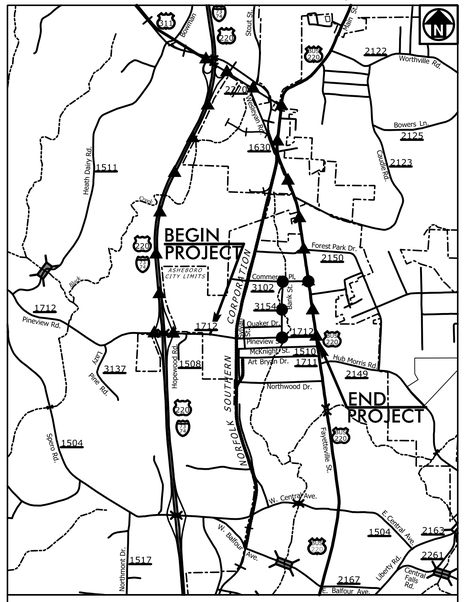
TIP PROJECT: U-5711

CONTRACT: C204990

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Plan Sheet Symbols



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RANDOLPH COUNTY

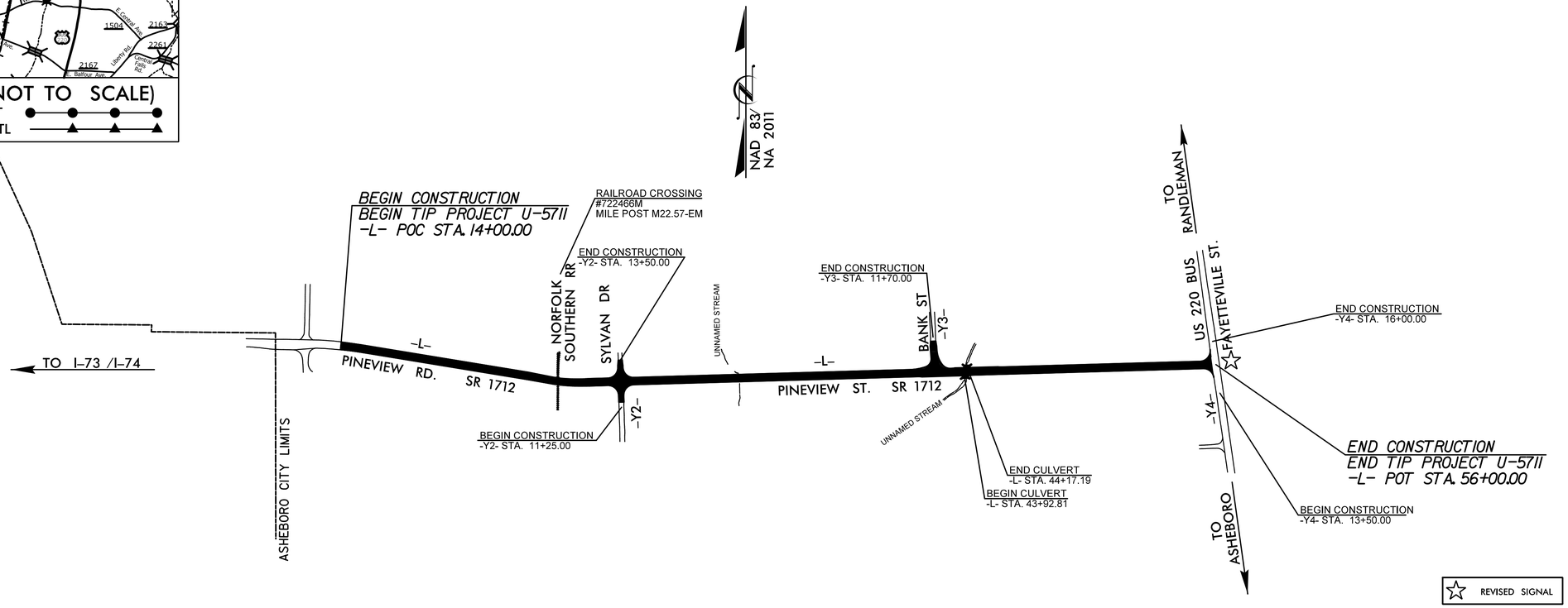
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5711		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
50160.1.1		P.E.
50160.2.1		R/W
50160.2.2		UTIL.
50160.3.1	5016002	CONST.

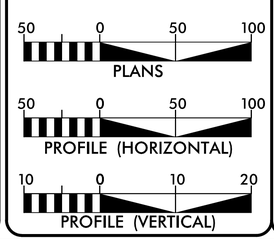
LOCATION: SR 1712 (PINEVIEW ROAD/STREET) FROM WEST OF SYLVAN DRIVE TO US 220 BUSINESS IN ASHEBORO

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

STRUCTURE PLANS



GRAPHIC SCALES



DESIGN DATA

ADT 2026 = 7,310
ADT 2046 = 8,870
K = 10 %
D = 70 %
T = 10 % *
V = 40 MPH
* TTST = 5% DUAL 5%
FUNC CLASS =
URBAN MAJOR COLLECTOR
R-R-R GUIDE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5711 = 0.790 MI
LENGTH STRUCTURE TIP PROJECT U-5711 = 0.005 MI
TOTAL LENGTH TIP PROJECT U-5711 = 0.795 MI

Prepared In the Office of WGI for
DIVISION 8
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 31, 2018

LETTING DATE: SEPTEMBER 15, 2026

TIM JORDAN, PE
PROJECT ENGINEER

JAMES R. RICE, PE
HYDRAULIC PROJECT ENGINEER

NCDOT CONTACT: JEFFREY L. TEAGUE, PE

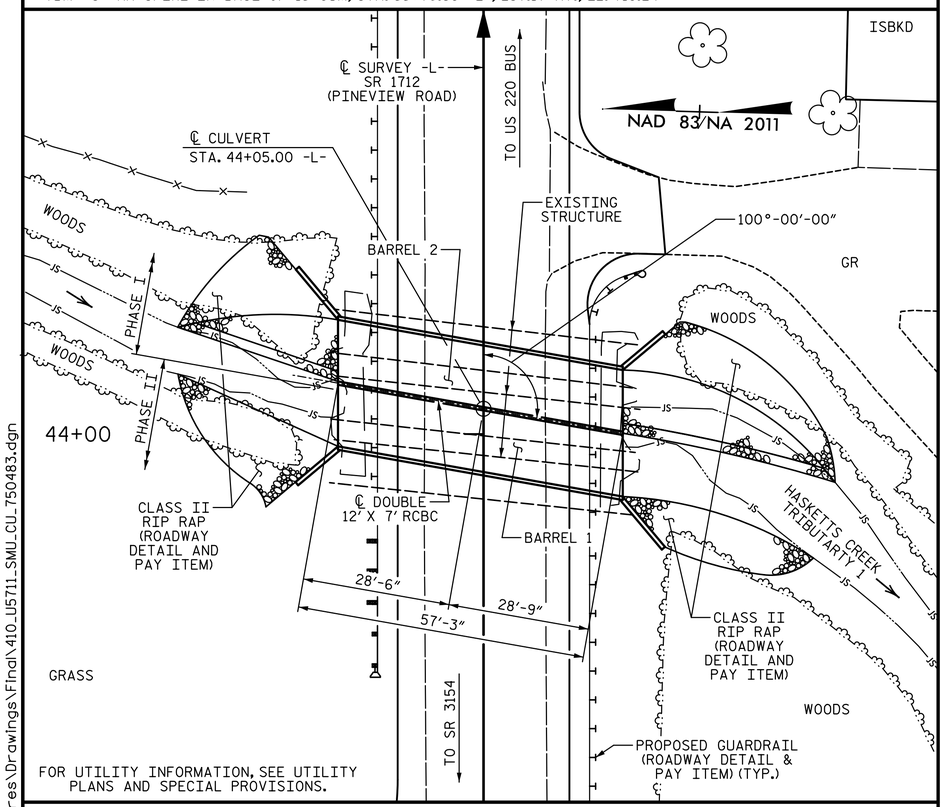
ENGINEER

8/4/2026 | 4:24 AM PDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED BY:

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434



LOCATION SKETCH

HYDRAULIC DATA:

DESIGN DISCHARGE	= 730 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YEAR
DESIGN HIGH WATER ELEVATION	= 684.60
DRAINAGE AREA	= 0.73 SQ. MI.
BASE DISCHARGE (Q 100)	= 760 CFS
BASE HIGH WATER ELEVATION	= 684.7

OVERTOPPING FLOOD DATA:

OVERTOPPING DISCHARGE	= 1800 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YEAR
OVERTOPPING FLOOD ELEVATION	= 689.10 **

** OVERTOPPING OCCURS AT ROADWAY SAG AT STA. 43+45.30 -L- AT ROADWAY CENTERLINE

GRADE DATA:

GRADE POINT EL. @ STA. 44+05.00 -L- = EL. 687.84
BED EL. @ STA. 44+05.00 -L- = EL. 677.04
ROADWAY SLOPE 2:1

TOTAL STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE		LUMP SUM
BOX CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MATERIAL		122 TONS
CLASS A CONCRETE		
BARREL @	2.774 CY/FT	158.8 C.Y.
HEADWALLS		2.4 C.Y.
SILLS		2.7 C.Y.
WING ETC.		22.8 C.Y.
TOTAL		186.7 C.Y.
REINFORCING STEEL		
BARREL		25,909 LBS.
WINGS ETC.		1,336 LBS.
TOTAL		27,245 LBS.

NOTES:

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

DESIGN FILL---------- 2'-6" (MIN.) AND 4'-3" (MAX.)

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

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

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB OF PHASE I INCLUDING 4" OF ALL VERITCAL WALLS.
2. THE REMAINING PORTIONS OF THE PHASE I WALLS AND WINGS FULL HEIGHT.
3. WING FOOTINGS AND FLOOR SLAB OF PHASE II INCLUDING 4" OF VERTICAL WALL.
4. THE REMAINING PORTION OF PHASE II WALL AND WINGS FULL HEIGHT FOLLOWED BY THE ROOF SLAB, HEADWALLS, AND SILLS.

THE ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL. 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.

REMOVAL OF THE EXISTING CM PIPES 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 PIPES IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTS OF 3 LINES OF 103" X 71" CM PIPE ARCH @ 60'-0" IN LENGTH ALONG CENTERLINE. THE EXISTING STRUCTURE, WHICH IS LOCATED AT THE SITE OF THE PROPOSED STRUCTURE AND SHALL BE REMOVED.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

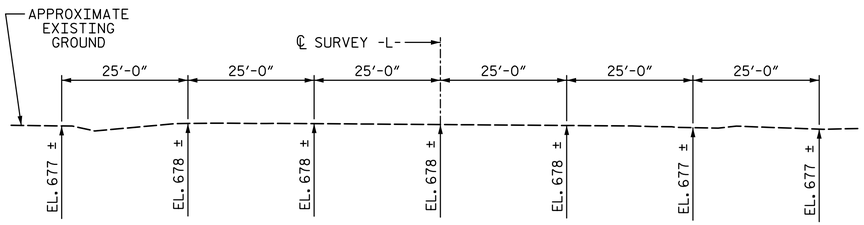
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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.

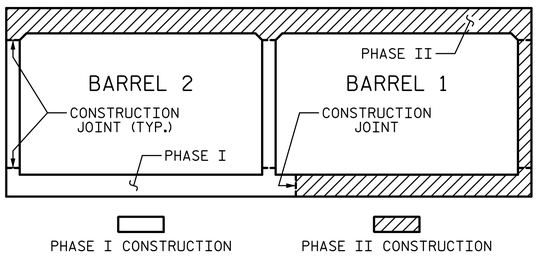
CULVERT MUST BE CAST-IN-PLACE, PRECAST OPTION WILL NOT BE ALLOWED.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 KG) OF REINFORCING STEEL, ONE 30 INCH (760 MM) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 KG) OF REINFORCING STEEL, TWO 30 INCH (760 MM) SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.



PROFILE ALONG ℄ CULVERT



CONSTRUCTION PHASING

LOOKING DOWNSTREAM

PHASE I STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE		LUMP SUM
BOX CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MATERIAL		66 TONS
CLASS A CONCRETE		
BARREL @	0.904 CY/FT	51.8 C.Y.
WING ETC.		11.6 C.Y.
TOTAL		63.4 C.Y.
REINFORCING STEEL		
BARREL		10,173 LBS.
WINGS ETC.		668 LBS.
TOTAL		10,805 LBS.

PHASE II STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE		LUMP SUM
BOX CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MATERIAL		56 TONS
CLASS A CONCRETE		
BARREL @	1.870 CY/FT	107.0 C.Y.
HEADWALLS		2.4 C.Y.
SILLS		2.7 C.Y.
WING ETC.		13.6 C.Y.
TOTAL		125.7 C.Y.
REINFORCING STEEL		
BARREL		15,772 LBS.
WINGS ETC.		668 LBS.
TOTAL		16,440 LBS.

