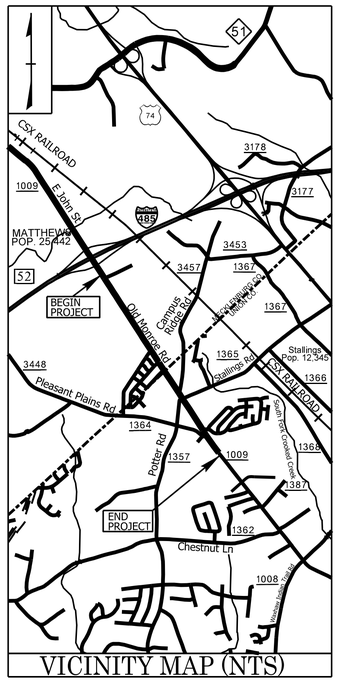
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09/08/99

TIP PROJECT: U-4714AC

CONTRACT: C205184

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



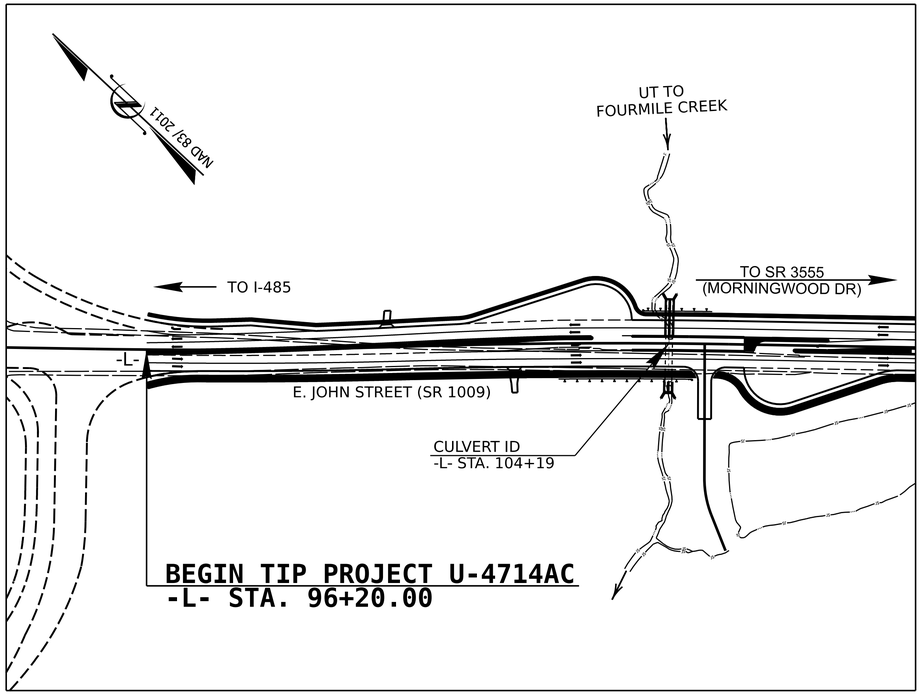
VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MECKLENBURG COUNTY

LOCATION: *EXTEND CULVERT ON SR 1009 (E. JOHN STREET) OVER UT TO FOURMILE CREEK*

TYPE OF WORK: *GRADING, PAVING, DRAINAGE, AND STRUCTURE*



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4714AC		
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
39078.1.8	N/A	PE	

FINAL PLANS

STRUCTURE

SUNGATE DESIGN GROUP
5400 Etta Burke Ct., STE. 100 • Raleigh, North Carolina 27606
Phone: (919) 859-2243 • Eng Firm License No. C-890

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DESIGN DATA

ADT 2026 = 50,600
ADT 2046 = 51,300
K = 7 %
D = 55 %
T = 6 % *
V = 40 MPH
*TTST = 2% DUAL = 4%

FUNC CLASS =
MINOR ARTERIAL
REGIONAL TIER

PROJECT LENGTH

TOTAL LENGTH OF TIP PROJECT U-4714AC = 1.843 MILES

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT F DECOLA
8/19/2026

Prepared In the Office of:
KCI ASSOCIATES OF N.C., P.A.
4800 Falls of Neuse Road, Suite 200
Raleigh, NC 27609
Phone (919) 783-9214
NC Firm License No: C-0764

