PROJECT TIP: BP10–C007

CONTRACT: DJ00566

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP10–C007	1	

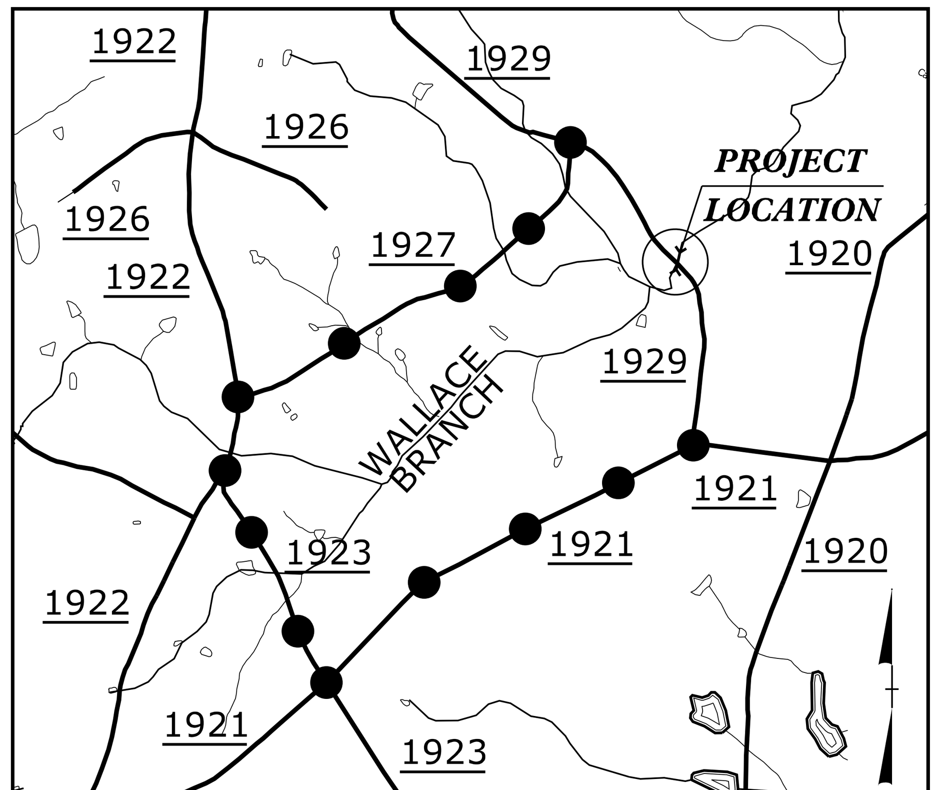
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
BP10.C007.1	N/A	PE
BP10.C007.2	N/A	ROW/UTIL
BP10.C007.3	N/A	CONST

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

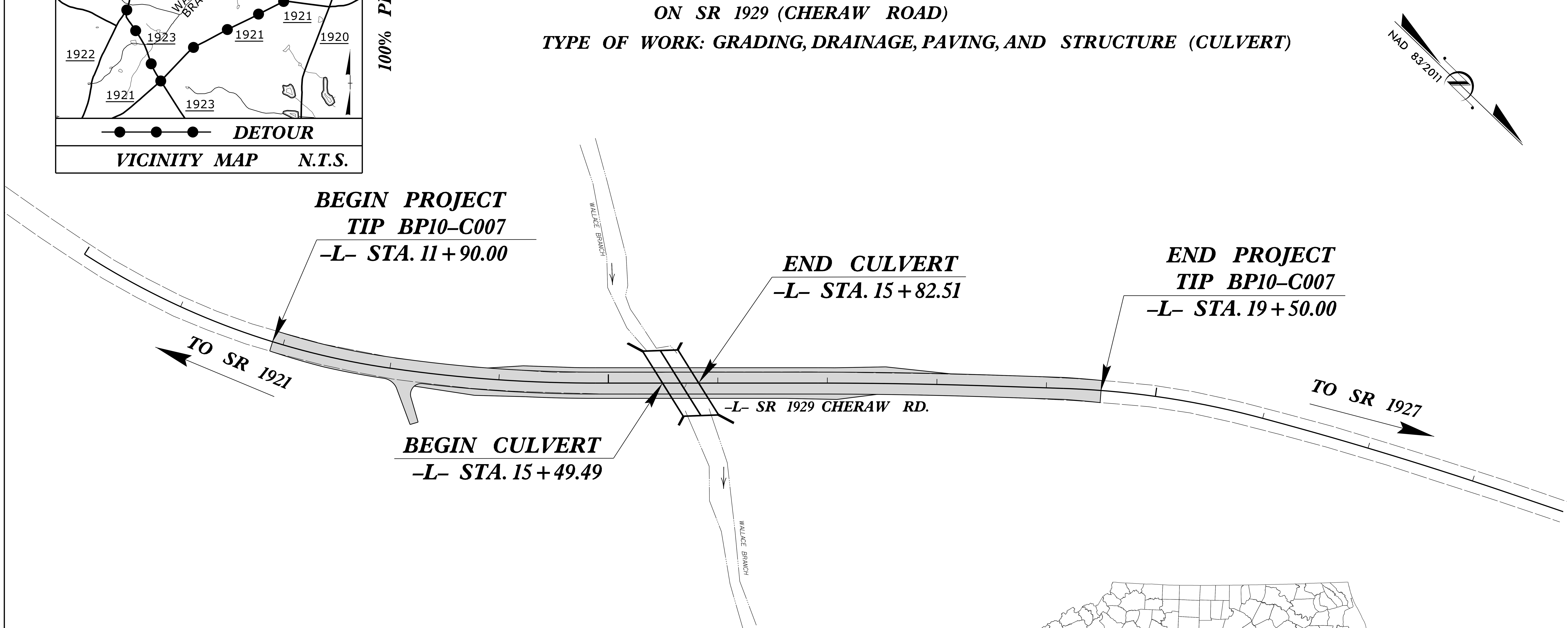
UNION COUNTY

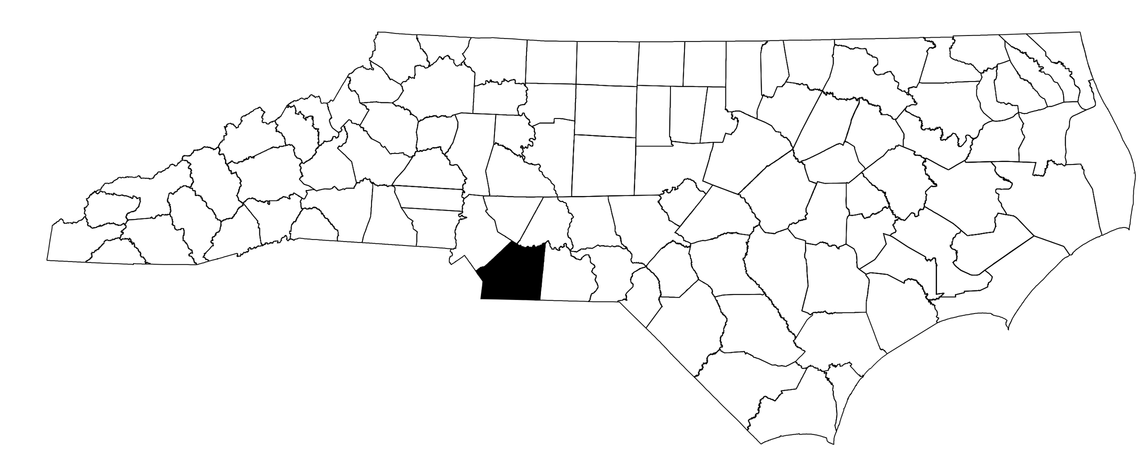
LOCATION: CULVERT 890113 OVER WALLACE BRANCH ON SR 1929 (CHERAW ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE (CULVERT)



100% PLANS





STRUCTURE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DESIGN DATA

ADT 2025 = 270
ADT 2045 = 400

T = 6 %
V = 55 MPH

FUNC CLASS = LOCAL SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BP10–C007 = 0.138 MILES
LENGTH STRUCTURE TIP PROJECT BP10–C007 = 0.006 MILES
TOTAL LENGTH TIP PROJECT BP10–C007 = 0.144 MILES

PREPARED IN THE OFFICE OF:
RS&H
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
NC FIRM LICENSE No: F-0493
FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MARCH 8, 2024

LETTING DATE: MAY 21, 2025

ALLISON DRAKE, PE
PROJECT ENGINEER

CASSIE ROBINSON, PE
PROJECT DESIGN ENGINEER

YANWEI MA, PE
NCDOT CONTACT

STRUCTURAL ENGINEER

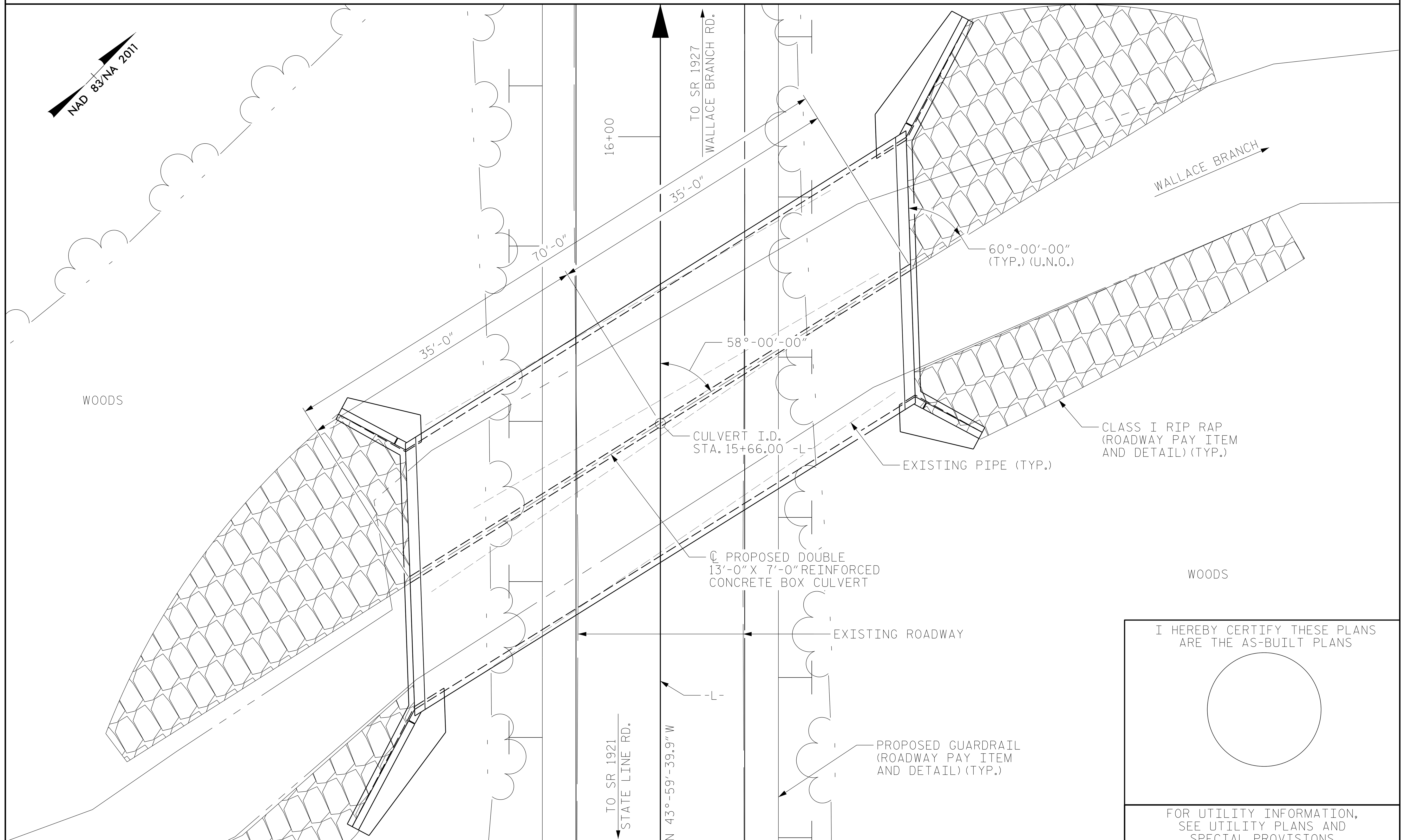
NORTH CAROLINA PROFESSIONAL SEAL 052672 ENGINEER MATTHEW R. ACOSTA

4/17/2025

SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

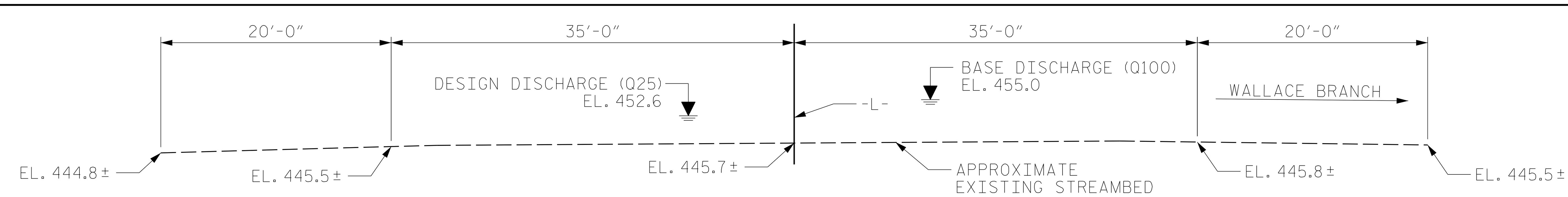
BM #2 RAILROAD SPIKE IN 18" Ø OAK TREE, 42' LT. OF STA. 14+54.00 -L-, EL. 456.33



I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS

LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

NOTES

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

DESIGN FILL = 6.75' MAX. AND 6.08' MIN.

