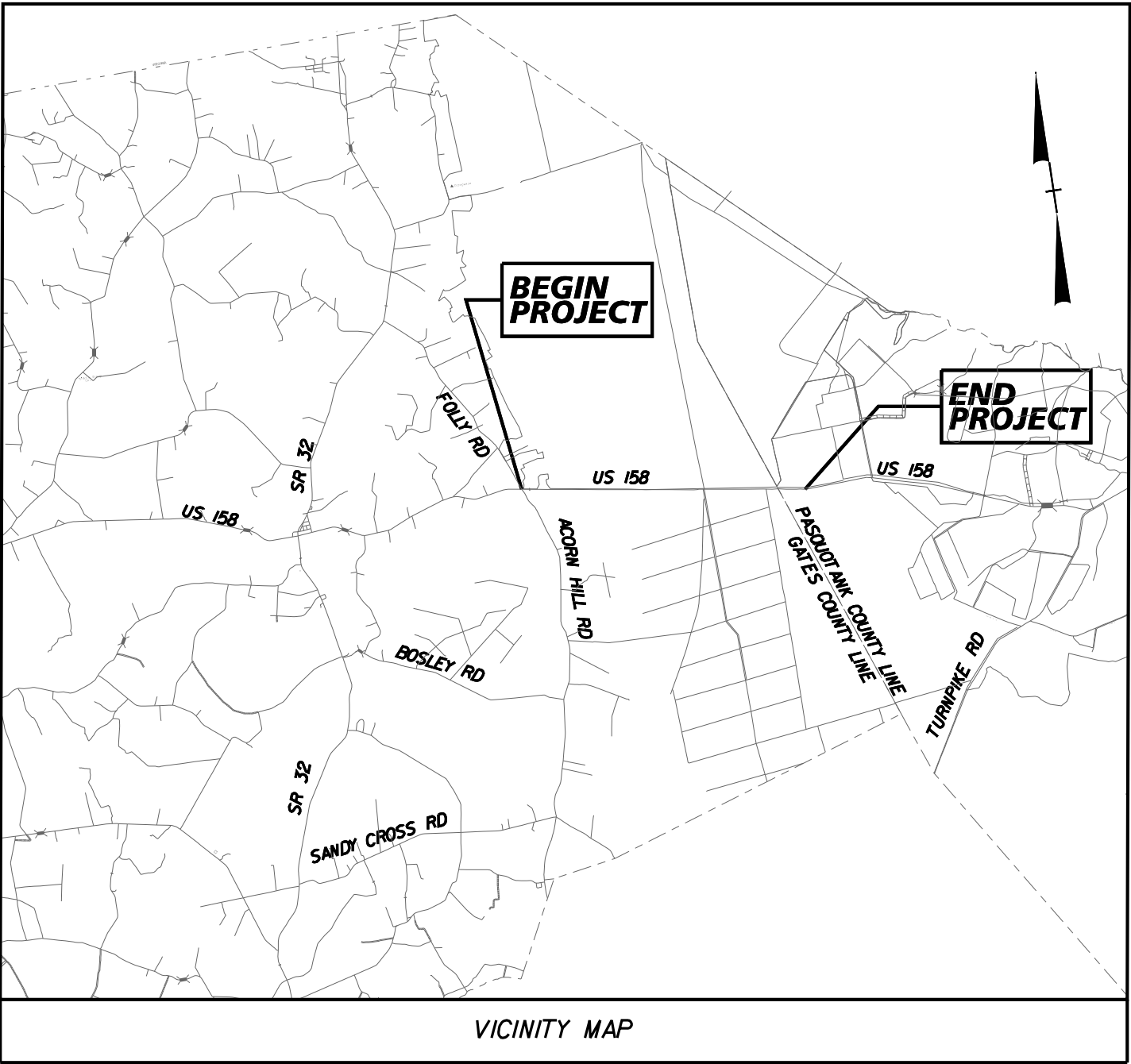


09/08/24

9/9/2024

TIP PROJECT: R-5808

CONTRACT: C204854



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

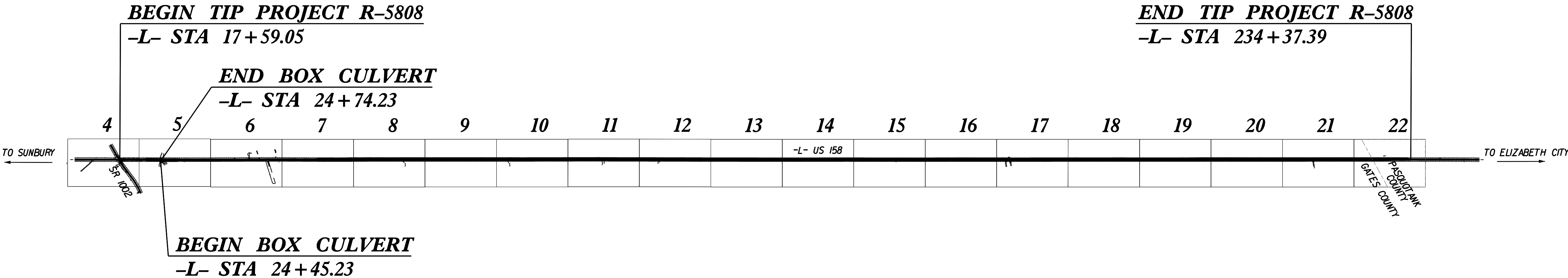
GATES AND PASQUOTANK COUNTY

LOCATION: US 158 FROM THE INTERSECTION OF SR 1002
(ACORN HILL ROAD) AND US 158 TO THE PASQUOTANK COUNTY LINE

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5808	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
46972.1.2	NHP-0158(076)	PE	
46972.2.1	0158076	R / W	
46972.2.2	0158076	UTIL.	
46972.3.1	0158076	CONSTR.	

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



STRUCTURES

DESIGN DATA

ADT 2023 = 4,300
ADT 2043 = 6,200
K = 10%
D = 55%
T = 12%
V = 60 MPH

CLASSIFICATION:
OTHER PRINCIPAL ARTERIAL
* 7% TTST 5% DUAL
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5808 = 4.101 MILES
LENGTH OF STRUCTURE TIP PROJECT R-5808 = .005 MILES
TOTAL LENGTH TIP PROJECT R-5808 = 4.106 MILES

Prepared in the Office of:

Kimley»Horn

NO LICENSE REQUIRED
PAVING/PAVING SURF/PAVING
PAVING/PAVING SURF/PAVING
PAVING/PAVING SURF/PAVING

2024 STANDARD SPECIFICATIONS

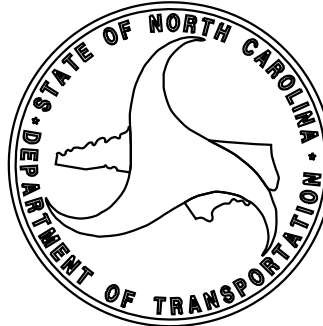
RIGHT OF WAY DATE:
AUGUST 23, 2022

LETTING DATE:
DECEMBER 17, 2024

VINCENT RICCIO, PE
PROJECT ENGINEER

ANDREW PHILLIPS, P.E.
PROJECT DESIGN ENGINEER

RYAN SHOOK
PROJECT MANAGER
NCDOT HIGHWAY DIVISION



BENCHMARK: STA. 22+55.69 -L-, 19.85' LT. ROD & CAP IN GROUND, EL. 26.07', N 988979 E 2722075 NAD 83

F.A. PROJECT NO. NHP-0158 (076)

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

DESIGN FILL = 1.99 FT.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

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

FOR POURING SEQUENCE OF CONCRETE IN CULVERT, SEE "STAGING DETAILS", SHEET C1-2.

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

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

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

THE REINFORCED CONCRETE BOX CULVERT SHALL BE PLACED ON THE STANDARD 1.0 FT. BLANKET OF FOUNDATION CONDITIONING MATERIAL. SEE SECTION 414 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.

TRAFFIC ON US 158 SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN SECTIONS AS SHOWN ON THESE PLANS AS DIRECTED BY THE ENGINEER.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF 2 @ 12' X 6' RCBC; 33' ALONG CENTERLINE OF CULVERT WITH 22' CLEAR ROADWAY WITH WINGWALLS AND LOCATED AT THE SITE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.

EXCAVATE 1 FOOT BELOW CULVERT AND FOOTING, AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.

CULVERT BARREL SHOULD BE BACK FILLED WITH NATIVE MATERIAL TO BURY DEPTH (1.0'). 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.

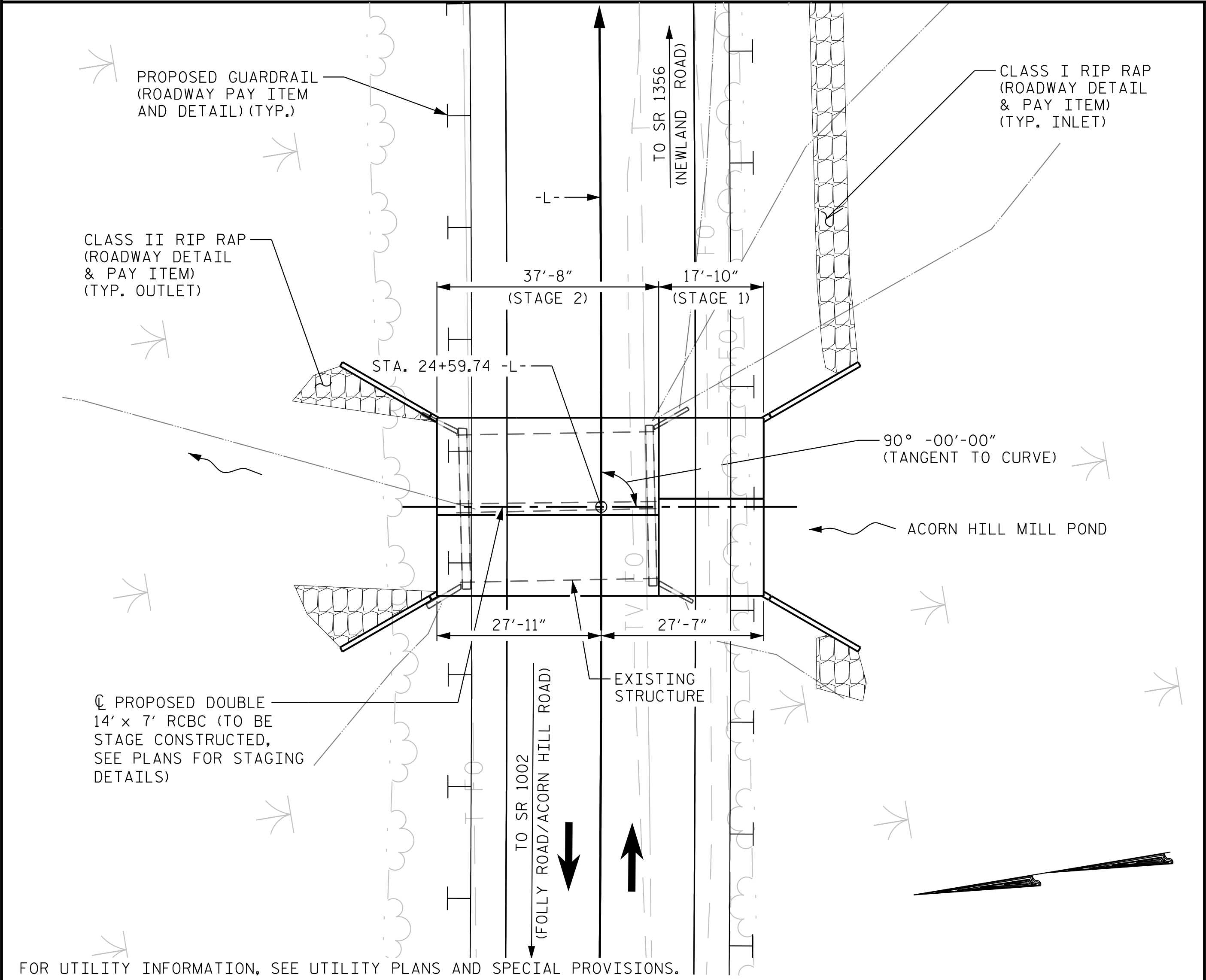
THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 KG) OF REINFORCING STEEL, ONE 30 INCH (760 MM) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 KG) OF REINFORCING STEEL, TWO 30 INCH (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.

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.

I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS.



