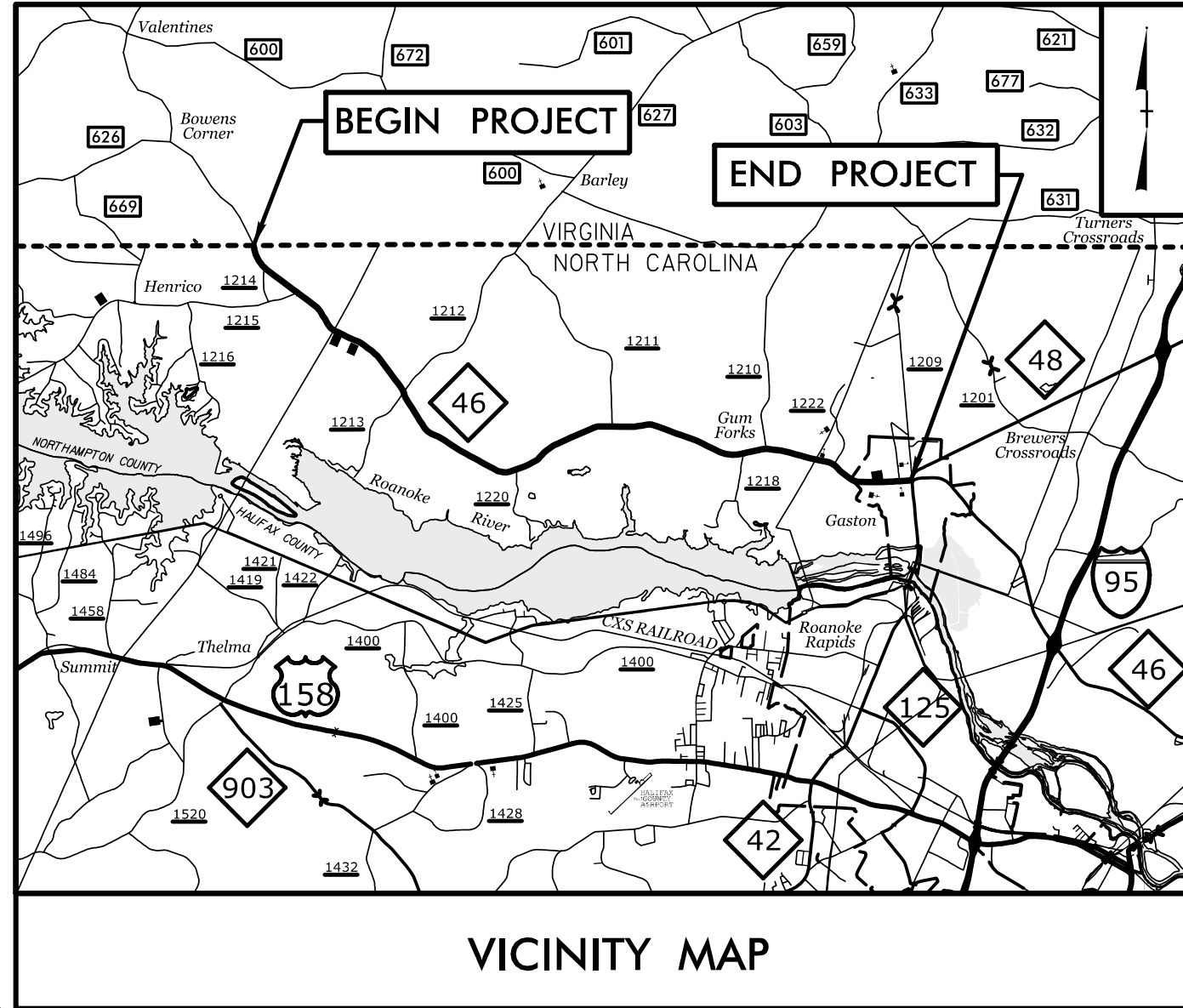


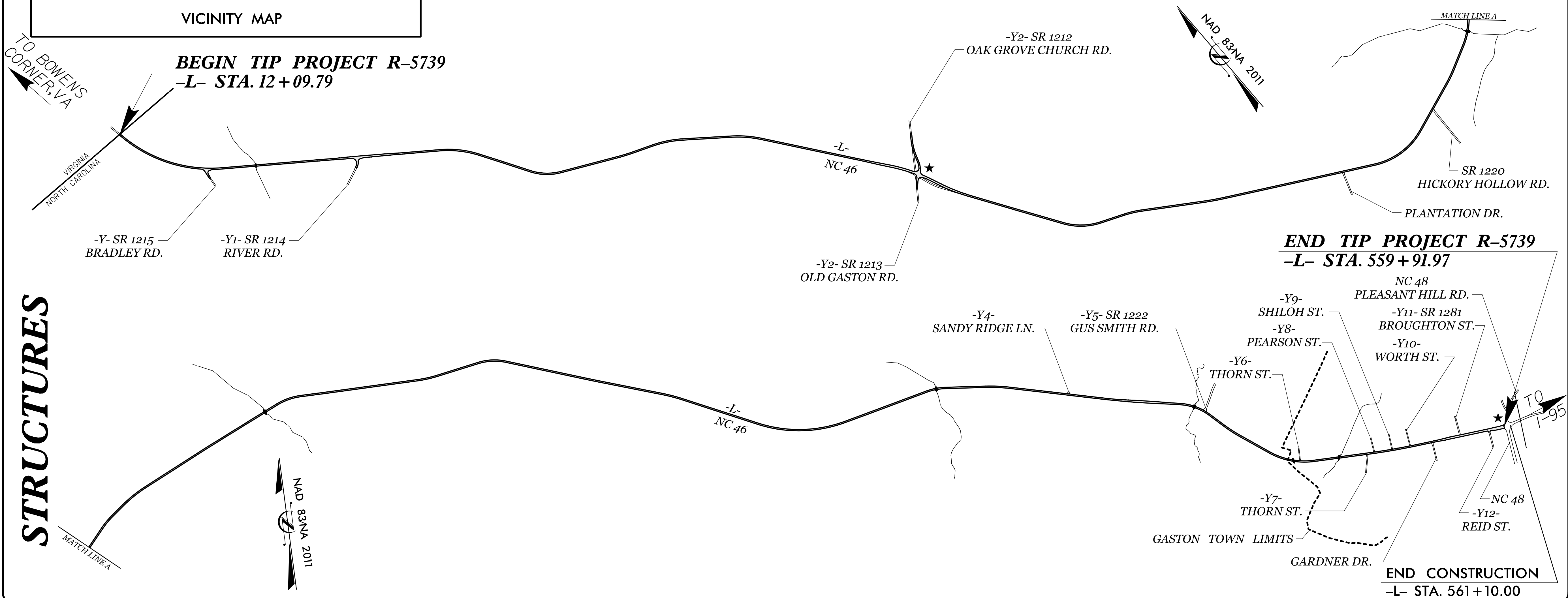
TIP PROJECT: R-5739

CONTRACT: C205034

STRUCTURES



VICINITY MAP



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NORTHAMPTON COUNTY

LOCATION: NC 46 FROM NC 48 IN GASTON TO THE VIRGINIA
STATE LINE UPGRADE AND WIDEN EXISTING FACILITY

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

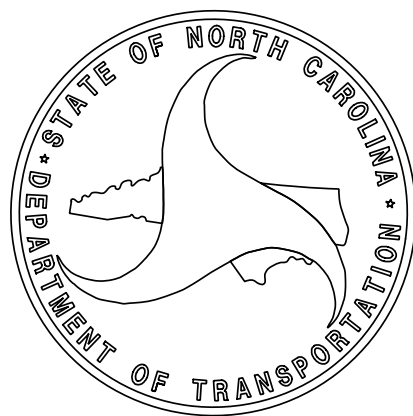
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5739		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
BP4.R033.1		PE	
BP4.R033.2		UTIL./RW	
BP4.R033.3		CONSTR.	

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

BEGIN TIP PROJECT R-5739
-L- STA. 12 + 09.79

END TIP PROJECT R-5739
-L- STA. 559 + 91.97

END CONSTRUCTION
-L- STA. 561 + 10.00



DESIGN DATA

ADT 2016 = 8,400
V = 40 TO 60 MPH**

FUNC CLASS =
PRINCIPAL ARTERIAL

R-R-R DESIGN

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5739 = 10.375 mile

TOTAL LENGTH TIP PROJECT R-5739 = 10.375 mile

Prepared For:
DIVISION OF HIGHWAYS
113 Airport Drive, Suite 100, Edenton, NC 27932



TGS ENGINEERS
706 HILLSBOROUGH ST
SUITE 200
RALEIGH, NC 27603

By:
PH (919) 773-8887
CORP. LICENSE NO.:
C-0275

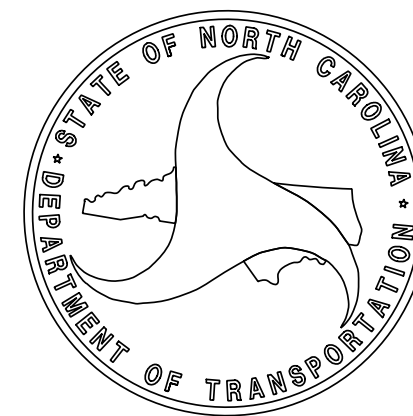
LETTING DATE:
OCTOBER 21, 2025

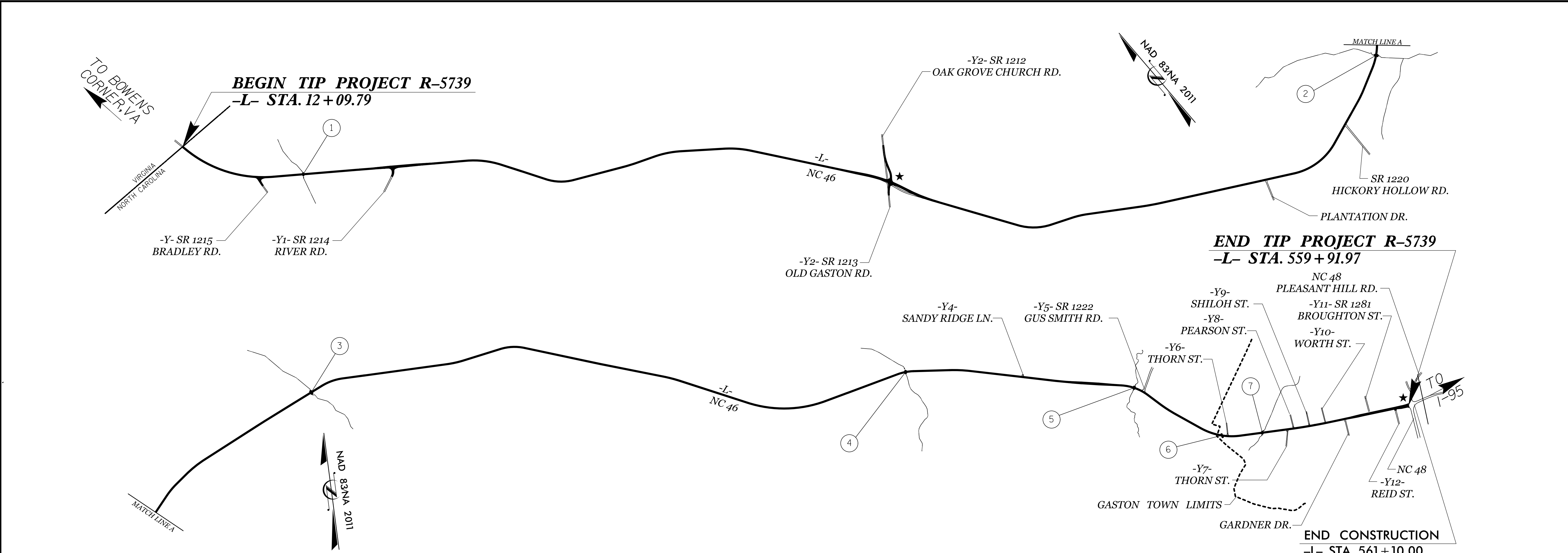
MARC CHEEK, PE
STRUCTURES DESIGN ENGINEER

STRUCTURES DESIGN
ENGINEER



7/23/2025





INDEX			
STR	STATION	DESCRIPTION	SHEET NUMBERS
1	38+74.00 -L-	SINGLE 3' X 7' RCBC LEFT EXTENSION SINGLE 3' X 5' RCBC RIGHT EXTENSION	C1-1 THRU C1-10
2	280+87.40 -L-	DOUBLE 6' X 7' RCBC LEFT & RIGHT EXTENSION	C2-1 THRU C2-9
3	324+27.00 -L-	DOUBLE 6' X 8' RCBC LEFT EXTENSION DOUBLE 6' X 9' RCBC RIGHT EXTENSION	C3-1 THRU C3-10
4	451+96.00 -L-	DOUBLE 6' X 9' RCBC LEFT & RIGHT EXTENSION	C4-1 THRU C4-9
5	499+65.60 -L-	DOUBLE 8' X 10' RCBC LEFT & RIGHT EXTENSION	C5-1 THRU C5-9
6	520+60.00 -L-	SINGLE 3' X 4' LEFT EXTENSION SINGLE 3' X 6' RIGHT EXTENSION	C6-1 THRU C6-11
7	529+01.60 -L-	SINGLE 6' X 8' RCBC LEFT EXTENSION SINGLE 6' X 9' RCBC RIGHT EXTENSION	C7-1 THRU C7-12

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS

706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

PROJECT NO. R-5739
NORTHAMPTON COUNTY

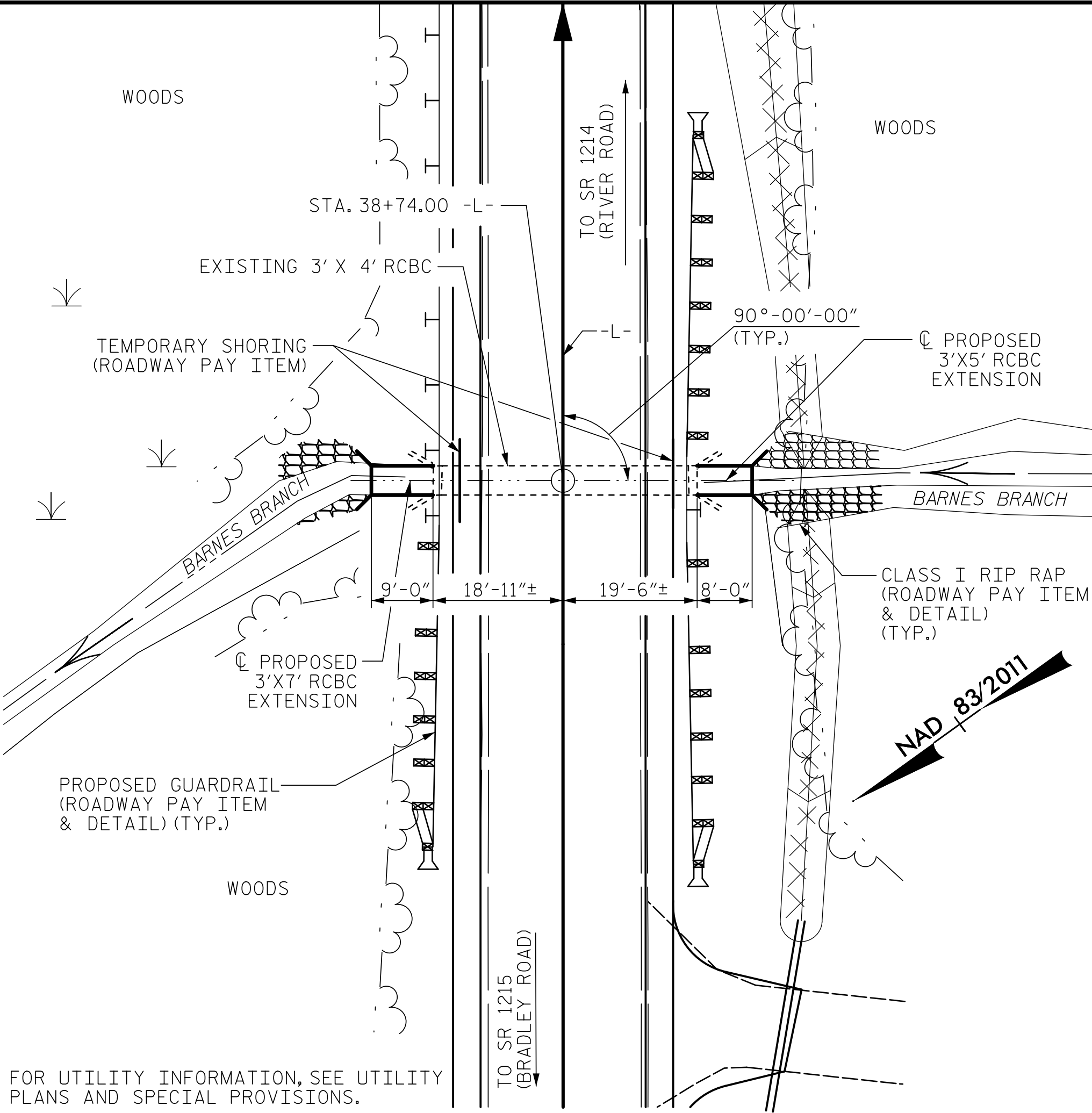
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STRUCTURE INDEX

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

DRAWN BY : ZCS DATE : 1/23
CHECKED BY : MGC DATE : 1/23

BENCH MARK: TBM "V": CHISLED X ON BOLT OF FIRE HYDRANT
43.73' RT OF STA. 28+97.43 -L-; ELEV. = 329.70



LOCATION SKETCH

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
LEFT EXTENSION	14.6	C.Y.
RIGHT EXTENSION	10.1	C.Y.
TOTAL	24.7	C.Y.
REINFORCING STEEL		
LEFT EXTENSION	1,195	LBS.
RIGHT EXTENSION	813	LBS.
TOTAL	2,008	LBS.
FOUNDATION COND. MAT'L.		
LEFT EXTENSION	5	TONS
RIGHT EXTENSION	5	TONS
TOTAL	10	TONS
CULVERT EXCAVATION	LUMP SUM	

ROADWAY DATA

GRADE POINT ELEV. @ STA. 38+74.00-L- = 302.71
BED ELEV. @ STA. 38+74.00-L- = 294.06
ROADWAY SLOPES = 2:1

HYDROGRAPHIC DATA

DESIGN DISCHARGE = 130 CFS
FREQUENCY OF DESIGN FLOOD = 50 YRS
DESIGN HIGH WATER ELEVATION = 300.7
DRAINAGE AREA = 0.13 SQ. MI.
BASE DISCHARGE (Q100) = 150 CFS
BASE HIGH WATER ELEVATION = 301.6

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 170 CFS
FREQUENCY OF OVERTOPPING FLOOD = 200± YRS
OVERTOPPING FLOOD ELEVATION = 302.6

NOTES:

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

DESIGN FILL----- 4.0' MAX.

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTES SHEET.

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

CONCRETE IN CULVERT TO BE POURED IN THE FOLLOWING ORDER:

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

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF 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 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.

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

EXCAVATE 1 FOOT BELOW CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS. FOUNDATION CONDITIONING MATERIAL SHOULD CONSIST OF SELECT MATERIAL CLASS V OR VI FOR RCBC.

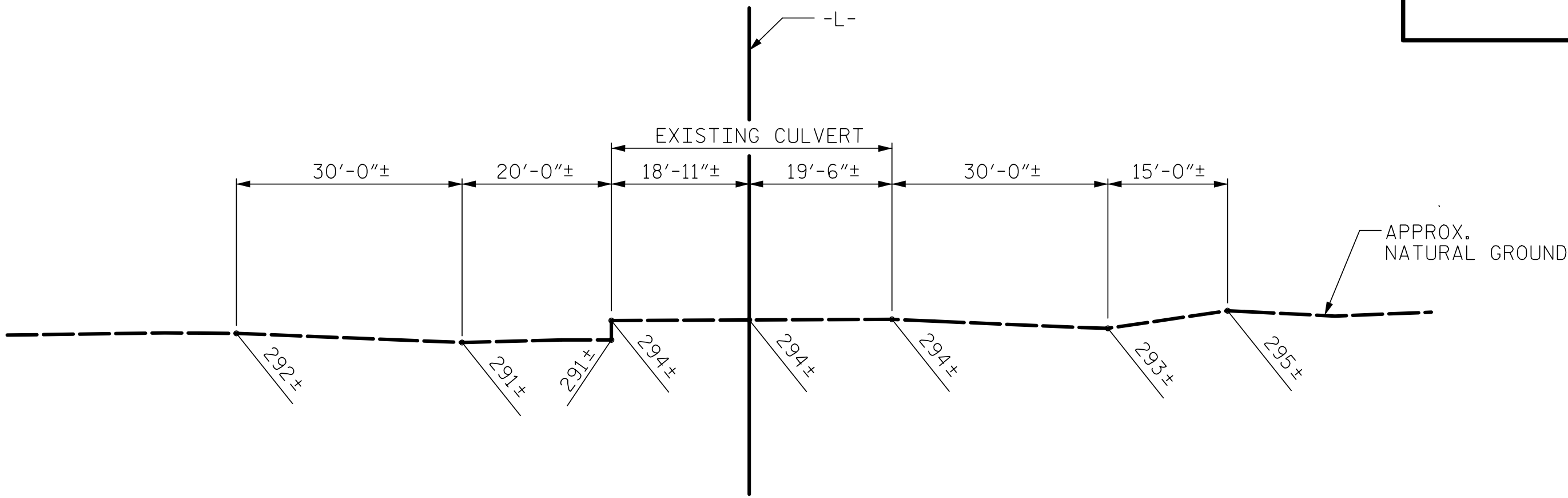
IF REQUIRED, UNDERCUT LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL.

FOR TRAFFIC PHASING, SEE TRAFFIC CONTROL PLANS.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSIONS SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

DOWELS SHALL BE USED TO CONNECT THE PROPOSED EXTENSIONS TO THE EXISTING CULVERT. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

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.



PROFILE ALONG CULVERT

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 38+74.00 -L-

SHEET 1 OF 10



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE
3' X 7' RCBC LEFT EXT.
&
3' X 5' RCBC RIGHT EXT.
90° SKEW

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

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

DRAWN BY : ZCS DATE : 4/22
CHECKED BY : MGC DATE : 7/22
DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

11/27/2023
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User:ZSmith

STR. #1

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11/29/2023
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User:ZSmith

DESIGN LOAD RATING FACTORS

NOTE:

COMMENTS:

- # 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

SHEET 2 OF 10

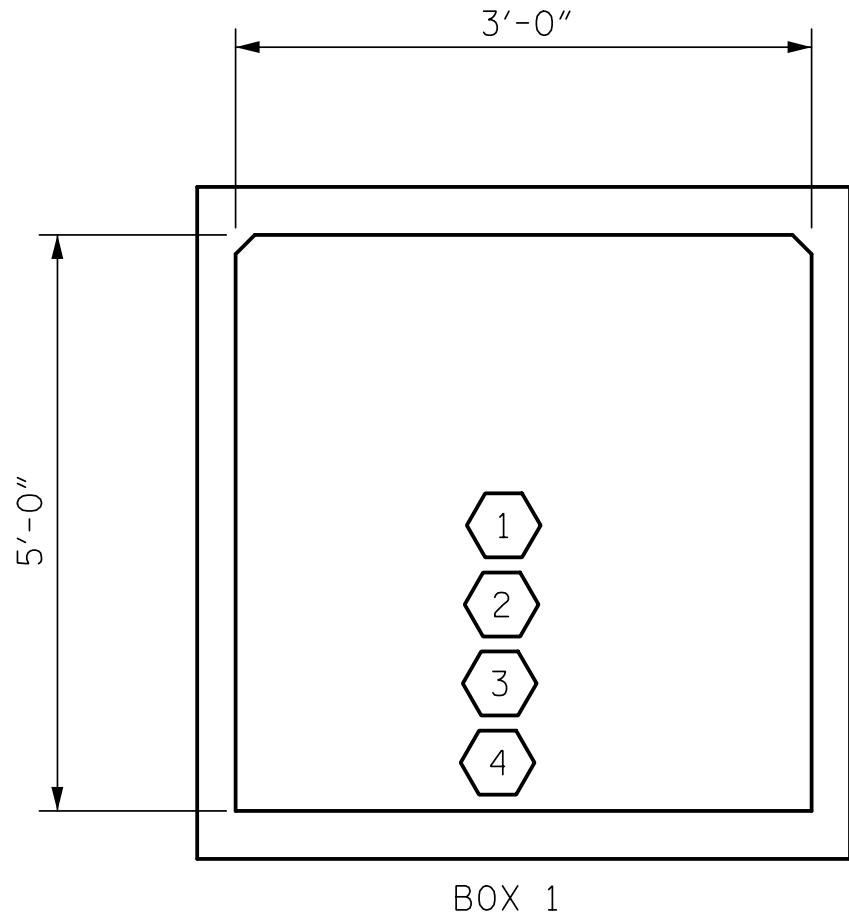
STR. #1

STD. NO. LRFR5

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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
						γ_{LL} 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	2.16	--	1.75	2.16	1	BOTT. SLAB	1.83	5.32	1	BOTT. SLAB	0.87	
	HL-93 (OPERATING)	N/A		2.81	--	1.35	2.81	1	BOTT. SLAB	1.83	6.90	1	BOTT. SLAB	0.87	
	HS-20 (INVENTORY)	36.000	2	2.79	100.44	1.75	2.79	1	BOTT. SLAB	1.83	6.86	1	BOTT. SLAB	0.87	
	HS-20 (OPERATING)	36.000		3.62	130.32	1.35	3.62	1	BOTT. SLAB	1.83	8.89	1	BOTT. SLAB	0.87	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		3.94	53.19	1.40	3.94	1	BOTT. SLAB	1.83	9.68	1	BOTT. SLAB	0.87	
		SNGARBS2		3.68	73.60	1.40	3.68	1	BOTT. SLAB	1.83	9.06	1	BOTT. SLAB	0.87	
		SNAGRIS2		3.94	86.68	1.40	3.94	1	BOTT. SLAB	1.83	9.68	1	BOTT. SLAB	0.87	
		SNCOTTS3	3	3.35	91.29	1.40	3.35	1	BOTT. SLAB	1.83	8.23	1	BOTT. SLAB	0.87	
		SNAGGRS4		4.17	145.64	1.40	4.17	1	BOTT. SLAB	1.83	10.19	1	BOTT. SLAB	0.87	
		SNS5A		4.96	176.33	1.40	4.96	1	TOP SLAB	1.83	13.04	1	TOP SLAB	0.87	
		SNS6A		3.88	155.01	1.40	3.88	1	BOTT. SLAB	1.83	9.50	1	BOTT. SLAB	0.87	
		SNS7B		3.88	162.96	1.40	3.88	1	BOTT. SLAB	1.83	9.50	1	BOTT. SLAB	0.87	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3		3.94	130.02	1.40	3.94	1	BOTT. SLAB	1.83	9.68	1	BOTT. SLAB	0.87	
		TNT4A		3.99	131.97	1.40	3.99	1	BOTT. SLAB	1.83	9.80	1	BOTT. SLAB	0.87	
		TNT6A		3.88	161.41	1.40	3.88	1	BOTT. SLAB	1.83	9.52	1	BOTT. SLAB	0.87	
		TNT7A		3.94	165.48	1.40	3.94	1	BOTT. SLAB	1.83	9.66	1	BOTT. SLAB	0.87	
		TNT7B		3.88	162.96	1.40	3.88	1	BOTT. SLAB	1.83	9.50	1	BOTT. SLAB	0.87	
		TNAGRIT4		3.94	169.42	1.40	3.94	1	BOTT. SLAB	1.83	9.68	1	BOTT. SLAB	0.87	
		TNAGT5A		3.94	177.30	1.40	3.94	1	BOTT. SLAB	1.83	9.68	1	BOTT. SLAB	0.87	
		TNAGT5B		3.99	179.55	1.40	3.99	1	BOTT. SLAB	1.83	9.80	1	BOTT. SLAB	0.87	
EMERGENCY VEHICLE (EV)	EV2	28.750	4	2.78	79.93	1.30	2.78	1	BOTT. SLAB	1.83	6.84	1	BOTT. SLAB	0.87	
	EV3	43.000		2.91	125.13	1.30	2.91	1	BOTT. SLAB	1.83	7.15	1	BOTT. SLAB	0.87	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

ASSEMBLED BY :	STM	DATE :	07/23
CHECKED BY :	MGC	DATE :	11/23
DRAWN BY :	WMC	7/11	REV. 10/1/11
CHECKED BY :	GM	7/11	REV. 12/1/17
			MAA/GM
			REV. 04/23
			MAA/THC
			BNB/AAI

11/23/2023
X:\NCDOT\NR-5739\Structures\Str. #1 (38 + 74.00 -L-)\Final Plans\DGNs\411.001.R-5739.SMU.C1-3.dgn
User:z2Smith

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:
1.
2.
3.
4.

⬡ CONTROLLING LOAD RATING

⬡1 DESIGN LOAD RATING (HL-93)

⬡2 DESIGN LOAD RATING (HS-20)

⬡3 LEGAL LOAD RATING **

⬡4 EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 38+74.00 -L-

SHEET 3 OF 10

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

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

7/23/2025

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UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS

706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

NO. 1

BY: [Signature]

DATE: 7/23/2025

NO. 2

BY: [Signature]

DATE: 7/23/2025

NO. 3

BY: [Signature]

DATE: 7/23/2025

NO. 4

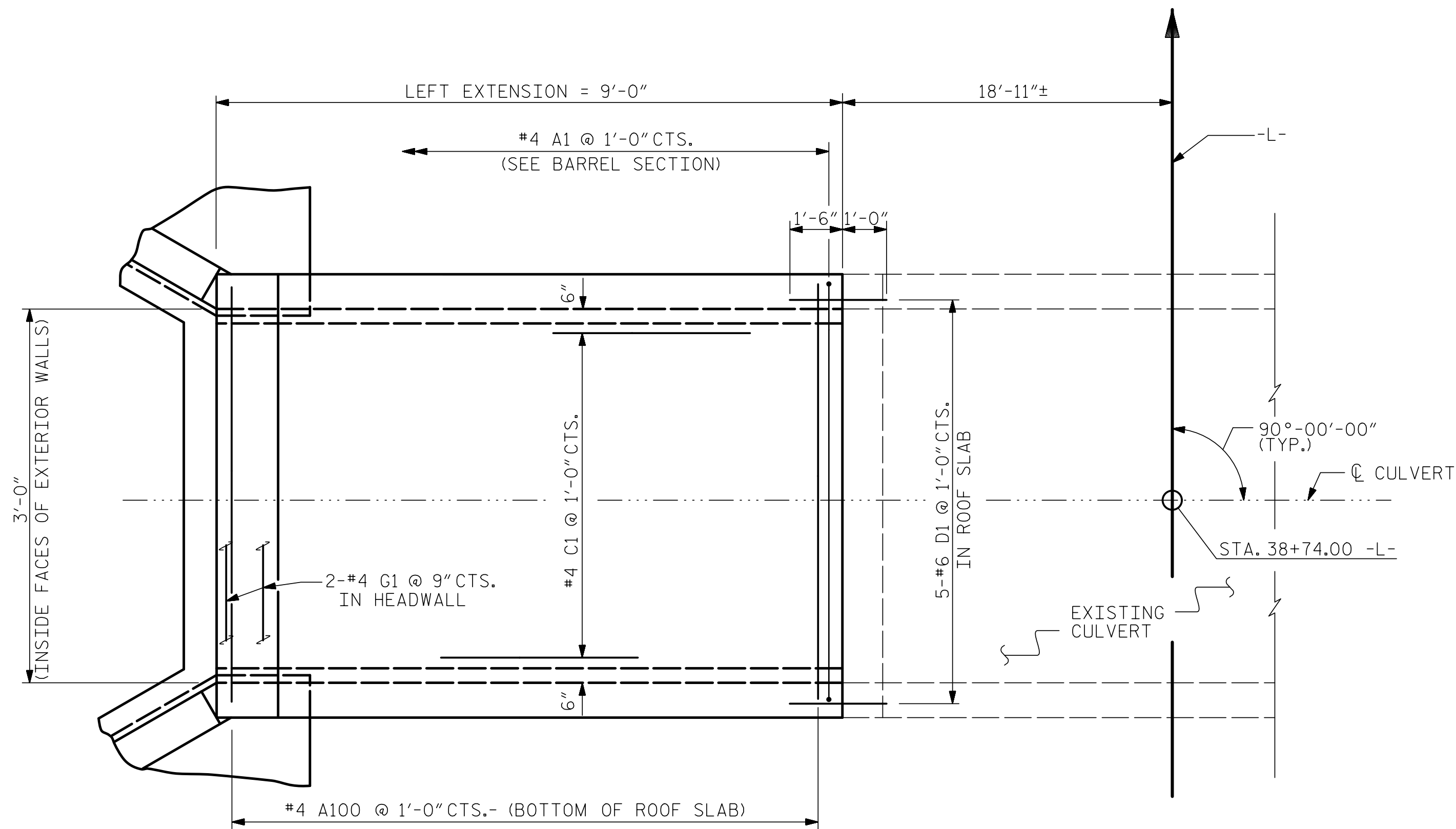
BY: [Signature]

DATE: 7/23/2025

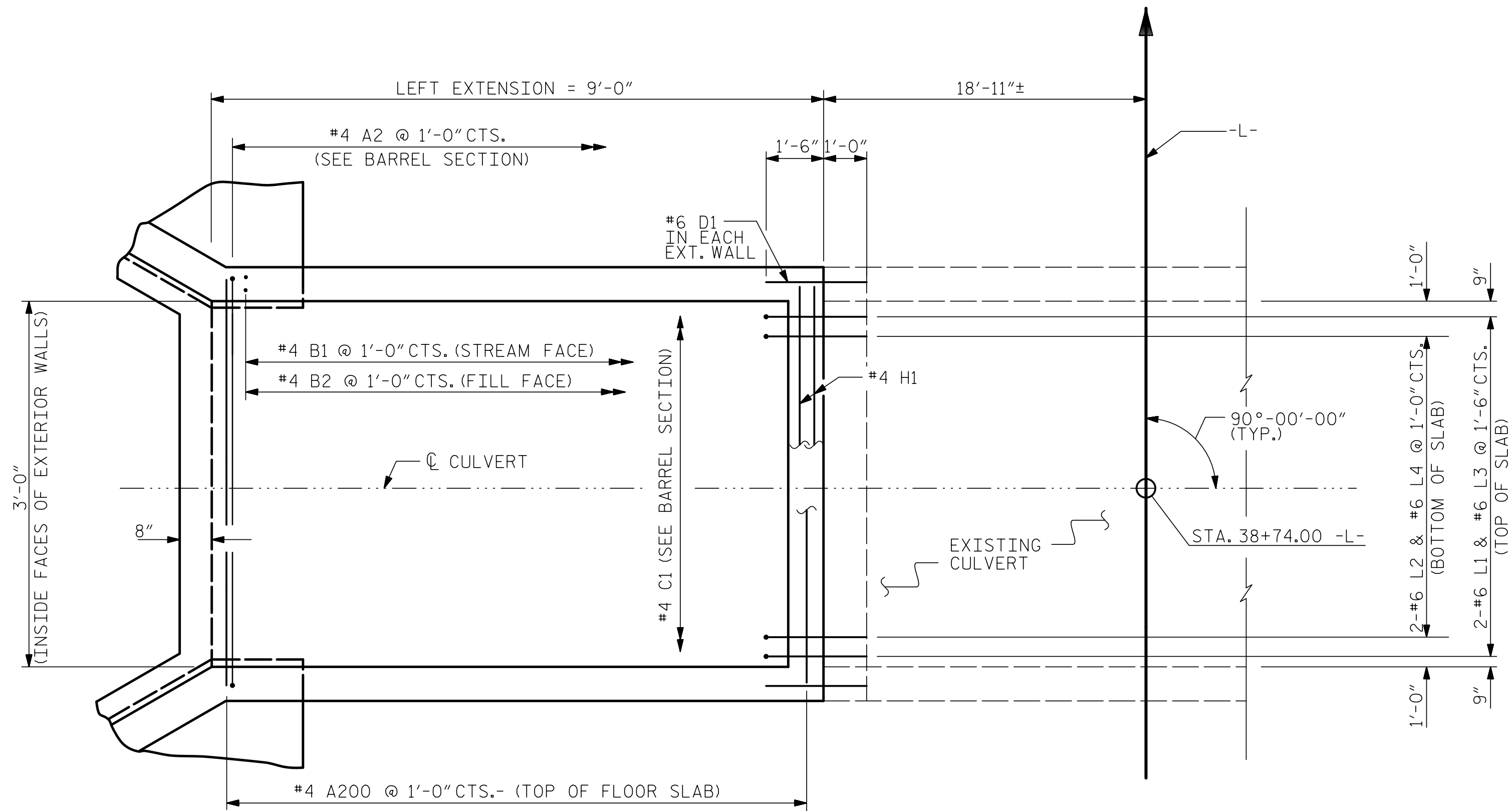
SHEET NO. C1-3

TOTAL SHEETS 10

STR. #1 STD. NO. LRFR5



PLAN ROOF SLAB



PLAN FLOOR SLAB

FOR S1 BARS IN FLOOR SLAB & FOOTING, SEE WING SHEET

DRAWN BY :	ZCS	DATE :	4/22
CHECKED BY :	MGC	DATE :	7/22
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

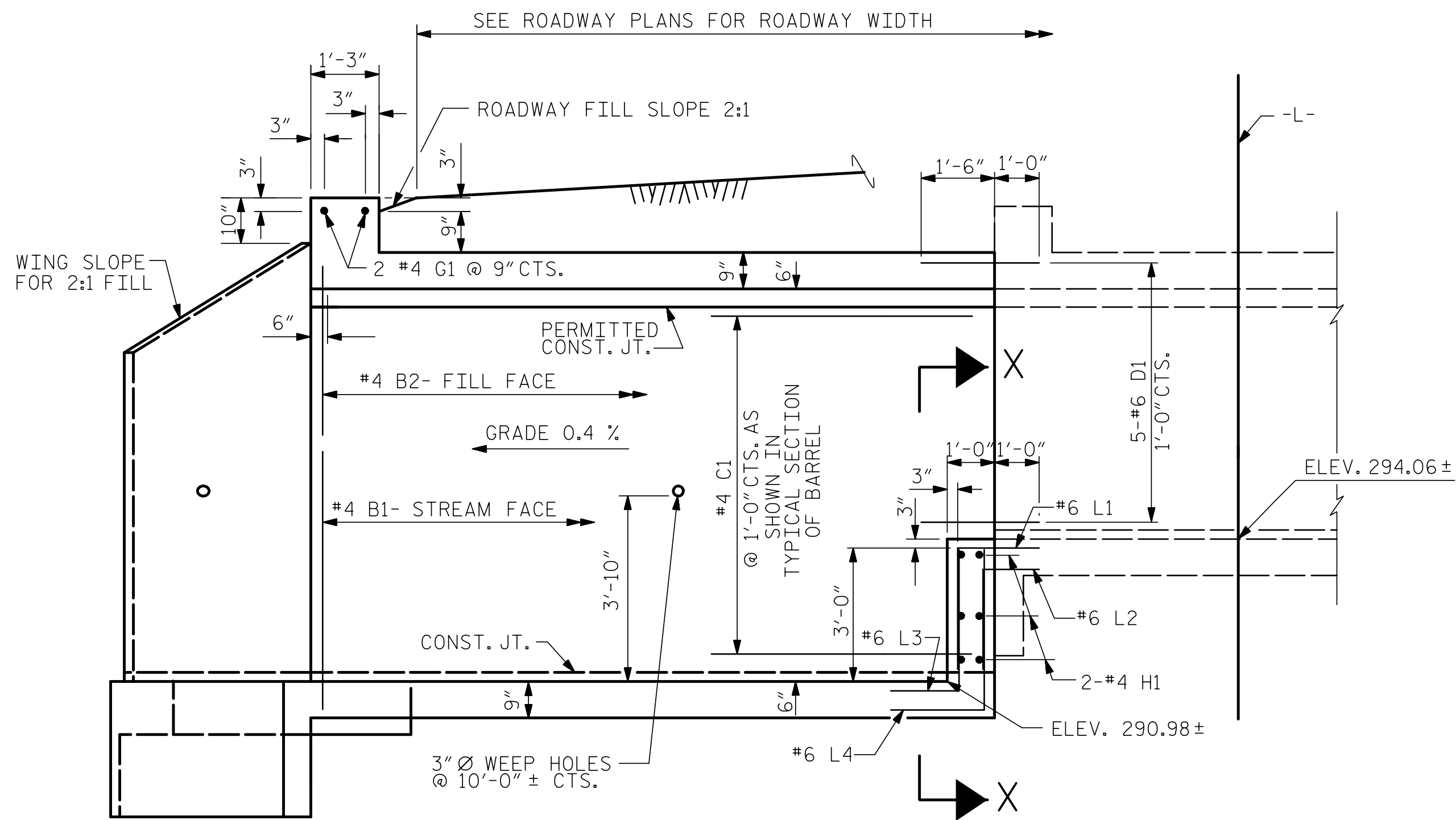
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User:ZSmith

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 38+74.00 -L-

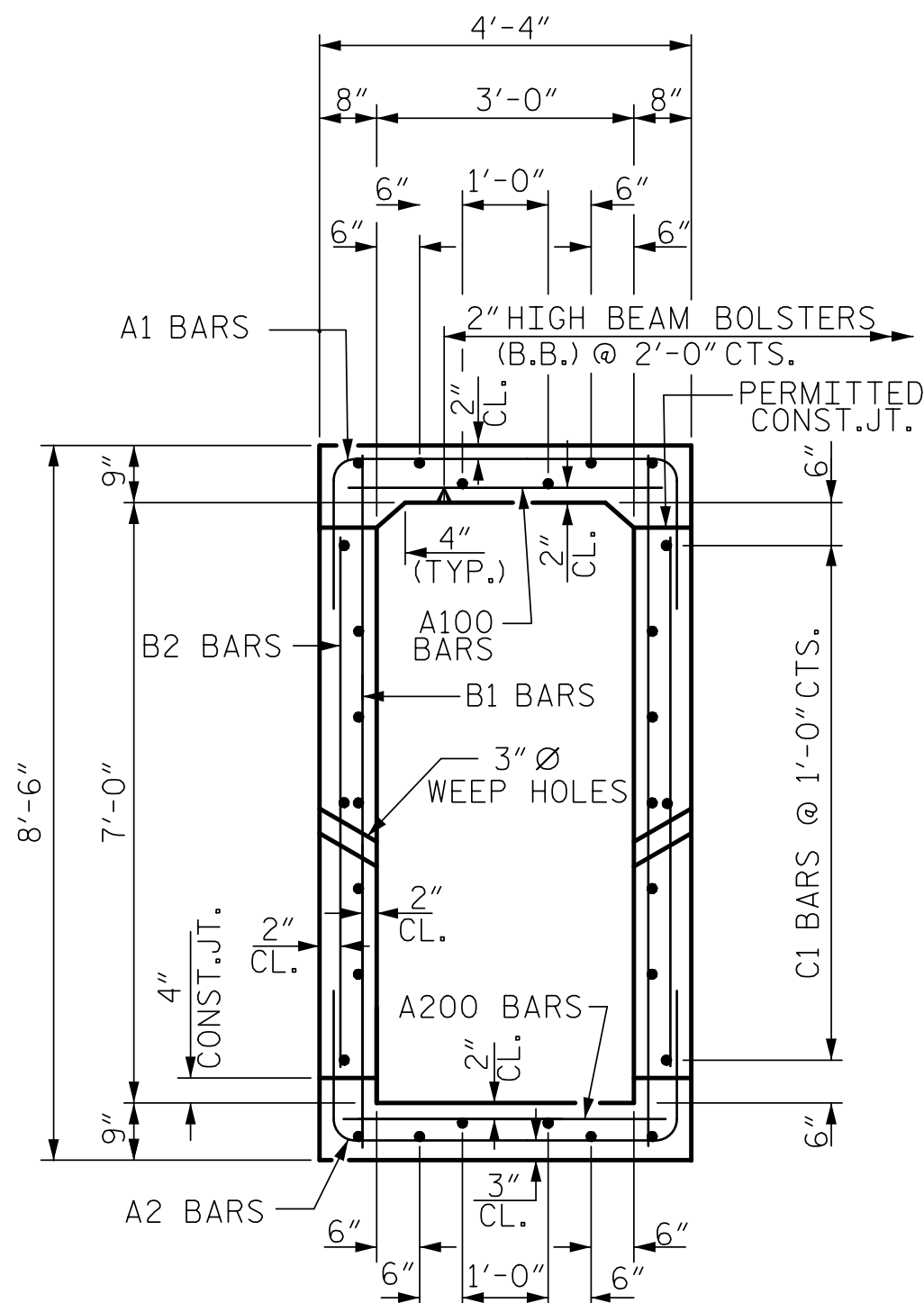
SHEET 4 OF 10

		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH																							
		SINGLE 3 FT. X 7 FT. CONCRETE BOX CULVERT 90° SKEW LEFT EXTENSION																							
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275		REVISIONS <table border="1"> <thead> <tr> <th>NO.</th> <th>BY:</th> <th>DATE:</th> <th>NO.</th> <th>BY:</th> <th>DATE:</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td></td> <td>3</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> </tr> </tbody> </table>						NO.	BY:	DATE:	NO.	BY:	DATE:	1			3			2			4		
NO.	BY:	DATE:	NO.	BY:	DATE:																				
1			3																						
2			4																						
		SHEET NO. C1-4 TOTAL SHEETS 10																							

STR. #1

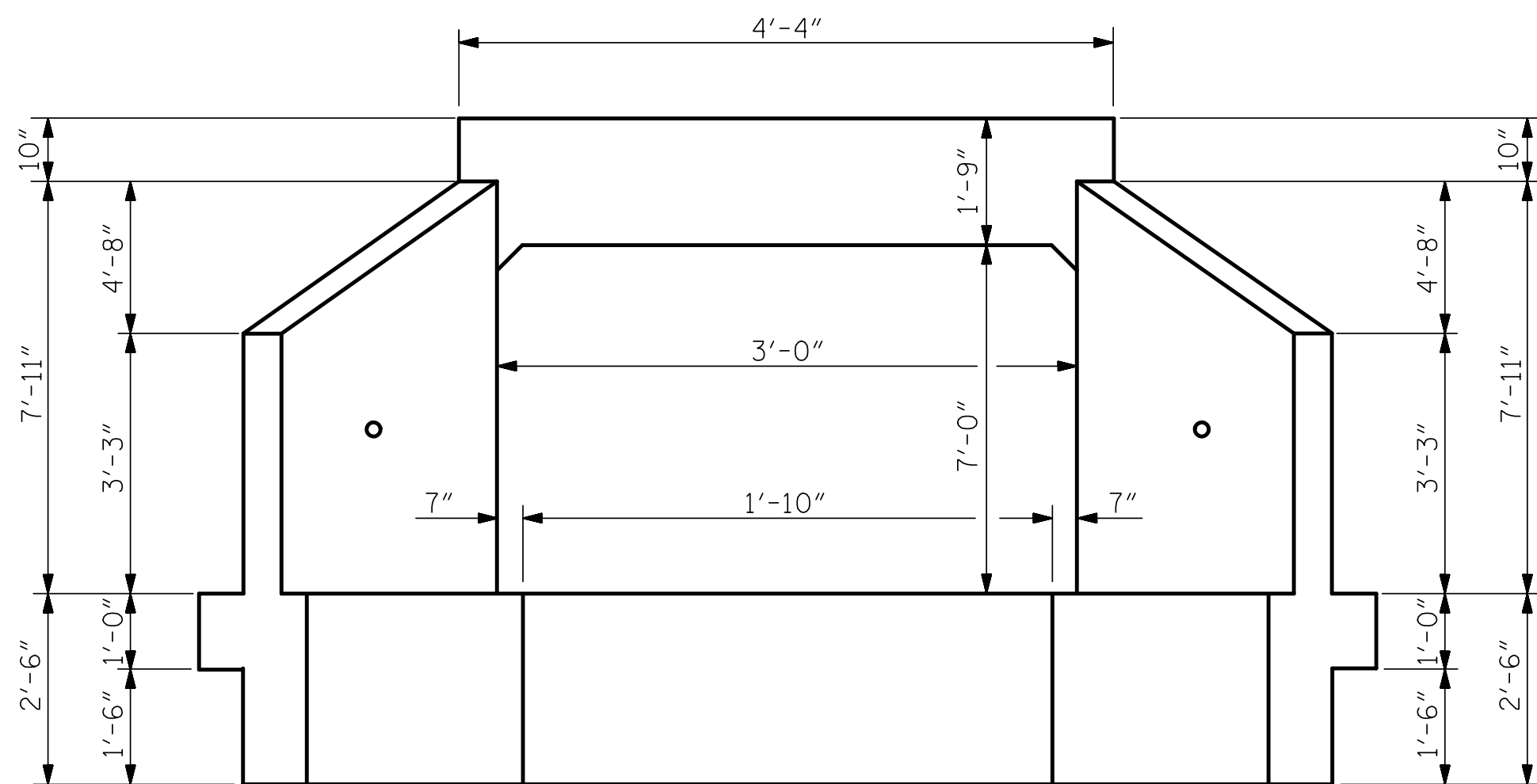


CULVERT SECTION NORMAL TO ROADWAY



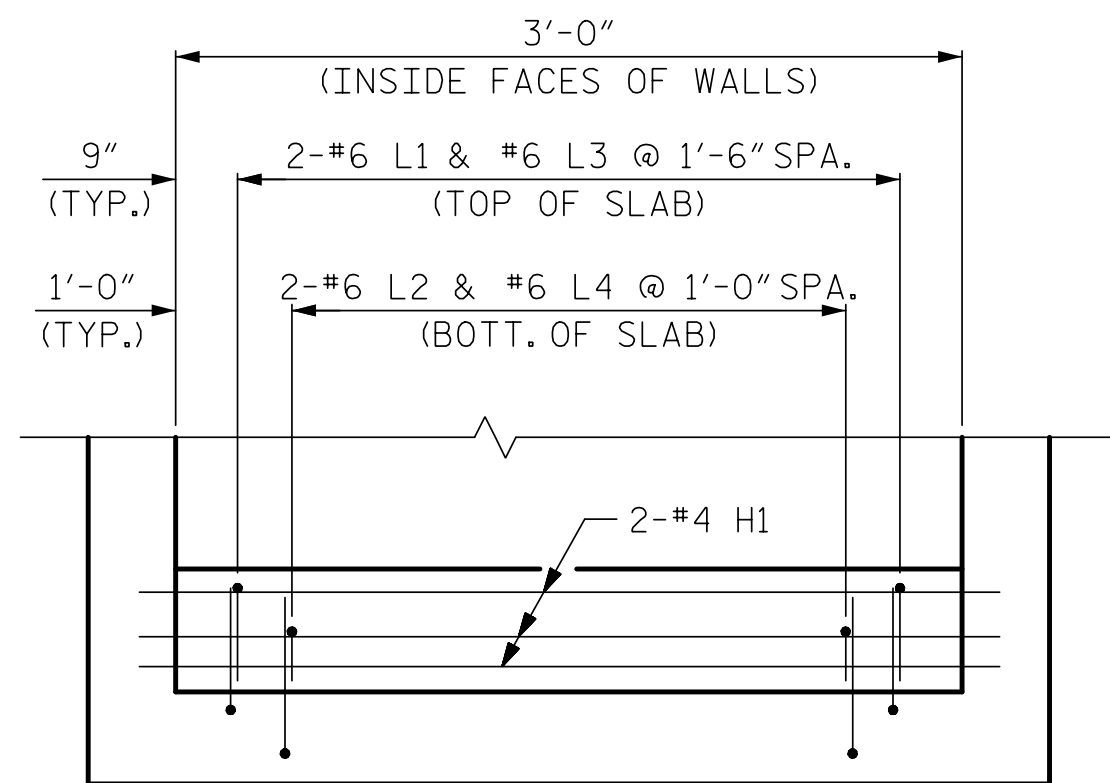
RIGHT ANGLE SECTION OF BARREL

THERE ARE 28 "C" BARS IN SECTION OF BARREL



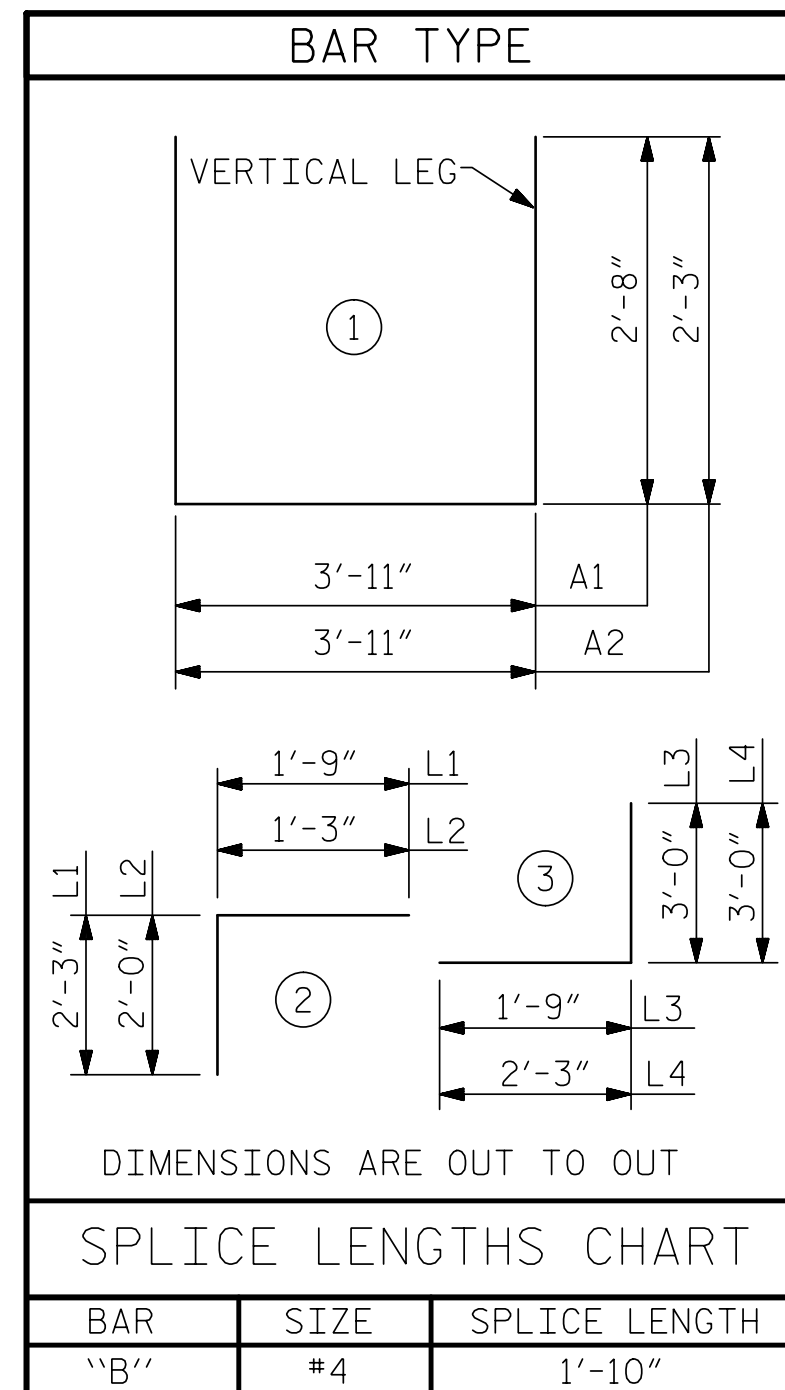
OUTLET END ELEVATION

LEFT EXTENSION QUANTITIES			
CLASS A CONCRETE			
BARREL @	0.591	CY/FT	5.3 C.Y.
WINGS, ETC.			8.9 C.Y.
SILL			0.1 C.Y.
BOTTOM SLAB STEP			0.3 C.Y.
TOTAL			14.6 C.Y.
REINFORCING STEEL			
BARREL & SILL			623 LBS.
WINGS, ETC.			572 LBS.
TOTAL			1,195 LBS.
CULVERT EXCAVATION		LUMP SUM	
FOUNDATION COND. MAT'L.		5 TONS	



SECTION X-X

LEFT EXTENSION BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	9	#4	STR	3'-11"	24
A200	9	#4	STR	3'-11"	24
A1	9	#4	1	9'-3"	56
A2	9	#4	1	8'-5"	51
B1	18	#4	STR	8'-1"	97
B2	18	#4	STR	6'-4"	76
C1	28	#4	STR	8'-8"	162
D1	15	#6	STR	2'-6"	56
D2	2	#6	STR	1'-4"	4
G1	2	#4	STR	3'-11"	5
H1	6	#4	STR	3'-11"	16
L1	2	#6	2	4'-0"	12
L2	2	#6	2	3'-3"	10
L3	2	#6	3	4'-9"	14
L4	2	#6	3	5'-3"	16
REINFORCING STEEL					623 LBS



PROJECT NO. R-5739

NORTHAMPTON COUNTY

STATION: 38+74.00 -L-

SHEET 5 OF 10



7/23/2025

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

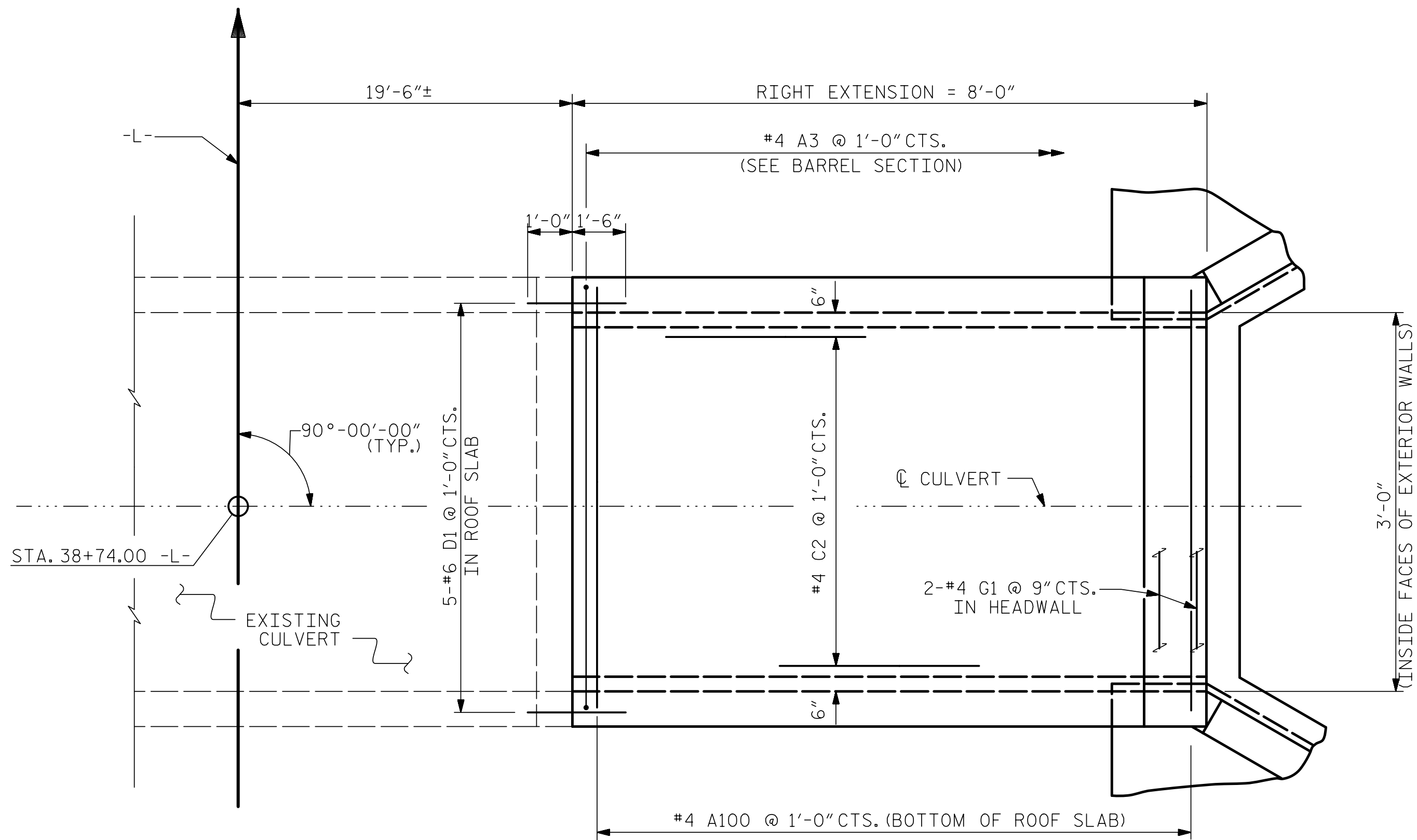
SINGLE 3 FT. X 7 FT.
CONCRETE BOX CULVERT
90° SKEW
LEFT EXTENSION

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

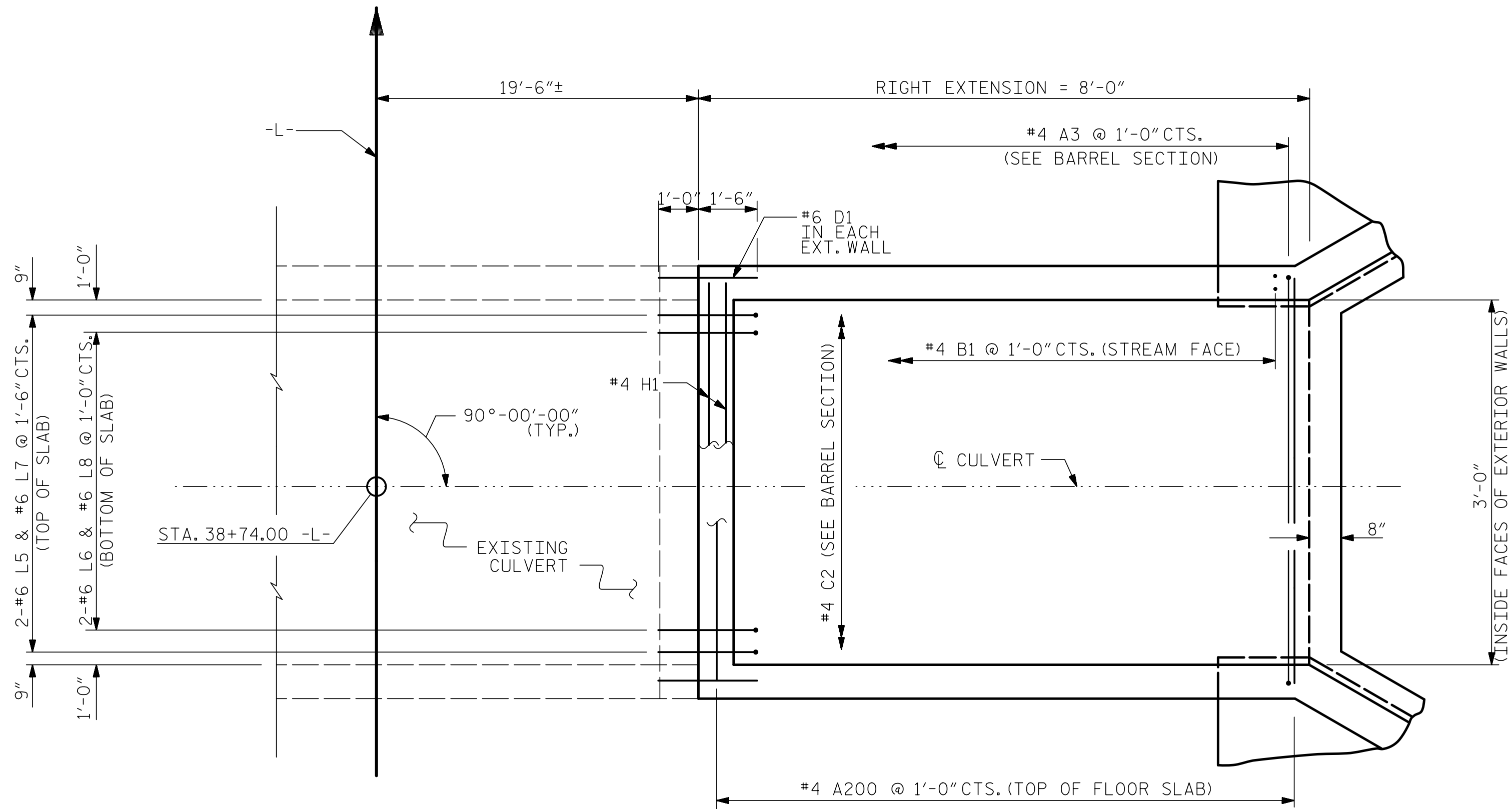
STR, #1

DRAWN BY :	ZCS	DATE :	4/22
CHECKED BY :	MGC	DATE :	7/22
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

11/27/2023
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User:z2sm1h



PLAN ROOF SLAB



PLAN FLOOR SLAB

FOR S1 BARS IN FLOOR SLAB & FOOTING, SEE WING SHEET

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 38+74.00 -L-

SHEET 6 OF 10



7/23/2025

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SUITE 200
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PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 3 FT. X 5 FT.
CONCRETE BOX CULVERT
90° SKEW
RIGHT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C1-6
2			4			TOTAL SHEETS 10

DRAWN BY : ZCS DATE : 4/22
CHECKED BY : MGC DATE : 7/22
DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

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User:ZSmith

STR. #1



RIGHT EXTENSION QUANTITIES

CLASS A CONCRETE		
BARREL @	0.492	CY/FT
	3.9	C.Y.
WINGS, ETC.	6.0	C.Y.
SILL	0.1	C.Y.
BOTTOM SLAB STEP	0.1	C.Y.
TOTAL	10.1	C.Y.

REINFORCING STEEL		
BARREL & SILL	475	LBS.
WINGS, ETC.	338	LBS.
TOTAL	813	LBS.

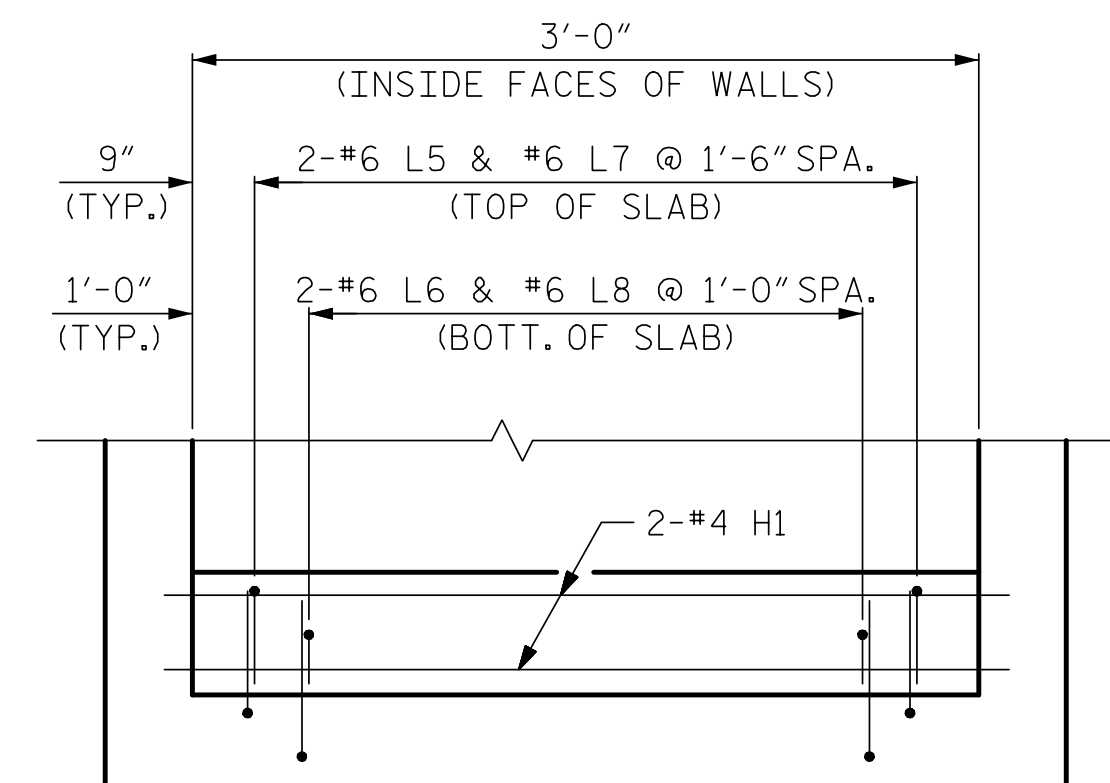
CULVERT EXCAVATION	LUMP SUM
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FOUNDATION COND. MAT'L.	5 TONS
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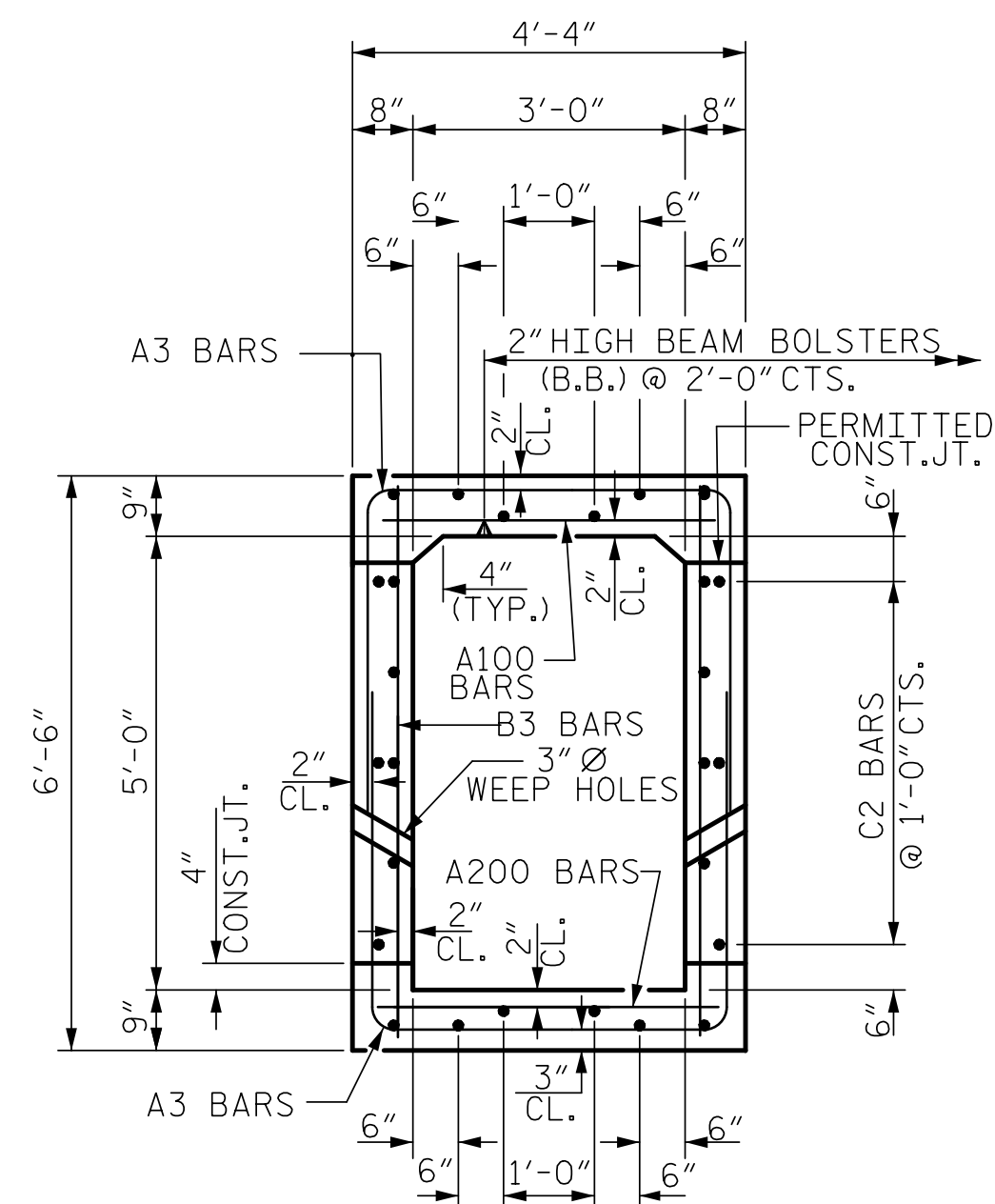
RIGHT EXTENSION
BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	8	#4	STR	3'-11"	21
A200	8	#4	STR	3'-11"	21
A3	16	#4	1	11'-9"	126
B3	16	#4	STR	6'-2"	66
C2	26	#4	STR	7'-8"	133
D1	15	#6	STR	2'-6"	56
D2	2	#6	STR	1'-4"	4
G1	2	#4	STR	3'-11"	5
H1	4	#4	STR	3'-11"	10
L5	2	#6	2	2'-9"	8
L6	2	#6	2	2'-5"	7
L7	2	#6	3	2'-9"	8
L8	2	#6	3	3'-5"	10

REINFORCING STEEL	475 LBS
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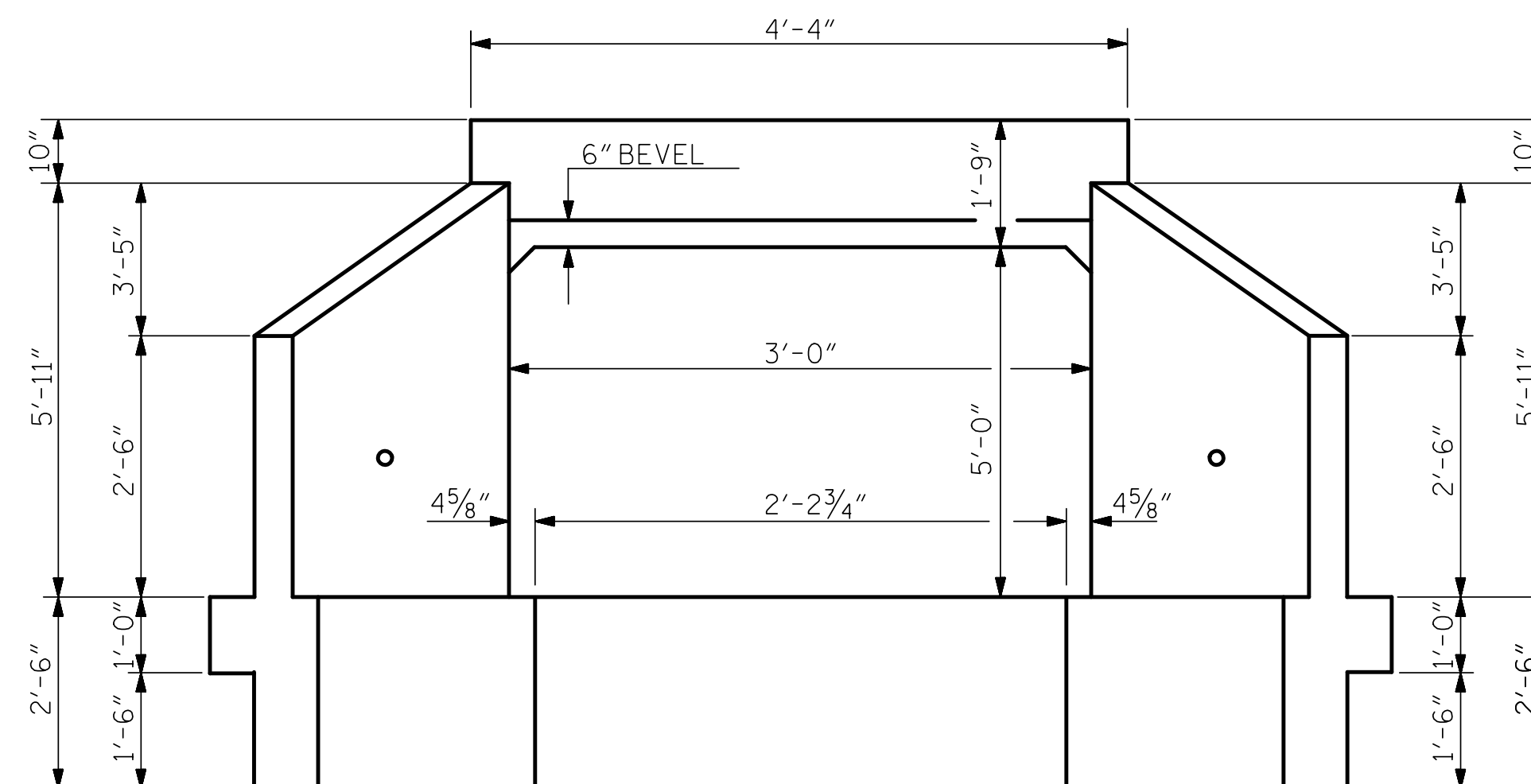


SECTION X-X

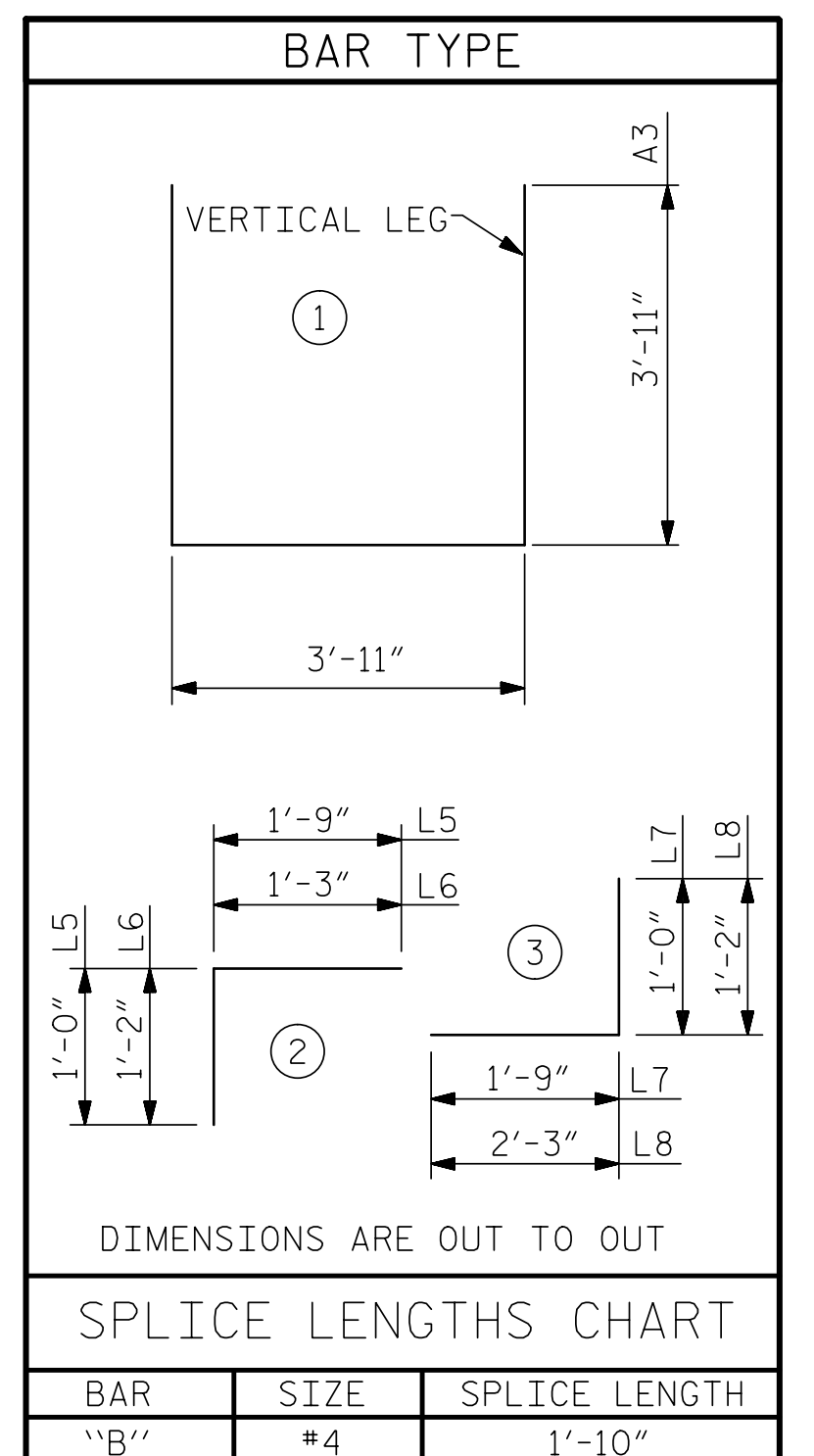


RIGHT ANGLE SECTION OF BARREL

THERE ARE 26 "C" BARS IN SECTION OF BARREL

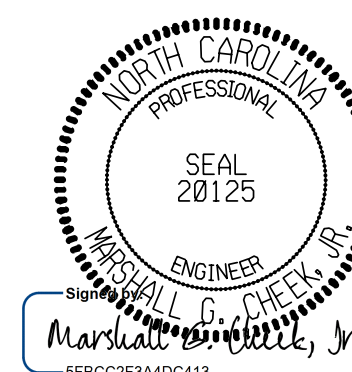


INLET END ELEVATION



PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 38+74.00 -L-

SHEET 7 OF 10



7/23/2025

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 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 3 FT. X 5 FT.
CONCRETE BOX CULVERT
90° SKEW
RIGHT EXTENSION

ID	REVISIONS						SHEET NO.
	NO.	BY:	DATE:	NO.	BY:	DATE:	C1-7
	1			3			TOTAL SHEETS
75	2			4			10

STR. #1

DRAWN BY :	ZCS	DATE :	4/22
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DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

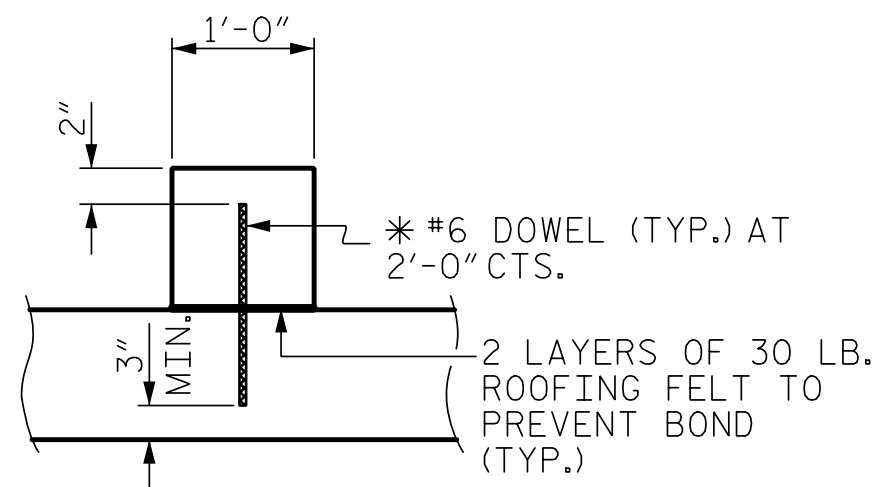
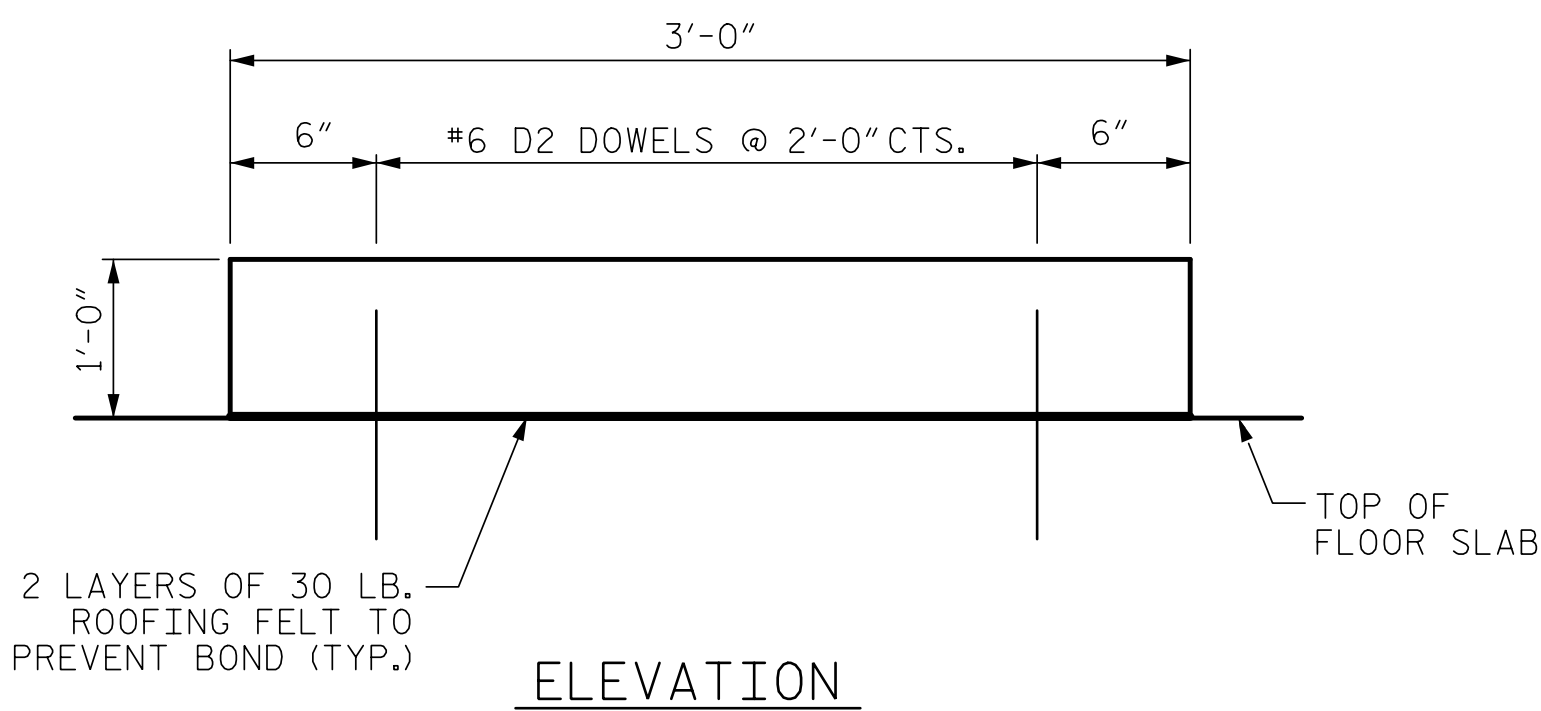
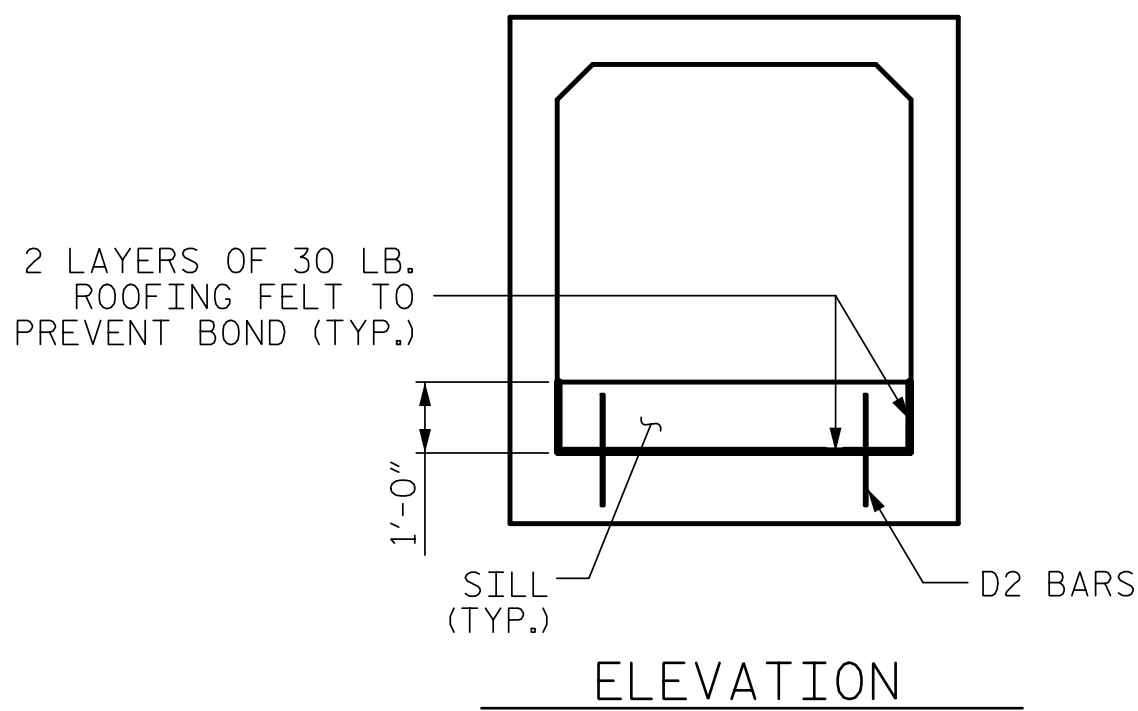
11/27/2023
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User:ZSmith

NOTES

MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT EXTENSIONS. BED MATERIAL MAY BE SUPPLEMENTED WITH CLASS B RIP RAP AS NECESSARY. NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

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

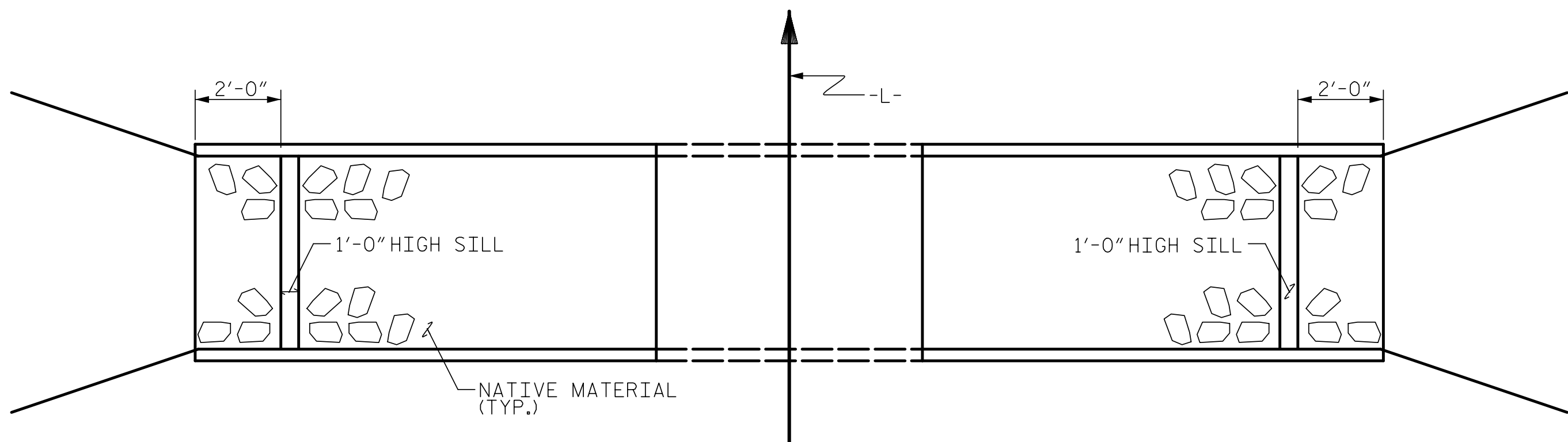
THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