Plans Prepared For:
DIVISION OF HIGHWAYS

2024 STANDARD SPECIFICATIONS

LETTING DATE:
JANUARY 19, 2027

ROBERT F. DECOLA, P.E.
PROJECT ENGINEER

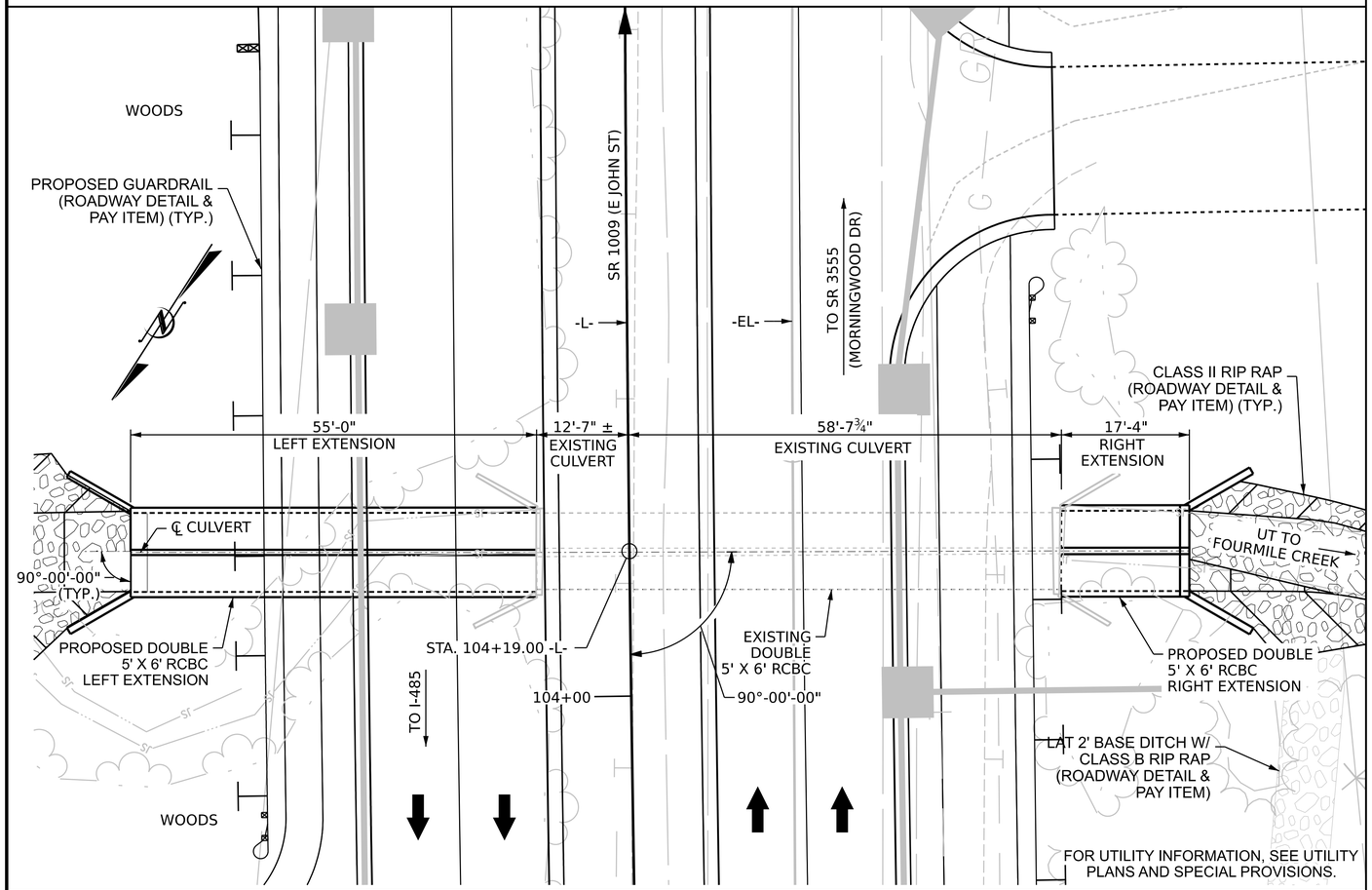
NICHOLAS GIAGUNTO, EIT
PROJECT DESIGN ENGINEER

NCDOT CONTACT: *RADHA ATTALURI, P.E.*
PROJECT MANAGER – NCDOT

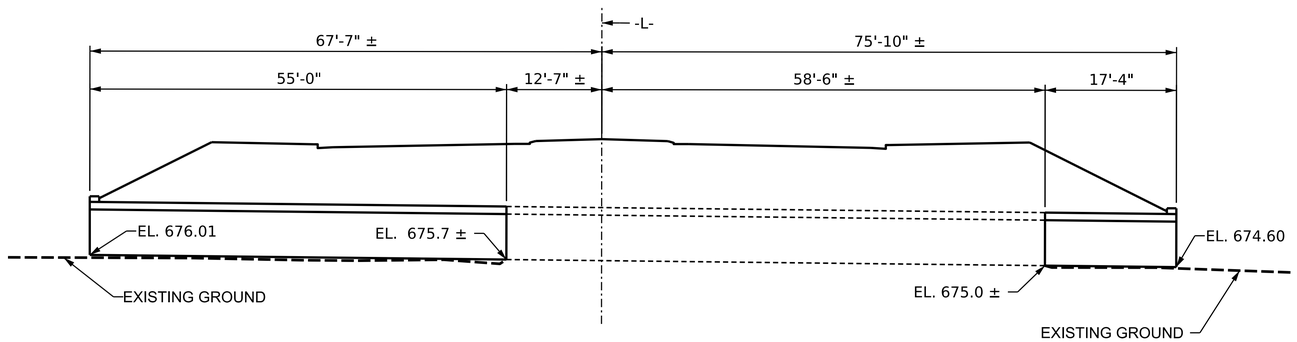
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BM #4 - TIE SPIKE IN 10" PINE, STA. 70+29.00 -L-, 112' RT EL = 694.71' NAVD 88 N 498191 E 1487724



LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

ROADWAY DATA

GRADE POINT ELEV. @ STA. 104+19.00 -L-	= 691.22
BED ELEV @ STA. 104+19.00 -L-	= 675.57
ROADWAY SLOPES	= 2:1

HYDRAULIC DATA

DESIGN DISCHARGE	= 480 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS
DESIGN HIGH WATER ELEVATION	= 682.70
DRAINAGE AREA	= 0.46 SQ. MI.
BASIC DISCHARGE (Q100)	= 500 CFS
BASIC HIGH WATER ELEVATION	= 682.90

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1,130 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS
OVERTOPPING FLOOD ELEVATION @ STA. 104+84.25 -L- LT AT SHOULDER POINT	= 690.1

NOTES

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

DESIGN FILL---------- 10.4'

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

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

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.

2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

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

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

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

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

NO PRECAST REINFORCED BOX CULVERT WILL BE ALLOWED.

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

STEEL IN THE BOTTOM SLAB MAY BE SLICED 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.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR ERORSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT 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 HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI (10.3 MPA).