CONCRETE CULVERTS TO BE POURED IN THE FOLLOWING ORDER FOR EACH STAGE:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

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

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

AT THE CONTRACTOR'S OPTION, THEY MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF THE EXTERIOR WALL ABOVE THE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

AT THE CONTRACTOR'S OPTION, THEY MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAILS DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED BOX CULVERT, SEE SPECIAL PROVISIONS.

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

FOR CULVERT EXCAVATION, SEE SECTION 414 OF THE STANDARD SPECIFICATIONS.

THE REINFORCED CONCRETE BOX CULVERT SHALL BE PLACED ON 1' BLANKET OF FOUNDATION CONDITIONING MATERIAL. SEE SECTION 414 OF THE STANDARD SPECIFICATIONS.

PERFORM CULVERT FOUNDATION TESTING USING NCDOT ½" ROD, IN ACCORDANCE WITH NCDOT CONSTRUCTION MANUAL SECTION 410-3, TO IDENTIFY SOFT/LOOSE SOILS. VERIFY A BEARING RESISTANCE OF 3.3 TSF AND UNDERCUT MATERIALS WITH BLOW COUNTS LESS THAN 12 BPF. NOTIFY THE GEOTECHNICAL OPERATIONS ENGINEER IF THE ADDITIONAL UNDERCUT EXCEEDS 3' PRIOR TO PROCEEDING. BACKFILL UNDERCUT AREAS WITH ADDITIONAL FOUNDATION CONDITIONING MATERIAL AS NEEDED.

SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

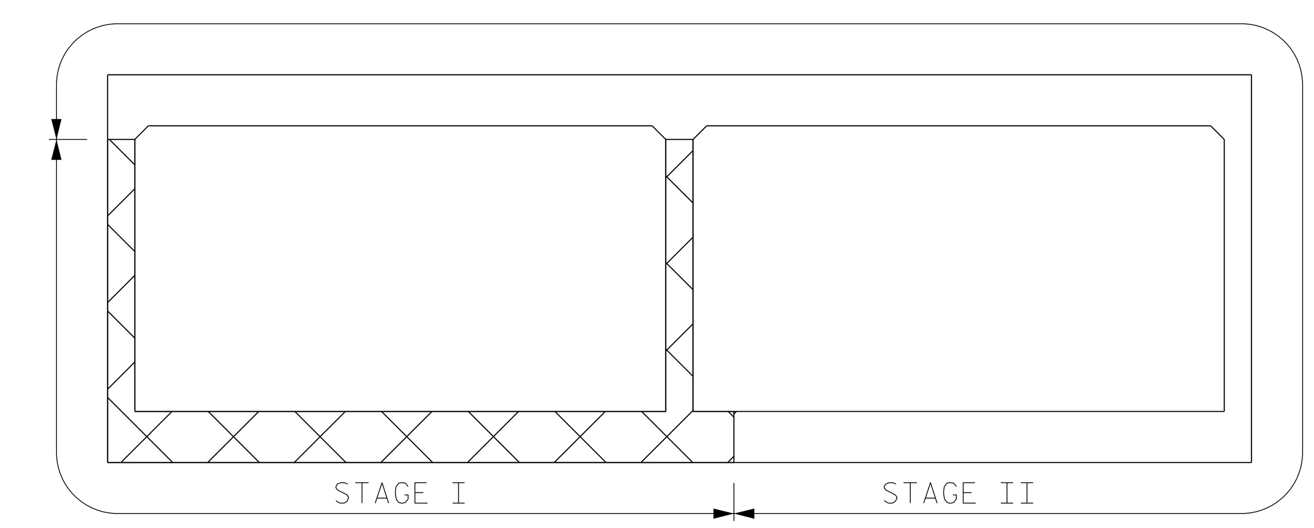
FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT OF STRUCTURES, SEE SPECIAL PROVISIONS.

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



CONSTRUCTION SEQUENCE

LOOKING UPSTREAM

STAGE I CONSTRUCTION

STAGE II CONSTRUCTION

HYDRAULIC DATA

DESIGN DISCHARGE	= 940 CFS
FREQUENCY OF DESIGN DISCHARGE	= 25 YRS
DESIGN HIGH WATER ELEVATION	= 452.6'
DRAINAGE AREA	= 2.50 SQ MI
BASE DISCHARGE (Q100)	= 1,350 CFS
BASE HIGH WATER ELEVATION	= 455.0'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1950 CFS
FREQUENCY OF OVERTOPPING	= 500+ YRS
* OVERTOPPING ELEVATION	= 458.4'

* OVERTOPPING @ STA. 15+79.00 -L-

GRADE DATA

GRADE POINT EL. @ STA. 15+66.00 -L-	= 458.50'
CULVERT BED EL. @ STA. 15+66.00 -L-	= 444.90'
ROADWAY SLOPES	= 2:1 MAX.

PROFILE DATA -L-

P.I. = 15+45.00
EL. = 448.82'
VC = 620'
K = 49
G1 = -7.0000%
G2 = +5.6263%

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			REINFORCING STEEL			FOUNDATION CONDITIONING MATERIAL		
BARREL @ 3.12 C.Y./FT						STAGE I	86	TONS
STAGE I			STAGE I			STAGE II	72	TONS
CULVERT	73.8	C.Y.	CULVERT	13,560	LBS.	TOTAL	158	TONS
WING ETC.	12.0	C.Y.	WING ETC.	660	LBS.			
TOTAL	85.8	C.Y.	TOTAL	14,220	LBS.	REMOVAL OF EXISTING STRUCTURE STA. 15+66.00 -L-	LUMP SUM	
STAGE II			STAGE II					
CULVERT	147.8	C.Y.	CULVERT	22,760	LBS.	CULVERT EXCAVATION STA. 15+66.00 -L-	LUMP SUM	
WING ETC.	14.8	C.Y.	WING ETC.	660	LBS.			
TOTAL	162.6	C.Y.	TOTAL	23,420	LBS.			
TOTAL CONCRETE	248.4	C.Y.	TOTAL STEEL	37,640	LBS.			

PROJECT NO. BP10-C007

UNION COUNTY

STATION: 15+66.00 -L-

SHEET 1 OF 7 REPLACES CULVERT 890113

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 052672 MATTHEW R. ACORD

4/17/2025

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North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 13'-0" X 7'-0" CONCRETE BOX CULVERT FOR WALLACE BRANCH ON SR 1929 BETWEEN SR 1927 AND SR 1921 60° SKEW

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

DRAWN BY :	MRA	DATE :	01/2024
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DESIGN ENGINEER OF RECORD:	MRA	DATE :	09/2024

10/9/2024
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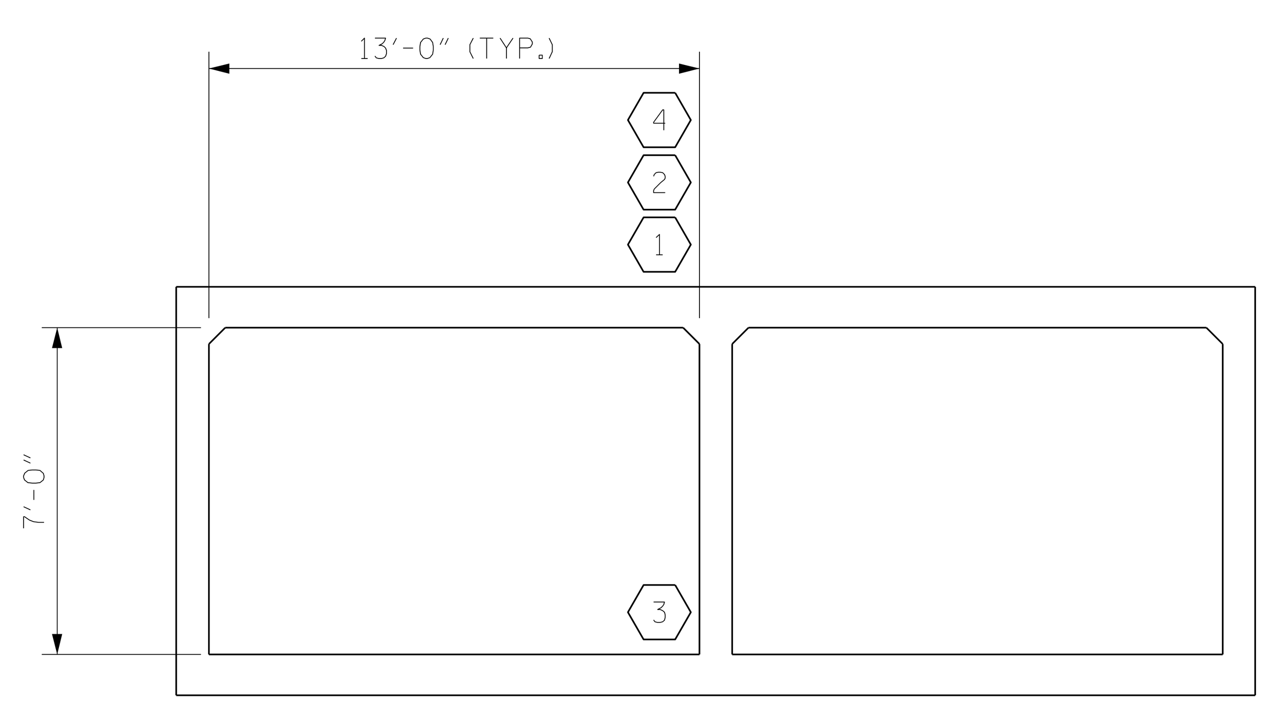
LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	# CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	LIVE-LOAD FACTORS (γ_{LL})	STRENGTH I LIMIT STATE — MOMENT: RATING FACTOR	MOMENT: BOX NO.	MOMENT: ELEMENT TYPE	MOMENT: DISTANCE FROM LEFT END OF ELEMENT (ft)	SHEAR: RATING FACTOR	SHEAR: BOX NO.	SHEAR: ELEMENT TYPE	SHEAR: DISTANCE FROM LEFT END OF ELEMENT (ft)	COMMENT NUMBER
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	1	1.57	--	1.75	2.70	1 & 2	TOP SLAB	13.00	1.57	1 & 2	TOP SLAB	13.00	
	HL-93 (OPERATING)	N/A		2.04	--	1.35	3.49	1 & 2	TOP SLAB	13.00	2.04	1 & 2	TOP SLAB	13.00	
	HS-20 (INVENTORY)	36.000	2	1.82	65.520	1.75	2.97	1 & 2	TOP SLAB	13.00	1.82	1 & 2	TOP SLAB	13.00	
	HS-20 (OPERATING)	36.000		2.36	84.960	1.35	3.85	1 & 2	TOP SLAB	13.00	2.36	1 & 2	TOP SLAB	13.00	
LEGAL LOAD RATING — SINGLE VEHICLE (SV)	SNSH	13.500		3.92	52.920	1.40	5.89	1 & 2	EXTERIOR WALL	7.00	3.92	1 & 2	BOTTOM SLAB	13.00	
	SNGARBS2	20.000		3.65	73.000	1.40	5.79	1 & 2	EXTERIOR WALL	7.00	3.65	1 & 2	TOP SLAB	13.00	
	SNAGRIS2	22.000		3.54	77.880	1.40	5.61	1 & 2	TOP SLAB	13.00	3.54	1 & 2	BOTTOM SLAB	13.00	
	SNCOTTS3	27.250		2.20	59.950	1.40	4.06	1 & 2	EXTERIOR WALL	7.00	2.20	1 & 2	BOTTOM SLAB	13.00	
	SNAGGRS4	34.925		2.24	78.232	1.40	3.85	1 & 2	BOTTOM SLAB	13.00	2.24	1 & 2	BOTTOM SLAB	13.00	
	SNS5A	35.550		2.31	82.121	1.40	3.86	1 & 2	BOTTOM SLAB	13.00	2.31	1 & 2	BOTTOM SLAB	13.00	
	SNS6A	39.950		2.21	88.290	1.40	3.88	1 & 2	BOTTOM SLAB	13.00	2.21	1 & 2	BOTTOM SLAB	13.00	
	SNS7B	42.000		2.10	88.200	1.40	3.69	1 & 2	BOTTOM SLAB	13.00	2.10	1 & 2	BOTTOM SLAB	13.00	
LEGAL LOAD RATING — TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.38	78.540	1.40	4.17	1 & 2	BOTTOM SLAB	13.00	2.38	1 & 2	BOTTOM SLAB	13.00	
	TNT4A	33.075		2.52	83.349	1.40	4.21	1 & 2	BOTTOM SLAB	13.00	2.52	1 & 2	TOP SLAB	13.00	
	TNT6A	41.600		2.28	94.848	1.40	3.94	1 & 2	BOTTOM SLAB	13.00	2.28	1 & 2	BOTTOM SLAB	13.00	
	TNT7A	42.000		2.32	97.440	1.40	3.92	1 & 2	BOTTOM SLAB	13.00	2.32	1 & 2	BOTTOM SLAB	13.00	
	TNT7B	42.000		2.25	94.500	1.40	3.76	1 & 2	BOTTOM SLAB	13.00	2.25	1 & 2	TOP SLAB	13.00	
	TNAGRIT4	43.000		2.02	86.860	1.40	3.36	1 & 2	BOTTOM SLAB	13.00	2.02	1 & 2	BOTTOM SLAB	13.00	
	TNAGT5A	45.000		2.09	94.050	1.40	3.64	1 & 2	BOTTOM SLAB	13.00	2.09	1 & 2	BOTTOM SLAB	13.00	
	TNAGT5B	45.000	3	1.84	82.800	1.40	3.24	1 & 2	BOTTOM SLAB	13.00	1.84	1 & 2	BOTTOM SLAB	13.00	
EMERGENCY VEHICLE (EV)	EV2	28.750		2.79	80.213	1.30	4.62	1 & 2	TOP SLAB	13.00	2.79	1 & 2	TOP SLAB	13.00	
	EV3	43.000	4	1.88	80.840	1.30	3.34	1 & 2	BOTTOM SLAB	13.00	1.88	1 & 2	TOP SLAB	13.00	



