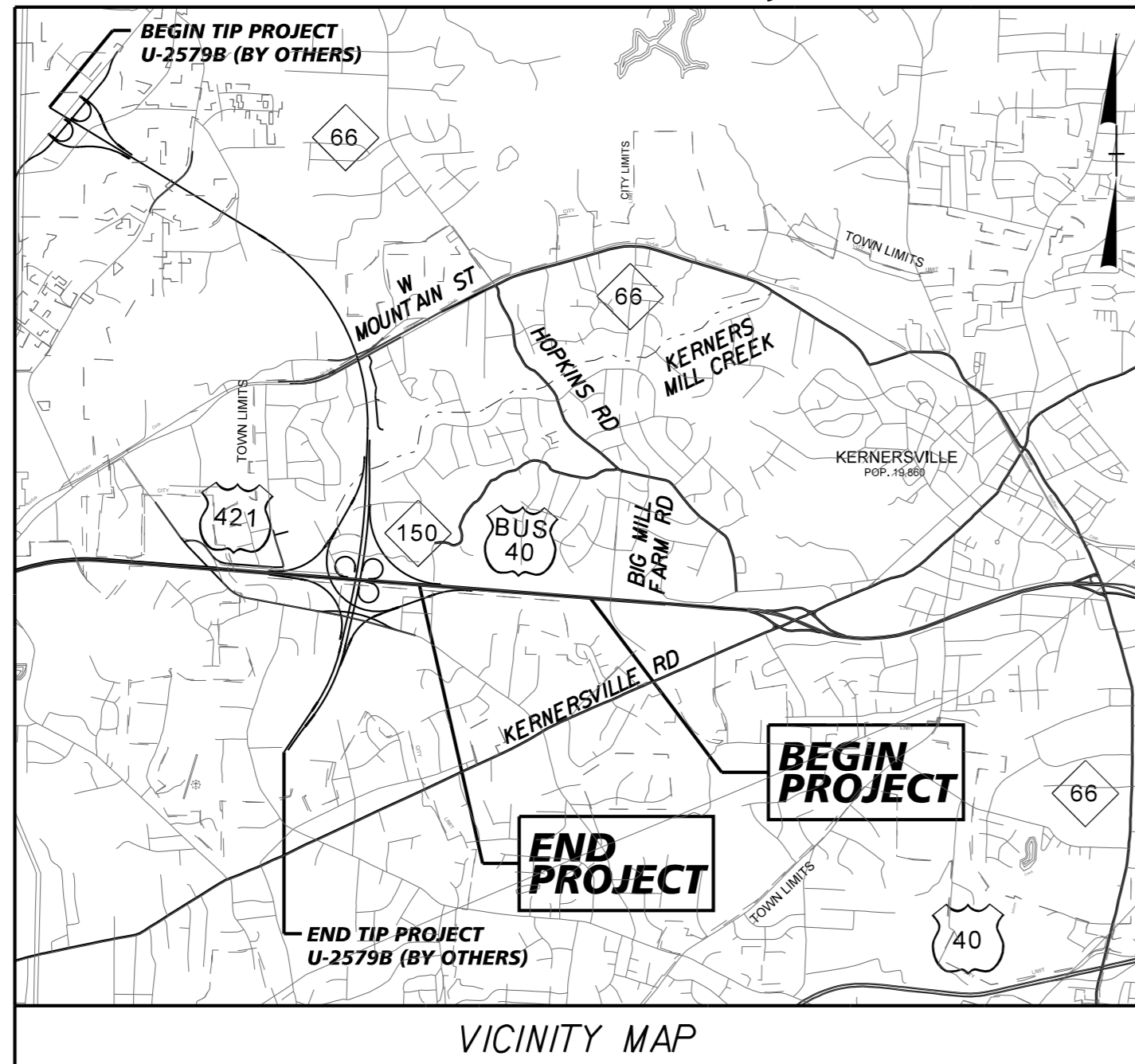


09/26/19

TIP PROJECT: U-2579BA

CONTRACT: C204533

See Sheet IA For Index of Sheets  
See Sheet IB For Conventional Plan Sheet Symbols



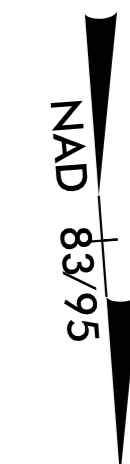
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# FORSYTH COUNTY

