

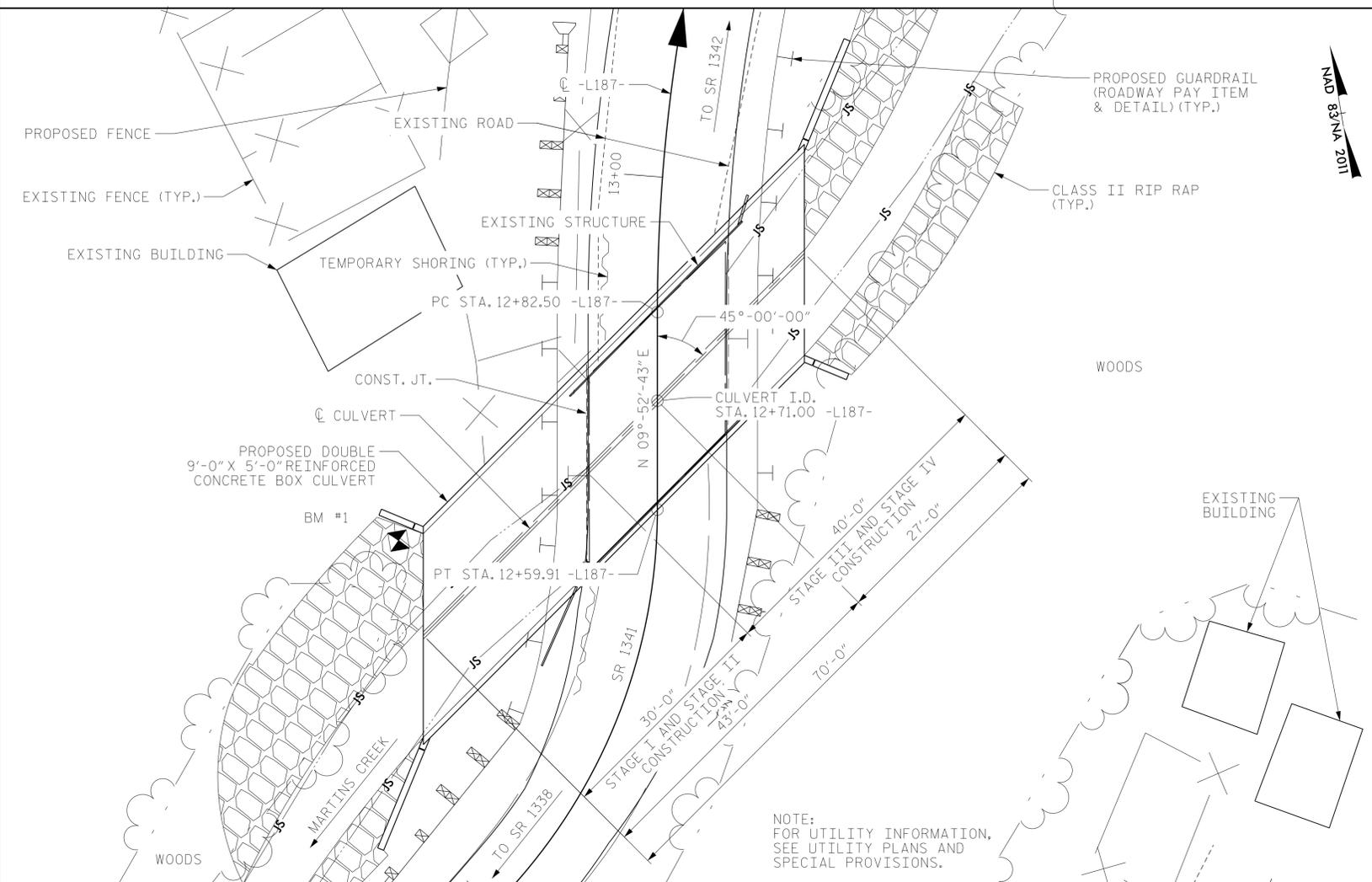
**This electronic collection of documents is provided  
for the convenience of the user  
and is Not a Certified Document –**

**The documents contained herein were originally issued  
and sealed by the individuals whose names and license  
numbers appear on each page, on the dates appearing  
with their signature on that page.**

**This file or an individual page  
shall not be considered a certified document.**

BM #1 SPIKE IN BASE OF 10" WALNUT TREE, 10' LT. OF STA. 12+50.00 -L187-, EL. 2394.82'

NOTES



ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING  
 DESIGN FILL = 3.67' MAX. AND 1.33' MIN.  
 CONCRETE CULVERTS TO BE POURED IN THE FOLLOWING ORDER FOR EACH STAGE:  
 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.  
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH SPECIFICATIONS.  
 AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING STRUCTURE CONSISTING OF 1 SPAN @ 25'-6" TIMBER FLOOR ON I-BEAMS WITH TIMBER CAPS, POSTS, AND SILLS @ 5'-3" CENTERS AND CLEAR ROADWAY WIDTH OF 17'-1" SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.  
 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.  
 THE SUBSTRUCTURE OF 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 STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.  
 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 AT STATION 12+71.00 -L187-".  
 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.  
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF THE EXTERIOR WALL ABOVE THE 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.  
 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.  
 SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.  
 EXCAVATE AT LEAST 1 FOOT BELOW BOTTOM OF CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.  
 SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.  
 BACKFILL WITH SELECT MATERIAL, CLASS II OR CLASS III MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATIONS.  
 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.  
 SEE ROADWAY DETAIL DRAWING 862.03 FOR GUARDRAIL OVER CULVERT.  
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.  
 FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.  
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR GROUT OF STRUCTURES, SEE SPECIAL PROVISIONS.  
 FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

LOCATION SKETCH

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

TOTAL STRUCTURE QUANTITIES		
CLASS A CONCRETE	REINFORCING STEEL	FOUNDATION CONDITIONING MATERIAL
BARREL @ 2.23 C.Y./FT		
<b>STAGE I</b>	<b>STAGE I</b>	<b>STAGE I</b>
CULVERT 24.7 C.Y.	CULVERT 4,315 LBS.	STAGE I 33 TONS
WING ETC. 2.7 C.Y.	WING ETC. 142 LBS.	STAGE II 19 TONS
TOTAL 27.4 C.Y.	TOTAL 4,457 LBS.	STAGE III 44 TONS
<b>STAGE II</b>	<b>STAGE II</b>	<b>STAGE IV</b>
CULVERT 47.7 C.Y.	CULVERT 6,538 LBS.	STAGE IV 25 TONS
WING ETC. 7.3 C.Y.	WING ETC. 350 LBS.	TOTAL 121 TONS
TOTAL 55.0 C.Y.	TOTAL 6,888 LBS.	
<b>STAGE III</b>	<b>STAGE III</b>	REMOVAL OF EXISTING STRUCTURE STA. 12+71.00 -L187- LUMP SUM
CULVERT 32.0 C.Y.	CULVERT 5,477 LBS.	CULVERT EXCAVATION STA. 12+17.00 -L187- LUMP SUM
WING ETC. 2.7 C.Y.	WING ETC. 142 LBS.	CLASS II RIP RAP 160 TONS
TOTAL 34.7 C.Y.	TOTAL 5,619 LBS.	GEOTEXTILE FOR DRAINAGE 169 SY
<b>STAGE IV</b>	<b>STAGE IV</b>	ASBESTOS ASSESSMENT LUMP SUM
CULVERT 64.6 C.Y.	CULVERT 8,164 LBS.	
WING ETC. 7.3 C.Y.	WING ETC. 350 LBS.	
TOTAL 71.9 C.Y.	TOTAL 8,514 LBS.	
<b>TOTAL CONCRETE</b> 189.0 C.Y.	<b>TOTAL STEEL</b> 25,478 LBS.	

HYDRAULIC DATA	
DESIGN DISCHARGE	= 690 CFS
FREQUENCY OF DESIGN DISCHARGE	= 25 YRS
DESIGN HIGH WATER ELEVATION	= 2,396.7'
DRAINAGE AREA	= 2.13 SQ MI
BASE DISCHARGE (Q100)	= 990 CFS
BASE HIGH WATER ELEVATION	= 2,397.3'

OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	= 690 CFS
FREQUENCY OF OVERTOPPING	= 25+ YRS
* OVERTOPPING ELEVATION	= 2,396.6'
* OCCURS @ STA. 13+13.00 -L187-	

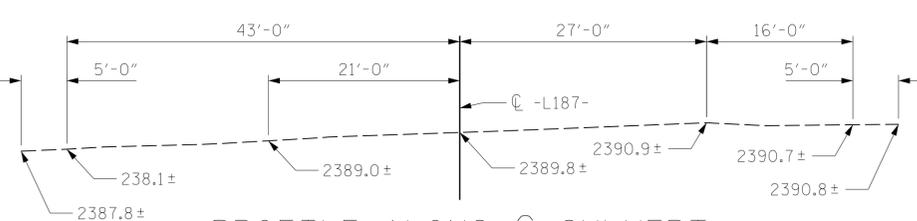
GRADE DATA	
GRADE POINT EL. @ STA. 12+71.00 -L187-	= 2,397.0'
CULVERT BED EL. @ STA. 12+71.00 -L187-	= 2,388.8'
ROADWAY SLOPES	= 2:1 MAX.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR GROUT OF STRUCTURES, SEE SPECIAL PROVISIONS.  
 FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

PROFILE DATA -L187-		
P.I. = 11+75.00	P.I. = 12+63.00	P.I. = 13+54.00
EL. = 2,392.05'	EL. = 2,397.41'	EL. = 2,397.14'
VC = 56'	VC = 76'	VC = 52'
K = 26	K = 12	K = 7
G1 = +3.9500%	G1 = +6.0873%	G1 = -0.3000%
G2 = +6.0873%	G2 = -0.3000%	G2 = +7.7603%

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+71.00 -L187-

SHEET 1 OF 10 REPLACES BRIDGE 430187



PROFILE ALONG CULVERT

DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : T. LAWS DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 Raleigh, NC 27615  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-5403-C&E

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-1
1			3			TOTAL SHEETS
2			4			10

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 9'-0" X 5'-0" CONCRETE BOX CULVERT FOR MARTINS CREEK ON SR 1341 BETWEEN SR 1338 AND SR 1342**  
 45° SKEW

## 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 (γ <sub>LL</sub> )	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	1.36	--	1.75	2.00	1 & 2	TOP SLAB	3.87	1.36	1 & 2	TOP SLAB	9.00		
	HL-93 (OPERATING)	N/A		1.77	--	1.35	2.60	1 & 2	TOP SLAB	3.87	1.77	1 & 2	TOP SLAB	9.00		
	HS-20 (INVENTORY)	36.000	②	1.56	56.160	1.75	2.21	1 & 2	TOP SLAB	3.87	1.56	1 & 2	TOP SLAB	9.00		
	HS-20 (OPERATING)	36.000		2.02	72.720	1.35	2.86	1 & 2	TOP SLAB	3.87	2.02	1 & 2	TOP SLAB	9.00		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		3.82	51,570	1.40	4.10	1 & 2	TOP SLAB	3.87	3.82	1 & 2	TOP SLAB	9.00	
		SNGARBS2	20,000		3.33	66,600	1.40	3.68	1 & 2	TOP SLAB	3.87	3.33	1 & 2	TOP SLAB	9.00	
		SNAGRIS2	22,000		3.56	78,320	1.40	3.93	1 & 2	TOP SLAB	3.87	3.56	1 & 2	TOP SLAB	9.00	
		SNCOTTS3	27,250	③	1.83	49,868	1.40	2.65	1 & 2	TOP SLAB	3.87	1.83	1 & 2	TOP SLAB	9.00	
		SNAGGRS4	34,925		2.41	84,169	1.40	3.18	1 & 2	BOTTOM SLAB	9.00	2.41	1 & 2	TOP SLAB	9.00	
		SNS5A	35,550		2.20	78,210	1.40	3.24	1 & 2	TOP SLAB	3.87	2.20	1 & 2	TOP SLAB	9.00	
		SNS6A	39,950		2.10	83,895	1.40	3.24	1 & 2	TOP SLAB	3.87	2.10	1 & 2	TOP SLAB	9.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	SNS7B	42,000		2.10	88,200	1.40	3.27	1 & 2	BOTTOM SLAB	9.00	2.10	1 & 2	TOP SLAB	9.00	
		TNAGRIT3	33,000		3.06	100,980	1.40	3.93	1 & 2	TOP SLAB	3.87	3.06	1 & 2	TOP SLAB	9.00	
		TNT4A	33,075		2.16	71,442	1.40	3.16	1 & 2	TOP SLAB	3.87	2.16	1 & 2	TOP SLAB	9.00	
		TNT6A	41,600		2.16	89,856	1.40	3.25	1 & 2	TOP SLAB	3.87	2.16	1 & 2	TOP SLAB	9.00	
		TNT7A	42,000		2.16	90,720	1.40	3.20	1 & 2	TOP SLAB	3.87	2.16	1 & 2	TOP SLAB	9.00	
		TNT7B	42,000		2.12	89,040	1.40	3.15	1 & 2	TOP SLAB	3.87	2.12	1 & 2	TOP SLAB	9.00	
		TNAGRIT4	43,000		2.04	87,720	1.40	3.16	1 & 2	TOP SLAB	3.87	2.04	1 & 2	TOP SLAB	9.00	
EMERGENCY VEHICLE (EV)	TNAGT5A	45,000		2.04	91,800	1.40	3.20	1 & 2	TOP SLAB	9.00	2.04	1 & 2	TOP SLAB	9.00		
	TNAGT5B	45,000		2.03	91,350	1.40	2.73	1 & 2	BOTTOM SLAB	9.00	2.03	1 & 2	TOP SLAB	9.00		
EMERGENCY VEHICLE (EV)	EV2	28,750		2.30	66,125	1.30	2.77	1 & 2	TOP SLAB	3.87	2.30	1 & 2	TOP SLAB	9.00		
	EV3	43,000	④	1.53	65,790	1.30	2.30	1 & 2	TOP SLAB	3.87	1.53	1 & 2	TOP SLAB	9.00		

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

LOAD RATINGS FOR MAXIMUM AND MINIMUM FILL CONDITIONS HAVE BEEN EVALUATED. MINIMUM FILL CONDITION CONTROLS LOAD RATINGS.

COMMENTS:

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

④ CONTROLLING LOAD RATING

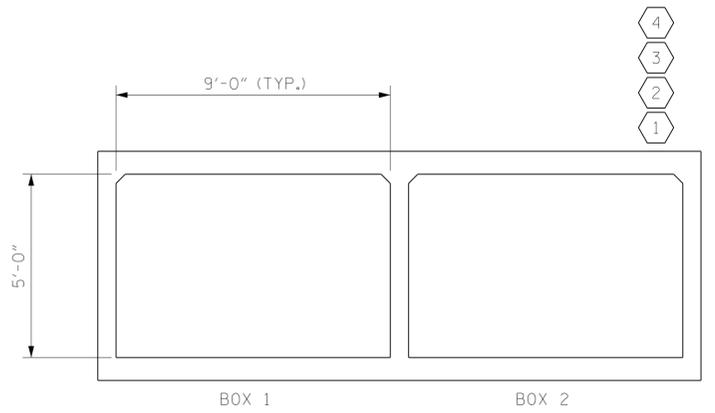
① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

④ EMERGENCY VEHICLE LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+71.00 -L187-

SHEET 2 OF 10

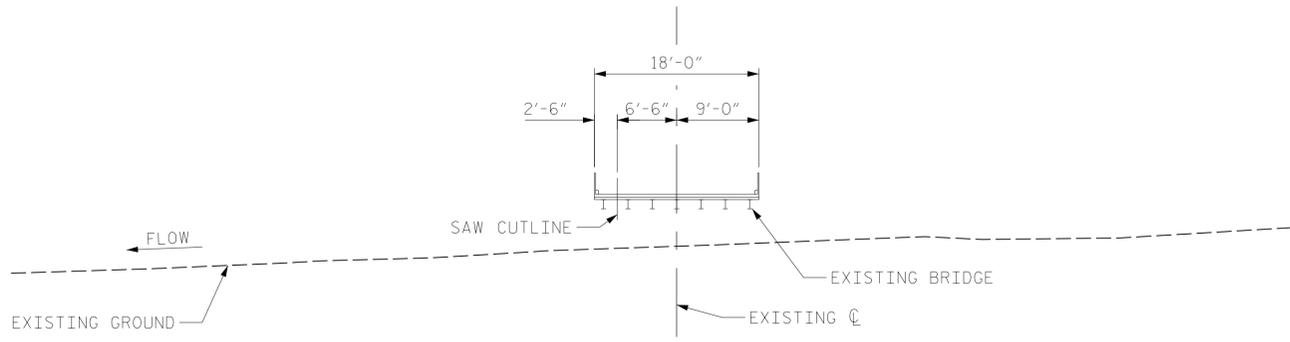
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**LRFR SUMMARY FOR  
 REINFORCED CONCRETE  
 BOX CULVERTS**  
 (NON-INTERSTATE TRAFFIC)

DRAWN BY : <u>N. CUANY</u>	DATE : <u>02/2024</u>
CHECKED BY : <u>T. LAWS</u>	DATE : <u>02/2024</u>
DESIGN ENGINEER OF RECORD: <u>M. ACOSTA</u>	DATE : <u>08/2025</u>

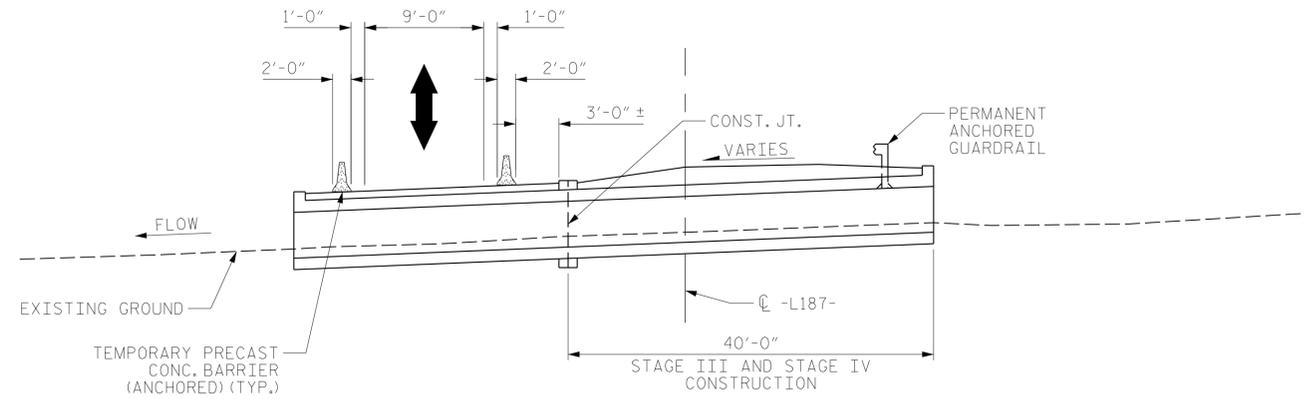
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS
2			4			10



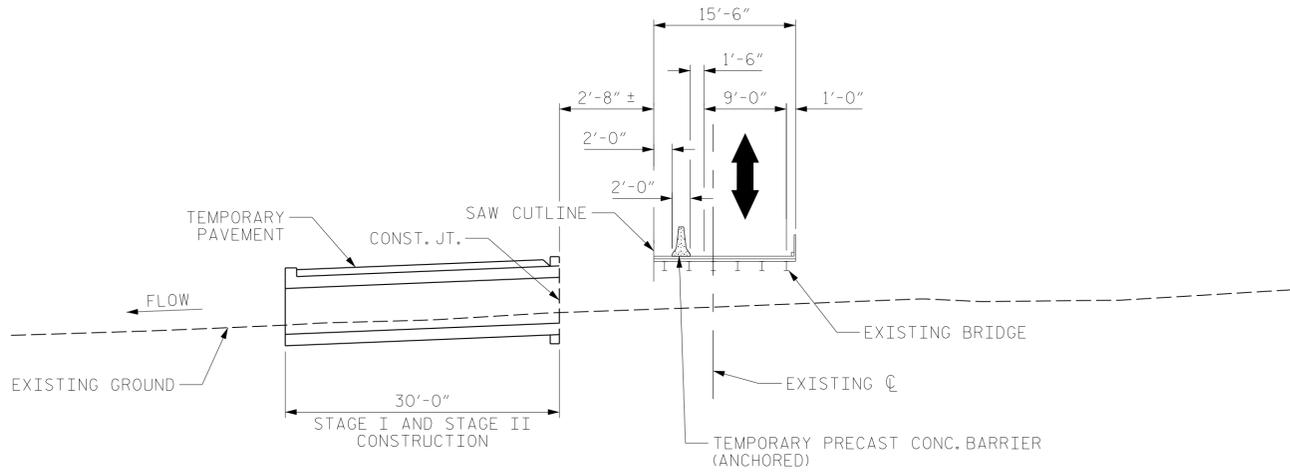
**INITIAL CONDITION**

(LOOKING UPSTATION)  
SECTION ALONG CL CULVERT



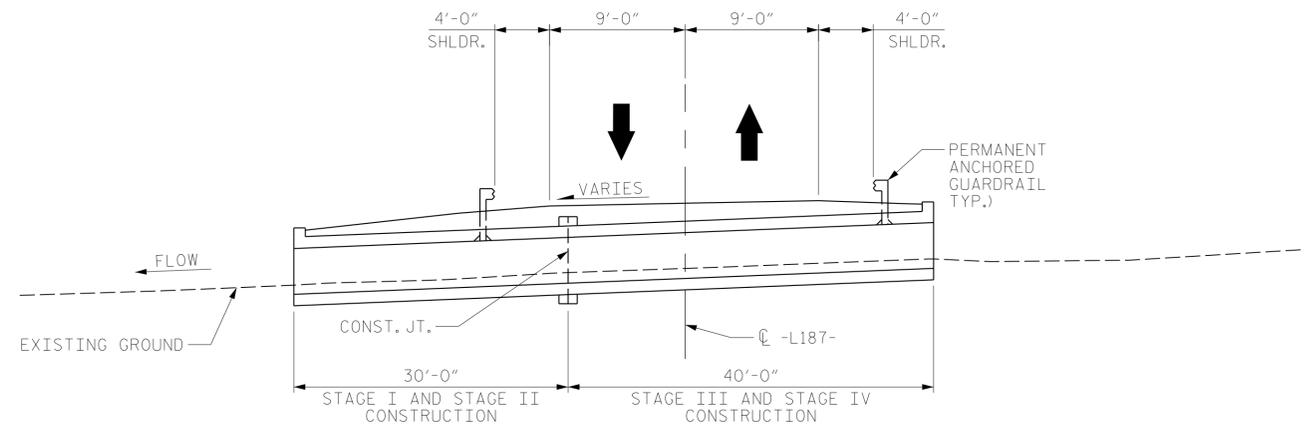
**STAGE III AND STAGE IV CONSTRUCTION**

(LOOKING UPSTATION)  
SECTION ALONG CL CULVERT



**STAGE I AND STAGE II CONSTRUCTION**

(LOOKING UPSTATION)  
SECTION ALONG CL CULVERT



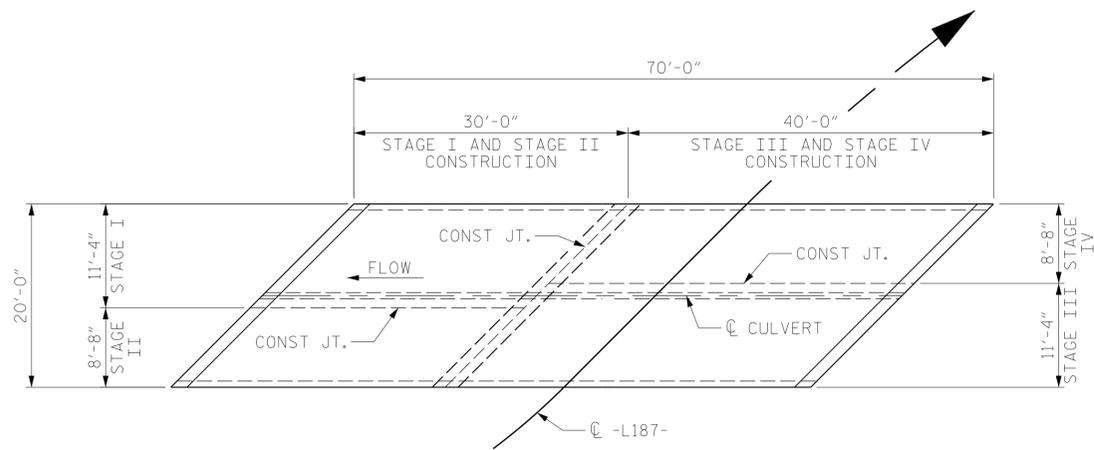
**FINAL CONDITION**

(LOOKING UPSTATION)  
SECTION ALONG CL CULVERT

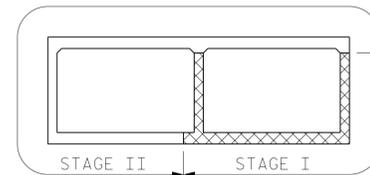
**NOTE:**  
FOR MAINTENANCE OF TRAFFIC, SEE TRANSPORTATION MANAGEMENT PLAN.

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
STATION: 12+71.00 -L187-

SHEET 3 OF 10

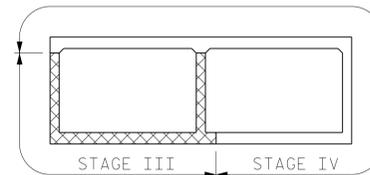


**PLAN VIEW**



**CONSTRUCTION SEQUENCE**  
(SECTION LOOKING DOWNSTREAM)

- ▨ STAGE I CONSTRUCTION
- ▭ STAGE II CONSTRUCTION



**CONSTRUCTION SEQUENCE**  
(SECTION LOOKING DOWNSTREAM)

- ▨ STAGE III CONSTRUCTION
- ▭ STAGE IV CONSTRUCTION

DRAWN BY : N. CUANY DATE : 02/2024  
CHECKED BY : T. LAWS DATE : 02/2024  
DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

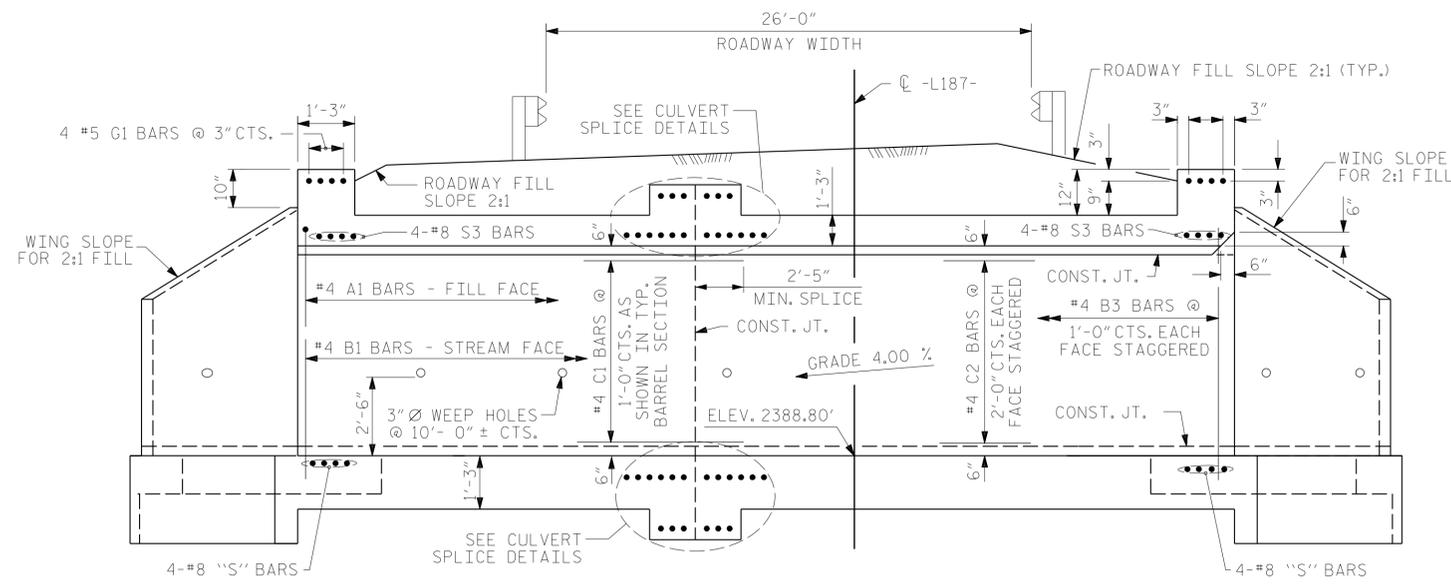
**RS&H**  
RS&H Architects-Engineers-Planners, Inc.  
8521 Six Forks Road, Suite 400  
Raleigh, NC 27615  
919-926-4100 FAX 919-846-9080  
www.rsandh.com  
North Carolina License No. 50737-F-0403-C-03

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
1			3			TOTAL SHEETS
2			4			10

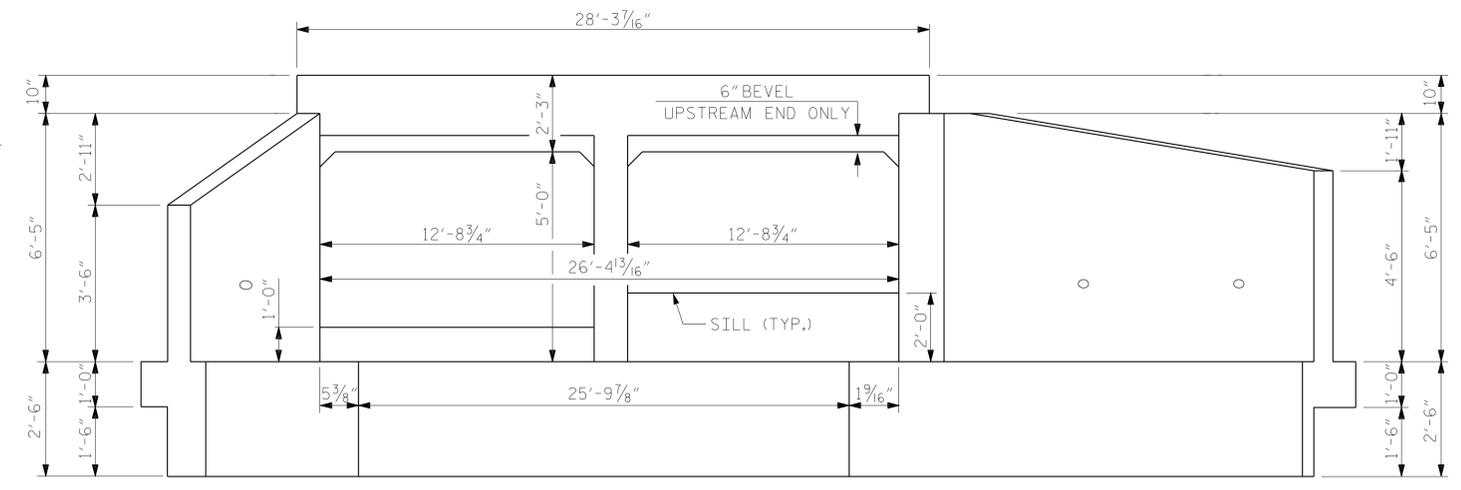
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**DOUBLE 9'-0" X 5'-0" CONCRETE BOX CULVERT STAGING DETAILS**

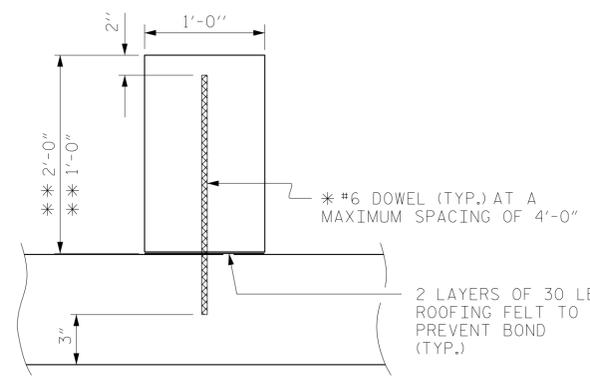
45° SKEW



EXTERIOR WALL INTERIOR WALL  
CULVERT SECTION NORMAL TO ROADWAY

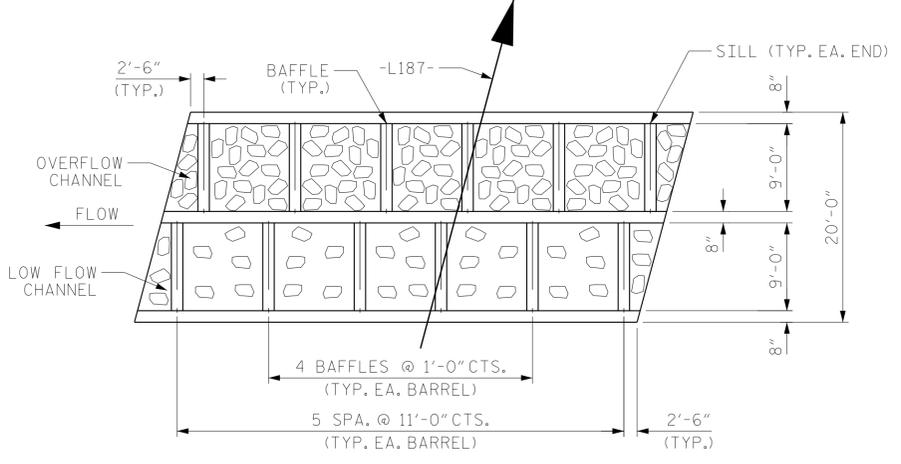


END ELEVATION NORMAL TO SKEW



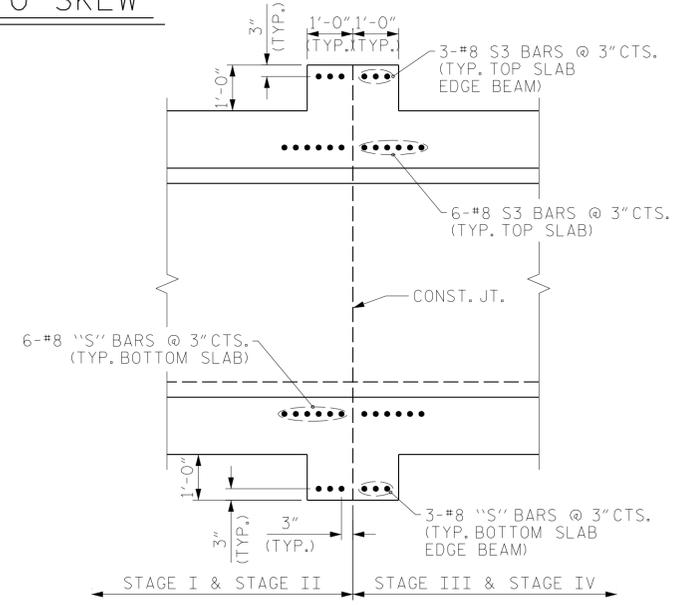
SECTION THROUGH SILL

\* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.  
\*\* SEE CULVERT SILL / BAFFLE DETAILS FOR LOCATION AND HEIGHT OF SILL  
(SILL SHOWN, BAFFLE SIMILAR)



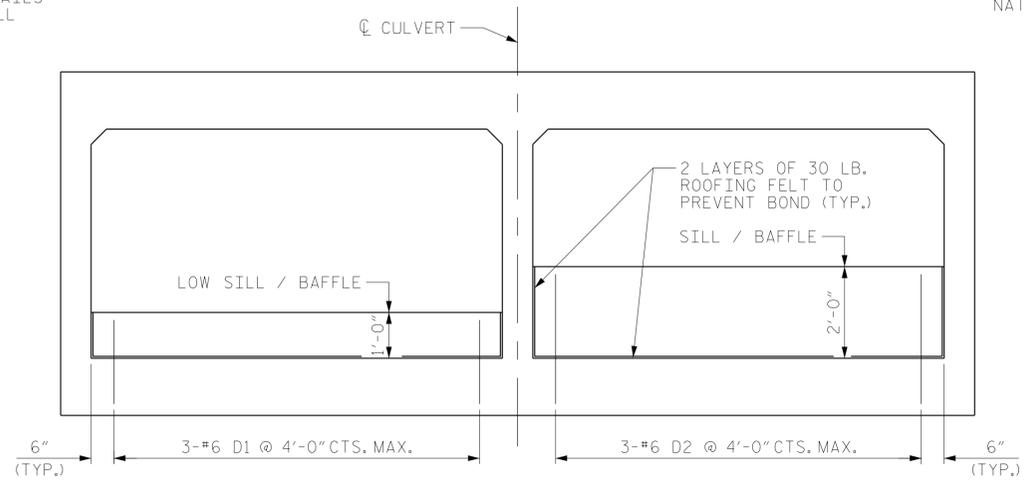
PLAN OF FLOOR SILL / BAFFLE LAYOUT

BACKFILL ENTIRE CULVERT BED WITH NATIVE BED MATERIAL TO SILL HEIGHT



CULVERT SPLICE DETAILS

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



CULVERT SILL / BAFFLE DETAILS

NOTES:

