

F.A. PROJECT NO. NHPP-077-1(220)29

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING
DESIGN FILL ----- 21'-0" (MAX.)
FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATIONS.

CONCRETE IN THE 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.

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

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

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

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

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

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

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

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, 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 EXTENSIONS. 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.

DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

BACKFILL WITH SELECT MATERIAL, CLASS V MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATIONS.

EXCAVATE 12 INCHES BELOW THE BOTTOM OF BOX CULVERT EXTENSION AND WING BEARING ELEVATIONS AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

INSTALL TYPE 4 GEOTEXTILE FOR SOIL STABILIZATION AT THE BOTTOM OF THE EXCAVATION PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL. THE GEOTEXTILE SHOULD BE PLACED AT THE BOTTOM OF THE EXCAVATION AND WRAPPED UP THE SIDE WALLS OF THE EXCAVATION. FOR GEOTEXTILE FOR SOIL STABILIZATION, SEE SECTION 270 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

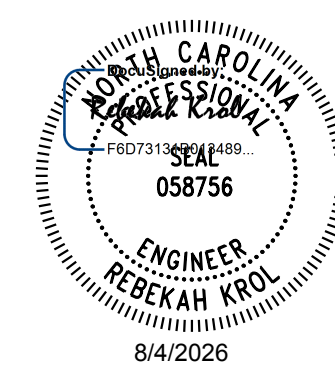
FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

NOTE:
SAMPLE BAR REPLACEMENT LENGTHS
BASED ON 30"(SAMPLE LENGTH) PLUS
TWO SPLICE LENGTHS AND $f_y = 60\text{ksi}$.

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Kimley»»Horn

421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772 NC LICENSE #
Phone (919) 677-2000 F-0102

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PROJECT NO. I-5715
MECKLENBURG COUNTY
 STATION: 20+52.99 -Y2RPA-

SHEET 1 OF 5

BRIDGE NO. 590453

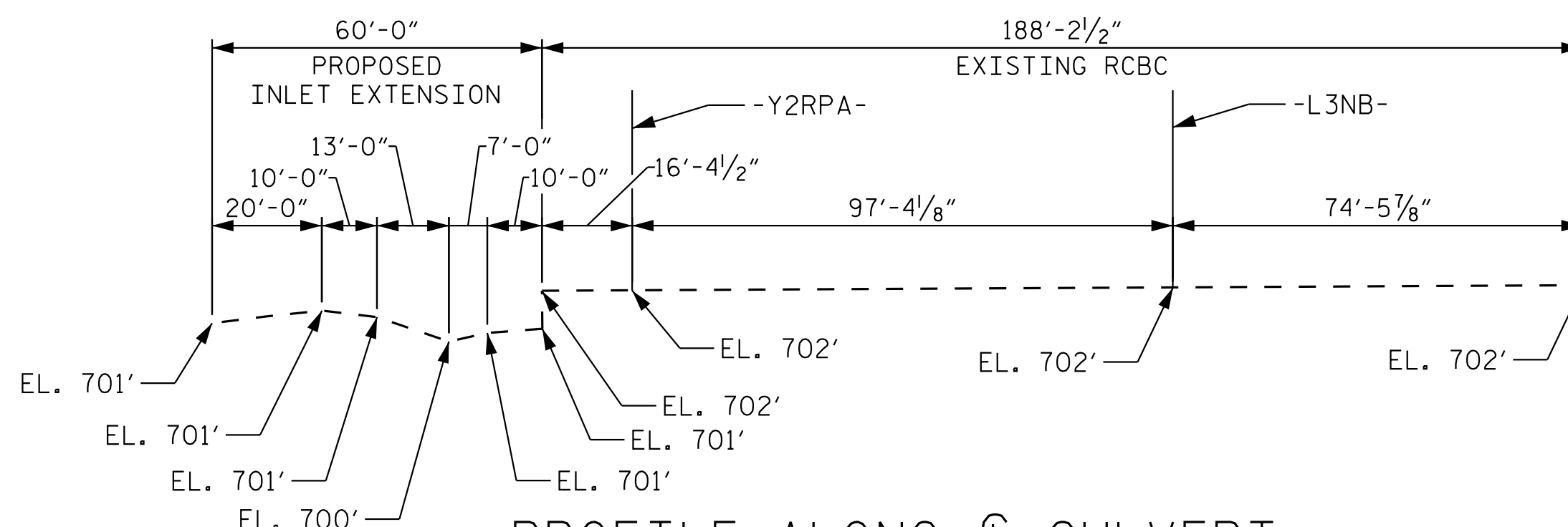
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO. C1A-1
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 5
2			4			

CULVERT 1A

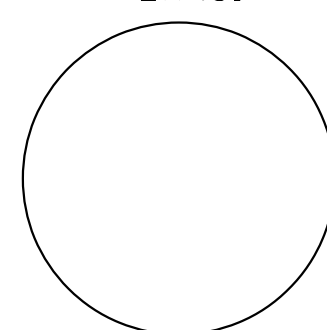
LOCATION SKETCH



PROFILE ALONG $\mathbb{C}$ CULVERT

CLASS A CONCRETE		
BARREL @	3.32	CY/FT 199.1
WINGS ETC.	12.9	C.Y.
EDGE BEAM	1.7	C.Y.
TOTAL	213.7	C.Y.
REINFORCING STEEL		
BARREL	29,945	LBS.
WINGS ETC.	721	LBS.
TOTAL	30,666	LBS.
CULVERT EXCAVATION STA. 20+52.99 -Y2RPA-		LUMP SUM
FOUNDATION CONDITIONING MATERIAL		112 TONS