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

PROJECT NO. U-4714AC

MECKLENBURG COUNTY

STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT F. DECOLA
8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 5 FT. X 6 FT. CONCRETE BOX CULVERT
LEFT AND RIGHT EXTENSIONS
90° SKEW

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA	DATE : 8/19/2026
DRAWN BY : A.W. LOWRANCE	DATE : 12/30/25
CHECKED BY : ROBERT F. DECOLA	DATE : 1/2/26

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ENGINEERS ● PLANNERS ● SCIENTISTS ● CONSTRUCTION MANAGERS LICENSE NUMBER: C-0164
KCI Associates of North Carolina, P.A.
4800 Falls of Neuse Road, Suite 200 Raleigh, NC 27609-6270 Phone (919) 783-9214

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-01
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2			4			9

STD. NO. CB90_2

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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 (γLL)	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	2.64	--	1.75	2.64	2	EXTERIOR WALL	6.00	6.86	1	TOP SLAB	5.00	
		HL-93 (OPERATING)	N/A		3.42	--	1.35	3.42	2	EXTERIOR WALL	6.00	8.90	1	TOP SLAB	5.00	
		HS-20 (INVENTORY)	36.000	2	3.26	117.360	1.75	3.26	2	EXTERIOR WALL	6.00	10.98	2	EXTERIOR WALL	6.00	
		HS-20 (OPERATING)	36.000		4.22	151.920	1.35	4.22	2	EXTERIOR WALL	6.00	14.24	2	EXTERIOR WALL	6.00	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		4.65	62.775	1.40	4.65	2	EXTERIOR WALL	6.00	14.04	1	EXTERIOR WALL	0.00	
		SNGARBS2	20.000		4.59	91.800	1.40	4.59	2	EXTERIOR WALL	6.00	14.07	1	EXTERIOR WALL	0.00	
		SNAGRIS2	22.000		4.65	102.300	1.40	4.65	2	EXTERIOR WALL	6.00	14.04	1	EXTERIOR WALL	0.00	
		SNCOTTS3	27.250		3.74	101.915	1.40	3.74	2	EXTERIOR WALL	6.00	11.63	1	TOP SLAB	5.00	
		SNAGGRS4	34.925	3	3.70	129.223	1.40	3.70	2	EXTERIOR WALL	6.00	10.97	1	TOP SLAB	5.00	
		SNS5A	35.550		3.73	132.602	1.40	3.73	2	EXTERIOR WALL	6.00	11.39	1	TOP SLAB	5.00	
		SNS6A	39.950		3.73	149.014	1.40	3.73	2	EXTERIOR WALL	6.00	11.19	1	TOP SLAB	5.00	
		SNS7B	42.000		3.73	156.660	1.40	3.73	2	EXTERIOR WALL	6.00	11.18	1	TOP SLAB	5.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		4.08	134.640	1.40	4.08	2	EXTERIOR WALL	6.00	13.81	2	EXTERIOR WALL	6.00	
		TNT4A	33.075		3.96	130.977	1.40	3.96	2	EXTERIOR WALL	6.00	13.63	1	TOP SLAB	5.00	
		TNT6A	41.600		3.77	156.832	1.40	3.77	2	EXTERIOR WALL	6.00	11.75	1	TOP SLAB	5.00	
		TNT7A	42.000		3.87	162.540	1.40	3.87	2	EXTERIOR WALL	6.00	12.92	1	TOP SLAB	5.00	
		TNT7B	42.000		3.77	158.340	1.40	3.77	2	EXTERIOR WALL	6.00	11.64	1	TOP SLAB	5.00	
		TNAGRIT4	43.000		3.96	170.280	1.40	3.96	2	EXTERIOR WALL	6.00	13.35	1	TOP SLAB	5.00	
		TNAGT5A	45.000		3.96	178.200	1.40	3.96	2	EXTERIOR WALL	6.00	13.44	1	TOP SLAB	5.00	
		TNAGT5B	45.000		3.96	178.200	1.40	3.96	2	EXTERIOR WALL	6.00	13.38	1	TOP SLAB	5.00	
EMERGENCY VEHICLE (EV)		EV2	28.750		4.56	131.100	1.30	4.56	2	EXTERIOR WALL	6.00	15.44	2	EXTERIOR WALL	6.00	
		EV3	43.000	4	3.72	159.960	1.30	3.72	2	EXTERIOR WALL	6.00	9.99	1	TOP SLAB	5.00	

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.

COMMENTS:

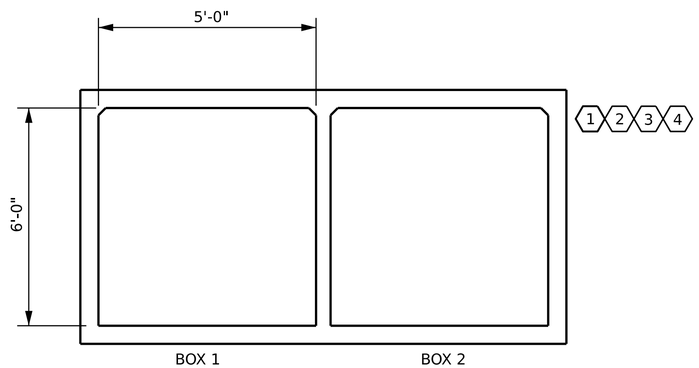
1.

2.

3.

4.

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



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. U-4714AC

MECKLENBURG COUNTY

STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT F. DECOLA

8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-02
1			3			TOTAL SHEETS
2			4			9