- SILLS TO BE CONSTRUCTED AT INLET AND OUTLET AS SHOWN.
- SILLS TO BE 1'-0" WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.
- BACKFILL OVERFLOW BARREL AND LOW FLOW BARREL TO TOP OF SILL WITH NATIVE BED MATERIAL.
- SEE "NATIVE MATERIAL SPECIFICATIONS FOR BACKFILLING" UNDER "ADDITIONAL INFORMATION AND COMPUTATIONS" OF THE CULVERT SURVEY & HYDRAULIC DESIGN REPORT.
- THE ENTIRE COST OF WORK REQUIRED TO PLACE EXCAVATED OR SUPPLEMENTAL MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
STATION: 12+71.00 -L187-

SHEET 4 OF 10

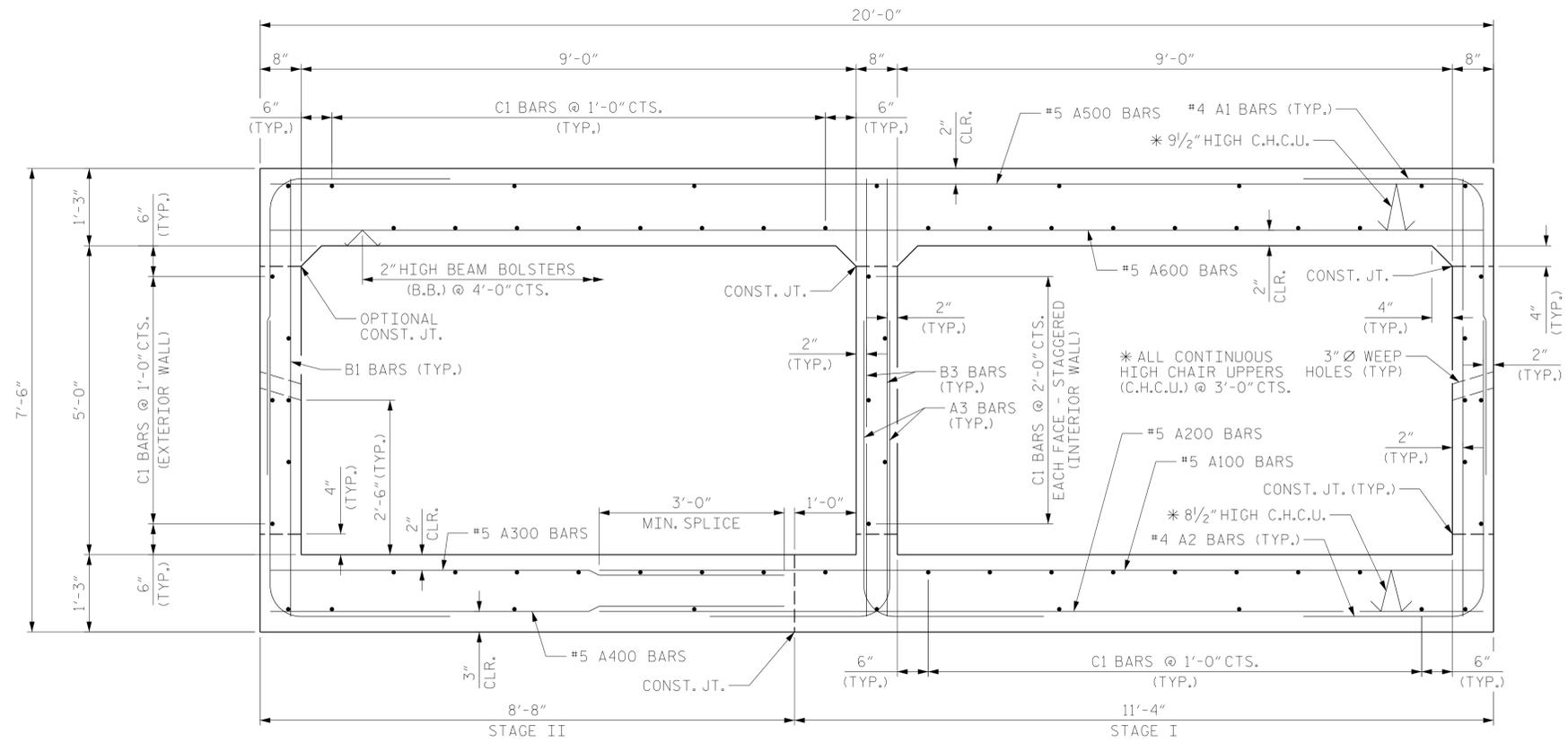


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
DOUBLE 9'-0" X 5'-0"  
CONCRETE BOX CULVERT  
SECTION  
45° SKEW

DRAWN BY : N. CUANY DATE : 02/2024  
CHECKED BY : T. LAWS DATE : 02/2024  
DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

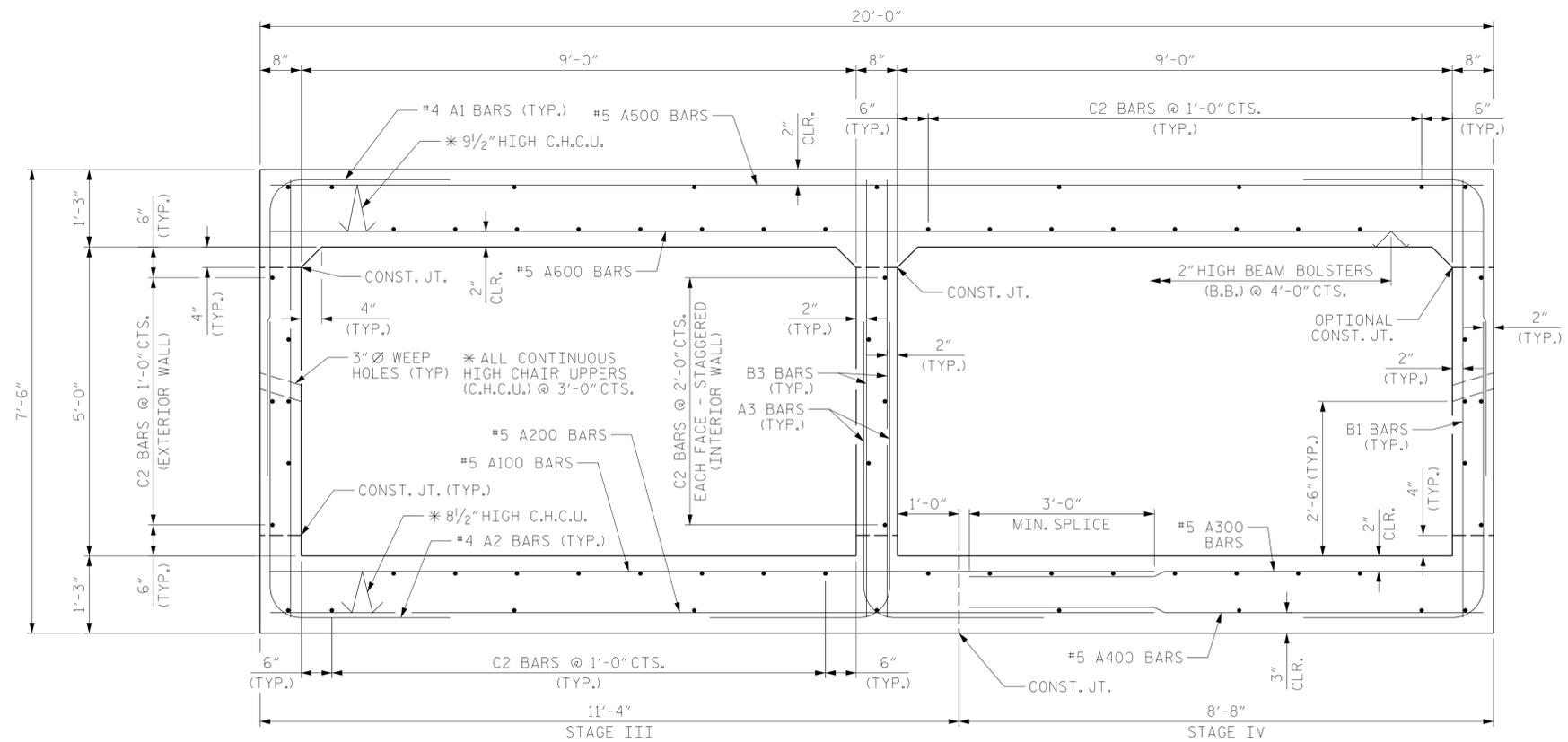
DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			10



RIGHT ANGLE SECTION OF BARREL (STAGE I AND STAGE II)

(LOOKING DOWNSTREAM)  
THERE ARE 67 "C" BARS IN SECTION OF BARREL.



RIGHT ANGLE SECTION OF BARREL (STAGE III AND STAGE IV)

(LOOKING DOWNSTREAM)  
THERE ARE 67 "C" BARS IN SECTION OF BARREL.

NOTES:

THERE ARE 25 "C" BARS IN STAGE I AND STAGE III SECTION OF BARREL.

THERE ARE 42 "C" BARS IN STAGE II AND STAGE IV SECTION OF BARREL.

C1 BARS FROM STAGE I AND STAGE II TO EXTEND 2'-7" INTO STAGE III AND STAGE IV.

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
STATION: 12+71.00 -L187-

SHEET 5 OF 10

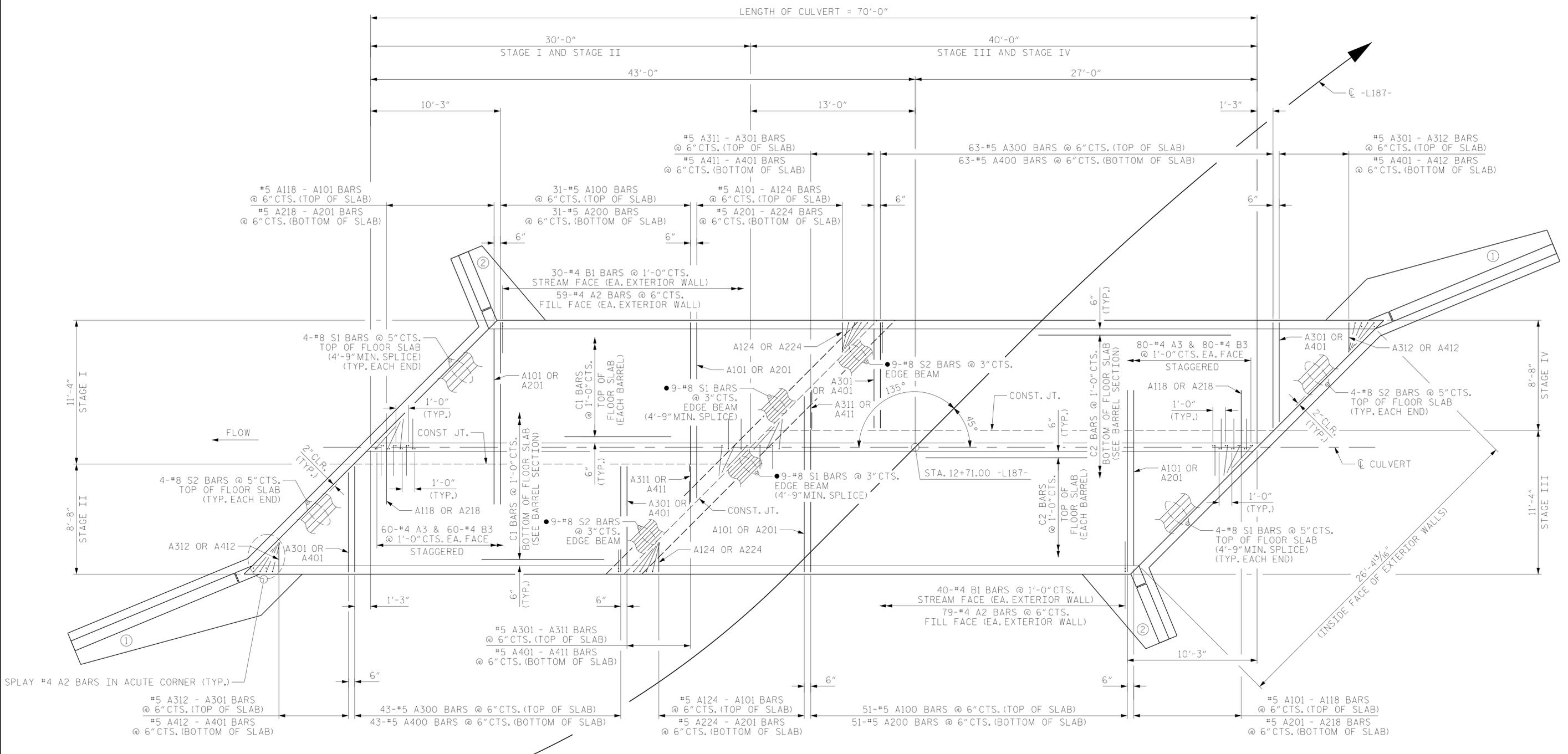


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
DOUBLE 9'-0" X 5'-0"  
CONCRETE BOX CULVERT  
BARREL  
45° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5
1			3			TOTAL SHEETS
2			4			10

DRAWN BY : N. CUANY DATE : 02/2024  
CHECKED BY : T. LAWS DATE : 02/2024  
DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

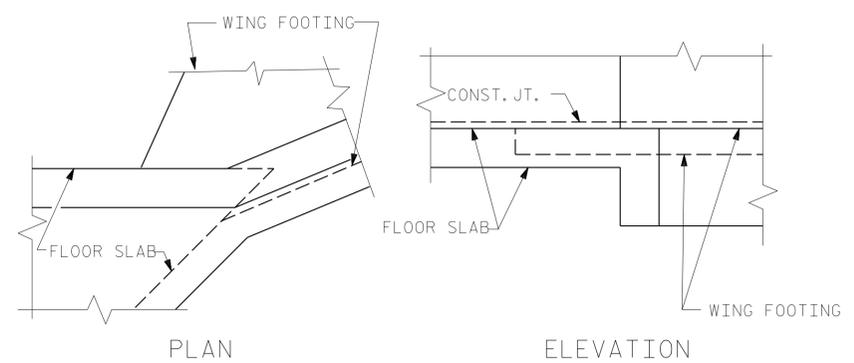
DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED



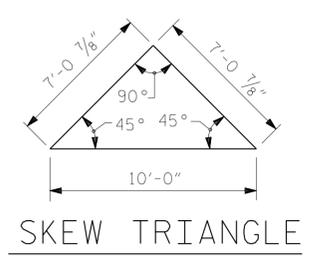
PLAN - FLOOR SLAB

NOTES:

- SEE SHEET 3 OF 10 FOR ADDITIONAL STAGING DETAILS.
- SEE SHEET 4 OF 10 FOR CULVERT SPLICE DETAILS.
- SEE SHEET 5 OF 10 FOR ADDITIONAL BAR PLACEMENT DETAILS.
- SEE CULVERT SPLICE DETAILS ON SHEET 4 OF 10 FOR "S" BAR PLACEMENT NEAR JOINT.
- C1 BARS FROM STAGE I AND STAGE II TO EXTEND 2'-7" MIN. INTO STAGE III AND STAGE IV.



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



SKEW TRIANGLE

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+71.00 -L187-

SHEET 6 OF 10

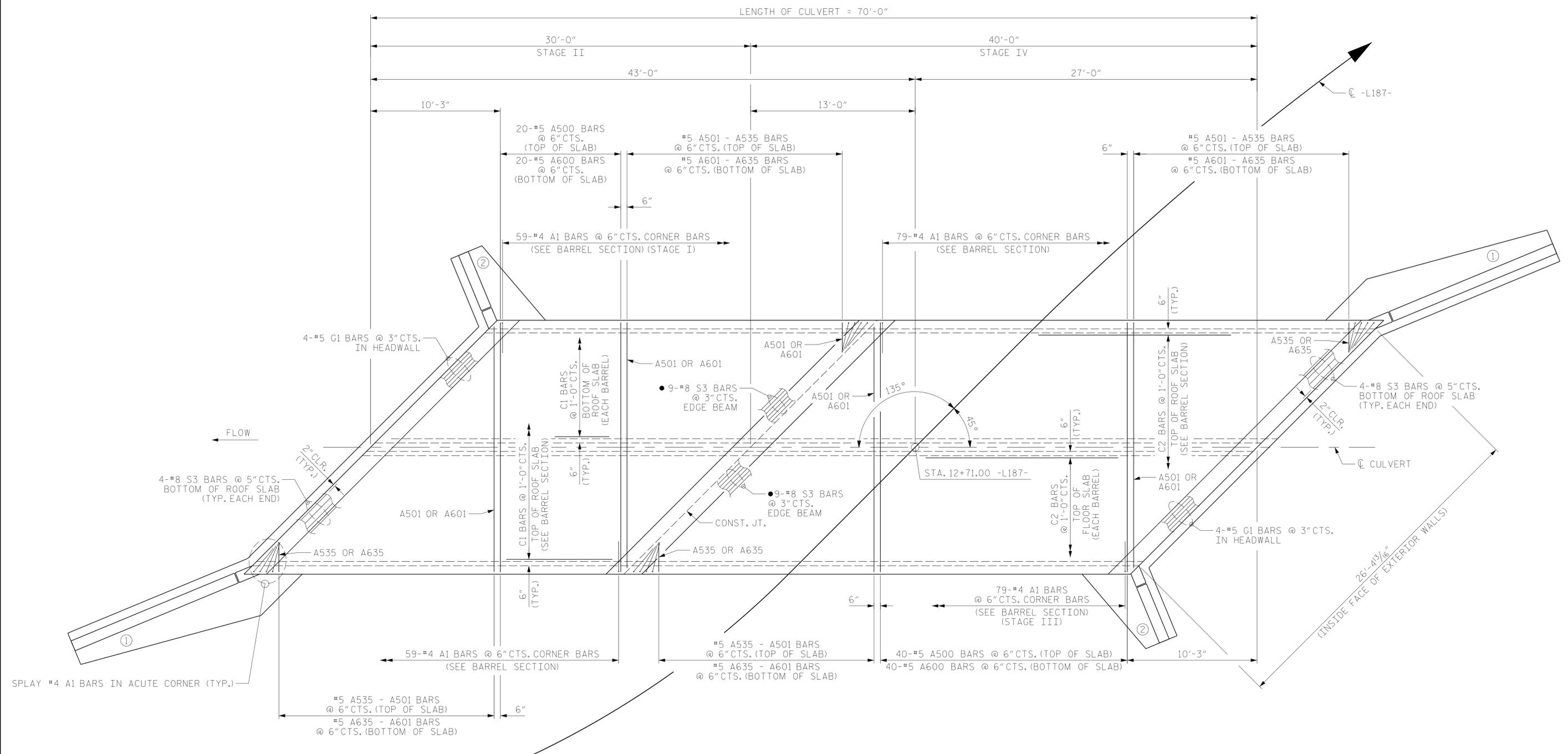


**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 Raleigh, NC 27615  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-F-0403-C-28

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 9'-0" X 5'-0" CONCRETE BOX CULVERT FLOOR SLAB					
45° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					C1-6
TOTAL SHEETS					10

DRAWN BY :	N. CUANY	DATE :	02/2024
CHECKED BY :	T. LAWS	DATE :	02/2024
DESIGN ENGINEER OF RECORD:	M. ACOSTA	DATE :	08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED



PLAN - ROOF SLAB

NOTES:

- SEE SHEET 3 OF 10 FOR ADDITIONAL STAGING DETAILS.
- SEE SHEET 4 OF 10 FOR CULVERT SPLICE DETAILS.
- SEE SHEET 5 OF 10 FOR ADDITIONAL BAR PLACEMENT DETAILS.
- SEE CULVERT SPLICE DETAILS ON SHEET 4 OF 10 FOR "S" BAR PLACEMENT NEAR JOINT.
- C1 BARS FROM STAGE I AND STAGE II TO EXTEND 2'-7" MIN. INTO STAGE III AND STAGE IV.
- ALL BARS TO BE PLACED IN STAGE II OR STAGE IV U.N.O.

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+71.00 -L187-

SHEET 7 OF 10

DRAWN BY :	N. CUANY	DATE :	02/2024
CHECKED BY :	T. LAWS	DATE :	02/2024
DESIGN ENGINEER OF RECORD:	M. ACOSTA	DATE :	08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

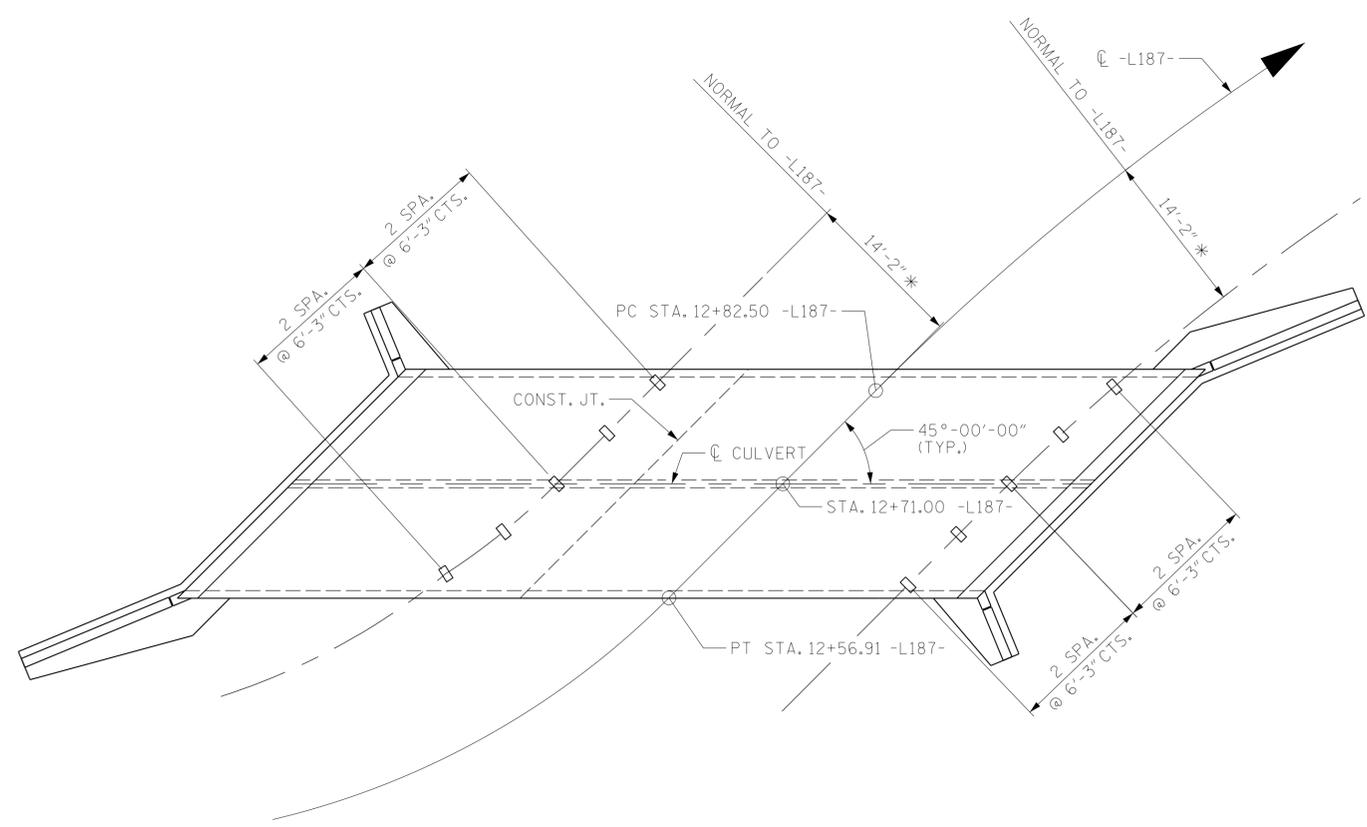
**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 Raleigh, NC 27615  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-50403-C&E

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 9'-0" X 5'-0" CONCRETE BOX CULVERT ROOF SLAB					
45° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					C1-7
					TOTAL SHEETS
					10

# BILL OF MATERIAL

STAGE I						STAGE II						STAGE III						STAGE IV																							
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	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	59	#4	1	7'-6"	296	B1	30	#4	STR	7'-1"	142	A1	59	#4	1	7'-6"	296	A600	20	#5	STR	19'-8"	410	A1	79	#4	1	7'-6"	396	A1	79	#4	1	7'-6"	396	A607	2	#5	STR	16'-4"	34
A2	59	#4	1	7'-6"	296	B3	60	#4	STR	7'-1"	284	A2	59	#4	1	7'-6"	296	A601	2	#5	STR	19'-4"	40	A2	79	#4	1	7'-6"	396	A2	79	#4	1	7'-6"	396	A608	2	#5	STR	15'-10"	33
A3	60	#4	1	7'-6"	301							A602	2	#5	STR	18'-10"	39	A3	80	#4	1	7'-6"	401							A609	2	#5	STR	15'-4"	32						
						C1	25	#4	STR	32'-5"	541	A300	43	#5	STR	8'-4"	374	A603	2	#5	STR	18'-4"	38	A300	63	#5	STR	8'-4"	548	A610	2	#5	STR	14'-10"	31						
A100	31	#5	STR	14'-4"	463							A301	2	#5	STR	7'-10"	16	A604	2	#5	STR	17'-10"	37	A301	2	#5	STR	7'-10"	16	A611	2	#5	STR	14'-4"	30						
A101	2	#5	STR	13'-10"	29	D1	3	#6	STR	1'-10"	8	A302	2	#5	STR	7'-4"	15	A605	2	#5	STR	17'-4"	36	A101	2	#5	STR	13'-10"	29	A302	2	#5	STR	7'-4"	15	A612	2	#5	STR	13'-10"	29
A102	2	#5	STR	13'-4"	28	D2	8	#6	STR	2'-10"	34	A303	2	#5	STR	6'-10"	14	A606	2	#5	STR	16'-10"	35	A102	2	#5	STR	13'-4"	28	A303	2	#5	STR	6'-10"	14	A613	2	#5	STR	13'-4"	28
A103	2	#5	STR	12'-10"	27							A304	2	#5	STR	6'-4"	13	A607	2	#5	STR	16'-4"	34	A103	2	#5	STR	12'-10"	27	A304	2	#5	STR	6'-4"	13	A614	2	#5	STR	12'-10"	27
A104	2	#5	STR	12'-4"	26	S1	13	#8	STR	20'-10"	723	A305	2	#5	STR	5'-10"	12	A608	2	#5	STR	15'-10"	33	A104	2	#5	STR	12'-4"	26	A305	2	#5	STR	5'-10"	12	A615	2	#5	STR	12'-4"	26
A105	2	#5	STR	11'-10"	25							A306	2	#5	STR	5'-4"	11	A609	2	#5	STR	15'-4"	32	A105	2	#5	STR	11'-10"	25	A306	2	#5	STR	5'-4"	11	A616	2	#5	STR	11'-10"	25
A106	2	#5	STR	11'-4"	24	REINFORCING STEEL 4,315 LBS.					A307	2	#5	STR	4'-10"	10	A610	2	#5	STR	14'-10"	31	A106	2	#5	STR	11'-4"	24	A307	2	#5	STR	4'-10"	10	A617	2	#5	STR	11'-4"	24	
A107	2	#5	STR	10'-10"	23	SILL FOR ONE BARREL					A308	2	#5	STR	4'-4"	9	A611	2	#5	STR	14'-4"	30	A107	2	#5	STR	10'-10"	23	A308	2	#5	STR	4'-4"	9	A618	2	#5	STR	10'-10"	23	
A108	2	#5	STR	10'-4"	22	CLASS A CONCRETE					A309	2	#5	STR	3'-10"	8	A612	2	#5	STR	13'-10"	29	A108	2	#5	STR	10'-4"	22	A309	2	#5	STR	3'-10"	8	A619	2	#5	STR	10'-4"	22	
A109	2	#5	STR	9'-10"	21	HIGH FLOW SILL 0.7 C.Y.					A310	2	#5	STR	3'-4"	7	A613	2	#5	STR	13'-4"	28	A109	2	#5	STR	9'-10"	21	A310	2	#5	STR	3'-4"	7	A620	2	#5	STR	9'-10"	21	
A110	2	#5	STR	9'-4"	19	BAFFLE 0.7 C.Y.					A311	2	#5	STR	2'-10"	6	A614	2	#5	STR	12'-10"	27	A110	2	#5	STR	9'-4"	19	A311	2	#5	STR	2'-10"	6	A621	2	#5	STR	9'-4"	19	
A111	2	#5	STR	8'-10"	18	EDGE BEAM 0.6 C.Y.					A312	1	#5	STR	2'-4"	2	A615	2	#5	STR	12'-4"	26	A111	2	#5	STR	8'-10"	18	A312	1	#5	STR	2'-4"	2	A622	2	#5	STR	8'-10"	18	
A112	2	#5	STR	8'-4"	17	TOTAL 2.0 C.Y.					A616	2	#5	STR	11'-10"	25	A616	2	#5	STR	11'-10"	25	A112	2	#5	STR	8'-4"	17	A623	2	#5	STR	8'-4"	17							
A113	2	#5	STR	7'-10"	16							A400	43	#5	STR	8'-4"	374	A617	2	#5	STR	11'-4"	24	A113	2	#5	STR	7'-10"	16	A400	63	#5	STR	8'-4"	548	A624	2	#5	STR	7'-10"	16
A114	2	#5	STR	7'-4"	15							A401	2	#5	STR	7'-10"	16	A618	2	#5	STR	10'-10"	23	A114	2	#5	STR	7'-4"	15	A401	2	#5	STR	7'-10"	16	A625	2	#5	STR	7'-4"	15
A115	2	#5	STR	6'-10"	14							A402	2	#5	STR	7'-4"	15	A619	2	#5	STR	10'-4"	22	A115	2	#5	STR	6'-10"	14	A402	2	#5	STR	7'-4"	15	A626	2	#5	STR	6'-10"	14
A116	2	#5	STR	6'-4"	13							A403	2	#5	STR	6'-10"	14	A620	2	#5	STR	9'-10"	21	A116	2	#5	STR	6'-4"	13	A403	2	#5	STR	6'-10"	14	A627	2	#5	STR	6'-10"	13
A117	2	#5	STR	5'-10"	12							A404	2	#5	STR	6'-4"	13	A621	2	#5	STR	9'-4"	19	A117	2	#5	STR	5'-10"	12	A404	2	#5	STR	6'-4"	13	A628	2	#5	STR	5'-10"	12
A118	2	#5	STR	5'-4"	11							A405	2	#5	STR	5'-10"	12	A622	2	#5	STR	8'-10"	18	A118	2	#5	STR	5'-4"	11	A405	2	#5	STR	5'-10"	12	A629	2	#5	STR	5'-4"	11
A119	1	#5	STR	4'-10"	5							A406	2	#5	STR	5'-4"	11	A623	2	#5	STR	8'-4"	17	A119	1	#5	STR	4'-10"	5	A406	2	#5	STR	5'-4"	11	A630	2	#5	STR	4'-10"	10
A120	1	#5	STR	4'-4"	5							A407	2	#5	STR	4'-10"	10	A624	2	#5	STR	7'-10"	16	A120	1	#5	STR	4'-4"	5	A407	2	#5	STR	4'-10"	10	A631	2	#5	STR	4'-4"	9
A121	1	#5	STR	3'-10"	4							A408	2	#5	STR	4'-4"	9	A625	2	#5	STR	7'-4"	15	A121	1	#5	STR	3'-10"	4	A408	2	#5	STR	4'-4"	9	A632	2	#5	STR	3'-10"	8
A122	1	#5	STR	3'-4"	3							A409	2	#5	STR	3'-10"	8	A626	2	#5	STR	6'-10"	14	A122	1	#5	STR	3'-4"	3	A409	2	#5	STR	3'-10"	8	A633	2	#5	STR	3'-4"	7
A123	1	#5	STR	2'-10"	3							A410	2	#5	STR	3'-4"	7	A627	2	#5	STR	6'-4"	13	A123	1	#5	STR	2'-10"	3	A410	2	#5	STR	3'-4"	7	A634	2	#5	STR	2'-10"	6
A124	1	#5	STR	2'-4"	2							A411	2	#5	STR	2'-10"	6	A628	2	#5	STR	5'-10"	12	A124	1	#5	STR	2'-4"	2	A411	2	#5	STR	2'-10"	6	A635	2	#5	STR	2'-4"	5
A200	31	#5	STR	14'-4"	463							A412	1	#5	STR	2'-4"	2	A629	2	#5	STR	5'-4"	11	A200	51	#5	STR	14'-4"	762	A412	1	#5	STR	2'-4"	2	B1	40	#4	STR	7'-1"	189
A201	2	#5	STR	13'-10"	29							A630	2	#5	STR	4'-10"	10	A201	2	#5	STR	13'-10"	29	A500	40	#5	STR	19'-8"	820												
A202	2	#5	STR	13'-4"	28							A631	2	#5	STR	4'-4"	9	A202	2	#5	STR	13'-4"	28	A501	2	#5	STR	19'-4"	40	C2	42	#4	STR	39'-6"	1108						
A203	2	#5	STR	12'-10"	27							A632	2	#5	STR	3'-10"	8	A203	2	#5	STR	12'-10"	27	A502	2	#5	STR	18'-10"	39												
A204	2	#5	STR	12'-4"	26							A633	2	#5	STR	3'-4"	7	A204	2	#5	STR	12'-4"	26	A503	2	#5	STR	18'-4"	38	D2	6	#6	STR	2'-10"	26						
A205	2	#5	STR	11'-10"	25							A634	2	#5	STR	2'-10"	6	A205	2	#5	STR	11'-10"	25	A504	2	#5	STR	17'-10"	37												
A206	2	#5	STR	11'-4"	24							A635	2	#5	STR	2'-4"	5	A206	2	#5	STR	11'-4"	24	A505	2	#5	STR	17'-4"	36												
A207	2	#5	STR	10'-10"	23													A207	2	#5	STR	10'-10"	23	A506	2	#5	STR	16'-10"	35												
A208	2	#5	STR	10'-4"	22							B1	30	#4	STR	7'-1"	142	A208	2	#5	STR	10'-4"	22	A507	2	#5	STR	16'-4"	34												
A209	2	#5	STR	9'-10"	21													A209	2	#5	STR	9'-10"	21	A508	2	#5	STR	15'-10"	33												
A210	2	#5	STR	9'-4"	19							C1	42	#4	STR	32'-5"	909	A210	2	#5	STR	9'-4"	19	A509	2	#5	STR	15'-4"	32												
A211	2	#5	STR	8'-10"	18													A211	2	#5	STR	8'-10"	18	A510	2	#5	STR	14'-10"	31												
A212	2	#5	STR	8'-4"	17							D1	5	#6	STR	1'-10"	14	A212	2	#5	STR	8'-4"	17	A511	2	#5	STR	14'-4"	30												
A213	2	#5	STR	7'-10"	16													A213	2	#5	STR	7'-10"	16	A512	2	#5	STR	13'-10"	29												
A214	2	#5	STR	7'-4"	15							G1	4	#5	STR	27'-9"	116	A214	2	#5	STR	7'-4"	15	A513	2	#5	STR	13'-4"	28												
A215	2	#5	STR	6'-10"	14													A215	2	#5	STR	6'-10"	14	A514	2	#5	STR	12'-10"	27												
A216	2	#5	STR	6'-4"	13							S2	13																												



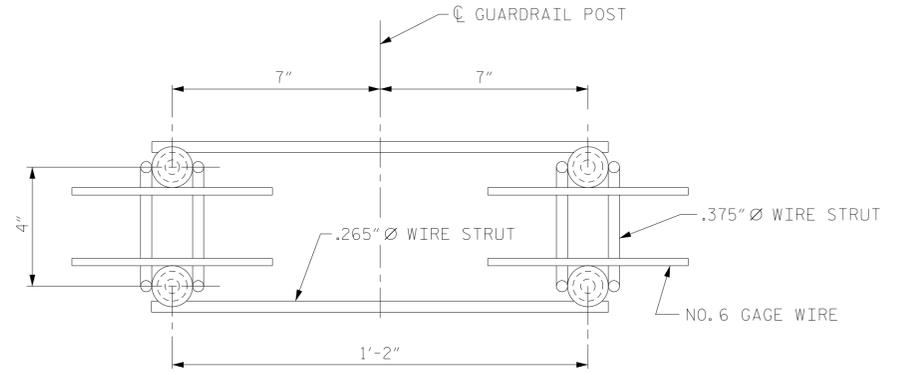


PLAN OF CULVERT GUARDRAIL ANCHOR ASSEMBLY SPACING

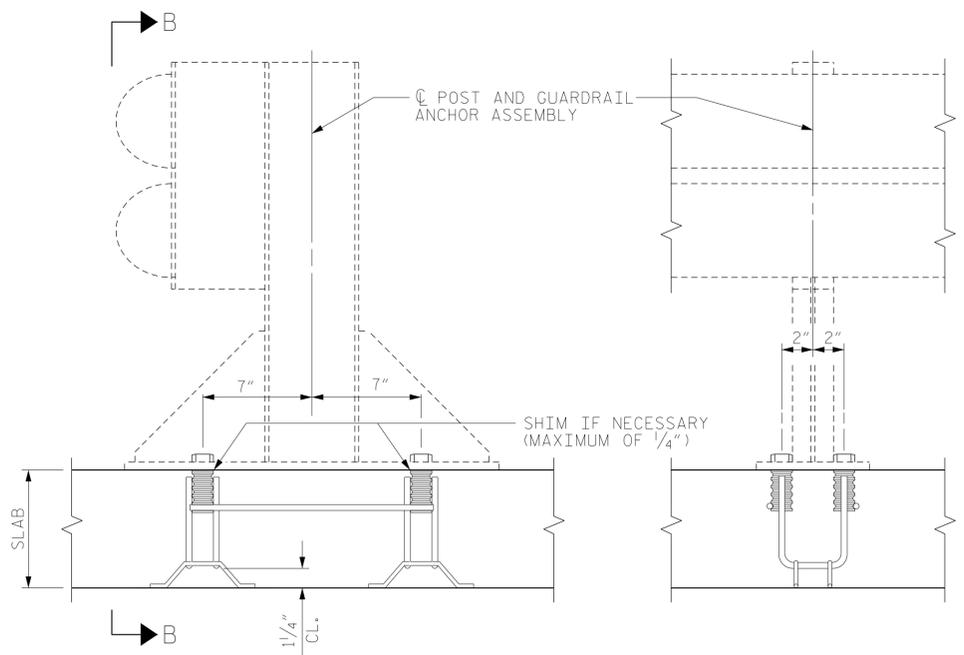
\* CONTRACTOR TO VERIFY LOCATION WITH FIELD ENGINEER PRIOR TO INSTALLATION.