NOTES (CONTINUED):

EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS.

STEEL IN BOTTOM SLAB MAY BE SPLICED AT PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.

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

SAMPLE BAR REPLACEMENT

SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:
SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND fy = 60 ksi.

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 ENGINEER MARK A. AVERETTE
8/4/2026 | 4:24 AM PDT

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F.A. PROJECT NO. 5016002

PROJECT NO. U-5711
RANDOLPH COUNTY
STATION: 44+05.00 -L-

SHEET 1 OF 7 REPLACES CULVERT P483

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 7 FT. CONCETE BOX CULVERT

100° SKEW

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

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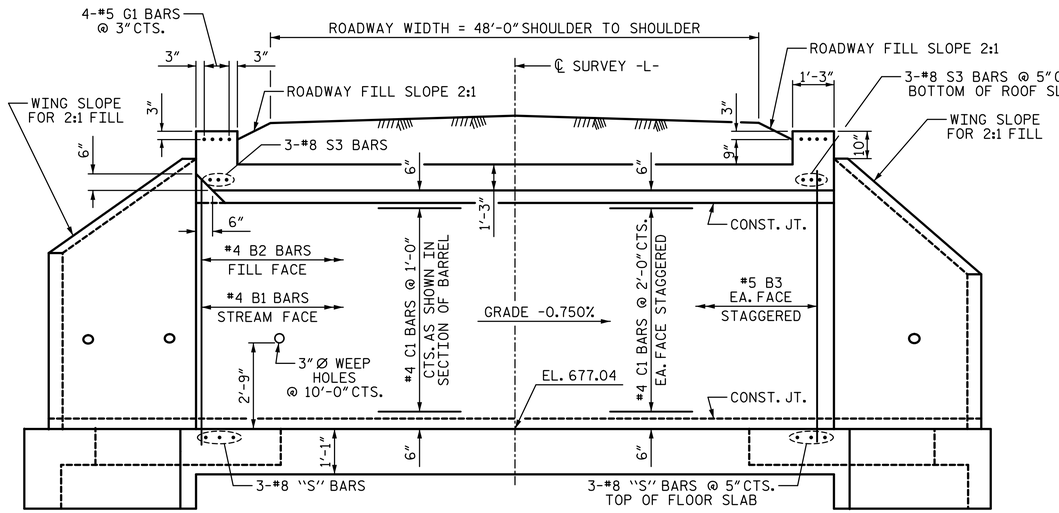
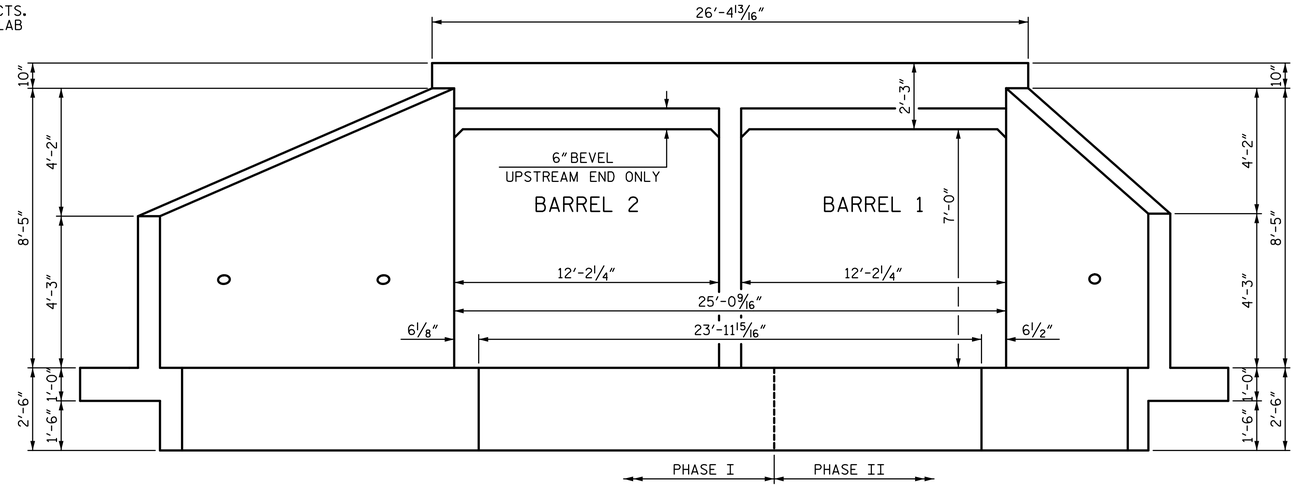


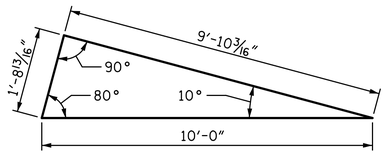
CULVERT SECTION NORMAL TO ROADWAY

(CONCRETE SILLS NOT SHOWN)

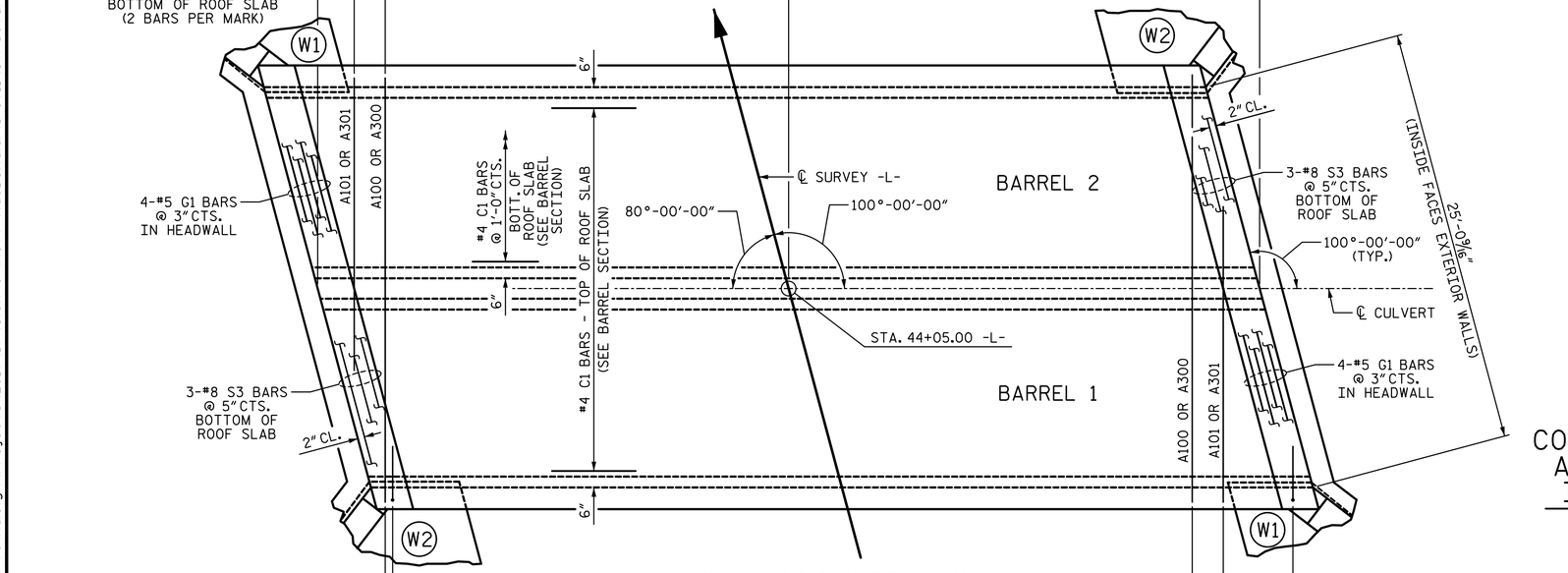


END ELEVATION

LOOKING DOWNSTREAM

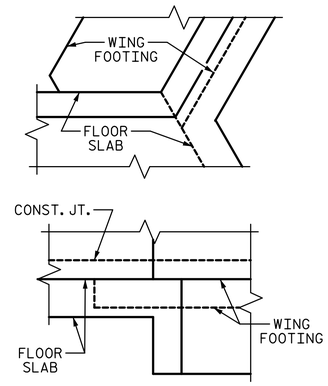


SKEW TRIANGLE



PLAN OF ROOF SLAB

C1 BARS ARE 2 BAR RUNS



DETAIL

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

DRAWN BY: T. BANKOVICH DATE: 8-22
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DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

WGI
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Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL SEAL 023908 ENGINEER MARK A. AVERETTE
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PROJECT NO. U-5711
RANDOLPH COUNTY
STATION: 44+05.00 -L-

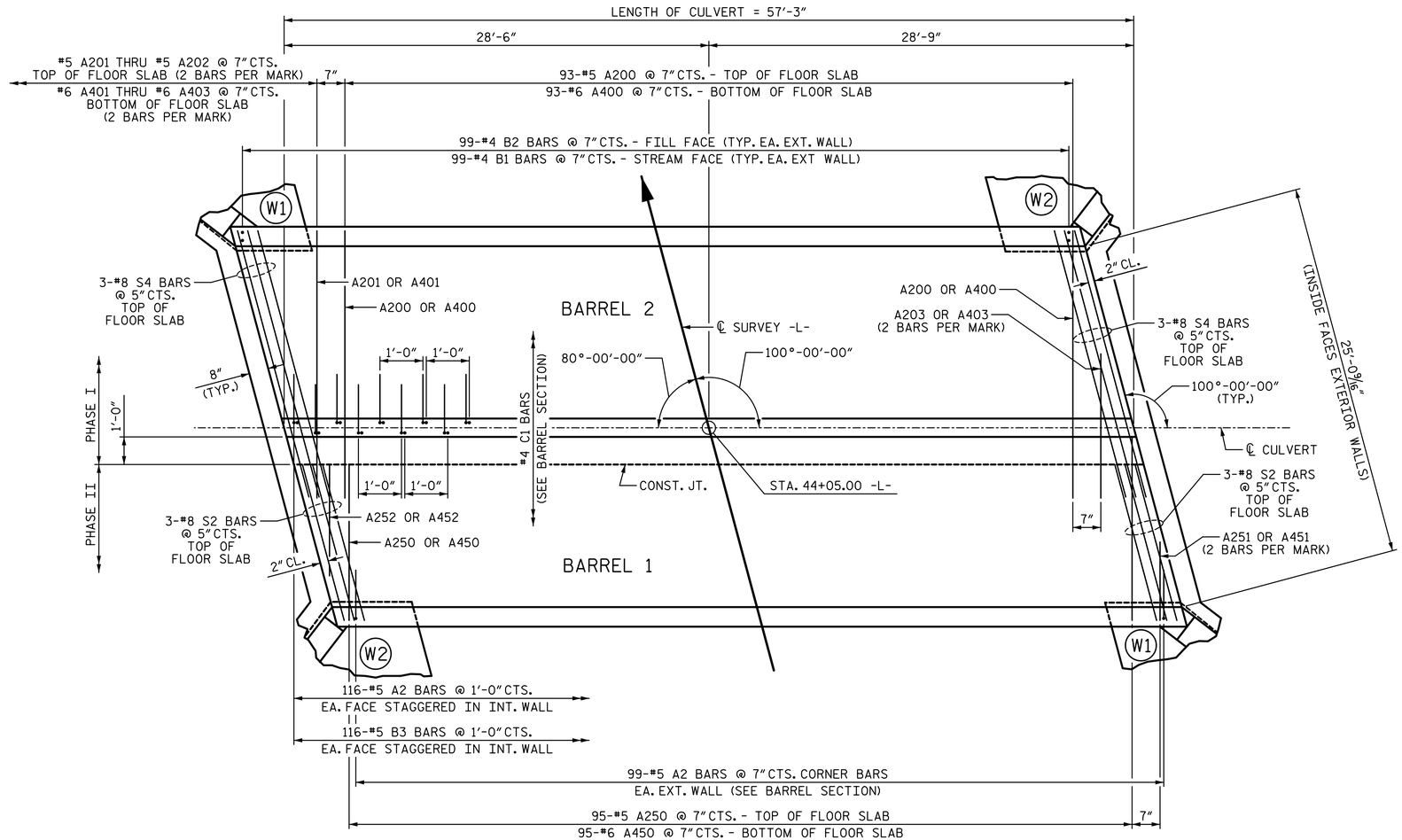
SHEET 2 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 7 FT. CONCRETE BOX CULVERT