LRFR SUMMARY

(LOOKING DOWNSTREAM)

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

COMMENTS:

1.
2.
3.
4.

CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING ✱✱

4 EMERGENCY VERHICLE LOAD RATING ✱✱

✱✱ SEE CHART FOR VEHICLE TYPE

PROJECT NO. BP10-C007

UNION COUNTY

STATION: 15+66.00 -L-

SHEET 2 OF 7

SEAL 052672 NORTH CAROLINA PROFESSIONAL ENGINEER MATTHEW R. ACOSTA

4/17/2025

RS&H

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919-926-4100 FAX 919-846-9080
www.rsandh.com
North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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

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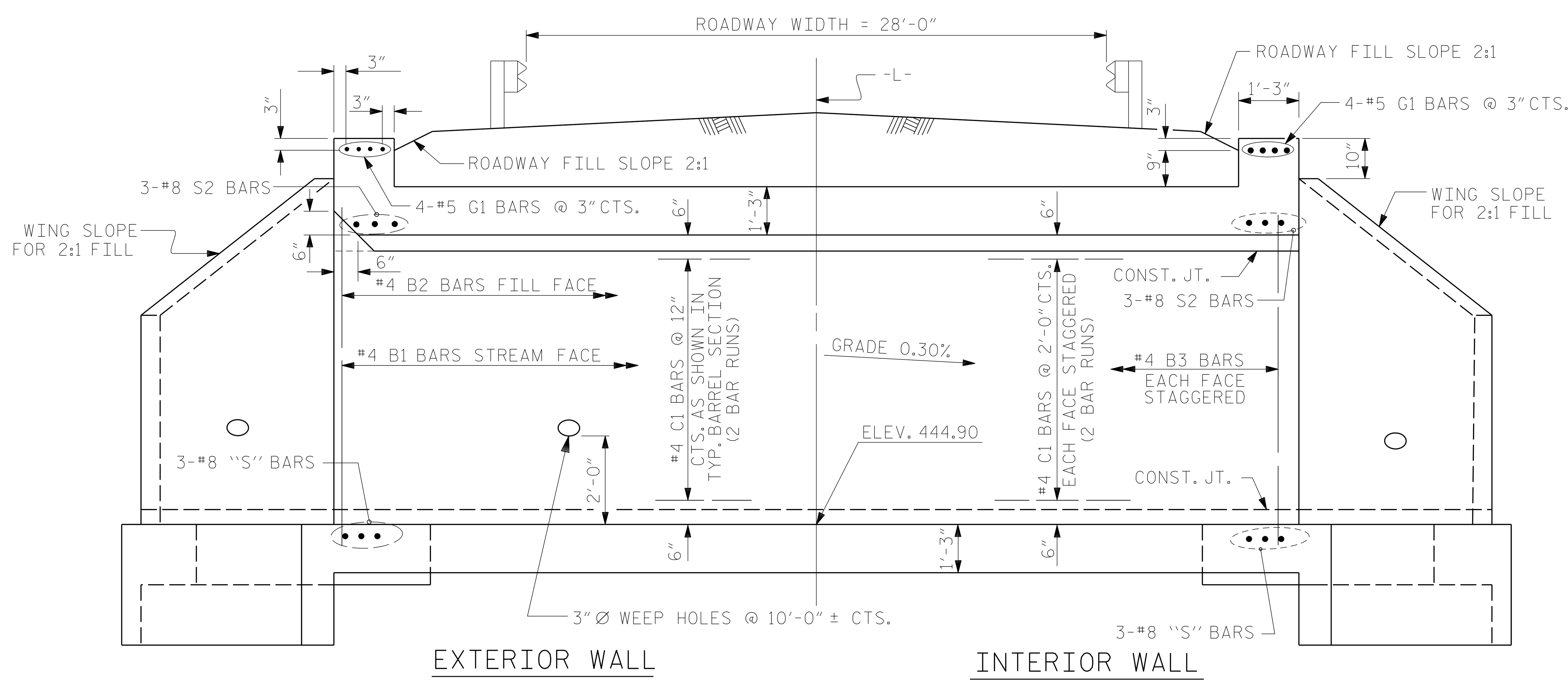
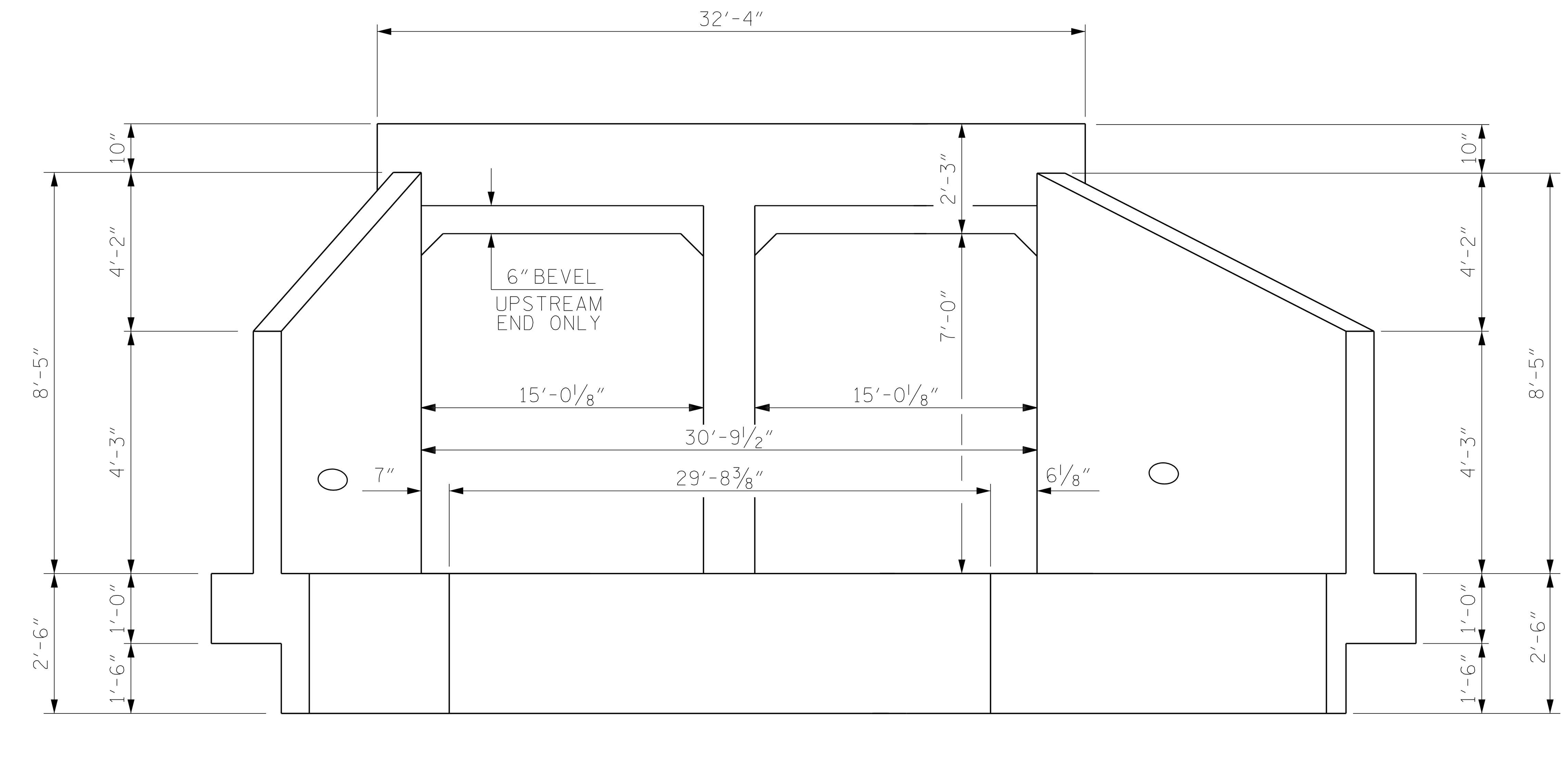
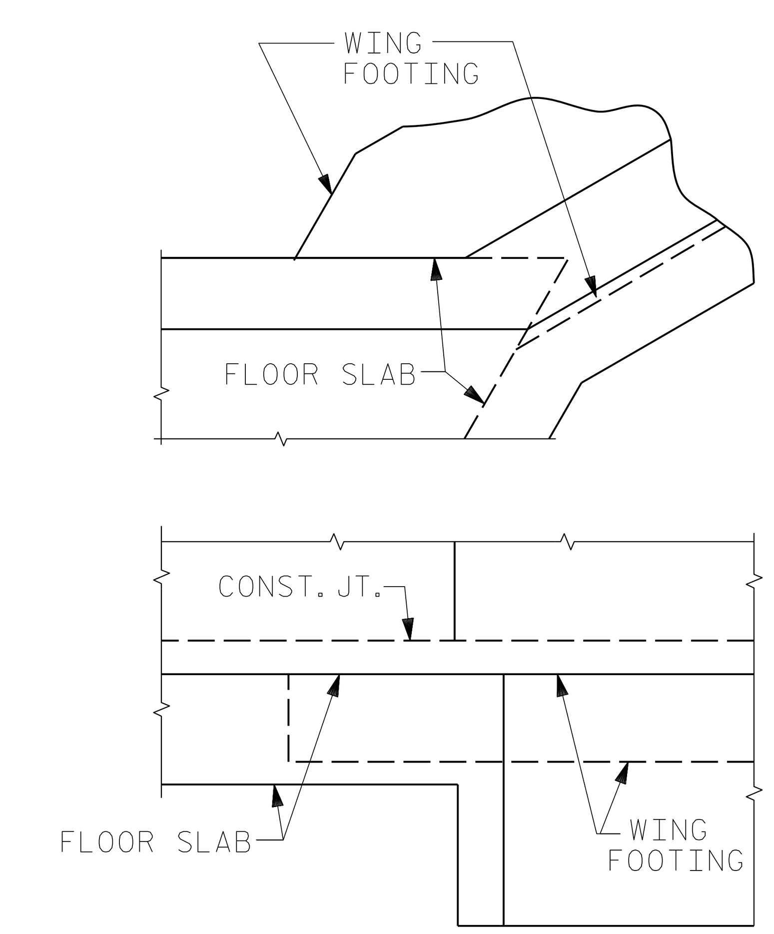


