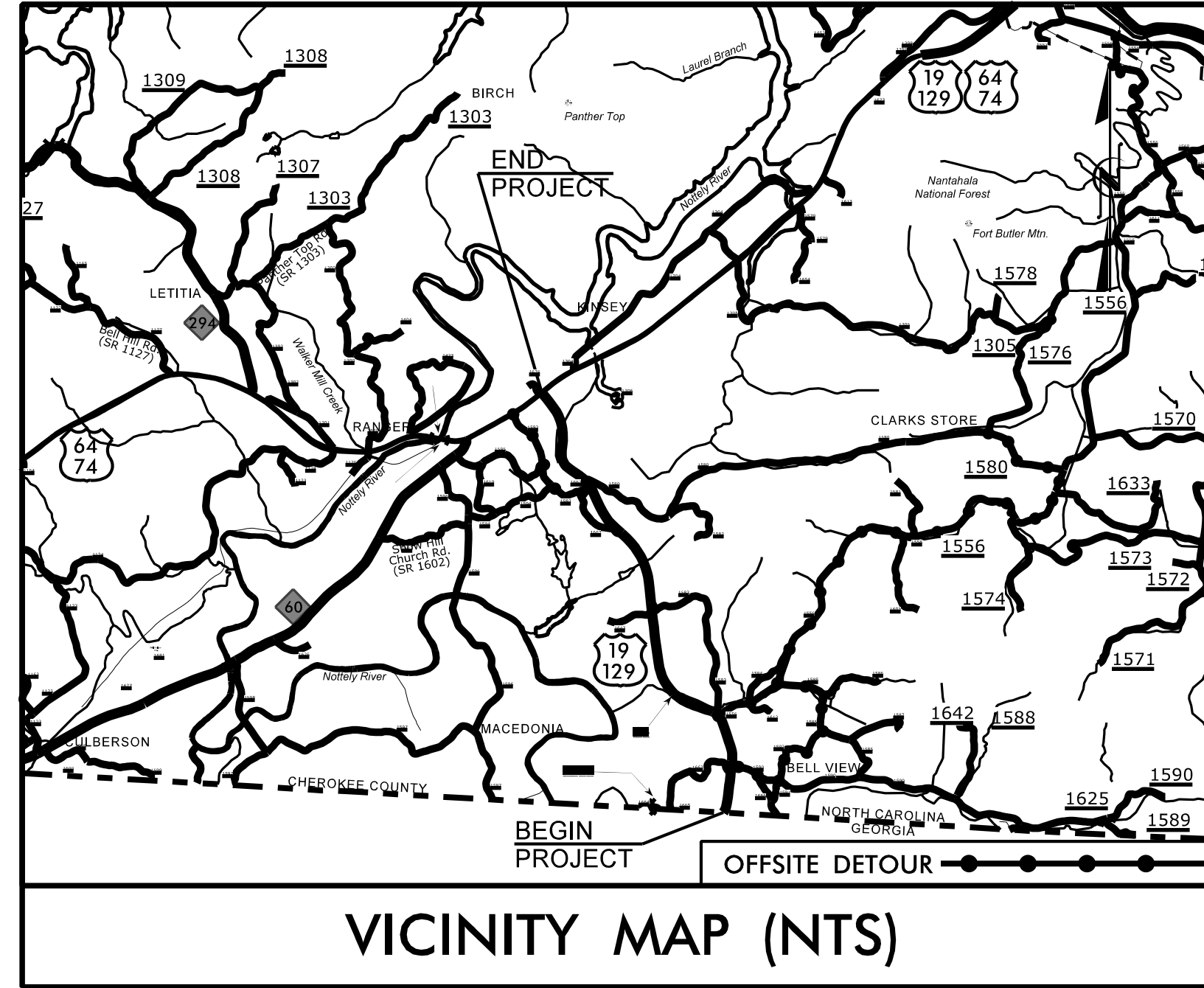


TIP PROJECT: R-5861

CONTRACT: C204887



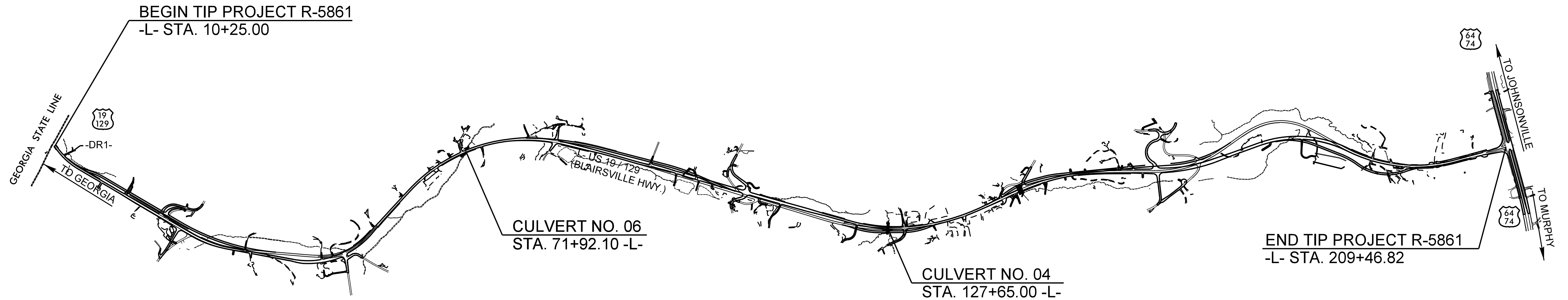
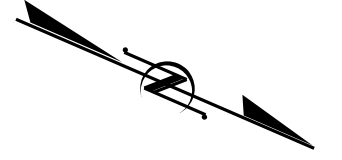
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CHEROKEE COUNTY

LOCATION: WIDENING US 19/129 FROM THE GEORGIA STATE LINE TO US 64/74.

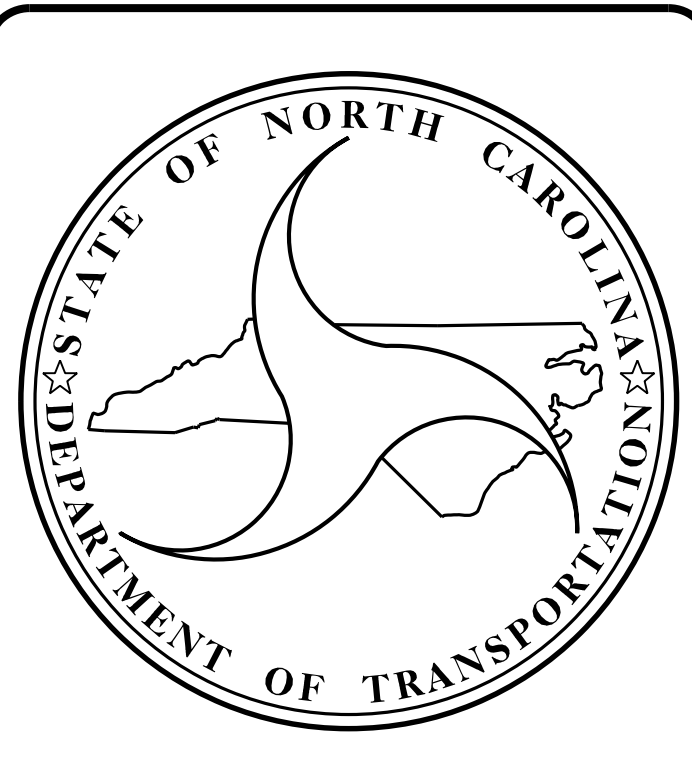
TYPE OF WORK: GRADING, PAVING, WIDENING, DRAINAGE, AND CULVERTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5861		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
47427.1.2		PE	
47427.2.1		RW	
47427.2.2		UTIL.	
47427.3.1	4742701	CONST.	



STRUCTURES

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

ADT 2023	=	9,477
ADT 2043	=	11,103
V	=	60 MPH
DHV	=	8%
D	=	55%
T	=	4% *
(* TTST=2% /* DUAL=2%)		
FUNC CLASS	=	RURAL ARTERIAL REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5861	=	3.769 MILES
LENGTH STRUCTURE TIP PROJECT R-5861	=	0.004 MILE
TOTAL LENGTH TIP PROJECT R-5861	=	3.773 MILES

Prepared for the Office of:
DIVISION OF HIGHWAYS
STRUCTURES MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

2018 STANDARD SPECIFICATIONS

Brandon McInnis, P.E.
PROJECT ENGINEER

Ricky V. Keith, P.E.
PROJECT STRUCTURE ENGINEER

Kenneth J. McDowell
DIVISION 14

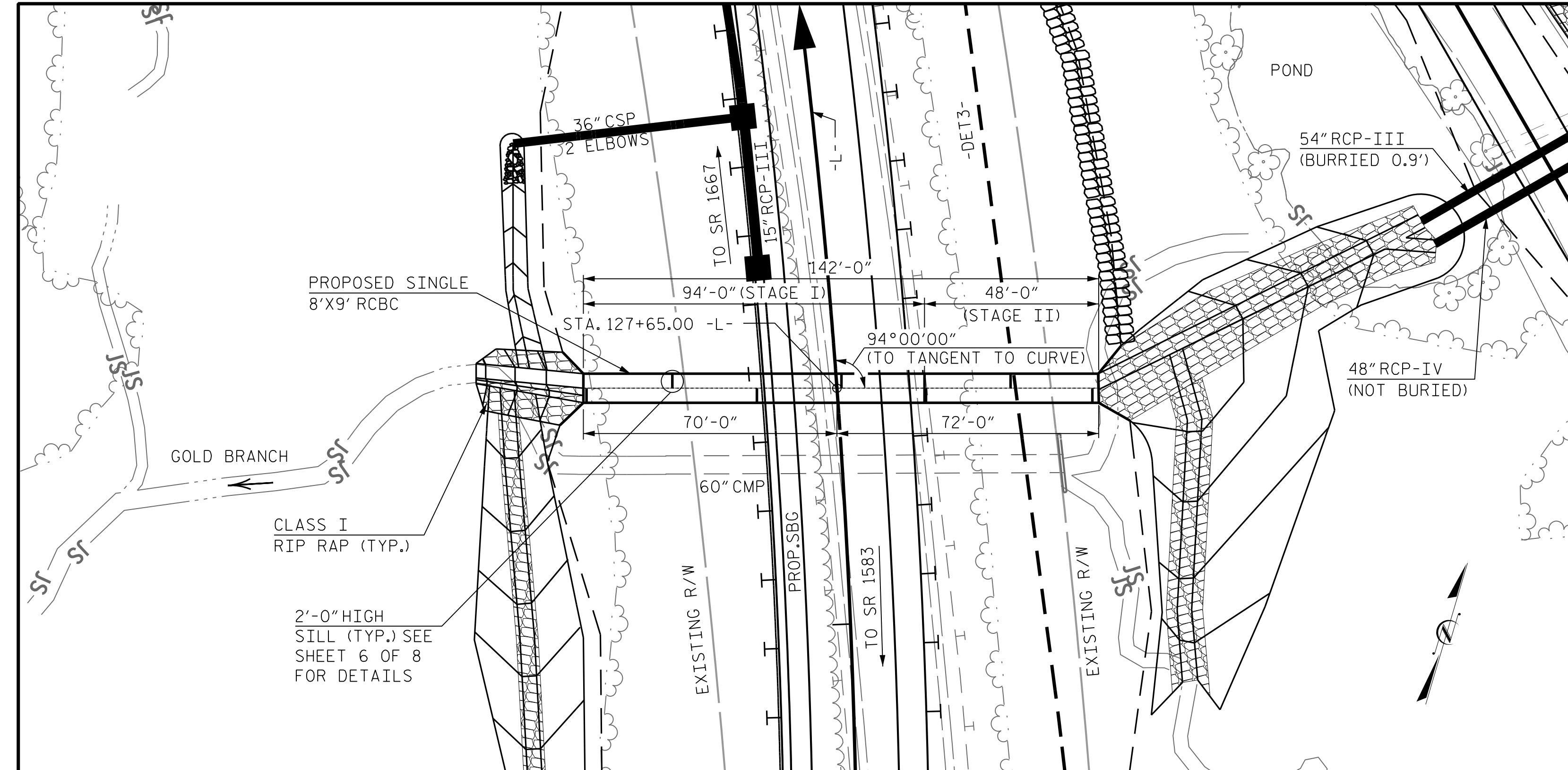
LETTING DATE :
DECEMBER 19, 2023

PLANS PREPARED BY:

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Raleigh, North Carolina 27615 | NC License No. F-0112
www.rkk.com
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10/9/2023

BENCH MARK: BM #7 -L- STA. 123+65.00, 38' LT, BENCHTIE NAIL IN 24" OAK, N 498955, E 477848; EL. 1676.10, NAVD 88



LOCATION SKETCH

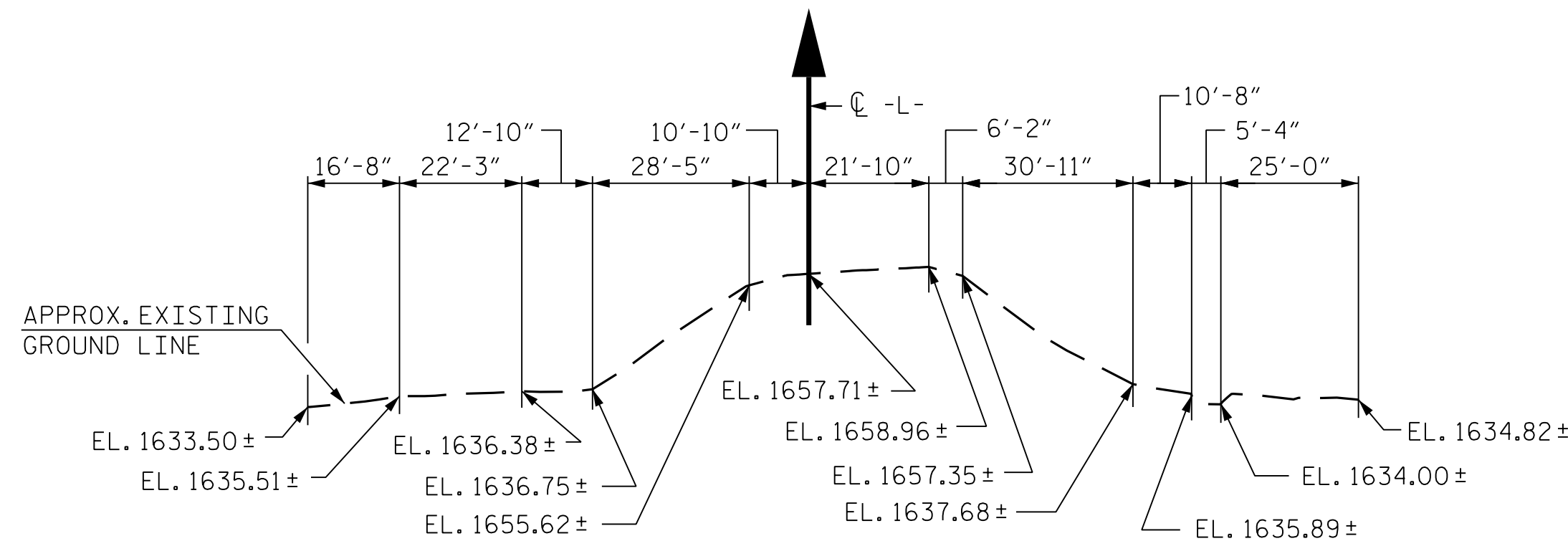
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS
 GRADE POINT ELEVATION AT STA. 127+65.00 = 1664.63
 INVERT ELEVATION AT STA. 127+65.00 = 1631.30
 ROADWAY SLOPES = 2:1

STAGE I STRUCTURE QUANTITIES			
CLASS A CONCRETE			
BARREL @ 1.21	CY/FT	113.8	C.Y.
WING ETC.	15.0		C.Y.
SILLS/BAFFLES	2.3		C.Y.
TOTAL	131.1		C.Y.
REINFORCING STEEL			
BARREL	27,890		LBS.
WINGS ETC.	902		LBS.
TOTAL	28,792		LBS.
CULVERT EXCAVATION			LUMP SUM
FOUNDATION CONDITIONING MATERIAL			447 TONS

STAGE II STRUCTURE QUANTITIES			
CLASS A CONCRETE			
BARREL @ 1.21	CY/FT	58.1	C.Y.
WING ETC.	15.0		C.Y.
SILLS/BAFFLES	0.9		C.Y.
TOTAL	74.0		C.Y.
REINFORCING STEEL			
BARREL	14,181		LBS.
WINGS ETC.	902		LBS.
TOTAL	15,083		LBS.
CULVERT EXCAVATION			LUMP SUM
FOUNDATION CONDITIONING MATERIAL			228 TONS

HORIZONTAL CURVE DATA -L-

P.I. STA. 127+30.02
 $\Delta = 23^\circ 20' 58.3''$ (LT)
 $D = 2^\circ 41' 46.6''$
 $L = 865.99'$
 $T = 439.09'$
 $R = 2,125.00'$



PROFILE ALONG CULVERT

NOTES:

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.
- DESIGN FILL----- 24.1 FT. (MAX.), 22.2 FT. (MIN.)
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
- CONCRETE IN STAGE I CULVERT TO BE POURED IN THE FOLLOWING ORDER:
 1. STAGE I WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE I VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF STAGE I WALLS TO THE PERMITTED CONSTRUCTION JOINT AND STAGE I WINGS FOR FULL HEIGHT.
 3. STAGE I ROOF SLAB, HEADWALL, AND SILL/BAFFLE.
- CONCRETE IN STAGE II CULVERT TO BE POURED IN THE FOLLOWING ORDER:
 1. STAGE II WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE II VERTICAL WALLS.
 2. THE REMAINING PORTION OF STAGE II WALLS TO THE PERMITTED CONSTRUCTION JOINT AND STAGE II WINGS FOR FULL HEIGHT.
 3. STAGE II ROOF SLAB, HEADWALL, AND SILL/BAFFLE.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN 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 THE EXTERIOR WALL ABOVE THE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WINGS COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- NO PRECAST BOX CULVERT OPTION WILL BE ALLOWED.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- EXCAVATE 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL (SELECT MATERIAL, CLASS VI). UNDERCUT AN ADDITIONAL 4 FEET AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL.
- UNDERCUT ANY SOFT/LOOSE ALLUVIAL SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL BACKFILL UNDERCUT AREA WITH FOUNDATION CONDITIONING MATERIAL.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

HYDRAULIC DATA

DESIGN DISCHARGE-----430 C.F.S.
 FREQUENCY OF DESIGN FLOOD-----50 YR.
 DESIGN HIGH WATER ELEVATION-----1641.30
 DRAINAGE AREA-----211.0 AC.
 BASE DISCHARGE (Q100)-----490 C.F.S.
 BASE HIGH WATER ELEVATION-----1642.00

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE-----1,614 C.F.S.
 FREQUENCY OF OVERTOPPING FLOOD-----500 YR. +
 OVERTOPPING FLOOD ELEVATION-----1665.10

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 127+65.00 -L-

SHEET 1 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SINGLE 8 FT. X 9 FT.
 CONCRETE BOX CULVERT
 94° SKEW

CULVERT NO. 04



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REVISIONS				SHEET NO.	
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1			3		
2			4		

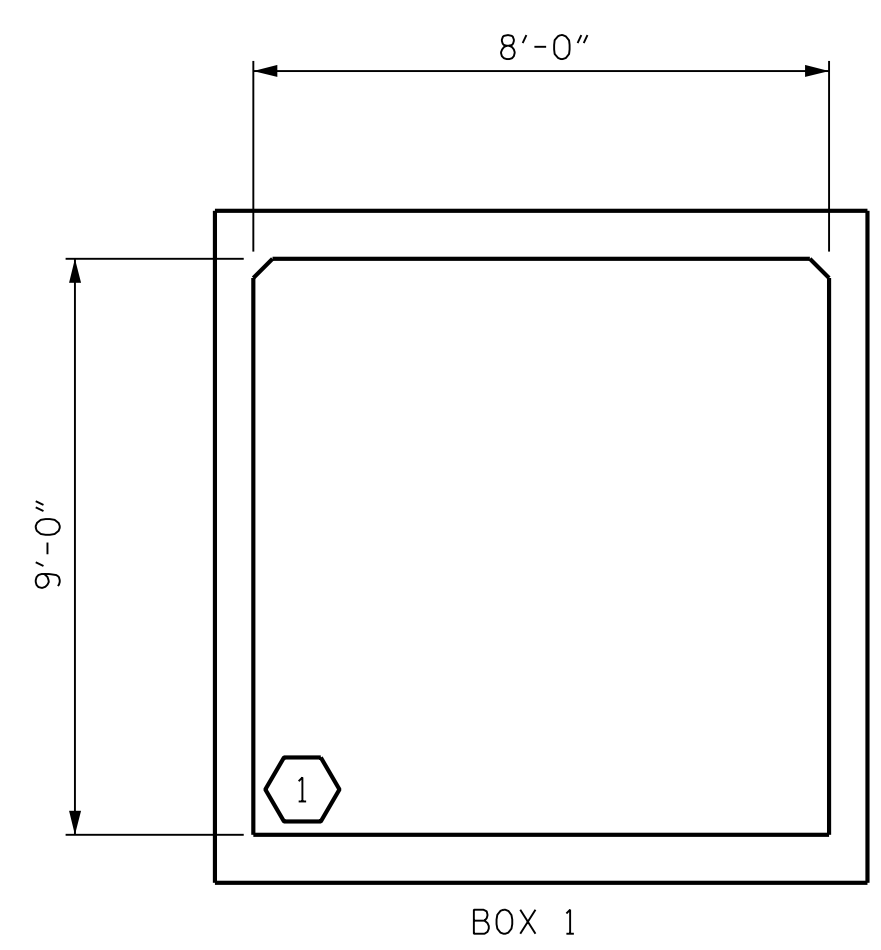
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TOTAL SHEETS
8

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DRAWN BY : B. H. GONFA DATE : JUN 2023
 CHECKED BY : K. HAWKINS DATE : JUN 2023
 DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JUN 2023

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS										
	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	STRENGTH I LIMIT STATE							
			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)
PERMANENT LOAD RATING	1	1.10	1.19	1	WALL	4.5	1.10	1	WALL	0.1



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
WA	1.00	--

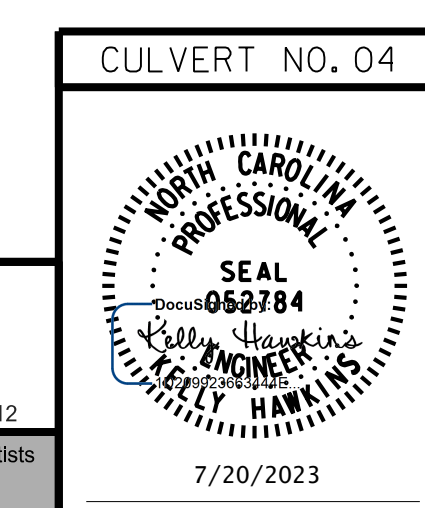
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.
 THE EFFECTS OF LIVE LOAD ON DESIGN AND LOAD RATING MAY BE NEGLECTED FOR CULVERTS WITH CERTAIN FILL DEPTHS DESCRIBED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
 CULVERTS WITH NEGLIGIBLE LIVE LOAD SHOULD BE LOAD RATED FOR PERMANENT LOADS ONLY IN ACCORDANCE WITH THE AASHTO MANUAL FOR BRIDGE EVALUATION.