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



HYDRAULIC DATA

```
DESIGN DISCHARGE -----1700 CFS
FREQUENCY OF DESIGN FLOOD -----50-YR.
DESIGN HIGH WATER ELEVATION-----714.2 FT.
DRAINAGE AREA -----2.6 SQ. MI.
BASIC DISCHARGE (Q100)-----1,900 CFS
BASIC HIGH WATER ELEVATION-----715.7 FT.
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OVERTOPPING FLOOD DATA

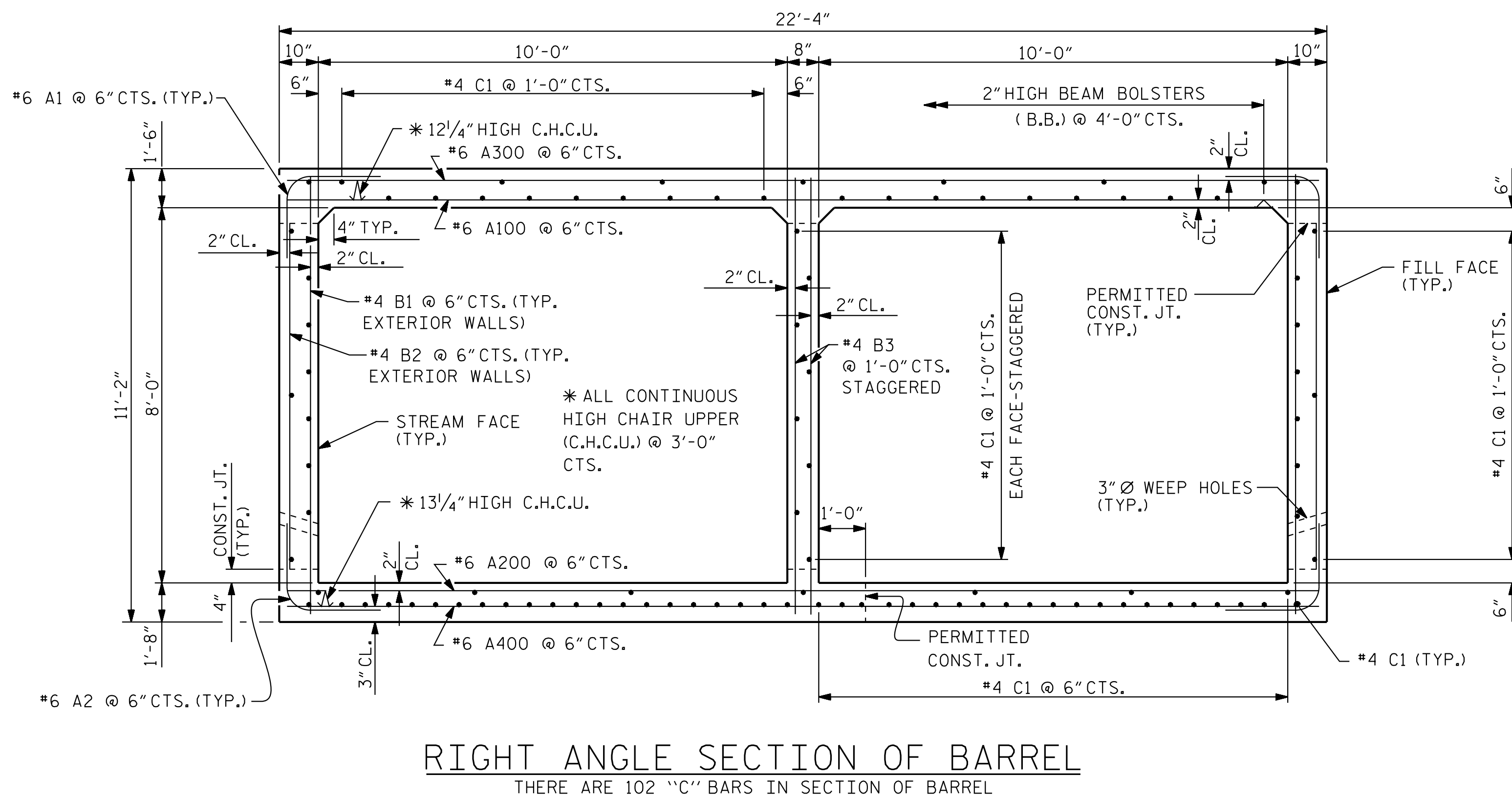
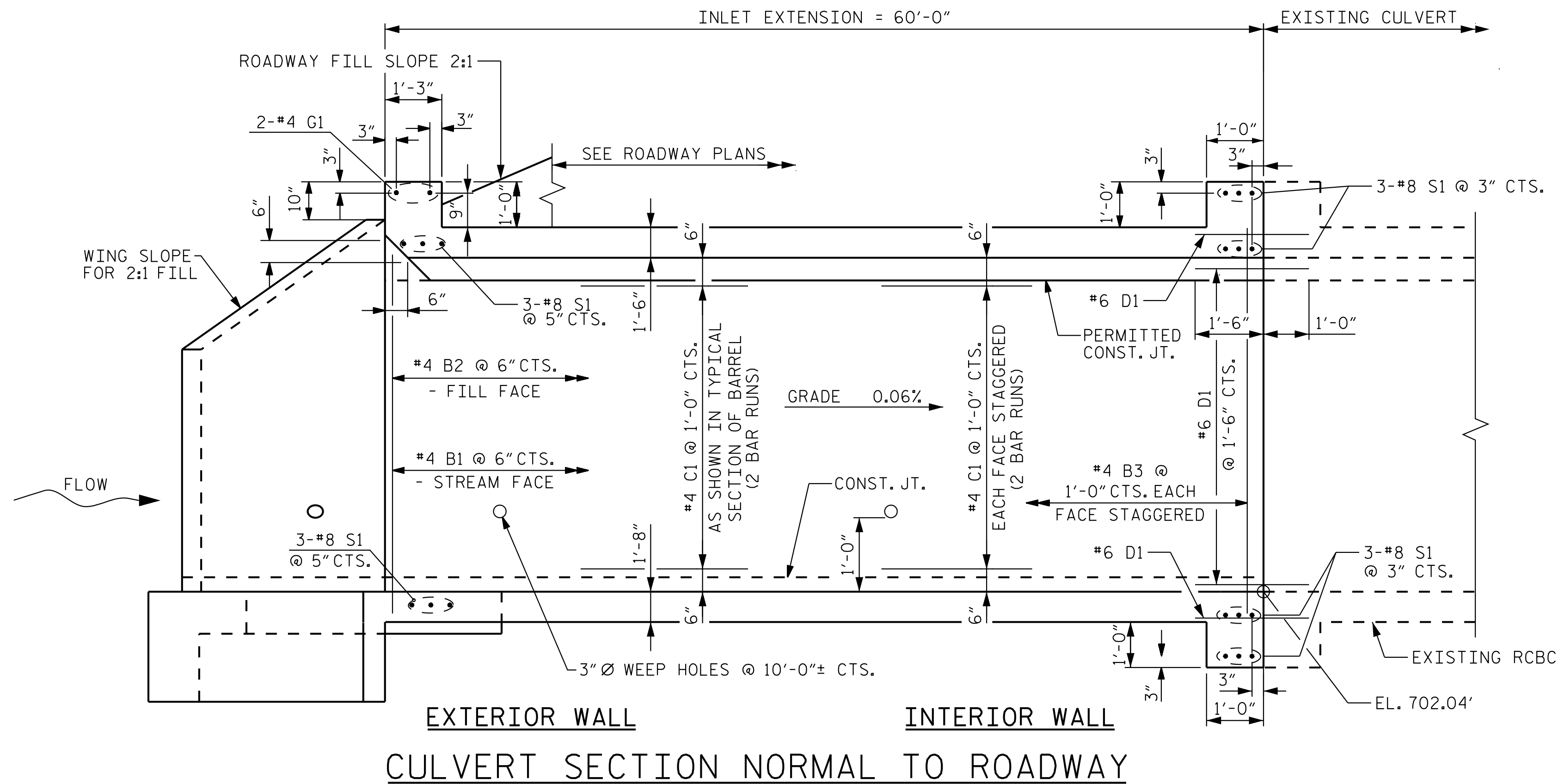
OVERTOPPING DISCHARGE -----3,450 CFS
FREQUENCY OF OVERTOPPING FLOOD --->500-YR.
OVERTOPPING FLOOD ELEVATION -----730.12 FT.*

* -L2RPA- STA.17+81.7 (SAG)
WS EL.TAKEN @ RIVER STATION 3561

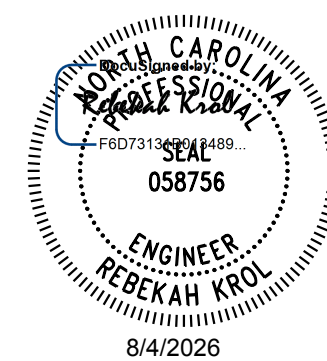
ROADWAY DATA

GRADE POINT EL. @ STA. 20+52.99 -Y2RPA- = 731.67'
BED ELEVATION @ STA. 20+52.99 -Y2RPA- = 702.03'
ROADWAY SLOPES 2 : 1

DRAWN BY: R. C. GIESEN	DATE: 05/2026
CHECKED BY: R. M. KROL	DATE: 05/2026
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS	DATE: 05/2026



BAR SIZE	SPLICE LENGTH
#4 B1	1'-10"
#4 C1	2'-5"
#6 A200	3'-7"
#6 A400	2'-9"



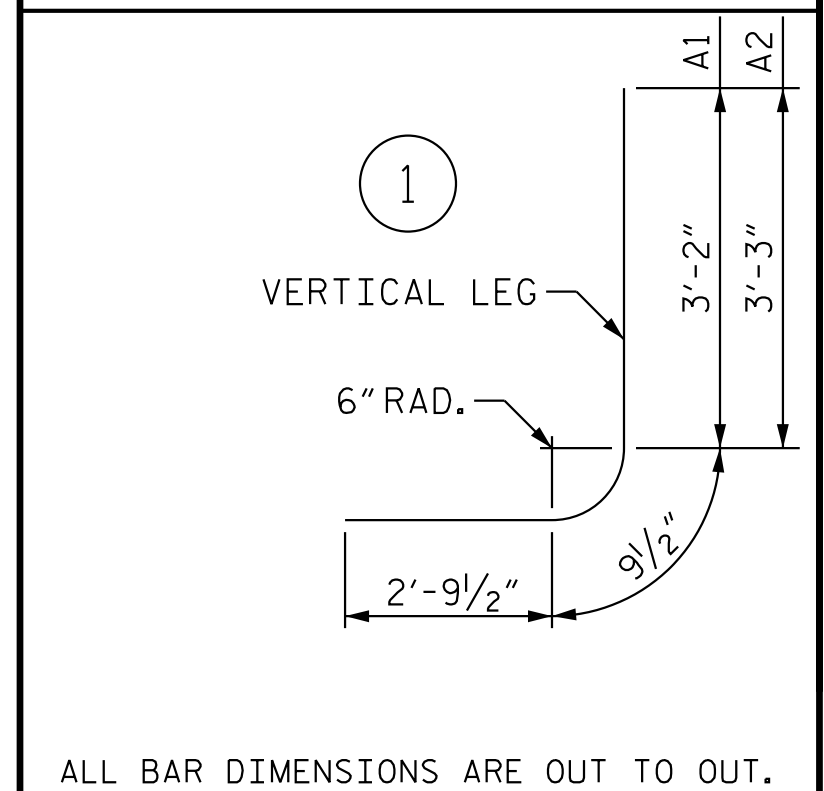
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BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	240	6	1	6'-9"	2,433
A2	240	6	1	6'-10"	2,463
A100	119	6	STR	22'-0"	3,932
A101	1	6	STR	14'-4"	22
A102	1	6	STR	4'-3"	6
A200	119	6	STR	22'-0"	3,932
A201	1	6	STR	14'-4"	22
A202	1	6	STR	4'-3"	6
A300	119	6	STR	22'-0"	3,932
A301	1	6	STR	14'-4"	22
A302	1	6	STR	4'-3"	6
A400	119	6	STR	22'-0"	3,932
A401	1	6	STR	14'-4"	22
A402	1	6	STR	4'-3"	6
B1	240	4	STR	10'-9"	1,723
B2	240	4	STR	7'-4"	1,176
B3	120	4	STR	10'-9"	862
C1	204	4	STR	31'-4"	4,270
D1	24	6	STR	2'-6"	90
G1	2	4	STR	22'-0"	31
S1	18	8	STR	22'-0"	1,057
REINFORCING STEEL				LBS.	29,945

BAR TYPE	
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PROJECT NO. I-5715
MECKLENBURG COUNTY
 STATION: 20+52.99 -Y2RPA-

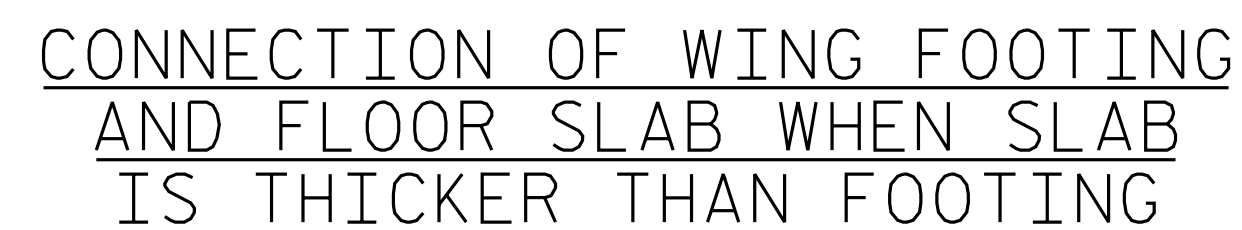
SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO. C1A-2
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 5
2			4			

CULVERT 1A

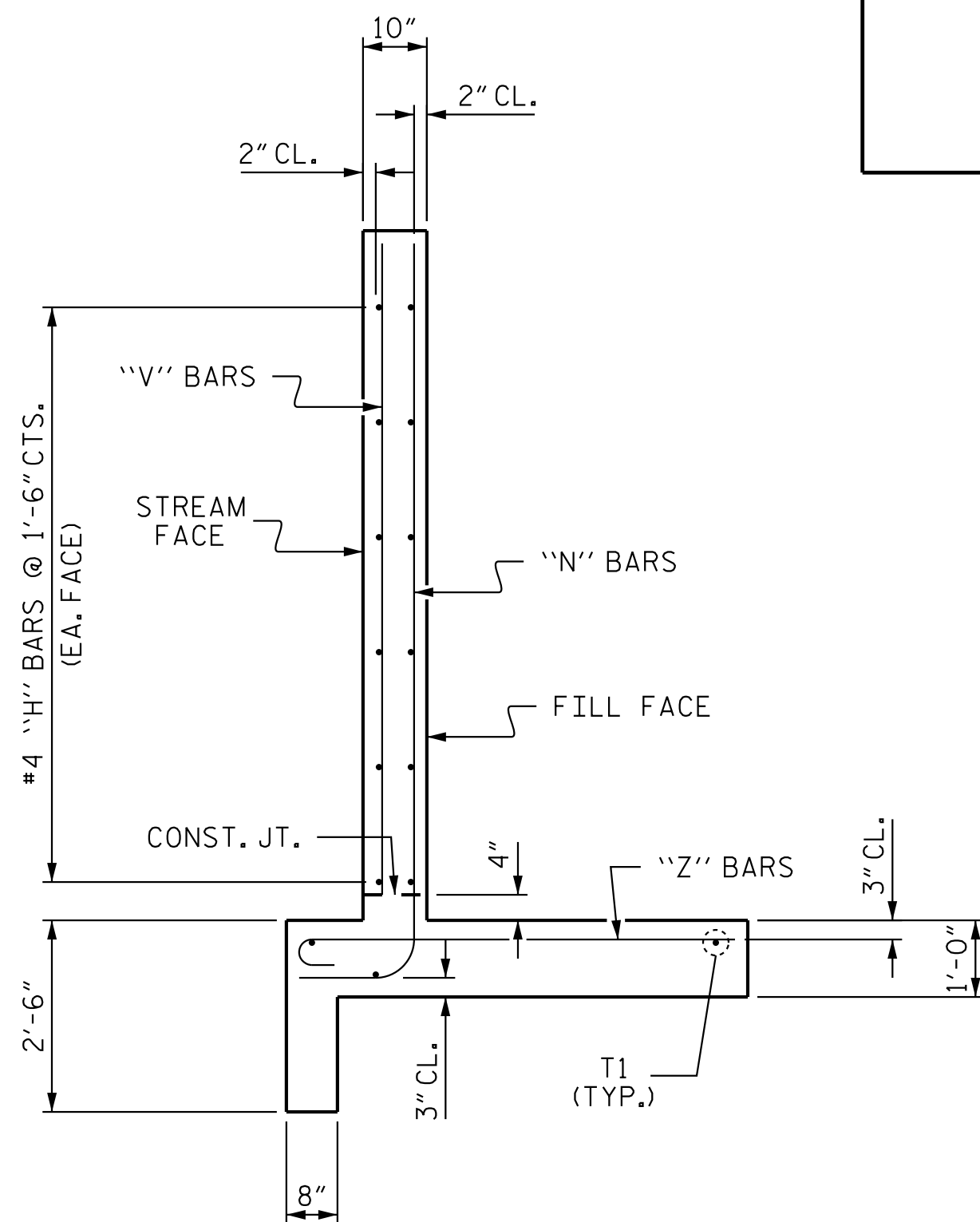
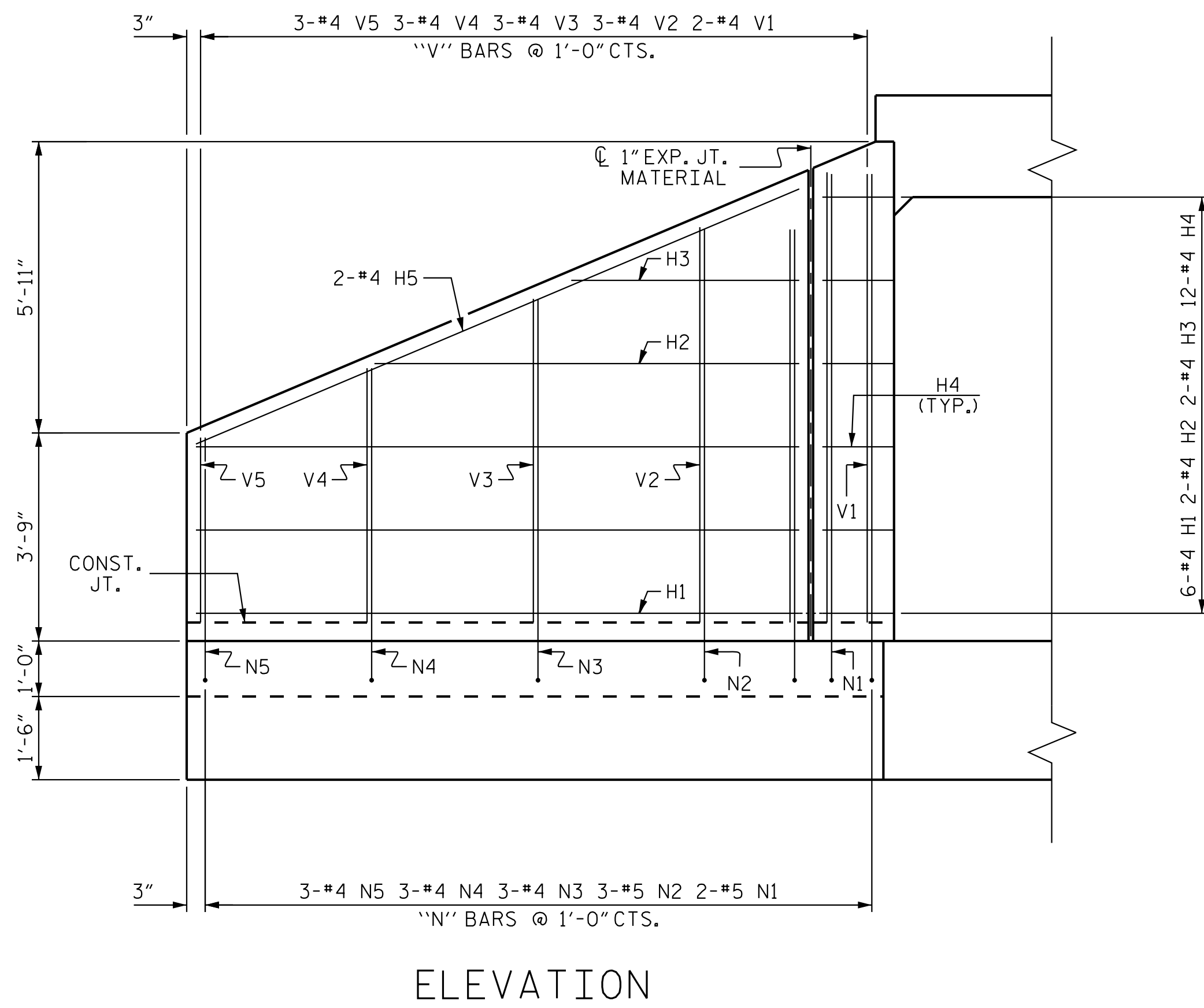
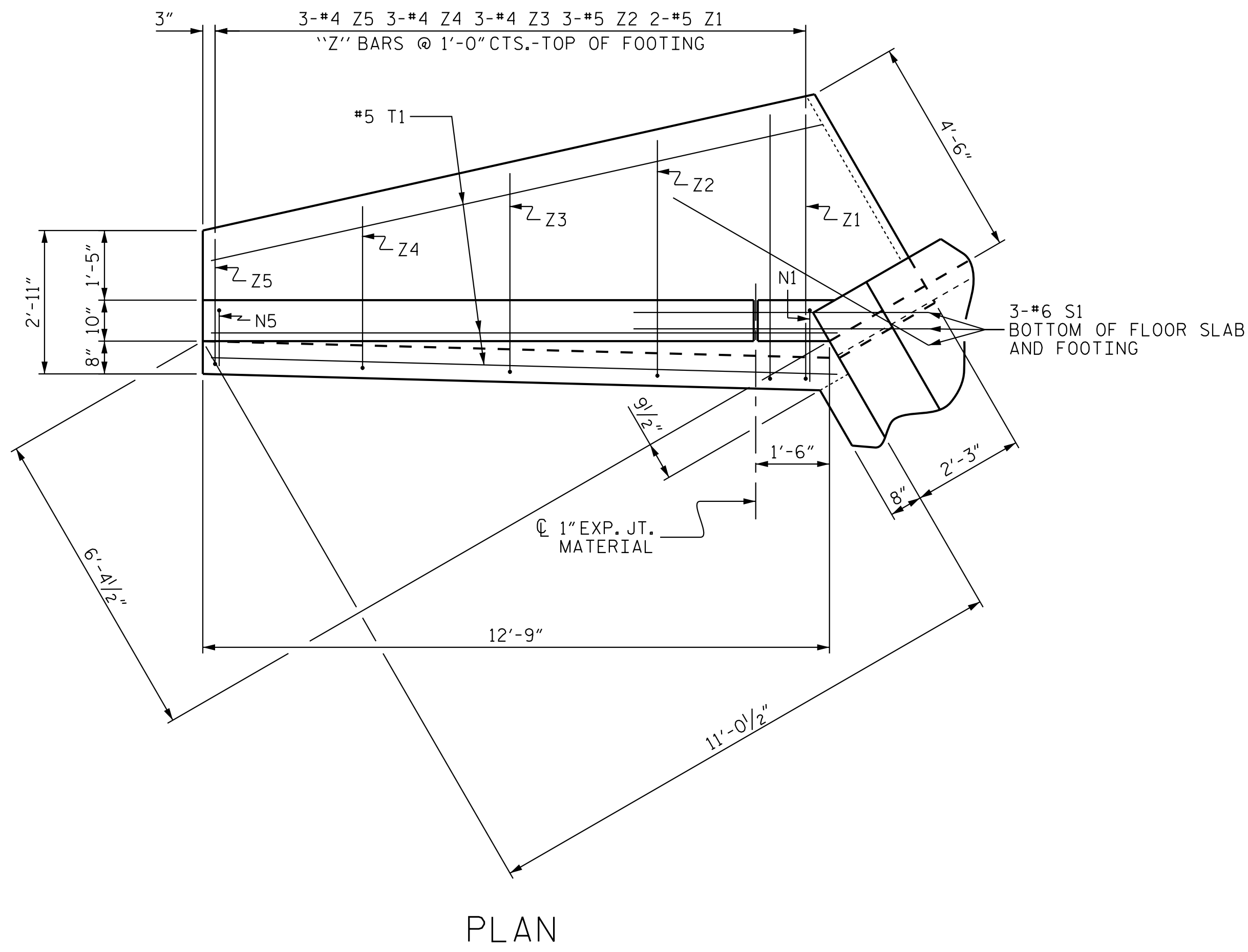


SHEET 3 OF 5



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CULVERT 1A



BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.

1

2'-0"

1'-0"

1'-3"

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

2

6" RAD.

8"

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

N1

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

N2

7'-8 $\frac{1}{2}$ "

N3

6'-5 $\frac{1}{2}$ "

N4

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

N5

3'-10 $\frac{1}{2}$ "

3

Z1

5'-5"

7"

Z2

4'-10"

7"

Z3

4'-1"

6"

Z4

3'-4"

6"

Z5

2'-7"

6"

HK.

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	4'-1"	11
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	11'-9"	31
N1	4	#5	2	10'-2"	42
N2	6	#5	2	9'-2"	57
N3	6	#4	2	7'-11"	32
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	8'-1"	22
V2	6	#4	STR	7'-1"	28
V3	6	#4	STR	5'-10"	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					721 LBS
CLASS A CONCRETE 2 WINGS					10.7 CY
1 HEADWALLS					1.0 CY
1 END CURTAIN WALLS					1.2 CY
TOTAL					12.9 CY

PROJECT NO. I-5715
MECKLENBURG COUNTY
 STATION: 20+52.99 -Y2RPA-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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

CULVERT 1A	STD. NO. CW9008
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Raleigh, NC 27601-1772 NC
Phone (919) 633 2000

Phone (919) 677-2000

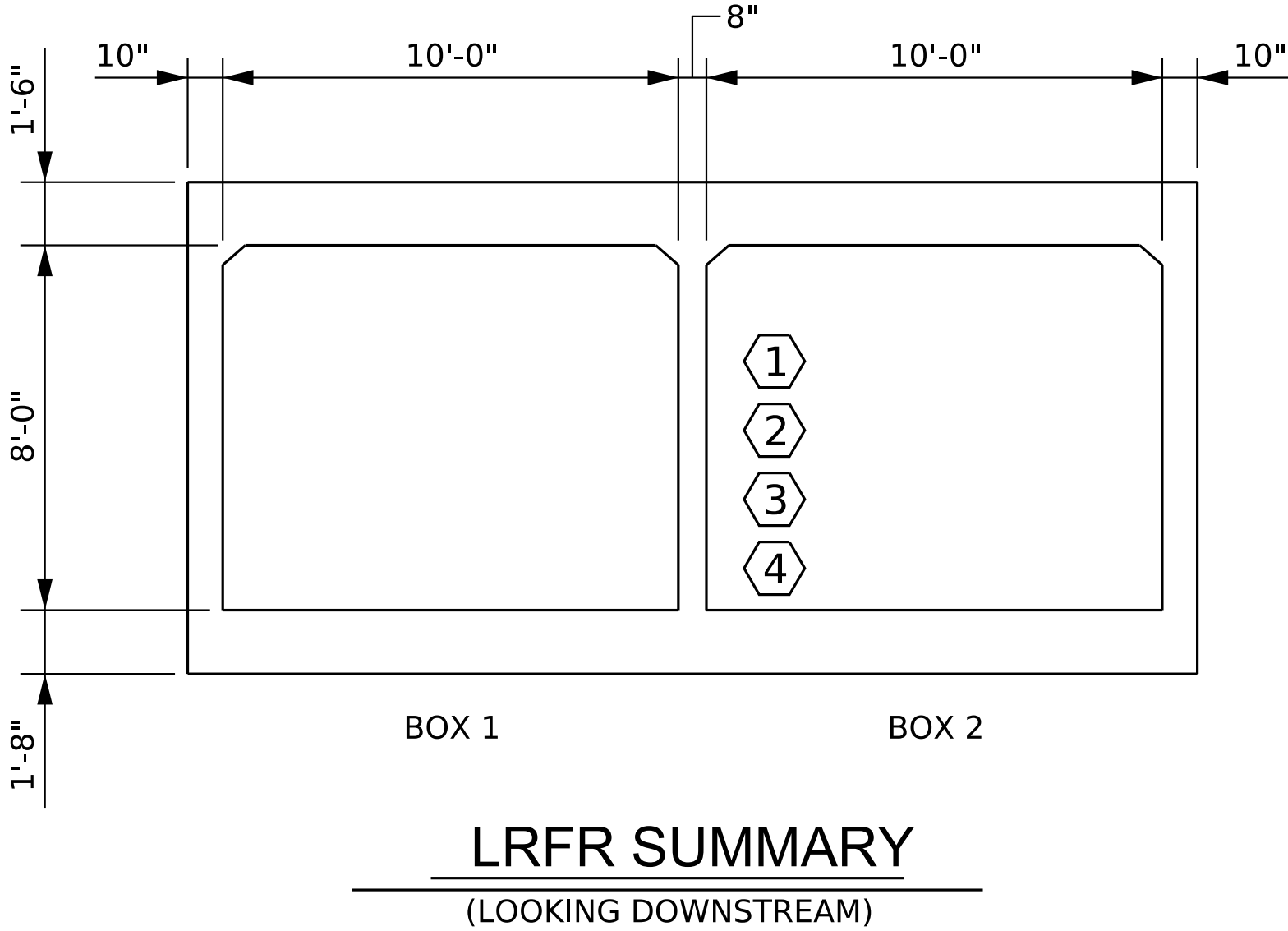
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K:\RD1_Structures\Bridges\NC\01036524 - I-5715 Structure Design\Cad\Drawn\Culvert\1 Final\Culvert_1A\410_009_I5715_SML_CUL_590463_005.dgn 8/2/2026

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS																	
LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING ⬡	MINIMUM RATING FACTORS (RF)	TONS = W x 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		HL-93 (INVENTORY)	N/A	⬡1	2.55	--	1.75	6.95	1	BOTTOM SLAB	10.83	2.55	2	BOTTOM SLAB	11.50		
		HL-93 (OPERATING)	N/A		3.31	--	1.35	9.00	1	BOTTOM SLAB	10.83	3.31	2	BOTTOM SLAB	11.50		
		HS-20 (INVENTORY)	36.000	⬡2	3.34	120.24	1.75	9.04	1	BOTTOM SLAB	10.83	3.34	2	BOTTOM SLAB	11.50		
		HS-20 (OPERATING)	36.000		4.33	155.88	1.35	11.72	1	BOTTOM SLAB	10.83	4.33	2	BOTTOM SLAB	11.50		
LEGAL LOAD		SINGLE VEHICLE (SV)	SNSH	13.500		8.68	117.18	1.40	18.88	2	EXTERIOR WALL	22.33	8.68	2	BOTTOM SLAB	11.50	