SECTION THROUGH SILL

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

SILL DETAILS



PROJECT NO. R-5739

NORTHAMPTON COUNTY

STATION: 38+74.00 -L-

SHEET 8 OF 10



7/23/2025

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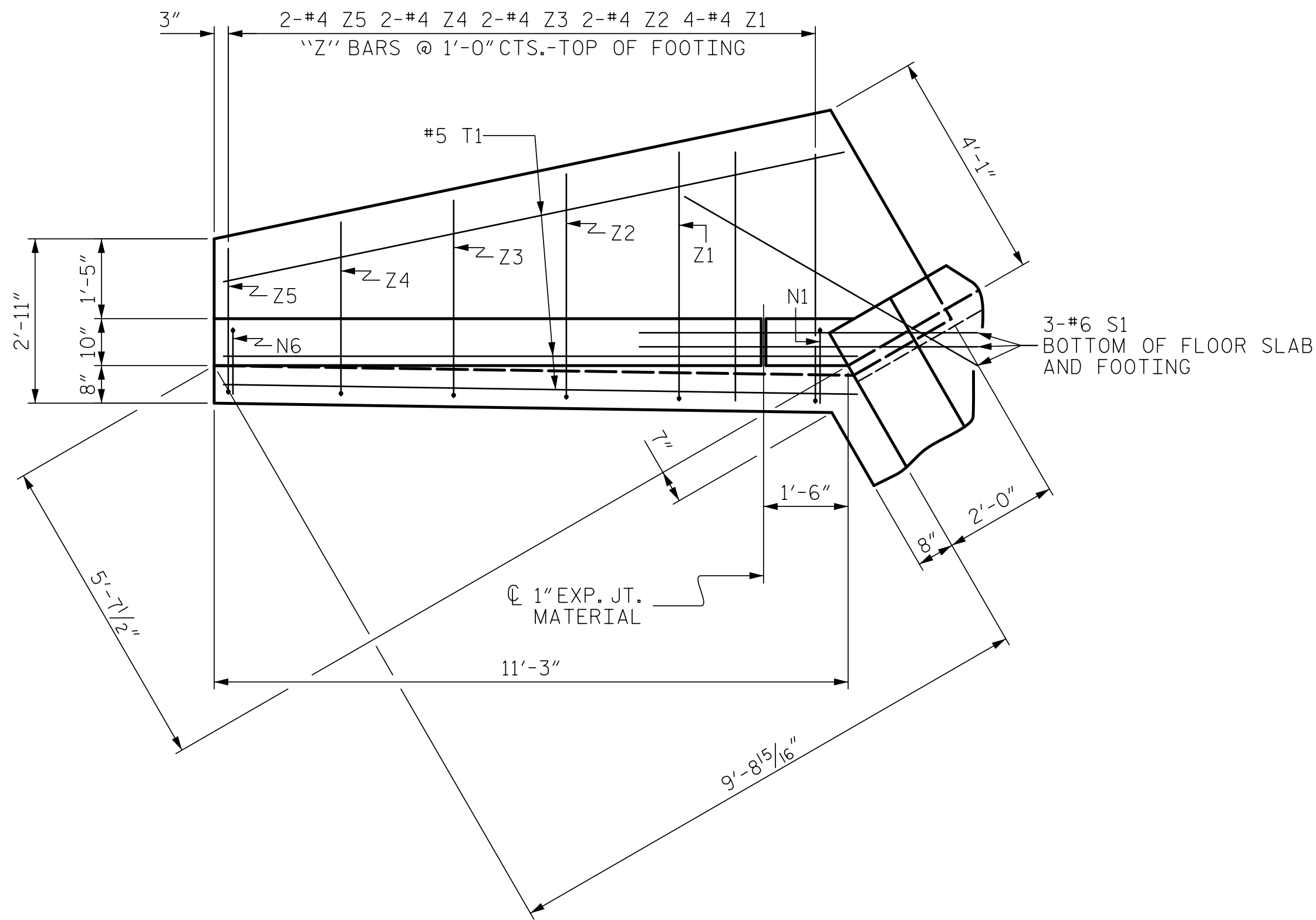
LEFT & RIGHT
EXTENSION SILLS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-8
1			3			TOTAL SHEETS
2			4			10

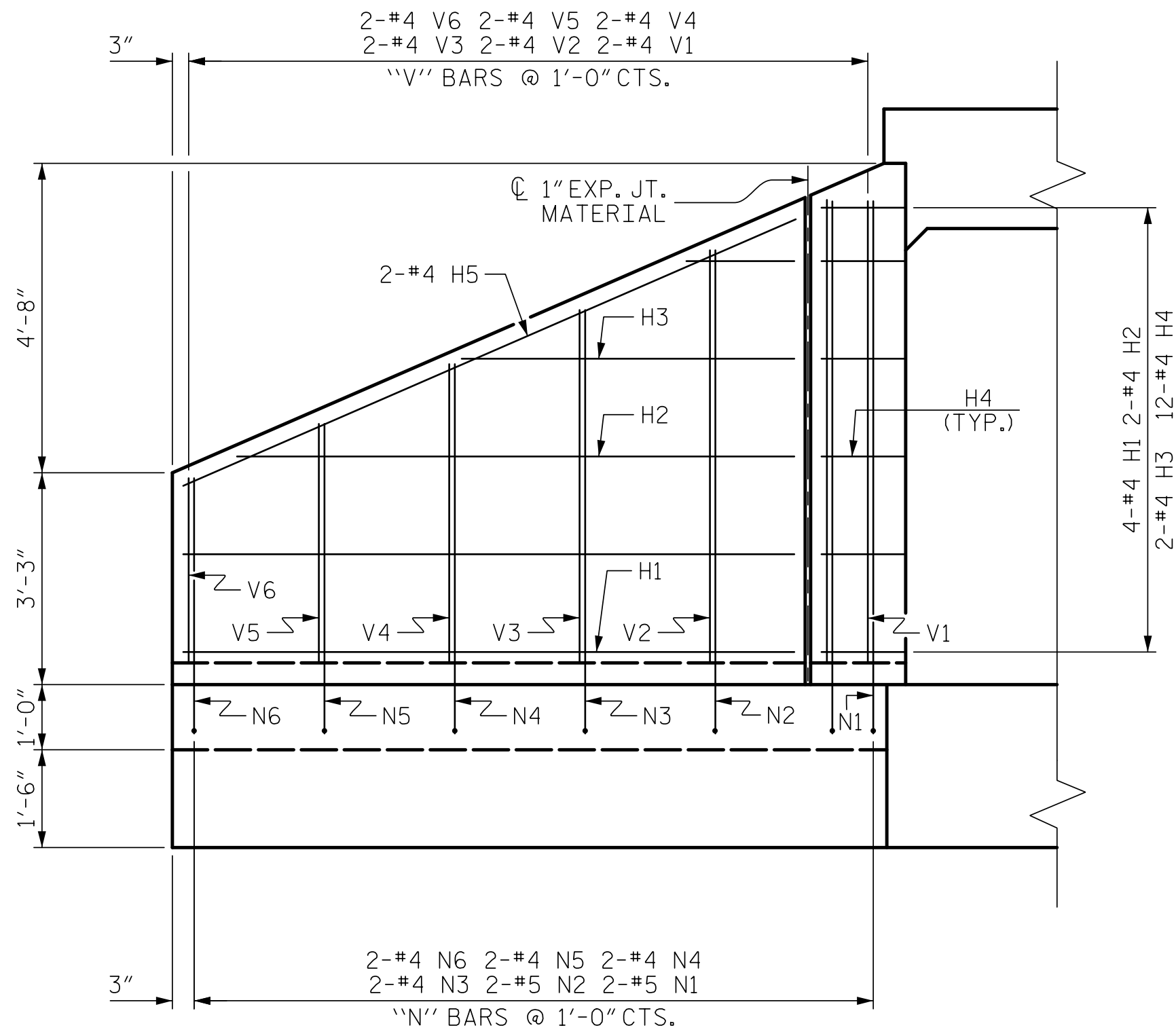
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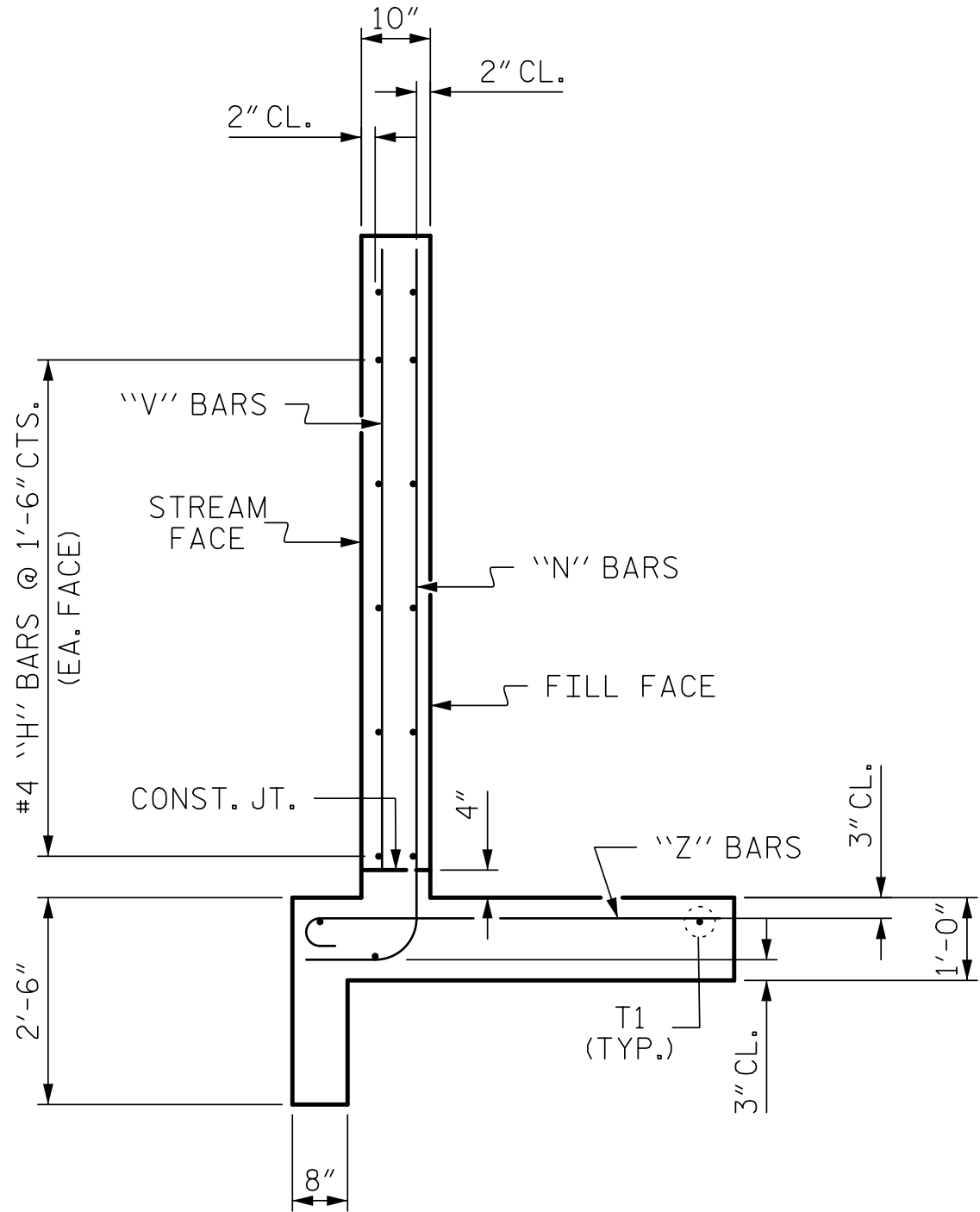
CHECKED BY : MGC DATE : 7/22



PLAN

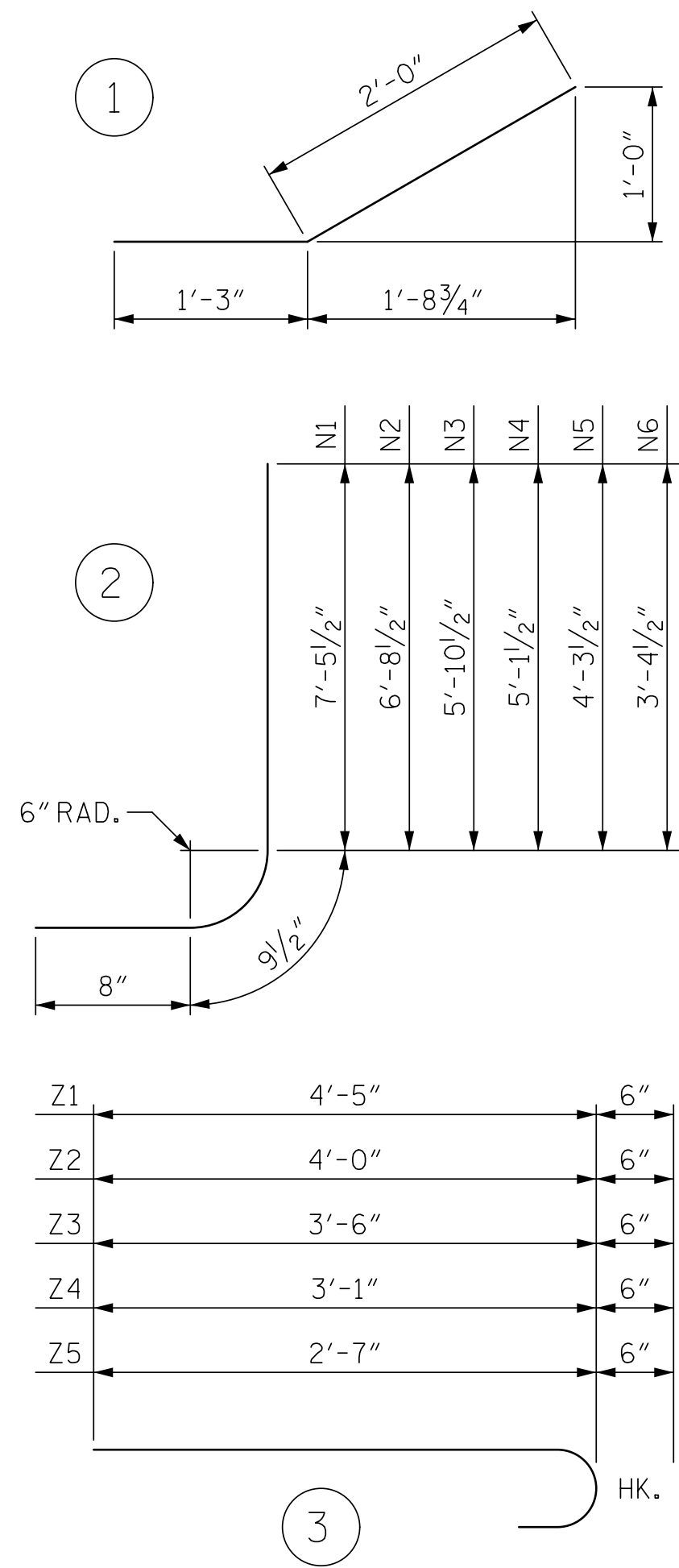


ELEVATION



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

NOTES
G1 BARS IN HEADWALL ARE INCLUDED IN BARREL REINFORCING.
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.

BILL OF MATERIAL

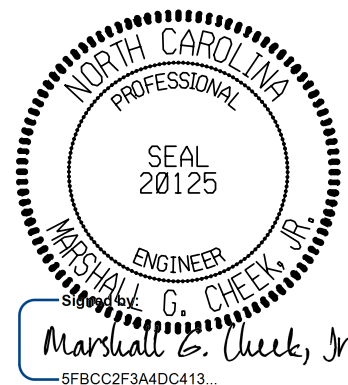
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-4"	50
H2	4	#4	STR	8'-6"	23
H3	4	#4	STR	5'-1"	14
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	10'-3"	27
N1	4	#5	2	8'-11"	37
N2	4	#5	2	8'-2"	34
N3	4	#4	2	7'-4"	20
N4	4	#4	2	6'-7"	18
N5	4	#4	2	5'-9"	15
N6	4	#4	2	4'-10"	13
S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	11'-3"	70
V1	4	#4	STR	6'-10"	18
V2	4	#4	STR	6'-2"	16
V3	4	#4	STR	5'-4"	14
V4	4	#4	STR	4'-6"	12
V5	4	#4	STR	3'-8"	10
V6	4	#4	STR	2'-10"	8
Z1	8	#4	3	4'-11"	26
Z2	4	#4	3	4'-6"	12
Z3	4	#4	3	4'-0"	11
Z4	4	#4	3	3'-7"	10
Z5	4	#4	3	3'-1"	8

TOTAL REINFORCING STEEL FOR 2 WINGS 572 LBS

CLASS A CONCRETE
2 WINGS 8.6 CY
1 HEADWALL 0.2 CY
1 END CURTAIN WALL 0.1 CY
TOTAL 8.9 CY

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 38+74.00 -L-

SHEET 9 OF 10



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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

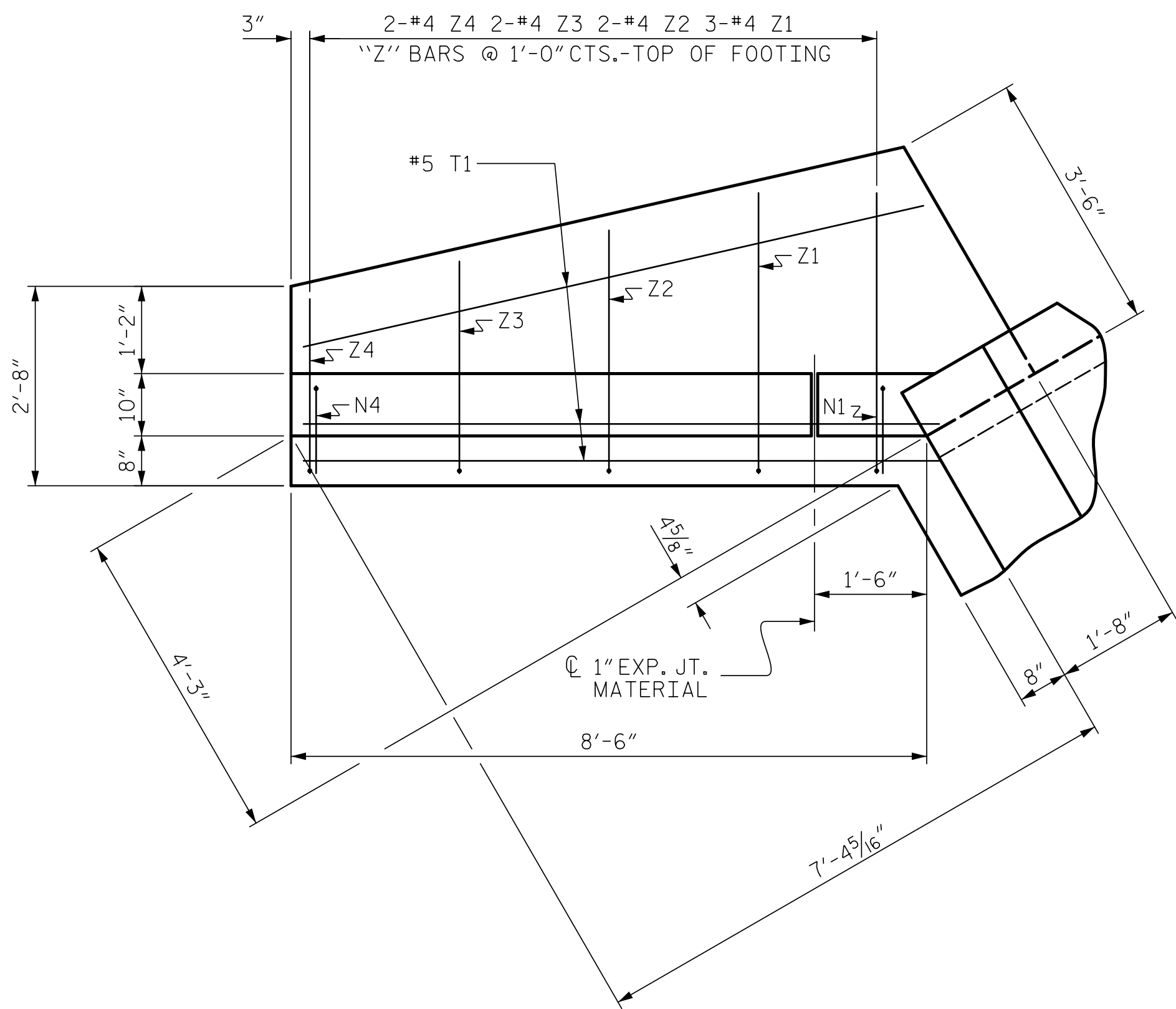
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1			3			TOTAL SHEETS	
2			4			10	

STR. #1

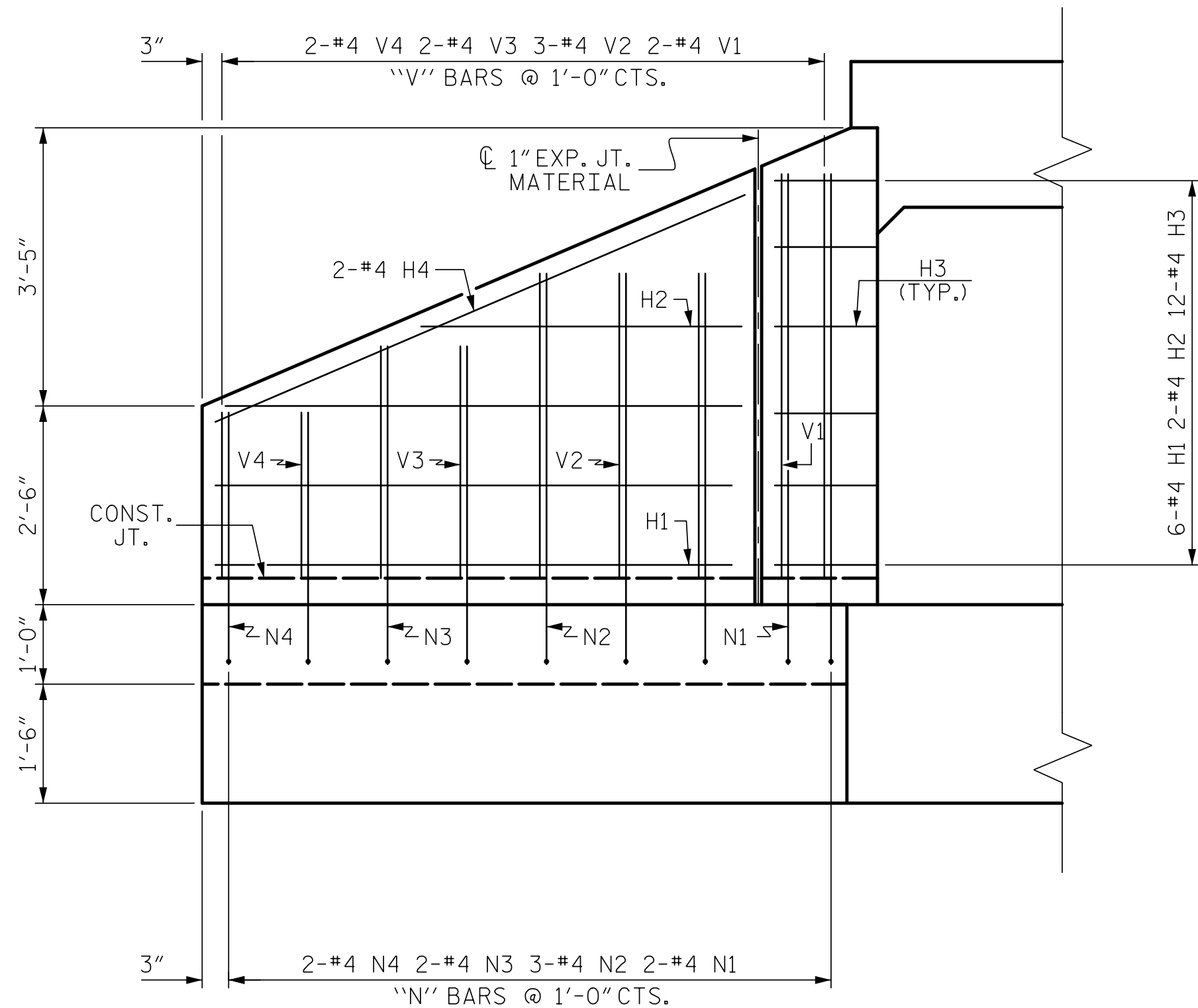
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CHECKED BY :	MGC	DATE :	7/22
DRAWN BY :	CCJ	IO/99	REV. 6/19
CHECKED BY :	RWW	03/00	MAA/THC

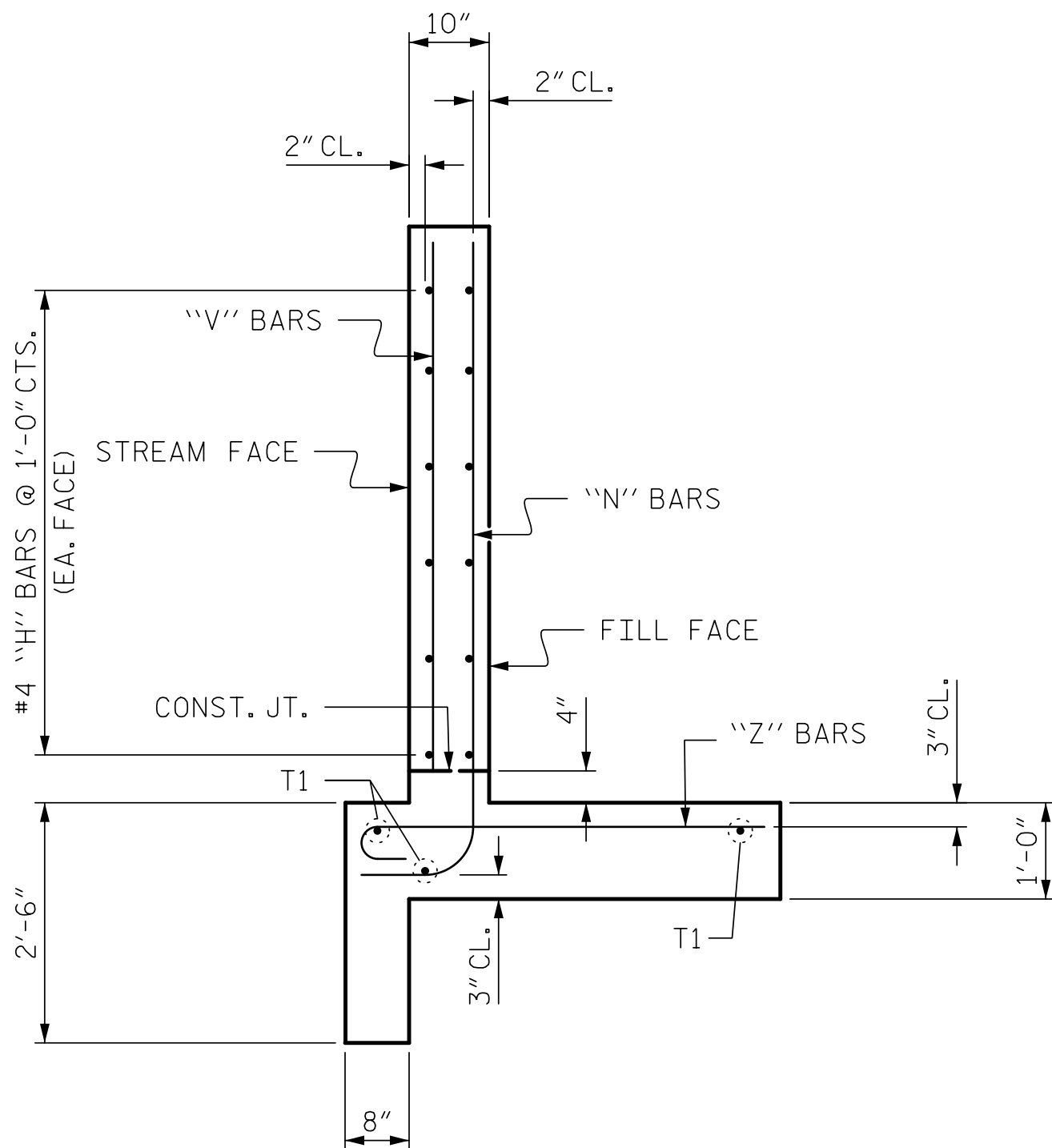
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PLAN

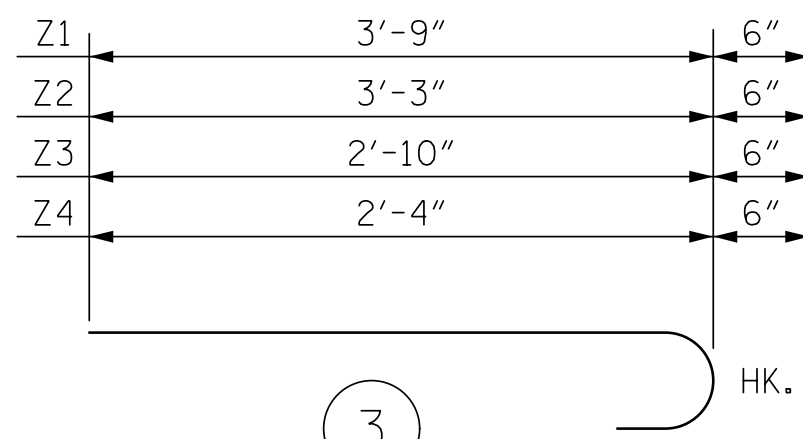
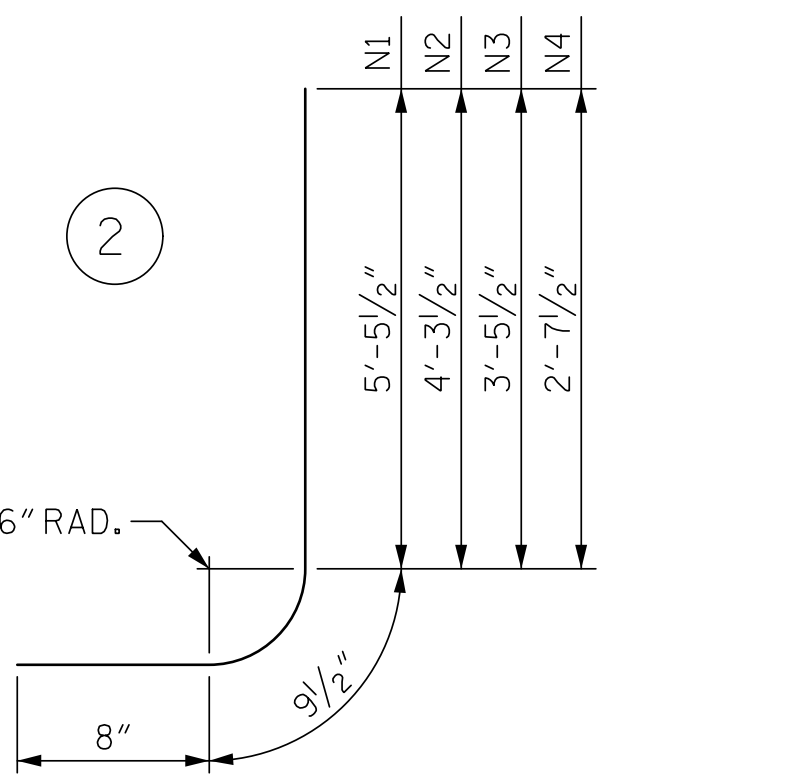
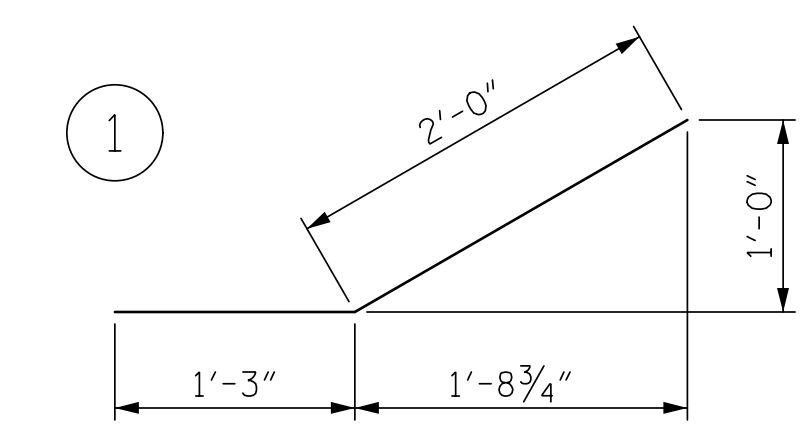


ELEVATION



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	6'-6"	52
H2	4	#4	STR	4'-0"	11
H3	24	#4	1	3'-3"	52
H4	4	#4	STR	7'-3"	19
N1	4	#4	2	6'-11"	18
N2	6	#4	2	5'-9"	23
N3	4	#4	2	4'-11"	13
N4	4	#4	2	4'-1"	11
T1	6	#5	STR	8'-6"	53
V1	4	#4	STR	4'-11"	13
V2	6	#4	STR	3'-8"	15
V3	4	#4	STR	2'-11"	8
V4	4	#4	STR	2'-1"	6
Z1	6	#4	3	4'-3"	17
Z2	4	#4	3	3'-9"	10
Z3	4	#4	3	3'-4"	9
Z4	4	#4	3	2'-10"	8

REINFORCING STEEL
FOR 2 WINGS 338 LBS

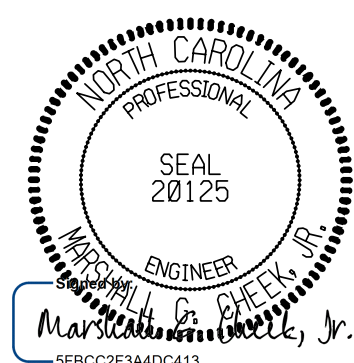
CLASS A CONCRETE
2 WINGS 5.7 CY
1 HEADWALL 0.2 CY
END CURTAIN WALL 0.1 CY
TOTAL 6.0 CY

NOTES

G1 BARS IN HEADWALL ARE INCLUDED IN
BARREL REINFORCING.
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.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 38+74.00 -L-

SHEET 10 OF 10



7/23/2025

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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS
FOR
CONCRETE BOX CULVERT
H = 5'-0" SLOPE = 2:1
RIGHT EXTENSION

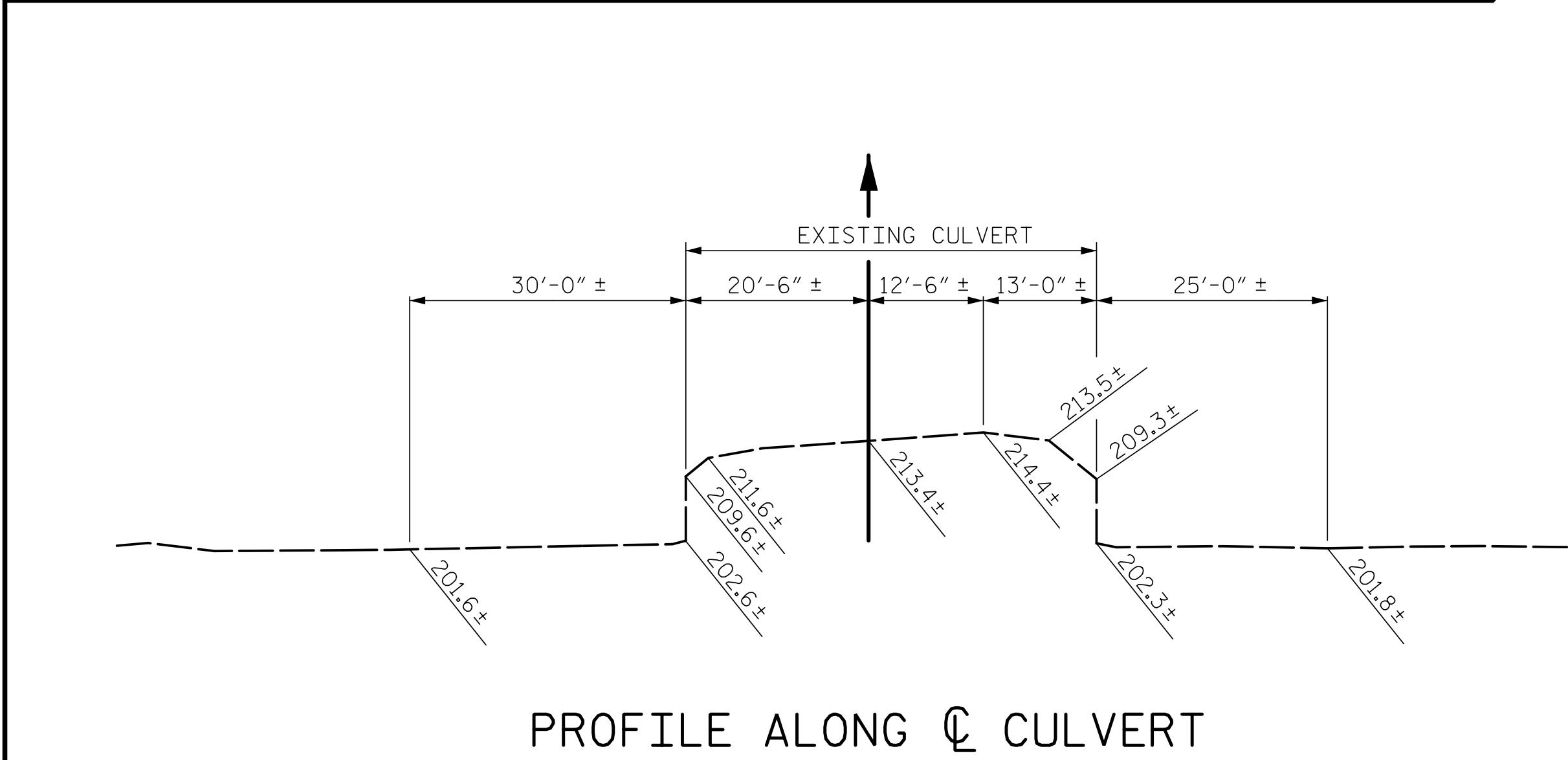
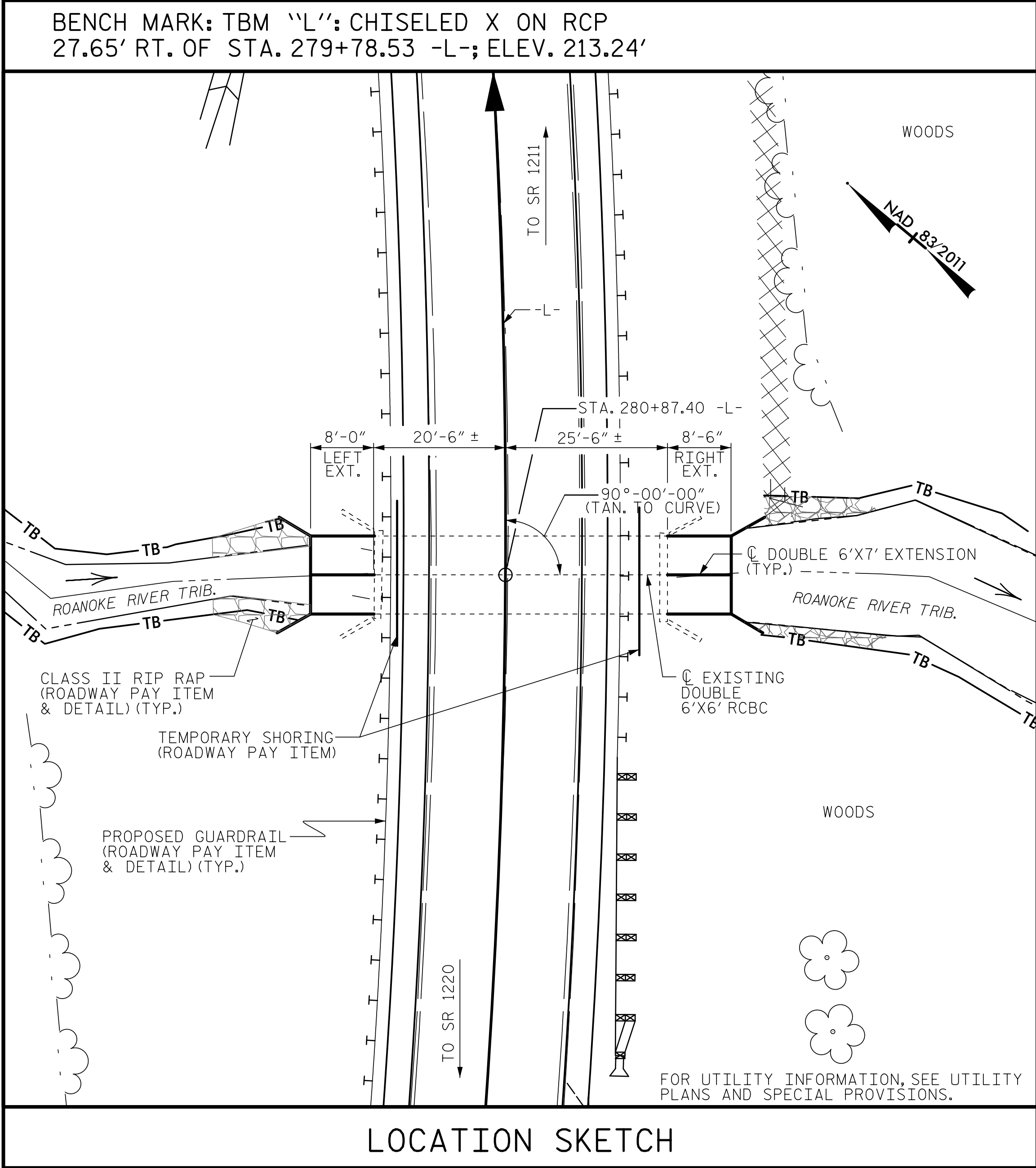
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NO.	BY:	DATE:	NO.	BY:	DATE:	C1-10	
1			3			TOTAL SHEETS	
2			4			10	

STR, #1

STD. NO. CW9005

ASSEMBLED BY :	ZCS	DATE :	4/22
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DRAWN BY :	CCJ	10/99	REV. 6/19
CHECKED BY :	RWW	03/00	MAA/THC

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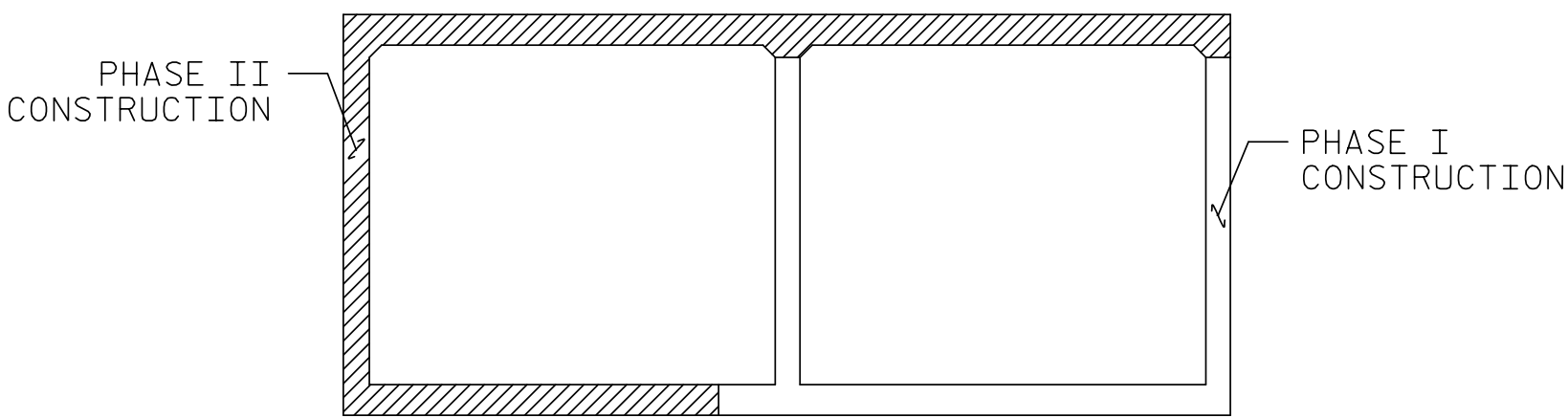


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DESIGN ENGINEER OF RECORD: ZCS DATE : 8/22

11/27/2023
X:\NCDOT\1R-5739\Structures\Str. #2 (280 + 87.40 -L-)\Final Plans\DGNS\1R-5739.SMU. CU.650000.dgn
User:z2sm1h

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
LEFT EXTENSION	24.8 C.Y.
RIGHT EXTENSION	21.5 C.Y.
TOTAL	46.3 C.Y.
REINFORCING STEEL	
LEFT EXTENSION	2,345 LBS
RIGHT EXTENSION	2,212 LBS
TOTAL	4,557 LBS
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	
LEFT EXTENSION	10 TONS
RIGHT EXTENSION	11 TONS
TOTAL	21 TONS

ROADWAY DATA	
GRADE POINT ELEV. @ STA. 280+87.40 -L- =	213.91'
BED ELEV. @ STA. 280+87.40 -L- =	202.43'
ROADWAY SLOPES =	3:1 LEFT 2:1 RIGHT
HYDROGRAPHIC DATA	
DESIGN DISCHARGE =	900 CFS
FREQUENCY OF DESIGN FLOOD =	50 YRS
DESIGN HIGH WATER ELEVATION =	211.7'
DRAINAGE AREA =	1.67 SQ. MI.
BASE DISCHARGE (Q100) =	1100 CFS
BASE HIGH WATER ELEVATION =	213.5'
OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE =	1319 CFS
FREQUENCY OF OVERTOPPING FLOOD =	500- YRS
OVERTOPPING FLOOD ELEVATION =	215.7'



CONSTRUCTION PHASING

(LOOKING DOWNSTREAM)

- PHASE I CONSTRUCTION
- PHASE II CONSTRUCTION

NOTES:

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

DESIGN FILL----- 4.5' MAX.

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTES SHEET.

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

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. PHASE I WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF PHASE I WALLS AND PHASE I WINGS FULL HEIGHT.
3. PHASE II WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE II VERTICAL WALLS.
4. THE REMAINING PORTIONS OF PHASE II WALLS AND PHASE II WINGS FULL HEIGHT.
5. ROOF SLAB AND HEADWALLS.

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

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

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

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSION. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

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

EXCAVATE 1 FOOT BELOW CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS. FOUNDATION CONDITIONING MATERIAL SHOULD CONSIST OF SELECT MATERIAL CLASS V OR VI FOR CULVERTS.

DOWELS SHALL BE USED TO CONNECT THE PROPOSED EXTENSIONS TO THE EXISTING CULVERT. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

FOR TRAFFIC PHASING, SEE TRAFFIC CONTROL PLANS.

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.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 1 OF 9

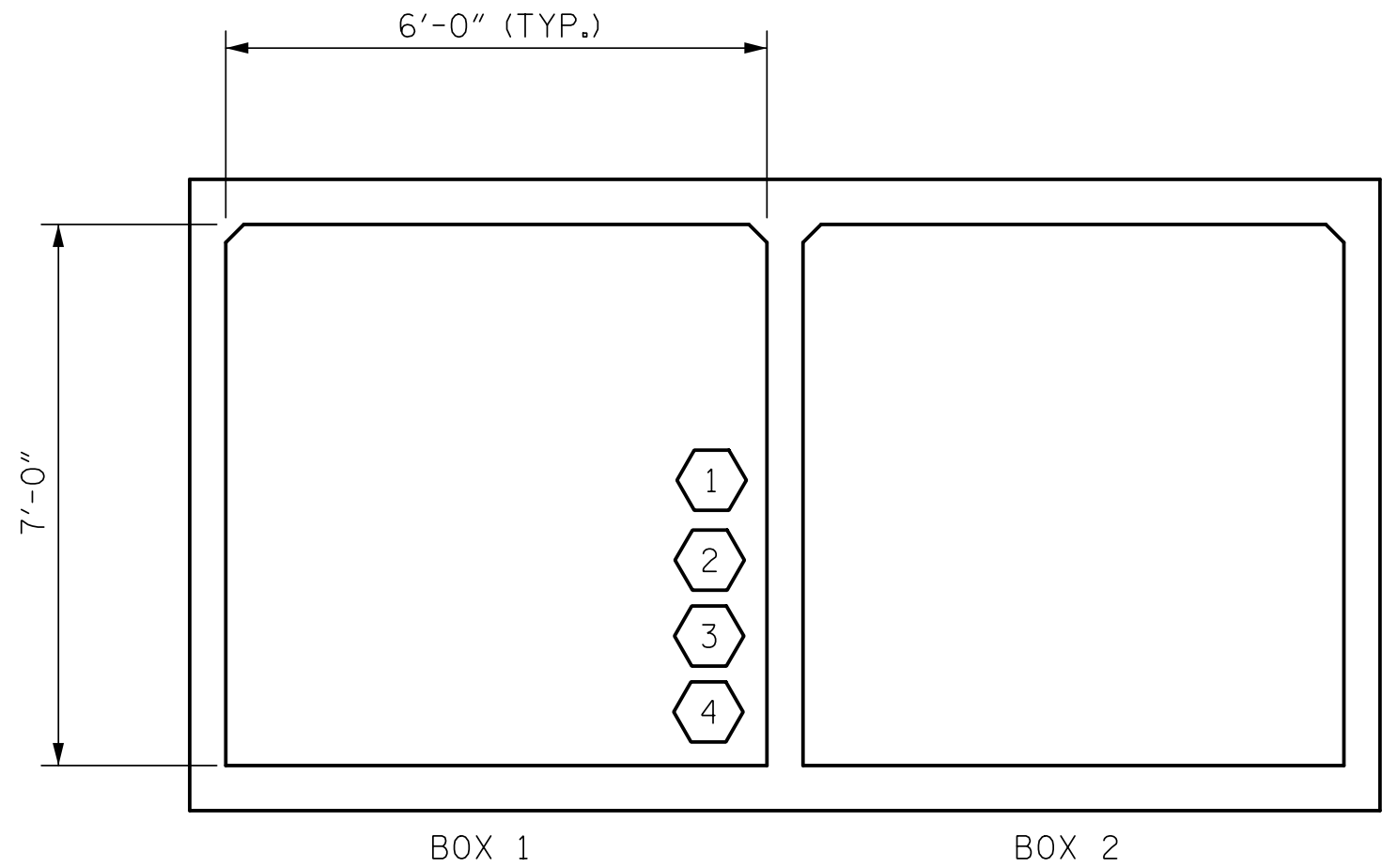
7/23/2025	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH	SHEET NO. C2-1			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275	TOTAL SHEETS 9			
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

STR #2

+

+

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
						γ_{LL} LIVE-LOAD FACTORS	MOMENT				SHEAR				
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	1	1.36	--	1.75	1.36	1	BOTT. SLAB	6.67	1.94	1	TOP SLAB	6.19	
	HL-93 (OPERATING)	N/A		1.76	--	1.35	1.76	1	BOTT. SLAB	6.67	2.52	1	TOP SLAB	6.19	
	HS-20 (INVENTORY)	36.000	2	1.41	50.76	1.75	1.41	1	BOTT. SLAB	6.67	2.03	1	TOP SLAB	6.19	
	HS-20 (OPERATING)	36.000		1.83	65.88	1.35	1.83	1	BOTT. SLAB	6.67	2.64	1	TOP SLAB	6.19	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SN5H		3.39	45.77	1.40	3.39	1	BOTT. SLAB	6.67	3.57	1	TOP SLAB	6.19	
		SNGARBS2		3.18	63.60	1.40	3.18	1	BOTT. SLAB	6.67	3.34	1	TOP SLAB	6.19	
		SNAGRIS2		3.39	74.58	1.40	3.39	1	BOTT. SLAB	6.67	3.57	1	TOP SLAB	6.19	
		SNCOTTS3		1.69	46.05	1.40	1.69	1	BOTT. SLAB	6.67	2.44	1	TOP SLAB	6.19	
		SNAGGRS4		1.69	59.02	1.40	1.69	1	BOTT. SLAB	6.67	2.39	1	TOP SLAB	6.19	
		SNS5A		1.92	68.26	1.40	1.92	1	BOTT. SLAB	6.67	2.65	1	TOP SLAB	6.19	
		SNS6A		1.62	64.72	1.40	1.62	1	BOTT. SLAB	6.67	2.44	1	BOTT. SLAB	6.67	
		SNS7B	3	1.60	67.20	1.40	1.60	1	BOTT. SLAB	6.67	2.41	1	BOTT. SLAB	6.67	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3		2.28	75.24	1.40	2.28	1	BOTT. SLAB	6.67	3.31	1	TOP SLAB	6.19	
		TNT4A		1.99	65.82	1.40	1.99	1	BOTT. SLAB	6.67	2.91	1	TOP SLAB	6.19	
		TNT6A		1.80	74.88	1.40	1.80	1	BOTT. SLAB	6.67	2.54	1	TOP SLAB	6.19	
		TNT7A		1.92	80.64	1.40	1.92	1	BOTT. SLAB	6.67	2.77	1	TOP SLAB	6.19	
		TNT7B		1.73	72.66	1.40	1.73	1	BOTT. SLAB	6.67	2.44	1	TOP SLAB	6.19	
		TNAGRIT4		1.96	84.28	1.40	1.96	1	BOTT. SLAB	6.67	2.89	1	TOP SLAB	6.19	
		TNAGT5A		1.96	88.20	1.40	1.96	1	BOTT. SLAB	6.67	2.89	1	TOP SLAB	6.19	
		TNAGT5B		1.94	87.30	1.40	1.94	1	BOTT. SLAB	6.67	2.88	1	TOP SLAB	6.19	
EMERGENCY VEHICLE (EV)	EV2		2.40	69.00	1.30	2.40	1	BOTT. SLAB	6.67	2.53	1	TOP SLAB	6.19		
	EV3		4	1.47	63.21	1.30	1.47	1	BOTT. SLAB	6.67	2.12	1	TOP SLAB	6.19	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

ASSEMBLED BY :	STM	DATE :	07/23
CHECKED BY :	MGC	DATE :	11/23
DRAWN BY :	WMC	7/II	REV. 10/1/II
CHECKED BY :	GM	7/II	REV. 12/1/II
			MAA/GM
			REV. 04/23
			MAA/THC
			BNB/AAI

11/23/2023
X:\NCDDOT\NR-5739\Structures\Str. #2 (280 + 87.40 -L-)\Final Plans\DGNS\412.001.R-5739_SMU.C2-2.dgn
User:z2Smith

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

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

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

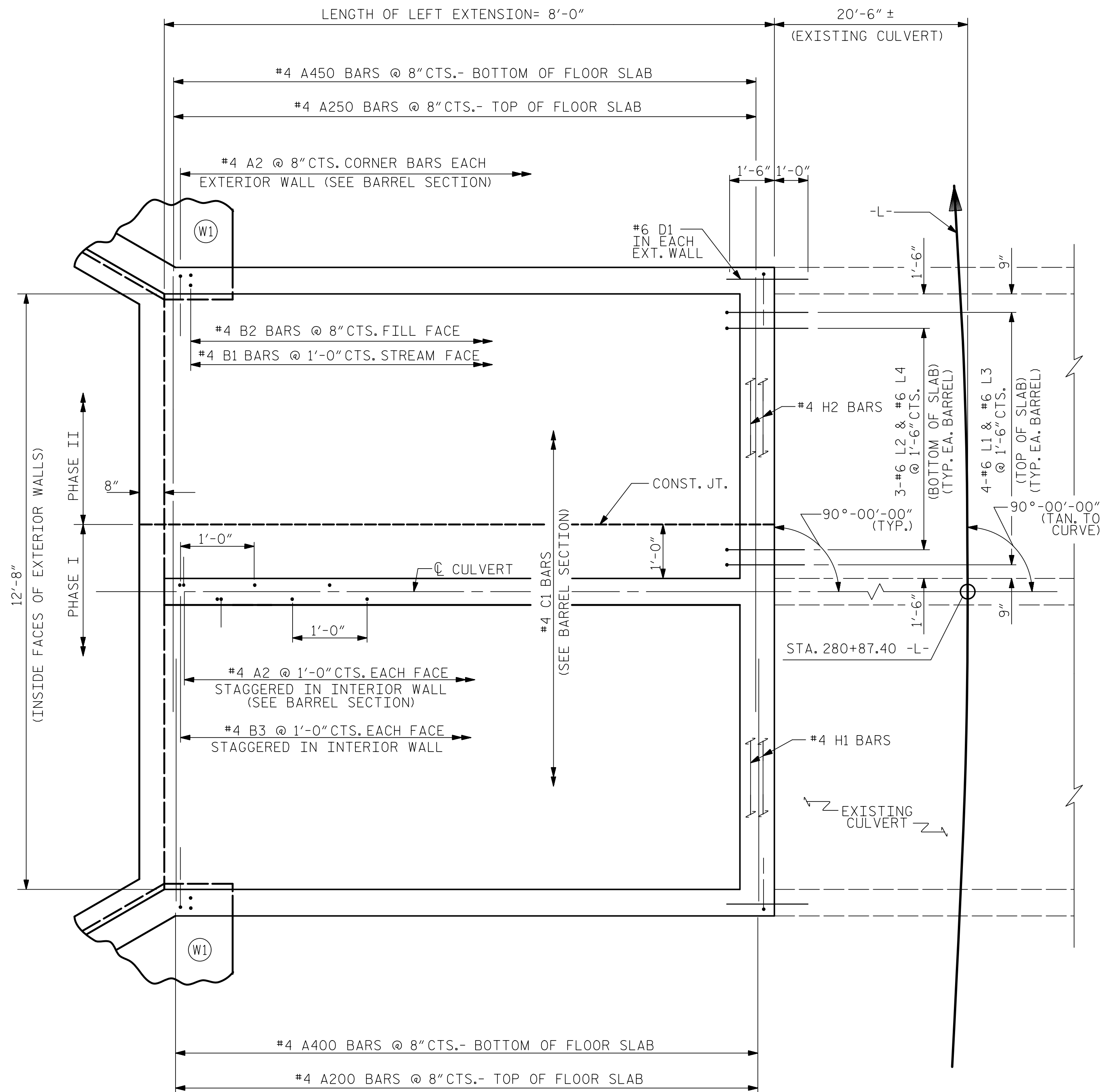
PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 2 OF 9

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275		REVISIONS						SHEET NO.
		NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
		1			3			TOTAL SHEETS
		2			4			9

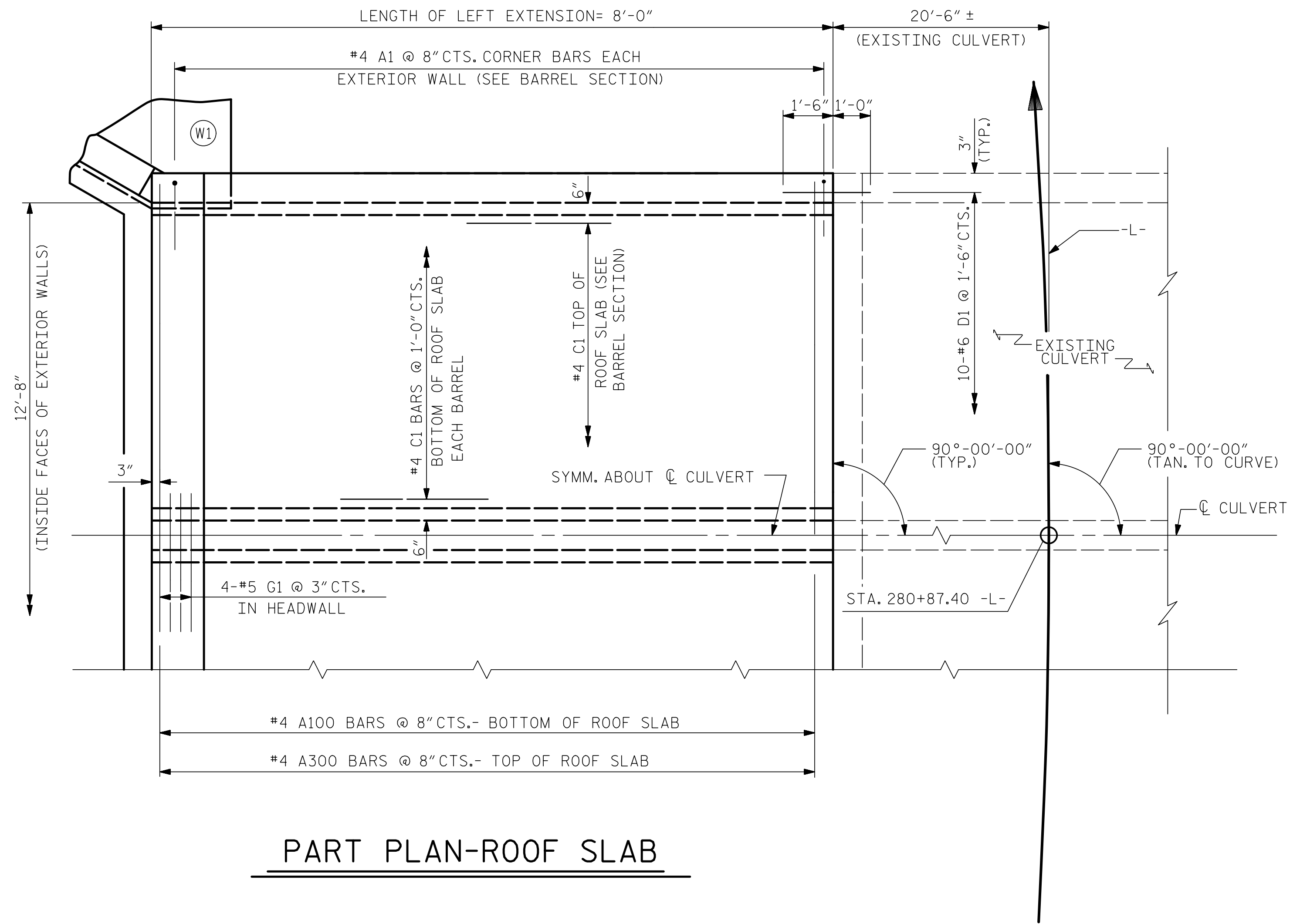
STR. #2

STD. NO. LRFR5



PLAN-FLOOR SLAB

FOR S1 BARS IN FLOOR SLAB & FOOTING, SEE WING SHEET.



PART PLAN-ROOF SLAB

LEFT EXTENSION QUANTITIES

CLASS A CONCRETE			
BARREL @	1.26	CY/FT	10.1 C.Y.
WINGS, ETC.			14.2 C.Y.
BOTTOM SLAB STEP			0.5 C.Y.
TOTAL			24.8 C.Y.

REINFORCING STEEL	
BARREL	1,523 LBS.
WINGS, ETC.	822 LBS.
TOTAL	2,345 LBS.

CULVERT EXCAVATION	LUMP SUM
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FOUNDATION COND. MAT'L.	10 TONS
-------------------------	---------

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 3 OF 9



7/23/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 6 FT. X 7 FT.
CONCRETE BOX CULVERT
LEFT EXTENSION
90° SKEW

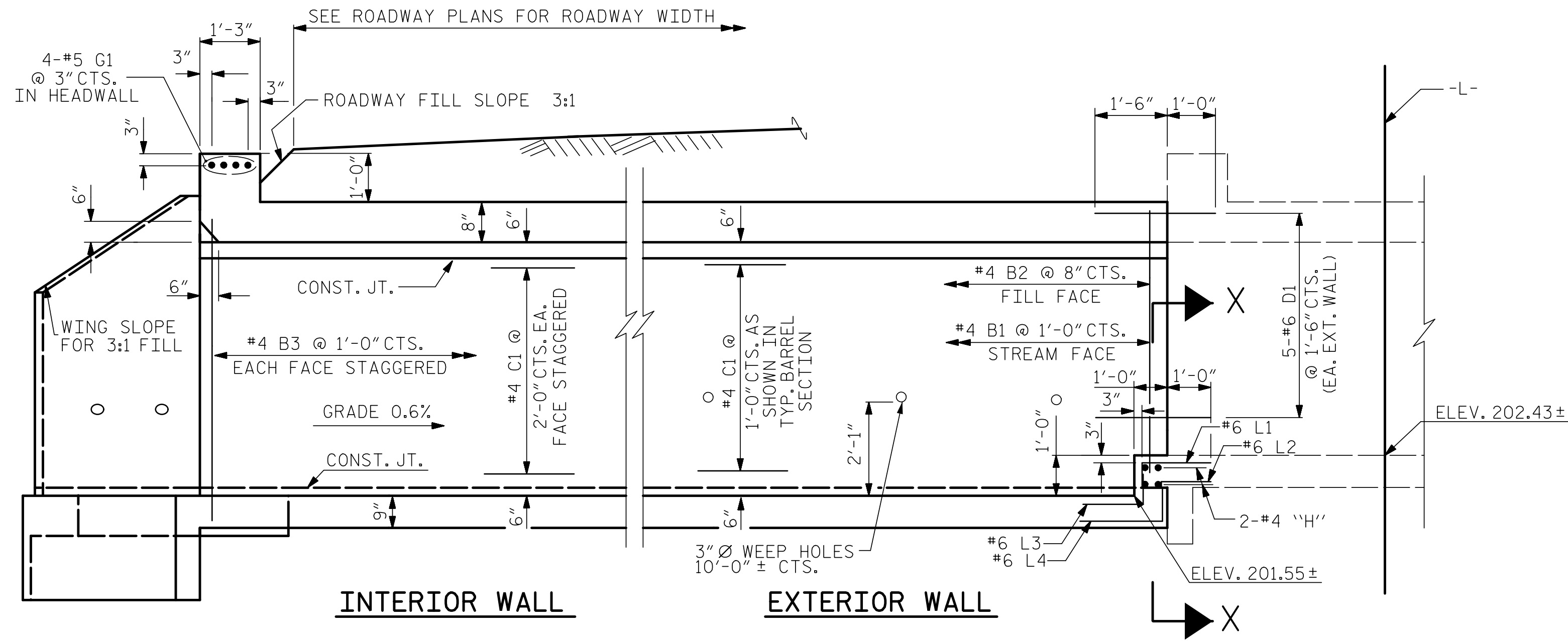
ASSEMBLED BY : ZCS DATE : 5/22
CHECKED BY : MGC DATE : 8/22
DESIGN ENGINEER OF RECORD: ZCS DATE : 8/22

11/28/2023
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User:z2sm1h

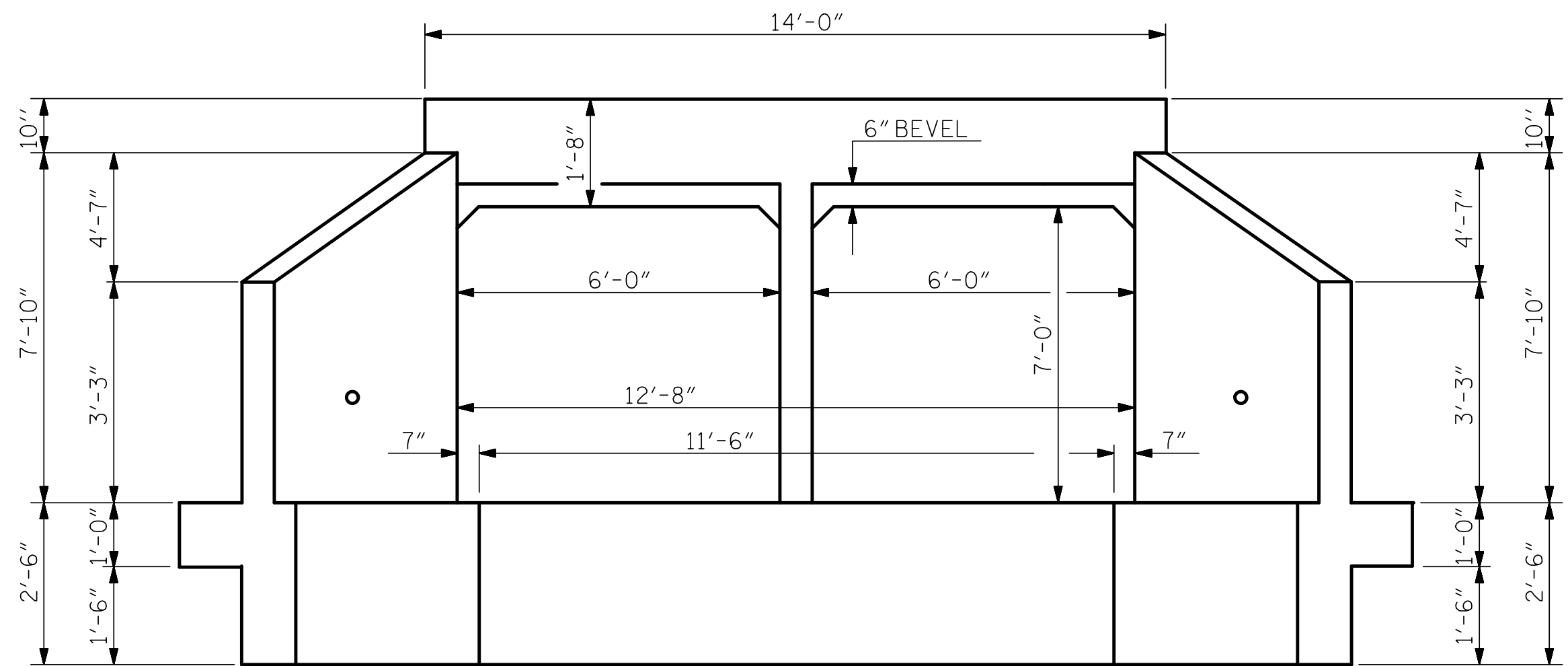
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SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO. C2-3
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

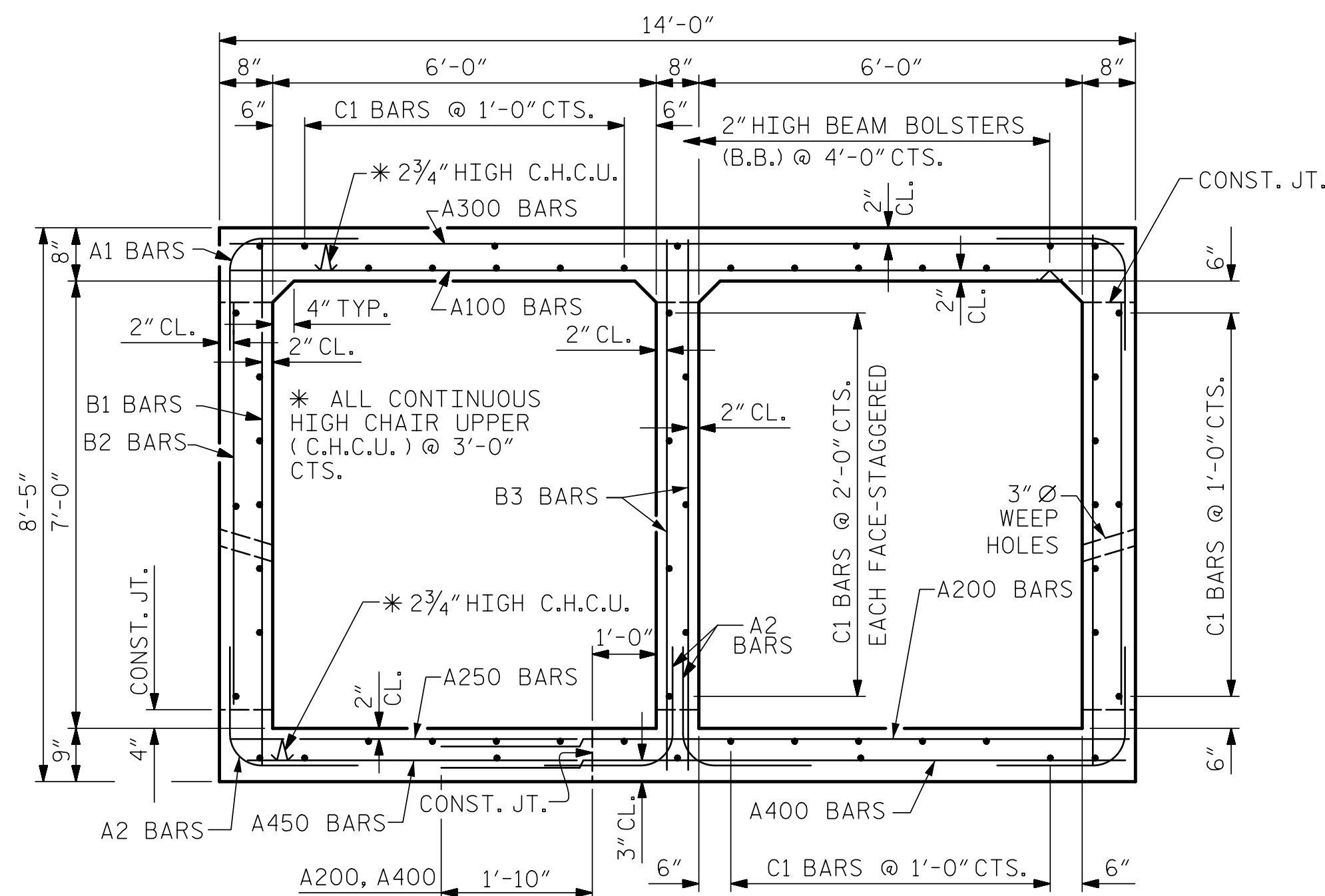
STR. #2



CULVERT EXTENSION SECTION NORMAL TO ROADWAY

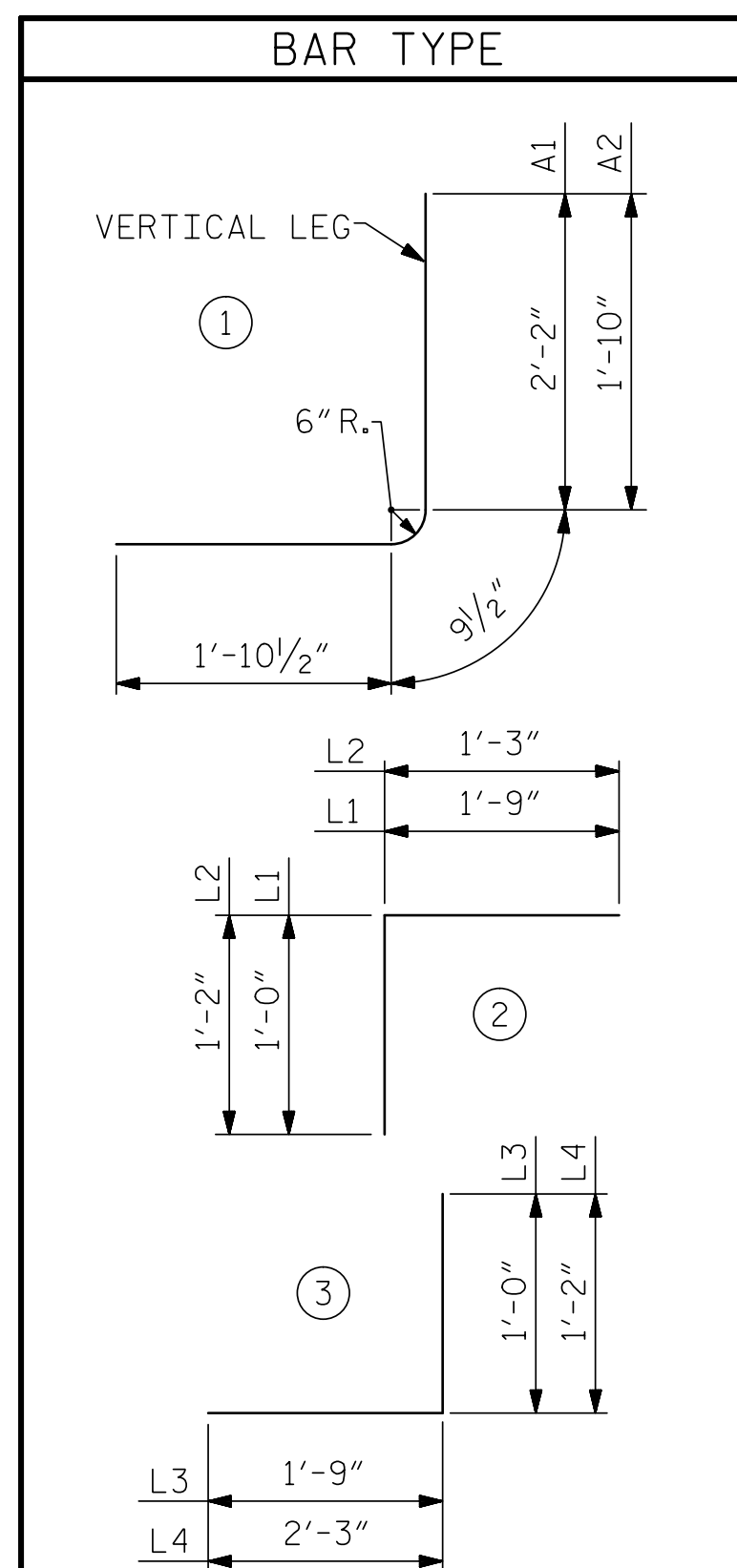


INLET END ELEVATION



RIGHT ANGLE SECTION OF BARREL

THERE ARE 57 "C" BARS IN SECTION OF BARREL,
LOOKING DOWNSTREAM

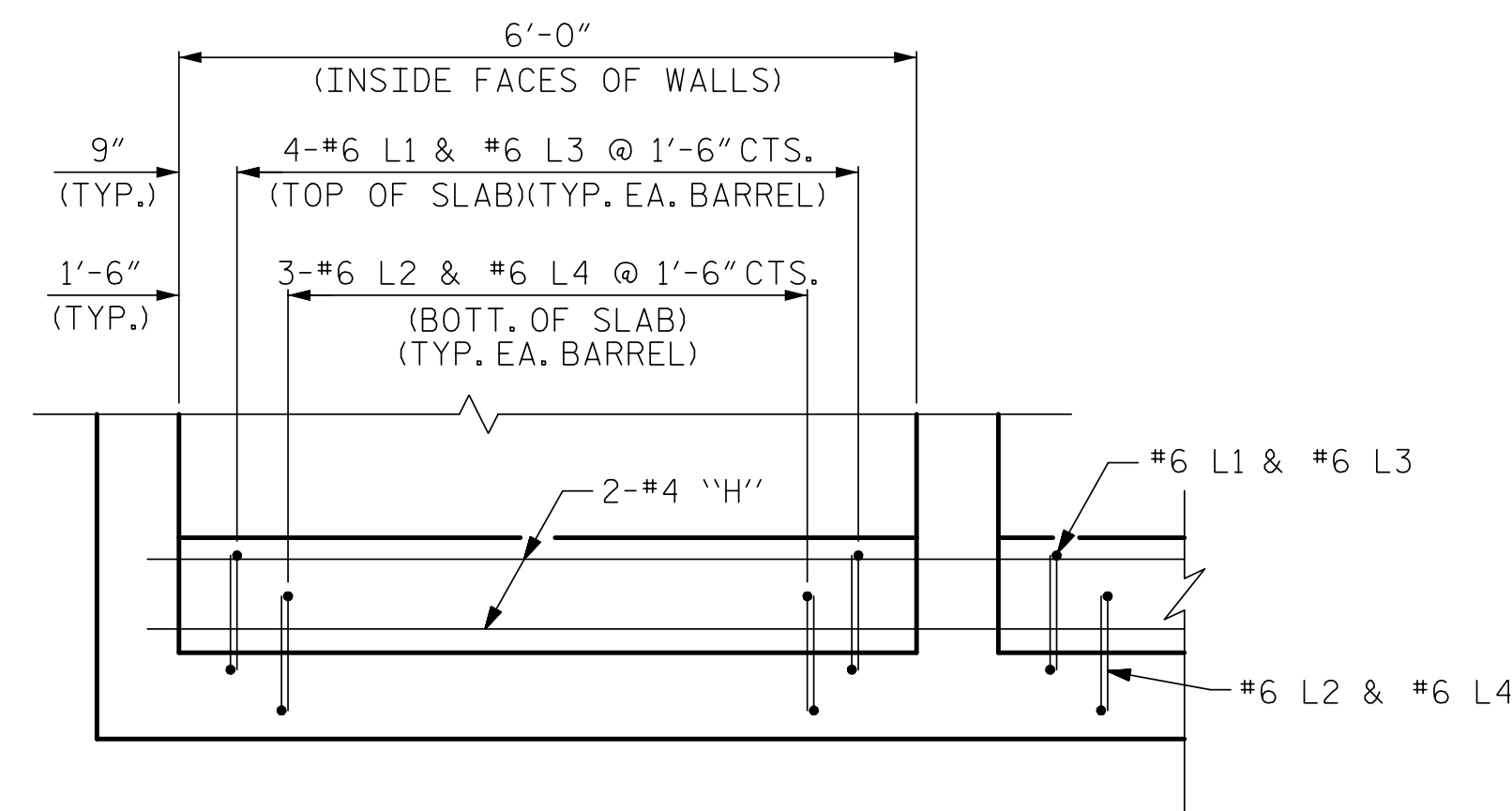


DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
"B"	#4	1'-10"
A200	#4	1'-10"
A400	#4	1'-10"
"H"	#4	1'-10"

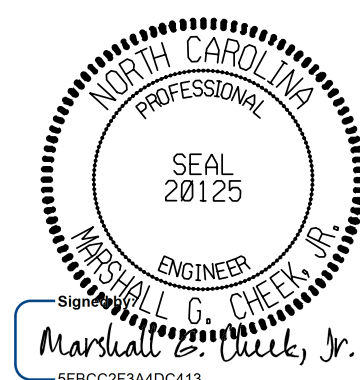
LEFT EXTENSION BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	24	#4	1	4'-10"	77
A2	40	#4	1	4'-6"	120
A100	12	#4	STR	13'-8"	110
A200	12	#4	STR	10'-2"	81
A250	12	#4	STR	5'-5"	43
A300	12	#4	STR	13'-8"	110
A400	12	#4	STR	10'-2"	81
A450	12	#4	STR	5'-5"	43
B1	16	#4	STR	8'-0"	86
B2	24	#4	STR	6'-4"	102
B3	16	#4	STR	8'-0"	86
C1	57	#4	STR	7'-8"	292
D1	20	#6	STR	2'-6"	75
G1	4	#5	STR	13'-8"	57
H1	4	#4	STR	10'-2"	27
H2	4	#4	STR	5'-5"	14
L1	8	#6	2	2'-9"	33
L2	6	#6	2	2'-5"	22
L3	8	#6	3	2'-9"	33
L4	6	#6	3	3'-5"	31
REINFORCING STEEL					1,523 LBS



SECTION X-X

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 4 OF 9



DOCUMENT NOT CONSIDERED FINAL
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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

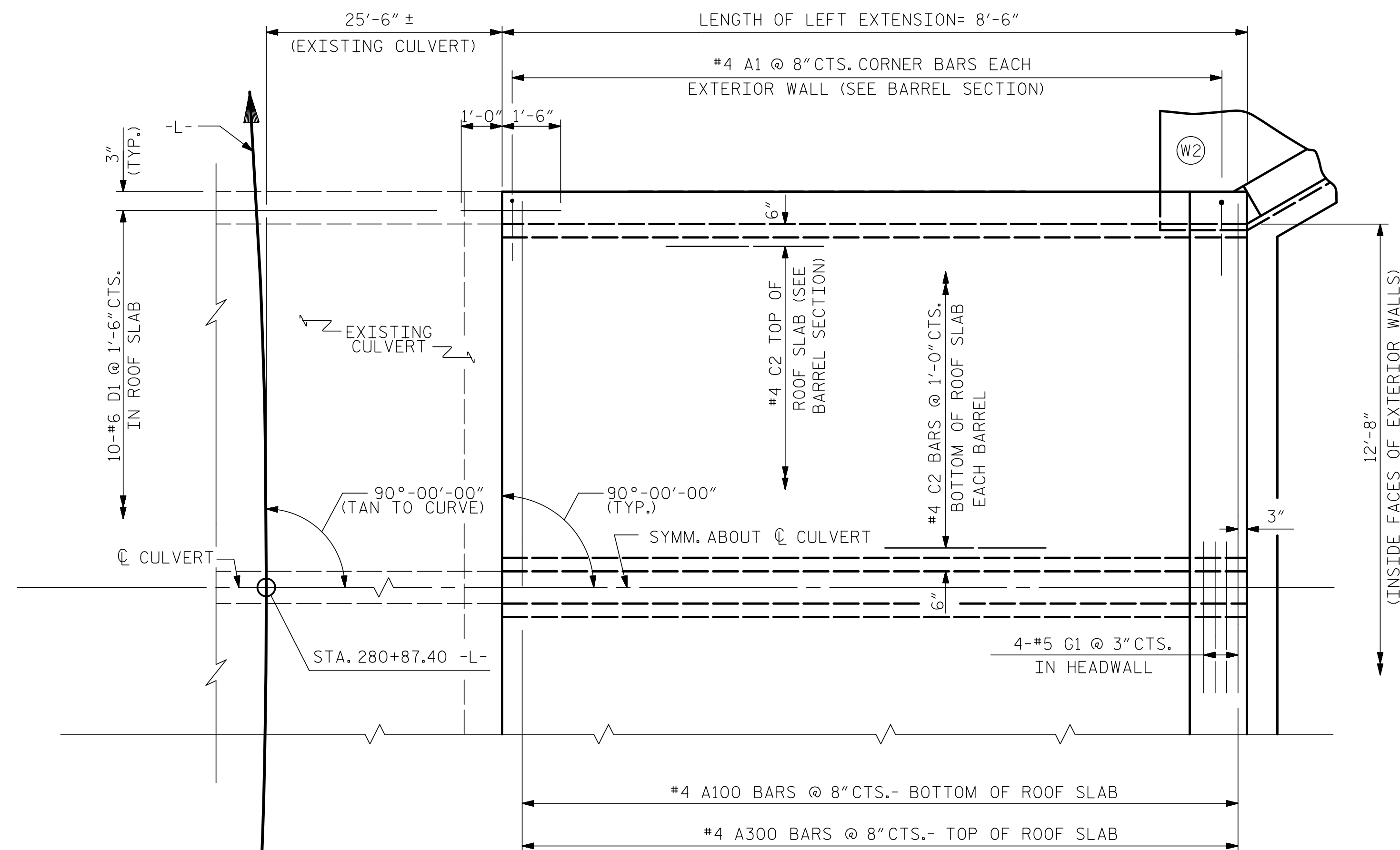
DOUBLE 6 FT. X 7 FT.
CONCRETE BOX CULVERT
LEFT EXTENSION
90° SKEW

REVISIONS						SHEET NO. C2-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

STR. #2

ASSEMBLED BY : ZCS DATE : 5/22
CHECKED BY : MGC DATE : 8/22
DESIGN ENGINEER OF RECORD: ZCS DATE : 8/22

3/24/2023
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User:ZSmith

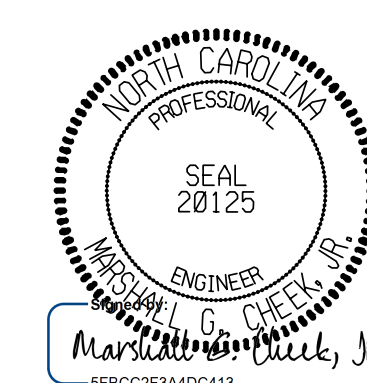


PART PLAN-ROOF SLAB

RIGHT EXTENSION QUANTITIES

CLASS A CONCRETE		
BARREL @	1.26	CY/FT
WINGS, ETC.	9.9	C.Y.
SILLS	0.4	C.Y.
BOTTOM SLAB STEP	0.5	C.Y.
TOTAL	21.5	C.Y.
REINFORCING STEEL		
BARREL	1,641	LBS.
WINGS, ETC.	571	LBS.
TOTAL	2,212	LBS.
CULVERT EXCAVATION		LUMP SUM
FOUNDATION COND. MAT'L.		11 TONS

SHEET 5 OF 9



7/23/2025

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CORP. LICENSE NO.: C-0275

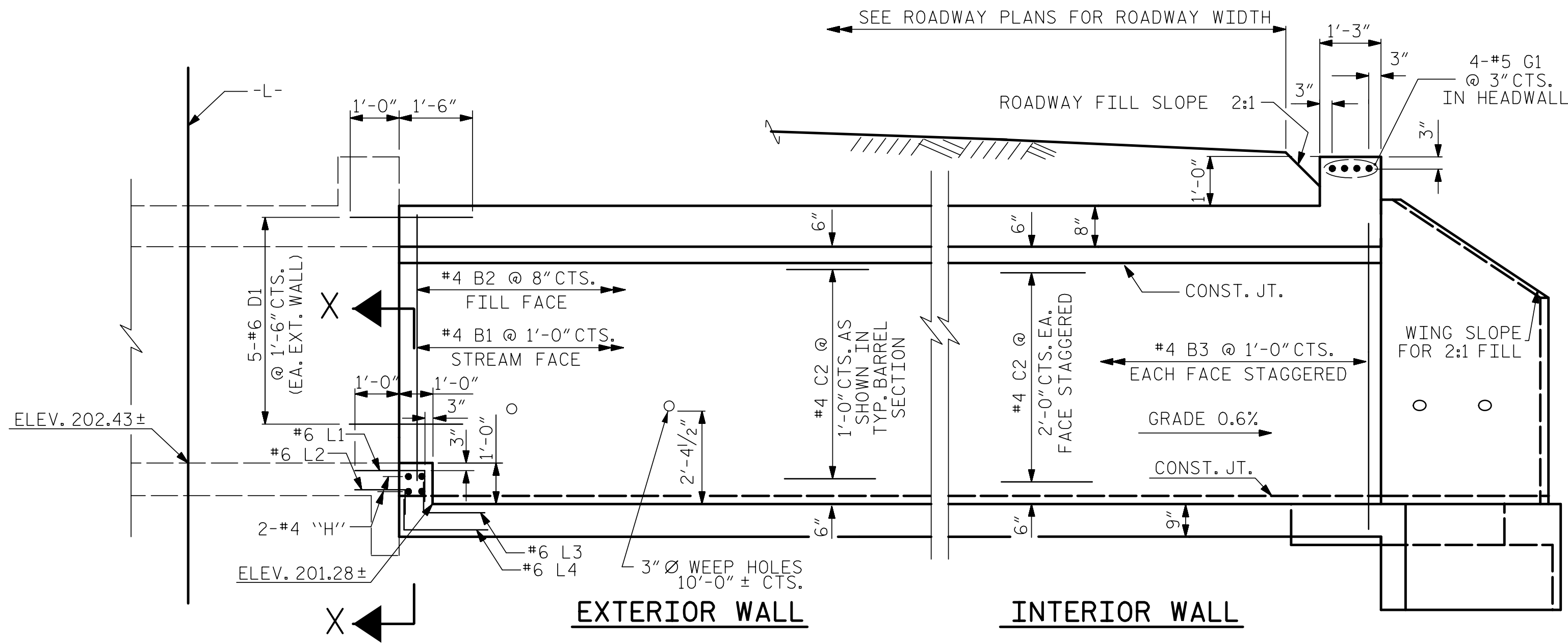
DOUBLE 6 FT. X 7 FT.
CONCRETE BOX CULVERT
RIGHT EXTENSION
90° SKEW

REVISIONS						SHEET NO. C2-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