7/20/2023 R:\Structures\Culverts\Culvert 4 - GoldBranch\Drawn\Final\NR-5861_SMU_CU_4-2_190000.dgn

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 127+65.00 -L-

SHEET 2 OF 8



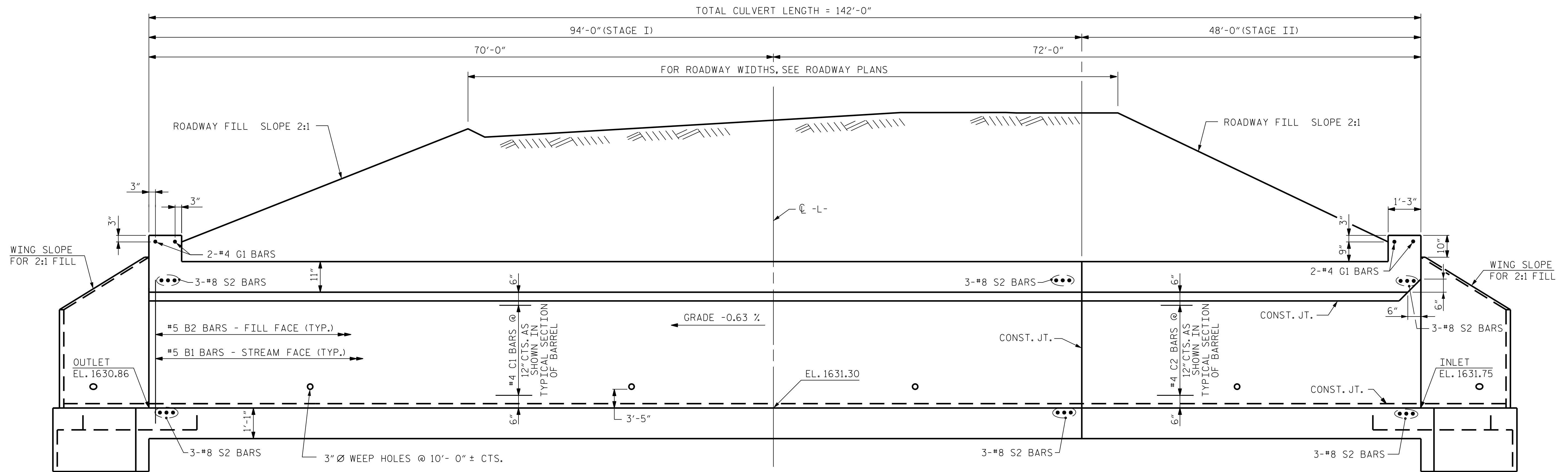
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (DEEP FILLS)

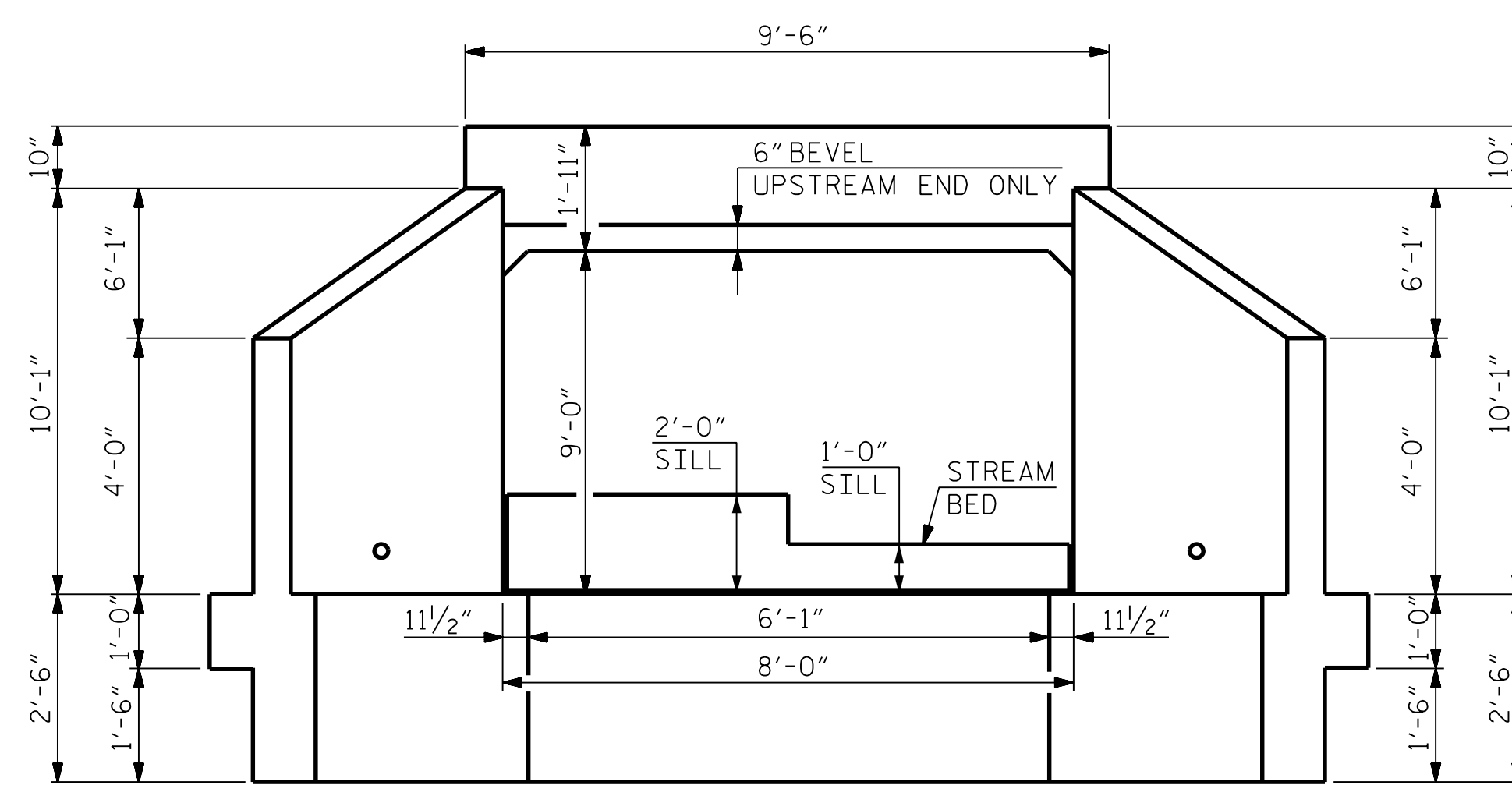
DRAWN BY : B. H. GONFA DATE : JUN 2023
 CHECKED BY : K. HAWKINS DATE : JUN 2023
 DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JUN 2023

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

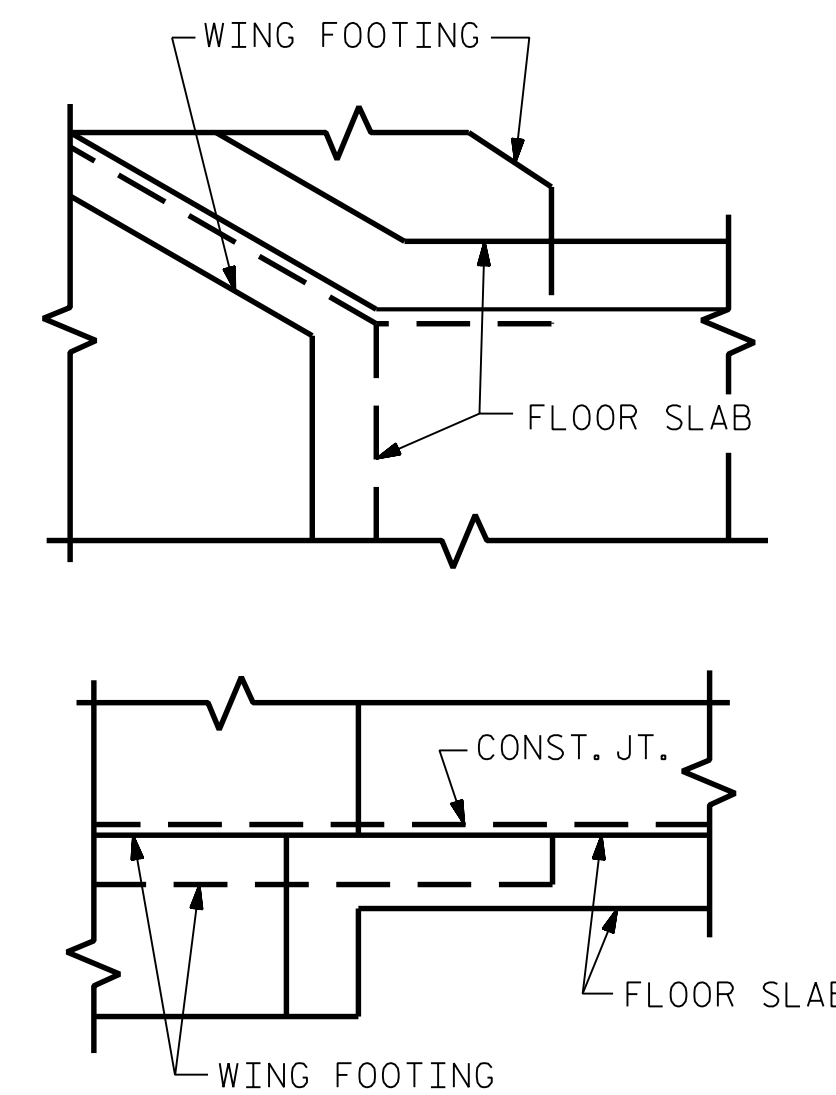
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CULVERT SECTION ALONG CENTERLINE OF CULVERT
 (FOR SILL/BAFFLE LOCATIONS, SEE SHEET 6 OF 8)



END ELEVATION



DETAIL

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

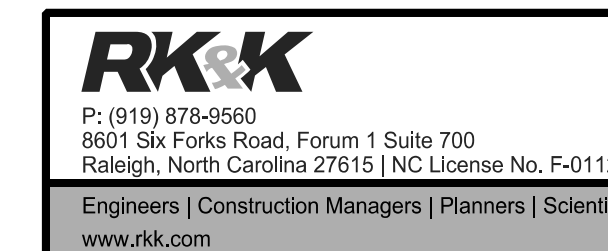
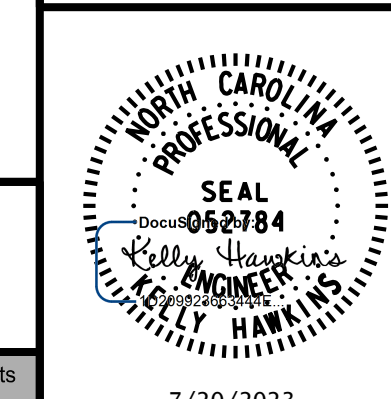
PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 127+65.00 -L-

SHEET 3 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**SINGLE 8 FT. X 9 FT.
 CONCRETE BOX CULVERT**

CULVERT NO. 04



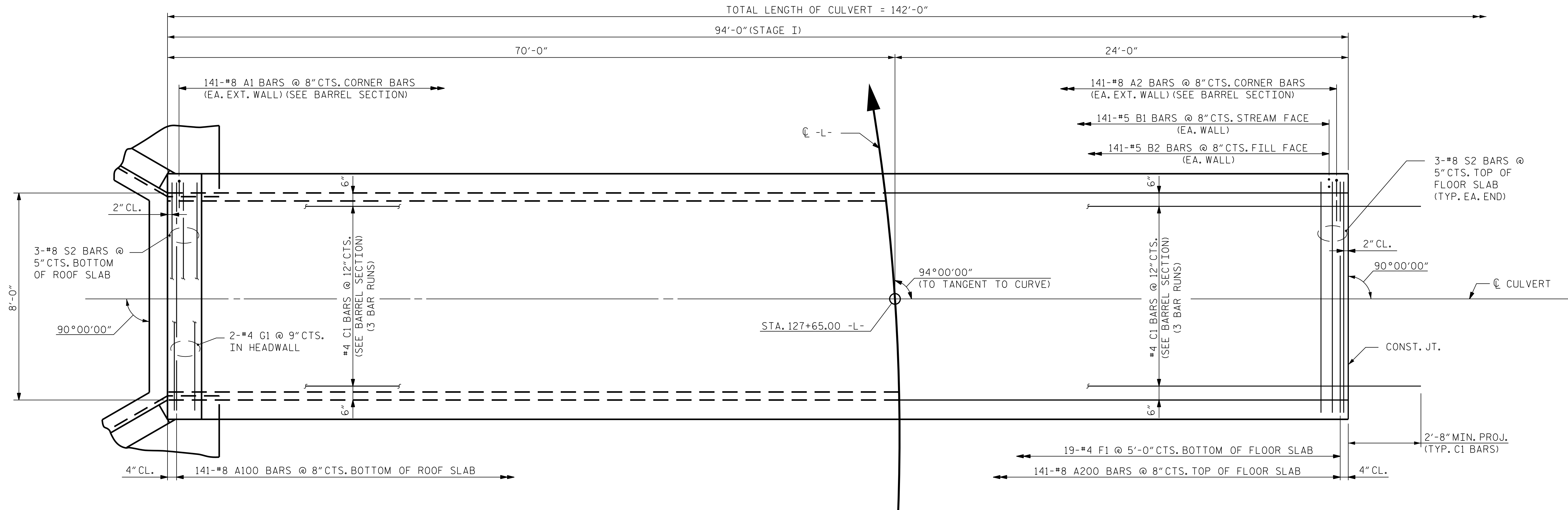
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NO.	BY:	DATE:	NO.	BY:	DATE:
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2			4		

TOTAL SHEETS: **8**

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DRAWN BY : B. H. GONFA DATE : JUN 2023
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 DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JUN 2023



PART PLAN ROOF SLAB

PART PLAN FLOOR SLAB

STAGE I

(FOR SILL/BAFFLE LOCATIONS, SEE SHEET 6 OF 8)

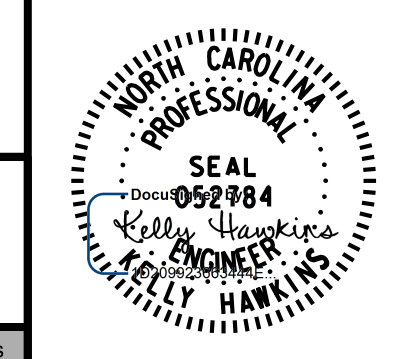
PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 127+65.00 -L-

SHEET 4 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SINGLE 8 FT. X 9 FT.
 CONCRETE BOX CULVERT
 STAGE I

CULVERT NO. 04



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 P: (919) 878-9560
 8601 Six Forks Road, Forum 1 Suite 700
 Raleigh, North Carolina 27615 | NC License No. F-0112
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NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
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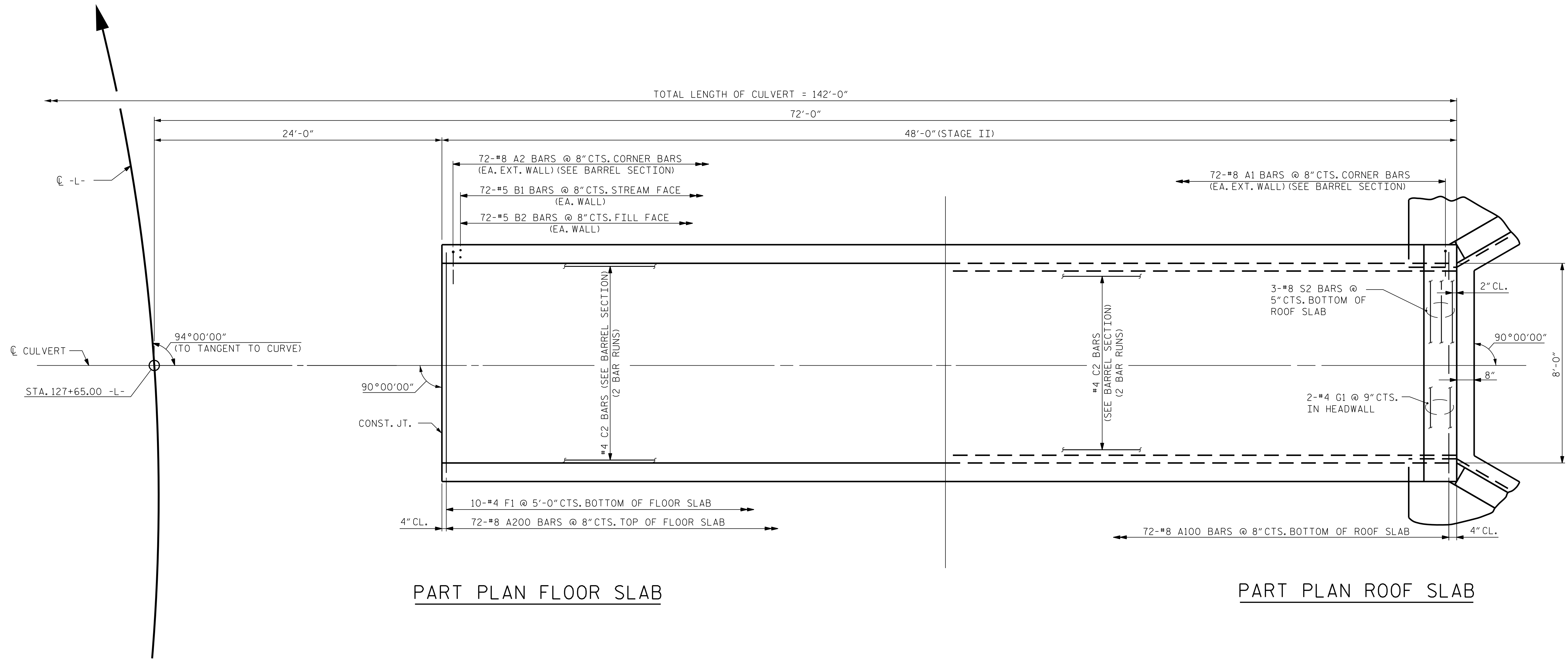
TOTAL SHEETS: **8**

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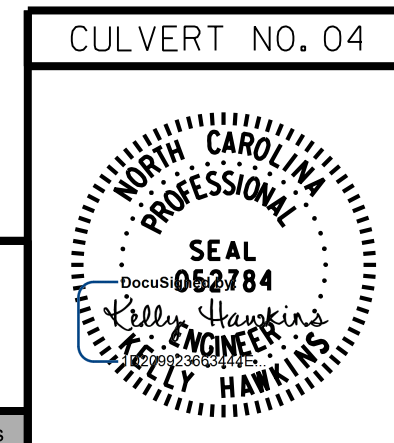
STAGE II
(FOR SILL/BAFFLE LOCATIONS, SEE SHEET 6 OF 8)

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 127+65.00 -L-

SHEET 5 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SINGLE 8 FT. X 9 FT.
 CONCRETE BOX CULVERT
 STAGE II

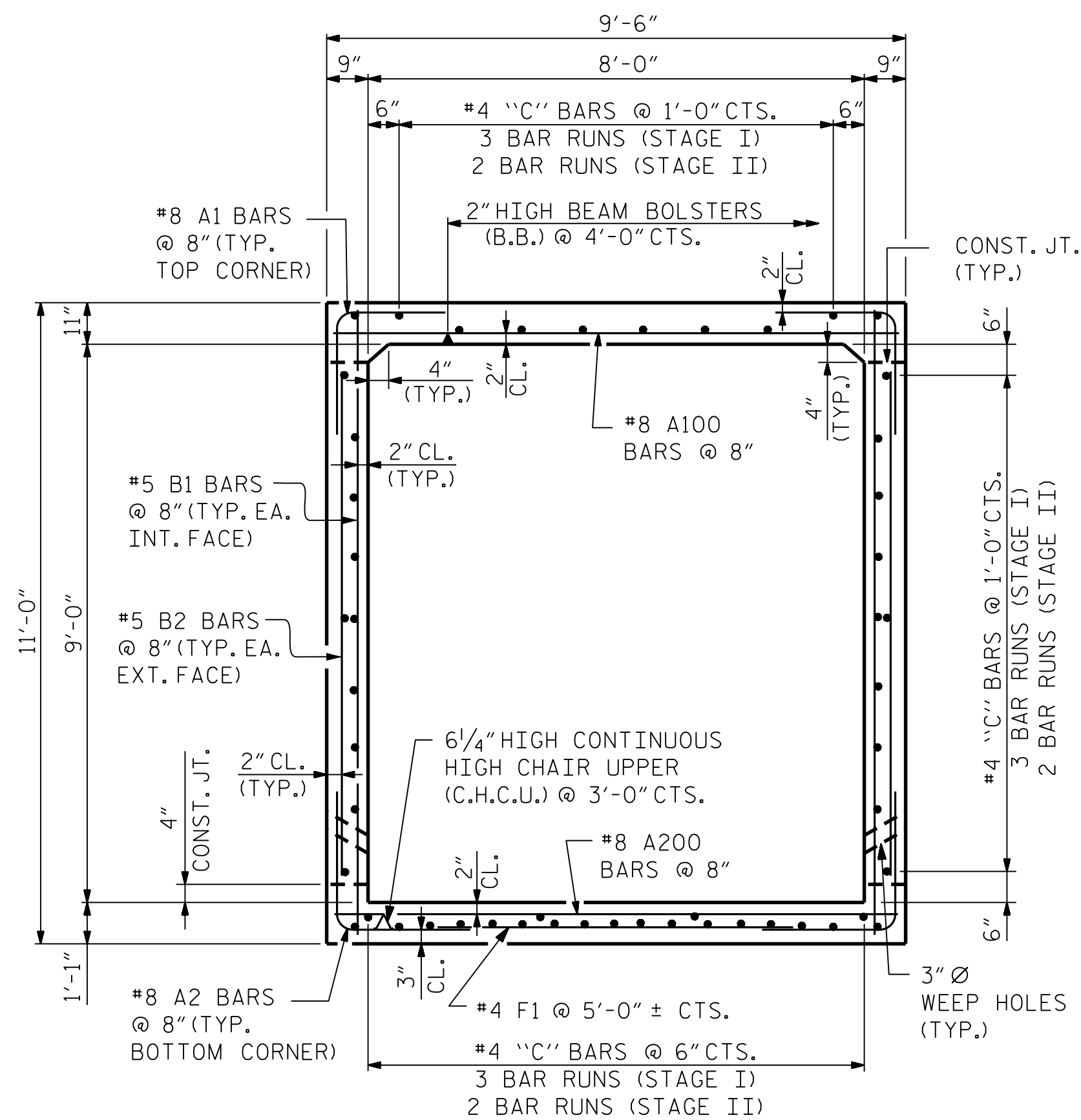


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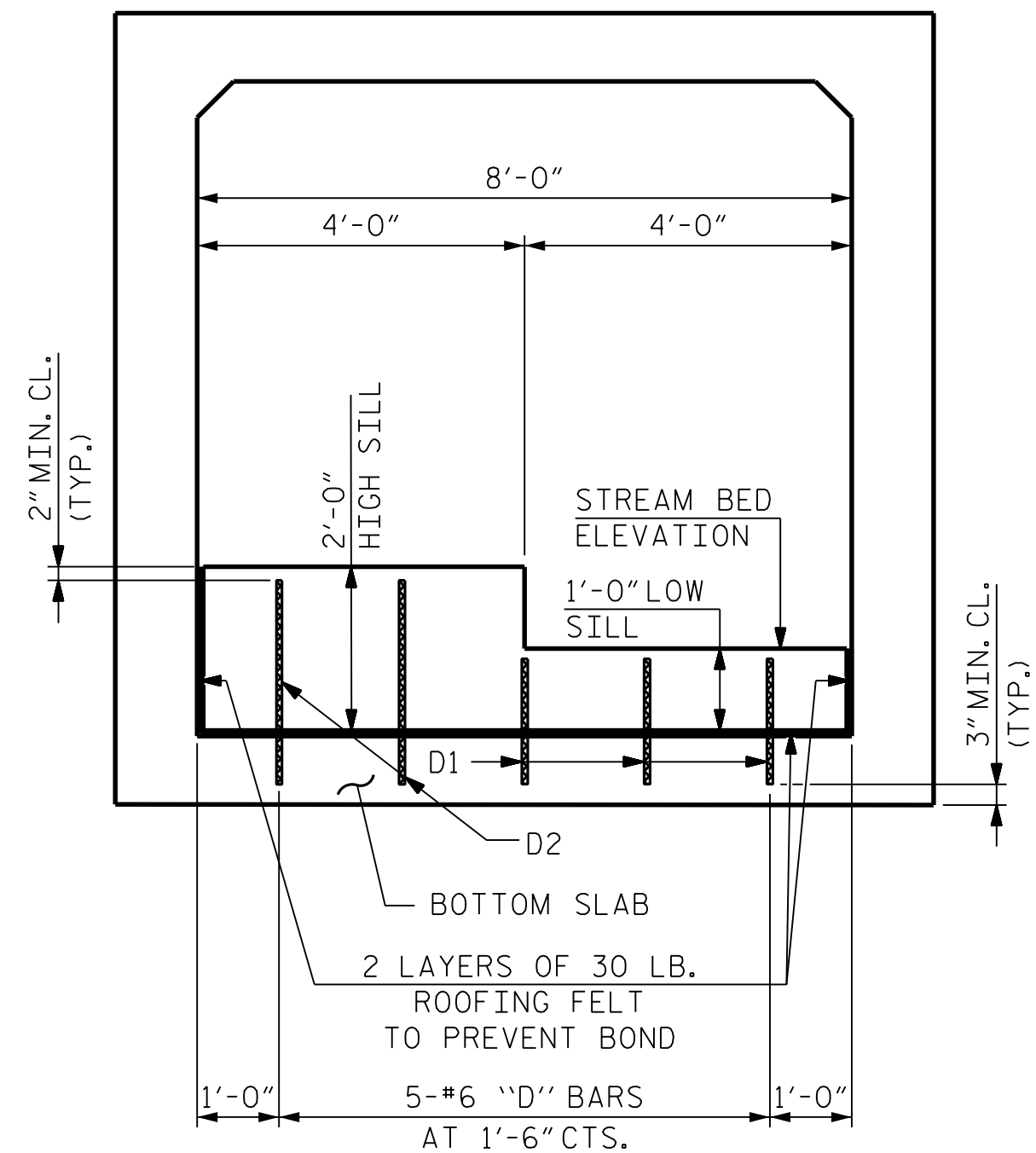
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RIGHT ANGLE SECTION OF BARREL