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA DATE : 8/19/2026

DRAWN BY : F. SELLAMI DATE : 1/29/26

CHECKED BY : ROBERT F. DECOLA DATE : 2/3/26

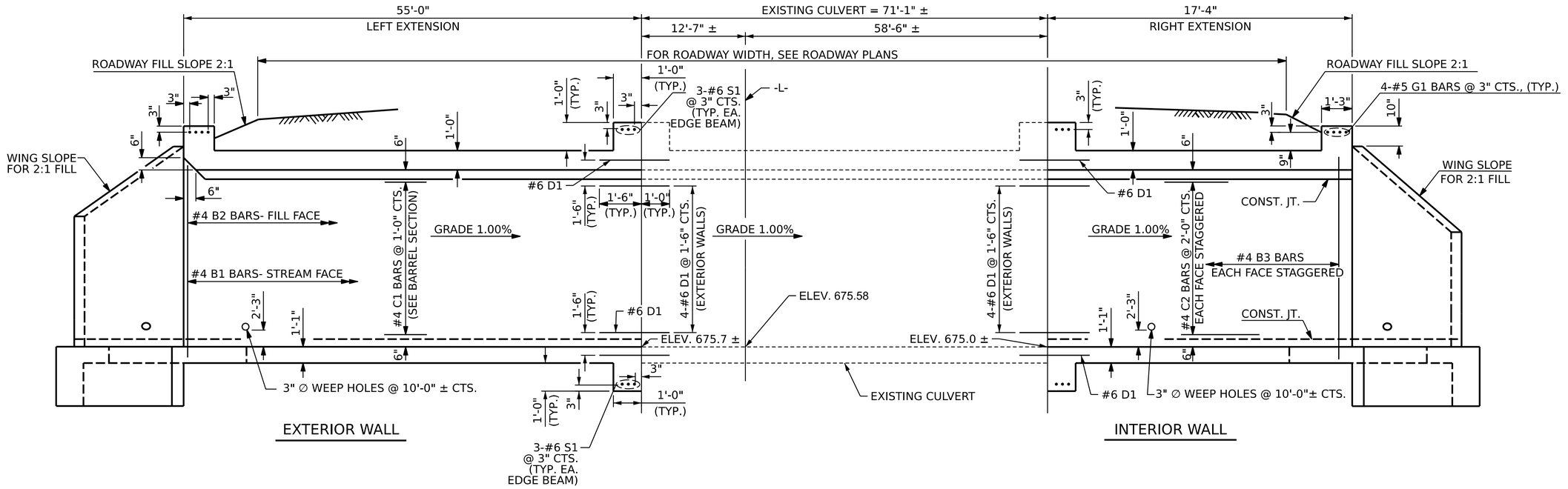
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ENGINEERS ◆ PLANNERS ◆ SCIENTISTS ◆ CONSTRUCTION MANAGERS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
4800 Falls of Neuse Road, Suite 200 Raleigh, NC 27609-6270 Phone (919) 783-9214

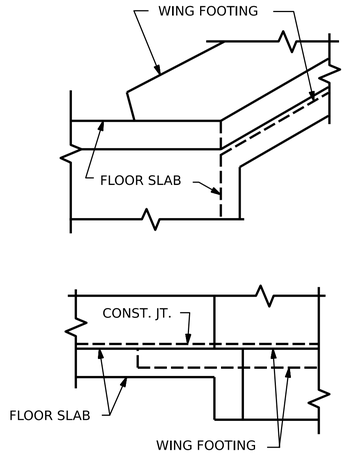
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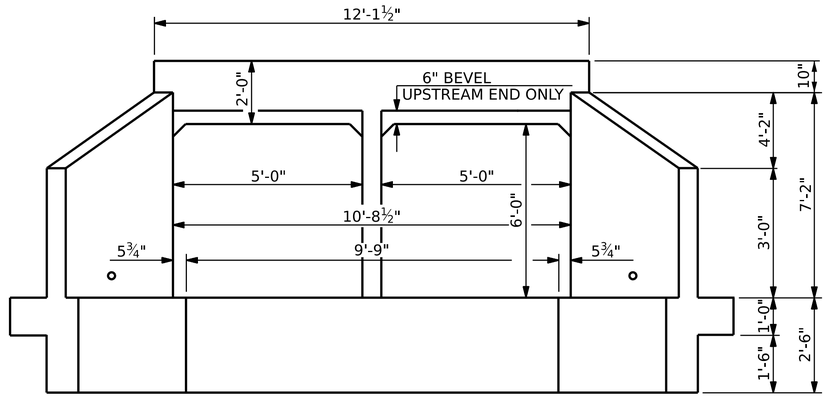


CULVERT SECTION NORMAL TO ROADWAY



DETAIL

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



END ELEVATION

LEFT END (INLET) SHOWN - RIGHT END (OUTLET) SIMILAR EXCEPT AS NOTED

PROJECT NO. U-4714AC
MECKLENBURG COUNTY
STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT FRANCIS DECOLA
8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 5 FT. X 6 FT. CONCRETE BOX CULVERT
LEFT AND RIGHT EXTENSIONS
90° SKEW

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA	DATE : 8/19/2026
DRAWN BY : A.W. LOWRANCE	DATE : 1/6/26
CHECKED BY : ROBERT F. DECOLA	DATE : 2/23/26

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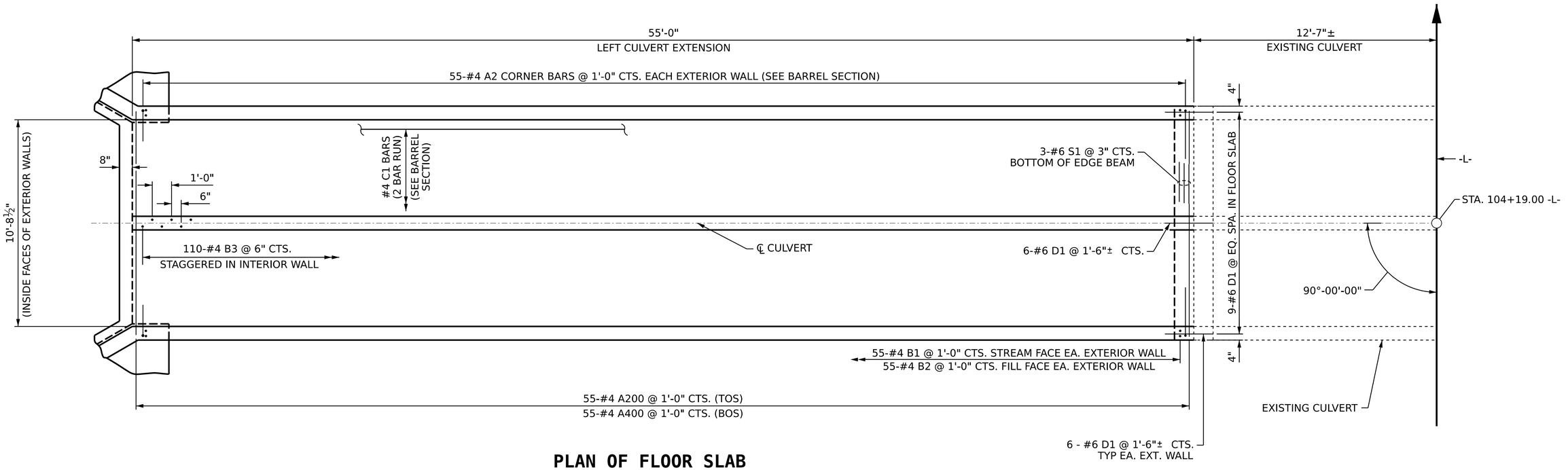
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PLAN OF FLOOR SLAB