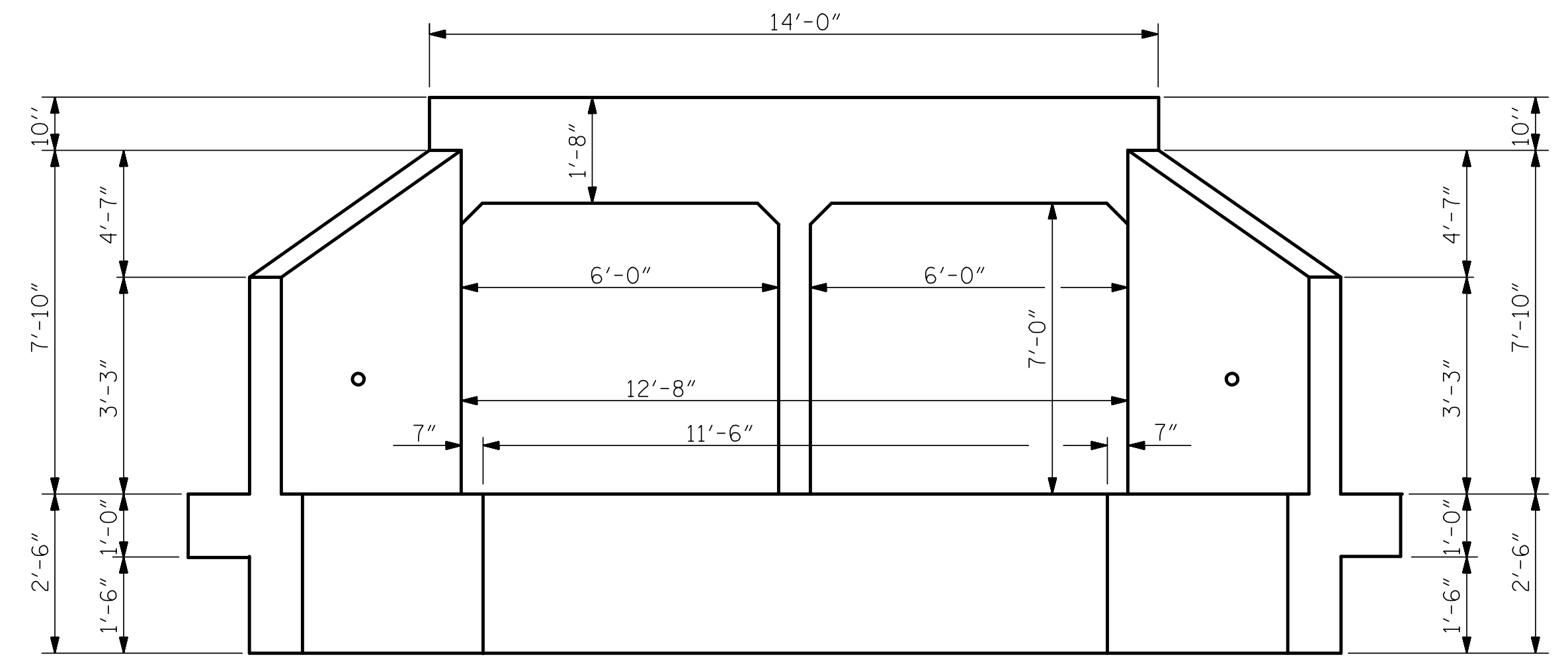
STR. #2

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CHECKED BY :	MGC	DATE :	8/22
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	8/22

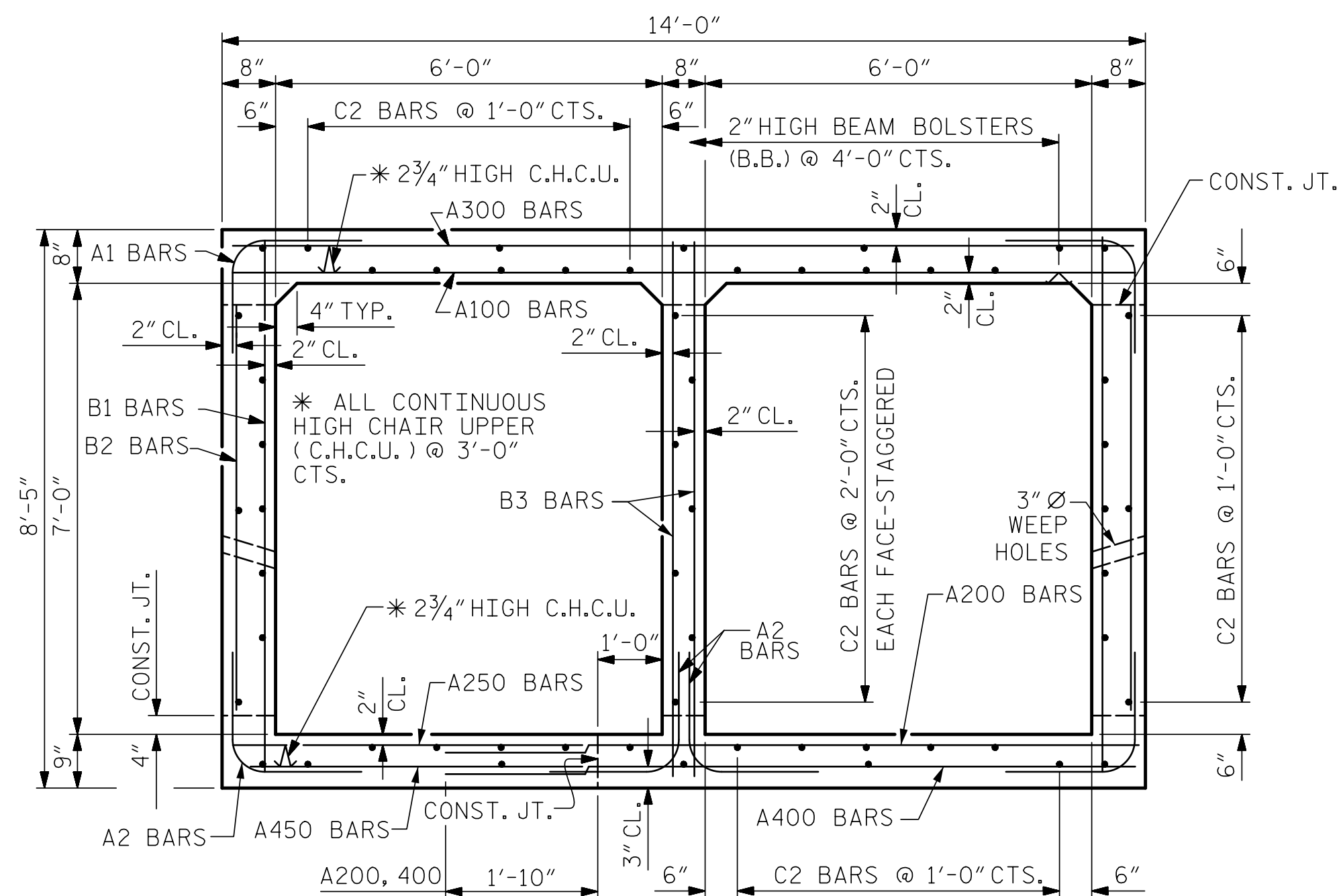
11/28/2023
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User:ZSmith



CULVERT EXTENSION SECTION NORMAL TO ROADWAY

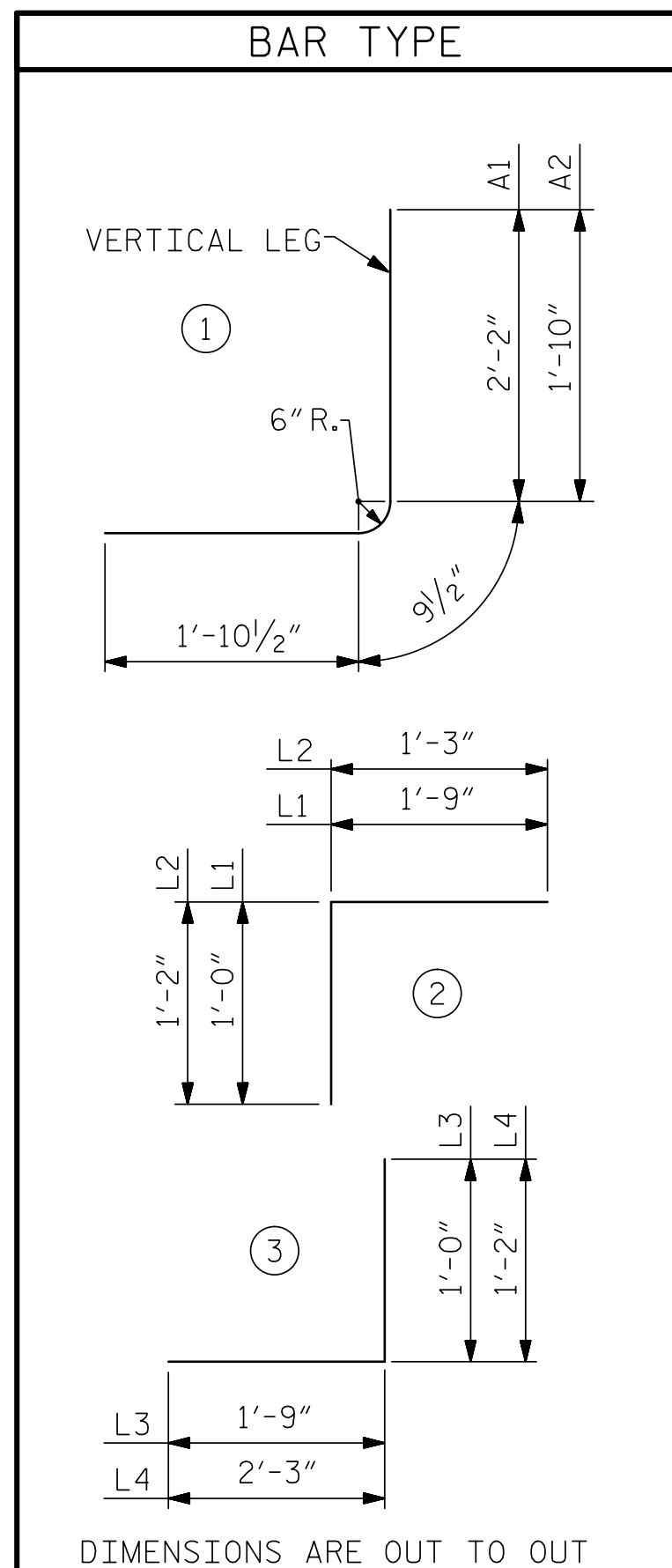


OUTLET END ELEVATION



RIGHT ANGLE SECTION OF BARREL

THERE ARE 57 "C" BARS IN SECTION OF BARREL.
LOOKING DOWNSTREAM



DIMENSIONS ARE OUT TO OUT

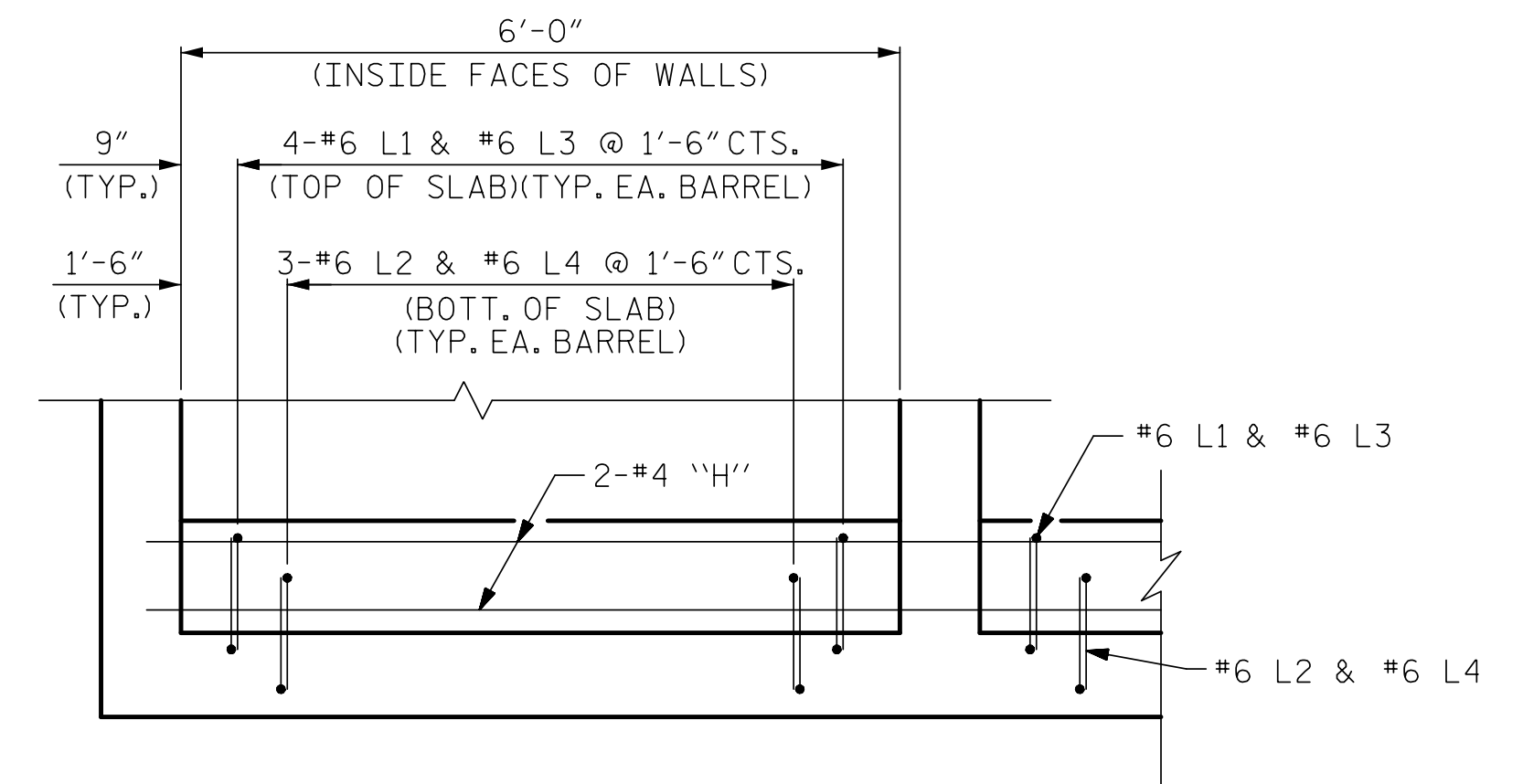
SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
"B"	#4	1'-10"
A200	#4	1'-10"
A400	#4	1'-10"
"H"	#4	1'-10"

RIGHT EXTENSION BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	26	#4	1	4'-10"	84
A2	44	#4	1	4'-6"	132
A100	13	#4	STR	13'-8"	119
A200	13	#4	STR	10'-2"	88
A250	13	#4	STR	5'-5"	47
A300	13	#4	STR	13'-8"	119
A400	13	#4	STR	10'-2"	88
A450	13	#4	STR	5'-5"	47
B1	18	#4	STR	8'-0"	96
B2	26	#4	STR	6'-4"	110
B3	18	#4	STR	8'-0"	96
C2	57	#4	STR	8'-2"	311
D1	20	#6	STR	2'-6"	75
D2	6	#6	STR	1'-4"	12
G1	4	#5	STR	13'-8"	57
H1	4	#4	STR	10'-2"	27
H2	4	#4	STR	5'-5"	14
L1	8	#6	2	2'-9"	33
L2	6	#6	2	2'-5"	22
L3	8	#6	3	2'-9"	33
L4	6	#6	3	3'-5"	31

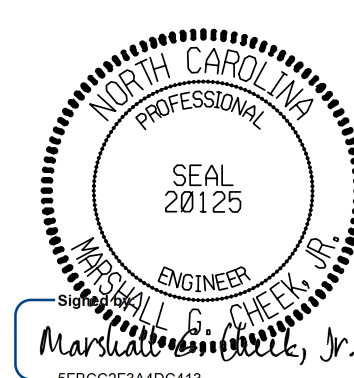
REINFORCING STEEL 1,641 LBS



SECTION X-X

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 6 OF 9



7/23/2025

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 6 FT. X 7 FT.
CONCRETE BOX CULVERT
RIGHT EXTENSION
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C2-6
2			4			TOTAL SHEETS
						9

STR: #2

ASSEMBLED BY : ZCS DATE : 5/22
CHECKED BY : MGC DATE : 8/22
DESIGN ENGINEER OF RECORD: ZCS DATE : 8/22

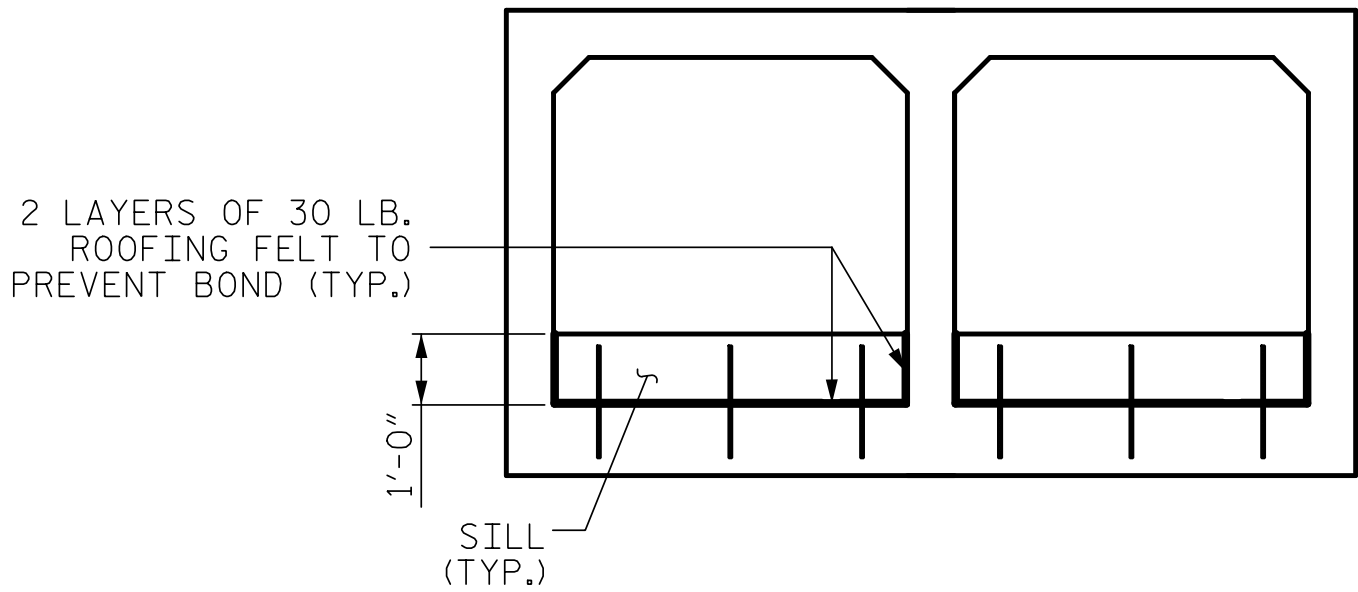
11/27/2023
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User:ZSmith

NOTES

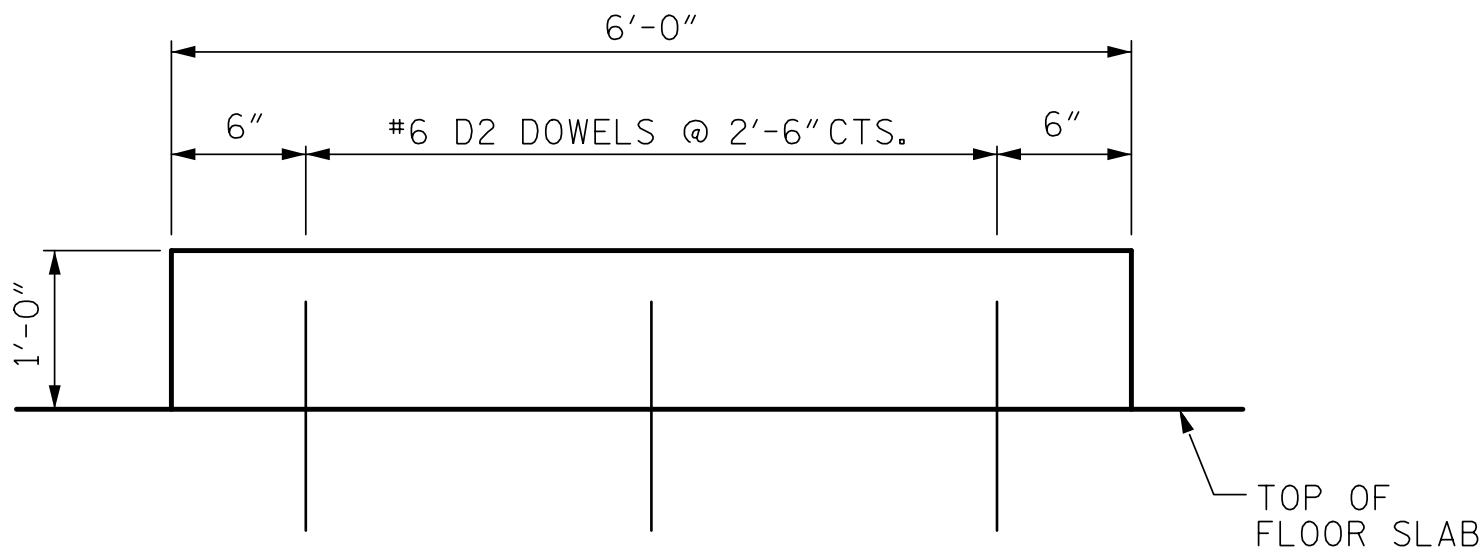
MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT EXTENSIONS. BED MATERIAL MAY BE SUPPLEMENTED WITH CLASS B RIP RAP AS NECESSARY. NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

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

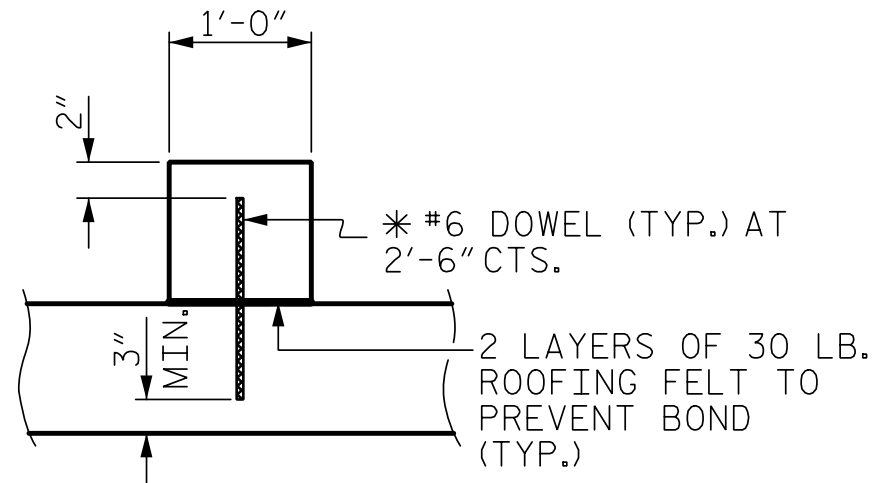
THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



INLET ELEVATION



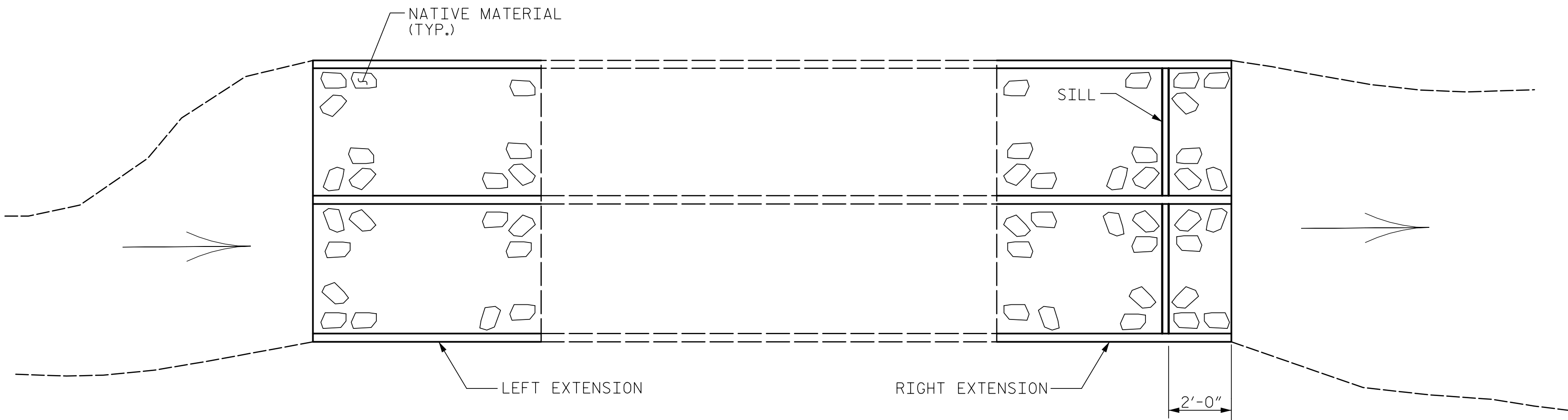
ELEVATION



SECTION THROUGH SILL

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

SILL DETAILS



PLAN OF FLOOR SILL LAYOUT

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 7 OF 9

7/23/2025

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PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

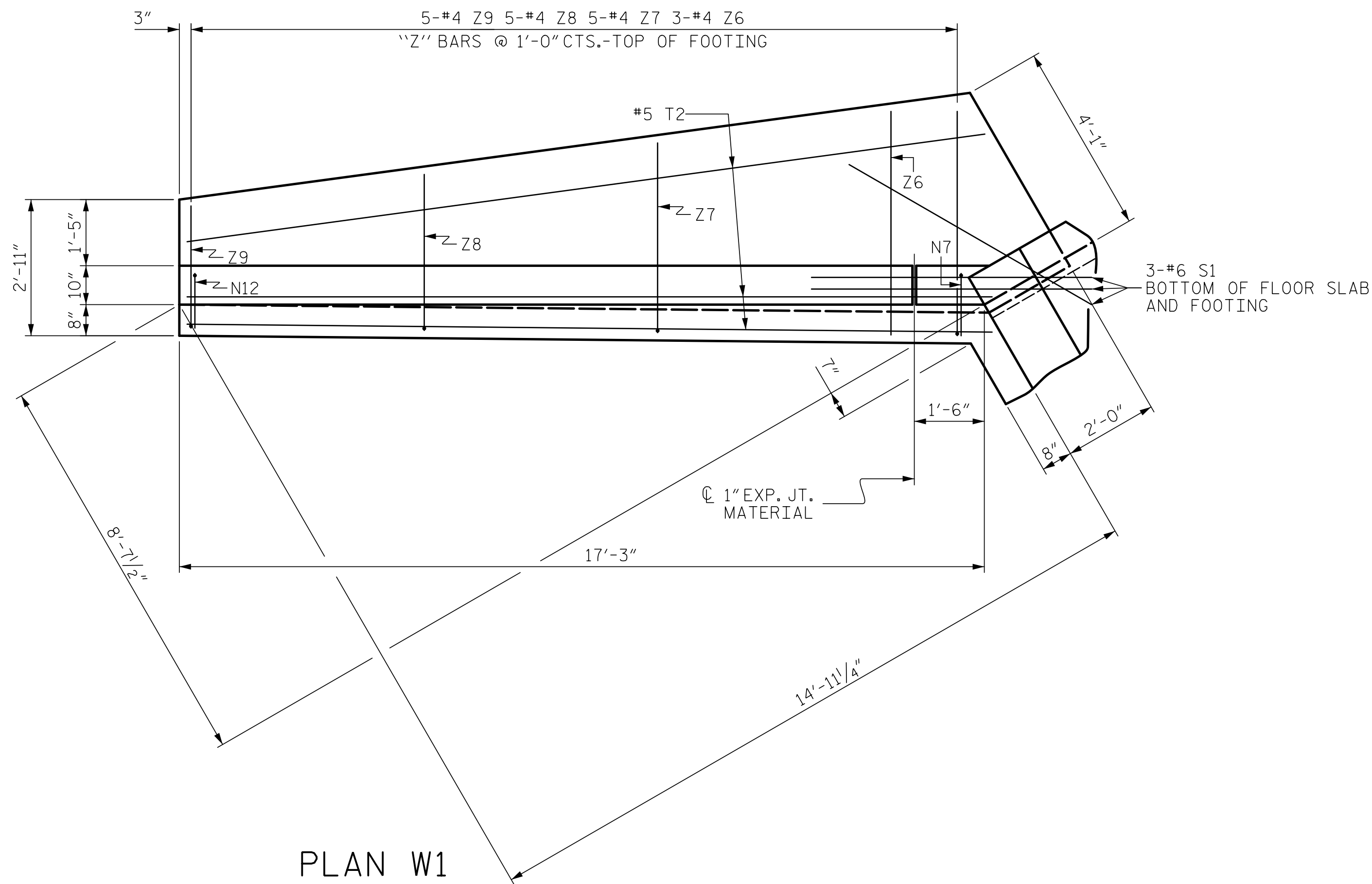
DOUBLE 6 FT. X 7 FT.
CONCRETE BOX CULVERT
LT & RT EXTENSIONS
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C2-7
2			4			TOTAL SHEETS 9

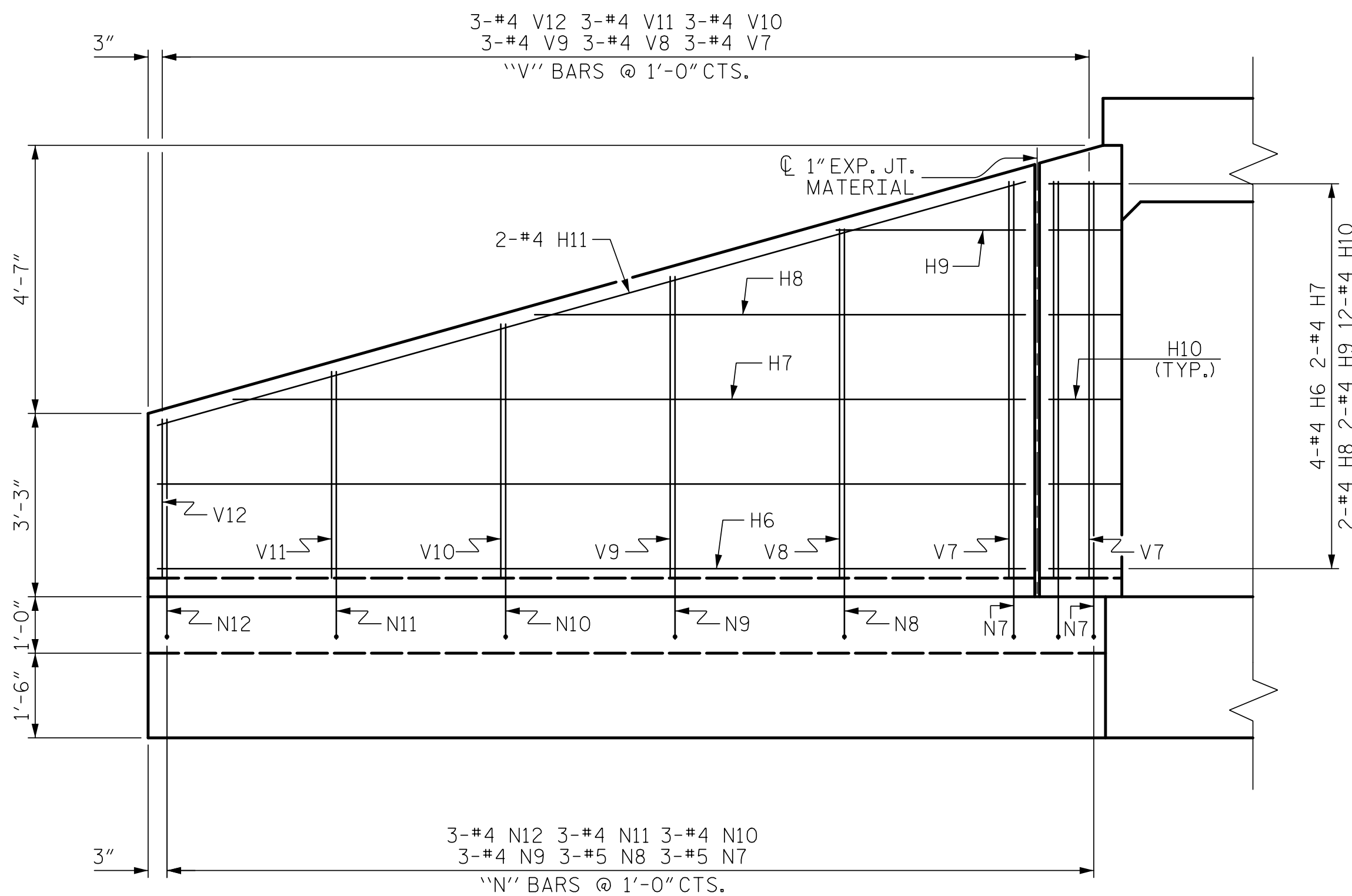
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CHECKED BY : MGC DATE : 8/22
DESIGN ENGINEER OF RECORD: ZCS DATE : 8/22

3/24/2023
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User:ZSmith

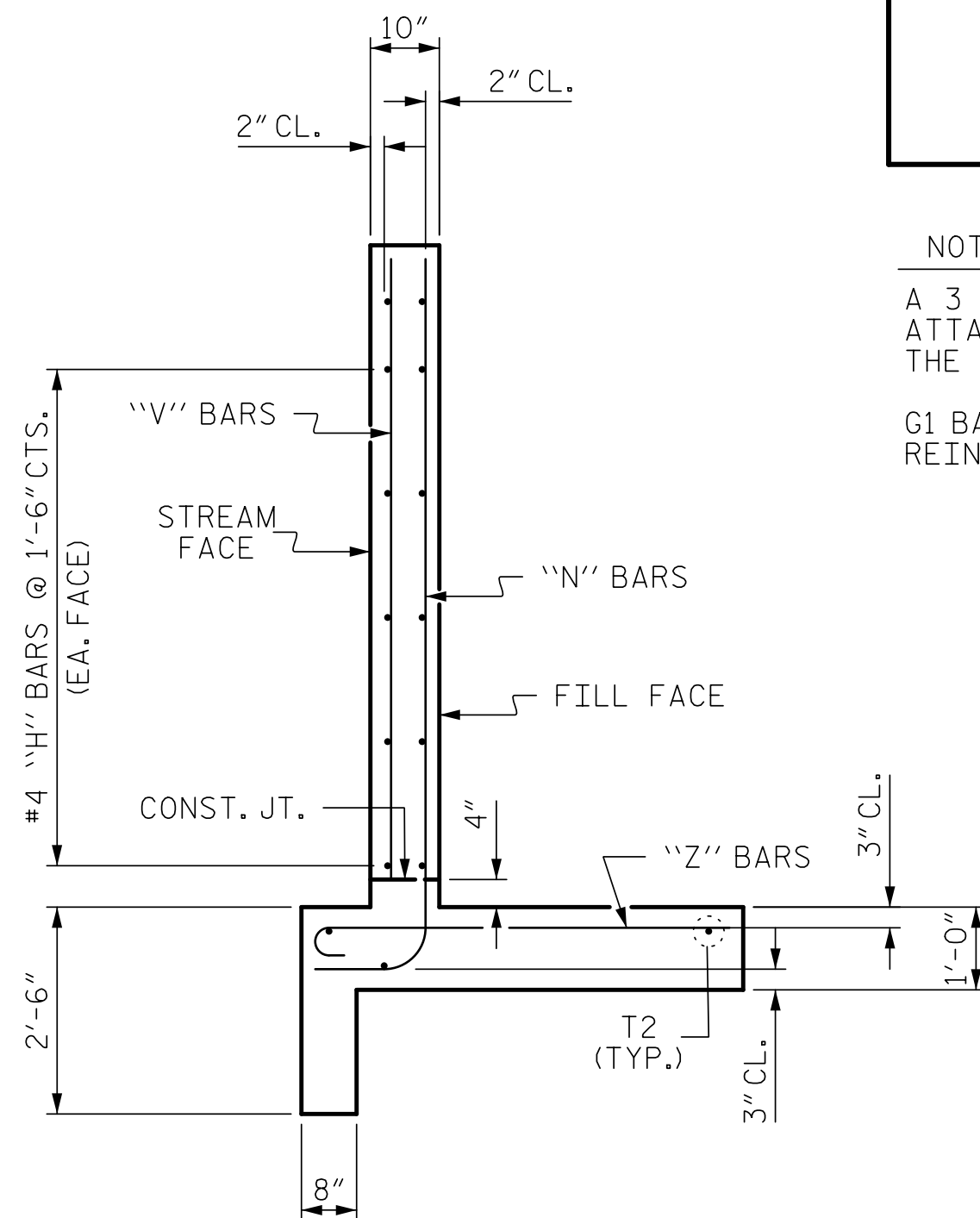
STR. #2



PLAN W1

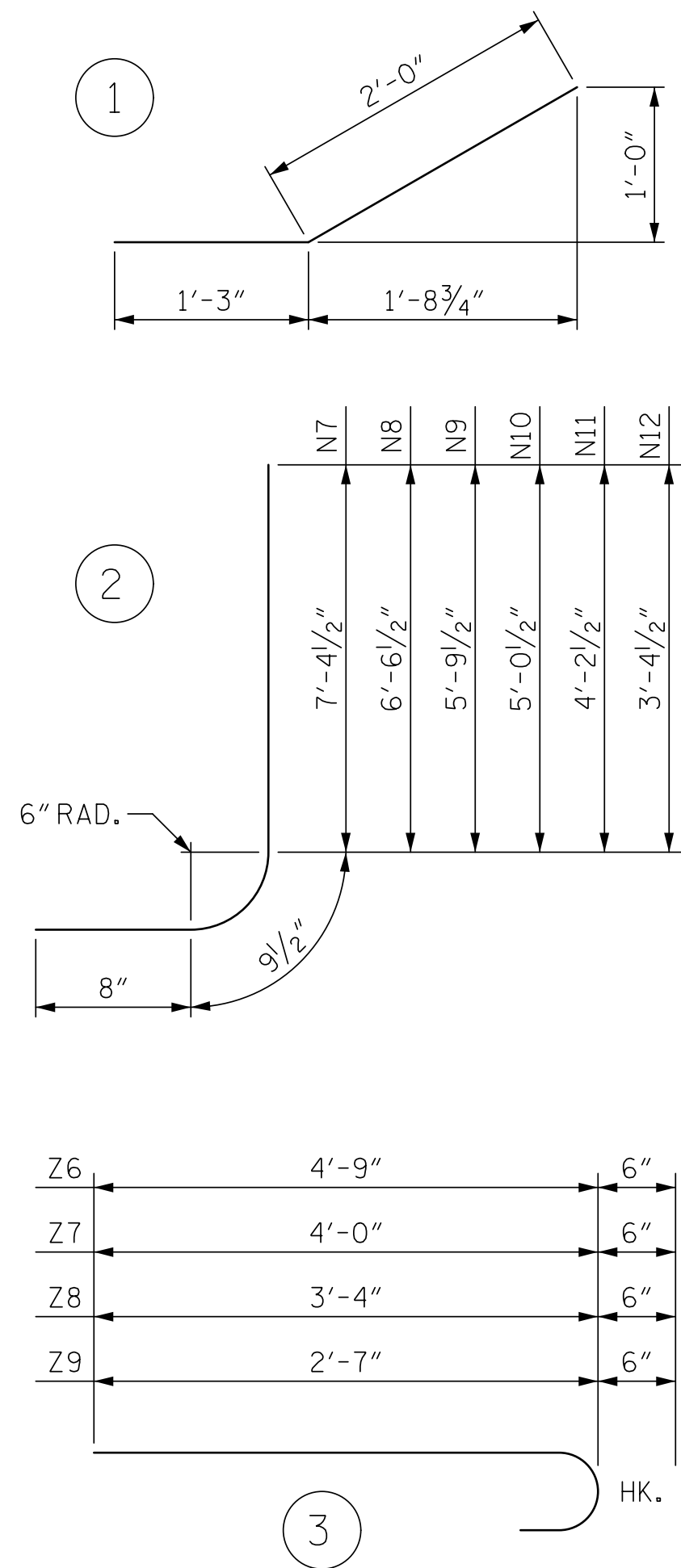


ELEVATION W1



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

NOTES

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.

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL REINFORCING STEEL.

BILL OF MATERIAL INLET WINGS

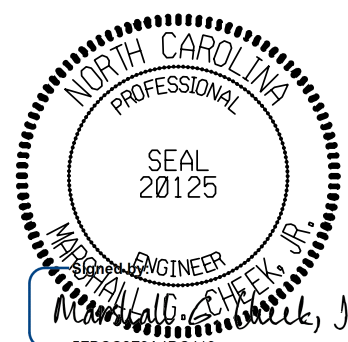
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	8	#4	STR	15'-4"	82
H7	4	#4	STR	14'-4"	38
H8	4	#4	STR	8'-8"	23
H9	4	#4	STR	3'-2"	8
H10	24	#4	1	3'-3"	52
H11	4	#4	STR	15'-11"	43
N7	6	#5	2	8'-10"	55
N8	6	#5	2	8'-0"	50
N9	6	#4	2	7'-3"	29
N10	6	#4	2	6'-6"	26
N11	6	#4	2	5'-8"	23
N12	6	#4	2	4'-10"	19
S1	6	#6	STR	6'-0"	54
T2	6	#5	STR	17'-3"	108
V7	6	#4	STR	6'-9"	27
V8	6	#4	STR	5'-11"	24
V9	6	#4	STR	5'-2"	21
V10	6	#4	STR	4'-4"	17
V11	6	#4	STR	3'-6"	14
V12	6	#4	STR	2'-9"	11
Z6	6	#4	3	5'-3"	21
Z7	10	#4	3	4'-6"	30
Z8	10	#4	3	3'-10"	26
Z9	10	#4	3	3'-1"	21

TOTAL REINFORCING STEEL FOR 2 WINGS 822 LBS

CLASS A CONCRETE
2 WINGS 12.9 CY
1 HEADWALL 0.6 CY
1 END CURTAIN WALL 0.7 CY
TOTAL 14.2 CY

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 8 OF 9



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INLET WINGS
FOR
CONCRETE BOX CULVERT
H = 7'-0" SLOPE = 3:1
90° SKEW

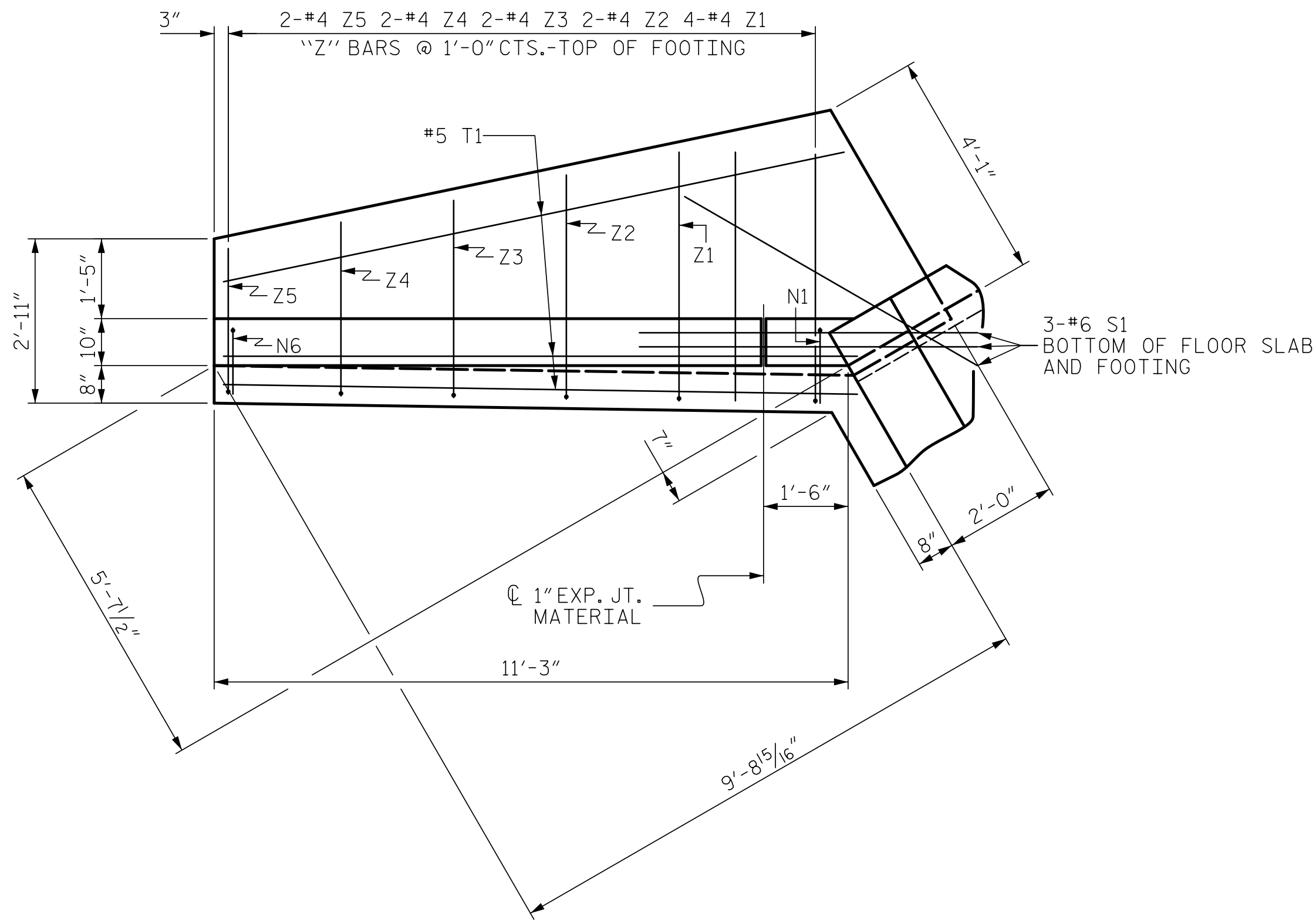
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CHECKED BY : MGC DATE : 8/22
DESIGN ENGINEER OF RECORD : ZCS DATE : 8/22

3/24/2023
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User:ZSmith

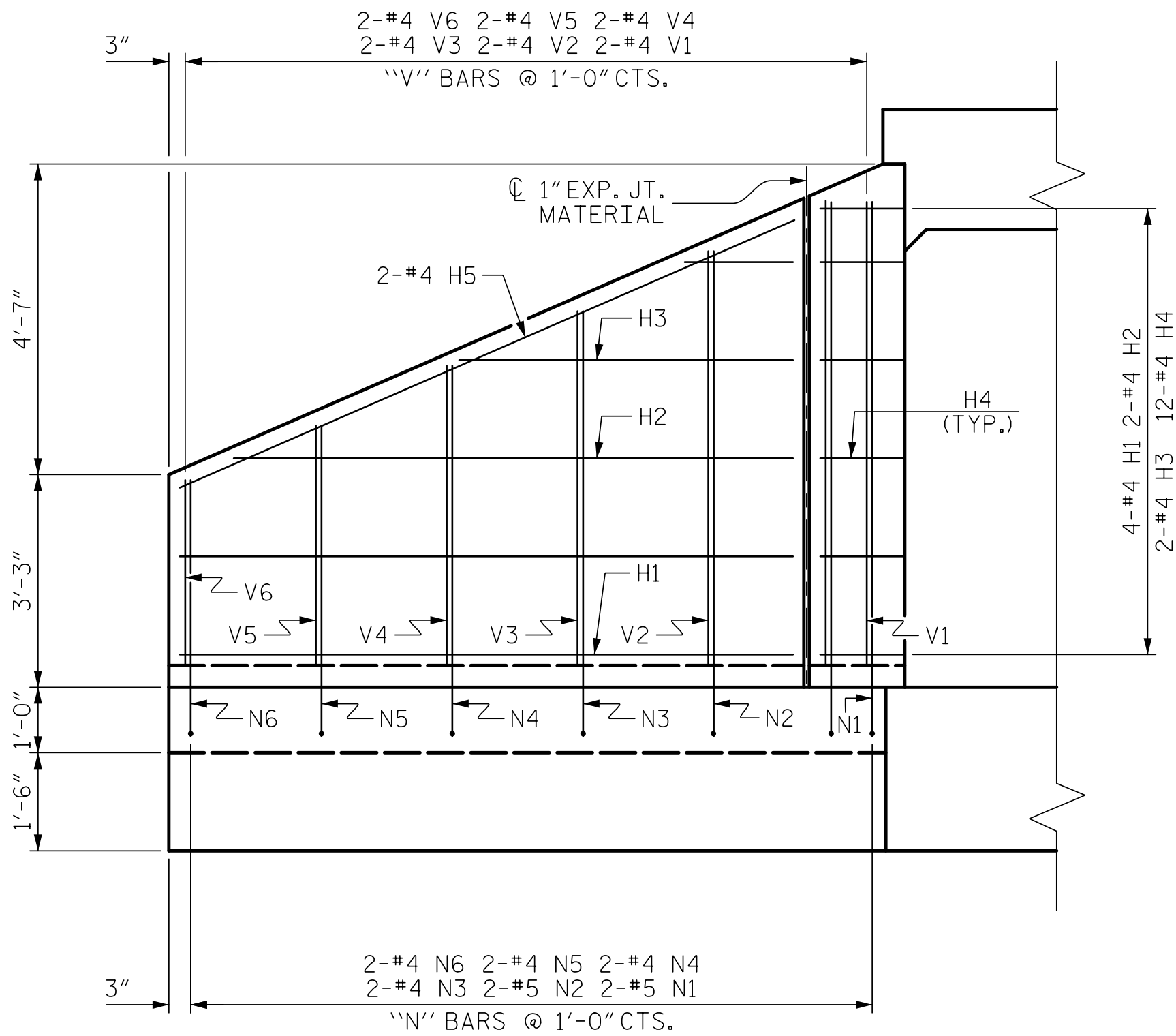
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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			TOTAL SHEETS 9

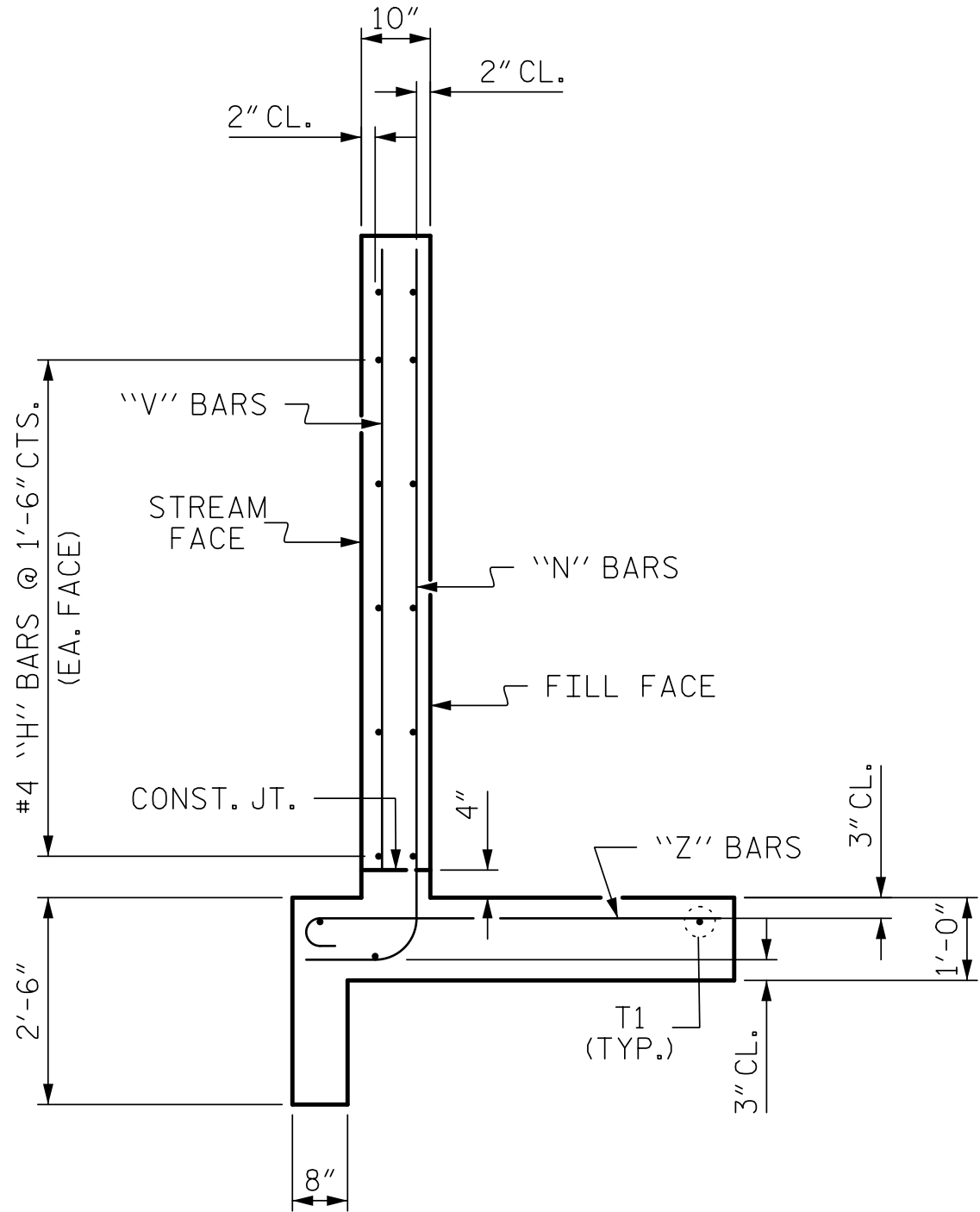
STR. #2



PLAN W2

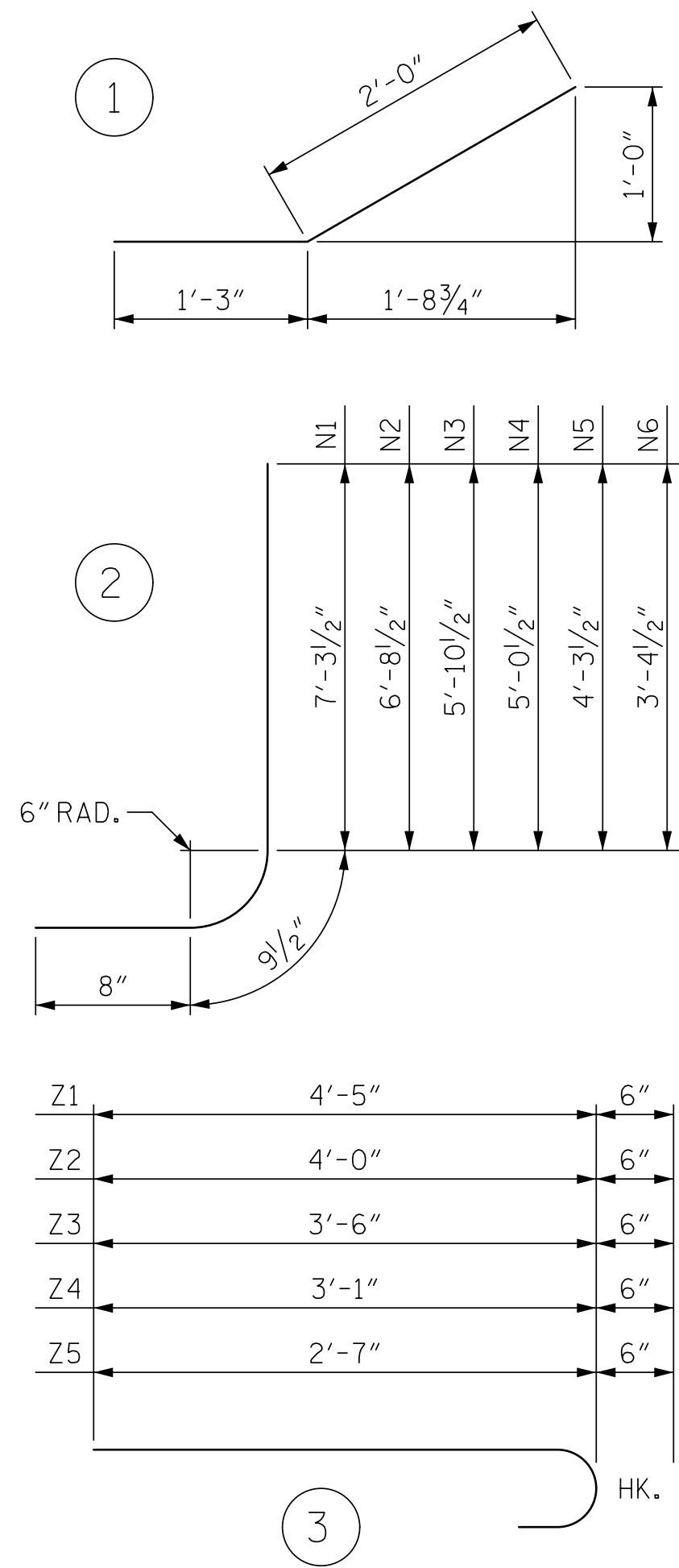


ELEVATION W2



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

NOTES

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.

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL REINFORCING STEEL.

BILL OF MATERIAL
OUTLET WINGS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-4"	50
H2	4	#4	STR	8'-6"	23
H3	4	#4	STR	5'-1"	14
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	10'-3"	27

N1	4	#5	2	8'-9"	37
N2	4	#5	2	8'-2"	34
N3	4	#4	2	7'-4"	20
N4	4	#4	2	6'-6"	17
N5	4	#4	2	5'-9"	15
N6	4	#4	2	4'-10"	13

S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	11'-3"	70

V1	4	#4	STR	6'-10"	18
V2	4	#4	STR	6'-1"	16
V3	4	#4	STR	5'-3"	14
V4	4	#4	STR	4'-5"	12
V5	4	#4	STR	3'-8"	10
V6	4	#4	STR	2'-10"	8

Z1	8	#4	3	4'-11"	26
Z2	4	#4	3	4'-6"	12
Z3	4	#4	3	4'-0"	11
Z4	4	#4	3	3'-7"	10
Z5	4	#4	3	3'-1"	8

TOTAL REINFORCING STEEL
FOR 2 WINGS 571 LBS

CLASS A CONCRETE
2 WINGS 8.6 CY
1 HEADWALL 0.6 CY
1 END CURTAIN WALL 0.7 CY
TOTAL 9.9 CY

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 280+87.40 -L-

SHEET 9 OF 9



7/23/2025

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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

OUTLET WINGS
FOR
CONCRETE BOX CULVERT
H = 7'-0" SLOPE = 2:1
90° SKEW

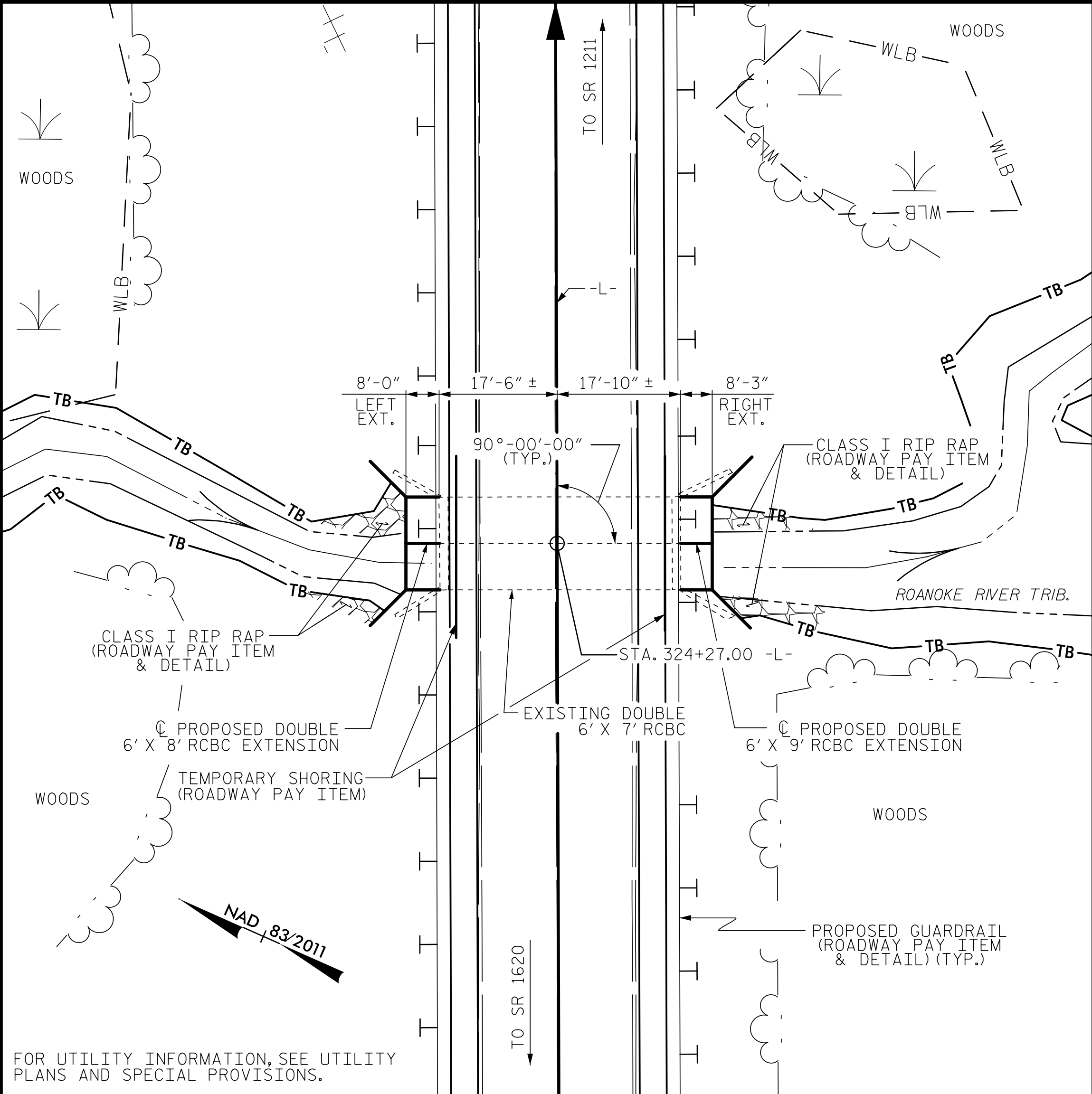
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NO.	BY:	DATE:	NO.	BY:	DATE:	C2-9	
1			3			TOTAL SHEETS	9
2			4				

STR. #2 STD. NO. CW9007

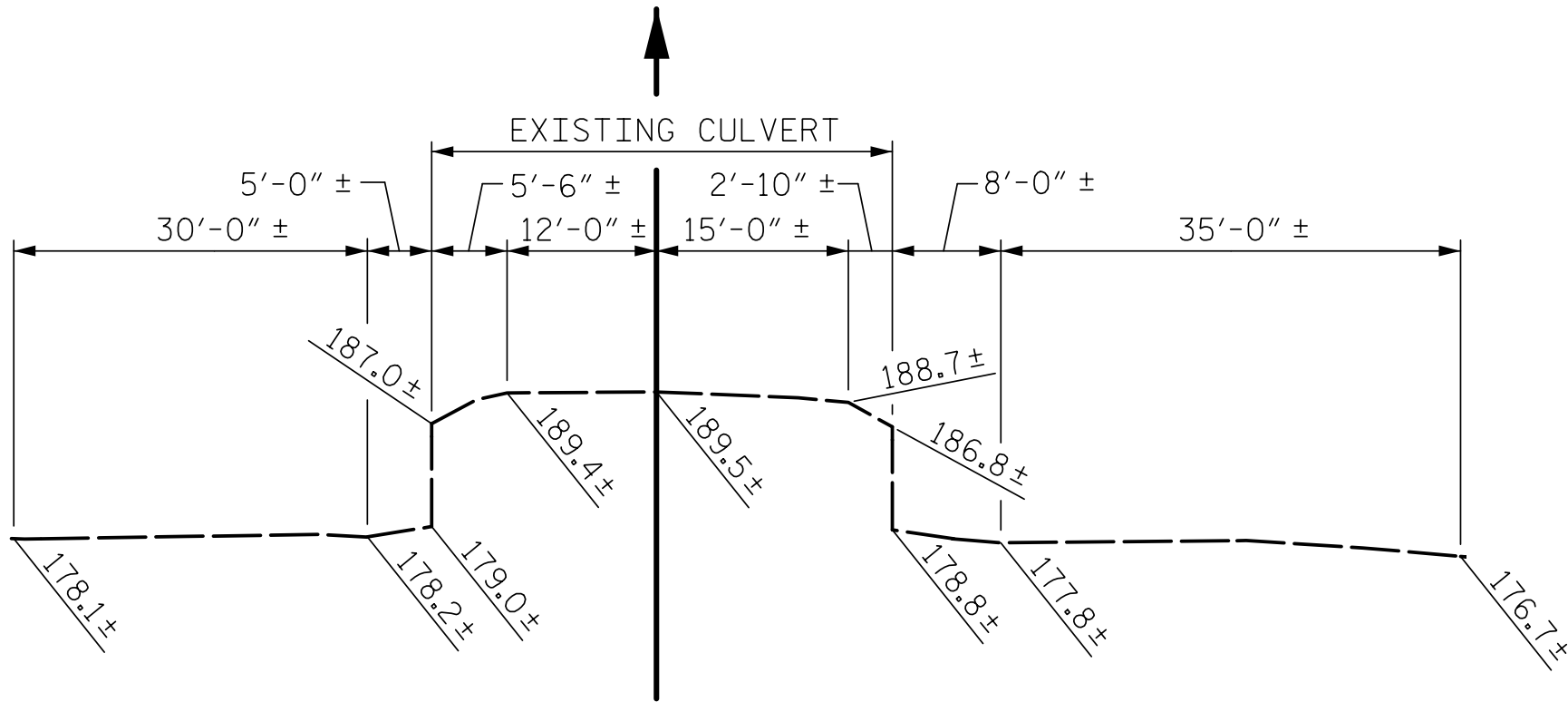
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CHECKED BY :	MGC	DATE :	8/22
DRAWN BY :	CCJ	IO/99	REV. 6/19
CHECKED BY :	RWW	03/00	MAA/THC

3/24/2023
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User:ZSmith

BENCH MARK: TBM ``J``: CHISELED X ON RCP
30.94' LT OF STA. 332+92.38 -L-; ELEV. 228.90



LOCATION SKETCH



PROFILE ALONG Q CULVERT

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
LEFT EXTENSION	23.2 C.Y.
RIGHT EXTENSION	27.4 C.Y.
TOTAL	50.6 C.Y.
REINFORCING STEEL	
LEFT EXTENSION	2,302 LBS
RIGHT EXTENSION	2,618 LBS
TOTAL	4,920 LBS
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	
LEFT EXTENSION	10 TONS
RIGHT EXTENSION	10 TONS
TOTAL	20 TONS

ROADWAY DATA

GRADE POINT ELEV. @ STA. 324+27.00 -L- = 189.86'
BED ELEV. @ STA. 324+27.00 -L- = 178.95'
ROADWAY SLOPES = 2:1

HYDROGRAPHIC DATA

DESIGN DISCHARGE = 1000 CFS
FREQUENCY OF DESIGN FLOOD = 50 YRS
DESIGN HIGH WATER ELEVATION = 188.5'
DRAINAGE AREA = 2.02 SQ. MI.
BASE DISCHARGE (Q100) = 1200 CFS
BASE HIGH WATER ELEVATION = 190.0'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 1140 CFS
FREQUENCY OF OVERTOPPING FLOOD = 100- YRS
OVERTOPPING FLOOD ELEVATION = 189.8'

NOTES:

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

DESIGN FILL----- 3' MAX.

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTES SHEET.

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

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. PHASE I WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF PHASE I WALLS AND PHASE I WINGS FULL HEIGHT.
3. PHASE II WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE II VERTICAL WALLS.
4. THE REMAINING PORTIONS OF PHASE II WALLS AND PHASE II WINGS FULL HEIGHT.
5. ROOF SLAB AND HEADWALLS.

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

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

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

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSION. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

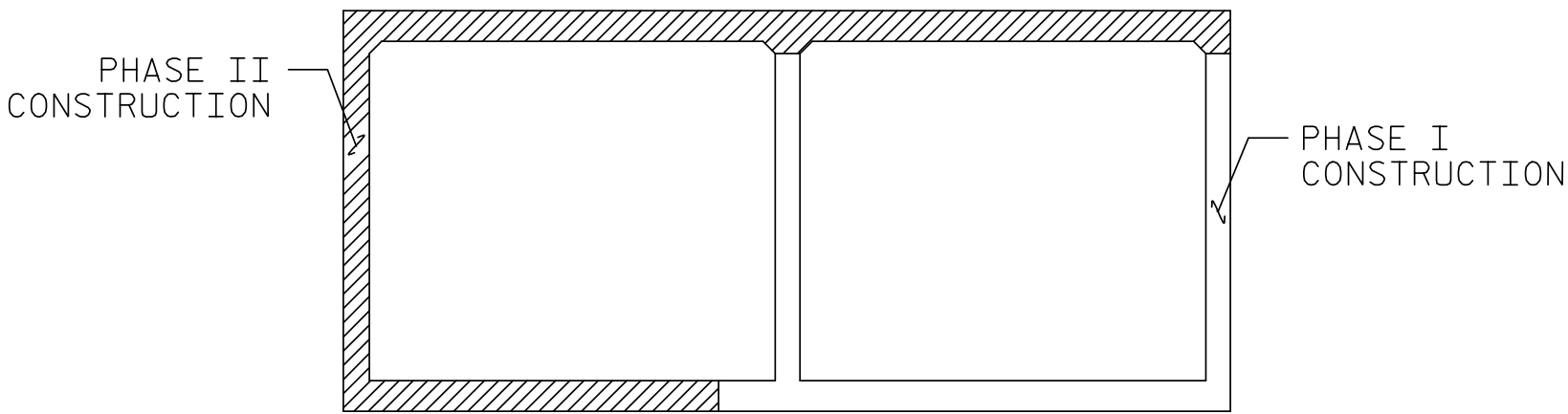
AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR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

EXCAVATE 1 FOOT BELOW CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS. FOUNDATION CONDITIONING MATERIAL SHOULD CONSIST OF SELECT MATERIAL CLASS V OR VI FOR CULVERTS.

DOWELS SHALL BE USED TO CONNECT THE PROPOSED EXTENSIONS TO THE EXISTING CULVERT. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

FOR TRAFFIC PHASING, SEE TRAFFIC CONTROL PLANS.

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.



CONSTRUCTION PHASING

(LOOKING UPSTREAM)

- PHASE I CONSTRUCTION
- PHASE II CONSTRUCTION

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 324+27.00 -L-

SHEET 1 OF 10

	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH DOUBLE 6' X 8' RCBC LEFT EXT. & 6' X 9' RCBC RIGHT EXT. 90° SKEW					
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-1
1			3			TOTAL SHEETS
2			4			10

STR *3

DRAWN BY : ZCS DATE : 6/22
CHECKED BY : MGC DATE : 1/23
DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

10/18/2023
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User:ZSmith

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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	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	1.27	--	1.75	1.27	1	TOP SLAB	3.33	1.38	1	TOP SLAB	6.50	
	HL-93 (OPERATING)	N/A		1.65	--	1.35	1.65	1	TOP SLAB	3.33	1.79	1	TOP SLAB	6.50	
	HS-20 (INVENTORY)	36.000	2	1.34	48.24	1.75	1.34	1	BOTT. SLAB	6.33	1.61	1	TOP SLAB	6.50	
	HS-20 (OPERATING)	36.000		1.74	62.64	1.35	1.74	1	BOTT. SLAB	6.33	2.09	1	TOP SLAB	6.50	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.32	31.32	1.40	2.32	1	TOP SLAB	3.33	2.53	1	TOP SLAB	6.50	
		SNGARBS2		2.17	43.40	1.40	2.17	1	TOP SLAB	3.33	2.37	1	TOP SLAB	6.50	
		SNAGRIS2		2.32	51.04	1.40	2.32	1	TOP SLAB	3.33	2.53	1	TOP SLAB	6.50	
		SNCOTTS3		1.61	43.87	1.40	1.61	1	BOTT. SLAB	6.33	1.94	1	TOP SLAB	6.50	
		SNAGGRS4		1.63	56.93	1.40	1.63	1	BOTT. SLAB	6.33	2.26	1	BOTT. SLAB	6.67	
		SNS5A		1.83	65.06	1.40	1.83	1	BOTT. SLAB	6.33	2.52	1	BOTT. SLAB	6.67	
		SNS6A	3	1.58	63.12	1.40	1.58	1	BOTT. SLAB	6.33	2.20	1	TOP SLAB	6.50	
		SNS7B		1.58	66.36	1.40	1.58	1	BOTT. SLAB	6.33	2.16	1	TOP SLAB	6.50	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3		1.99	65.67	1.40	1.99	1	BOTT. SLAB	6.33	2.42	1	TOP SLAB	6.50	
		TNT4A		1.88	62.18	1.40	1.88	1	BOTT. SLAB	6.33	2.29	1	TOP SLAB	6.50	
		TNT6A		1.71	71.14	1.40	1.71	1	BOTT. SLAB	6.33	2.21	1	TOP SLAB	6.50	
		TNT7A		1.84	77.28	1.40	1.84	1	BOTT. SLAB	6.33	2.26	1	TOP SLAB	6.50	
		TNT7B		1.61	67.62	1.40	1.61	1	BOTT. SLAB	6.33	2.17	1	TOP SLAB	6.50	
		TNAGRIT4		1.84	79.12	1.40	1.84	1	BOTT. SLAB	6.33	2.27	1	TOP SLAB	6.50	
		TNAGT5A		1.84	82.80	1.40	1.84	1	BOTT. SLAB	6.33	2.27	1	TOP SLAB	6.50	
		TNAGT5B		1.84	82.80	1.40	1.84	1	BOTT. SLAB	6.33	2.28	1	TOP SLAB	6.50	
EMERGENCY VEHICLE (EV)	EV2		1.64	47.15	1.30	1.64	1	TOP SLAB	3.33	1.80	1	TOP SLAB	6.50		
	EV3	4	1.40	60.20	1.30	1.40	1	BOTT. SLAB	6.33	1.68	1	TOP SLAB	6.50		

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

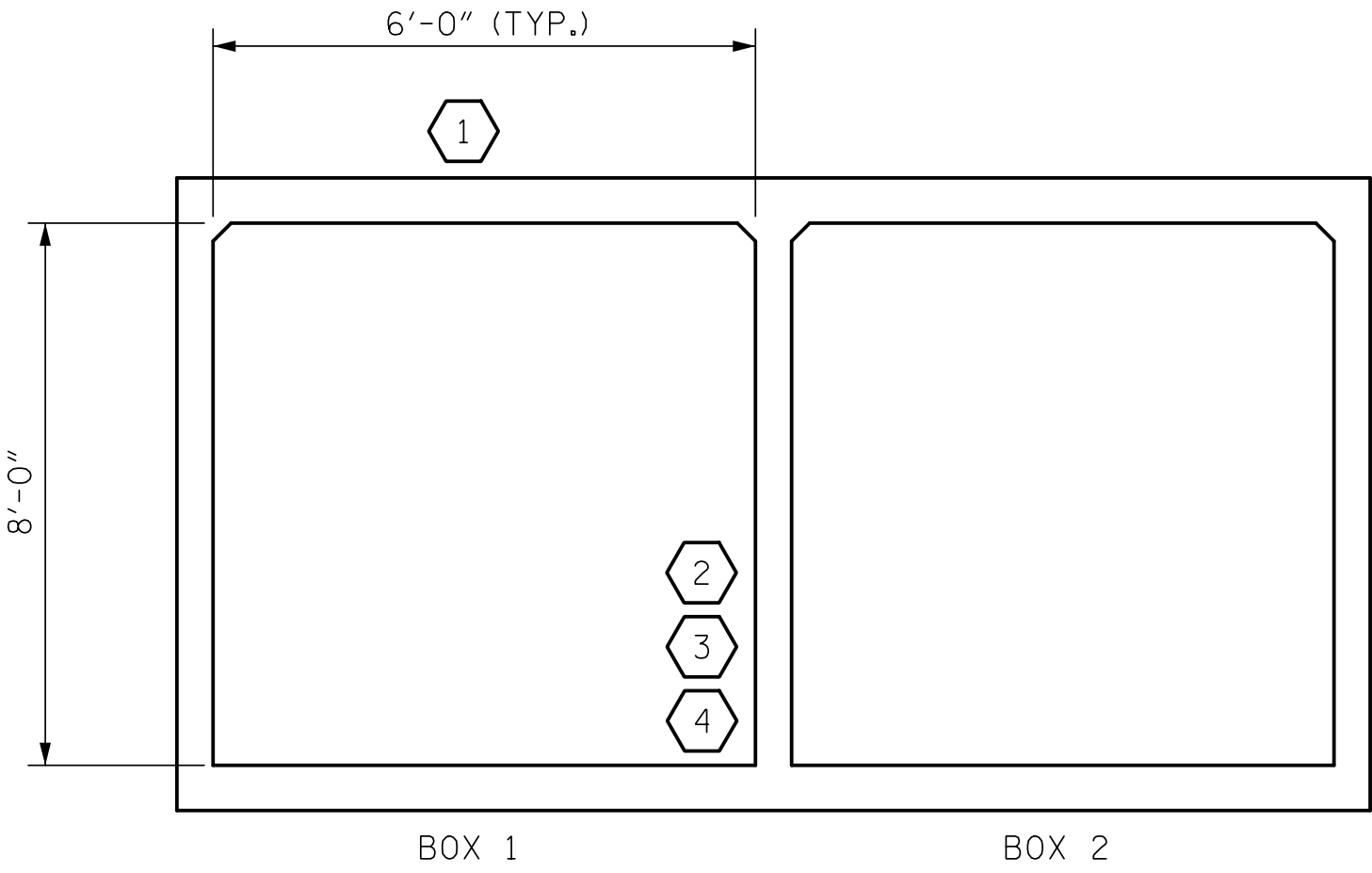
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

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2.
3.
4.

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



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 324+27.00 -L-

SHEET 2 OF 10

ASSEMBLED BY :	ZCS	DATE :	07/23
CHECKED BY :	MGC	DATE :	11/23
DRAWN BY :	WMC	7/II	REV. 10/1/II
CHECKED BY :	GM	7/II	REV. 12/1/II
			MAA/GM
			REV. 04/23
			MAA/THC
			BNB/AAI

11/23/2023
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 STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC) LEFT EXTENSION 7/23/2025 SEAL 20125 ENGINEER Marshall G. Goches, Jr. Professional Engineer 7/23/2025 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275		REVISIONS						SHEET NO.
		NO.	BY:	DATE:	NO.	BY:	DATE:	C3-2
		1			3			TOTAL SHEETS
		2			4			10

STR. #3

STD. NO. LRFR5

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11/29/2023
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NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

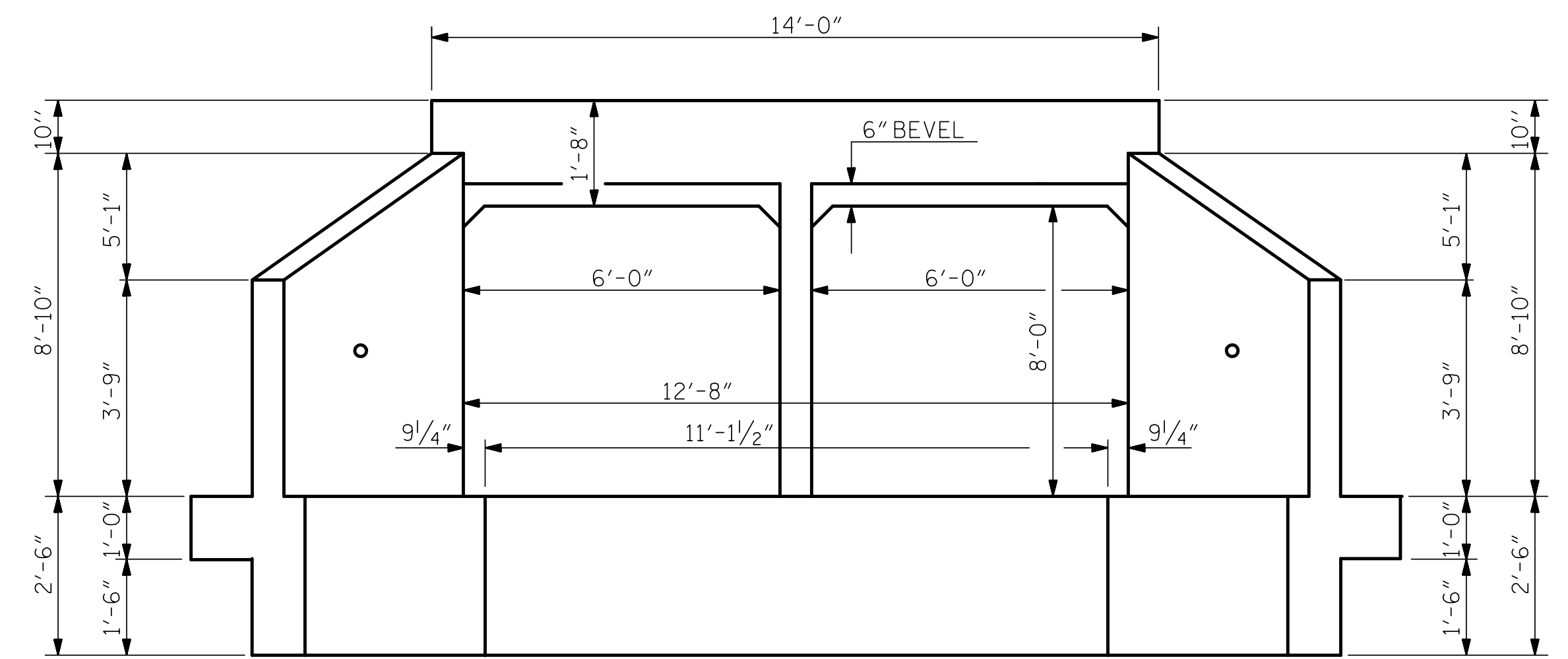
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PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 324+27.00 -L-

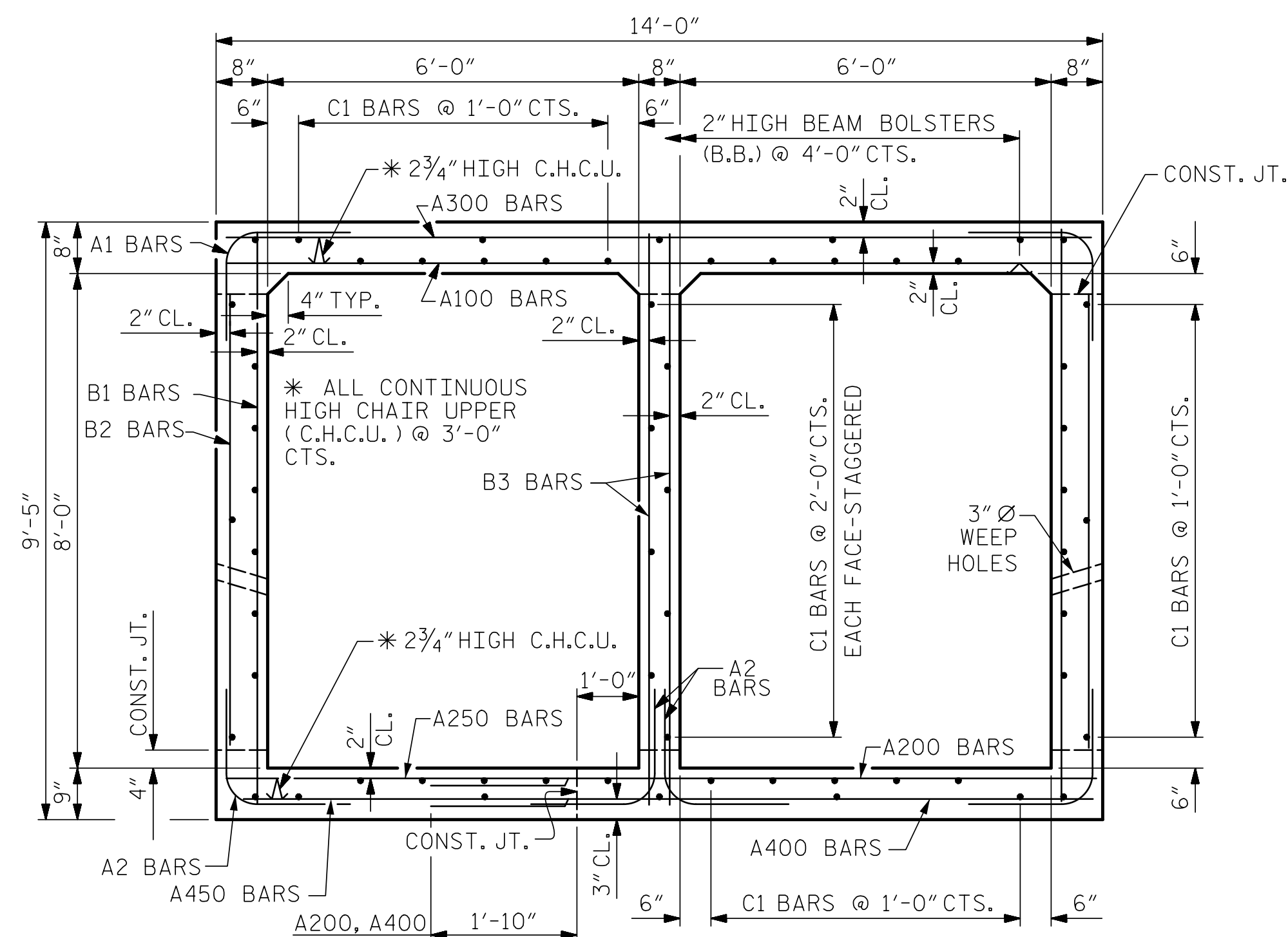
SHEET 3 OF 10

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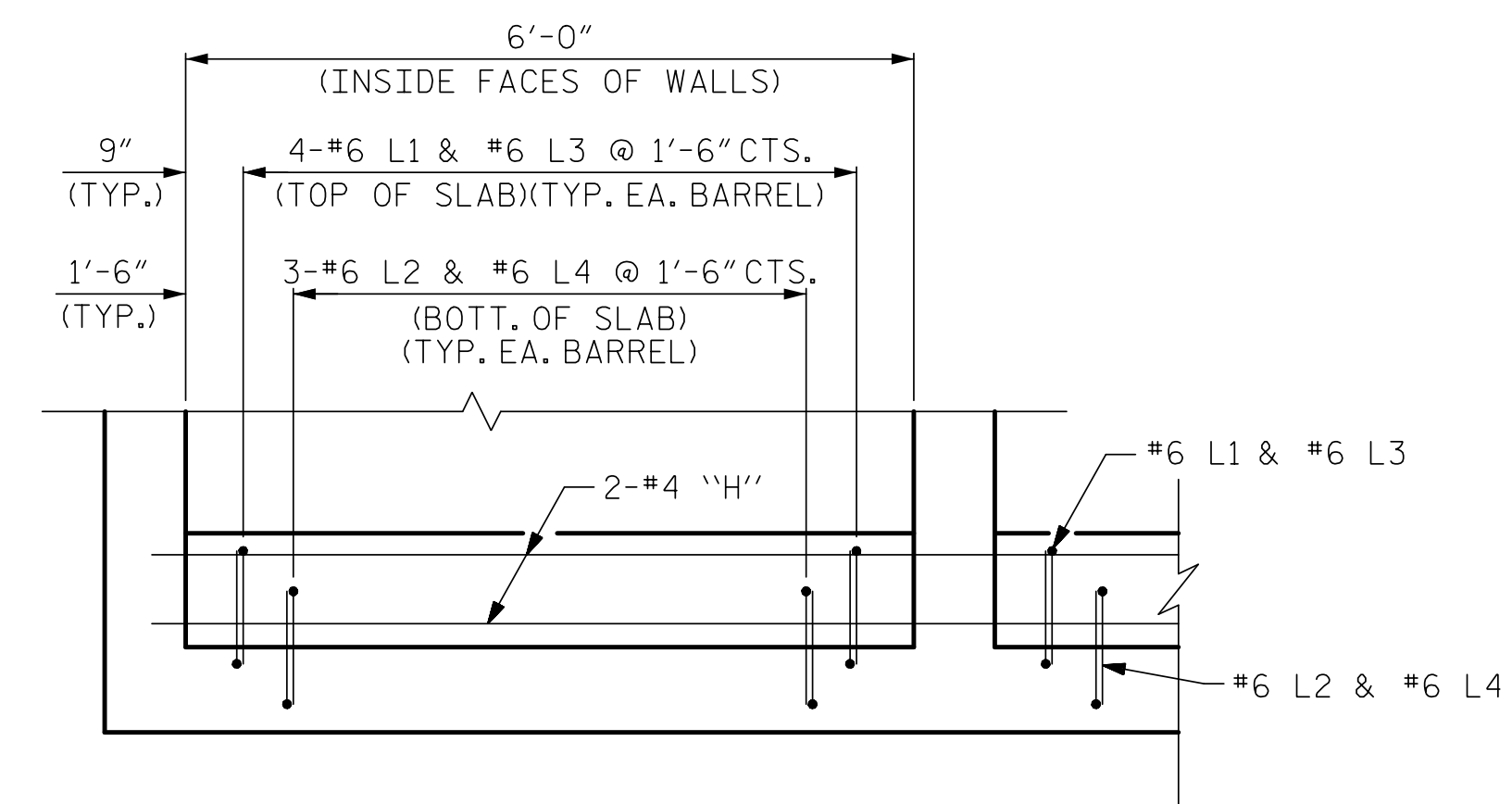
STD. NO. LRFR5



INTERIOR WALL EXTERIOR WALL  X
CULVERT EXTENSION SECTION NORMAL TO ROADWAY



THERE ARE 60 "C" BARS IN SECTION OF BARREL.
(LOOKING UPSTREAM)

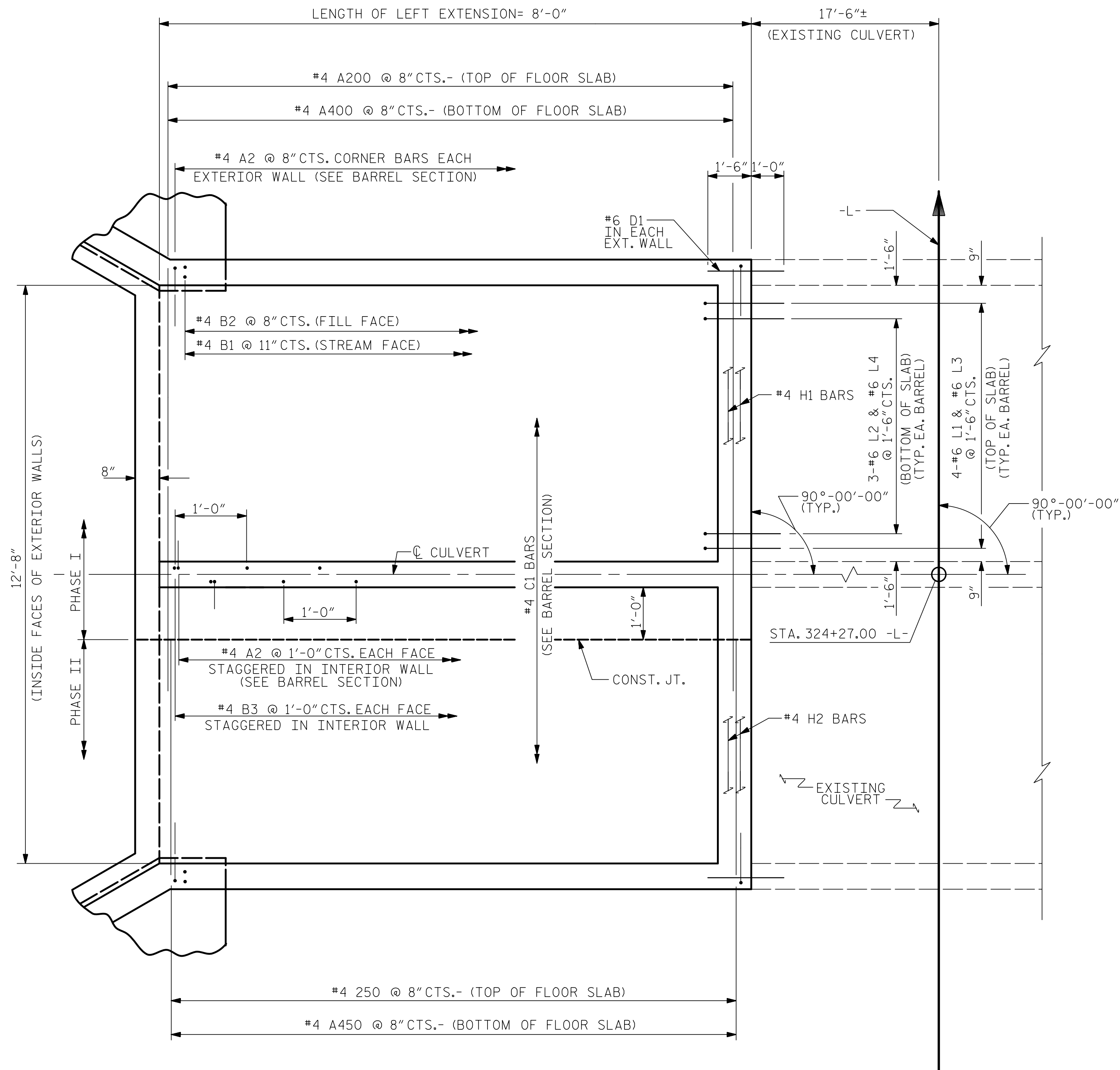


SECTION X-X

SHEET 4 OF 10

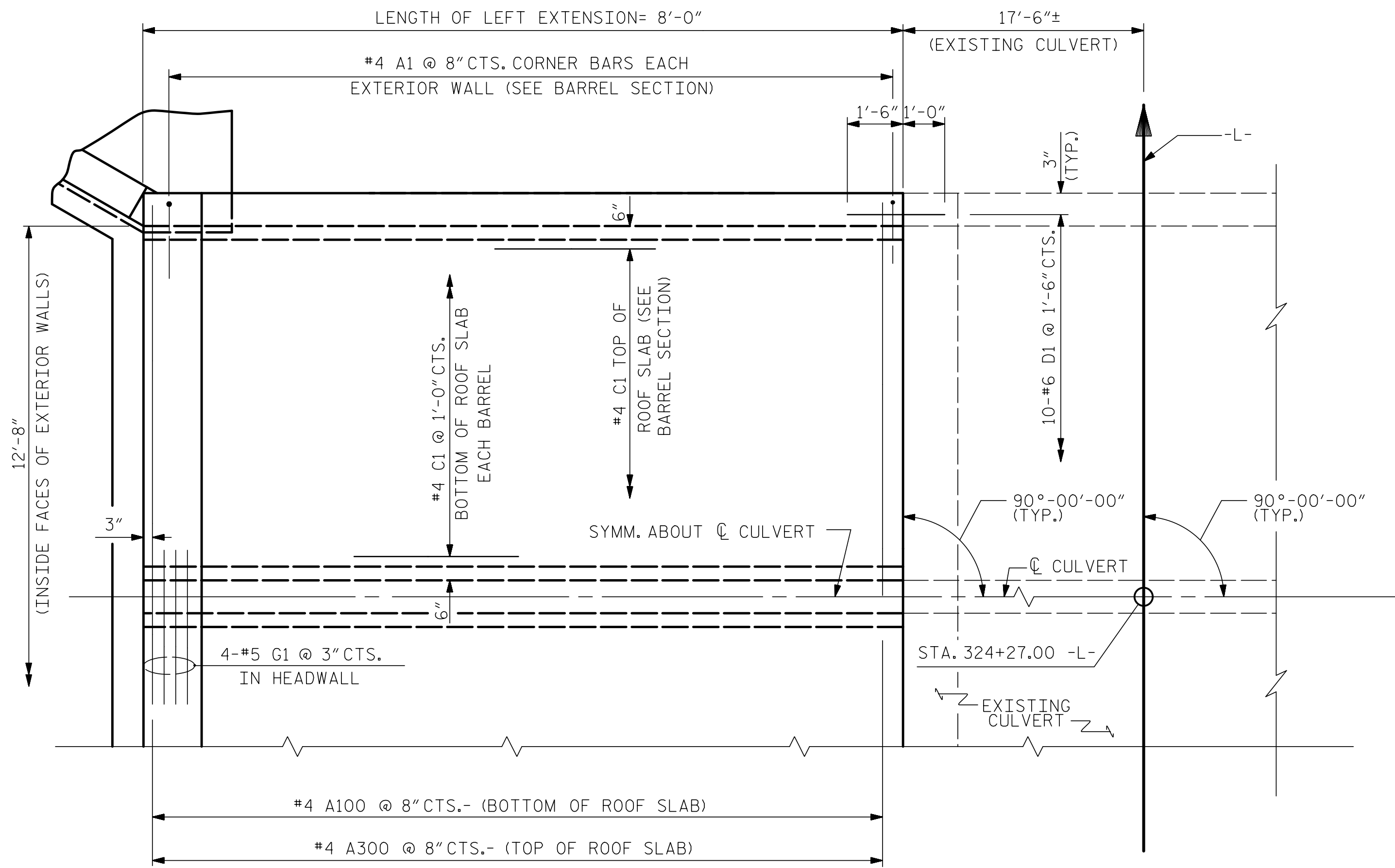
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STR. #3



PLAN-FLOOR SLAB

FOR S1 BARS IN FLOOR SLAB & WING FOOTING, SEE WING SHEET.