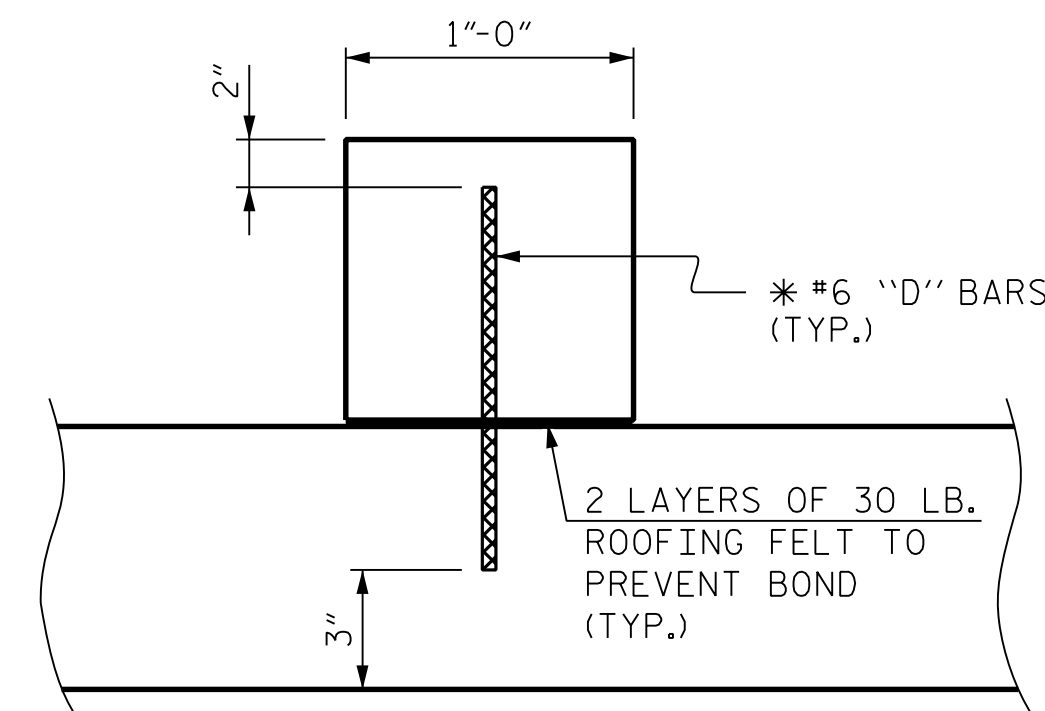
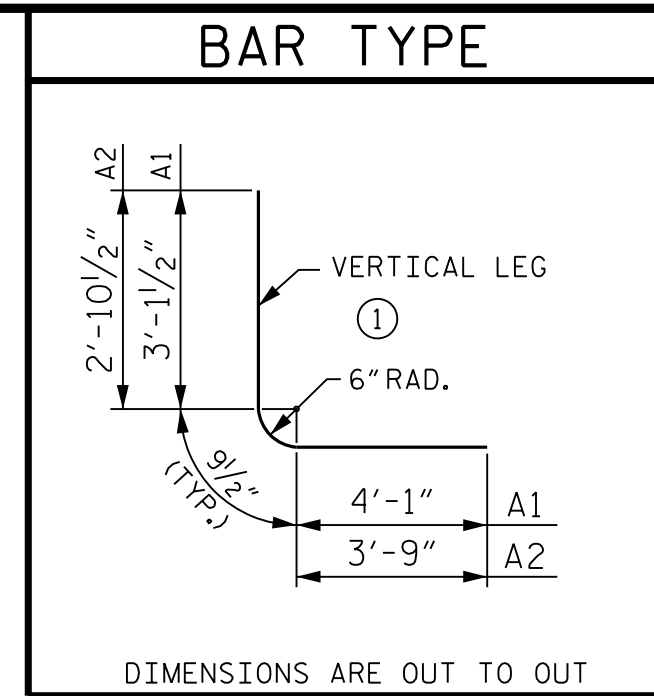
THERE ARE 51 'C' BARS IN SECTION OF BARREL



SILL ELEVATION

DOWEL SPACING SHOWN PERPENDICULAR TO CULVERT BARREL

SPLICE LENGTHS		
BAR	SIZE	SPLICE LENGTHS
B1	#5	2'-4"
B2	#5	2'-4"
C1	#4	2'-5"
C2	#4	2'-5"



SECTION THROUGH SILL

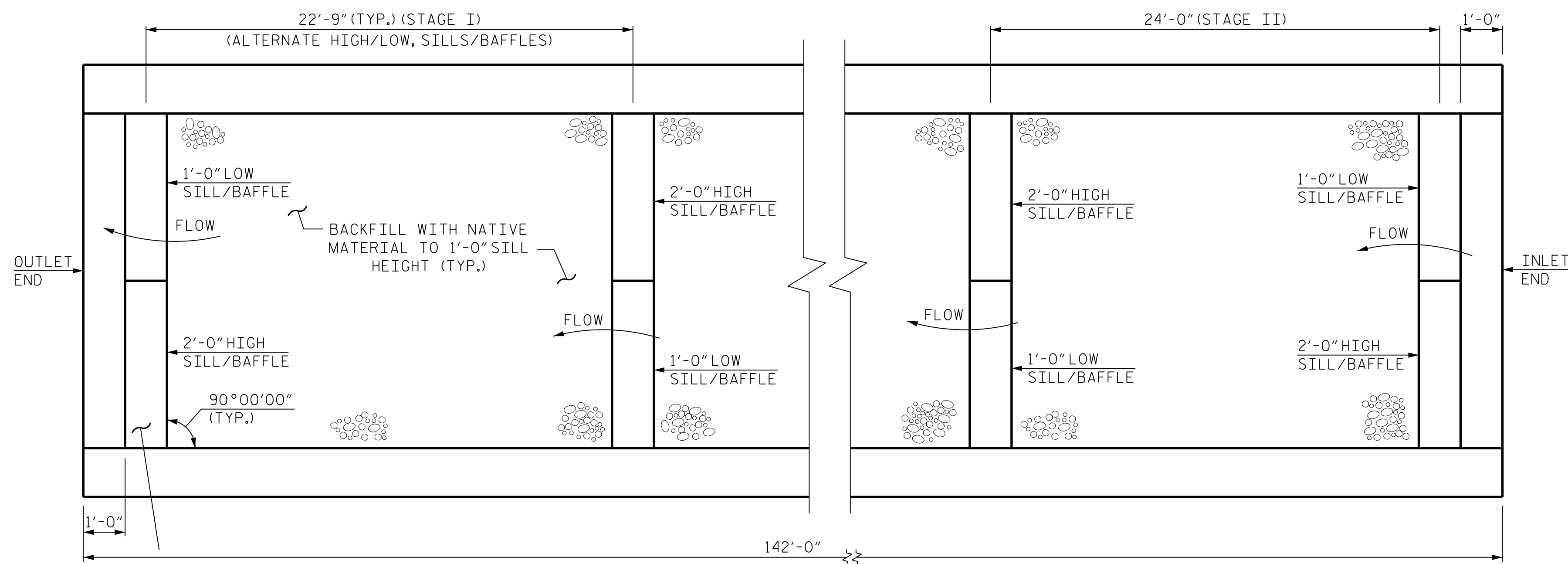
DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED

BILL OF MATERIAL (STAGE I)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	282	#8	1	8'-0"	6,024
A2	282	#8	1	7'-5"	5,584
A100	141	#8	STR.	9'-2"	3,451
A200	141	#8	STR.	9'-2"	3,451
B1	282	#5	STR.	10'-7"	3,113
B2	282	#5	STR.	8'-0"	2,353
C1	153	#4	STR.	33'-10"	3,458
D1	15	#6	STR.	1'-8"	38
D2	10	#6	STR.	2'-8"	40
F1	19	#4	STR.	5'-8"	72
G1	2	#4	STR.	9'-2"	12
S2	12	#8	STR.	9'-2"	294

REINFORCING STEEL 27,890 LBS.

BILL OF MATERIAL (STAGE II)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	144	#8	1	8'-0"	3,076
A2	144	#8	1	7'-5"	2,852
A100	72	#8	STR.	9'-2"	1,762
A200	72	#8	STR.	9'-2"	1,762
B1	144	#5	STR.	10'-7"	1,590
B2	144	#5	STR.	8'-0"	1,202
C1	102	#4	STR.	25'-1"	1,709
D1	6	#6	STR.	1'-8"	15
D2	4	#6	STR.	2'-8"	16
F1	10	#4	STR.	5'-8"	38
G1	2	#4	STR.	9'-2"	12
S2	6	#8	STR.	9'-2"	147

REINFORCING STEEL 14,181 LBS.



SILL PLAN

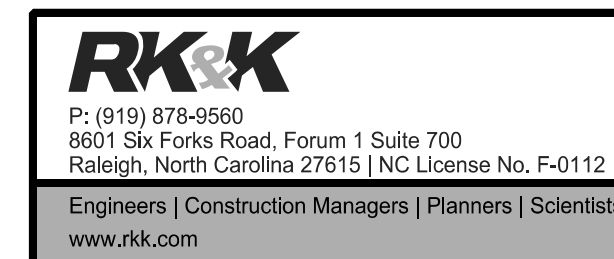
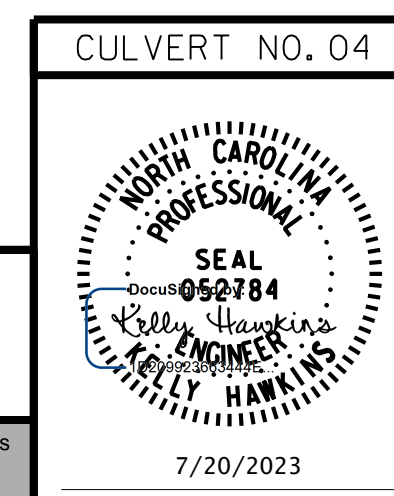
ALTERNATE 2'-0" TALL HIGH SILLS/BAFFLES LEFT AND RIGHT TO FORCE STREAM TO MEANDER ALONG THE LENGTH OF THE CULVERT

NOTES:

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO BACKFILL THE CULVERT BARREL. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 127+65.00 -L-

SHEET 6 OF 8



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SINGLE 8 FT. X 9 FT. CONCRETE BOX CULVERT

CULVERT NO. 04

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

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SHEET NO.	
CU-4-6	TOTAL SHEETS 8

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DRAWN BY : <u>B. H. GONFA</u>	DATE : <u>JUN 2023</u>
CHECKED BY : <u>K. HAWKINS</u>	DATE : <u>JUN 2023</u>
DESIGN ENGINEER OF RECORD : <u>K. HAWKINS</u>	DATE : <u>JUN 2023</u>

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1 1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

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

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

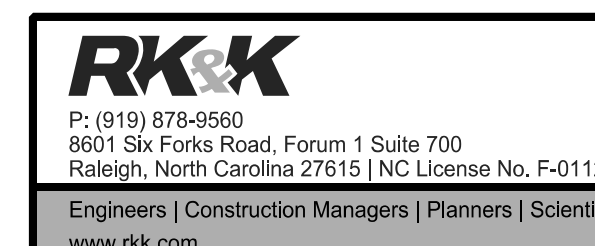
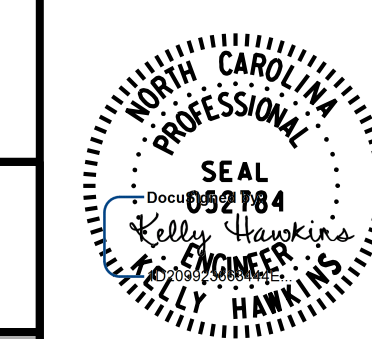
PROJECT NO. R-5861
CHEROKEE COUNTY
STATION: 127+65.00 -L-

SHEET 8 OF 8

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
NOTES

CULVERT NO. 04



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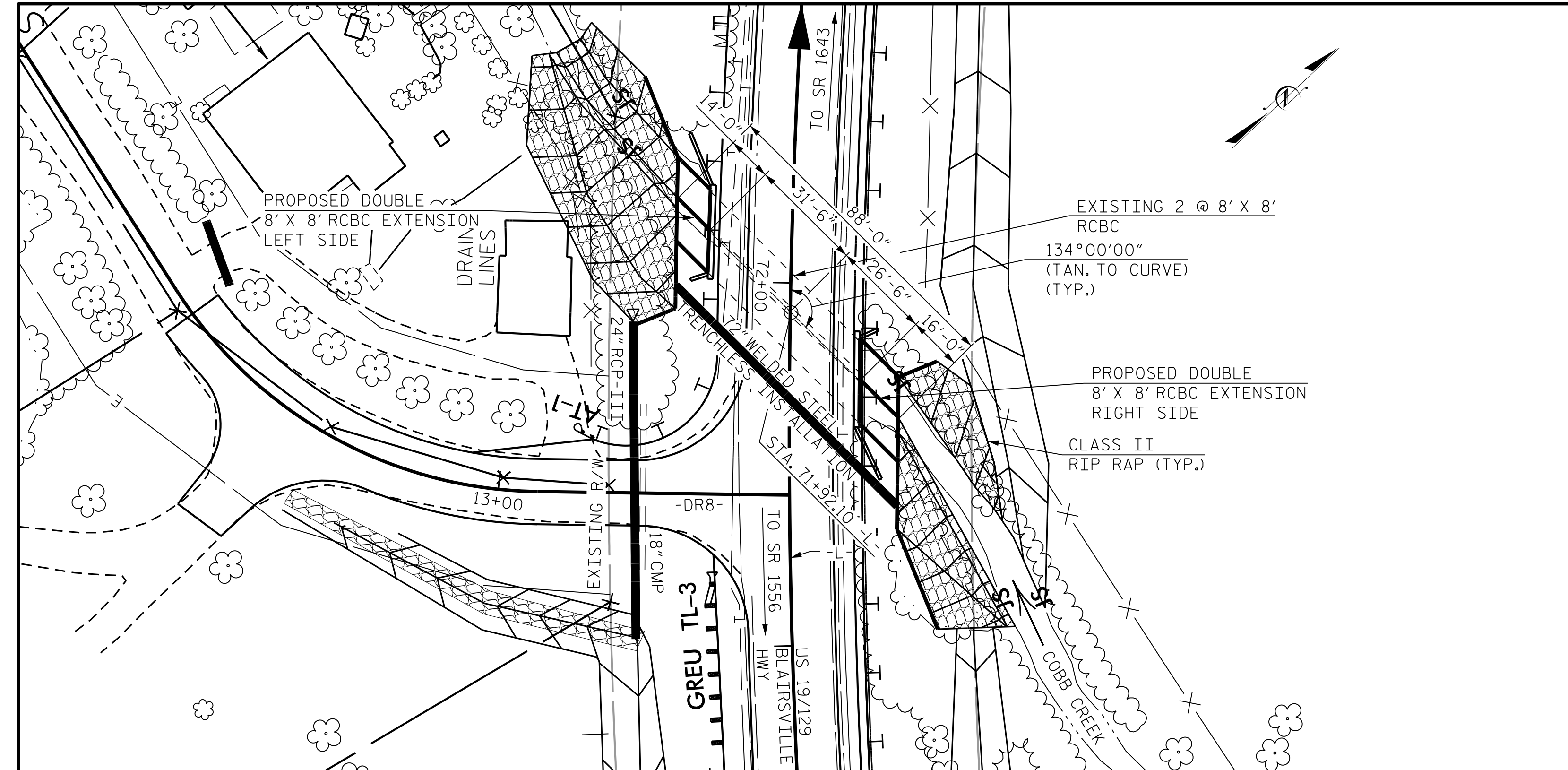
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1			3		
2			4		
				TOTAL SHEETS	
				8	

DRAWN BY : B. H. GONFA DATE : JUN 2023
CHECKED BY : K. HAWKINS DATE : JUN 2023
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JUN 2023

7/20/2023 R:\Structures\Culverts\Culvert 4 - GoldBranch\GN\FinalR-5861_SMJ_CU_4-8_190000.dgn tboyd

BENCH MARK: BM #4 -L- STA. 69+21.01, 80.5' RT, BENCHTIE NAIL IN 20" PINE, N 493887, E 479285; EL. 1630.12, NAVD 88



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS
 GRADE POINT ELEVATION AT STA. 71+92.10 = 1631.21
 INVERT ELEVATION AT STA. 71+92.10 = 1618.40
 ROADWAY SLOPES = 2:1

NOTES:

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.
- DESIGN FILL----- 5.5 FT. (MAX.), 3.4 FT. (MIN.)
- 3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
- CONCRETE IN BOTH LEFT AND RIGHT EXTENSION OF THE CULVERT TO BE POURED IN THE FOLLOWING ORDER:
 1. STAGE I FLOOR SLAB INCLUDING 4" OF VERTICAL WALL, CURTAIN WALL TO CONSTRUCTION JOINT, STAGE I WINGWALL FOOTING.
 2. REMAINING PORTION OF THE STAGE I WALLS TO THE CONSTRUCTION JOINT AND STAGE I WING FOR FULL HEIGHT.
 3. STAGE II FLOOR SLAB INCLUDING 4" OF VERTICAL WALL, REMAINING PORTION OF CURTAIN WALL, STAGE II WINGWALL AND PIPE HEADWALL FOOTING.
 4. REMAINING PORTION OF STAGE II WALLS TO THE PERMITTED CONSTRUCTION JOINT.
 5. ROOF SLAB, HEADWALL, REMAINING PIPE HEADWALL, STAGE II WING FOR FULL HEIGHT, AND SILL/BAFFLE.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN 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 THE EXTERIOR WALLS, AND EACH FACE OF INTERIOR WALL, ABOVE THE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WINGS COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- NO PRECAST BOX CULVERT OPTION WILL BE ALLOWED.
- 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 CU-6-15.
 EXCAVATE 1-FT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL (SELECT MATERIAL, CLASS VI).
 UNDERCUT ANY SOFT/LOOSE ALLUVIAL SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREA WITH FOUNDATION CONDITIONING MATERIAL.

HYDRAULIC DATA

DESIGN DISCHARGE-----1500 C.F.S.
 FREQUENCY OF DESIGN FLOOD-----50 YR.
 DESIGN HIGH WATER ELEVATION-----1628.40
 DRAINAGE AREA-----2.17 SQ.MI
 BASE DISCHARGE (Q100)-----1700 C.F.S.
 BASE HIGH WATER ELEVATION-----1629.60

OVERTOPPING FLOOD DATA

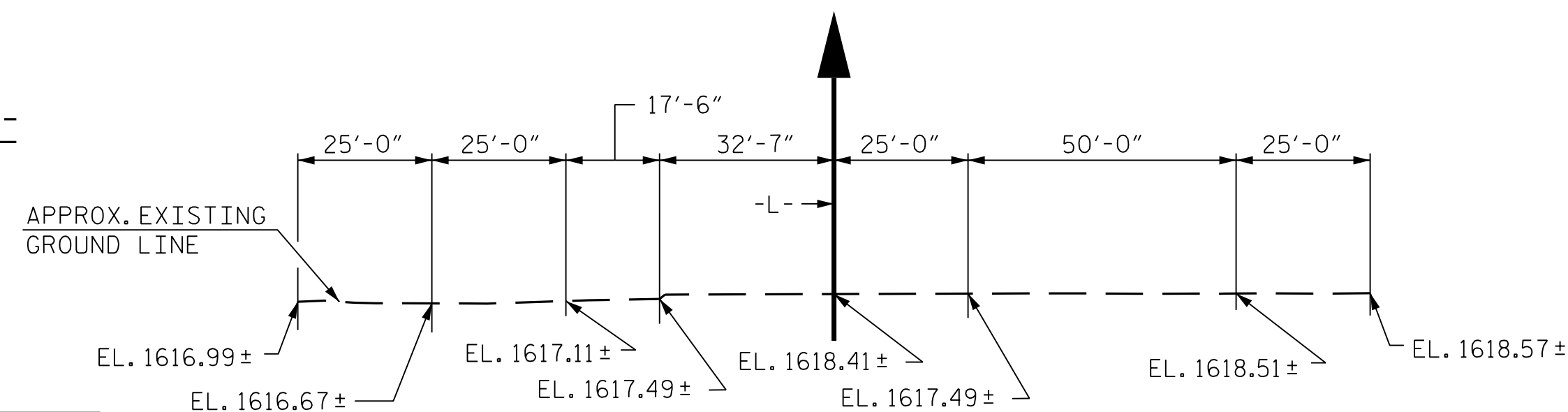
OVERTOPPING DISCHARGE-----1730 C.F.S.
 FREQUENCY OF OVERTOPPING FLOOD-----100 YR. +
 OVERTOPPING FLOOD ELEVATION-----1629.70
 SAG @ STA. 73+11.6 -L- LOW SIDE OF 6% SUPER

LEFT EXTENSION STRUCTURE QUANTITIES	
STAGE I	STAGE II
CLASS A CONCRETE	CLASS A CONCRETE
BARREL @ 0.83 CY/FT 11.7 C.Y.	BARREL @ 1.24 CY/FT 17.4 C.Y.
WING (W1) ETC. 15.1 C.Y.	WING (W2) ETC. 6.6 C.Y.
	PIPE HEADWALL 11.1 C.Y.
	SILLS 0.3 C.Y.
TOTAL 26.8 C.Y.	TOTAL 35.4 C.Y.
REINFORCING STEEL	REINFORCING STEEL
BARREL 2,205 LBS.	BARREL 2,904 LBS.
WING (W1) ETC. 1,958 LBS.	WING (W2) ETC. 294 LBS.
	PIPE HEADWALL 1,093 LBS.
TOTAL 4,163 LBS.	TOTAL 4,291 LBS.
CULVERT EXCAVATION ----- LUMP SUM	
* FOUNDATION CONDITIONING MATERIAL -- 12.2 TONS	* FOUNDATION CONDITIONING MATERIAL -- 22.8 TONS

RIGHT EXTENSION STRUCTURE QUANTITIES	
STAGE I	STAGE II
CLASS A CONCRETE	CLASS A CONCRETE
BARREL @ 0.83 CY/FT 13.2 C.Y.	BARREL @ 1.24 CY/FT 19.8 C.Y.
WING (W2) ETC. 6.3 C.Y.	WING (W1) ETC. 15.4 C.Y.
	PIPE HEADWALL 14.3 C.Y.
	SILLS 0.3 C.Y.
TOTAL 19.5 C.Y.	TOTAL 49.8 C.Y.
REINFORCING STEEL	REINFORCING STEEL
BARREL 2,483 LBS.	BARREL 3,219 LBS.
WING (W2) ETC. 294 LBS.	WING (W1) ETC. 1,958 LBS.
	PIPE HEADWALL 1,295 LBS.
TOTAL 2,777 LBS.	TOTAL 6,472 LBS.
CULVERT EXCAVATION ----- LUMP SUM	
* FOUNDATION CONDITIONING MATERIAL -- 13.9 TONS	* FOUNDATION CONDITIONING MATERIAL -- 29.1 TONS

HORIZONTAL CURVE DATA -L-

P.I. STA. 75+17.07
 Δ = 60°30'48.9" (RT)
 D = 2°47'41.7"
 L = 2,165.13'
 T = 1,195.85'
 R = 2,050.00'



PROFILE ALONG CULVERT

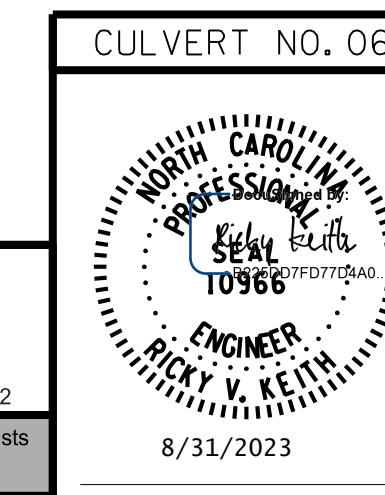
* INCLUDES 1' DEPTH UNDER PIPE HEADWALL FOOTINGS.