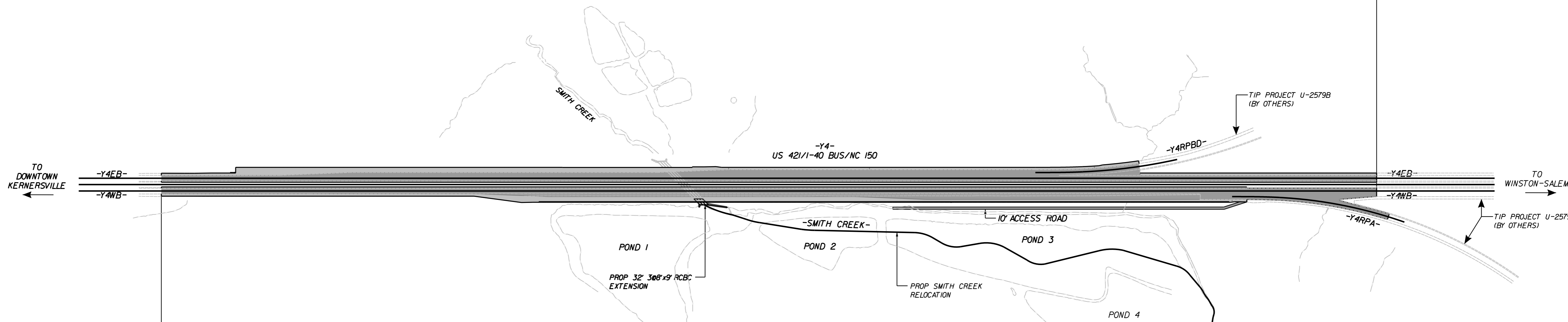
**LOCATION: FUTURE I-74 FROM WINSTON-SALEM NORTHERN BELTWAY  
EASTERN SECTION US 421/NC 150/I-40 BUS TO US 158**

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2579BA	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34839.1.10	0074229	P.E.	
34839.3.12	0074231	CONST.	



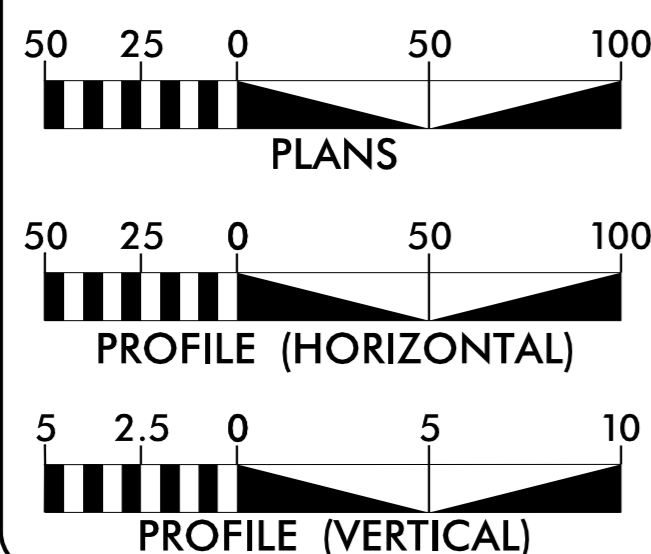
END TIP PROJECT U-2579BA  
TIE TO TIP PROJECT U-2579B (BY OTHERS)  
-Y4EB- POT Sta. 75+00.00 (U-2579BA) =  
-Y4EB- POT Sta. 75+00.00 (U-2579B) =  
-Y4WB- POT Sta. 75+00.00 (U-2579BA) =  
-Y4WB- POT Sta. 75+00.00 (U-2579B) =



BEGIN TIP PROJECT U-2579BA  
TIE TO TIP PROJECT U-5760 (BY OTHERS)  
-Y4EB- POT Sta. 23+50.00 (U-2579B) =  
-Y4WB- POT Sta. 23+50.00 (U-2579B) =  
-Y1- POT Sta. 56+50.00 (U-5760)  
NOTE: U-5760 PROJECT (BY OTHERS) USES DIFFERENT COORDINATE SYSTEM

## STRUCTURES

### GRAPHIC SCALES



### DESIGN DATA

AADT 2020 = 57,600  
AADT 2040 = 77,900  
K = 9%  
D = 65%  
T = 7%\*  
V = 65 MPH  
\* (TTST 4% + DUAL 3%)  
FUNCTIONAL CLASSIFICATION:  
URBAN FREEWAY  
REGIONAL TIER

### PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-2579BA = 0.975 MILES  
TOTAL LENGTH TIP PROJECT U-2579BA = 0.975 MILES

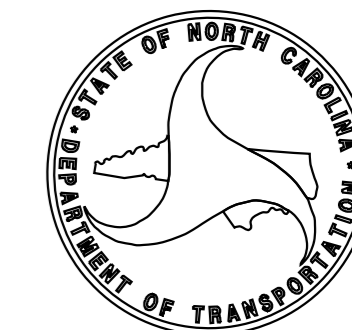
PLANS PREPARED FOR  
THE NCDOT BY:

**Kimley»Horn**

NO. LICENSE #20020  
FAYETTEVILLE STREET, SUITE 600  
FAYETTEVILLE, NORTH CAROLINA 27401  
PHONE: (771) 977-0200

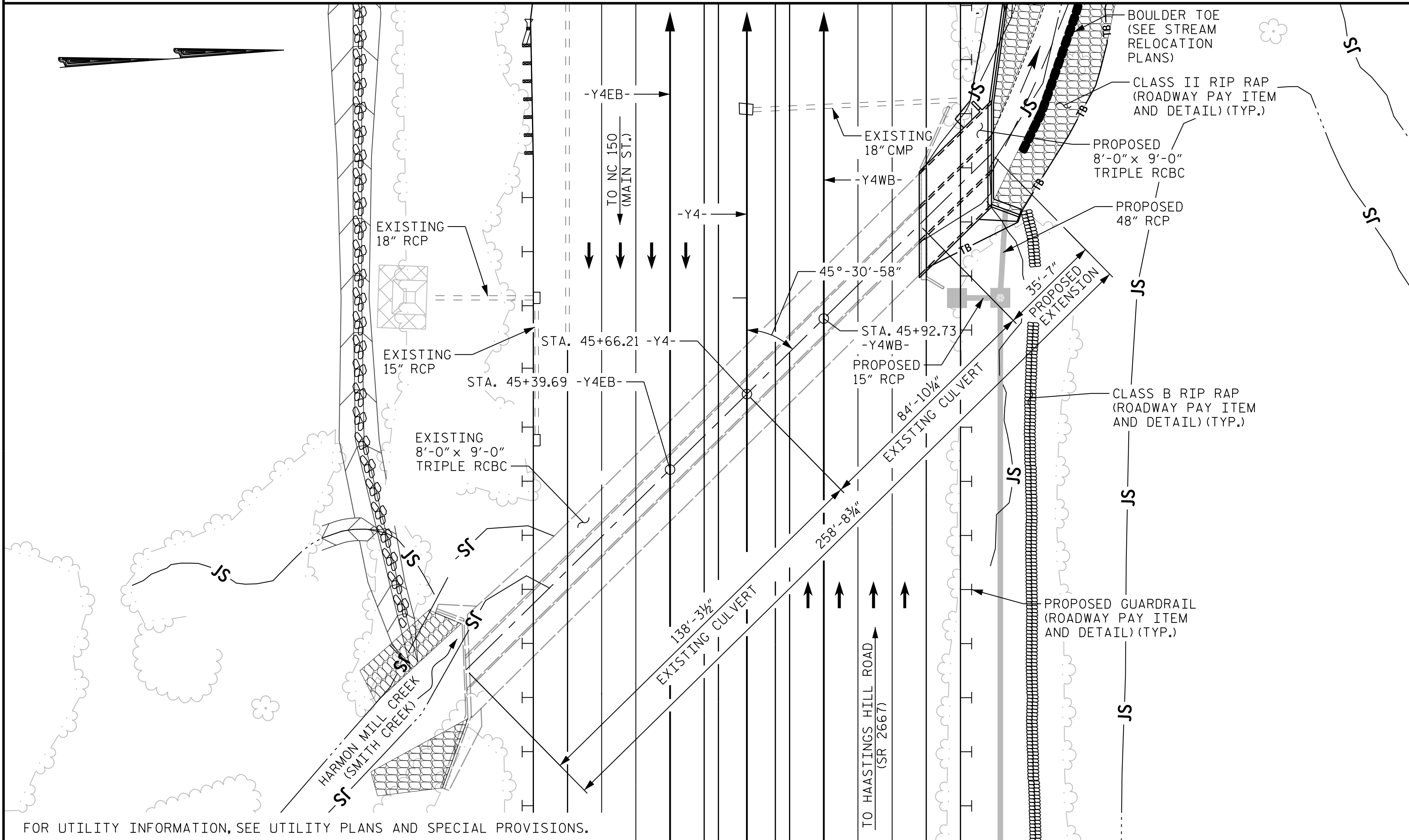
2018 STANDARD SPECIFICATIONS

LETTING DATE:  
APRIL 20, 2021



3/10/2021

BENCHMARK: BM#10, -BY17- STA. 8+83.00, OFFSET 14' RT., EL. 935.89', RR SPIKE IN ROOT OF 30" WILLOW OAK



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING
- DESIGN FILL ----- 5'-6" (MAX.), 2'-0" (MIN.)
- FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- THE REINFORCED CONCRETE BOX CULVERT SHALL BE PLACED ON THE STANDARD 1.0 FT. BLANKET OF FOUNDATION CONDITIONING MATERIAL. SEE SECTION 414 OF STANDARD SPECIFICATIONS.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING WALL SHEETS.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF THE CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF FILL.