			SNGARBS2	20.000		6.69	133.80	1.40	17.81	2	EXTERIOR WALL	22.33	6.69	2	BOTTOM SLAB	11.50	
			SNAGRIS2	22.000		6.43	141.46	1.40	17.34	1	BOTTOM SLAB	10.83	6.43	2	BOTTOM SLAB	11.50	
			SNCOTTS3	27.250		4.16	113.36	1.40	11.42	1	BOTTOM SLAB	10.83	4.16	2	BOTTOM SLAB	11.50	
			SNAGGRS4	34.925		3.64	127.13	1.40	9.96	1	BOTTOM SLAB	10.83	3.64	2	BOTTOM SLAB	11.50	
			SNS5A	35.550		3.57	126.91	1.40	9.78	1	BOTTOM SLAB	10.83	3.57	2	BOTTOM SLAB	11.50	
			SNS6A	39.950		3.38	135.03	1.40	9.25	1	BOTTOM SLAB	10.83	3.38	2	BOTTOM SLAB	11.50	
			SNS7B	42.000		3.18	133.56	1.40	8.74	1	BOTTOM SLAB	10.83	3.18	2	BOTTOM SLAB	11.50	
		TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		4.18	137.94	1.40	11.44	1	BOTTOM SLAB	10.83	4.18	2	BOTTOM SLAB	11.50	
			TNT4A	33.075		4.19	138.58	1.40	11.46	1	BOTTOM SLAB	10.83	4.19	2	BOTTOM SLAB	11.50	
			TNT6A	41.600		3.42	142.27	1.40	9.38	1	BOTTOM SLAB	10.83	3.42	2	BOTTOM SLAB	11.50	
			TNT7A	42.000		3.54	148.68	1.40	9.65	1	BOTTOM SLAB	10.83	3.54	2	BOTTOM SLAB	11.50	
			TNT7B	42.000		3.64	152.88	1.40	9.95	1	BOTTOM SLAB	10.83	3.64	2	BOTTOM SLAB	11.50	
			TNAGRIT4	43.000		3.45	148.35	1.40	9.43	1	BOTTOM SLAB	10.83	3.45	2	BOTTOM SLAB	11.50	
			TNAGT5A	45.000		3.22	144.90	1.40	8.86	1	BOTTOM SLAB	10.83	3.22	2	BOTTOM SLAB	11.50	
			TNAGT5B	45.000	⬡3	3.16	142.20	1.40	8.60	1	BOTTOM SLAB	10.83	3.16	2	BOTTOM SLAB	11.50	
EMERGENCY VEHICLE (EV)		EV2	28.750		5.15	148.06	1.30	13.93	1	BOTTOM SLAB	10.83	5.15	2	BOTTOM SLAB	11.50		
		EV3	43.000	⬡4	3.35	144.05	1.30	9.15	1	BOTTOM SLAB	10.83	3.35	2	BOTTOM SLAB	11.50		



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	--

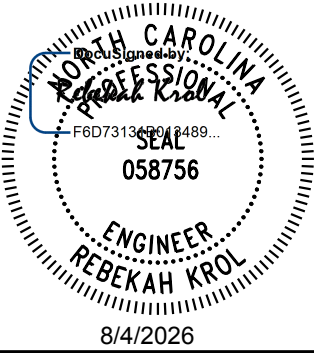
NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATES.

⬡	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. I-5715
MECKLENBURG COUNTY
STATION: 20+52.99 - Y2RPA-

SHEET 5 OF 5



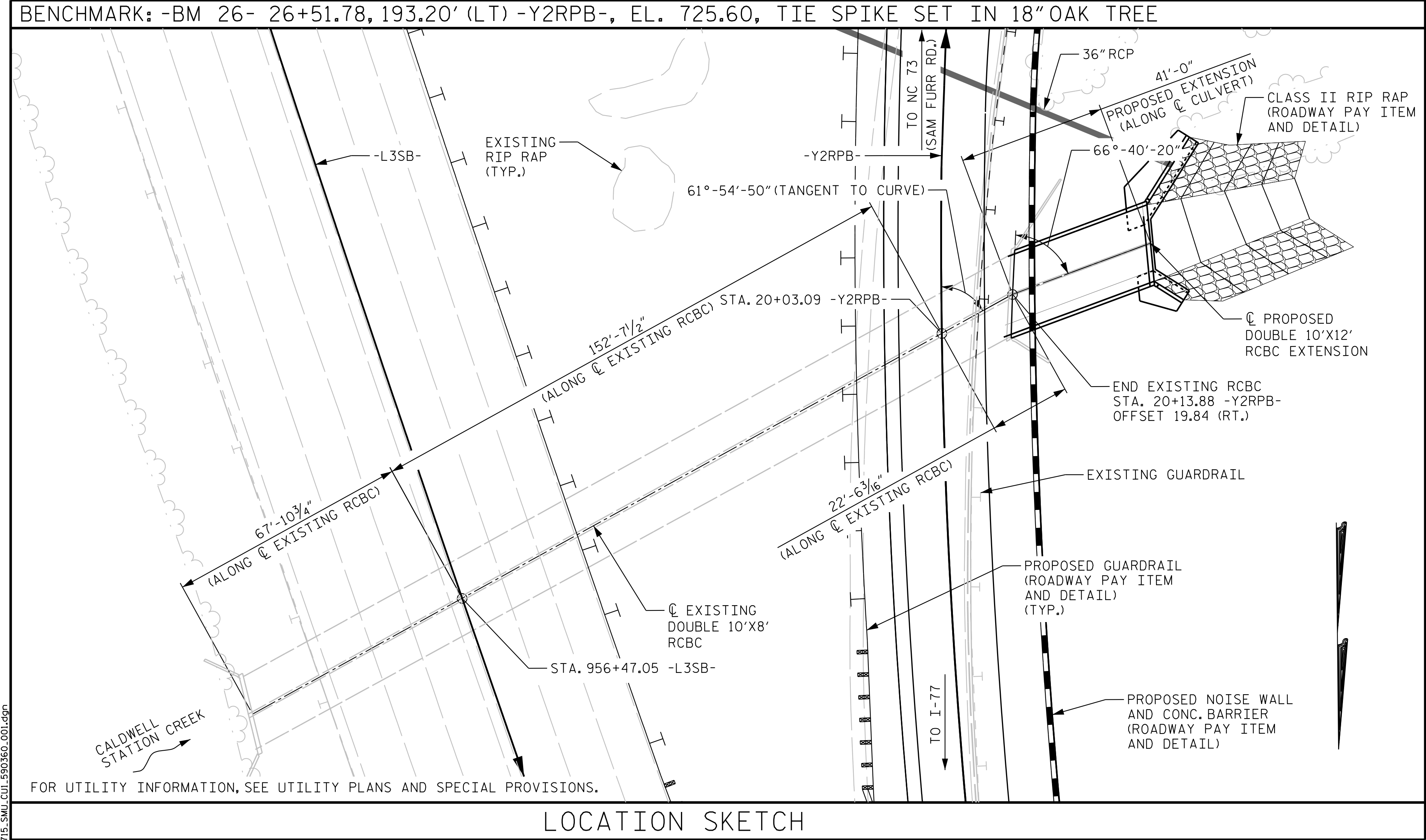
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC)					
REVISIONS					SHEET NO. C1A-5
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					TOTAL SHEETS 5

ASSEMBLED BY : R.G. GIESEN	DATE : 05/2026
CHECKED BY : A. L. PHILLIPS	DATE : 05/2026
DRAWN BY : WMC 7/II	REV. 10/1/II
CHECKED BY : GM 7/II	REV. 12/17
	REV. 04/23
	MAA/GM
	MAA/THC
	BNB/AAI

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HYDRAULIC DATA

DESIGN DISCHARGE -----1,700 CFS
FREQUENCY OF DESIGN FLOOD -----50-YR.
DESIGN HIGH WATER ELEVATION----711.4 FT.
DRAINAGE AREA -----2.6 SQ. MI.
BASIC DISCHARGE (Q100)-----1,900 CFS
BASIC HIGH WATER ELEVATION-----712.3 FT.

OVERTOPPING FLOOD DATA

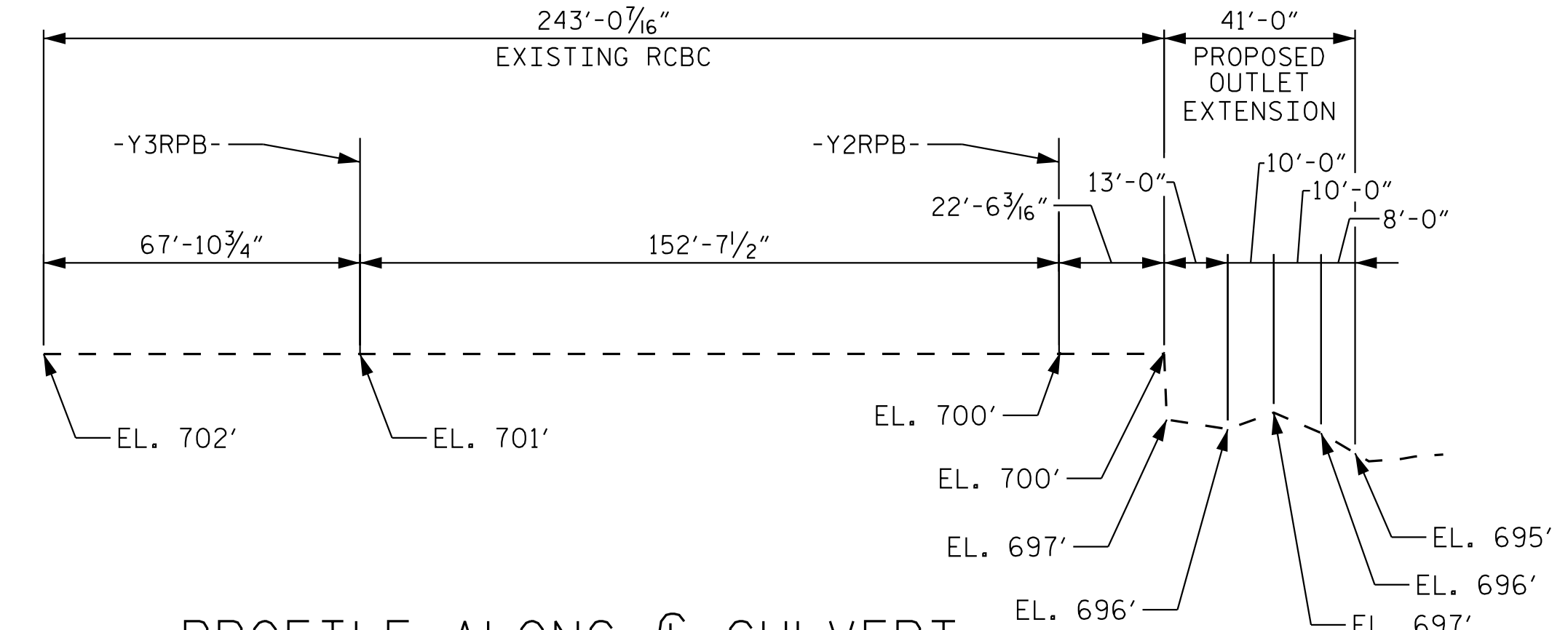
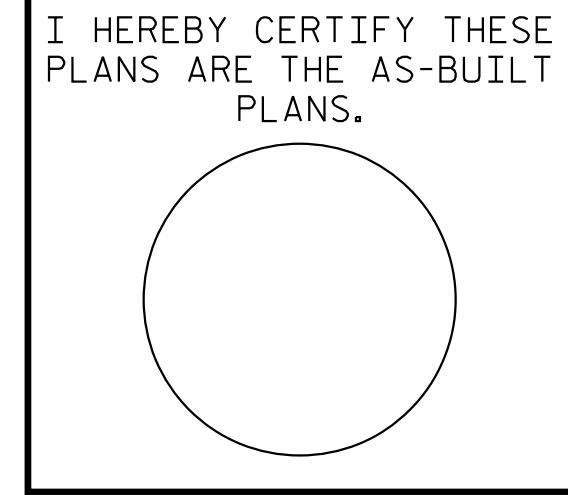
OVERTOPPING DISCHARGE -----2,900 CFS
FREQUENCY OF OVERTOPPING FLOOD --->500-YR.
OVERTOPPING FLOOD ELEVATION -----714.4 FT.*
* OVERTOPPING OCCURS @
STA. 952+10 -L3SB- (SAG)
W.S. EL. TAKEN @
RIVER STA. 3158

ROADWAY DATA

GRADE POINT EL. @ STA. 20+03.15 -Y2RPB- = 722.24'
BED ELEVATION @ STA. 20+03.15 -Y2RPB- = 699.73'
ROADWAY SLOPES 2 : 1

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @	3.502	CY/FT	143.6 C.Y.
WINGS ETC.	39.6		C.Y.
EDGE BEAM	1.8		C.Y.
TOTAL	185.0		C.Y.
REINFORCING STEEL			
BARREL	23,681		LBS.
WINGS ETC.	5,820		LBS.
TOTAL	29,506		LBS.
CULVERT EXCAVATION STA. 20+03.15 -Y2RPB- LUMP SUM			
FOUNDATION CONDITIONING MATERIAL		78	TONS



F.A. PROJECT NO. NHPP-077-1(220)29

NOTES

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

DESIGN FILL -----13'-8" (MAX.)

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

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

CONCRETE IN THE 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.

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

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

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

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

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

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

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, 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 EXTENSIONS. 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.

THE 36" DIA. PIPE THROUGH THE WINGWALL SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECESSARY TO CLEAR PIPE.

DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

BACKFILL WITH SELECT MATERIAL, CLASS V MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATIONS.