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE -----600 CFS
FREQUENCY OF DESIGN FLOOD -----50 YR.
DESIGN HIGH WATER ELEVATION-----22.9
DRAINAGE AREA -----3.1 SQ.MI.
BASE DISCHARGE (Q100) -----1290 CFS
BASE HIGH WATER ELEVATION -----25.1

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE -----1800 CFS
FREQUENCY OF OVERTOPPING FLOOD --->500 YR.
OVERTOPPING FLOOD ELEVATION -----26.9 *
* OVERTOPPING WILL OCCUR AT STA. 24+53.40 -L-

ROADWAY DATA

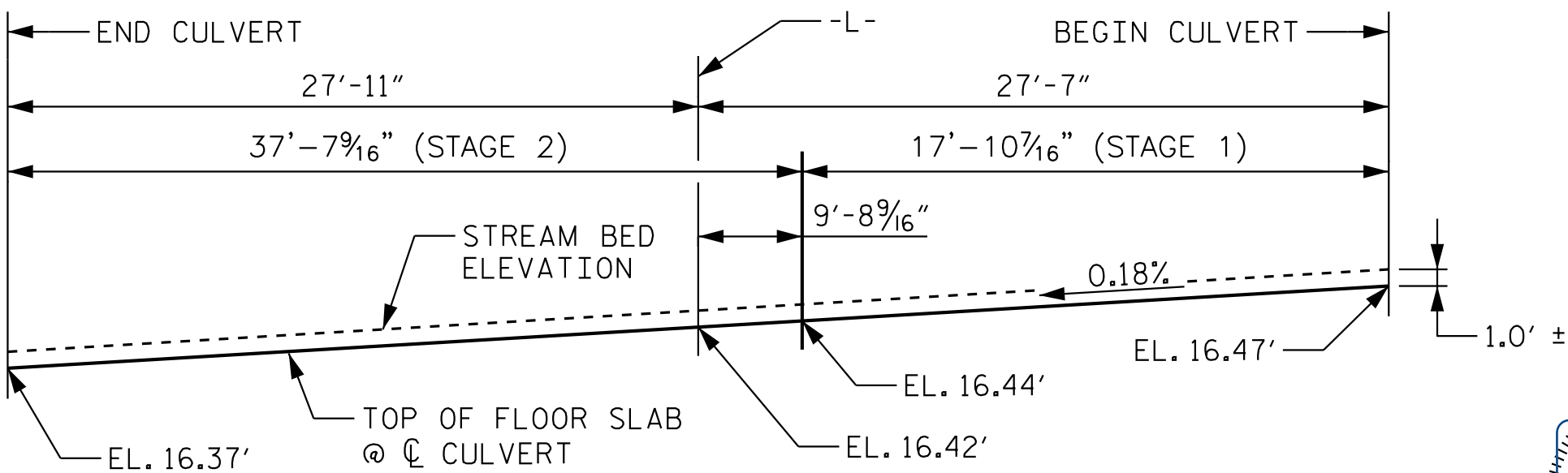
GRADE POINT EL. @ STA. 24+59.74 -L- = 26.91'
INVERT ELEVATION @ STA. 24+59.74 -L- = 16.42'
ROADWAY SLOPES 3 : 1

TOTAL STRUCTURE QUANTITIES

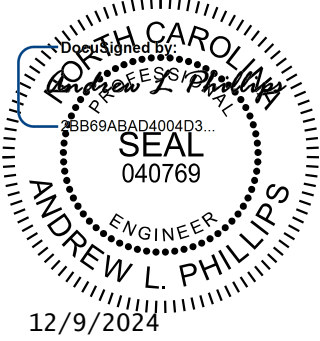
REMOVAL OF EXISTING STRUCTURE	LUMP SUM
CLASS A CONCRETE	
STAGE 1	76.2 C.Y.
STAGE 2	141.7 C.Y.
TOTAL	217.9 C.Y.
REINFORCING STEEL	
STAGE 1	12,431 LBS.
STAGE 2	23,971 LBS.
TOTAL	36,402 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
STAGE 1	44 TONS
STAGE 2	91 TONS
TOTAL	135 TONS

-L- HORIZONTAL CURVE DATA

PI STA. 24+74.63
Δ = 1°-32'-44.9" (LT)
D = 0°-29'-53.6"
L = 310.26'
T = 155.14'
R = 11,500.00'



PROFILE ALONG CULVERT



Kimley»Horn

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Raleigh, NC 27601-1772
Phone (919) 677-2000 NC LICENSE # F-0102

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PROJECT NO. R-5808

GATES COUNTY

STATION: 24+59.74 -L-

SHEET 1 OF 10 REPLACES BRIDGE NO. 31

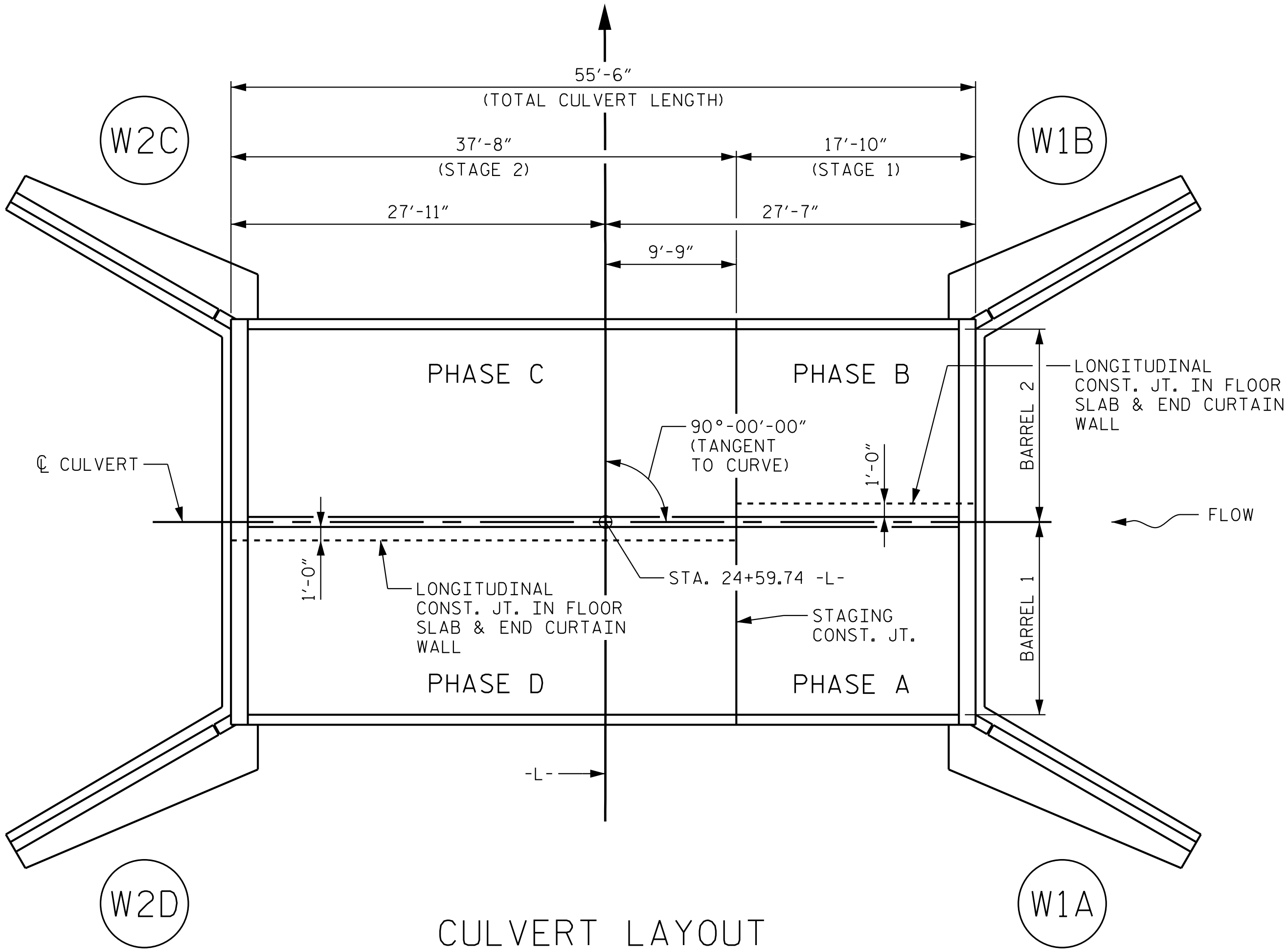
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 14 FT. X 7 FT.
CONCRETE BOX CULVERT
90° SKEW

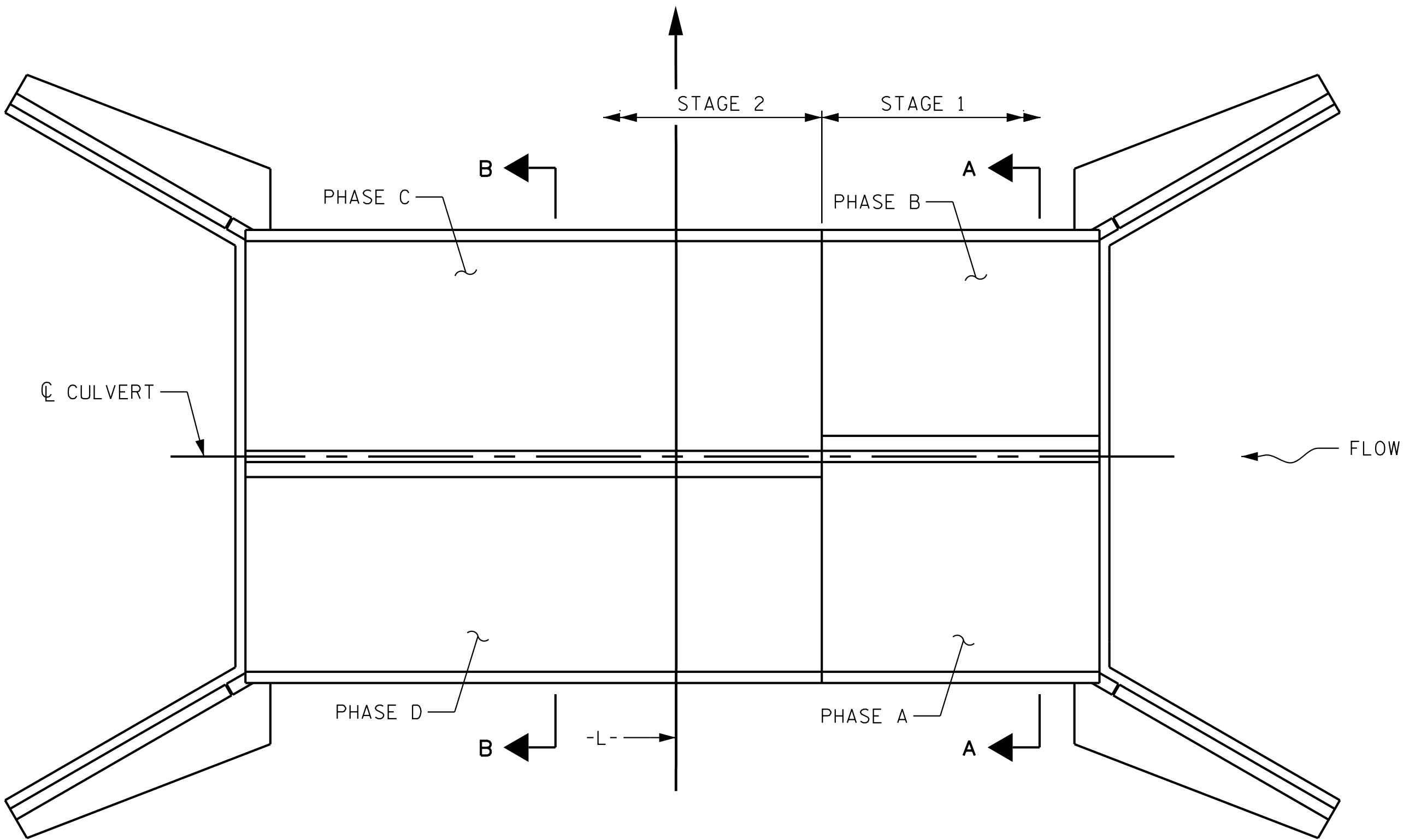
REVISIONS						SHEET NO. C1-1
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 10
2			4			