CULVERT SECTION NORMAL TO ROADWAY



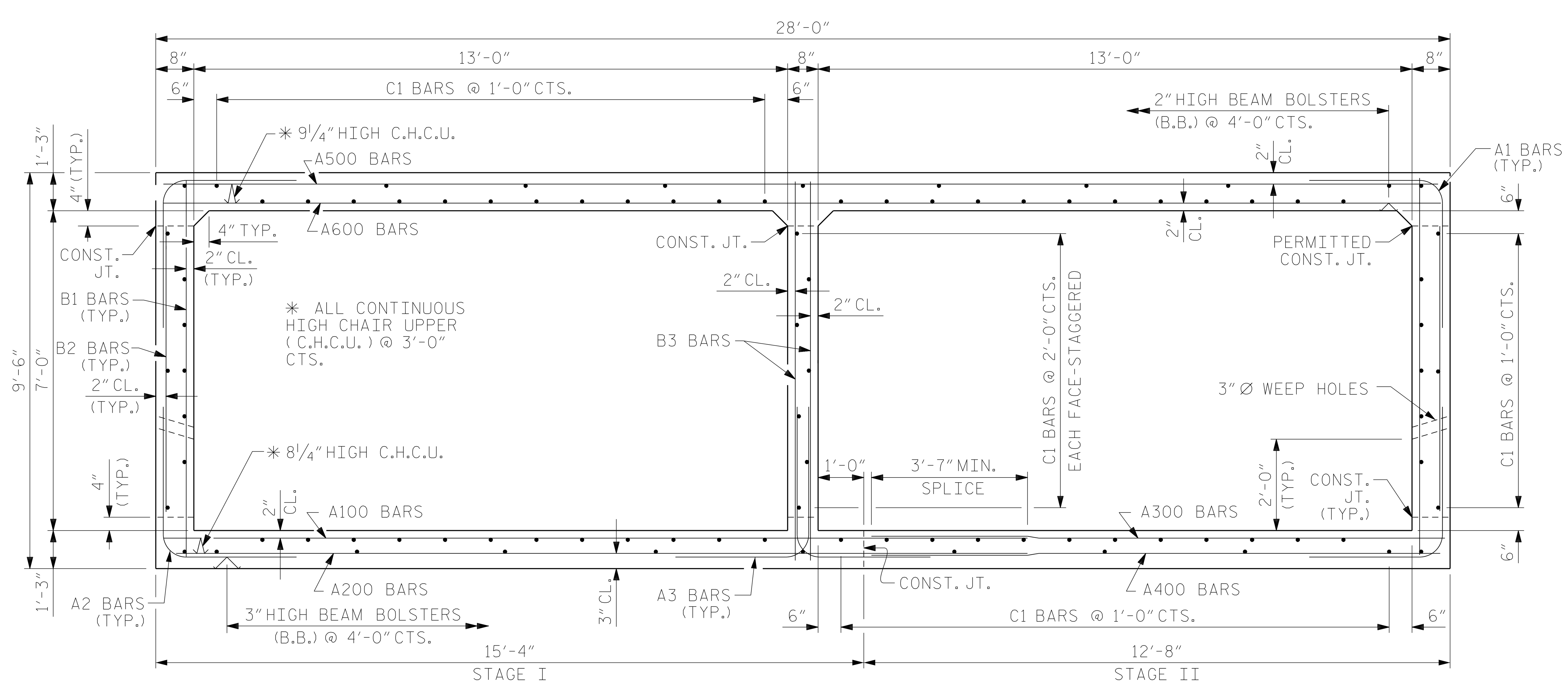
END ELEVATION NORMAL TO SKEW



DETAIL

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

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



RIGHT ANGLE SECTION OF BARREL

THERE ARE 93 "C" BARS IN SECTION OF BARREL.

NOTES:

THERE ARE 34 "C" BARS IN STAGE I SECTION OF BARREL.

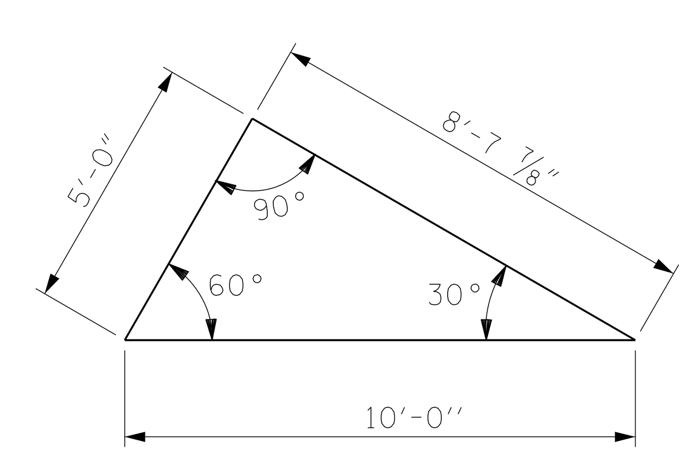
THERE ARE 59 "C" BARS IN STAGE II SECTION OF BARREL.

PROJECT NO. BP10-C007

UNION COUNTY

STATION: 15+66.00 -L-

SHEET 3 OF 7



SKEW TRIANGLE

SEAL 052672
MATTHEW R. ACOSTA
4/17/2025

RS&H

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8521 Six Forks Road, Suite 400
Raleigh, NC 27615
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North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 13'-0" X 7'-0" CONCRETE BOX CULVERT SECTION

60° SKEW

REVISIONS							SHEET NO.
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1			3				TOTAL SHEETS
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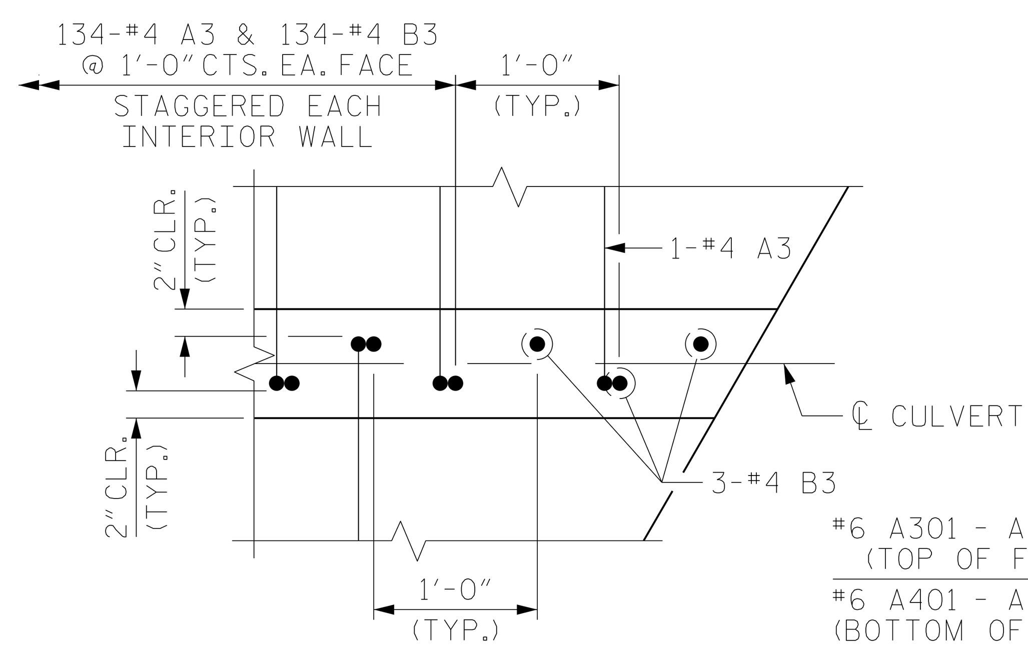
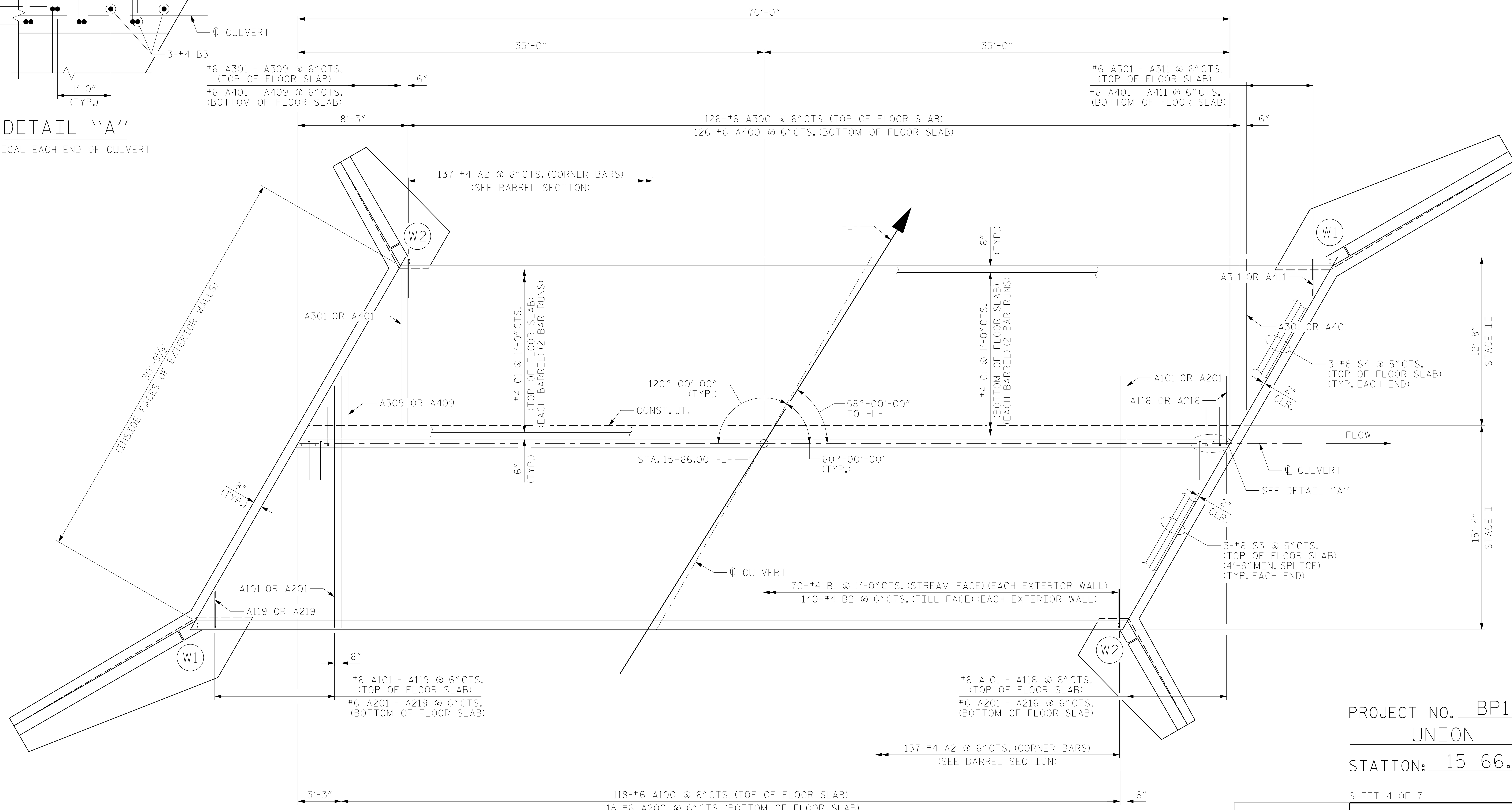