EXCAVATE 12 INCHES BELOW THE BOTTOM OF BOX CULVERT EXTENSION AND WING BEARING ELEVATIONS AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

UNDERCUT SOFT/LOOSE ALLUVIAL SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL TO A MAXIMUM TOTAL DEPTH OF THREE FEET BELOW THE BOTTOM OF BOX CULVERT EXTENSION. BACKFILL OF UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL, CLASS V, AS REQUIRED.

INSTALL TYPE 4 GEOTEXTILE FOR SOIL STABILIZATION AT THE BOTTOM OF THE EXCAVATION PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL. THE GEOTEXTILE SHOULD BE PLACED AT THE BOTTOM OF THE EXCAVATION AND WRAPPED UP THE SIDE WALLS OF THE EXCAVATION. FOR GEOTEXTILE FOR SOIL STABILIZATION, SEE SECTION 270 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

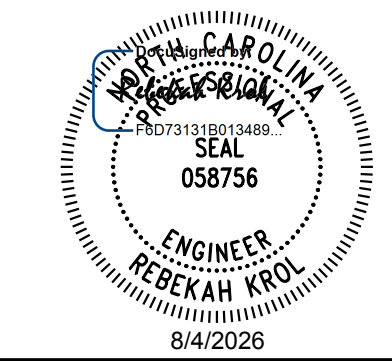
FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

PROJECT NO. I-5715
MECKLENBURG COUNTY
STATION: 20+03.15 -Y2RPB-

SHEET 1 OF 7 BRIDGE NO. 590360



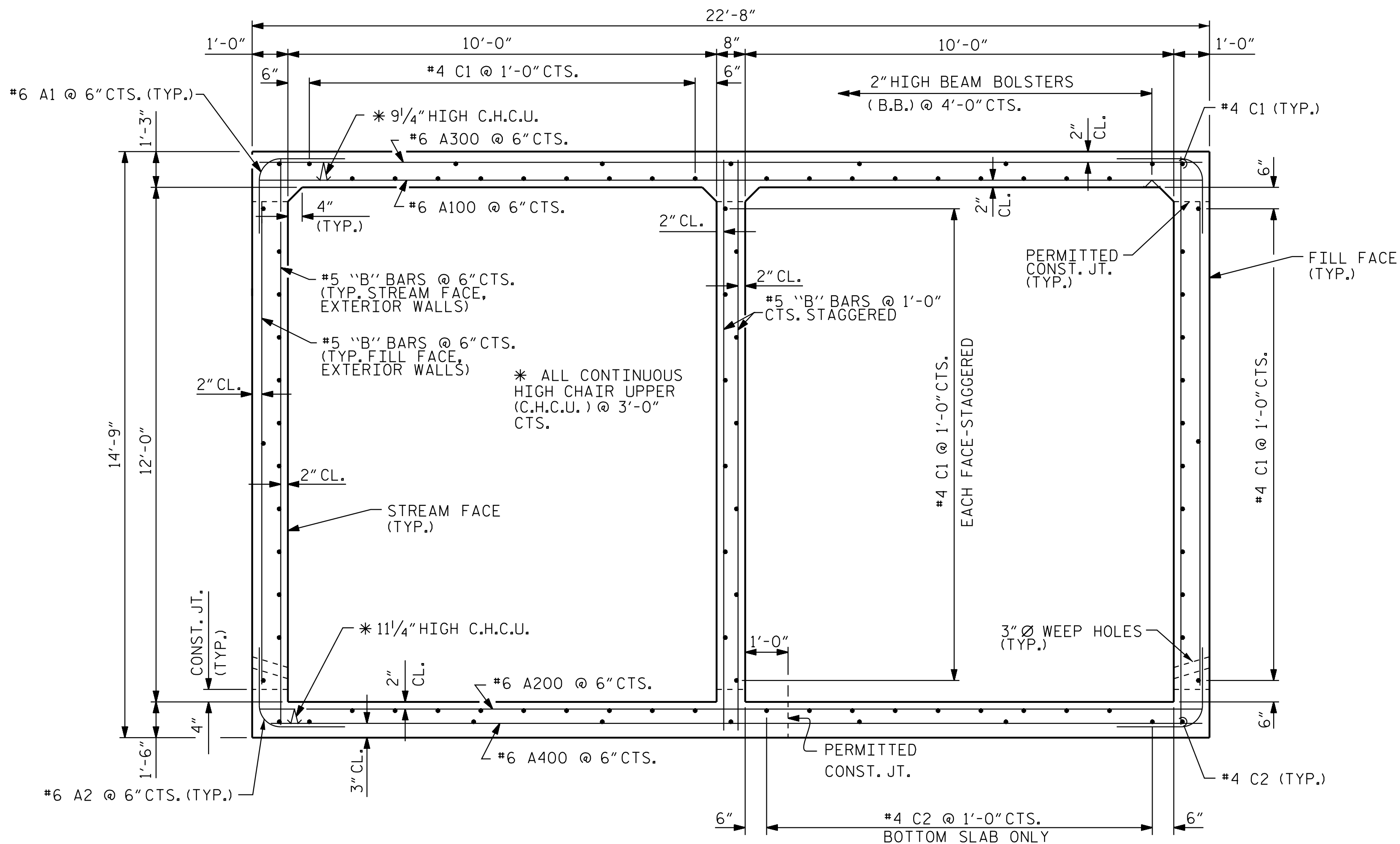
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
DOUBLE 10 FT. X 12 FT. CONCRETE BOX CULVERT EXTENSION 75° SKEW					
REVISIONS					SHEET NO. C1B-1
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
TOTAL SHEETS 7					

CULVERT 1B



PROJECT NO. I-5715
MECKLENBURG COUNTY
 STATION: 20+03.15 -Y2RPB-

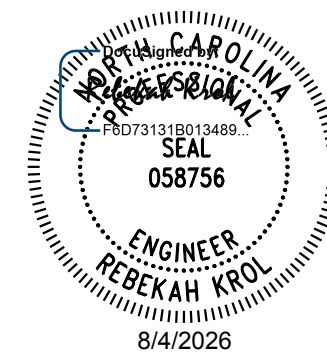
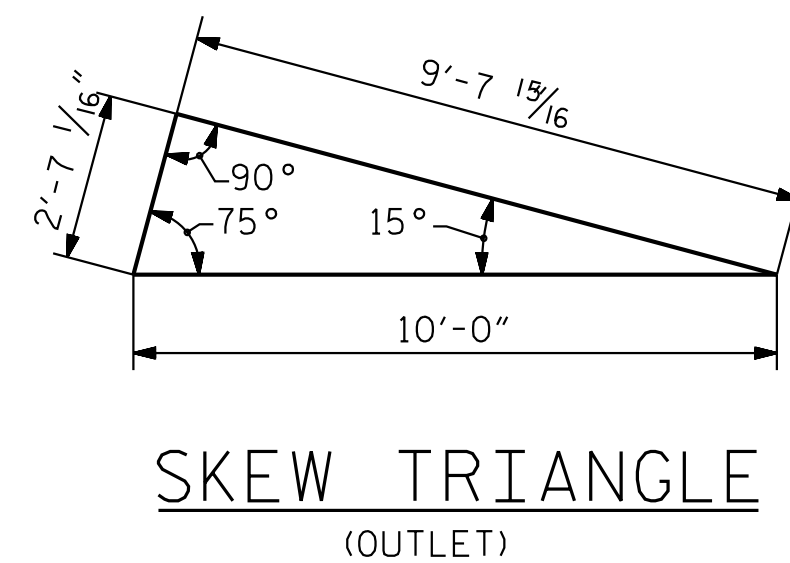
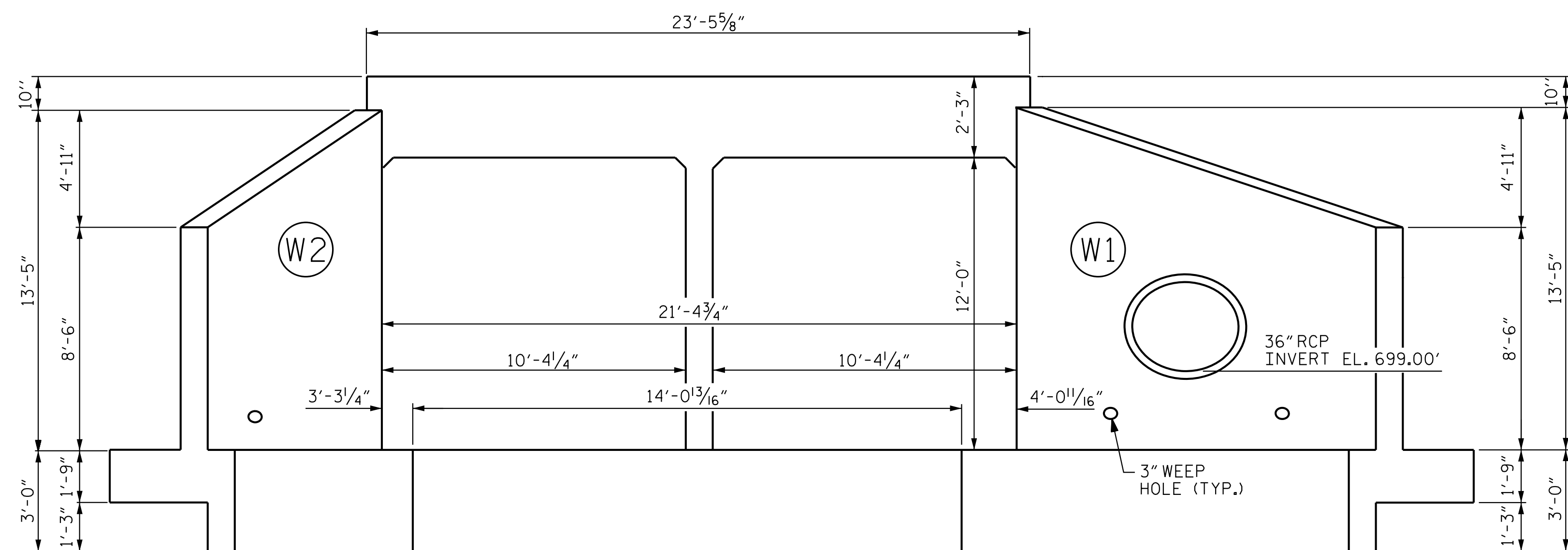
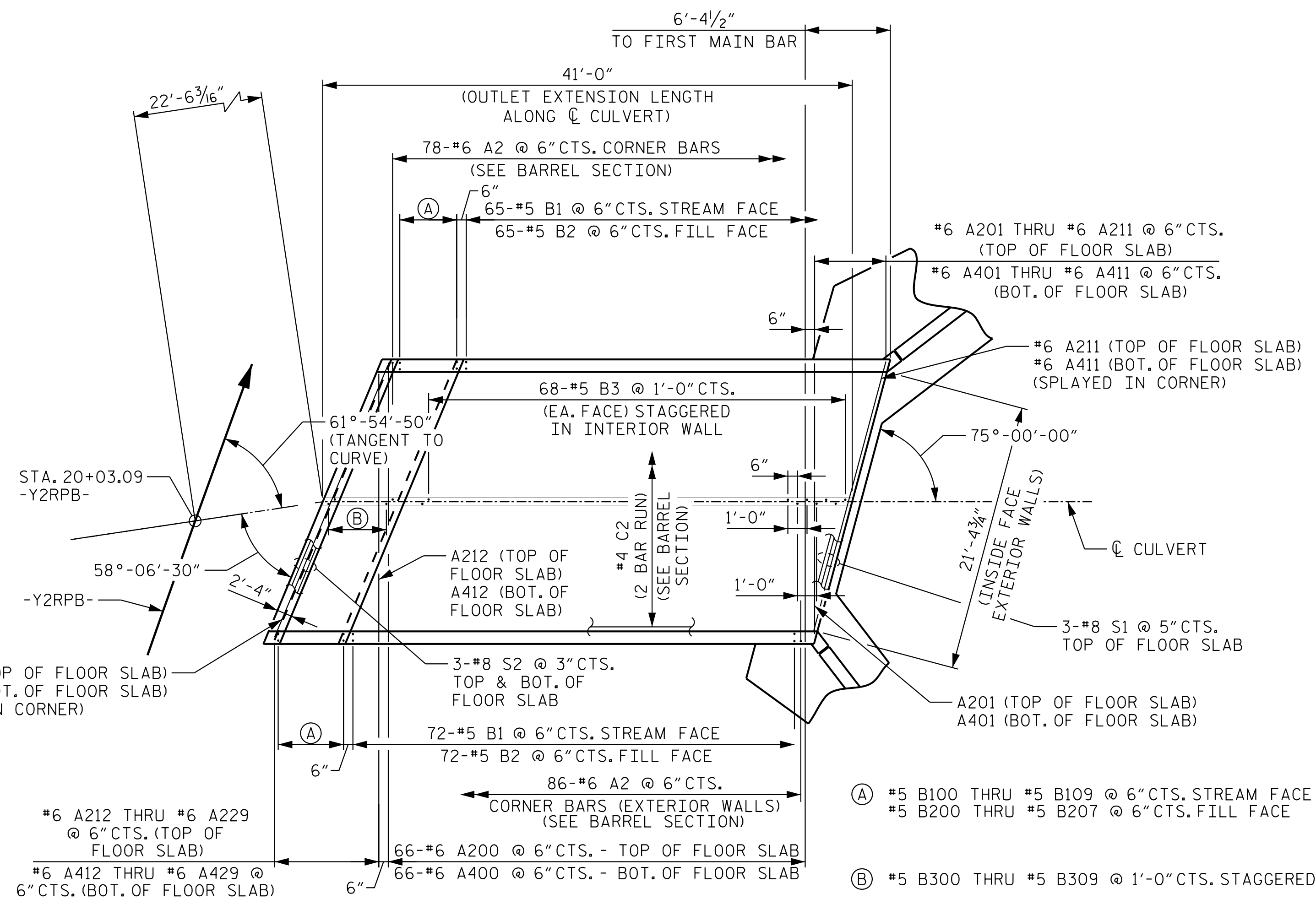
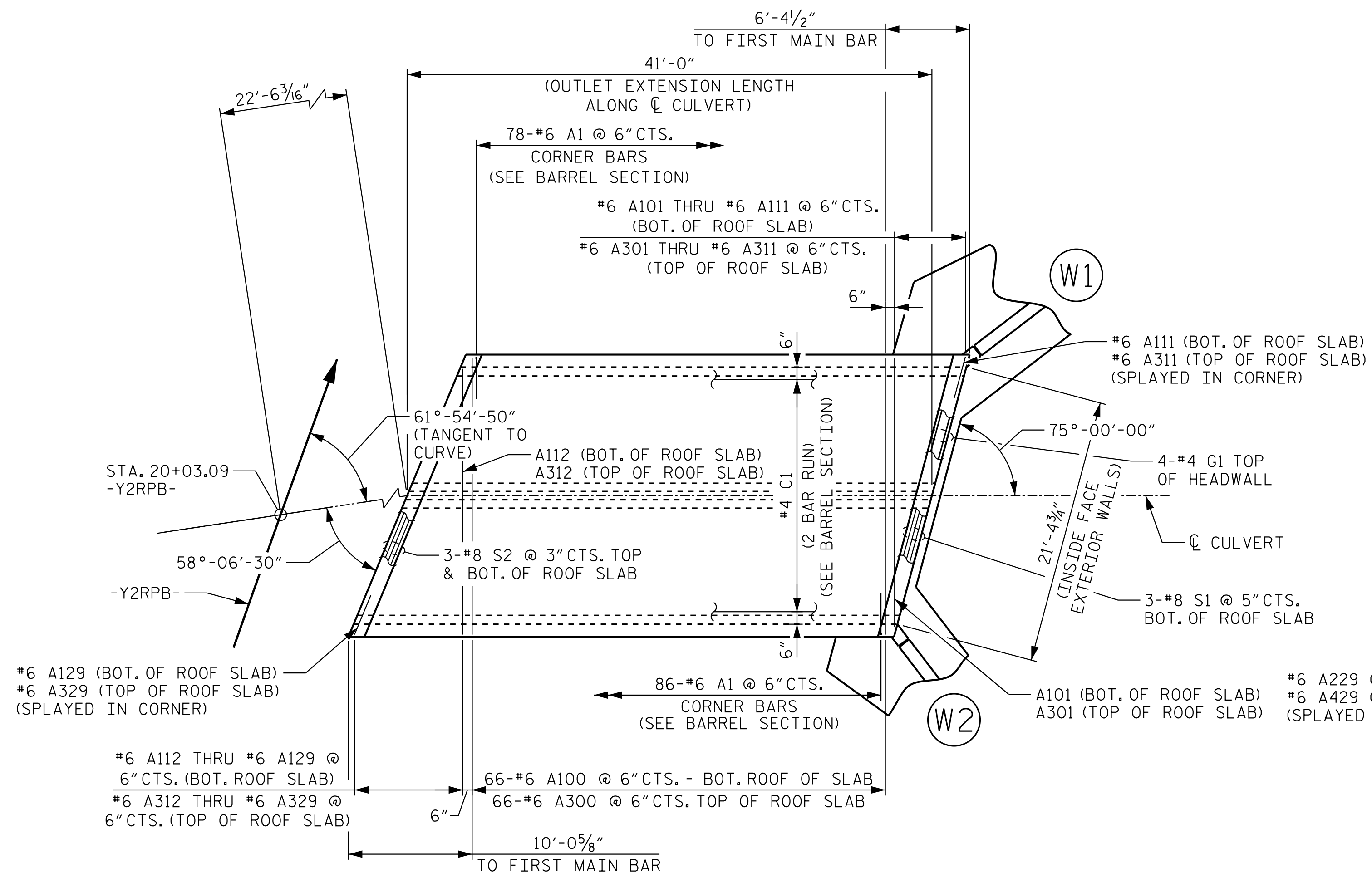
Professional Engineer Seal for North Carolina, No. 058756, issued 8/4/2026.

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CULVERT 1B

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PROJECT NO. I-5715
MECKLENBURG COUNTY
 STATION: 20+03.15 - Y2RPB-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 10 FT. X 12 FT.
CONCRETE BOX CULVERT
75° SKEW

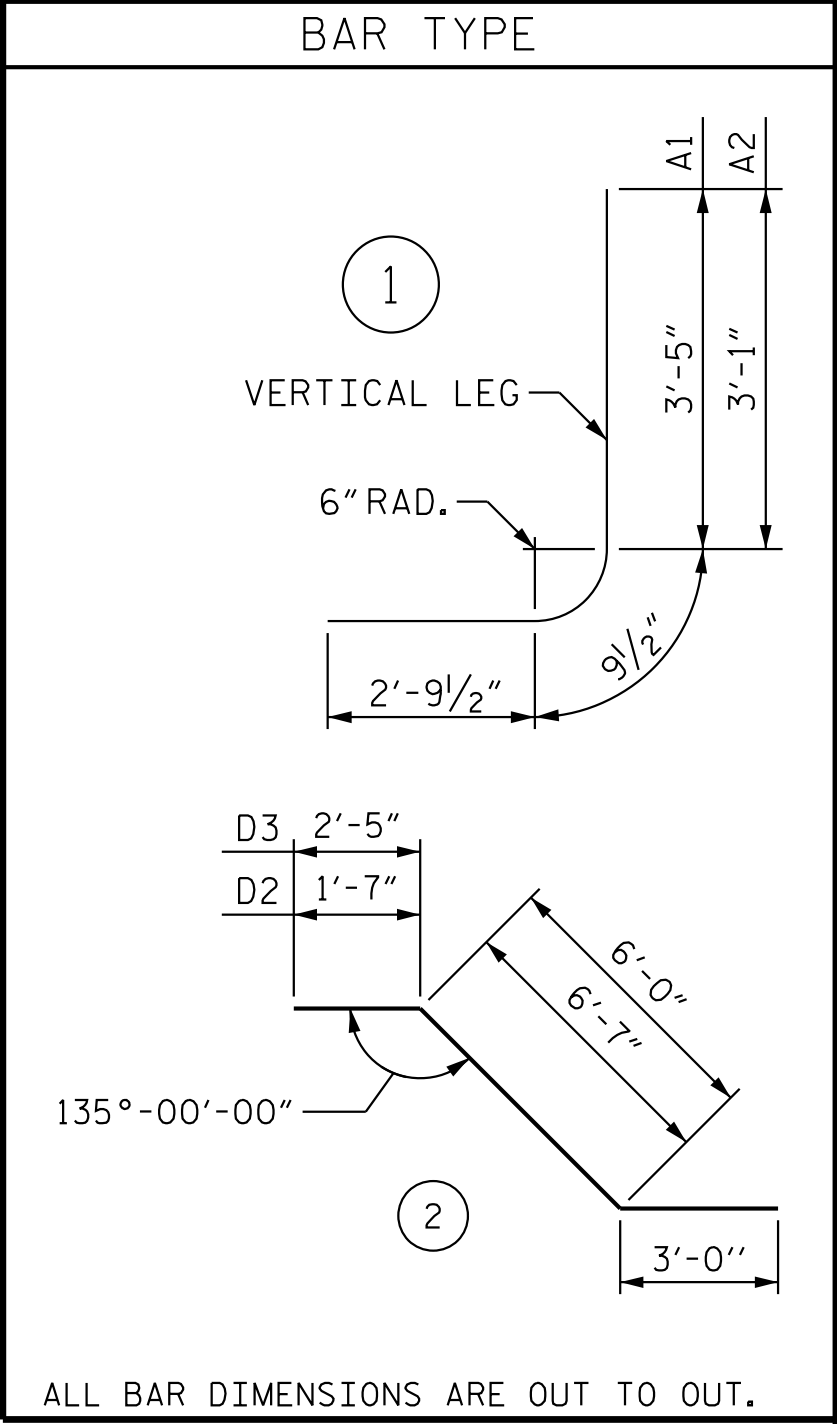
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NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			

SHEET NO.
C1B-3

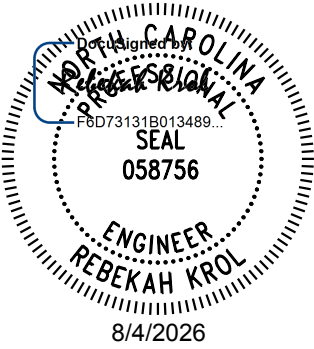
TOTAL
SHEETS
7

CULVERT 1B

8/3/2026 K:\RDT_Structures\Bridge\NC\011036524 - I-5715 Structure Design\Cad\Dgn\Culverts\Final\Culvert IB\411.005.I5715-SMU.CU3.590360_003.dgn



BAR TYPE						BILL OF MATERIAL																							
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	164	6	1	7'-0"	1,724	A300	66	6	STR	22'-4"	2,214	B1	137	5	STR	14'-4"	2,048												
A2	164	6	1	7'-2"	1,765	A301	1	6	STR	21'-1"	32	B2	137	5	STR	11'-4"	1,619												
						A302	1	6	STR	19'-2"	29	B3	68	5	STR	14'-4"	1,017												
A100	66	6	STR	22'-4"	2,214	A303	1	6	STR	17'-4"	26																		
A101	1	6	STR	21'-1"	32	A304	1	6	STR	15'-6"	23	B100	2	5	STR	13'-10"	29												
A102	1	6	STR	19'-2"	29	A305	1	6	STR	13'-7"	20	B101	2	5	STR	13'-5"	28												
A103	1	6	STR	17'-4"	26	A306	1	6	STR	11'-9"	18	B102	2	5	STR	12'-11"	27												
A104	1	6	STR	15'-6"	23	A307	1	6	STR	9'-10"	15	B103	2	5	STR	12'-6"	26												
A105	1	6	STR	13'-7"	20	A308	1	6	STR	8'-0"	12	B104	2	5	STR	12'-0"	25												
A106	1	6	STR	11'-9"	18	A309	1	6	STR	6'-2"	9	B105	2	5	STR	11'-7"	24												
A107	1	6	STR	9'-10"	15	A310	1	6	STR	4'-3"	6	B106	2	5	STR	11'-1"	23												
A108	1	6	STR	8'-0"	12	A311	2	6	STR	2'-5"	7	B107	2	5	STR	10'-8"	22												
A109	1	6	STR	6'-2"	9	A312	1	6	STR	21'-6"	32	B108	2	5	STR	10'-2"	21												
A110	1	6	STR	4'-3"	6	A313	1	6	STR	20'-4"	31	B109	8	5	STR	9'-10"	82												
A111	2	6	STR	2'-5"	7	A314	1	6	STR	19'-2"	29																		
A112	1	6	STR	21'-6"	32	A315	1	6	STR	18'-1"	27	B200	2	5	STR	10'-7"	22												
A113	1	6	STR	20'-4"	31	A316	1	6	STR	16'-11"	25	B201	2	5	STR	10'-1"	21												
A114	1	6	STR	19'-2"	29	A317	1	6	STR	15'-9"	24	B202	2	5	STR	9'-8"	20												
A115	1	6	STR	18'-1"	27	A318	1	6	STR	14'-7"	22	B203	2	5	STR	9'-2"	19												
A116	1	6	STR	16'-11"	25	A319	1	6	STR	13'-5"	20	B204	2	5	STR	8'-9"	18												
A117	1	6	STR	15'-9"	24	A320	1	6	STR	12'-3"	18	B205	2	5	STR	8'-3"	17												
A118	1	6	STR	14'-7"	22	A321	1	6	STR	11'-1"	17	B206	2	5	STR	7'-10"	16												
A119	1	6	STR	13'-5"	20	A322	1	6	STR	9'-11"	15	B207	12	5	STR	7'-4"	92												
A120	1	6	STR	12'-3"	18	A323	1	6	STR	8'-9"	13																		
A121	1	6	STR	11'-1"	17	A324	1	6	STR	7'-7"	11	B300	1	5	STR	13'-10"	14												
A122	1	6	STR	9'-11"	15	A325	1	6	STR	6'-5"	10	B301	1	5	STR	13'-5"	14												
A123	1	6	STR	8'-9"	13	A326	1	6	STR	5'-3"	8	B302	1	5	STR	12'-11"	13												