CULVERT 41C001

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CULVERT LAYOUT
WING DESIGNATIONS ARE FOR STAGING SEQUENCE ONLY

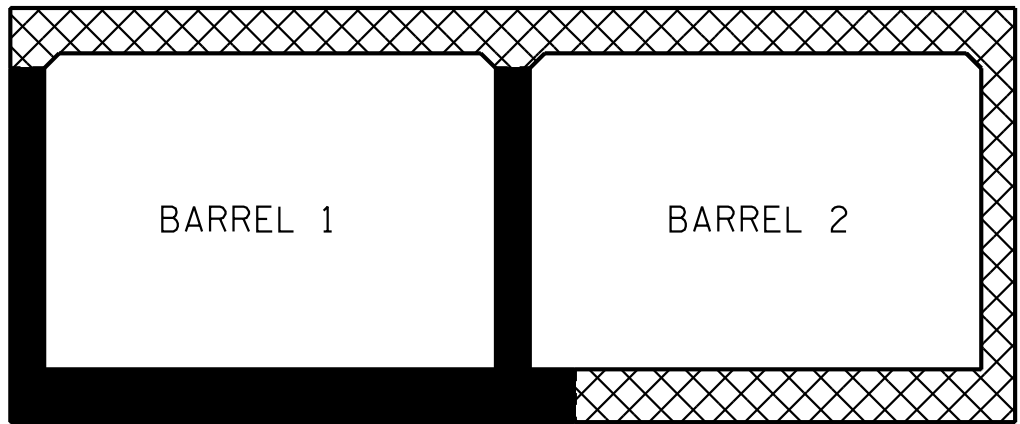


PLAN OF FLOOR SLAB

NOTES

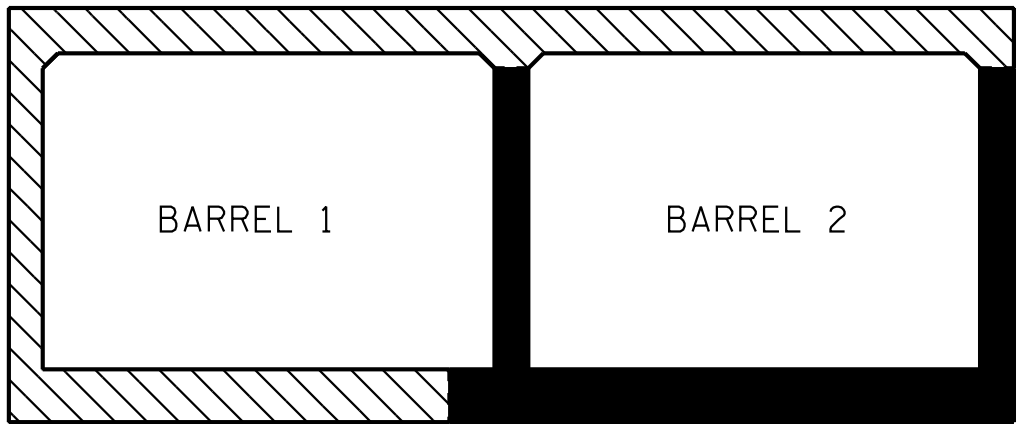
CONCRETE IN CULVERT TO BE POURED IN THE FOLLOWING ORDER:

- STAGE 1:
- PHASE A
INLET WING W1A FOOTING; BARREL 1 FLOOR SLAB, INCLUDING 4" OF BARREL 1 WALLS (EXTERIOR & INTERIOR). REMAINING PORTION OF BARREL 1 WALLS (EXTERIOR AND INTERIOR) AND INTLET WING W1A FULL HEIGHT.
- PHASE B
INLET WING W1B FOOTING; BARREL 2 FLOOR SLAB, INCLUDING 4" OF BARREL 2 WALLS (EXTERIOR & INTERIOR). REMAINING PORTION OF BARREL 2 WALL (EXTERIOR) AND INTLET WING W1B FULL HEIGHT. ROOF SLAB AND HEADWALL AT OUTLET END.
- STAGE 2:
- PHASE C
OUTLET WING W2C FOOTING; BARREL 2 FLOOR SLAB, INCLUDING 4" OF BARREL 2 WALLS (EXTERIOR & INTERIOR). REMAINING PORTION OF BARREL 2 WALLS (EXTERIOR AND INTERIOR) AND OUTLET WING W2C FULL HEIGHT.
- PHASE D
OUTLET WING W2D FOOTING; BARREL 1 FLOOR SLAB, INCLUDING 4" OF BARREL 1 WALLS (EXTERIOR & INTERIOR). REMAINING PORTION OF BARREL 1 WALL (EXTERIOR) AND OUTLET WING W2D FULL HEIGHT. ROOF SLAB AND HEADWALL AT INLET END.



SECTION A-A

- STAGE 1 (PHASE A)
- STAGE 1 (PHASE B)

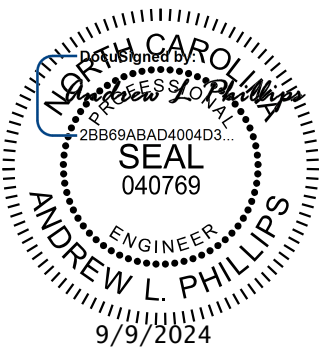


SECTION B-B

- STAGE 2 (PHASE C)
- STAGE 2 (PHASE D)

PROJECT NO. R-5808
GATES COUNTY
STATION: 24+59.74 -L-

SHEET 2 OF 10



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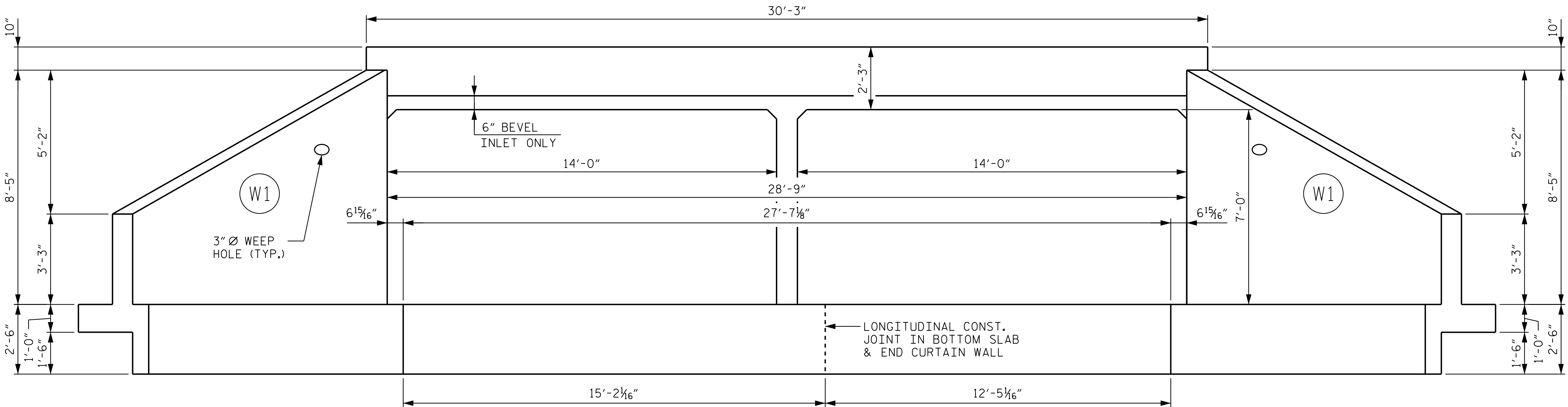
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STAGING DETAILS

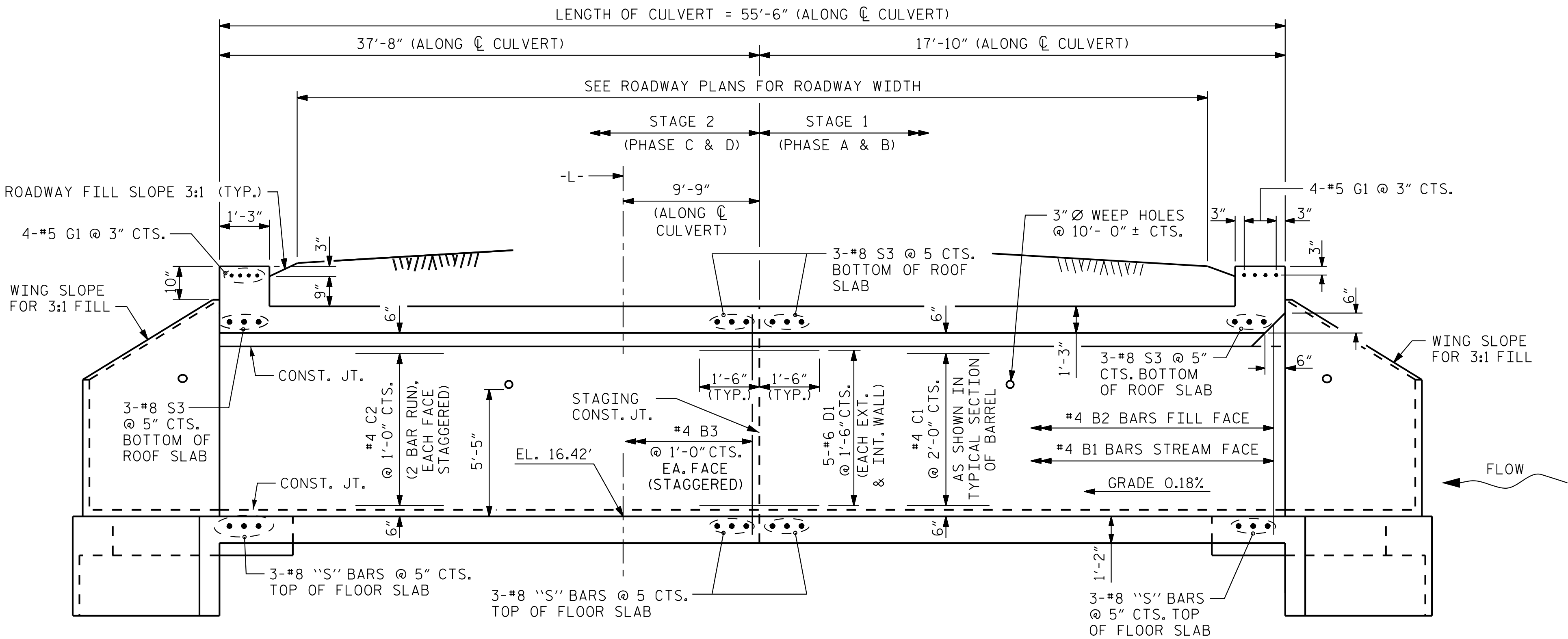
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1			3			TOTAL SHEETS 10
2			4			

CULVERT 41C001



INLET END ELEVATION NORMAL TO SKEW
(OUTLET SIMILAR)

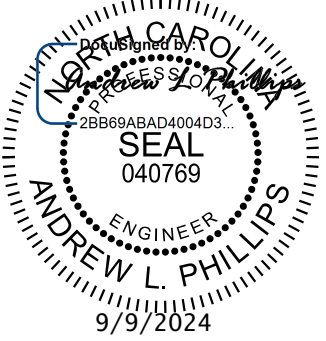
I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS.



INTERIOR WALL EXTERIOR WALL

CULVERT SECTION NORMAL TO ROADWAY

*6 D1 DOWEL BARS IN THE SLABS NOT SHOWN FOR CLARITY,
SEE SHEETS C1-5 & C1-7 FOR SLAB DOWEL DETAILS.



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PROJECT NO. R-5808
GATES COUNTY
STATION: 24+59.74 -L-

SHEET 3 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 14 FT. X 7 FT.
CONCRETE BOX CULVERT
90° SKEW

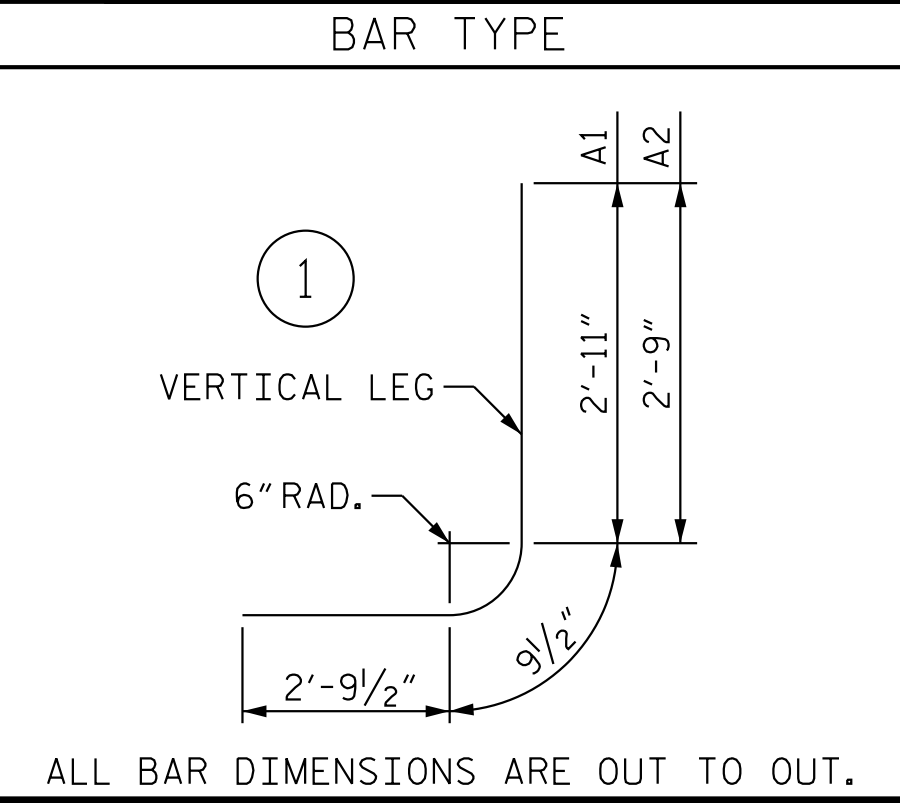
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NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			10