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.

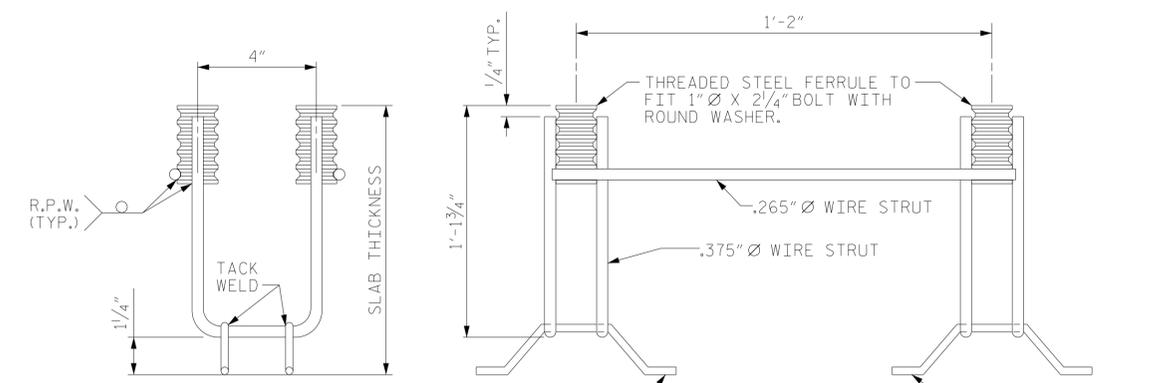


PLAN



SECTION A-A

SECTION B-B



ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

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

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+71.00 -L187-

SHEET 10 OF 10

**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 Raleigh, NC 27615  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-F-0403-C-03

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD					
ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					C1-10
TOTAL SHEETS					10

ASSEMBLED BY :	NSC	DATE :	02/2024
CHECKED BY :	TRL	DATE :	02/2024
DRAWN BY :	FCJ 6/88	REV. 10/1/11	MAA/CM
CHECKED BY :	ARB 6/88	REV. 12/17	MAA/THC
		REV. 6/19	MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	AASHTO (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE AASHTO
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	--	20,000 LBS. PER SQ. IN.
	--	27,000 LBS. PER SQ. IN.
	--	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 AASHTO
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 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

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

### CONCRETE:

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

### CONCRETE CHAMFERS:

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

### DOWELS:

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

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

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

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

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

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

### REINFORCING STEEL:

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

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

### STRUCTURAL STEEL:

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

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST  $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

### HANDRAILS AND POSTS:

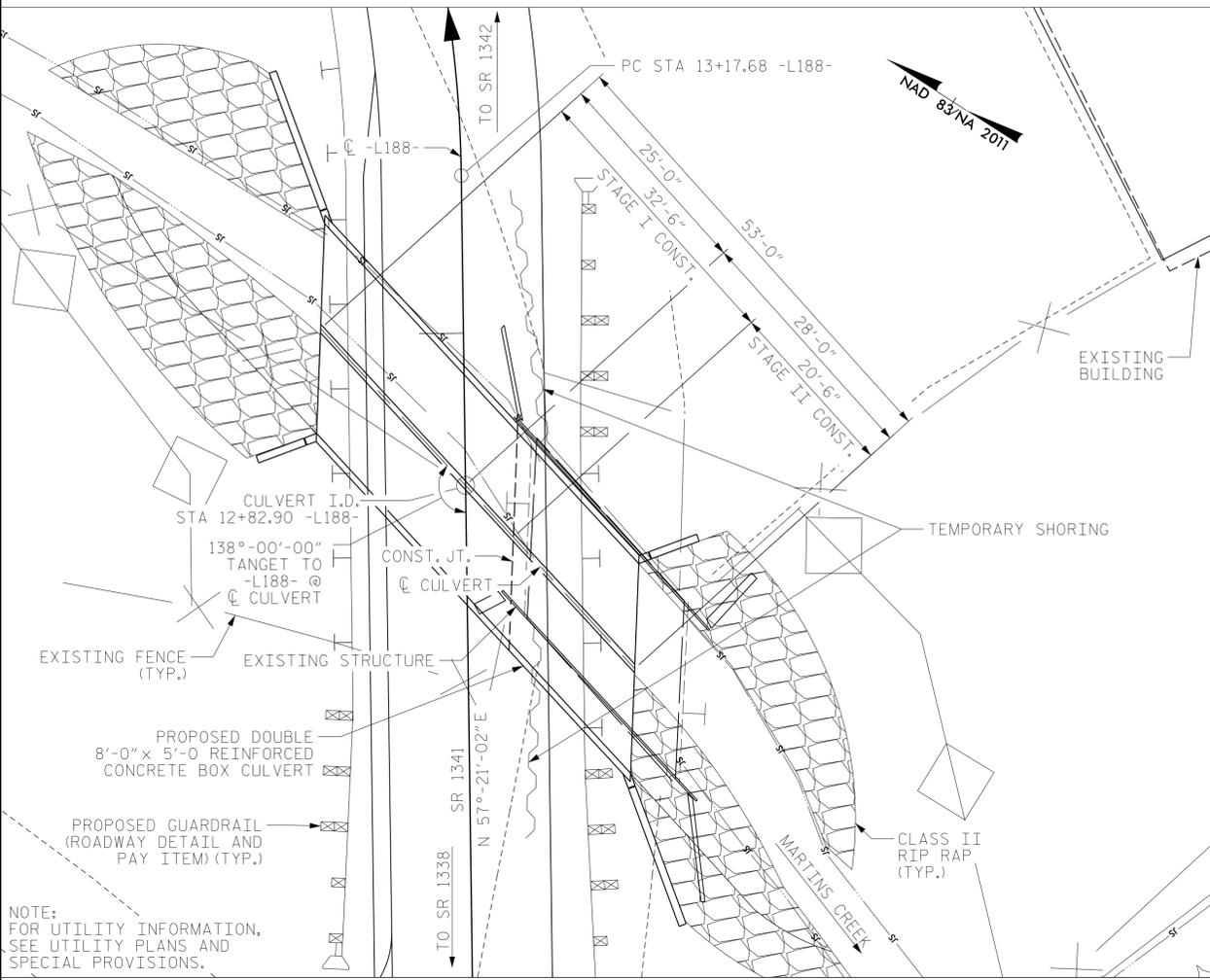
METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

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.

BM#1 -L188- STA 11+79.00, 48' RT SPIKE IN BASE OF 18" POPLAR,  
ELEV. = 2424.92, DATUM: NAVD 88



LOCATION SKETCH

**HYDRAULIC DATA**

DESIGN DISCHARGE	= 360 CFS
FREQUENCY OF DESIGN DISCHARGE	= 5 YRS
DESIGN HIGH WATER ELEVATION	= 2427.90'
DRAINAGE AREA	= 2.06 SQ MI
BASE DISCHARGE (Q100)	= 950 CFS
BASE HIGH WATER ELEVATION	= 2,430.60'

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE	= 465 CFS
FREQUENCY OF OVERTOPPING	= 5+ YRS
OVERTOPPING ELEVATION	= 2428.30'

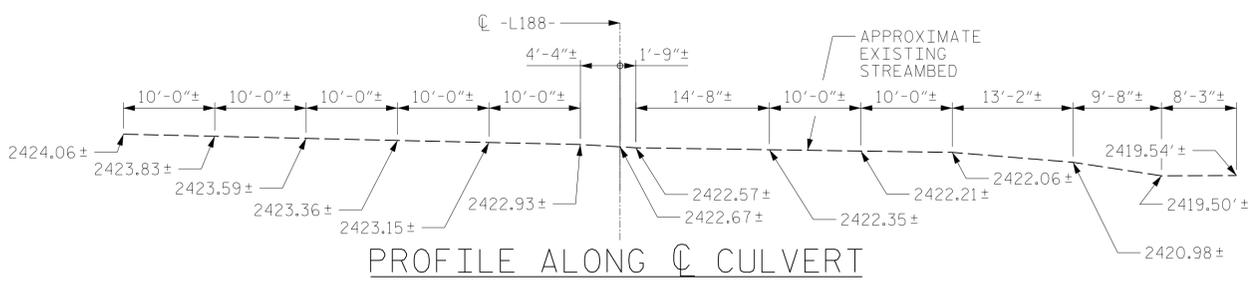
**GRADE DATA -L188-**

GRADE POINT EL. @ STA. 12+82.90 -L188-	= 2,429.24'
BED EL. @ STA. 12+82.90 -L188-	= 2421.79'
ROADWAY FILL SLOPES	= 2:1
TOP OF FOOTING ELEVATION	= 2421.79'

**-L188- PROFILE DATA**

PI = 12+50.00	PI = 13+33.33
EL. = 2,429.35'	EL. = 2429.10'
VC = 80'	K = 86'
K = 17	K = 27
G1 = 4.5321%	G1 = -0.3000%
G2 = -0.3000%	G2 = 2.9769%

DRAWN BY : N. CUANY DATE : 03/2024  
 CHECKED BY : M. ACOSTA DATE : 03/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025



PROFILE ALONG CULVERT

**TOTAL STRUCTURE QUANTITIES**

CLASS A CONCRETE	REINFORCING STEEL	FOUNDATION CONDITIONING MATERIAL	CLASS II RIP RAP
BARREL @ 1.77 C.Y./FT			158 TONS
<b>STAGE I</b>	<b>STAGE I</b>	<b>STAGE I</b>	
CULVERT 60.8 C.Y.	CULVERT 8,521 LBS.	51 TONS	
WING ETC. 10.4 C.Y.	WING ETC. 460 LBS.	32 TONS	
TOTAL 71.2 C.Y.	TOTAL 8,981 LBS.	TOTAL 83 TONS	
<b>STAGE II</b>	<b>STAGE II</b>	<b>REMOVAL OF EXISTING STRUCTURE</b>	
CULVERT 39.6 C.Y.	CULVERT 5,484 LBS.	STA. 12+82.90 -L188- LUMP SUM	
WING ETC. 10.4 C.Y.	WING ETC. 460 LBS.		
TOTAL 50.0 C.Y.	TOTAL 5,944 LBS.	<b>CULVERT EXCAVATION</b>	
<b>TOTAL CONCRETE</b> 121.2 C.Y.	<b>TOTAL STEEL</b> 14,925 LBS.	STA. 12+82.90 -L188- LUMP SUM	

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 FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.  
 FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+82.90 -L188-

SHEET 1 OF 8 REPLACES BRIDGE NO. 430188

**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 Raleigh, NC 27615  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-54037-C&E

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 8'-0" X 5'-0" CONCRETE BOX CULVERT**  
 FOR MARTINS CREEK ON SR 1341 BETWEEN SR 1338 AND SR 1342  
 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-1
1			3			TOTAL SHEETS
2			4			8

**NOTES**

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING  
 DESIGN FILL = 3.17' MAX. AND 1.50' MIN.  
 CONCRETE CULVERTS TO BE POURED IN THE FOLLOWING ORDER FOR EACH STAGE:  
 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 THE CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.  
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.  
 AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING STRUCTURE CONSISTING OF 1 SPAN @ 20'-6" TIMBER FLOOR ON I-BEAMS WITH TIMBER CAPS, POSTS, AND SILLS @ 5'-6" CENTERS AND CLEAR ROADWAY WIDTH OF 16'-11" SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.  
 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.  
 THE STRUCTURE OF 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 STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.  
 NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.  
 A THREE FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.  
 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 AT STATION 12+82.90 -L188-".  
 BED MATERIAL PLACED BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL BETWEEN THE LOWER SILLS. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS II RIP RAP. STONES LARGER THAN 23 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.  
 STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.  
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.  
 EXCAVATE AT LEAST 1 FOOT BELOW BOTTOM OF CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.  
 SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.  
 SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.  
 BACKFILL WITH SELECT MATERIALS, CLASS II OR CLASS III MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATIONS.  
 SEE ROADWAY DETAIL DRAWING 862.03 FOR GUARDRAIL OVER CULVERT.  
 FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.  
 FOR MAINTENANCE OF TRAFFIC, SEE TRANSPORTATION MANAGEMENT PLAN.  
 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.

## 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 (γ <sub>LL</sub> )	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	1.01	--	1.75	1.28	1	TOP SLAB	3.13	1.01	1	TOP SLAB	7.67		
	HL-93 (OPERATING)	N/A		1.30	--	1.35	1.65	1	TOP SLAB	3.13	1.30	1	TOP SLAB	7.67		
	HS-20 (INVENTORY)	36.000	2	1.10	39.60	1.75	1.40	1	TOP SLAB	3.13	1.10	1	TOP SLAB	7.67		
	HS-20 (OPERATING)	36.000		1.43	51.48	1.35	1.81	1	TOP SLAB	3.13	1.43	1	TOP SLAB	7.67		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.55	34.43	1.40	2.55	1	TOP SLAB	3.13	2.76	1	TOP SLAB	7.67		
		SNGARBS2	20.000		2.29	45.80	1.40	2.29	1	TOP SLAB	3.13	2.43	1	TOP SLAB	7.67	
		SNAGRIS2	22.000		2.45	53.90	1.40	2.45	1	TOP SLAB	3.13	2.58	1	BOTTOM SLAB	8.00	
		SNCOTTS3	27.250	3	1.32	35.97	1.40	1.82	1	TOP SLAB	3.13	1.32	1	TOP SLAB	7.67	
		SNAGGRS4	34.925		1.76	61.47	1.40	2.15	1	BOTTOM SLAB	8.00	1.76	1	TOP SLAB	7.67	
		SNS5A	35.550		1.60	56.88	1.40	2.10	1	BOTTOM SLAB	8.00	1.60	1	TOP SLAB	7.67	
		SNS6A	39.950		1.55	61.92	1.40	1.94	1	BOTTOM SLAB	8.00	1.55	1	TOP SLAB	7.67	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	SNS7B	42.000		1.55	65.10	1.40	1.93	1	BOTTOM SLAB	8.00	1.55	1	TOP SLAB	7.67	
		TNAGRIT3	33.000		2.37	78.21	1.40	2.45	1	TOP SLAB	3.13	2.37	1	TOP SLAB	7.67	
		TNT4A	33.075		1.62	53.58	1.40	2.17	1	TOP SLAB	3.13	1.62	1	TOP SLAB	7.67	
		TNT6A	41.600		1.60	66.56	1.40	2.20	1	BOTTOM SLAB	8.00	1.60	1	TOP SLAB	7.67	
		TNT7A	42.000		1.62	68.04	1.40	2.18	1	BOTTOM SLAB	8.00	1.62	1	TOP SLAB	7.67	
		TNT7B	42.000		1.56	65.52	1.40	2.03	1	BOTTOM SLAB	8.00	1.56	1	TOP SLAB	7.67	
		TNAGRIT4	43.000		1.55	66.65	1.40	1.89	1	BOTTOM SLAB	8.00	1.55	1	TOP SLAB	7.67	
EMERGENCY VEHICLE (EV)	TNAGT5A	45.000		1.55	69.75	1.40	1.88	1	BOTTOM SLAB	8.00	1.55	1	TOP SLAB	7.67		
	TNAGT5B	45.000		1.65	74.25	1.40	1.87	1	BOTTOM SLAB	8.00	1.65	1	BOTTOM SLAB	8.00		
EMERGENCY VEHICLE (EV)	EV2	28.750		1.73	49.74	1.30	1.73	1	TOP SLAB	3.13	1.75	1	TOP SLAB	7.67		
	EV3	43.000	4	1.15	49.45	1.30	1.58	1	TOP SLAB	3.13	1.15	1	TOP SLAB	7.67		

LOAD FACTORS:

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

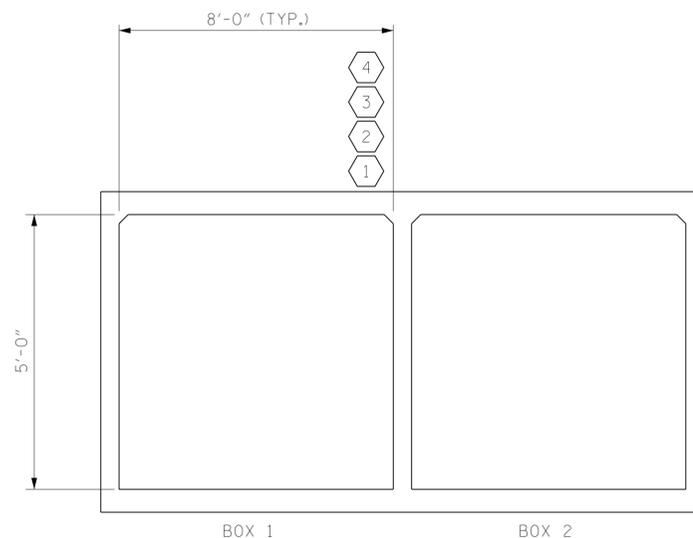
NOTE:

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 **
4	EMERGENCY VEHICLE LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



### LRFR SUMMARY

(LOOKING DOWNSTREAM)

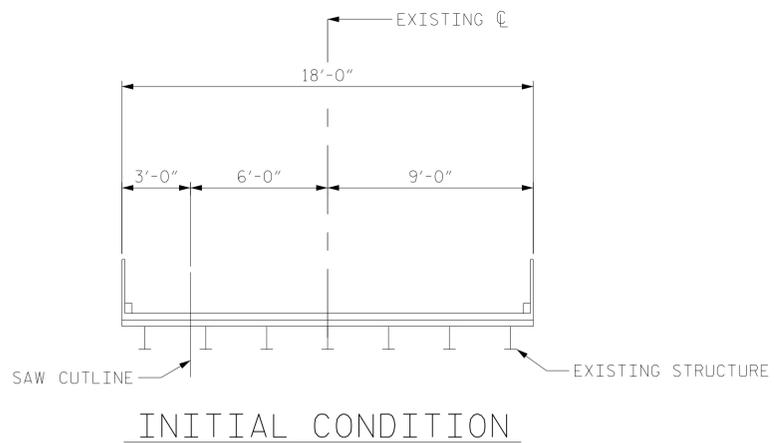
PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+82.90 -L188-

SHEET 2 OF 8

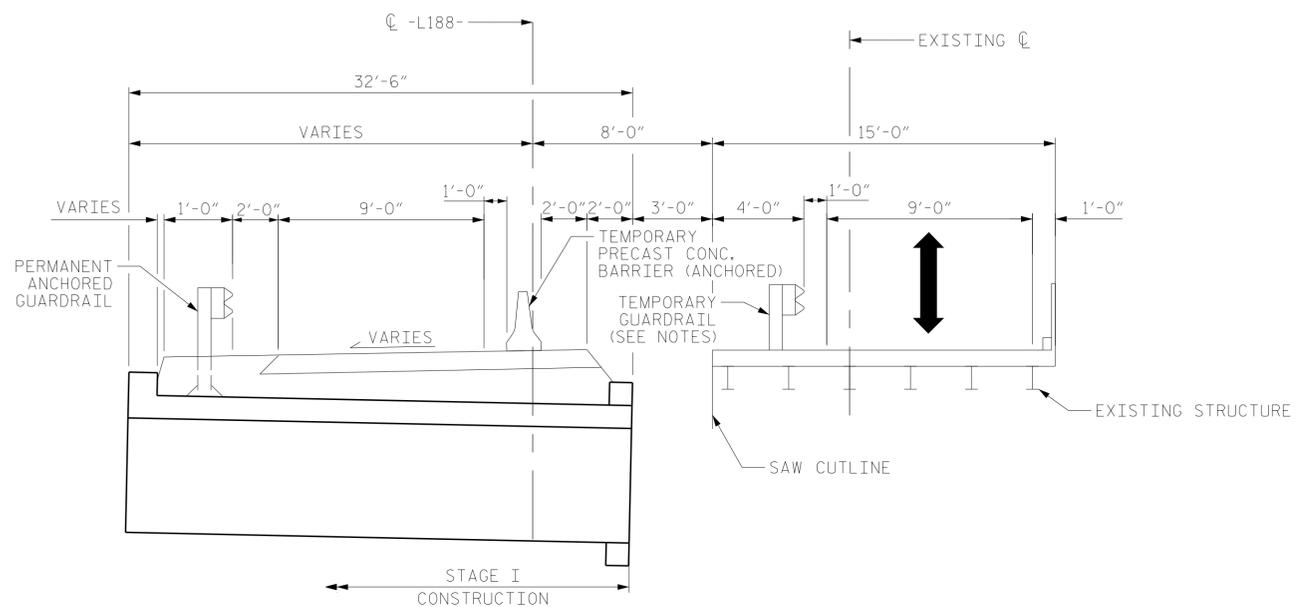
DRAWN BY : N. CUANY DATE : 03/2024  
 CHECKED BY : M. ACOSTA DATE : 03/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

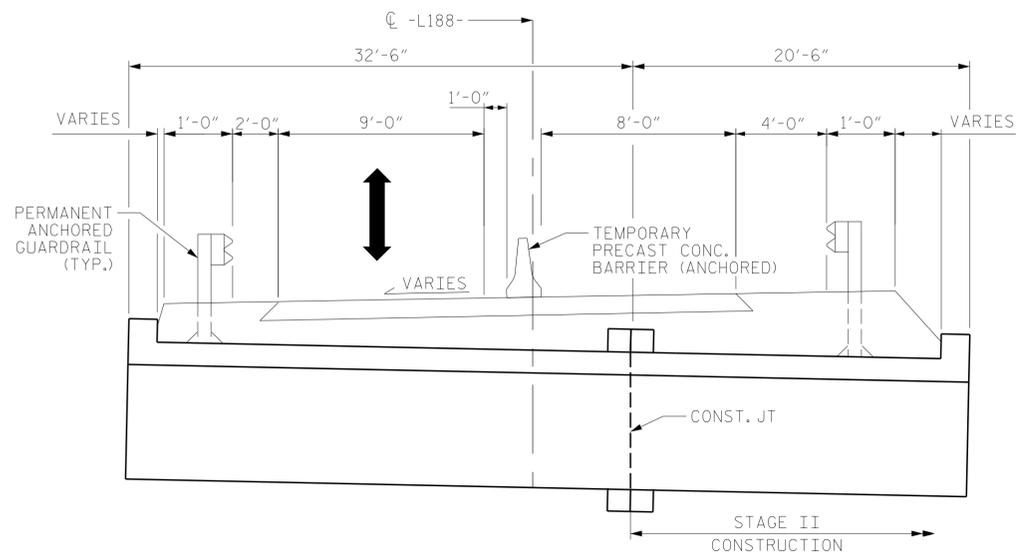
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						SHEET NO.
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC)						C2-2
REVISIONS						TOTAL SHEETS
NO.	BY:	DATE:	NO.	BY:	DATE:	8
1			3			
2			4			



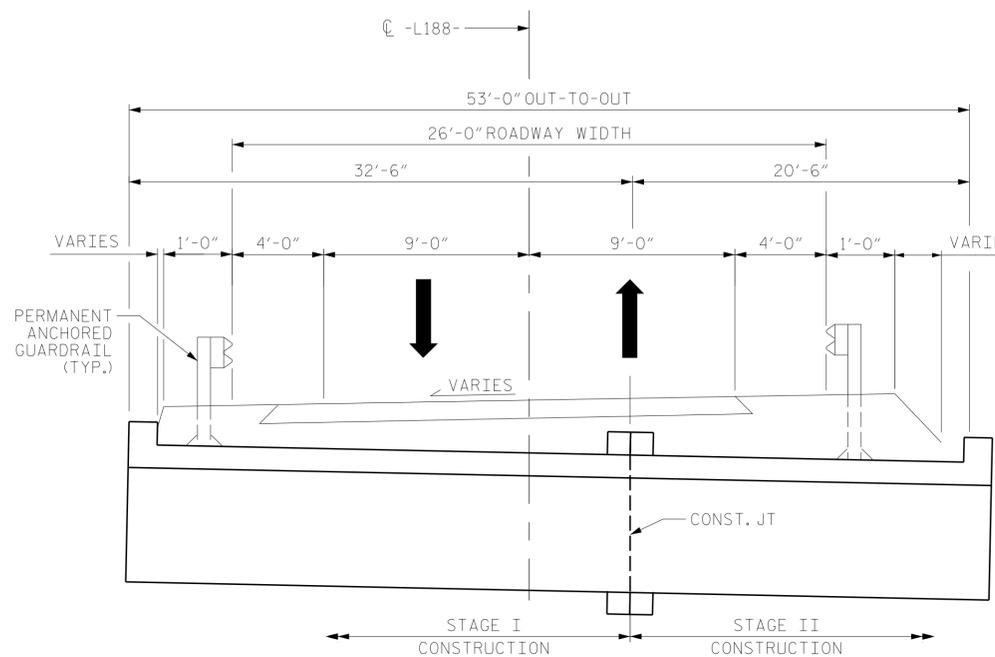
INITIAL CONDITION



STAGE I CONSTRUCTION  
NORMAL TO ROADWAY SECTION



STAGE II CONSTRUCTION  
NORMAL TO ROADWAY SECTION



FINAL CONDITION  
NORMAL TO ROADWAY SECTION

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
STATION: 12+82.90 -L188-

SHEET 3 OF 8

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
DOUBLE 8'-0" X 5'-0"  
CONCRETE BOX CULVERT  
STAGING DETAILS  
135° SKEW

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

NOTES:

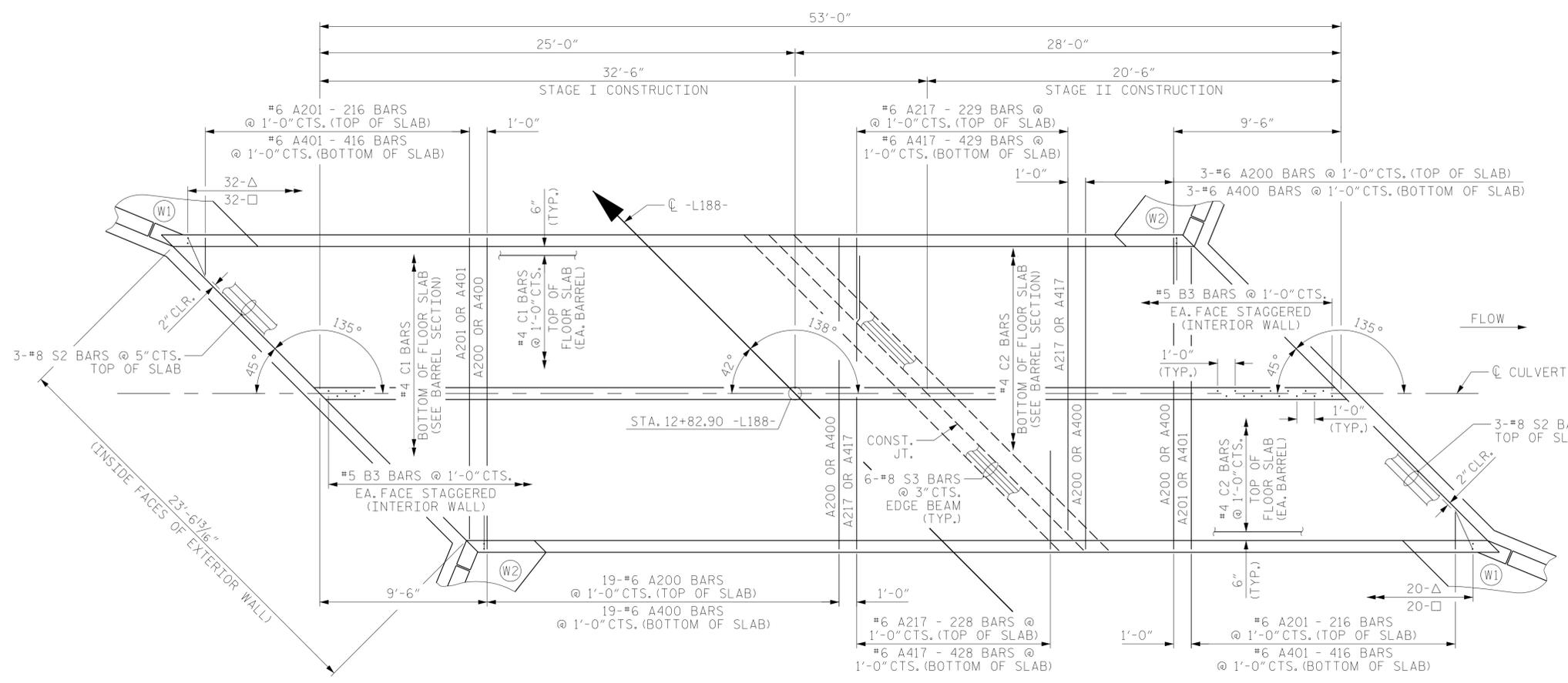
TEMPORARY GUARDRAIL SHOWN FOR REFERENCE ONLY.  
FOR GUARDRAIL OVER EXISITING STRUCTURE, SEE ROADWAY PLANS.

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

DRAWN BY : N. CUANY DATE : 03/2024  
CHECKED BY : M. ACOSTA DATE : 03/2024  
DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

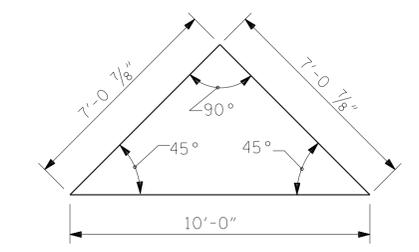


**NOTES:**  
 "A" BARS FROM STAGE I TO EXTEND 3'-10" MIN. INTO STAGE II.  
 C1 BARS FROM STAGE I TO EXTEND 2'-7" MIN. INTO STAGE II.  
 SEE SHEET 4 OF 8 FOR PLACEMENT OF S3 BARS IN SLAB AND EDGE BEAM.