A124	1	6	STR	7'-7"	11	A327	1	6	STR	4'-2"	6	B303	1	5	STR	12'-6"	13												
A125	1	6	STR	6'-5"	10	A328	1	6	STR	3'-0"	5	B304	1	5	STR	12'-0"	13												
A126	1	6	STR	5'-3"	8	A329	2	6	STR	1'-10"	6	B305	1	5	STR	11'-7"	12												
A127	1	6	STR	4'-2"	6							B306	1	5	STR	11'-1"	12												
A128	1	6	STR	3'-0"	5	A400	66	6	STR	22'-4"	2,214	B307	1	5	STR	10'-8"	11												
A129	2	6	STR	1'-10"	6	A401	1	6	STR	21'-1"	32	B308	1	5	STR	10'-2"	11												
						A402	1	6	STR	19'-2"	29	B309	4	5	STR	9'-10"	41												
A200	66	6	STR	22'-4"	2,214	A403	1	6	STR	17'-4"	26																		
A201	1	6	STR	21'-1"	32	A404	1	6	STR	15'-6"	23	C1	130	4	STR	22'-6"	1,954												
A202	1	6	STR	19'-2"	29	A405	1	6	STR	13'-7"	20	C2	54	4	STR	19'-0"	685												
A203	1	6	STR	17'-4"	26	A406	1	6	STR	11'-9"	18																		
A204	1	6	STR	15'-6"	23	A407	1	6	STR	9'-10"	15	G1	4	4	STR	23'-1"	62												
A205	1	6	STR	13'-7"	20	A408	1	6	STR	8'-0"	12																		
A206	1	6	STR	11'-9"	18	A409	1	6	STR	6'-2"	9	S1	6	8		23'-1"	370												
A207	1	6	STR	9'-10"	15	A410	1	6	STR	4'-3"	6	S2	6	8	STR	24'-4"	390												
A208	1	6	STR	8'-0"	12	A411	2	6	STR	2'-5"	7																		
A209	1	6	STR	6'-2"	9	A412	1	6	STR	21'-6"	32	D1	18	6	STR	2'-6"	68												
A210	1	6	STR	4'-3"	6	A413	1	6	STR	20'-4"	31	D2	11	6	2	11'-5"	189												
A211	2	6	STR	2'-5"	7	A414	1	6	STR	19'-2"	29	D3	11	6	2	11'-2"	184												
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A218	1	6	STR	14'-7"	22	A421	1	6	STR	11'-1"	17																		
A219	1	6	STR	13'-5"	20	A422	1	6	STR	9'-11"	15																		
A220	1	6	STR	12'-3"	18	A423	1	6	STR	8'-9"	13																		
A221	1	6	STR	11'-1"	17	A424	1	6	STR	7'-7"	11																		
A222	1	6	STR	9'-11"	15	A425	1	6	STR	6'-5"	10																		
A223	1	6	STR	8'-9"	13	A426	1	6	STR	5'-3"	8																		
A224	1	6	STR	7'-7"	11	A427	1	6	STR	4'-2"	6																		
A225	1	6	STR	6'-5"	10	A428	1	6	STR	3'-0"	5																		
A226	1	6	STR	5'-3"	8	A429	2	6	STR	1'-10"	6																		
A227	1	6	STR	4'-2"	6																								
A228	1	6	STR	3'-0"	5																								
A229	2	6	STR	1'-10"	6																								



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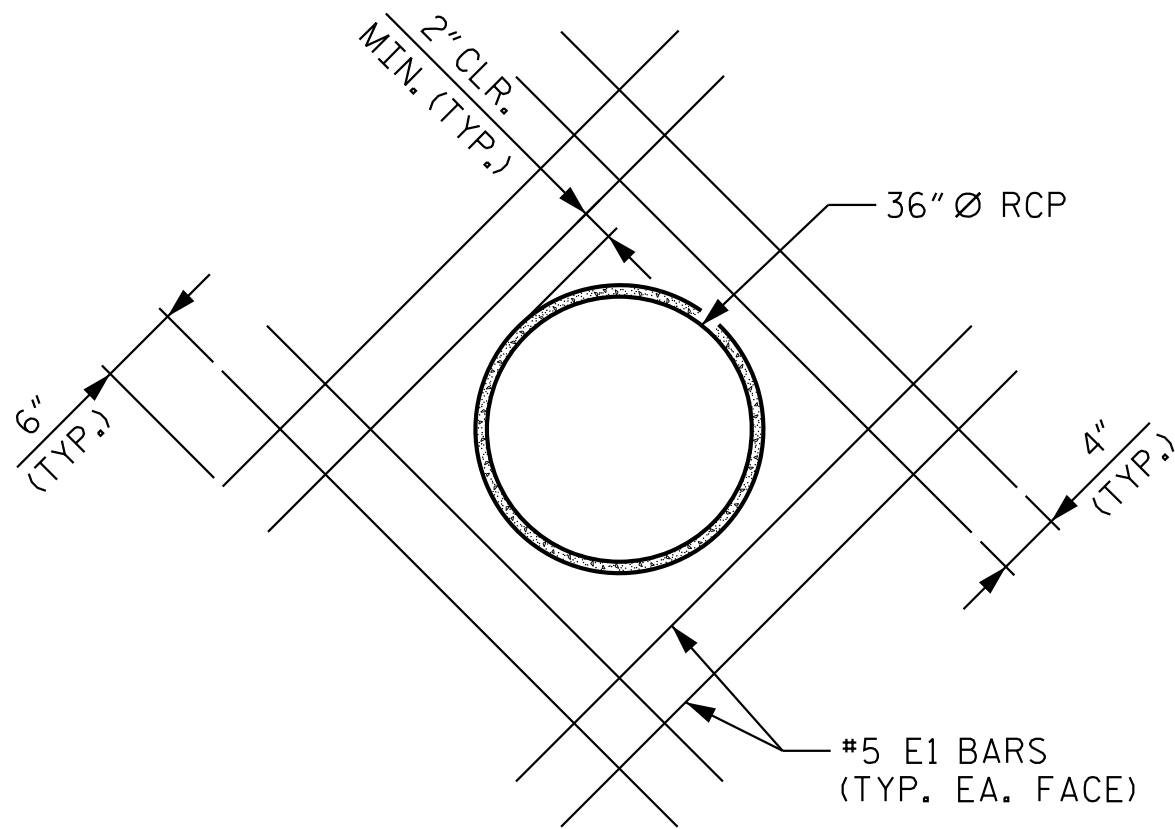
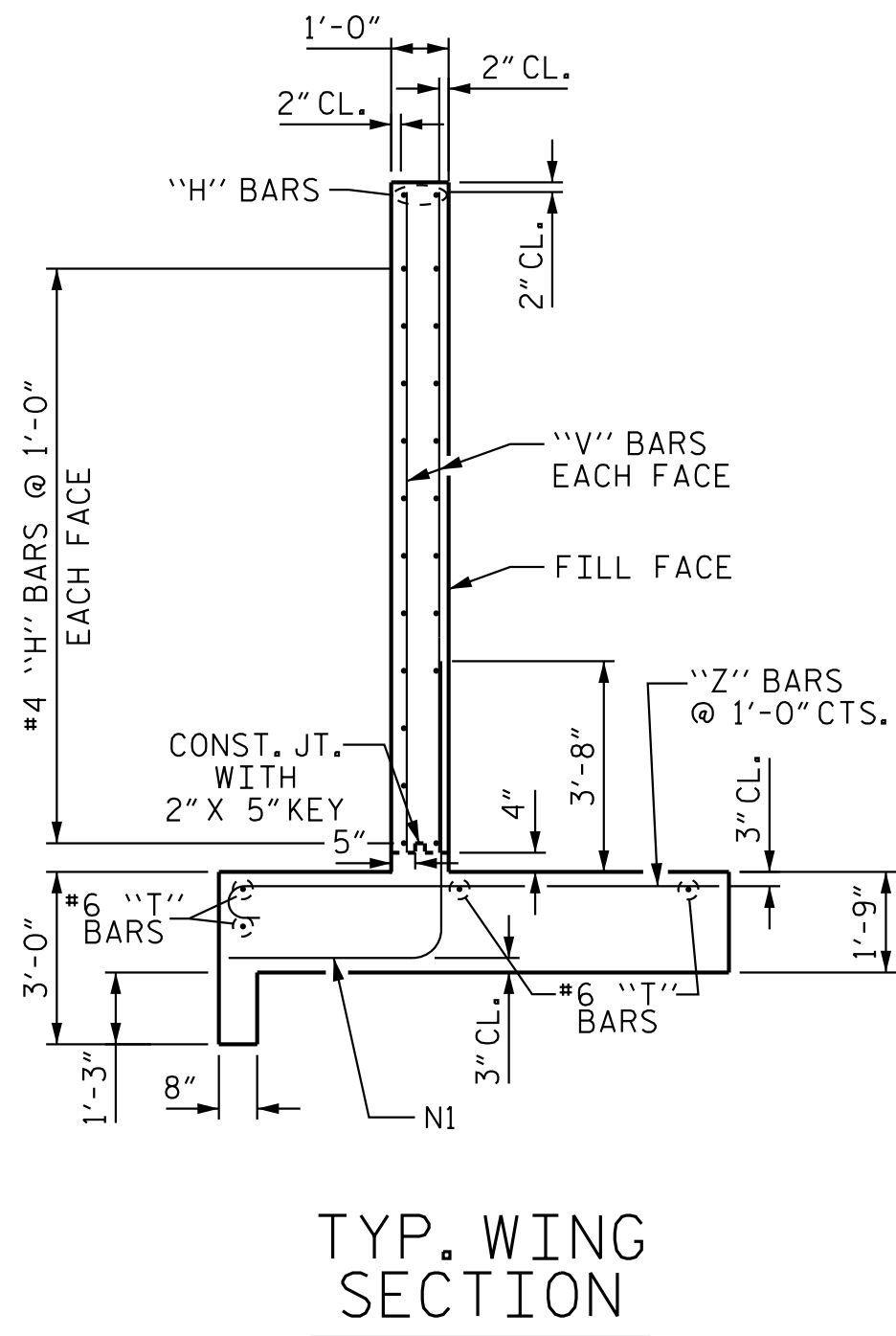
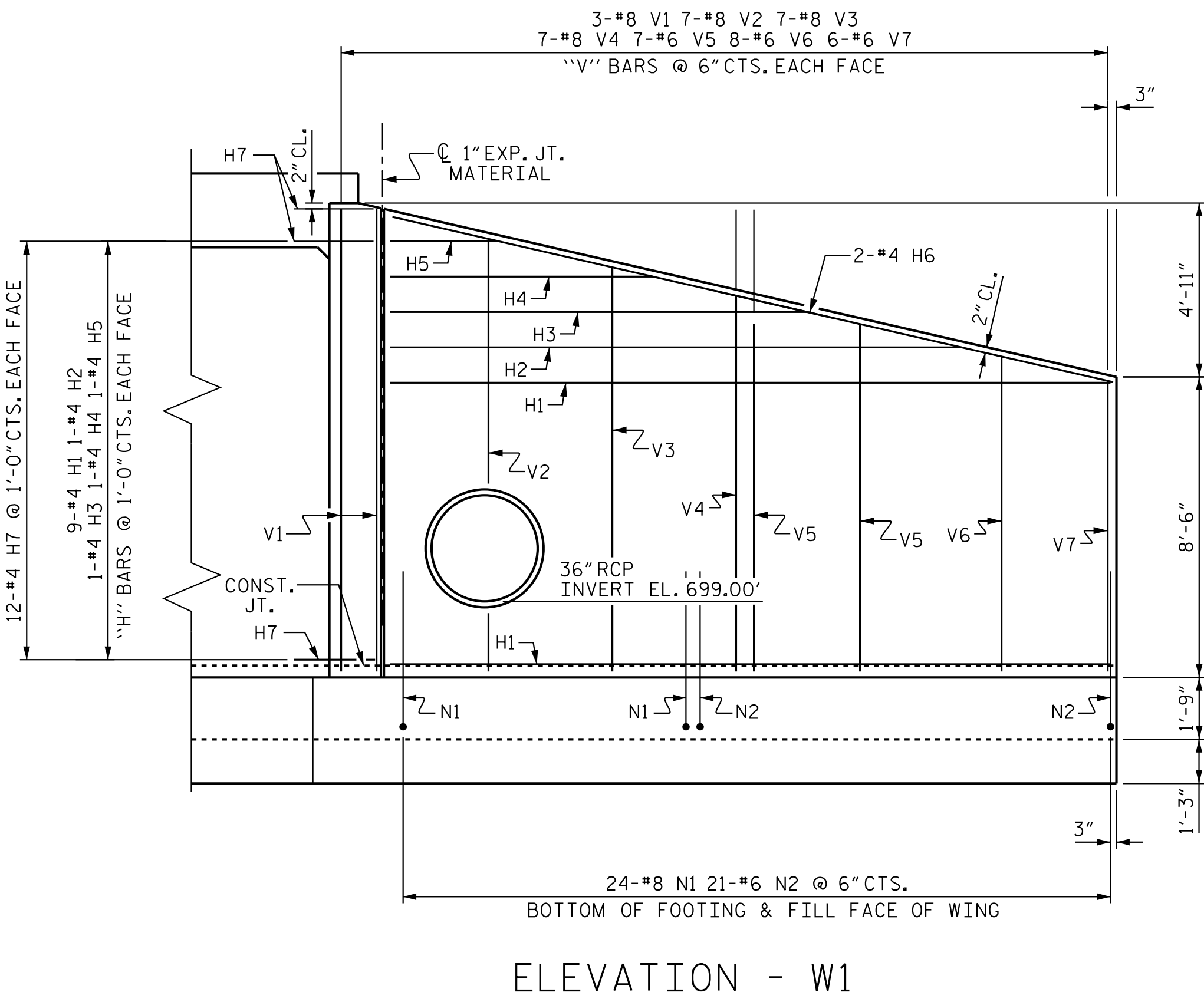
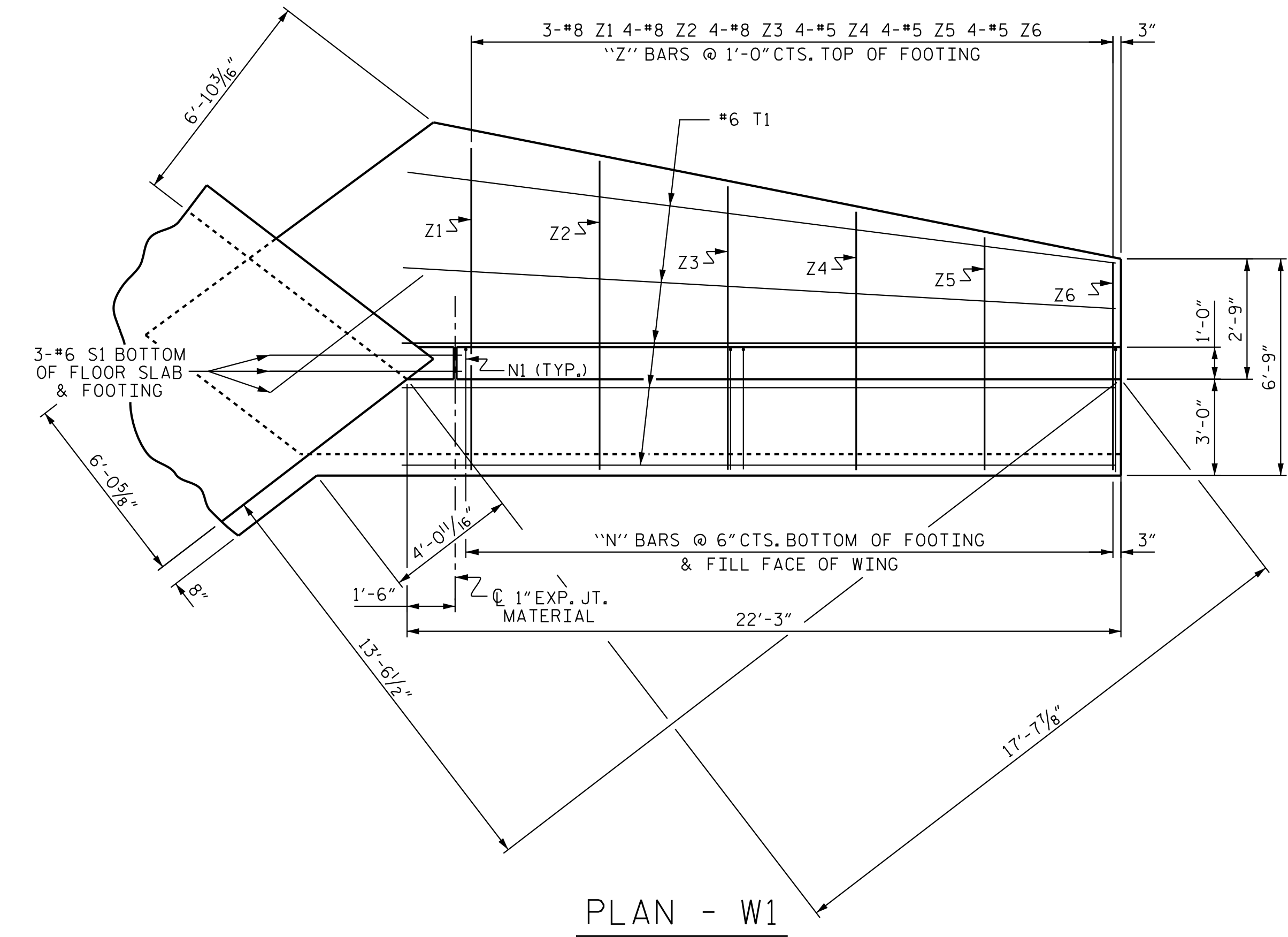
PROJECT NO. I-5715
MECKLENBURG COUNTY
STATION: 20+03.15 - Y2RPB-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 10 FT. X 12 FT.
CONCRETE BOX CULVERT
75° SKEW

REVISIONS						SHEET NO. C1B-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

CULVERT 1B



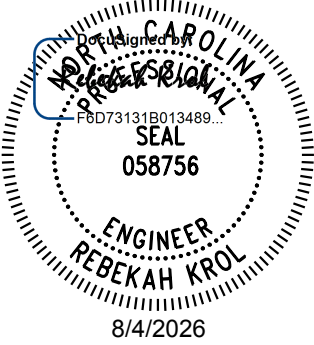
NOTES

FOR LOCATION OF 36" RCP, REFER TO ROADWAY PLANS.

REINFORCING BARS MAY BE FIELD CUT AS NECESSARY TO AVOID THE 36-INCH RCP. WHERE REINFORCING STEEL IS FIELD CUT, THE BARS SHALL BE CUT ONLY TO MAINTAIN A MAXIMUM OF 2 INCHES CLEAR TO THE PIPE.

PROJECT NO. I-5715
MECKLENBURG COUNTY
STATION: 20+03.15 - Y2RPB-

SHEET 5 OF 7



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING DETAILS
FOR
CONCRETE BOX CULVERT

H = 12'-0" SLOPE = 2:1
75° SKEW

REVISIONS						SHEET NO. C1B-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

CULVERT 1B

ASSEMBLED BY : R.G. GIESEN	DATE : 05/2026
CHECKED BY : A. L. PHILLIPS	DATE : 05/2026
DRAWN BY : CCJ 12/99	REV. 6/19 MAA/THC
CHECKED BY : RWW 03/00	

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PROJECT NO. I-5715
MECKLENBURG COUNTY
 STATION: 20+03.15 -Y2RPB-

NORTH CAROLINA
 PROFESSIONAL
 ENGINEER
 REBEKAH KROL
 F8073131B013489
 SEAL
 058756
 8/4/2026

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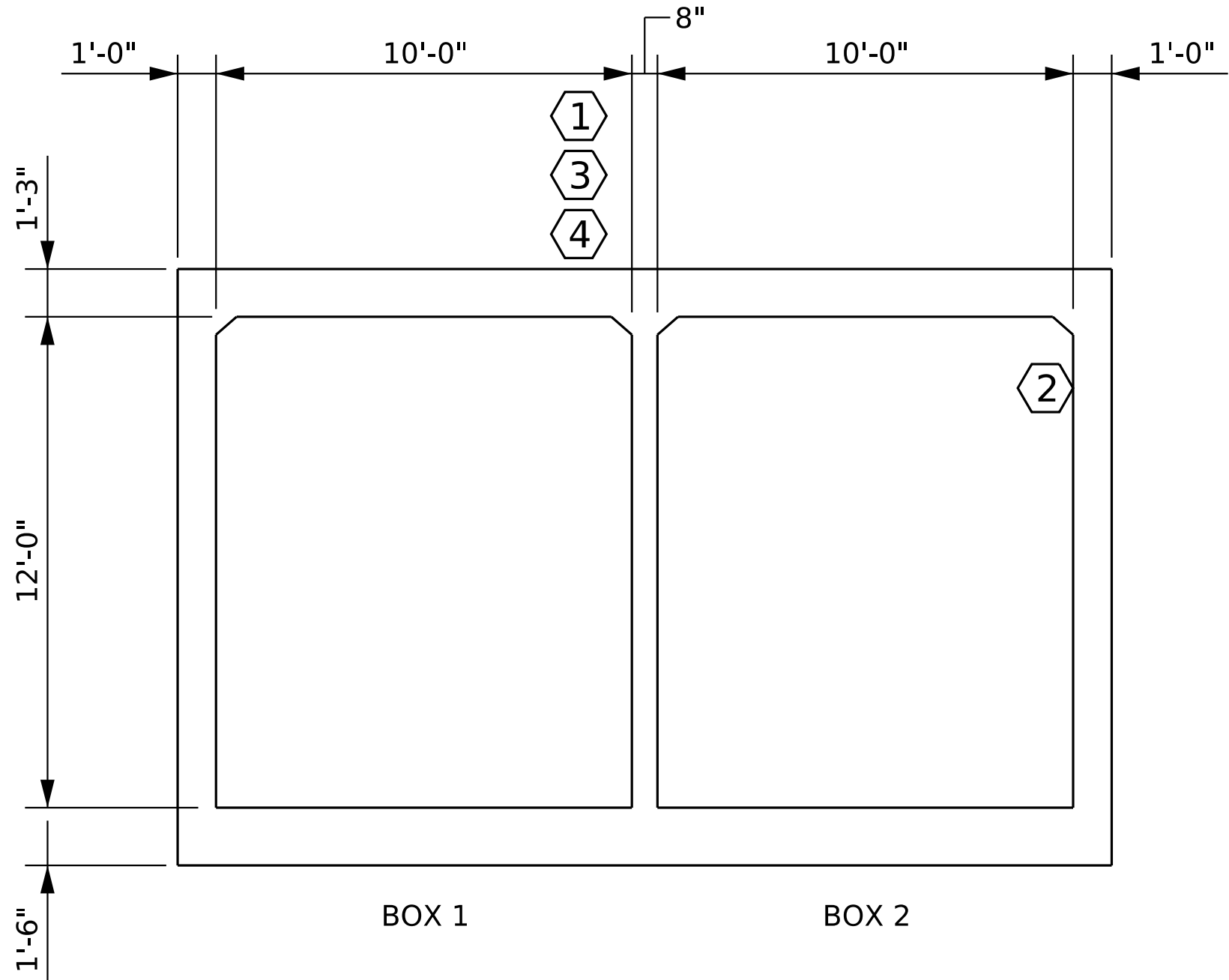
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CULVERT 1B

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K:\B01_Structures\Bridges\NC\01036524 - I-5715 Structure Design\Cad\Drawn\Culvert\1B\411_013_151715_SMU_CUL_7_590360_007.dgn 8/2/2026

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS																		
LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING Ⓝ	MINIMUM RATING FACTORS (RF)	TONS = W x 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		HL-93 (INVENTORY)	N/A	Ⓛ	4.64	--	1.75	4.70	2	EXTERIOR WALL	22.67	4.64	1	TOP SLAB	11.00			
		HL-93 (OPERATING)	N/A		6.01	--	1.35	6.09	2	EXTERIOR WALL	22.67	6.01	1	TOP SLAB	11.00			