CULVERT 41C001

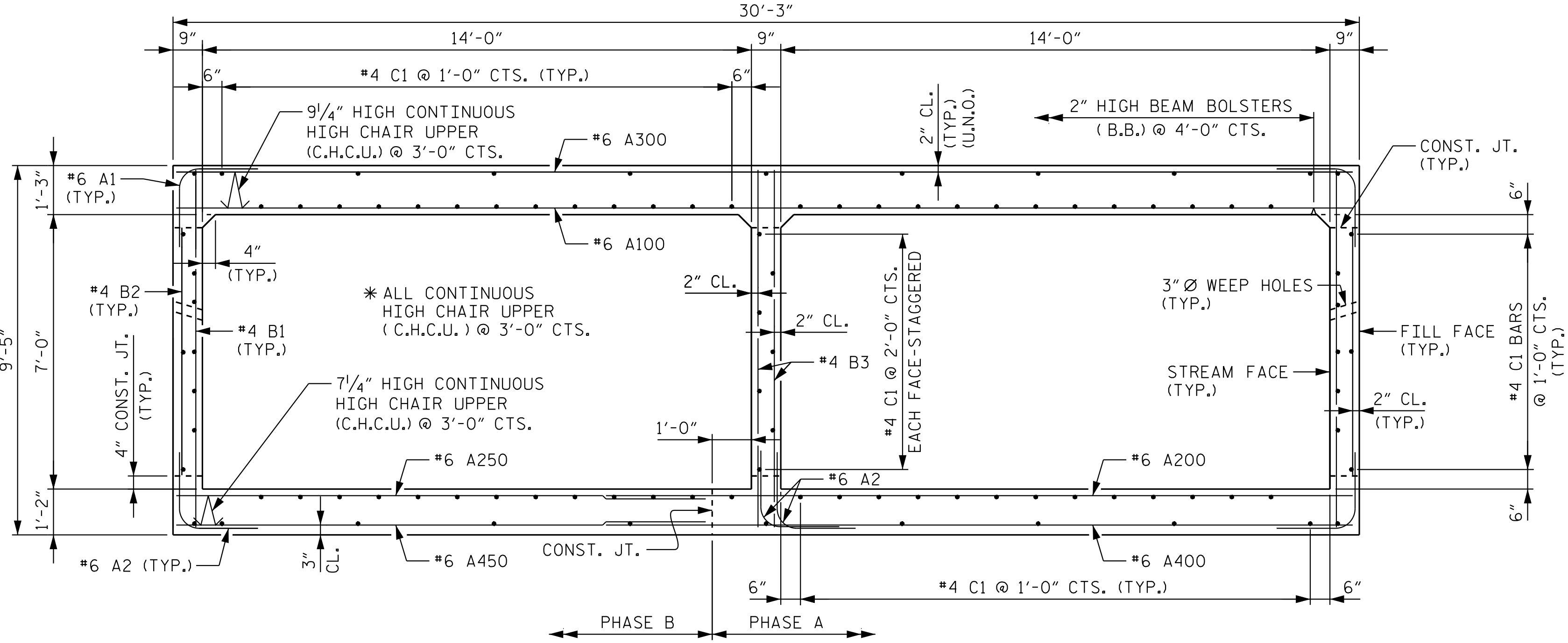
DRAWN BY: D.D. LOWERY DATE: 08/2023
CHECKED BY: T.H. ORR DATE: 08/2023
DESIGN ENGINEER OF RECORD: A.L. PHILLIPS DATE: 08/2023

STAGE 1 QUANTITIES				STAGE 2 QUANTITIES			
CLASS A CONCRETE				CLASS A CONCRETE			
BARREL @	3.299	C.Y./FT.	58.8	C.Y.	BARREL @	3.299	C.Y./FT. 124.3
WINGS, ETC.	17.4	C.Y.			WINGS, ETC.	17.4	C.Y.
TOTAL	76.2	C.Y.			TOTAL	141.7	C.Y.
REINFORCING STEEL				REINFORCING STEEL			
BARREL	11,476	LBS.			BARREL	23,016	LBS.
WINGS, ETC.	955	LBS.			WINGS, ETC.	955	LBS.
TOTAL	12,431	LBS.			TOTAL	23,971	LBS.
CULVERT EXCAVATION				CULVERT EXCAVATION			
LUMP SUM				LUMP SUM			
FOUNDATION COND. MATERIAL				FOUNDATION COND. MATERIAL			
44 TONS				91 TONS			

SPLICE CHART		
BAR	SIZE	SPLICE LENGTH
A200, A400	#6	2'-9"
B1, B3	#4	1'-10"
C1	#4	2'-5"
S1	#8	4'-9"

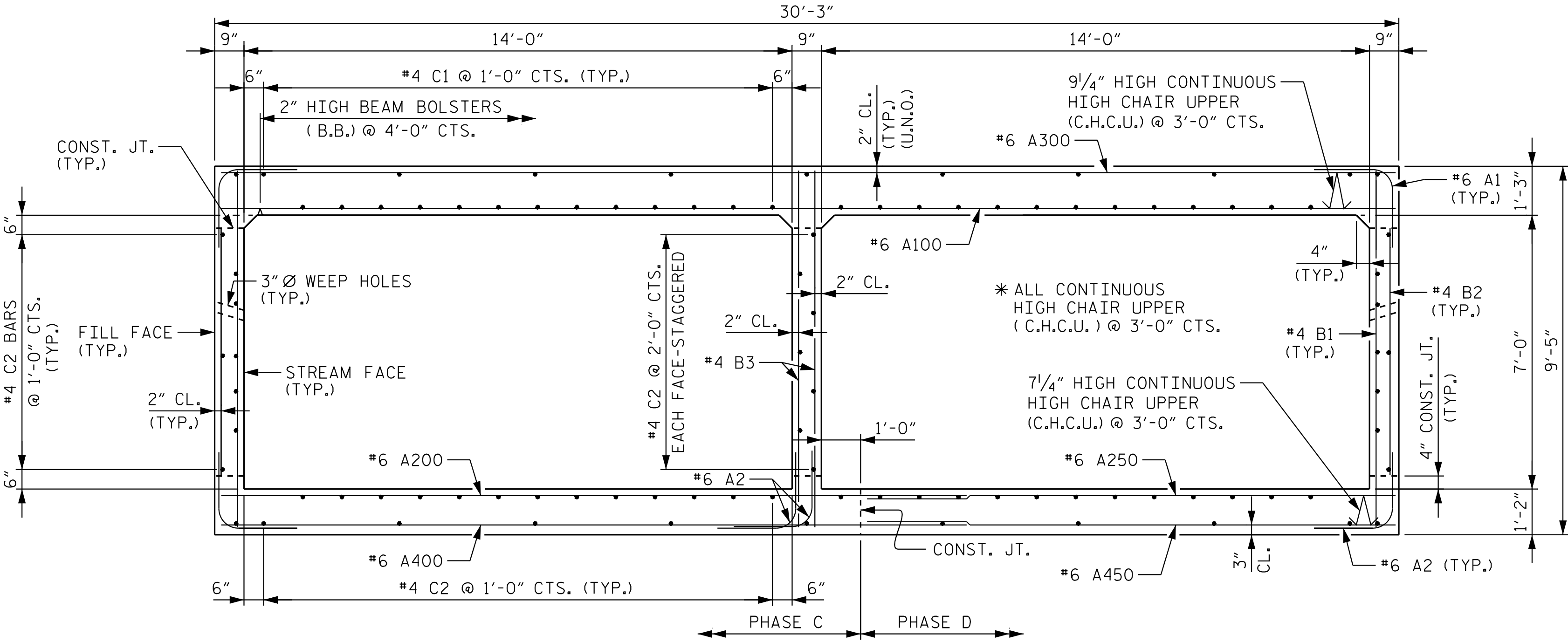


BILL OF MATERIAL (STAGE 1)						BILL OF MATERIAL (STAGE 2)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	72	6	1	6'-6"	703	A1	152	6	1	6'-6"	1,484
A2	108	6	1	6'-4"	1,027	A2	228	6	1	6'-4"	2,169
A100	36	6	STR	29'-11"	1,618	A100	76	6	STR	29'-11"	3,415
A200	36	6	STR	19'-3"	1,041	A200	76	6	STR	19'-3"	2,197
A250	36	6	STR	13'-5"	725	A250	76	6	STR	13'-5"	1,532
A300	36	6	STR	29'-11"	1,618	A300	76	6	STR	29'-11"	3,415
A400	36	6	STR	19'-3"	1,041	A400	76	6	STR	19'-3"	2,197
A450	36	6	STR	13'-5"	725	A450	76	6	STR	13'-5"	1,532
B1	72	4	STR	9'-0"	433	B1	152	4	STR	9'-0"	914
B2	72	4	STR	6'-4"	305	B2	152	4	STR	6'-4"	643
B3	36	4	STR	9'-0"	216	B3	76	4	STR	9'-0"	457
C1	97	4	STR	17'-6"	1,134	C2	97	4	STR	37'-4"	2,419
D1	55	6	STR	3'-0"	248	G1	4	5	STR	29'-11"	125
G1	4	5	STR	29'-11"	125	S1	3	8	STR	21'-3"	170
S1	3	8	STR	21'-3"	170	S2	3	8	STR	13'-5"	107
S2	3	8	STR	13'-5"	107	S3	3	8	STR	29'-11"	240
S3	3	8	STR	29'-11"	240						
REINFORCING STEEL LBS. 11,476						REINFORCING STEEL LBS. 23,016					



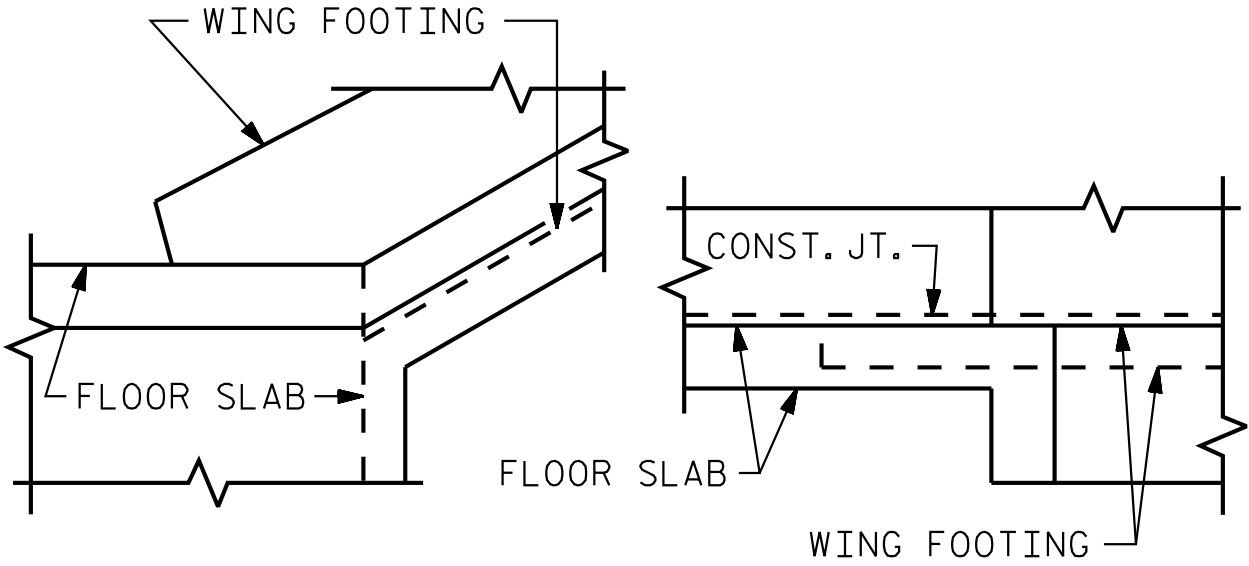
RIGHT ANGLE SECTION OF BARREL - STAGE 1

THERE ARE 97 "C" BARS IN SECTION OF BARREL
(LOOKING UPSTREAM)



RIGHT ANGLE SECTION OF BARREL - STAGE 2

THERE ARE 97 "C" BARS IN SECTION OF BARREL
(LOOKING UPSTREAM)

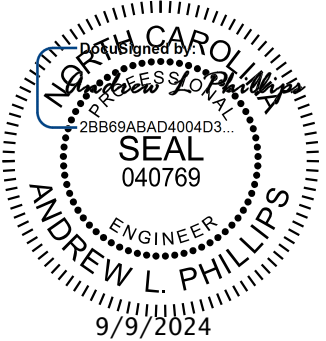


DETAIL

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

PROJECT NO. R-5808
GATES COUNTY
STATION: 24+59.74 -L-

SHEET 4 OF 10



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 14 FT. X 7 FT.
CONCRETE BOX CULVERT
90° SKEW