**PLAN - FLOOR SLAB**

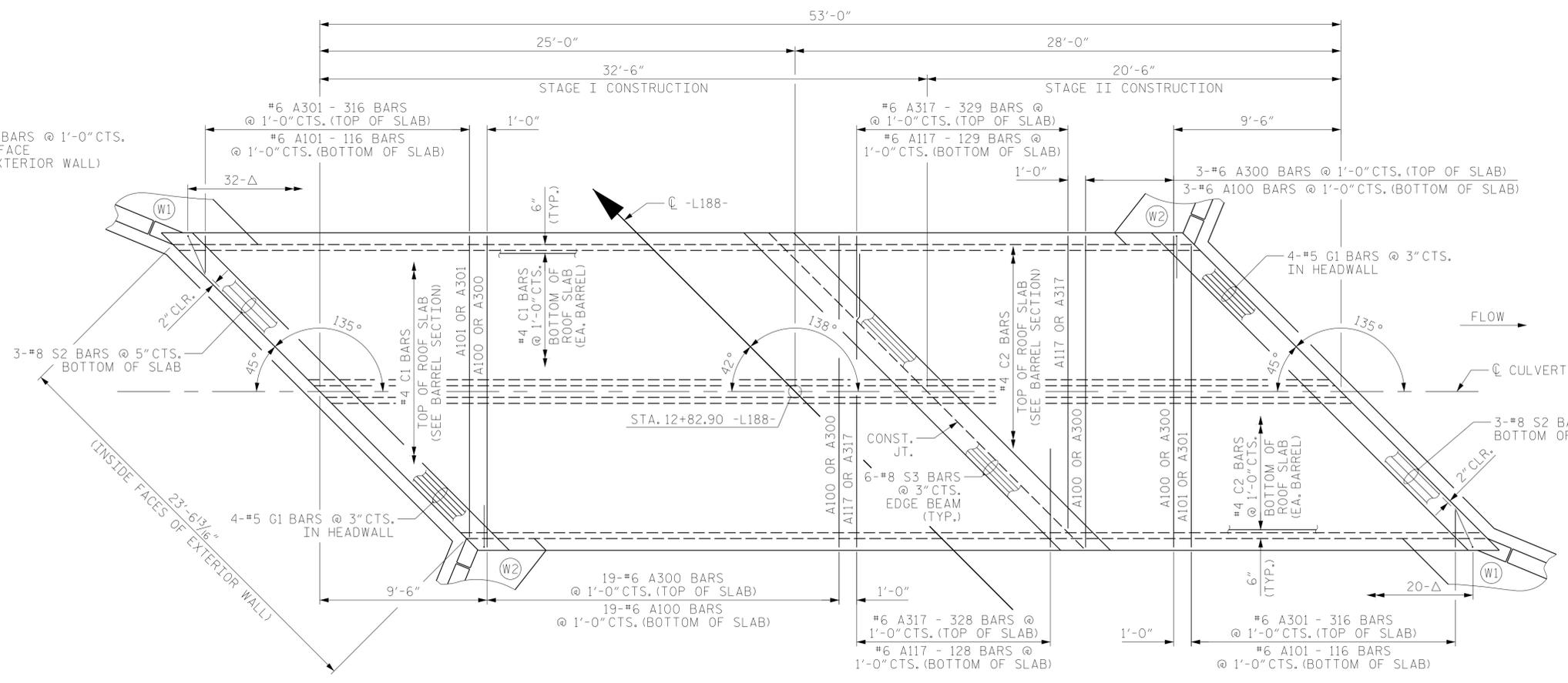
△ #5 A2 BARS @ 1'-0" CTS. FILL FACE (EA. EXTERIOR WALL)  
 □ #5 B1 BARS @ 1'-0" CTS. STREAM FACE (EA. EXTERIOR WALL)



**SKEW TRIANGLE**

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+82.90 -L188-

SHEET 5 OF 8



**PLAN - ROOF SLAB**



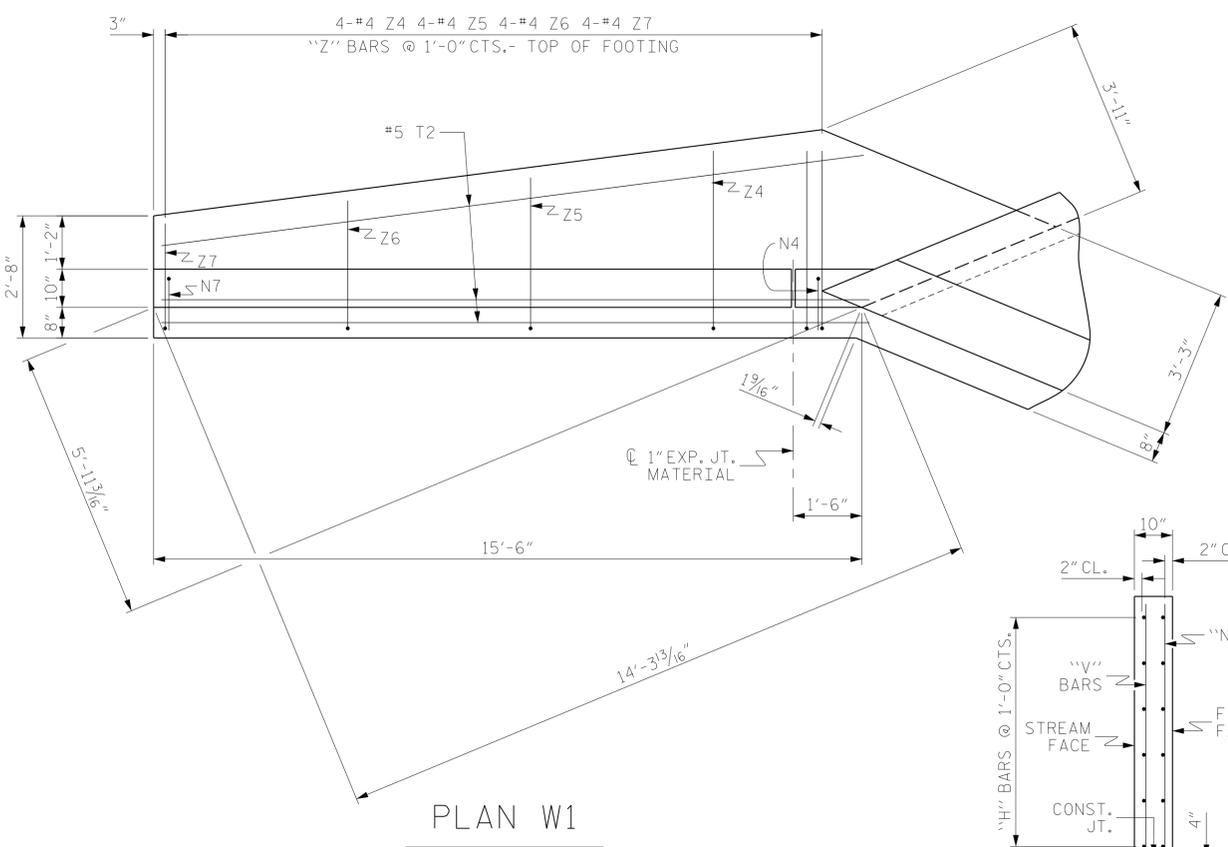
**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 Raleigh, NC 27615  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-5403-C&E

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 8'-0" X 5'-0" CONCRETE BOX CULVERT PLAN					
135° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. C2-5
					TOTAL SHEETS 8

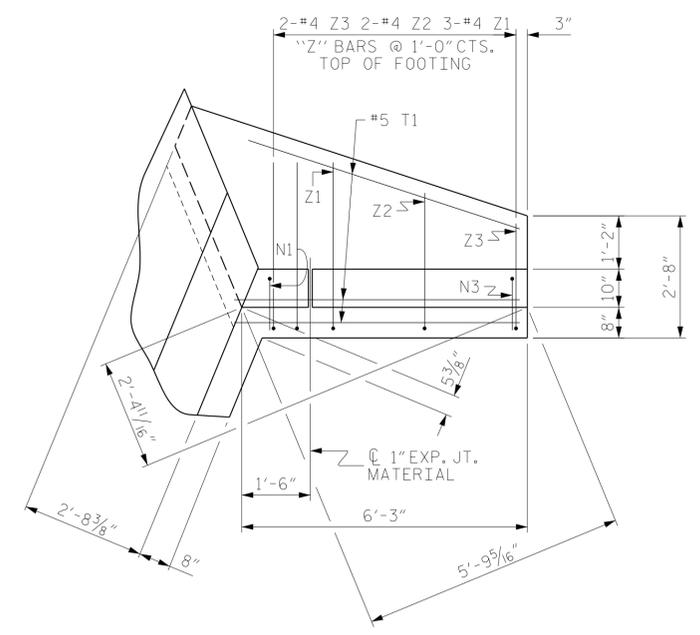
DRAWN BY : N. CUANY DATE : 03/2024  
 CHECKED BY : M. ACOSTA DATE : 03/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

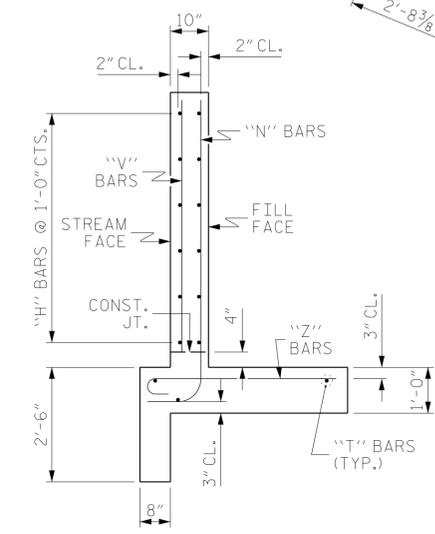




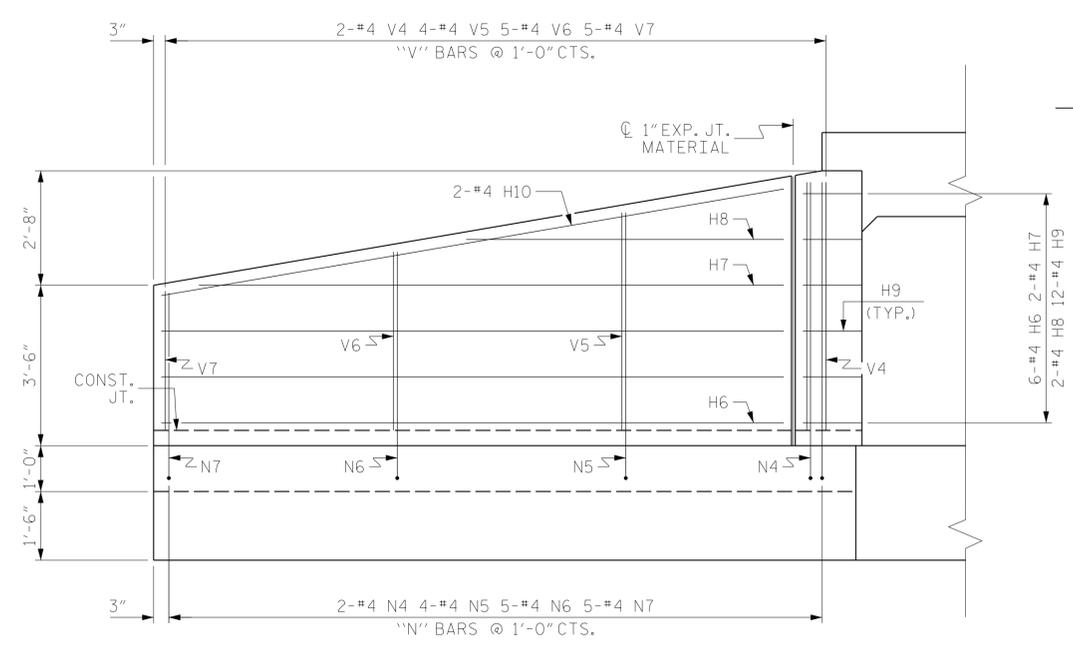
PLAN W1



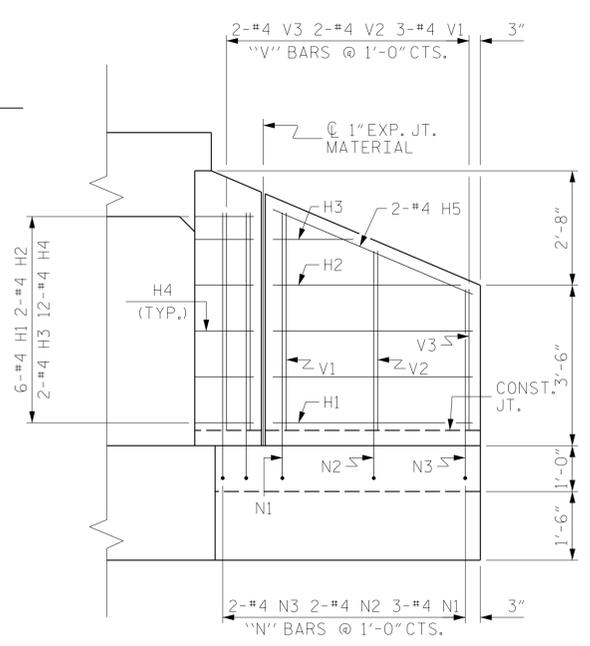
PLAN W2



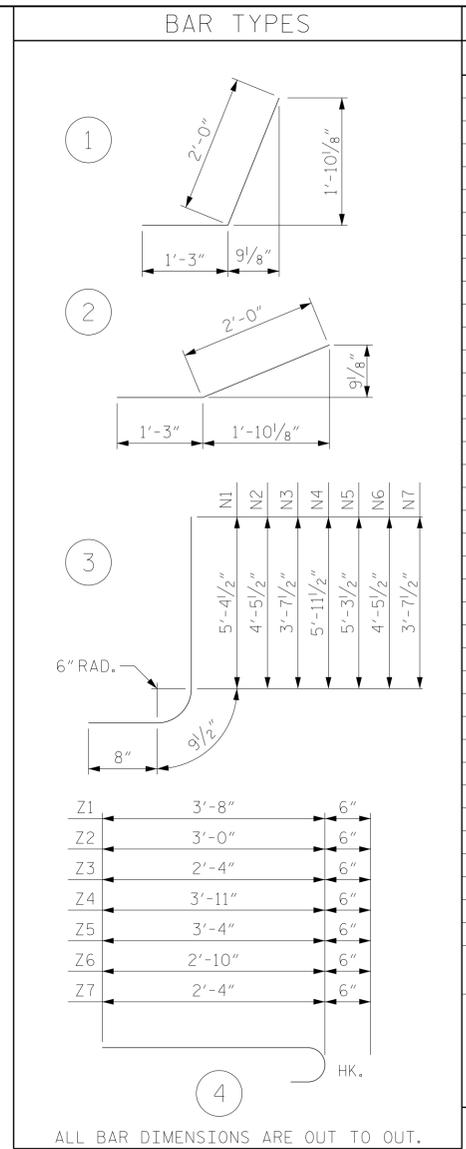
TYPICAL WING SECTION



ELEVATION W1



ELEVATION W2



BILL OF MATERIAL					
EACH STAGE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	4'-4"	17
H2	2	#4	STR	4'-1"	5
H3	2	#4	STR	1'-9"	2
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	4'-9"	6
H6	6	#4	STR	13'-7"	54
H7	2	#4	STR	12'-9"	17
H8	2	#4	STR	6'-11"	9
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	13'-9"	18
N1	3	#4	3	6'-10"	14
N2	2	#4	3	5'-11"	8
N3	2	#4	3	5'-1"	7
N4	2	#4	3	7'-5"	10
N5	4	#4	3	6'-9"	18
N6	5	#4	3	5'-11"	20
N7	5	#4	3	5'-1"	17
T1	3	#5	STR	6'-3"	20
T2	3	#5	STR	15'-6"	48
V1	3	#4	STR	4'-9"	10
V2	2	#4	STR	3'-11"	5
V3	2	#4	STR	3'-1"	4
V4	2	#4	STR	5'-5"	7
V5	4	#4	STR	4'-9"	13
V6	5	#4	STR	3'-10"	13
V7	5	#4	STR	3'-0"	10
Z1	3	#4	4	4'-2"	8
Z2	2	#4	4	3'-6"	5
Z3	2	#4	4	2'-10"	4
Z4	4	#4	4	4'-5"	12
Z5	4	#4	4	3'-10"	10
Z6	4	#4	4	3'-4"	9
Z7	4	#4	4	2'-10"	8
REINFORCING STEEL				460	LBS
FOR 2 WINGS					
CLASS A CONCRETE					
2 WINGS				7.4	CY
1 HEADWALL				1.2	CY
1 END CURTAIN WALL				1.8	CY
TOTAL				10.4	CY

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+82.90 -L188-

SHEET 7 OF 8



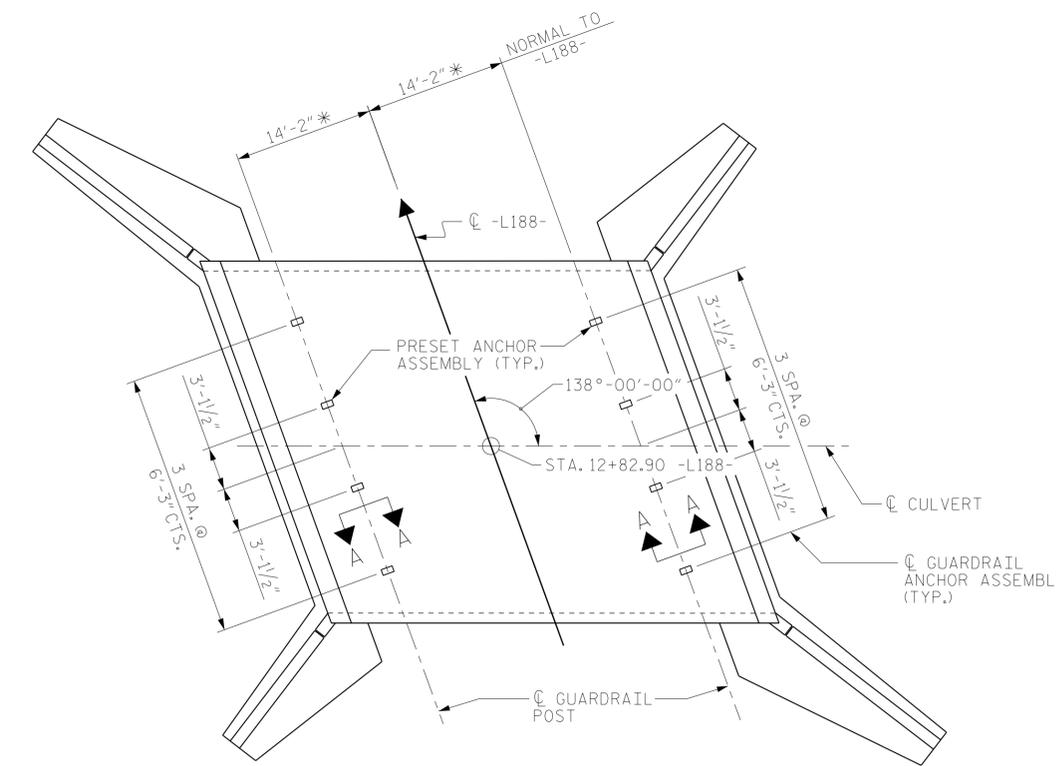
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**WINGS FOR CONCRETE BOX CULVERT**  
 H = 5'-0" SLOPE = 2:1  
 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-7
1			3			TOTAL SHEETS
2			4			8

DRAWN BY : N. CUANY DATE : 03/2024  
 CHECKED BY : M. ACOSTA DATE : 03/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

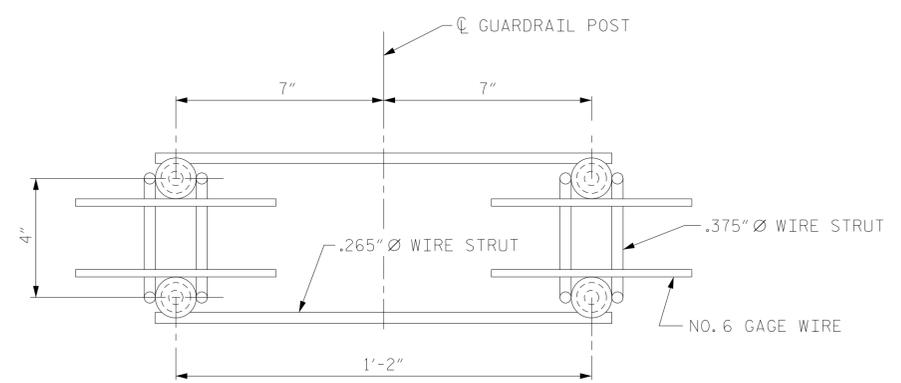


### PLAN OF CULVERT GUARDRAIL ANCHOR ASSEMBLY SPACING

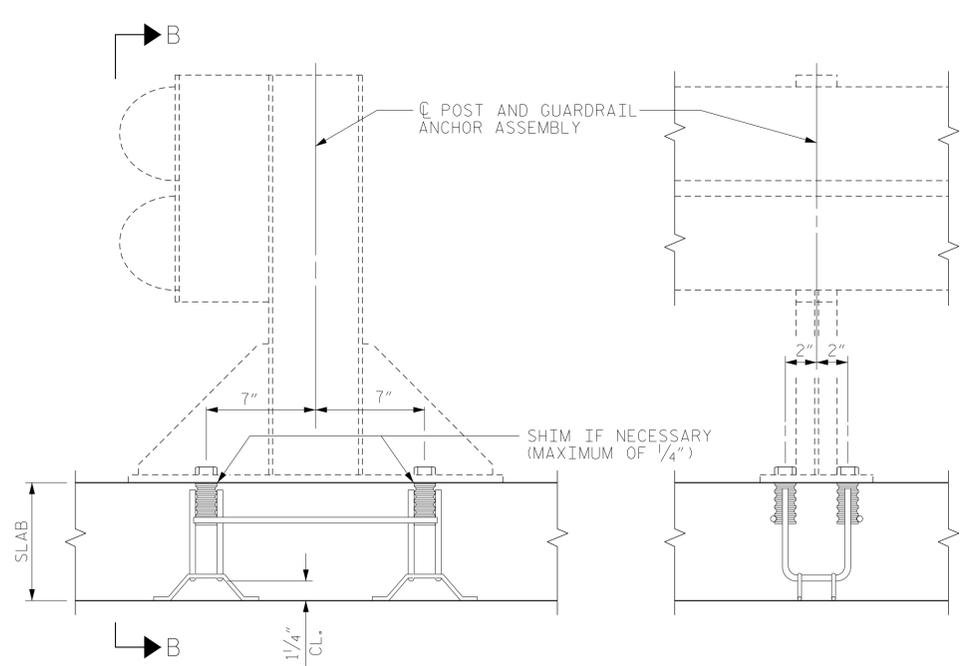
\* CONTRACTOR TO VERIFY LOCATION WITH FIELD ENGINEER PRIOR TO INSTALLATION

### NOTES

- THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :
- 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".
  - 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.)
  - 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.

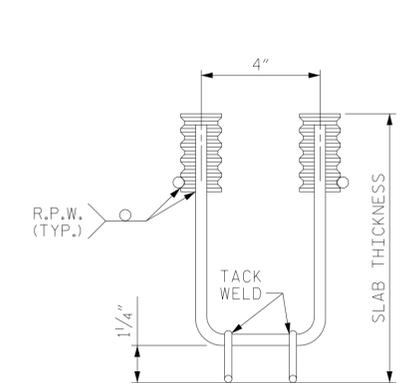


PLAN

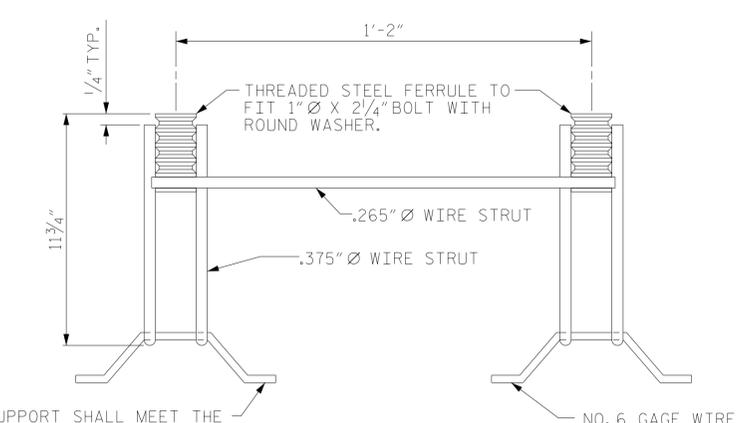


SECTION A-A

SECTION B-B



ELEVATION



SIDE VIEW

### GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

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

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 12+82.90 -L188-

SHEET 8 OF 8



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

ASSEMBLED BY : NSC	DATE : 03/2024
CHECKED BY : MRA	DATE : 03/2024
DRAWN BY : FCJ 6/88	REV. 10/1/11 MAA/THC
CHECKED BY : ARB 6/88	REV. 12/17 MAA/THC
	REV. 6/19 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 Raleigh, NC 27615  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-5-0403-C-28

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

## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	- - - - -	AASHTO (CURRENT)
LIVE LOAD	- - - - -	SEE PLANS
IMPACT ALLOWANCE	- - - - -	SEE AASHTO
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 AASHTO
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 2024 "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 3/16" 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" OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

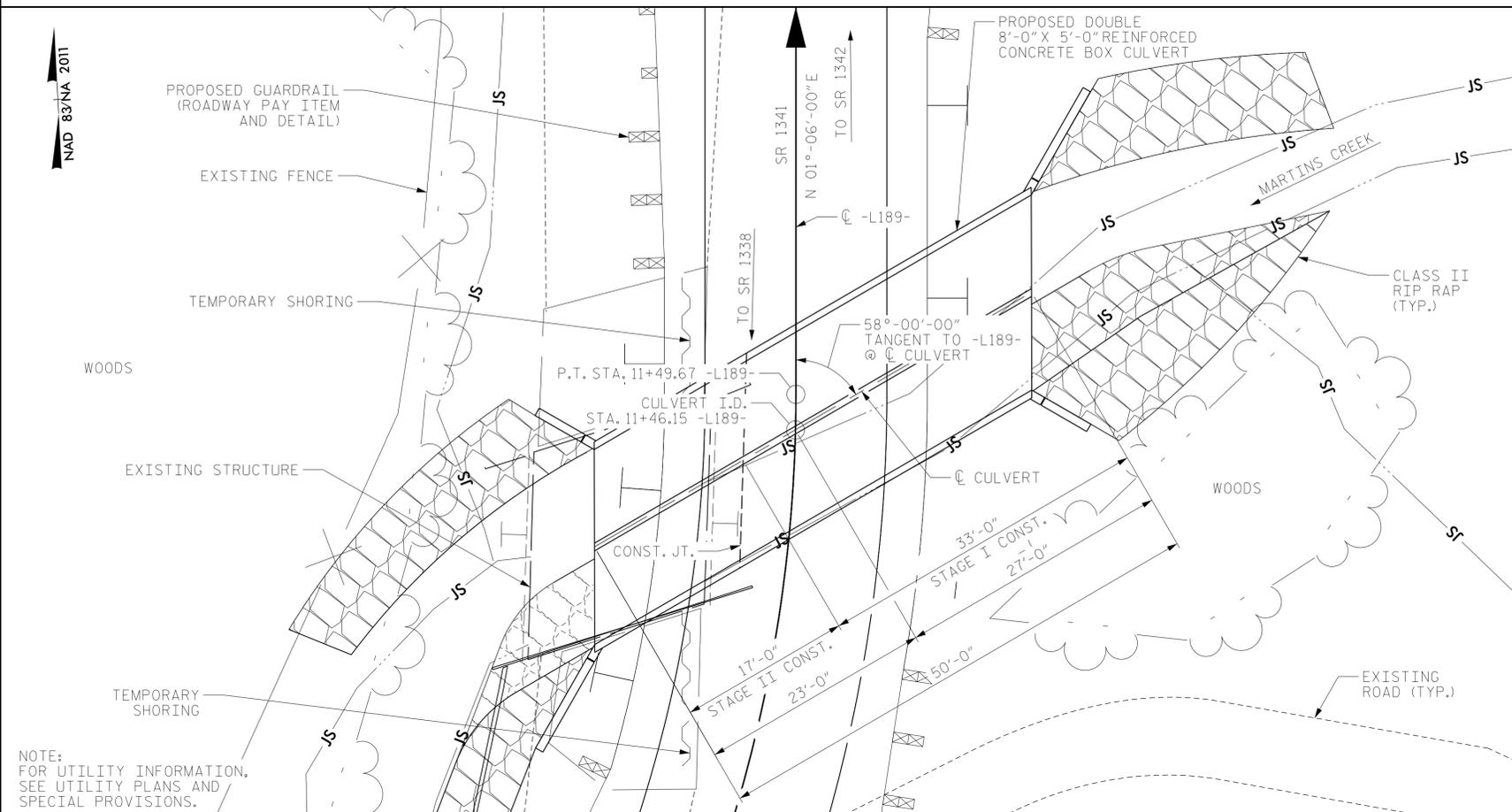
METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS 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.

BM#1: SPIKE IN BASE OF 24" POPLAR 45' LT. OF STA. 10+87.51 -L189-, ELEV. 2475.18



LOCATION SKETCH

NOTES

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING
- DESIGN FILL = 4.00' MAX. AND 1.08' MIN.
- CONCRETE CULVERTS TO BE POURED IN THE FOLLOWING ORDER FOR EACH STAGE:
  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 THE CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING STRUCTURE CONSISTING OF 1 SPAN @ 20'-6" TIMBER FLOOR ON I-BEAMS WITH TIMBER CAPS, POSTS, AND SILLS @ 4'-3" CENTERS AND CLEAR ROADWAY WIDTH OF 16'-11" SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT, SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.
- 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.
- THE SUBSTRUCTURE OF 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 STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.
- A THREE FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- 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 AT STATION 11+46.15 -L189-".
- BED MATERIAL PLACED BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL BETWEEN THE LOWER SILLS. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS II RIP RAP. STONES LARGER THAN 23 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.
- STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- 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.
- EXCAVATE AT LEAST 1 FOOT BELOW BOTTOM OF CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.
- SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.
- SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE BARREL @ 1.71 C.Y./FT	REINFORCING STEEL
STAGE I	STAGE I
CULVERT 59.4 C.Y.	CULVERT 11,763 LBS.
WING ETC. 8.5 C.Y.	WING ETC. 406 LBS.
TOTAL 67.9 C.Y.	TOTAL 12,169 LBS.
STAGE II	STAGE II
CULVERT 31.7 C.Y.	CULVERT 6,190 LBS.
WING ETC. 8.5 C.Y.	WING ETC. 406 LBS.
TOTAL 40.2 C.Y.	TOTAL 6,596 LBS.
TOTAL CONCRETE 108.1 C.Y.	TOTAL STEEL 18,765 LBS.
FOUNDATION CONDITIONING MATERIAL	REMOVAL OF EXISTING STRUCTURE STA. 11+46.15 -L189- LUMP SUM
STAGE I 52 TONS	CULVERT EXCAVATION STA. 11+46.15 -L189- LUMP SUM
STAGE II 27 TONS	
TOTAL 79 TONS	
CLASS II RIP RAP 108 TONS	GEOTEXTILE FOR DRAINAGE 120 SY
ASBESTOS ASSESSMENT LUMP SUM	

HYDRAULIC DATA

DESIGN DISCHARGE	= 190 CFS
FREQUENCY OF DESIGN DISCHARGE	= 2 YRS
DESIGN HIGH WATER ELEVATION	= 2,475.10'
DRAINAGE AREA	= 1.98 SQ. MI
BASE DISCHARGE (0100)	= 950 CFS
BASE HIGH WATER ELEVATION	= 2,477.80'

OVERTOPPING FLOOD DATA

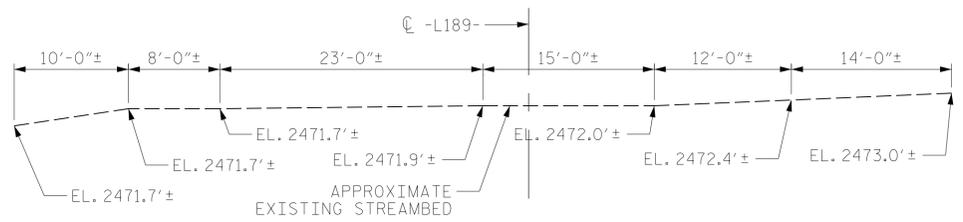
OVERTOPPING DISCHARGE	= 350 CFS
FREQUENCY OF OVERTOPPING	= 5+ YRS
OVERTOPPING ELEVATION	= 2,476.50'

PROFILE DATA -L189-

PI = 10+52.00	PI = 11+44.00	PI = 12+47.00
EL. = 2,472.41'	EL. = 2,479.04'	EL. = 2,483.35'
VC = 104'	VC = 80'	VC = 126'
K = 26	K = 26	K = 26
G1 = 3.2408%	G1 = 7.2112%	G1 = 4.1858%
G2 = 7.2112%	G2 = 4.1858%	G2 = 8.9874%

GRADE DATA -L189-

GRADE POINT EL. @ STA. 11+46.15 -L189-	= 2,478.9'
BED EL. @ STA. 11+46.15 -L189-	= 2,470.9'
ROADWAY FILL SLOPES	= 2:1 MAX.



PROFILE ALONG CULVERT

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

**RS&H**  
RS&H Architects-Engineers-Planners, Inc.  
8521 Six Forks Road, Suite 400  
919-926-4100 FAX 919-846-9080  
www.rsandh.com  
North Carolina License No. 50737-5403-C&E

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
STATION: 11+46.15 -L189-

SHEET 1 OF 7 REPLACES BRIDGE 430189

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 8'-0" X 5'-0" CONCRETE BOX CULVERT FOR MARTINS CREEK ON SR 1341 BETWEEN SR 1338 AND SR 1342					
60° SKEW					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					C3-1
					TOTAL SHEETS 7

DRAWN BY : N. CUANY	DATE : 02/2024
CHECKED BY : M. ACOSTA	DATE : 02/2024
DESIGN ENGINEER OF RECORD: M. ACOSTA	DATE : 08/2025

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 (γ <sub>LL</sub> )	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	Ⓛ	1.09	--	1.75	2.25	1	TOP SLAB	3.13	1.09	1	TOP SLAB	0.33		
	HL-93 (OPERATING)	N/A		1.41	--	1.35	2.92	1	TOP SLAB	3.13	1.41	1	TOP SLAB	0.33		
	HS-20 (INVENTORY)	36.000	Ⓜ	1.22	43.92	1.75	2.54	1	TOP SLAB	3.13	1.22	1	TOP SLAB	0.33		
	HS-20 (OPERATING)	36.000		1.59	57.24	1.35	3.30	1	TOP SLAB	3.13	1.59	1	TOP SLAB	0.33		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.91	39.29	1.40	4.63	1	TOP SLAB	3.13	2.91	1	TOP SLAB	0.33	
		SNGARBS2	20.000		2.45	49.00	1.40	4.03	1	TOP SLAB	3.13	2.45	1	TOP SLAB	0.33	
		SNAGRIS2	22.000		2.68	58.96	1.40	4.31	1	TOP SLAB	3.13	2.68	1	TOP SLAB	0.33	
		SNCOTTS3	27.250	Ⓝ	1.45	39.51	1.40	3.21	1	INTERIOR WALL	5.00	1.45	1	TOP SLAB	0.33	
		SNAGGRS4	34.925		1.96	68.45	1.40	4.14	1	INTERIOR WALL	5.00	1.96	1	TOP SLAB	7.67	
		SNS5A	35.550		1.80	63.99	1.40	4.06	1	TOP SLAB	3.13	1.80	1	TOP SLAB	7.67	
		SNS6A	39.950		1.74	69.51	1.40	4.04	1	BOTTOM SLAB	8.00	1.74	1	TOP SLAB	7.67	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	SNS7B	42.000		1.74	73.08	1.40	4.04	1	BOTTOM SLAB	8.00	1.74	1	TOP SLAB	7.67	
		TNAGRIT3	33.000		2.68	88.44	1.40	4.31	1	TOP SLAB	3.13	2.68	1	TOP SLAB	0.33	
		TNT4A	33.075		1.82	60.20	1.40	3.60	1	INTERIOR WALL	5.00	1.82	1	TOP SLAB	7.67	
		TNT6A	41.600		1.79	74.46	1.40	3.95	1	TOP SLAB	3.13	1.79	1	TOP SLAB	7.67	
		TNT7A	42.000		1.81	76.02	1.40	3.96	1	TOP SLAB	3.13	1.81	1	TOP SLAB	7.67	
		TNT7B	42.000		1.75	73.50	1.40	3.72	1	INTERIOR WALL	5.00	1.75	1	TOP SLAB	7.67	
		TNAGRIT4	43.000		1.75	75.25	1.40	3.60	1	INTERIOR WALL	5.00	1.75	1	TOP SLAB	7.67	
EMERGENCY VEHICLE (EV)	TNAGT5A	45.000		1.75	78.75	1.40	3.97	1	TOP SLAB	3.13	1.75	1	TOP SLAB	7.67		
	TNAGT5B	45.000		1.75	78.75	1.40	3.60	1	INTERIOR WALL	5.00	1.75	1	TOP SLAB	7.67		
EMERGENCY VEHICLE (EV)	EV2	28.750		1.77	50.89	1.30	3.05	1	TOP SLAB	3.13	1.77	1	TOP SLAB	0.33		
	EV3	43.000	Ⓞ	1.26	54.18	1.30	2.78	1	INTERIOR WALL	5.00	1.26	1	TOP SLAB	0.33		

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

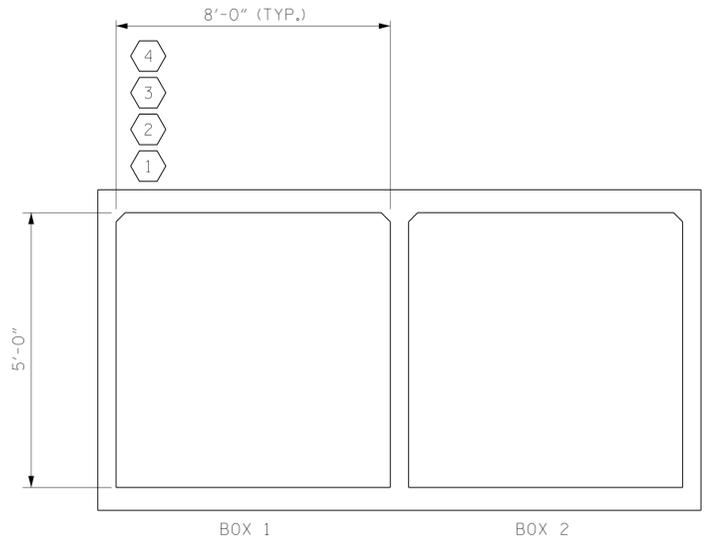
Ⓛ DESIGN LOAD RATING (HL-93)

Ⓜ DESIGN LOAD RATING (HS-20)

Ⓝ LEGAL LOAD RATING \*\*

Ⓞ EMERGENCY VEHICLE LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 11+46.15 -L189-

SHEET 2 OF 7

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

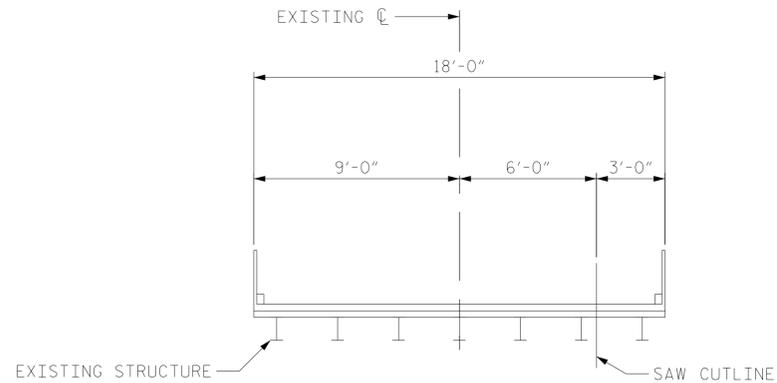
LRFR SUMMARY FOR  
REINFORCED CONCRETE  
BOX CULVERTS  
(NON-INTERSTATE TRAFFIC)

**RS&H**  
RS&H Architects-Engineers-Planners, Inc.  
8521 Six Forks Road, Suite 400  
919-926-4100 FAX 919-846-9080  
www.rsandh.com  
North Carolina License Nos. 50737-54043-C&E