		HS-20 (INVENTORY)	36.000	Ⓜ	5.04	181.44	1.75	5.04	2	EXTERIOR WALL	22.67	5.68	1	TOP SLAB	11.00			
		HS-20 (OPERATING)	36.000		6.53	235.08	1.35	6.53	2	EXTERIOR WALL	22.67	7.36	1	TOP SLAB	11.00			
LEGAL LOAD		SINGLE VEHICLE (SV)		SNSH	13.500		6.61	89.24	1.40	6.61	1	EXTERIOR WALL	0.00	14.70	1	TOP SLAB	11.00	
				SNGARBS2	20.000		6.49	129.80	1.40	6.49	2	EXTERIOR WALL	22.17	10.96	1	TOP SLAB	11.00	
				SNAGRIS2	22.000		6.57	144.54	1.40	6.57	1	EXTERIOR WALL	0.00	10.38	1	TOP SLAB	11.00	
				SNCOTTS3	27.250		6.11	166.50	1.40	6.11	2	EXTERIOR WALL	22.67	7.00	1	TOP SLAB	11.00	
				SNAGGRS4	34.925		6.01	209.90	1.40	6.01	2	EXTERIOR WALL	22.67	6.43	1	TOP SLAB	11.00	
				SNS5A	35.550		5.90	209.75	1.40	5.90	2	EXTERIOR WALL	22.67	6.10	1	TOP SLAB	11.00	
				SNS6A	39.950		5.79	231.31	1.40	5.79	2	EXTERIOR WALL	22.67	5.83	1	TOP SLAB	11.00	
				SNS7B	42.000		5.60	235.20	1.40	5.74	2	EXTERIOR WALL	22.67	5.60	1	TOP SLAB	11.00	
		TRUCK TRACTOR SEMI-TRAILER (TTST)		TNAGRIT3	33.000		6.43	212.19	1.40	6.43	1	EXTERIOR WALL	0.00	7.69	1	TOP SLAB	11.00	
				TNT4A	33.075		6.24	206.39	1.40	6.24	2	EXTERIOR WALL	22.67	7.12	1	TOP SLAB	11.00	
				TNT6A	41.600		6.10	253.76	1.40	6.10	2	EXTERIOR WALL	22.67	6.41	2	BOTTOM SLAB	11.67	
				TNT7A	42.000		6.16	258.72	1.40	6.16	2	EXTERIOR WALL	22.67	6.70	2	BOTTOM SLAB	11.67	
				TNT7B	42.000		5.96	250.32	1.40	5.96	2	EXTERIOR WALL	22.67	6.20	1	TOP SLAB	11.00	
				TNAGRIT4	43.000		6.00	258.00	1.40	6.00	2	EXTERIOR WALL	22.67	6.09	1	TOP SLAB	11.00	
				TNAGT5A	45.000		5.95	267.75	1.40	5.95	2	EXTERIOR WALL	22.67	6.03	1	TOP SLAB	11.00	
				TNAGT5B	45.000	Ⓜ	5.53	248.85	1.40	5.77	2	EXTERIOR WALL	22.67	5.53	1	TOP SLAB	11.00	
EMERGENCY VEHICLE (EV)		EV2	28.750		6.96	200.10	1.30	6.96	1	EXTERIOR WALL	0.00	8.89	1	TOP SLAB	11.00			
		EV3	43.000	Ⓞ	6.05	260.15	1.30	6.14	2	EXTERIOR WALL	22.67	6.05	1	TOP SLAB	11.00			



LRFR SUMMARY
(LOOKING DOWNSTREAM)

LOAD FACTORS:

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

NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATES.

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

Ⓝ CONTROLLING LOAD RATING

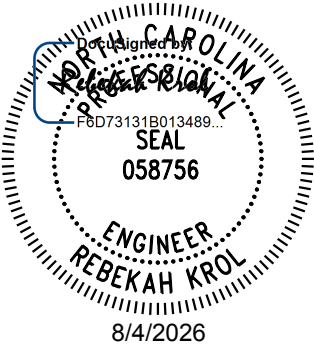
Ⓛ DESIGN LOAD RATING (HL-93)

Ⓜ DESIGN LOAD RATING (HS-20)

Ⓜ LEGAL LOAD RATING **

Ⓞ EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



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Raleigh, NC 27601-1772
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ASSEMBLED BY : R.G. GIESEN	DATE : 05/2026
CHECKED BY : A. L. PHILLIPS	DATE : 05/2026
DRAWN BY : WMC 7/II	REV. 10/1/II
CHECKED BY : GM 7/II	REV. 12/17
	REV. 04/23
	MAA/GM
	MAA/THC
	BNB/AAT

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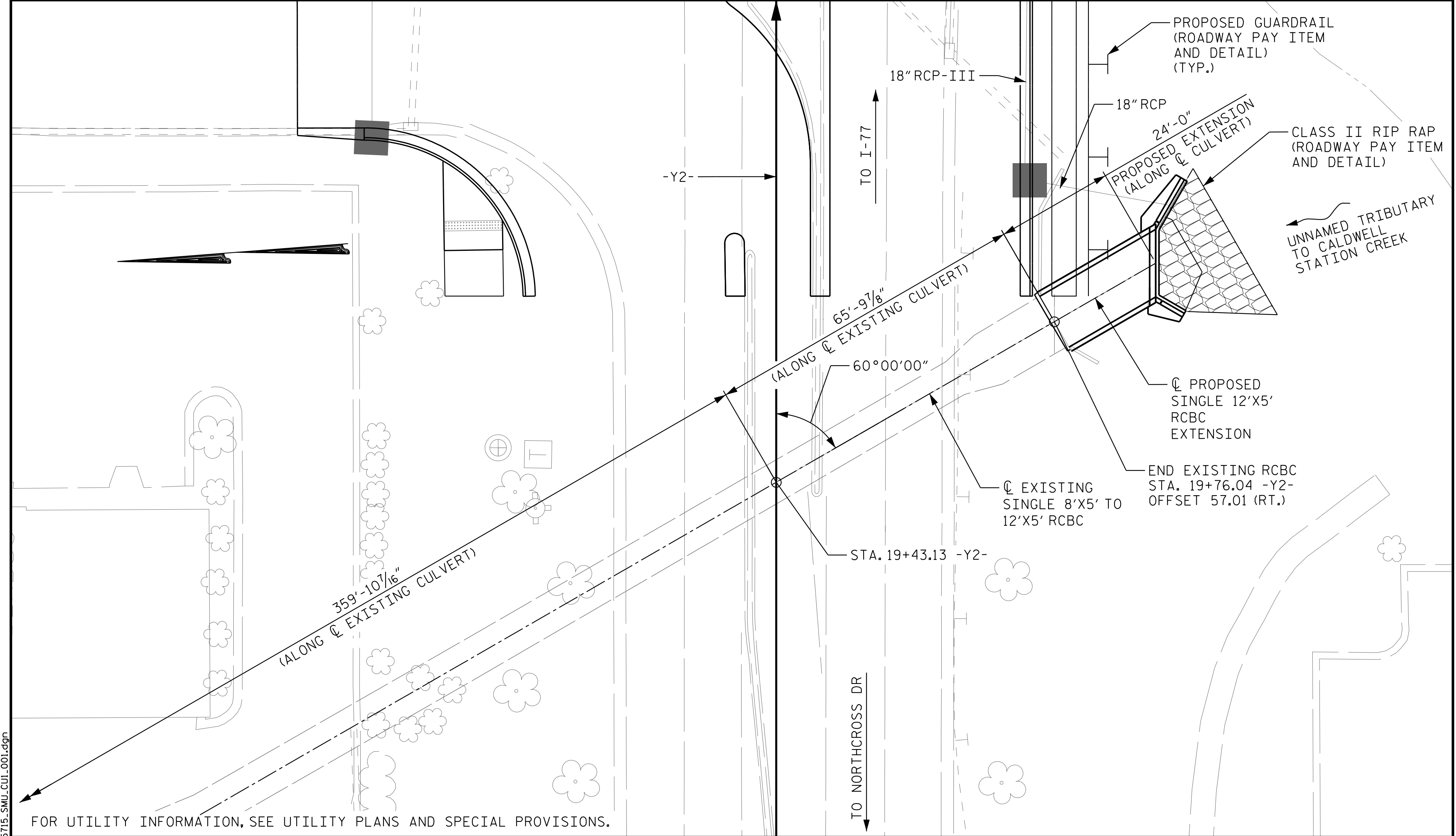
PROJECT NO. I-5715
MECKLENBURG COUNTY
STATION: 20+03.15 -Y2RPB-

SHEET 7 OF 7

REVISIONS						SHEET NO. C1B-7
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

CULVERT 1B STD. NO. LRFR5

BENCHMARK: -BM #25- 16+05.37, 306.84' (RT) -Y2-, EL. 721.83, TIE SPIKE IN 19" OAK



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE -----370 CFS
FREQUENCY OF DESIGN FLOOD -----50-YR.
DESIGN HIGH WATER ELEVATION-----702.8 FT.
DRAINAGE AREA -----0.35 SQ. MI.
BASIC DISCHARGE (Q100)-----390 CFS
BASIC HIGH WATER ELEVATION-----703.0 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE ----->440 CFS
FREQUENCY OF OVERTOPPING FLOOD --->500-YR.
OVERTOPPING FLOOD ELEVATION -----707.7 FT.

ROADWAY DATA

GRADE POINT EL. @ STA. 19+43.13 -Y2- = 708.30
BED ELEVATION @ STA. 19+43.13 -Y2- = 696.94
ROADWAY SLOPES 2 : 1

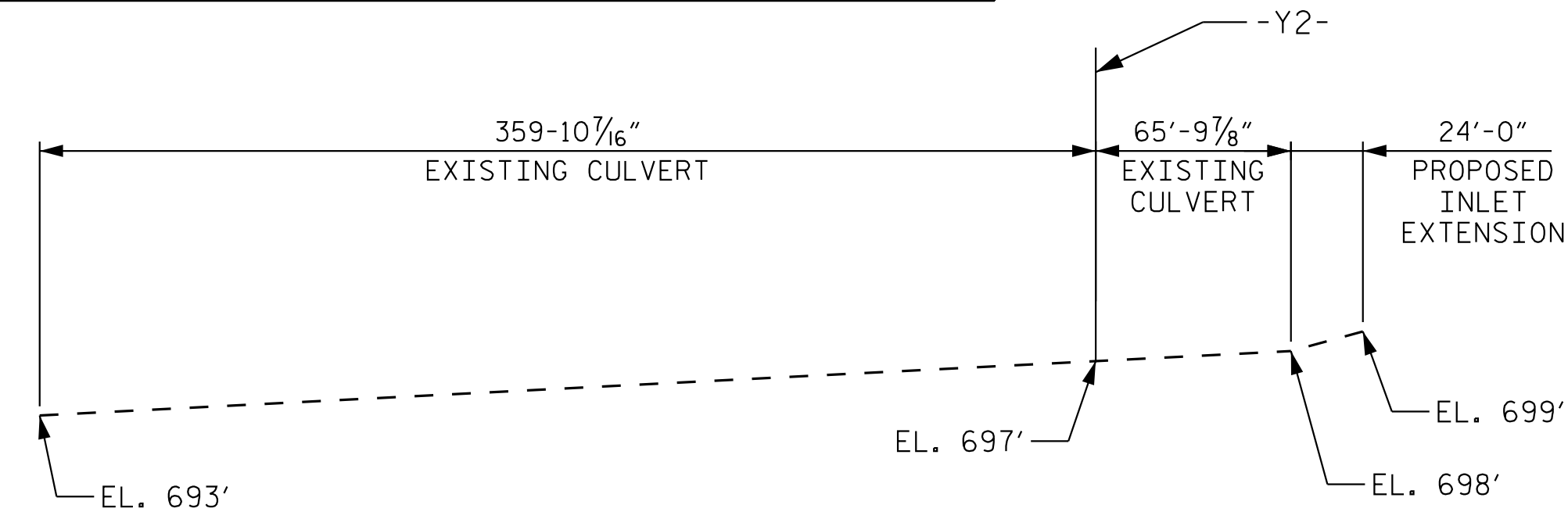
TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @	1.413	CY/FT	33.9 C.Y.
WINGS ETC.	7.7		C.Y.
EDGE BEAM	1.2		C.Y.
TOTAL	42.8		C.Y.
REINFORCING STEEL			
BARREL	4,472		LBS.
WINGS ETC.	466		LBS.
TOTAL	4,938		LBS.
CULVERT EXCAVATION STA. 19+43.13 -Y2-		LUMP SUM	
FOUNDATION CONDITIONING MATERIAL		31 TONS	

SAMPLE BAR REPLACEMENT

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

NOTE:
SAMPLE BAR REPLACEMENT LENGTHS
BASED ON 30" (SAMPLE LENGTH) PLUS
TWO SPLICE LENGTHS AND $f_y = 60\text{ksi}$.



PROFILE ALONG & CULVERT

F.A. PROJECT NO. NHPP-077-1(220)29

NOTES

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING
DESIGN FILL -----5'-0" (MAX.)
FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATIONS.

CONCRETE IN THE 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 THE WING SHEET.

THE 18"Ø R.C. PIPE THROUGH THE WING WALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECESSARY TO CLEAR PIPE.