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

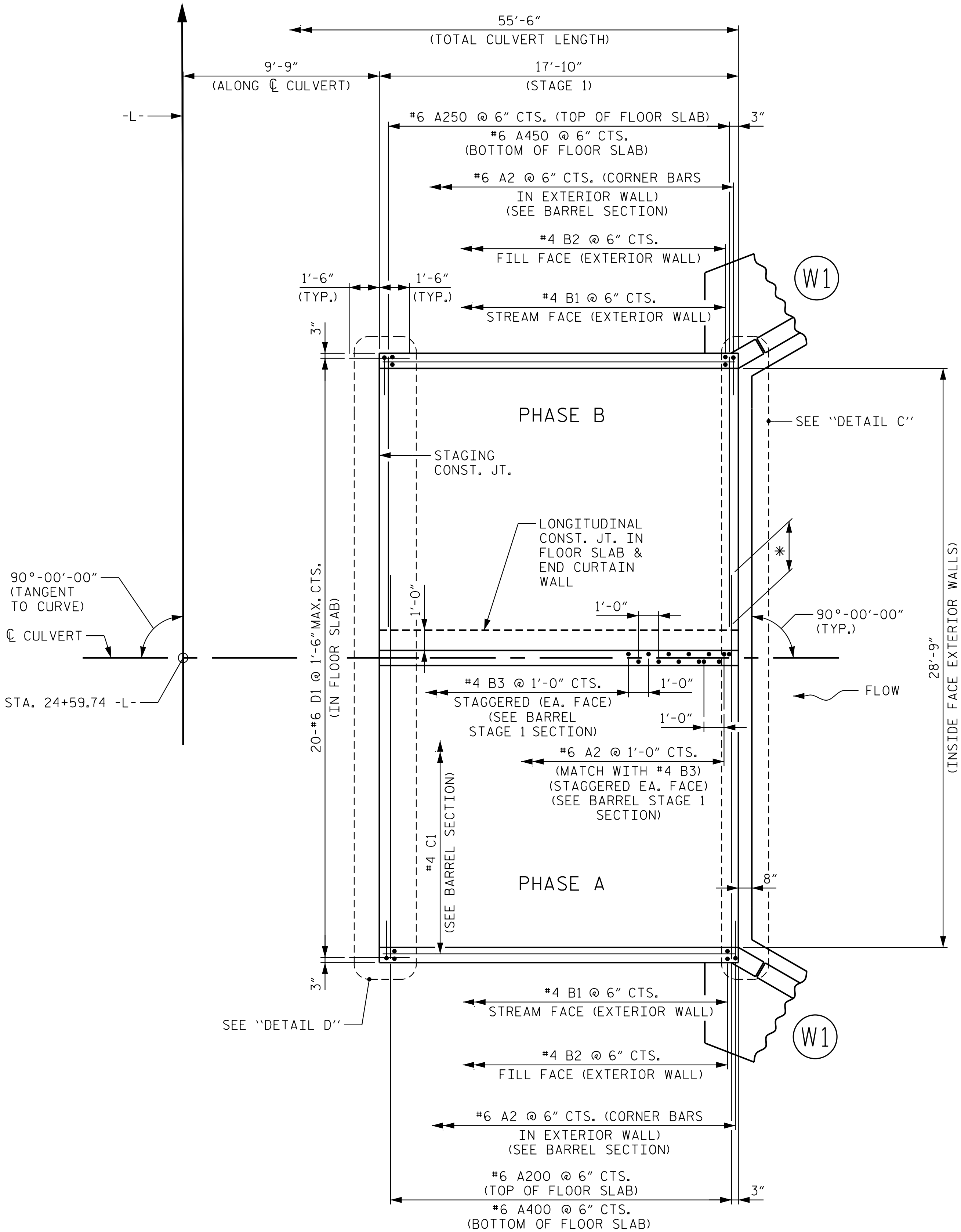
CULVERT 41C001

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CHECKED BY: T.H. ORR DATE: 08/2023
DESIGN ENGINEER OF RECORD: A.L. PHILLIPS DATE: 08/2023

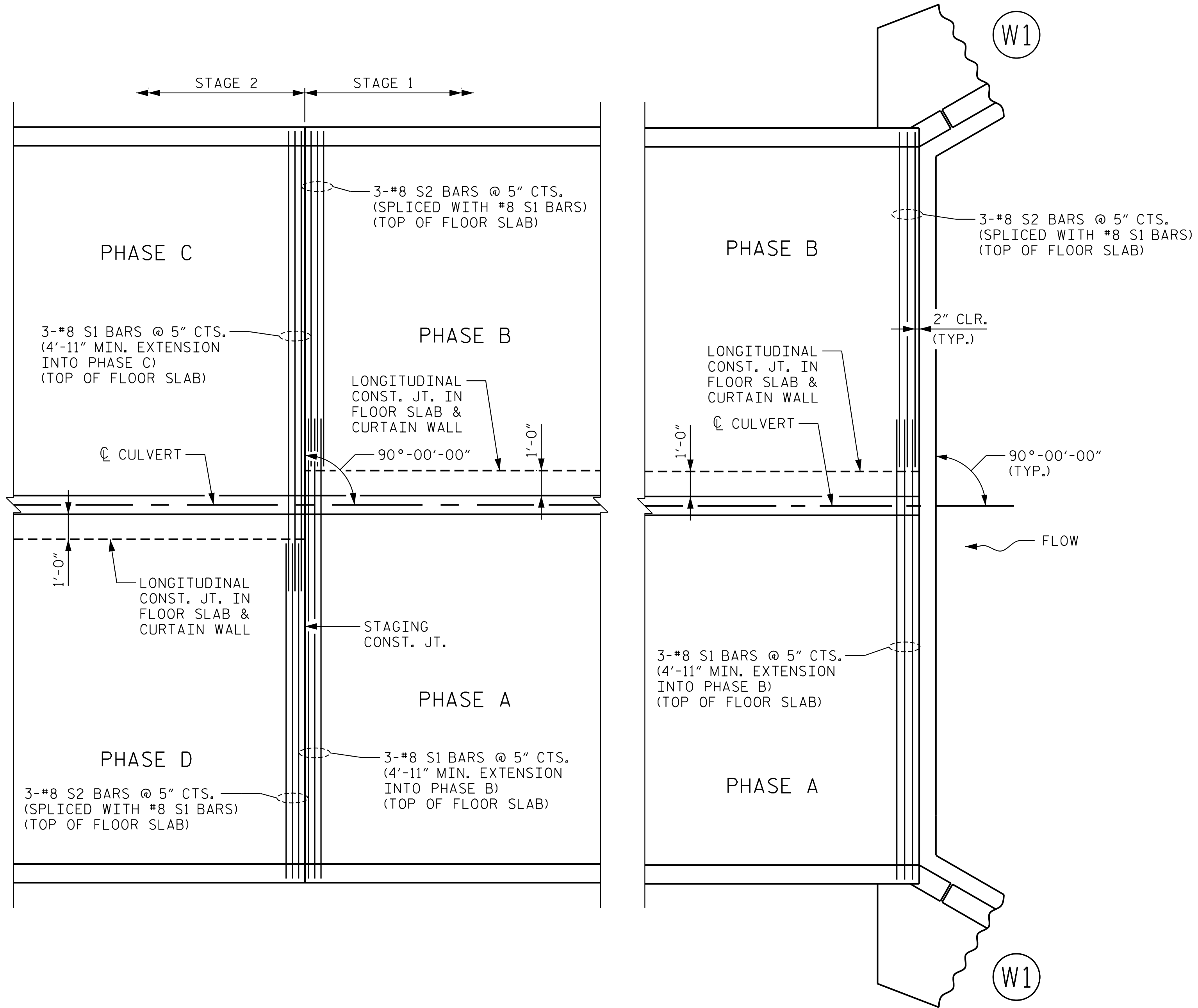
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9/9/2024



FLOOR SLAB PLAN - STAGE 1

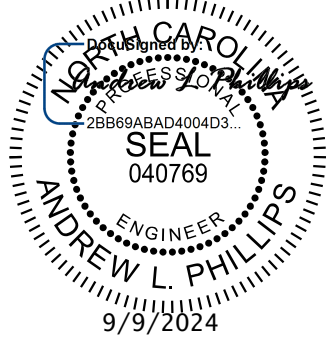
* EXTEND #6 A200 2'-11" INTO PHASE B IN TOP OF FLOOR SLAB
EXTEND #6 A400 2'-11" INTO PHASE B IN BOTTOM OF FLOOR SLAB



DETAIL D

*6-D1 NOT SHOWN FOR CLARITY

DETAIL C



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PROJECT NO. R-5808
GATES COUNTY
STATION: 24+59.74 -L-

SHEET 5 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 14 FT. X 7 FT.
CONCRETE BOX CULVERT
90° SKEW
(STAGE 1)

REVISIONS						SHEET NO. C1-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			10

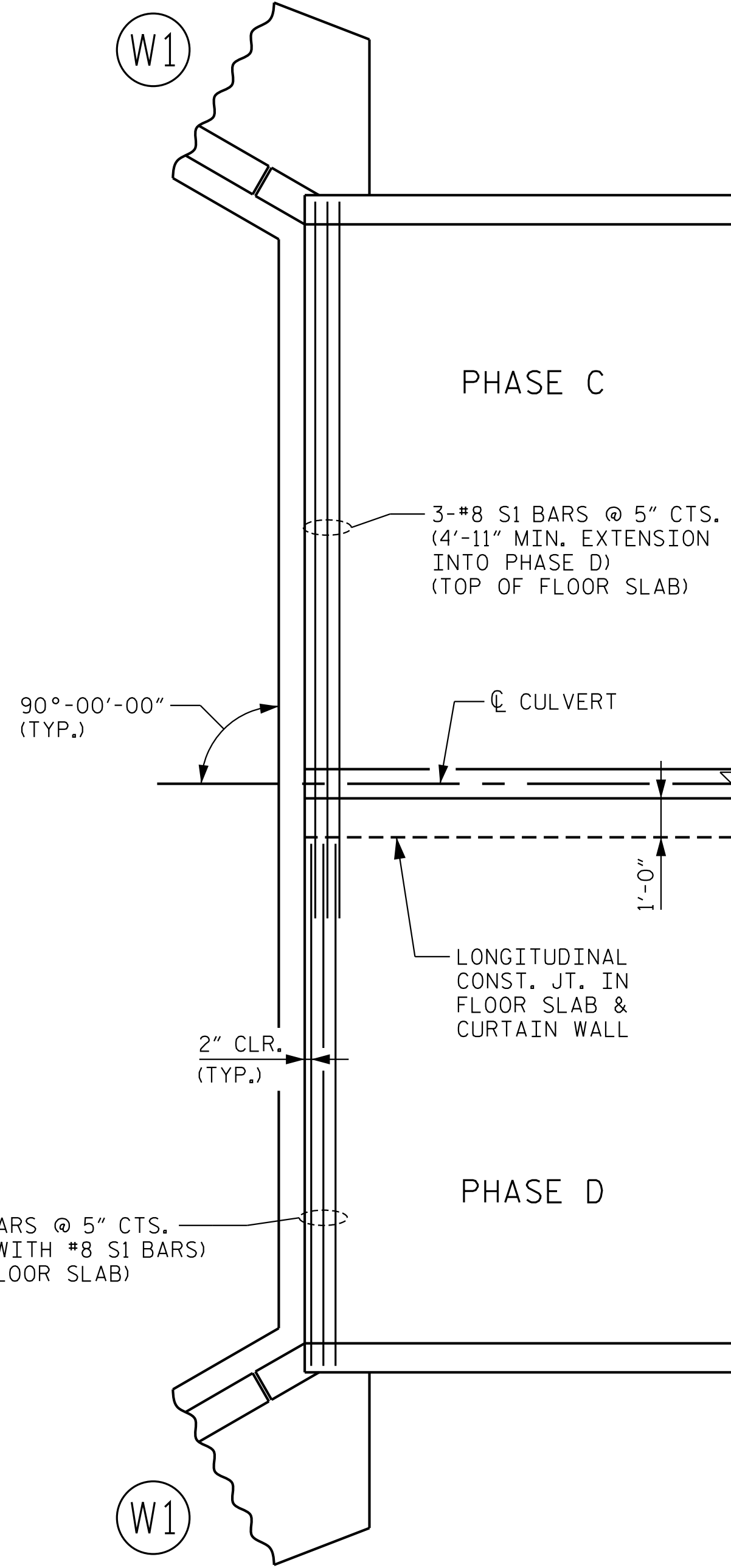
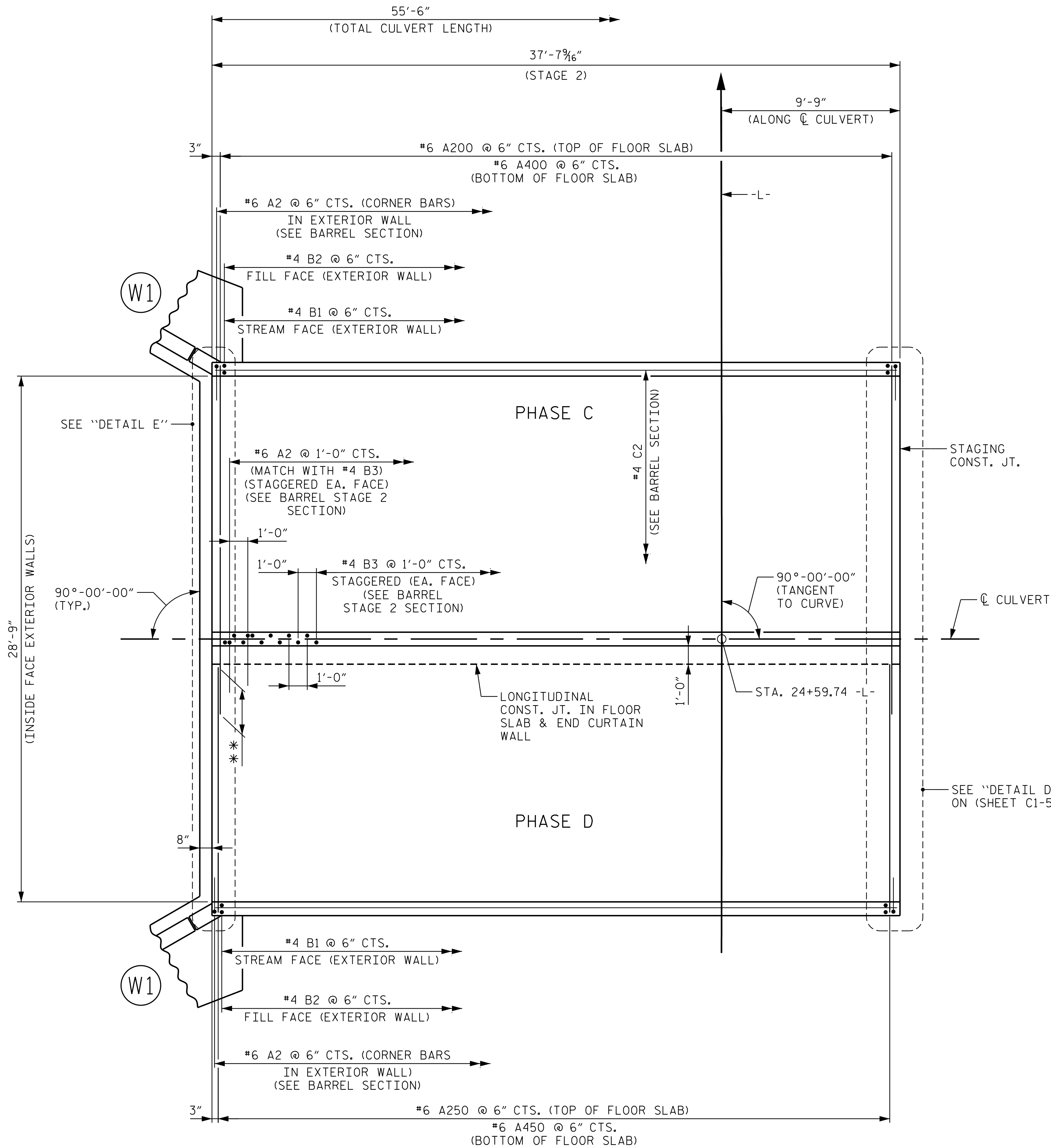
CULVERT 41C001