PERMITTED CONSTRUCTION JOINT IN FLOOR SLAB NOT SHOWN FOR CLARITY
(TOS) DENOTES TOP OF SLAB
(BOS) DENOTES BOTTOM OF SLAB

PROJECT NO. U-4714AC
MECKLENBURG **COUNTY**
STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT F. DECOLA
8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 5 FT. X 6 FT. CONCRETE BOX CULVERT
LEFT AND RIGHT
EXTENSIONS. 90° SKEW

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA	DATE : 8/19/2026
DRAWN BY : A.W. LOWRANCE	DATE : 1/6/26
CHECKED BY : ROBERT F. DECOLA	DATE : 2/3/26

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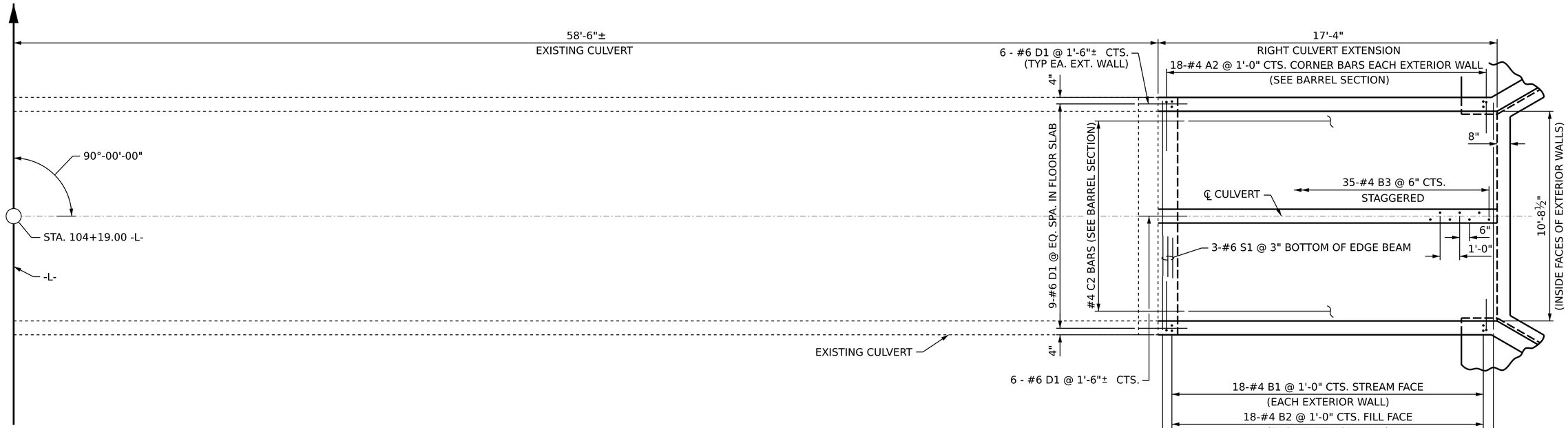
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PLAN OF FLOOR SLAB

PERMITTED CONSTRUCTION JOINT IN BOTTOM SLAB NOT SHOWN FOR CLARITY

PROJECT NO. U-4714AC

MECKLENBURG COUNTY

STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT F. DECOLA
Digitally Signed by ROBERT F. DECOLA
8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 5 FT. X 6 FT. CONCRETE BOX CULVERT

LEFT AND RIGHT EXTENSIONS. 90° SKEW

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA	DATE : 8/19/2026
DRAWN BY : A.W. LOWRANCE	DATE : 1/6/26
CHECKED BY : ROBERT F. DECOLA	DATE : 2/3/26

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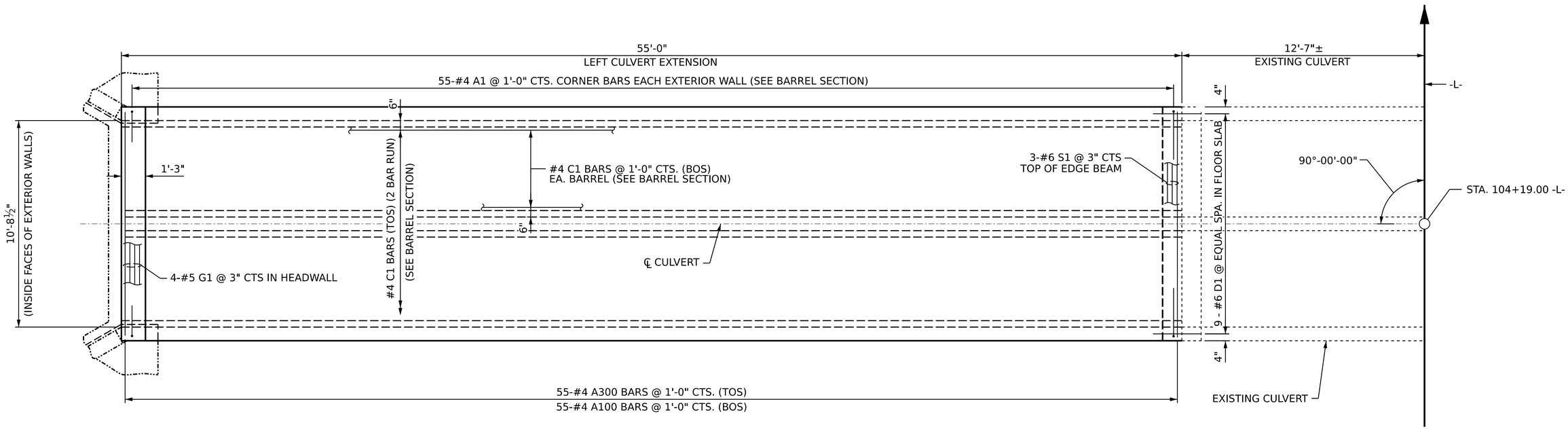
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PLAN OF ROOF SLAB