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

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.

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

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, 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 EXTENSIONS. 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.

DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

BACKFILL WITH SELECT MATERIAL, CLASS V MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATIONS.

EXCAVATE 12 INCHES BELOW THE BOTTOM OF BOX CULVERT EXTENSION AND WING BEARING ELEVATIONS AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

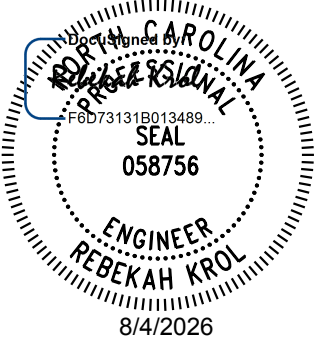
FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

PROJECT NO. I-5715
MECKLENBURG COUNTY
STATION: 19+43.13 -Y2-

SHEET 1 OF 5



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 12 FT. X 5 FT.
CONCRETE BOX CULVERT
60° SKEW

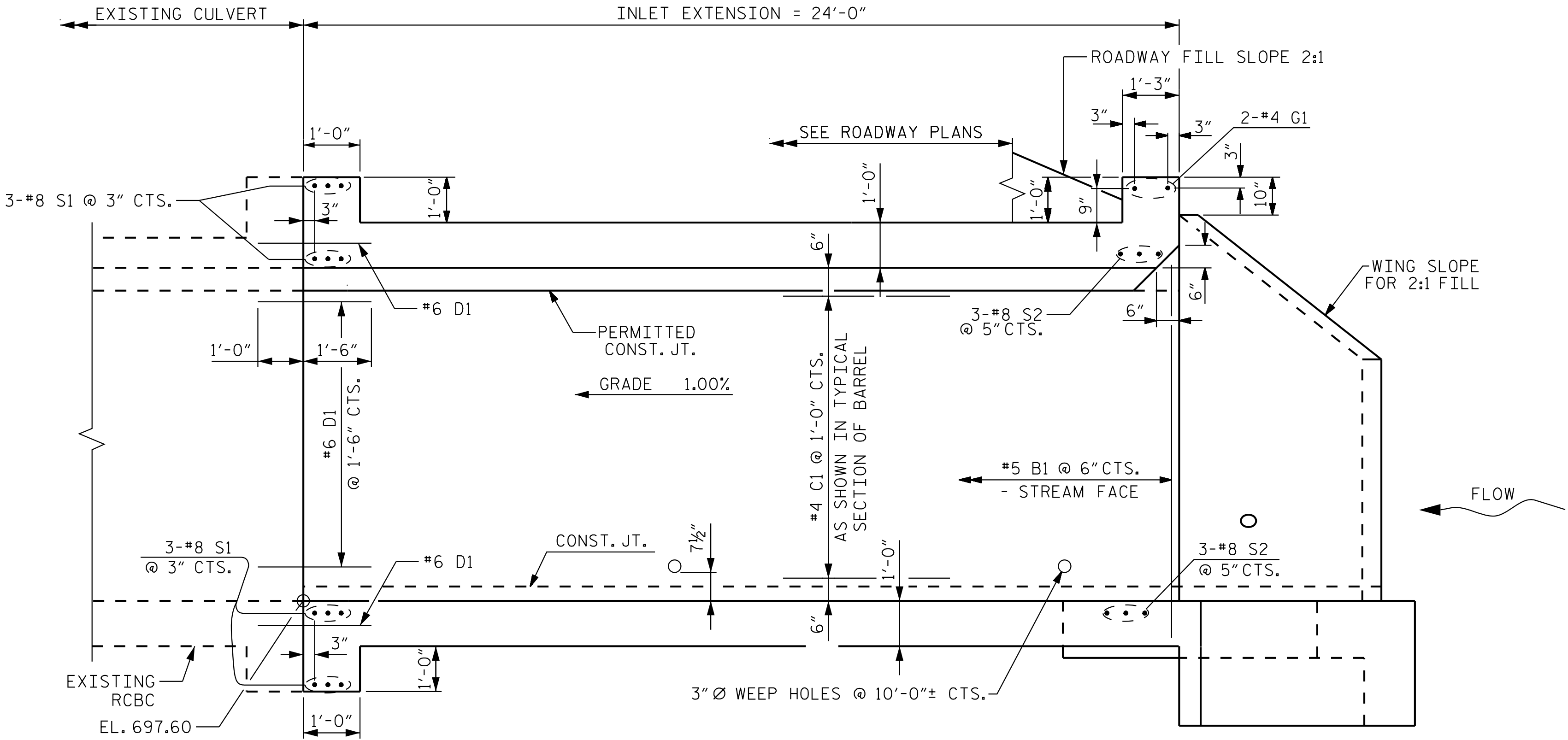
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2			4			

CULVERT 2

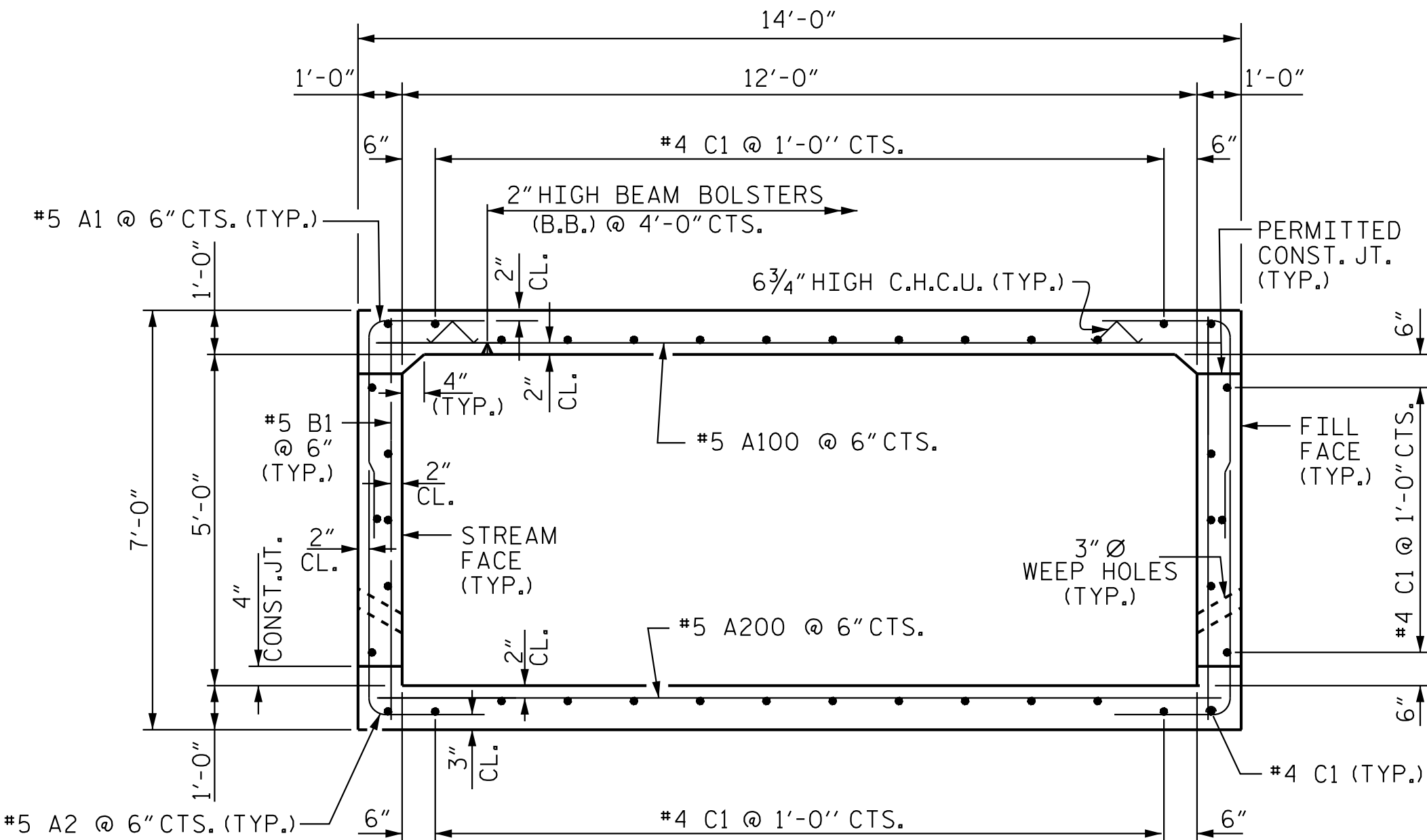
DRAWN BY: R. C. GIESEN DATE: 05/2026
CHECKED BY: R. M. KROL DATE: 05/2026
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 05/2026

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K:\PDI_Structures\Bridges\NC\01036524 - I-5715 Structure Design\Cad\00p\Culvert\1s\Final\Culvert_2.dwg, 15:15, 003, 15:15, SWI, CU2, 002.dgn



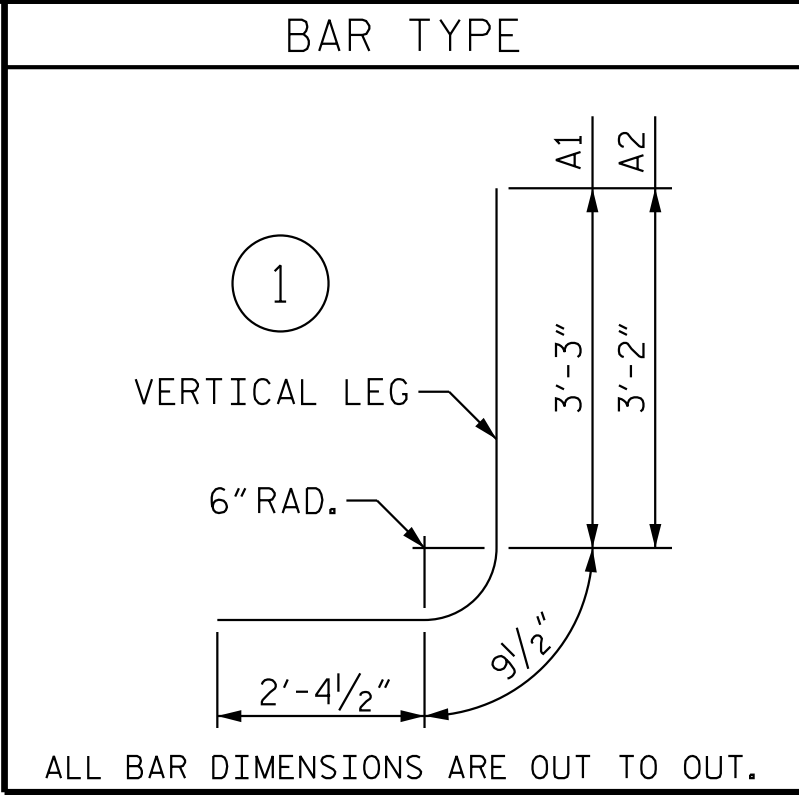
CULVERT SECTION NORMAL TO ROADWAY



RIGHT ANGLE SECTION OF BARREL

THERE ARE 40 "C" BARS IN SECTION OF BARREL

BAR SIZE	SPLICE LENGTH
#5 B1	2'-4"
#4 C1	2'-5"

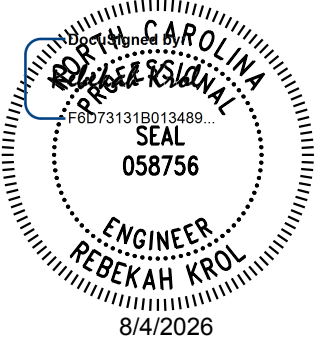


ALL BAR DIMENSIONS ARE OUT TO OUT.

BAR TYPE		BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT		
A1	96	5	1	6'-4"	634		
A2	96	5	1	6'-3"	626		
A100	40	5	STR	13'-8"	570		
A101	1	5	STR	13'-1"	14		
A102	1	5	STR	12'-2"	13		
A103	1	5	STR	11'-4"	12		
A104	1	5	STR	10'-6"	11		
A105	1	5	STR	9'-7"	10		
A106	1	5	STR	8'-9"	9		
A107	1	5	STR	7'-10"	8		
A108	1	5	STR	7'-0"	7		
A109	1	5	STR	6'-2"	6		
A110	1	5	STR	5'-3"	5		
A111	1	5	STR	4'-5"	5		
A112	1	5	STR	3'-6"	4		
A113	1	5	STR	2'-8"	3		
A114	1	5	STR	1'-10"	2		
A115	1	5	STR	0'-10"	1		
A116	1	5	STR	15'-6"	16		
A200	40	5	STR	13'-8"	570		
A201	1	5	STR	13'-1"	14		
A202	1	5	STR	12'-2"	13		
A203	1	5	STR	11'-4"	12		
A204	1	5	STR	10'-6"	11		
A205	1	5	STR	9'-7"	10		
A206	1	5	STR	8'-9"	9		
A207	1	5	STR	7'-10"	8		
A208	1	5	STR	7'-0"	7		
A209	1	5	STR	6'-2"	6		
A210	1	5	STR	5'-3"	5		
A211	1	5	STR	4'-5"	5		
A212	1	5	STR	3'-6"	4		
A213	1	5	STR	2'-8"	3		
A214	1	5	STR	1'-10"	2		
A215	1	5	STR	0'-10"	1		
A216	1	5	STR	15'-6"	16		
B1	96	5	STR	6'-7"	659		
C1	40	4	STR	15'-1"	403		
D1	12	6	STR	2'-6"	45		
G1	2	4	STR	15'-10"	21		
S1	12	8	STR	13'-8"	438		
S2	6	8	STR	15'-10"	254		
REINFORCING STEEL				LBS.	4,472		

PROJECT NO. I-5715
MECKLENBURG COUNTY
STATION: 19+43.13 -Y2-

SHEET 2 OF 5



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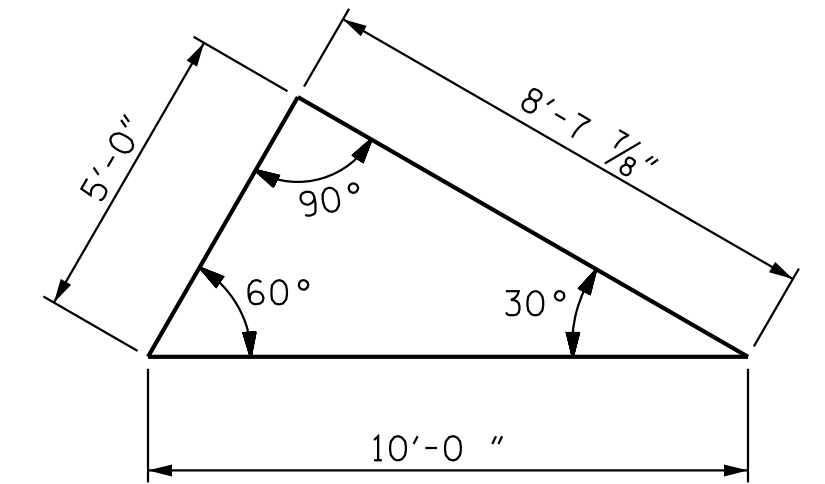
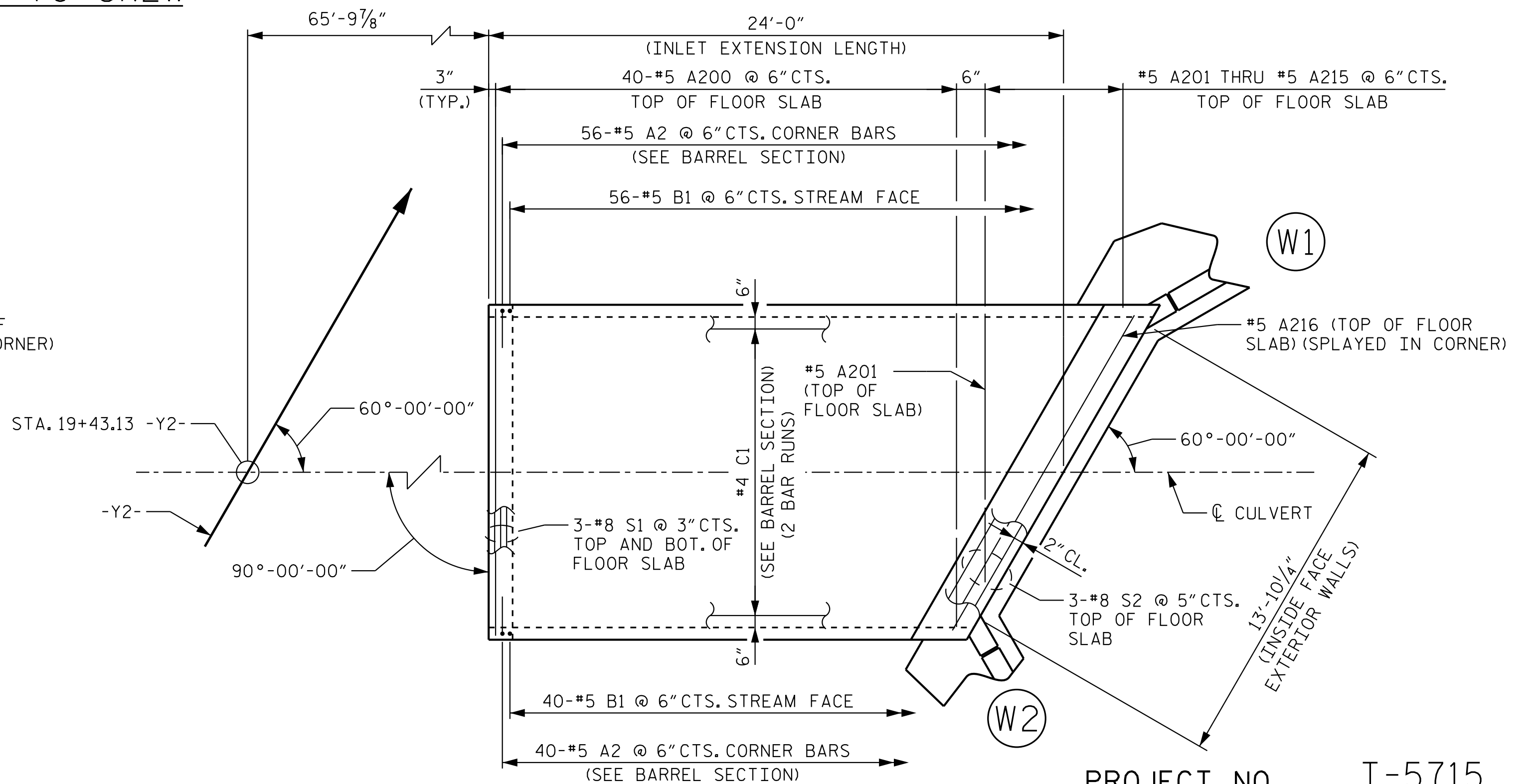
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CULVERT 2

DRAWN BY: R. C. GIESEN DATE: 05/2026
CHECKED BY: R. M. KROL DATE: 05/2026
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 05/2026

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INLET END ELEVATION NORMAL TO SKEW

FLOOR SLAB PLAN

SHEET 3 OF 5



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2			4			

CULVERT 2

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CHECKED BY: <u>R. M. KROL</u>	DATE: <u>05/2026</u>
DESIGN ENGINEER OF RECORD: <u>A. L. PHILLIPS</u>	DATE: <u>05/2026</u>

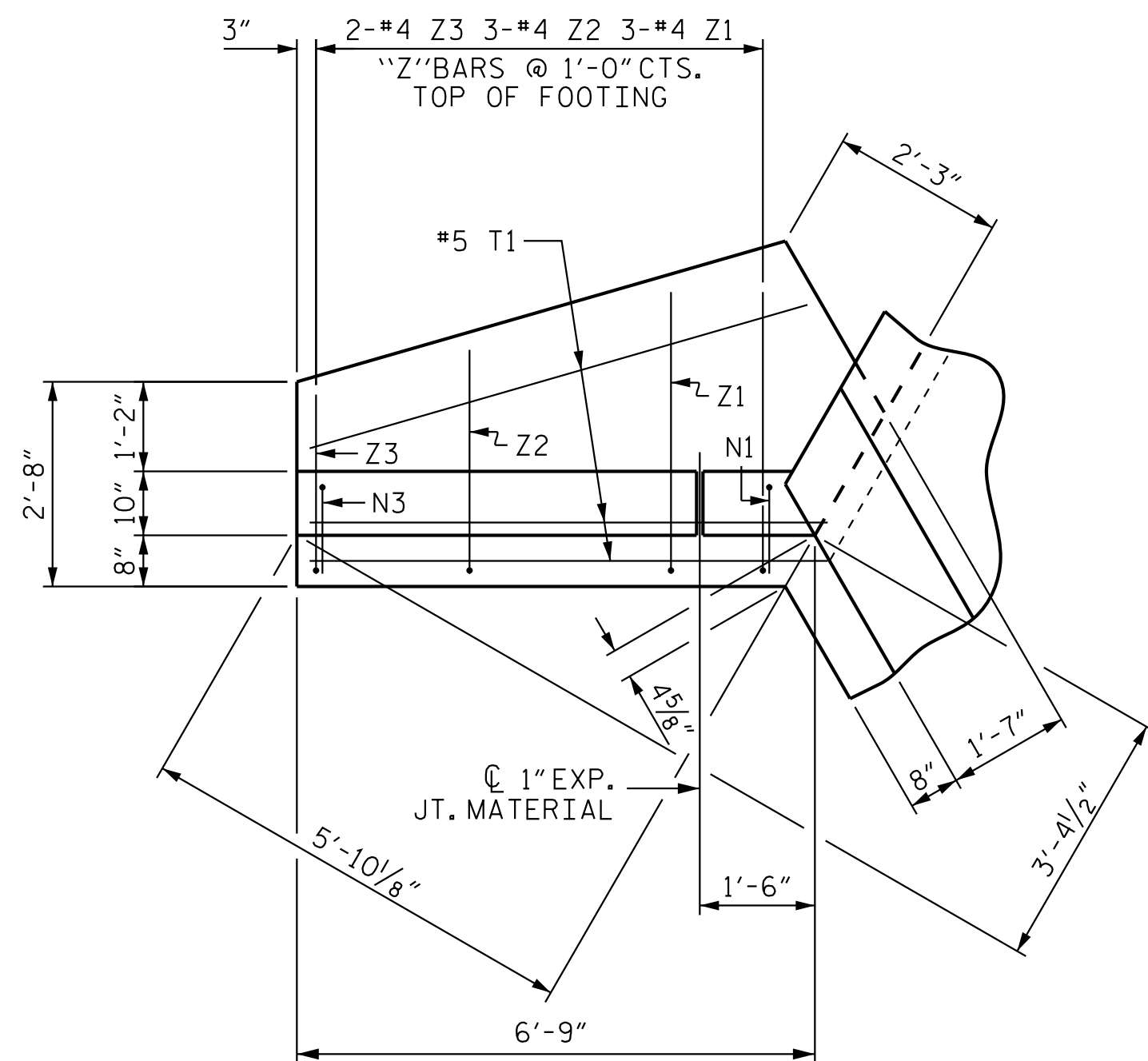
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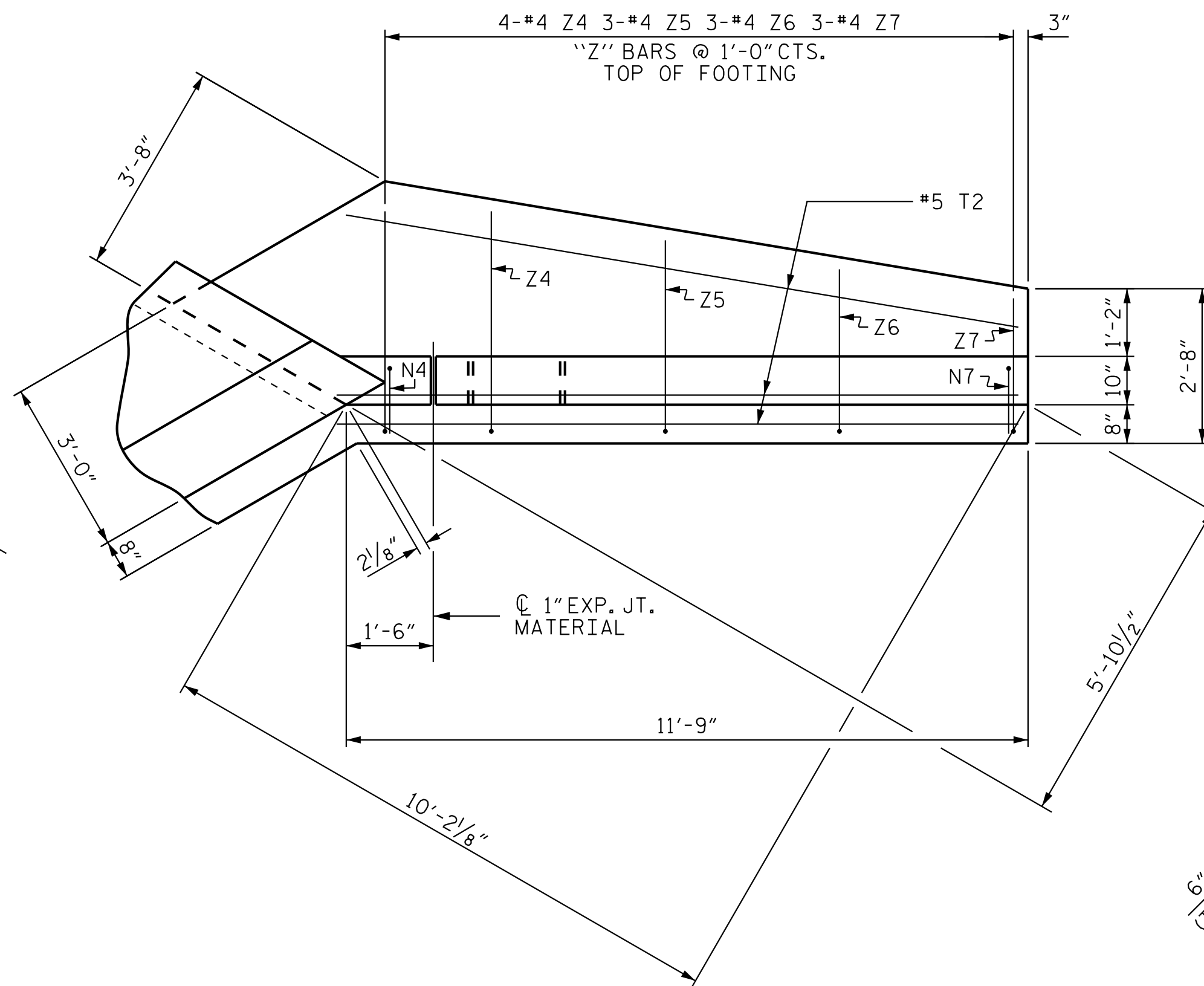
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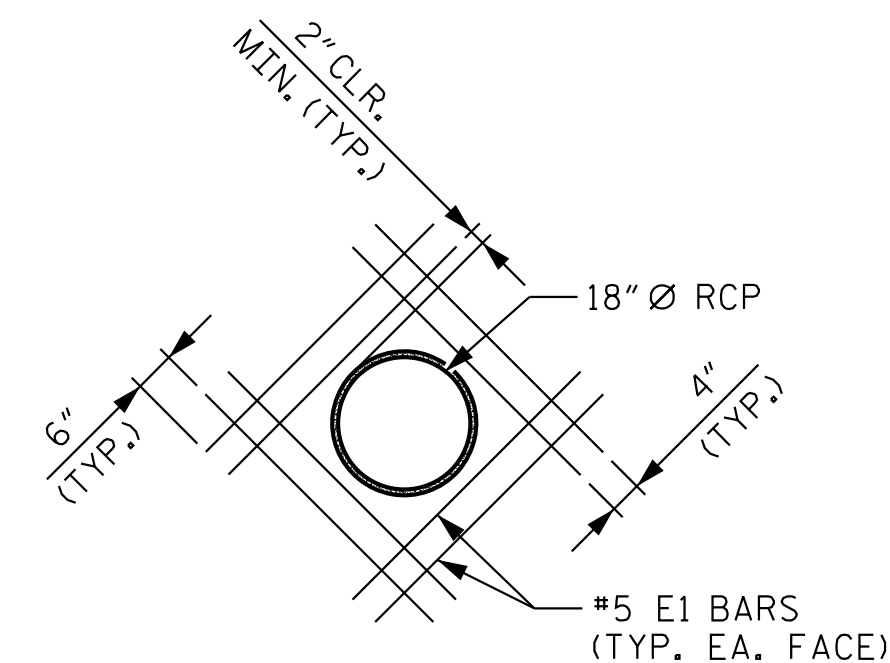
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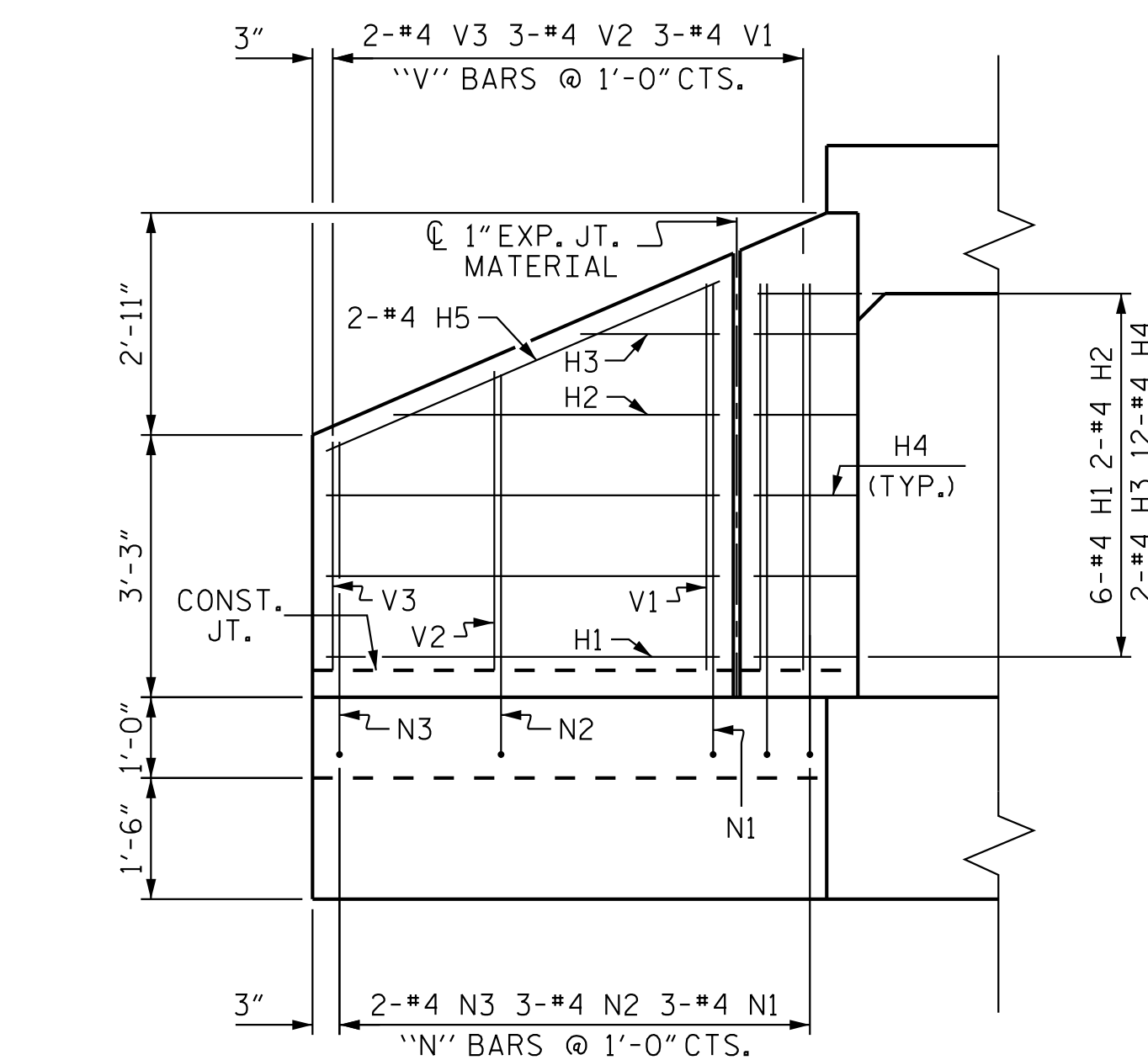
PLAN W2



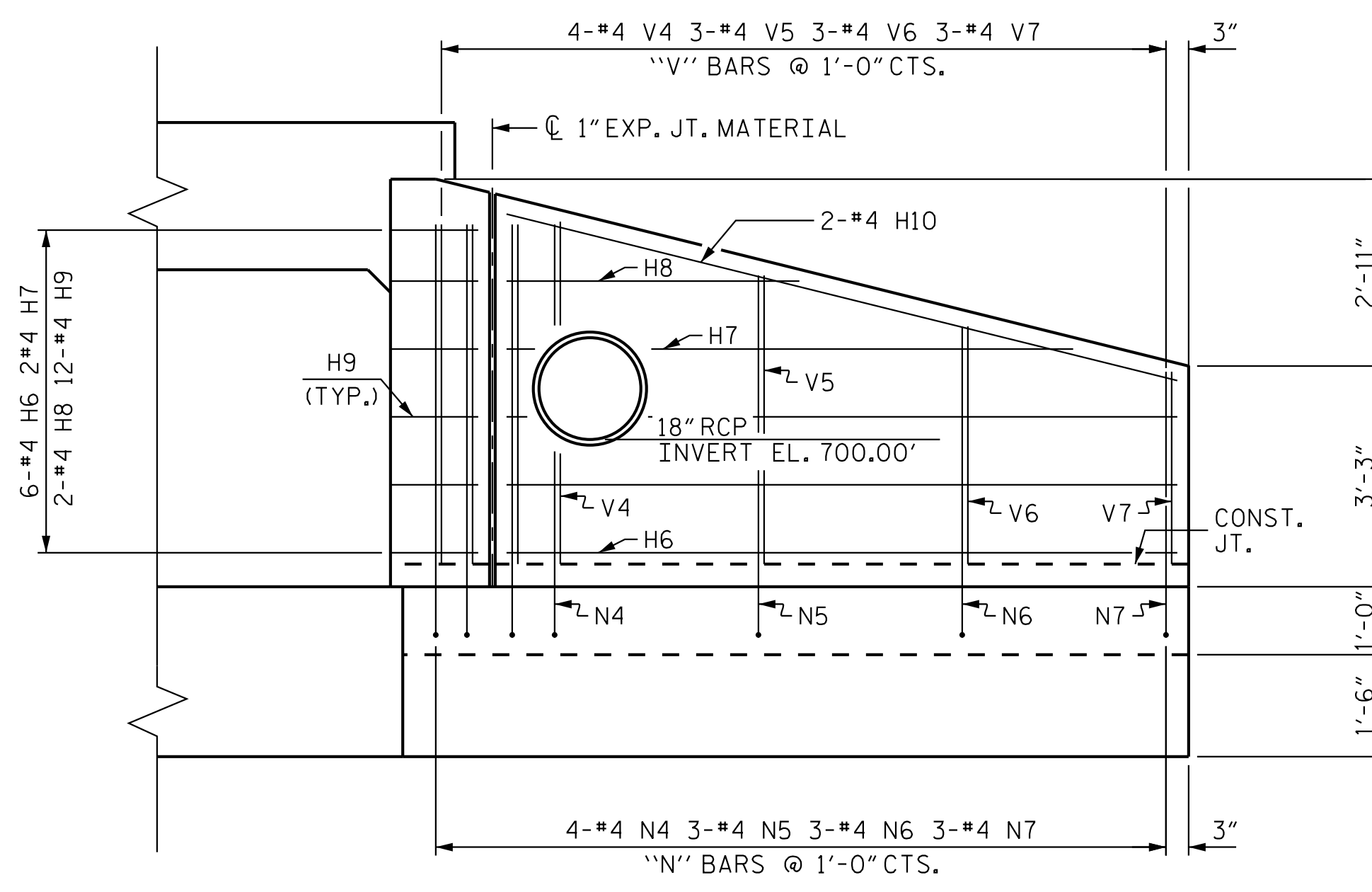
PLAN W1



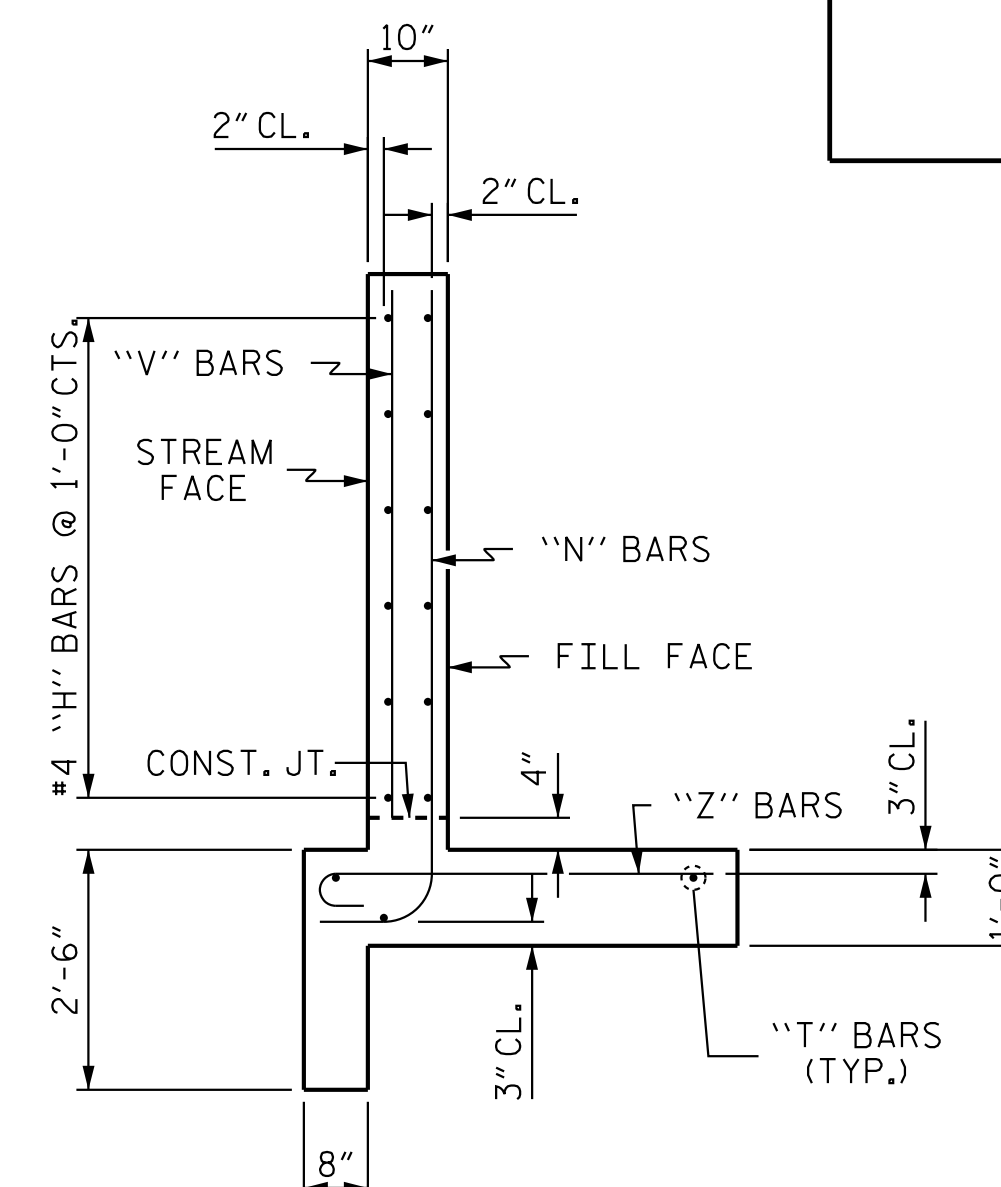
DETAIL OF REINFORCING
AROUND 18' DIA. RCP



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

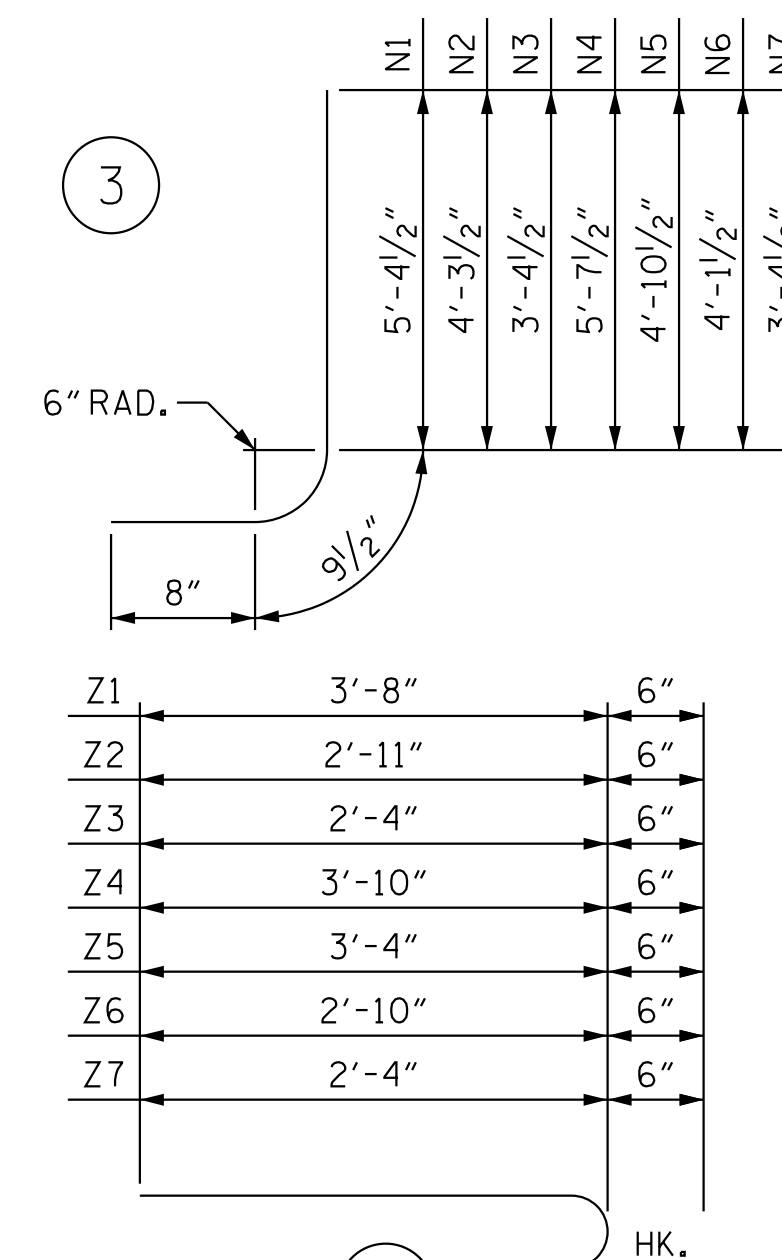
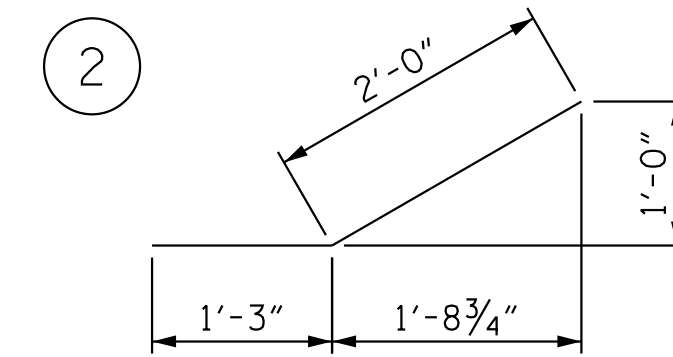
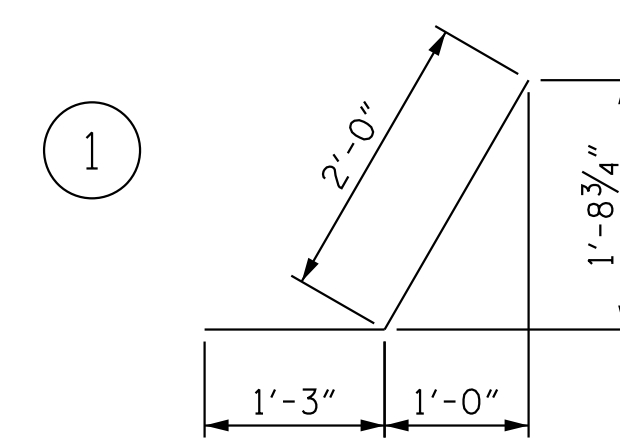
NOTES

FOR LOCATION OF 18" RCP, REFER TO
ROADWAY PLANS.

REINFORCING BARS MAY BE FIELD CUT AS NECESSARY TO AVOID THE 18-INCH RCP. WHERE REINFORCING STEEL IS FIELD CUT, THE BARS SHALL BE CUT ONLY TO MAINTAIN A MAXIMUM OF 2 INCHES CLEAR TO THE PIPE.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