PART PLAN-ROOF SLAB

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 324+27.00 -L-

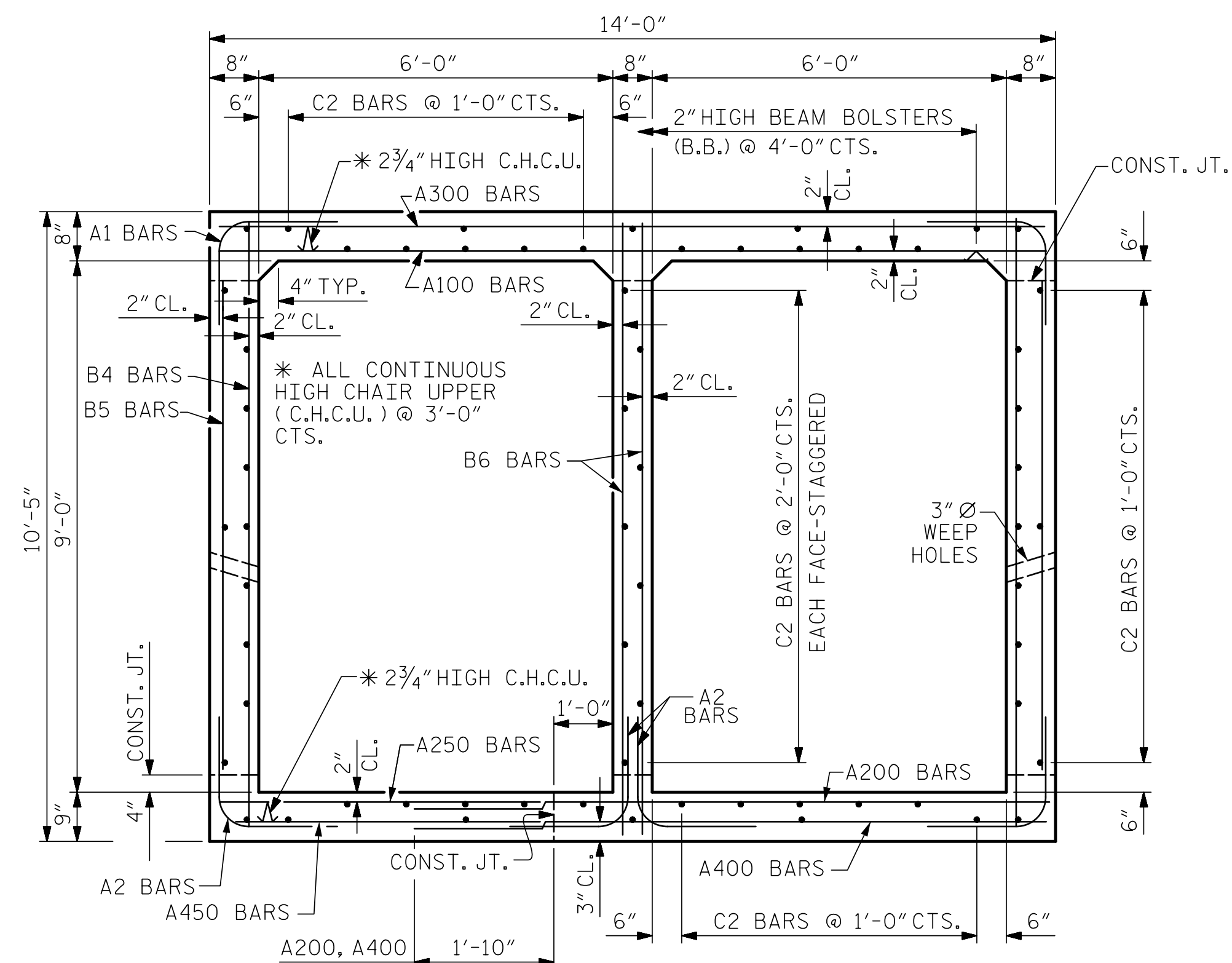
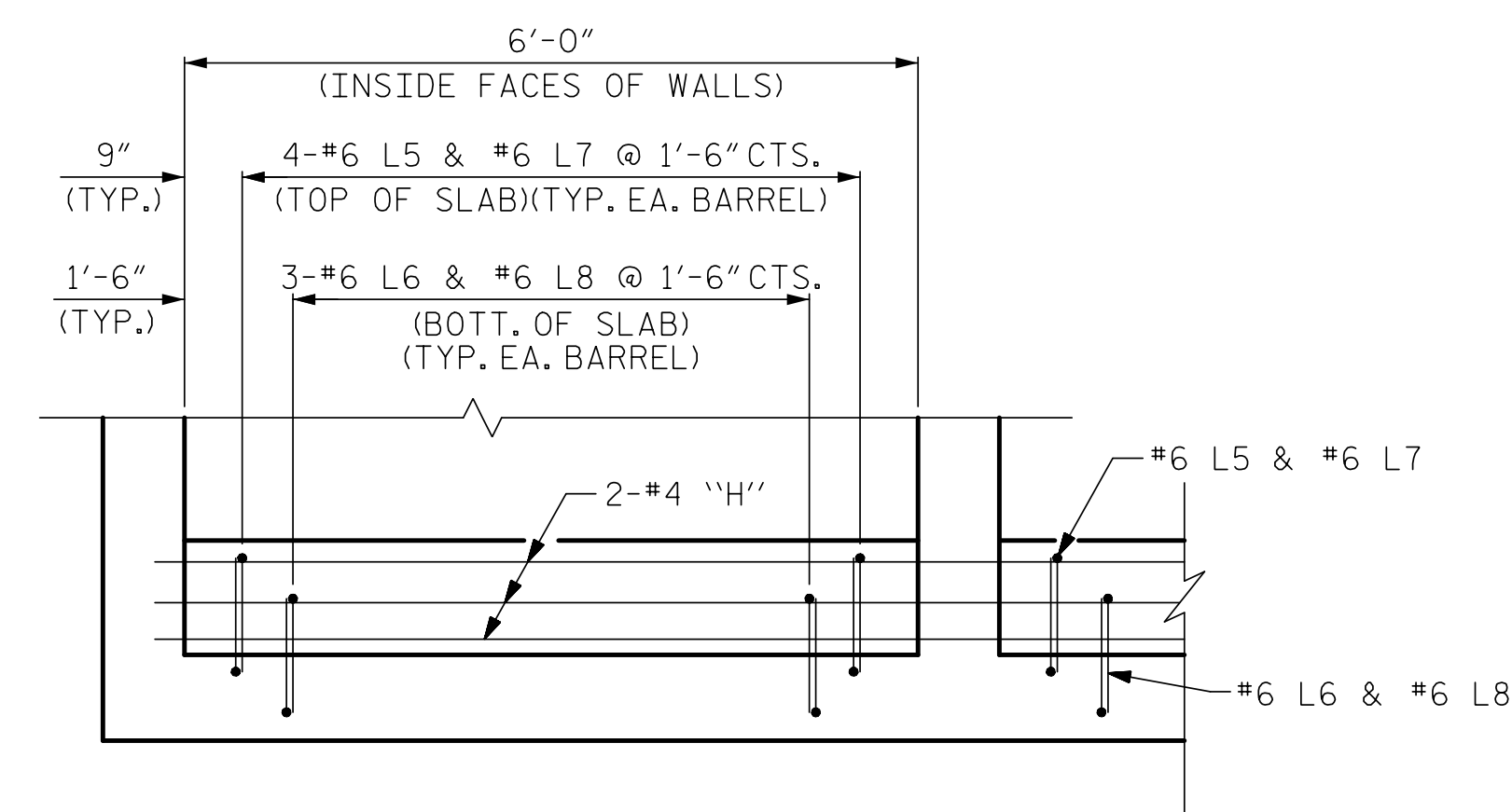
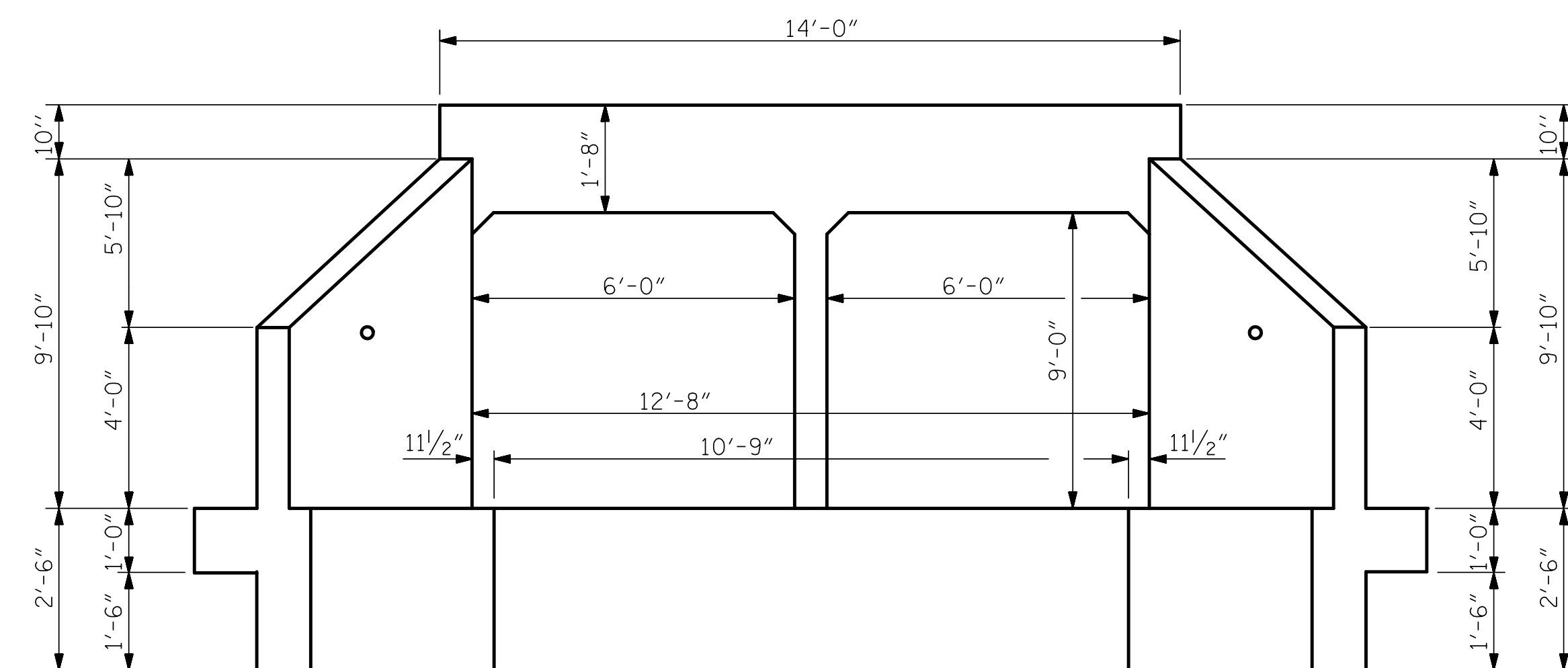
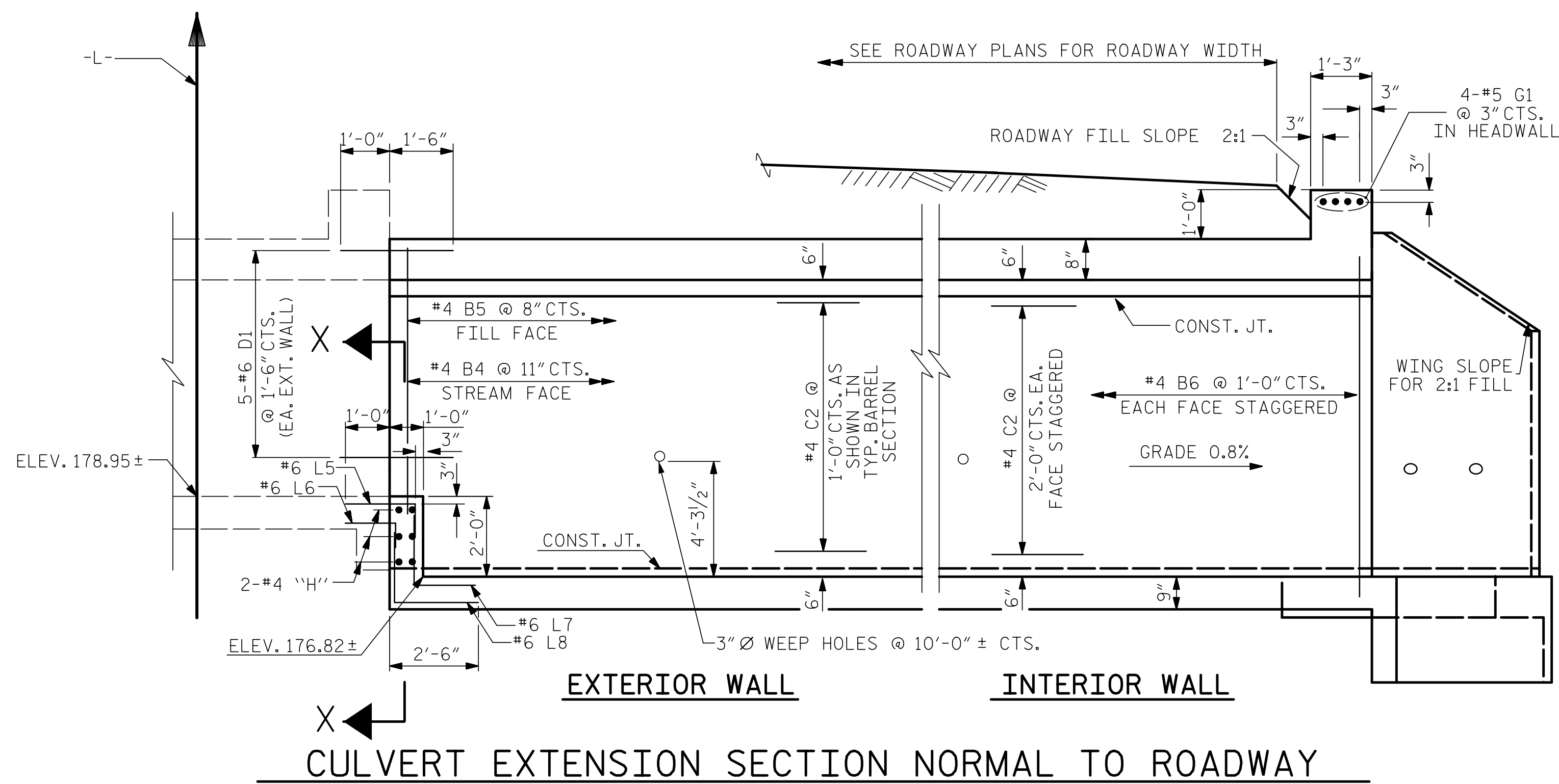
SHEET 5 OF 10

 7/23/2025		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH											
		DOUBLE 6 FT. X 8 FT. CONCRETE BOX CULVERT LEFT EXTENSION 90° SKEW											
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED							TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275			REVISIONS		SHEET NO. C3-5	
NO.		BY:		DATE:		NO.		BY:		DATE:		TOTAL SHEETS 10	
1						3							
2						4							

ASSEMBLED BY : ZCS DATE : 6/22
CHECKED BY : MGC DATE : 7/22
DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

11/28/2023
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User:zsmith

STR. #3

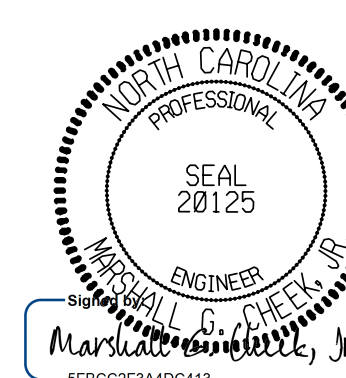


RIGHT ANGLE SECTION OF BARREL

THERE ARE 63 "C" BARS IN SECTION OF BARREL.
(LOOKING UPSTREAM)

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 324+27.00 -L-

SHEET 6 OF 10



7/23/2025

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOUBLE 6 FT. X 9 FT.
 CONCRETE BOX CULVERT
 RIGHT EXTENSION
 90° SKEW

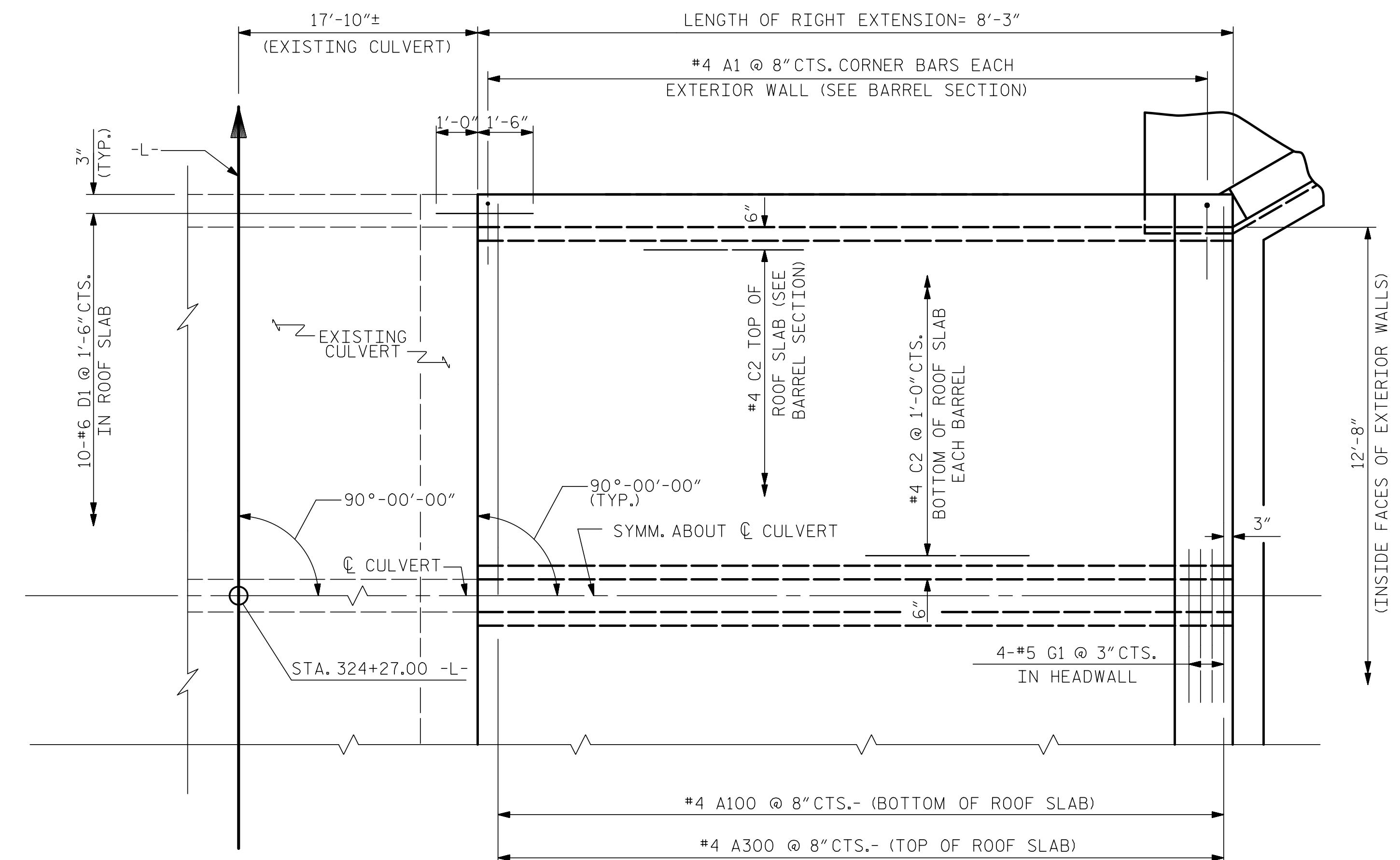
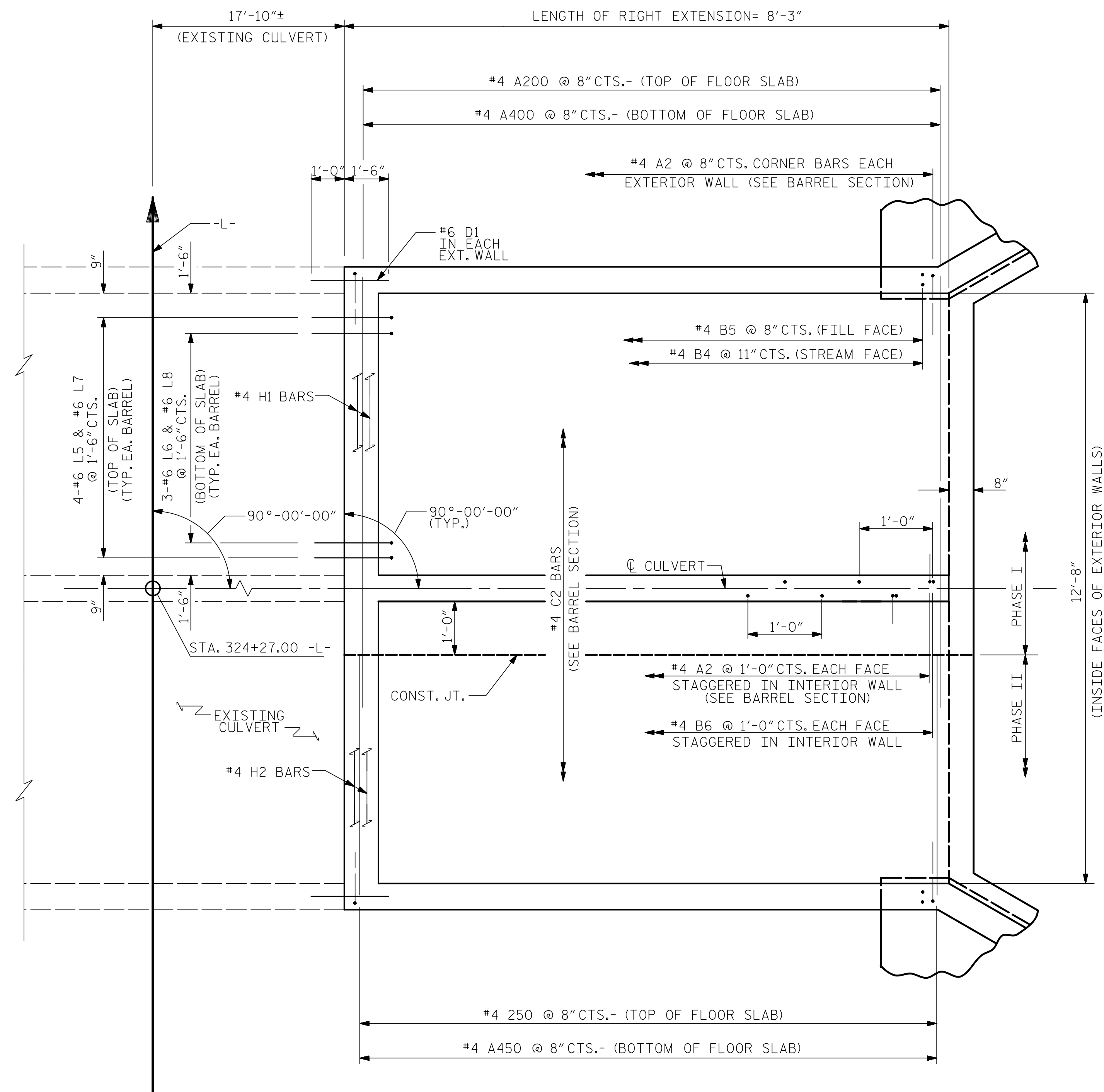
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 RALEIGH, NC 27603
 PH (919) 773-8887
 CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C3-6
2			4			TOTAL SHEETS
						10

ASSEMBLED BY : ZCS DATE : 5/22
 CHECKED BY : MGC DATE : 7/22
 DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

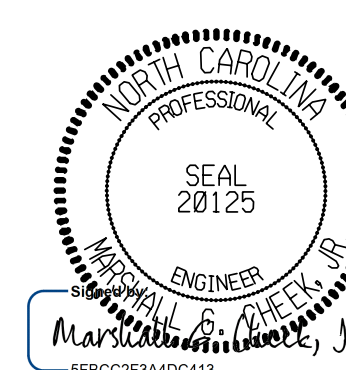
11/23/2023
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 User:zsmith

STR. #3



PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 324+27.00 -L-

SHEET 7 OF 10



7/23/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 6 FT. X 9 FT.
CONCRETE BOX CULVERT
RIGHT EXTENSION
90° SKEW

ASSEMBLED BY :	ZCS	DATE :	6/22
CHECKED BY :	MGC	DATE :	7/22
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

11/29/2023
X:\NC00T\R-5739\Structures\Str. #3 (324 + 27.00 -L-)\Final Plans\DGNS\413-001-R-5739-SMU-C3-7.dgn
User:ZSmith

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

ID	REVISIONS						SHEET NO.
	NO.	BY:	DATE:	NO.	BY:	DATE:	C3-7
	1			3			TOTAL SHEETS
ET	2			4			10
75							

STR. #3

LEFT EXTENSION QUANTITIES			
CLASS A CONCRETE			
BARREL @	1.34	CY/FT	10.7 C.Y.
WINGS, ETC.			12.0 C.Y.
BOTTOM SLAB STEP			0.5 C.Y.
TOTAL			23.2 C.Y.
REINFORCING STEEL			
BARREL			1,586 LBS.
WINGS, ETC.			716 LBS.
TOTAL			2,302 LBS.
CULVERT EXCAVATION			LUMP SUM
FOUNDATION COND. MAT'L.			10 TONS

RIGHT EXTENSION QUANTITIES			
CLASS A CONCRETE			
BARREL @	1.41	CY/FT	11.6 C.Y.
WINGS, ETC.			14.4 C.Y.
SILLS			0.4 C.Y.
BOTTOM SLAB STEP			1.0 C.Y.
TOTAL			27.4 C.Y.
REINFORCING STEEL			
BARREL			1,727 LBS.
WINGS, ETC.			891 LBS.
TOTAL			2,618 LBS.
CULVERT EXCAVATION			LUMP SUM
FOUNDATION COND. MAT'L.			10 TONS

LEFT EXTENSION BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	24	#4	4	4'-10"	77
A2	40	#4	4	4'-6"	120
A100	12	#4	STR	13'-8"	110
A200	12	#4	STR	10'-2"	81
A250	12	#4	STR	5'-5"	43
A300	12	#4	STR	13'-8"	110
A400	12	#4	STR	10'-2"	81
A450	12	#4	STR	5'-5"	43
B1	18	#4	STR	9'-0"	108
B2	24	#4	STR	7'-4"	118
B3	16	#4	STR	9'-0"	96
C1	60	#4	STR	7'-8"	307
D1	20	#6	STR	2'-6"	75
G1	4	#5	STR	13'-8"	57
H1	4	#4	STR	10'-2"	27
H2	4	#4	STR	5'-5"	14
L1	8	#6	5	2'-9"	33
L2	6	#6	5	2'-5"	22
L3	8	#6	6	2'-9"	33
L4	6	#6	6	3'-5"	31
REINFORCING STEEL					1,586 LBS

BAR TYPE

⑤

⑥

DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
``B''	#4	1'-10"
A200	#4	1'-10"
A400	#4	1'-10"
``H''	#4	1'-10"

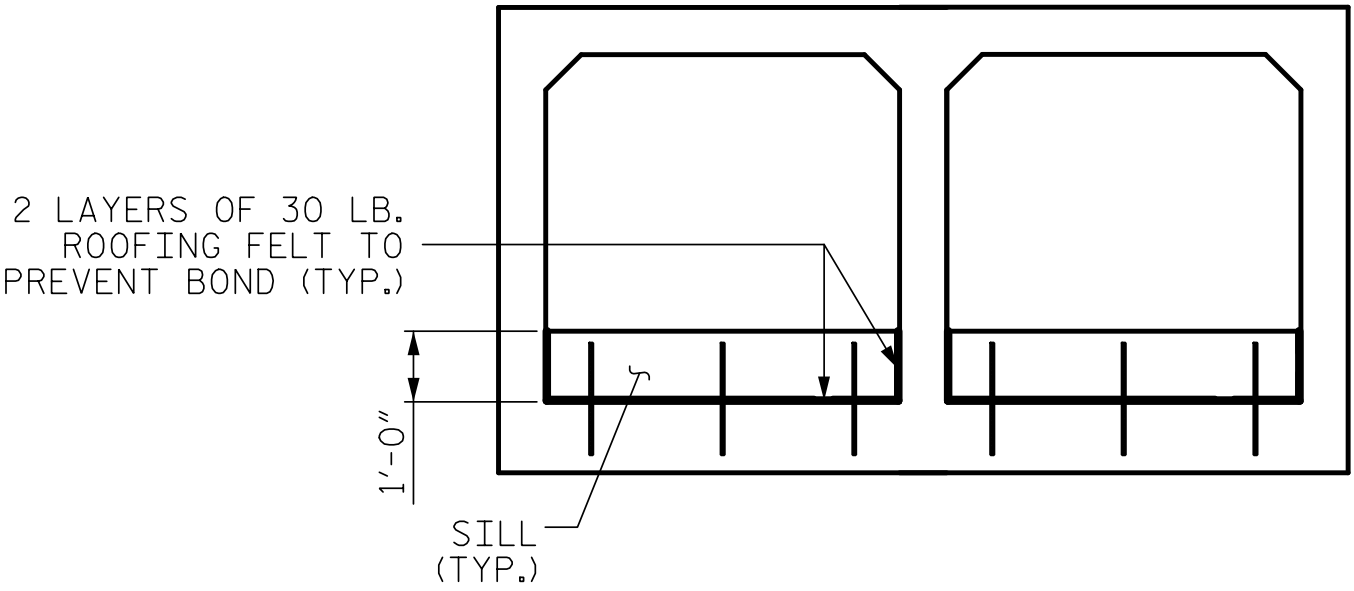
RIGHT EXTENSION BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	24	#4	4	4'-10"	77
A2	40	#4	4	4'-6"	120
A100	12	#4	STR	13'-8"	110
A200	12	#4	STR	10'-2"	81
A250	12	#4	STR	5'-5"	43
A300	12	#4	STR	13'-8"	110
A400	12	#4	STR	10'-2"	81
A450	12	#4	STR	5'-5"	43
B4	18	#4	STR	10'-0"	120
B5	24	#4	STR	8'-4"	134
B6	16	#4	STR	10'-0"	107
C2	63	#4	STR	7'-11"	333
D1	20	#6	STR	2'-6"	75
D2	6	#6	STR	1'-4"	12
G1	4	#5	STR	13'-8"	57
H1	6	#4	STR	10'-2"	41
H2	6	#4	STR	5'-5"	22
L5	8	#6	5	3'-9"	45
L6	6	#6	5	3'-5"	31
L7	8	#6	6	3'-9"	45
L8	6	#6	6	4'-5"	40
REINFORCING STEEL					1,727 LBS

NOTES

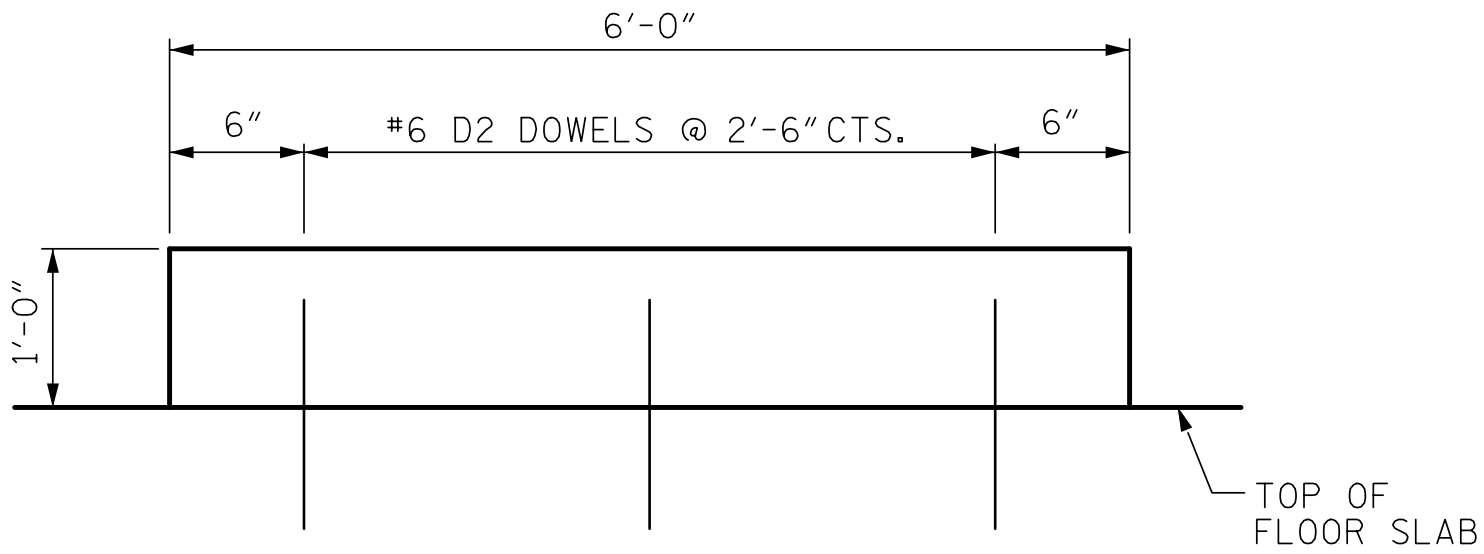
MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT EXTENSIONS. BED MATERIAL MAY BE SUPPLEMENTED WITH CLASS B RIP RAP AS NECESSARY. NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

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

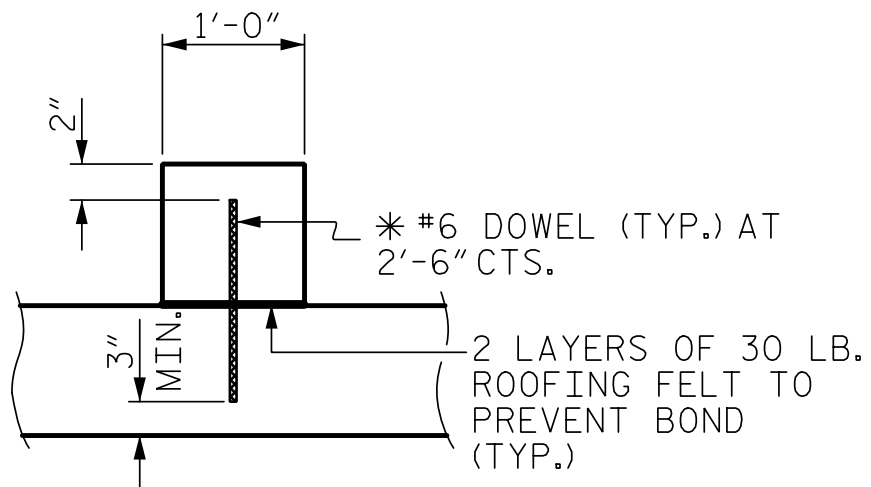
THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



OUTLET ELEVATION



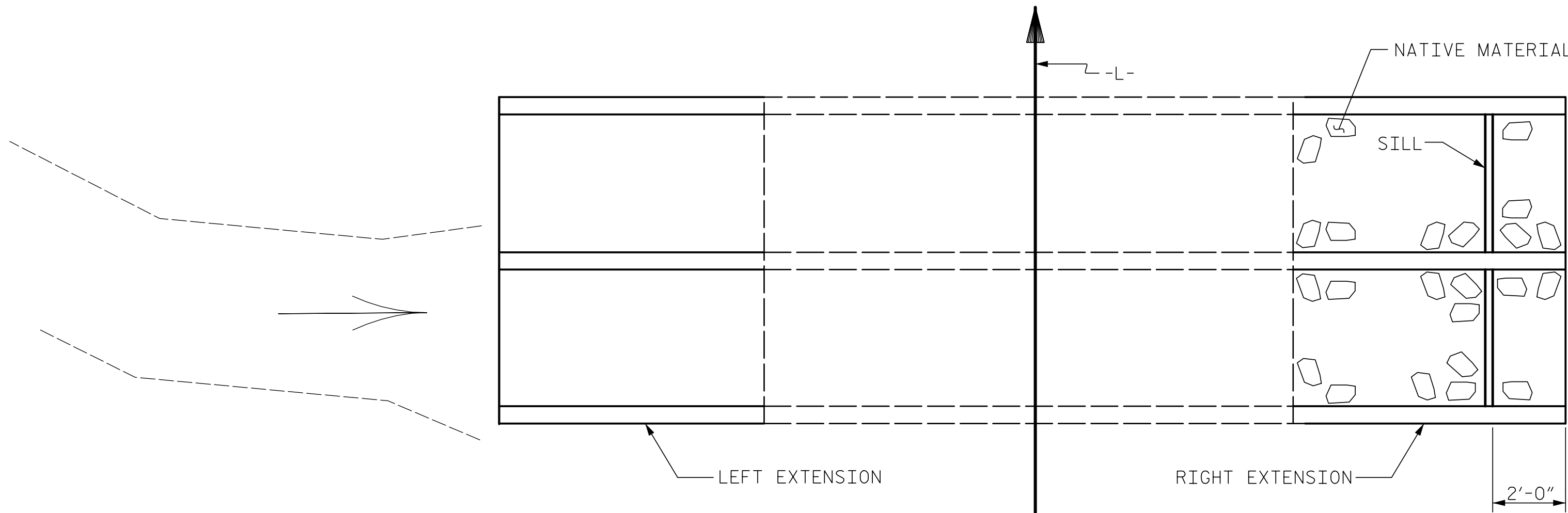
ELEVATION



SECTION THROUGH SILL

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

SILL DETAILS



PLAN OF FLOOR SILL LAYOUT

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 324+27.00 -L-

SHEET 8 OF 10

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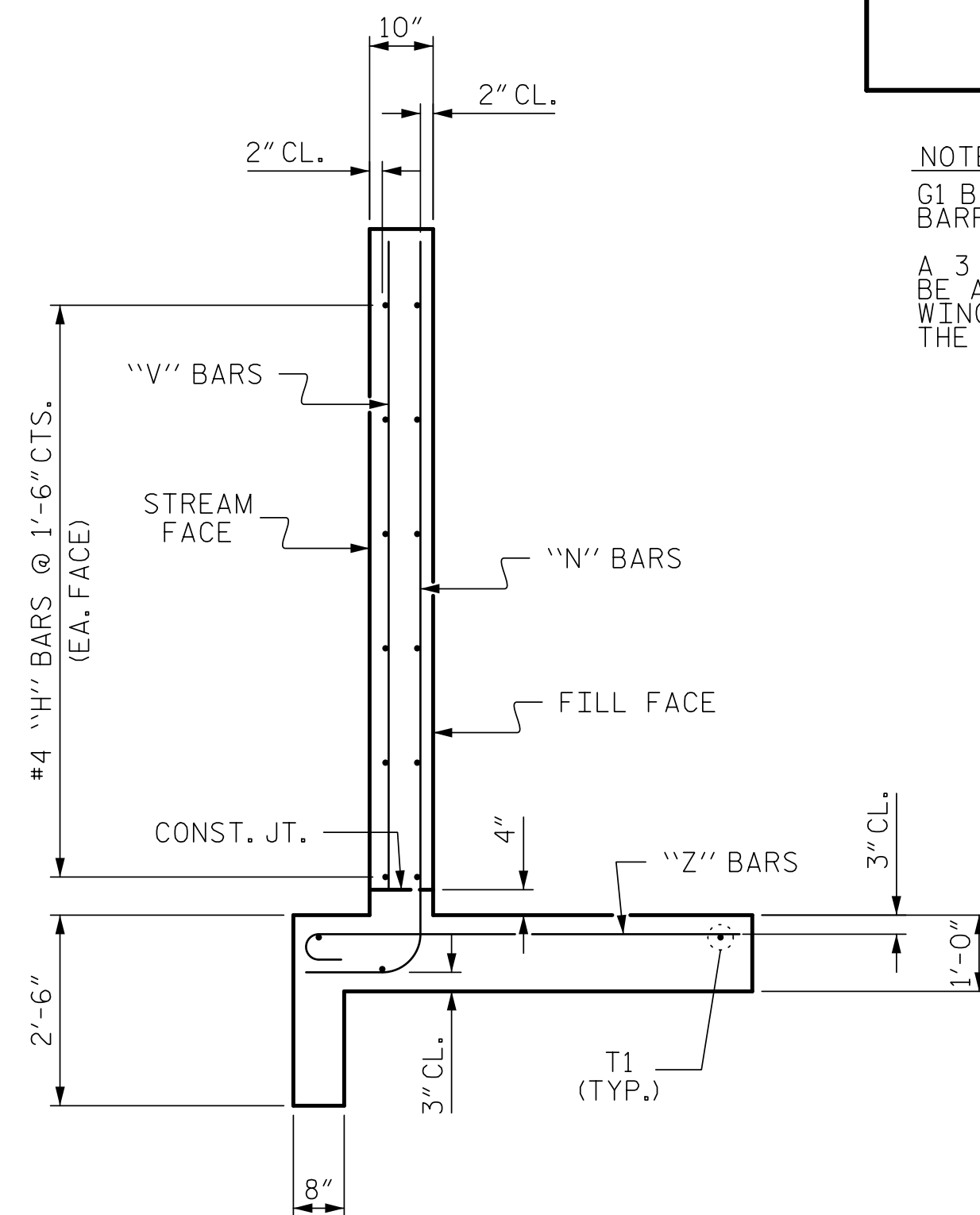
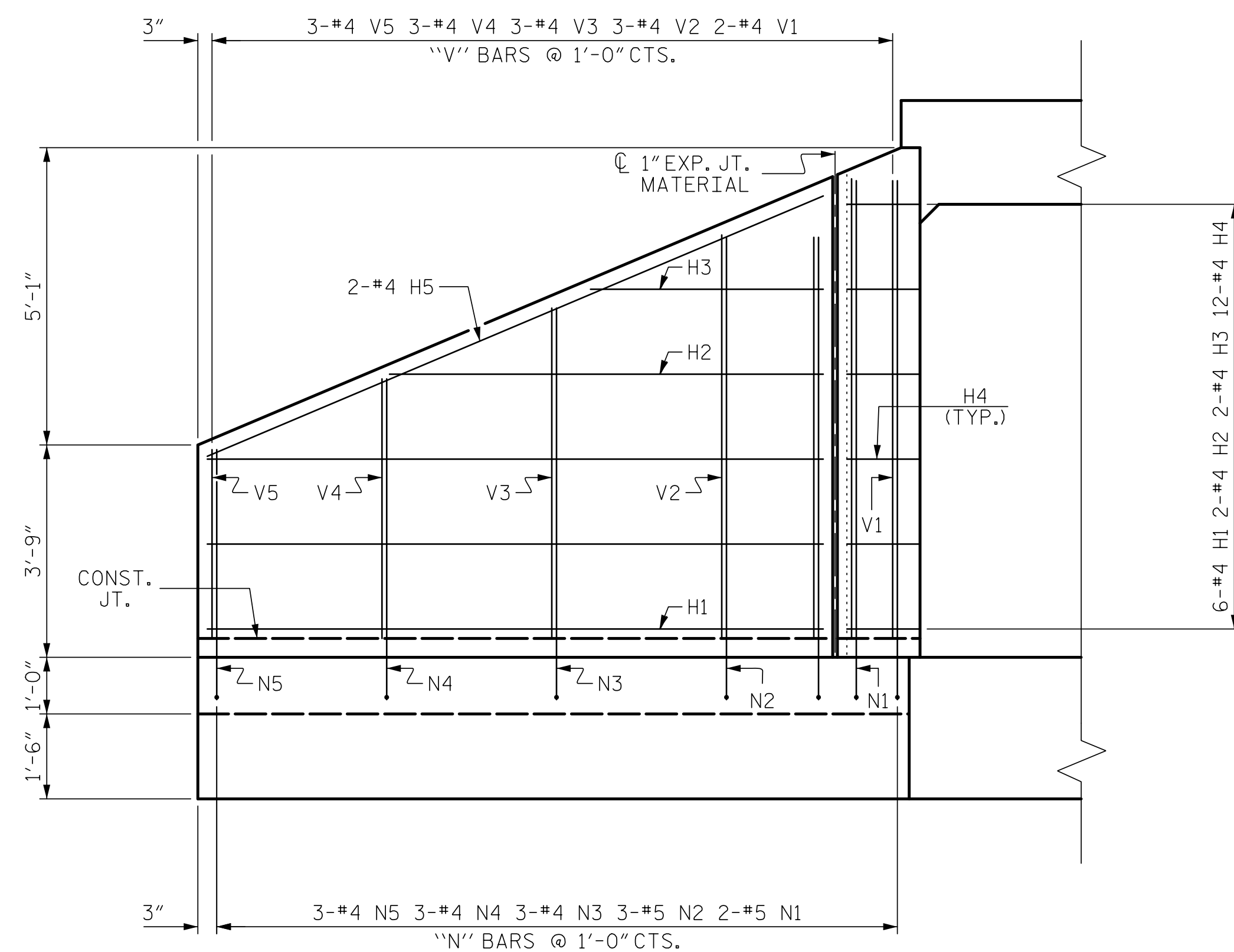
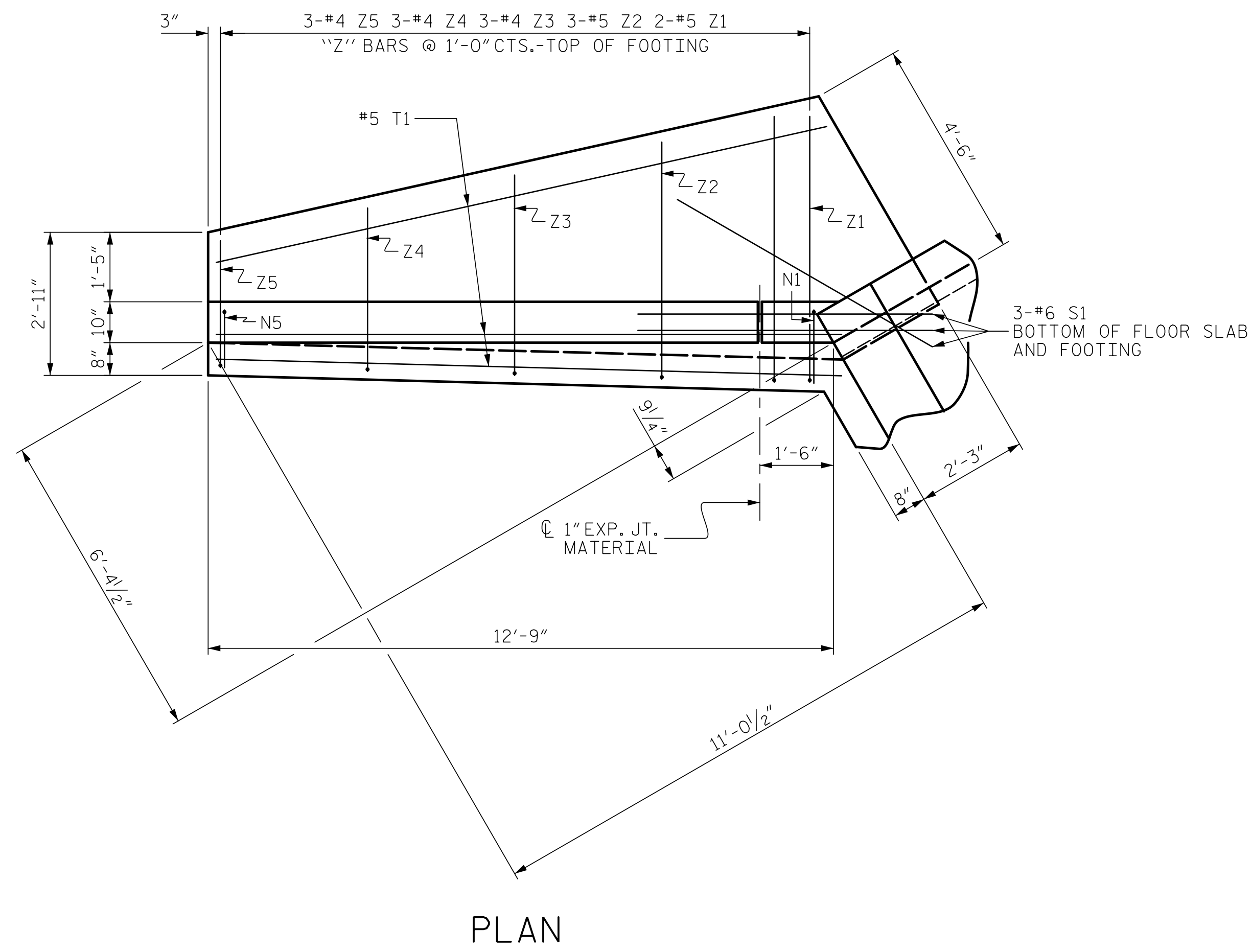
TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

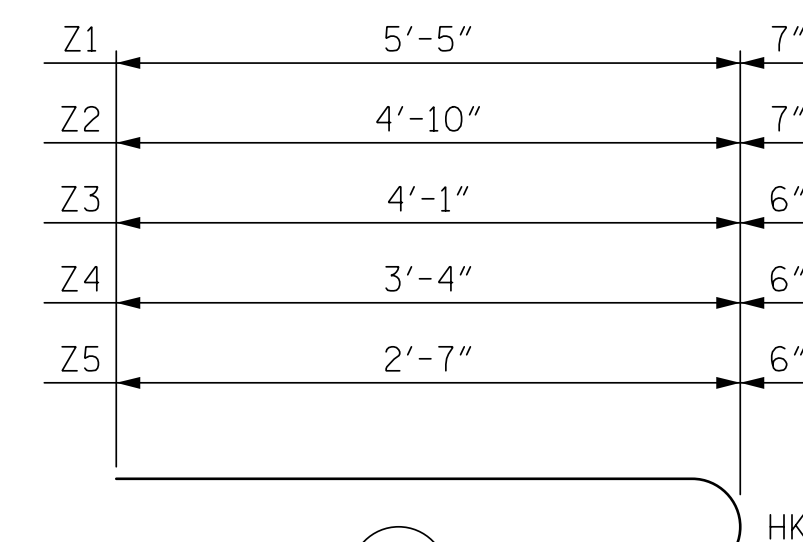
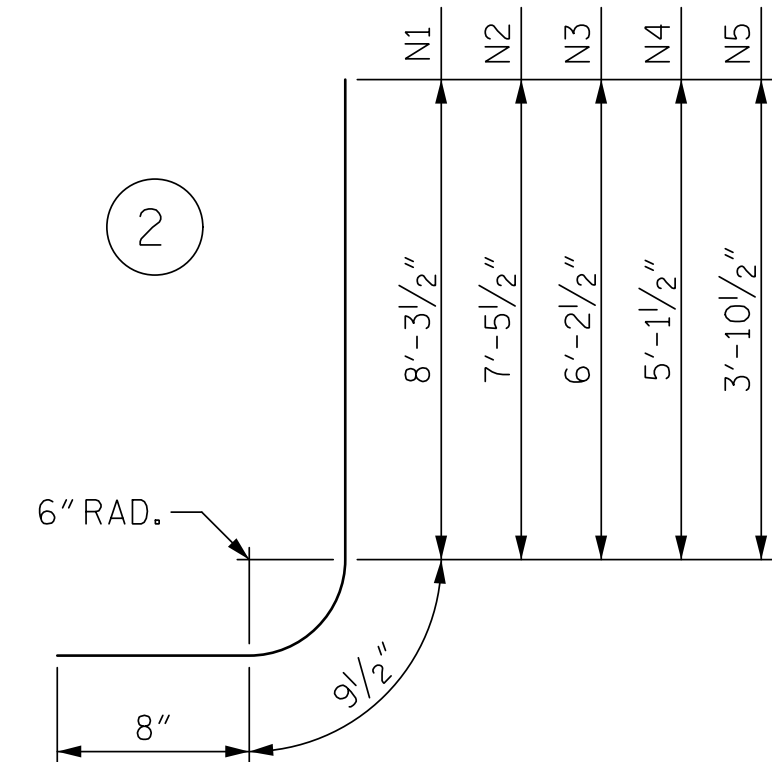
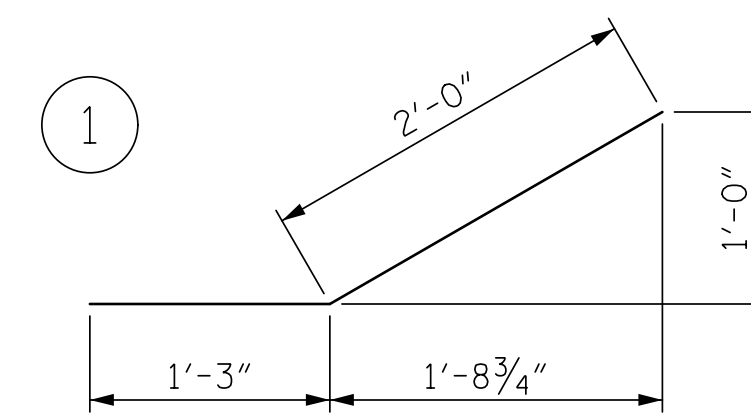
DOUBLE
CONCRETE BOX CULVERT
LT & RT EXTENSIONS
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C3-8
2			4			TOTAL SHEETS 10

DRAWN BY :	ZCS	DATE :	6/22
CHECKED BY :	MGC	DATE :	7/22
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23



BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	10'-10"	87
H2	4	#4	STR	7'-8"	20
H3	4	#4	STR	3'-11"	10
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	11'-9"	31

N1	4	#5	2	9'-9"	41
N2	6	#5	2	8'-11"	56
N3	6	#4	2	7'-8"	31
N4	6	#4	2	6'-7"	26
N5	6	#4	2	5'-4"	21

S1	6	#6	STR	6'-0"	54
----	---	----	-----	-------	----

T1	6	#5	STR	12'-9"	80
----	---	----	-----	--------	----

V1	4	#4	STR	7'-10"	21
V2	6	#4	STR	6'-11"	28
V3	6	#4	STR	5'-9"	23
V4	6	#4	STR	4'-7"	18
V5	6	#4	STR	3'-4"	13

Z1	4	#5	3	6'-0"	25
Z2	6	#5	3	5'-5"	34
Z3	6	#4	3	4'-7"	18
Z4	6	#4	3	3'-10"	15
Z5	6	#4	3	3'-1"	12

REINFORCING STEEL FOR 2 WINGS	716 LBS
----------------------------------	---------

CLASS A CONCRETE		
2 WINGS	10.7	CY
1 HEADWALL	0.6	CY
1 END CURTAIN WALL	0.7	CY
TOTAL	12.0	CY

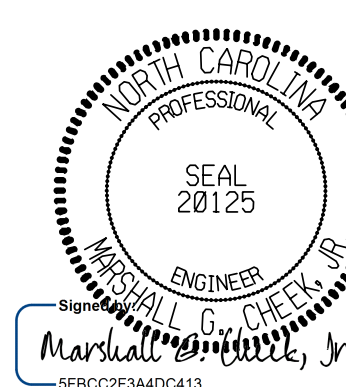
NOTES

G1 BARS IN HEADWALL ARE INCLUDED IN
BARREL REINFORCING.

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.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 324+27.00 -L-

SHEET 9 OF 10



7/23/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INLET WINGS
FOR
CONCRETE BOX CULVERT
H = 8'-0" SLOPE = 2:1
90° SKEW

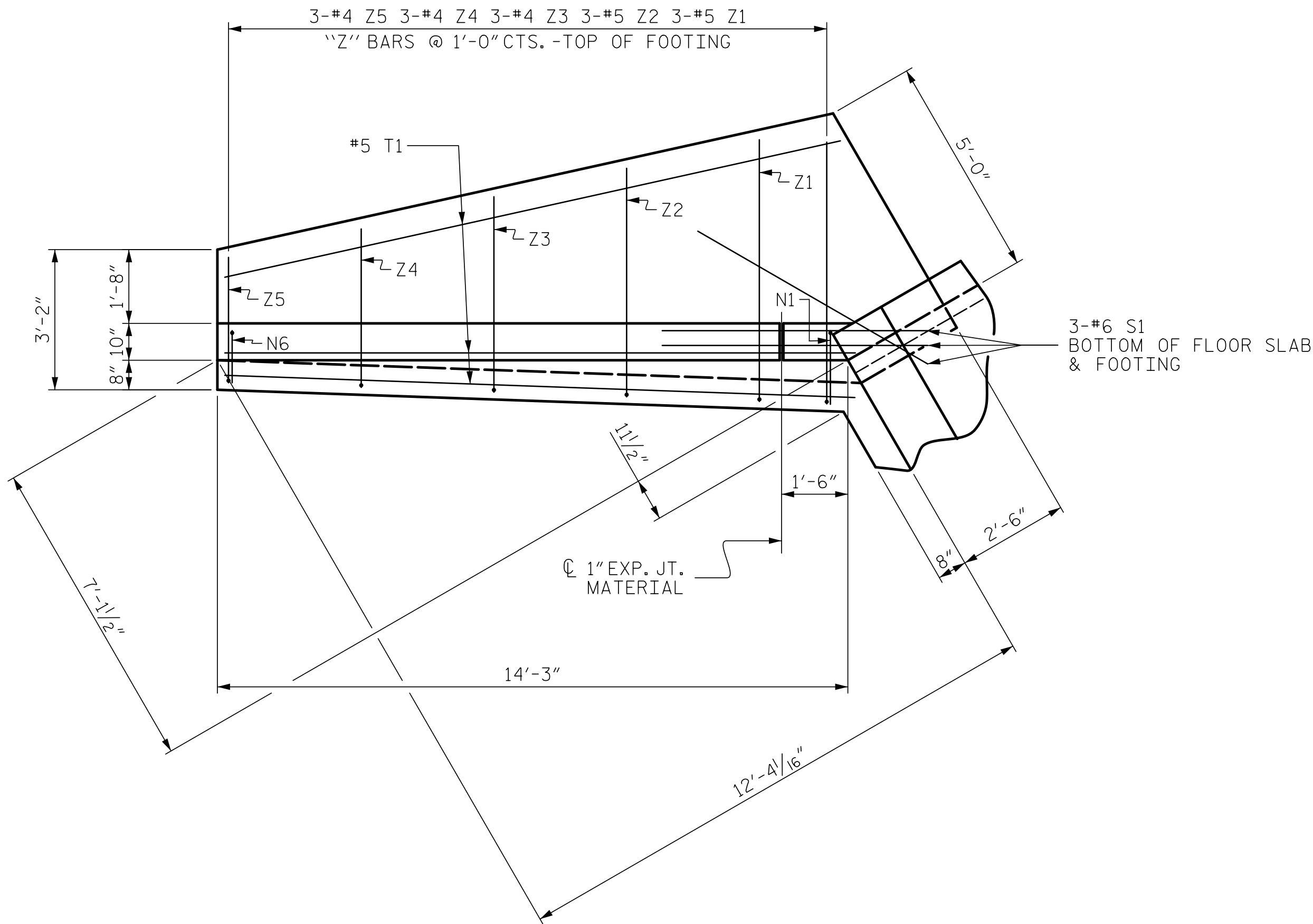
REVISIONS						SHEET NO. C3-9
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 10
2			4			

STR. #3

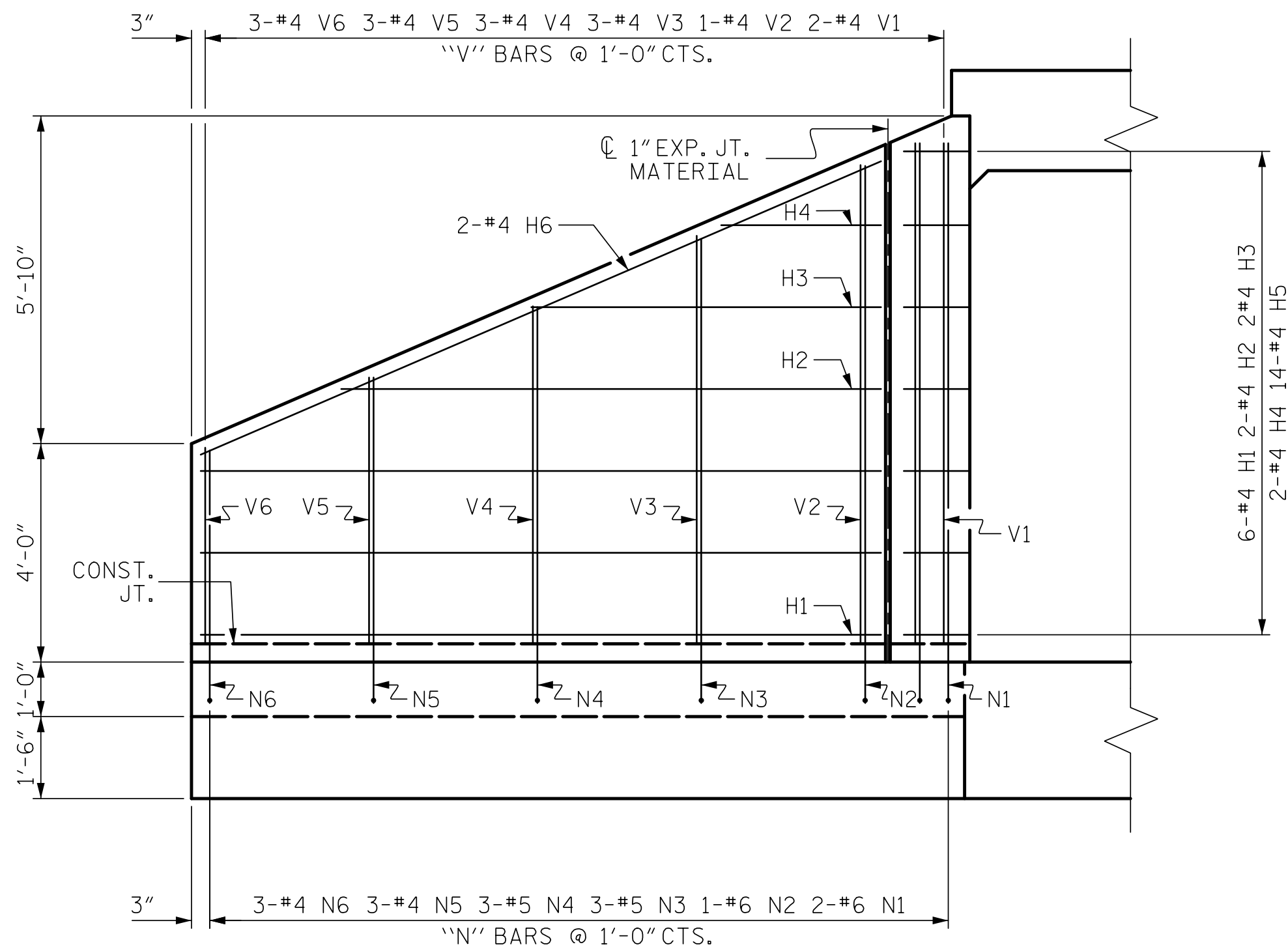
STD. NO. CW9008

ASSEMBLED BY :	ZCS	DATE :	6/22
CHECKED BY :	MGC	DATE :	7/22
DRAWN BY :	CCJ 10/99	REV. 6/19	MAA/THC
CHECKED BY :	RWW 03/00		

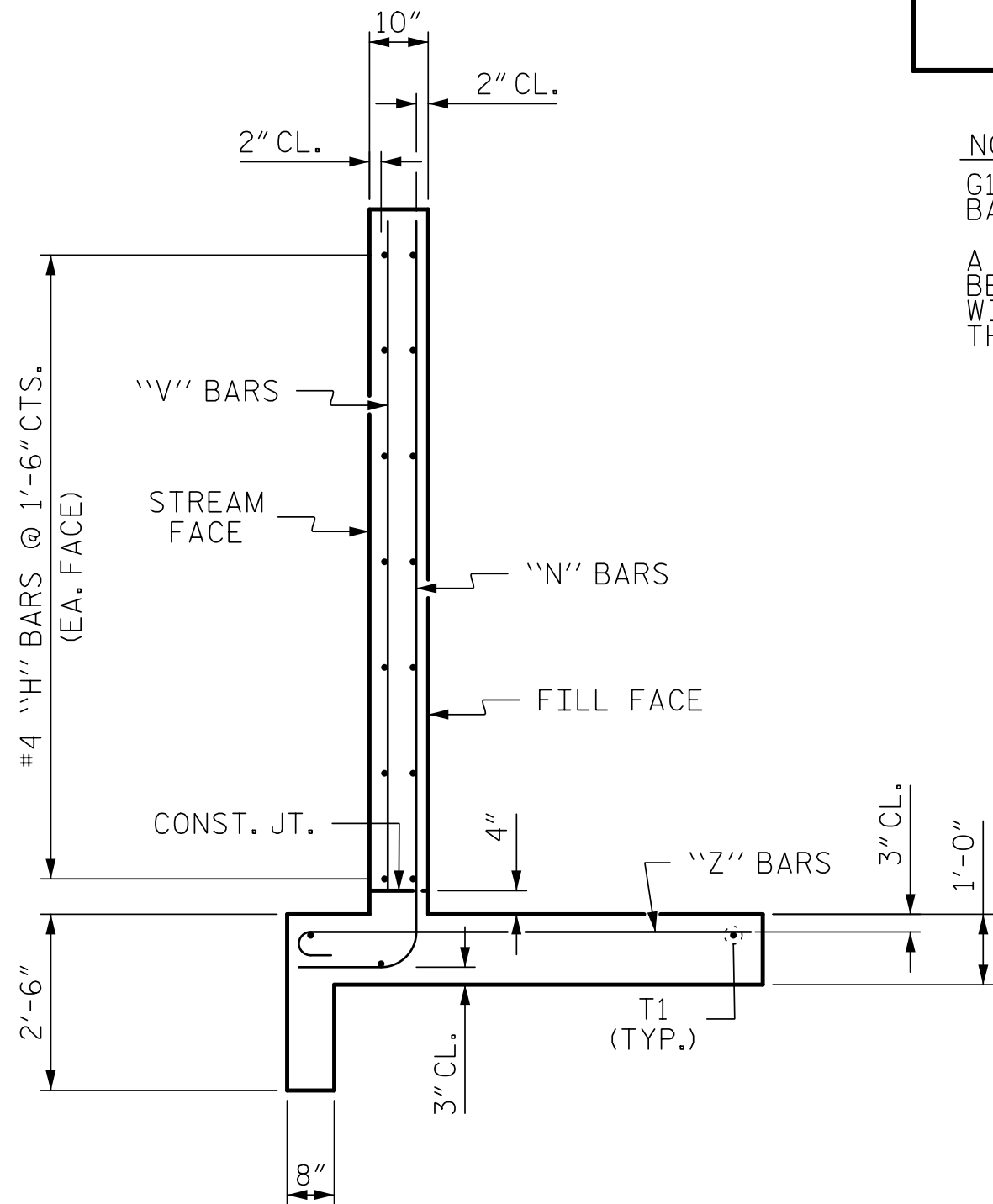
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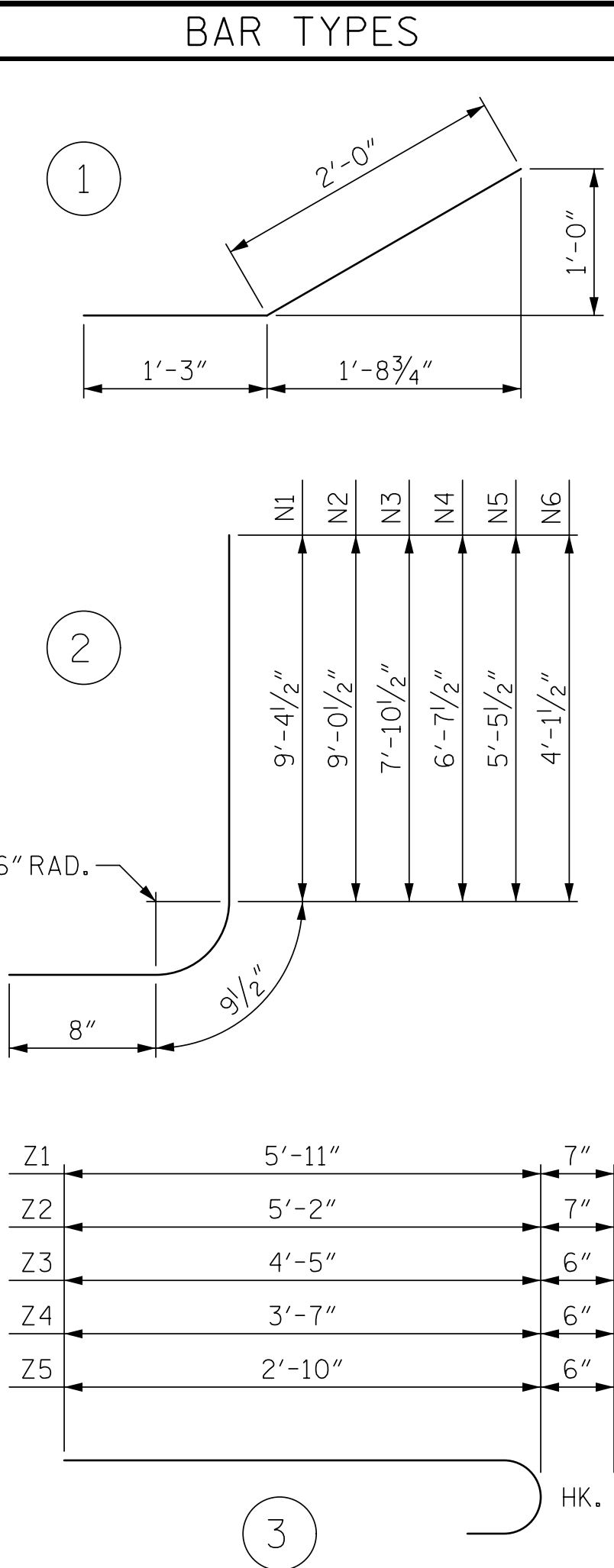
PLAN



ELEVATION



TYPICAL WING SECTION



BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	12'-4"	99
H2	4	#4	STR	9'-10"	26
H3	4	#4	STR	6'-2"	16
H4	4	#4	STR	2'-6"	7
H5	28	#4	1	3'-3"	61
H6	4	#4	STR	13'-4"	36
N1	4	#6	2	10'-10"	65
N2	2	#6	2	10'-6"	32
N3	6	#5	2	9'-4"	58
N4	6	#5	2	8'-1"	51
N5	6	#4	2	6'-11"	28
N6	6	#4	2	5'-7"	22
S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	14'-3"	89
V1	4	#4	STR	8'-10"	24
V2	2	#4	STR	8'-6"	11
V3	6	#4	STR	7'-3"	29
V4	6	#4	STR	6'-1"	24
V5	6	#4	STR	4'-10"	19
V6	6	#4	STR	3'-7"	14
Z1	6	#5	3	6'-6"	41
Z2	6	#5	3	5'-9"	36
Z3	6	#4	3	4'-11"	20
Z4	6	#4	3	4'-1"	16
Z5	6	#4	3	3'-4"	13
REINFORCING STEEL FOR 2 WINGS				891	LBS
CLASS A CONCRETE				13.1	CY
2 WINGS				0.6	CY
1 HEADWALL				0.7	CY
1 END CURTAIN WALL				14.4	CY
TOTAL					

NOTES
G1 BARS IN HEADWALL ARE INCLUDED IN BARREL REINFORCING.
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.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 324+27.00 -L-

SHEET 10 OF 10

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

OUTLET WINGS

FOR

CONCRETE BOX CULVERT

H = 9'-0"

SLOPE = 2:1

90° SKEW

7/23/2025

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UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS

706 HILLSBOROUGH STREET

SUITE 200

RALEIGH, NC 27603

PH (919) 773-8887

CORP. LICENSE NO.: C-0275

NO. 1

BY: CCJ

DATE: 10/99

NO. 2

BY: RWJ

DATE: 03/00

NO. 3

BY: MGC

DATE: 6/22

NO. 4

BY: MGC

DATE: 7/22

SHEET NO. C3-10

TOTAL SHEETS 10

ASSEMBLED BY :	ZCS	DATE :	6/22
CHECKED BY :	MGC	DATE :	7/22
DRAWN BY :	CCJ	REV. 6/19	MAA/THC
CHECKED BY :	RWW	03/00	

3/24/2023
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User:zSmith

NAD 83/2011

POC STA. 501+81.53 -L- =
POT STA. 12+00.00 -Y5-

WOODS

STA. 451+96.00 -L-

8'-9" 20'-2" ± 16'-8" ± 7'-0"

90°-00'-00" (TAN. TO CURVE)

CLASS II RIP RAP (ROADWAY PAY ITEM & DETAIL) (TYP.)

DOUBLE 6' X 9' RCBC EXTENSION

TEMPORARY SHORING (ROADWAY PAY ITEM)

EXISTING DOUBLE 6' X 6' RCBC

PROPOSED GUARDRAIL (ROADWAY PAY ITEM & DETAIL) (TYP.)

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

TO SR 1222

TO SR 1218

ROANOKE RIVER TRIB.

WOODS

Plan view of the proposed bridge structure. The bridge is 100 feet long, divided into three spans: 20'-2" ±, 16'-8" ±, and 15'-0". The bridge is supported by three piers. The existing culvert is shown as a dashed line. The bridge deck is shown as a solid line. The elevations at the bridge ends are 177.3 ± and 174.0 ±. The elevations at the piers are 176.2 ±, 185.4 ±, 188.0 ±, 187.2 ±, and 185.1 ±. The dimensions are as follows: 16'-4" from the left end to the first pier, 20'-6" between the first and second piers, 20'-2" ± for the first span, 16'-8" ± for the second span, 15'-0" for the third span, and 38'-3" from the third pier to the right end. A north arrow points towards the top of the page.

DRAWN BY : STM DATE : 06/22
 CHECKED BY : MGC DATE : 08/22
 DESIGN ENGINEER OF RECORD: STM DATE : 06/22

11/28/2023
X:\NCD001\R-5739\Structures\Str. #4 (451 + 96.00 -L-)\Final Plans\DGNS\R-5739-SMU-CU-STR 4-1.dgn
User:ZSmith

CLASS A CONCRETE		
LEFT EXTENSION	<u>29.5</u>	C.Y.
RIGHT EXTENSION	<u>32.7</u>	C.Y.
TOTAL	<u>62.2</u>	C.Y.

CULVERT EXCAVATION	LUMP SUM
--------------------	----------

GRADE POINT ELEV. @ STA. 451+96.00 -L- = 187.87'
BED ELEV. @ STA. 451+96.00 -L- _____ = 178.27'
ROADWAY SLOPES _____ = 2:1 LEFT
 3:1 RIGHT

DESIGN DISCHARGE _____ = 520 CFS
 FREQUENCY OF DESIGN FLOOD _____ = 50 YRS
 DESIGN HIGH WATER ELEVATION _____ = 184.3'
 DRAINAGE AREA _____ = 1.21 SQ. MI.
 BASE DISCHARGE (Q100) _____ = 620 CFS
 BASE HIGH WATER ELEVATION _____ = 185.0'

OVERTOPPING DISCHARGE _____ = >880 CFS
FREQUENCY OF OVERTOPPING FLOOD_ = 500+ YRS
OVERTOPPING FLOOD ELEVATION _____ = 188.1' *

* OVERTOPPING EXCEEDS 500 YEAR EVENT &
OCCURS AT LEFT SHOULDER AT STA. 458+00.00 -L-

 PHASE II CONSTRUCTION

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.

DOUBLE 6 FT. X 9 FT.
CONCRETE BOX CULVERT
LT & RT EXTENSION
90° SKEW

STR #4

7/23/2025

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO. C-027

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	1.14	--	1.75	1.14	1	BOTT. SLAB	6.00	1.17	1	TOP SLAB	5.67	
		HL-93 (OPERATING)	N/A		1.48	--	1.35	1.48	1	BOTT. SLAB	6.00	1.51	1	TOP SLAB	5.67	
		HS-20 (INVENTORY)	36,000	2	1.09	39.24	1.75	1.19	1	BOTT. SLAB	3.00	1.09	1	TOP SLAB	5.67	
		HS-20 (OPERATING)	36,000		1.41	50.76	1.35	1.54	1	BOTT. SLAB	3.00	1.41	1	TOP SLAB	5.67	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		2.37	32.00	1.40	2.93	1	EXT. WALL	0.33	2.37	1	TOP SLAB	5.67	
		SNGARBS2	20,000		2.17	43.40	1.40	2.79	1	TOP SLAB	3.00	2.17	1	TOP SLAB	5.67	
		SNAGRIS2	22,000		2.37	52.14	1.40	2.93	1	EXT. WALL	0.33	2.37	1	TOP SLAB	5.67	
		SNCOTTS3	27,250		1.43	38.97	1.40	1.43	1	BOTT. SLAB	6.00	1.60	1	TOP SLAB	5.67	
		SNAGGRS4	34,925		1.40	48.90	1.40	1.40	1	BOTT. SLAB	6.00	1.83	1	BOTT. SLAB	5.67	
		SNS5A	35,550		1.37	48.70	1.40	1.37	1	BOTT. SLAB	6.00	1.77	1	BOTT. SLAB	5.67	
		SNS6A	39,950		1.32	52.73	1.40	1.32	1	BOTT. SLAB	6.00	1.76	1	BOTT. SLAB	5.67	
		SNS7B	42,000	3	1.32	55.44	1.40	1.32	1	BOTT. SLAB	6.00	1.76	1	BOTT. SLAB	5.67	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		1.68	55.44	1.40	1.68	1	BOTT. SLAB	6.00	2.17	1	TOP SLAB	5.67	
		TNT4A	33,075		1.63	53.91	1.40	1.63	1	BOTT. SLAB	6.00	1.92	1	TOP SLAB	5.67	
		TNT6A	41,600		1.46	60.74	1.40	1.46	1	BOTT. SLAB	6.00	1.84	1	TOP SLAB	5.67	
		TNT7A	42,000		1.57	65.94	1.40	1.57	1	BOTT. SLAB	6.00	1.88	1	TOP SLAB	5.67	
		TNT7B	42,000		1.33	55.86	1.40	1.33	1	BOTT. SLAB	6.00	1.77	1	BOTT. SLAB	5.67	
		TNAGRIT4	43,000		1.58	67.94	1.40	1.58	1	BOTT. SLAB	6.00	1.88	1	TOP SLAB	5.67	
		TNAGT5A	45,000		1.58	71.10	1.40	1.58	1	BOTT. SLAB	6.00	1.88	1	TOP SLAB	5.67	
		TNAGT5B	45,000		1.59	71.55	1.40	1.59	1	BOTT. SLAB	6.00	1.89	1	TOP SLAB	5.67	
EMERGENCY VEHICLE (EV)		EV2	28,750		1.50	43.13	1.30	2.11	1	TOP SLAB	3.00	1.50	1	TOP SLAB	5.67	
		EV3	43,000	4	1.24	53.32	1.30	1.24	1	BOTT. SLAB	6.00	1.39	1	TOP SLAB	5.67	

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	--

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

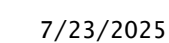
Diagram illustrating the layout of two boxes, BOX 1 and BOX 2, with dimensions and callout numbers.

- BOX 1 is on the left, and BOX 2 is on the right.
- The overall width of the arrangement is dimensioned as 6'-0" (TYP.)
- The overall height of the arrangement is dimensioned as 9'-0"
- Callout 1 points to the top edge of BOX 1.
- Callout 2 points to the top edge of BOX 2.
- Callout 3 points to the bottom edge of BOX 1.
- Callout 4 points to the bottom edge of BOX 2.