100° SKEW

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



PLAN OF FLOOR SLAB

C1 BARS ARE 2 BAR RUNS

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 7 FT. CONCRETE BOX CULVERT

100° SKEW

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

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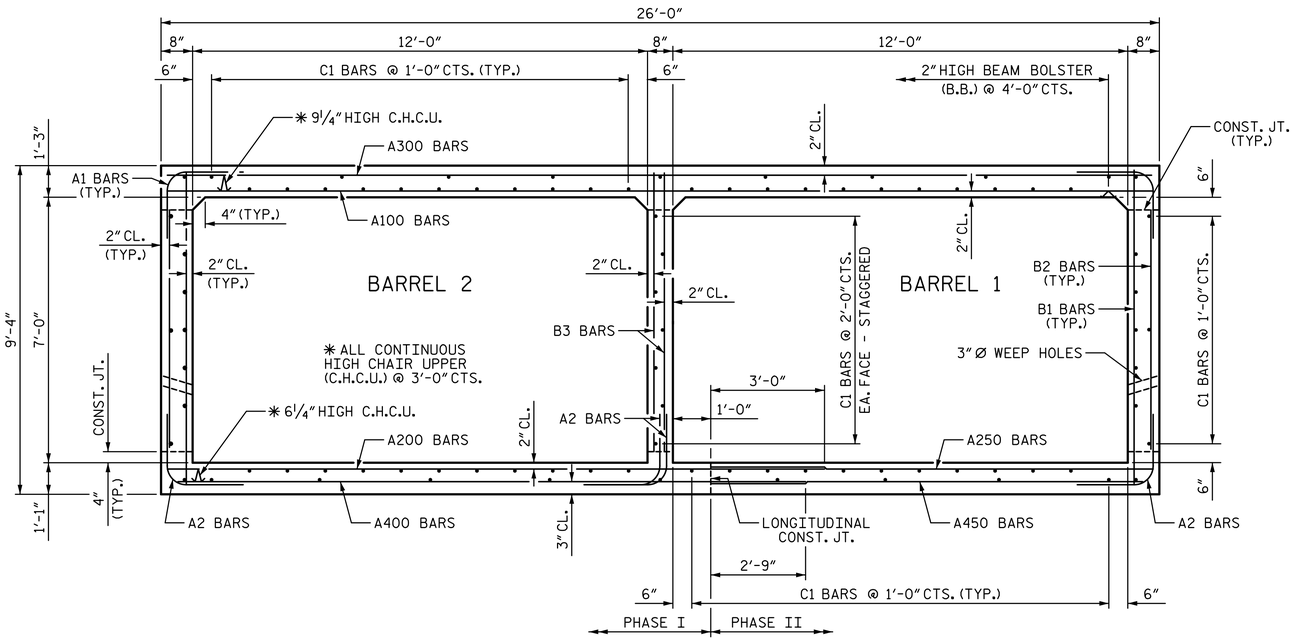
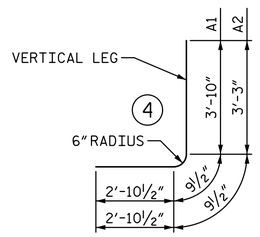


RIGHT ANGLE SECTION OF BARREL

(THERE ARE 89 "C" BARS IN SECTION OF BARREL)
("C1" BARS ARE 2 BAR RUNS)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

SPLICE CHART

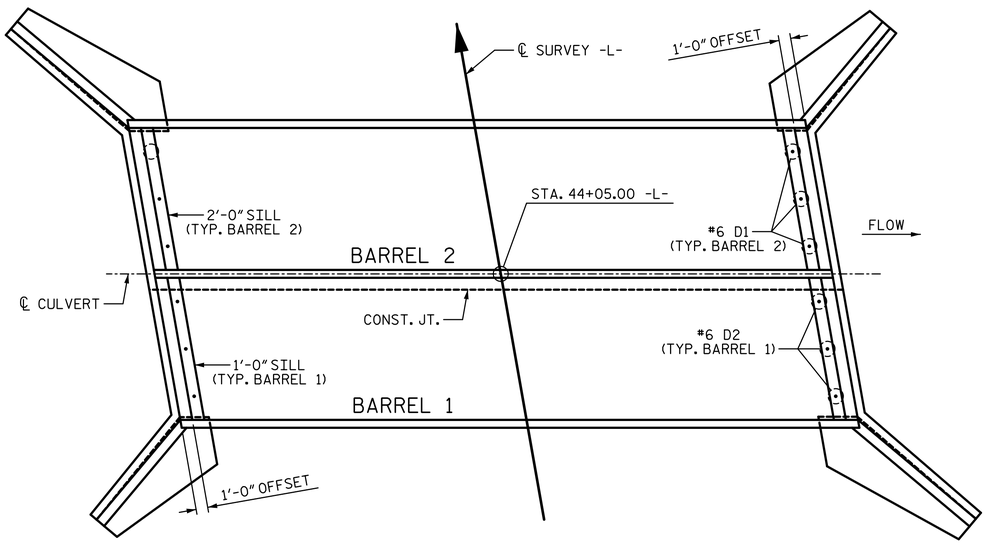
#4 B1 SPLICE LENGTH = 1'-10"
#4 C1 SPLICE LENGTH = 2'-5"
#5 A200/A250 SPLICE LENGTH = 3'-0"
#6 A400/A450 SPLICE LENGTH = 2'-9"
#8 S2/S4 SPLICE LENGTH = 4'-9"

BILL OF MATERIAL
PHASE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	99	#5	4	7'-6"	774
A2	215	#5	4	6'-11"	1551
A200	93	#5	STR	17'-3"	1673
A201	2	#5	STR	11'-8"	24
A202	2	#5	STR	5'-0"	10
A203	2	#5	STR	11'-0"	23
A400	93	#6	STR	17'-3"	2410
A401	2	#6	STR	11'-8"	35
A402	2	#6	STR	5'-0"	15
A403	2	#6	STR	11'-9"	35
B1	99	#4	STR	8'-11"	590
B2	99	#4	STR	6'-4"	419
B3	116	#5	STR	7'-9"	938
C1	66	#4	STR	29'-8"	1308
D1	6	#6	STR	2'-8"	24
S4	6	#8	STR	19'-3"	308
TOTAL REINFORCING STEEL					10137 LB
CLASS A CONCRETE BREAKDOWN					
BARREL					51.8 CY

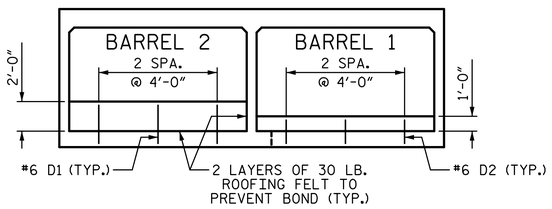
BILL OF MATERIAL
PHASE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	99	#5	4	7'-6"	774
A2	99	#5	4	6'-11"	714
A100	91	#6	STR	25'-7"	3497
A101	4	#6	STR	18'-3"	110
A102	4	#6	STR	11'-8"	70
A103	4	#6	STR	5'-0"	30
A250	95	#5	STR	11'-5"	1131
A251	2	#5	STR	5'-0"	10
A252	1	#5	STR	8'-1"	8
A300	91	#6	STR	25'-7"	3497
A301	4	#6	STR	18'-3"	110
A302	4	#6	STR	11'-8"	70
A303	4	#6	STR	5'-0"	30
A450	95	#6	STR	11'-5"	1629
A451	2	#6	STR	5'-0"	15
A452	1	#6	STR	8'-1"	12
B1	99	#4	STR	8'-11"	590
B2	99	#4	STR	6'-4"	419
C1	112	#4	STR	29'-8"	2220
D2	6	#6	STR	1'-8"	15
G1	8	#5	STR	26'-0"	217
S2	6	#8	STR	11'-8"	187
S3	6	#8	STR	26'-0"	417
TOTAL REINFORCING STEEL					15772 LB
CLASS A CONCRETE BREAKDOWN					
BARREL					107.0 CY
SILLS					2.7 CY

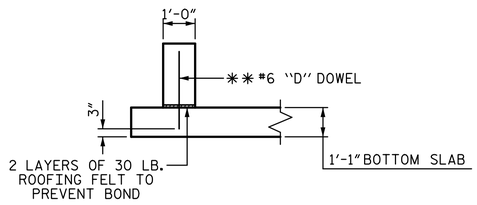


FLOOR PLAN

(SHOWING PLACEMENT OF SILLS)



ELEVATION - LOOKING DOWNSTREAM



SECTION THROUGH SILL

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

CULVERT SILL DETAILS

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP RAP MAY BE USED TO SUPPLEMENT NATIVE MATERIAL IN THE HIGH FLOW BARREL(S). IF RIP RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL(S), NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
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PROJECT NO. U-5711
RANDOLPH COUNTY
STATION: 44+05.00 -L-

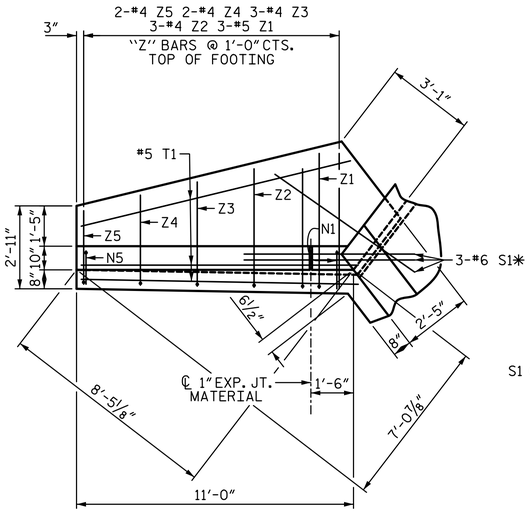
SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

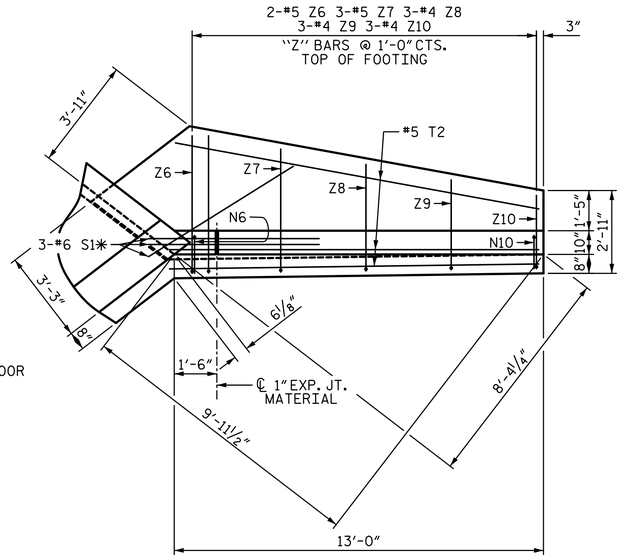
DOUBLE 12 FT. X 7 FT. CONCRETE BOX CULVERT

100° SKEW

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

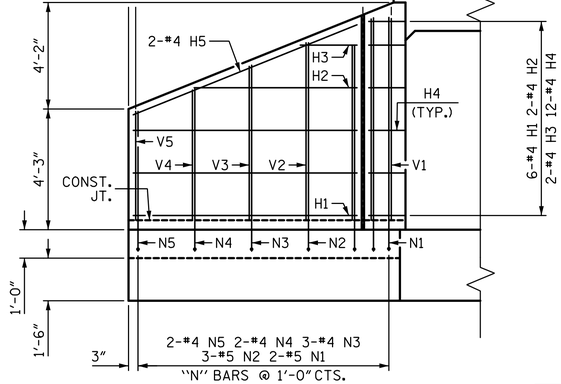


PLAN W2

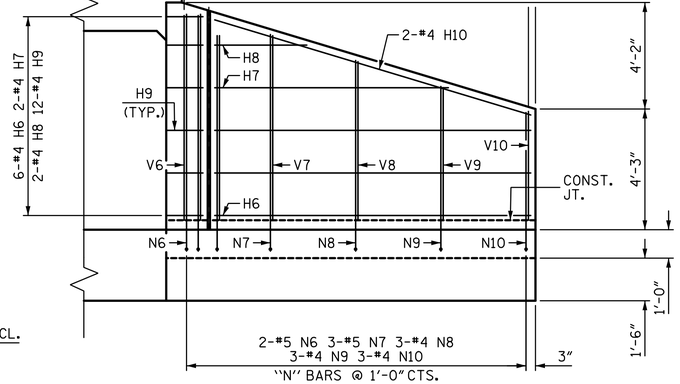


PLAN W1

S1 @ BOTTOM OF FLOOR SLAB & FOOTING



ELEVATION W2



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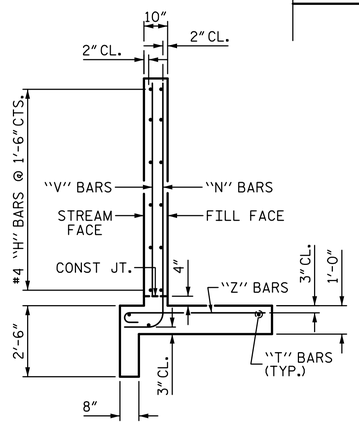
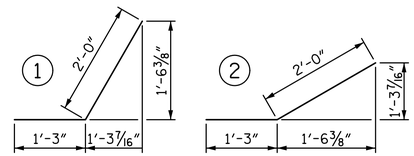
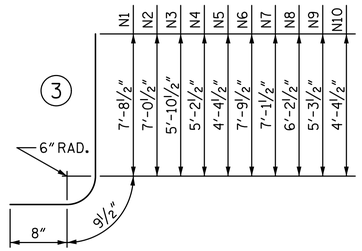
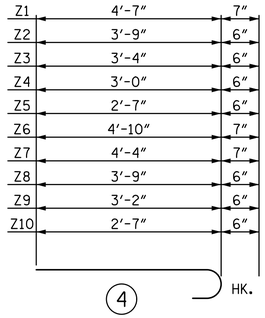