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 1 OF 15 EXTENDS CULVERT NO. 190003

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOUBLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 LEFT AND RIGHT EXTENSION
 134° SKEW



REVISIONS		SHEET NO.			
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2			4		

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8/31/2023 R:\Structures\Culverts\Culvert 6 - CobbCreek\DGN\Final\R-5861_CU-6-1_190003.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 _L)	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	1.34	--	1.75	2.03	2	TOP SLAB	4.0	1.34	2	TOP SLAB	0.1		
	HL-93 (OPERATING)	N/A		1.74	--	1.35	2.63	2	TOP SLAB	4.0	1.74	2	TOP SLAB	0.1		
	HS-20 (INVENTORY)	36,000	②	1.52	54.72	1.75	1.89	2	TOP SLAB	4.0	1.52	2	TOP SLAB	0.1		
	HS-20 (OPERATING)	36,000		1.97	70.92	1.35	2.45	2	TOP SLAB	4.0	1.97	2	TOP SLAB	0.1		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		3.95	53.32	1.40	5.01	1	TOP SLAB	4.0	3.95	1	TOP SLAB	8.0	
		SNGARBS2	20,000		3.70	74.00	1.40	4.69	1	TOP SLAB	4.0	3.70	1	TOP SLAB	8.0	
		SNAGRIS2	22,000		3.95	86.90	1.40	4.99	1	BOT. SLAB	8.0	3.95	1	TOP SLAB	8.0	
		SNCOTTS3	27,250		2.39	65.13	1.40	3.02	1	TOP SLAB	4.0	2.39	2	TOP SLAB	0.1	
		SNAGGRS4	34,925		2.96	103.38	1.40	3.64	2	BOT. SLAB	0.1	2.96	2	TOP SLAB	0.1	
		SNS5A	35,550		2.77	98.47	1.40	3.76	2	BOT. SLAB	0.1	2.77	2	TOP SLAB	0.1	
		SNS6A	39,950		2.69	107.46	1.40	3.39	2	BOT. SLAB	0.1	2.69	2	TOP SLAB	0.1	
		SNS7B	42,000		2.69	112.98	1.40	3.39	2	BOT. SLAB	0.1	2.69	2	TOP SLAB	0.1	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		3.61	119.13	1.40	4.95	2	BOT. SLAB	0.1	3.61	2	TOP SLAB	0.1	
		TNT4A	33,075		2.77	91.62	1.40	3.90	2	BOT. SLAB	0.1	2.77	2	TOP SLAB	0.1	
		TNT6A	41,600		2.76	114.82	1.40	3.83	2	BOT. SLAB	0.1	2.76	2	TOP SLAB	0.1	
		TNT7A	42,000		2.77	116.34	1.40	3.87	2	BOT. SLAB	0.1	2.77	2	TOP SLAB	0.1	
		TNT7B	42,000		2.70	113.40	1.40	3.64	2	BOT. SLAB	0.1	2.70	2	TOP SLAB	0.1	
		TNAGRIT4	43,000		2.69	115.67	1.40	3.38	2	BOT. SLAB	0.1	2.69	2	TOP SLAB	0.1	
EMERGENCY VEHICLE (EV)	EV2	28,750		2.61	75.03	1.30	3.25	2	TOP SLAB	4.0	2.61	2	TOP SLAB	0.1		
	EV3	43,000	③	1.95	83.85	1.30	2.94	2	TOP SLAB	4.0	1.95	2	TOP SLAB	0.1		

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:

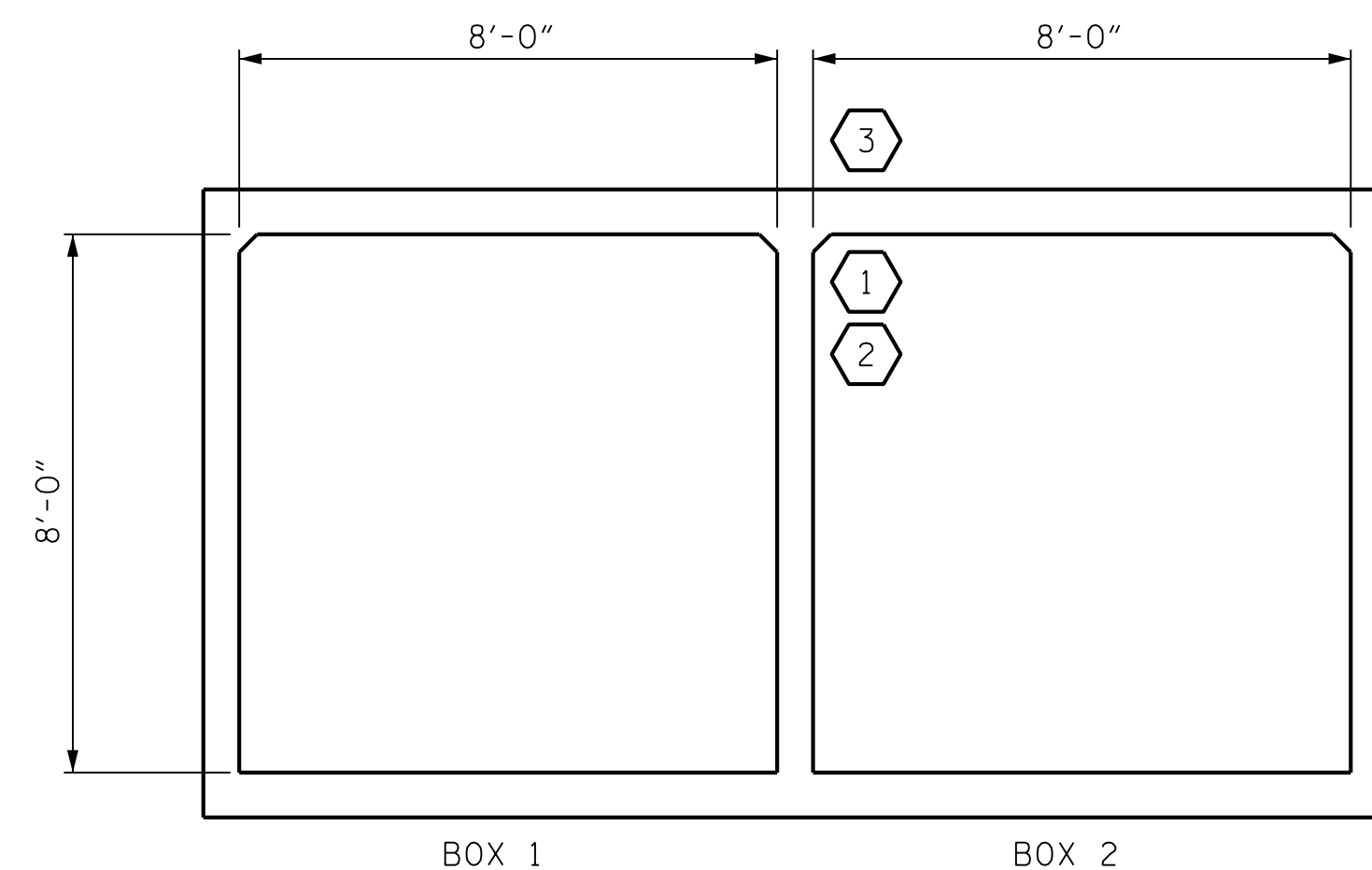
1. MINIMUM FILL CONTROLS.

2.

3.

4.

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



LRFR SUMMARY
(LOOKING DOWNSTREAM)

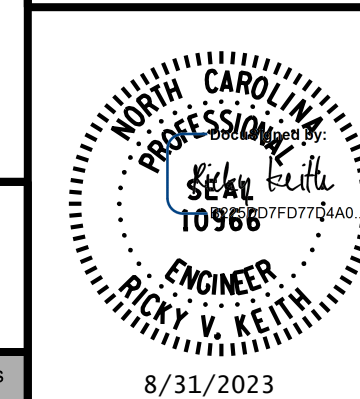
PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 2 OF 15

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERT
 LEFT AND RIGHT EXTENSION
 (NON-INTERSTATE TRAFFIC)

CULVERT NO. 06



RK&K
 P: (919) 878-9560
 8601 Six Forks Road, Forum 1 Suite 700
 Raleigh, North Carolina 27615 | NC License No. F-0112
 Engineers | Construction Managers | Planners | Scientists
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8/31/2023

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SHEET NO.

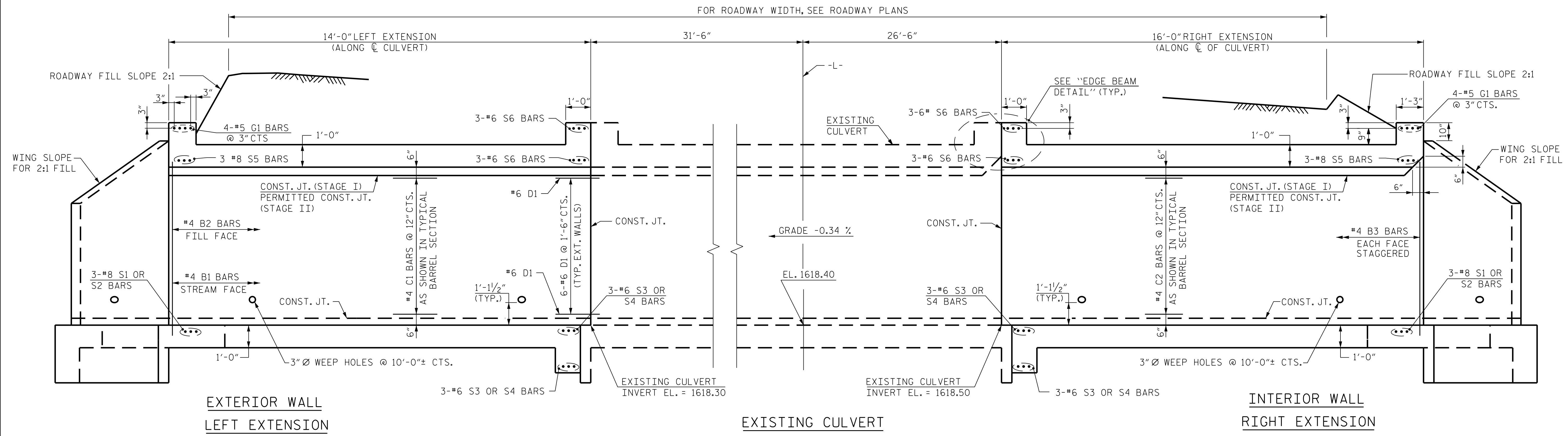
CU-6-2
 TOTAL SHEETS
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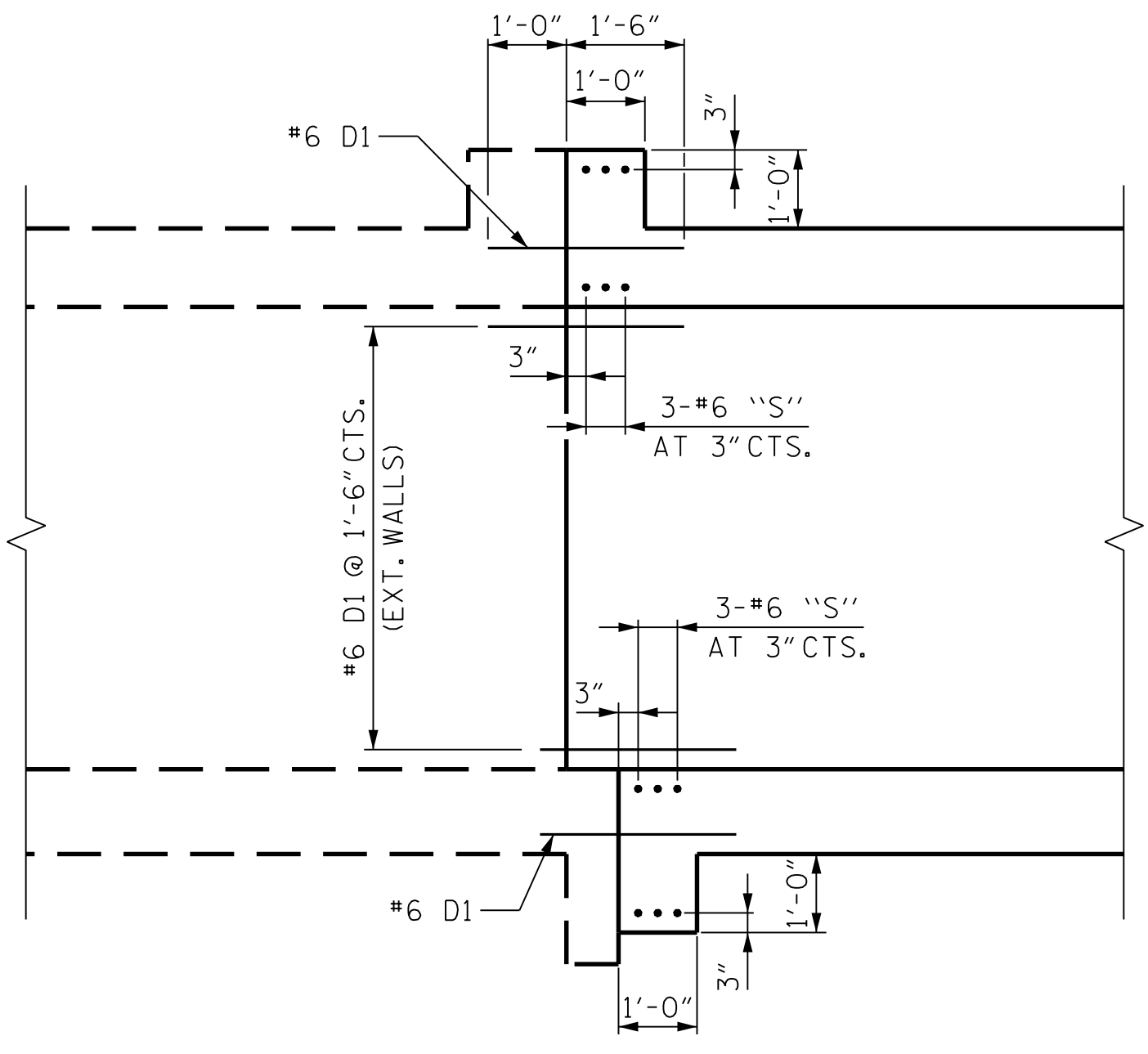
8/31/2023 R:\Structures\Culverts\Culvert 6 - CobbCreek\DGN\Final\R-5861_CU_6-2_190003.dgn

DRAWN BY : A. J. WOLCOTT DATE : JUL 2023
 CHECKED BY : R. V. KEITH DATE : JUL 2023
 DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023

8/31/2023 R:\Structures\Culverts\Culvert 6 - CobbCreek\DGNN\Final\R-5861_SMU_CU_6-3_190003.dgn



CULVERT SECTION NORMAL TO ROADWAY



EDGE BEAM DETAIL

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 3 OF 15

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOUBLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 LEFT AND RIGHT EXTENSION
 134° SKEW

CULVERT NO. 06

8/31/2023

RK&K

P: (919) 878-9560
 8601 Six Forks Road, Forum 1 Suite 700
 Raleigh, North Carolina 27615 | NC License No. F-0112

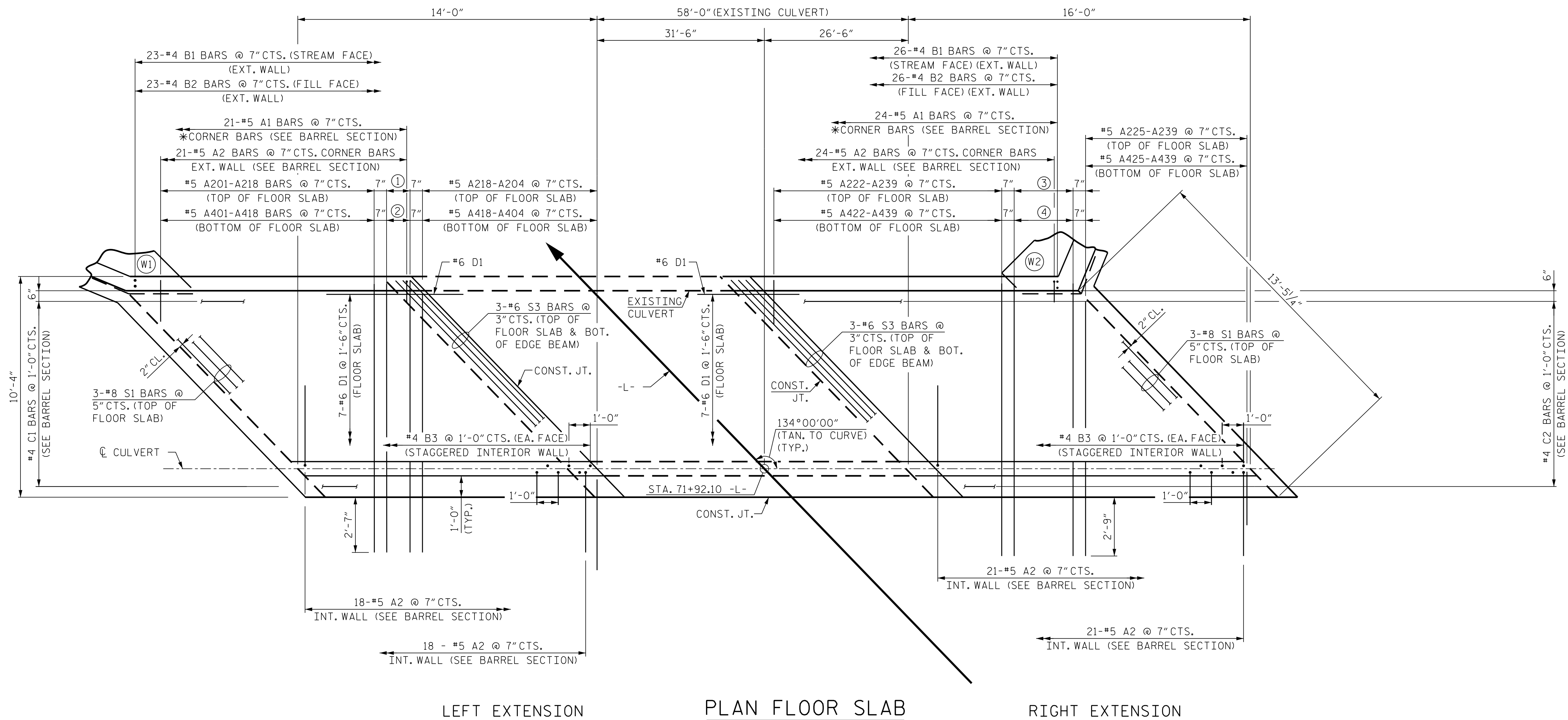
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DRAWN BY : A. J. WOLCOTT DATE : JUL 2023
 CHECKED BY : R. V. KEITH DATE : JUL 2023
 DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023

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					TOTAL SHEETS 15

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LEFT EXTENSION

PLAN FLOOR SLAB

RIGHT EXTENSION

STAGE I

NOTES:

FOR EDGE BEAM DETAIL, SEE SHEET CU-6-3.

A2 BARS MAY BE SPLAYED IN ACUTE CORNERS.

* THE CONTRACTOR'S ATTENTION IS CALLED TO THE A1 BARS BEING PLACED IN THE TOP OF STAGE I EXTERIOR WALL DURING CONSTRUCTION OF STAGE I

- ① (3) A219 @ 7" CTS. (TOP OF FLOOR SLAB)
- ② (3) A419 @ 7" CTS. (BOTTOM OF FLOOR SLAB)
- ③ (6) A240 @ 7" CTS. (TOP OF FLOOR SLAB)
- ④ (6) A440 @ 7" CTS. (BOTTOM OF FLOOR SLAB)

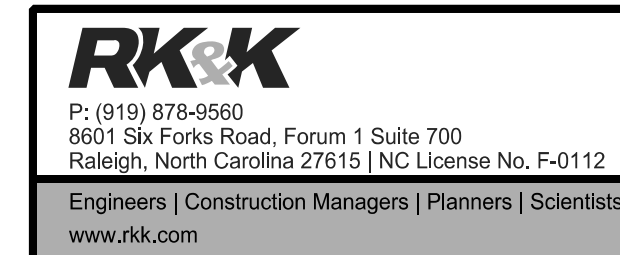
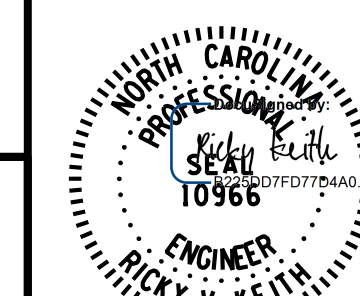
PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 4 OF 15

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOUBLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 LEFT AND RIGHT EXTENSION
 134° SKEW

CULVERT NO. 06



8/31/2023

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

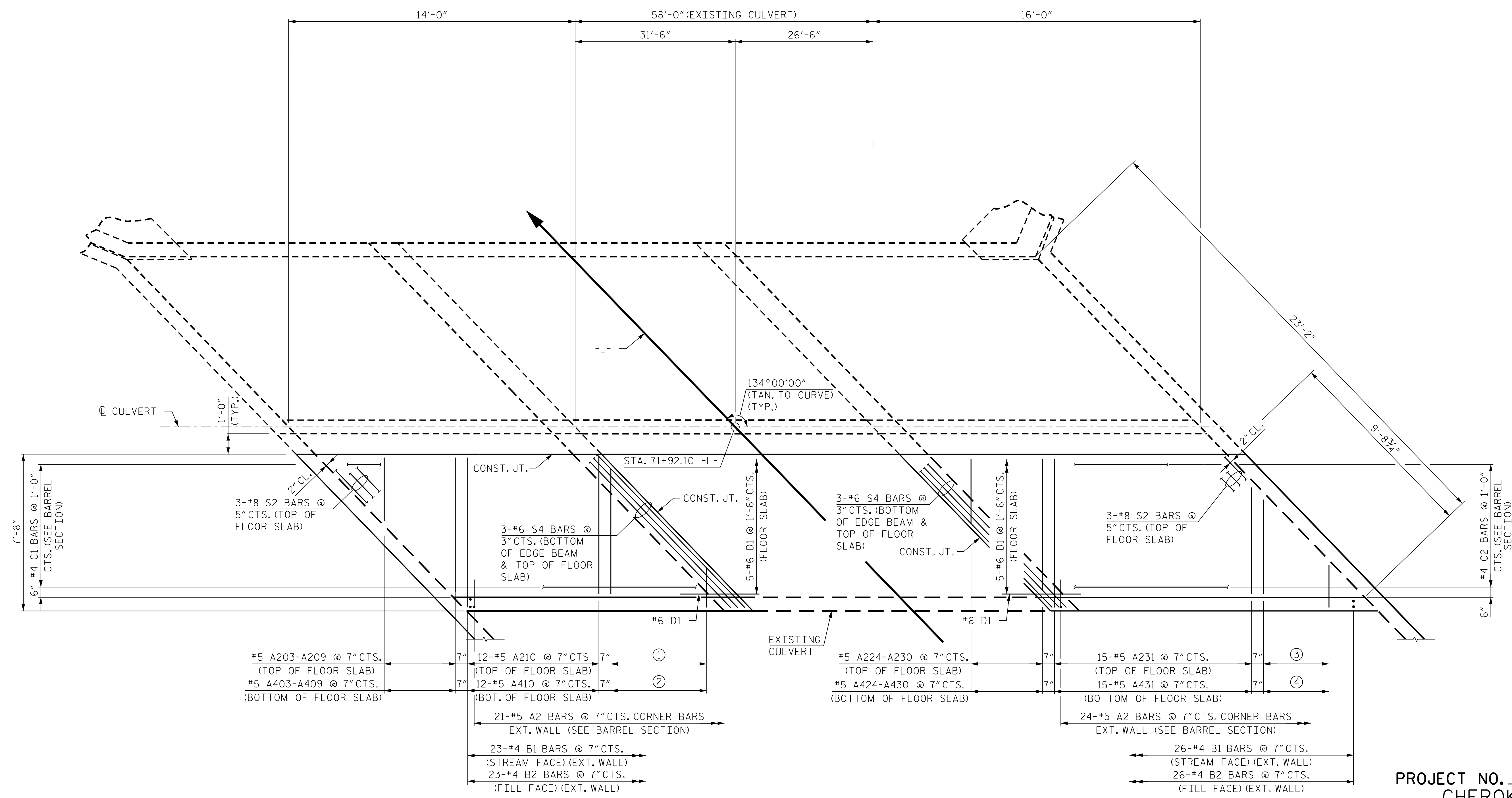
TOTAL SHEETS
15

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DRAWN BY : A. J. WOLCOTT DATE : JUL 2023
 CHECKED BY : R. V. KEITH DATE : JUL 2023
 DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023

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NOTES:

FOR EDGE BEAM DETAIL, SEE SHEET CU-6-3.
 A2 BARS MAY BE SPLAYED IN ACUTE CORNERS.

- ① #5 A201-A209 @ 7" CTS. (TOP OF FLOOR SLAB)
- ② #5 A401-A409 @ 7" CTS. (BOTTOM OF FLOOR SLAB)
- ③ #5 A222-A230 @ 7" CTS. (TOP OF FLOOR SLAB)
- ④ #5 A422-A430 @ 7" CTS. (BOTTOM OF FLOOR SLAB)

LEFT EXTENSION

PLAN FLOOR SLAB

STAGE II

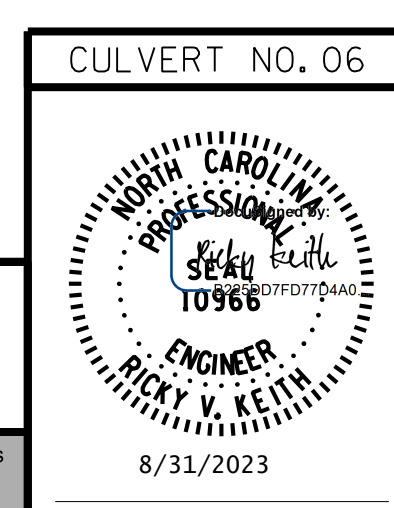
RIGHT EXTENSION

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 5 OF 15

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**DOUBLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 LEFT AND RIGHT EXTENSION
 134° SKEW**



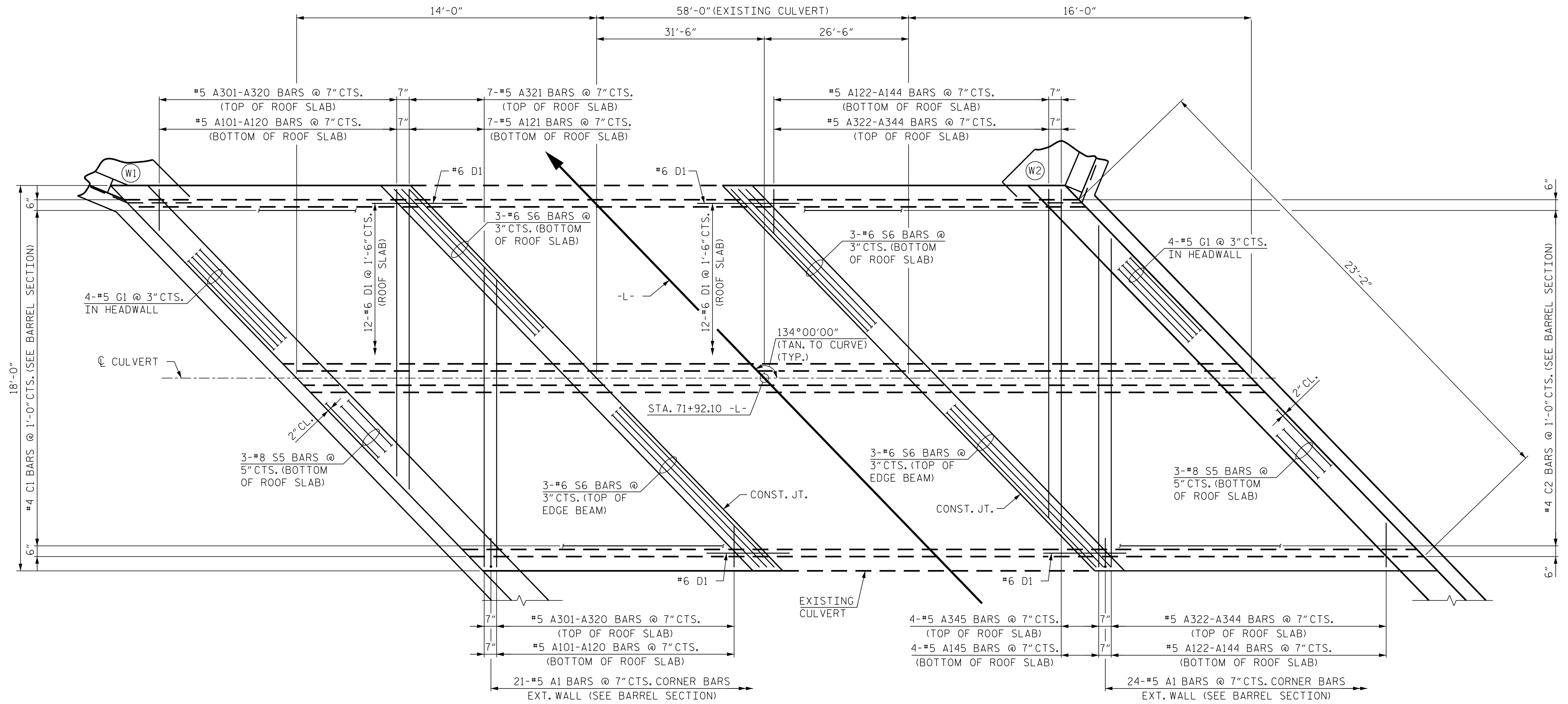
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REVISIONS				SHEET NO.			
NO.	BY:	DATE:	NO.	BY:	DATE:	CU-6-5	
1			3			TOTAL SHEETS	
2			4			15	

DRAWN BY : A. J. WOLCOTT	DATE : JUL 2023
CHECKED BY : R. V. KEITH	DATE : JUL 2023
DESIGN ENGINEER OF RECORD : R. V. KEITH	DATE : JUL 2023

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LEFT EXTENSION

PLAN ROOF SLAB

RIGHT EXTENSION

STAGE II

NOTES:

FOR EDGE BEAM DETAIL, SEE SHEET CU-6-3.