DRAWN BY: D.D. LOWERY DATE: 08/2023
CHECKED BY: T.H. ORR DATE: 08/2023
DESIGN ENGINEER OF RECORD: A.L. PHILLIPS DATE: 08/2023

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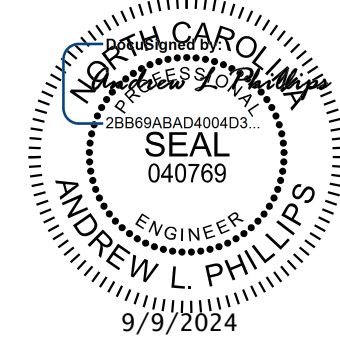
9/9/2024



DETAIL E

PROJECT NO. R-5808
GATES COUNTY
STATION: 24+59.74 -L-

SHEET 6 OF 10



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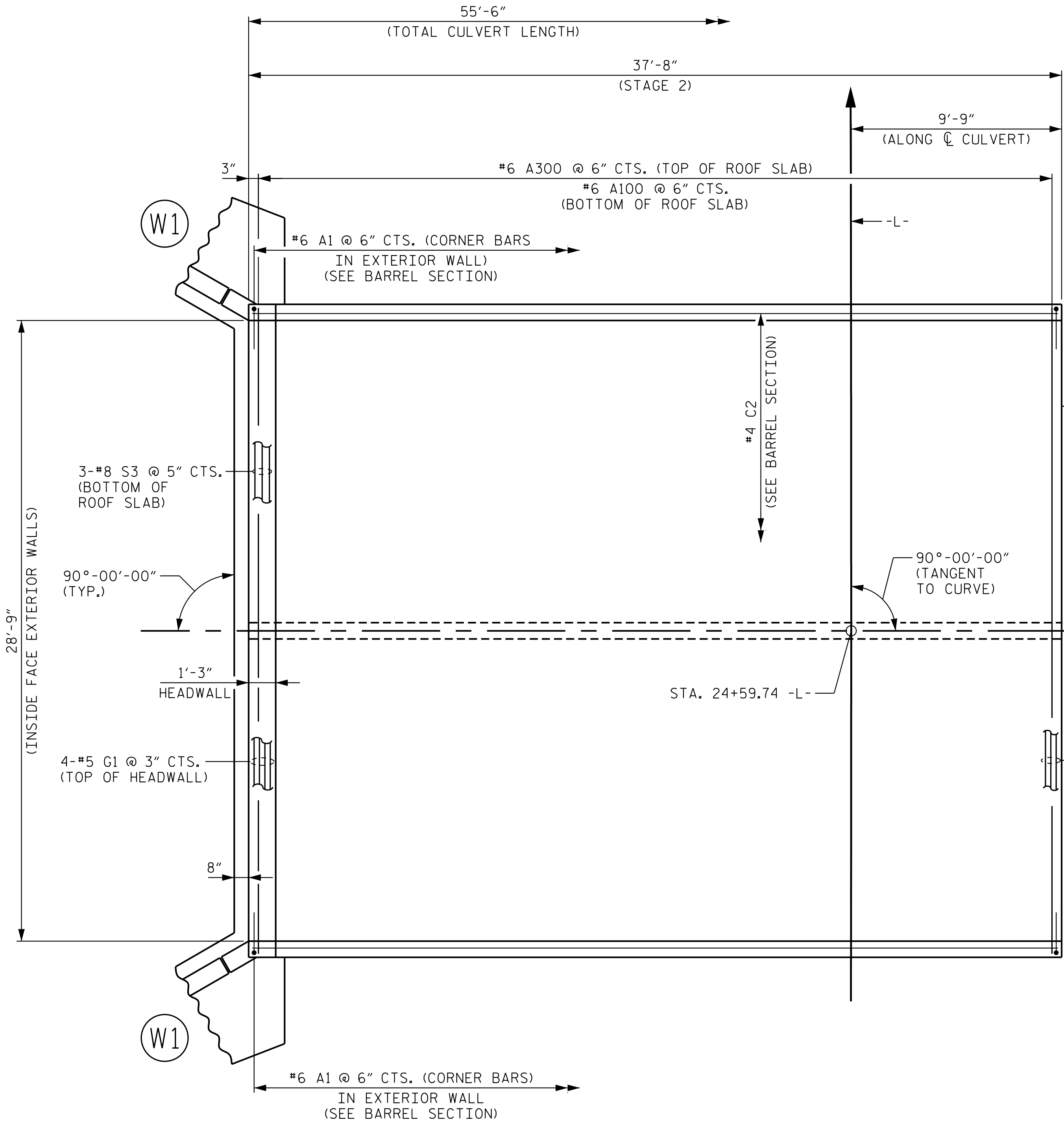
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 14 FT. X 7 FT.
CONCRETE BOX CULVERT
90° SKEW
(STAGE 2)

REVISIONS						SHEET NO. C1-6
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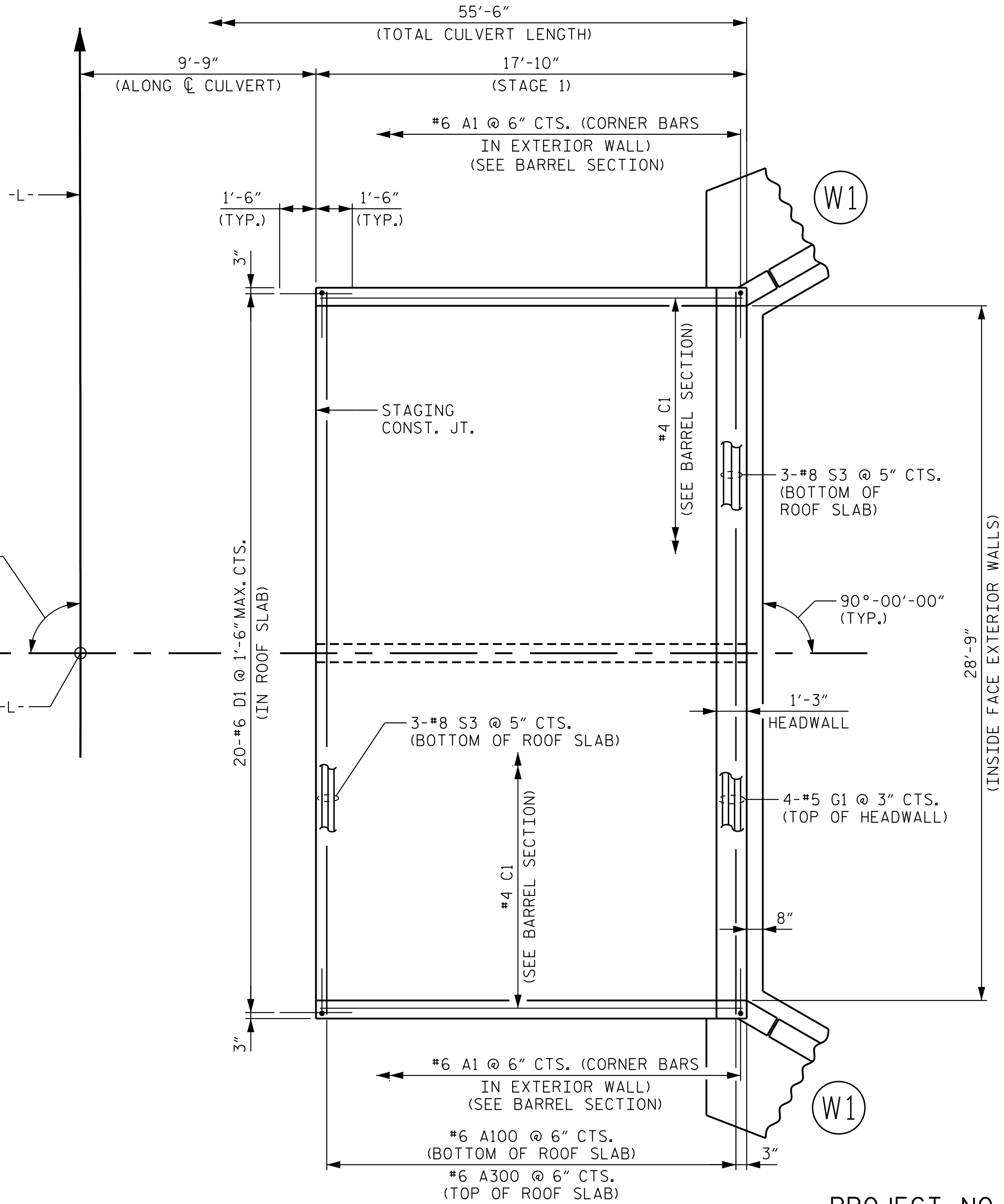
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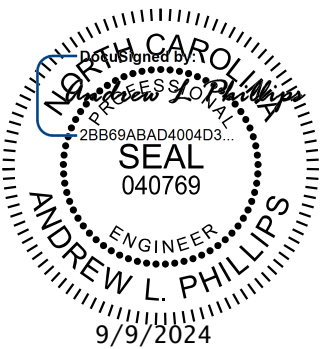
ROOF SLAB PLAN - STAGE 2