DETAIL "A"

TYPICAL EACH END OF CULVERT



PLAN - FLOOR SLAB

PROJECT NO. BP10-C007

UNION COUNTY

STATION: 15+66.00 -L-

SHEET 4 OF 7

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 052672 MATTHEW R. ACOSTA
4/17/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 13'-0" X 7'-0"
CONCRETE BOX CULVERT
FLOOR SLAB

60° SKEW

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

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10/9/2024
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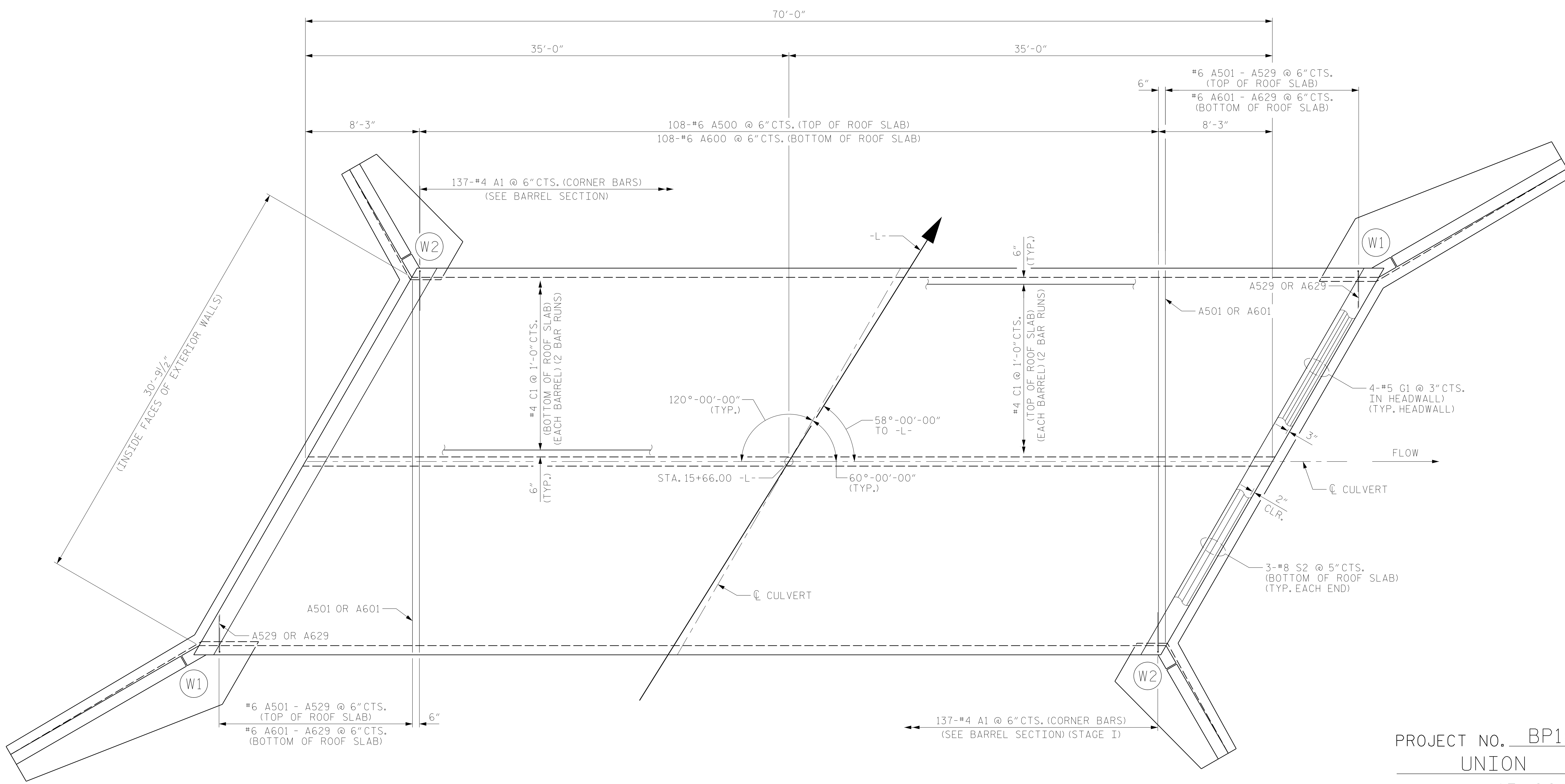

PLAN - ROOF SLAB

ALL BARS TO BE PLACED IN STAGE II (U.N.O.)

PROJECT NO. BP10-C007

UNION COUNTY

STATION: 15+66.00 -L-

SHEET 5 OF 7

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 052672 MATTHEW R. ACOSTA
4/17/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 13'-0" X 7'-0" CONCRETE BOX CULVERT ROOF SLAB

60° SKEW

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

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BILL OF MATERIAL

STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	137	#4	1	6'-7"	602
A2	137	#4	1	6'-7"	602
A3	136	#4	1	6'-7"	598
A100	118	#6	STR	18'-11"	3353
A101	2	#6	STR	18'-2"	55
A102	2	#6	STR	17'-3"	52
A103	2	#6	STR	16'-5"	49
A104	2	#6	STR	15'-6"	47
A105	2	#6	STR	14'-8"	44
A106	2	#6	STR	13'-10"	42
A107	2	#6	STR	12'-11"	39
A108	2	#6	STR	12'-1"	36
A109	2	#6	STR	11'-2"	34
A110	2	#6	STR	10'-4"	31
A111	2	#6	STR	9'-6"	29
A112	2	#6	STR	8'-7"	26
A113	2	#6	STR	7'-9"	23
A114	2	#6	STR	6'-10"	21
A115	2	#6	STR	6'-0"	18
A116	2	#6	STR	5'-2"	16
A117	1	#6	STR	4'-3"	6
A118	1	#6	STR	3'-5"	5
A119	1	#6	STR	2'-7"	4
A200	118	#6	STR	18'-11"	3353
A201	2	#6	STR	18'-2"	55
A202	2	#6	STR	17'-3"	52
A203	2	#6	STR	16'-5"	49
A204	2	#6	STR	15'-6"	47
A205	2	#6	STR	14'-8"	44
A206	2	#6	STR	13'-10"	42
A207	2	#6	STR	12'-11"	39
A208	2	#6	STR	12'-1"	36
A209	2	#6	STR	11'-2"	34
A210	2	#6	STR	10'-4"	31
A211	2	#6	STR	9'-6"	29
A212	2	#6	STR	8'-7"	26
A213	2	#6	STR	7'-9"	23
A214	2	#6	STR	6'-10"	21
A215	2	#6	STR	6'-0"	18
A216	2	#6	STR	5'-2"	16
A217	1	#6	STR	4'-3"	6
A218	1	#6	STR	3'-5"	5
A219	1	#6	STR	2'-7"	4
B1	70	#4	STR	9'-1"	425
B2	140	#4	STR	6'-4"	592
B3	140	#4	STR	9'-1"	849
C1	68	#4	STR	36'-0"	1635
D1	10	#6	STR	1'-10"	28
D2	2	#6	STR	2'-10"	9
S3	6	#8	STR	22'-6"	360

REINFORCING STEEL 13,560 LBS.

SILL FOR ONE BARREL

CLASS A CONCRETE
LOW FLOW SILL 1.1 C.Y.
HIGH FLOW SILL 0.0 C.Y.
TOTAL 1.1 C.Y.

STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	137	#4	1	6'-7"	602	A529	2	#6	STR	2'-8"	8
A2	137	#4	1	6'-7"	602						
						A600	108	#6	STR	27'-8"	4488
A300	126	#6	STR	12'-4"	2334	A601	2	#6	STR	26'-11"	81
A301	2	#6	STR	11'-4"	34	A602	2	#6	STR	26'-0"	78
A302	2	#6	STR	10'-5"	31	A603	2	#6	STR	25'-2"	76
A303	2	#6	STR	9'-7"	29	A604	2	#6	STR	24'-3"	73
A304	2	#6	STR	8'-8"	26	A605	2	#6	STR	23'-5"	70
A305	2	#6	STR	7'-10"	24	A606	2	#6	STR	22'-7"	68
A306	2	#6	STR	7'-0"	21	A607	2	#6	STR	21'-8"	65
A307	2	#6	STR	6'-1"	18	A608	2	#6	STR	20'-10"	63
A308	2	#6	STR	5'-3"	16	A609	2	#6	STR	19'-11"	60
A309	2	#6	STR	4'-4"	13	A610	2	#6	STR	19'-1"	57
A310	1	#6	STR	3'-6"	5	A611	2	#6	STR	18'-3"	55
A311	1	#6	STR	2'-8"	4	A612	2	#6	STR	17'-4"	52
						A613	2	#6	STR	16'-6"	50
A400	126	#6	STR	12'-4"	2334	A614	2	#6	STR	15'-7"	47
A401	2	#6	STR	11'-4"	34	A615	2	#6	STR	14'-9"	44
A402	2	#6	STR	10'-5"	31	A616	2	#6	STR	13'-11"	42
A403	2	#6	STR	9'-7"	29	A617	2	#6	STR	13'-0"	39
A404	2	#6	STR	8'-8"	26	A618	2	#6	STR	12'-2"	37
A405	2	#6	STR	7'-10"	24	A619	2	#6	STR	11'-4"	34
A406	2	#6	STR	7'-0"	21	A620	2	#6	STR	10'-5"	31
A407	2	#6	STR	6'-1"	18	A621	2	#6	STR	9'-7"	29
A408	2	#6	STR	5'-3"	16	A622	2	#6	STR	8'-8"	26
A409	2	#6	STR	4'-4"	13	A623	2	#6	STR	7'-10"	24
A410	1	#6	STR	3'-6"	5	A624	2	#6	STR	7'-0"	21
A411	1	#6	STR	2'-8"	4	A625	2	#6	STR	6'-1"	18
						A626	2	#6	STR	5'-3"	16
A500	108	#6	STR	27'-8"	4488	A627	2	#6	STR	4'-4"	13
A501	2	#6	STR	26'-11"	81	A628	2	#6	STR	3'-6"	11
A502	2	#6	STR	26'-0"	78	A629	2	#6	STR	2'-8"	8
A503	2	#6	STR	25'-2"	76						
A504	2	#6	STR	24'-3"	73	B1	70	#4	STR	9'-1"	425
A505	2	#6	STR	23'-5"	70	B2	140	#4	STR	6'-4"	592
A506	2	#6	STR	22'-7"	68						
A507	2	#6	STR	21'-8"	65	C1	118	#4	STR	36'-0"	2838
A508	2	#6	STR	20'-10"	63						
A509	2	#6	STR	19'-11"	60	D2	8	#6	STR	2'-10"	34
A510	2	#6	STR	19'-1"	57						
A511	2	#6	STR	18'-3"	55	G1	8	#5	STR	31'-11"	266
A512	2	#6	STR	17'-4"	52						
A513	2	#6	STR	16'-6"	50	S2	6	#8	STR	31'-11"	511
A514	2	#6	STR	15'-7"	47	S4	6	#8	STR	14'-3"	228
A515	2	#6	STR	14'-9"	44						
A516	2	#6	STR	13'-11"	42						
A517	2	#6	STR	13'-0"	39						
A518	2	#6	STR	12'-2"	37						
A519	2	#6	STR	11'-4"	34						
A520	2	#6	STR	10'-5"	31						
A521	2	#6	STR	9'-7"	29						
A522	2	#6	STR	8'-8"	26						
A523	2	#6	STR	7'-10"	24						
A524	2	#6	STR	7'-0"	21						
A525	2	#6	STR	6'-1"	18						
A526	2	#6	STR	5'-3"	16						
A527	2	#6	STR	4'-4"	13						
A528	2	#6	STR	3'-6"	11						

REINFORCING STEEL 22,760 LBS.