(LOOKING DOWNSTREAM)

11/29/2023
X:\NCD01\TR-5739\Structures\Str. #4 (451 + 96.00 -L-)\Final Plans\DGNS\R-5739-SMU-CU-STR 4_2.dgn
User:ZSmith

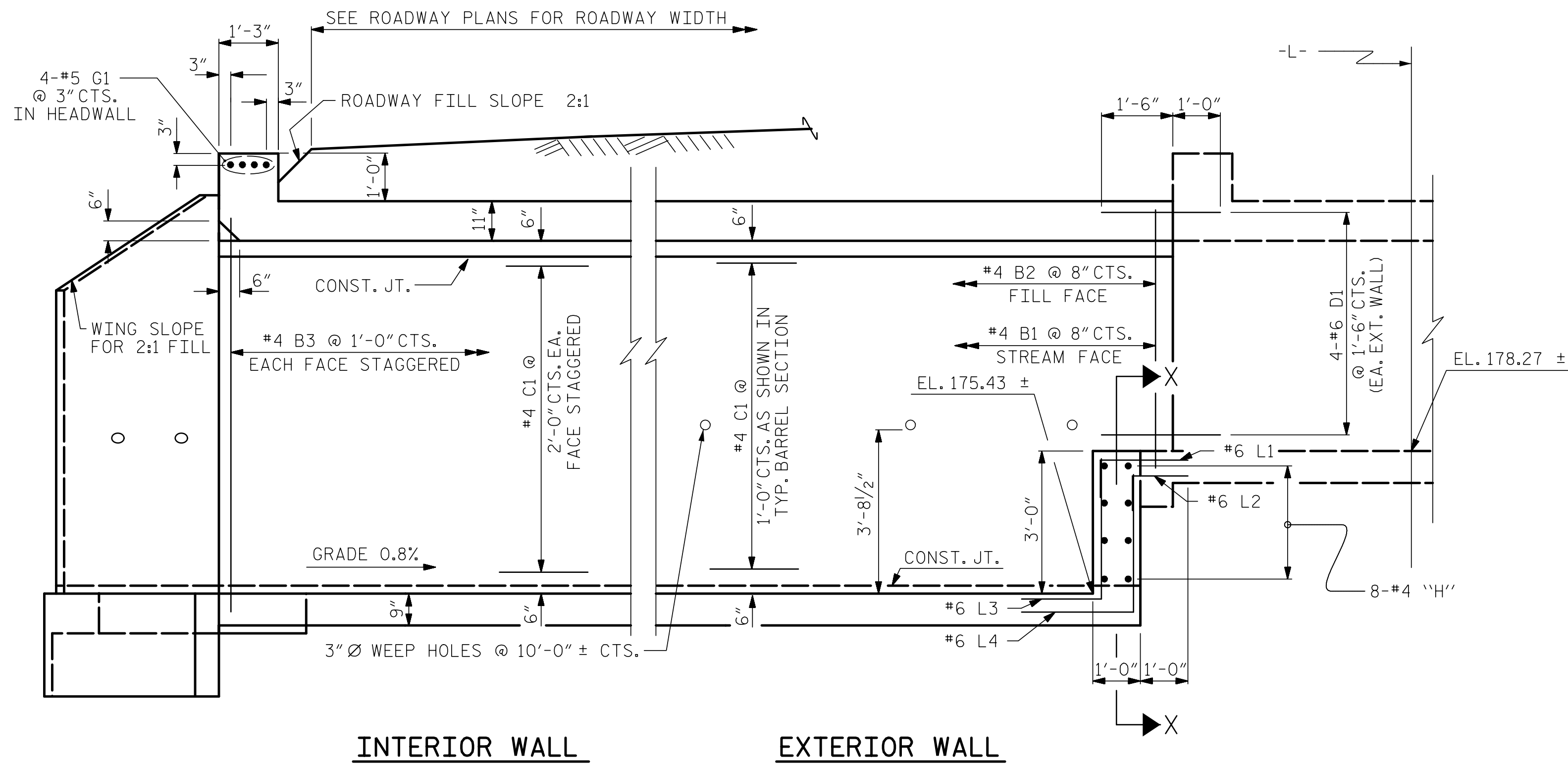
SHEET 2 OF 9



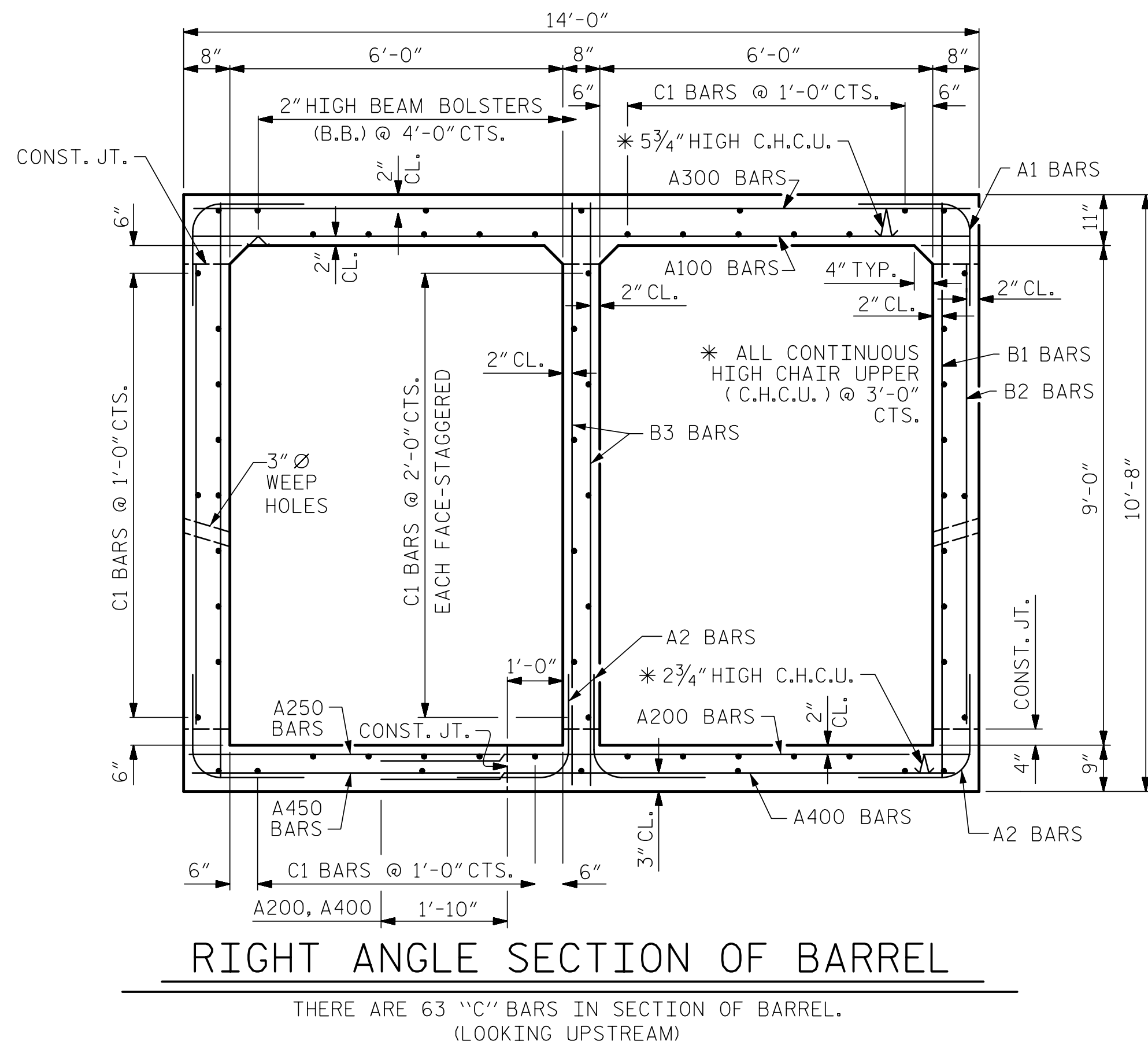
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
LRFR SUMMARY FOR
REINFORCED CONCRETE
BOX CULVERTS
(NON-INTERSTATE TRAFFIC)

STR. #4

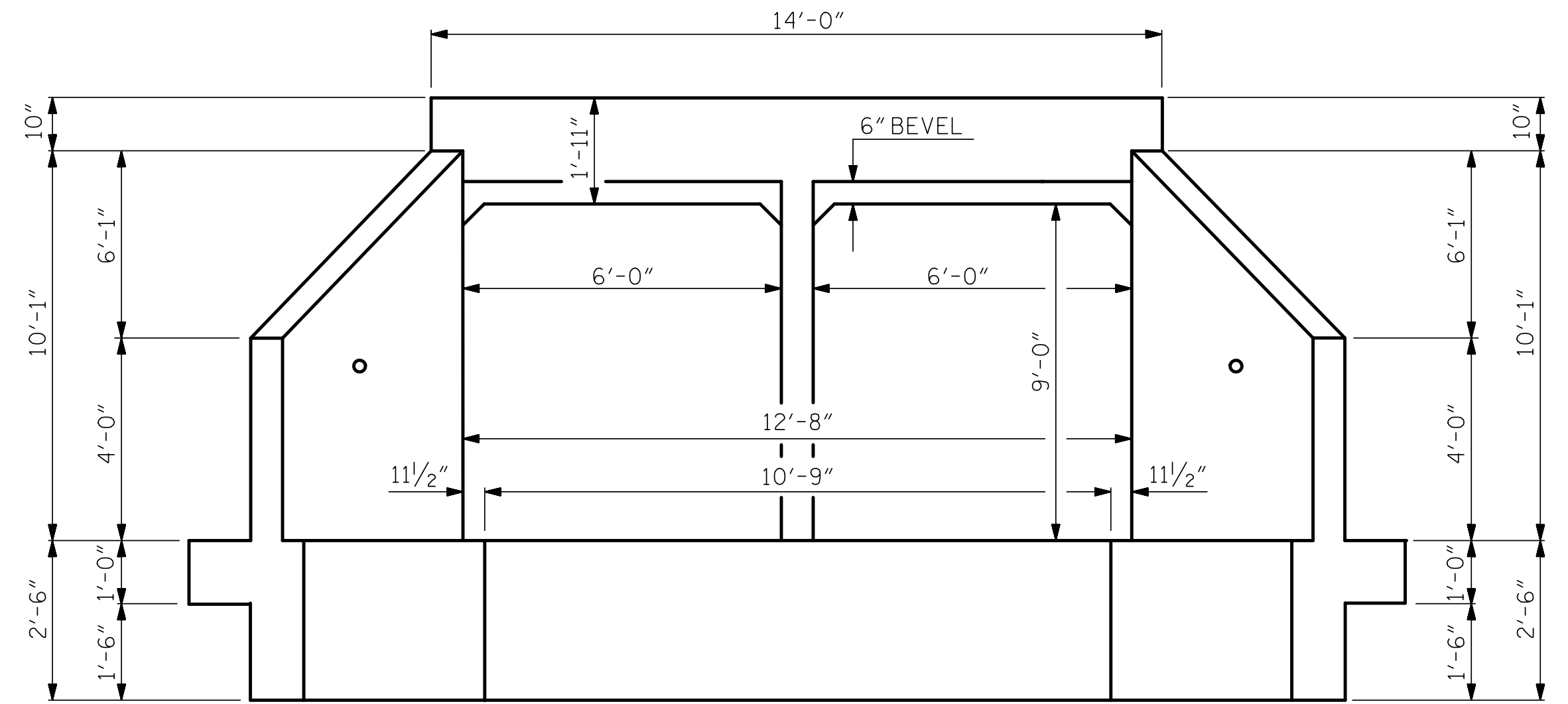
STD. NO. LRFR5



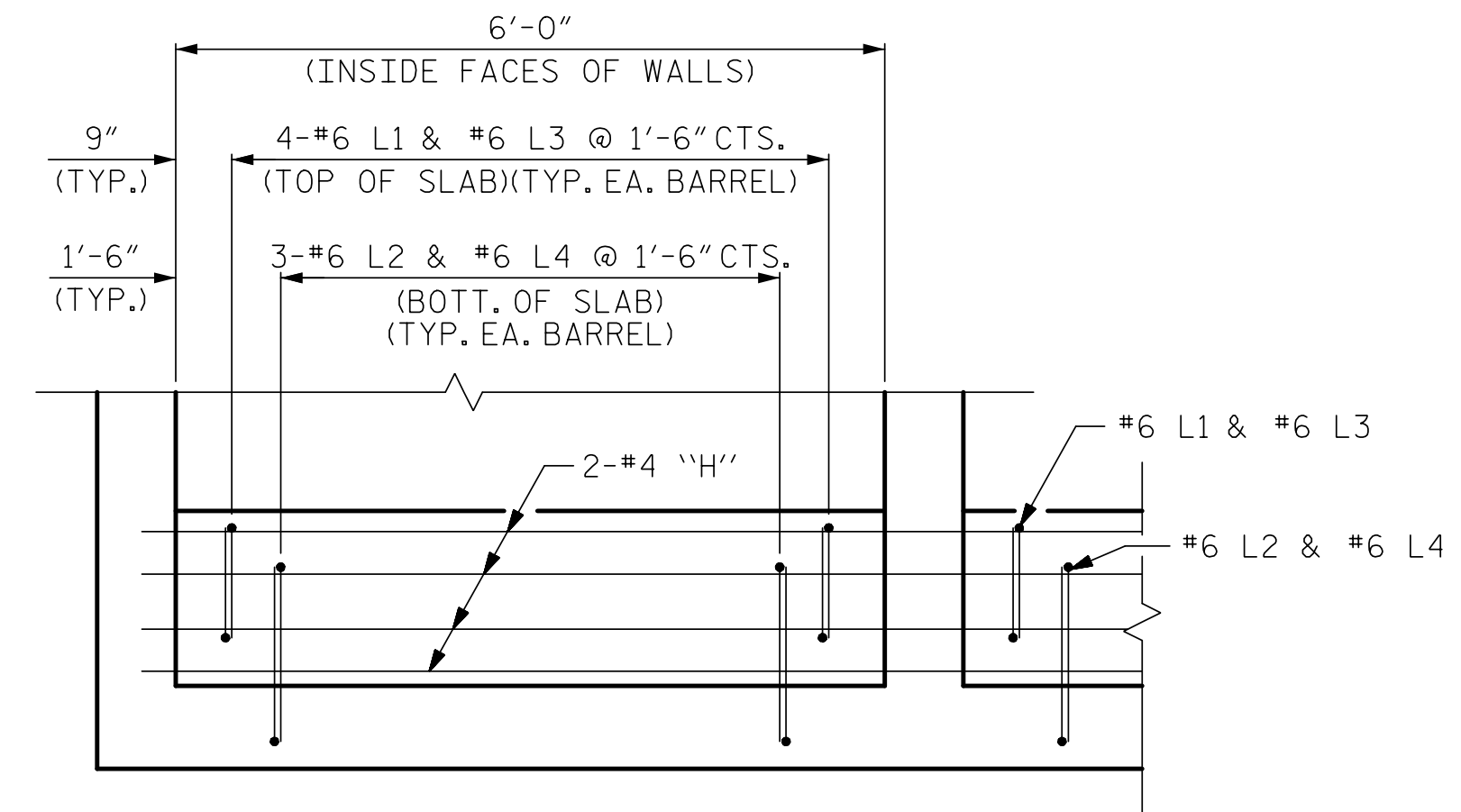
CULVERT EXTENSION SECTION NORMAL TO ROADWAY



RIGHT ANGLE SECTION OF BARREL



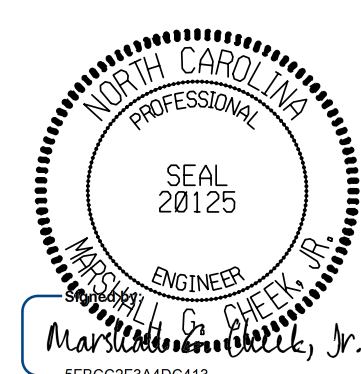
INLET END ELEVATION



SECTION X-X

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 451+96.00 -L-

SHEET 3 OF 9



7/23/2025

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 TGS ENGINEERS
 706 HILLSBOROUGH STREET
 SUITE 200
 RALEIGH, NC 27603
 PH (919) 773-8887
 CORP. LICENSE NO.: C-0275

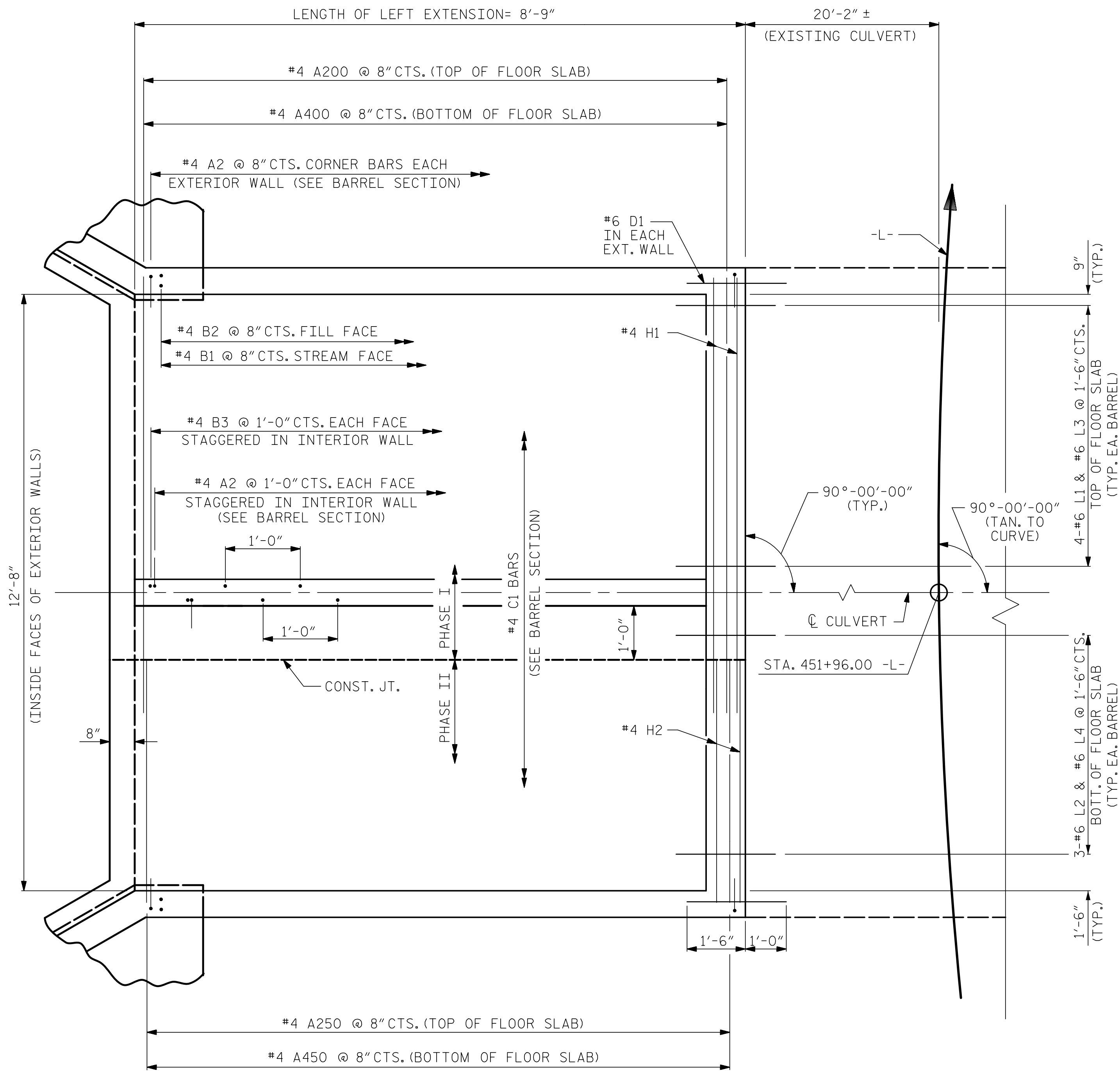
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 6 FT. X 9 FT.
 CONCRETE BOX CULVERT
 LEFT EXTENSION
 90° SKEW

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

ASSEMBLED BY : STM DATE : 06/22
 CHECKED BY : MGC DATE : 08/22
 DESIGN ENGINEER OF RECORD: STM DATE : 06/22

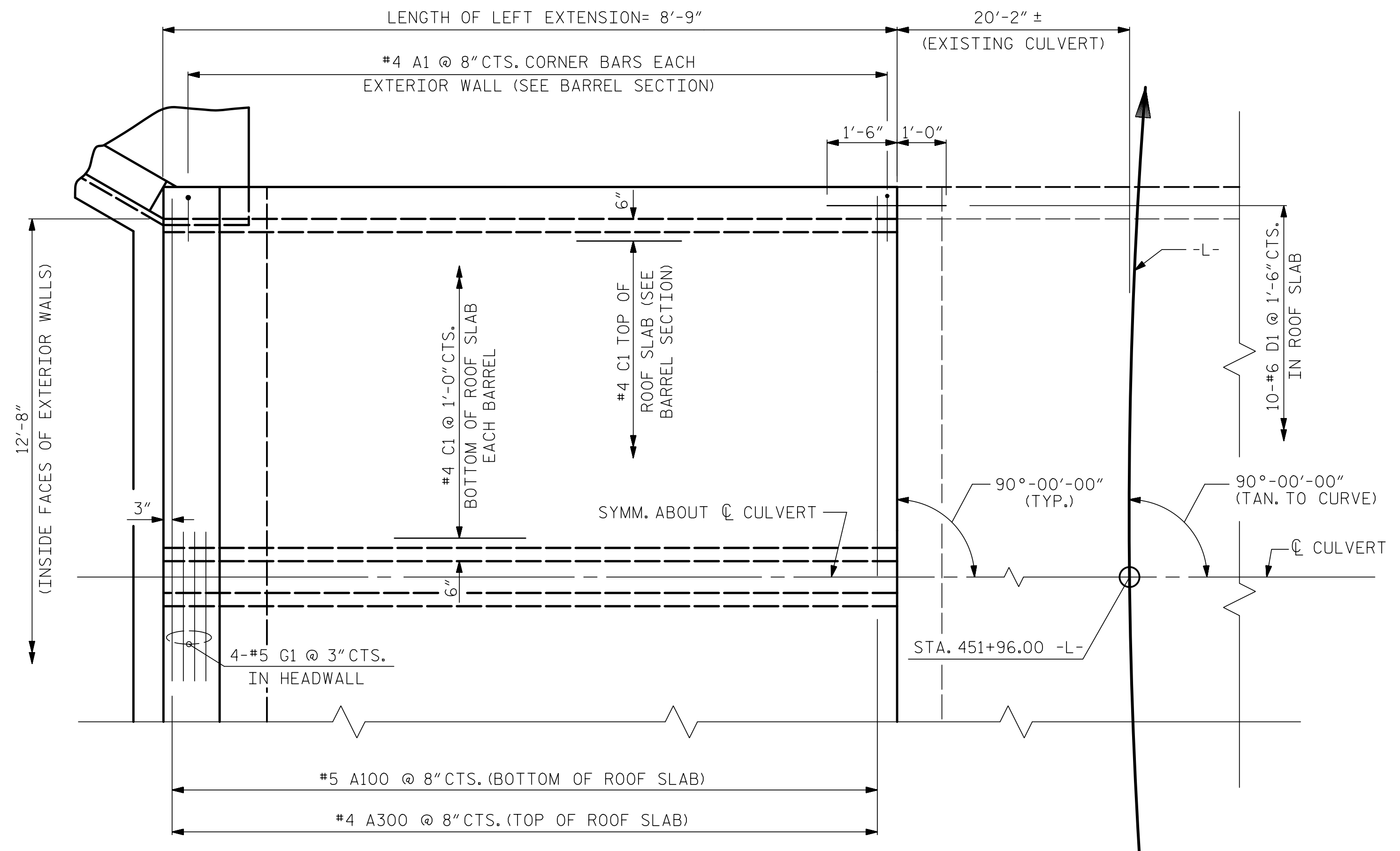
11/28/2023
 X:\NCDOT\NR-5739\Structures\Str. #4 (451 + 96.00 -L-\Final Plans\DCNs\NR-5739.SMU.CU.STR 4.3.dgn
 User:zSmith

STR. #4



PLAN-FLOOR SLAB

FOR S1 BARS IN FLOOR SLAB & FOOTING, SEE WING SHEET.



PART PLAN-ROOF SLAB

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 451+96.00 -L-

SHEET 4 OF 9

ASSEMBLED BY : STM DATE : 06/22
 CHECKED BY : MGC DATE : 08/22
 DESIGN ENGINEER OF RECORD: STM DATE : 06/22

11/28/2023
 X:\NCDOT\NR-5739\Structures\Str. #4 (451 + 96.00 -L-)\Final Plans\DCNs\NR-5739.SMU.CU_STR 4.4.dgn
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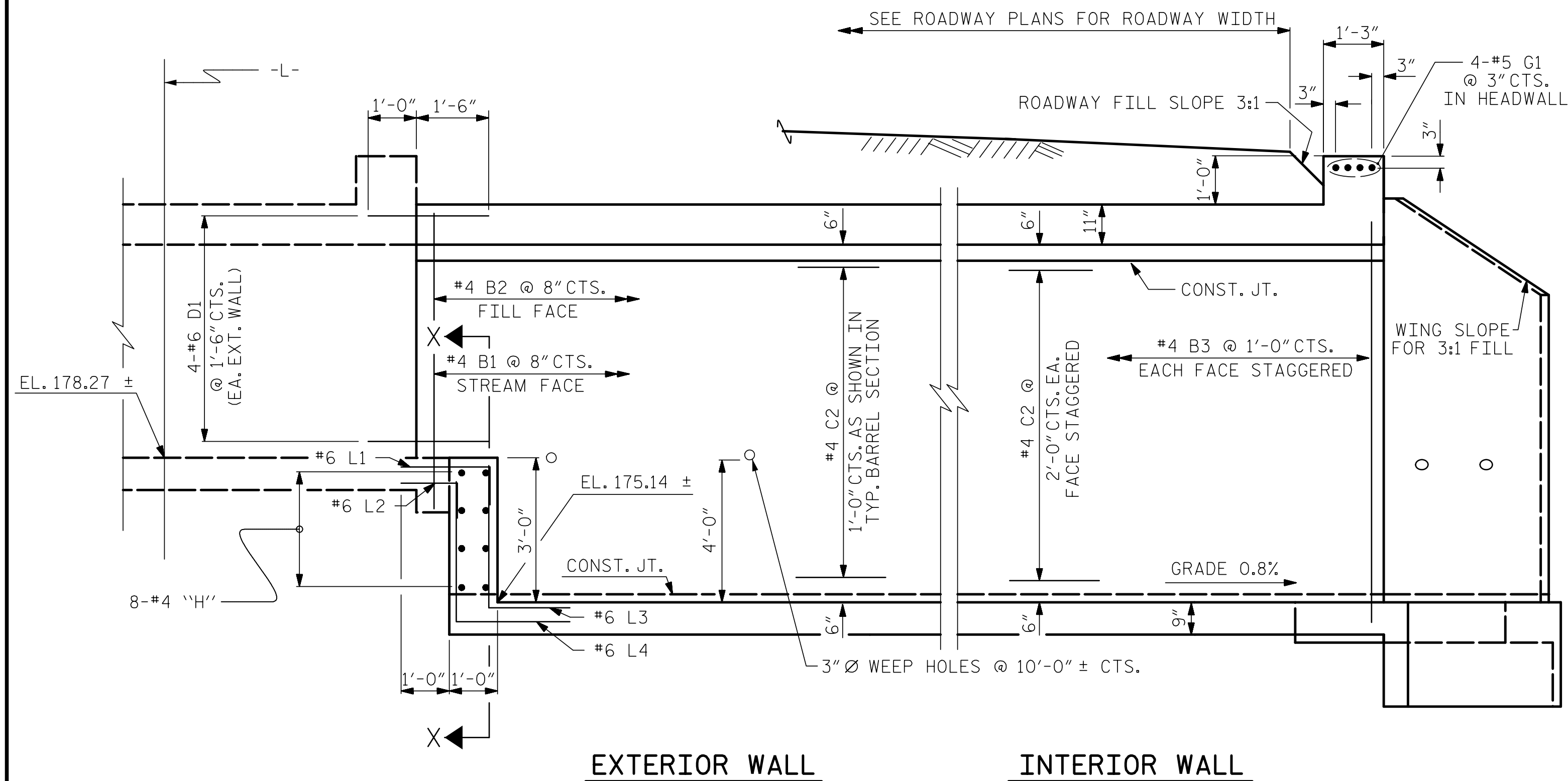
TGS ENGINEERS
 706 HILLSBOROUGH STREET
 SUITE 200
 RALEIGH, NC 27603
 PH (919) 773-8887
 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

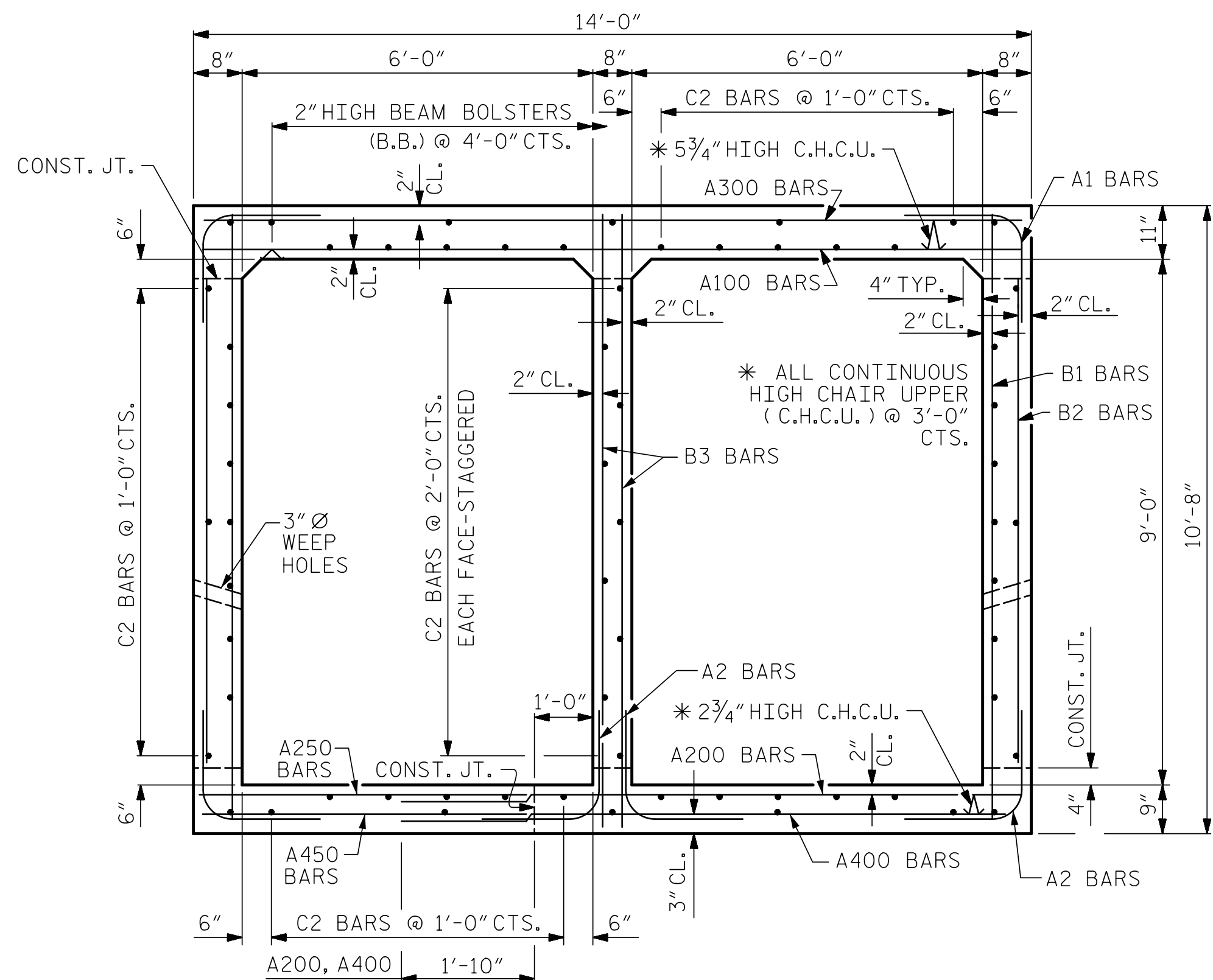
DOUBLE 6 FT. X 9 FT.
 CONCRETE BOX CULVERT
 LEFT EXTENSION
 90° SKEW

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

STR. #4

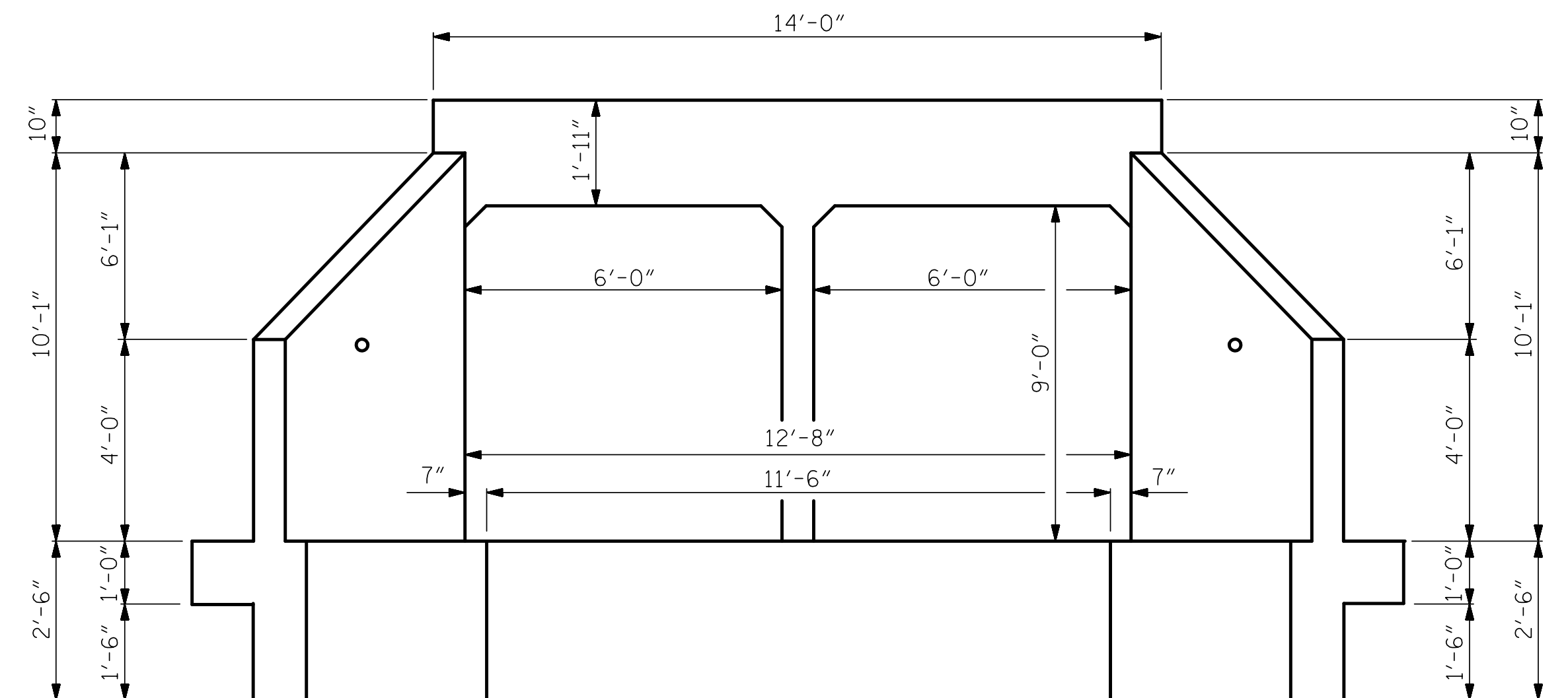


CULVERT EXTENSION SECTION NORMAL TO ROADWAY

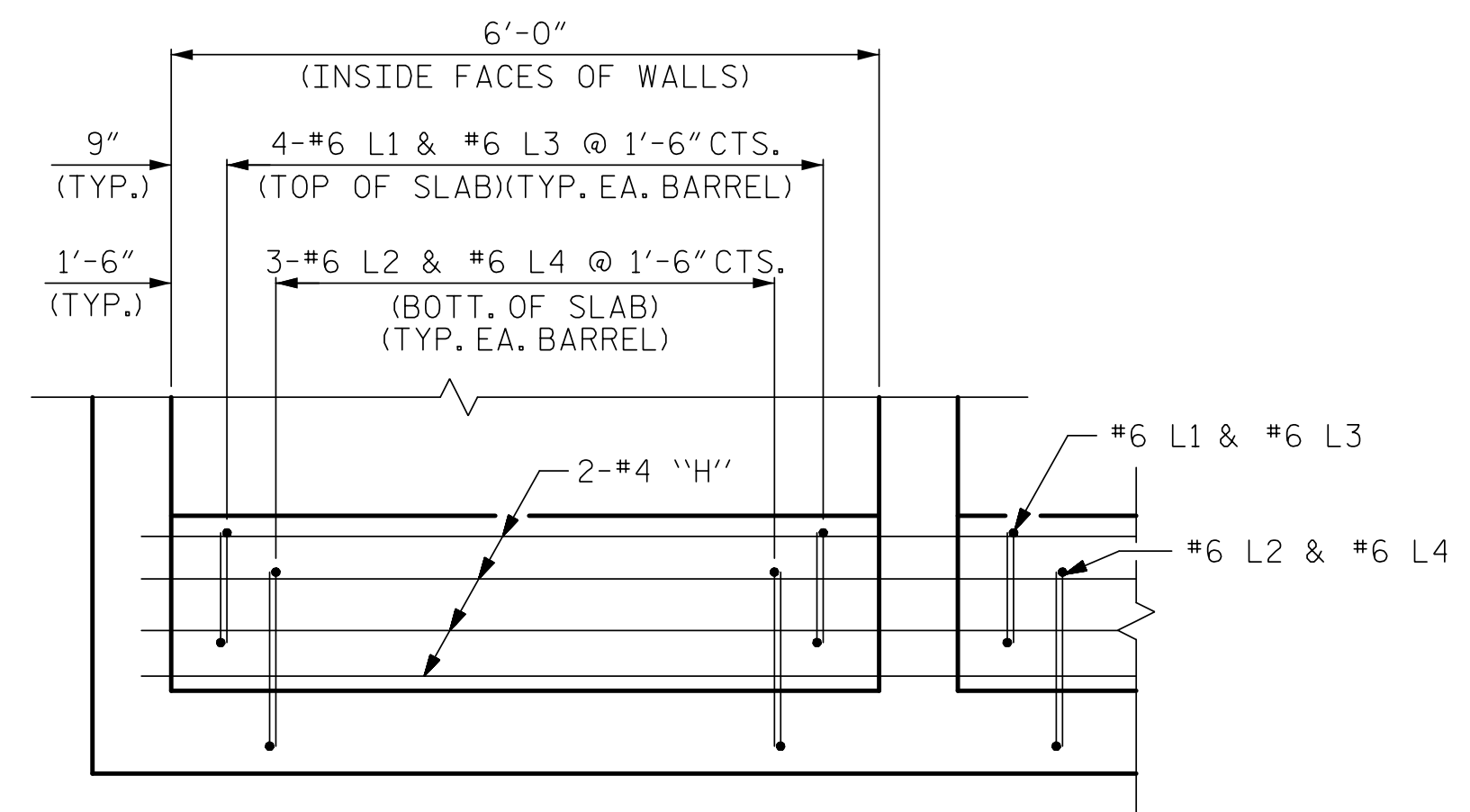


RIGHT ANGLE SECTION OF BARREL

THERE ARE 63 "C" BARS IN SECTION OF BARREL.
(LOOKING UPSTREAM)



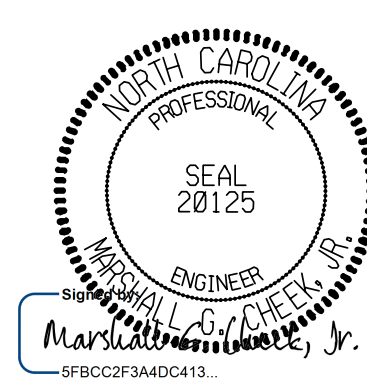
OUTLET END ELEVATION



SECTION X-X

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 451+96.00 -L-

SHEET 5 OF 9



7/23/2025

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PH (919) 773-8887
CORP. LICENSE NO.: C-0275

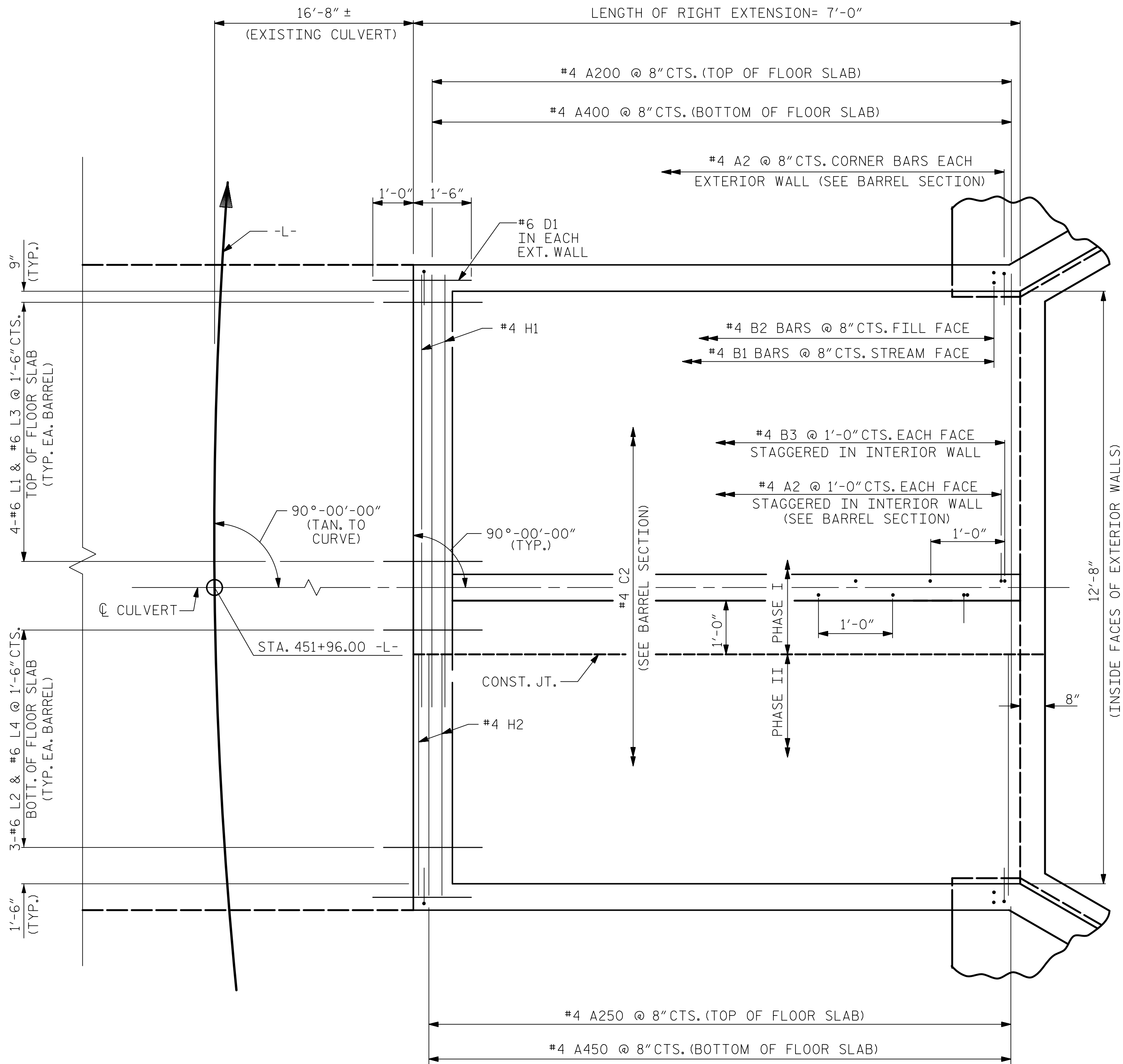
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 6 FT. X 9 FT.
CONCRETE BOX CULVERT
RIGHT EXTENSION
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C4-5
2			4			TOTAL SHEETS 9

ASSEMBLED BY : STM DATE : 06/22
CHECKED BY : MGC DATE : 08/22
DESIGN ENGINEER OF RECORD: STM DATE : 06/22

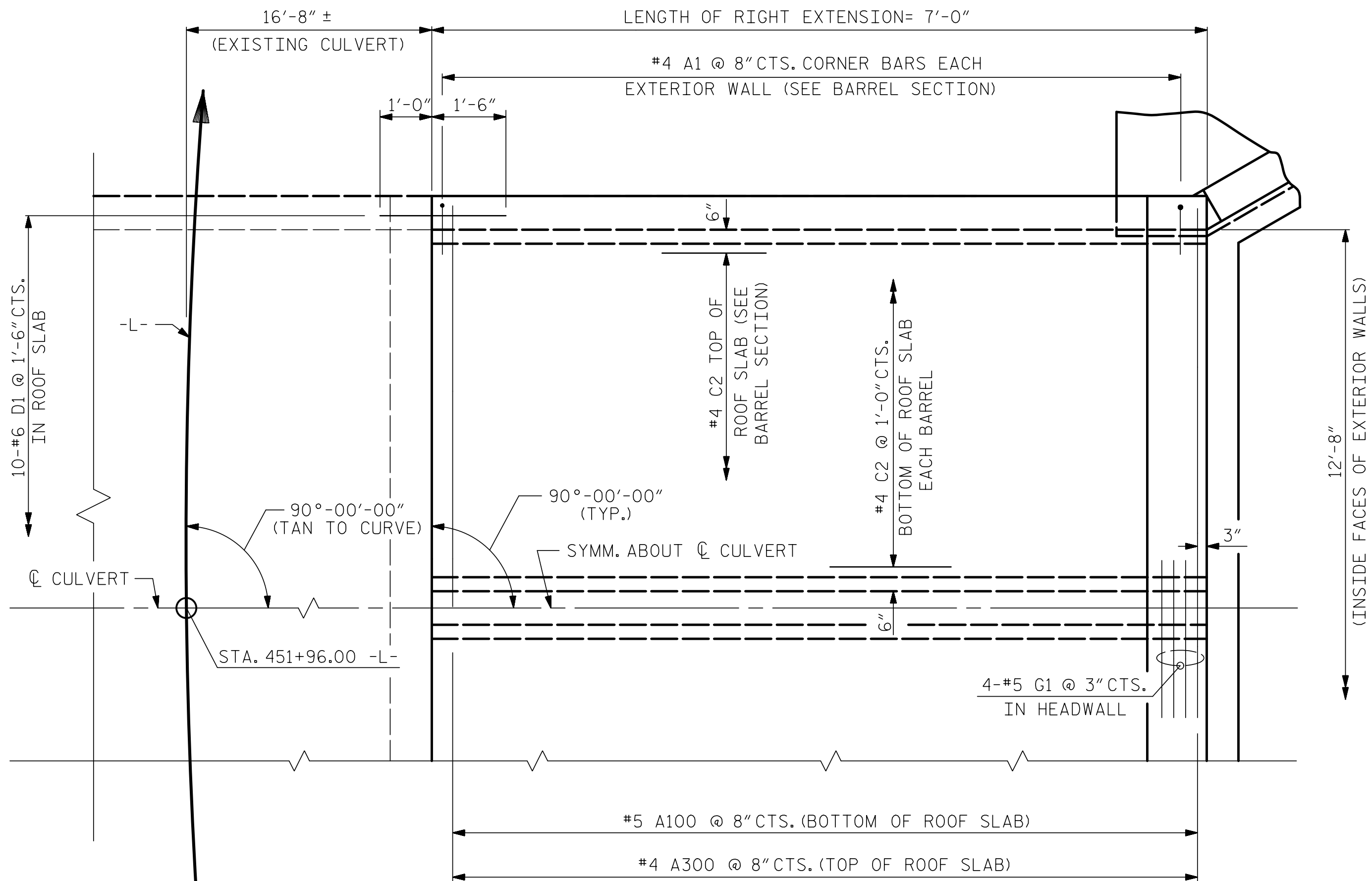
11/28/2023
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User:ZSmith

STR. #4



PLAN-FLOOR SLAB

FOR S1 BARS IN FLOOR SLAB & FOOTING, SEE WING SHEET.



PART PLAN-ROOF SLAB

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 451+96.00 -L-

SHEET 6 OF 9



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SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

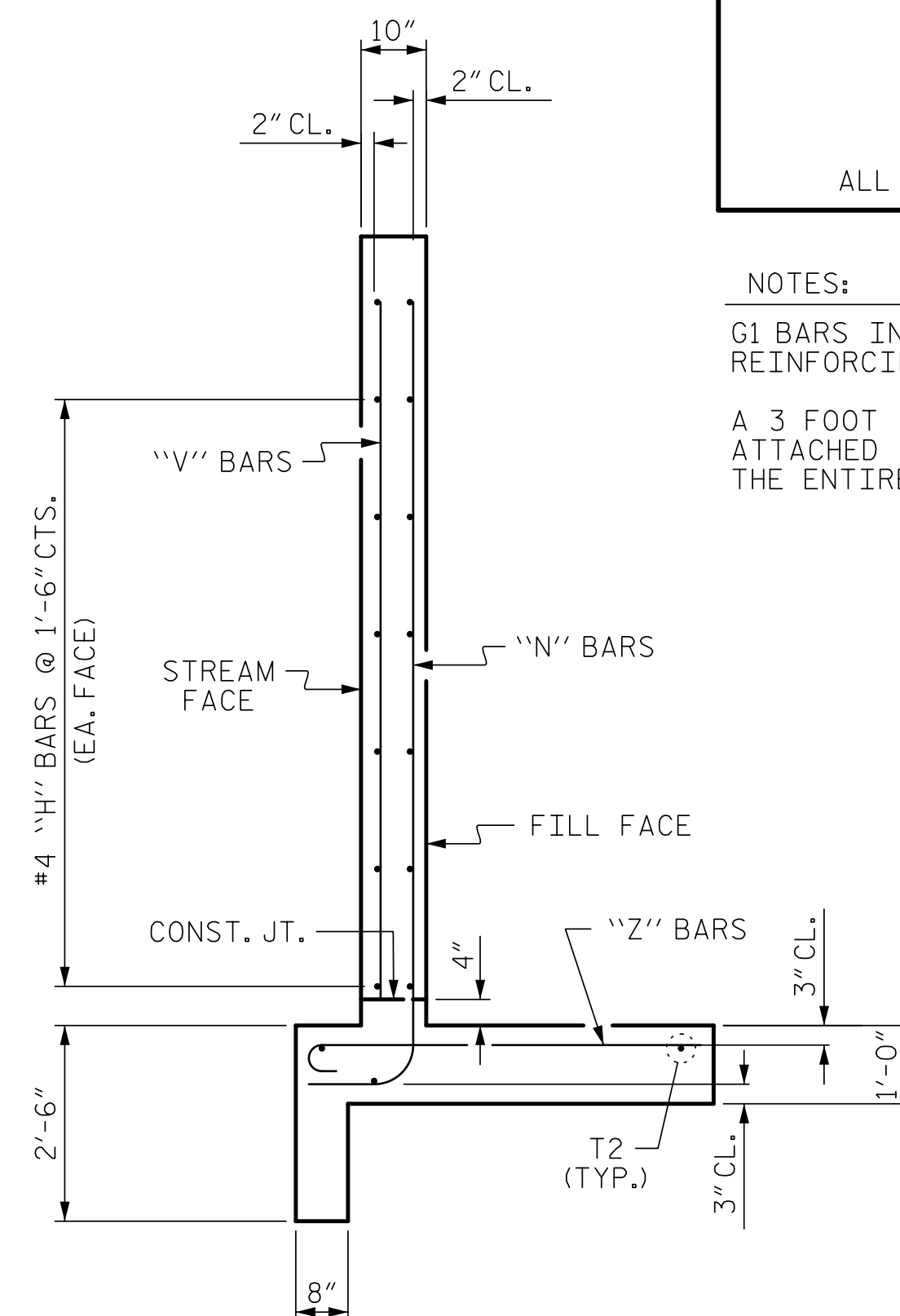
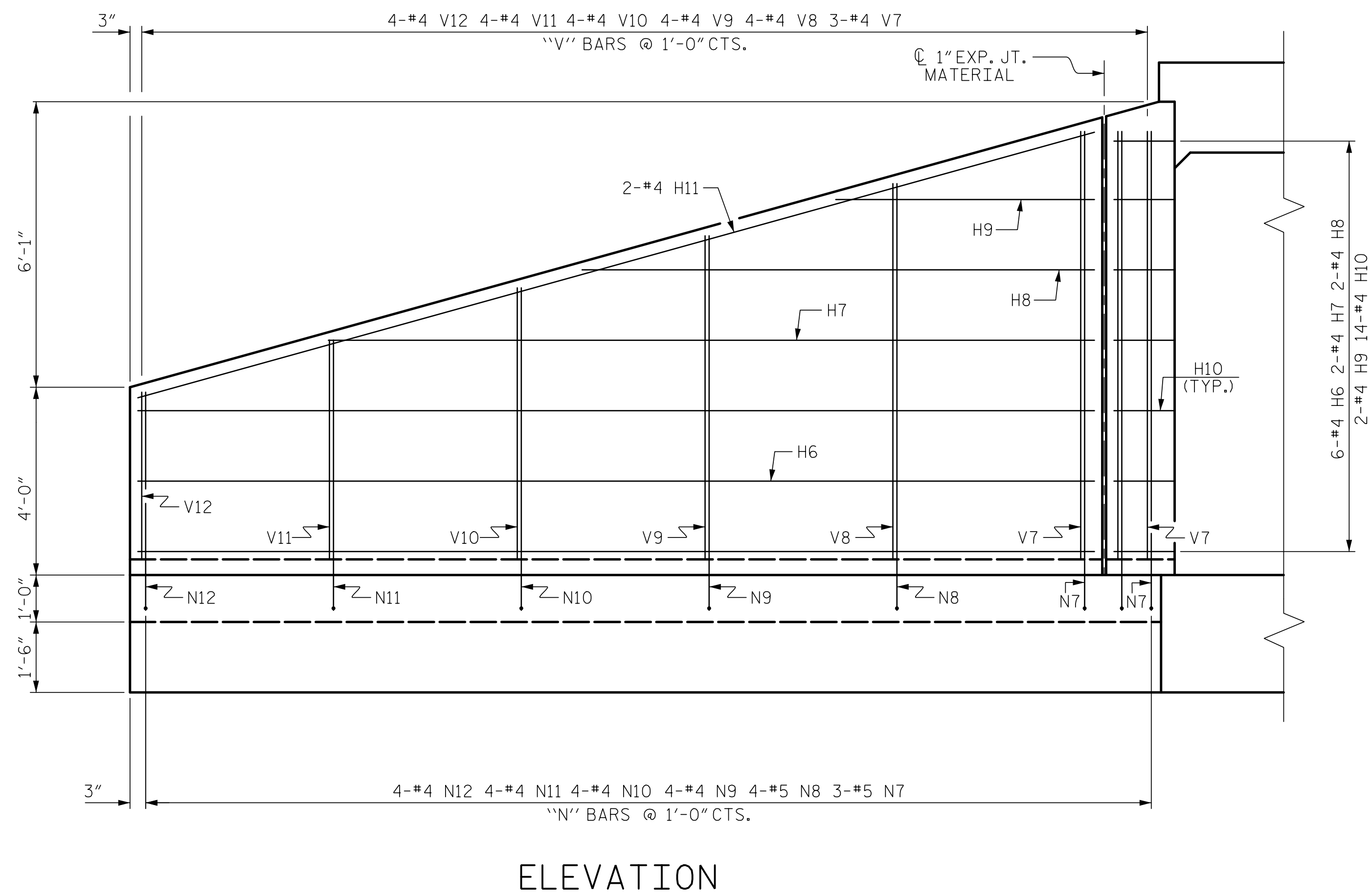
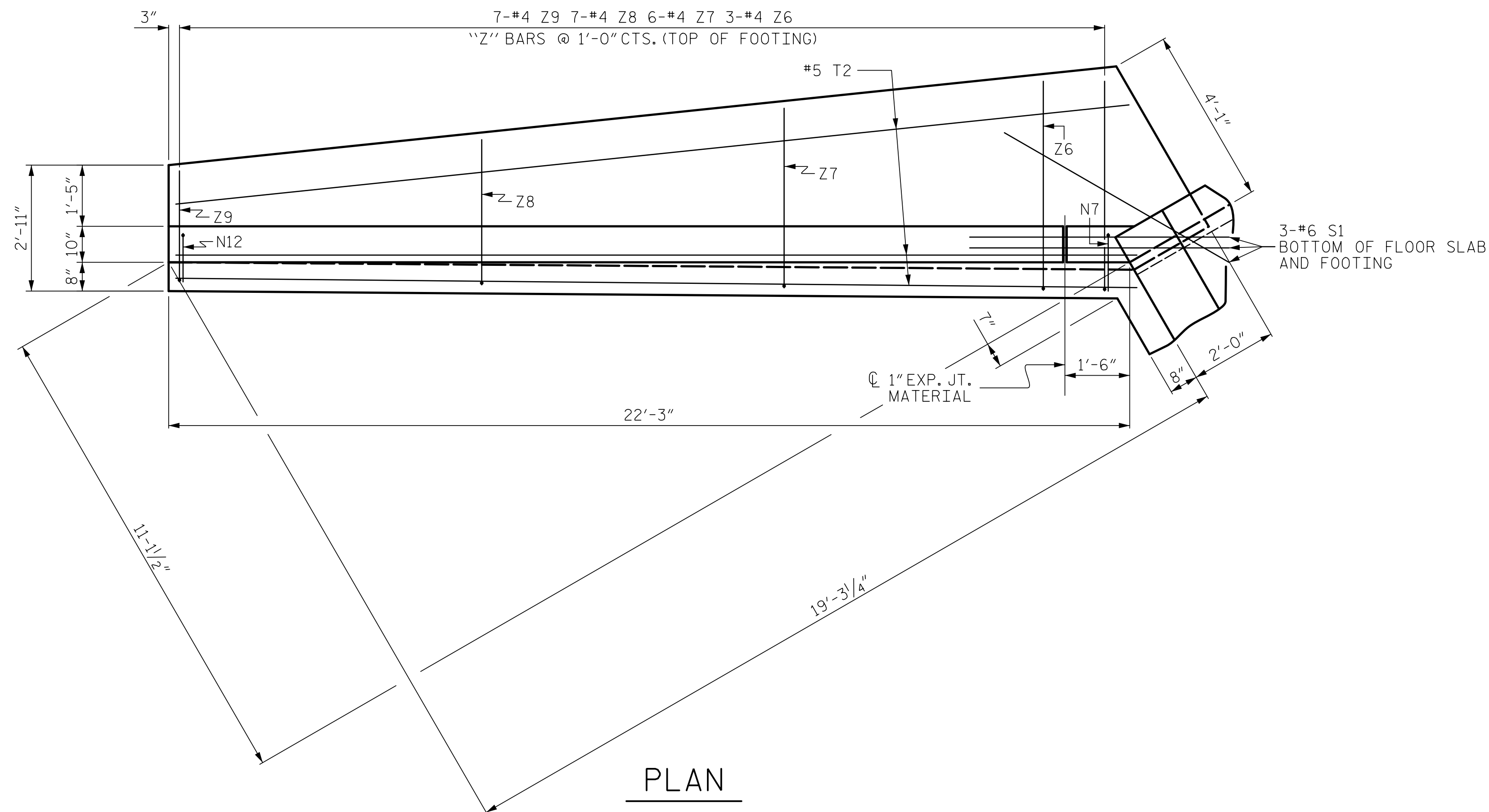
DOUBLE 6 FT. X 9 FT.
CONCRETE BOX CULVERT
RIGHT EXTENSION
90° SKEW

REVISIONS						SHEET NO. C4-6
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

ASSEMBLED BY : STM DATE : 06/22
CHECKED BY : MGC DATE : 08/22
DESIGN ENGINEER OF RECORD: STM DATE : 06/22

11/28/2023
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User:z2Smith

STR. #4



1

2'-0"

1'-0"

1'-3"

1'-8 $\frac{3}{4}$ "

2

6" RAD.

8"

9 $\frac{1}{2}$ "

N7

N8

N9

N10

N11

N12

9'-6 $\frac{1}{2}$ "

8'-6 $\frac{1}{2}$ "

7'-5 $\frac{1}{2}$ "

6'-4 $\frac{1}{2}$ "

5'-2 $\frac{1}{2}$ "

4'-1 $\frac{1}{2}$ "

3

Z6

Z7

Z8

Z9

4'-10"

4'-1"

3'-4"

2'-7"

6"

6"

6"

6"

HK.

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	12	#4	STR	20'-4"	163
H7	4	#4	STR	16'-3"	43
H8	4	#4	STR	10'-10"	29
H9	4	#4	STR	5'-6"	15
H10	28	#4	1	3'-3"	61
H11	4	#4	STR	21'-0"	56
N7	6	#5	2	11'-0"	69
N8	8	#5	2	10'-0"	83
N9	8	#4	2	8'-11"	48
N10	8	#4	2	7'-10"	42
N11	8	#4	2	6'-8"	36
N12	8	#4	2	5'-7"	30
S1	6	#6	STR	6'-0"	54
T2	6	#5	STR	22'-3"	139
V7	6	#4	STR	9'-0"	36
V8	8	#4	STR	7'-11"	42
V9	8	#4	STR	6'-10"	37
V10	8	#4	STR	5'-9"	31
V11	8	#4	STR	4'-7"	24
V12	8	#4	STR	3'-6"	19
Z6	6	#4	3	5'-4"	21
Z7	12	#4	3	4'-7"	37
Z8	14	#4	3	3'-10"	36
Z9	14	#4	3	3'-1"	29
TOTAL REINFORCING STEEL FOR 2 WINGS					1180 LBS.
CLASS A CONCRETE					
2 WINGS					18.6 C.Y.
1 HEADWALL					0.6 C.Y.
1 END CURTAIN WALL					0.7 C.Y.
TOTAL					19.9 C.Y.

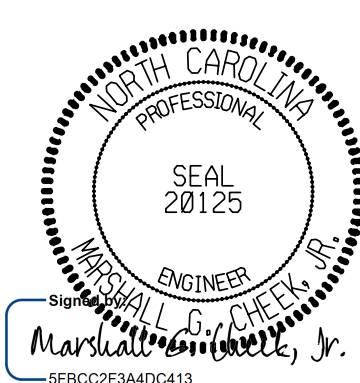
NOTES:

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL
REINFORCING STEEL.

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.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 451+96.00 -L-

SHEET 9 OF 9



7/23/2025

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UNLESS ALL SIGNATURES COMPLETED**

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

OUTLET WINGS FOR CONCRETE BOX CULVERT

H = 9'-0" SLOPE = 3:1
 RIGHT EXTENSION

ASSEMBLED BY :	STM	DATE :	07/22
CHECKED BY :	MGC	DATE :	08/22
DESIGN ENGINEER OF RECORD :	STM	DATE :	07/22

3/24/2023
X:\NCDOT\R-5739\Structures\Str. #4 (451 + 96.00 -L-)\Final Plans\DGNS\R-5739_SMU.CU_STR 4_9.dgn
User:ZSmith

STR. #4

BENCH MARK: TBM "D" DISK STAMPED "NOR-47"; 14.92FT RT OF STA 499+57.51 -L-; ELEV. 136.81

NAD 83/2011

TO SR 1222

WOODS

STA. 499+65.60 -L-

4'-9" LT EXT.

22'-2" ±

15'-8" ±

7'-6" RT EXT.

90°-00'-00" (TAN. TO CURVE)

CLASS II RIP RAP (ROADWAY PAY ITEM & DETAIL) (TYP.)

BLACK DUCK CREEK

DOUBLE 8' X 10' RCBC EXTENSION

EXISTING DOUBLE 8' X 7' RCBC

PROPOSED GUARDRAIL (ROADWAY PAY ITEM & DETAIL) (TYP.)

WOODS

TO JASPER JONES RD

TEMPORARY SHORING (ROADWAY PAY ITEM)

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

Profile view of the existing culvert. The diagram shows the ground profile (dashed line) and the culvert structure (solid line). The culvert is labeled "EXISTING CULVERT". The profile is defined by the following elevations and dimensions:

- Left end elevation: 127.3 ±
- First step elevation: 126.6 ±
- Second step elevation: 126.3 ±
- Third step elevation: 136.6 ±
- Fourth step elevation: 138.0 ±
- Fifth step elevation: 136.1 ±
- Sixth step elevation: 125.1 ±
- Seventh step elevation: 125.0 ±
- Right end elevation: 124.9 ±

Horizontal dimensions (distances between steps) are:

- 28'-2"
- 27'-10"
- 22'-2" ±
- 15'-8" ±
- 24'-8"
- 30'-10"

The culvert is labeled "EXISTING CULVERT". The profile is labeled "PROFILE ALONG CULVERT".

10/18/2023
X:\NCDOT\R-5739\Structures\Str. #5 (499 + 65.60 -L-)\Final Plans\DGNs\R-5739-SMU-CU-STR 5.1.dgn
User:ZSmith

CLASS A CONCRETE		
LEFT EXTENSION _____	28.4	C.Y.
RIGHT EXTENSION _____	43.5	C.Y.
TOTAL _____	71.9	C.Y.
REINFORCING STEEL		
LEFT EXTENSION _____	3,015	LBS
RIGHT EXTENSION _____	4,465	LBS
TOTAL _____	7,480	LBS
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION COND. MAT'L.		
LEFT EXTENSION _____	7	TONS
RIGHT EXTENSION _____	12	TONS
TOTAL _____	19	TONS

GRADE POINT ELEV. @ STA. 499+65.60 -L- = 138.42'
BED ELEV. @ STA. 499+65.60 -L- = 128.28'
ROADWAY SLOPES = 2:1 LEFT
3:1 RIGHT

DESIGN DISCHARGE _____ = 850 CFS
 FREQUENCY OF DESIGN FLOOD _____ = 50 YRS
 DESIGN HIGH WATER ELEVATION _____ = 135.4'
 DRAINAGE AREA _____ = 3.6 SQ. MI.
 BASE DISCHARGE (Q100) _____ = 1000 CFS
 BASE HIGH WATER ELEVATION _____ = 136.3'

OVERTOPPING DISCHARGE _____ = 1670 CFS
FREQUENCY OF OVERTOPPING FLOOD _ = 500+ YRS
OVERTOPPING FLOOD ELEVATION _____ = 139.4'

 PHASE II CONSTRUCTION

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.

SHEET NO.	C5-1
TOTAL SHEETS	9

STR #5

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	1.05	--	1.75	1.17	1	BOTT. SLAB	8.00	1.05	1	TOP SLAB	7.67	
		HL-93 (OPERATING)	N/A		1.36	--	1.35	1.51	1	BOTT. SLAB	8.00	1.36	1	TOP SLAB	7.67	
		HS-20 (INVENTORY)	36,000	2	1.09	39.24	1.75	1.15	1	BOTT. SLAB	8.00	1.09	1	TOP SLAB	7.67	
		HS-20 (OPERATING)	36,000		1.41	50.76	1.35	1.49	1	BOTT. SLAB	8.00	1.41	1	TOP SLAB	7.67	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		2.22	29.97	1.40	2.48	1	BOTT. SLAB	4.00	2.22	1	TOP SLAB	7.67	
		SNGARBS2	20,000		2.03	40.60	1.40	2.28	1	BOTT. SLAB	8.00	2.03	1	TOP SLAB	7.67	
		SNAGRIS2	22,000		2.11	46.42	1.40	2.11	1	BOTT. SLAB	8.00	2.22	1	TOP SLAB	7.67	
		SNCOTTS3	27,250	3	1.31	35.70	1.40	1.64	1	BOTT. SLAB	8.00	1.31	1	TOP SLAB	7.67	
		SNAGGRS4	34,925		1.62	56.58	1.40	1.62	1	BOTT. SLAB	8.00	1.64	1	TOP SLAB	7.67	
		SNS5A	35,550		1.52	54.04	1.40	1.59	1	BOTT. SLAB	8.00	1.52	1	TOP SLAB	7.67	
		SNS6A	39,950		1.38	55.13	1.40	1.44	1	BOTT. SLAB	8.00	1.38	1	BOTT. SLAB	8.00	
		SNS7B	42,000		1.38	57.96	1.40	1.43	1	BOTT. SLAB	8.00	1.38	1	BOTT. SLAB	8.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		1.85	61.05	1.40	1.85	1	TOP SLAB	5.67	2.04	1	TOP SLAB	7.67	
		TNT4A	33,075		1.53	50.60	1.40	1.68	1	BOTT. SLAB	8.00	1.53	1	TOP SLAB	7.67	
		TNT6A	41,600		1.52	63.23	1.40	1.69	1	BOTT. SLAB	8.00	1.52	1	TOP SLAB	7.67	
		TNT7A	42,000		1.53	64.26	1.40	1.67	1	BOTT. SLAB	8.00	1.53	1	TOP SLAB	7.67	
		TNT7B	42,000		1.50	63.00	1.40	1.56	1	BOTT. SLAB	8.00	1.50	1	TOP SLAB	7.67	
		TNAGRIT4	43,000		1.41	60.63	1.40	1.45	1	BOTT. SLAB	8.00	1.41	1	BOTT. SLAB	8.00	
		TNAGT5A	45,000		1.41	63.45	1.40	1.45	1	BOTT. SLAB	8.00	1.41	1	BOTT. SLAB	8.00	
		TNAGT5B	45,000		1.34	60.30	1.40	1.41	1	BOTT. SLAB	8.00	1.34	1	BOTT. SLAB	6.00	
EMERGENCY VEHICLE (EV)		EV2	28,750		1.52	43.70	1.30	1.76	1	BOTT. SLAB	8.00	1.52	1	TOP SLAB	7.67	
		EV3	43,000	4	1.14	49.02	1.30	1.53	1	BOTT. SLAB	8.00	1.14	1	TOP SLAB	7.67	

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	--

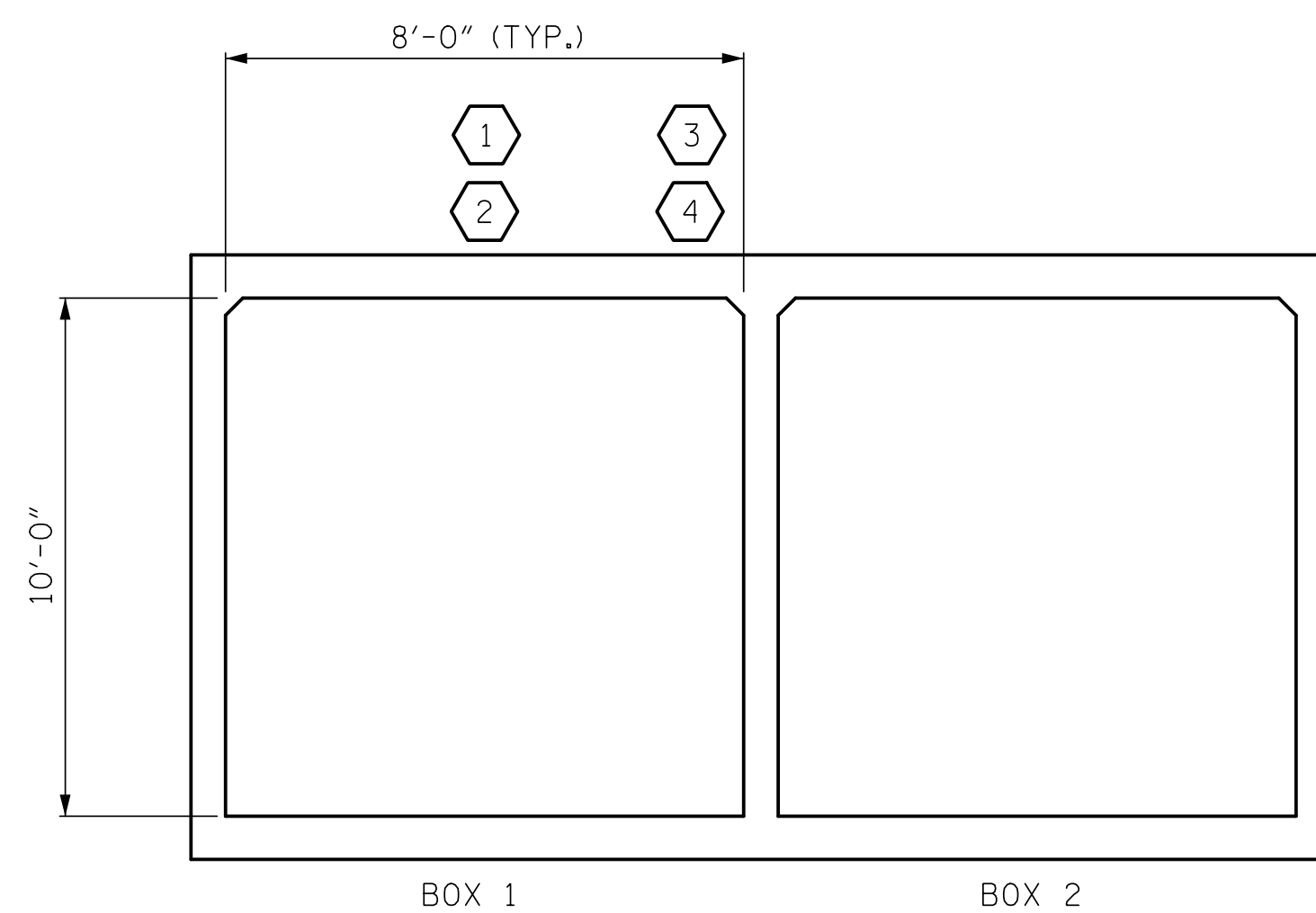
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

CONTROLLING LOAD RATING

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

** SEE CHART FOR VEHICLE TYPE



(LOOKING DOWNSTREAM)

ASSEMBLED BY : STM		DATE : 07/23	
CHECKED BY : MGC		DATE : 11/23	
DRAWN BY : WMC 7/II		REV. 10/1/II MAA/GM	
CHECKED BY : GM 7/II		REV. 12/17 MAA/THA	
		REV. 04/23 BNB/AA	

11/29/2023
X:\NCDOT\IR-5739\Structures\Str. #5 (499 + 65.60 -L-)\FinalPlans\DGNs\R-5739-SMU-CU-STR 5_2.dgn
User:ZSmith

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 499+65.60 -L-

SHEET 2 OF 9



7/23/2025

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

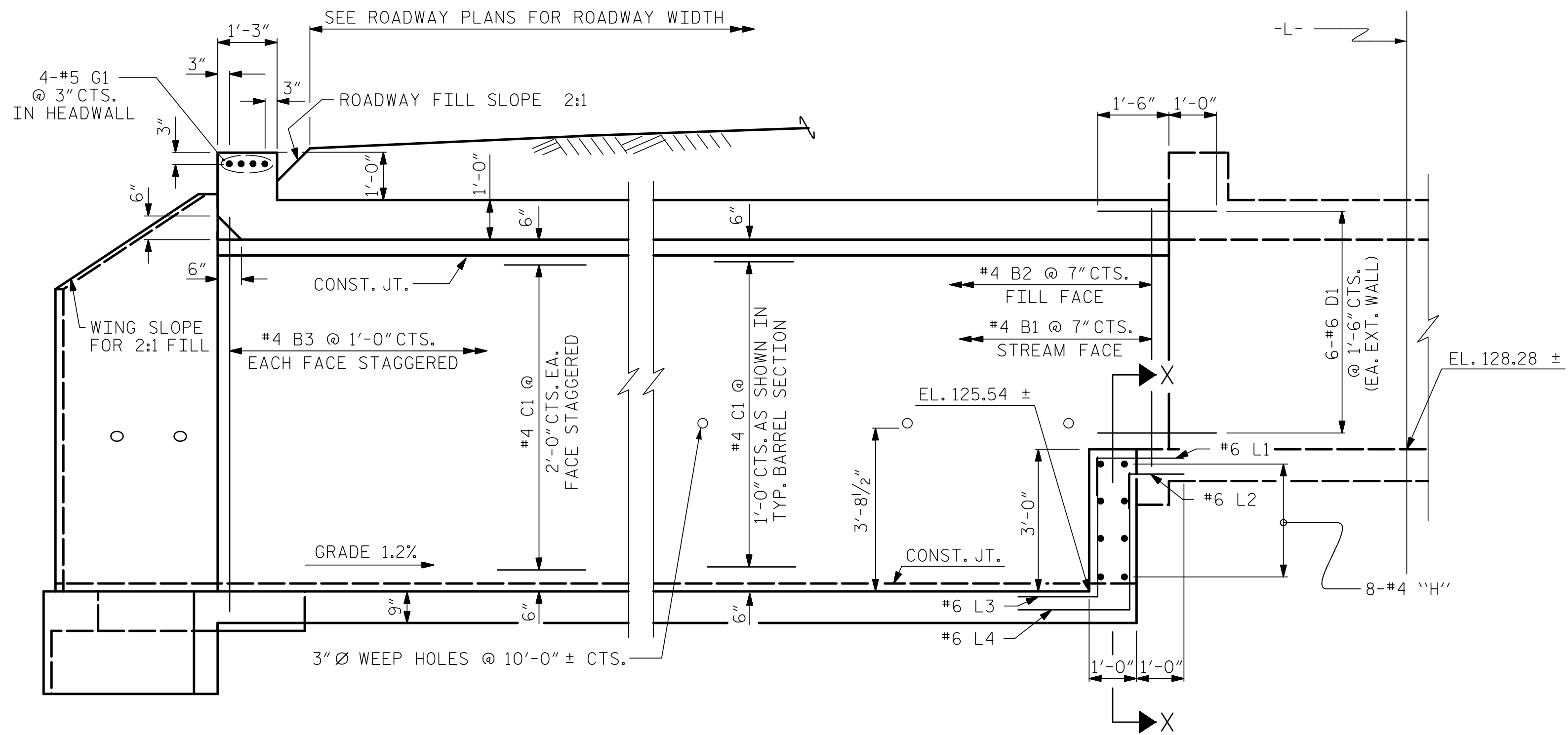
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

ID	REVISIONS						SHEET NO.
	NO.	BY:	DATE:	NO.	BY:	DATE:	C5-2
ET	1			3			TOTAL SHEETS 9
	2			4			

STR. #5

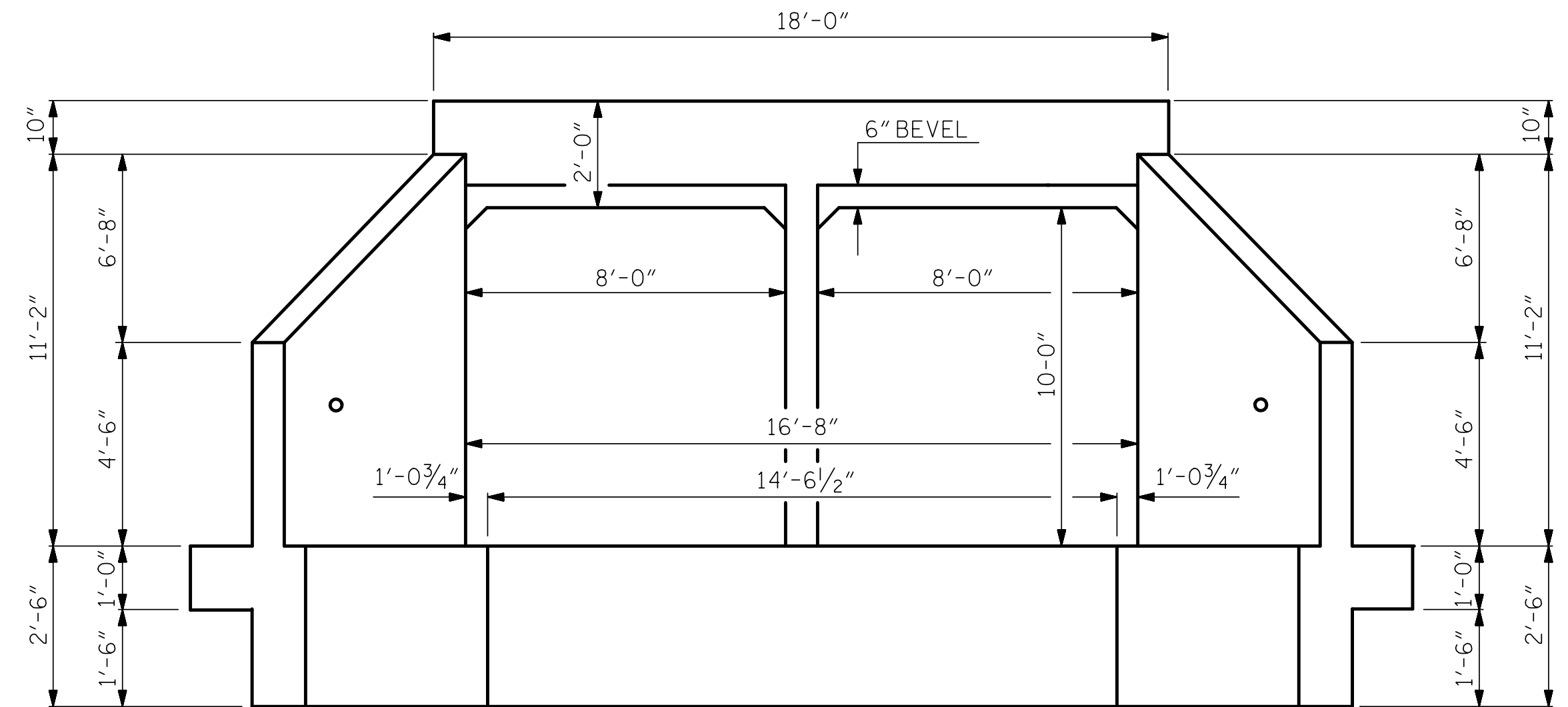
STD. NO. LRFR5



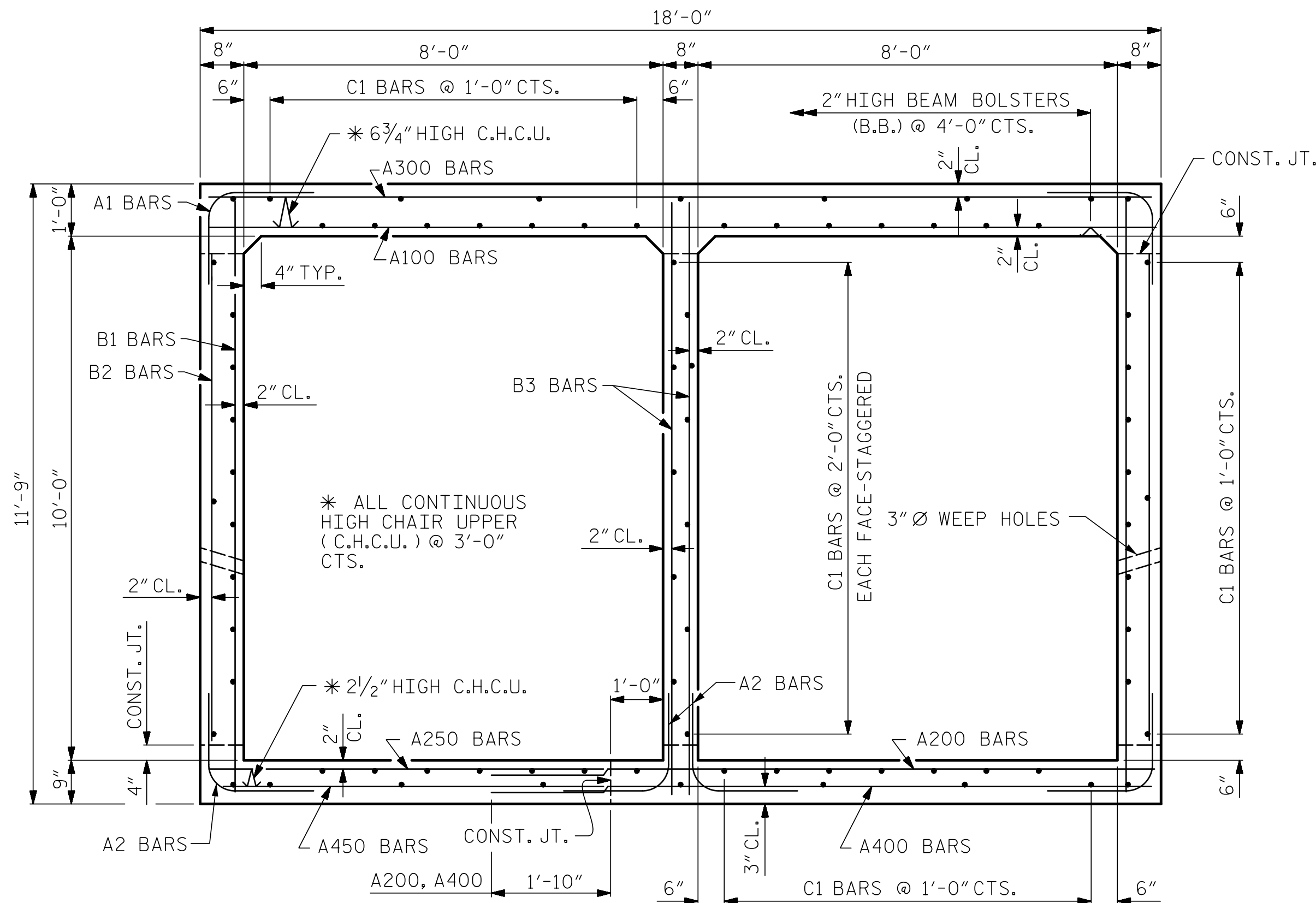
INTERIOR WALL

EXTERIOR WALL

CULVERT EXTENSION SECTION NORMAL TO ROADWAY

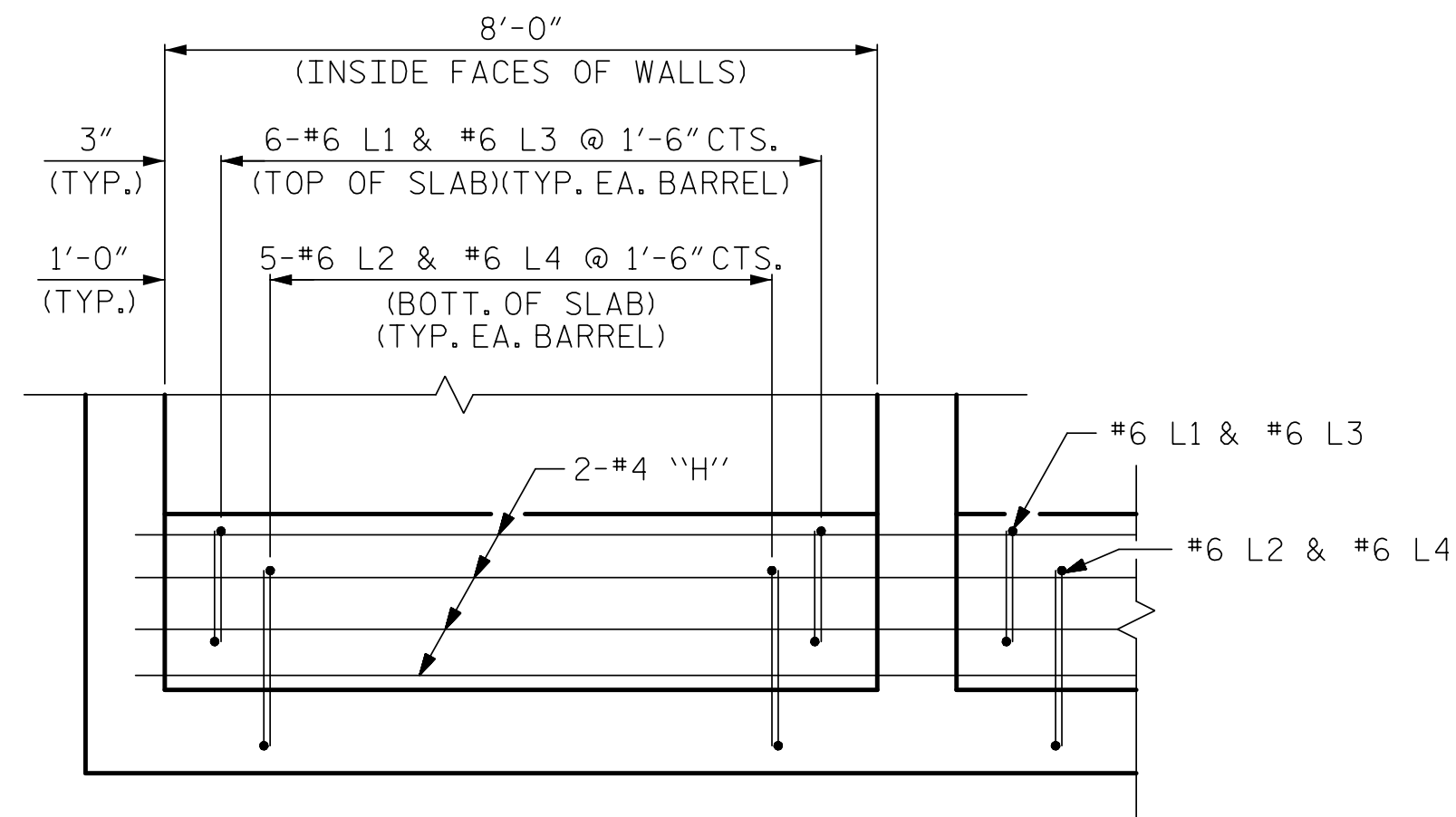


INLET END ELEVATION



RIGHT ANGLE SECTION OF BARREL

THERE ARE 78 "C" BARS IN SECTION OF BARREL.
(LOOKING DOWNSTREAM)



SECTION X-X

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 499+65.60 -L-

SHEET 3 OF 9



7/23/2025

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SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 8 FT. X 10 FT.
CONCRETE BOX CULVERT
LEFT EXTENSION
90° SKEW

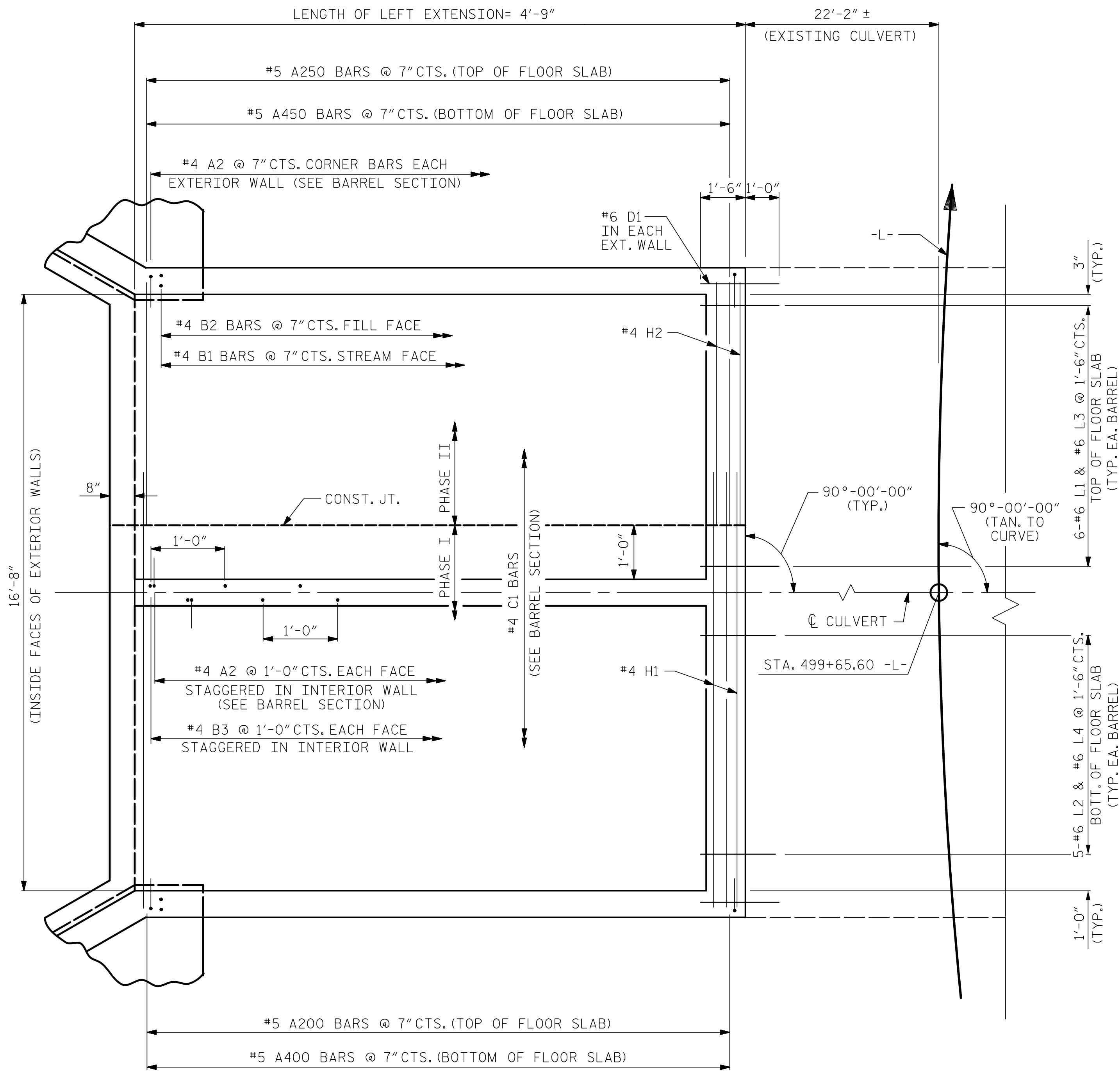
REVISIONS						SHEET NO. C5-3
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

STR. #5

STD. NO. CB90_2

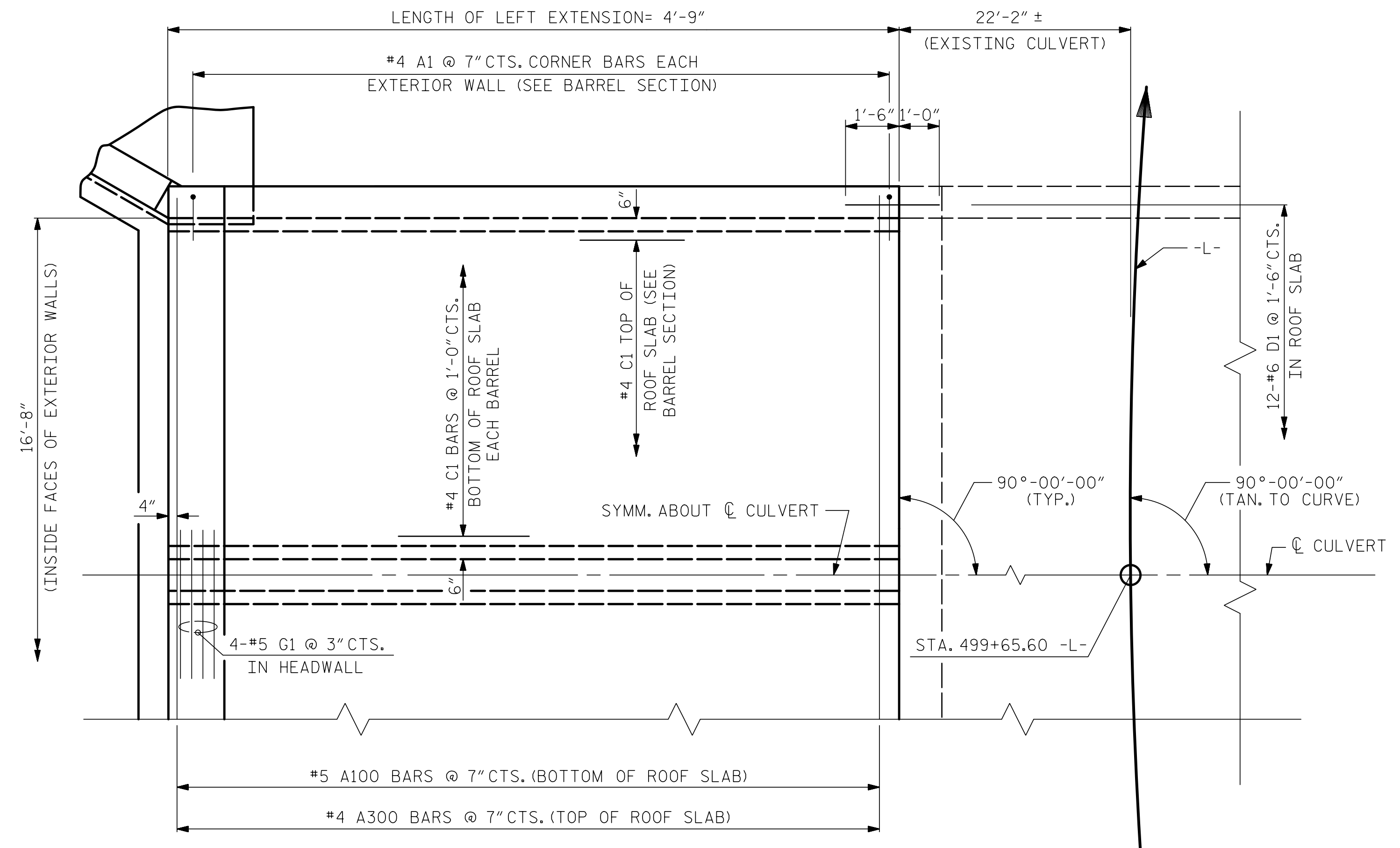
ASSEMBLED BY : STM DATE : 08/22
CHECKED BY : MCC DATE : 01/23
DESIGN ENGINEER OF RECORD: STM DATE : 08/22

3/27/2023
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User:ZSmith



PLAN-FLOOR SLAB

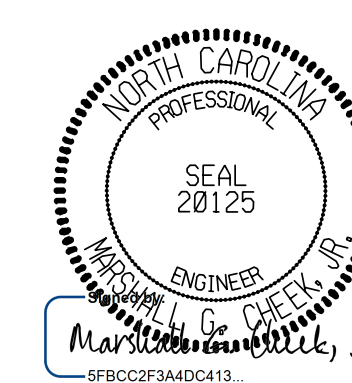
FOR S1 BARS IN FLOOR SLAB & FOOTING, SEE WING SHEET.