A1 BARS MAY BE SPLAYED IN ACUTE CORNERS.

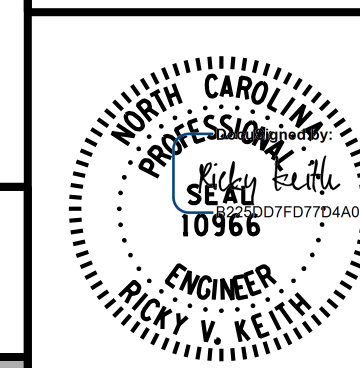
PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 6 OF 15

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOUBLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 LEFT AND RIGHT EXTENSION
 134° SKEW

CULVERT NO. 06



8/31/2023



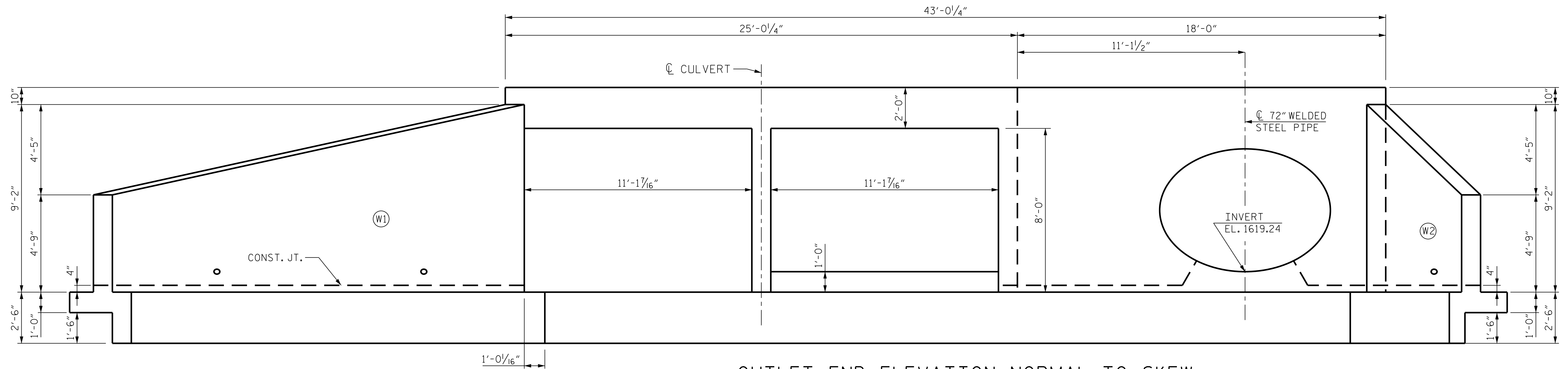
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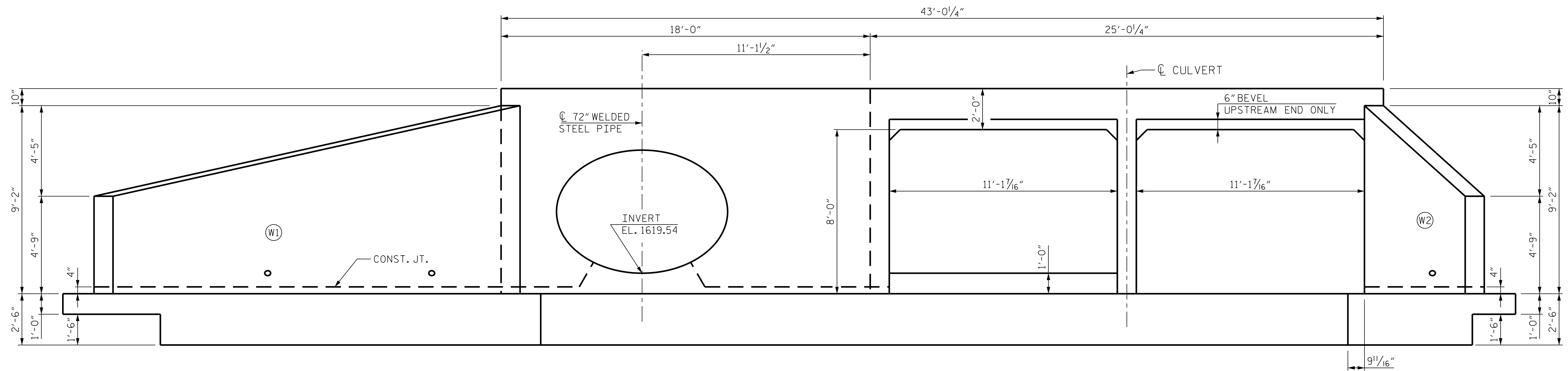
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REVISIONS				SHEET NO.			
NO.	BY:	DATE:	NO.	BY:	DATE:	CU-6-6	
1			3			TOTAL SHEETS	
2			4			15	

DRAWN BY : A. J. WOLCOTT DATE : JUL 2023
 CHECKED BY : R. V. KEITH DATE : JUL 2023
 DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023



OUTLET END ELEVATION NORMAL TO SKEW
(LEFT EXTENSION)



INLET END ELEVATION NORMAL TO SKEW
(RIGHT EXTENSION)

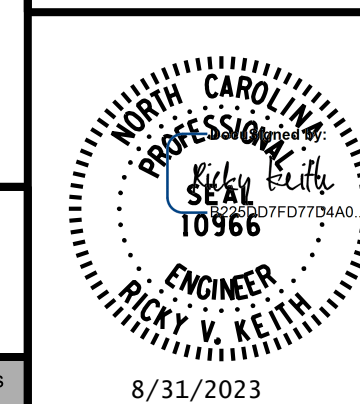
PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 7 OF 15

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOUBLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 EXTENSION ELEVATIONS
 134° SKEW

CULVERT NO. 06



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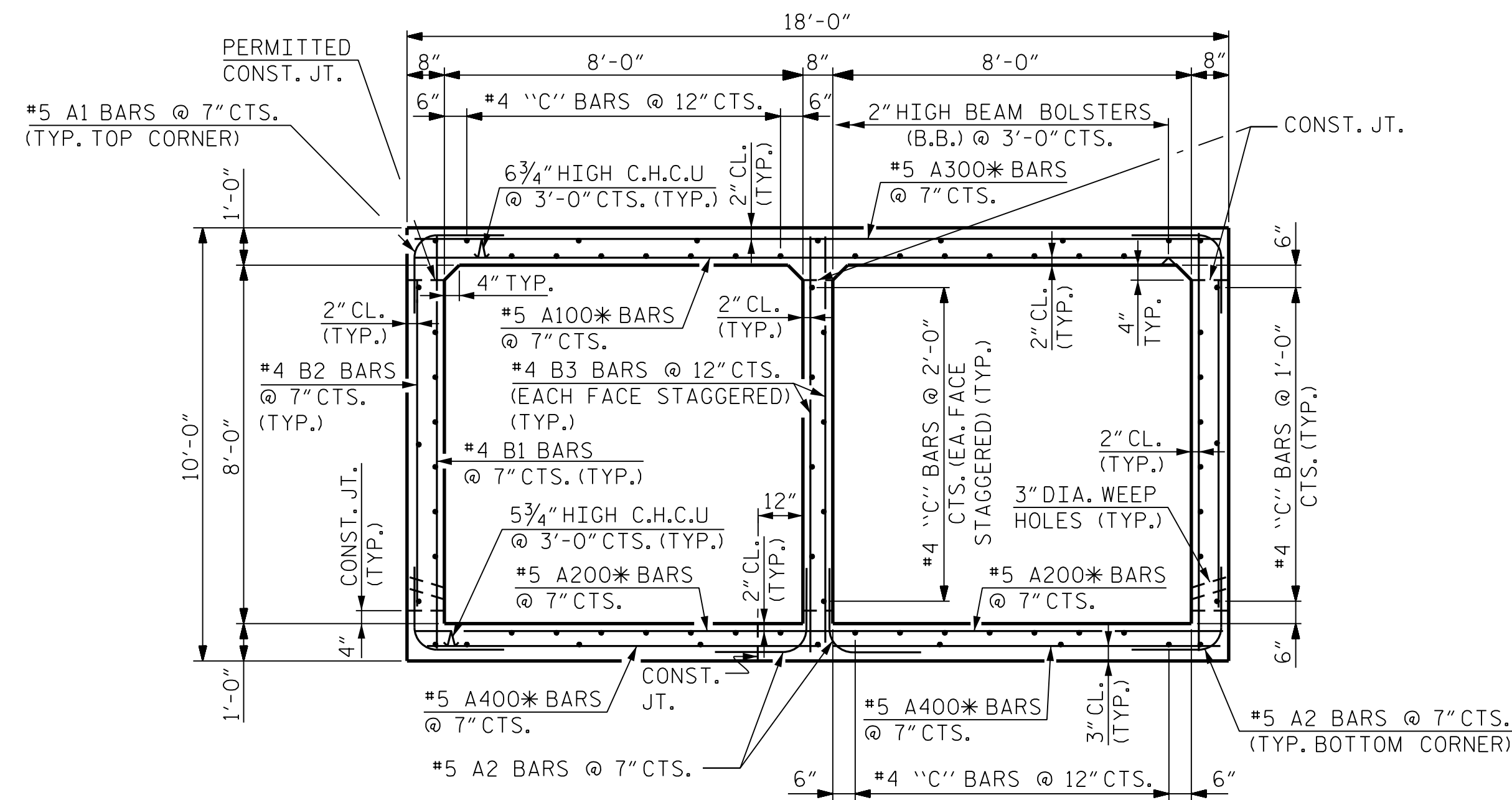
8/31/2023

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU-6-7
1			3			TOTAL SHEETS
2			4			15

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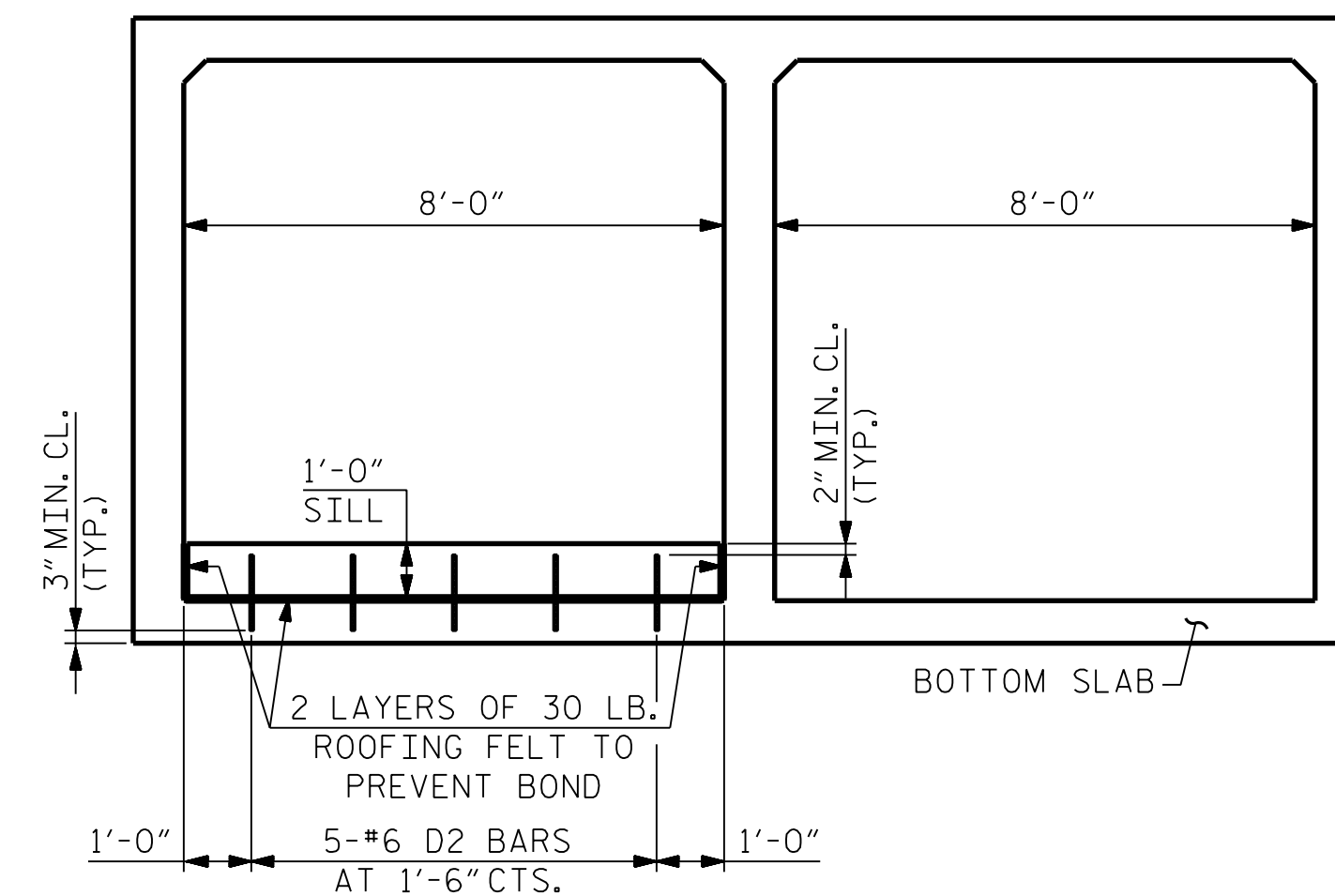
8/31/2023 R:\Structures\Culverts\Culvert 6 - CobbCreek\GN\Final\R-5861_SMU_CU-6-7_1900003.dgn

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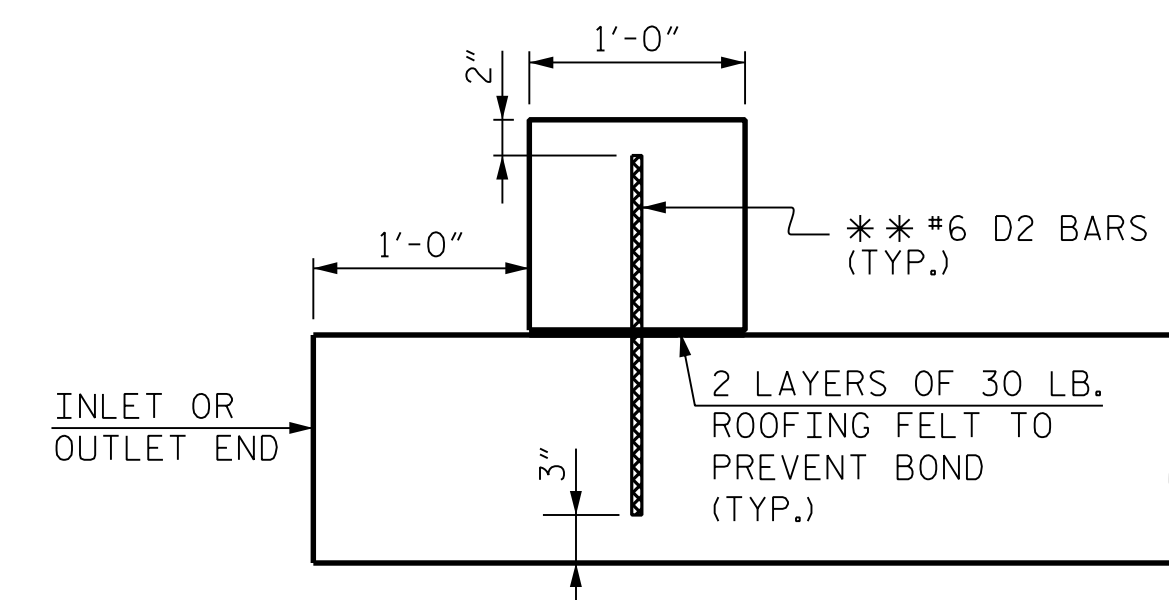


STAGE II STAGE I
RIGHT ANGLE SECTION OF BARREL
 (THERE ARE 72 'C' BARS IN SECTION OF BARREL)
 (LOOKING DOWNSTREAM)

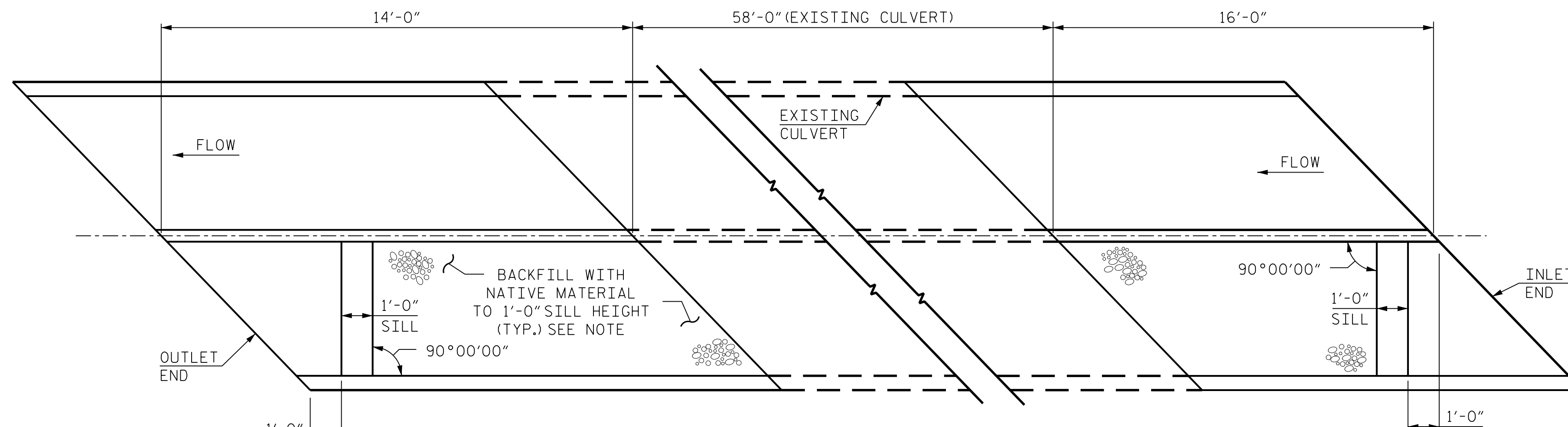
NOTE: FOR STAGE I 'A' BAR EXTENSIONS BEYOND CONSTRUCTION JOINT IN BOTTOM SLAB, SEE SHEET CU-6-4.



SILL ELEVATION
 DOWEL SPACING SHOWN PERPENDICULAR TO CULVERT BARREL
 (LOOKING DOWN STREAM)



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



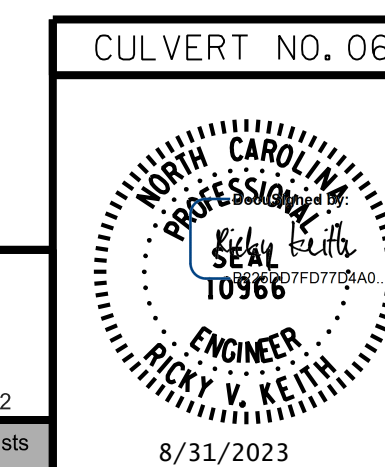
SILL PLAN

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

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 8 OF 15

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 8 FT. X 8 FT.
 CONCRETE BOX CULVERT
 LEFT AND RIGHT EXTENSION
 134° SKEW



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

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TOTAL SHEETS: **15**

DRAWN BY : A. J. WOLCOTT DATE : JUL 2023
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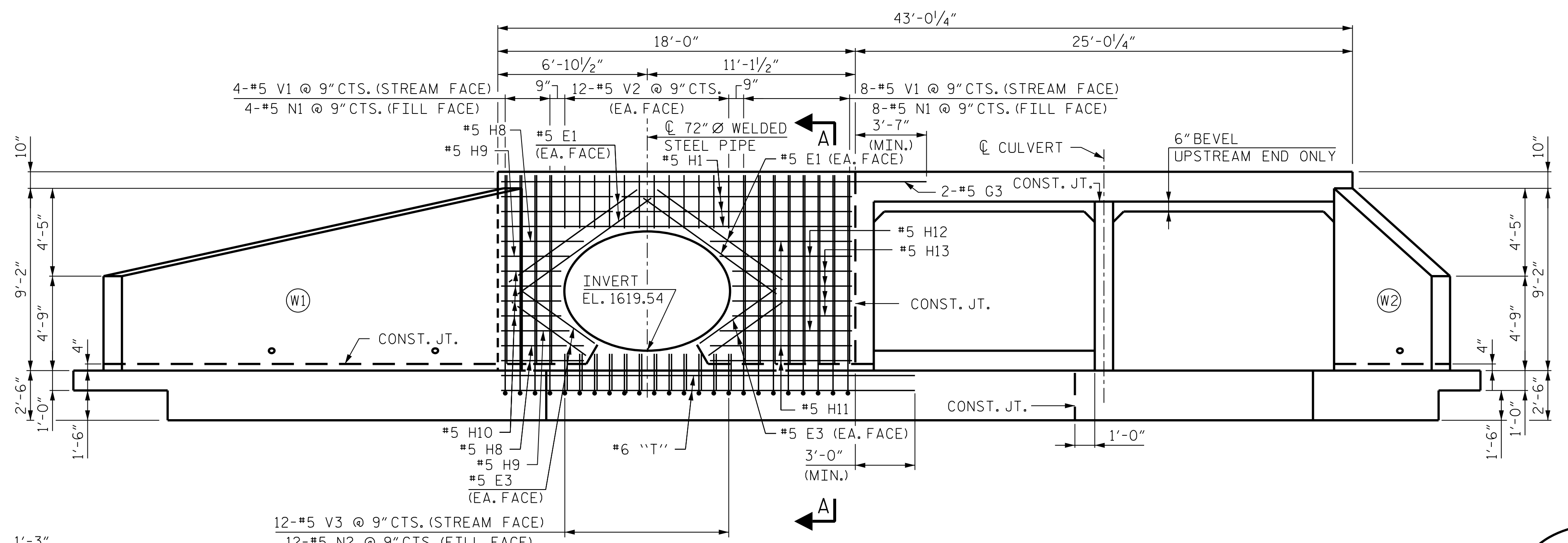
8/31/2023 R:\Structures\Culverts\Culvert 6 - CobbCreek\DGN\Final\N-5861_SMU_CU_6-8_1900003.dgn

BILL OF MATERIAL (LEFT EXTENSION)

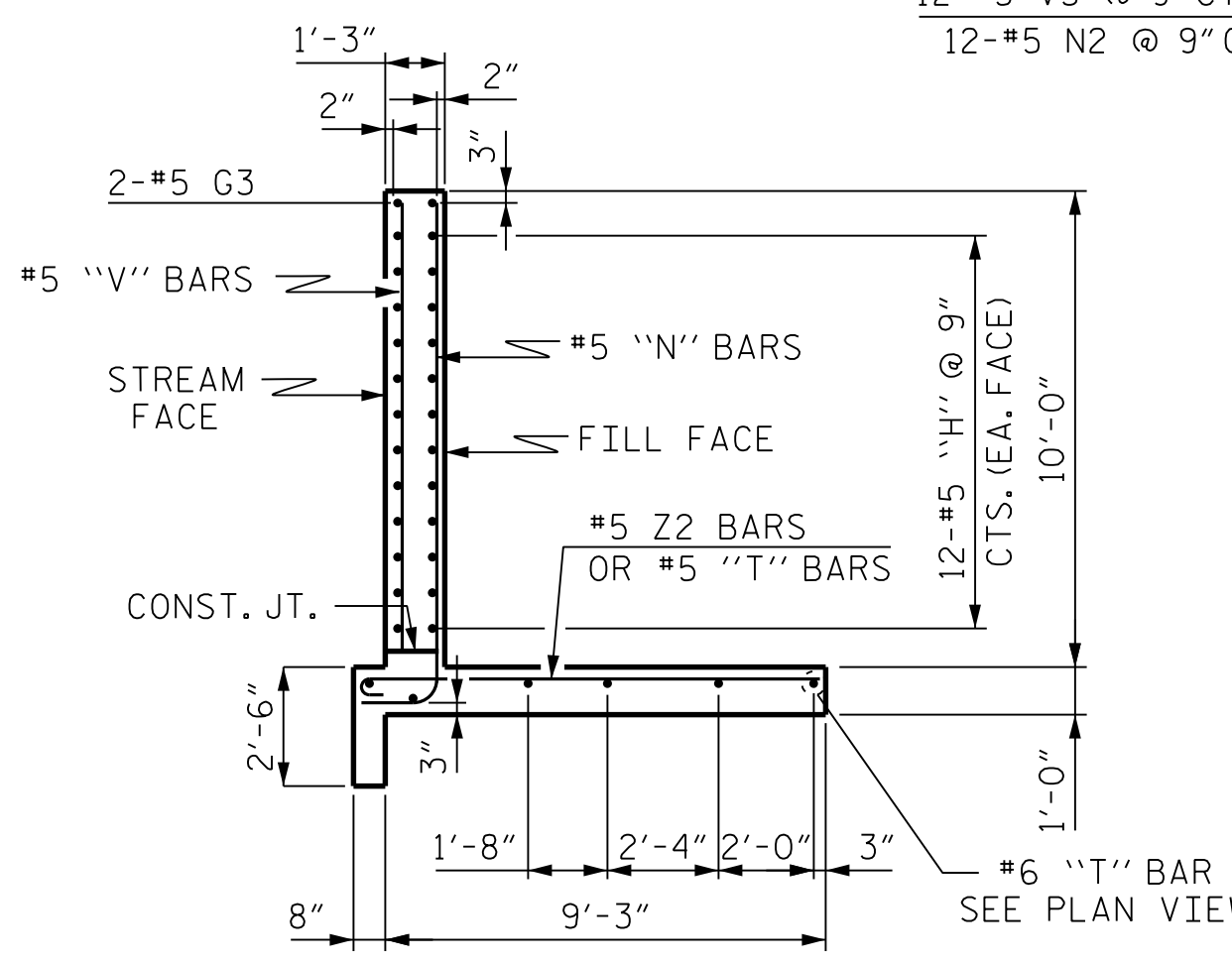
BILL OF MATERIAL (RIGHT EXTENSION)