(TOS) DENOTES TOP OF SLAB
(BOS) DENOTES BOTTOM OF SLAB

PROJECT NO. U-4714AC
MECKLENBURG COUNTY
STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT FRANKLIN DECOLA
8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 5 FT. X 6 FT. CONCRETE BOX CULVERT
LEFT AND RIGHT EXTENSIONS. 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-06
1			3			TOTAL SHEETS
2			4			9

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA DATE : 8/19/2026
DRAWN BY : A.W. LOWRANCE DATE : 1/7/26
CHECKED BY : ROBERT F. DECOLA DATE : 2/3/26

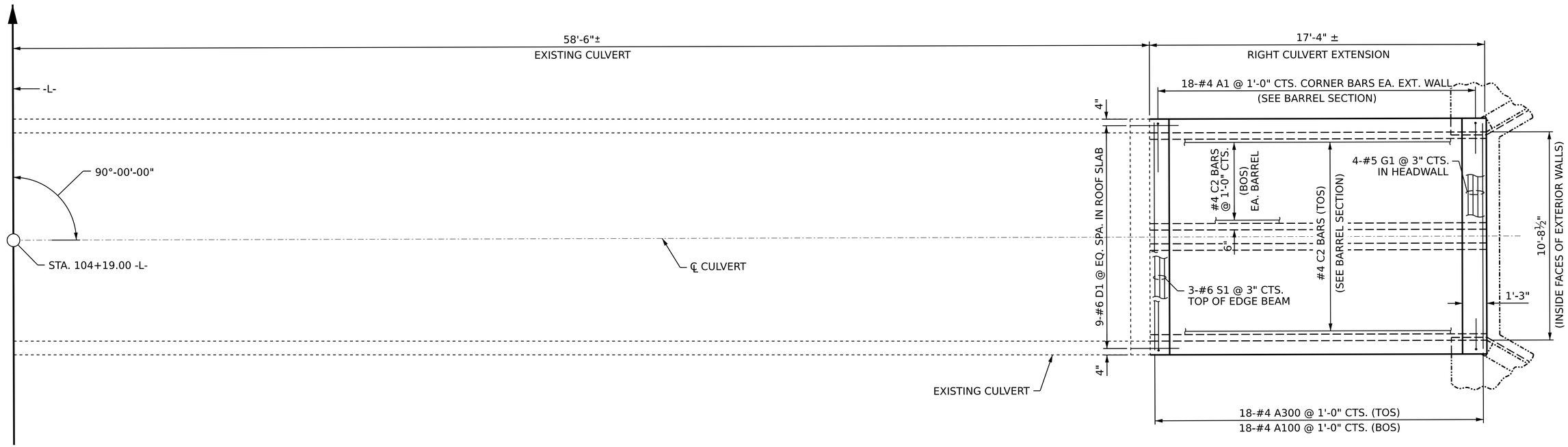
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KCI Associates of North Carolina, P.A.
4800 Falls of Neuse Road, Suite 200 Raleigh, NC 27609-6270 Phone (919) 783-9214

STD. NO. CB90_1

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PLAN OF ROOF SLAB

(TOS) DENOTES TOP OF SLAB
(BOS) DENOTES BOTTOM OF SLAB

PROJECT NO. U-4714AC
MECKLENBURG COUNTY
STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT FRANCIS DECOLA
8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 5 FT. X 6 FT. CONCRETE BOX CULVERT
LEFT AND RIGHT EXTENSIONS. 90° SKEW

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA	DATE : 8/19/2026
DRAWN BY : A.W. LOWRANCE	DATE : 1/8/26
CHECKED BY : ROBERT F. DECOLA	DATE : 2/2/26

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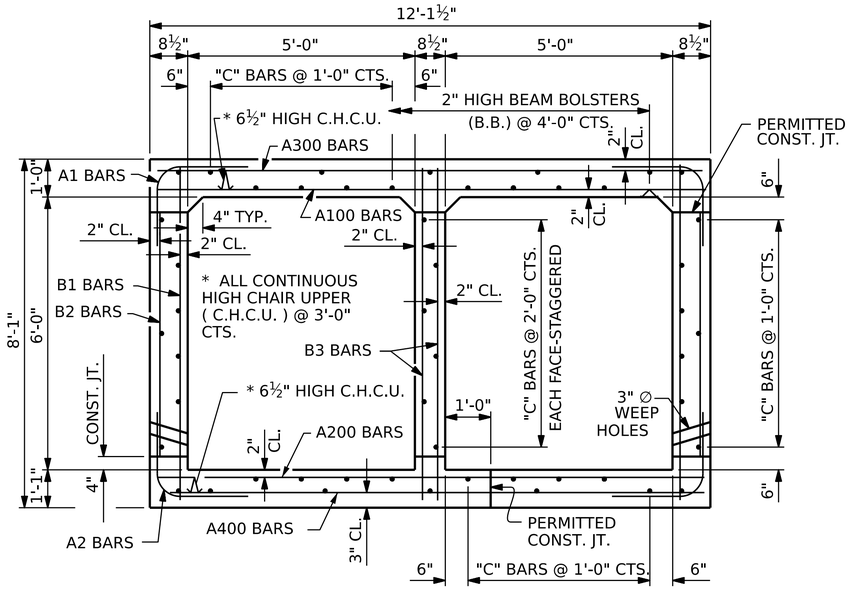
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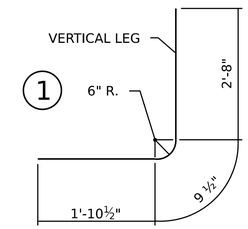
RIGHT ANGLE SECTION OF BARREL

THERE ARE 50 "C" BARS IN SECTION OF BARREL.