PART PLAN-ROOF SLAB

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 499+65.60 -L-

SHEET 4 OF 9



7/23/2025

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TGS ENGINEERS
 706 HILLSBOROUGH STREET
 SUITE 200
 RALEIGH, NC 27603
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 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

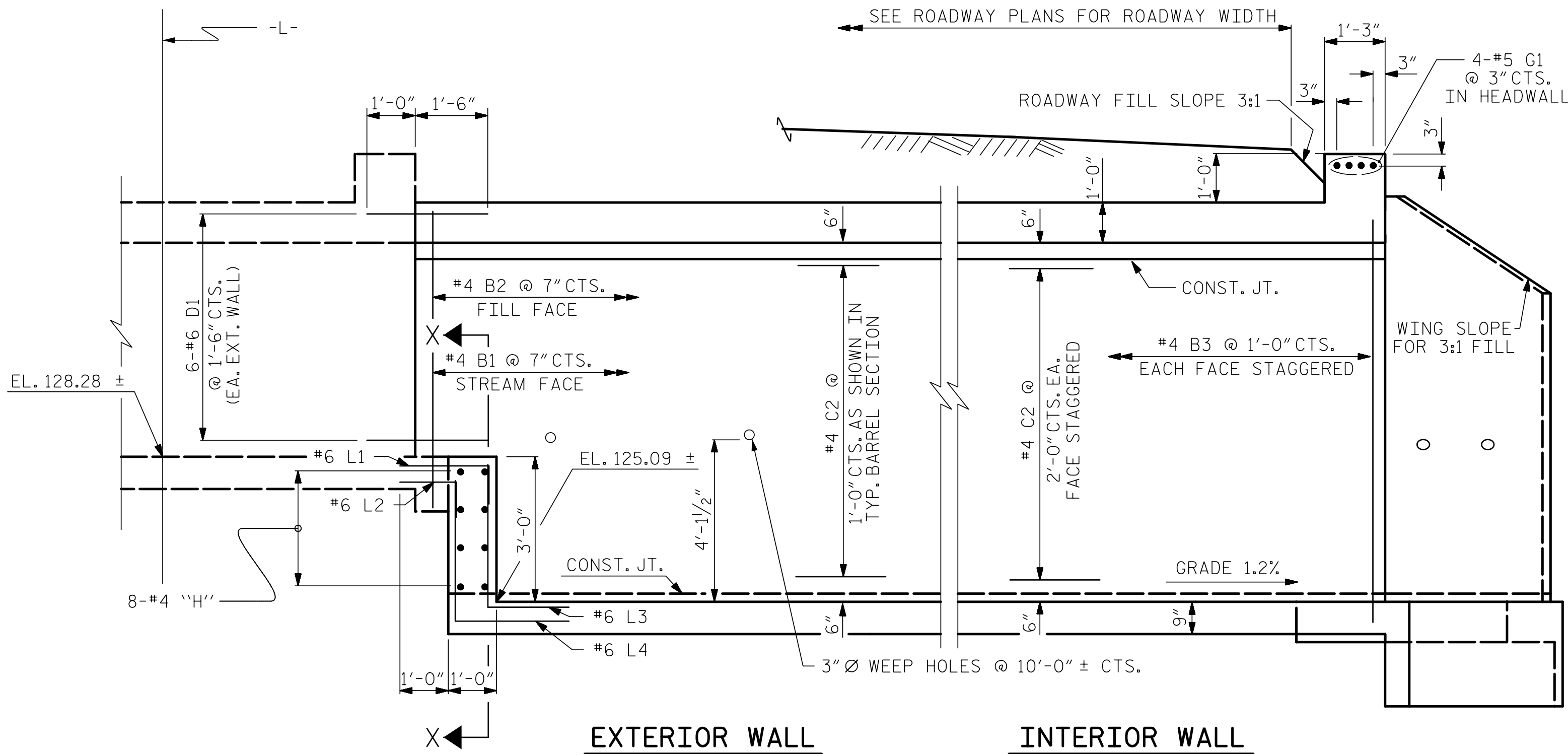
DOUBLE 8 FT. X 10 FT.
 CONCRETE BOX CULVERT
 LEFT EXTENSION
 90° SKEW

REVISIONS						SHEET NO. C5-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

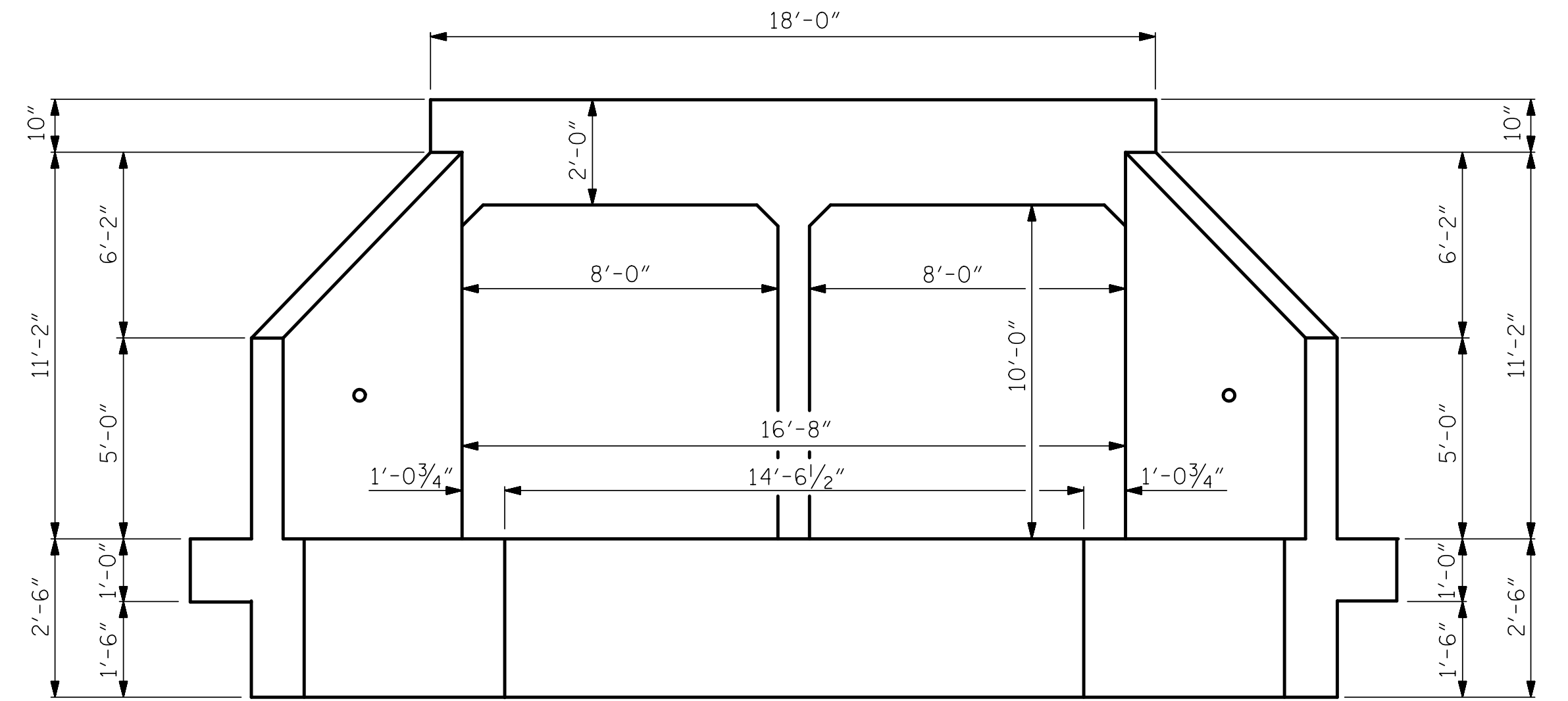
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 CHECKED BY : MGC DATE : 01/23
 DESIGN ENGINEER OF RECORD: STM DATE : 08/22

11/28/2023
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 User:zSmith

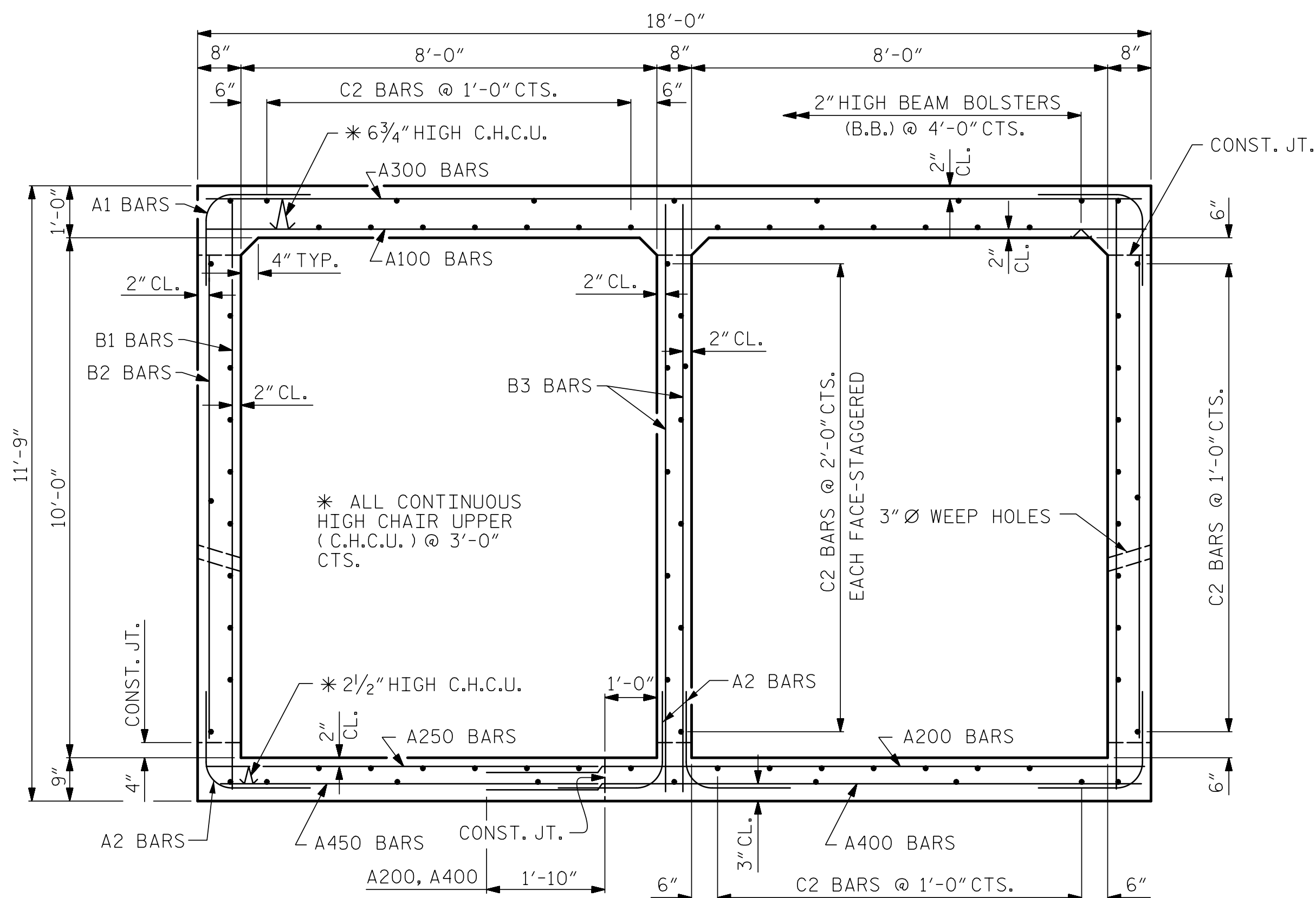
STR. #5



CULVERT EXTENSION SECTION NORMAL TO ROADWAY

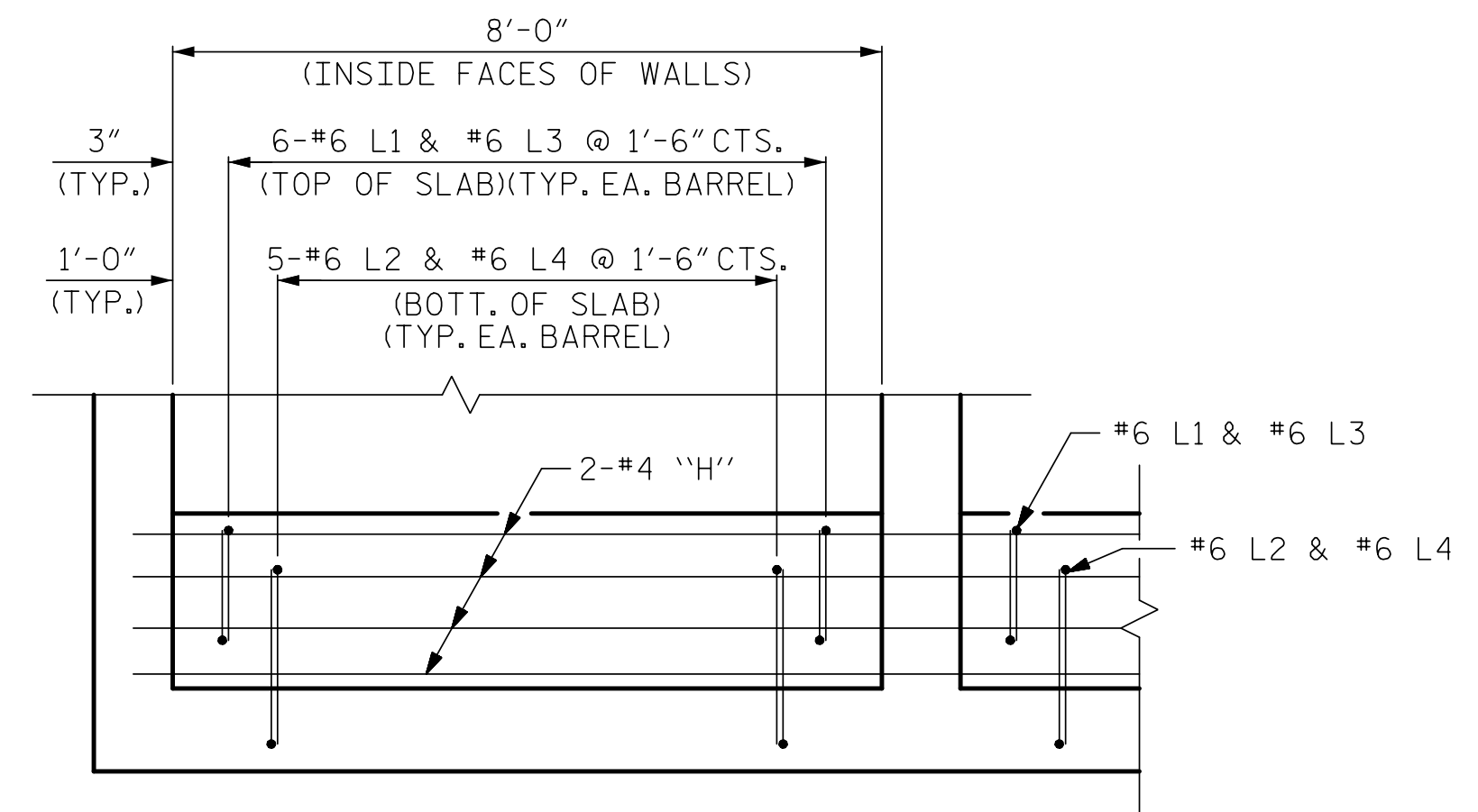


OUTLET END ELEVATION



RIGHT ANGLE SECTION OF BARREL

THERE ARE 78 "C" BARS IN SECTION OF BARREL.
(LOOKING DOWNSTREAM)



SECTION X-X

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 499+65.60 -L-

SHEET 5 OF 9



7/23/2025

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

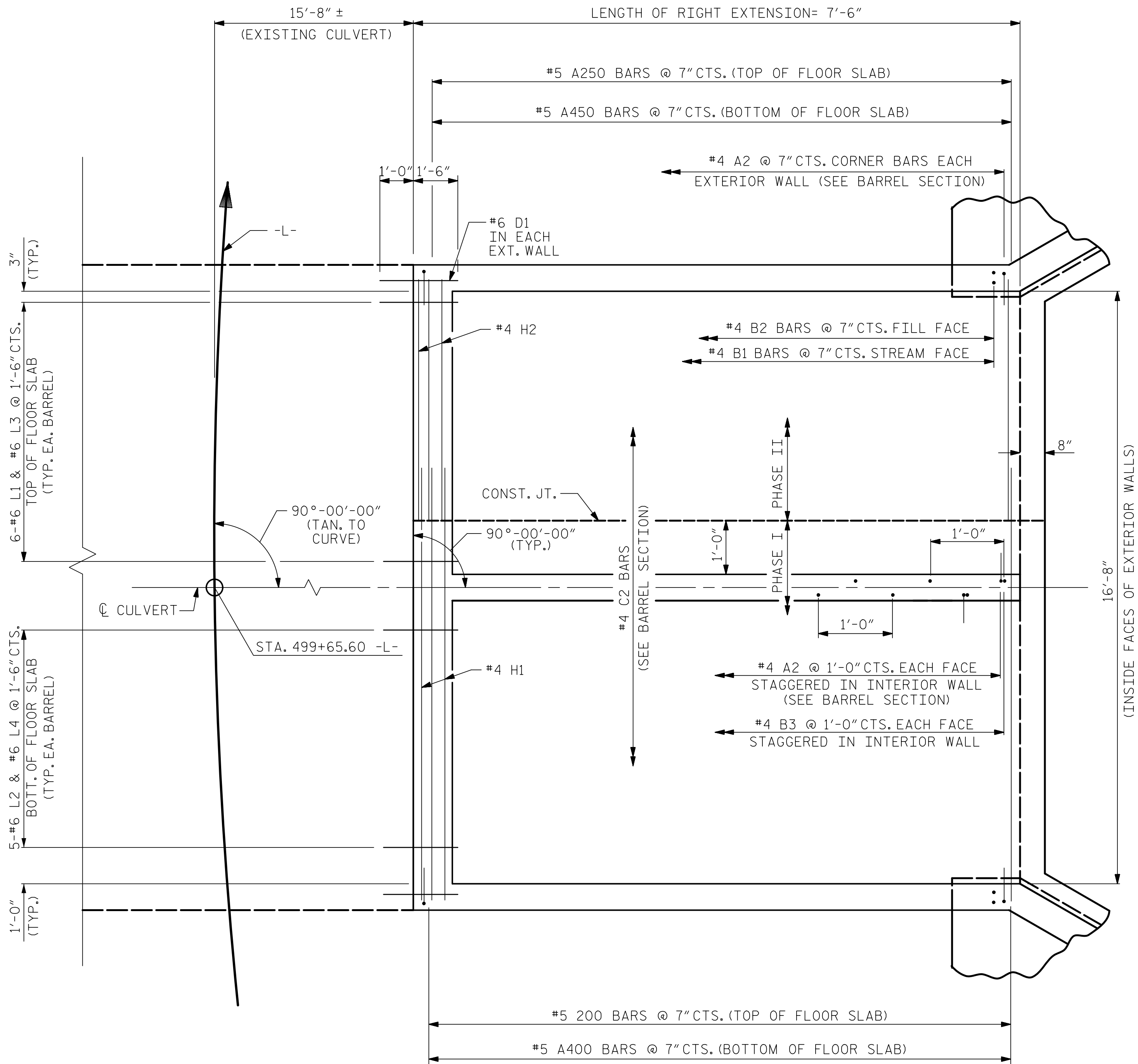
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DOUBLE 8 FT. X 10 FT.
CONCRETE BOX CULVERT
RIGHT EXTENSION
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C5-5
2			4			TOTAL SHEETS 9

ASSEMBLED BY : STM DATE : 08/22
CHECKED BY : MGC DATE : 01/23
DESIGN ENGINEER OF RECORD: STM DATE : 08/22

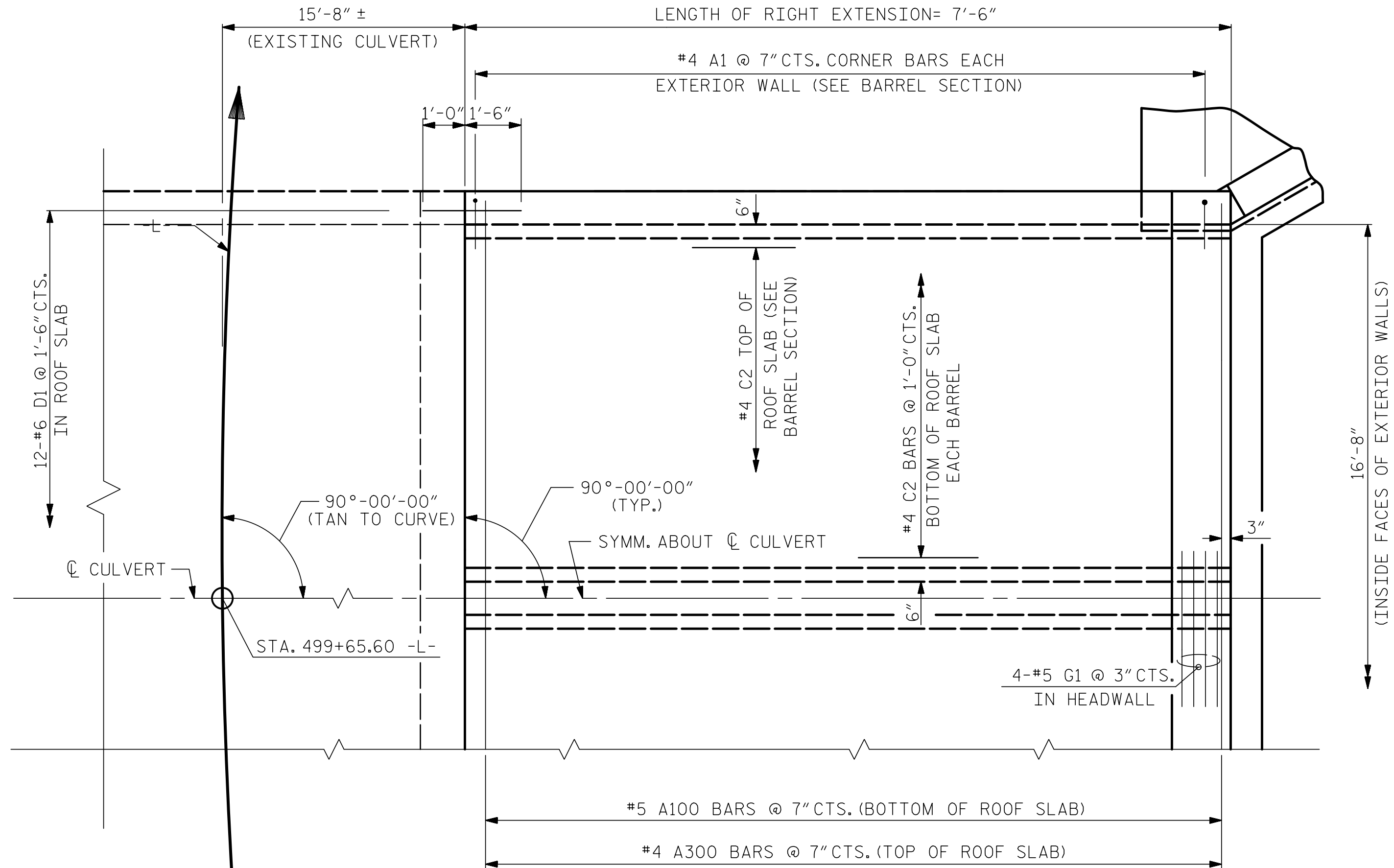
11/23/2023
X:\NCDOT\1R-5739\Structures\Str. #5 (499 + 65.60 -L-)\Final Plans\DGNS\1R-5739.SMU.CU.STR 5.5.dgn
User:ZSmith

STR. #5



PLAN-FLOOR SLAB

FOR S1 BARS IN FLOOR SLAB & FOOTING, SEE WING SHEET.



PART PLAN-ROOF SLAB

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 499+65.60 -L-

SHEET 6 OF 9

 7/23/2025		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
		DOUBLE 8 FT. X 10 FT. CONCRETE BOX CULVERT RIGHT EXTENSION 90° SKEW					
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275					
		REVISIONS					
		SHEET NO. C5-6					
		TOTAL SHEETS 9					

ASSEMBLED BY : STM DATE : 08/22
CHECKED BY : MGC DATE : 01/23
DESIGN ENGINEER OF RECORD: STM DATE : 08/22

11/28/2023
X:\NCDOT\NR-5739\Structures\Str. #5 (499 + 65.60 -L-)\Final Plans\DGNS\NR-5739.SMU.CU.STR 5.6.dgn
User:zSmith

STR. #5

LEFT EXTENSION QUANTITIES				
CLASS A CONCRETE				
BARREL @	1.92	CY/FT	9.1	C.Y.
WINGS, ETC.			17.3	C.Y.
BOTTOM SLAB STEP			2.0	C.Y.
TOTAL			28.4	C.Y.
REINFORCING STEEL				
BARREL			1,797	LBS.
WINGS, ETC.			1,218	LBS.
TOTAL			3,015	LBS.
CULVERT EXCAVATION			LUMP SUM	
FOUNDATION COND. MAT'L.			7 TONS	

RIGHT EXTENSION QUANTITIES				
CLASS A CONCRETE				
BARREL @	1.92	CY/FT	14.4	C.Y.
WINGS, ETC.			26.5	C.Y.
BOTTOM SLAB STEP			2.0	C.Y.
SILLS			0.6	C.Y.
TOTAL			43.5	C.Y.
REINFORCING STEEL				
BARREL			2,586	LBS.
WINGS, ETC.			1,879	LBS.
TOTAL			4,465	LBS.
CULVERT EXCAVATION			LUMP SUM	
FOUNDATION COND. MAT'L.			12 TONS	

LEFT EXTENSION BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	16	#4	1	5'-8"	61
A2	26	#4	1	4'-8"	81
A100	8	#5	STR	17'-8"	147
A200	8	#5	STR	12'-6"	104
A250	8	#5	STR	7'-6"	63
A300	8	#4	STR	17'-8"	94
A400	8	#5	STR	12'-6"	104
A450	8	#5	STR	7'-6"	63
B1	16	#4	STR	11'-4"	121
B2	16	#4	STR	9'-4"	100
B3	10	#4	STR	11'-4"	76
C1	78	#4	STR	4'-4"	226
D1	24	#6	STR	2'-6"	90
G1	4	#5	STR	17'-8"	74
H1	8	#4	STR	12'-6"	67
H2	8	#4	STR	7'-6"	40
L1	12	#6	2	4'-0"	72
L2	10	#6	2	3'-3"	49
L3	12	#6	3	4'-9"	86
L4	10	#6	3	5'-3"	79
REINFORCING STEEL				1,797	LBS

BAR TYPE	
VERTICAL LEG	A1
	A2
6" R.	2'-9"
	1'-9"
2'-1 1/2"	9 1/2"
	2'-3"
L1	L2
	1'-9"
L1	L2
	1'-3"
2'-3"	2'-0"
	VERTICAL LEG
L3	L4
	3'-0"
L3	L4
	1'-9"
L3	L4
	2'-3"
REINFORCING STEEL	
2,586	

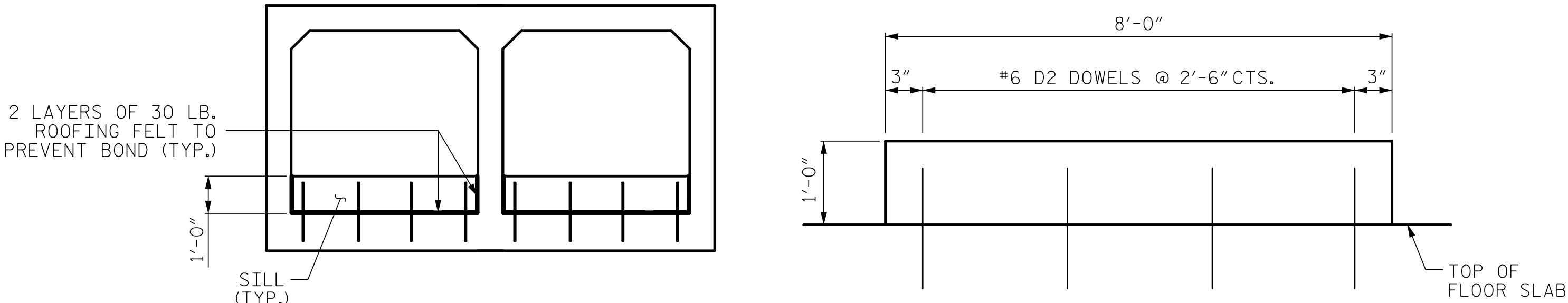
RIGHT EXTENSION BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	26	#4	1	5'-8"	98
A2	42	#4	1	4'-8"	131
A100	13	#5	STR	17'-8"	240
A200	13	#5	STR	12'-6"	169
A250	13	#5	STR	7'-6"	102
A300	13	#4	STR	17'-8"	153
A400	13	#5	STR	12'-6"	169
A450	13	#5	STR	7'-6"	102
B1	26	#4	STR	11'-4"	197
B2	26	#4	STR	9'-4"	162
B3	16	#4	STR	11'-4"	121
C2	78	#4	STR	7'-1"	369
D1	24	#6	STR	2'-6"	90
D2	8	#6	STR	1'-4"	16
G1	4	#5	STR	17'-8"	74
H1	8	#4	STR	12'-6"	67
H2	8	#4	STR	7'-6"	40
L1	12	#6	2	4'-0"	72
L2	10	#6	2	3'-3"	49
L3	12	#6	3	4'-9"	86
L4	10	#6	3	5'-3"	79
REINFORCING STEEL				2,586	LBS

SPLICE LENGTHS CHART		
BAR	SIZE	SPLICE LENGTH
B1	#4	1'-10"
A200	#5	2'-4"
A400	#5	2'-4"
``H``	#4	1'-10"

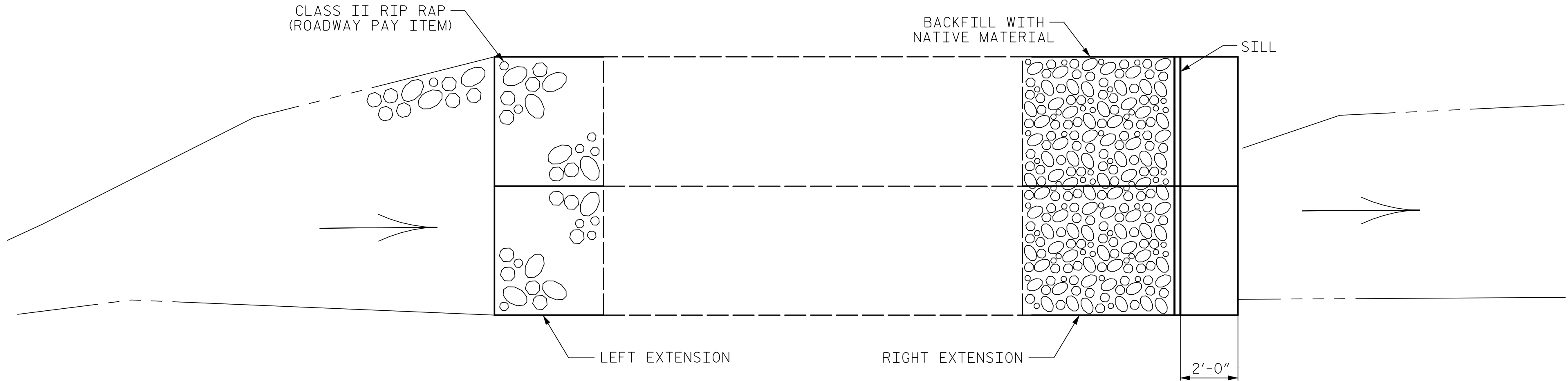
MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT EXTENSIONS. BED MATERIAL MAY BE SUPPLEMENTED WITH CLASS B RIP RAP AS NECESSARY. NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

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

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



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



DRAWN BY : STM DATE : 08/22
CHECKED BY : MGC DATE : 01/23
DESIGN ENGINEER OF RECORD: STM DATE : 08/22

PLAN OF FLOOR SILL LAYOUT

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

DOUBLE 8 FT. X 10 FT. CONCRETE BOX CULVERT

LT & RT EXTENSION

90° SKEW

11/23/2023

X:\NCDOT\NR-5739\Structures\Str. #5 (499 + 65.60 -L-)\Final Plans\DGNs\NR-5739.SMU.CU.STR 5.7.dgn

User:z2smith

REVISIONS

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

SHEET NO.

C5-7

TOTAL SHEETS

9

STR. #5

TGS ENGINEERS

706 HILLSBOROUGH STREET

SUITE 200

RALEIGH, NC 27603

PH (919) 773-8887

CORP. LICENSE NO.: C-0275

SEAL

20125

ENGINEER

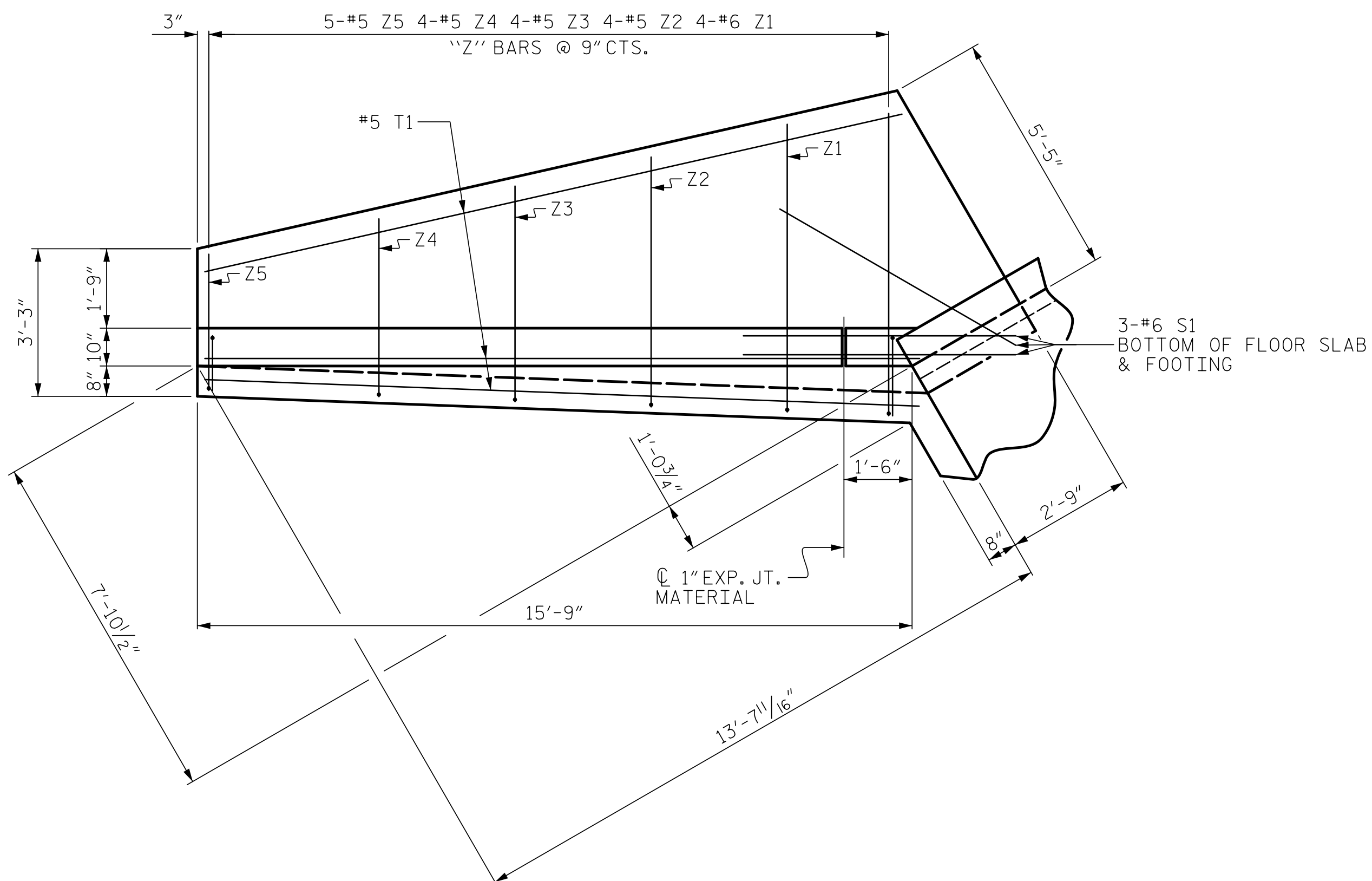
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5F8BC2F34DC413

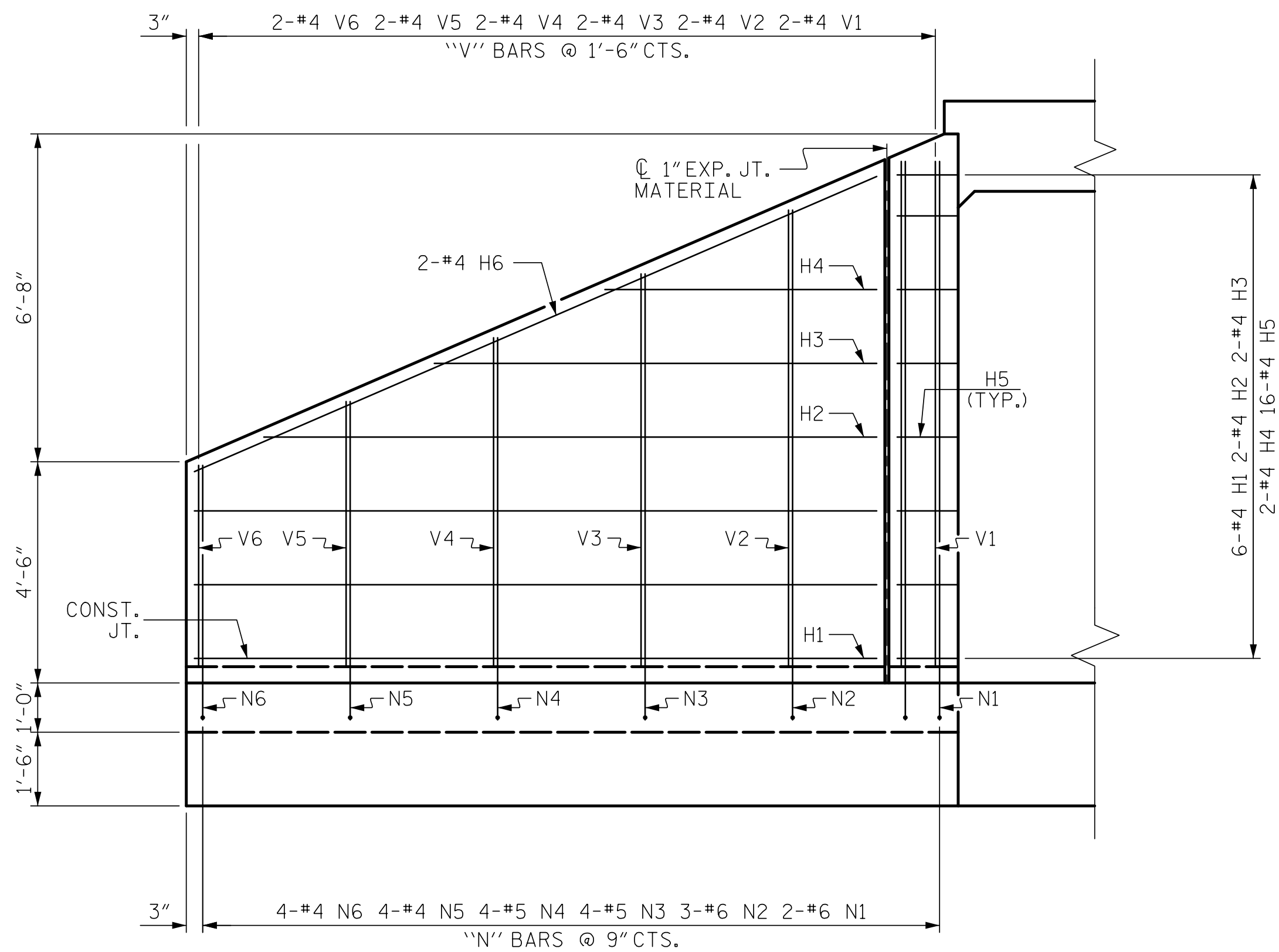
7/23/2025

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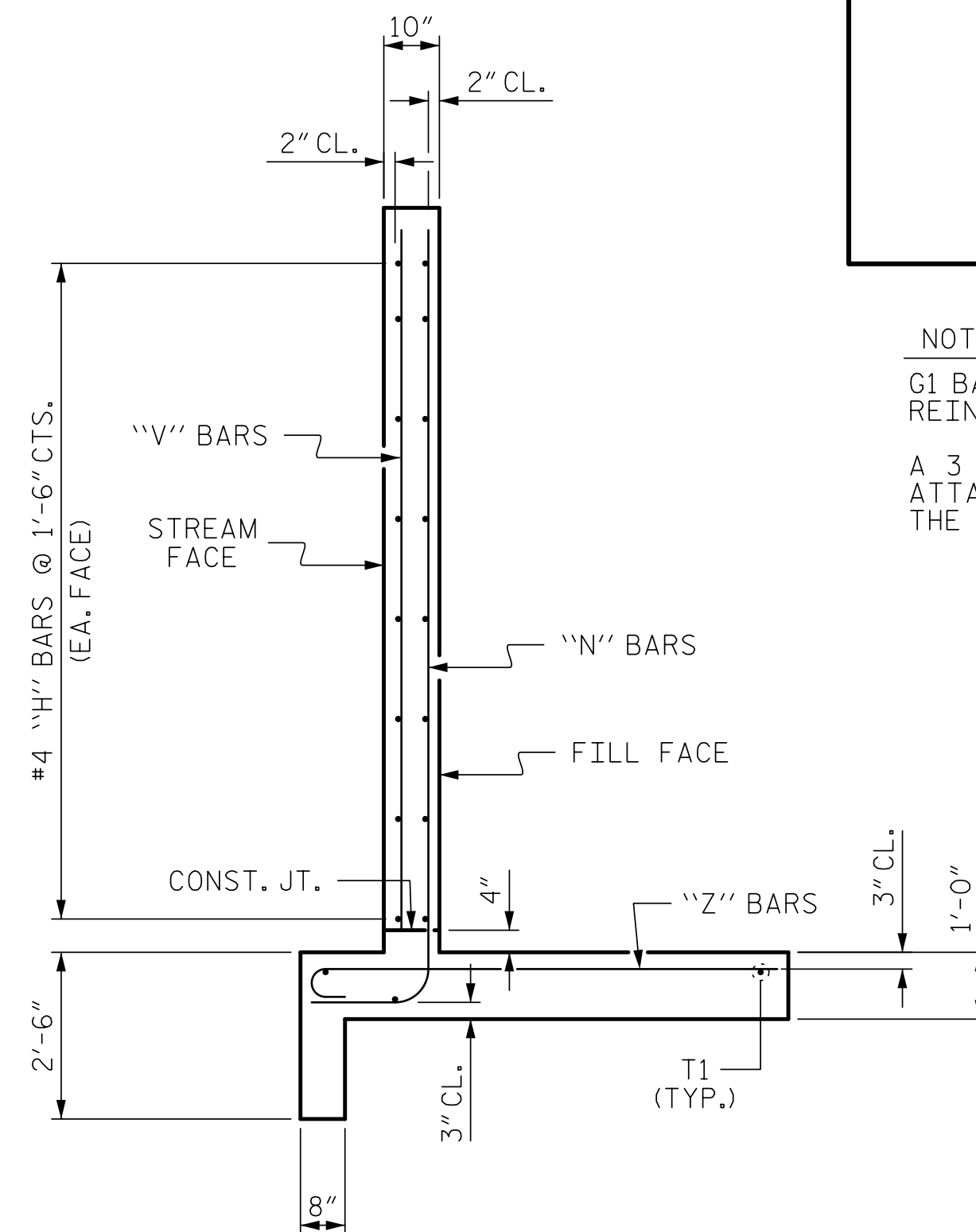
UNLESS ALL SIGNATURES COMPLETED



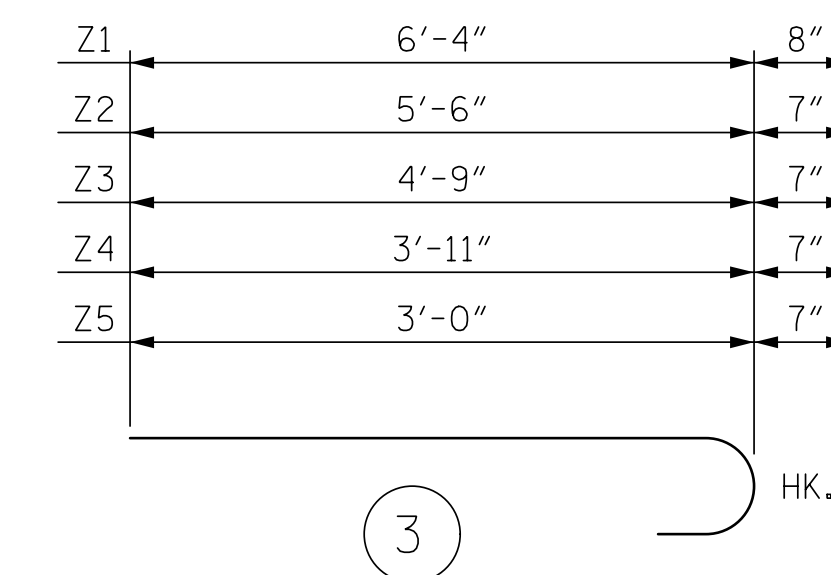
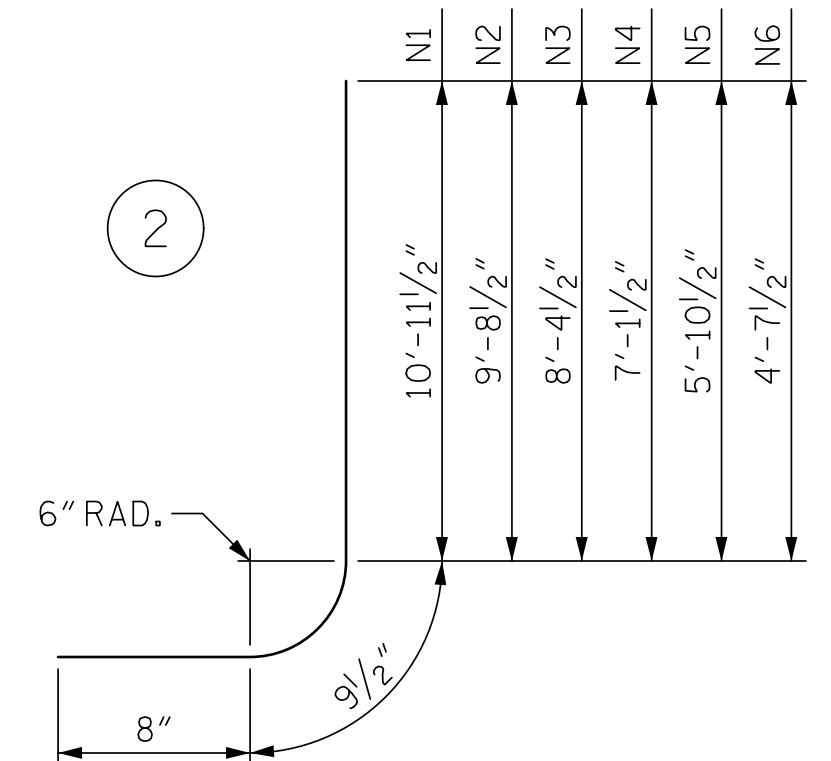
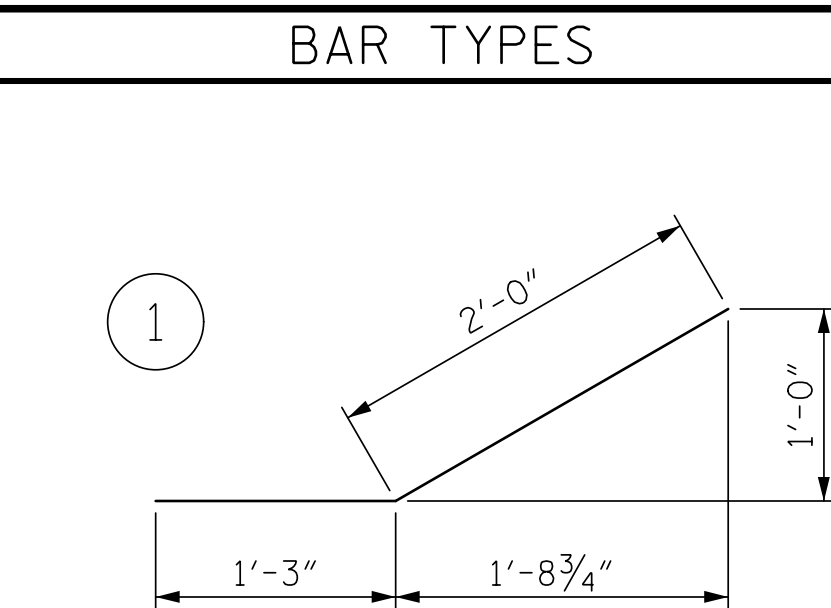
PLAN



ELEVATION



TYPICAL WING SECTION



ALL BAR DIMENSIONS ARE OUT TO OUT.

BAR TYPES

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	13'-10"	111
H2	4	#4	STR	12'-7"	34
H3	4	#4	STR	9'-1"	24
H4	4	#4	STR	5'-6"	15
H5	32	#4	1	3'-3"	69
H6	4	#4	STR	15'-1"	40

N1	4	#6	2	12'-5"	75
N2	6	#6	2	11'-2"	101
N3	8	#5	2	9'-10"	82
N4	8	#5	2	8'-7"	72
N5	8	#4	2	7'-4"	39
N6	8	#4	2	6'-1"	33

S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	15'-9"	99

V1	4	#4	STR	10'-4"	28
V2	4	#4	STR	9'-2"	24
V3	4	#4	STR	7'-8"	20
V4	4	#4	STR	6'-7"	18
V5	4	#4	STR	5'-4"	14
V6	4	#4	STR	4'-1"	11

Z1	8	#6	3	7'-0"	84
Z2	8	#5	3	6'-1"	51
Z3	8	#5	3	5'-4"	45
Z4	8	#5	3	4'-6"	38
Z5	10	#5	3	3'-7"	37

REINFORCING STEEL FOR 2 WINGS	1,218 LBS
----------------------------------	-----------

CLASS A CONCRETE	
2 WINGS	15.6 CY
1 HEADWALL	0.8 CY
END CURTAIN WALL	0.9 CY
TOTAL	17.3 CY

NOTES

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL
REINFORCING STEEL.

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.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 499+65.60 -L-

SHEET 8 OF 9



7/23/2025

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS
FOR
CONCRETE BOX CULVERT
H = 10'-0" SLOPE = 2:1
LEFT EXTENSION

REVISIONS

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

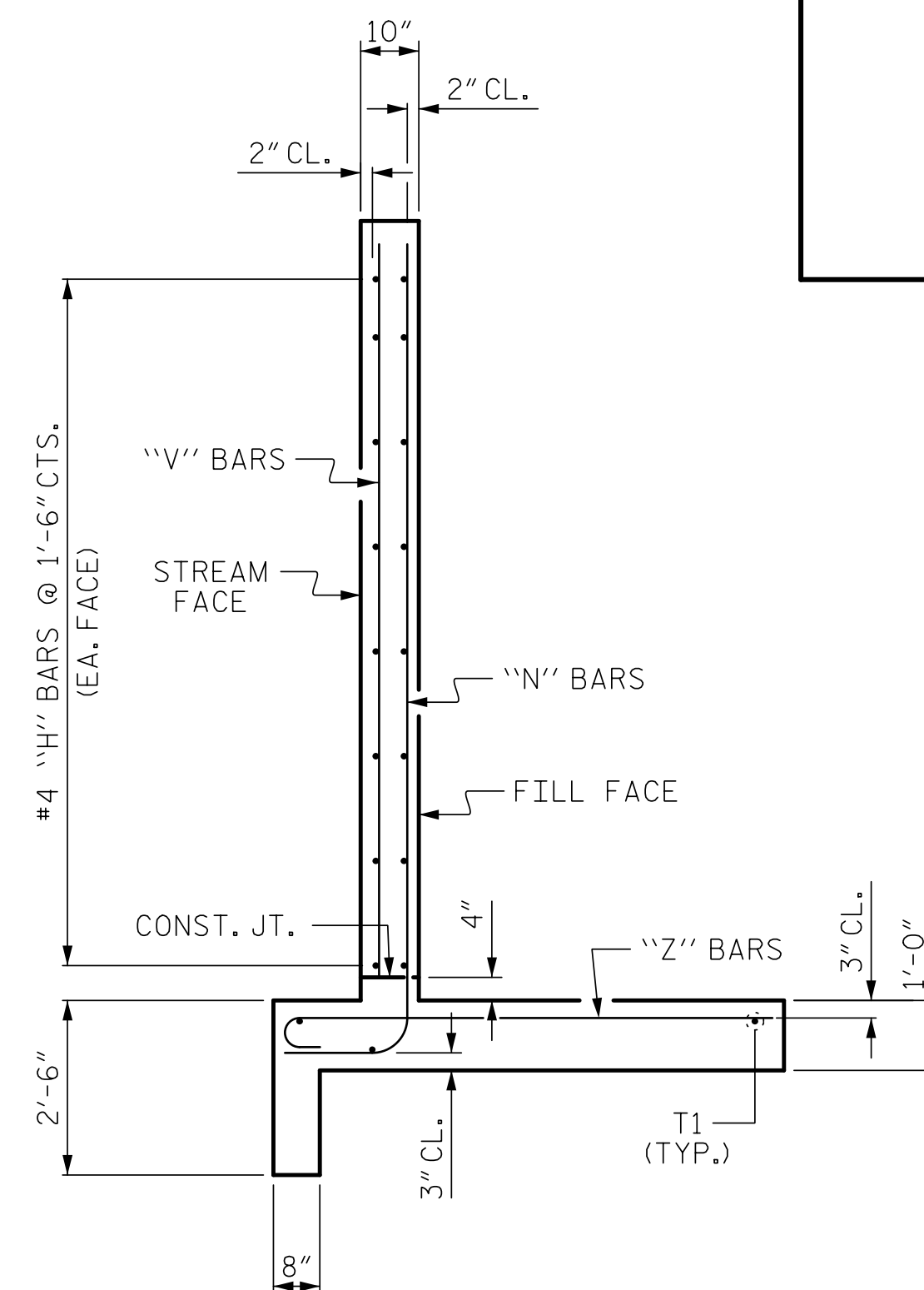
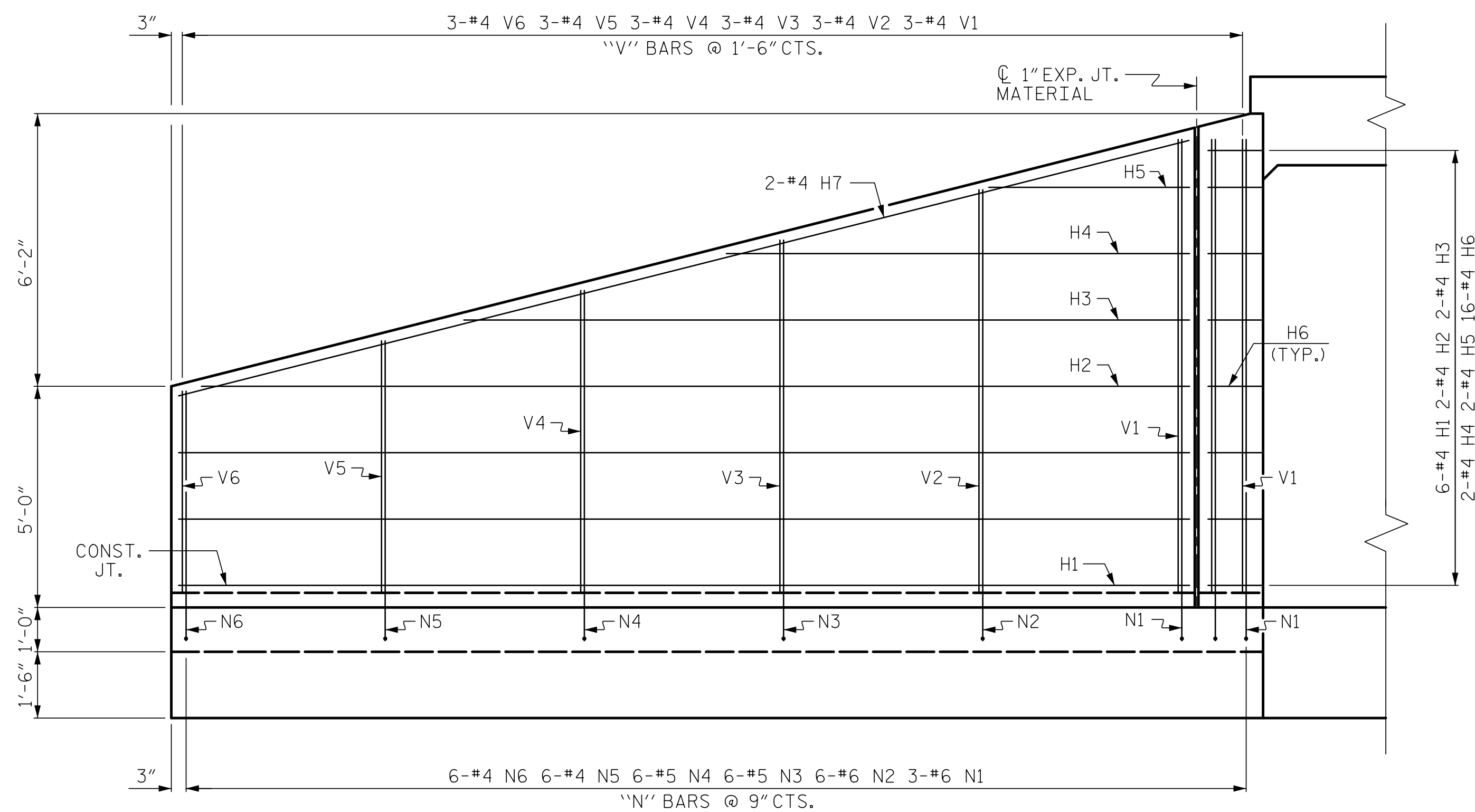
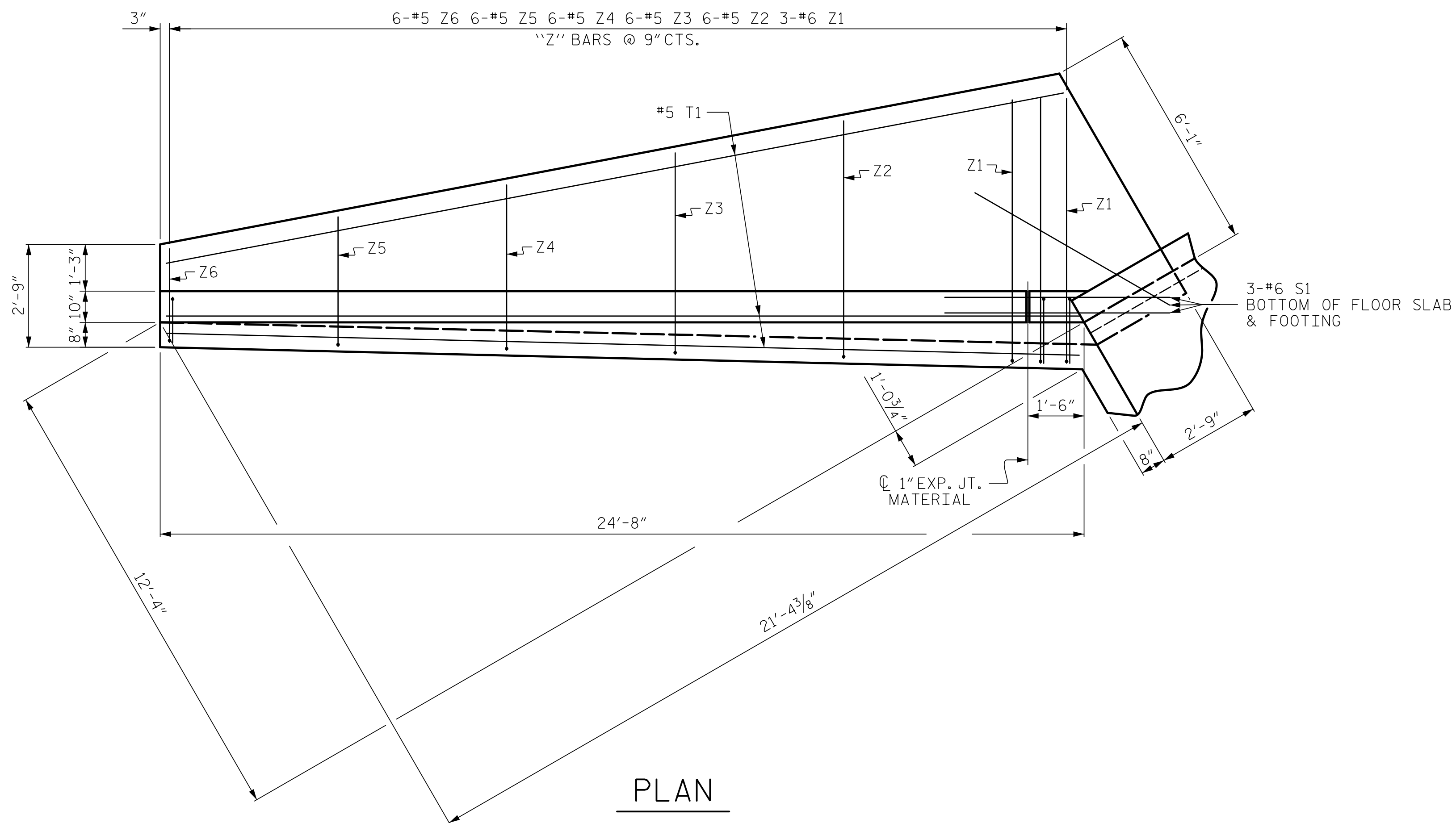
SHEET NO.
C5-8

	TOTAL SHEETS	9
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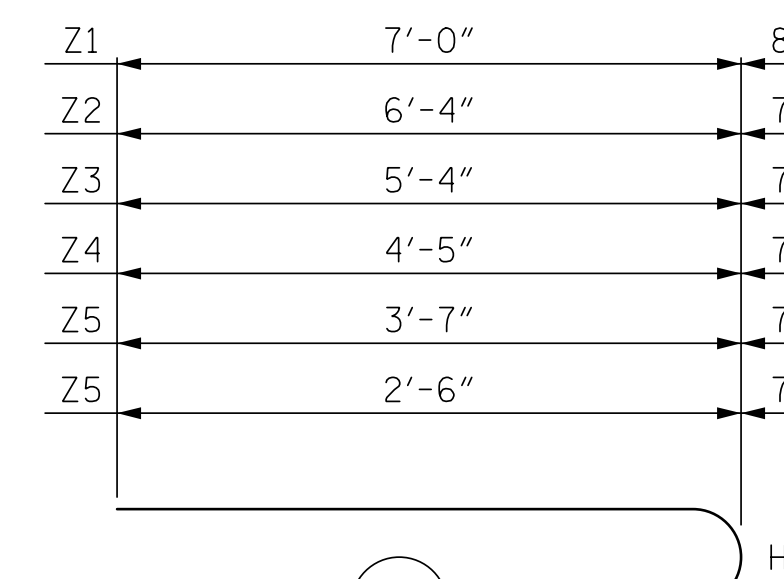
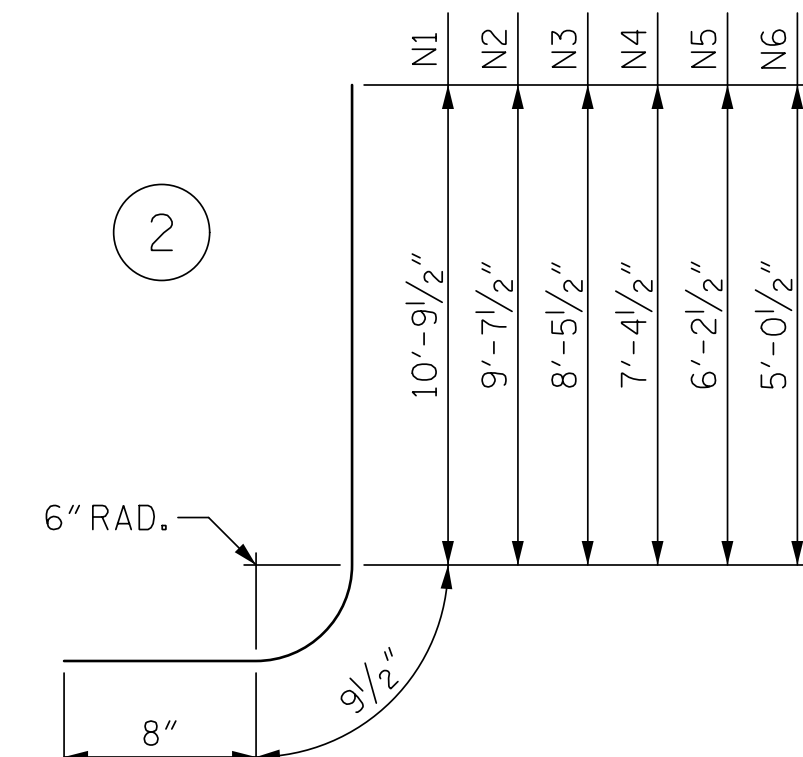
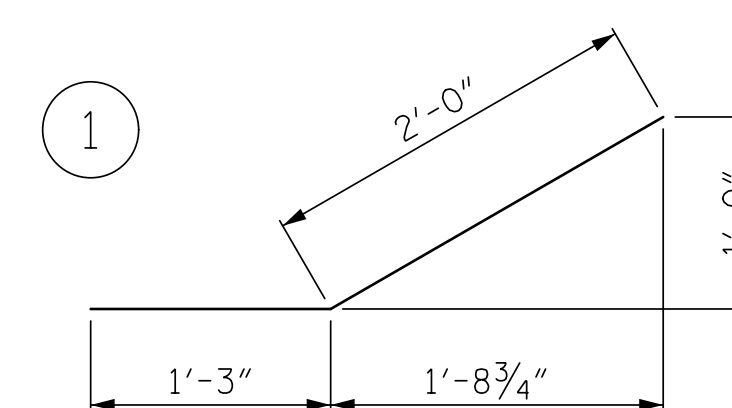
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ASSEMBLED BY :	STM	DATE :	08/22
CHECKED BY :	MGC	DATE :	01/23
DRAWN BY :	CCJ 10/99	REV. 6/19	MAA/THC
CHECKED BY :	RWW 03/00		

3/27/2023
X:\NCDOT\R-5739\Structures\Str. #5 (499 + 65.60 -L)\FinalPlans\DGNS\R-5739-SMU-CU-STR 5.8.dgn
User:ZSmith



BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	22'-9"	182
H2	4	#4	STR	22'-3"	59
H3	4	#4	STR	16'-4"	44
H4	4	#4	STR	10'-5"	28
H5	4	#4	STR	4'-6"	12
H6	32	#4	1	3'-3"	69
H7	4	#4	STR	23'-6"	63
N1	6	#6	2	12'-3"	110
N2	12	#6	2	11'-1"	200
N3	12	#5	2	9'-11"	124
N4	12	#5	2	8'-10"	111
N5	12	#4	2	7'-8"	61
N6	12	#4	2	6'-6"	52
S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	24'-8"	154
V1	6	#4	STR	10'-0"	40
V2	6	#4	STR	8'-10"	35
V3	6	#4	STR	7'-9"	31
V4	6	#4	STR	6'-7"	26
V5	6	#4	STR	5'-6"	22
V6	6	#4	STR	4'-6"	18
Z1	6	#6	3	7'-8"	69
Z2	12	#5	3	6'-11"	87
Z3	12	#5	3	5'-11"	74
Z4	12	#5	3	5'-0"	63
Z5	12	#5	3	4'-2"	52
Z6	12	#5	3	3'-1"	39

REINFORCING STEEL FOR 2 WINGS	1879 LBS
----------------------------------	----------

CLASS A CONCRETE	
2 WINGS	24.7 CY
1 HEADWALL	0.8 CY
END CURTAIN WALL	1.0 CY
TOTAL	26.5 CY

NOTES

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL
REINFORCING STEEL.

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.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 499+65.60 -L-

SHEET 9 OF 9



7/23/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

OUTLET WINGS
FOR
CONCRETE BOX CULVERT
H = 10'-0" SLOPE = 3:1
RIGHT EXTENSION

REVISIONS						SHEET NO. C5-9
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

STR. #5

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	4.85	--	1.75	4.85	1	BOTTOM SLAB	1.83	12.85	1	TOP SLAB	1.00		
	HL-93 (OPERATING)	N/A		6.29	--	1.35	6.29	1	BOTTOM SLAB	1.83	16.66	1	TOP SLAB	1.00		
	HS-20 (INVENTORY)	36,000	⬡2	5.06	182.16	1.75	5.06	1	BOTTOM SLAB	1.83	13.46	1	TOP SLAB	1.00		
	HS-20 (OPERATING)	36,000		6.55	235.80	1.35	6.55	1	BOTTOM SLAB	1.83	17.45	1	TOP SLAB	1.00		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		8.97	121.10	1.40	8.97	1	BOTTOM SLAB	1.83	24.59	1	TOP SLAB	1.00	
		SNGARBS2	20,000		8.40	168.00	1.40	8.40	1	BOTTOM SLAB	1.83	22.92	1	TOP SLAB	1.00	
		SNAGRIS2	22,000		8.97	197.34	1.40	8.97	1	BOTTOM SLAB	1.83	24.59	1	TOP SLAB	1.00	
		SNCOTTS3	27,250		6.07	165.41	1.40	6.07	1	BOTTOM SLAB	1.83	16.06	1	TOP SLAB	1.00	
		SNAGGRS4	34,925	⬡3	4.77	166.59	1.40	4.77	1	TOP SLAB	1.83	12.50	1	TOP SLAB	3.33	
		SNS5A	35,550		5.18	184.15	1.40	5.18	1	TOP SLAB	1.83	13.83	1	TOP SLAB	1.00	
		SNS6A	39,950		5.15	205.74	1.40	5.15	1	TOP SLAB	1.83	13.48	1	TOP SLAB	1.00	
		SNS7B	42,000		5.15	216.30	1.40	5.15	1	TOP SLAB	1.83	13.48	1	TOP SLAB	1.00	
	TRUCK TRACTOR SEMI-TRAILER (TTS1)	TNAGRIT3	33,000		8.97	296.01	1.40	8.97	1	BOTTOM SLAB	1.83	24.59	1	TOP SLAB	1.00	
		TNT4A	33,075		7.22	238.80	1.40	7.22	1	BOTTOM SLAB	1.83	19.49	1	TOP SLAB	1.00	
		TNT6A	41,600		4.97	206.75	1.40	4.97	1	TOP SLAB	1.83	13.13	1	TOP SLAB	1.00	
		TNT7A	42,000		5.33	223.86	1.40	5.33	1	TOP SLAB	1.83	14.24	1	TOP SLAB	1.00	
		TNT7B	42,000		5.18	217.56	1.40	5.18	1	TOP SLAB	1.83	13.56	1	TOP SLAB	1.00	
		TNAGRIT4	43,000		7.22	310.46	1.40	7.22	1	BOTTOM SLAB	1.83	19.49	1	TOP SLAB	1.00	
		TNAGT5A	45,000		7.22	324.90	1.40	7.22	1	BOTTOM SLAB	1.83	19.49	1	TOP SLAB	1.00	
		TNAGT5B	45,000		7.22	324.90	1.40	7.22	1	BOTTOM SLAB	1.83	19.49	1	TOP SLAB	1.00	
EMERGENCY VEHICLE (EV)	EV2	28,750		6.34	182.28	1.30	6.34	1	BOTTOM SLAB	1.83	16.70	1	TOP SLAB	1.00		
	EV3	43,000	⬡4	5.27	226.61	1.30	5.27	1	BOTTOM SLAB	1.83	13.38	1	TOP SLAB	1.00		

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	--

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

A diagram of a rectangular structure, possibly a wall or panel, with dimensions and numbered callouts. The overall width is labeled as 3'-0" and the overall height is labeled as 4'-0". The structure has a central rectangular area with rounded corners. There are four numbered callouts (1, 2, 3, 4) pointing to specific features:

- Callout 1 points to the top edge of the central rectangular area.
- Callout 2 points to the right edge of the central rectangular area.
- Callout 3 points to the top edge of the entire structure.
- Callout 4 points to the bottom edge of the central rectangular area.

(LOOKING DOWNSTREAM)

11/28/2023
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SHEET 2 OF 11

STR. #6

STD. NO. LRFR5

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		3.66	--	1.75	3.66	1	TOP SLAB	1.83	8.35	1	TOP SLAB	0.81	
		HL-93 (OPERATING)	N/A		4.74	--	1.35	4.74	1	TOP SLAB	1.83	10.82	1	TOP SLAB	0.81	
		HS-20 (INVENTORY)	36.000		4.06	146.16	1.75	4.06	1	TOP SLAB	1.83	9.20	1	EXT. WALL	0.86	
		HS-20 (OPERATING)	36.000		5.27	189.72	1.35	5.27	1	TOP SLAB	1.83	11.93	1	EXT. WALL	0.86	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		6.14	82.89	1.40	6.14	1	BOTTOM SLAB	1.83	11.45	1	EXT. WALL	0.86	
		SNGARBS2	20.000		6.14	122.80	1.40	6.14	1	BOTTOM SLAB	1.83	11.46	1	EXT. WALL	0.86	
		SNAGRIS2	22.000		6.14	135.08	1.40	6.14	1	BOTTOM SLAB	1.83	11.45	1	EXT. WALL	0.86	
		SNCOTTS3	27.250		4.88	132.98	1.40	4.88	1	TOP SLAB	1.83	11.12	1	TOP SLAB	0.81	
		SNAGGRS4	34.925		4.08	142.49	1.40	4.08	1	TOP SLAB	1.83	9.11	1	TOP SLAB	3.50	
		SNS5A	35.550		4.61	163.89	1.40	4.61	1	TOP SLAB	1.83	10.31	1	TOP SLAB	0.81	
		SNS6A	39.950		4.51	180.17	1.40	4.51	1	TOP SLAB	1.83	9.89	1	TOP SLAB	0.81	
		SNS7B	42.000		4.51	189.42	1.40	4.51	1	TOP SLAB	1.83	9.89	1	TOP SLAB	0.81	
	TRUCK TRACTOR SEMI-TRAILER (TTS1)	TNAGRIT3	33.000		6.14	202.62	1.40	6.14	1	BOTTOM SLAB	1.83	11.41	1	EXT. WALL	0.86	
		TNT4A	33.075		5.80	191.84	1.40	5.80	1	TOP SLAB	1.83	11.45	1	EXT. WALL	0.86	
		TNT6A	41.600		4.23	175.97	1.40	4.23	1	TOP SLAB	1.83	9.40	1	TOP SLAB	0.81	
		TNT7A	42.000		4.51	189.42	1.40	4.51	1	TOP SLAB	1.83	9.99	1	TOP SLAB	0.81	
		TNT7B	42.000		4.53	190.26	1.40	4.53	1	TOP SLAB	1.83	9.93	1	TOP SLAB	0.81	
		TNAGRIT4	43.000		5.80	249.40	1.40	5.80	1	TOP SLAB	1.83	11.43	1	EXT. WALL	0.86	
TNAGT5A		45.000		5.80	261.00	1.40	5.80	1	TOP SLAB	1.83	11.43	1	EXT. WALL	0.86		
TNAGT5B		45.000		5.80	261.00	1.40	5.80	1	TOP SLAB	1.83	11.42	1	EXT. WALL	0.86		
EMERGENCY VEHICLE (EV)		EV2	28.750		4.70	135.13	1.30	4.70	1	TOP SLAB	1.83	10.73	1	TOP SLAB	0.81	
		EV3	43.000		4.23	181.89	1.30	4.23	1	TOP SLAB	1.83	9.66	1	TOP SLAB	0.81	

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	--

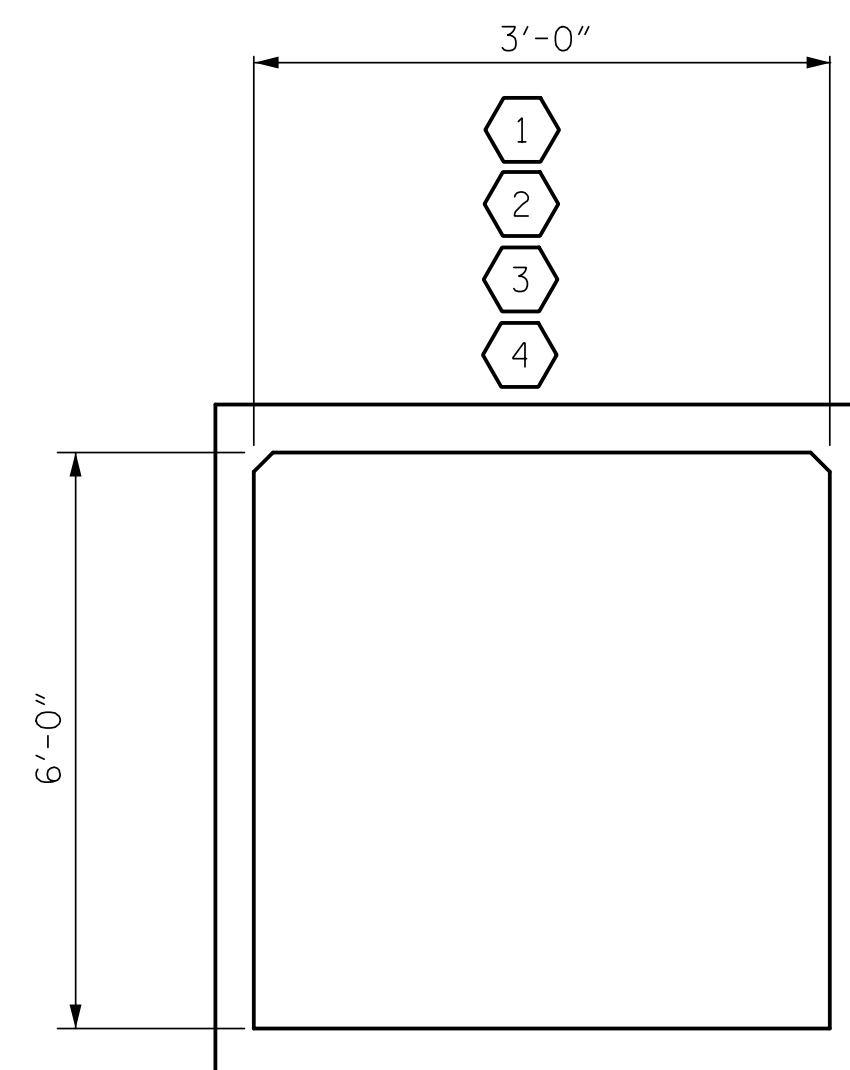
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

CONTROLLING LOAD RATING

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

** SEE CHART FOR VEHICLE TYPE



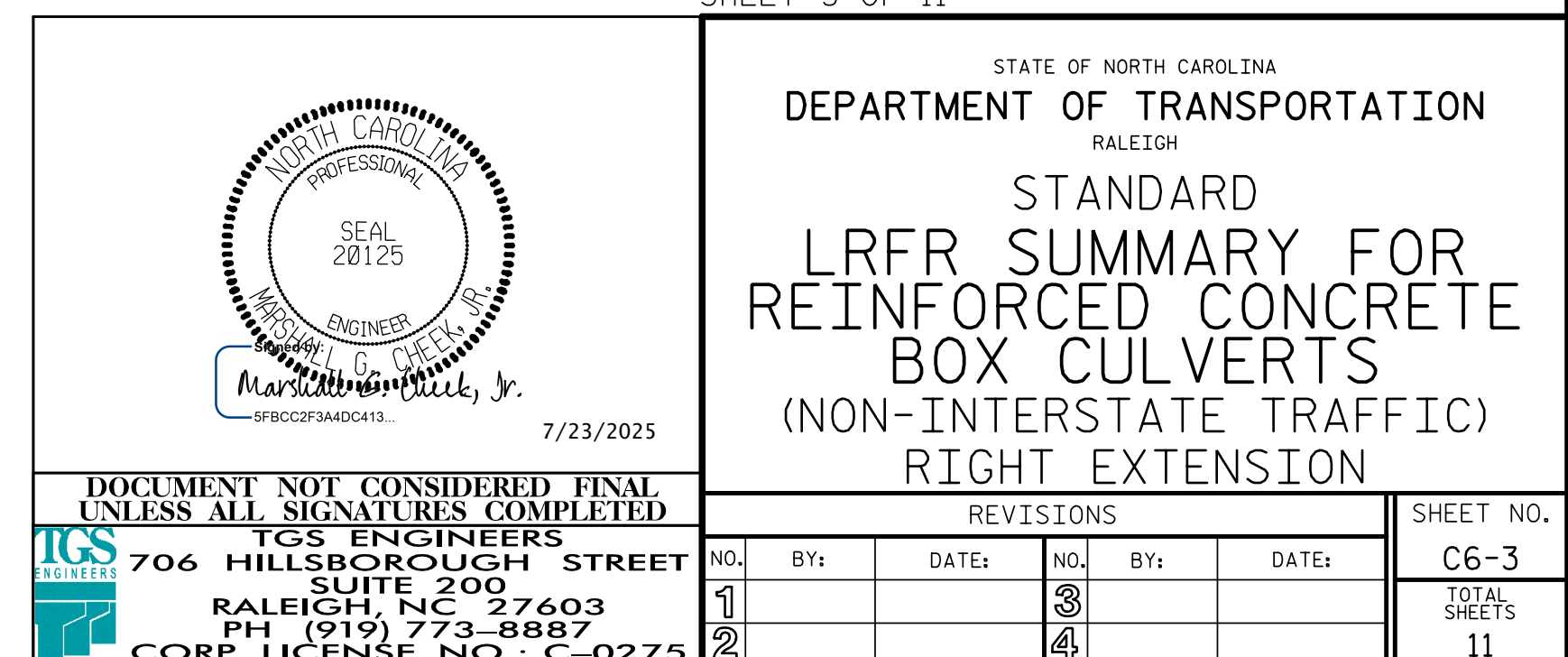
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CHECKED BY :	MGC	DATE :	11/23
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CHECKED BY :	GM 7/11	REV. 12/17	MAA/THC
		REV. 04/23	BNB/AA

11/28/2023
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User:ZSmith

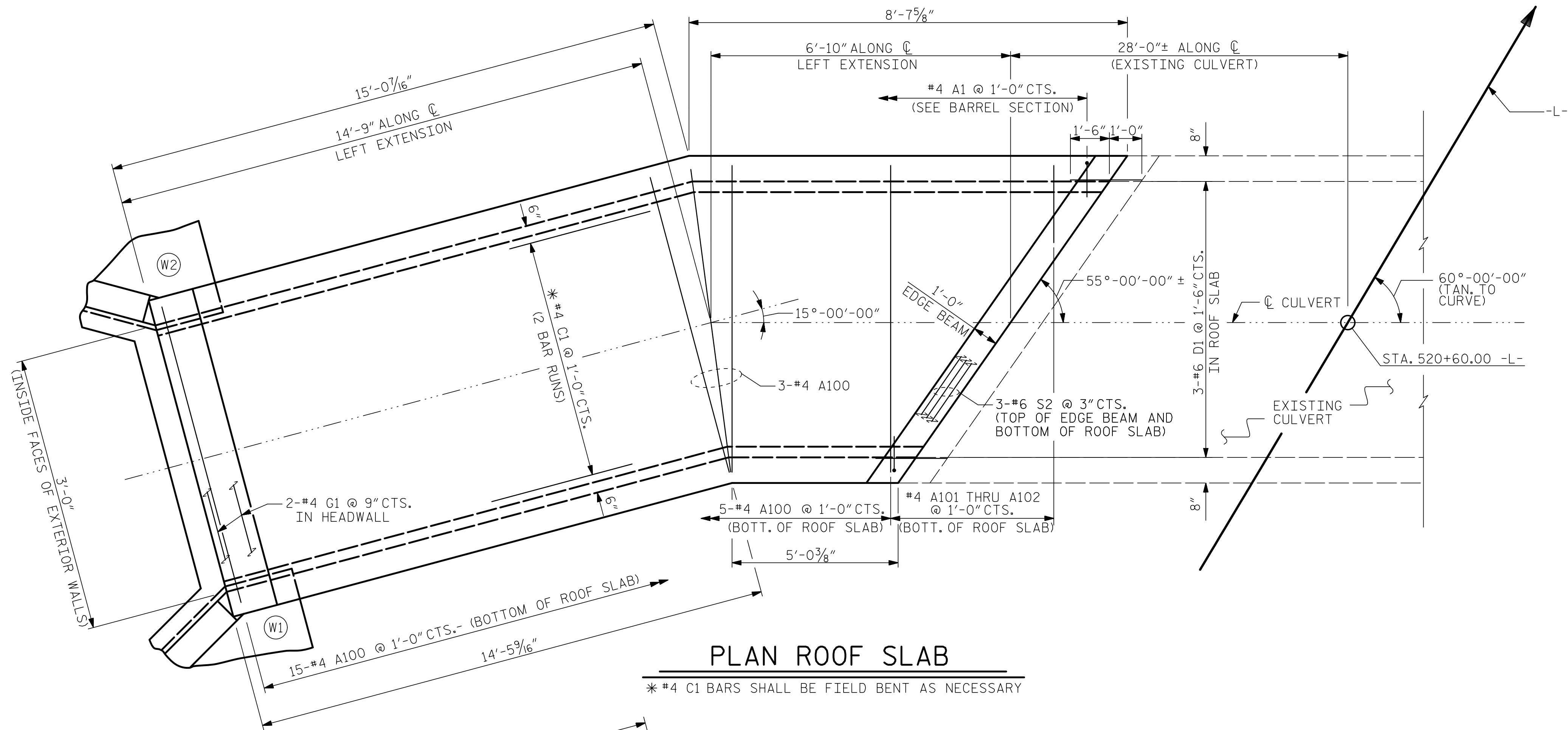
PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 520+60.00 -L-