TYPICAL WING SECTION

BAR TYPES







ALL BAR DIMENSIONS ARE OUT TO OUT

PHASE I	
CLASS A CONCRETE	
2 WINGS	9.9 CY
2 END CURTAIN WALLS	1.7 CY
PHASE I TOTAL	11.6 CY

PHASE II	
CLASS A CONCRETE	
2 WINGS	9.9 CY
2 END CURTAIN WALLS	1.3 CY
2 HEADWALLS	2.4 CY
PHASE II TOTAL	13.6 CY

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	9'-2"	37
H2	2	#4	STR	7'-0"	9
H3	2	#4	STR	3'-0"	4
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	9'-10"	13
H6	6	#4	STR	11'-1"	44
H7	2	#4	STR	8'-2"	11
H8	2	#4	STR	3'-3"	4
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	11'-7"	15
N1	2	#5	3	9'-2"	19
N2	3	#5	3	8'-6"	27
N3	3	#4	3	7'-4"	15
N4	2	#4	3	6'-8"	9
N5	2	#4	3	5'-10"	8
N6	2	#5	3	9'-3"	19
N7	3	#5	3	8'-7"	27
N8	3	#4	3	7'-8"	15
N9	3	#4	3	6'-9"	14
N10	3	#4	3	5'-10"	12
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	11'-0"	34
T2	3	#5	STR	13'-0"	41
V1	2	#4	STR	7'-1"	9
V2	3	#4	STR	6'-6"	13
V3	3	#4	STR	5'-4"	11
V4	2	#4	STR	4'-7"	6
V5	2	#4	STR	3'-10"	5
V6	2	#4	STR	7'-3"	10
V7	3	#4	STR	6'-6"	13
V8	3	#4	STR	5'-7"	11
V9	3	#4	STR	4'-8"	9
V10	3	#4	STR	3'-10"	8
Z1	3	#5	4	5'-2"	16
Z2	3	#4	4	4'-3"	9
Z3	3	#4	4	3'-10"	8
Z4	2	#4	4	3'-6"	5
Z5	2	#4	4	3'-1"	4
Z6	2	#5	4	5'-5"	11
Z7	3	#5	4	4'-11"	15
Z8	3	#4	4	4'-3"	9
Z9	3	#4	4	3'-8"	7
Z10	3	#4	4	3'-1"	6

TOTAL REINFORCING STEEL FOR 2 WINGS EACH PHASE 668 LB

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

H = 7'-0" SLOPE = 2:1

100° SKEW

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
8/4/2026 | 4:24 AM PDT

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2			4			7

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

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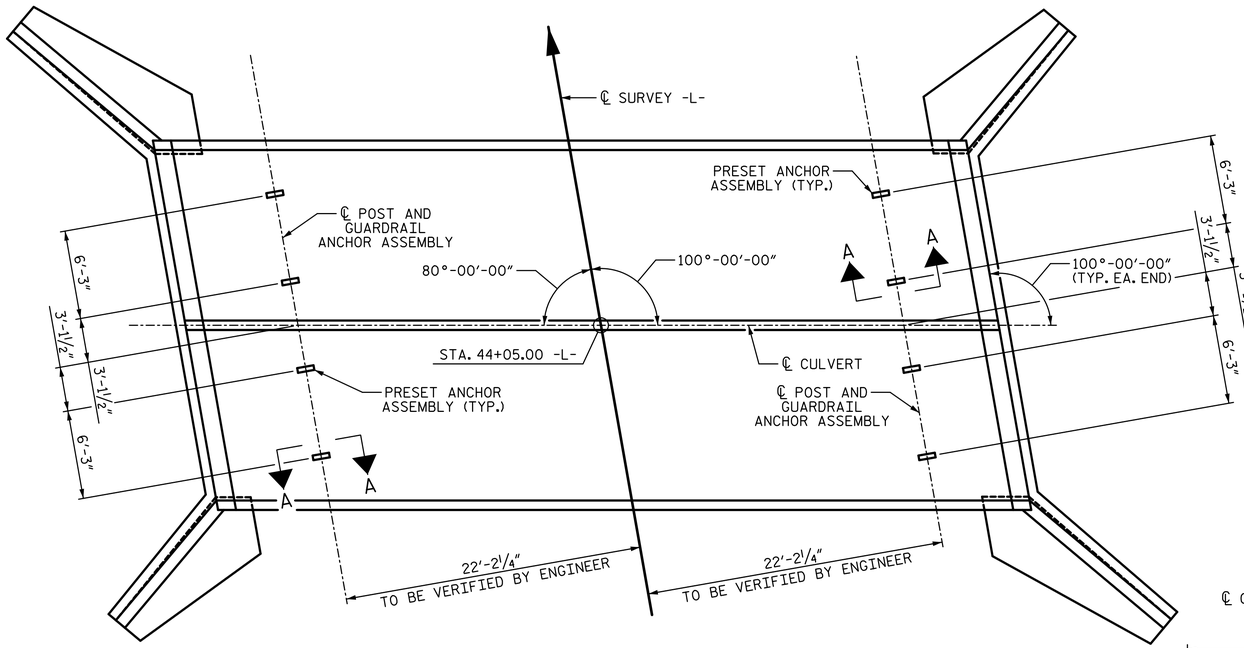


PLAN

(SHOWING GUARDRAIL ANCHOR ASSEMBLY SPACING)

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 2½″.

B. 4 - 1″ Ø X 2 ¼″ 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 2¼″ 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 7/16″ 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.

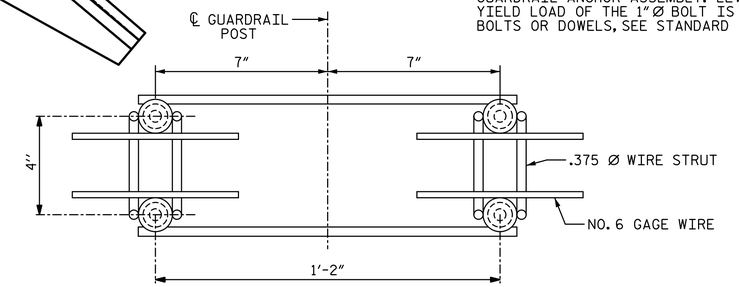
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

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

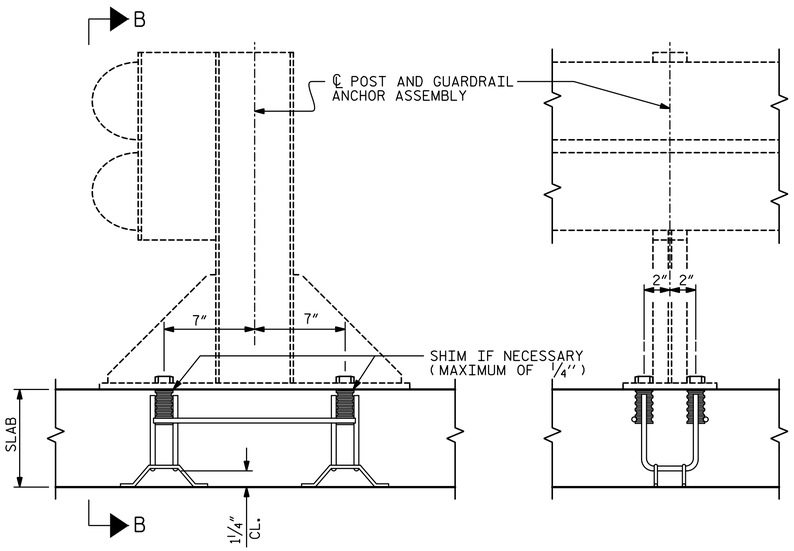
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

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.

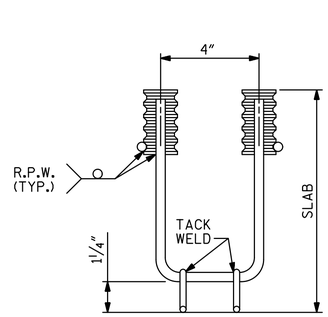


PLAN

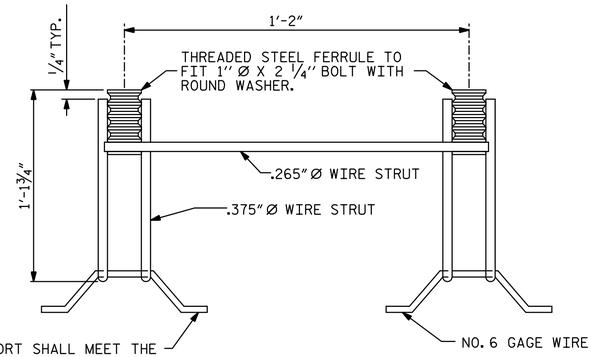


SECTION A-A

SECTION B-B



ELEVATION



SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

DRAWN BY:	T. BANKOVICH	DATE:	8-22
CHECKED BY:	J.A. BATTS	DATE:	8-22
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	9-25

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

8/4/2026 | 4:24 AM PDT

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2			4			7

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 × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BARREL NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BARREL NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.23	- -	1.75	1.47	1	ROOF SLAB - RIGHT	12.00	1.23	1	ROOF SLAB - RIGHT	11.06	
		HL-93 (OPERATING)	N/A		1.59	- -	1.35	1.91	1	ROOF SLAB - RIGHT	12.00	1.59	1	ROOF SLAB - RIGHT	11.06	
		HS-20 (INVENTORY)	36.000	2	1.28	46.1	1.75	1.47	1	ROOF SLAB - RIGHT	12.00	1.28	1	ROOF SLAB - RIGHT	11.06	
		HS-20 (OPERATING)	36.000		1.66	59.7	1.35	1.91	1	ROOF SLAB - RIGHT	12.00	1.66	1	ROOF SLAB - RIGHT	11.06	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.72	36.7	1.40	2.79	1	ROOF SLAB - MIDDLE	4.73	2.72	1	ROOF SLAB - RIGHT	11.06	
		SNGARBS2	20.000		2.46	49.2	1.40	2.61	1	ROOF SLAB - MIDDLE	4.73	2.46	1	ROOF SLAB - RIGHT	11.06	
		SNAGRIS2	22.000		2.58	56.8	1.40	2.67	1	ROOF SLAB - RIGHT	12.00	2.58	1	ROOF SLAB - RIGHT	11.06	
		SNCOTTS3	27.250	3	1.44	39.2	1.40	1.73	1	ROOF SLAB - MIDDLE	4.73	1.44	1	ROOF SLAB - RIGHT	11.06	
		SNAGGRS4	34.925		1.70	59.4	1.40	1.91	1	FLOOR SLAB - RIGHT	12.00	1.70	1	ROOF SLAB - RIGHT	11.06	
		SNS5A	35.550		1.63	57.9	1.40	1.87	1	FLOOR SLAB - RIGHT	12.00	1.63	1	ROOF SLAB - RIGHT	11.06	
		SNS6A	39.950		1.59	63.5	1.40	1.83	1	FLOOR SLAB - RIGHT	12.00	1.59	1	ROOF SLAB - RIGHT	11.06	
		SNS7B	42.000		1.56	65.5	1.40	1.85	1	FLOOR SLAB - RIGHT	12.00	1.56	1	ROOF SLAB - RIGHT	11.06	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.14	70.6	1.40	2.14	1	FLOOR SLAB - RIGHT	12.00	2.17	1	ROOF SLAB - RIGHT	11.06	
		TNT4A	33.075		1.66	54.9	1.40	2.06	1	ROOF SLAB - MIDDLE	4.73	1.66	1	ROOF SLAB - RIGHT	11.06	
		TNT6A	41.600		1.61	67.0	1.40	1.89	1	FLOOR SLAB - RIGHT	12.00	1.61	1	ROOF SLAB - RIGHT	11.06	
		TNT7A	42.000		1.65	69.3	1.40	1.80	1	FLOOR SLAB - RIGHT	12.00	1.65	1	ROOF SLAB - RIGHT	11.06	
		TNT7B	42.000		1.62	68.0	1.40	1.88	1	FLOOR SLAB - RIGHT	12.00	1.62	1	ROOF SLAB - RIGHT	11.06	
		TNAGRIT4	43.000		1.61	69.2	1.40	1.66	1	FLOOR SLAB - RIGHT	12.00	1.61	1	ROOF SLAB - RIGHT	11.06	
		TNAGT5A	45.000		1.61	72.5	1.40	1.84	1	ROOF SLAB - RIGHT	12.00	1.61	1	ROOF SLAB - RIGHT	11.06	
		TNAGT5B	45.000		1.57	70.7	1.40	1.57	1	ROOF SLAB - RIGHT	12.00	1.57	1	ROOF SLAB - RIGHT	11.06	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.83	52.6	1.30	1.90	1	ROOF SLAB - RIGHT	12.00	1.83	1	ROOF SLAB - RIGHT	11.06	
		EV3	43.000	4	1.21	52.0	1.30	1.31	1	FLOOR SLAB - RIGHT	12.00	1.21	1	ROOF SLAB - RIGHT	11.06	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