BILL OF MATERIAL

LEFT EXTENSION						RIGHT EXTENSION					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	110	4	1	5'-4"	392	A1	36	4	1	5'-4"	128
A2	110	4	1	5'-4"	392	A2	36	4	1	5'-4"	128
A100	55	4	STR	11'-9"	432	A100	18	4	STR	11'-9"	141
A200	55	4	STR	11'-9"	432	A200	18	4	STR	11'-9"	141
A300	55	4	STR	11'-9"	432	A300	18	4	STR	11'-9"	141
A400	55	4	STR	11'-9"	432	A400	18	4	STR	11'-9"	141
B1	110	4	STR	7'-8"	563	B1	36	4	STR	7'-8"	184
B2	110	4	STR	5'-4"	392	B2	36	4	STR	5'-4"	128
B3	110	4	STR	7'-8"	563	B3	35	4	STR	7'-8"	179
C1	100	4	STR	28'-7"	1909	C2	50	4	STR	17'-0"	568
D1	36	6	STR	2'-6"	135	D1	36	6	STR	2'-6"	135
G1	4	5	STR	11'-9"	49	G1	4	5	STR	11'-9"	49
S2	6	6	STR	11'-9"	106	S2	6	6	STR	11'-9"	106
REINFORCING STEEL, LB.					6,229	REINFORCING STEEL, LB.					2,169

BAR TYPES



DIMENSIONS ARE OUT TO OUT

REINFORCING SPLICE LENGTH CHART

BAR	SPLICE
#4 "B''	1'-10"
#4 "C"	2'-5"
#4 "A''	1'-10"

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE

LEFT EXTENSION

BARREL @ 1.416 CY/FT 77.9 C.Y.

WINGS ETC. 9.0 C.Y.

TOTAL 86.9 C.Y.

RIGHT EXTENSION

BARREL @ 1.416 CY/FT 24.5 C.Y.

WINGS ETC. 9.0 C.Y.

TOTAL 33.5 C.Y.

REINFORCING STEEL

LEFT EXTENSION

BARREL @ 6,229 LBS.

WINGS ETC. 396 LBS.

TOTAL 6,625 LBS.

RIGHT EXTENSION

BARREL @ 2,169 LBS.

WINGS ETC. 396 LBS.

TOTAL 2,565 LBS.

FOUNDATION CONDITIONING MATERIAL

LEFT EXTENSION 63 TONS

RIGHT EXTENSION 20 TONS

TOTAL 83 TONS

CULVERT EXCAVATION LUMP SUM

PROJECT NO. U-4714AC

MECKLENBURG COUNTY

STATION: 104+19.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT F. DECOLA

8/19/2026

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 5 FT. X 6 FT. CONCRETE BOX CULVERT

LEFT AND RIGHT EXTENSIONS. 90° SKEW

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA DATE: 8/19/2026

DRAWN BY: A.W. LOWRANCE DATE: 1/8/26

CHECKED BY: ROBERT F. DECOLA DATE: 2/3/26

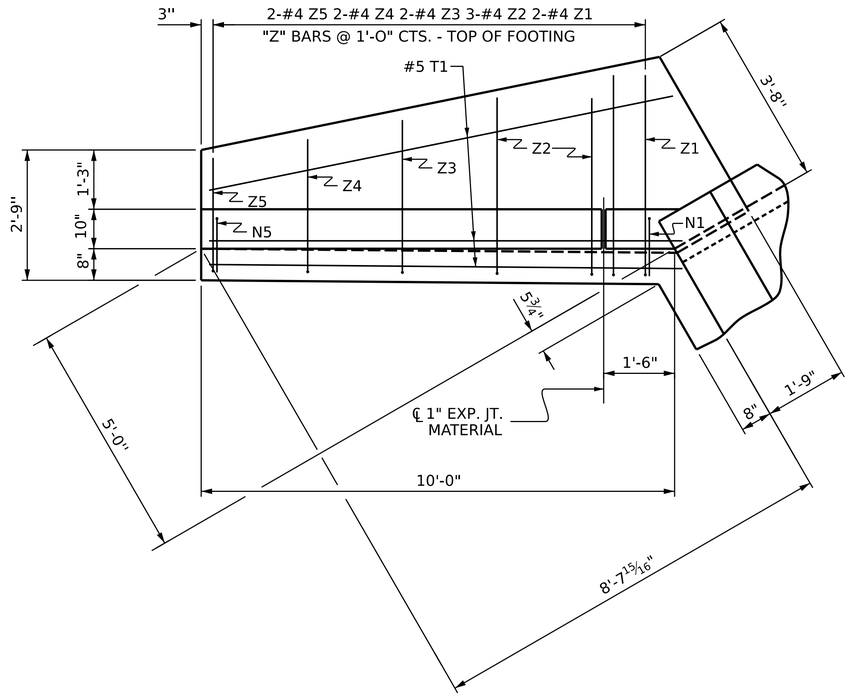
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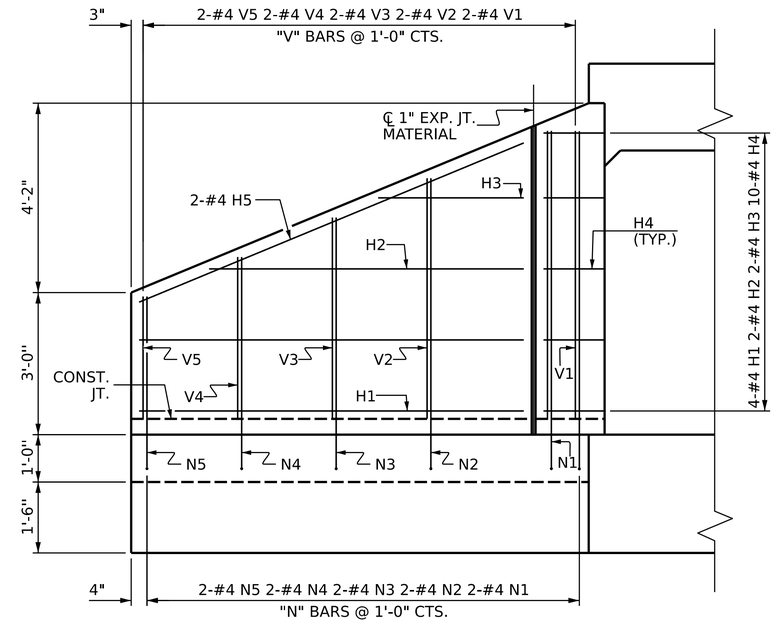
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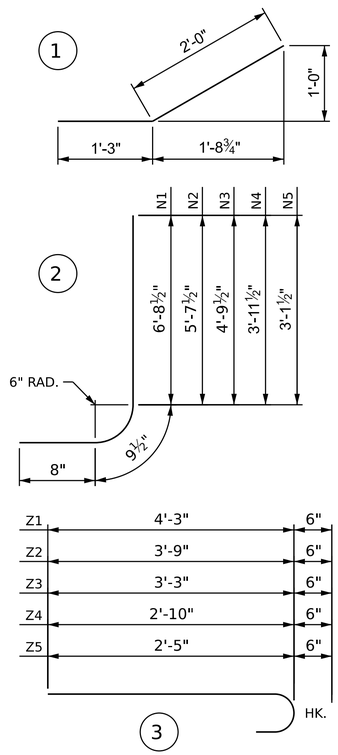