ROOF SLAB PLAN - STAGE 1

PROJECT NO. R-5808
 GATES COUNTY
STATION: 24+59.74 -L-

SHEET 7 OF 10



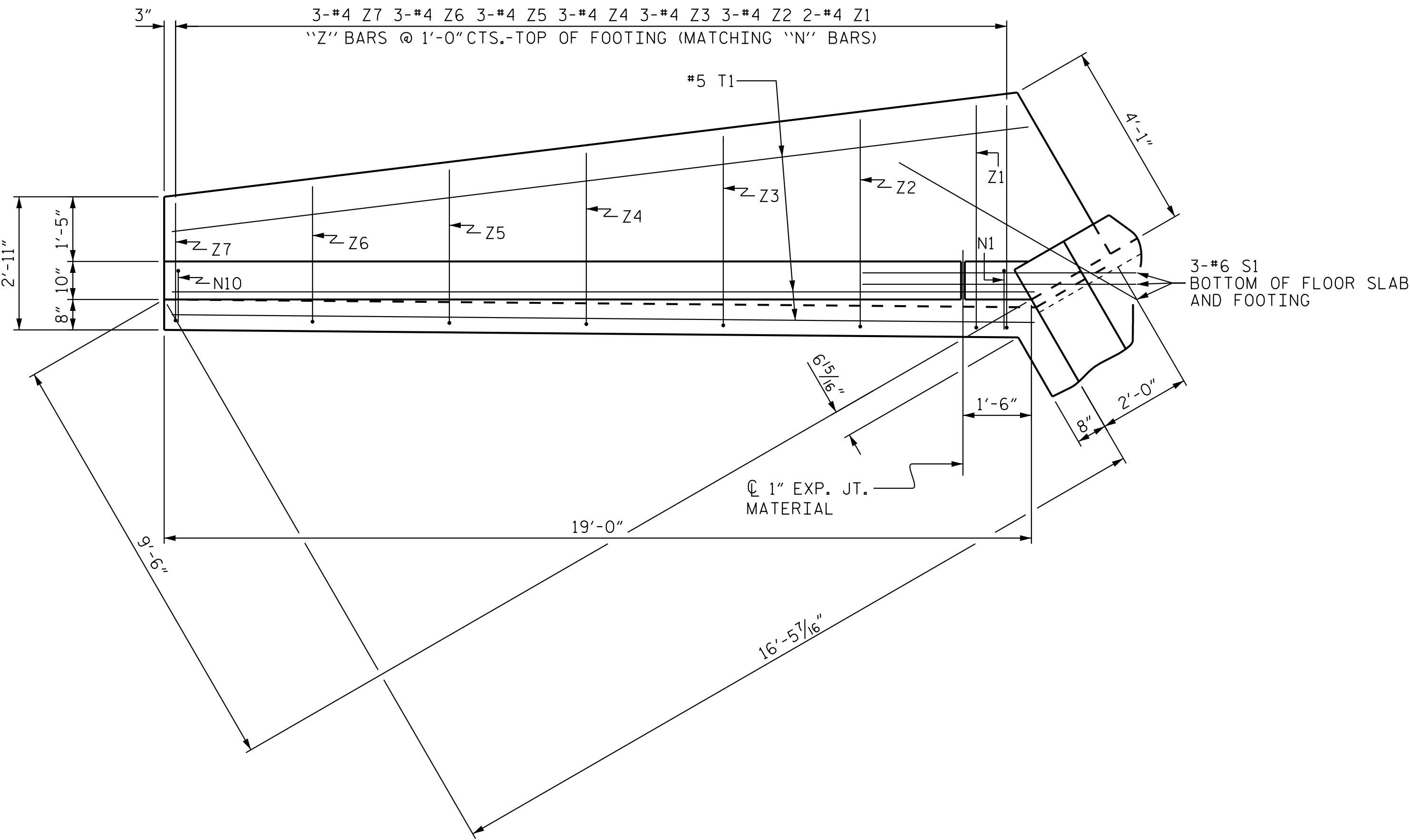
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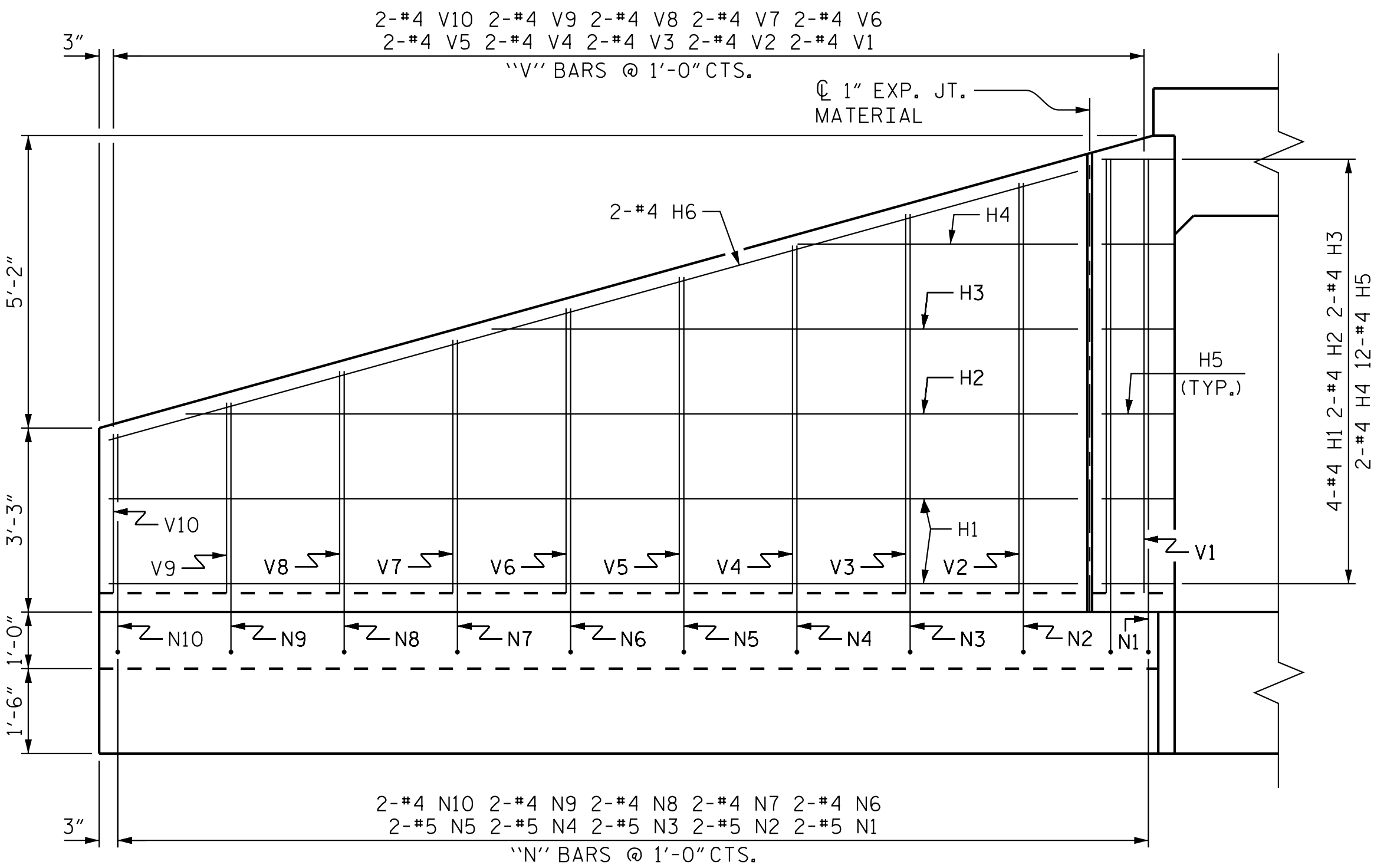
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CULVERT 41C001

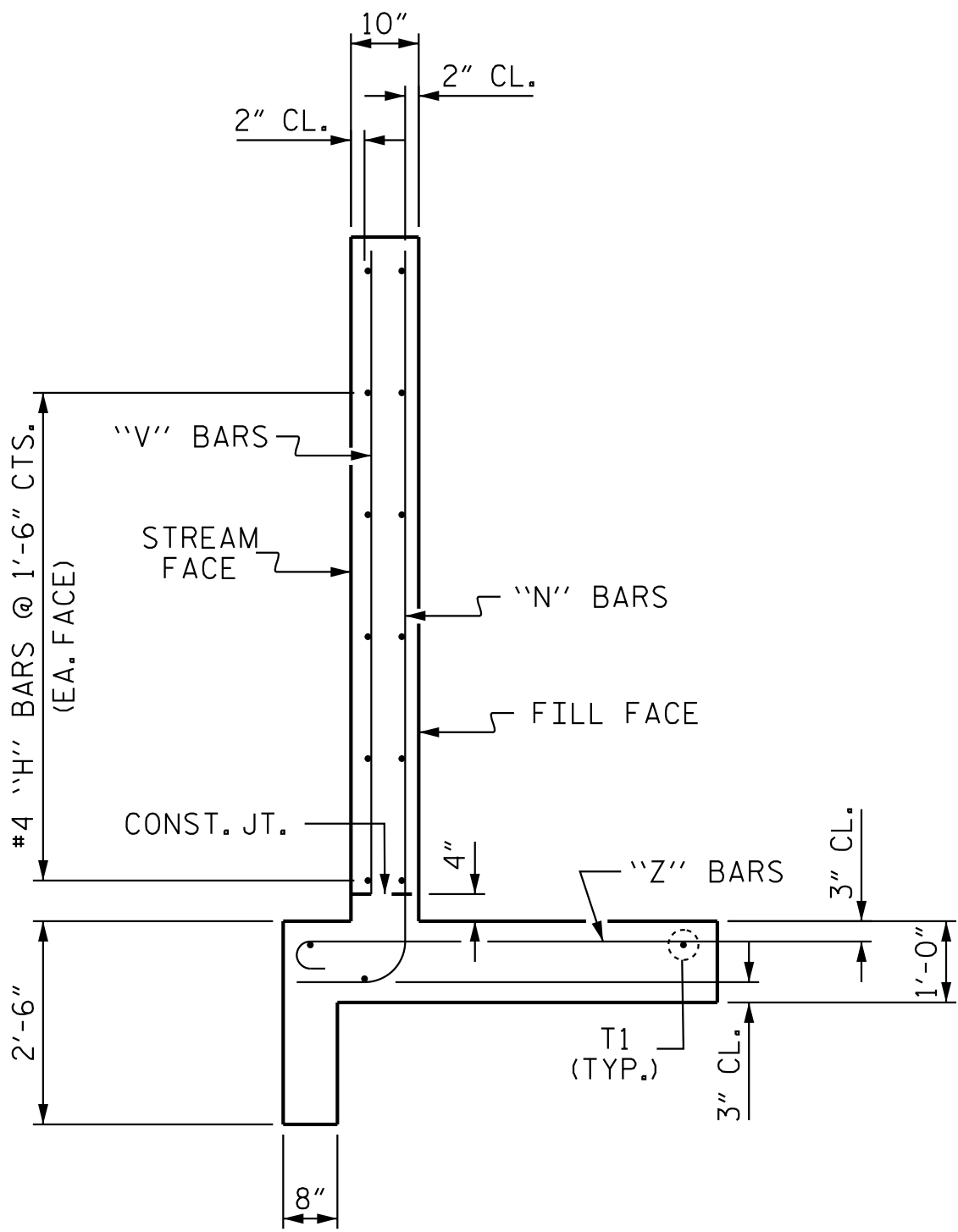
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PLAN

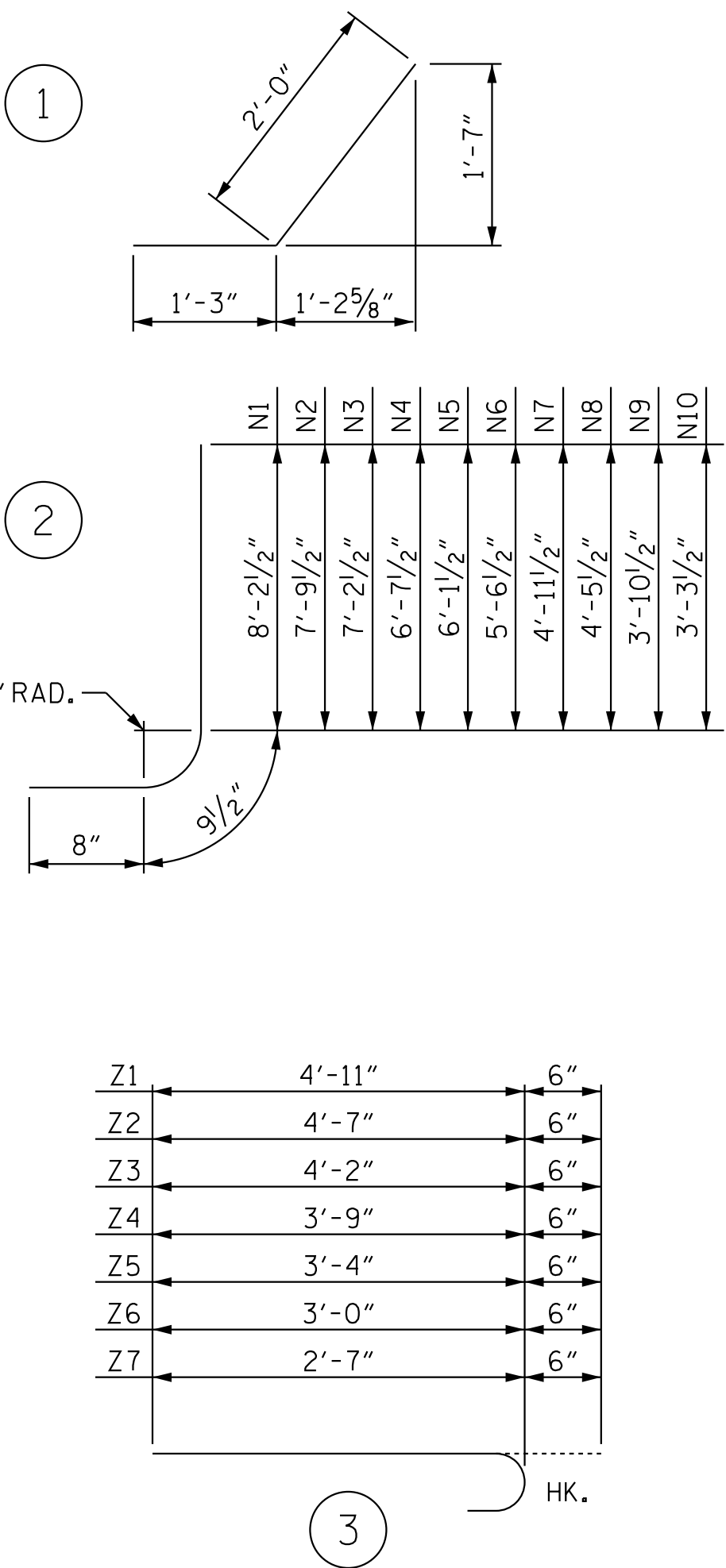


ELEVATION



TYPICAL WING SECTION

BAR TYPES



Z1	4'-11"	6"
Z2	4'-7"	6"
Z3	4'-2"	6"
Z4	3'-9"	6"
Z5	3'-4"	6"
Z6	3'-0"	6"
Z7	2'-7"	6"