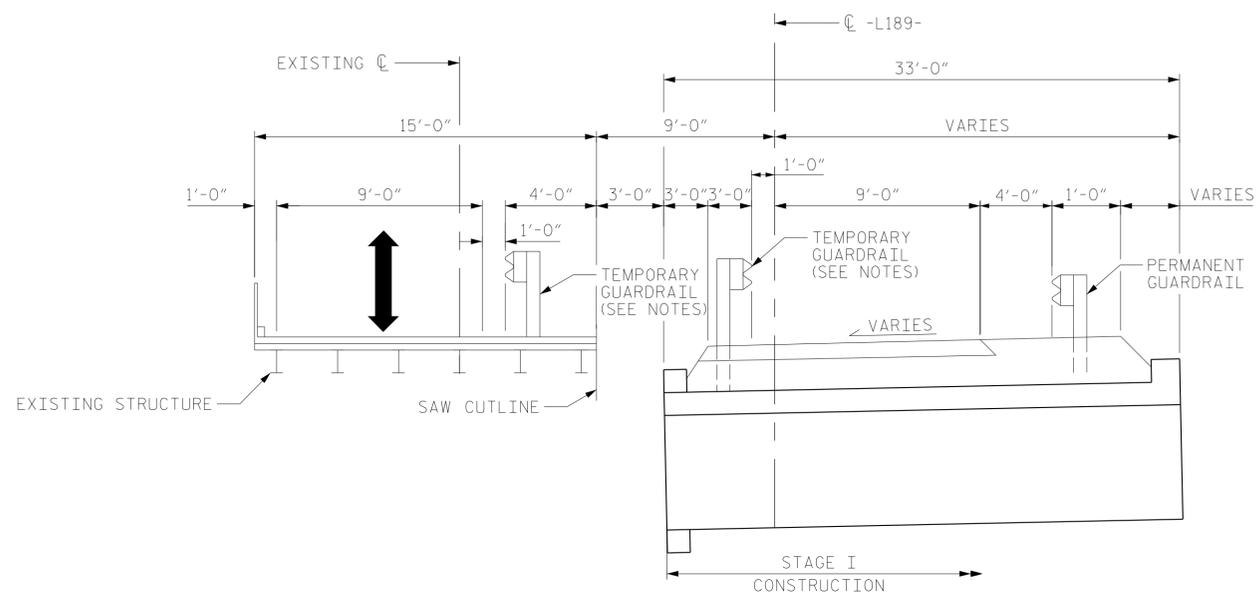
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			C3-2
2			4			7

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

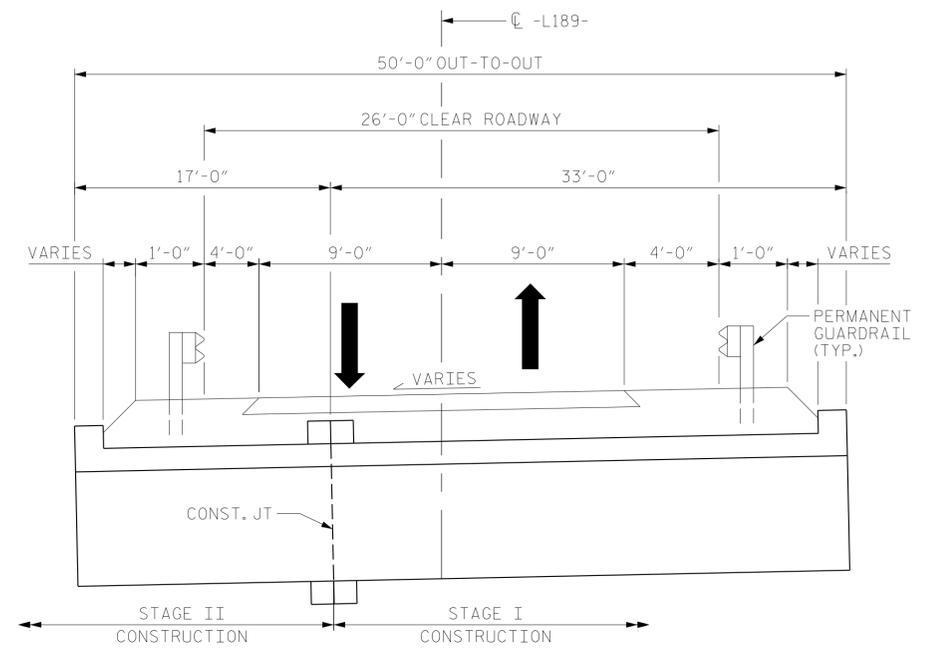
DRAWN BY : <u>N. CUANY</u>	DATE : <u>02/2024</u>
CHECKED BY : <u>M. ACOSTA</u>	DATE : <u>02/2024</u>
DESIGN ENGINEER OF RECORD: <u>M. ACOSTA</u>	DATE : <u>08/2025</u>



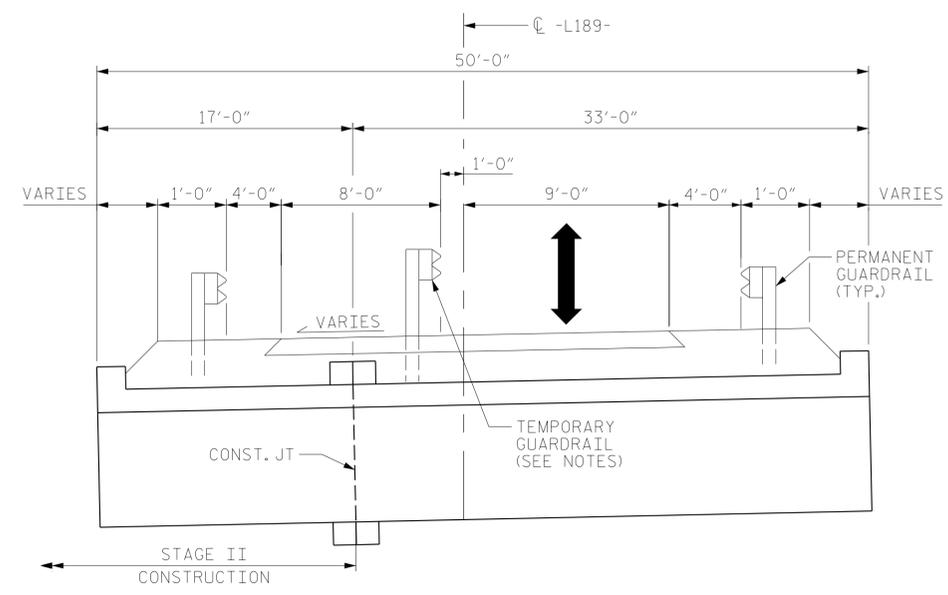
INITIAL CONDITION



STAGE I CONSTRUCTION  
NORMAL TO ROADWAY SECTION



FINAL CONDITION  
NORMAL TO ROADWAY SECTION



STAGE II CONSTRUCTION  
NORMAL TO ROADWAY SECTION

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
STATION: 11+46.15 -L189-

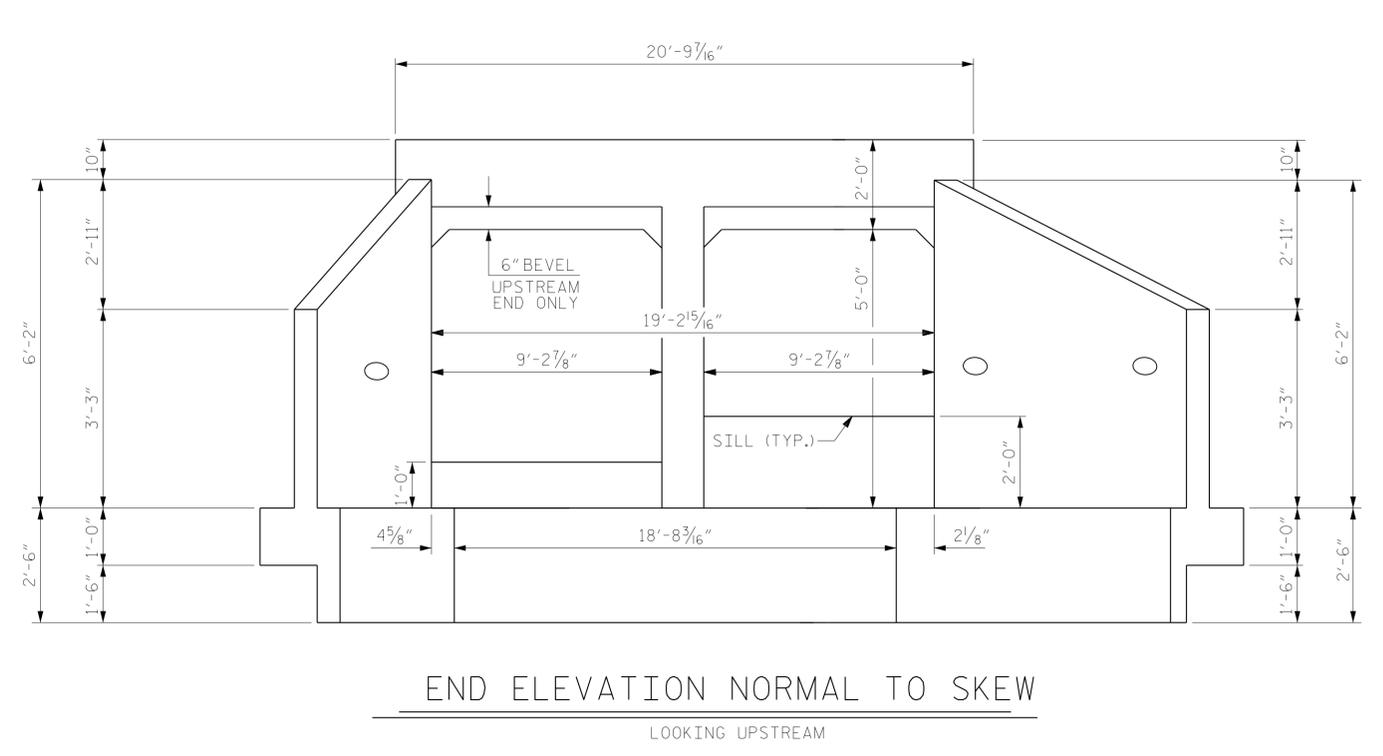
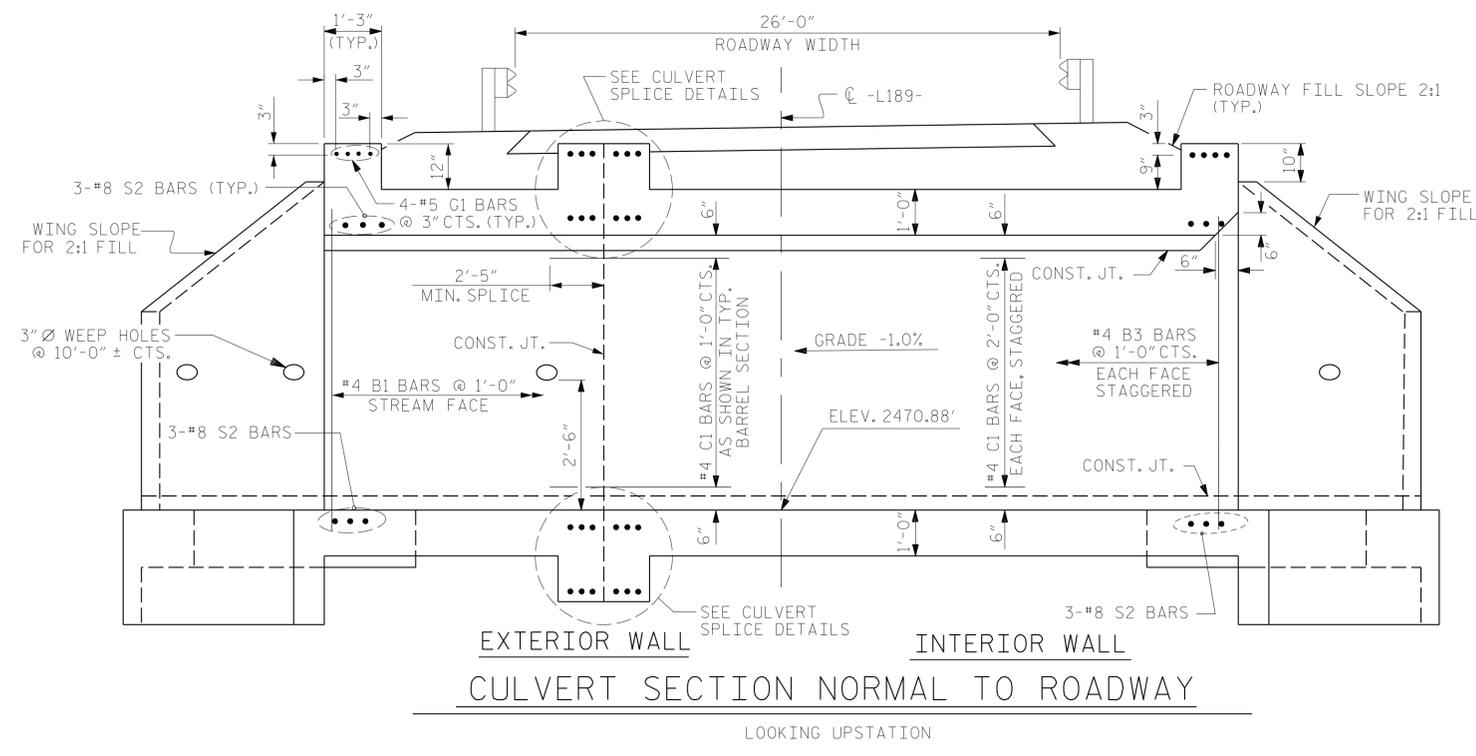
SHEET 3 OF 7

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 8'-0" X 5'-0" CONCRETE BOX CULVERT STAGING DETAILS					
60° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. C3-3					TOTAL SHEETS 7

NOTES:  
TEMPORARY GUARDRAIL SHOWN FOR REFERENCE ONLY.  
FOR PLACEMENT OF TEMPORARY GUARDRAIL, SEE TMP PLANS.

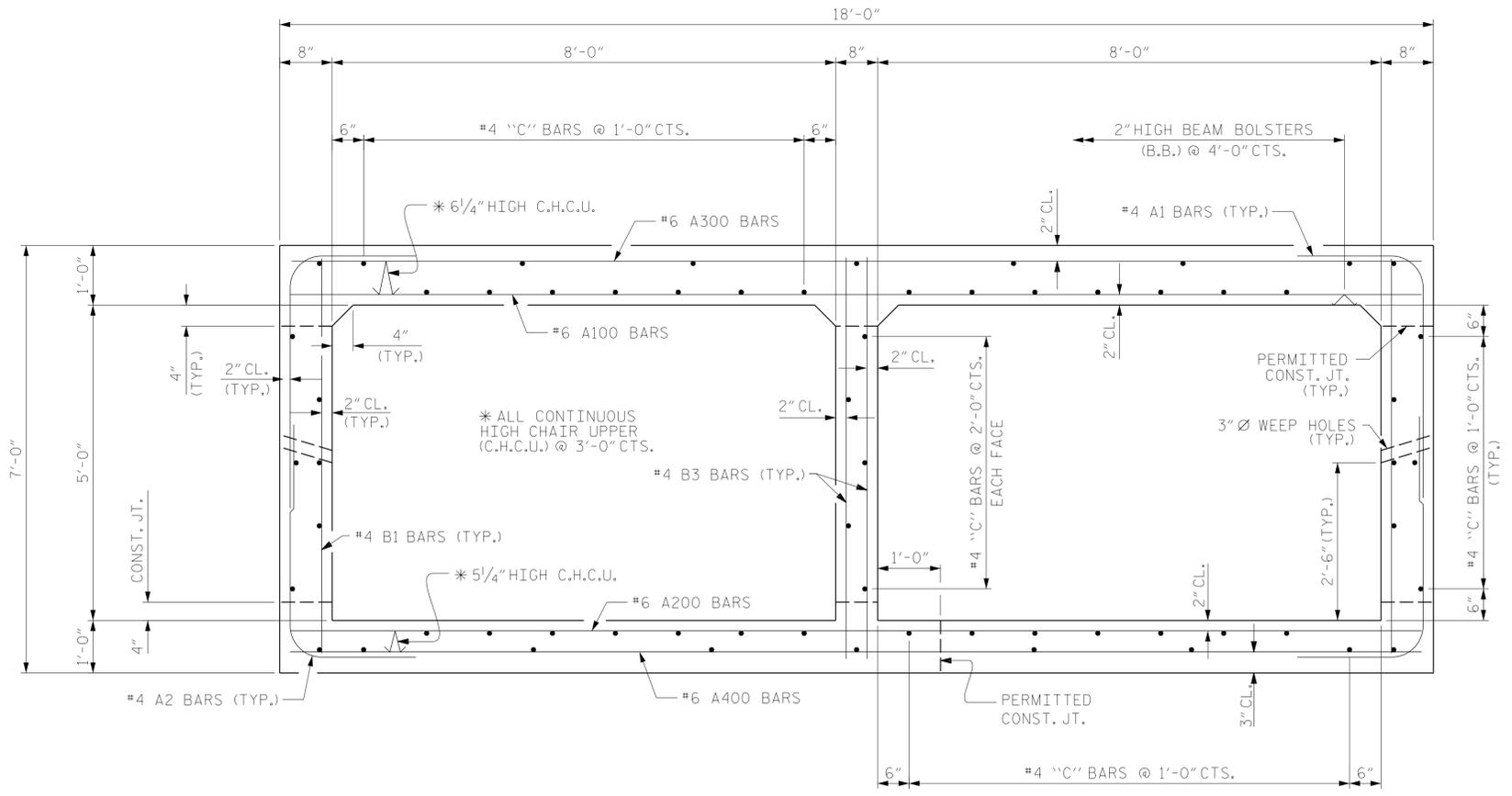
DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

DRAWN BY :	N. CUANY	DATE :	02/2024
CHECKED BY :	M. ACOSTA	DATE :	02/2024
DESIGN ENGINEER OF RECORD:	M. ACOSTA	DATE :	08/2025

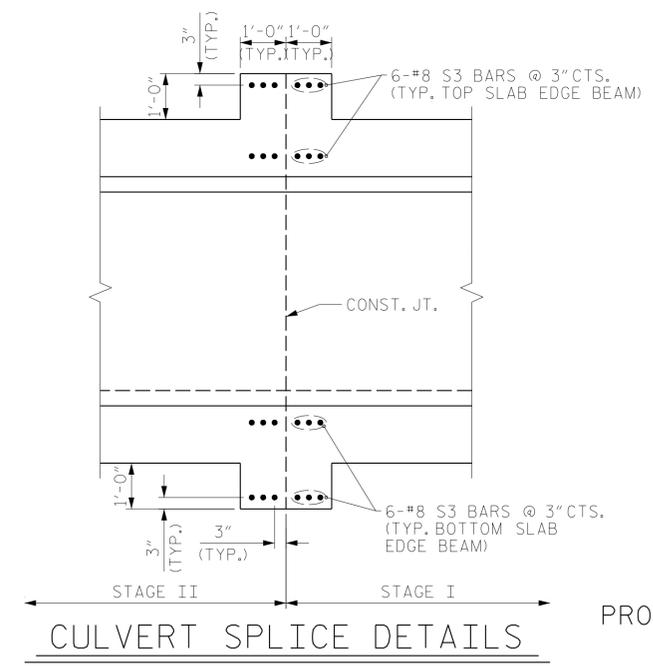


EXTERIOR WALL INTERIOR WALL  
**CULVERT SECTION NORMAL TO ROADWAY**  
 LOOKING UPSTATION

**END ELEVATION NORMAL TO SKEW**  
 LOOKING UPSTREAM



**RIGHT ANGLE SECTION OF BARREL**  
 THERE ARE 63 #C# BARS IN SECTION OF BARREL.



**CULVERT SPLICE DETAILS**

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 11+46.15 -L189-

SHEET 4 OF 7

I HEREBY CERTIFY THESE PLANS  
 ARE THE AS-BUILT PLANS

**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-0403-C&E

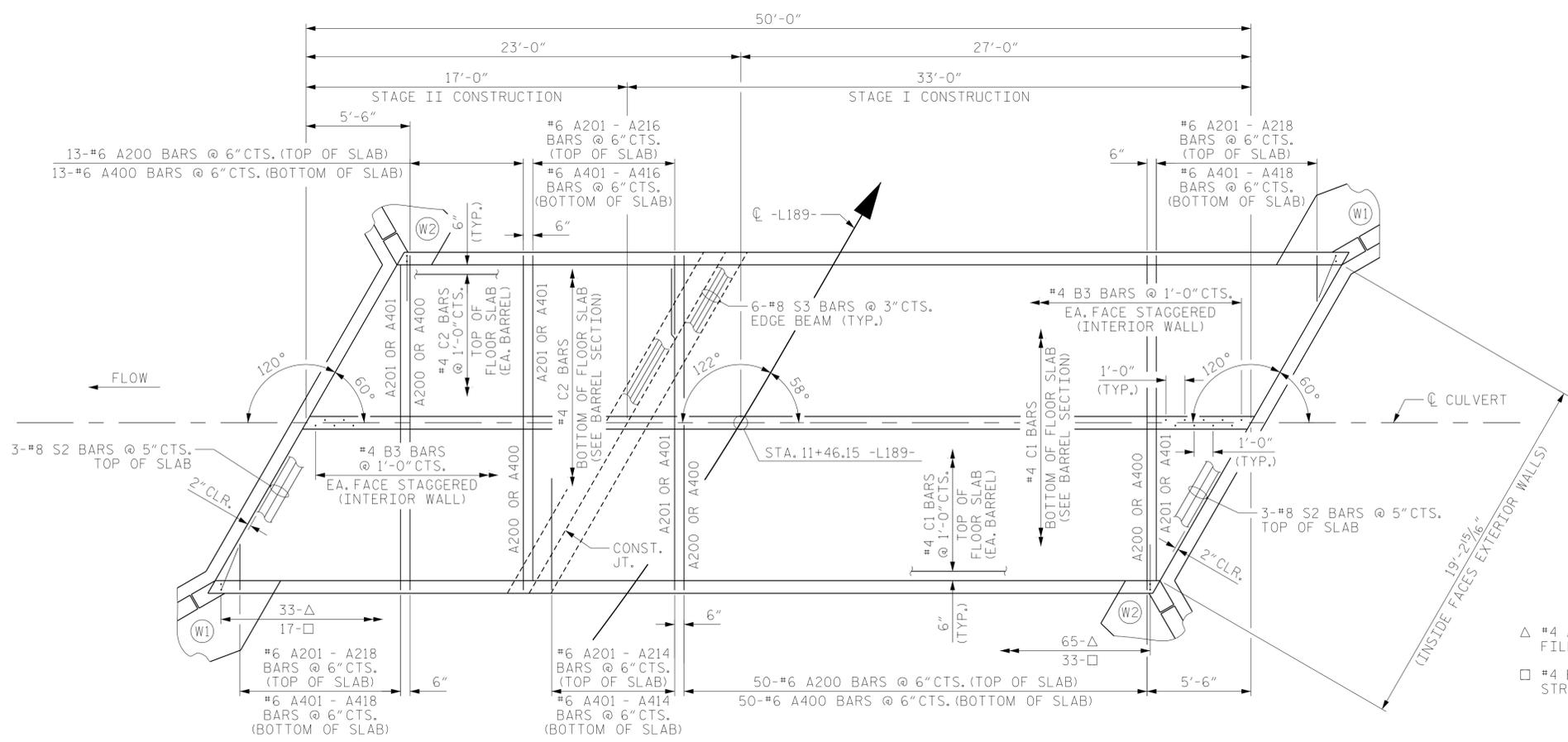
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**DOUBLE 8'-0" X 5'-0" CONCRETE BOX CULVERT SECTION**  
 60° SKEW

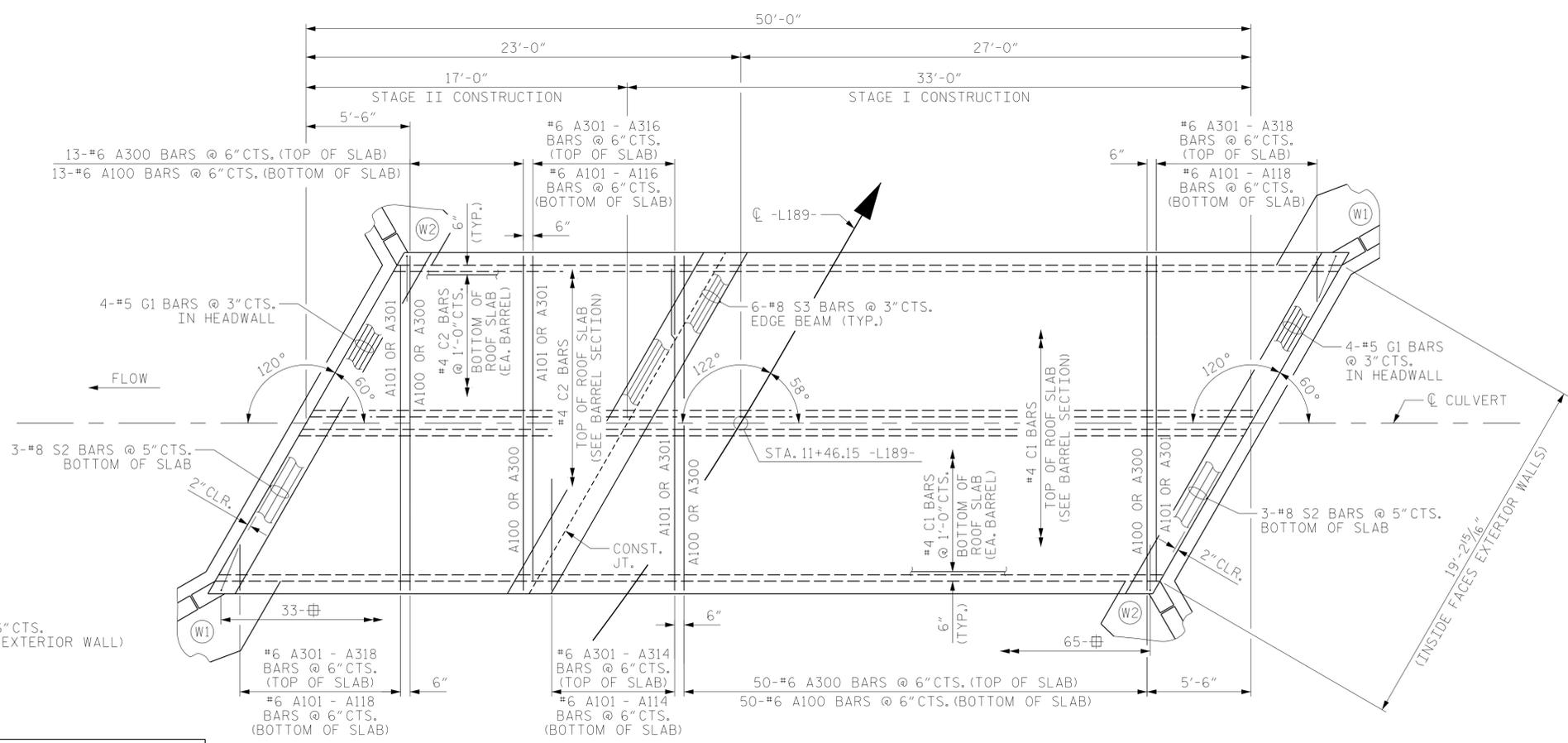
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-4
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED



PLAN - FLOOR SLAB

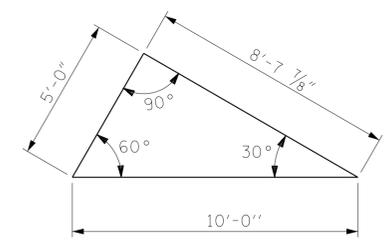


PLAN - ROOF SLAB

NOTES:

- "A" BARS FROM STAGE I TO EXTEND 4'-0" MIN. INTO STAGE II.
- C1 BARS FROM STAGE I TO EXTEND 2'-7" MIN. INTO STAGE II.
- SEE SHEET 4 OF 7 FOR PLACEMENT OF S3 BARS IN SLAB AND EDGE BEAM.

- △ #4 A2 BARS @ 6" CTS. FILL FACE (EA. EXTERIOR WALL)
- #4 B1 BARS @ 1'-0" CTS. STREAM FACE (EA. EXTERIOR WALL)



SKEW TRIANGLE

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 11+46.15 -L189-

SHEET 5 OF 7

**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-5403 - C-28

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 8'-0" X 5'-0" CONCRETE BOX CULVERT PLAN					
60° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. C3-5 TOTAL SHEETS 7

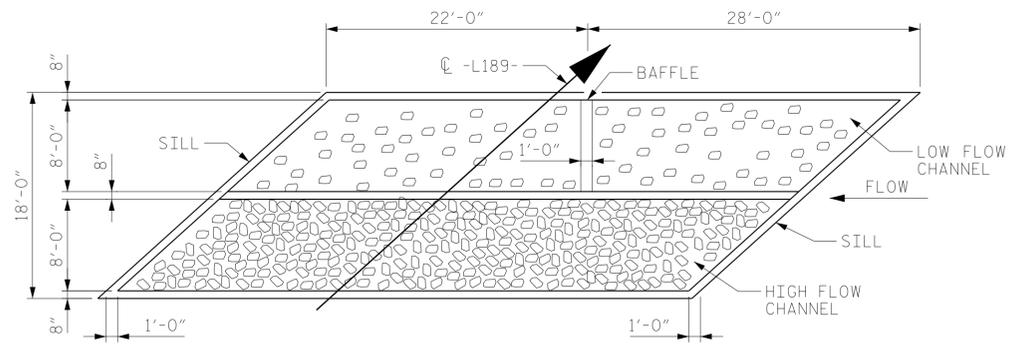
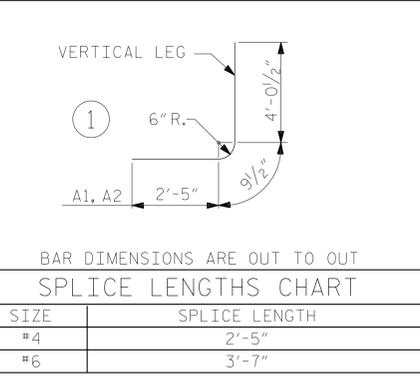
DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

# BILL OF MATERIAL

STAGE I						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	130	#4	1	7'-3"	630	A400	50	#6	STR	17'-8"	1327	A1	66	#4	1	7'-3"	320	A400	13	#6	STR	17'-8"	345						
A2	130	#4	1	7'-3"	630	A401	2	#6	STR	17'-1"	51	A2	66	#4	1	7'-3"	320	A401	2	#6	STR	17'-1"	51						
						A402	2	#6	STR	16'-3"	49							A402	2	#6	STR	16'-3"	49						
A100	50	#6	STR	17'-8"	1327	A403	2	#6	STR	15'-5"	46	A100	13	#6	STR	17'-8"	345	A403	2	#6	STR	15'-5"	46						
A101	2	#6	STR	17'-1"	51	A404	2	#6	STR	14'-6"	44	A101	2	#6	STR	17'-1"	51	A404	2	#6	STR	14'-6"	44						
A102	2	#6	STR	16'-3"	49	A405	2	#6	STR	13'-8"	41	A102	2	#6	STR	16'-3"	49	A405	2	#6	STR	13'-8"	41						
A103	2	#6	STR	15'-5"	46	A406	2	#6	STR	12'-9"	38	A103	2	#6	STR	15'-5"	46	A406	2	#6	STR	12'-9"	38						
A104	2	#6	STR	14'-6"	44	A407	2	#6	STR	11'-11"	36	A104	2	#6	STR	14'-6"	44	A407	2	#6	STR	11'-11"	36						
A105	2	#6	STR	13'-8"	41	A408	2	#6	STR	11'-1"	33	A105	2	#6	STR	13'-8"	41	A408	2	#6	STR	11'-1"	33						
A106	2	#6	STR	12'-9"	38	A409	2	#6	STR	10'-2"	31	A106	2	#6	STR	12'-9"	38	A409	2	#6	STR	10'-2"	31						
A107	2	#6	STR	11'-11"	36	A410	2	#6	STR	9'-4"	28	A107	2	#6	STR	11'-11"	36	A410	2	#6	STR	9'-4"	28						
A108	2	#6	STR	11'-1"	33	A411	2	#6	STR	8'-6"	26	A108	2	#6	STR	11'-1"	33	A411	2	#6	STR	8'-6"	26						
A109	2	#6	STR	10'-2"	31	A412	2	#6	STR	7'-7"	23	A109	2	#6	STR	10'-2"	31	A412	2	#6	STR	7'-7"	23						
A110	2	#6	STR	9'-4"	28	A413	2	#6	STR	6'-9"	20	A110	2	#6	STR	9'-4"	28	A413	2	#6	STR	6'-9"	20						
A111	2	#6	STR	8'-6"	26	A414	2	#6	STR	5'-10"	18	A111	2	#6	STR	8'-6"	26	A414	2	#6	STR	5'-10"	18						
A112	2	#6	STR	7'-7"	23	A415	1	#6	STR	5'-0"	8	A112	2	#6	STR	7'-7"	23	A415	2	#6	STR	5'-0"	15						
A113	2	#6	STR	6'-9"	20	A416	1	#6	STR	4'-2"	6	A113	2	#6	STR	6'-9"	20	A416	2	#6	STR	4'-2"	13						
A114	2	#6	STR	5'-10"	18	A417	1	#6	STR	3'-3"	5	A114	2	#6	STR	5'-10"	18	A417	1	#6	STR	3'-3"	5						
A115	1	#6	STR	5'-0"	8	A418	1	#6	STR	2'-5"	4	A115	2	#6	STR	5'-0"	15	A418	1	#6	STR	2'-5"	4						
A116	1	#6	STR	4'-2"	6							A116	2	#6	STR	4'-2"	13												
A117	1	#6	STR	3'-3"	5	B1	66	#4	STR	6'-7"	290	A117	1	#6	STR	3'-3"	5	B1	34	#4	STR	6'-7"	150						
A118	1	#6	STR	2'-5"	4	B3	66	#4	STR	6'-7"	290	A118	1	#6	STR	2'-5"	4	B3	34	#4	STR	6'-7"	150						
A200	50	#6	STR	17'-8"	1327	C1	63	#4	STR	35'-5"	1490	A200	13	#6	STR	17'-8"	345	C2	63	#4	STR	16'-7"	698						
A201	2	#6	STR	17'-1"	51							A201	2	#6	STR	17'-1"	51												
A202	2	#6	STR	16'-3"	49	D1	8	#6	STR	1'-7"	19	A202	2	#6	STR	16'-3"	49	D1	4	#6	STR	1'-7"	10						
A203	2	#6	STR	15'-5"	46	D2	4	#6	STR	2'-7"	16	A203	2	#6	STR	15'-5"	46	D2	4	#6	STR	2'-7"	16						
A204	2	#6	STR	14'-6"	44							A204	2	#6	STR	14'-6"	44												
A205	2	#6	STR	13'-8"	41	G1	4	#5	STR	20'-4"	85	A205	2	#6	STR	13'-8"	41	G1	4	#5	STR	20'-4"	85						
A206	2	#6	STR	12'-9"	38							A206	2	#6	STR	12'-9"	38												
A207	2	#6	STR	11'-11"	36	S2	6	#8	STR	20'-4"	326	A207	2	#6	STR	11'-11"	36	S2	6	#8	STR	20'-4"	326						
A208	2	#6	STR	11'-1"	33	S3	12	#8	STR	20'-4"	651	A208	2	#6	STR	11'-1"	33	S3	12	#8	STR	20'-4"	651						
A209	2	#6	STR	10'-2"	31							A209	2	#6	STR	10'-2"	31												
A210	2	#6	STR	9'-4"	28	REINFORCING STEEL 11,763 LBS.					A210	2	#6	STR	9'-4"	28	REINFORCING STEEL 6,190 LBS.												
A211	2	#6	STR	8'-6"	26	SILL FOR TWO BARRELS					A211	2	#6	STR	8'-6"	26	SILL FOR TWO BARRELS												
A212	2	#6	STR	7'-7"	23							A212	2	#6	STR	7'-7"	23												
A213	2	#6	STR	6'-9"	20	CLASS A CONCRETE					A213	2	#6	STR	6'-9"	20	CLASS A CONCRETE												
A214	2	#6	STR	5'-10"	18	LOW FLOW SILL 0.3 C.Y.					A214	2	#6	STR	5'-10"	18	LOW FLOW SILL 0.3 C.Y.												
A215	1	#6	STR	5'-0"	8	HIGH FLOW SILL 0.7 C.Y.					A215	2	#6	STR	5'-0"	15	HIGH FLOW SILL 0.7 C.Y.												
A216	1	#6	STR	4'-2"	6	BAFFLE 0.3 C.Y.					A216	2	#6	STR	4'-2"	13	BAFFLE 0.0 C.Y.												
A217	1	#6	STR	3'-3"	5	EDGE BEAM 1.6 C.Y.					A217	1	#6	STR	3'-3"	5	EDGE BEAM 1.6 C.Y.												
A218	1	#6	STR	2'-5"	4	TOTAL 2.9 C.Y.					A218	1	#6	STR	2'-5"	4	TOTAL 2.6 C.Y.												
A300	50	#6	STR	17'-8"	1327							A300	13	#6	STR	17'-8"	345												
A301	2	#6	STR	17'-1"	51							A301	2	#6	STR	17'-1"	51												
A302	2	#6	STR	16'-3"	49							A302	2	#6	STR	16'-3"	49												
A303	2	#6	STR	15'-5"	46							A303	2	#6	STR	15'-5"	46												
A304	2	#6	STR	14'-6"	44							A304	2	#6	STR	14'-6"	44												
A305	2	#6	STR	13'-8"	41							A305	2	#6	STR	13'-8"	41												
A306	2	#6	STR	12'-9"	38							A306	2	#6	STR	12'-9"	38												
A307	2	#6	STR	11'-11"	36							A307	2	#6	STR	11'-11"	36												
A308	2	#6	STR	11'-1"	33							A308	2	#6	STR	11'-1"	33												
A309	2	#6	STR	10'-2"	31							A309	2	#6	STR	10'-2"	31												
A310	2	#6	STR	9'-4"	28							A310	2	#6	STR	9'-4"	28												
A311	2	#6	STR	8'-6"	26							A311	2	#6	STR	8'-6"	26												
A312	2	#6	STR	7'-7"	23							A312	2	#6	STR	7'-7"	23												
A313	2	#6	STR	6'-9"	20							A313	2	#6	STR	6'-9"	20												
A314	2	#6	STR	5'-10"	18							A314	2	#6	STR	5'-10"	18												
A315	1	#6	STR	5'-0"	8							A315	2	#6	STR	5'-0"	15												
A316	1	#6	STR	4'-2"	6							A316	2	#6	STR	4'-2"	13												
A317	1	#6	STR	3'-3"	5							A317	1	#6	STR	3'-3"	5												
A318	1	#6	STR	2'-5"	4							A318	1	#6	STR	2'-5"	4												