STAGE I						STAGE II						STAGE I						STAGE II																	
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	21	#5	1	6'-11"	151	A1	21	#5	1	6'-11"	151	B1	23	#4	STR.	9'-7"	147	A1	24	#5	1	6'-11"	173	A1	24	#5	1	6'-11"	173	A422	1	#5	STR.	2'-0"	2
A2	57	#5	1	6'-11"	411	A2	21	#5	1	6'-11"	151	B2	23	#4	STR.	7'-2"	110	A2	66	#5	1	6'-11"	476	A2	24	#5	1	6'-11"	173	A423	1	#5	STR.	2'-8"	3
A201	1	#5	STR.	1'-11"	2	A101	2	#5	STR.	1'-11"	4	C1	42	#4	STR.	13'-6"	379	A222	1	#5	STR.	2'-0"	2	A122	2	#5	STR.	2'-0"	4	A424	2	#5	STR.	3'-3"	7
A202	1	#5	STR.	2'-6"	3	A102	2	#5	STR.	2'-6"	5							A223	1	#5	STR.	2'-8"	3	A123	2	#5	STR.	2'-8"	6	A425	2	#5	STR.	3'-10"	8
A203	1	#5	STR.	3'-1"	3	A103	2	#5	STR.	3'-1"	6	D1	23	#6	STR.	2'-6"	86	A224	1	#5	STR.	3'-3"	3	A124	2	#5	STR.	3'-3"	7	A426	2	#5	STR.	4'-5"	9
A204	2	#5	STR.	3'-9"	8	A104	2	#5	STR.	3'-9"	8	D2	5	#6	STR.	1'-7"	12	A225	2	#5	STR.	3'-10"	8	A125	2	#5	STR.	3'-10"	8	A427	2	#5	STR.	5'-1"	11
A205	2	#5	STR.	4'-4"	9	A105	2	#5	STR.	4'-4"	9							A226	2	#5	STR.	4'-5"	9	A126	2	#5	STR.	4'-5"	9	A428	2	#5	STR.	5'-8"	12
A206	2	#5	STR.	4'-11"	10	A106	2	#5	STR.	4'-11"	10	G1	4	#5	STR.	24'-6"	102	A227	2	#5	STR.	5'-1"	11	A127	2	#5	STR.	5'-1"	11	A429	2	#5	STR.	6'-3"	13
A207	2	#5	STR.	5'-6"	11	A107	2	#5	STR.	5'-6"	11	S2	3	#8	STR.	10'-2"	81	A228	2	#5	STR.	5'-8"	12	A128	2	#5	STR.	5'-8"	12	A430	2	#5	STR.	6'-10"	14
A208	2	#5	STR.	6'-2"	13	A108	2	#5	STR.	6'-2"	13	S4	6	#6	STR.	10'-2"	92	A229	2	#5	STR.	6'-3"	13	A129	2	#5	STR.	6'-3"	13	A431	15	#5	STR.	7'-6"	117
A209	2	#5	STR.	6'-9"	14	A109	2	#5	STR.	6'-9"	14	S5	3	#8	STR.	24'-6"	196	A230	2	#5	STR.	6'-10"	14	A130	2	#5	STR.	6'-10"	14	B1	26	#4	STR.	9'-7"	166
A210	2	#5	STR.	7'-4"	15	A110	2	#5	STR.	7'-4"	15	S6	6	#6	STR.	24'-6"	221	A231	2	#5	STR.	7'-6"	16	A131	2	#5	STR.	7'-6"	16	B2	26	#4	STR.	7'-2"	124
A211	2	#5	STR.	7'-11"	17	A111	2	#5	STR.	7'-11"	17							A232	2	#5	STR.	8'-1"	17	A132	2	#5	STR.	8'-1"	17						
A212	2	#5	STR.	8'-7"	18	A112	2	#5	STR.	8'-7"	18	REINFORCING STEEL 2,904 LBS.						A233	2	#5	STR.	8'-8"	18	A133	2	#5	STR.	8'-8"	18	C2	42	#4	STR.	15'-6"	435
A213	2	#5	STR.	9'-2"	19	A113	2	#5	STR.	9'-2"	19							A234	2	#5	STR.	9'-3"	19	A134	2	#5	STR.	9'-3"	19						
A214	2	#5	STR.	9'-9"	20	A114	2	#5	STR.	9'-9"	20							A235	2	#5	STR.	9'-11"	21	A135	2	#5	STR.	9'-11"	21	D1	23	#6	STR.	2'-6"	86
A215	2	#5	STR.	10'-4"	22	A115	2	#5	STR.	10'-4"	22							A236	2	#5	STR.	10'-6"	22	A136	2	#5	STR.	10'-6"	22	D2	5	#6	STR.	1'-7"	12
A216	2	#5	STR.	11'-0"	23	A116	2	#5	STR.	11'-0"	23							A237	2	#5	STR.	11'-1"	23	A137	2	#5	STR.	11'-1"	23						
A217	2	#5	STR.	11'-7"	24	A117	2	#5	STR.	11'-7"	24							A238	2	#5	STR.	11'-8"	24	A138	2	#5	STR.	11'-8"	24	G1	4	#5	STR.	24'-6"	102
A218	2	#5	STR.	12'-2"	25	A118	2	#5	STR.	12'-2"	25							A239	2	#5	STR.	12'-4"	26	A139	2	#5	STR.	12'-4"	26						
A219	3	#5	STR.	12'-9"	40	A119	2	#5	STR.	12'-9"	27							A240	6	#5	STR.	12'-11"	81	A140	2	#5	STR.	12'-11"	27	S2	3	#8	STR.	10'-2"	81
						A120	2	#5	STR.	13'-5"	28							A422	1	#5	STR.	2'-0"	2	A141	2	#5	STR.	13'-6"	28	S4	6	#6	STR.	10'-2"	92
A401	1	#5	STR.	1'-11"	2	A121	7	#5	STR.	14'-0"	102							A423	1	#5	STR.	2'-8"	3	A142	2	#5	STR.	14'-1"	29	S5	3	#8	STR.	24'-6"	196
A402	1	#5	STR.	2'-6"	3							A424	1	#5	STR.	3'-3"	3	A143	2	#5	STR.	14'-9"	31	S6	6	#6	STR.	24'-6"	221						
A403	1	#5	STR.	3'-1"	3	A201	1	#5	STR.	1'-11"	2	A425	2	#5	STR.	3'-10"	8	A144	2	#5	STR.	15'-4"	32	REINFORCING STEEL 3,219 LBS.											
A404	2	#5	STR.	3'-9"	8	A202	1	#5	STR.	2'-6"	3	A426	2	#5	STR.	4'-5"	9	A145	4	#5	STR.	15'-11"	66												
A405	2	#5	STR.	4'-4"	9	A203	2	#5	STR.	3'-1"	6	A427	2	#5	STR.	5'-1"	11	A222	1	#5	STR.	2'-0"	2												
A406	2	#5	STR.	4'-11"	10	A204	2	#5	STR.	3'-9"	8	A428	2	#5	STR.	5'-8"	12	A223	1	#5	STR.	2'-8"	3												
A407	2	#5	STR.	5'-6"	11	A205	2	#5	STR.	4'-4"	9	A429	2	#5	STR.	6'-3"	13	A224	2	#5	STR.	3'-3"	7												
A408	2	#5	STR.	6'-2"	13	A206	2	#5	STR.	4'-11"	10	A430	2	#5	STR.	6'-10"	14	A225	2	#5	STR.	3'-10"	8												
A409	2	#5	STR.	6'-9"	14	A207	2	#5	STR.	5'-6"	11	A431	2	#5	STR.	7'-6"	16	A226	2	#5	STR.	4'-5"	9												
A410	2	#5	STR.	7'-4"	15	A208	2	#5	STR.	6'-2"	13	A432	2	#5	STR.	8'-1"	17	A227	2	#5	STR.	5'-1"	11												
A411	2	#5	STR.	7'-11"	17	A209	2	#5	STR.	6'-9"	14	A433	2	#5	STR.	8'-8"	18	A228	2	#5	STR.	5'-8"	12												
A412	2	#5	STR.	8'-7"	18	A210	14	#5	STR.	7'-4"	92	A434	2	#5	STR.	9'-3"	19	A229	2	#5	STR.	6'-3"	13												
A413	2	#5	STR.	9'-2"	19							A435	2	#5	STR.	9'-11"	21	A230	2	#5	STR.	6'-10"	14												
A414	2	#5	STR.	9'-9"	20	A301	2	#5	STR.	1'-11"	4	A436	2	#5	STR.	10'-6"	22	A231	15	#5	STR.	7'-6"	117												
A415	2	#5	STR.	10'-4"	22	A302	2	#5	STR.	2'-6"	5	A437	2	#5	STR.	11'-1"	23																		
A416	2	#5	STR.	11'-0"	23	A303	2	#5	STR.	3'-1"	6	A438	2	#5	STR.	11'-8"	24	A322	2	#5	STR.	2'-0"	4												
A417	2	#5	STR.	11'-7"	24	A304	2	#5	STR.	3'-9"	8	A439	2	#5	STR.	12'-4"	26	A323	2	#5	STR.	2'-8"	6												
A418	2	#5	STR.	12'-2"	25	A305	2	#5	STR.	4'-4"	9	A440	6	#5	STR.	12'-11"	81	A324	2	#5	STR.	3'-3"	7												
A419	3	#5	STR.	12'-9"	40	A306	2	#5	STR.	4'-11"	10							A325	2	#5	STR.	3'-10"	8												
						A307	2	#5	STR.	5'-6"	11							A326	2	#5	STR.	4'-5"	9												
B1	23	#4	STR.	9'-7"	147	A308	2	#5	STR.	6'-2"	13	B1	26	#4	STR.	9'-7"	166	A327	2	#5	STR.	5'-1"	11												
B2	23	#4	STR.	7'-2"	110	A309	2	#5	STR.	6'-9"	14	B2	26	#4	STR.	7'-2"	124	A328	2	#5	STR.	5'-8"	12												
B3	28	#4	STR.	9'-7"	179	A310	2	#5	STR.	7'-4"	15	B3	32	#4	STR.	9'-7"	205	A329	2	#5	STR.	6'-3"	13												
						A311	2	#5	STR.	7'-11"	17							A330	2	#5	STR.	6'-10"	14												
C1	30	#4	STR.	13'-6"	271	A312	2	#5	STR.	8'-7"	18							A331	2	#5	STR.	7'-6"	16												
						A313	2	#5	STR.	9'-2"	19							A332	2	#5	STR.	8'-1"	17												
D1	13	#6	STR.	2'-6"	49	A314	2	#5	STR.	9'-9"	20							A333	2	#5	STR.	8'-8"	18												
						A315	2	#5	STR.	10'-4"	22							A334	2	#5	STR.	9'-3"	19												
S1	3	#8	STR.	17'-10"	143	A316	2	#5	STR.	11'-0"	23							A335	2	#5	STR.	9'-11"	21												
S3	6	#6	STR.	16'-11"	152	A317	2	#5	STR.	11'-7"	24							A336	2	#5	STR.	10'-6"	22												
						A318	2	#5	STR.	12'-2"	25							A337	2	#5	STR.	11'-1"	23												
						A319	2	#5	STR.	12'-9"	27							A338	2	#5	STR.	11'-8"	24												
						A320	2	#5	STR.	13'-5"	28							A339	2	#5	STR.	12'-4"	26												
						A321	7	#5	STR.	14'-0"	102							A340	2	#5	STR.	12'-11"	27												
																		A341	2	#5	STR.	13'-6"	28												

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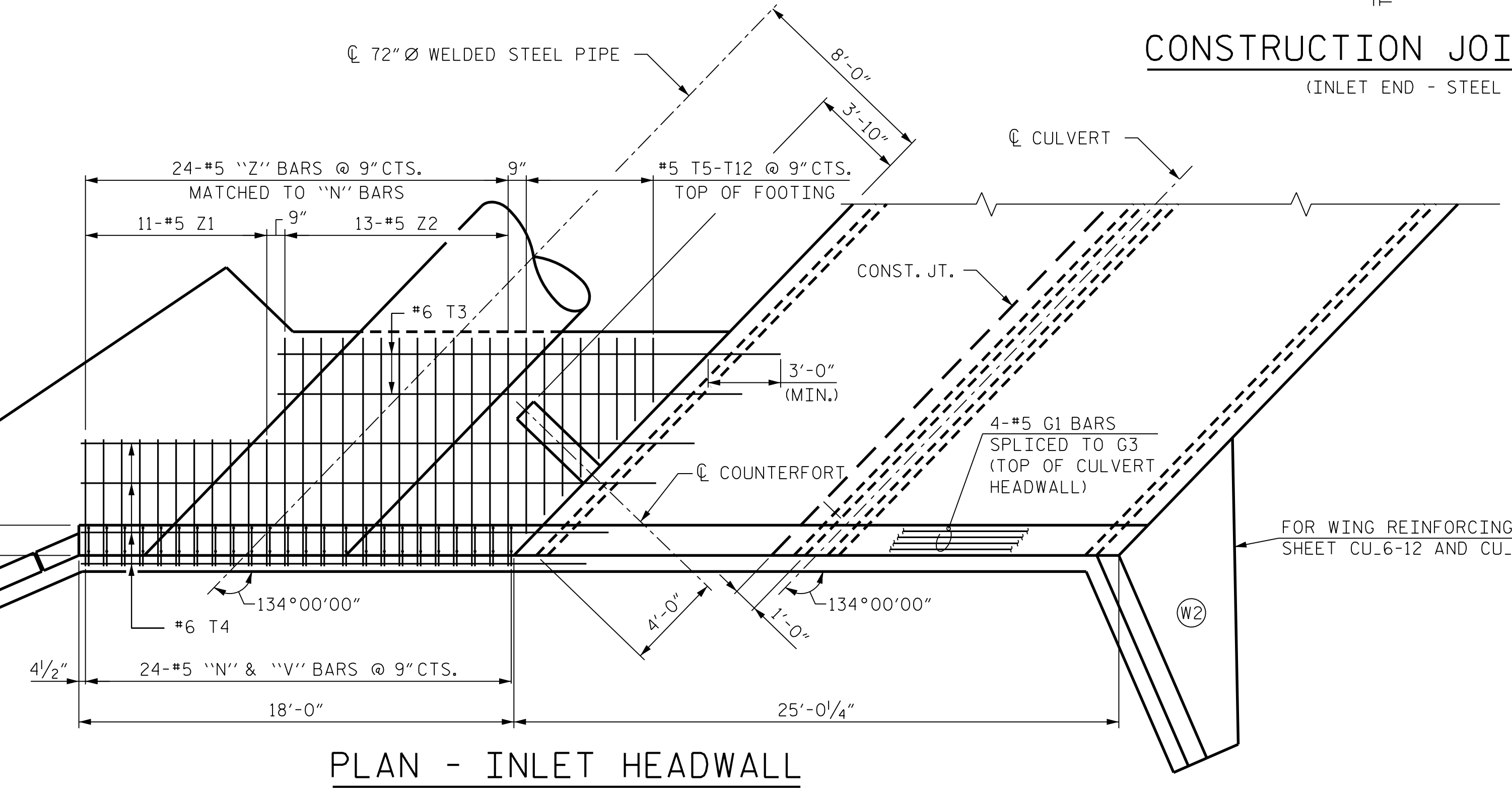


END ELEVATION - NORMAL TO SKEW
(INLET END)



SECTION A-A

FOR WING REINFORCING SEE SHEET CU-6-12 AND CU-6-13



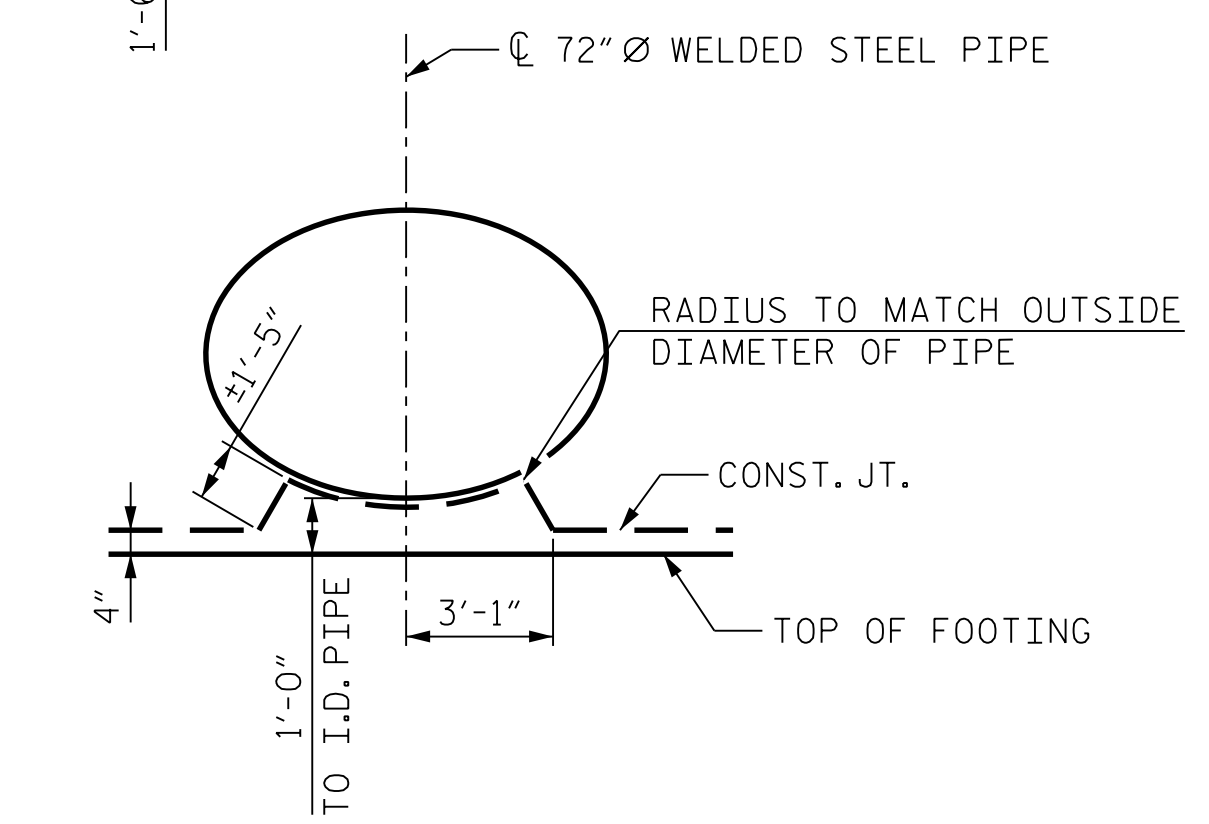
PLAN - INLET HEADWALL
(RIGHT EXTENSION)

(SHIFT BARS AS REQUIRED TO MISS CULVERT BOTTOM SLAB STEEL)

BAR TYPE	
①	6" RAD. 1'-0 1/2" 10'-1" 1'-0" N1 N2
②	7" 9'-6" 5'-3" Z2 Z1

DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL INLET END					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
E1	8	#5	STR.	8'-4"	70
E3	8	#5	STR.	4'-10"	40
G3	2	#5	STR.	21'-5"	45
H1	6	#5	STR.	17'-8"	111
H8	6	#5	STR.	4'-2"	26
H9	4	#5	STR.	3'-8"	15
H10	8	#5	STR.	3'-0"	25
H11	6	#5	STR.	7'-1"	44
H12	4	#5	STR.	6'-8"	28
H13	8	#5	STR.	5'-11"	49
N1	12	#5	1	11'-11"	149
N2	12	#5	1	2'-10"	35
T3	2	#6	STR.	20'-10"	63
T4	4	#6	STR.	25'-6"	153
T5	1	#5	STR.	8'-1"	8
T6	1	#5	STR.	7'-4"	8
T7	1	#5	STR.	6'-7"	7
T8	1	#5	STR.	5'-9"	6
T9	1	#5	STR.	5'-0"	5
T10	1	#5	STR.	4'-3"	4
T11	1	#5	STR.	3'-5"	4
T12	1	#5	STR.	2'-8"	3
V1	12	#5	STR.	9'-6"	119
V2	24	#5	STR.	2'-5"	60
V3	12	#5	STR.	1'-1"	14
Z1	11	#5	2	5'-10"	67
Z2	13	#5	2	10'-1"	137
REINFORCING STEEL				1,295 LBS.	
CLASS A CONCRETE				14.3 C.Y.	

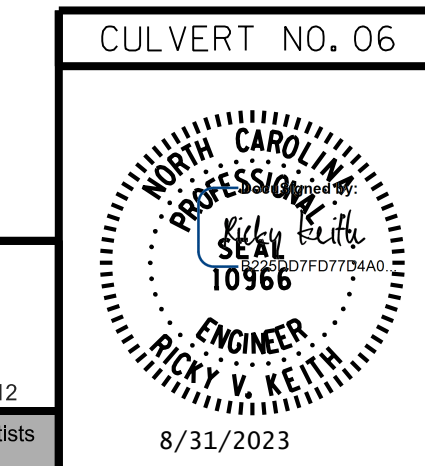


CONSTRUCTION JOINT DETAIL
(INLET END - STEEL PIPE)

NOTE:
BARS MAY BE SHIFTED SLIGHTLY TO ACCOMMODATE 72" W.S.P.