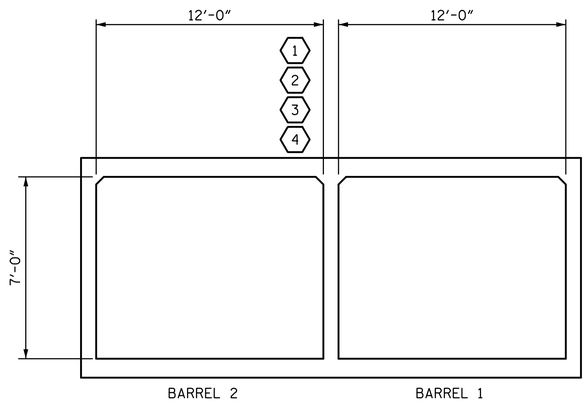
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

(#) CONTROLLING LOAD RATING

1. DESIGN LOAD RATING (HL-93)
2. DESIGN LOAD RATING (HS-20)
3. LEGAL LOAD RATING **
4. EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 7 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(NON-INTERSTATE TRAFFIC)

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL SEAL 023908 ENGINEER MARK A. AVERETTE
8/4/2026 | 4:24 AM PDT

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2			4			7

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

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STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 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 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

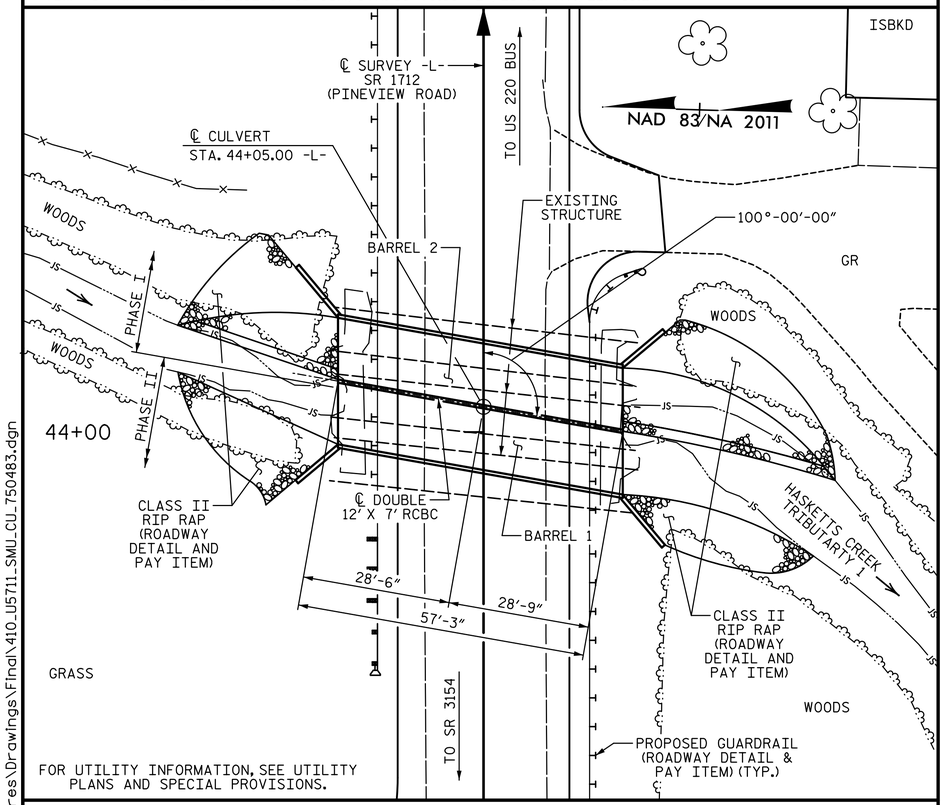
METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

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

TBM #3 RR SPIKE IN BASE OF 15" GUM, STA. 55+76.38 -L-, 237.17' RT., EL. 718.24



LOCATION SKETCH

HYDRAULIC DATA:

DESIGN DISCHARGE	= 730 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YEAR
DESIGN HIGH WATER ELEVATION	= 684.60
DRAINAGE AREA	= 0.73 SQ. MI.
BASE DISCHARGE (Q 100)	= 760 CFS
BASE HIGH WATER ELEVATION	= 684.7

OVERTOPPING FLOOD DATA:

OVERTOPPING DISCHARGE	= 1800 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YEAR
OVERTOPPING FLOOD ELEVATION	= 689.10 **

** OVERTOPPING OCCURS AT ROADWAY SAG AT STA. 43+45.30 -L- AT ROADWAY CENTERLINE

GRADE DATA:

GRADE POINT EL. @ STA. 44+05.00 -L- = EL. 687.84
BED EL. @ STA. 44+05.00 -L- = EL. 677.04
ROADWAY SLOPE 2:1

TOTAL STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE		LUMP SUM
BOX CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MATERIAL		122 TONS
CLASS A CONCRETE		
BARREL @	2.774 CY/FT	158.8 C.Y.
HEADWALLS		2.4 C.Y.
SILLS		2.7 C.Y.
WING ETC.		22.8 C.Y.
TOTAL		186.7 C.Y.
REINFORCING STEEL		
BARREL		25,909 LBS.
WINGS ETC.		1,336 LBS.
TOTAL		27,245 LBS.

NOTES:

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

DESIGN FILL---------- 2'-6" (MIN.) AND 4'-3" (MAX.)

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

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

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB OF PHASE I INCLUDING 4" OF ALL VERITCAL WALLS.
2. THE REMAINING PORTIONS OF THE PHASE I WALLS AND WINGS FULL HEIGHT.
3. WING FOOTINGS AND FLOOR SLAB OF PHASE II INCLUDING 4" OF VERTICAL WALL.
4. THE REMAINING PORTION OF PHASE II WALL AND WINGS FULL HEIGHT FOLLOWED BY THE ROOF SLAB, HEADWALLS, AND SILLS.

THE ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL. 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.

REMOVAL OF THE EXISTING CM PIPES 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 PIPES IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTS OF 3 LINES OF 103" X 71" CM PIPE ARCH @ 60'-0" IN LENGTH ALONG CENTERLINE. THE EXISTING STRUCTURE, WHICH IS LOCATED AT THE SITE OF THE PROPOSED STRUCTURE AND SHALL BE REMOVED.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

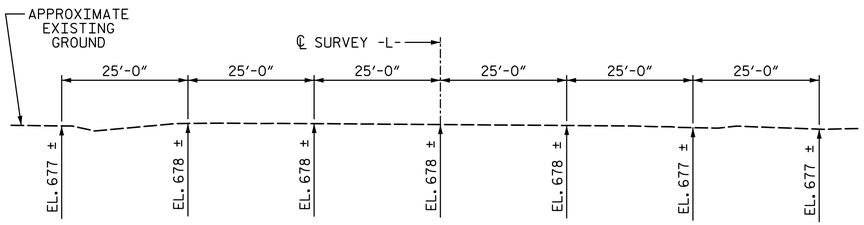
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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.

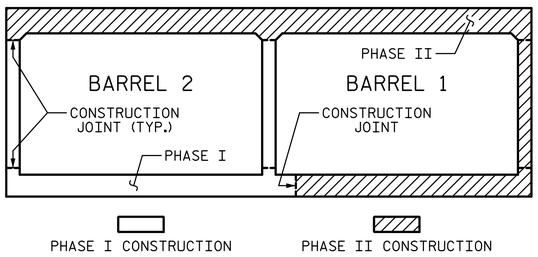
CULVERT MUST BE CAST-IN-PLACE, PRECAST OPTION WILL NOT BE ALLOWED.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 KG) OF REINFORCING STEEL, ONE 30 INCH (760 MM) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 KG) OF REINFORCING STEEL, TWO 30 INCH (760 MM) SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.



PROFILE ALONG ℄ CULVERT



CONSTRUCTION PHASING

LOOKING DOWNSTREAM

PHASE I STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE		LUMP SUM
BOX CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MATERIAL		66 TONS
CLASS A CONCRETE		
BARREL @	0.904 CY/FT	51.8 C.Y.
WING ETC.		11.6 C.Y.
TOTAL		63.4 C.Y.
REINFORCING STEEL		
BARREL		10,173 LBS.
WINGS ETC.		668 LBS.
TOTAL		10,805 LBS.

PHASE II STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE		LUMP SUM
BOX CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MATERIAL		56 TONS
CLASS A CONCRETE		
BARREL @	1.870 CY/FT	107.0 C.Y.
HEADWALLS		2.4 C.Y.
SILLS		2.7 C.Y.
WING ETC.		13.6 C.Y.
TOTAL		125.7 C.Y.
REINFORCING STEEL		
BARREL		15,772 LBS.
WINGS ETC.		668 LBS.
TOTAL		16,440 LBS.

NOTES (CONTINUED):

EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS.

STEEL IN BOTTOM SLAB MAY BE SPLICED AT PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.

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

SAMPLE BAR REPLACEMENT

SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:
SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND fy = 60 ksi.

F.A. PROJECT NO. 5016001

PROJECT NO. U-5711
RANDOLPH COUNTY
STATION: 44+05.00 -L-

SHEET 1 OF 7 REPLACES CULVERT P483

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 7 FT. CONCETE BOX CULVERT

100° SKEW

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

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
10/20/2025 | 12:06 PM PDT

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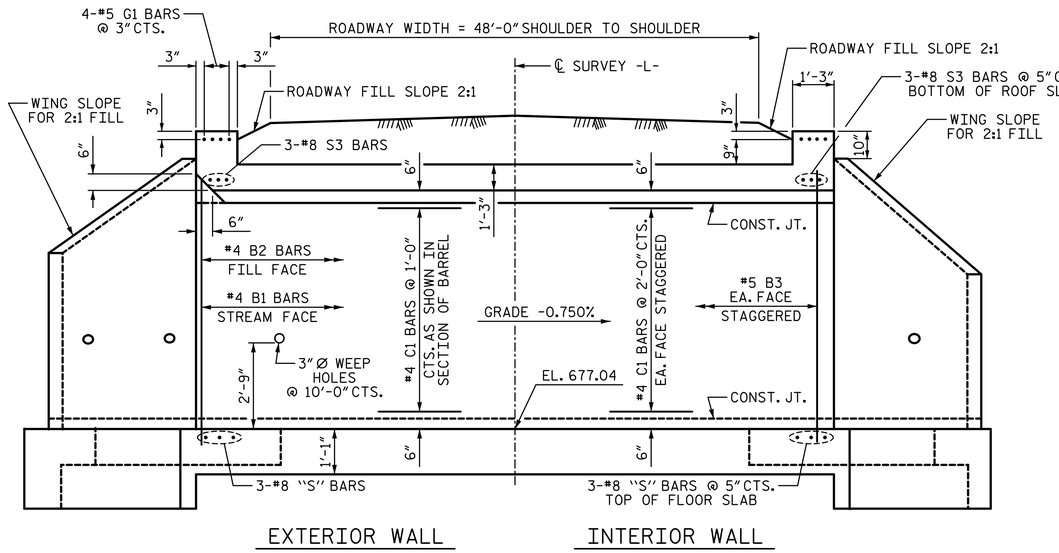
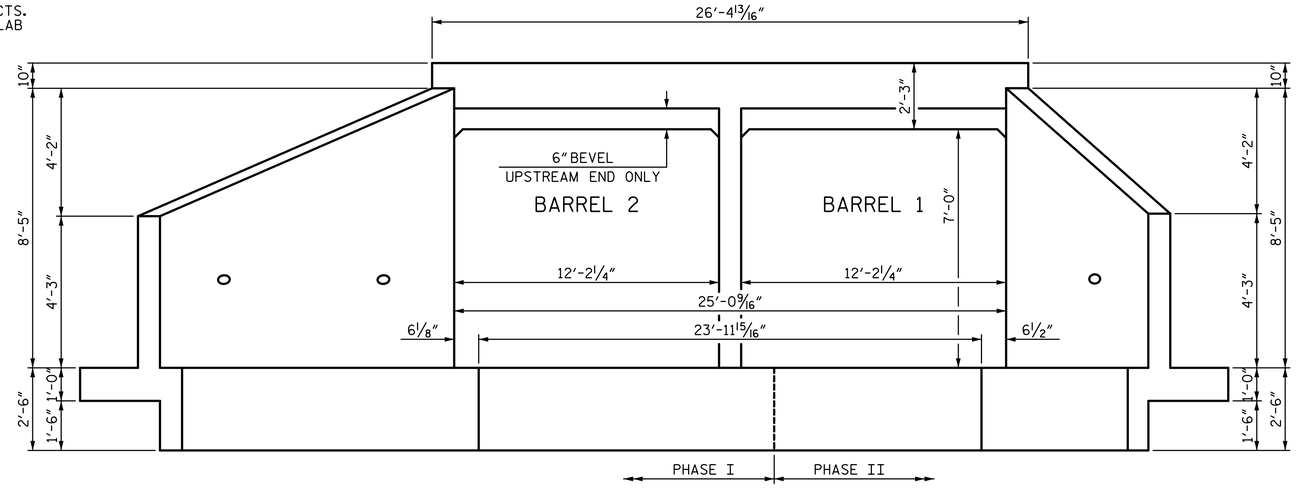