## BAR TYPE

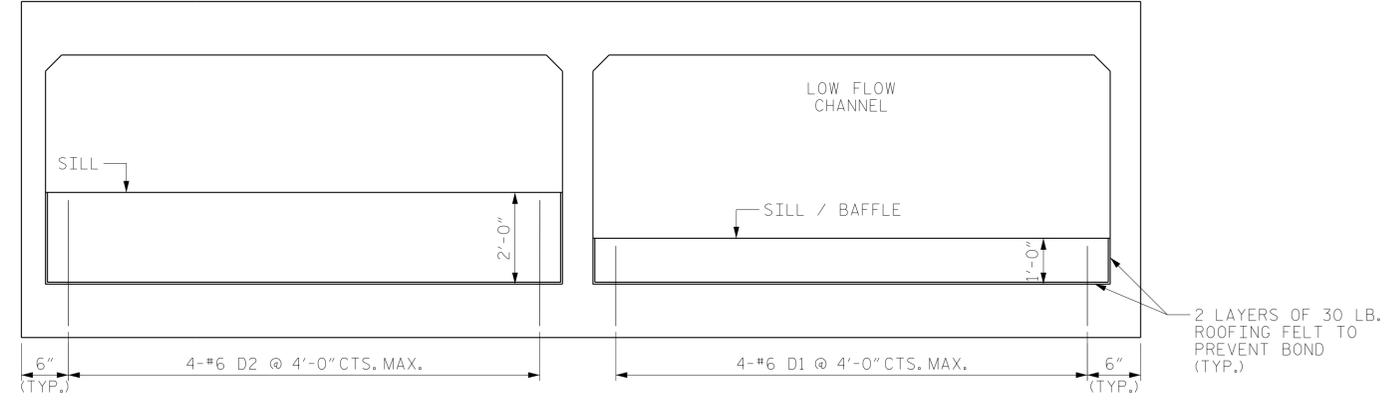


PLAN OF FLOOR SILL LAYOUT

BACKFILL ENTIRE CULVERT BED WITH NATIVE BED MATERIAL TO SILL HEIGHT

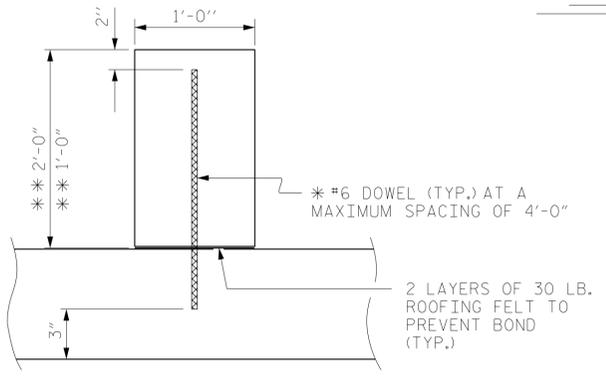
### NOTES:

- SILLS TO BE CONSTRUCTED AT INLET AND OUTLET AS SHOWN.
- SILLS TO BE 1'-0" WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.
- BACKFILL OVERFLOW BARREL AND LOW FLOW BARREL TO TOP OF SILL WITH NATIVE BED MATERIAL AND SUBSIZE WITH CLASS "II" RIP RAP IF NEEDED.
- SEE "NATIVE BED MATERIAL" UNDER "ADDITIONAL INFORMATION AND COMPUTATIONS" OF THE CULVERT SURVEY & HYDRAULIC DESIGN REPORT.
- THE ENTIRE COST OF WORK REQUIRED TO PLACE EXCAVATED OR SUPPLEMENTAL MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.



CULVERT SILL / BAFFLE DETAILS

LOOKING DOWNSTREAM



SECTION THROUGH SILL

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

\*\* SEE CULVERT SILL / BAFFLE DETAILS FOR LOCATION AND HEIGHT OF SILL

(SILL SHOWN, BAFFLE SIMILAR)

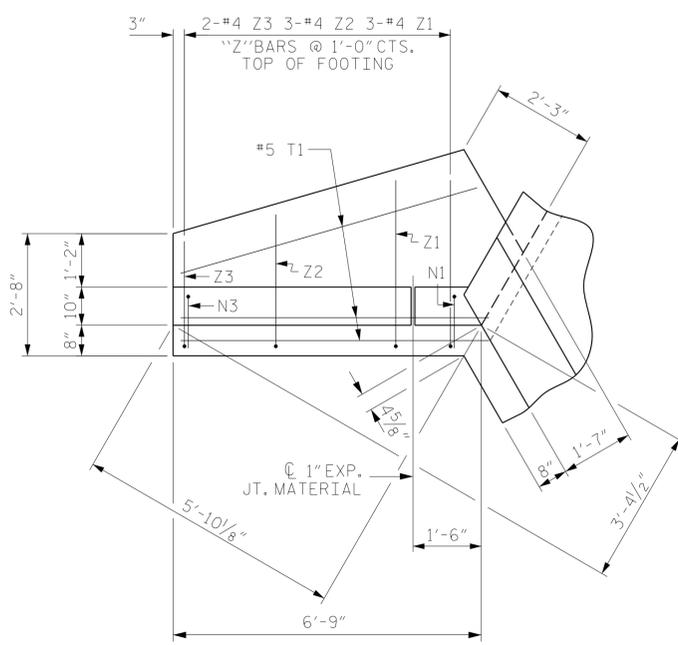
PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 11+46.15 -L189-

SHEET 6 OF 7

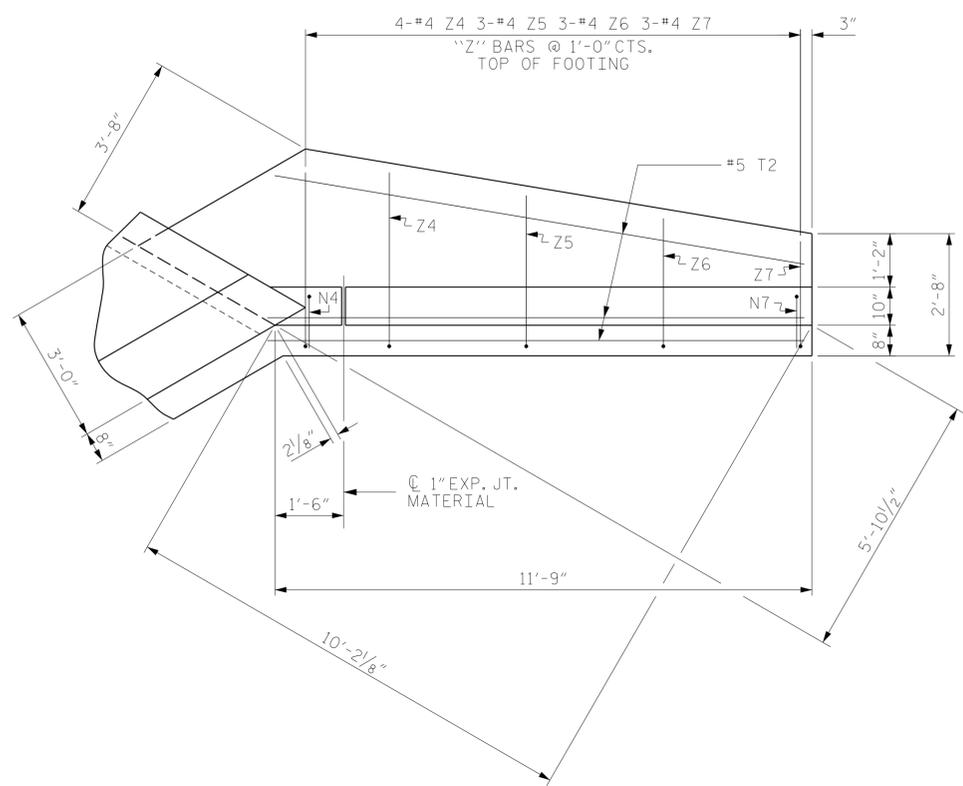
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 8'-0" X 5'-0" CONCRETE BOX CULVERT DETAILS					
60° SKEW					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					C3-6
					TOTAL SHEETS 7

DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

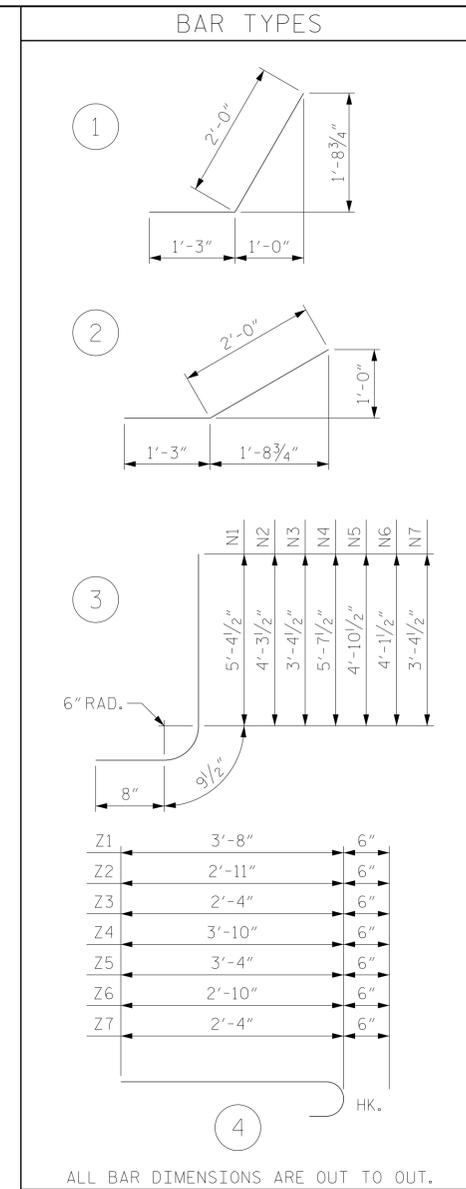
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



PLAN W2

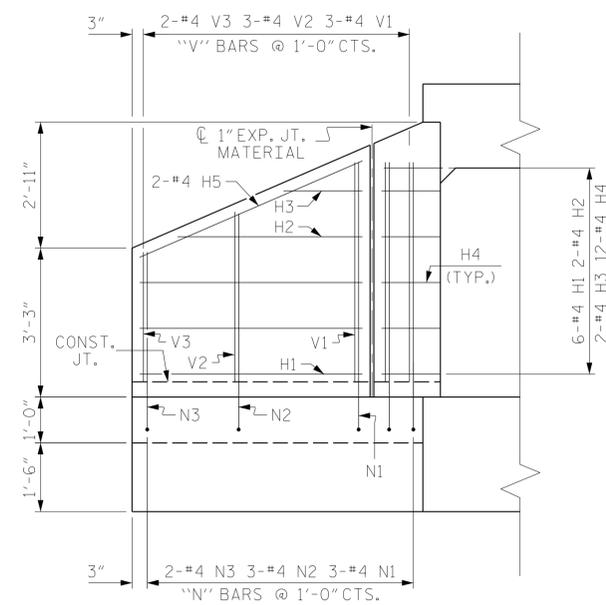


PLAN W1

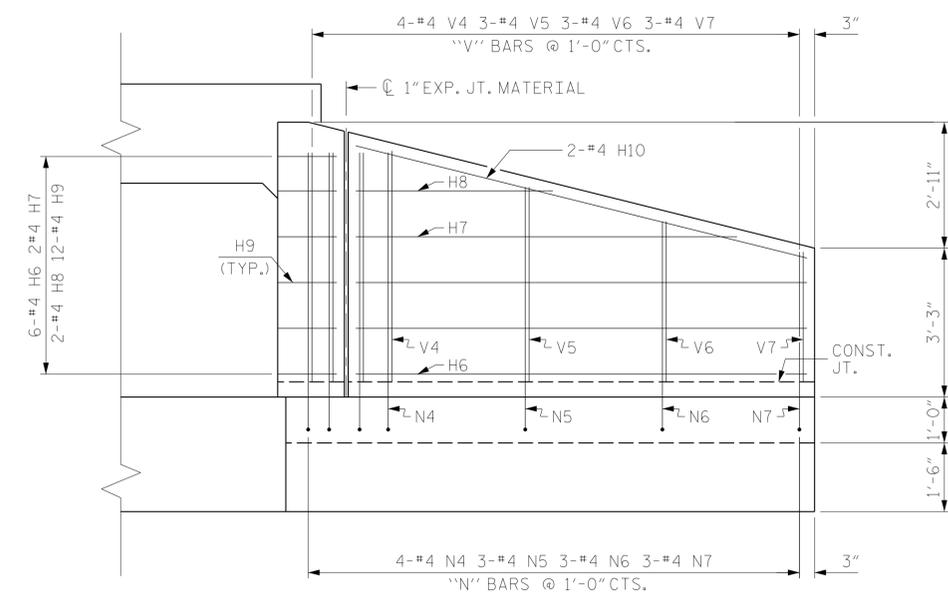


ALL BAR DIMENSIONS ARE OUT TO OUT.

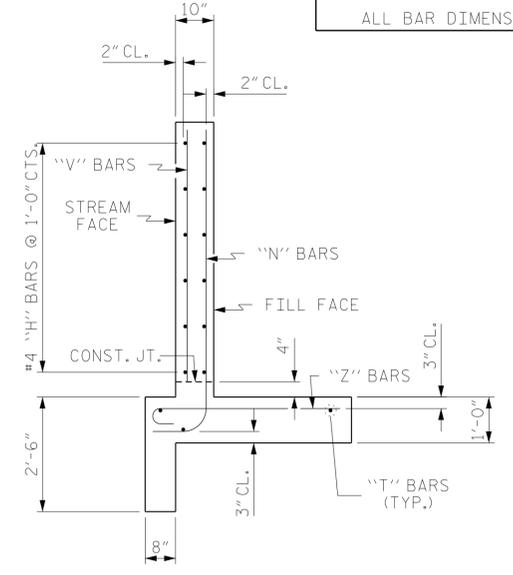
BILL OF MATERIAL					
EACH STAGE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	4'-10"	19
H2	2	#4	STR	4'-0"	5
H3	2	#4	STR	1'-9"	2
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	5'-3"	7
H6	6	#4	STR	9'-10"	39
H7	2	#4	STR	8'-4"	11
H8	2	#4	STR	4'-3"	6
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	10'-2"	14
N1	3	#4	3	6'-10"	14
N2	3	#4	3	5'-9"	12
N3	2	#4	3	4'-10"	6
N4	4	#4	3	7'-1"	19
N5	3	#4	3	6'-4"	13
N6	3	#4	3	5'-3"	11
N7	3	#4	3	4'-10"	10
T1	3	#5	STR	6'-9"	21
T2	3	#5	STR	11'-9"	37
V1	3	#4	STR	4'-9"	10
V2	3	#4	STR	3'-8"	7
V3	2	#4	STR	2'-10"	4
V4	4	#4	STR	5'-0"	13
V5	3	#4	STR	4'-3"	9
V6	3	#4	STR	3'-6"	7
V7	3	#4	STR	2'-10"	6
Z1	3	#4	4	4'-2"	8
Z2	3	#4	4	3'-5"	7
Z3	2	#4	4	2'-10"	4
Z4	4	#4	4	4'-4"	12
Z5	3	#4	4	3'-10"	8
Z6	3	#4	4	3'-4"	7
Z7	3	#4	4	2'-10"	6
REINFORCING STEEL FOR 2 WINGS					406 LBS
CLASS A CONCRETE					
2 WINGS					6.1 CY
1 HEADWALL					1.0 CY
1 END CURTAIN WALL					1.4 CY
TOTAL					8.5 CY



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 11+46.15 -L189-

SHEET 7 OF 7



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**WINGS FOR CONCRETE BOX CULVERT**  
 H = 5'-0" SLOPE = 2:1  
 60° SKEW

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

DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	- - - - -	AASHTO (CURRENT)
LIVE LOAD	- - - - -	SEE PLANS
IMPACT ALLOWANCE	- - - - -	SEE AASHTO
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 AASHTO
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 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

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

### CONCRETE:

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

### CONCRETE CHAMFERS:

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

### DOWELS:

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

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

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

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

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

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

### REINFORCING STEEL:

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

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

### STRUCTURAL STEEL:

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

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST  $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY  $\frac{1}{16}$ " 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.

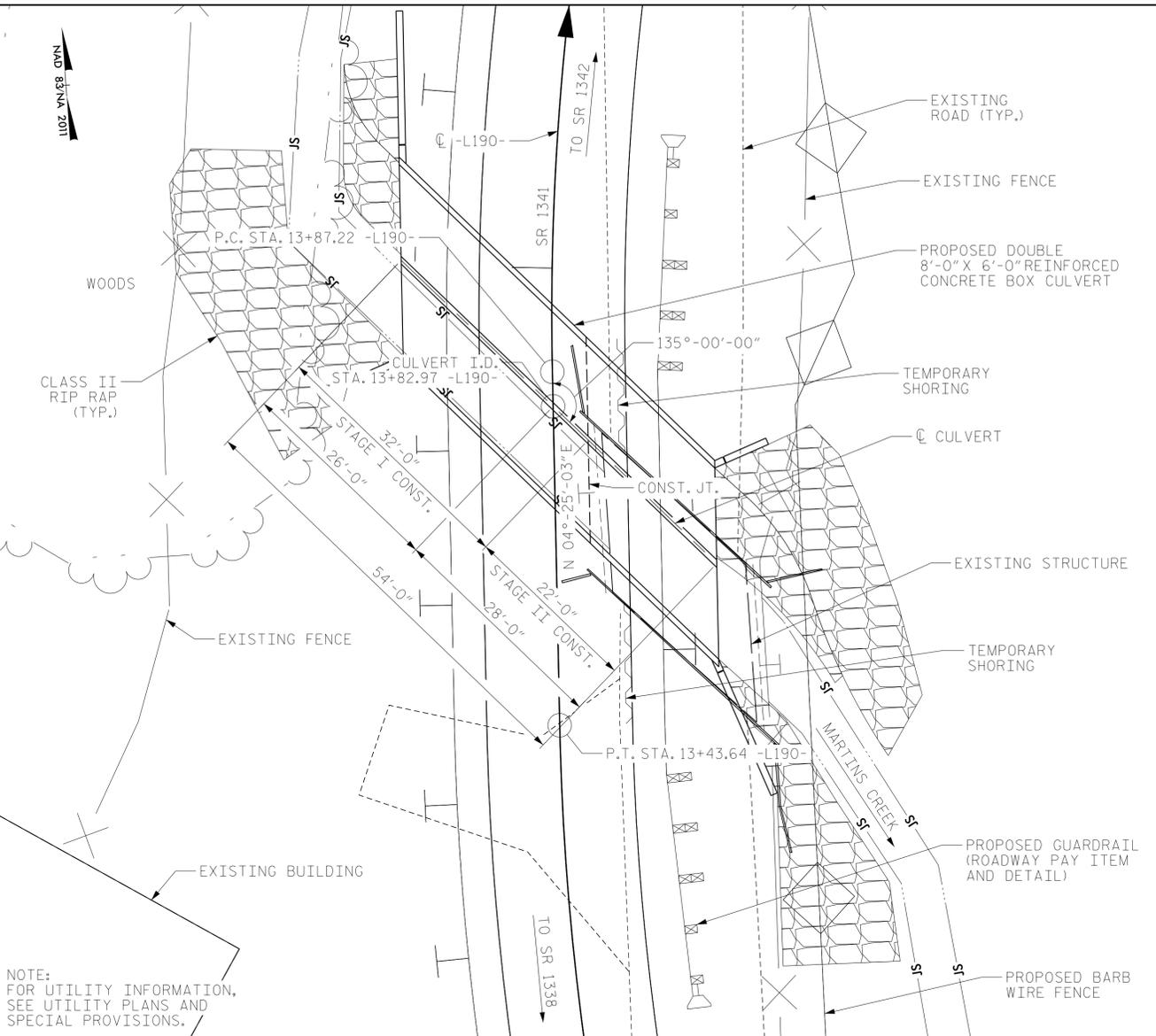
METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL 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.

BM#2: SPIKE IN BASE OF 15" WALNUT 41' LT. OF STA. 14+52.00 -L190-, ELEV. 2541.59

NOTES



LOCATION SKETCH

**HYDRAULIC DATA**

DESIGN DISCHARGE	= 480 CFS
FREQUENCY OF DESIGN DISCHARGE	= 25 YRS
DESIGN HIGH WATER ELEVATION	= 2,536.30'
DRAINAGE AREA	= 1.30 SQ MI
BASE DISCHARGE (Q100)	= 700 CFS
BASE HIGH WATER ELEVATION	= 2,537.90'

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE	= 1,100 CFS
FREQUENCY OF OVERTOPPING	= 500+ YRS
OVERTOPPING ELEVATION	= 2,540.90'

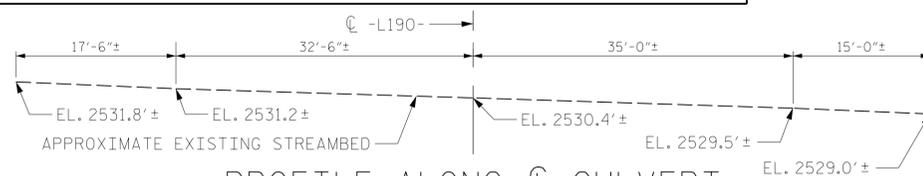
**GRADE DATA -L190-**

GRADE POINT EL. @ STA. 13+82.97 -L190-	= 2,538.6'
BED EL. @ STA. 13+82.97 -L190-	= 2,529.4'
ROADWAY FILL SLOPES	= 2:1 MAX.

**PROFILE DATA -L190-**

PI = 12+98.00	PI = 14+78.00
EL. = 2,537.92'	EL. = 2,539.29'
VC = 100'	VC = 232'
K = 32	K = 49
G1 = 3.9205%	G1 = 0.7583%
G2 = 0.7583%	G2 = 5.4884%

DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025



PROFILE ALONG C CULVERT

TOTAL STRUCTURE QUANTITIES			
CLASS A CONCRETE	REINFORCING STEEL	FOUNDATION CONDITIONING MATERIAL	CLASS II RIP RAP
BARREL @ 1.95 C.Y./FT			175 TONS
STAGE I	STAGE I	STAGE I 50 TONS	GEOTEXTILE FOR DRAINAGE
CULVERT 66.1 C.Y.	CULVERT 7,752 LBS.	STAGE II 35 TONS	194 SY
WING ETC. 13.4 C.Y.	WING ETC. 723 LBS.	TOTAL 85 TONS	ASBESTOS ASSESSMENT
TOTAL 79.5 C.Y.	TOTAL 8,475 LBS.	REMOVAL OF EXISTING STRUCTURE STA. 13+82.97 -L190-	LUMP SUM
STAGE II	STAGE II	CULVERT EXCAVATION STA. 13+82.97 -L190-	
CULVERT 46.3 C.Y.	CULVERT 5,399 LBS.		
WING ETC. 12.3 C.Y.	WING ETC. 583 LBS.		
TOTAL 58.6 C.Y.	TOTAL 5,982 LBS.		
TOTAL CONCRETE 138.1 C.Y.	TOTAL STEEL 14,457 LBS.		

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING  
 DESIGN FILL = 3.50' MAX. AND 2.75' MIN.  
 CONCRETE CULVERTS TO BE POURED IN THE FOLLOWING ORDER FOR EACH STAGE:  
 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 THE CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.  
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.  
 AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING STRUCTURE CONSISTING OF 1 SPAN @ 20'-9" TIMBER FLOOR ON I-BEAMS WITH TIMBER CAPS, POSTS, AND SILLS @ 5'-6" CENTERS AND CLEAR ROADWAY WIDTH OF 16'-11" SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.  
 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.  
 THE SUBSTRUCTURE OF 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 STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.  
 A THREE FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.  
 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 AT STATION 13+82.97 -L190-".  
 BED MATERIAL PLACED BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL BETWEEN THE LOWER SILLS. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS II RIP RAP. STONES LARGER THAN 23 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.  
 STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.  
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.  
 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.  
 EXCAVATE AT LEAST 1 FOOT BELOW BOTTOM OF CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.  
 SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.  
 SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.  
 BACKFILL WITH SELECT MATERIALS, CLASS II OR CLASS III MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATIONS.  
 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.  
 SEE ROADWAY DETAIL DRAWING 862.03 FOR GUARDRAIL OVER CULVERT.  
 FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.  
 FOR MAINTENANCE OF TRAFFIC, SEE TRANSPORTATION MANAGEMENT PLAN.  
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.  
 FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

SHEET 1 OF 10 REPLACES BRIDGE 430190

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 8'-0" X 6'-0" CONCRETE BOX CULVERT**  
 FOR MARTINS CREEK ON SR 1341 BETWEEN SR 1338 AND SR 1342  
 135° SKEW

RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-F-0403-C-28

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-1
1			3			TOTAL SHEETS
2			4			10

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 (γ <sub>LL</sub> )	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	1.19	--	1.75	1.31	1	BOTTOM SLAB	8.00	1.19	1	BOTTOM SLAB	8.00		
	HL-93 (OPERATING)	N/A		1.55	--	1.35	1.69	1	BOTTOM SLAB	8.00	1.55	1	BOTTOM SLAB	8.00		
	HS-20 (INVENTORY)	36.000	2	1.32	47.52	1.75	1.32	1	BOTTOM SLAB	8.00	1.37	1	BOTTOM SLAB	8.00		
	HS-20 (OPERATING)	36.000		1.71	61.56	1.35	1.71	1	BOTTOM SLAB	8.00	1.78	1	BOTTOM SLAB	8.00		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.64	35.64	1.40	2.64	1	TOP SLAB	3.13	3.18	1	TOP SLAB	7.67		
		SNGARBS2	20.000		2.71	54.20	1.40	2.74	1	TOP SLAB	3.13	2.71	1	BOTTOM SLAB	8.00	
		SNAGRIS2	22.000		2.39	52.58	1.40	2.59	1	BOTTOM SLAB	8.00	2.39	1	BOTTOM SLAB	8.00	
		SNCOTTS3	27.250		1.74	47.42	1.40	2.02	1	BOTTOM SLAB	8.00	1.74	1	TOP SLAB	7.67	
		SNAGGRS4	34.925		1.89	66.01	1.40	1.99	1	BOTTOM SLAB	8.00	1.89	1	BOTTOM SLAB	8.00	
		SNS5A	35.550		1.78	63.28	1.40	1.93	1	BOTTOM SLAB	8.00	1.78	1	BOTTOM SLAB	8.00	
		SNS6A	39.950		1.67	66.72	1.40	1.79	1	BOTTOM SLAB	8.00	1.67	1	BOTTOM SLAB	8.00	
	SNS7B	42.000		1.67	70.14	1.40	1.78	1	BOTTOM SLAB	8.00	1.67	1	BOTTOM SLAB	8.00		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.37	78.21	1.40	2.58	1	BOTTOM SLAB	8.00	2.37	1	BOTTOM SLAB	8.00	
		TNT4A	33.075		1.93	63.83	1.40	2.03	1	BOTTOM SLAB	8.00	1.93	1	BOTTOM SLAB	8.00	
		TNT6A	41.600		1.95	81.12	1.40	2.06	1	BOTTOM SLAB	8.00	1.95	1	BOTTOM SLAB	8.00	
		TNT7A	42.000		1.92	80.64	1.40	2.03	1	BOTTOM SLAB	8.00	1.92	1	BOTTOM SLAB	8.00	
		TNT7B	42.000		1.77	74.34	1.40	1.88	1	BOTTOM SLAB	8.00	1.77	1	BOTTOM SLAB	8.00	
		TNAGRIT4	43.000		1.63	70.09	1.40	1.74	1	BOTTOM SLAB	8.00	1.63	1	BOTTOM SLAB	8.00	
TNAGT5A		45.000		1.63	73.35	1.40	1.74	1	BOTTOM SLAB	8.00	1.63	1	BOTTOM SLAB	8.00		
TNAGT5B	45.000		3	1.60	72.00	1.40	1.72	1	BOTTOM SLAB	8.00	1.60	1	BOTTOM SLAB	8.00		
EMERGENCY VEHICLE (EV)	EV2	28.750		2.06	59.23	1.30	2.06	1	TOP SLAB	3.13	2.09	1	TOP SLAB	7.67		
	EV3	43.000	4	1.51	64.93	1.30	1.78	1	TOP SLAB	3.13	1.51	1	TOP SLAB	7.67		

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

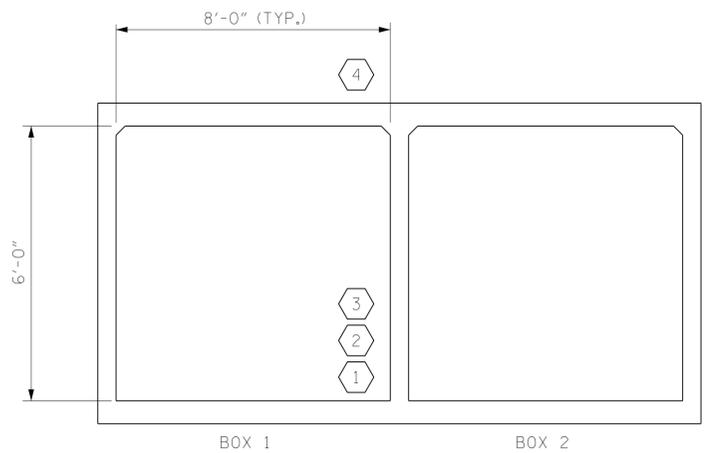
1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING \*\*

4 EMERGENCY VEHICLE LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

SHEET 2 OF 10

**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 00737-0403-C&E

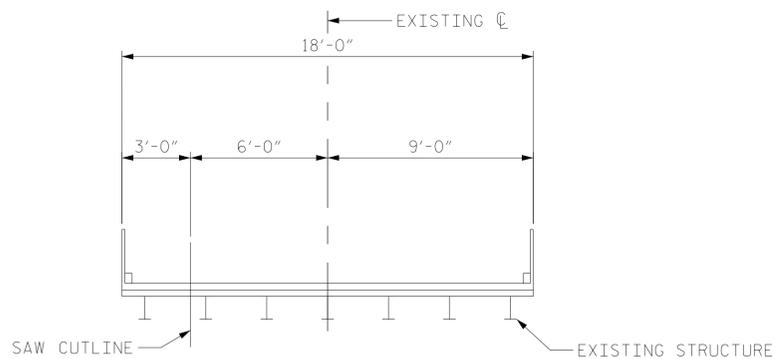
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**LRFR SUMMARY FOR  
 REINFORCED CONCRETE  
 BOX CULVERTS**  
 (NON-INTERSTATE TRAFFIC)

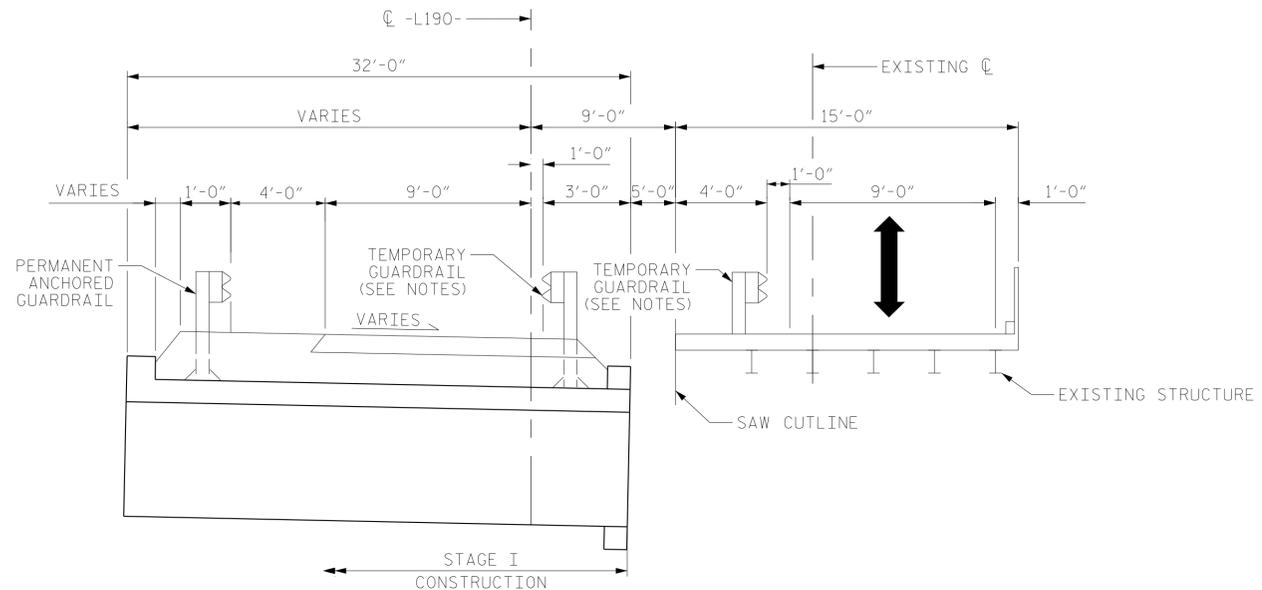
DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