PROJECT NO. R-5861
CHEROKEE COUNTY
STATION: 71+92.10 -L-

SHEET 10 OF 15



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
72" Ø WELDED STEEL PIPE HEADWALL INLET END

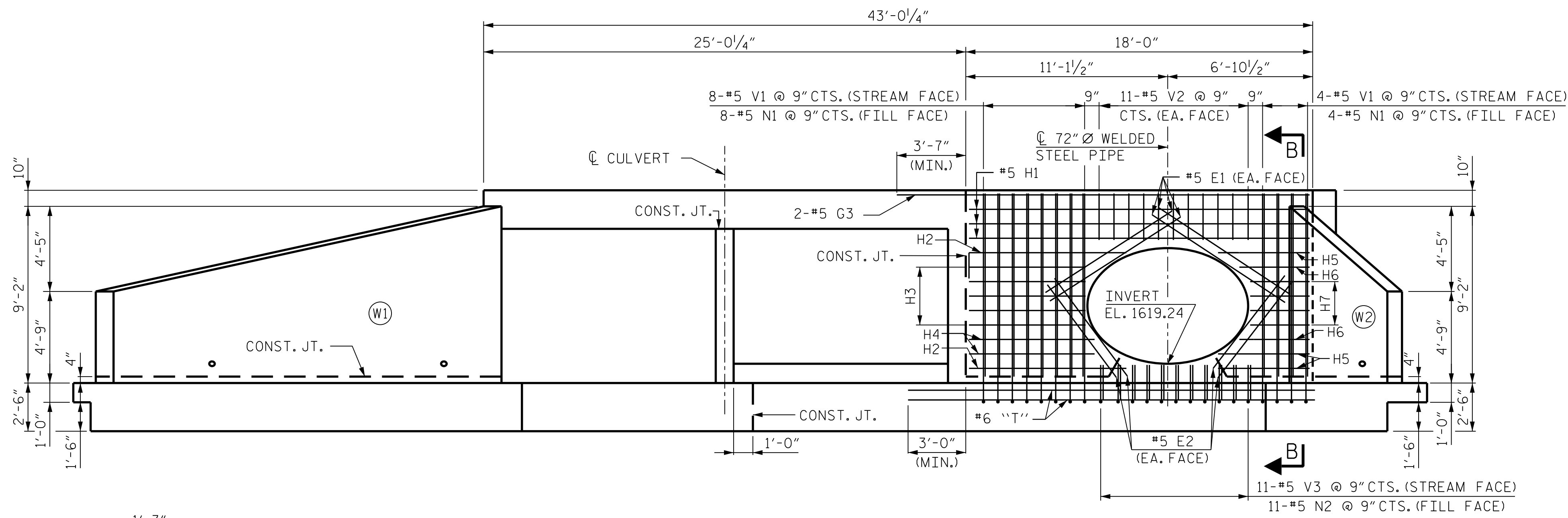
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Raleigh, North Carolina 27615 | NC License No. F-0112
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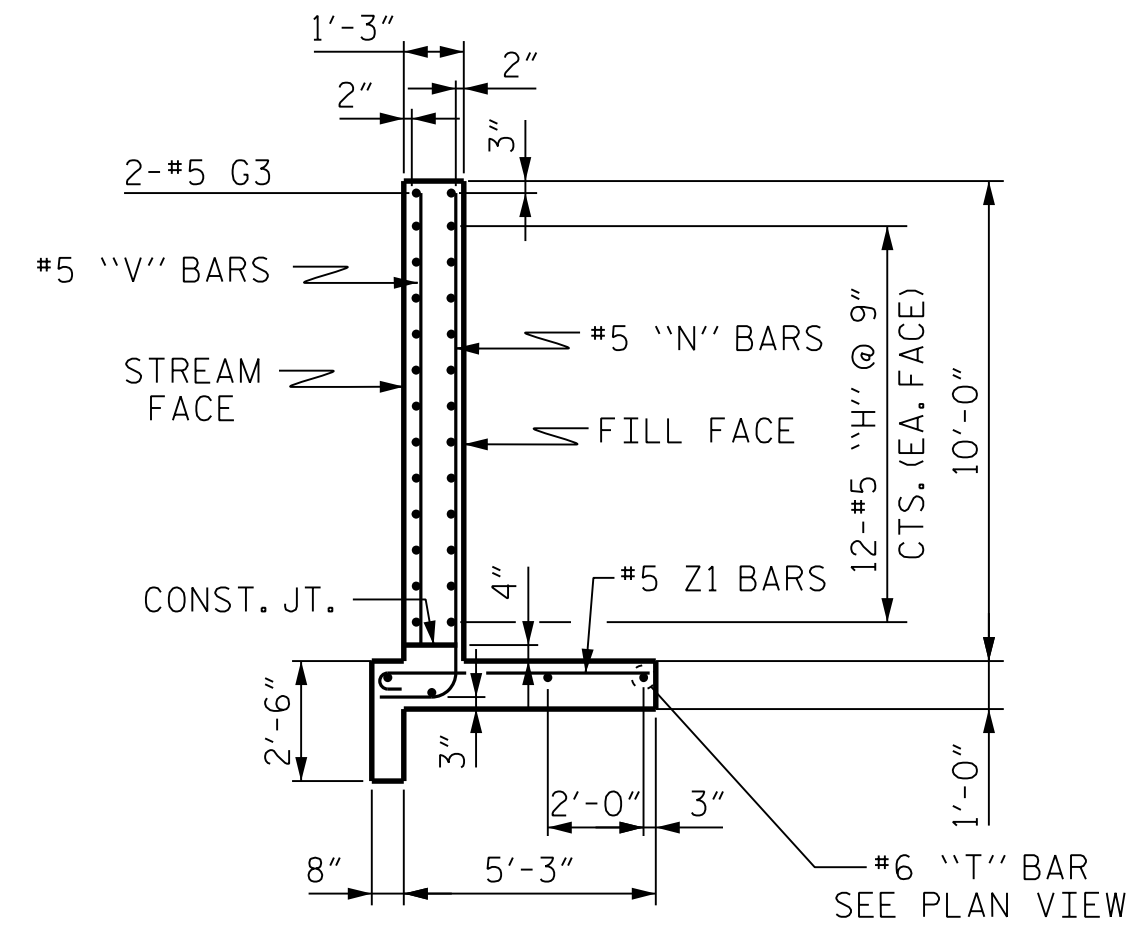
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DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023

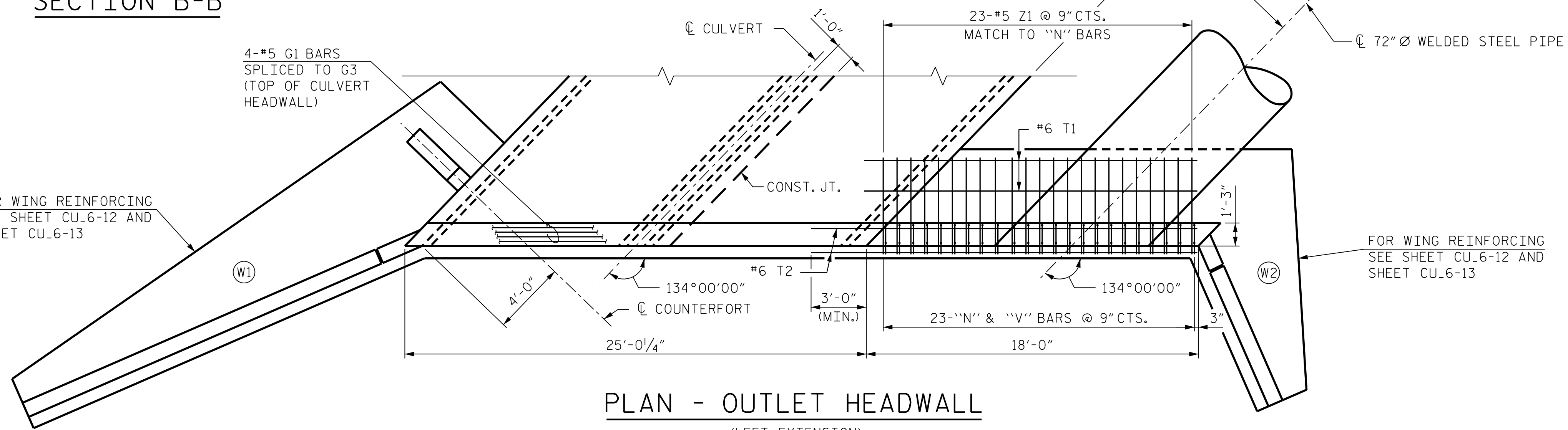
TOTAL SHEETS
15



END ELEVATION - NORMAL TO SKEW
(OUTLET END)



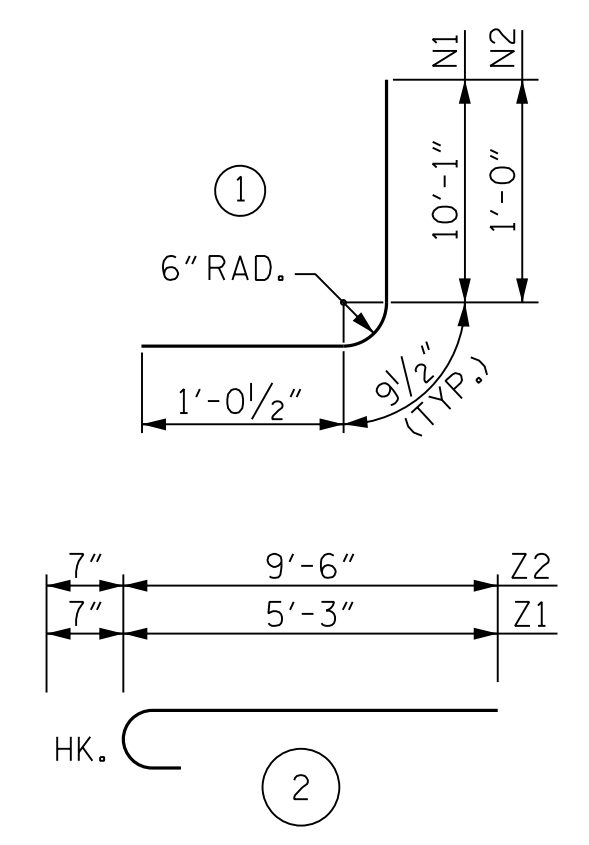
SECTION B-B



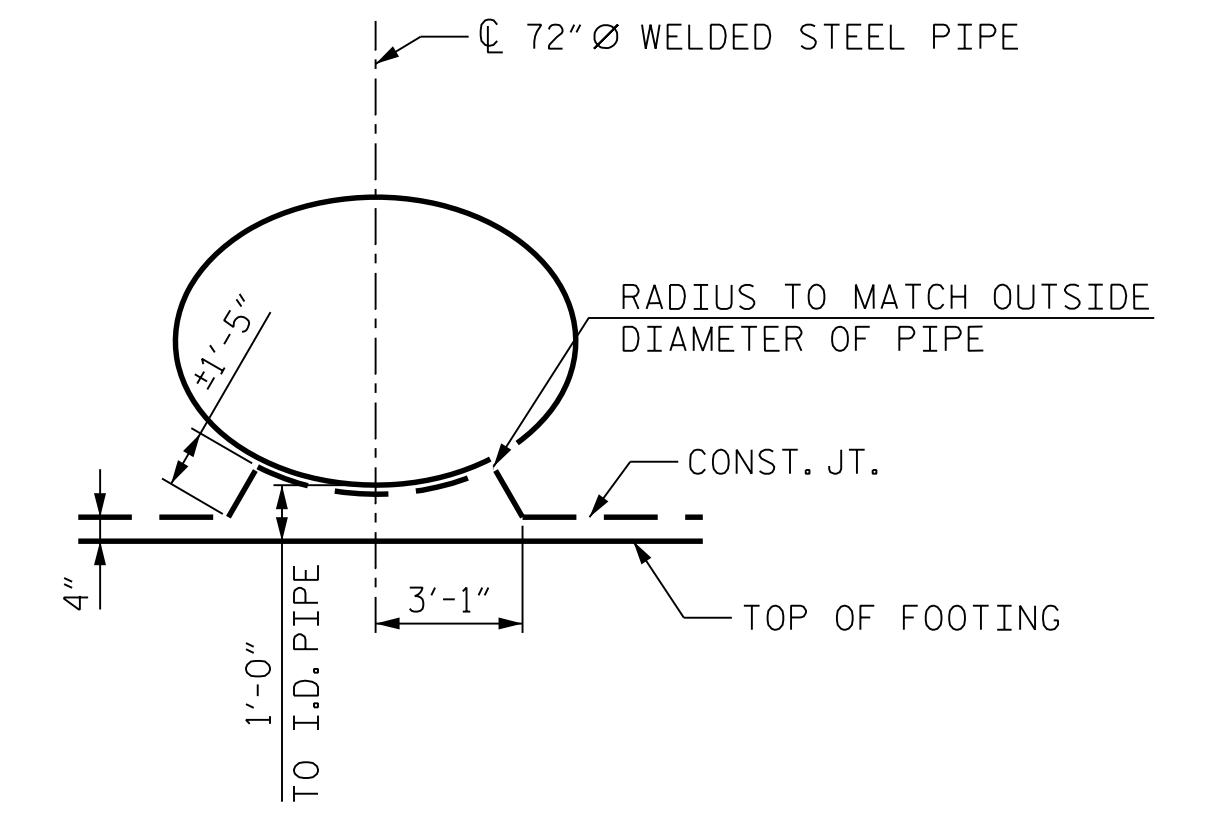
PLAN - OUTLET HEADWALL
(LEFT EXTENSION)
(SHIFT BARS AS REQUIRED TO MISS CULVERT BOTTOM SLAB STEEL)

NOTE:
BARS MAY BE SHIFTED SLIGHTLY TO ACCOMMODATE LOCATION OF 72" W.S.P.

BAR TYPE		BILL OF MATERIAL OUTLET END				
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
E1	#5	STR.	8'-4"	70		
E2	#5	STR.	6'-4"	53		
G3	#5	STR.	21'-5"	45		
H1	#5	STR.	17'-8"	111		
H2	#5	STR.	8'-2"	34		
H3	#5	STR.	6'-0"	63		
H4	#5	STR.	6'-6"	27		
H5	#5	STR.	4'-9"	30		
H6	#5	STR.	3'-8"	15		
H7	#5	STR.	3'-1"	26		
N1	#5	1	11'-11"	149		
N2	#5	1	2'-10"	33		
T1	#6	STR.	18'-3"	55		
T2	#6	STR.	21'-0"	63		
V1	#5	STR.	9'-6"	119		
V2	#5	STR.	2'-5"	55		
V3	#5	STR.	1'-1"	12		
Z1	#5	2	5'-10"	140		
REINFORCING STEEL				1,093 LBS.		
CLASS A CONCRETE				11.1 C.Y.		



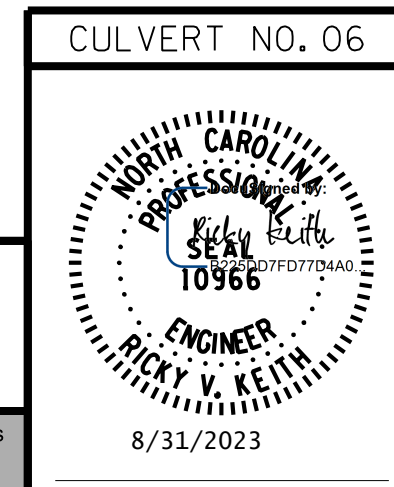
DIMENSIONS ARE OUT TO OUT



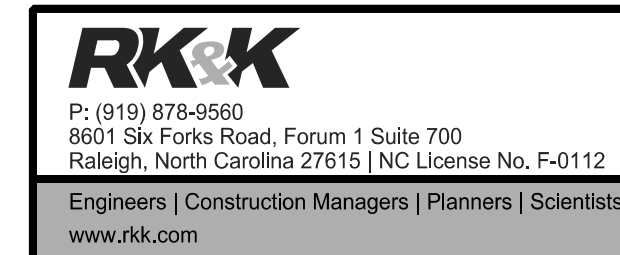
CONSTRUCTION JOINT DETAIL
(OUTLET END - STEEL PIPE)

PROJECT NO. R-5861
CHEROKEE COUNTY
STATION: 71+92.10 -L-

SHEET 11 OF 15



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
72" Ø WELDED STEEL PIPE HEADWALL OUTLET END



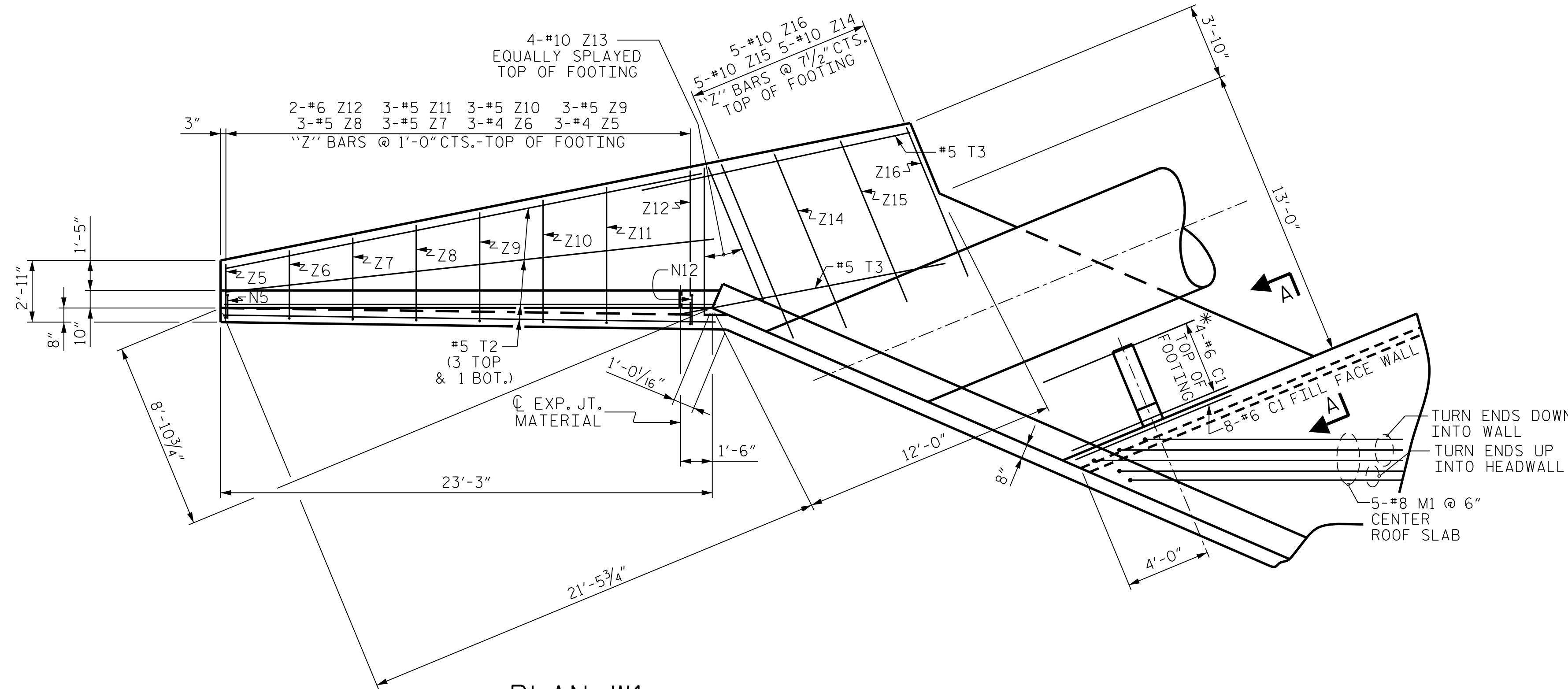
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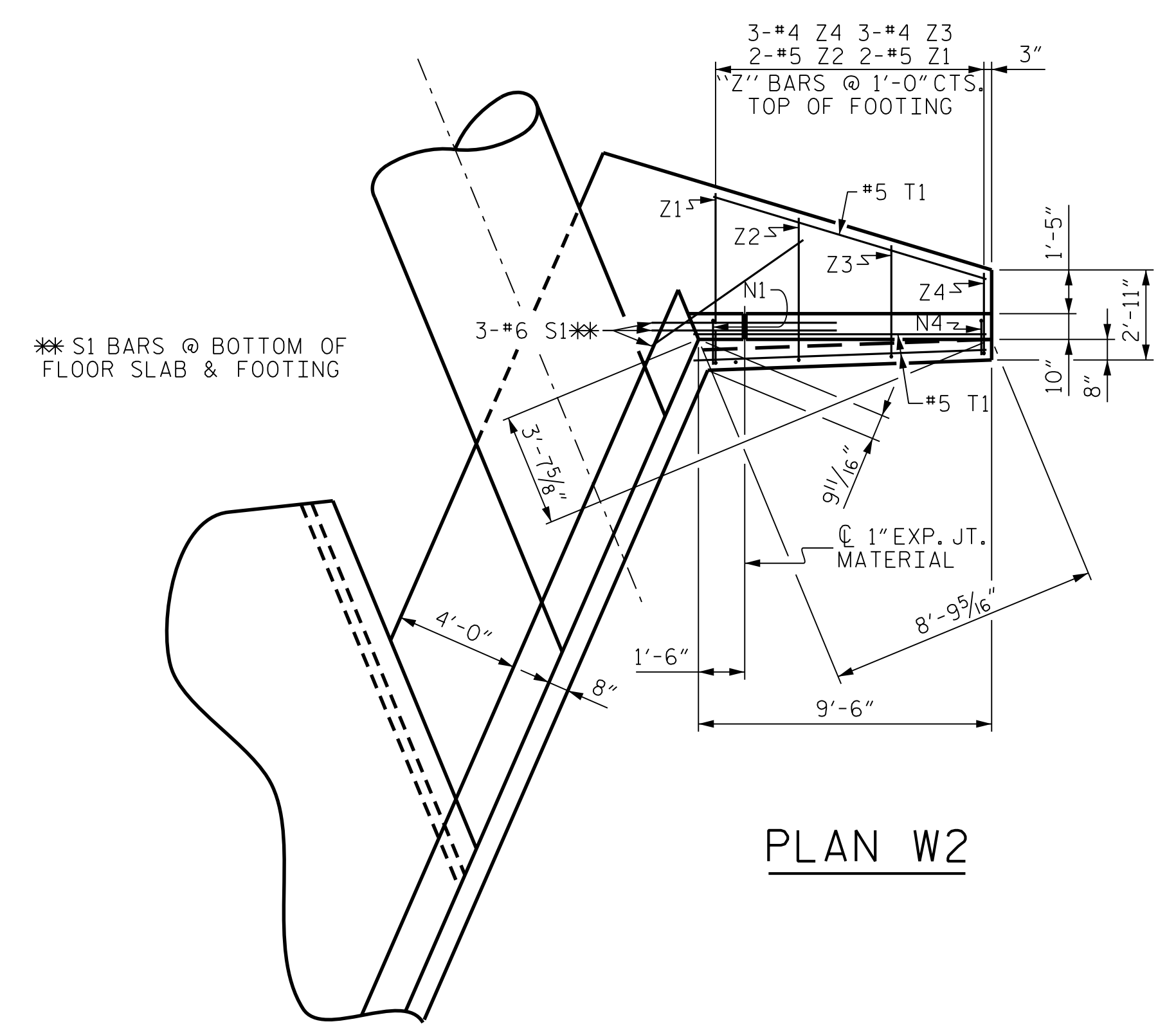
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DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023

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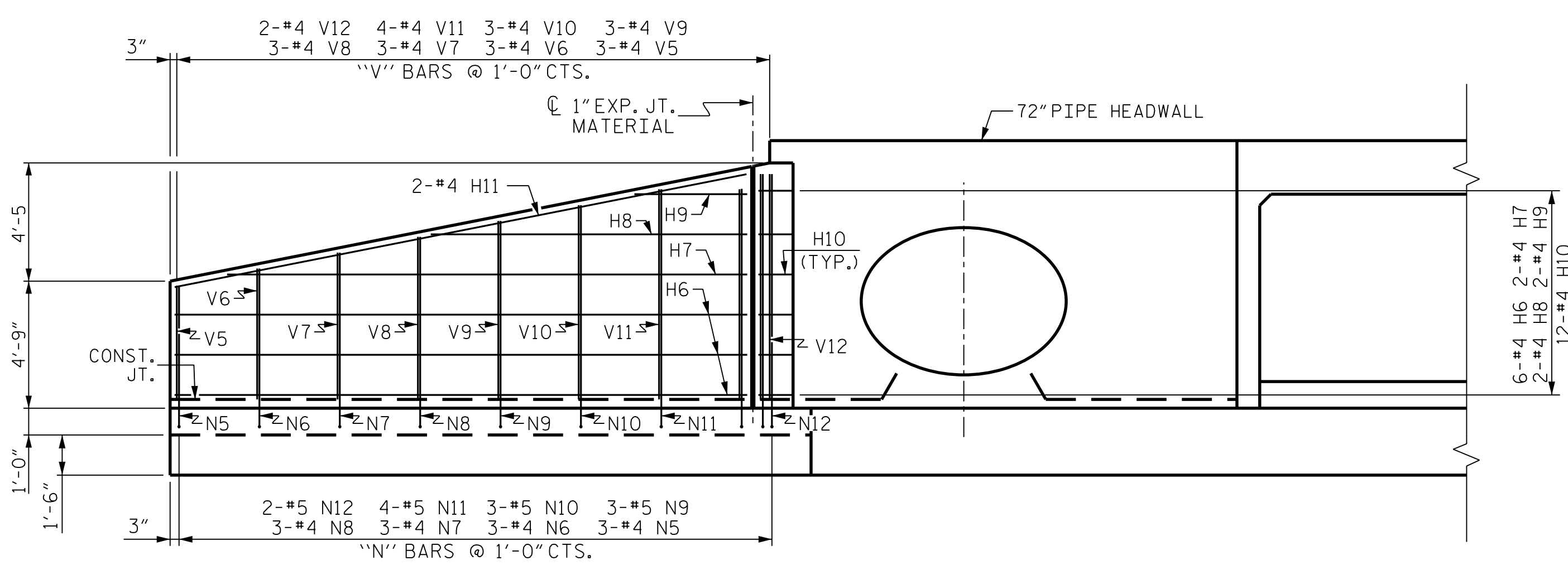