SILL FOR ONE BARREL

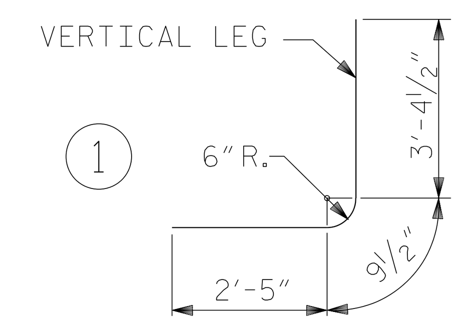
CLASS A CONCRETE
LOW FLOW SILL 0.0 C.Y.
HIGH FLOW SILL 2.2 C.Y.
TOTAL 2.2 C.Y.

NOTES:

SEE "NATIVE MATERIAL SPECIFICATIONS FOR BACKFILLING" UNDER "ADDITIONAL INFORMATION AND COMPUTATIONS" OF THE CULVERT SURVEY & HYDRAULIC DESIGN REPORT.

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

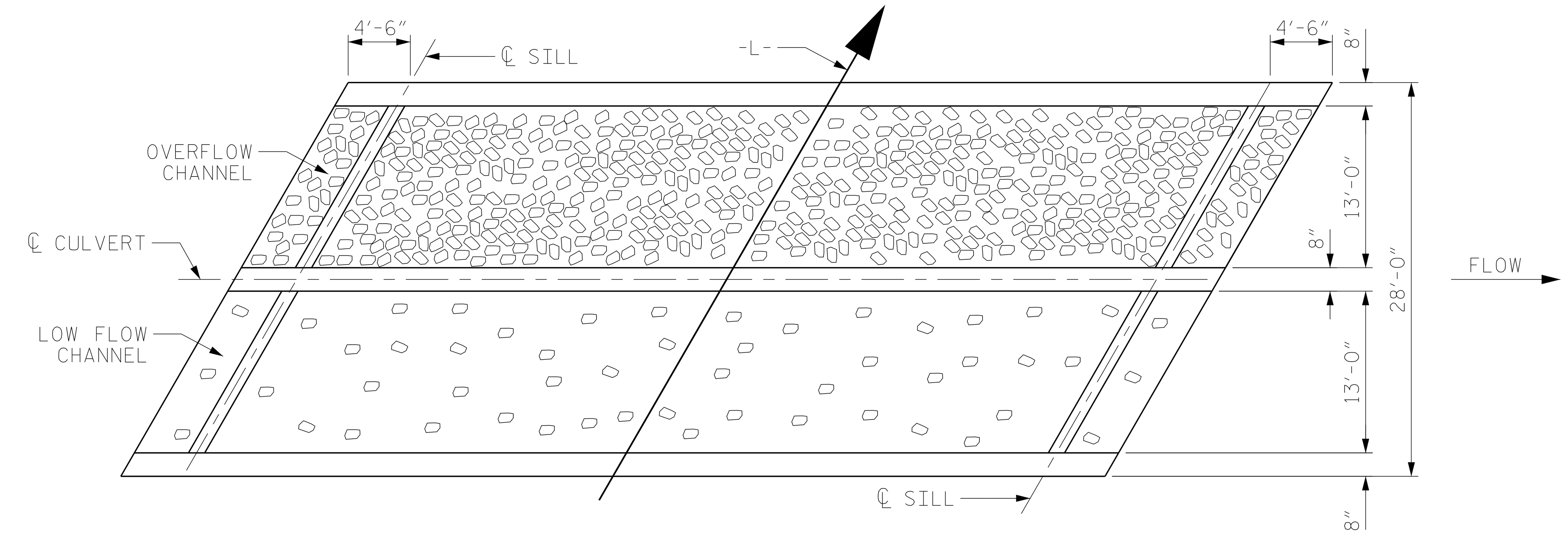
BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

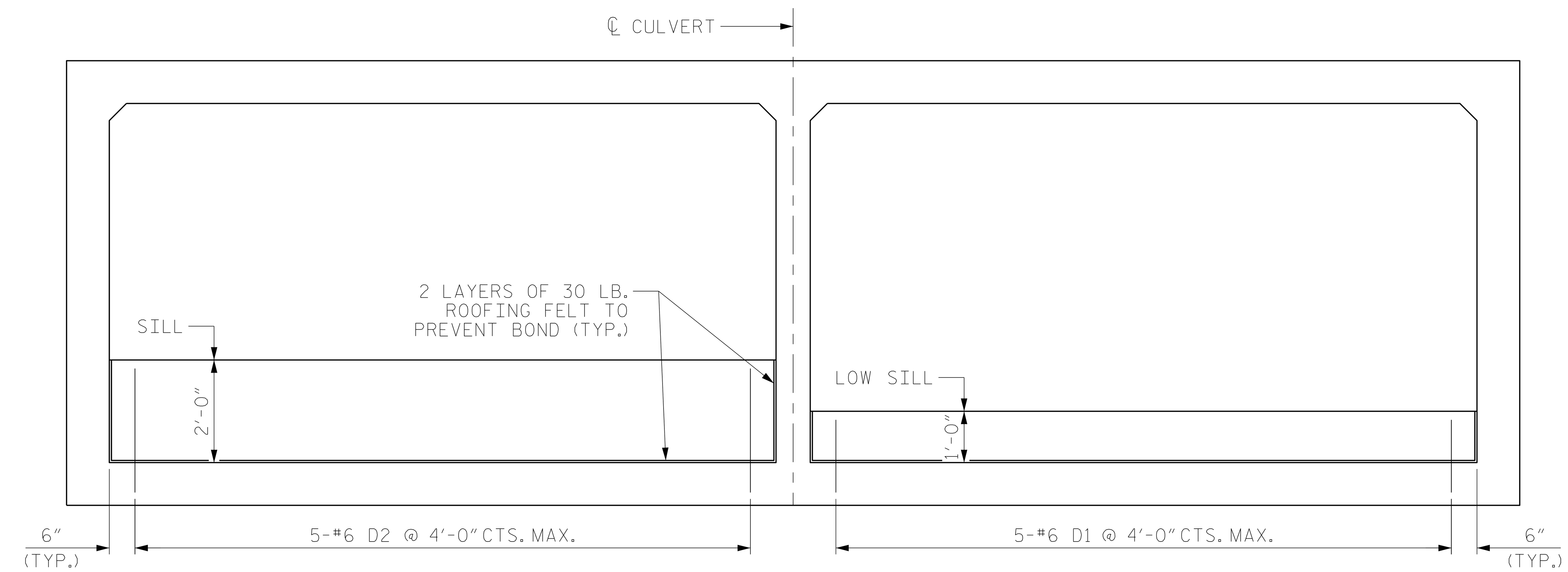
SPLICE LENGTHS CHART

SIZE	MIN. SPLICE LENGTH
#4	2'-5"
#5	3'-0"
#6	3'-7"
#8	4'-9"



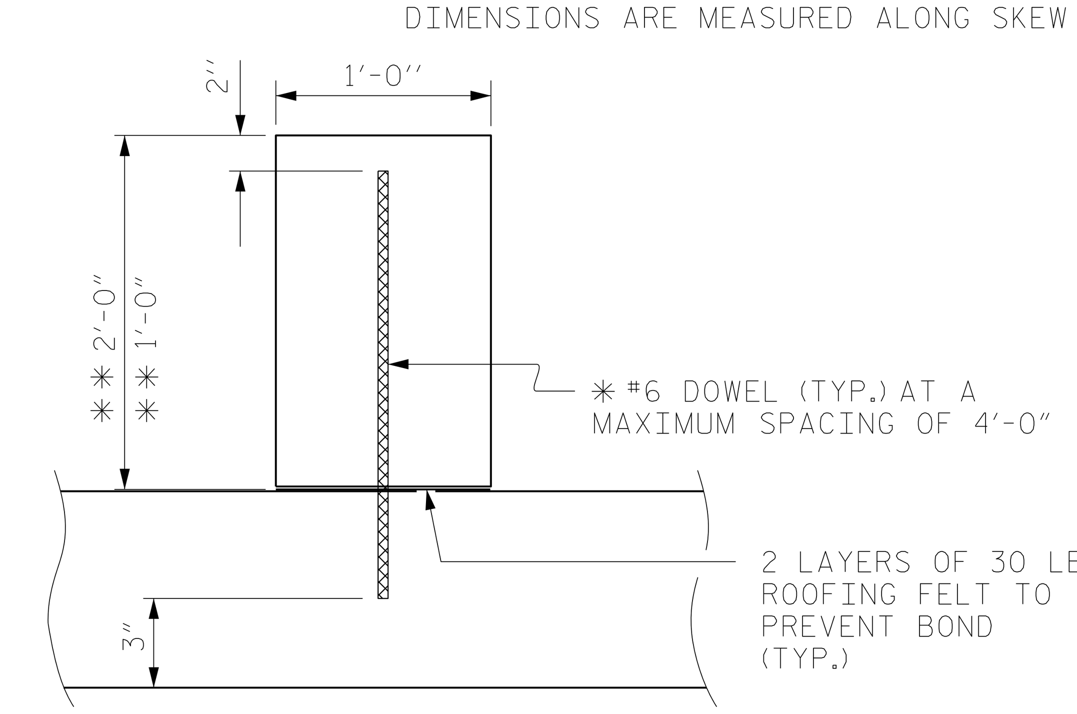
PLAN OF FLOOR SILL LAYOUT

BACKFILL ENTIRE CULVERT BED WITH NATIVE BED MATERIAL TO SILL HEIGHT



CULVERT SILL DETAILS

LOOKING DOWNSTREAM
DIMENSIONS ARE MEASURED ALONG SKEW



SECTION THROUGH SILL

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

✱✱ SEE CULVERT SILL DETAILS FOR LOCATION AND HEIGHT OF SILL

PROJECT NO. BP10-C007
UNION COUNTY
STATION: 15+66.00 -L-

SHEET 6 OF 7

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 052672 MATTHEW R. ACOSTA
4/17/2025

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North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 13'-0" X 7'-0" CONCRETE BOX CULVERT DETAILS