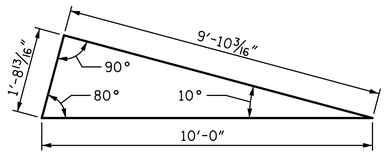
CULVERT SECTION NORMAL TO ROADWAY

(CONCRETE SILLS NOT SHOWN)

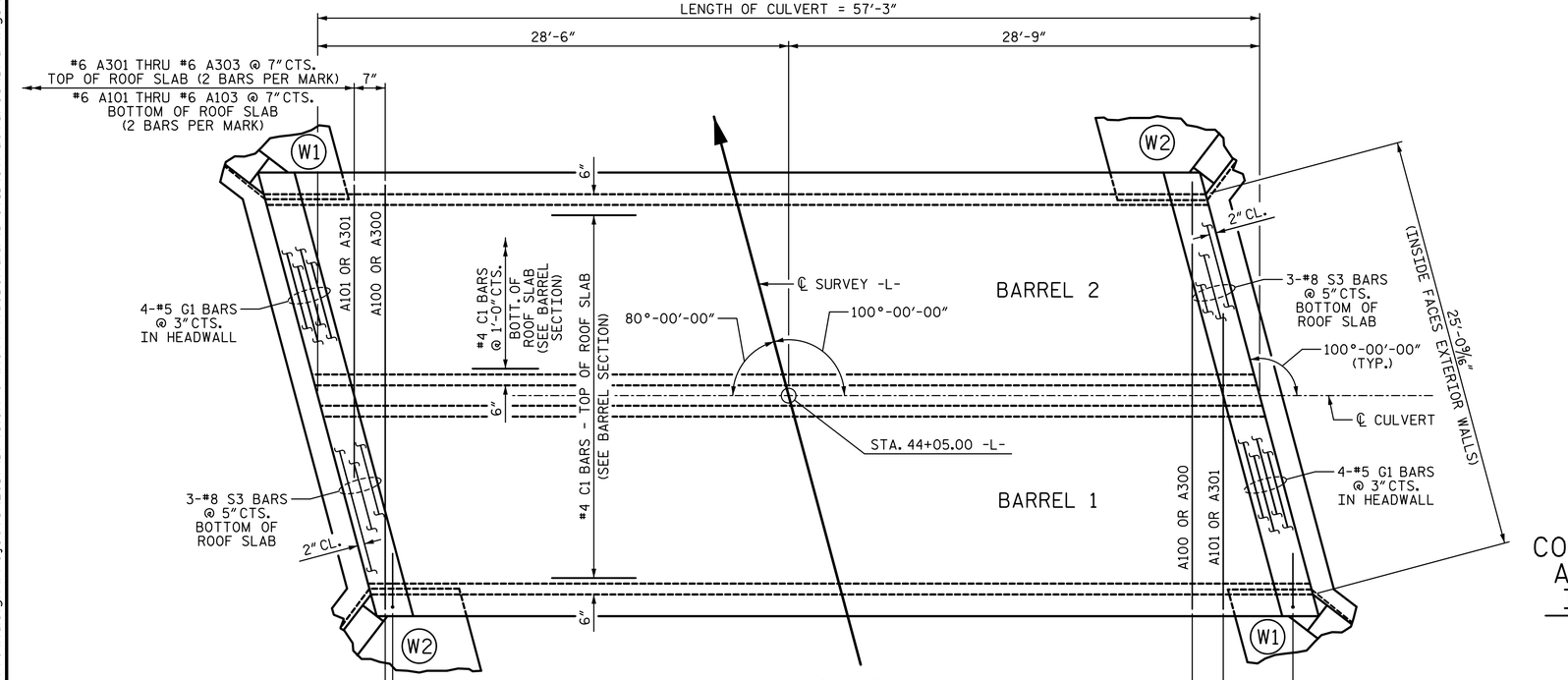


END ELEVATION

LOOKING DOWNSTREAM

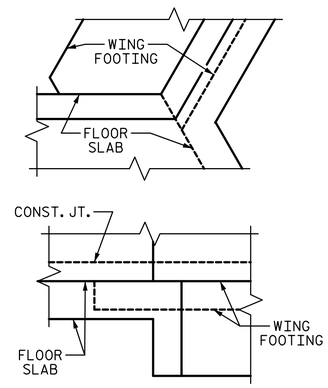


SKEW TRIANGLE



PLAN OF ROOF SLAB

C1 BARS ARE 2 BAR RUNS



DETAIL

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

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 2 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 7 FT. CONCRETE BOX CULVERT

100° SKEW

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

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CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

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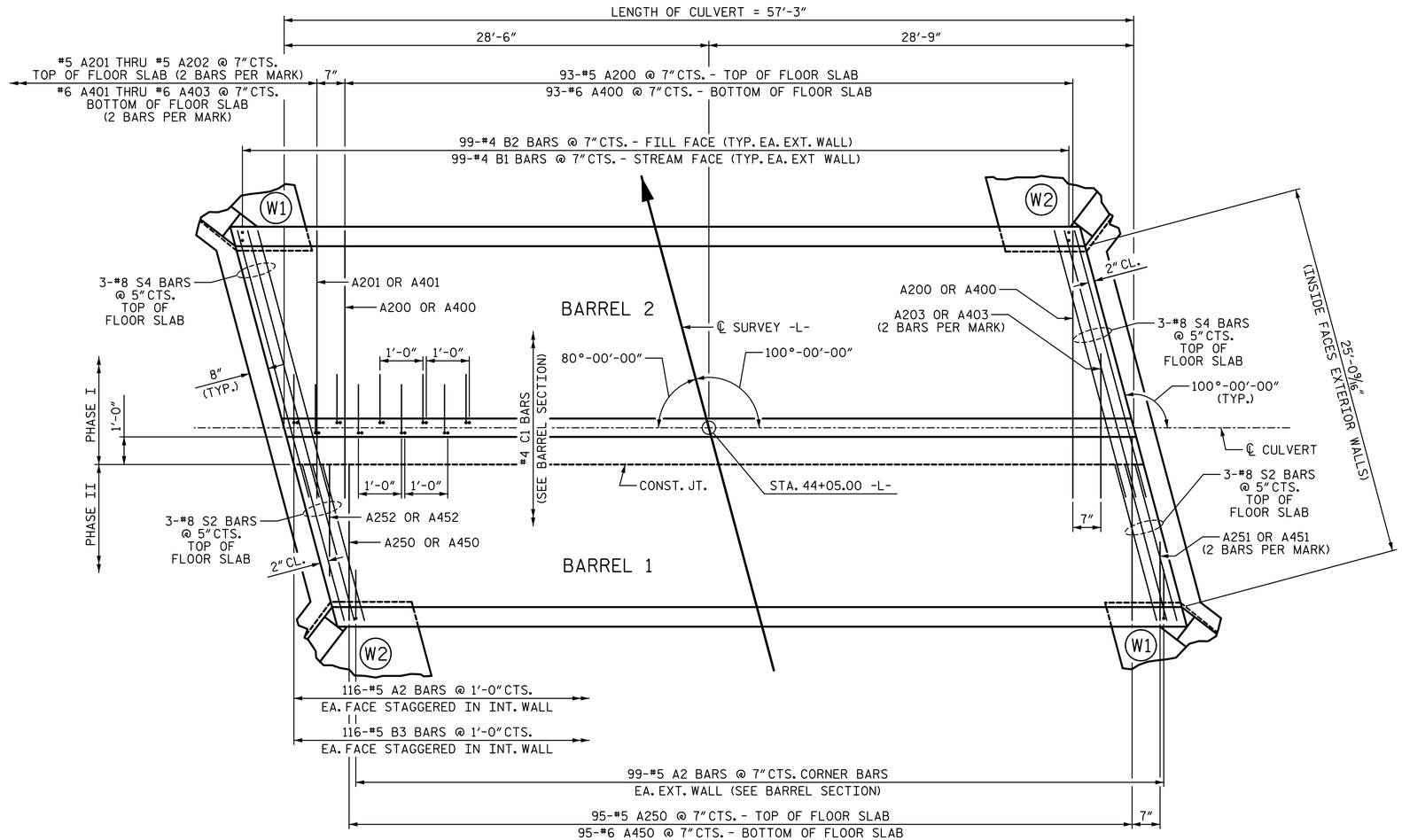

PLAN OF FLOOR SLAB

C1 BARS ARE 2 BAR RUNS

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 7 FT. CONCRETE BOX CULVERT

100° SKEW

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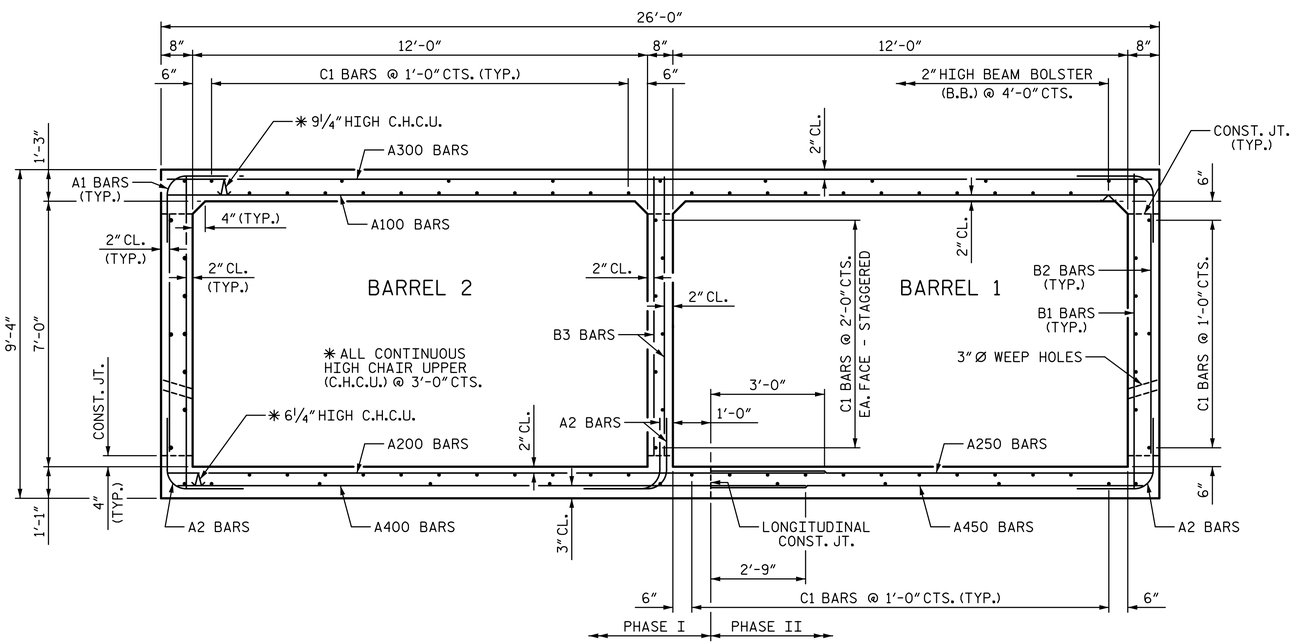
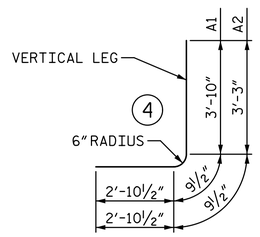


RIGHT ANGLE SECTION OF BARREL

(THERE ARE 89 "C" BARS IN SECTION OF BARREL)
("C1" BARS ARE 2 BAR RUNS)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