E1	16	#5	STR	3'-7"	60
H1	6	#4	STR	4'-10"	19
H2	2	#4	STR	4'-0"	5
H3	2	#4	STR	1'-9"	2
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	5'-3"	7
H6	6	#4	STR	9'-10"	39
H7	2	#4	STR	8'-4"	11
H8	2	#4	STR	4'-3"	6
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	10'-2"	14
N1	3	#4	3	6'-10"	14
N2	3	#4	3	5'-9"	12
N3	2	#4	3	4'-10"	6
N4	4	#4	3	7'-1"	19
N5	3	#4	3	6'-4"	13
N6	3	#4	3	5'-7"	11
N7	3	#4	3	4'-10"	10
T1	3	#5	STR	6'-9"	21
T2	3	#5	STR	11'-9"	37
V1	3	#4	STR	4'-9"	10
V2	3	#4	STR	3'-8"	7
V3	2	#4	STR	2'-10"	4
V4	4	#4	STR	5'-0"	13
V5	3	#4	STR	4'-3"	9
V6	3	#4	STR	3'-6"	7
V7	3	#4	STR	2'-10"	6
Z1	3	#4	4	4'-2"	8
Z2	3	#4	4	3'-4"	7
Z3	2	#4	4	2'-10"	4
Z4	4	#4	4	4'-4"	12
Z5	3	#4	4	4'-0"	8
Z6	3	#4	4	3'-4"	7
Z7	3	#4	4	2'-10"	6

REINFORCING STEEL FOR 2 WINGS	466 LBS
----------------------------------	---------

CLASS A CONCRETE	
2 WINGS	6.1 CY
1 HEADWALLS	0.8 CY
1 END CURTAIN WALLS	0.8 CY
TOTAL	7.7 CY

PROJECT NO. I-5715
MECKLENBURG COUNTY
 STATION: 19+43.13 -Y2-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

60° SKEW

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

CULVERT 2 STD. NO. CW6005

Kimley»»Horn

421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
Phone (919) 677-2000

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K:\B01_Structures\Bridge\N\01036524 - I-5715 Structure Design\Cad\Obj\Culvert\1\Final\Culvert_1.dwg 2:43:00 9/15/15 SWI CLU5 005.dgn

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS																
LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING ⬡	MINIMUM RATING FACTORS (RF)	TONS = W x 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		HL-93 (INVENTORY)	N/A	⬡1	1.23	--	1.75	1.23	1	TOP SLAB	7.00	2.11	1	TOP SLAB	13.00	
		HL-93 (OPERATING)	N/A		1.60	--	1.35	1.60	1	TOP SLAB	7.00	2.73	1	TOP SLAB	13.00	
		HS-20 (INVENTORY)	36.000	⬡2	1.42	51.12	1.75	1.42	1	TOP SLAB	7.00	2.41	1	TOP SLAB	13.00	
		HS-20 (OPERATING)	36.000		1.84	66.24	1.35	1.84	1	TOP SLAB	7.00	3.13	1	TOP SLAB	13.00	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		3.10	41.85	1.40	3.10	1	TOP SLAB	7.00	5.26	1	TOP SLAB	13.00	
		SNGARBS2	20.000		2.90	58.00	1.40	2.90	1	TOP SLAB	7.00	4.93	1	TOP SLAB	13.00	
		SNAGRIS2	22.000		3.10	68.20	1.40	3.10	1	TOP SLAB	7.00	5.26	1	TOP SLAB	13.00	
		SNCOTTS3	27.250	⬡3	1.56	42.51	1.40	1.56	1	TOP SLAB	7.00	2.97	1	TOP SLAB	1.00	
		SNAGGRS4	34.925		1.83	63.91	1.40	1.83	1	TOP SLAB	7.00	3.11	1	TOP SLAB	1.00	
		SNS5A	35.550		1.70	60.44	1.40	1.70	1	TOP SLAB	7.00	3.10	1	TOP SLAB	13.00	
		SNS6A	39.950		1.69	67.52	1.40	1.69	1	TOP SLAB	7.00	3.07	1	TOP SLAB	13.00	
		SNS7B	42.000		1.68	70.56	1.40	1.68	1	TOP SLAB	7.00	3.08	1	TOP SLAB	1.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.69	88.77	1.40	2.69	1	BOTTOM SLAB	7.00	4.89	1	TOP SLAB	13.00	
		TNT4A	33.075		1.85	61.19	1.40	1.85	1	TOP SLAB	7.00	3.52	1	TOP SLAB	1.00	
		TNT6A	41.600		1.77	73.63	1.40	1.77	1	TOP SLAB	7.00	3.20	1	TOP SLAB	1.00	
		TNT7A	42.000		1.81	76.02	1.40	1.81	1	TOP SLAB	7.00	3.39	1	TOP SLAB	1.00	
		TNT7B	42.000		1.77	74.34	1.40	1.77	1	TOP SLAB	7.00	3.12	1	TOP SLAB	1.00	
		TNAGRIT4	43.000		1.85	79.55	1.40	1.85	1	TOP SLAB	7.00	3.46	1	TOP SLAB	1.00	
		TNAGT5A	45.000		1.85	83.25	1.40	1.85	1	TOP SLAB	7.00	3.45	1	TOP SLAB	13.00	
		TNAGT5B	45.000		1.85	83.25	1.40	1.85	1	TOP SLAB	7.00	3.46	1	TOP SLAB	1.00	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.19	62.96	1.30	2.19	1	TOP SLAB	7.00	3.72	1	TOP SLAB	13.00	
		EV3	43.000	⬡4	1.36	58.48	1.30	1.36	1	TOP SLAB	7.00	2.59	1	TOP SLAB	13.00	

LOAD FACTORS:

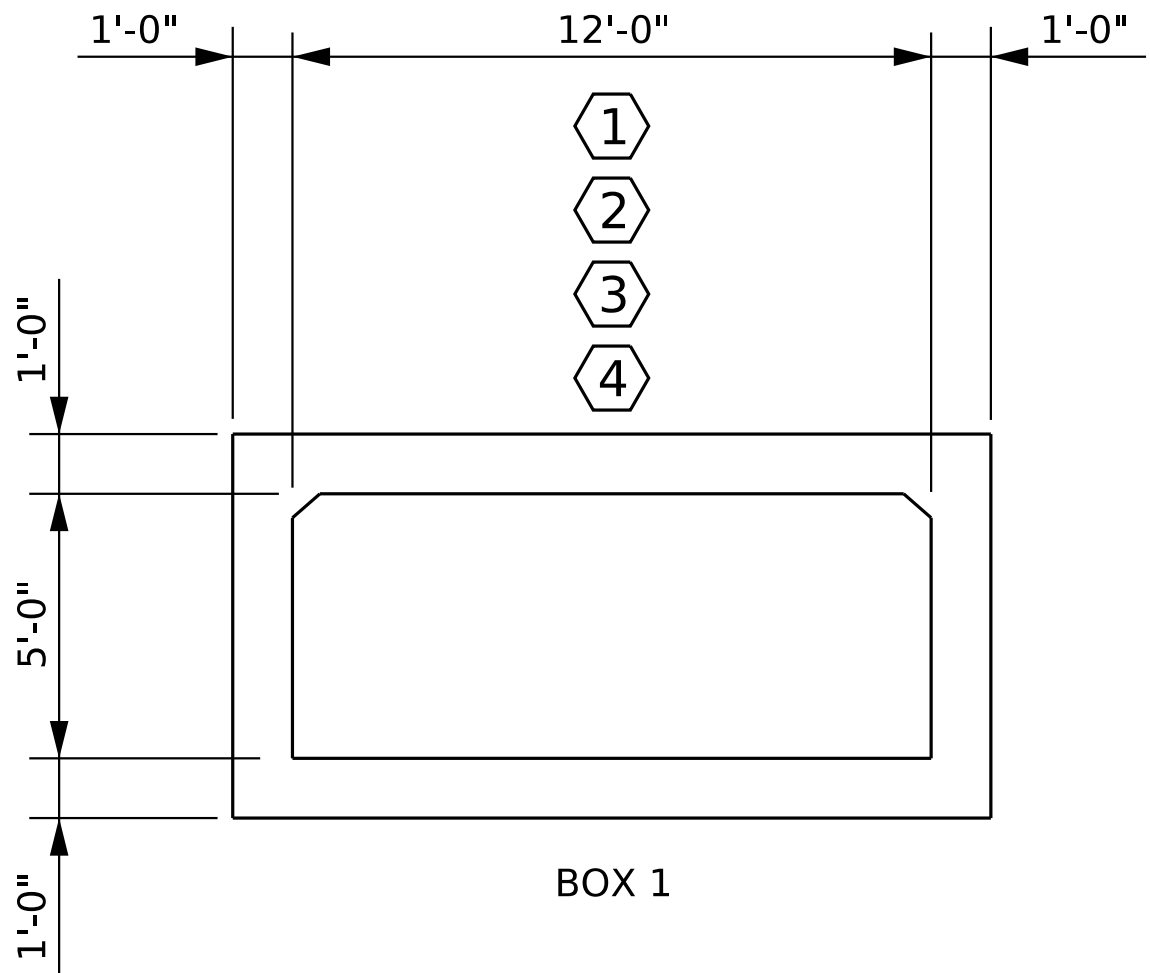
DESIGN LOAD RATING FACTORS		
LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATES.

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

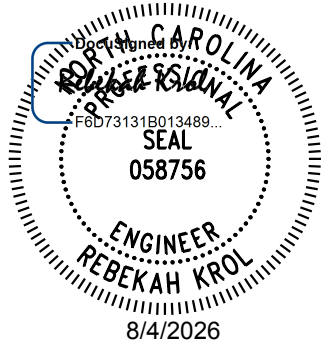
⬡	CONTROLLING LOAD RATING
⬡1	DESIGN LOAD RATING (HL-93)
⬡2	DESIGN LOAD RATING (HS-20)
⬡3	LEGAL LOAD RATING * *
⬡4	EMERGENCY VEHICLE LOAD RATING * *
* * SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. I-5715
MECKLENBURG COUNTY
STATION: 19+43.13 -Y2-

SHEET 5 OF 5



Kimley»Horn
421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
Phone (919) 677-2000
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ASSEMBLED BY : R.G. GIESEN	DATE : 04/2026
CHECKED BY : A. L. PHILLIPS	DATE : 04/2026
DRAWN BY : WMC 7/11	REV. 10/11/11
CHECKED BY : GM 7/11	REV. 12/17
	REV. 04/23
	MAA/GM
	MAA/THC
	BNB/AAI

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