60° SKEW

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

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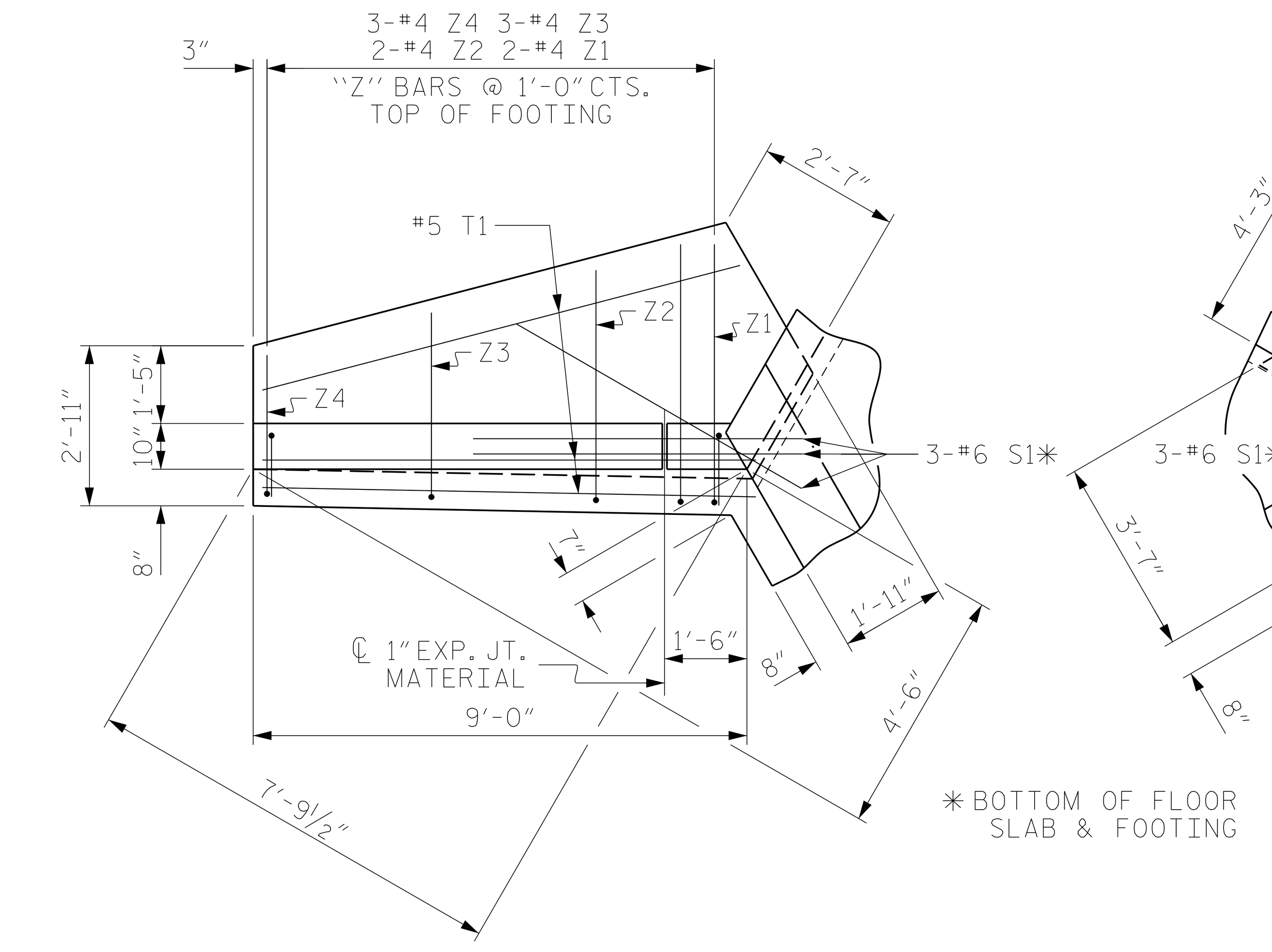
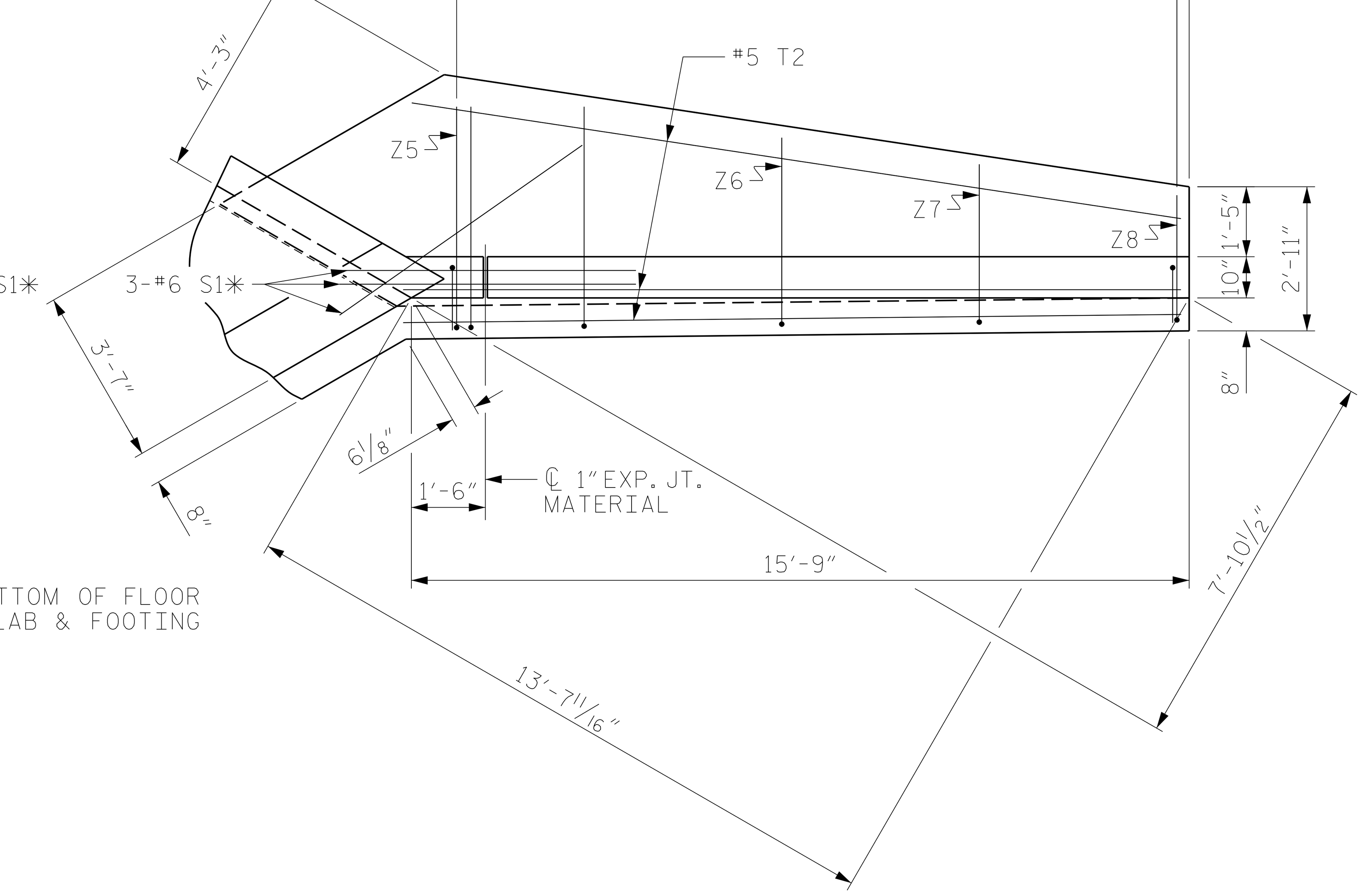
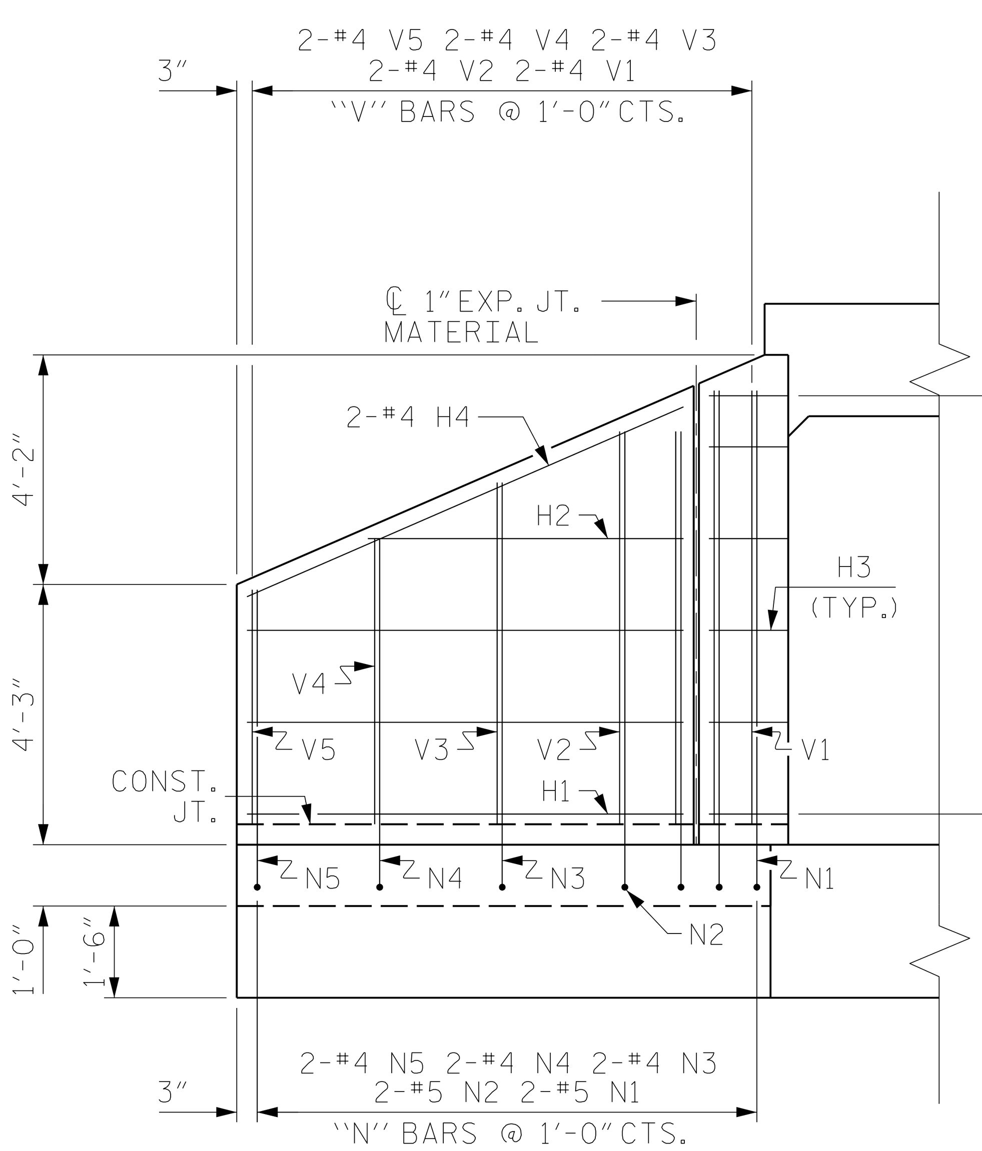