SPLICE CHART

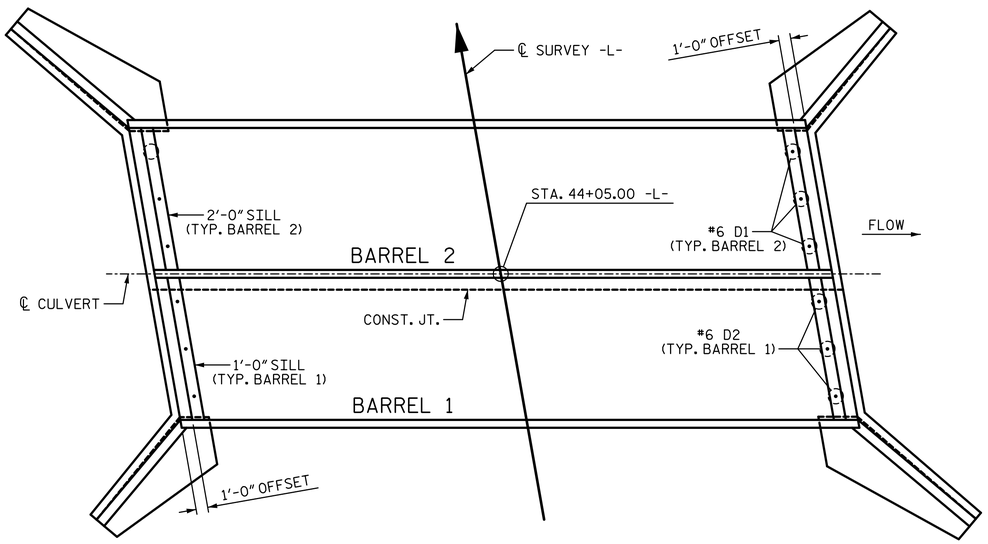
#4 B1 SPLICE LENGTH = 1'-10"
#4 C1 SPLICE LENGTH = 2'-5"
#5 A200/A250 SPLICE LENGTH = 3'-0"
#6 A400/A450 SPLICE LENGTH = 2'-9"
#8 S2/S4 SPLICE LENGTH = 4'-9"

BILL OF MATERIAL
PHASE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	99	#5	4	7'-6"	774
A2	215	#5	4	6'-11"	1551
A200	93	#5	STR	17'-3"	1673
A201	2	#5	STR	11'-8"	24
A202	2	#5	STR	5'-0"	10
A203	2	#5	STR	11'-0"	23
A400	93	#6	STR	17'-3"	2410
A401	2	#6	STR	11'-8"	35
A402	2	#6	STR	5'-0"	15
A403	2	#6	STR	11'-9"	35
B1	99	#4	STR	8'-11"	590
B2	99	#4	STR	6'-4"	419
B3	116	#5	STR	7'-9"	938
C1	66	#4	STR	29'-8"	1308
D1	6	#6	STR	2'-8"	24
S4	6	#8	STR	19'-3"	308
TOTAL REINFORCING STEEL					10137 LB
CLASS A CONCRETE BREAKDOWN					
BARREL					51.8 CY

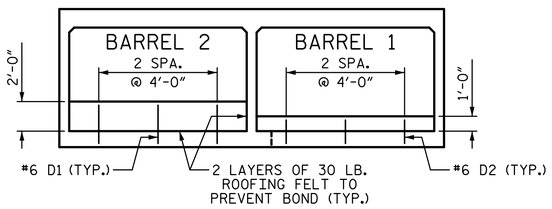
BILL OF MATERIAL
PHASE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	99	#5	4	7'-6"	774
A2	99	#5	4	6'-11"	714
A100	91	#6	STR	25'-7"	3497
A101	4	#6	STR	18'-3"	110
A102	4	#6	STR	11'-8"	70
A103	4	#6	STR	5'-0"	30
A250	95	#5	STR	11'-5"	1131
A251	2	#5	STR	5'-0"	10
A252	1	#5	STR	8'-1"	8
A300	91	#6	STR	25'-7"	3497
A301	4	#6	STR	18'-3"	110
A302	4	#6	STR	11'-8"	70
A303	4	#6	STR	5'-0"	30
A450	95	#6	STR	11'-5"	1629
A451	2	#6	STR	5'-0"	15
A452	1	#6	STR	8'-1"	12
B1	99	#4	STR	8'-11"	590
B2	99	#4	STR	6'-4"	419
C1	112	#4	STR	29'-8"	2220
D2	6	#6	STR	1'-8"	15
G1	8	#5	STR	26'-0"	217
S2	6	#8	STR	11'-8"	187
S3	6	#8	STR	26'-0"	417
TOTAL REINFORCING STEEL					15772 LB
CLASS A CONCRETE BREAKDOWN					
BARREL					107.0 CY
SILLS					2.7 CY

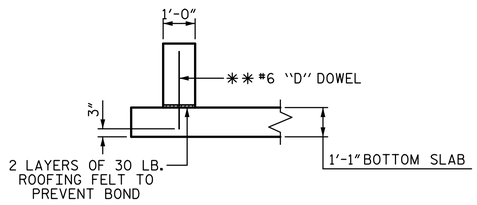


FLOOR PLAN

(SHOWING PLACEMENT OF SILLS)



ELEVATION - LOOKING DOWNSTREAM



SECTION THROUGH SILL

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

CULVERT SILL DETAILS

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP RAP MAY BE USED TO SUPPLEMENT NATIVE MATERIAL IN THE HIGH FLOW BARREL(S). IF RIP RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL(S), NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

PROJECT NO. U-5711
RANDOLPH COUNTY
STATION: 44+05.00 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12 FT. X 7 FT. CONCRETE BOX CULVERT

100° SKEW

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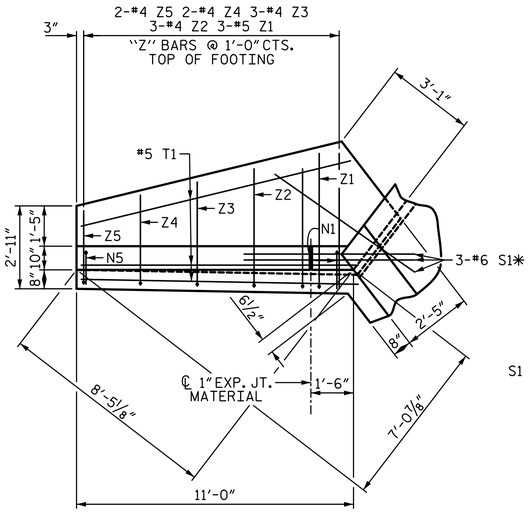
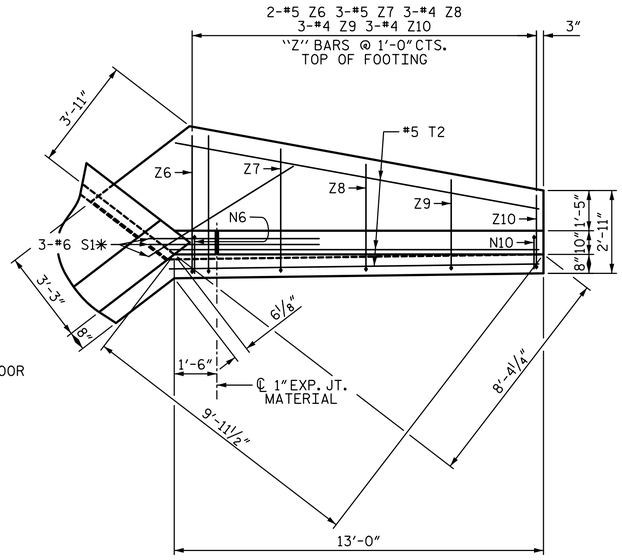
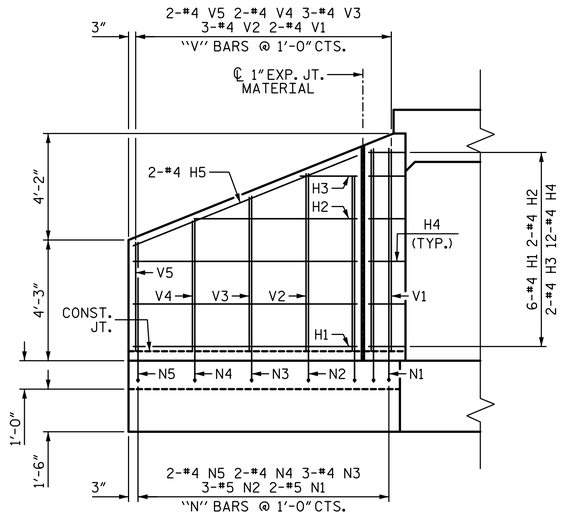


PLAN W2

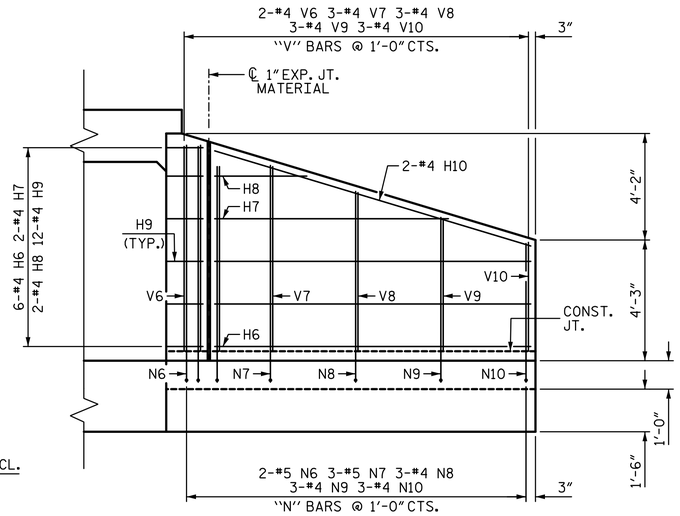
S1 @ BOTTOM OF FLOOR SLAB & FOOTING



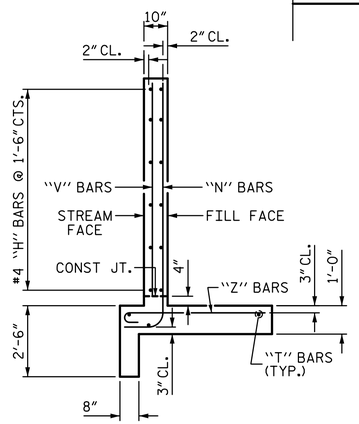
PLAN W1



ELEVATION W2

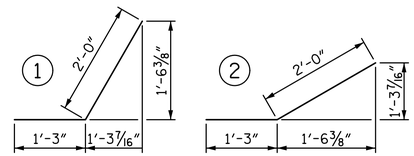


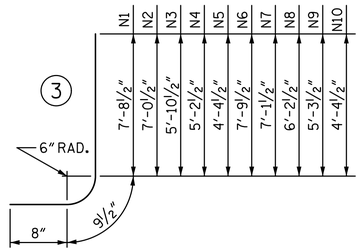
ELEVATION W1

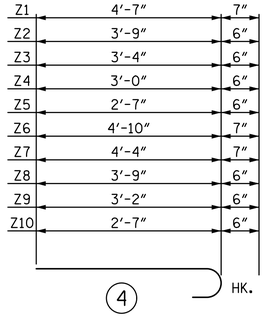


TYPICAL WING SECTION

BAR TYPES







ALL BAR DIMENSIONS ARE OUT TO OUT

PHASE I	
CLASS A CONCRETE	
2 WINGS	9.9 CY
2 END CURTAIN WALLS	1.7 CY
PHASE I TOTAL	11.6 CY

PHASE II	
CLASS A CONCRETE	
2 WINGS	9.9 CY
2 END CURTAIN WALLS	1.3 CY
2 HEADWALLS	2.4 CY
PHASE II TOTAL	13.6 CY

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	9'-2"	37
H2	2	#4	STR	7'-0"	9
H3	2	#4	STR	3'-0"	4
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	9'-10"	13
H6	6	#4	STR	11'-1"	44
H7	2	#4	STR	8'-2"	11
H8	2	#4	STR	3'-3"	4
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	11'-7"	15
N1	2	#5	3	9'-2"	19
N2	3	#5	3	8'-6"	27
N3	3	#4	3	7'-4"	15
N4	2	#4	3	6'-8"	9
N5	2	#4	3	5'-10"	8
N6	2	#5	3	9'-3"	19
N7	3	#5	3	8'-7"	27
N8	3	#4	3	7'-8"	15
N9	3	#4	3	6'-9"	14
N10	3	#4	3	5'-10"	12
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	11'-0"	34
T2	3	#5	STR	13'-0"	41
V1	2	#4	STR	7'-1"	9
V2	3	#4	STR	6'-6"	13
V3	3	#4	STR	5'-4"	11
V4	2	#4	STR	4'-7"	6
V5	2	#4	STR	3'-10"	5
V6	2	#4	STR	7'-3"	10
V7	3	#4	STR	6'-6"	13
V8	3	#4	STR	5'-7"	11
V9	3	#4	STR	4'-8"	9
V10	3	#4	STR	3'-10"	8
Z1	3	#5	4	5'-2"	16
Z2	3	#4	4	4'-3"	9
Z3	3	#4	4	3'-10"	8
Z4	2	#4	4	3'-6"	5
Z5	2	#4	4	3'-1"	4
Z6	2	#5	4	5'-5"	11
Z7	3	#5	4	4'-11"	15
Z8	3	#4	4	4'-3"	9
Z9	3	#4	4	3'-8"	7
Z10	3	#4	4	3'-1"	6