PLAN W1

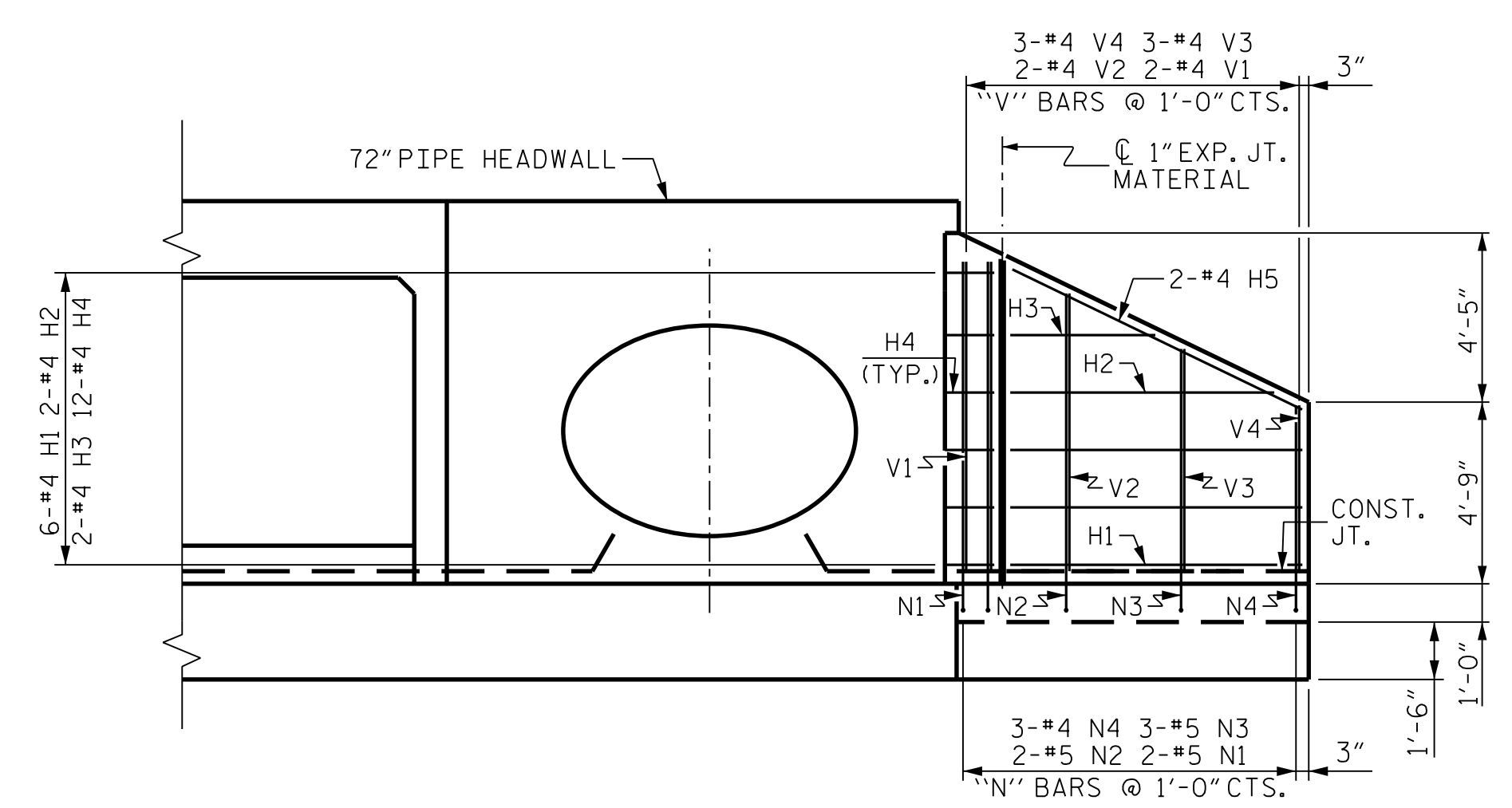
* CENTER ALL #6 C1 BARS ON COUNTERFORT



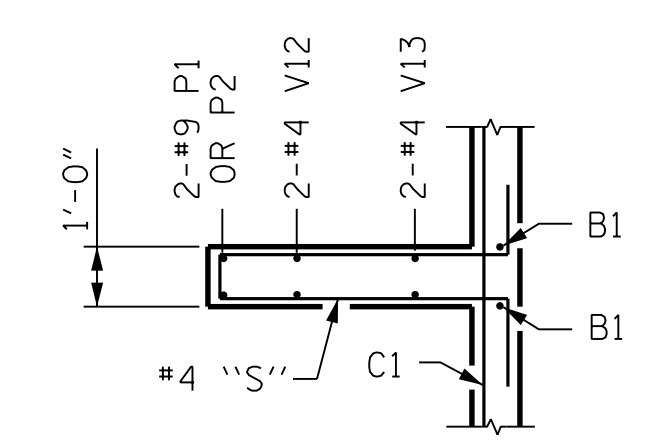
PLAN W2



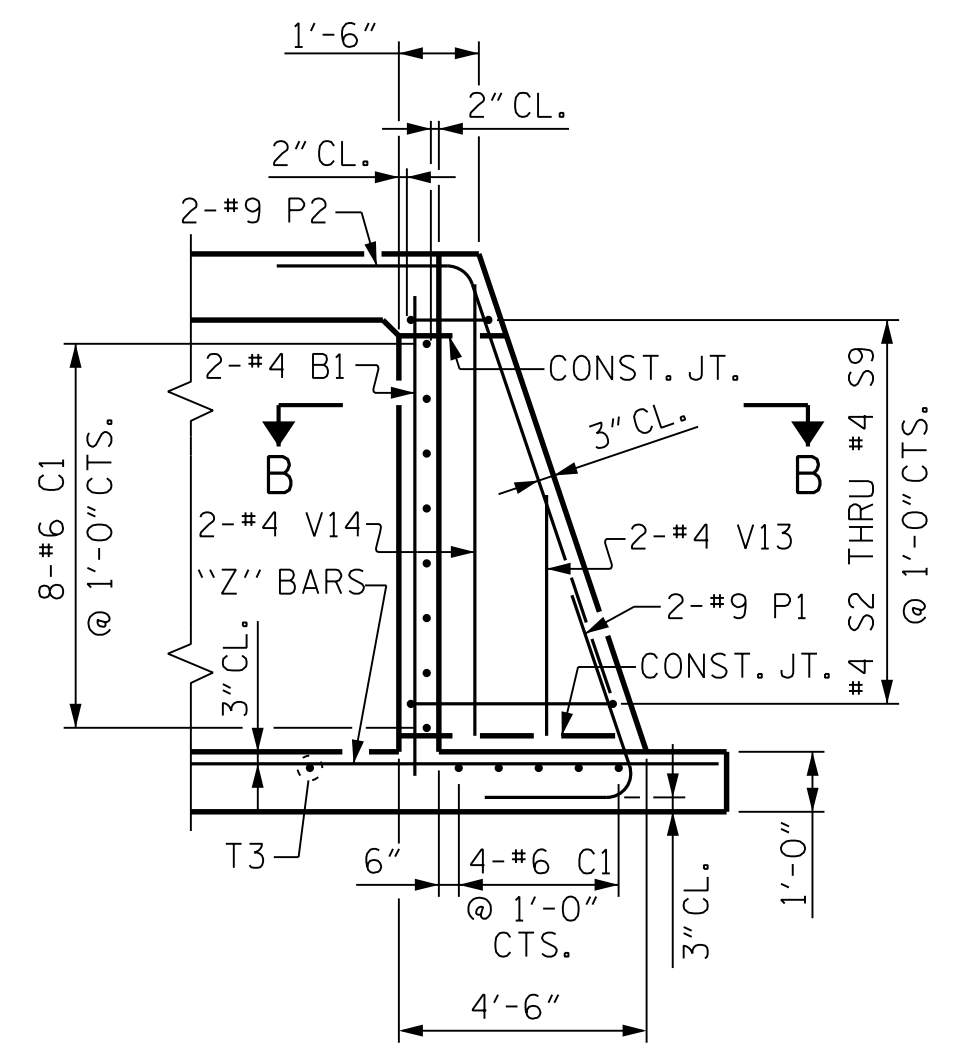
ELEVATION W1



ELEVATION W2

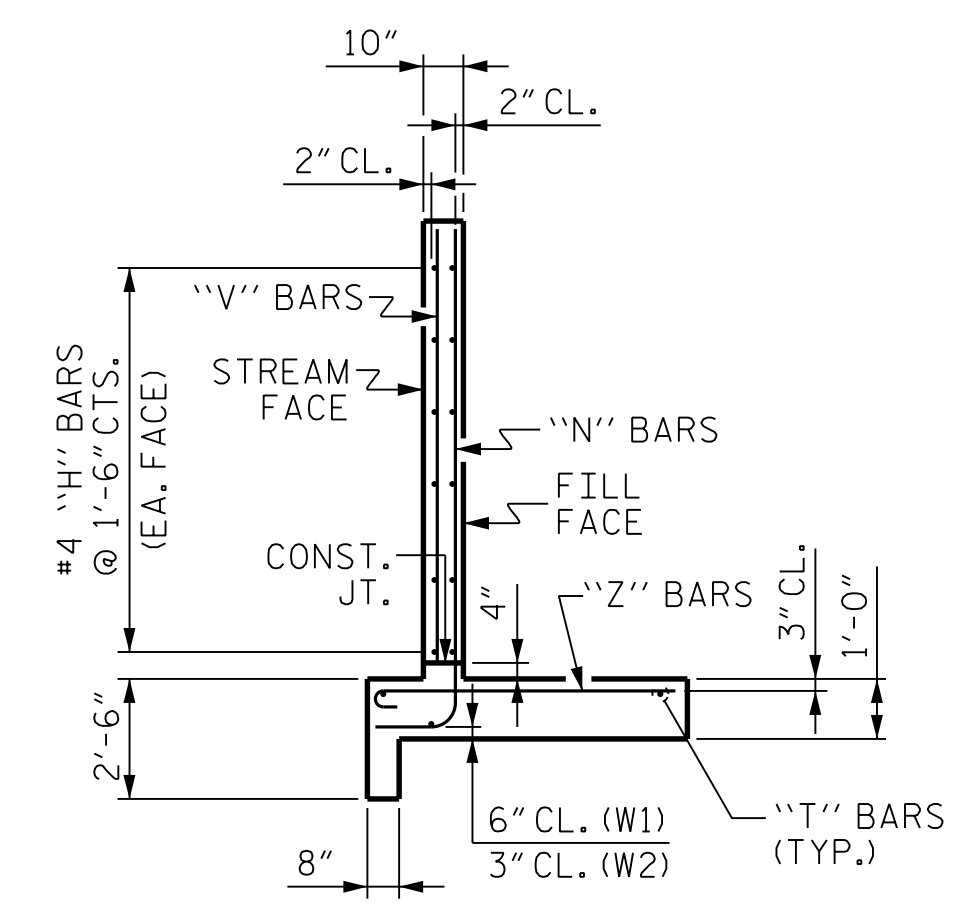


SECTION B-B



SECTION A-A

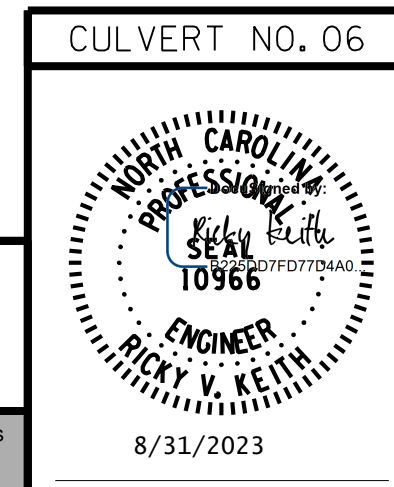
STANDARD REINFORCING STEEL IN BARREL NOT SHOWN



WING SECTION

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 12 OF 15



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
WINGS FOR
 CONCRETE BOX CULVERT
 H = 8'-0" SLOPE : 2:1

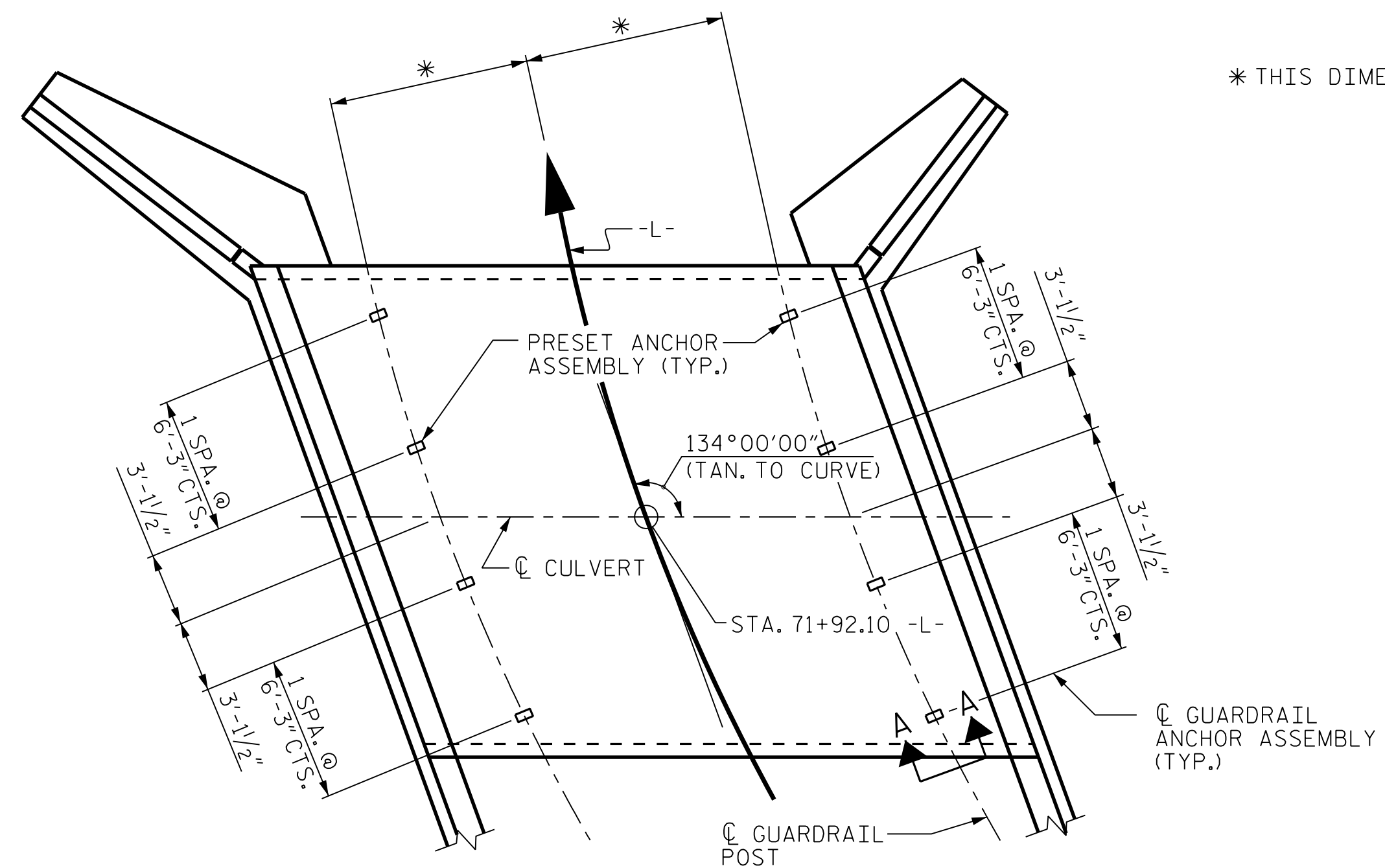


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DRAWN BY : A. J. WOLCOTT DATE : JUL 2023
 CHECKED BY : R. V. KEITH DATE : JUL 2023
 DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023



* THIS DIMENSION TO BE FURNISHED BY THE ENGINEER.

PLAN OF CULVERT GUARDRAIL ANCHOR ASSEMBLY SPACING

NOTES:

- THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2 1/2".
 - B. 4 - 1" Ø X 2 1/4" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2 1/4" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
 - C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

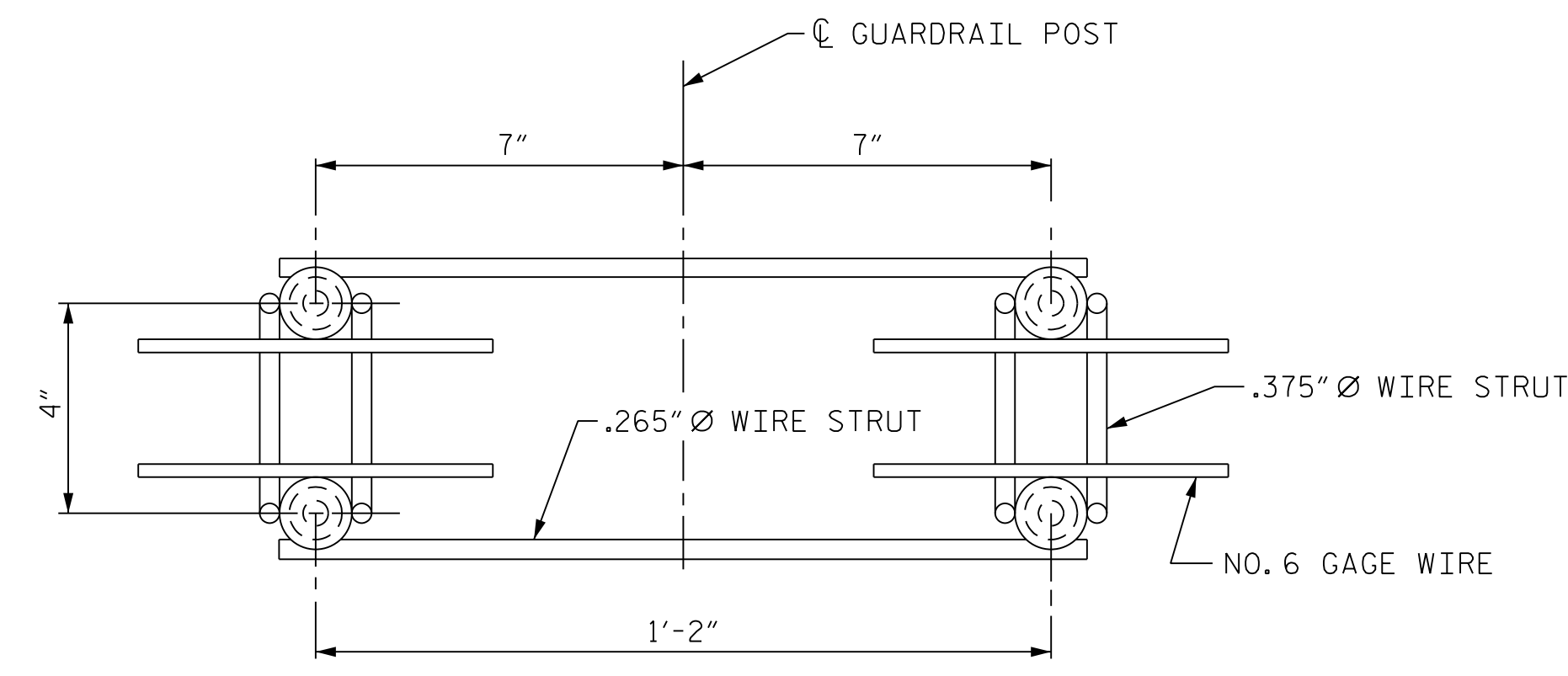
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

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

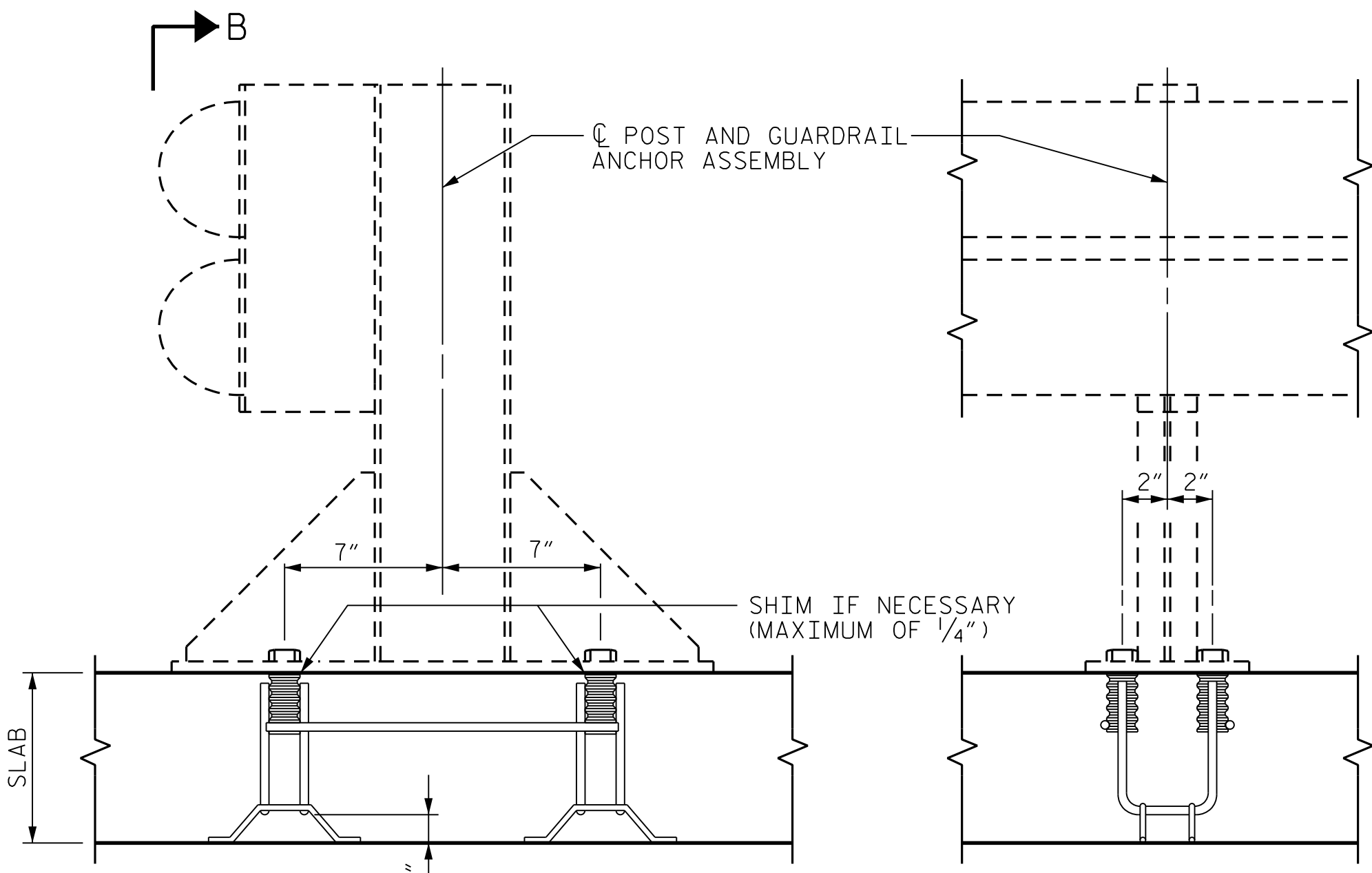
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

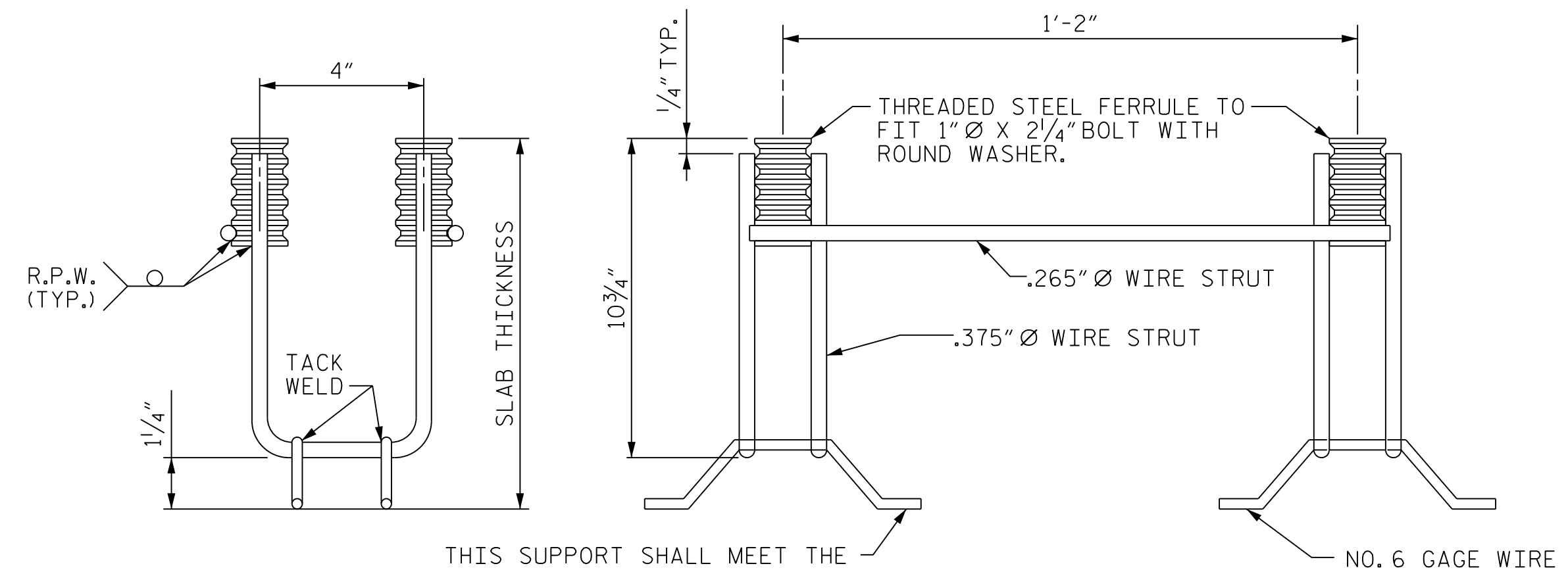


PLAN



SECTION A-A

SECTION B-B



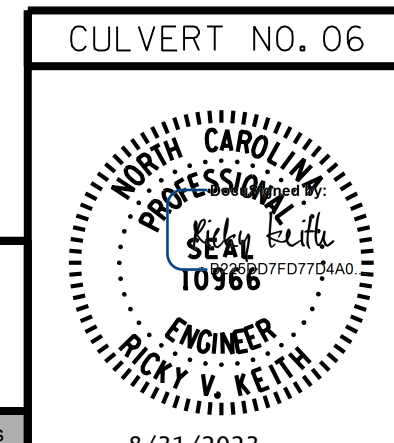
ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

PROJECT NO. R-5861
CHEROKEE COUNTY
 STATION: 71+92.10 -L-

SHEET 14 OF 15



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD
 ANCHORAGE DETAILS FOR
 GUARDRAIL ANCHOR ASSEMBLY
 FOR CULVERTS

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DRAWN BY : A. J. WOLCOTT DATE : JUL 2023
 CHECKED BY : R. V. KEITH DATE : JUL 2023
 DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JUL 2023

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1 1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 3/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

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

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

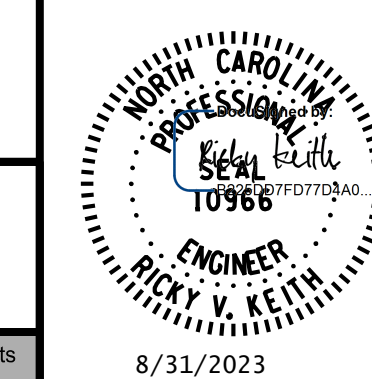
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CHEROKEE COUNTY
STATION: 71+92.10 -L-

SHEET 15 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
NOTES

CULVERT NO. 06



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2			4		
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DRAWN BY : <u>A. J. WOLCOTT</u>	DATE : <u>JUL 2023</u>
CHECKED BY : <u>R. V. KEITH</u>	DATE : <u>JUL 2023</u>
DESIGN ENGINEER OF RECORD : <u>R. V. KEITH</u>	DATE : <u>JUL 2023</u>

8/31/2023 R:\Structures\Culverts\Culvert 6 - CobbCreek\DGN\Final\R-5861_SMU_CU_6-15_190003.dgn tboyd