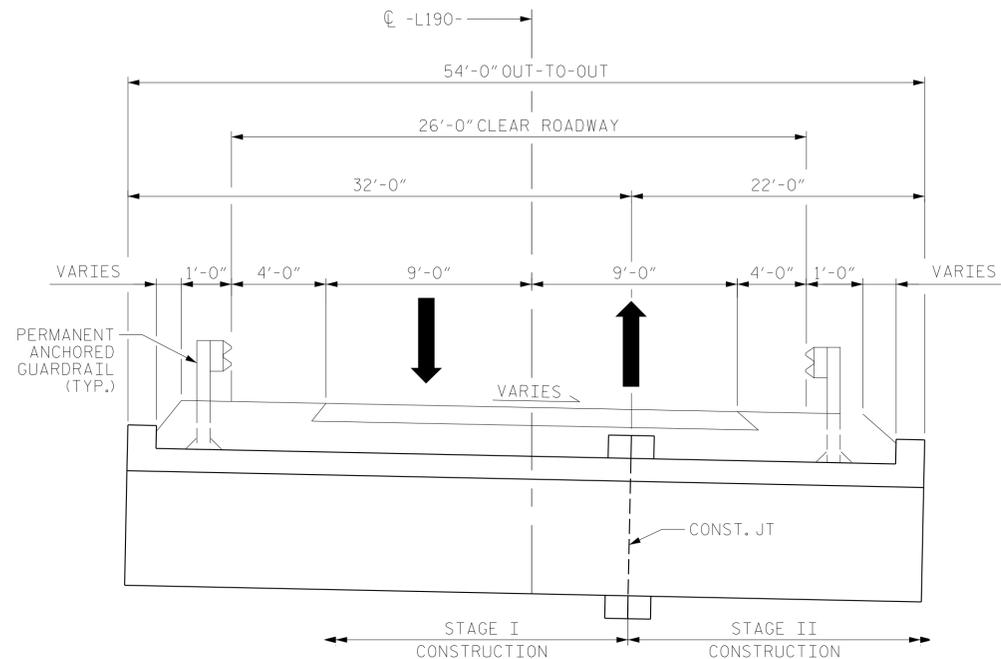
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-2
1			3			TOTAL SHEETS
2			4			10



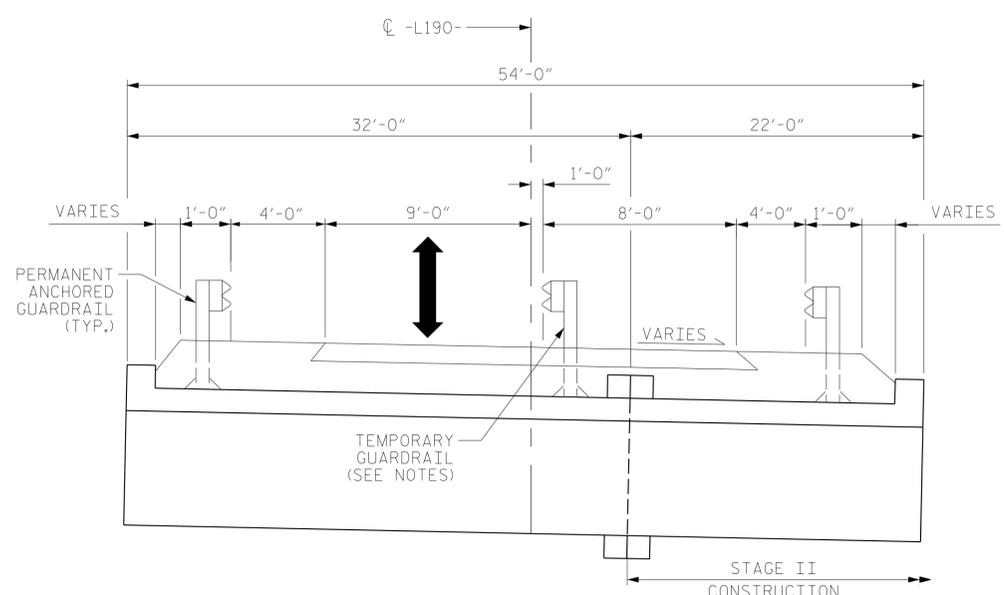
INITIAL CONDITION



STAGE I CONSTRUCTION  
NORMAL TO ROADWAY SECTION



FINAL CONDITION  
NORMAL TO ROADWAY SECTION



STAGE II CONSTRUCTION  
NORMAL TO ROADWAY SECTION

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
STATION: 13+82.97 -L190-

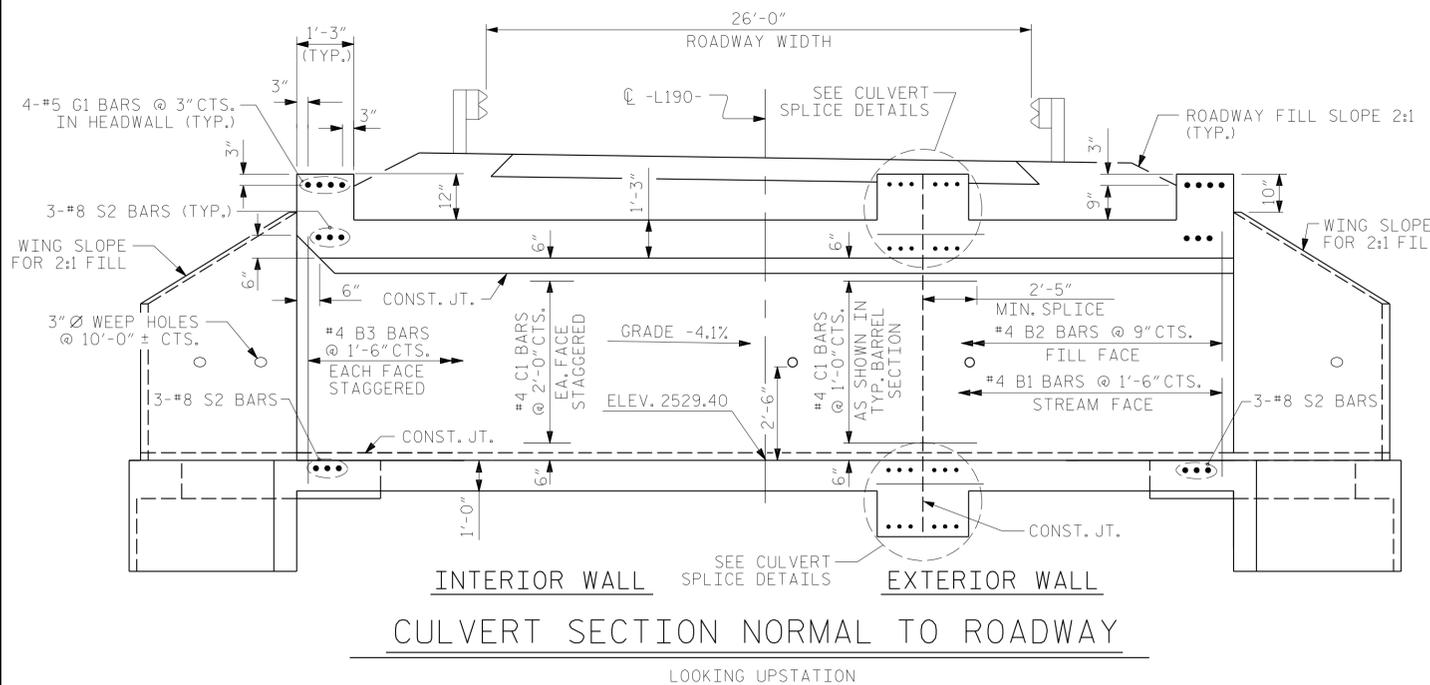
SHEET 3 OF 10

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 8'-0" X 6'-0" CONCRETE BOX CULVERT STAGING DETAILS					
135° SKEW					
SHEET NO. C4-3					
TOTAL SHEETS 10					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

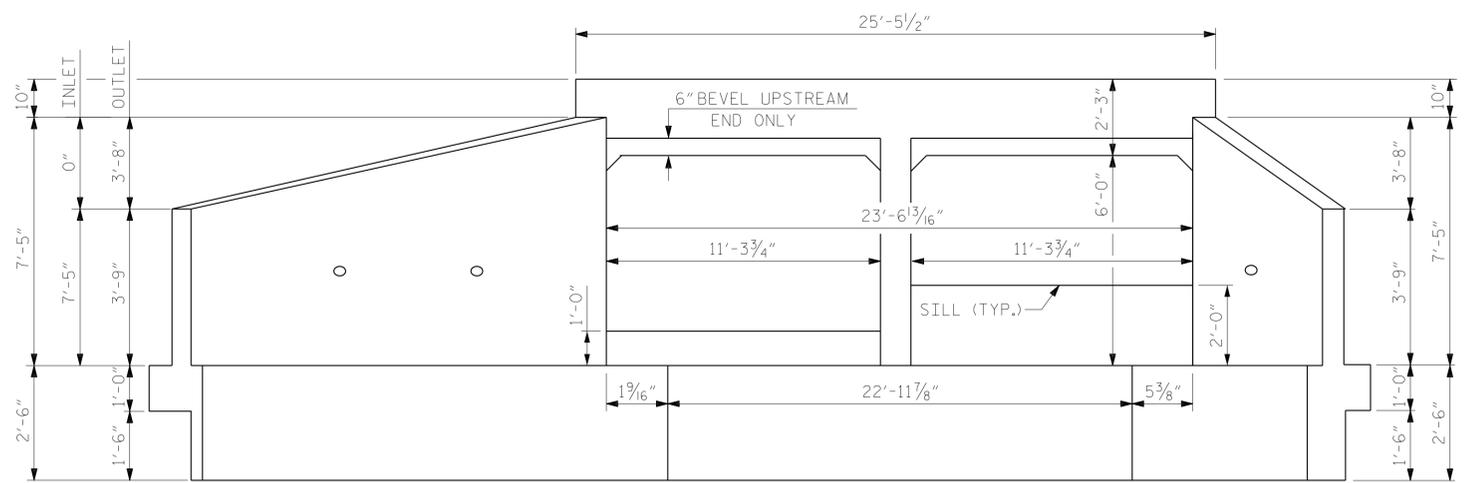
NOTES:  
TEMPORARY GUARDRAIL SHOWN FOR REFERENCE ONLY.  
FOR PLACEMENT OF TEMPORARY GUARDRAIL, SEE TMP PLANS.

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

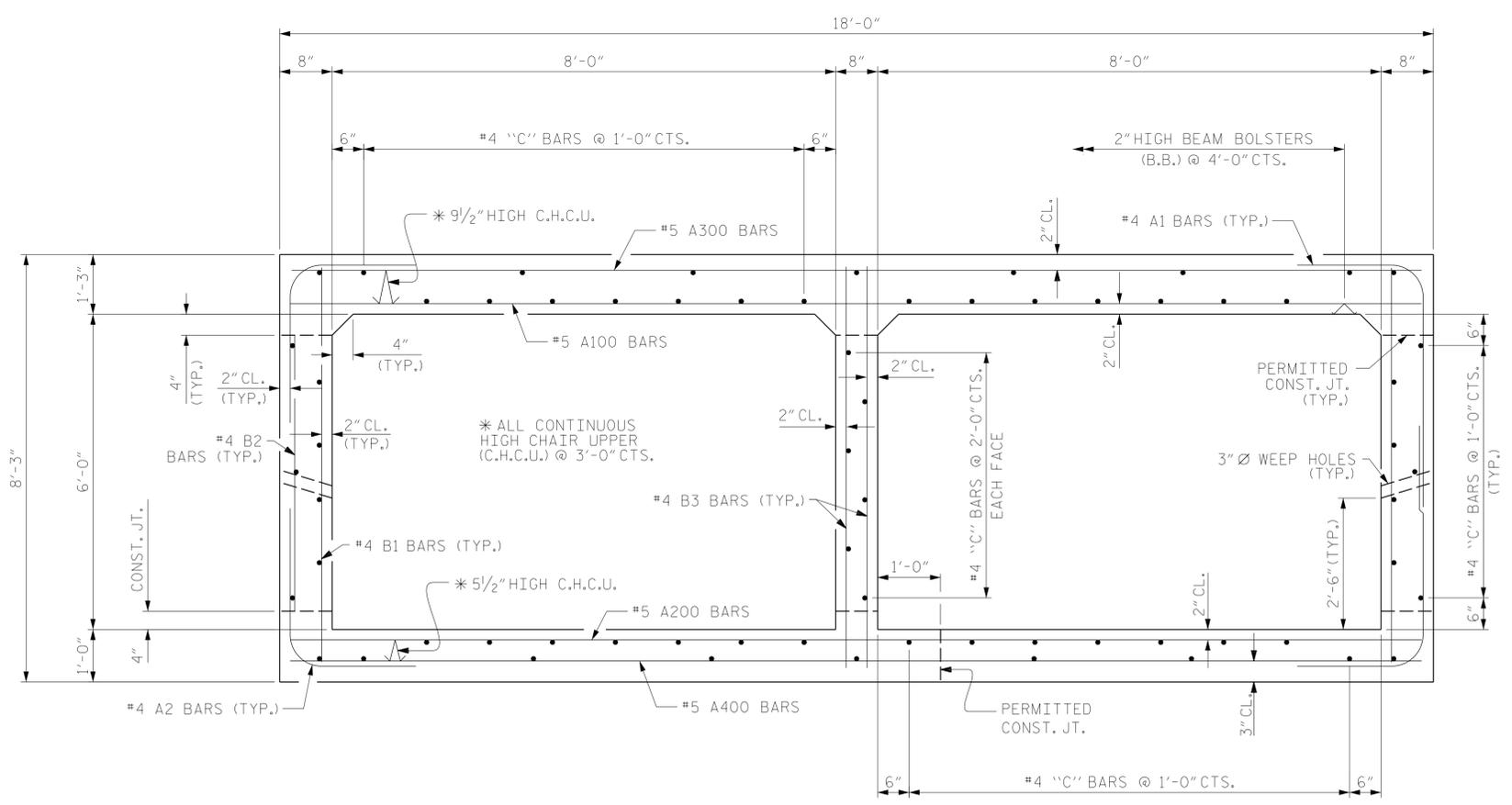
DRAWN BY :	N. CUANY	DATE :	02/2024
CHECKED BY :	M. ACOSTA	DATE :	02/2024
DESIGN ENGINEER OF RECORD:	M. ACOSTA	DATE :	08/2025



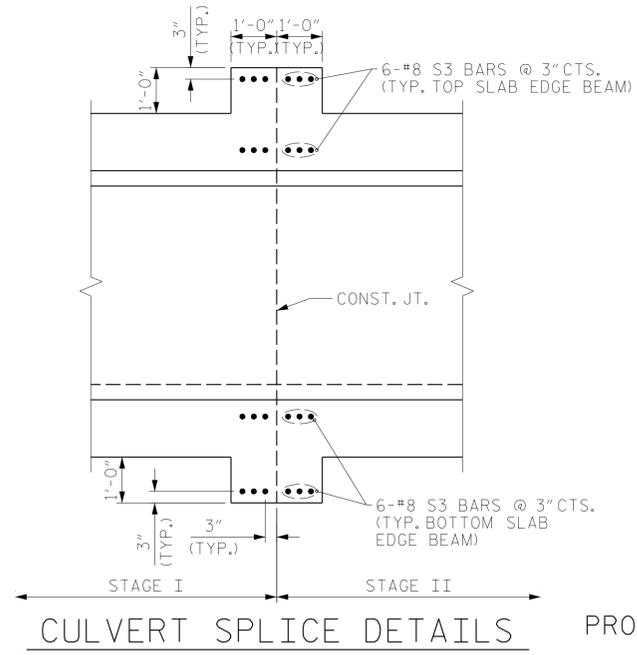
INTERIOR WALL      SEE CULVERT SPLICE DETAILS      EXTERIOR WALL  
**CULVERT SECTION NORMAL TO ROADWAY**  
 LOOKING UPSTATION



**END ELEVATION NORMAL TO SKEW**  
 LOOKING UPSTREAM



**RIGHT ANGLE SECTION OF BARREL**  
 THERE ARE 66 'C' BARS IN SECTION OF BARREL.



**CULVERT SPLICE DETAILS**

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

SHEET 4 OF 10

I HEREBY CERTIFY THESE PLANS  
 ARE THE AS-BUILT PLANS



RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-50403-1-C&E

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 8'-0" X 6'-0"**  
**CONCRETE BOX CULVERT**  
**SECTION**  
 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-4
1			3			TOTAL SHEETS
2			4			10

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

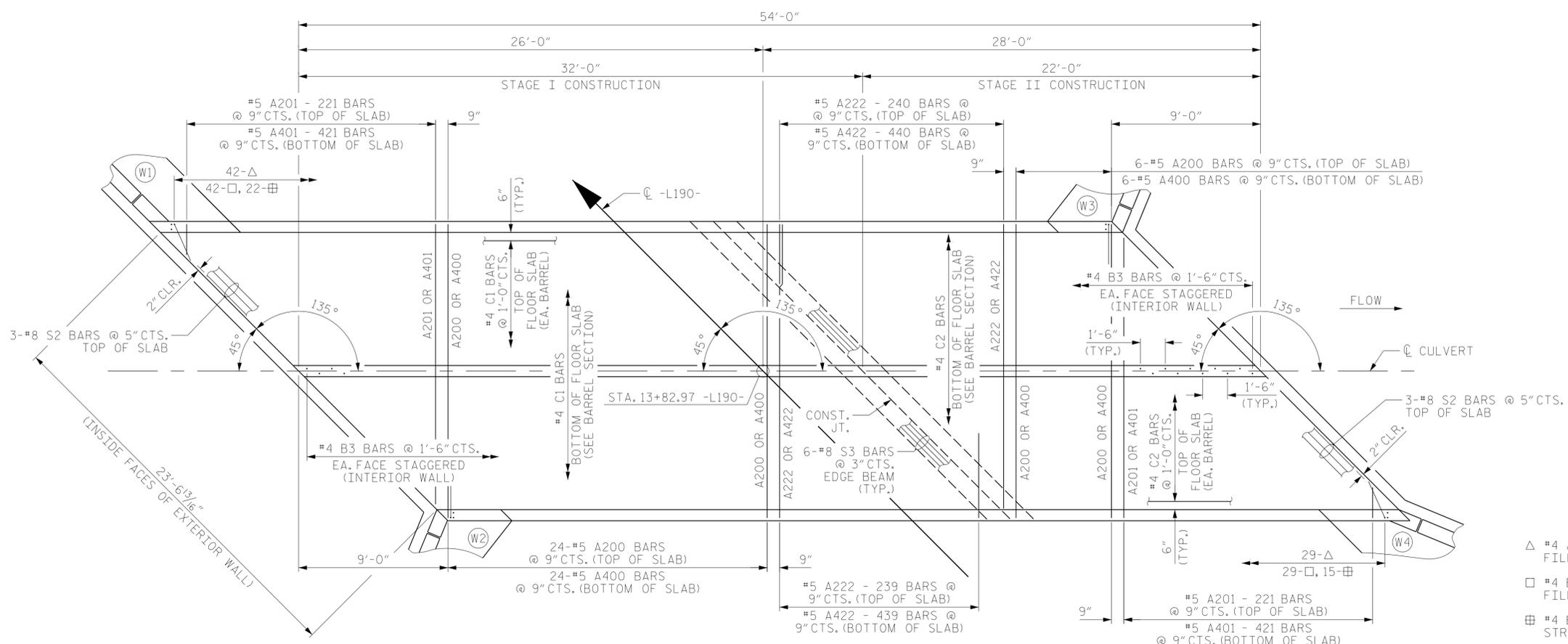
DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

**NOTES:**

"A" BARS FROM STAGE I TO EXTEND 3'-3" MIN. INTO STAGE II.

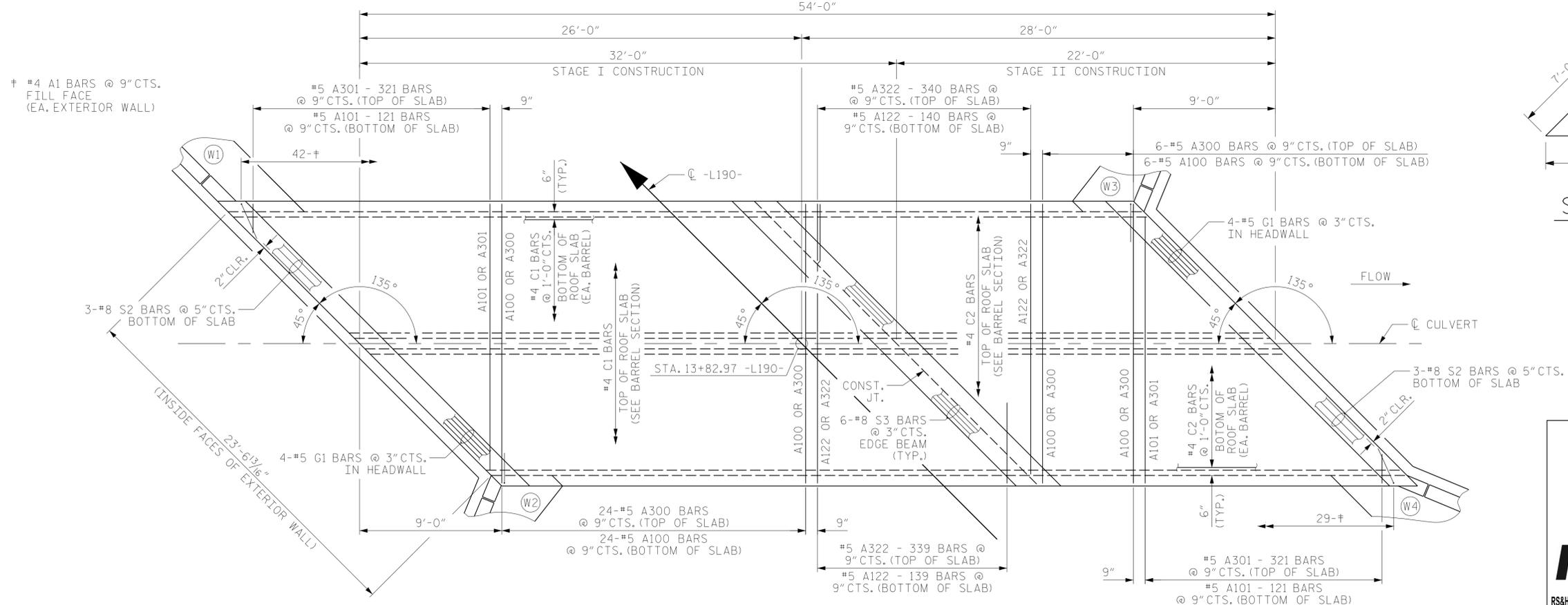
C1 BARS FROM STAGE I TO EXTEND 2'-7" MIN. INTO STAGE II.

SEE SHEET 4 OF 10 FOR PLACEMENT OF S3 BARS IN SLAB AND EDGE BEAM.

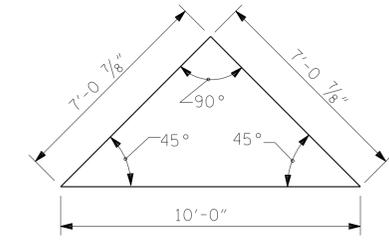


**PLAN - FLOOR SLAB**

- △ #4 A2 BARS @ 9" CTS. FILL FACE (EA. EXTERIOR WALL)
- #4 B2 BARS @ 9" CTS. FILL FACE (EA. EXTERIOR WALL)
- ⊞ #4 B1 BARS @ 1'-6" CTS. STREAM FACE (EA. EXTERIOR WALL)



**PLAN - ROOF SLAB**



**SKEW TRIANGLE**

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

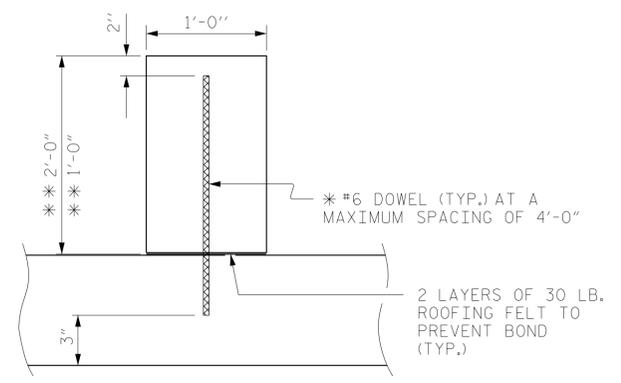
SHEET 5 OF 10

**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-50403-C-28

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 8'-0" X 6'-0" CONCRETE BOX CULVERT PLAN					
135° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. C4-5
					TOTAL SHEETS 10

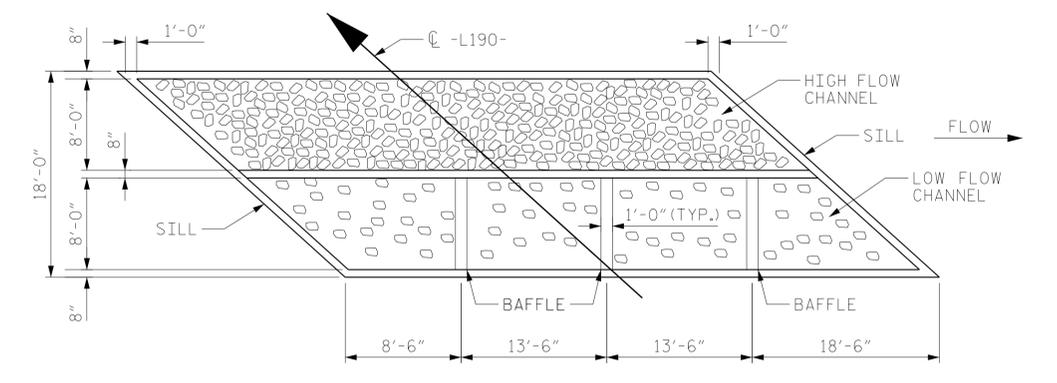
DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED



**SECTION THROUGH SILL**

\* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.  
 \*\* SEE CULVERT SILL / BAFFLE DETAILS FOR LOCATION AND HEIGHT OF SILL  
 (SILL SHOWN, BAFFLE SIMILAR)

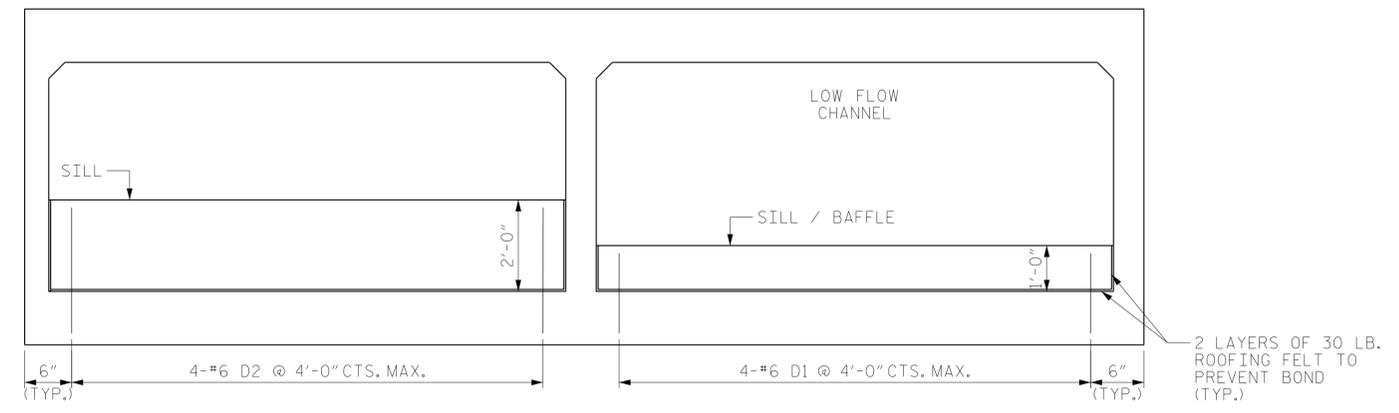


**PLAN OF FLOOR SILL / BAFFLE LAYOUT**

BACKFILL ENTIRE CULVERT BED WITH NATIVE BED MATERIAL TO SILL HEIGHT

**NOTES:**

- SILLS TO BE CONSTRUCTED AT INLET AND OUTLET AS SHOWN.
- SILLS TO BE 1'-0" WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.
- BACKFILL OVERFLOW BARREL AND LOW FLOW BARREL TO TOP OF SILL WITH NATIVE BED MATERIAL AND SUBSIZE WITH CLASS "II" RIP RAP IF NEEDED.
- SEE "NATIVE BED MATERIAL" UNDER "ADDITIONAL INFORMATION AND COMPUTATIONS" OF THE CULVERT SURVEY & HYDRAULIC DESIGN REPORT.
- THE ENTIRE COST OF WORK REQUIRED TO PLACE EXCAVATED OR SUPPLEMENTAL MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.



**CULVERT SILL / BAFFLE DETAILS**

LOOKING DOWNSTREAM

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

SHEET 6 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 8'-0" X 6'-0" CONCRETE BOX CULVERT DETAILS**  
 135° SKEW

DRAWN BY :	N. CUANY	DATE :	02/2024
CHECKED BY :	M. ACOSTA	DATE :	02/2024
DESIGN ENGINEER OF RECORD:	M. ACOSTA	DATE :	08/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License Nos. 50737-F-0403-C-08

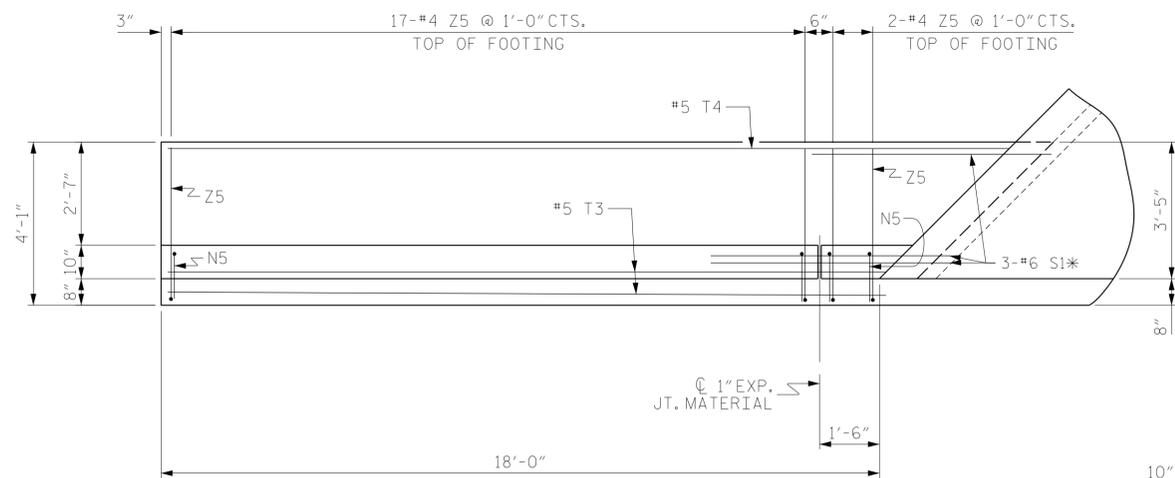
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-6
1			3			TOTAL SHEETS
2			4			10