TOTAL REINFORCING STEEL FOR 2 WINGS EACH PHASE 668 LB

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

10/20/2025 | 12:06 PM PDT

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PROJECT NO. U-5711
RANDOLPH COUNTY
STATION: 44+05.00 -L-

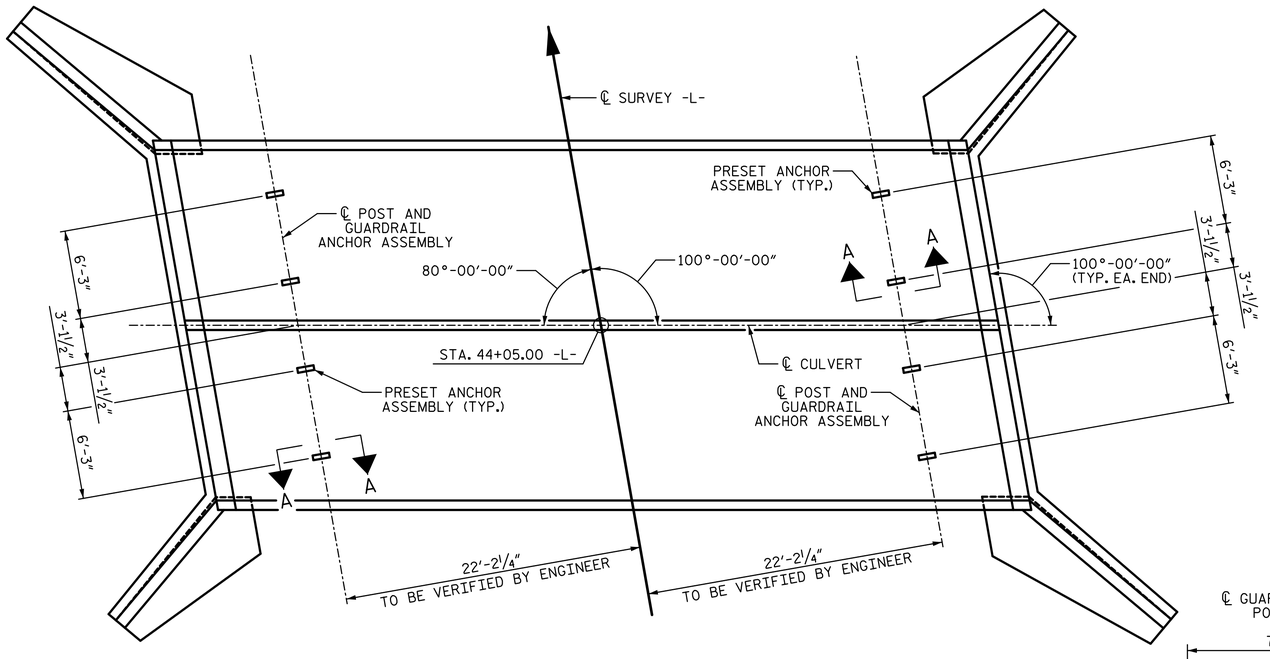
SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

# WINGS FOR CONCRETE BOX CULVERT
H = 7'-0" SLOPE = 2:1

100° SKEW

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



PLAN

(SHOWING GUARDRAIL ANCHOR ASSEMBLY SPACING)

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 2½″.

B. 4 - 1″ Ø X 2 ¼″ 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 2¼″ 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 7/16″ 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.

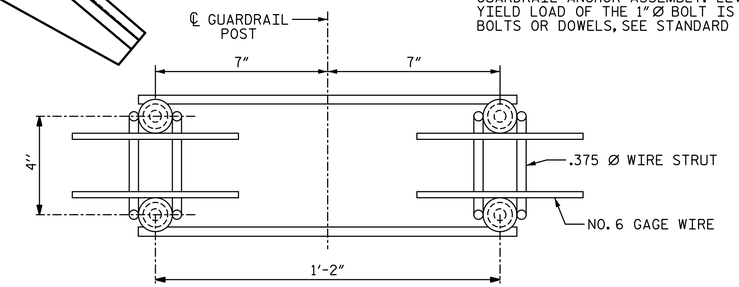
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

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

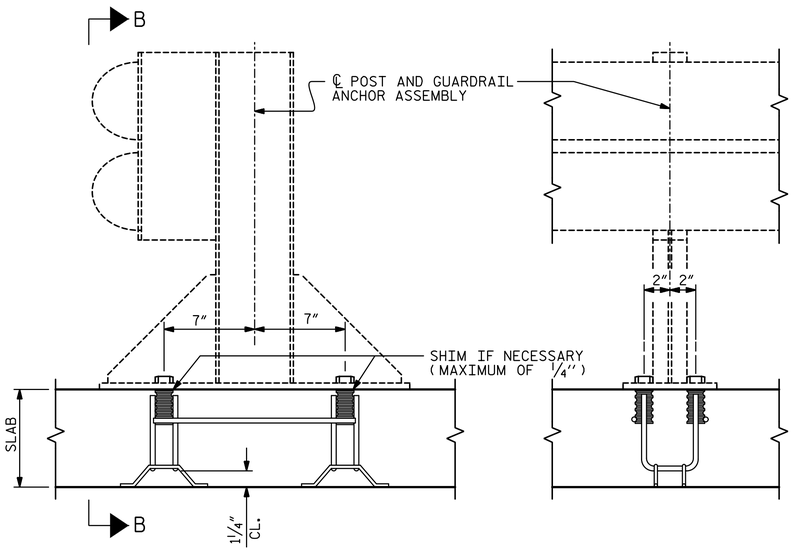
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

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.

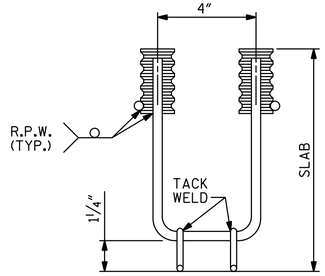


PLAN

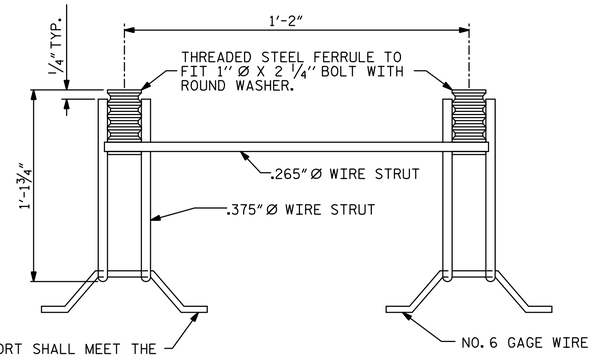


SECTION A-A

SECTION B-B



ELEVATION



SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

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

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
10/20/2025 | 12:06 PM PDT

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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 × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BARREL NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BARREL NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.23	- -	1.75	1.47	1	ROOF SLAB - RIGHT	12.00	1.23	1	ROOF SLAB - RIGHT	11.06	
		HL-93 (OPERATING)	N/A		1.59	- -	1.35	1.91	1	ROOF SLAB - RIGHT	12.00	1.59	1	ROOF SLAB - RIGHT	11.06	
		HS-20 (INVENTORY)	36.000	2	1.28	46.1	1.75	1.47	1	ROOF SLAB - RIGHT	12.00	1.28	1	ROOF SLAB - RIGHT	11.06	
		HS-20 (OPERATING)	36.000		1.66	59.7	1.35	1.91	1	ROOF SLAB - RIGHT	12.00	1.66	1	ROOF SLAB - RIGHT	11.06	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.72	36.7	1.40	2.79	1	ROOF SLAB - MIDDLE	4.73	2.72	1	ROOF SLAB - RIGHT	11.06	
		SNGARBS2	20.000		2.46	49.2	1.40	2.61	1	ROOF SLAB - MIDDLE	4.73	2.46	1	ROOF SLAB - RIGHT	11.06	
		SNAGRIS2	22.000		2.58	56.8	1.40	2.67	1	ROOF SLAB - RIGHT	12.00	2.58	1	ROOF SLAB - RIGHT	11.06	
		SNCOTTS3	27.250	3	1.44	39.2	1.40	1.73	1	ROOF SLAB - MIDDLE	4.73	1.44	1	ROOF SLAB - RIGHT	11.06	
		SNAGGRS4	34.925		1.70	59.4	1.40	1.91	1	FLOOR SLAB - RIGHT	12.00	1.70	1	ROOF SLAB - RIGHT	11.06	
		SNS5A	35.550		1.63	57.9	1.40	1.87	1	FLOOR SLAB - RIGHT	12.00	1.63	1	ROOF SLAB - RIGHT	11.06	
		SNS6A	39.950		1.59	63.5	1.40	1.83	1	FLOOR SLAB - RIGHT	12.00	1.59	1	ROOF SLAB - RIGHT	11.06	
		SNS7B	42.000		1.56	65.5	1.40	1.85	1	FLOOR SLAB - RIGHT	12.00	1.56	1	ROOF SLAB - RIGHT	11.06	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.14	70.6	1.40	2.14	1	FLOOR SLAB - RIGHT	12.00	2.17	1	ROOF SLAB - RIGHT	11.06	
		TNT4A	33.075		1.66	54.9	1.40	2.06	1	ROOF SLAB - MIDDLE	4.73	1.66	1	ROOF SLAB - RIGHT	11.06	
		TNT6A	41.600		1.61	67.0	1.40	1.89	1	FLOOR SLAB - RIGHT	12.00	1.61	1	ROOF SLAB - RIGHT	11.06	
		TNT7A	42.000		1.65	69.3	1.40	1.80	1	FLOOR SLAB - RIGHT	12.00	1.65	1	ROOF SLAB - RIGHT	11.06	
		TNT7B	42.000		1.62	68.0	1.40	1.88	1	FLOOR SLAB - RIGHT	12.00	1.62	1	ROOF SLAB - RIGHT	11.06	
		TNAGRIT4	43.000		1.61	69.2	1.40	1.66	1	FLOOR SLAB - RIGHT	12.00	1.61	1	ROOF SLAB - RIGHT	11.06	
		TNAGT5A	45.000		1.61	72.5	1.40	1.84	1	ROOF SLAB - RIGHT	12.00	1.61	1	ROOF SLAB - RIGHT	11.06	
		TNAGT5B	45.000		1.57	70.7	1.40	1.57	1	ROOF SLAB - RIGHT	12.00	1.57	1	ROOF SLAB - RIGHT	11.06	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.83	52.6	1.30	1.90	1	ROOF SLAB - RIGHT	12.00	1.83	1	ROOF SLAB - RIGHT	11.06	
		EV3	43.000	4	1.21	52.0	1.30	1.31	1	FLOOR SLAB - RIGHT	12.00	1.21	1	ROOF SLAB - RIGHT	11.06	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

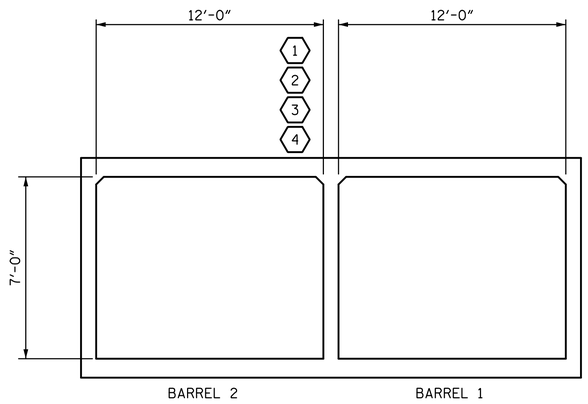
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

(#) CONTROLLING LOAD RATING

1. DESIGN LOAD RATING (HL-93)
2. DESIGN LOAD RATING (HS-20)
3. LEGAL LOAD RATING **
4. EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. U-5711

RANDOLPH COUNTY

STATION: 44+05.00 -L-

SHEET 7 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(NON-INTERSTATE TRAFFIC)

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL SEAL 023908 ENGINEER MARK A. AVERETTE

10/20/2025 | 12:06 PM PDT

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

DRAWN BY: T. BANKOVICH DATE: 8-22
CHECKED BY: J.A. BATTS DATE: 8-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 9-25

10/20/2025 11:58:41 AM P:\Raleigh\Projects\2017\Division 8 (Mott MacDonald)\U-5711\Structures\Drawings\Final\410_U5711_SMU_CU_750483.dgn

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 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 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

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

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