SHEET 3 OF 11



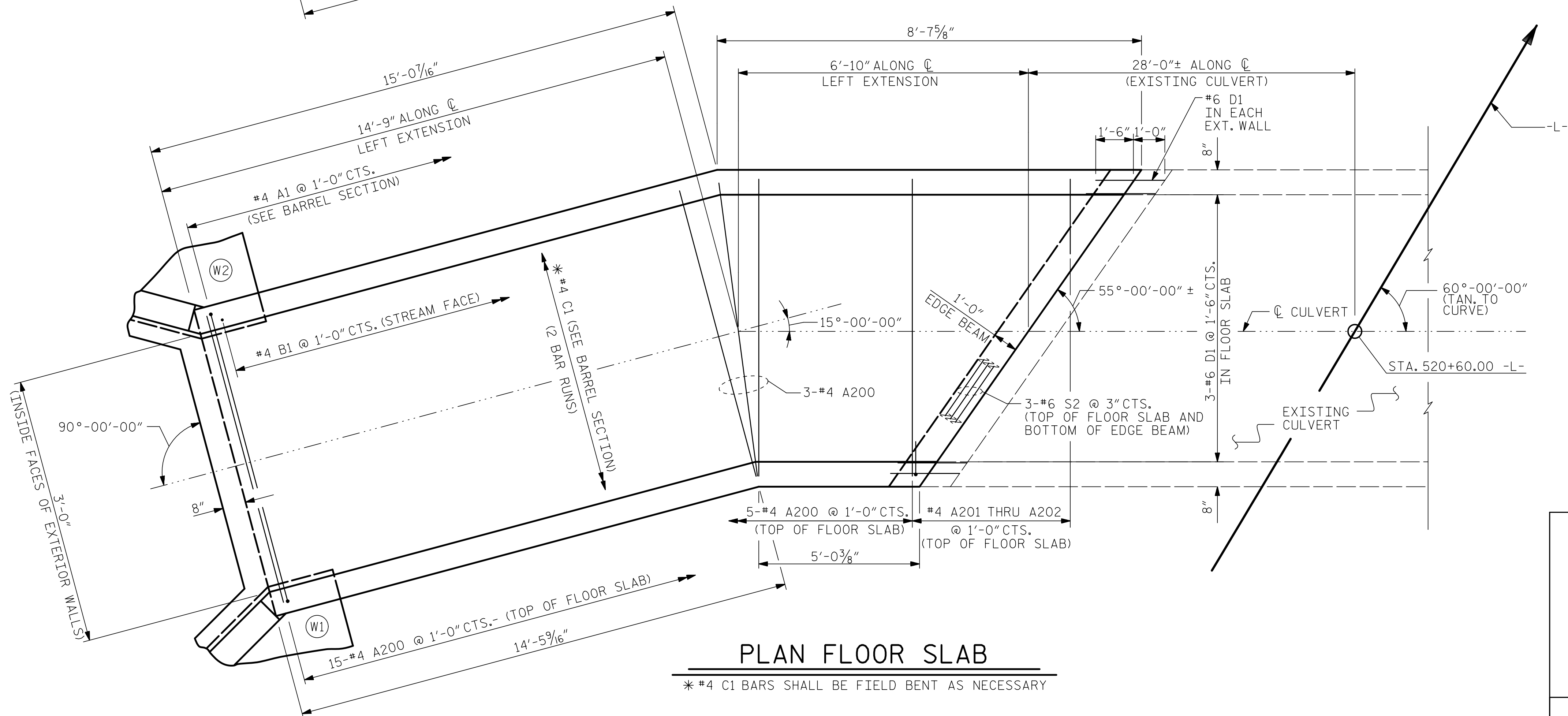
STR. #6

STD. NO. LRFR5



PLAN ROOF SLAB

* #4 C1 BARS SHALL BE FIELD BENT AS NECESSARY



PLAN FLOOR SLAB

* #4 C1 BARS SHALL BE FIELD BENT AS NECESSARY

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 520+60.00 -L-

SHEET 4 OF 11



7/23/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 3 FT. X 4 FT.
CONCRETE BOX CULVERT
60° SKEW
LEFT EXTENSION

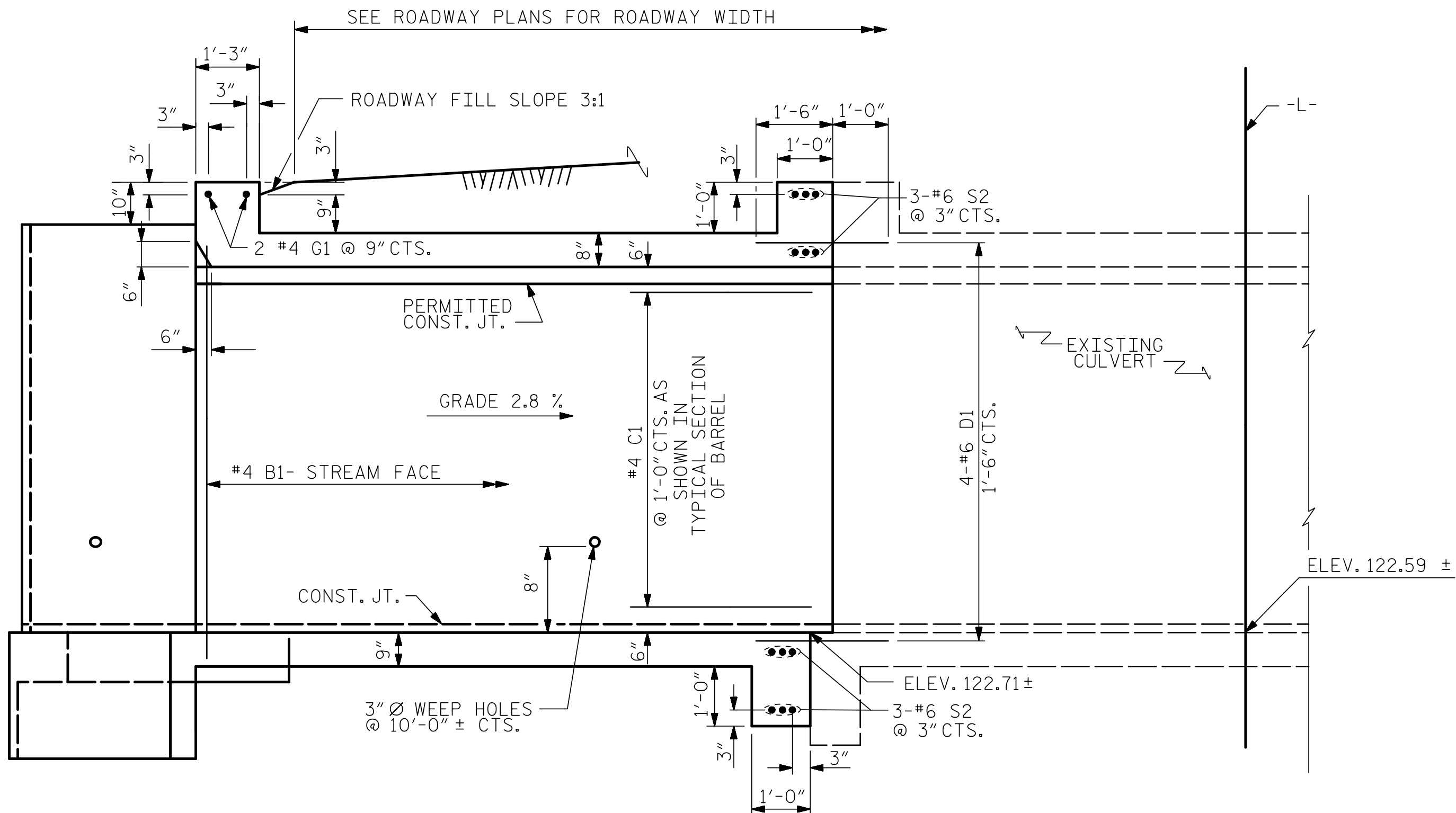
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CHECKED BY : MGC DATE : 1/23
DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

11/28/2023
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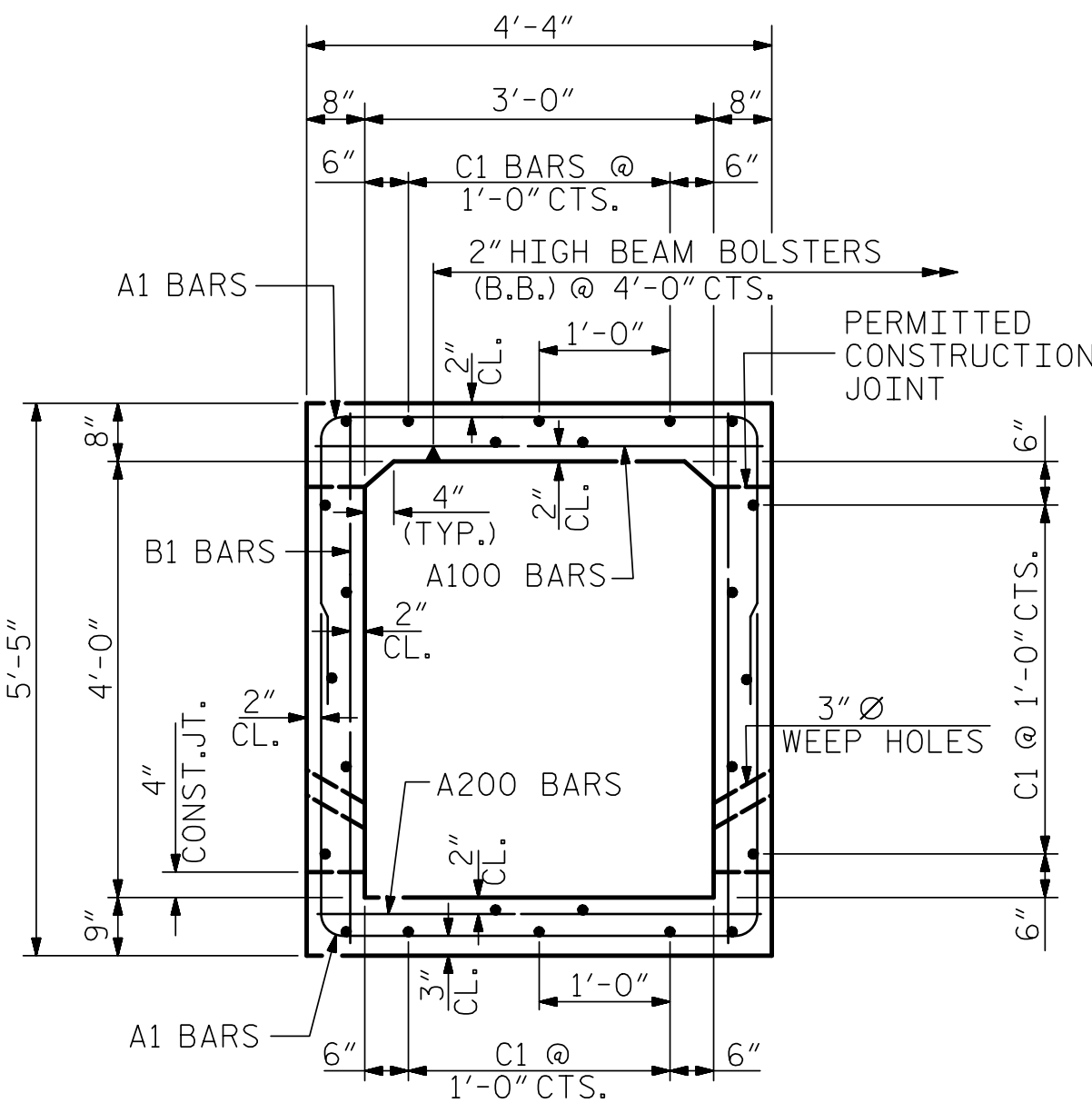
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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C6-4
2			4			TOTAL SHEETS 11

STR. #6

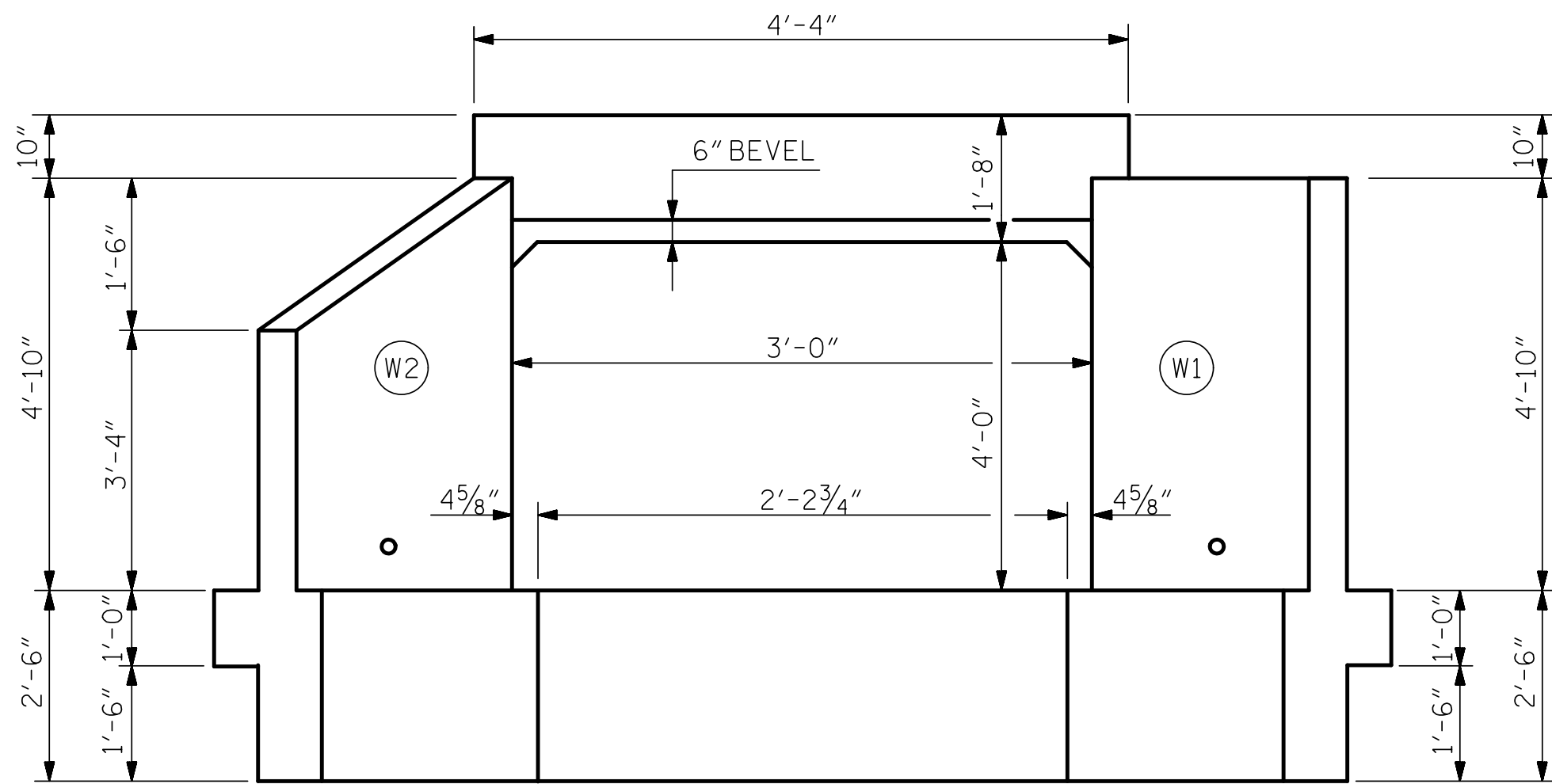


CULVERT SECTION NORMAL TO ROADWAY



RIGHT ANGLE SECTION OF BARREL

THERE ARE 24 "C" BARS IN SECTION OF BARREL



INLET END ELEVATION

BAR TYPE		LEFT EXTENSION BAR SCHEDULE					
		BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
		A100	23	#4	STR	3'-11"	60
		A101	1	#4	STR	2'-5"	2
		A102	1	#4	STR	1'-0"	1
DIMENSIONS ARE OUT TO OUT		A200	23	#4	STR	3'-11"	60
		A201	1	#4	STR	2'-5"	2
		A202	1	#4	STR	1'-0"	1
SPLICE LENGTHS CHART		A1	46	#4	1	10'-7"	325
		B1	44	#4	STR	5'-0"	147
		C1	48	#4	STR	12'-8"	406
		D1	14	#6	STR	2'-6"	53
		G1	2	#4	STR	3'-11"	5
		S2	12	#6	STR	4'-10"	87
		REINFORCING STEEL					
		1149 LBS					

LEFT EXTENSION QUANTITIES	
CLASS A CONCRETE	
BARREL @ _____ 0.429 _____ CY/FT	9.3 C.Y.
WINGS, ETC. _____	4.8 C.Y.
EDGE BEAMS _____	0.4 C.Y.
TOTAL _____	14.5 C.Y.
REINFORCING STEEL	
BARREL _____	1,149 LBS.
WINGS, ETC. _____	299 LBS.
TOTAL _____	1,448 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	13 TONS

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 520+60.00 -L-

SHEET 5 OF 11

7/23/2025

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SUITE 200
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

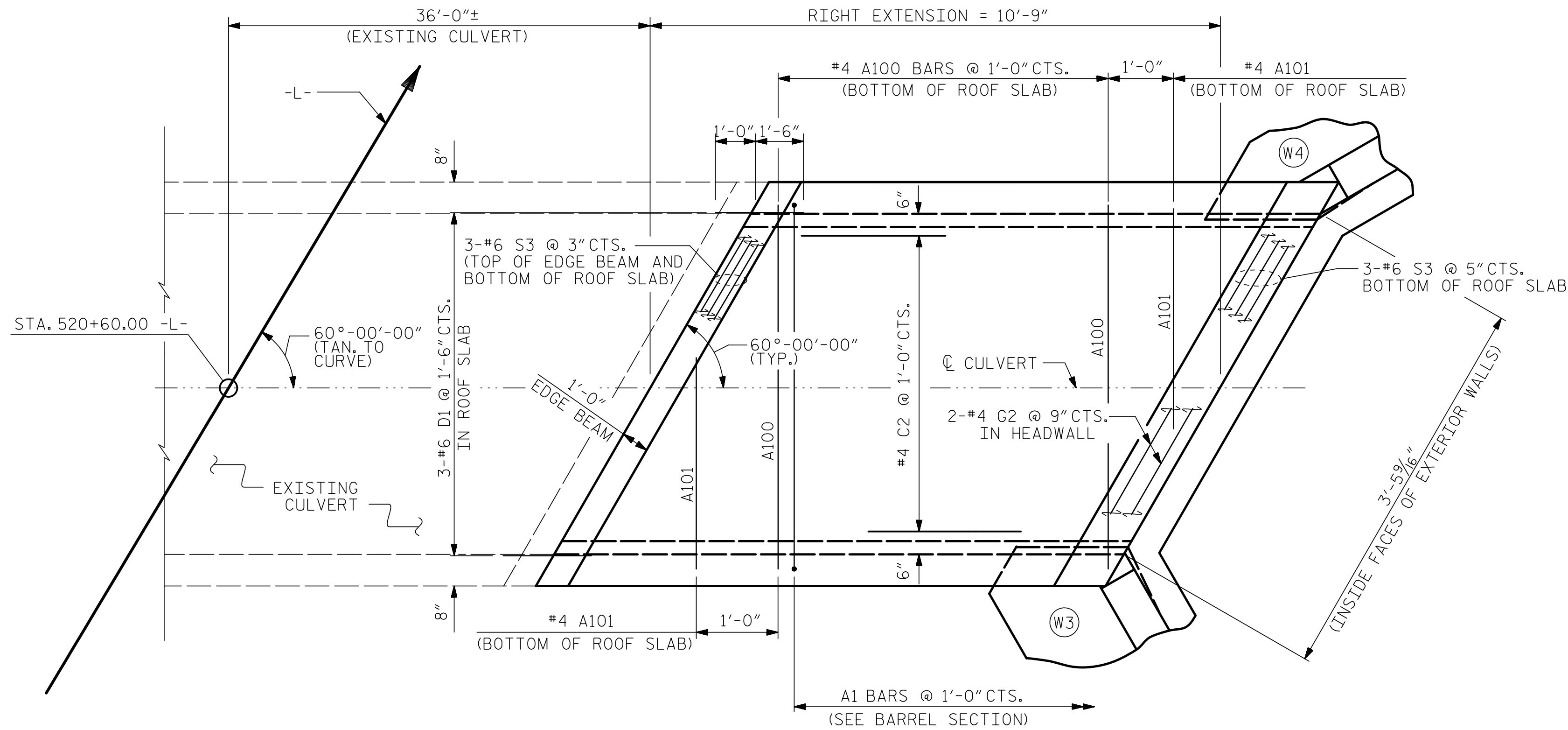
SINGLE 3 FT. X 4 FT.
CONCRETE BOX CULVERT
60° SKEW
LEFT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C6-5
2			4			TOTAL SHEETS
						11

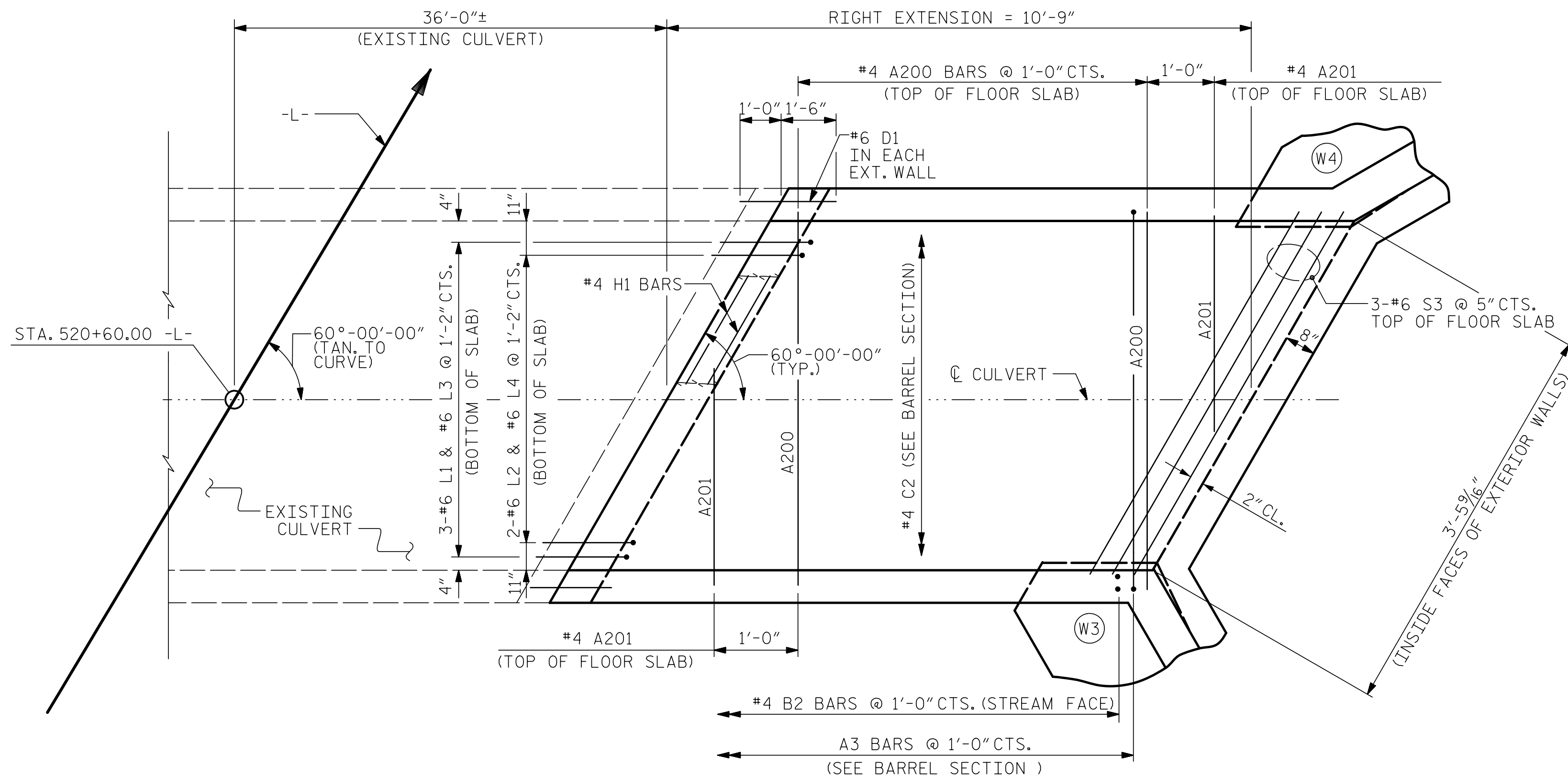
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CHECKED BY :	MGC	DATE :	1/23
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

11/28/2023
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User:ZSmith

STR. #6



PLAN ROOF SLAB



PLAN FLOOR SLAB

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 520+60.00 -L-

SHEET 6 OF 11



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 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

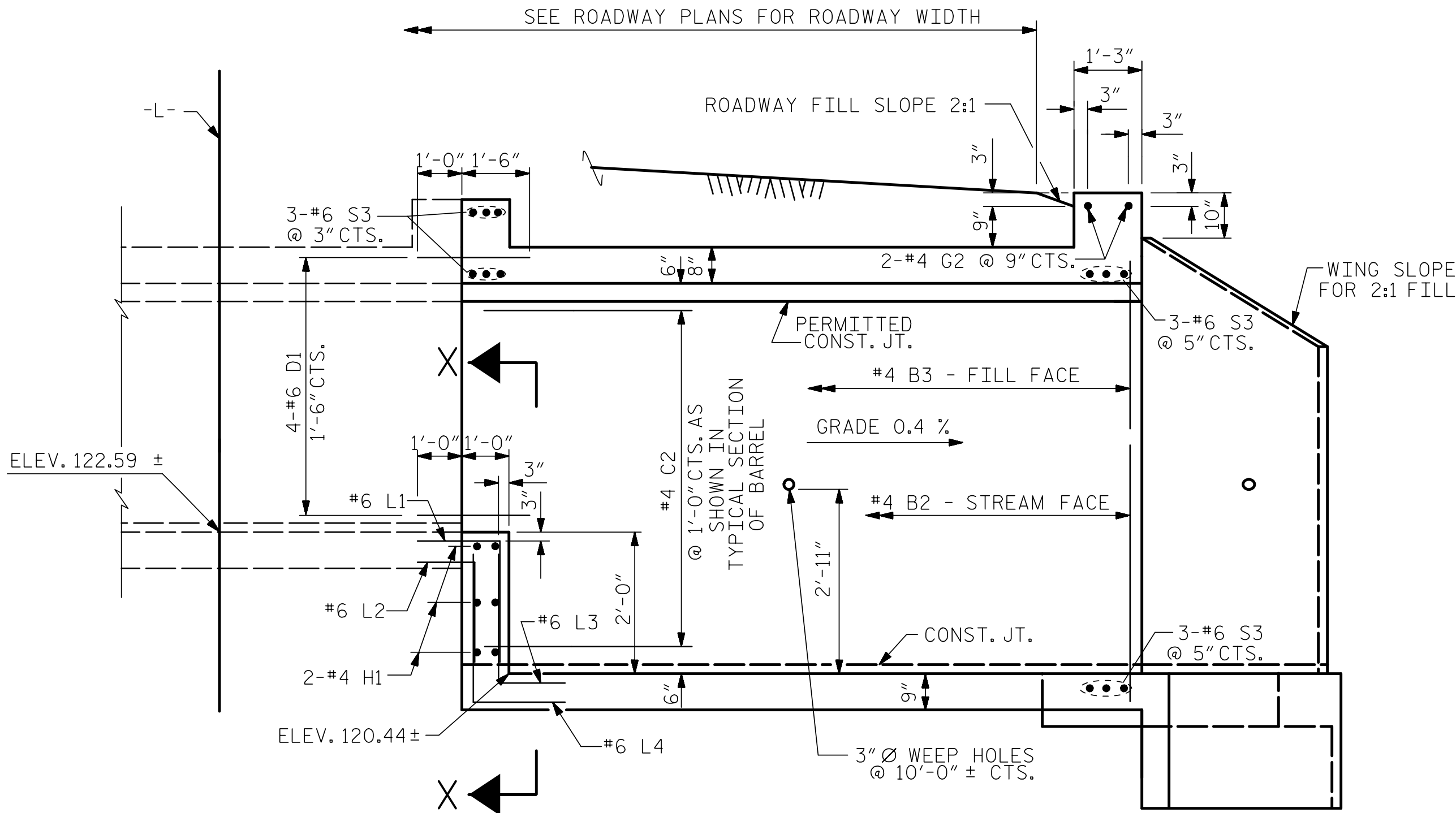
**SINGLE 3 FT. X 6 FT.
 CONCRETE BOX CULVERT
 60° SKEW
 RIGHT EXTENSION**

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C6-6
2			4			TOTAL SHEETS
						11

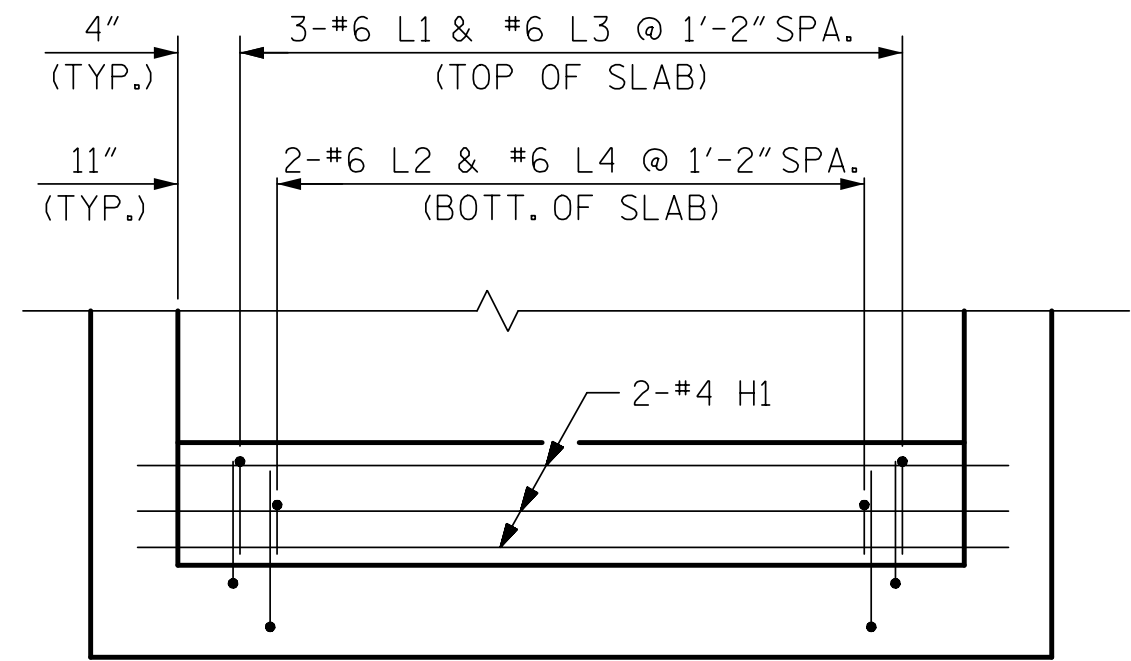
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 DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

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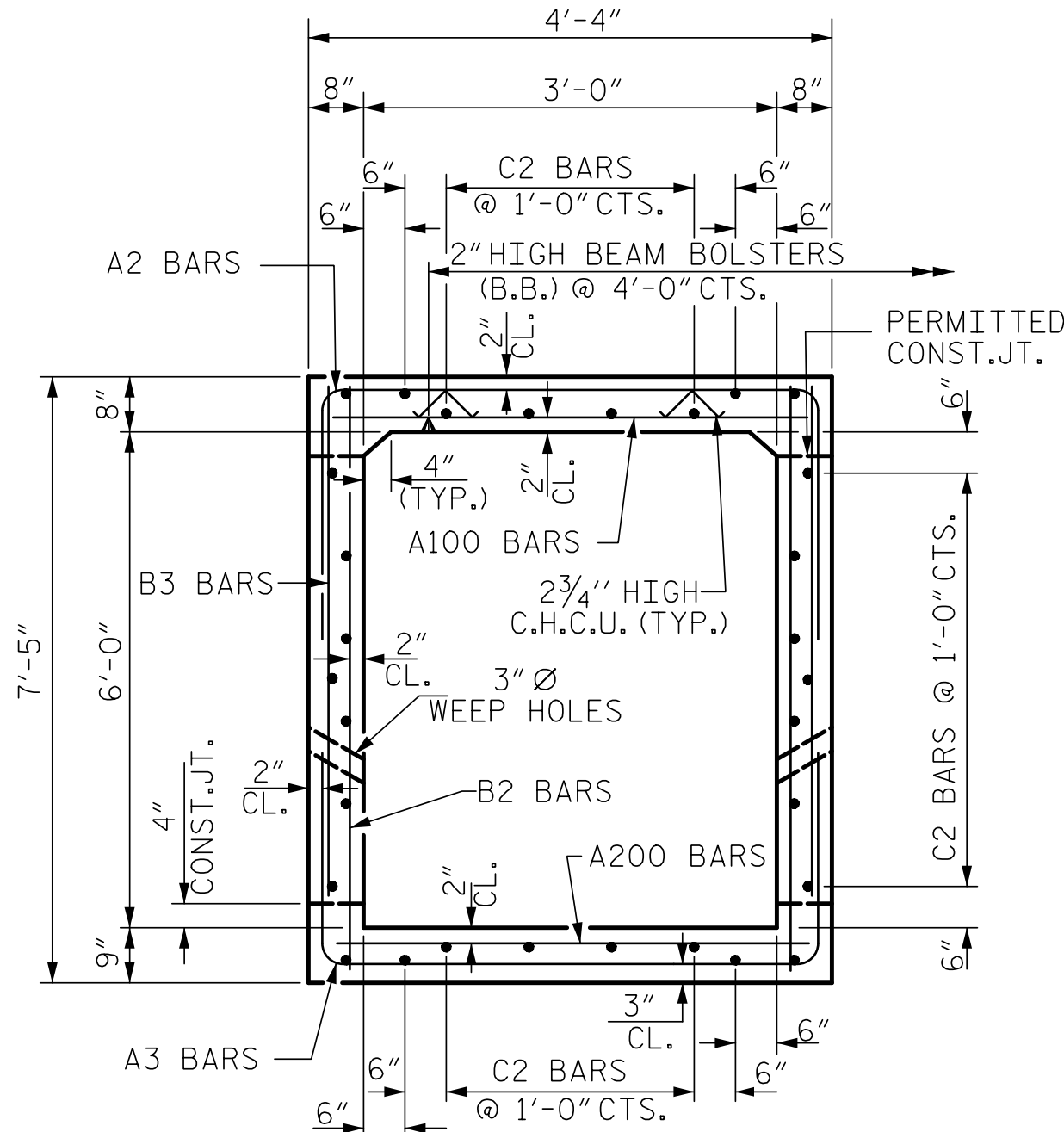
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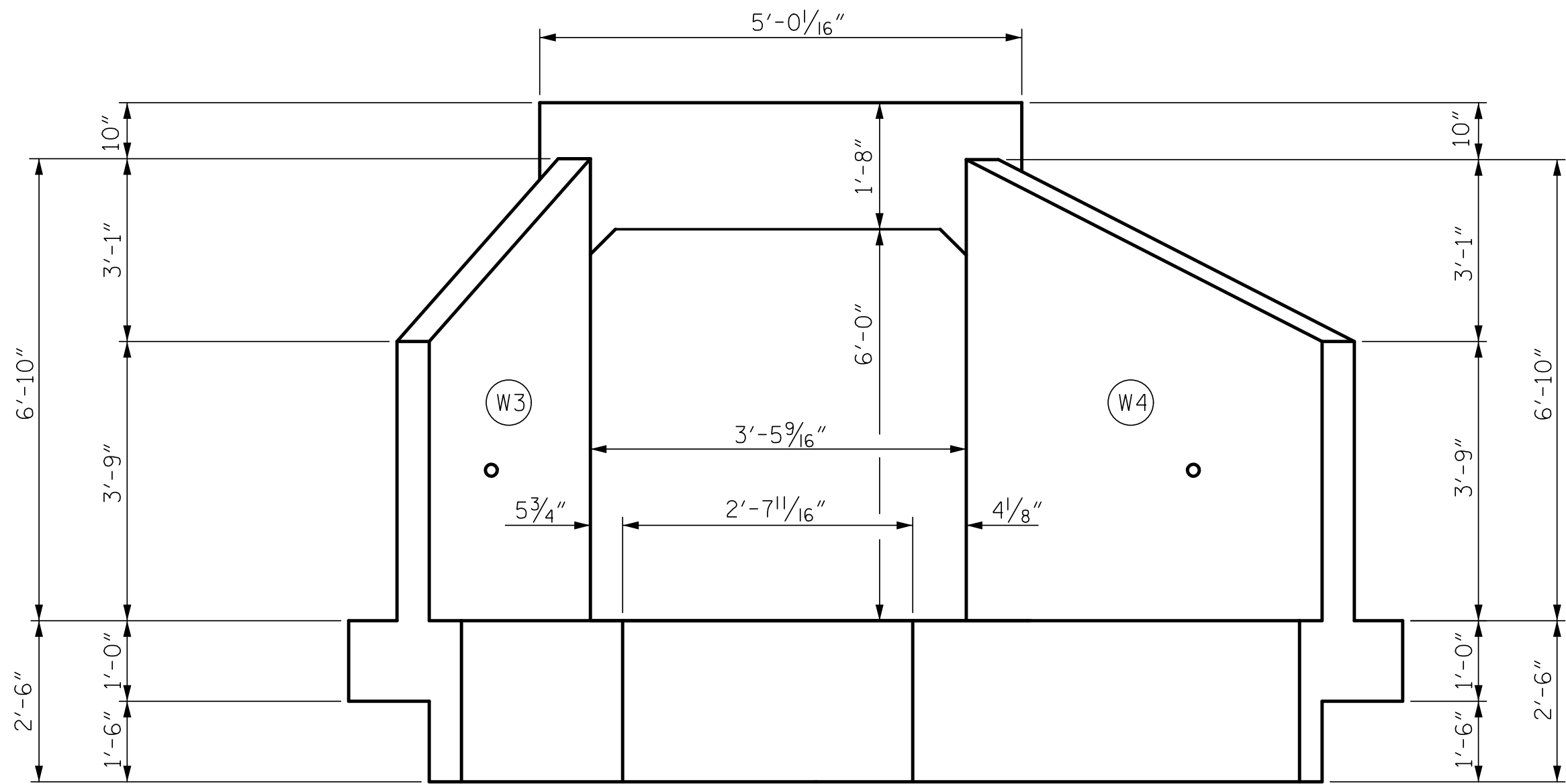
CULVERT SECTION NORMAL TO ROADWAY



SECTION X-X



RIGHT ANGLE SECTION OF BARREL
THERE ARE 28 "C" BARS IN SECTION OF BARREL



OUTLET END ELEVATION NORMAL TO SKEW

BAR TYPE		RIGHT EXTENSION BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT		
A100	9	#4	STR	3'-11"	24		
A101	2	#4	STR	2'-3"	3		
A200	9	#4	STR	3'-11"	24		
A201	2	#4	STR	2'-3"	3		
A2	9	#4	1	9'-1"	55		
A3	9	#4	1	8'-5"	51		
B2	20	#4	STR	7'-1"	95		
B3	20	#4	STR	6'-0"	80		
C2	28	#4	STR	10'-4"	193		
D1	11	#6	STR	2'-6"	41		
D2	2	#6	STR	1'-4"	4		
G2	2	#4	STR	4'-6"	6		
H1	6	#4	STR	4'-6"	18		
L1	3	#6	2	3'-0"	14		
L2	2	#6	2	2'-3"	7		
L3	3	#6	3	3'-9"	17		
L4	2	#6	3	4'-3"	13		
S2	12	#6	STR	4'-6"	81		
REINFORCING STEEL					729	LBS	

BAR	SIZE	SPLICE LENGTH
"B"	#4	1'-10"

RIGHT EXTENSION QUANTITIES

CLASS A CONCRETE		
BARREL @	0.528	CY/FT
WINGS, ETC.	8.1	C.Y.
SILL	0.1	C.Y.
BOTTOM SLAB STEP	0.5	C.Y.
TOTAL	14.4	C.Y.

REINFORCING STEEL		
BARREL & SILL	729	LBS.
WINGS, ETC.	459	LBS.
TOTAL	1,188	LBS.

CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	6 TONS

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 520+60.00 -L-

SHEET 7 OF 11



7/23/2025

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C6-7
2			4			TOTAL SHEETS 11

DRAWN BY :	ZCS	DATE :	8/22
CHECKED BY :	MGC	DATE :	1/23
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

11/28/2023
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User:ZSmith

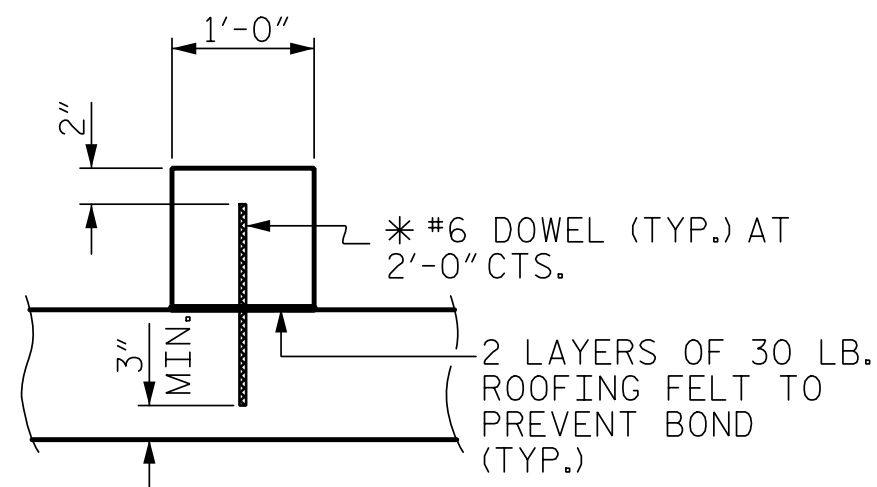
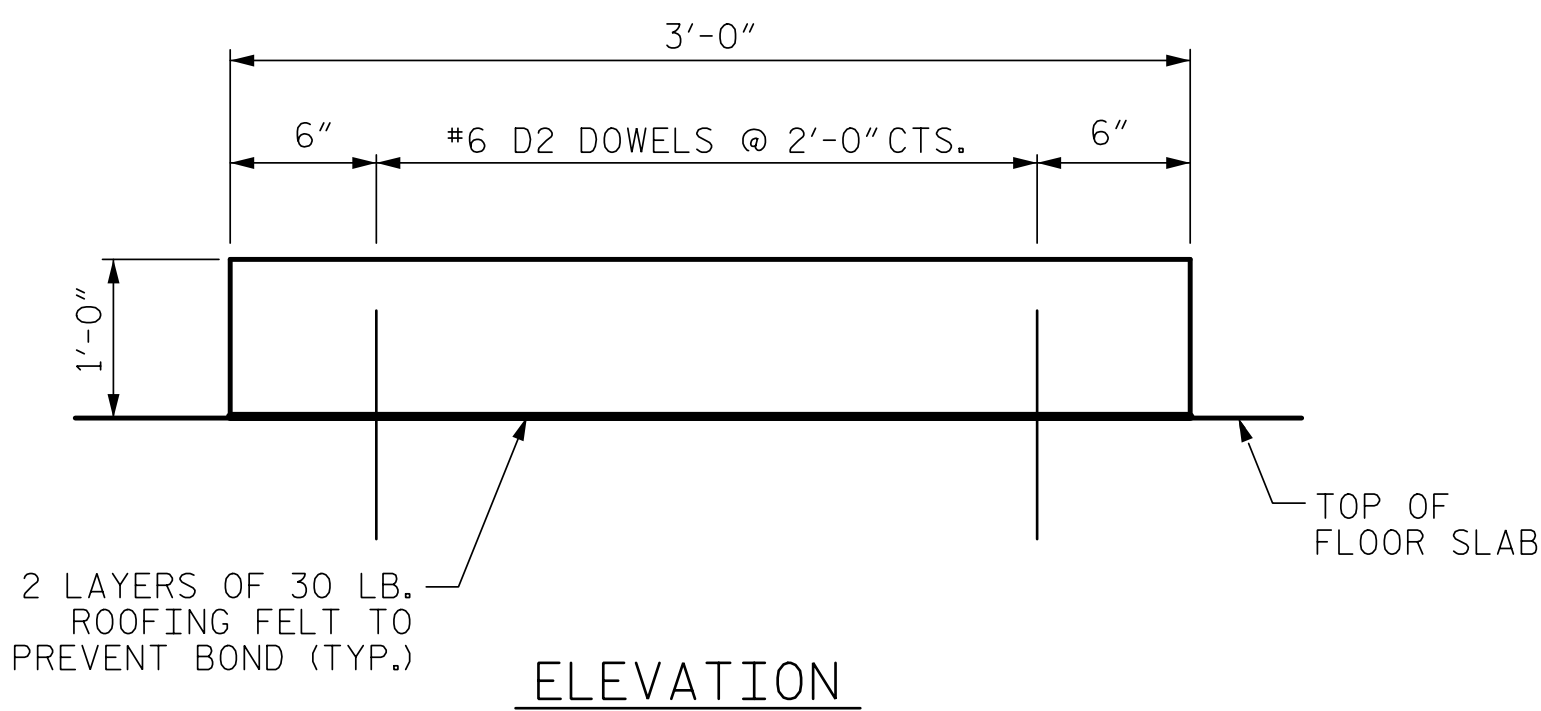
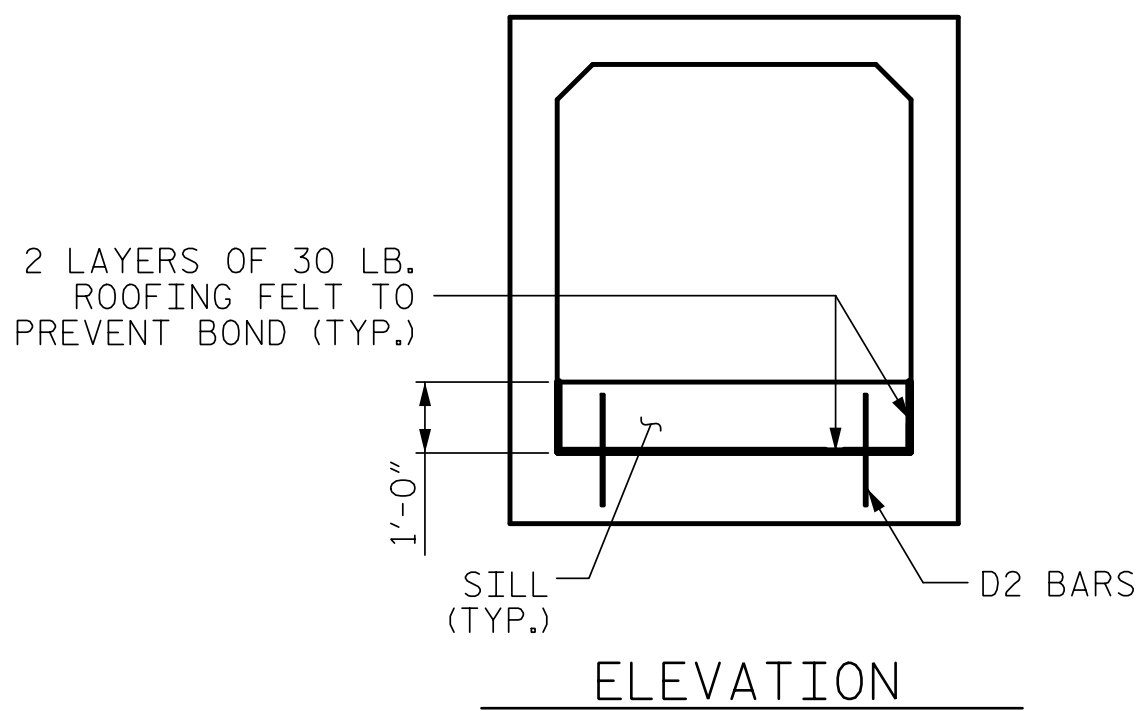
STR: #6

NOTES

MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT EXTENSION. BED MATERIAL MAY BE SUPPLEMENTED WITH CLASS B RIP RAP AS NECESSARY. NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

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

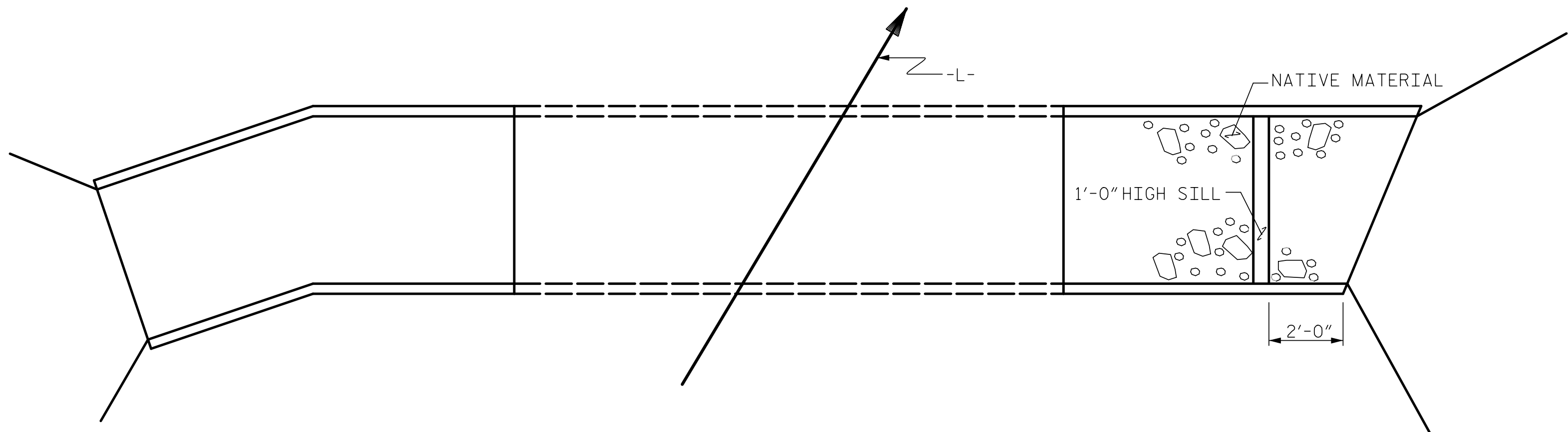
THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



SECTION THROUGH SILL

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

SILL DETAILS



PLAN OF FLOOR SILL LAYOUT

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 520+60.00 -L-

SHEET 8 OF 11



7/23/2025

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

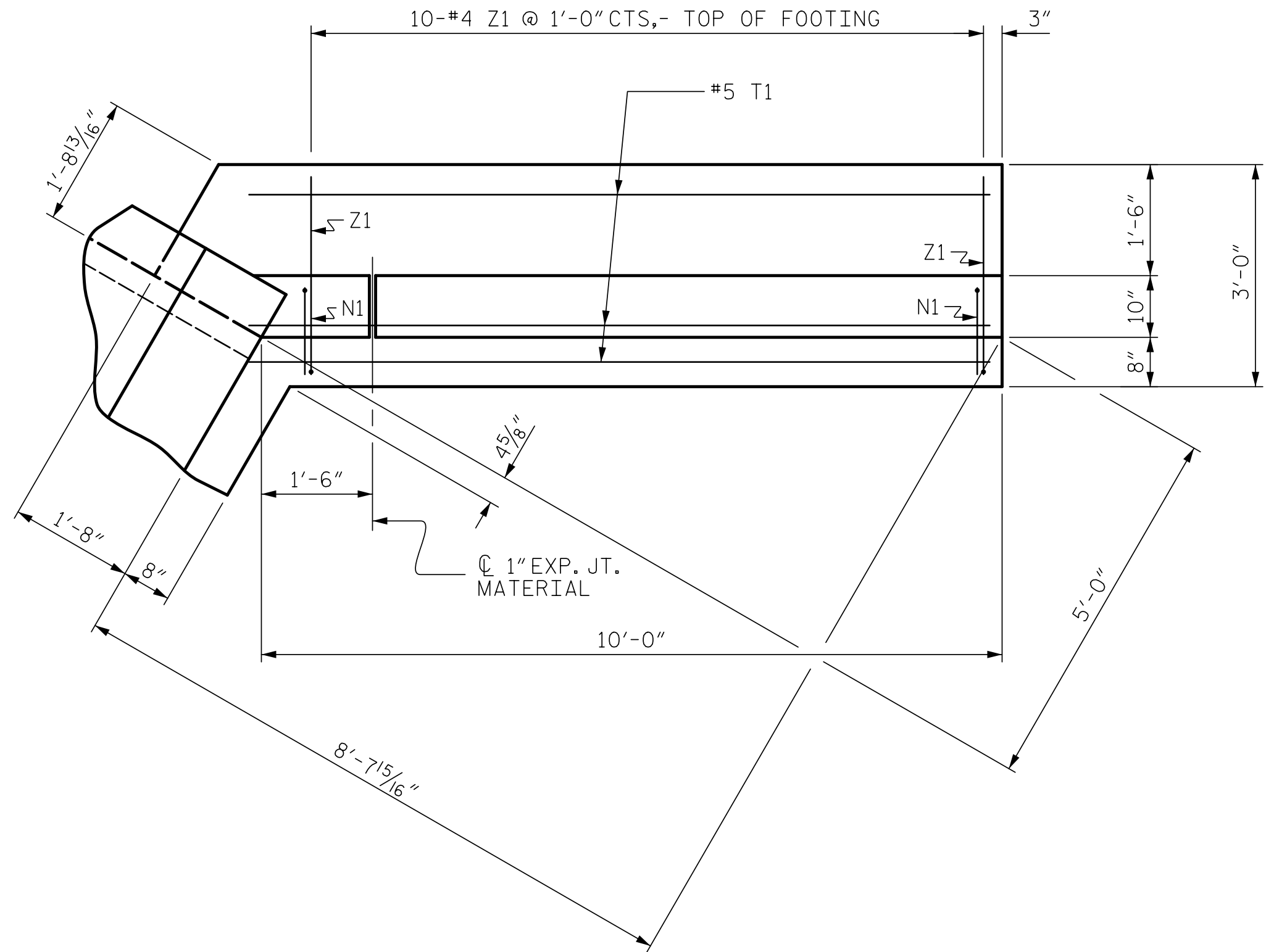
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE
CONCRETE BOX CULVERT
LT & RT EXTENSIONS
60° SKEW

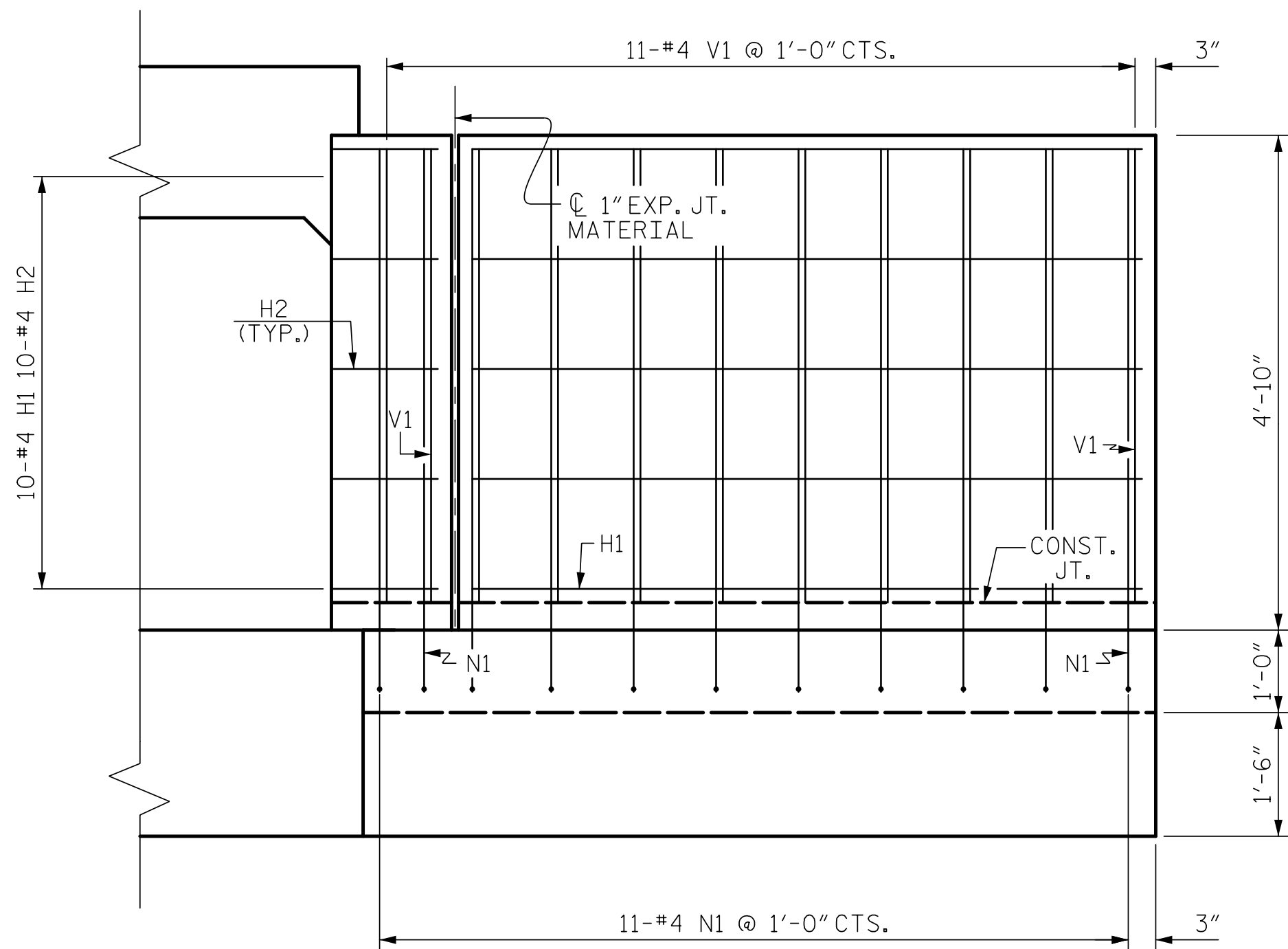
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C6-8
1			3			TOTAL SHEETS
2			4			11

STR. #6

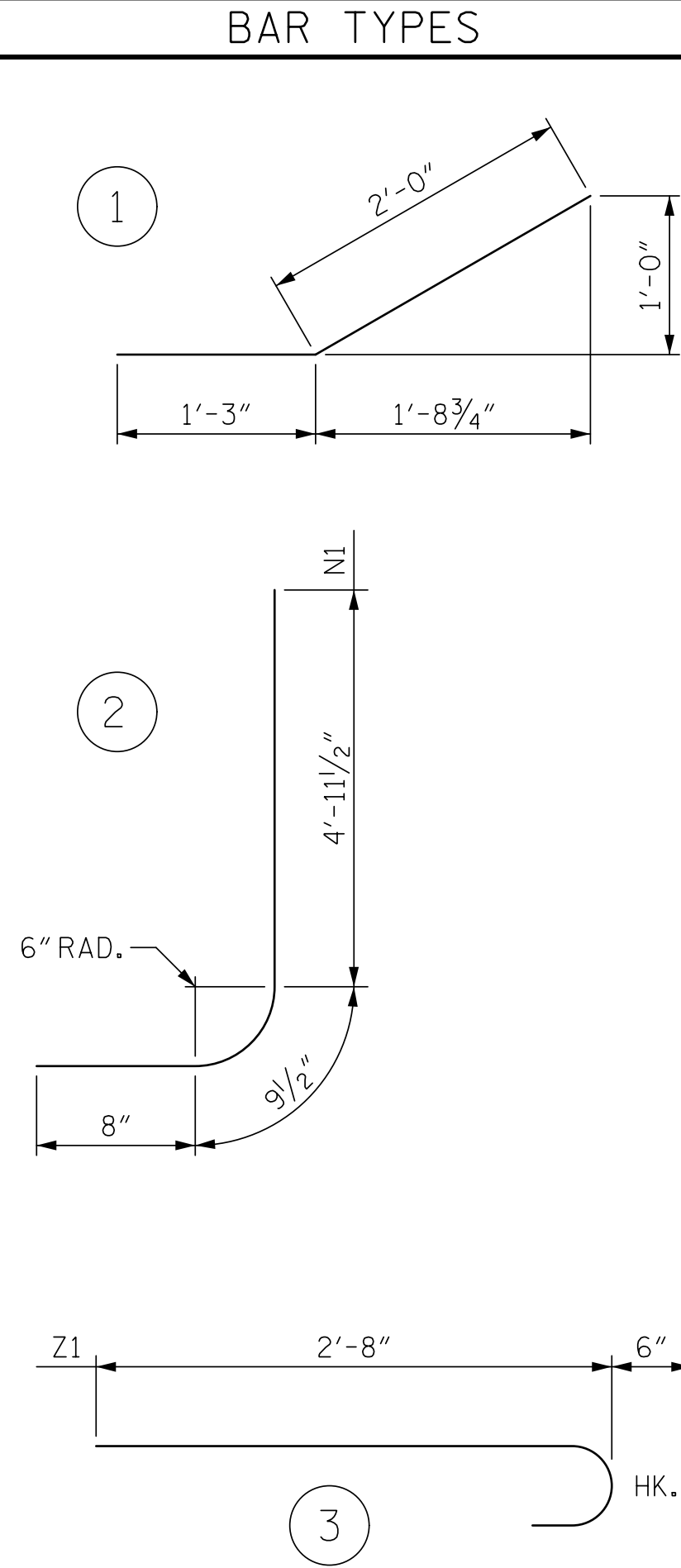
DRAWN BY : ZCS DATE : 8/22
CHECKED BY : MGC DATE : 1/23



W1 PLAN



W1 ELEVATION



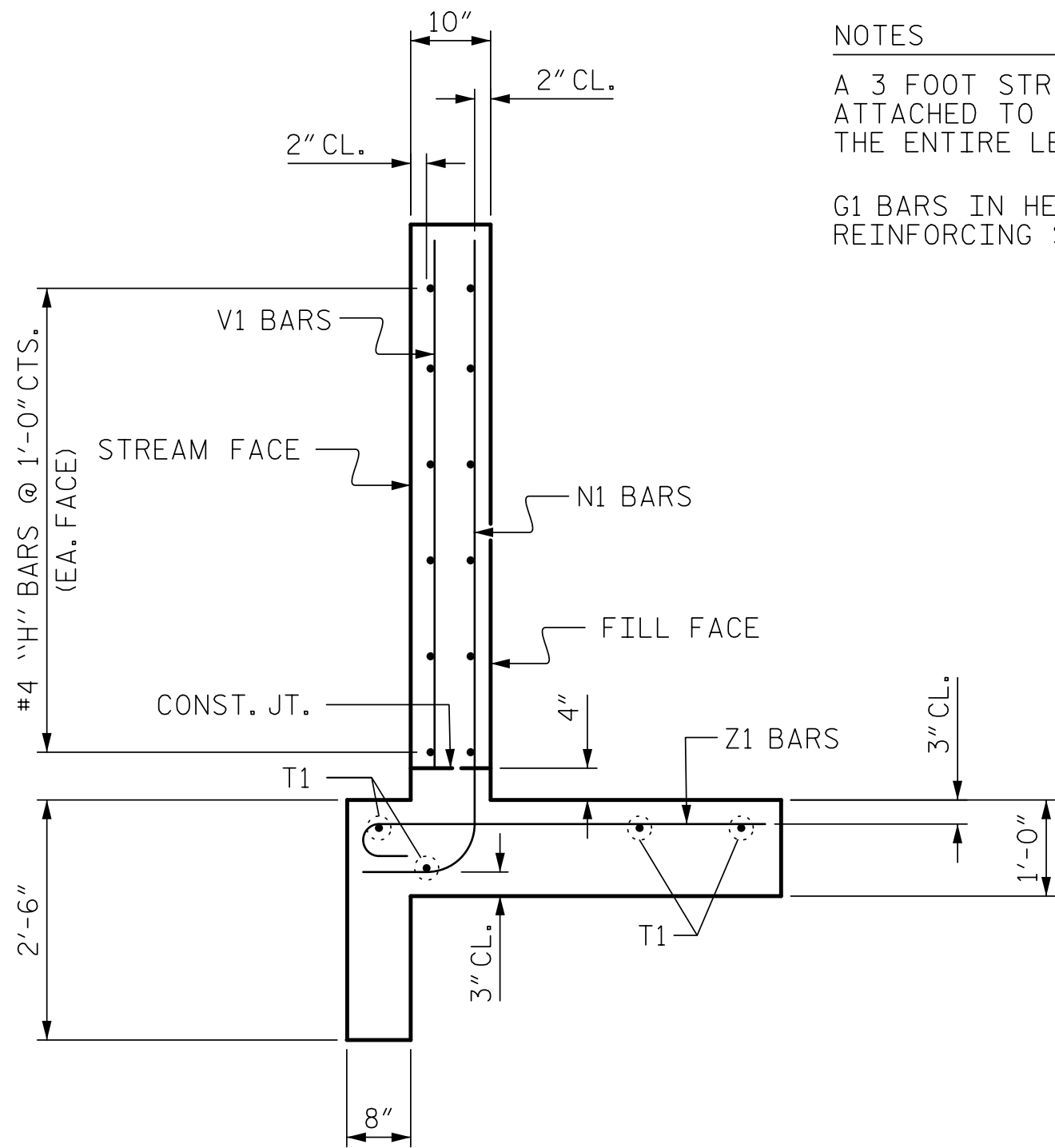
ALL BAR DIMENSIONS ARE OUT TO OUT.

WING W1 BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	10	#4	STR	8'-1"	54
H2	10	#4	1	3'-3"	22
N1	11	#4	2	6'-5"	47
T1	3	#5	STR	10'-0"	31
V1	11	#4	STR	4'-4"	32
Z1	10	#4	3	3'-2"	21
REINFORCING STEEL FOR WING W1 207 LBS					
CLASS A CONCRETE					
WING W1				3.1	CY
1 HEADWALL				0.2	CY
END CURTAIN WALL				0.1	CY
TOTAL				3.4	CY

NOTES

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.

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL REINFORCING STEEL.



TYPICAL WING SECTION

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 520+60.00 -L-

SHEET 9 OF 11

7/23/2025

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UNLESS ALL SIGNATURES COMPLETED

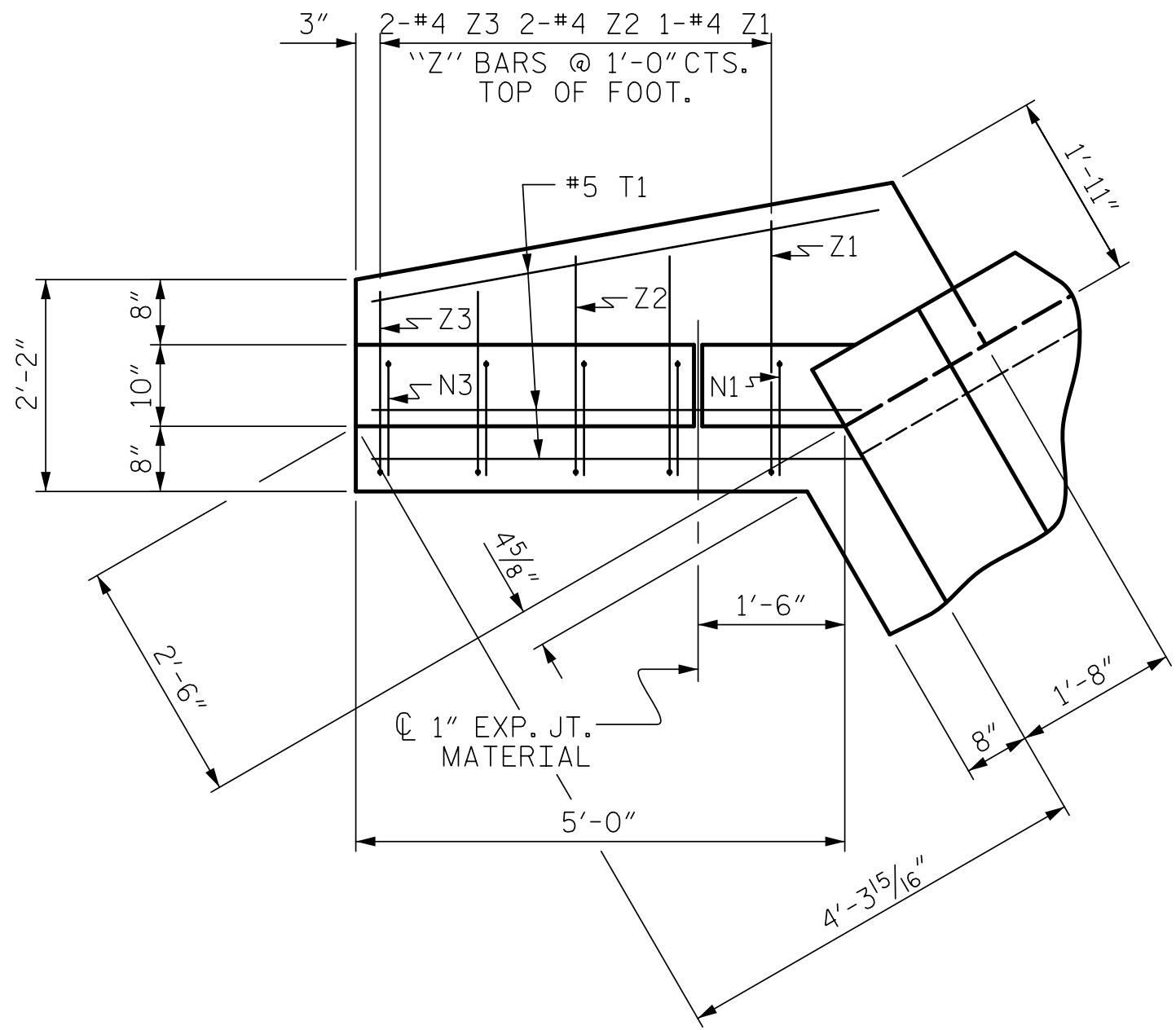
TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO. C6-9
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 11
2			4			

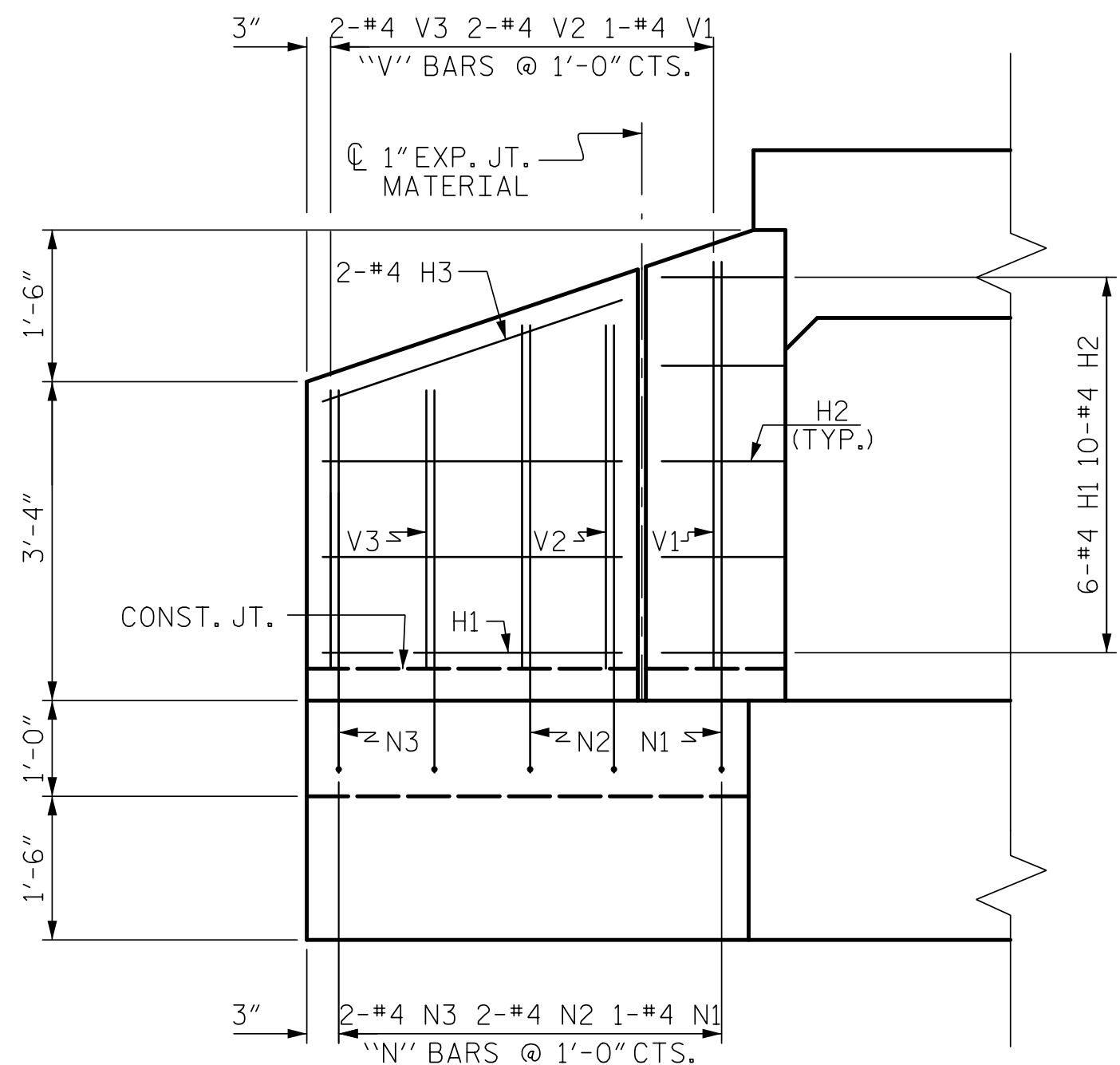
DRAWN BY : ZCS DATE : 8/22
CHECKED BY : MGC DATE : 1/23
DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

3/27/2023
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User:ZSmith

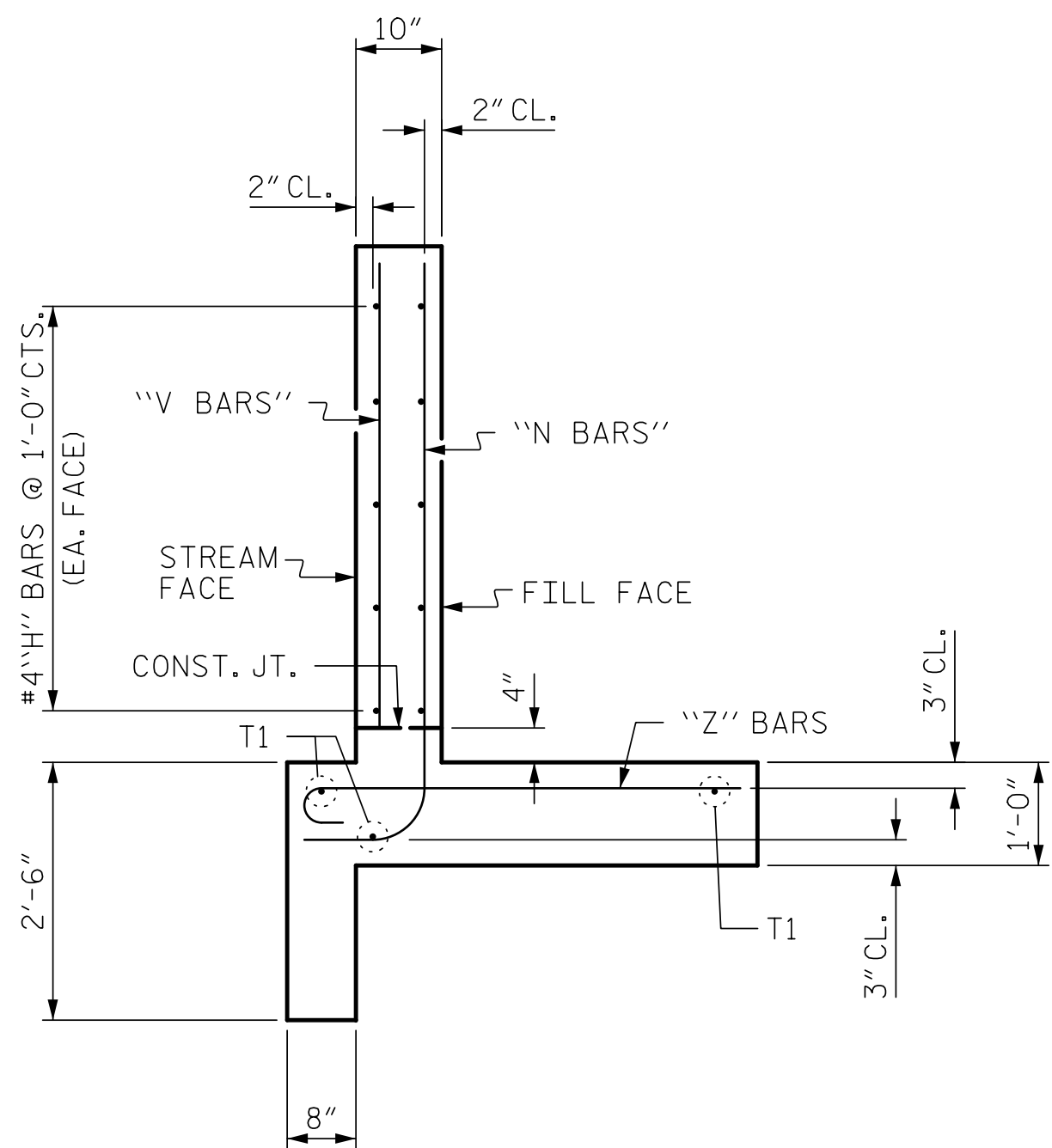
STR. #6



W2 PLAN

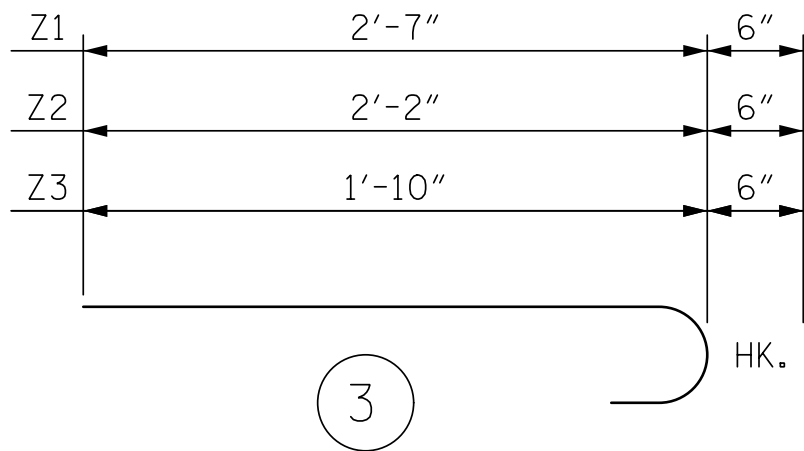
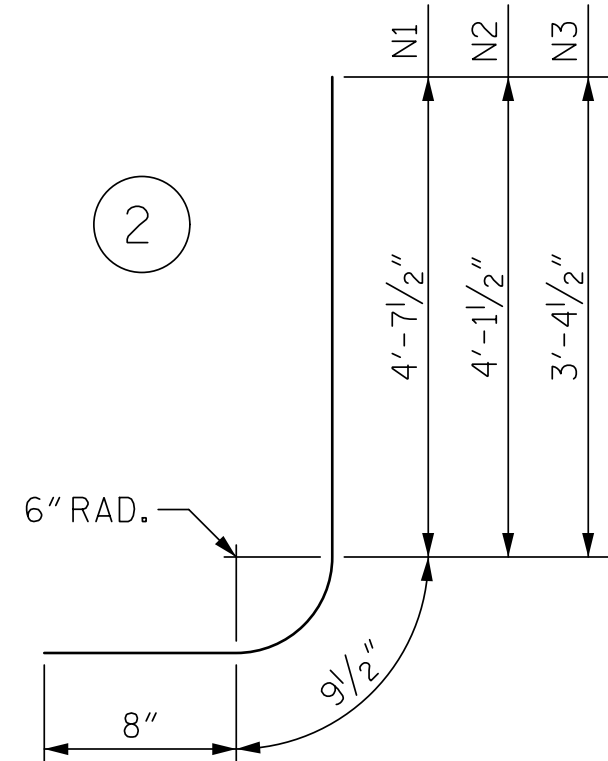
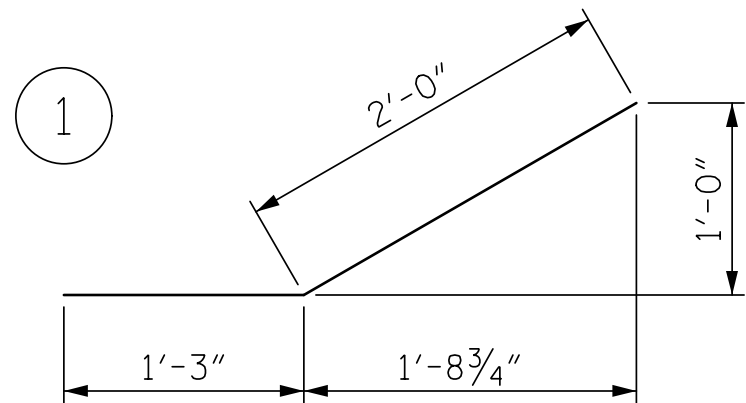


W2 ELEVATION



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

WING W2
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	3'-1"	12
H2	10	#4	1	3'-3"	22
H3	2	#4	STR	3'-3"	4
N1	1	#4	2	6'-1"	4
N2	2	#4	2	5'-7"	7
N3	2	#4	2	4'-10"	6
T1	3	#5	STR	5'-0"	16
V1	1	#4	STR	4'-1"	3
V2	2	#4	STR	3'-7"	5
V3	2	#4	STR	2'-10"	4
Z1	1	#4	3	3'-1"	2
Z2	2	#4	3	2'-8"	4
Z3	2	#4	3	2'-4"	3

REINFORCING STEEL
FOR WING W2 92 LBS

CLASS A CONCRETE
WING W2 1.4 CY
TOTAL 1.4 CY

NOTES

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.

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL REINFORCING STEEL.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 520+60.00 -L-

SHEET 10 OF 11



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INLET WING W2
FOR
CONCRETE BOX CULVERT

DRAWN BY : ZCS DATE : 8/22
CHECKED BY : MGC DATE : 1/23
DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

3/27/2023
X:\NCDOT\R-5739\Structures\Str. #6 (520 + 60.00 -L-)\Final Plans\DGNS\R-5739.SMU. CU.650000.dgn
User:ZSmith

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SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO. C6-10
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 11
2			4			

STR. #6

NOTES

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.

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL
REINFORCING STEEL.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 520+60.00 -L-

SHEET 11 OF 11



7/23/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS
FOR
CONCRETE BOX CULVERT
H = 6'-0" SLOPE = 2:1
OUTLET WINGS

REVISIONS						SHEET NO. C6-11
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 11
2			4			

STR. #6 STD. NO. CW6006

ASSEMBLED BY :	ZCS	DATE :	8/22
CHECKED BY :	MGC	DATE :	1/23
DRAWN BY :	CCJ 11/99	REV. 6/19	MAA/THC
CHECKED BY :	RWW 03/00		

3/27/2023
X:\NCDOT\IR-5739\Structures\Str.#6 (520 + 60.00 -L)\FinalPlans\DGNS\R-5739-SMU_ CU_650000.dgn
User:ZSmlth

WOODS

TB

TB

TB

TB

TB

CLASS II RIP RAP
(ROADWAY PAY ITEM
& DETAIL)
(TYP.)

CL 6' X 8'
EXTENSION

WL-B

TEMPORARY SHORING
(ROADWAY PAY ITEM)

WL

GRASS

TO CHERRY STREET

-L-

20'-8"±

20'-0"±

10'-3"

100°-00'-00"

EXISTING
6' X 6' RCBC

STA. 529+01.60 -L-

CL 6' X 9'
EXTENSION

TB

TB

TB

TB

TB

TB

TRIBUTARY TO ROMANO RIVER

WOODS

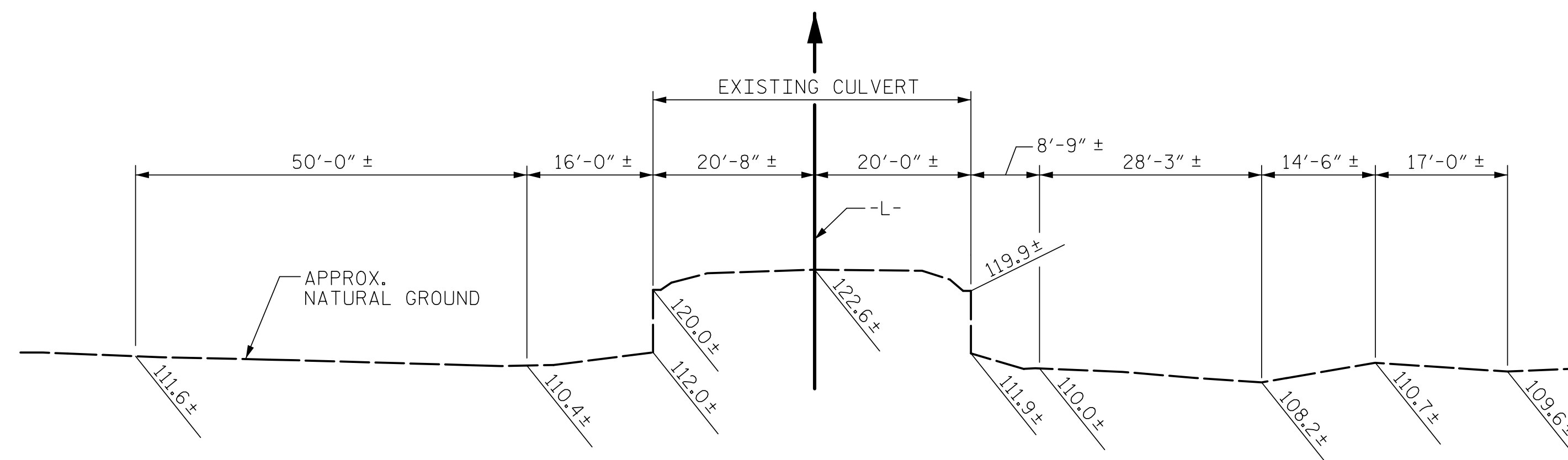
TO THORNE STREET

NAD 83/2011

PROPOSED GUARDRAIL
(ROADWAY PAY ITEM
& DETAIL) (TYP.)

FOR UTILITY INFORMATION, SEE UTILITY
PLANS AND SPECIAL PROVISIONS.

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DRAWN BY : _____ ZCS _____ DATE : 12/22
CHECKED BY : _____ MGC _____ DATE : 1/23
DESIGN ENGINEER OF RECORD: _____ ZCS _____ DATE : 1/23

11/27/2023
X:\NCD01\TR-5739\Structures\Str.#7 (529 + 01.60 -L-)\FinalPlans\DGNS\R-5739-SMU_ CU_650000.dgn
User:ZSmith

CLASS A CONCRETE	
LEFT EXTENSION _____	27.9 C.Y.
RIGHT EXTENSION _____	23.5 C.Y.
TOTAL _____	51.4 C.Y.
REINFORCING STEEL	
LEFT EXTENSION _____	2,511 LBS
RIGHT EXTENSION _____	2,255 LBS
TOTAL _____	4,766 LBS
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	
LEFT EXTENSION _____	11 TONS
RIGHT EXTENSION _____	8 TONS
TOTAL _____	19 TONS

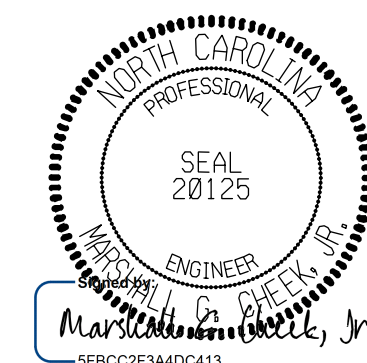
GRADE POINT ELEV. @ STA. 529+01.60 -L- = 123.15'
BED ELEV. @ STA. 529+01.60 -L- _____ = 111.96'
ROADWAY SLOPES _____ = 2:1

DESIGN DISCHARGE_____	=	200 CFS
FREQUENCY OF DESIGN FLOOD_____	=	50 YRS
DESIGN HIGH WATER ELEVATION_____	=	117.4'
DRAINAGE AREA_____	=	0.47 SQ. MI.
BASE DISCHARGE (Q100)_____	=	240 CFS
BASE HIGH WATER ELEVATION_____	=	117.9'

OVERTOPPING DISCHARGE _____ = >350 CFS
FREQUENCY OF OVERTOPPING FLOOD __ = 500+ YRS
OVERTOPPING FLOOD ELEVATION _____ = 123.1'

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.