# BILL OF MATERIAL

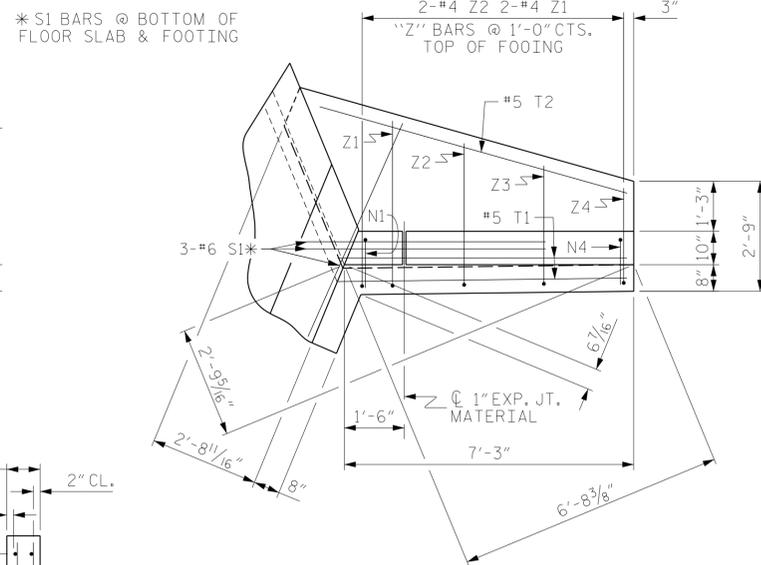
## STAGE I

## STAGE II

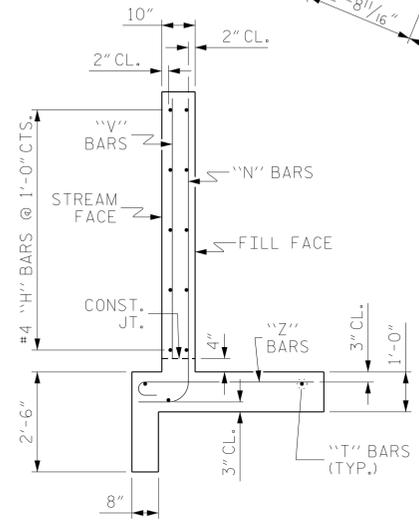
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	84	#4	1	6'-7"	369	A226	1	#5	STR	14'-1"	15	A414	1	#5	STR	7'-1"	7	A1	58	#4	1	6'-7"	255	A225	1	#5	STR	14'-10"	15	A411	1	#5	STR	9'-4"	10
A2	84	#4	1	6'-7"	369	A227	1	#5	STR	13'-4"	14	A415	1	#5	STR	6'-4"	7	A2	58	#4	1	6'-7"	255	A226	1	#5	STR	14'-1"	15	A412	1	#5	STR	8'-7"	9
						A228	1	#5	STR	12'-7"	13	A416	1	#5	STR	5'-7"	6							A227	1	#5	STR	13'-4"	14	A413	1	#5	STR	7'-10"	8
A100	24	#5	STR	17'-8"	442	A229	1	#5	STR	11'-10"	12	A417	1	#5	STR	4'-10"	5	A100	6	#5	STR	17'-8"	111	A228	1	#5	STR	12'-7"	13	A414	1	#5	STR	7'-1"	7
A101	1	#5	STR	16'-10"	18	A230	1	#5	STR	11'-1"	12	A418	1	#5	STR	4'-1"	4	A101	1	#5	STR	16'-10"	18	A229	1	#5	STR	11'-10"	12	A415	1	#5	STR	6'-4"	7
A102	1	#5	STR	16'-1"	17	A231	1	#5	STR	10'-4"	11	A419	1	#5	STR	3'-4"	3	A102	1	#5	STR	16'-1"	17	A230	1	#5	STR	11'-1"	12	A416	1	#5	STR	5'-7"	6
A103	1	#5	STR	15'-4"	16	A232	1	#5	STR	9'-7"	10	A420	1	#5	STR	2'-7"	3	A103	1	#5	STR	15'-4"	16	A231	1	#5	STR	10'-4"	11	A417	1	#5	STR	4'-10"	5
A104	1	#5	STR	14'-7"	15	A233	1	#5	STR	8'-10"	9	A421	1	#5	STR	1'-10"	2	A104	1	#5	STR	14'-7"	15	A232	1	#5	STR	9'-7"	10	A418	1	#5	STR	4'-1"	4
A105	1	#5	STR	13'-10"	14	A234	1	#5	STR	8'-1"	8	A422	1	#5	STR	17'-1"	18	A105	1	#5	STR	13'-10"	14	A233	1	#5	STR	8'-10"	9	A419	1	#5	STR	3'-4"	3
A106	1	#5	STR	13'-1"	14	A235	1	#5	STR	7'-4"	8	A423	1	#5	STR	16'-4"	17	A106	1	#5	STR	13'-1"	14	A234	1	#5	STR	8'-1"	8	A420	1	#5	STR	2'-7"	3
A107	1	#5	STR	12'-4"	13	A236	1	#5	STR	6'-7"	7	A424	1	#5	STR	15'-7"	16	A107	1	#5	STR	12'-4"	13	A235	1	#5	STR	7'-4"	8	A421	1	#5	STR	1'-10"	2
A108	1	#5	STR	11'-7"	12	A237	1	#5	STR	5'-10"	6	A425	1	#5	STR	14'-10"	15	A108	1	#5	STR	11'-7"	12	A236	1	#5	STR	6'-7"	7	A422	1	#5	STR	17'-1"	18
A109	1	#5	STR	10'-10"	11	A238	1	#5	STR	5'-1"	5	A426	1	#5	STR	14'-1"	15	A109	1	#5	STR	10'-10"	11	A237	1	#5	STR	5'-10"	6	A423	1	#5	STR	16'-4"	17
A110	1	#5	STR	10'-1"	11	A239	1	#5	STR	4'-4"	5	A427	1	#5	STR	13'-4"	14	A110	1	#5	STR	10'-1"	11	A238	1	#5	STR	5'-1"	5	A424	1	#5	STR	15'-7"	16
A111	1	#5	STR	9'-4"	10							A428	1	#5	STR	12'-7"	13	A111	1	#5	STR	9'-4"	10	A239	1	#5	STR	4'-4"	5	A425	1	#5	STR	14'-10"	15
A112	1	#5	STR	8'-7"	9	A300	24	#5	STR	17'-8"	442	A429	1	#5	STR	11'-10"	12	A112	1	#5	STR	8'-7"	9	A240	1	#5	STR	3'-7"	4	A426	1	#5	STR	14'-1"	15
A113	1	#5	STR	7'-10"	8	A301	1	#5	STR	16'-10"	18	A430	1	#5	STR	11'-1"	12	A113	1	#5	STR	7'-10"	8					A427	1	#5	STR	13'-4"	14		
A114	1	#5	STR	7'-1"	7	A302	1	#5	STR	16'-1"	17	A431	1	#5	STR	10'-4"	11	A114	1	#5	STR	7'-1"	7	A300	6	#5	STR	17'-8"	111	A428	1	#5	STR	12'-7"	13
A115	1	#5	STR	6'-4"	7	A303	1	#5	STR	15'-4"	16	A432	1	#5	STR	9'-7"	10	A115	1	#5	STR	6'-4"	7	A301	1	#5	STR	16'-10"	18	A429	1	#5	STR	11'-10"	12
A116	1	#5	STR	5'-7"	6	A304	1	#5	STR	14'-7"	15	A433	1	#5	STR	8'-10"	9	A116	1	#5	STR	5'-7"	6	A302	1	#5	STR	16'-1"	17	A430	1	#5	STR	11'-1"	12
A117	1	#5	STR	4'-10"	5	A305	1	#5	STR	13'-10"	14	A434	1	#5	STR	8'-1"	8	A117	1	#5	STR	4'-10"	5	A303	1	#5	STR	15'-4"	16	A431	1	#5	STR	10'-4"	11
A118	1	#5	STR	4'-1"	4	A306	1	#5	STR	13'-1"	14	A435	1	#5	STR	7'-4"	8	A118	1	#5	STR	4'-1"	4	A304	1	#5	STR	14'-7"	15	A432	1	#5	STR	9'-7"	10
A119	1	#5	STR	3'-4"	3	A307	1	#5	STR	12'-4"	13	A436	1	#5	STR	6'-7"	7	A119	1	#5	STR	3'-4"	3	A305	1	#5	STR	13'-10"	14	A433	1	#5	STR	8'-10"	9
A120	1	#5	STR	2'-7"	3	A308	1	#5	STR	11'-7"	12	A437	1	#5	STR	5'-10"	6	A120	1	#5	STR	2'-7"	3	A306	1	#5	STR	13'-1"	14	A434	1	#5	STR	8'-1"	8
A121	1	#5	STR	1'-10"	2	A309	1	#5	STR	10'-10"	11	A438	1	#5	STR	5'-1"	5	A121	1	#5	STR	1'-10"	2	A307	1	#5	STR	12'-4"	13	A435	1	#5	STR	7'-4"	8
A122	1	#5	STR	17'-1"	18	A310	1	#5	STR	10'-1"	11	A439	1	#5	STR	4'-4"	5	A122	1	#5	STR	17'-1"	18	A308	1	#5	STR	11'-7"	12	A436	1	#5	STR	6'-7"	7
A123	1	#5	STR	16'-4"	17	A311	1	#5	STR	9'-4"	10						A123	1	#5	STR	16'-4"	17	A309	1	#5	STR	10'-10"	11	A437	1	#5	STR	5'-10"	6	
A124	1	#5	STR	15'-7"	16	A312	1	#5	STR	8'-7"	9	B1	44	#4	STR	7'-10"	230	A124	1	#5	STR	15'-7"	16	A310	1	#5	STR	10'-1"	11	A438	1	#5	STR	5'-1"	5
A125	1	#5	STR	14'-10"	15	A313	1	#5	STR	7'-10"	8	B2	84	#4	STR	5'-4"	299	A125	1	#5	STR	14'-10"	15	A311	1	#5	STR	9'-4"	10	A439	1	#5	STR	4'-4"	5
A126	1	#5	STR	14'-1"	15	A314	1	#5	STR	7'-1"	7	B3	44	#4	STR	7'-10"	230	A126	1	#5	STR	14'-1"	15	A312	1	#5	STR	8'-7"	9	A440	1	#5	STR	3'-7"	4
A127	1	#5	STR	13'-4"	14	A315	1	#5	STR	6'-4"	7						A127	1	#5	STR	13'-4"	14	A313	1	#5	STR	7'-10"	8							
A128	1	#5	STR	12'-7"	13	A316	1	#5	STR	5'-7"	6	C1	66	#4	STR	34'-5"	1517	A128	1	#5	STR	12'-7"	13	A314	1	#5	STR	7'-1"	7	B1	30	#4	STR	7'-10"	157
A129	1	#5	STR	11'-10"	12	A317	1	#5	STR	4'-10"	5						A129	1	#5	STR	11'-10"	12	A315	1	#5	STR	6'-4"	7	B2	58	#4	STR	5'-4"	207	
A130	1	#5	STR	11'-1"	12	A318	1	#5	STR	4'-1"	4	D1	12	#6	STR	1'-7"	29	A130	1	#5	STR	11'-1"	12	A316	1	#5	STR	5'-7"	6	B3	30	#4	STR	7'-10"	157
A131	1	#5	STR	10'-4"	11	A319	1	#5	STR	3'-4"	3	D2	4	#6	STR	2'-7"	16	A131	1	#5	STR	10'-4"	11	A317	1	#5	STR	4'-10"	5						
A132	1	#5	STR	9'-7"	10	A320	1	#5	STR	2'-7"	3						A132	1	#5	STR	9'-7"	10	A318	1	#5	STR	4'-1"	4	C2	66	#4	STR	21'-6"	948	
A133	1	#5	STR	8'-10"	9	A321	1	#5	STR	1'-10"	2	G1	4	#5	STR	24'-11"	104	A133	1	#5	STR	8'-10"	9	A319	1	#5	STR	3'-4"	3						
A134	1	#5	STR	8'-1"	8	A322	1	#5	STR	17'-1"	18						A134	1	#5	STR	8'-1"	8	A320	1	#5	STR	2'-7"	3	D1	8	#6	STR	1'-7"	19	
A135	1	#5	STR	7'-4"	8	A323	1	#5	STR	16'-4"	17	S2	6	#8	STR	24'-11"	399	A135	1	#5	STR	7'-4"	8	A321	1	#5	STR	1'-10"	2	D2	4	#6	STR	2'-7"	16
A136	1	#5	STR	6'-7"	7	A324	1	#5	STR	15'-7"	16	S3	12	#8	STR	24'-11"	798	A136	1	#5	STR	6'-7"	7	A322	1	#5	STR	17'-1"	18						
A137	1	#5	STR	5'-10"	6	A325	1	#5	STR	14'-10"	15						A137	1	#5	STR	5'-10"	6	A323	1	#5	STR	16'-4"	17	G1	4	#5	STR	24'-11"	104	
A138	1	#5	STR	5'-1"	5	A326	1	#5	STR	14'-1"	15	REINFORCING STEEL 7,752 LBS.					A138	1	#5	STR	5'-1"	5	A324	1	#5	STR	15'-7"	16							
A139	1	#5	STR	4'-4"	5	A327	1	#5	STR	13'-4"	14	SILL FOR TWO BARRELS					A139	1	#5	STR	4'-4"	5	A325	1	#5	STR	14'-10"	15	S2	6	#8	STR	24'-11"	399	
						A328	1	#5	STR	12'-7"	13	CLASS A CONCRETE					A140	1	#5	STR	3'-7"	4	A326	1	#5	STR	14'-1"	15	S3	12	#8	STR	24'-11"	798	
A200	24	#5	STR	17'-8"	442	A329	1	#5	STR	11'-10"	12	LOW FLOW SILL 0.4 CY					A200	6	#5	STR	17'-8"	111	A328	1	#5	STR	12'-7"	13	REINFORCING STEEL 5,399 LBS.						
A201	1	#5	STR	16'-10"	18	A330	1	#5	STR	11'-1"	12	HIGH FLOW SILL 0.8 CY					A201	1	#5	STR	16'-10"	18	A329	1	#5	STR	11'-10"	12	SILL FOR TWO BARRELS						
A202	1	#5	STR	16'-1"	17	A331	1	#5	STR	10'-4"	11	BAFFLE 0.6 CY					A202	1	#5	STR	16'-1"	17	A330	1	#5	STR	11'-1"	12							
A203	1	#5	STR	15'-4"	16	A332	1	#5	STR	9'-7"	10	EDGE BEAM 1.8 CY					A203	1	#5	STR	15'-4"	16	A331	1	#5	STR	10'-4"	11	CLASS A CONCRETE						
A204	1	#5	STR	14'-7"	15	A333	1	#5	STR	8'-10"	9	TOTAL 3.6 CY					A204	1	#5	STR	14'-7"	15	A332	1	#5	STR	9'-7"	10	LOW FLOW SILL 0.4 CY						
A205	1	#5	STR	13'-10"	14	A334	1	#5	STR	8'-1"	8						A205	1	#5	STR	13'-10"	14													



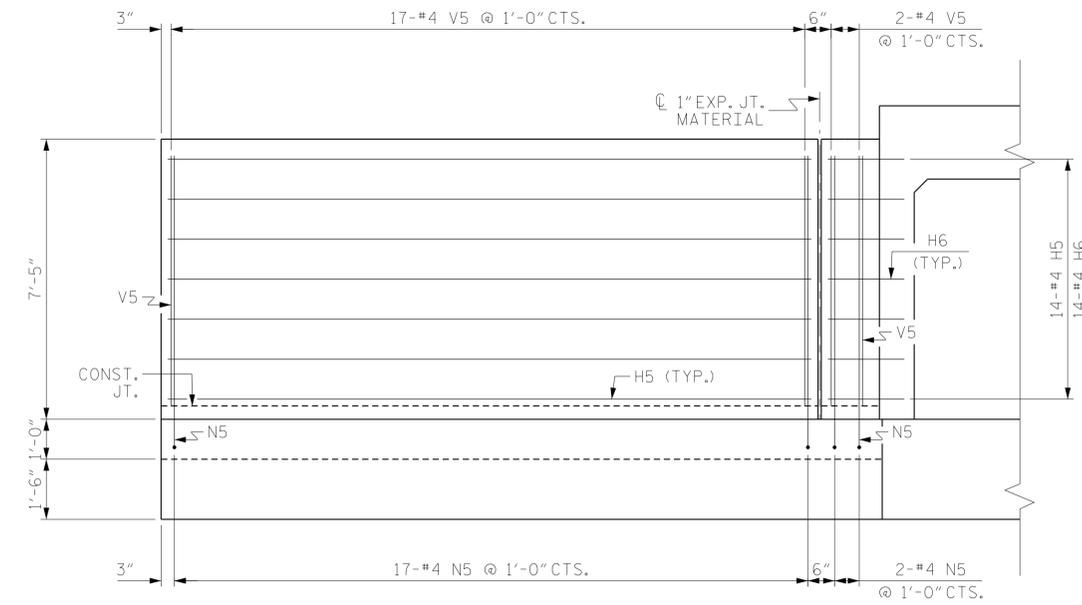
PLAN W1



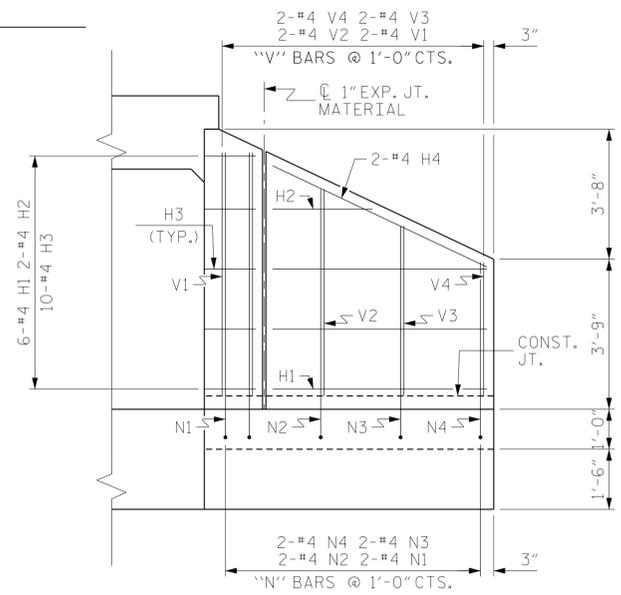
PLAN W2



TYPICAL WING SECTION

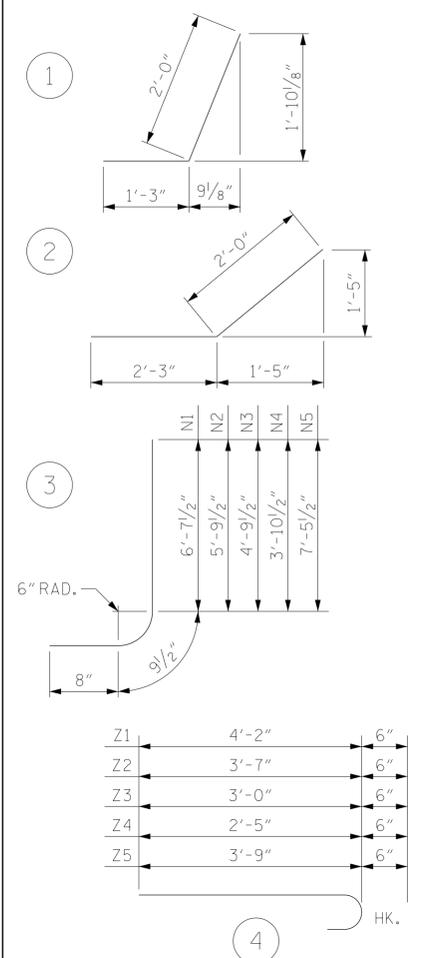


ELEVATION W1



ELEVATION W2

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	5'-4"	22
H2	2	#4	STR	2'-6"	4
H3	10	#4	1	3'-3"	22
H4	2	#4	STR	5'-11"	8
H5	14	#4	STR	16'-1"	150
H6	14	#4	2	4'-3"	40
N1	2	#4	3	8'-1"	11
N2	2	#4	3	7'-3"	10
N3	2	#4	3	6'-3"	9
N4	2	#4	3	5'-4"	7
N5	19	#4	3	8'-11"	113
S1	6	#6	STR	6'-0"	54
T1	2	#5	STR	7'-3"	15
T2	1	#5	STR	8'-0"	9
T3	2	#5	STR	18'-0"	38
T4	1	#5	STR	21'-0"	22
V1	2	#4	STR	6'-1"	8
V2	2	#4	STR	5'-2"	7
V3	2	#4	STR	4'-3"	6
V4	2	#4	STR	3'-4"	5
V5	19	#4	STR	6'-11"	88
Z1	2	#4	4	4'-8"	6
Z2	2	#4	4	4'-1"	6
Z3	2	#4	4	3'-6"	5
Z4	2	#4	4	2'-11"	4
Z5	19	#4	4	4'-3"	54
REINFORCING STEEL				723	LBS
FOR 2 WINGS					
CLASS A CONCRETE					
2 WINGS				10.4	CY
1 HEADWALL				1.2	CY
1 END CURTAIN WALL				1.8	CY
TOTAL				13.4	CY

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

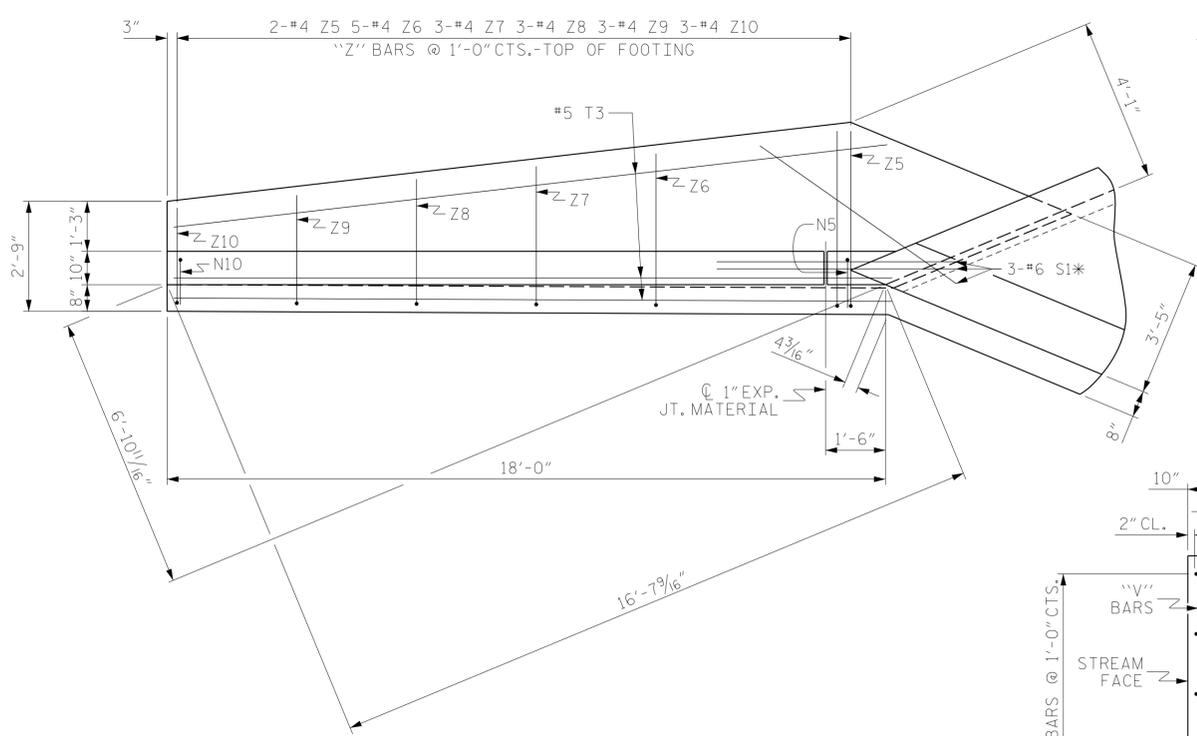
SHEET 8 OF 10



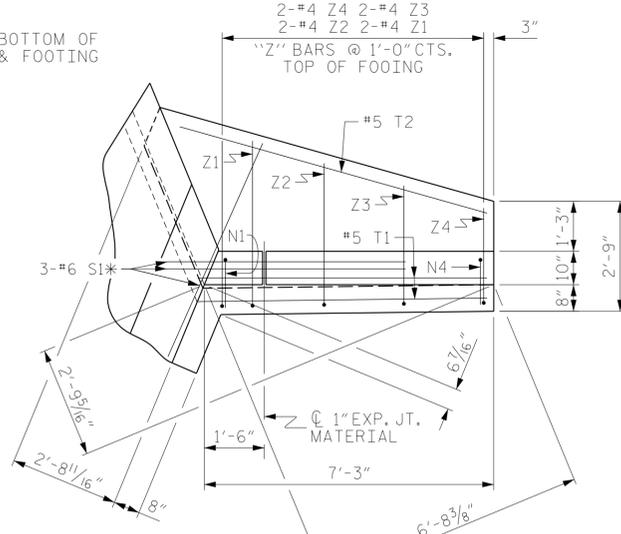
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-8
1			3			TOTAL SHEETS
2			4			10

DRAWN BY : N. CUANY DATE : 02/2024  
 CHECKED BY : M. ACOSTA DATE : 02/2024  
 DESIGN ENGINEER OF RECORD: M. ACOSTA DATE : 08/2025

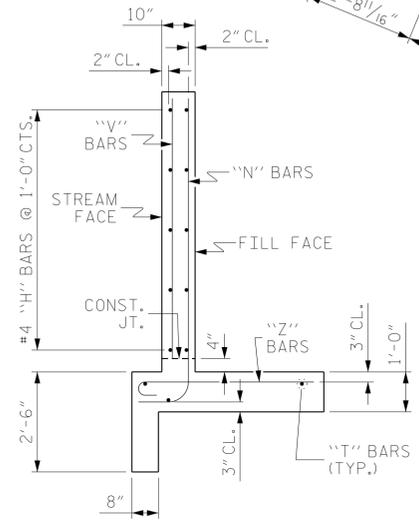
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED



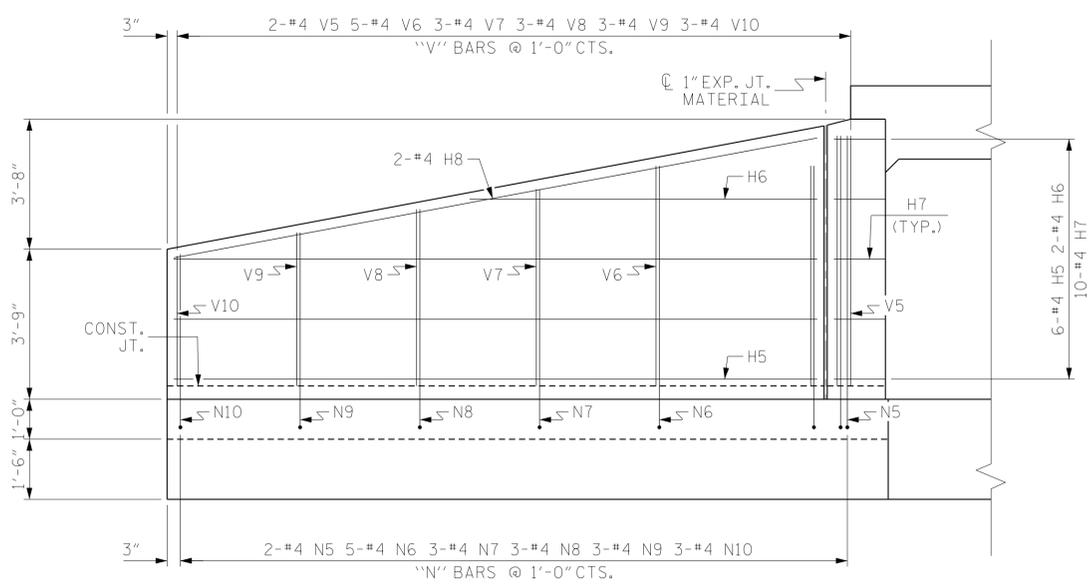
PLAN W3



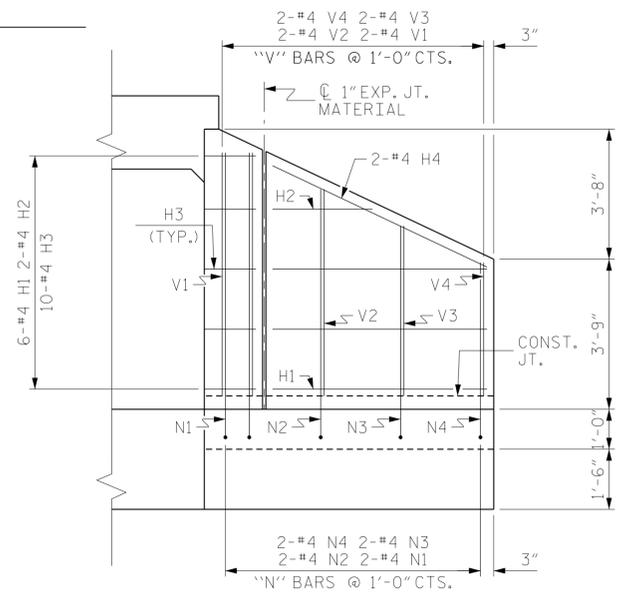
PLAN W4



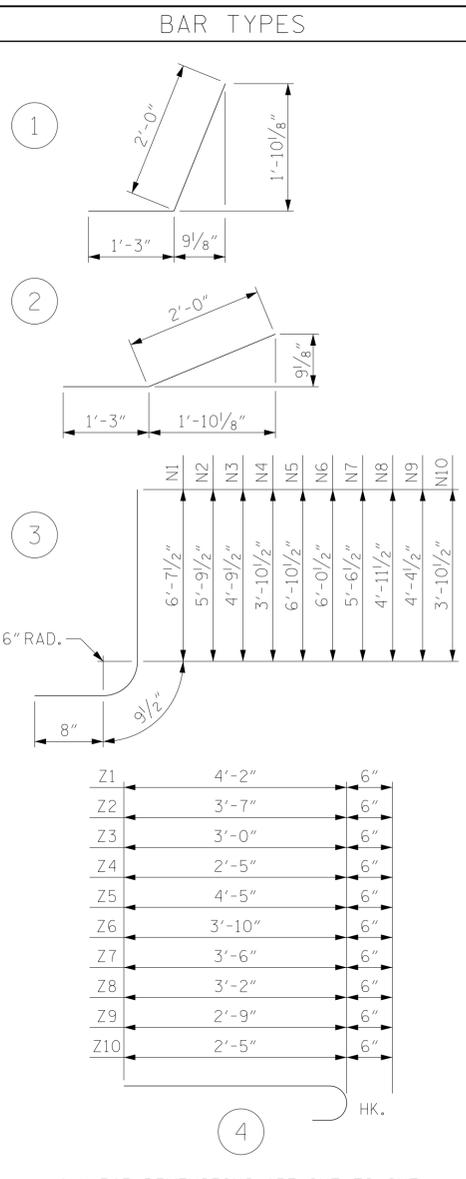
TYPICAL WING SECTION



ELEVATION W3



ELEVATION W4



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	5'-4"	21
H2	2	#4	STR	2'-6"	3
H3	10	#4	1	3'-3"	22
H4	2	#4	STR	5'-11"	8
H5	6	#4	STR	16'-1"	64
H6	2	#4	STR	8'-8"	12
H7	10	#4	2	3'-3"	22
H8	2	#4	STR	16'-4"	22
N1	2	#4	3	8'-1"	11
N2	2	#4	3	7'-3"	10
N3	2	#4	3	6'-3"	8
N4	2	#4	3	5'-4"	7
N5	2	#4	3	8'-4"	11
N6	5	#4	3	7'-6"	25
N7	3	#4	3	7'-0"	14
N8	3	#4	3	6'-5"	13
N9	3	#4	3	5'-10"	12
N10	3	#4	3	5'-4"	11
S1	6	#6	STR	6'-0"	54
T1	2	#5	STR	7'-3"	15
T2	1	#5	STR	8'-0"	8
T3	3	#5	STR	18'-0"	56
V1	2	#4	STR	6'-1"	8
V2	2	#4	STR	5'-2"	7
V3	2	#4	STR	4'-3"	6
V4	2	#4	STR	3'-4"	4
V5	2	#4	STR	6'-3"	8
V6	5	#4	STR	5'-6"	18
V7	3	#4	STR	4'-11"	10
V8	3	#4	STR	4'-5"	9
V9	3	#4	STR	3'-10"	8
V10	3	#4	STR	3'-3"	7
Z1	2	#4	4	4'-8"	6
Z2	2	#4	4	4'-1"	5
Z3	2	#4	4	3'-6"	5
Z4	2	#4	4	2'-11"	4
Z5	2	#4	4	4'-11"	7
Z6	5	#4	4	4'-4"	14
Z7	3	#4	4	4'-0"	8
Z8	3	#4	4	3'-8"	7
Z9	3	#4	4	3'-3"	7
Z10	3	#4	4	2'-11"	6

REINFORCING STEEL FOR 2 WINGS	583 LBS
CLASS A CONCRETE 2 WINGS	9.3 CY
1 HEADWALL	1.2 CY
1 END CURTAIN WALL	1.8 CY
<b>TOTAL</b>	<b>12.3 CY</b>

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

SHEET 9 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**OUTLET - WINGS FOR CONCRETE BOX CULVERT**

H = 6'-0" SLOPE = 2:1  
 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-9
1			3			TOTAL SHEETS
2			4			10

DRAWN BY :	N. CUANY	DATE :	02/2024
CHECKED BY :	M. ACOSTA	DATE :	02/2024
DESIGN ENGINEER OF RECORD:	M. ACOSTA	DATE :	08/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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.

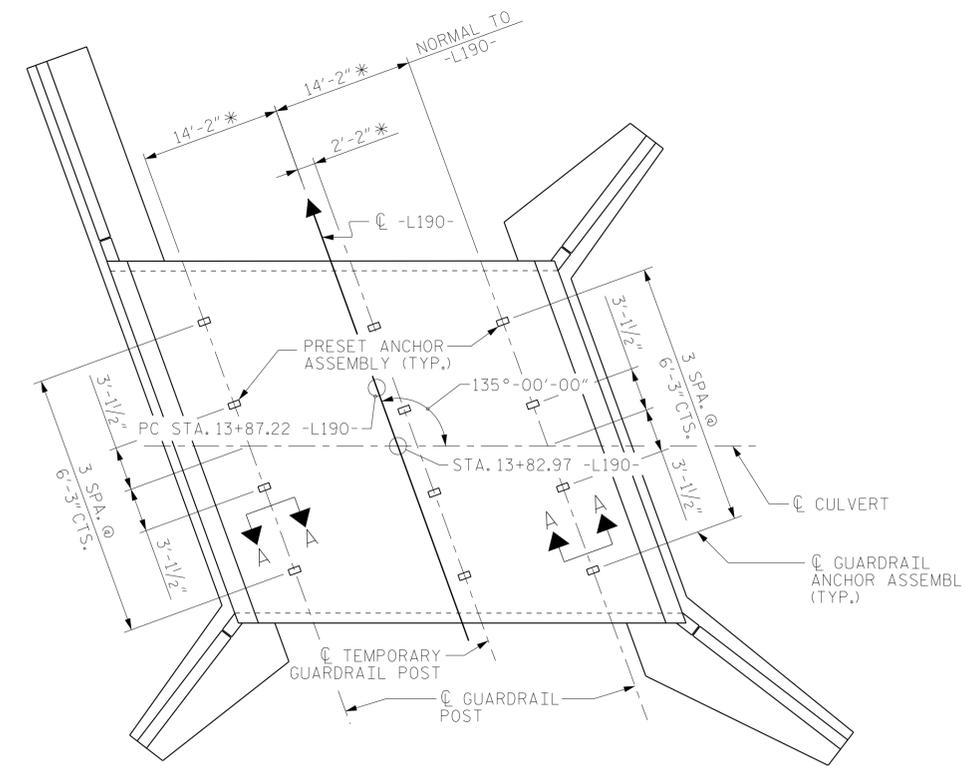
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

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.

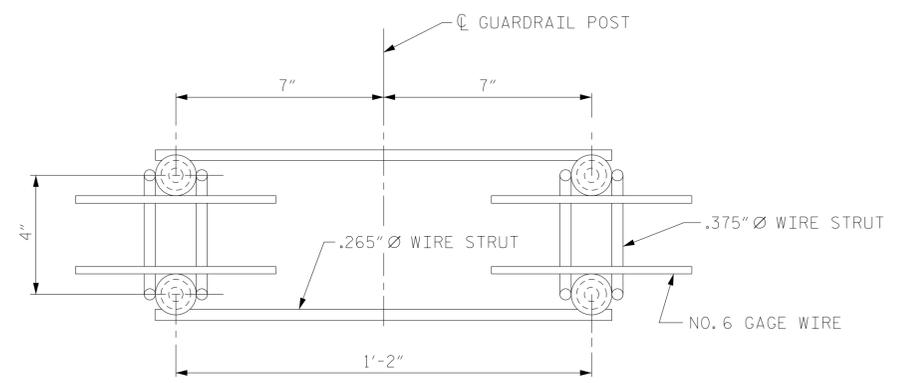


PLAN OF CULVERT GUARDRAIL ANCHOR ASSEMBLY SPACING

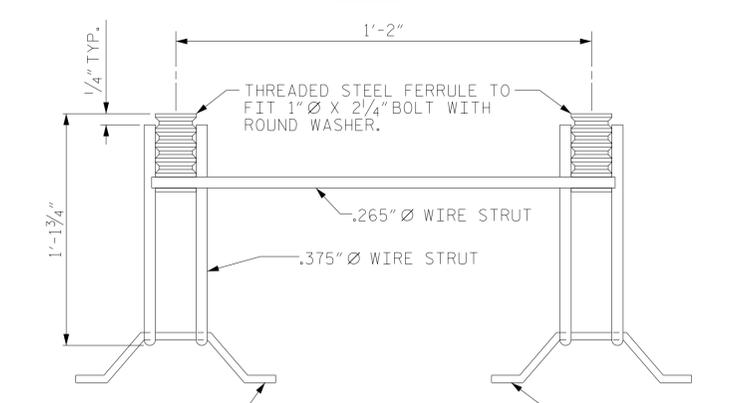
SEE TMP PLANS FOR LOCATION AND PHASING OF TEMPORARY GUARDRAIL.

TEMPORARY GUARDRAIL ANCHOR ASSEMBLY SHALL BE FILLED WITH GROUT UPON REMOVAL OF TEMPORARY GUARDRAIL.

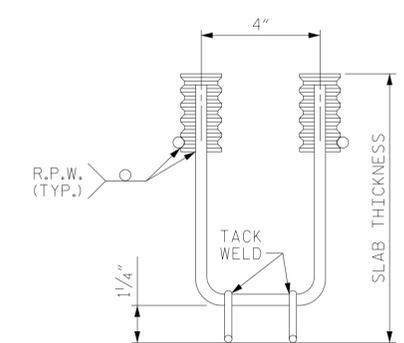
\* CONTRACTOR TO VERIFY LOCATION WITH FIELD ENGINEER PRIOR TO INSTALLATION.



PLAN



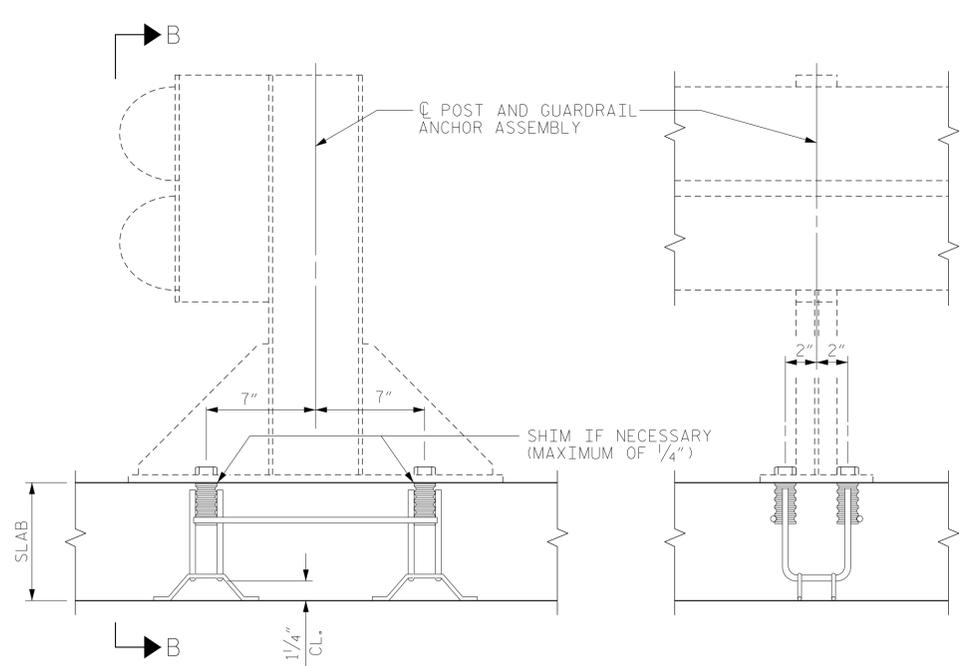
SIDE VIEW



ELEVATION

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

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS



SECTION A-A

SECTION B-B

PROJECT NO. BP14.R002  
HAYWOOD COUNTY  
 STATION: 13+82.97 -L190-

SHEET 10 OF 10



**RS&H**  
 RS&H Architects-Engineers-Planners, Inc.  
 8521 Six Forks Road, Suite 400  
 919-926-4100 FAX 919-846-9080  
 www.rsandh.com  
 North Carolina License No. 50737-5-0403-1-C&B

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 ANCHORAGE DETAILS FOR  
 GUARDRAIL ANCHOR ASSEMBLY  
 FOR CULVERTS  
 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-10
1			3			TOTAL SHEETS
2			4			10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : NSC	DATE : 02/2024
CHECKED BY : MRA	DATE : 02/2024
DRAWN BY : FCJ 6/88	REV. 10/1/11 MAA/CM
CHECKED BY : ARB 6/88	REV. 12/17 MAA/THC
	REV. 6/19 MAA/THC

## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	AASHTO (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE AASHTO
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	--	20,000 LBS. PER SQ. IN.
	--	27,000 LBS. PER SQ. IN.
	--	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 AASHTO
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 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

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

### CONCRETE:

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

### CONCRETE CHAMFERS:

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

### DOWELS:

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

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

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

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

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

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

### REINFORCING STEEL:

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

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

### STRUCTURAL STEEL:

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

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST  $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY  $\frac{1}{16}$ " 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. FINS 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.