PLAN



ELEVATION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

LEFT EXTENSION

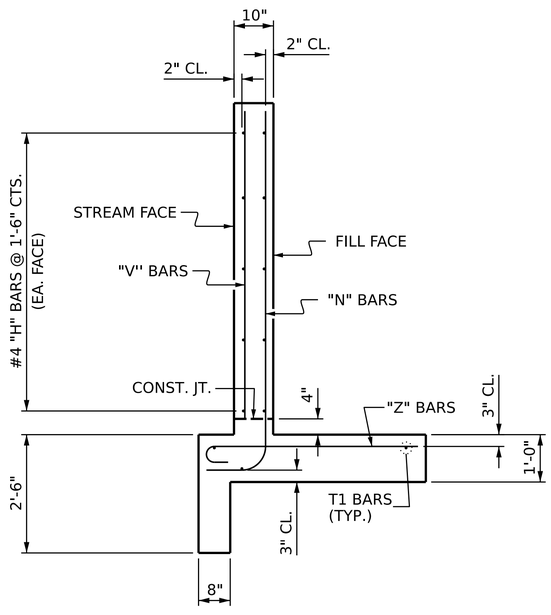
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	8'-1"	43
H2	4	#4	STR	6'-8"	18
H3	4	#4	STR	3'-1"	8
H4	20	#4	1	3'-3"	43
H5	4	#4	STR	8'-9"	23
N1	4	#4	2	8'-2"	22
N2	4	#4	2	7'-1"	19
N3	4	#4	2	6'-3"	17
N4	4	#4	2	5'-5"	14
N5	4	#4	2	4'-7"	12
T1	6	#5	STR	10'-0"	63
V1	4	#4	STR	6'-1"	16
V2	4	#4	STR	5'-1"	14
V3	4	#4	STR	4'-3"	11
V4	4	#4	STR	3'-5"	9
V5	4	#4	STR	2'-7"	7
Z1	4	#4	3	4'-9"	13
Z2	6	#4	3	4'-3"	17
Z3	4	#4	3	3'-9"	10
Z4	4	#4	3	3'-4"	9
Z5	4	#4	3	2'-11"	8

REINFORCING STEEL FOR 2 WINGS	396	LBS
CLASS A CONCRETE		
2 WINGS	6.9	CY
1 HEADWALL	0.6	CY
1 END CURTAIN WALL	0.6	CY
2 EDGE BEAMS	0.9	CY
TOTAL	9.0	CY

RIGHT EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	8'-1"	43
H2	4	#4	STR	6'-8"	18
H3	4	#4	STR	3'-1"	8
H4	20	#4	1	3'-3"	43
H5	4	#4	STR	8'-9"	23
N1	4	#4	2	8'-2"	22
N2	4	#4	2	7'-1"	19
N3	4	#4	2	6'-3"	17
N4	4	#4	2	5'-5"	14
N5	4	#4	2	4'-7"	12
T1	6	#5	STR	10'-0"	63
V1	4	#4	STR	6'-1"	16
V2	4	#4	STR	5'-1"	14
V3	4	#4	STR	4'-3"	11
V4	4	#4	STR	3'-5"	9
V5	4	#4	STR	2'-7"	7
Z1	4	#4	3	4'-9"	13
Z2	6	#4	3	4'-3"	17
Z3	4	#4	3	3'-9"	10
Z4	4	#4	3	3'-4"	9
Z5	4	#4	3	2'-11"	8

REINFORCING STEEL FOR 2 WINGS	396	LBS
CLASS A CONCRETE		
2 WINGS	6.9	CY
1 HEADWALL	0.6	CY
1 END CURTAIN WALL	0.6	CY
2 EDGE BEAMS	0.9	CY
TOTAL	9.0	CY



TYPICAL WING SECTION

PROJECT NO. U-4714AC
MECKLENBURG COUNTY
STATION: 104+19.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT
LEFT AND RIGHT EXTENSIONS

H = 6'-0" SLOPE = 2:1
90° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 36321 ENGINEER ROBERT F. DECOLA
DocuSigned by: Robert F. DeCola
8/19/2026

DESIGN ENGINEER OF RECORD: ROBERT F. DECOLA	DATE : 8/19/2026
DRAWN BY : A.W. LOWRANCE	DATE : 01/07/26
CHECKED BY : ROBERT F. DECOLA	DATE : 2/3/26

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STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED $\frac{3}{4}$" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1$\frac{1}{2}$" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A $\frac{1}{4}$" 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 $\frac{1}{4}$" 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 $\frac{7}{8}$" ∅ SHEAR STUDS FOR THE $\frac{3}{4}$" ∅ STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - $\frac{7}{8}$" ∅ STUDS FOR 4 - $\frac{3}{4}$" ∅ STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF $\frac{7}{8}$" ∅ STUDS ALONG THE BEAM AS SHOWN FOR $\frac{3}{4}$" ∅ STUDS BASED ON THE RATIO OF 3 - $\frac{7}{8}$"∅ STUDS FOR 4 - $\frac{3}{4}$" ∅ 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 $\frac{5}{16}$" 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 $\frac{1}{16}$" OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

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

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.