SHEET 1 OF 12



7/23/2025

SINGLE
6' X 8' LEFT EXT.
&
6' X 9' RIGHT EXT.
60° SKEW

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TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C7-1
1			3			TOTAL SHEETS
2			4			12

STR #7

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	1.09	--	1.75	1.09	1	TOP SLAB	3.33	1.96	1	TOP SLAB	0.81	
		HL-93 (OPERATING)	N/A		1.42	--	1.35	1.42	1	TOP SLAB	3.33	2.55	1	TOP SLAB	0.81	
		HS-20 (INVENTORY)	36,000	2	1.18	42.48	1.75	1.18	1	BOTT SLAB	3.33	2.23	1	BOTT SLAB	0.87	
		HS-20 (OPERATING)	36,000		1.53	55.08	1.35	1.53	1	BOTT SLAB	3.33	2.88	1	BOTT SLAB	0.87	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		1.99	26.87	1.40	1.99	1	TOP SLAB	3.33	3.57	1	TOP SLAB	0.81	
		SNGARBS2	20,000		1.86	37.20	1.40	1.86	1	TOP SLAB	3.33	3.34	1	TOP SLAB	0.81	
		SNAGRIS2	22,000		1.99	43.78	1.40	1.99	1	TOP SLAB	3.33	3.57	1	TOP SLAB	0.81	
		SNCOTTS3	27,250	3	1.41	38.42	1.40	1.41	1	BOTT SLAB	3.33	2.67	1	BOTT SLAB	0.87	
		SNAGGRS4	34,925		1.81	63.21	1.40	1.81	1	BOTT SLAB	3.33	3.40	1	BOTT SLAB	5.76	
		SNS5A	35,550		2.18	77.50	1.40	2.18	1	TOP SLAB	3.33	4.30	1	TOP SLAB	0.81	
		SNS6A	39,950		1.66	66.32	1.40	1.66	1	BOTT SLAB	3.33	3.12	1	BOTT SLAB	0.87	
		SNS7B	42,000		1.66	69.72	1.40	1.66	1	BOTT SLAB	3.33	3.12	1	BOTT SLAB	0.87	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		1.99	65.67	1.40	1.99	1	TOP SLAB	3.33	3.57	1	TOP SLAB	0.81	
		TNT4A	33,075		1.68	55.57	1.40	1.68	1	BOTT SLAB	3.33	3.18	1	BOTT SLAB	0.87	
		TNT6A	41,600		1.66	69.06	1.40	1.66	1	BOTT SLAB	3.33	3.13	1	BOTT SLAB	0.87	
		TNT7A	42,000		1.67	70.14	1.40	1.67	1	BOTT SLAB	3.33	3.15	1	BOTT SLAB	0.87	
		TNT7B	42,000		1.66	69.72	1.40	1.66	1	BOTT SLAB	3.33	3.13	1	BOTT SLAB	0.87	
		TNAGRIT4	43,000		1.68	72.24	1.40	1.68	1	BOTT SLAB	3.33	3.18	1	BOTT SLAB	0.87	
		TNAGT5A	45,000		1.68	75.60	1.40	1.68	1	BOTT SLAB	3.33	3.18	1	BOTT SLAB	0.87	
		TNAGT5B	45,000		1.68	75.60	1.40	1.68	1	BOTT SLAB	3.33	3.18	1	BOTT SLAB	0.87	
EMERGENCY VEHICLE (EV)		EV2	28,750		1.41	40.54	1.30	1.41	1	TOP SLAB	3.33	2.53	1	TOP SLAB	0.87	
		EV3	43,000	4	1.23	52.89	1.30	1.23	1	BOTT SLAB	3.33	2.32	1	BOTT SLAB	0.87	

LOAD FACTORS:

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

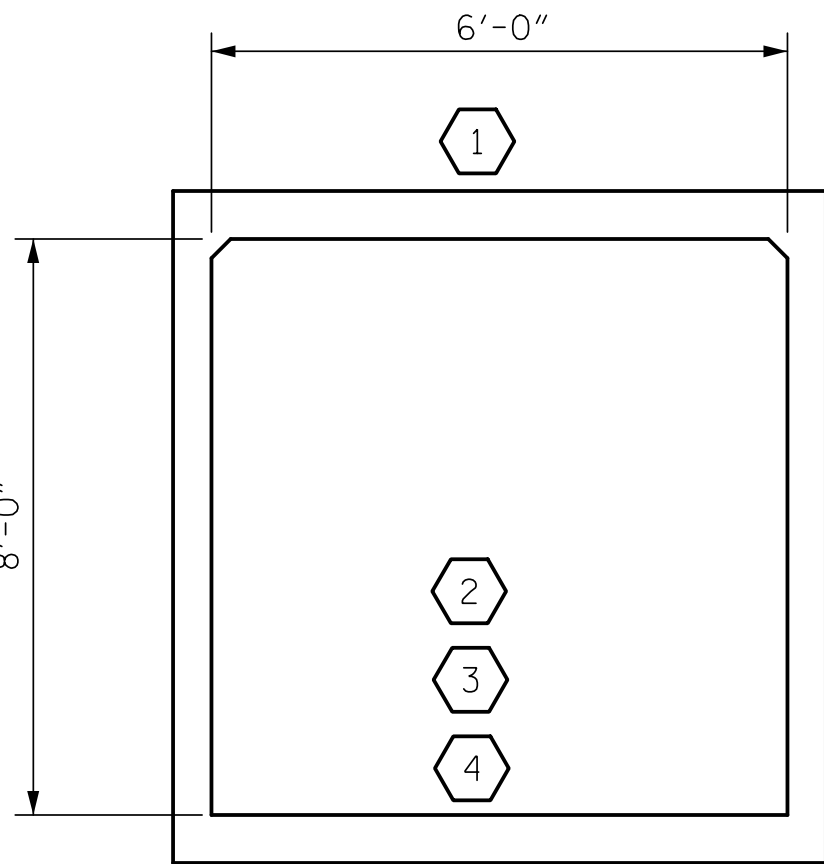
COMMENTS:

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

CONTROLLING LOAD RATING

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

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

ASSEMBLED BY :	STM	DATE :	07/23
CHECKED BY :	MGC	DATE :	11/23
DRAWN BY :	WMC	7/II	REV. 10/1/II
CHECKED BY :	GM	7/II	REV. 12/17
			REV. 04/23
			MAA/GM
			MAA/THAI
			BNB/ACI

11/28/2023
X:\NCDOT\R-5739\Structures\Str. #7 (529 + 01.60 -L-)\Final Plans\DGNs\417-001_R-5739-SMU-C7-2.dgn
User:ZSmith

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 529+01.60 -L-

SHEET 2 OF 12



7/23/2025

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706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO. C7-2
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 12
2			4			

STR #7

STD. NO. LRFR5

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	1.12	--	1.75	1.12	1	TOP SLAB	3.33	1.99	1	TOP SLAB	0.81	
		HL-93 (OPERATING)	N/A		1.45	--	1.35	1.45	1	TOP SLAB	3.33	2.58	1	TOP SLAB	0.81	
		HS-20 (INVENTORY)	36.000	2	1.21	43.56	1.75	1.21	1	BOTT SLAB	3.33	2.23	1	BOTT SLAB	0.87	
		HS-20 (OPERATING)	36.000		1.57	56.52	1.35	1.57	1	BOTT SLAB	3.33	2.89	1	BOTT SLAB	0.87	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.04	27.54	1.40	2.04	1	TOP SLAB	3.33	3.62	1	TOP SLAB	0.81	
		SNGARBS2	20.000		1.91	38.20	1.40	1.91	1	TOP SLAB	3.33	3.39	1	TOP SLAB	0.81	
		SNAGRIS2	22.000		2.04	44.88	1.40	2.04	1	TOP SLAB	3.33	3.62	1	TOP SLAB	0.81	
		SNCOTTS3	27.250	3	1.45	39.51	1.40	1.45	1	BOTT SLAB	3.33	2.68	1	BOTT SLAB	0.87	
		SNAGGRS4	34.925		1.85	64.61	1.40	1.85	1	BOTT SLAB	3.33	3.41	1	BOTT SLAB	0.87	
		SNS5A	35.550		2.25	79.99	1.40	2.25	1	TOP SLAB	3.33	4.30	1	EXT. WALL	0.86	
		SNS6A	39.950		1.70	67.92	1.40	1.70	1	BOTT SLAB	3.33	3.13	1	BOTT SLAB	0.87	
		SNS7B	42.000		1.70	71.40	1.40	1.70	1	BOTT SLAB	3.33	3.13	1	BOTT SLAB	0.87	
	TRUCK TRACTOR SEMI-TRAILER (TTSI)	TNAGRIT3	33.000		2.04	67.32	1.40	2.04	1	TOP SLAB	3.33	3.62	1	TOP SLAB	0.81	
		TNT4A	33.075		1.73	57.22	1.40	1.73	1	BOTT SLAB	3.33	3.19	1	BOTT SLAB	0.87	
		TNT6A	41.600		1.70	70.72	1.40	1.70	1	BOTT SLAB	3.33	3.14	1	BOTT SLAB	0.87	
		TNT7A	42.000		1.72	72.24	1.40	1.72	1	BOTT SLAB	3.33	3.16	1	BOTT SLAB	0.87	
		TNT7B	42.000		1.70	71.40	1.40	1.70	1	BOTT SLAB	3.33	3.13	1	BOTT SLAB	0.87	
		TNAGRIT4	43.000		1.73	74.39	1.40	1.73	1	BOTT SLAB	3.33	3.19	1	BOTT SLAB	0.87	
		TNAGT5A	45.000		1.73	77.85	1.40	1.73	1	BOTT SLAB	3.33	3.19	1	BOTT SLAB	0.87	
		TNAGT5B	45.000		1.73	77.85	1.40	1.73	1	BOTT SLAB	3.33	3.19	1	BOTT SLAB	0.87	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.44	41.40	1.30	1.44	1	TOP SLAB	3.33	2.56	1	TOP SLAB	0.81	
		EV3	43.000	4	1.26	54.18	1.30	1.26	1	BOTT SLAB	3.33	2.33	1	BOTT SLAB	0.87	

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	--

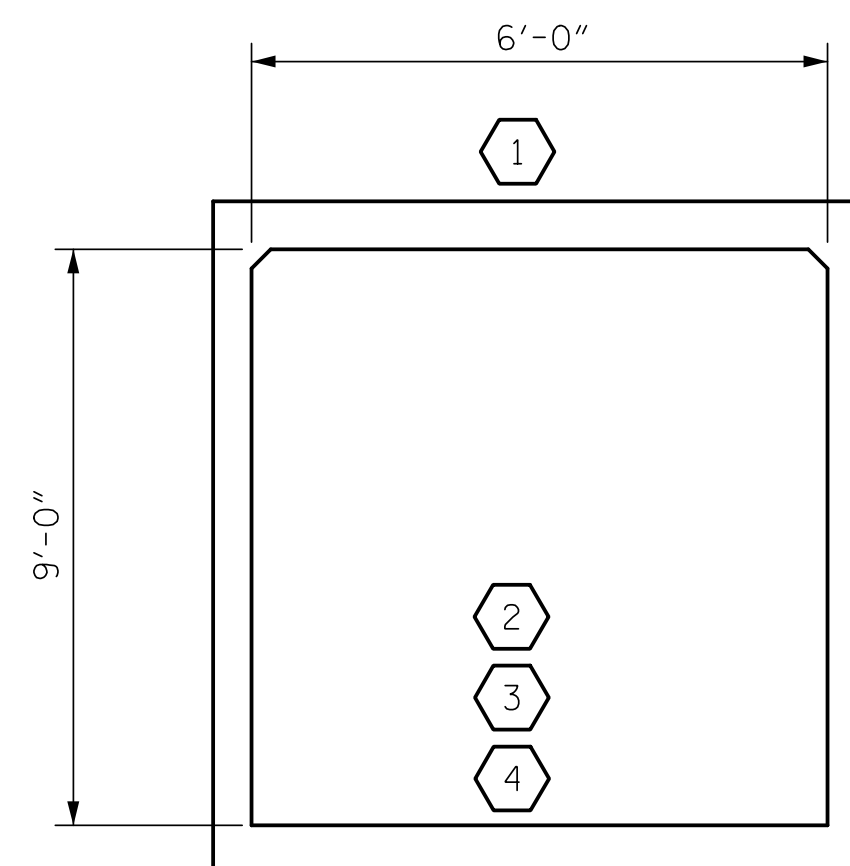
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

CONTROLLING LOAD RATING

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

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

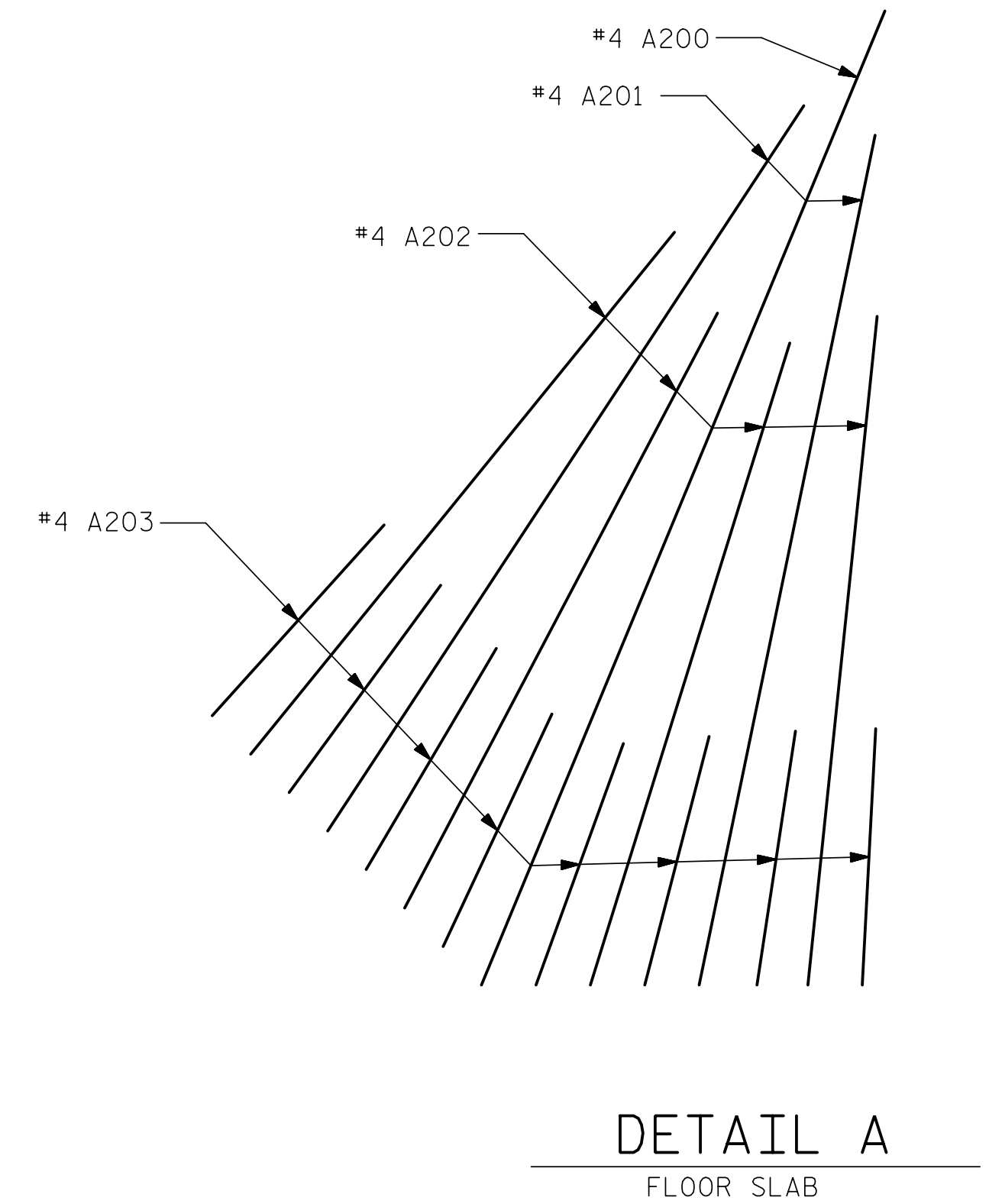
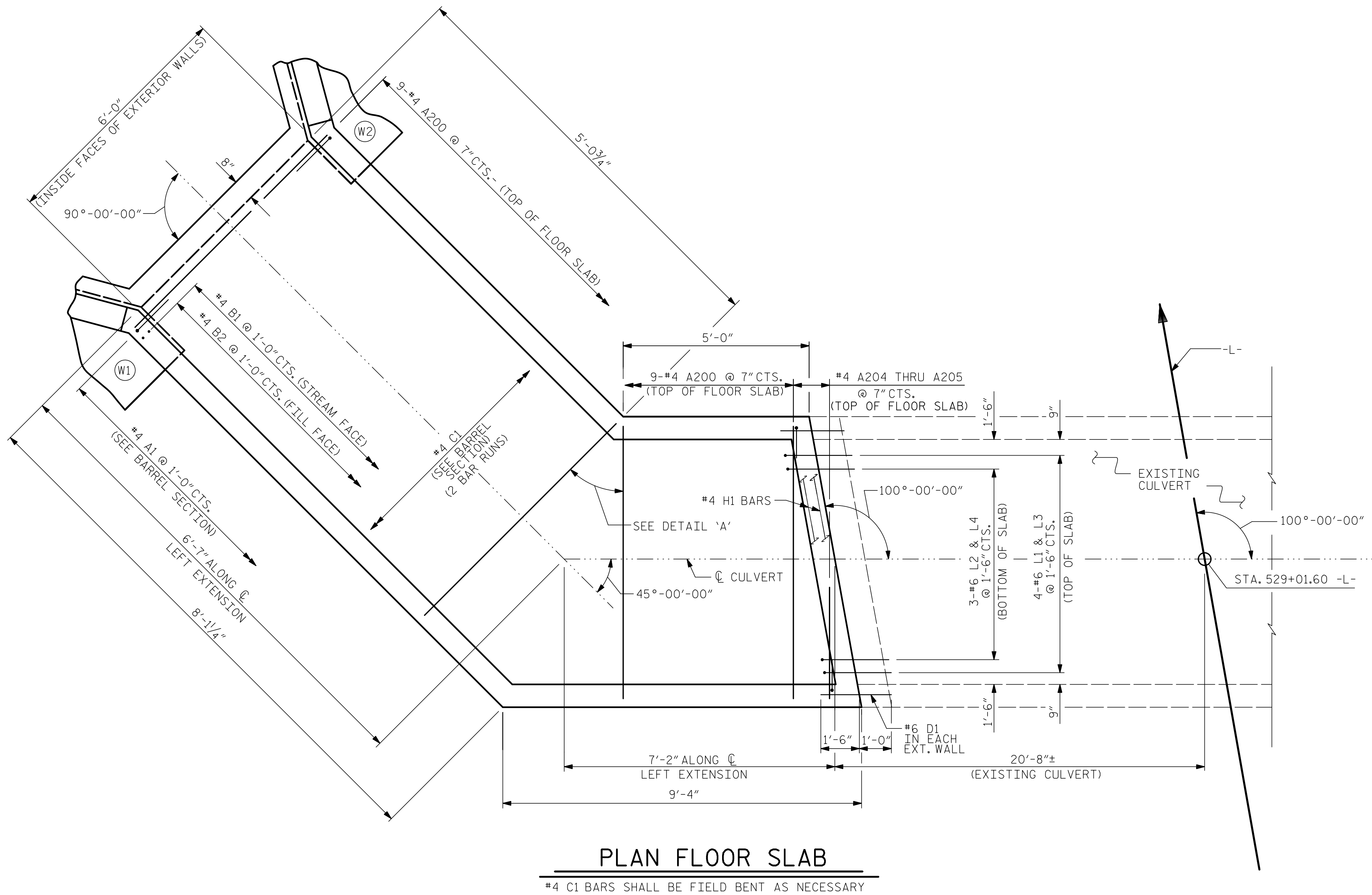
PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 529+01.60 -L-

SHEET 3 OF 12

 Seal of the State of North Carolina Professional Engineer Michael G. Cheek, Jr. License No. 35862 State Seal 20125	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC) RIGHT EXTENSION																																								
7/23/2025	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED																																								
TCS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO. 0275	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6">REVISIONS</th> <th>SHEET NO.</th> </tr> <tr> <th>NO.</th> <th>BY:</th> <th>DATE:</th> <th>NO.</th> <th>BY:</th> <th>DATE:</th> <th rowspan="3">TOTAL SHEETS</th> </tr> <tr> <td>1</td> <td></td> <td></td> <td>3</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> </tr> <tr> <td colspan="6"></td> <td>C7-3</td> </tr> <tr> <td colspan="6"></td> <td>12</td> </tr> </table>	REVISIONS						SHEET NO.	NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS	1			3			2			4									C7-3							12
REVISIONS						SHEET NO.																																			
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						C7-3																																			
						12																																			

STR #7

STD. NO. LRFR5

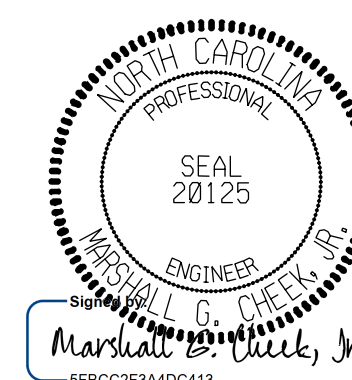


PROJECT NO. R-5739

NORTHAMPTON COUNTY

STATION: 529+01.60 -L-

SHEET 4 OF 12



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SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 6 FT. X 8 FT.
CONCRETE BOX CULVERT
100° SKEW
LEFT EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C7-4
1			3			TOTAL SHEETS
2			4			12

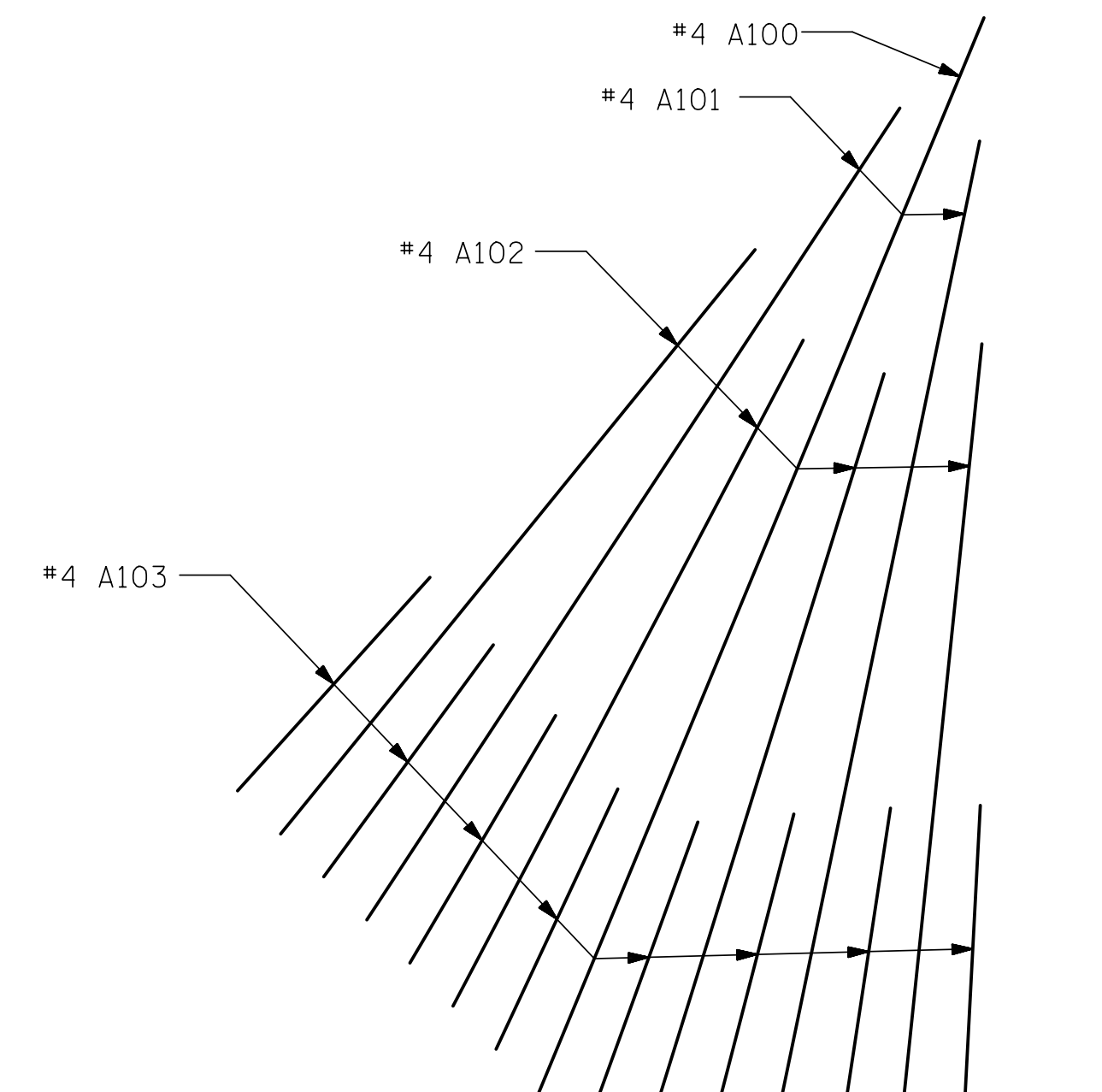
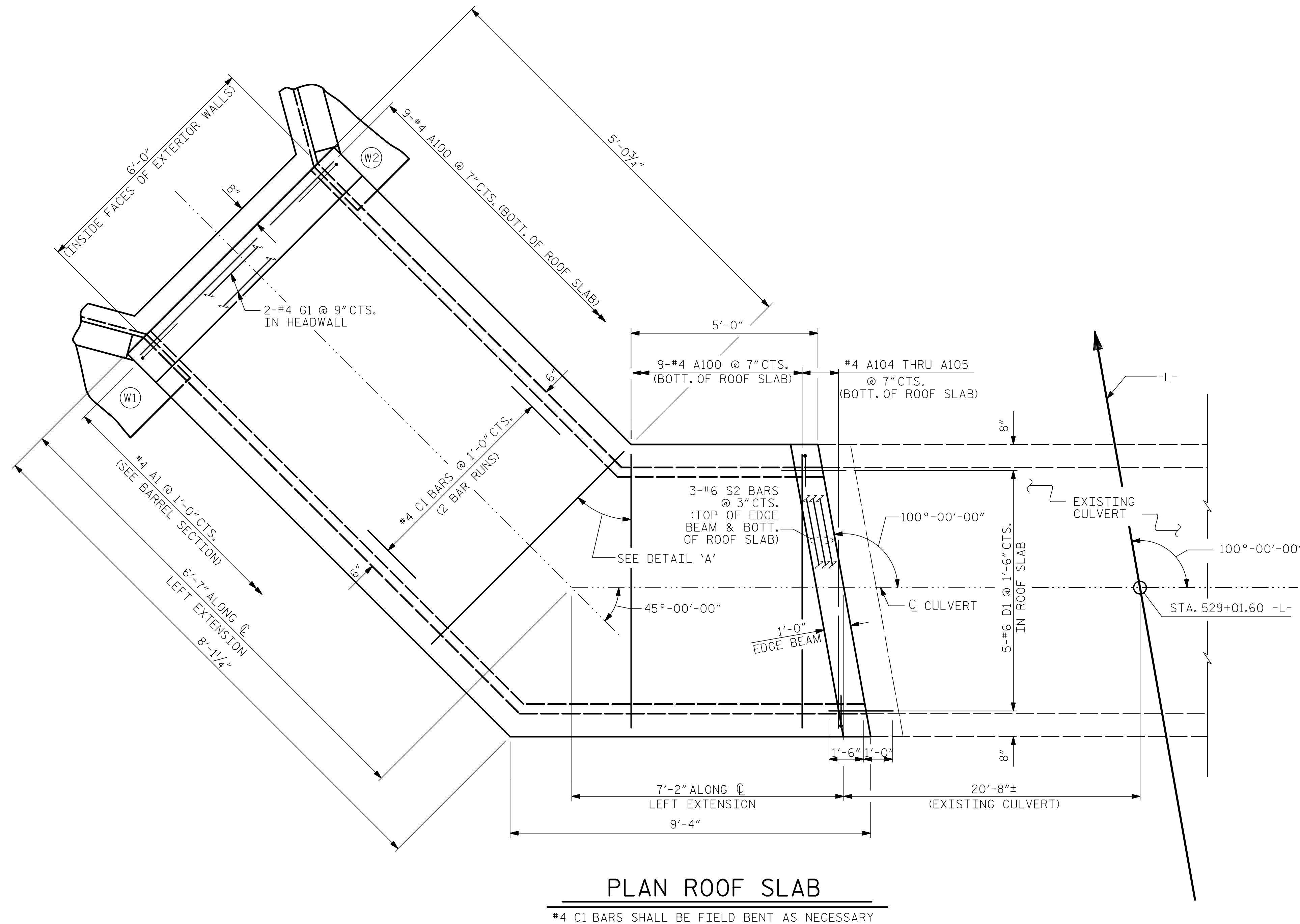
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CHECKED BY : MGC DATE : 1/23

DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

11/28/2023
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STR. #7



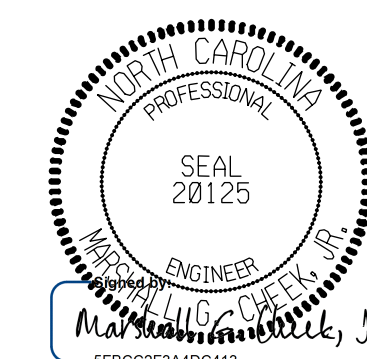
DETAIL A
ROOF SLAB

PLAN ROOF SLAB

#4 C1 BARS SHALL BE FIELD BENT AS NECESSARY

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 529+01.60 -L-

SHEET 5 OF 12



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STATE OF NORTH CAROLINA
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 RALEIGH

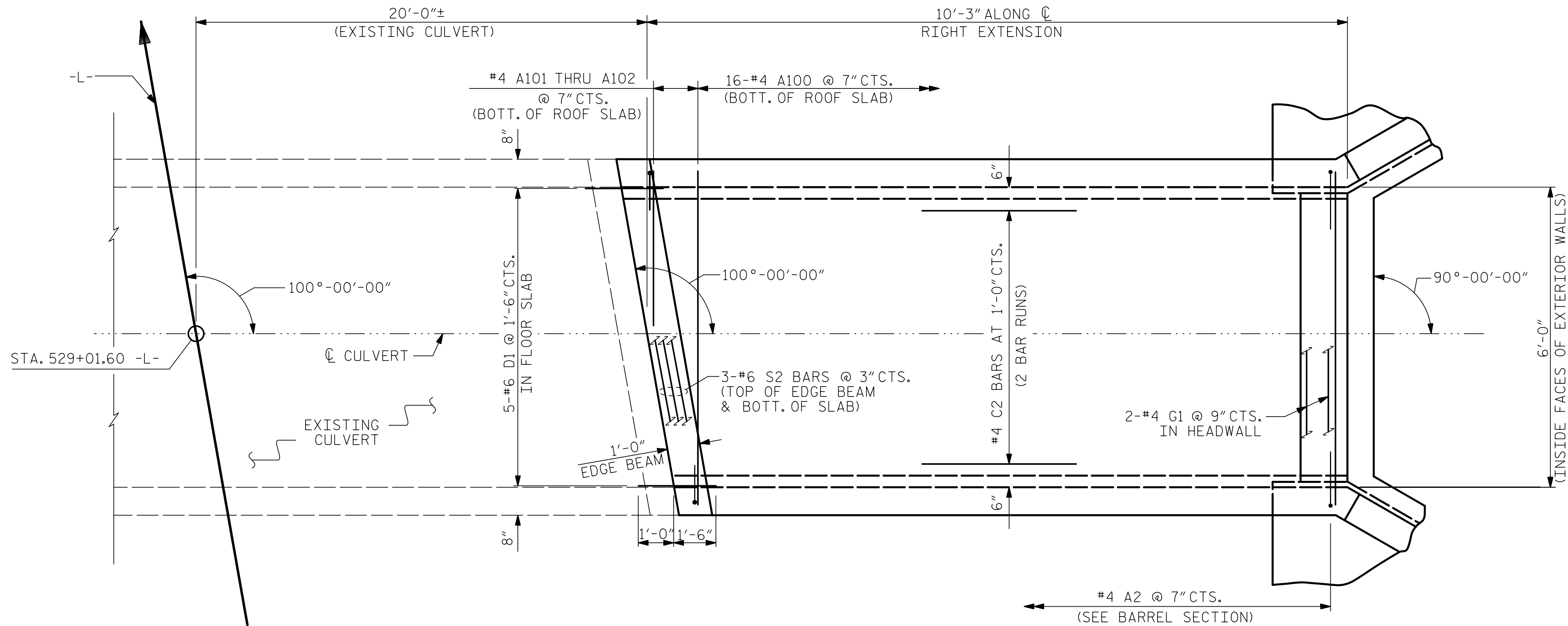
SINGLE 6 FT. X 8 FT.
 CONCRETE BOX CULVERT
 100° SKEW
 LEFT EXTENSION

DRAWN BY : ZCS DATE : 8/22
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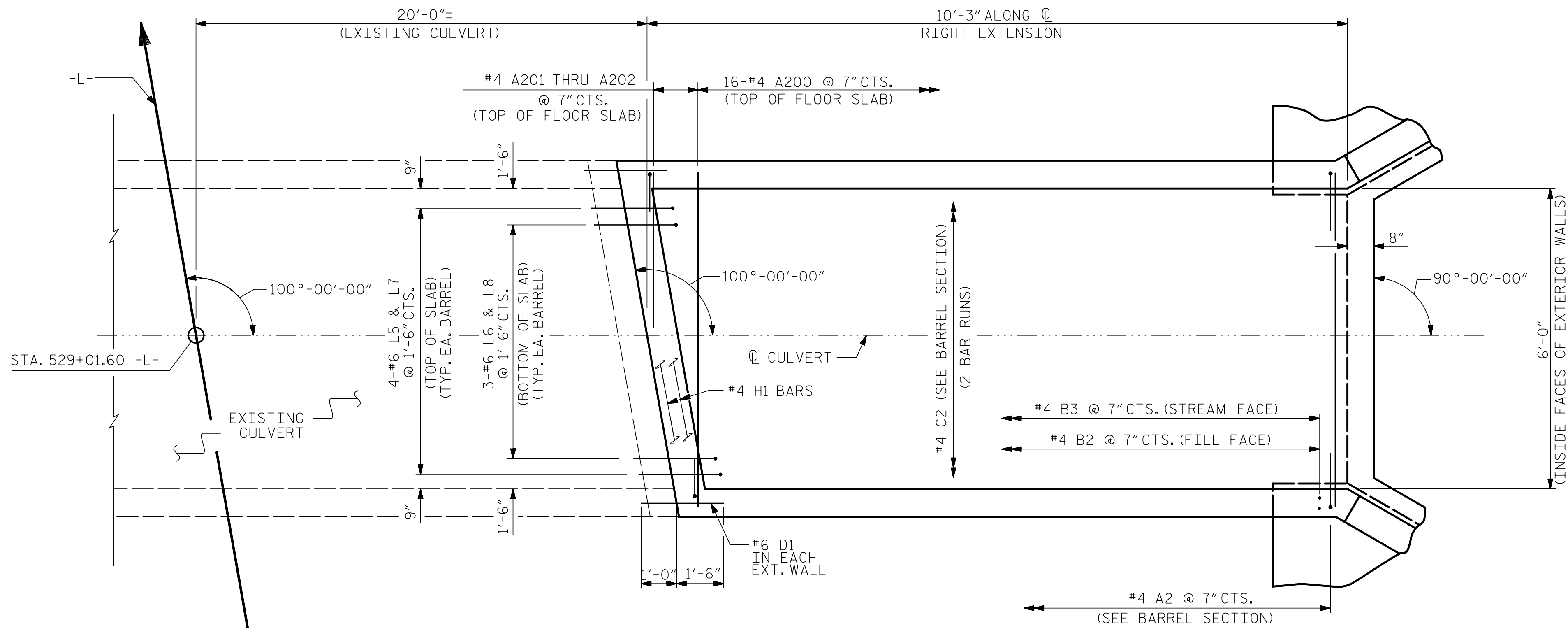
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STR. #7



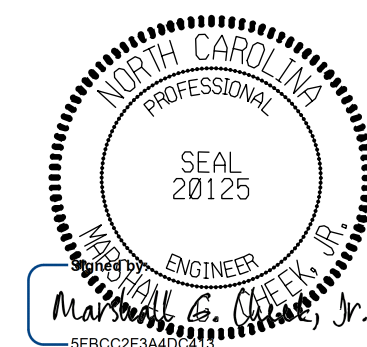
PLAN ROOF SLAB



PLAN FLOOR SLAB

PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 529+01.60 -L-

SHEET 7 OF 12



7/23/2025

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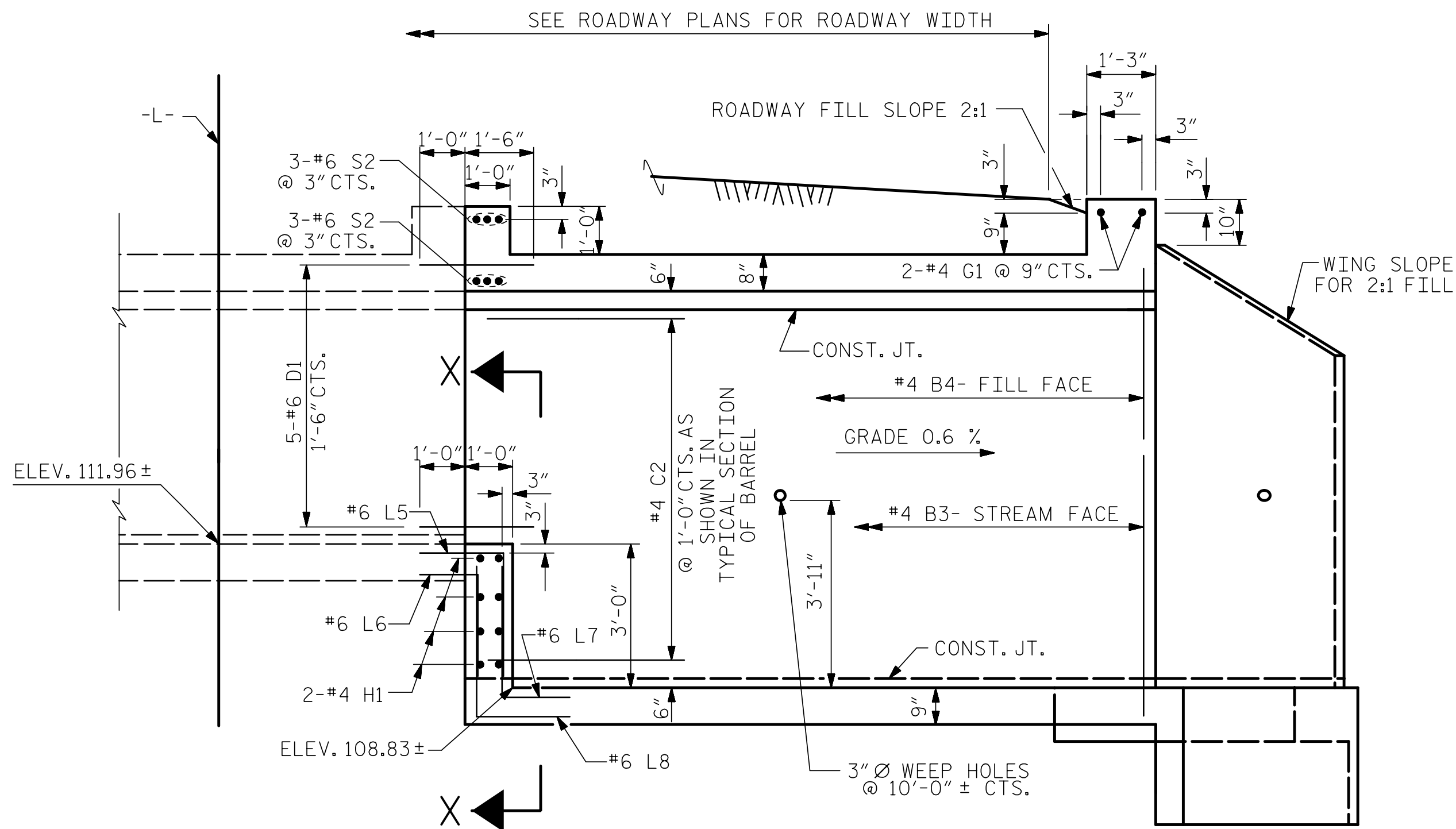
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SINGLE 6 FT. X 9 FT.
 CONCRETE BOX CULVERT
 100° SKEW
 RIGHT EXTENSION

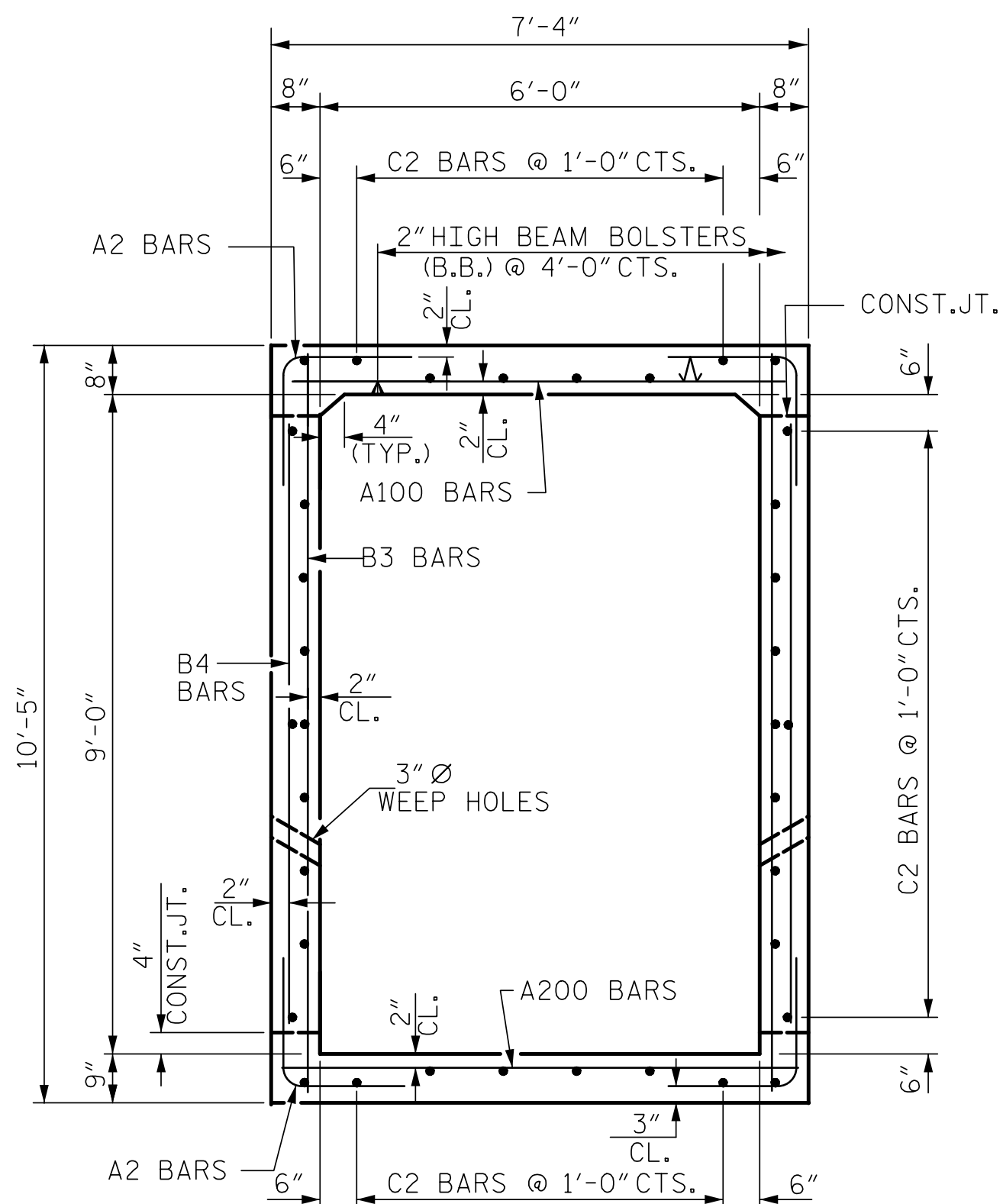
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NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			TOTAL SHEETS
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 DESIGN ENGINEER OF RECORD: ZCS DATE : 1/23

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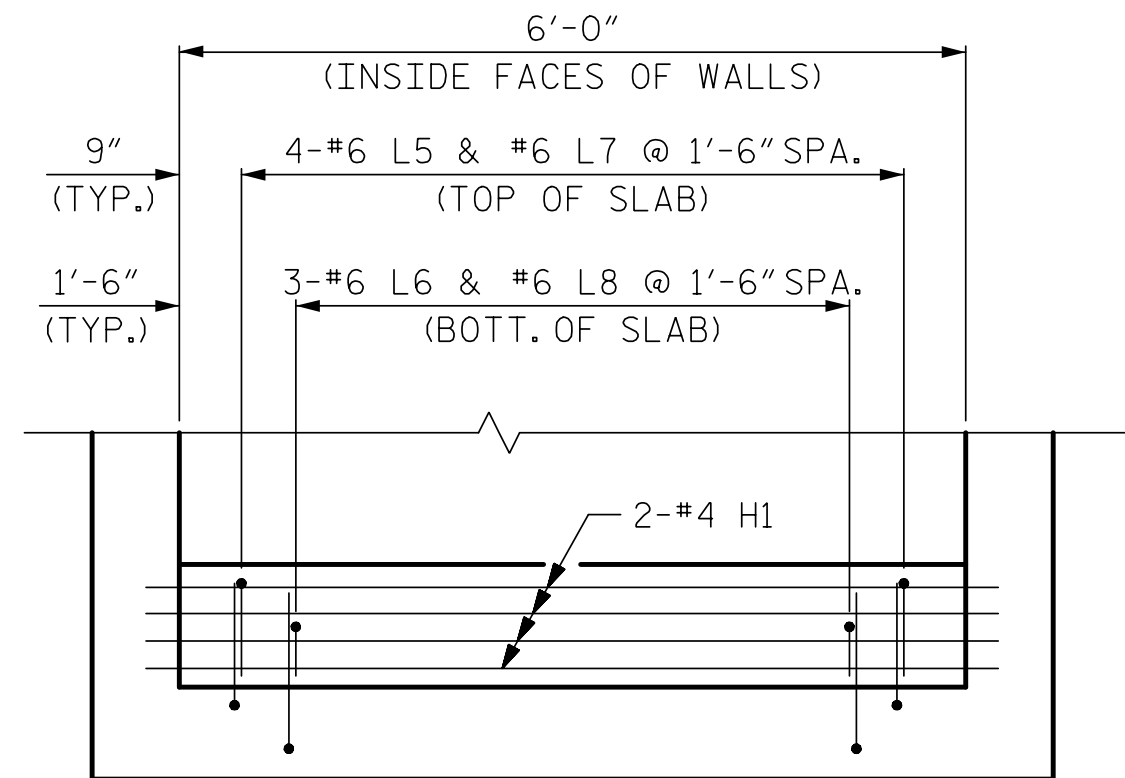


CULVERT SECTION NORMAL TO ROADWAY

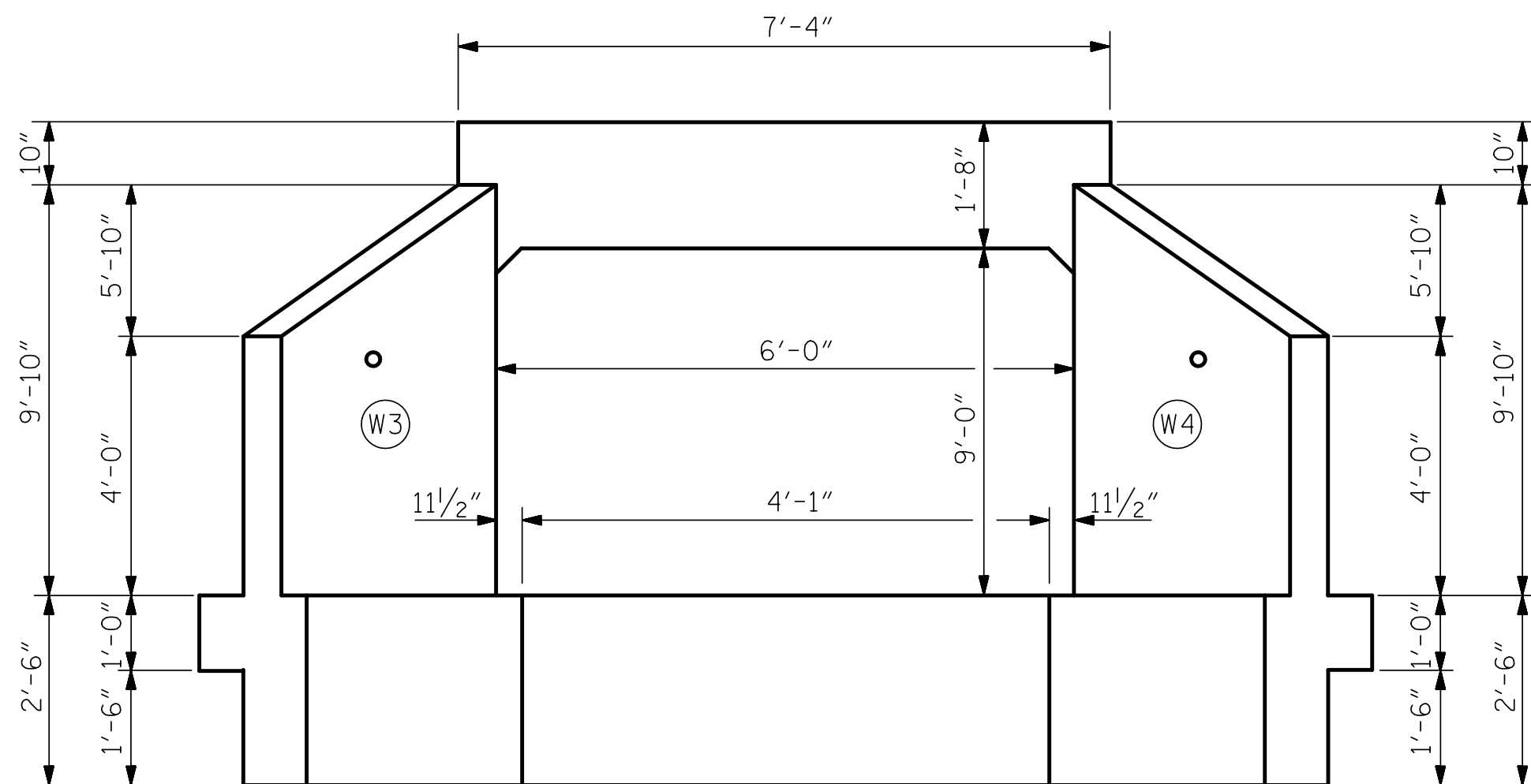


RIGHT ANGLE SECTION OF BARREL

THERE ARE 36 "C" BARS IN SECTION OF BARREL



SECTION X-X



OUTLET END ELEVATION

BAR TYPE				RIGHT EXTENSION BAR SCHEDULE					
				BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
				A100	16	#4	STR	7'-0"	75
				A101	1	#4	STR	5'-3"	4
				A102	1	#4	STR	1'-11"	1
				A200	16	#4	STR	7'-0"	75
				A201	1	#4	STR	5'-3"	4
				A202	1	#4	STR	1'-11"	1
				A2	68	#4	1	4'-10"	220
				B3	34	#4	STR	9'-6"	216
				B4	34	#4	STR	9'-0"	204
				C2	72	#4	STR	6'-3"	301
				D1	15	#6	STR	2'-6"	56
				D2	3	#6	STR	1'-4"	6
				G1	2	#4	STR	7'-0"	9
				H1	8	#4	STR	7'-0"	37
				L5	4	#6	2	4'-0"	24
				L6	3	#6	2	3'-3"	15
				L7	4	#6	3	4'-9"	29
				L8	3	#6	3	5'-3"	24
				S2	6	#6	STR	7'-0"	63
				REINFORCING STEEL					1364 LBS

RIGHT EXTENSION QUANTITIES	
CLASS A CONCRETE	
BARREL @ _____ 0.833 _CY/FT_____	8.5 _C.Y._
WINGS, ETC. _____	13.7 _C.Y._
EDGE BEAM _____	0.3 _C.Y._
BOTTOM SLAB STEP _____	1.0 _C.Y._
TOTAL _____	23.5 _C.Y._
REINFORCING STEEL	
BARREL _____	1,364 _LBS._
WINGS, ETC. _____	891 _LBS._
TOTAL _____	2,255 _LBS._
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	8 TONS

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 529+01.60 -L-

SHEET 8 OF 12

		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SINGLE 6 FT. X 9 FT. CONCRETE BOX CULVERT 100° SKEW RIGHT EXTENSION							
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TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275		NO.	BY:	DATE:	NO.	BY:	DATE:
		1			3		
		2			4		
		SHEET NO. C7-8					
		TOTAL SHEETS 12					

STR, #7

DRAWN BY :	ZCS	DATE :	8/22
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DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

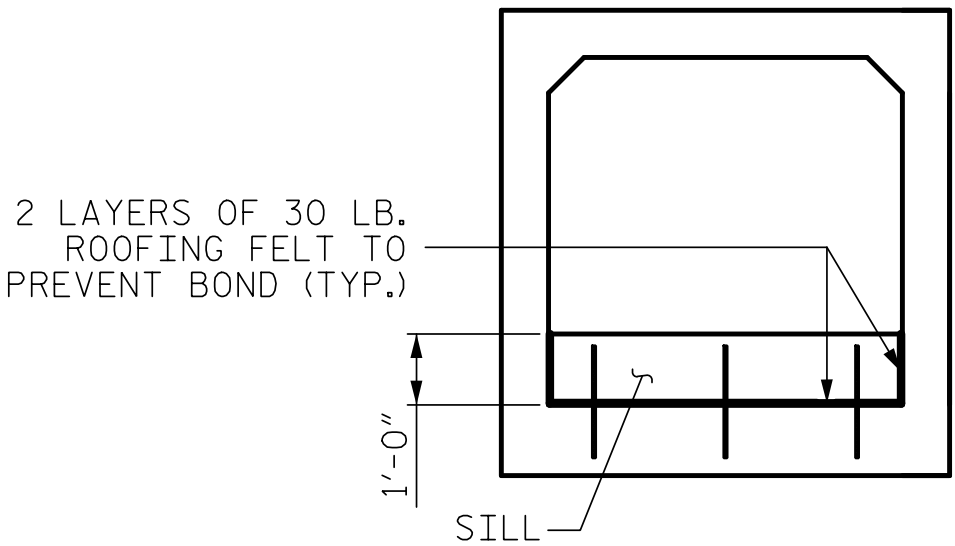
11/23/2023
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NOTES

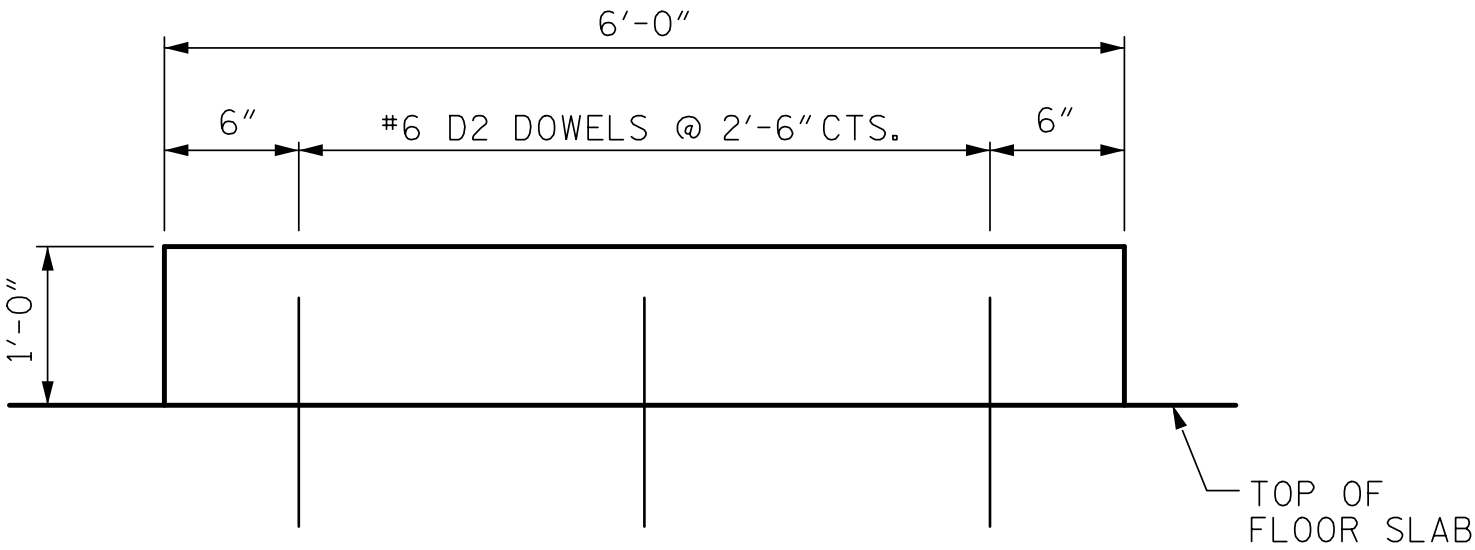
MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT EXTENSIONS. BED MATERIAL MAY BE SUPPLEMENTED WITH CLASS B RIP RAP AS NECESSARY. NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

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

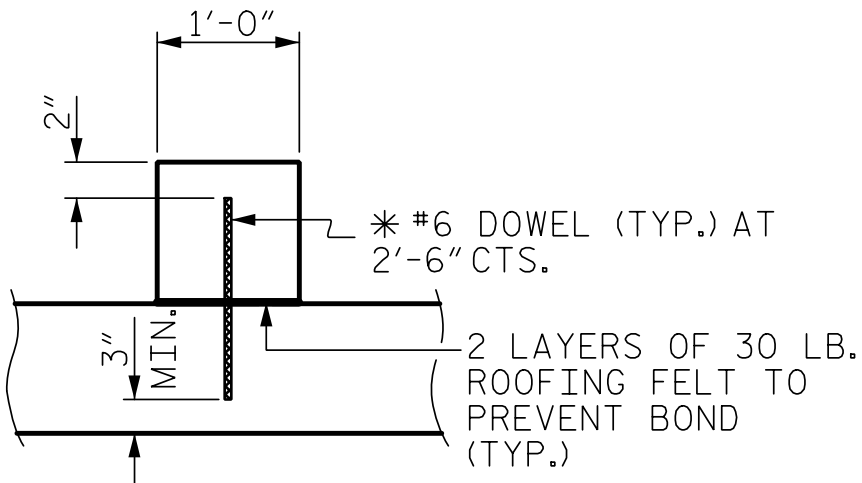
THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



OUTLET ELEVATION



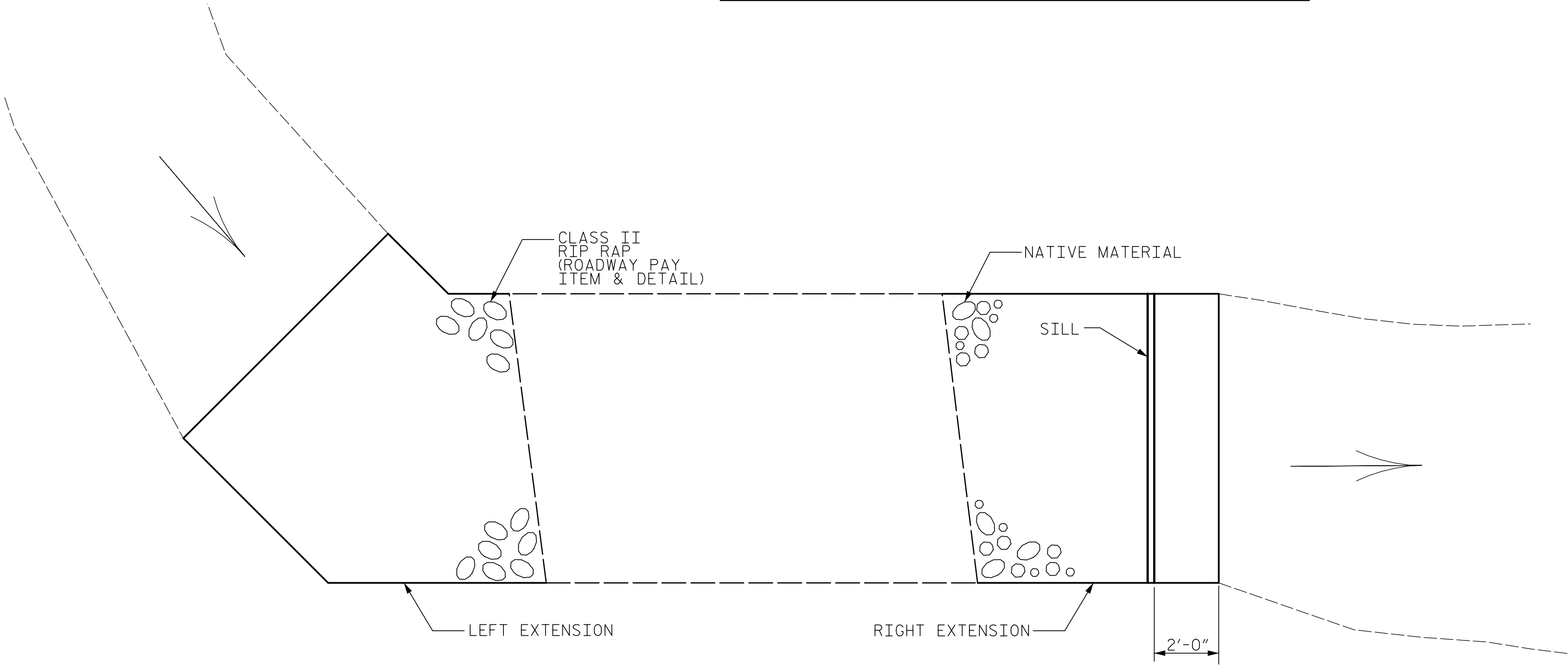
ELEVATION



SECTION THROUGH SILL

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

SILL DETAILS



PLAN OF FLOOR SILL LAYOUT

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 529+01.60 -L-

SHEET 9 OF 12



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SINGLE
6' X 8' LEFT EXT.
&
6' X 9' RIGHT EXT.
60° SKEW

DRAWN BY :	ZCS	DATE :	12/22
CHECKED BY :	MGC	DATE :	1/23
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	1/23

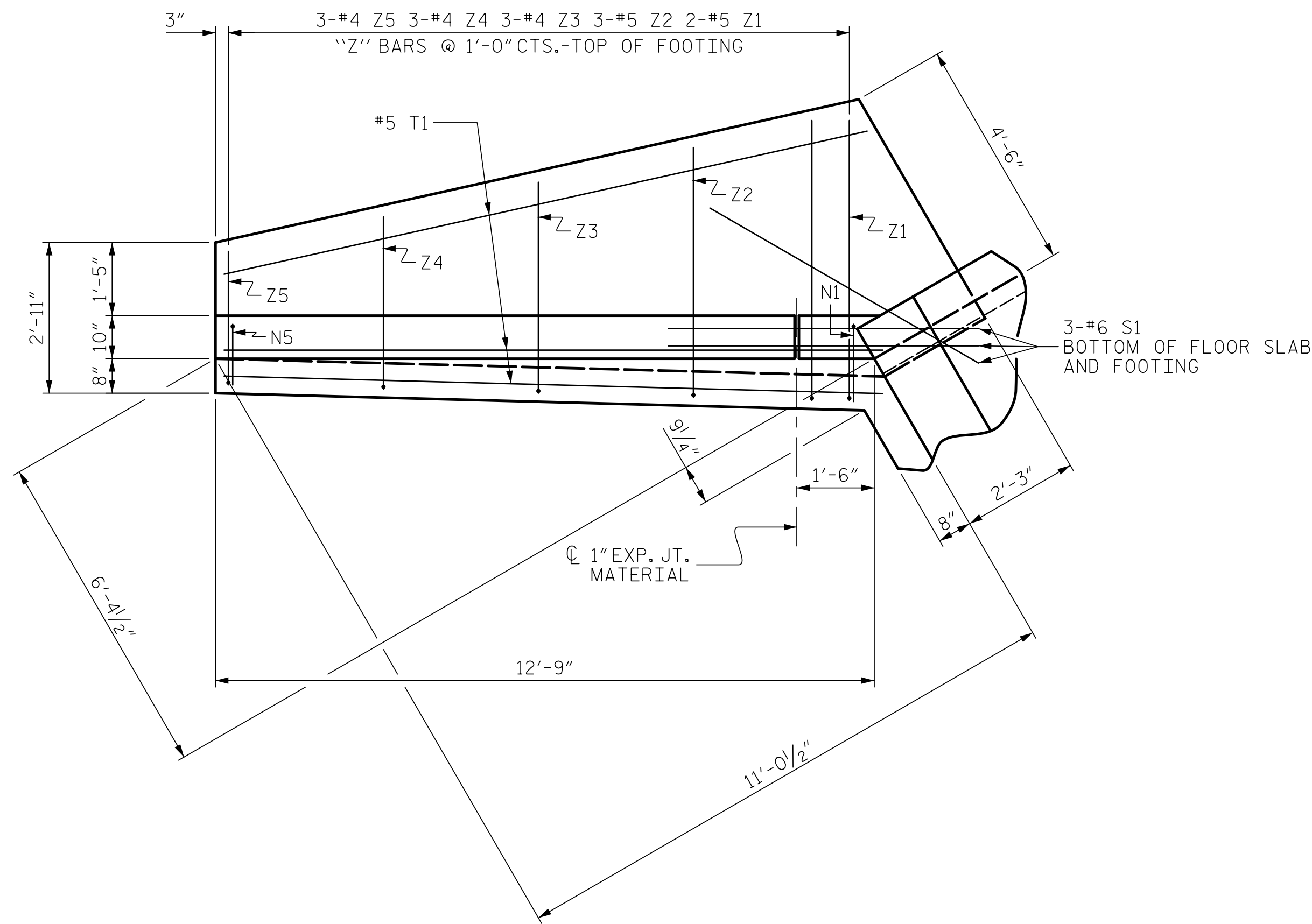
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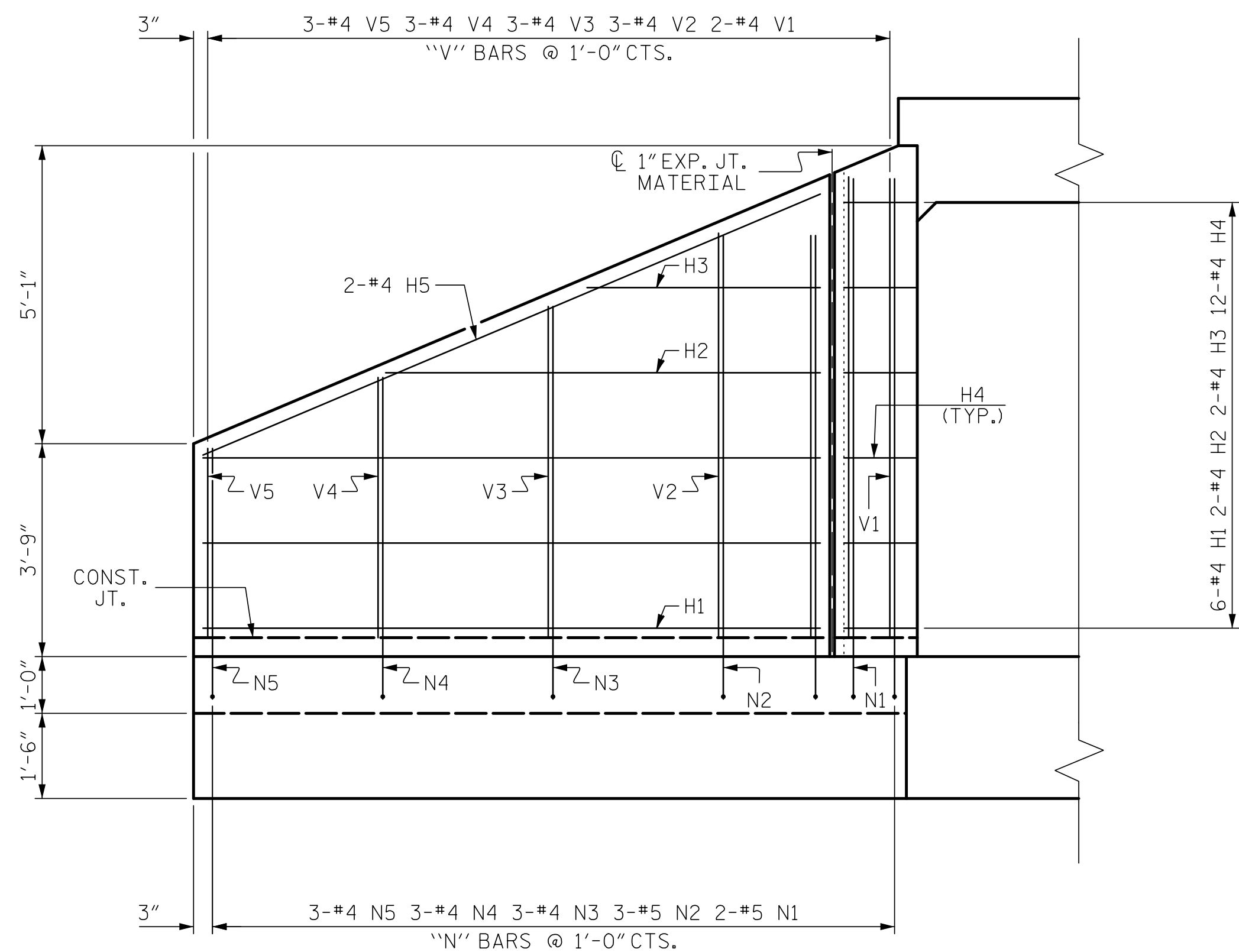
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706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C7-9
2			4			TOTAL SHEETS 12

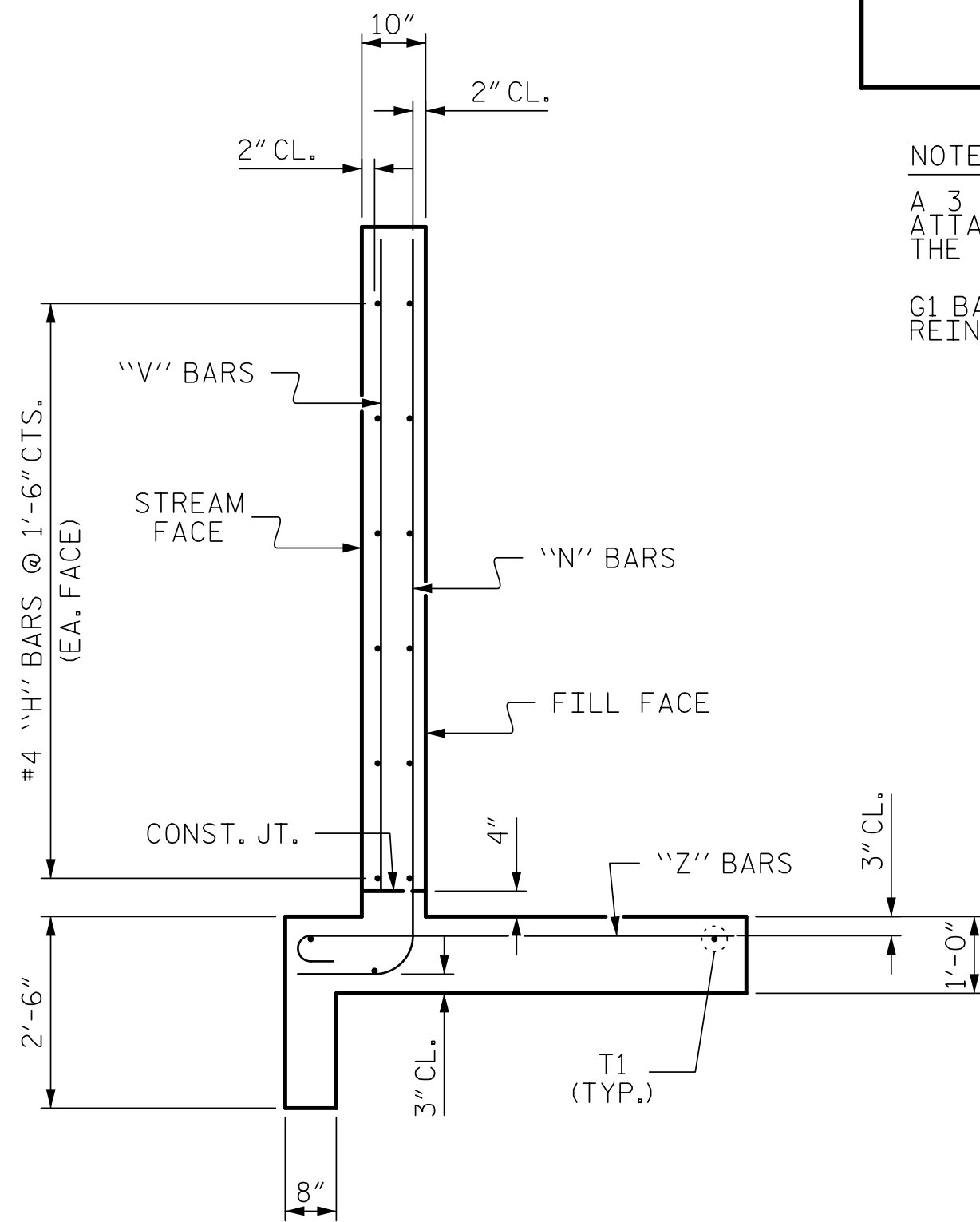
STR. #7



W1 PLAN

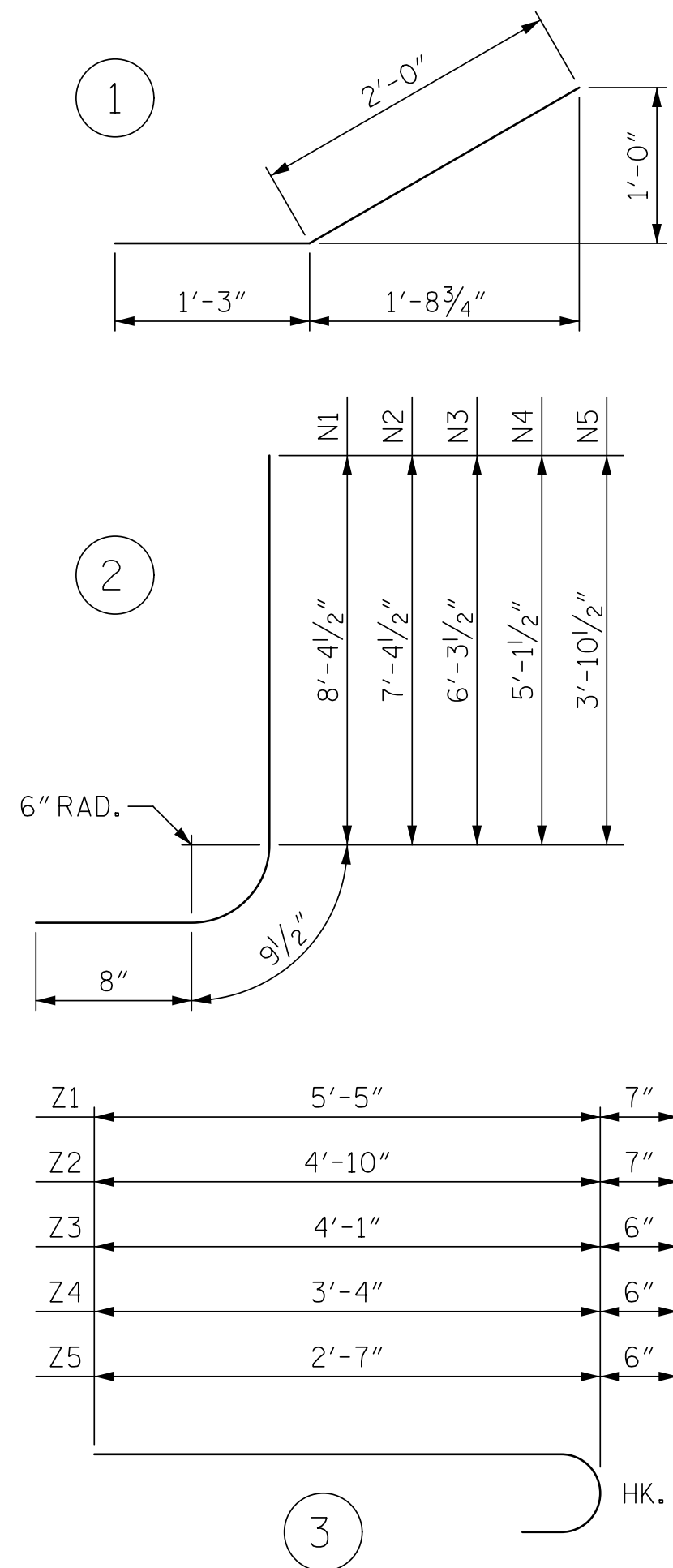


W1 ELEVATION



TYPICAL WING SECTION

BAR TYPES



NOTES

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.
G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL REINFORCING STEEL.

WING W1
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	10'-10"	43
H2	2	#4	STR	7'-8"	10
H3	2	#4	STR	4'-1"	5
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	11'-9"	16
N1	2	#5	2	9'-10"	21
N2	3	#5	2	8'-10"	28
N3	3	#4	2	7'-9"	16
N4	3	#4	2	6'-7"	13
N5	3	#4	2	5'-4"	11
S1	3	#6	STR	6'-0"	27
T1	3	#5	STR	12'-9"	40
V1	2	#4	STR	7'-8"	10
V2	3	#4	STR	6'-9"	14
V3	3	#4	STR	5'-6"	11
V4	3	#4	STR	4'-4"	9
V5	3	#4	STR	3'-4"	7
Z1	2	#5	3	6'-0"	13
Z2	3	#5	3	5'-5"	17
Z3	3	#4	3	4'-7"	9
Z4	3	#4	3	3'-10"	8
Z5	3	#4	3	3'-1"	6

REINFORCING STEEL FOR WING W1	360	LBS
CLASS A CONCRETE WING W1	5.4	CY
1 HEADWALL	0.3	CY
1 END CURTAIN WALL	0.3	CY
TOTAL	6.0	CY

PROJECT NO. R-5739
NORTHAMPTON COUNTY
STATION: 529+01.60 -L-

SHEET 10 OF 12



7/23/2025

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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

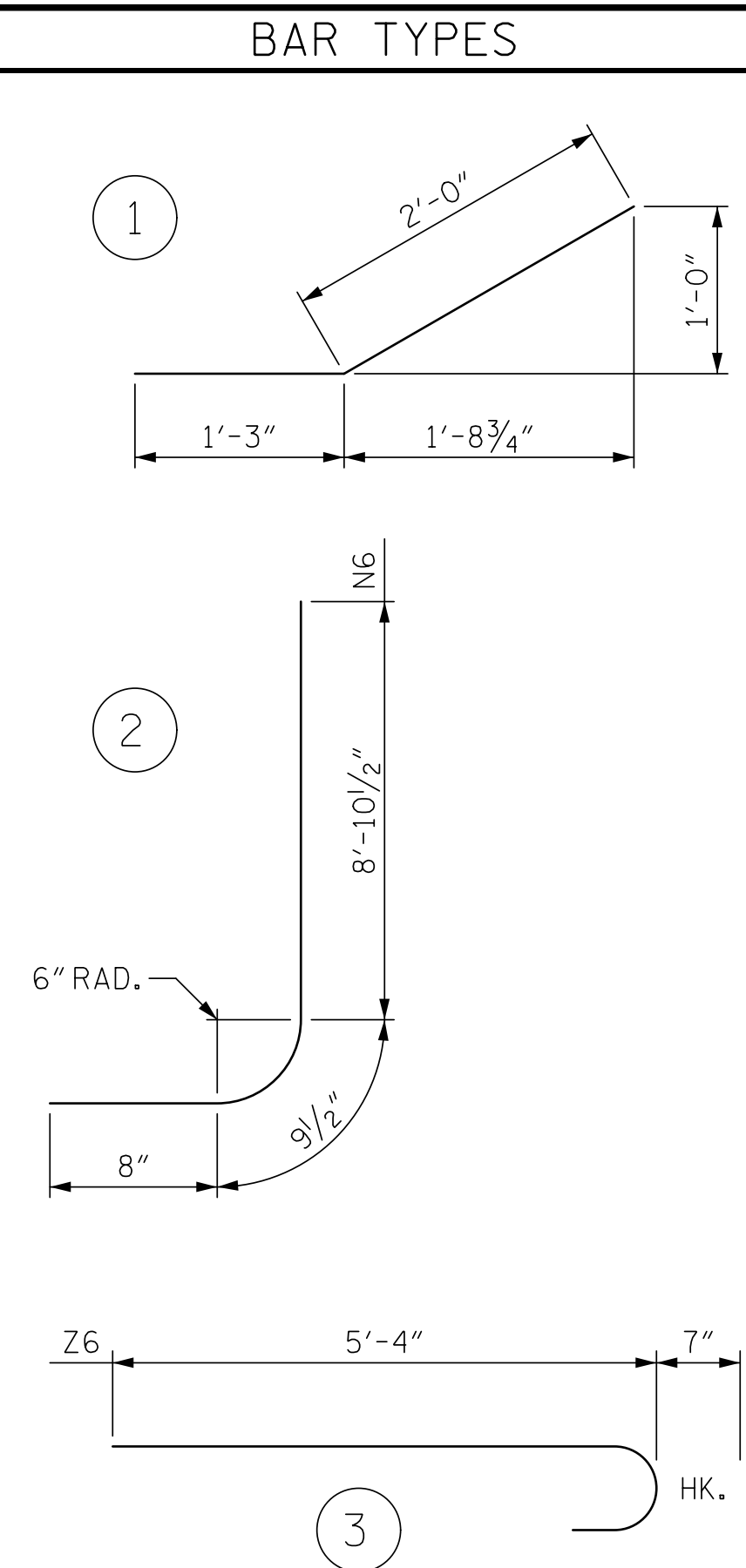
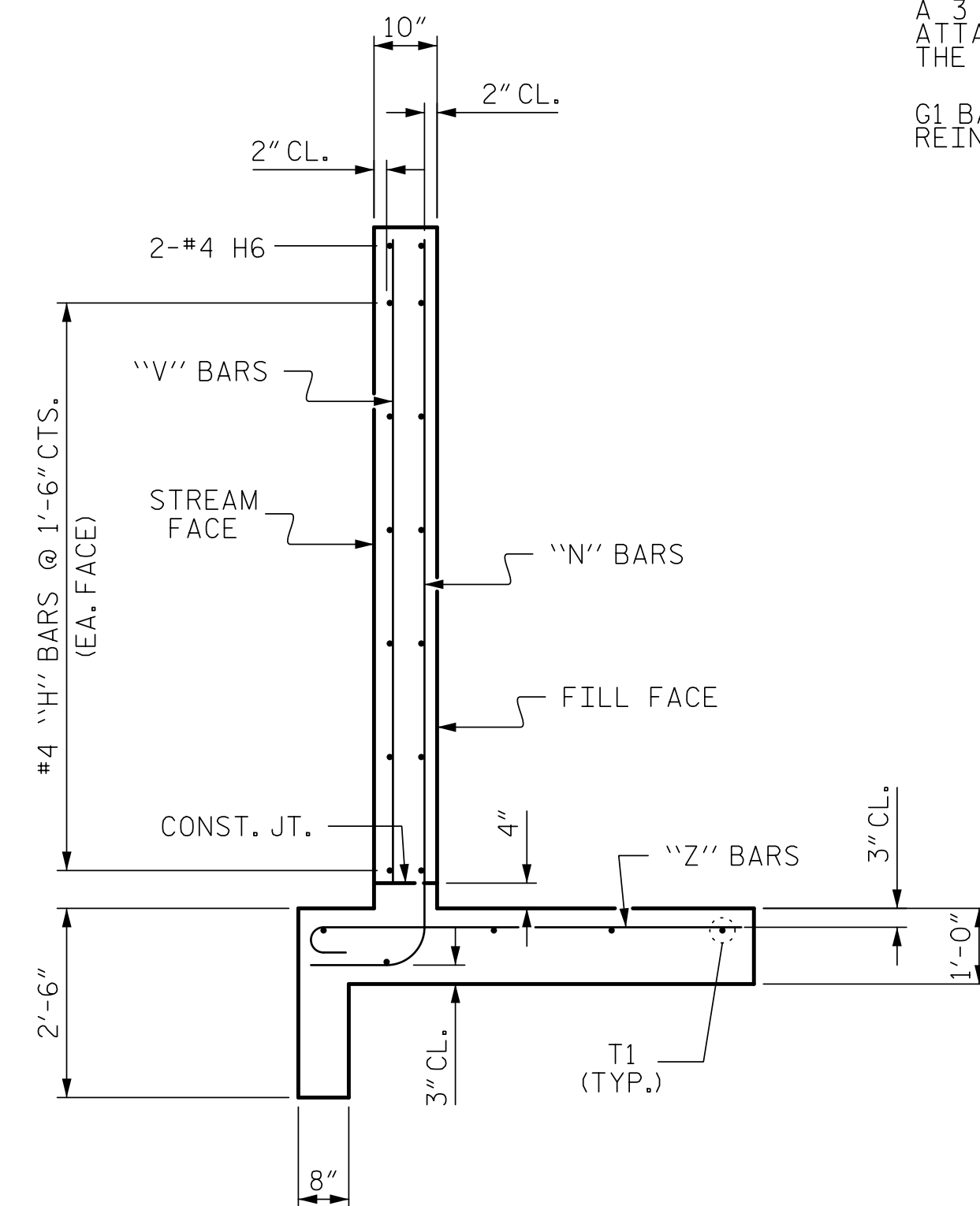
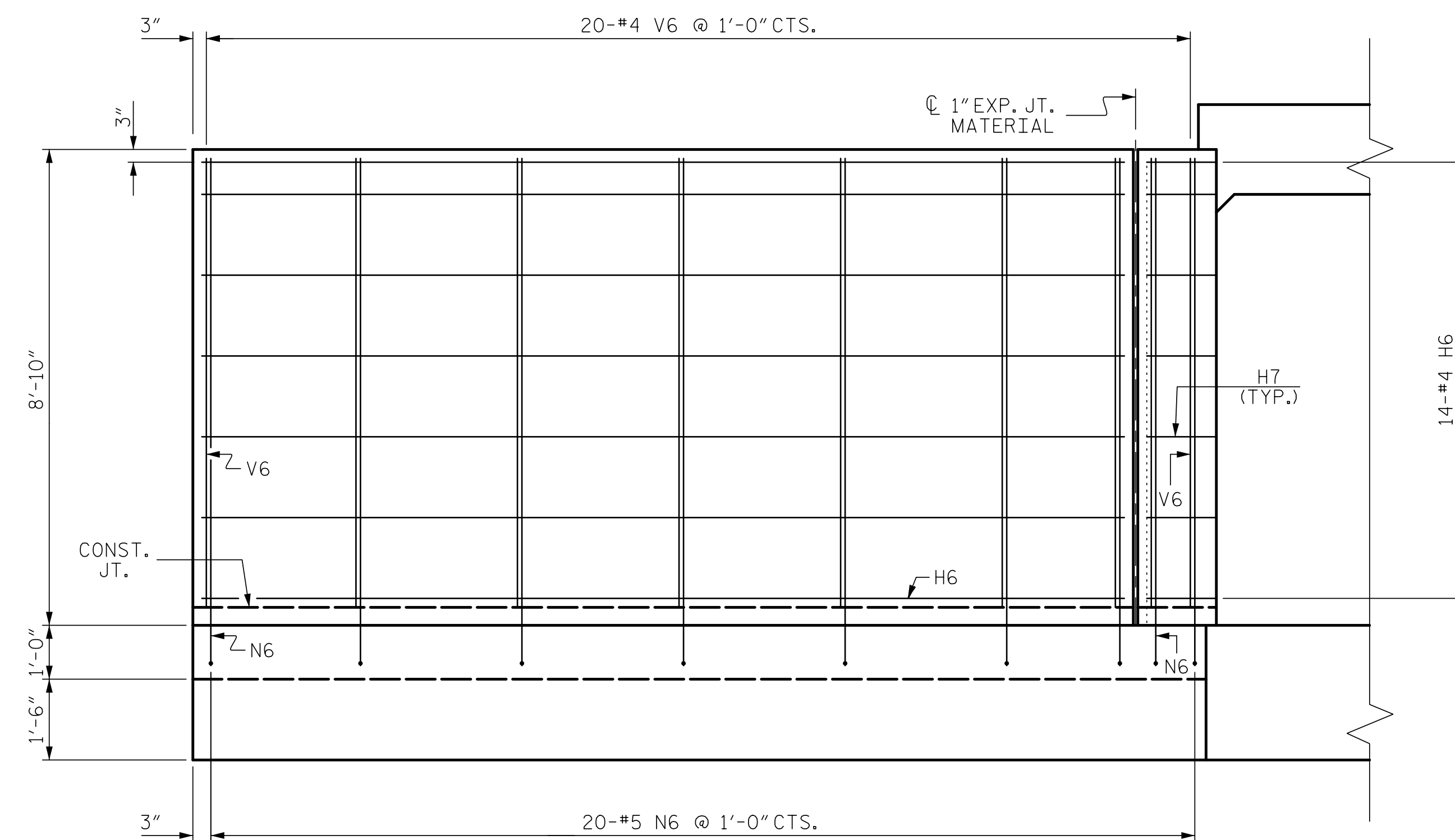
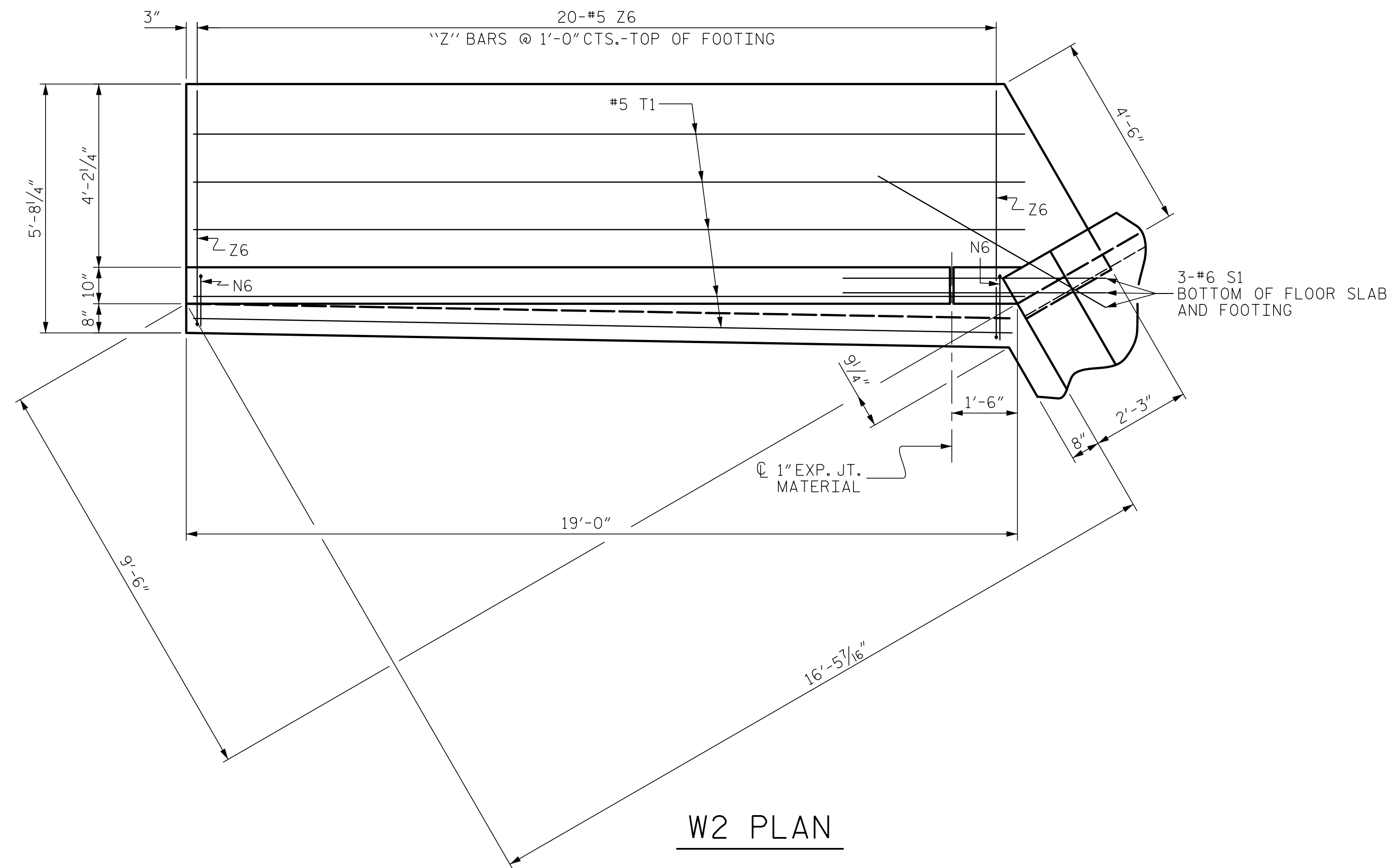
INLET WING W1
FOR
CONCRETE BOX CULVERT

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C7-10	
1			3			TOTAL SHEETS	
2			4			12	

STR. #7 STD. NO. CW9008

ASSEMBLED BY :	ZCS	DATE :	12/22
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CHECKED BY :	RWW	03/00	MAA/THC

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User:ZSmith



WING W2 BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	14	#4	STR	17'-1"	160
H7	14	#4	1	3'-3"	30
N6	20	#5	2	10'-4"	216
S1	3	#6	STR	6'-0"	27
T1	5	#5	STR	19'-0"	99
V6	20	#4	STR	8'-4"	111
Z6	20	#5	3	5'-11"	123

REINFORCING STEEL FOR WING W2	766 LBS
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CLASS A CONCRETE			
WING W2		10.2	CY
TOTAL		10.2	CY

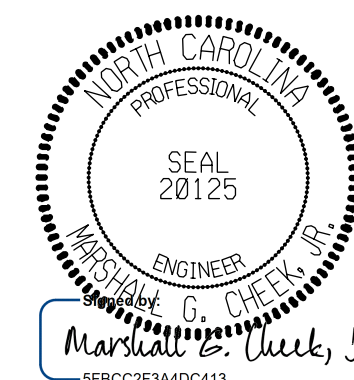
NOTES

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.

G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL
REINFORCING STEEL.

PROJECT NO. R-5739
NORTHAMPTON COUNTY
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SHEET 11 OF 12



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INLET WING W2
FOR
CONCRETE BOX CULVERT

REVISIONS						SHEET NO. C7-11
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 12
2			4			

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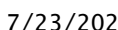
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STR. #7



PROJECT NO. R-5739
NORTHAMPTON COUNTY
 STATION: 529+01.60 -L-

SHEET 12 OF 12



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RAILROAD
STANDARD WINGS
FOR
CONCRETE BOX CULVERT
H = 9'-0" SLOPE = 2:1
OUTLET WINGS

REVISIONS						SHEET NO. C7-12
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1			3			TOTAL SHEETS 12
2			4			

STR. #7 STD. NO. CW9009

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CHECKED BY :	RWW 03/00		

11/27/2023
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User:ZSmith

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.