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	4	STR	17'-1"	91
H2	4	4	STR	15'-9"	42
H3	4	4	STR	10'-4"	28
H4	4	4	STR	4'-11"	13
H5	24	4	1	3'-3"	52
H6	4	4	STR	17'-9"	47
N1	4	5	2	9'-8"	40
N2	4	5	2	9'-3"	39
N3	4	5	2	8'-8"	36
N4	4	5	2	8'-1"	34
N5	4	5	2	7'-7"	32
N6	4	4	2	7'-0"	19
N7	4	4	2	6'-5"	17
N8	4	4	2	5'-11"	16
N9	4	4	2	5'-4"	14
N10	4	4	2	4'-9"	13
S1	6	6	STR	6'-0"	54
T1	6	5	STR	18'-10"	118
V1	4	4	STR	7'-8"	20
V2	4	4	STR	7'-3"	19
V3	4	4	STR	6'-8"	18
V4	4	4	STR	6'-2"	16
V5	4	4	STR	5'-7"	15
V6	4	4	STR	5'-0"	13
V7	4	4	STR	4'-5"	12
V8	4	4	STR	3'-11"	10
V9	4	4	STR	3'-4"	9
V10	4	4	STR	2'-9"	7
Z1	4	4	3	5'-5"	14
Z2	6	4	3	5'-1"	20
Z3	6	4	3	4'-8"	19
Z4	6	4	3	4'-3"	17
Z5	6	4	3	3'-10"	15
Z6	6	4	3	3'-6"	14
Z7	6	4	3	3'-1"	12

3

HK.

STAGE 1

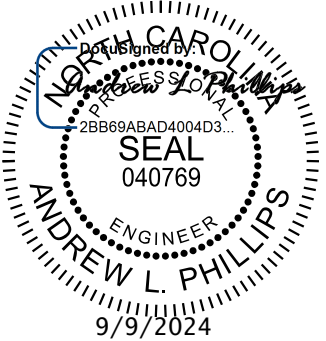
REINFORCING STEEL	955 LBS
FOR 2 WINGS	
CLASS A CONCRETE	
2 WINGS	14.4 CY
1 HEADWALL	1.3 CY
1 END CURTAIN WALL	1.7 CY
TOTAL	17.4 CY

STAGE 2

REINFORCING STEEL	955 LBS
FOR 2 WINGS	
CLASS A CONCRETE	
2 WINGS	14.4 CY
1 HEADWALL	1.3 CY
1 END CURTAIN WALL	1.7 CY
TOTAL	17.4 CY

PROJECT NO. R-5808
GATES COUNTY
STATION: 24+59.74 -L-

SHEET 8 OF 10



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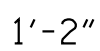
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CULVERT 41C001

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

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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.

CULVERT 41C001 STD. NO. GRA1

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	--

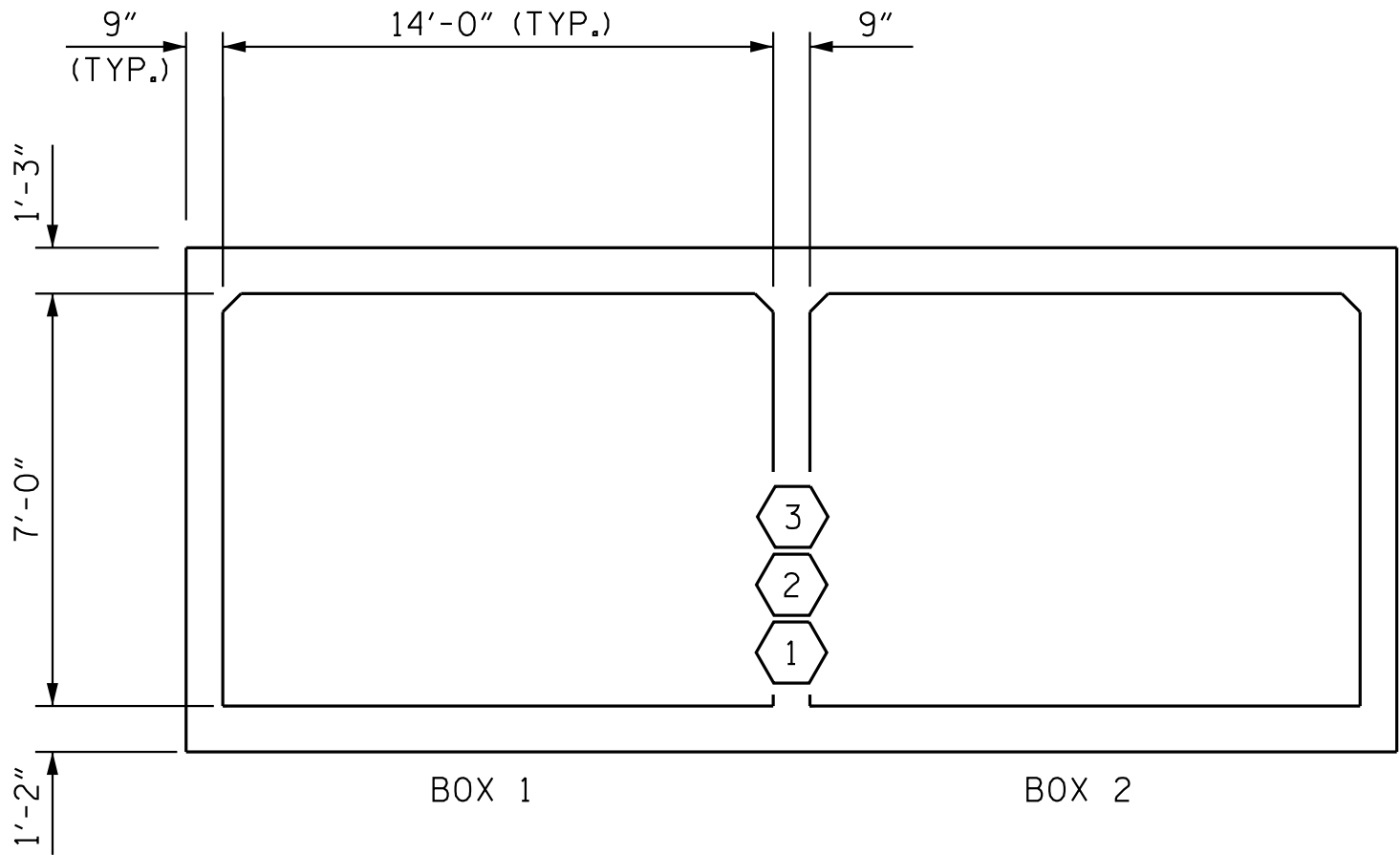
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

DISTANCE FROM LEFT END OF ELEMENT IS GIVEN FROM THE EXTERIOR EDGE OF EXTERIOR WALL.

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	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	①	1.18	--	1.75	1.28	2	BOTTOM SLAB	15.50	1.18	2	TOP SLAB	15.50	
		HL-93 (OPERATING)	N/A		1.53	--	1.35	1.66	2	BOTTOM SLAB	15.50	1.53	2	TOP SLAB	15.50	
		HS-20 (INVENTORY)	36.000	②	1.41	50.76	1.75	1.56	1	BOTTOM SLAB	14.75	1.41	2	TOP SLAB	15.50	
		HS-20 (OPERATING)	36.000		1.82	65.52	1.35	2.03	1	BOTTOM SLAB	14.75	1.82	2	TOP SLAB	15.50	
LEGAL LOAD RATING	SINGLE VEHICLE (SV) TRUCK TRACTOR SEMI-TRAILER (TTST)	SNSH	13.500		3.91	52.79	1.40	3.91	1	TOP SLAB	15.13	4.41	2	TOP SLAB	15.50	
		SNGARBS2	20.000		3.66	73.20	1.40	3.66	1	TOP SLAB	15.13	3.85	2	TOP SLAB	15.50	
		SNAGRIS2	22.000		3.67	80.74	1.40	3.67	1	TOP SLAB	15.50	4.04	2	TOP SLAB	15.50	
		SNCOTTS3	27.250		1.86	50.69	1.40	2.33	1	TOP SLAB	15.50	1.86	2	TOP SLAB	15.50	
		SNAGGRS4	34.925		2.09	72.99	1.40	2.21	2	BOTTOM SLAB	15.50	2.09	2	TOP SLAB	15.50	
		SNS5A	35.550		1.98	70.39	1.40	2.16	2	BOTTOM SLAB	15.50	1.98	2	TOP SLAB	15.50	
		SNS6A	39.950		1.94	77.50	1.40	1.94	2	BOTTOM SLAB	15.50	1.98	2	TOP SLAB	15.50	
		SNS7B	42.000		1.96	82.32	1.40	2.04	2	BOTTOM SLAB	15.50	1.96	2	TOP SLAB	15.50	
		TNAGRIT3	33.000		2.51	82.83	1.40	2.51	2	BOTTOM SLAB	15.13	2.84	2	TOP SLAB	15.50	
		TNT4A	33.075		2.24	74.09	1.40	2.36	2	BOTTOM SLAB	15.50	2.24	2	TOP SLAB	15.50	
		TNT6A	41.600		1.98	82.37	1.40	2.20	2	BOTTOM SLAB	15.50	1.98	2	TOP SLAB	15.50	
		TNT7A	42.000		2.01	84.42	1.40	2.01	2	BOTTOM SLAB	15.50	2.05	2	TOP SLAB	15.50	
		TNT7B	42.000		1.95	81.90	1.40	1.95	2	BOTTOM SLAB	15.50	2.06	2	TOP SLAB	15.50	
		TNAGRIT4	43.000		1.88	80.84	1.40	1.88	2	BOTTOM SLAB	15.50	2.10	2	TOP SLAB	15.50	
		TNAGT5A	45.000		1.84	82.80	1.40	1.84	2	BOTTOM SLAB	15.50	2.07	2	BOTTOM SLAB	15.50	
		TNAGT5B	45.000		1.81	81.45	1.40	1.81	2	BOTTOM SLAB	15.50	1.97	2	TOP SLAB	15.50	
EMERGENCY VEHICLE (EV)	EV2	28.750			2.70	77.63	1.30	2.76	1	TOP SLAB	15.13	2.70	2	TOP SLAB	15.50	
	EV3	43.000	③	1.47	63.21	1.30	1.90	2	BOTTOM SLAB	15.50	1.47	2	TOP SLAB	15.50		

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

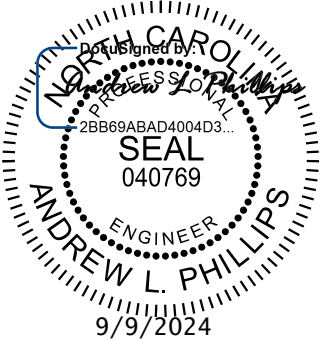


LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. R-5808
 GATES COUNTY
STATION: 24+59.74 -L-

SHEET 10 OF 10



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CULVERT 41C001 STD. NO. LRFR5

9/9/2024 K:\B01_Structures\Bridges\NC\17093002 - R-5808\Coa\Dgn\411-019_R5808_SML_CU-010.dgn

ASSEMBLED BY : D. D. LOWERY	DATE : 08/2023
CHECKED BY : A. L. PHILLIPS	DATE : 08/2023
DRAWN BY : WMC 7/II	REV. 10/1/II MAA/GM
CHECKED BY : GM 7/II	REV. 12/17 MAA/THC
	REV. 04/23 BNB/AAI

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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 ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" 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 ¼" 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 ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞"Ø STUDS FOR 4 - ¾" 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 ⅝₁₆" 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 ⅛₁₆" 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.