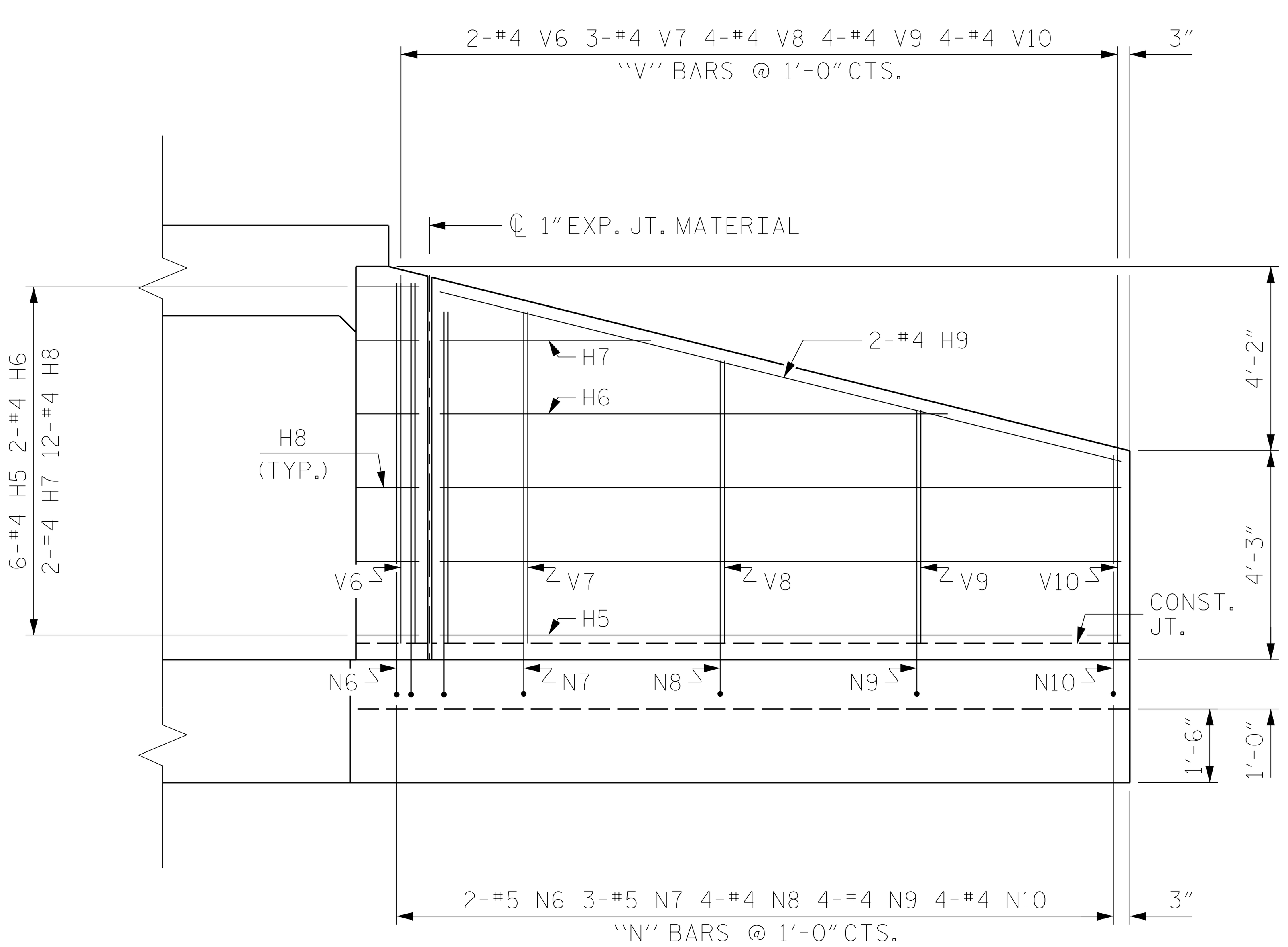
PLAN W2



PLAN W1

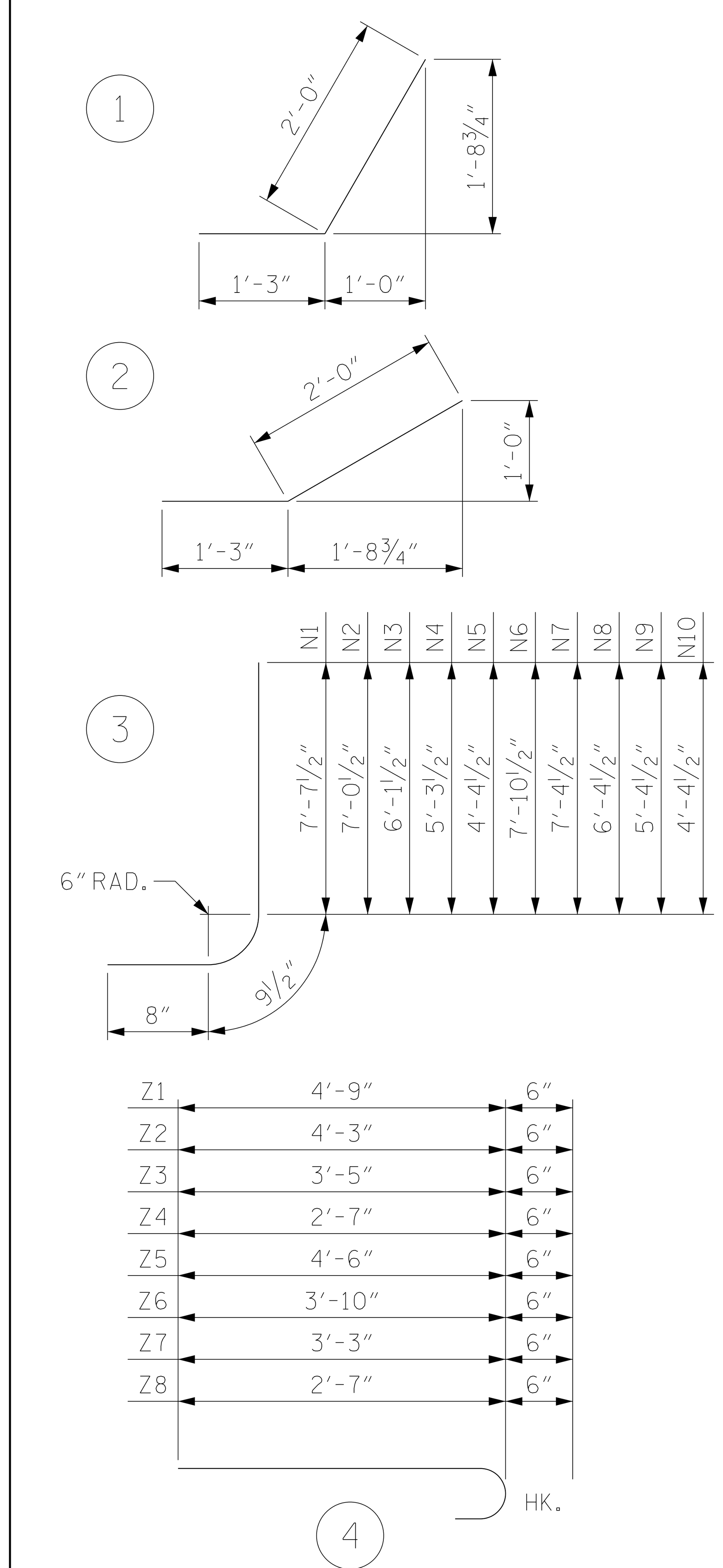


ELEVATION W2



ELEVATION W1

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	7'-1"	28
H2	2	#4	STR	5'-2"	7
H3	12	#4	1	3'-3"	26
H4	2	#4	STR	7'-9"	10
H5	6	#4	STR	13'-10"	55
H6	2	#4	STR	10'-4"	14
H7	2	#4	STR	4'-3"	6
H8	12	#4	2	3'-3"	26
H9	2	#4	STR	14'-3"	19
N1	2	#5	3	9'-1"	19
N2	2	#5	3	8'-6"	18
N3	2	#4	3	7'-7"	10
N4	2	#4	3	6'-9"	9
N5	2	#4	3	5'-10"	8
N6	2	#5	3	9'-4"	19
N7	3	#5	3	8'-10"	28
N8	4	#4	3	7'-10"	21
N9	4	#4	3	6'-10"	18
N10	4	#4	3	5'-10"	16
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	9'-0"	28
T2	3	#5	STR	15'-9"	49
V1	2	#4	STR	7'-1"	9
V2	2	#4	STR	6'-5"	9
V3	2	#4	STR	5'-7"	7
V4	2	#4	STR	4'-8"	6
V5	2	#4	STR	3'-10"	5
V6	2	#4	STR	7'-4"	10
V7	3	#4	STR	6'-9"	14
V8	4	#4	STR	5'-9"	15
V9	4	#4	STR	4'-9"	13
V10	4	#4	STR	3'-10"	10
Z1	2	#4	4	5'-3"	7
Z2	2	#4	4	4'-9"	6
Z3	3	#4	4	3'-11"	8
Z4	3	#4	4	3'-1"	6
Z5	5	#4	4	5'-0"	17
Z6	4	#4	4	4'-4"	12
Z7	4	#4	4	3'-9"	10
Z8	4	#4	4	3'-1"	8

REINFORCING STEEL FOR 2 WINGS 660 LBS.

CLASS A CONCRETE
- 2 WINGS 9.9 C.Y.
- 0 HEADWALLS 0.0 C.Y.
- 2 END CURTAIN WALLS 2.1 C.Y.
- TOTAL 12.0 C.Y.

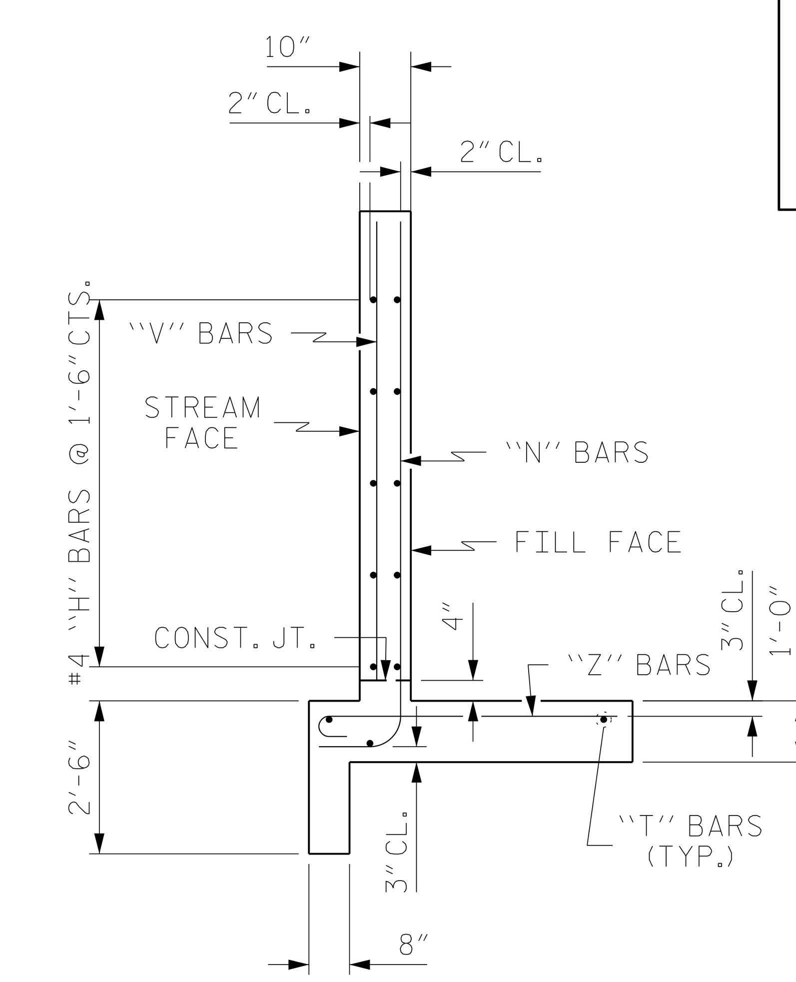
BILL OF MATERIAL

STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	7'-1"	28
H2	2	#4	STR	5'-2"	7
H3	12	#4	1	3'-3"	26
H4	2	#4	STR	7'-9"	10
H5	6	#4	STR	13'-10"	55
H6	2	#4	STR	10'-4"	14
H7	2	#4	STR	4'-3"	6
H8	12	#4	2	3'-3"	26
H9	2	#4	STR	14'-3"	19
N1	2	#5	3	9'-1"	19
N2	2	#5	3	8'-6"	18
N3	2	#4	3	7'-7"	10
N4	2	#4	3	6'-9"	9
N5	2	#4	3	5'-10"	8
N6	2	#5	3	9'-4"	19
N7	3	#5	3	8'-10"	28
N8	4	#4	3	7'-10"	21
N9	4	#4	3	6'-10"	18
N10	4	#4	3	5'-10"	16
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	9'-0"	28
T2	3	#5	STR	15'-9"	49
V1	2	#4	STR	7'-1"	9
V2	2	#4	STR	6'-5"	9
V3	2	#4	STR	5'-7"	7
V4	2	#4	STR	4'-8"	6
V5	2	#4	STR	3'-10"	5
V6	2	#4	STR	7'-4"	10
V7	3	#4	STR	6'-9"	14
V8	4	#4	STR	5'-9"	15
V9	4	#4	STR	4'-9"	13
V10	4	#4	STR	3'-10"	10
Z1	2	#4	4	5'-3"	7
Z2	2	#4	4	4'-9"	6
Z3	3	#4	4	3'-11"	8
Z4	3	#4	4	3'-1"	6
Z5	5	#4	4	5'-0"	17
Z6	4	#4	4	4'-4"	12
Z7	4	#4	4	3'-9"	10
Z8	4	#4	4	3'-1"	8

REINFORCING STEEL FOR 2 WINGS 660 LBS.

CLASS A CONCRETE
- 2 WINGS 9.9 C.Y.
- 2 HEADWALLS 3.0 C.Y.
- 2 END CURTAIN WALLS 1.9 C.Y.
- TOTAL 14.8 C.Y.

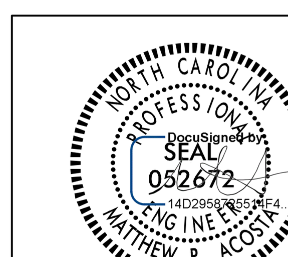


TYPICAL WING SECTION

PROJECT NO. BP10-C007

UNION COUNTY

STATION: 15+66.00 -L-



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

H = 7'-0" SLOPE = 2:1
60° SKEW

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1			3				TOTAL SHEETS
2			4				7

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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 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" 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.