- THE 48" R.C. PIPE THROUGH STEM OF W1 SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECESSARY TO CLEAR PIPE.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACES OF EXTERIOR WALLS 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 SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- 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 CURED 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 1,500 PSI.
- DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTES REGARDING SETTING OF DOWELS, SEE SHEET SN.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- NO PRECAST REINFORCED CULVERT OPTION WILL BE ALLOWED.

HYDRAULIC DATA

DESIGN DISCHARGE -----1,810 CFS  
 FREQUENCY OF DESIGN FLOOD -----50 YR.  
 DESIGN HIGH WATER ELEVATION-----854.2 FT.  
 DRAINAGE AREA -----2.9 SQ. MI.  
 BASE DISCHARGE (Q100) -----2,090 CFS  
 BASE HIGH WATER ELEVATION -----856.0 FT.

OVERTOPPING FLOOD DATA

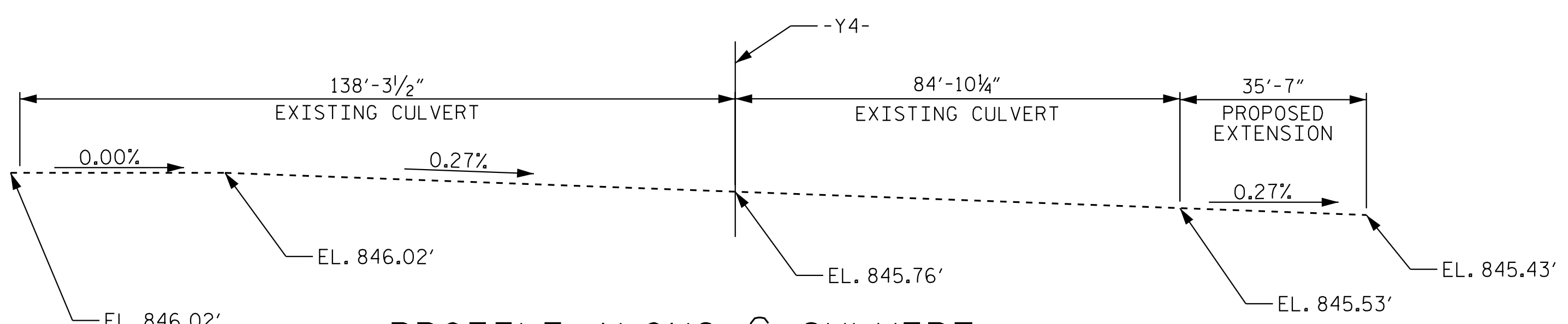
OVERTOPPING DISCHARGE -----2,800 CFS  
 FREQUENCY OF OVERTOPPING FLOOD ---50 YR.<<100 YR.  
 OVERTOPPING FLOOD ELEVATION -----856.06 FT.

ROADWAY DATA

GRADE POINT EL. @ STA. 45+65.83 -Y4- = 860.92'  
 BED ELEVATION @ STA. 45+65.83 -Y4- = 845.76'  
 ROADWAY SLOPES 2 : 1

TOTAL STRUCTURE QUANTITIES

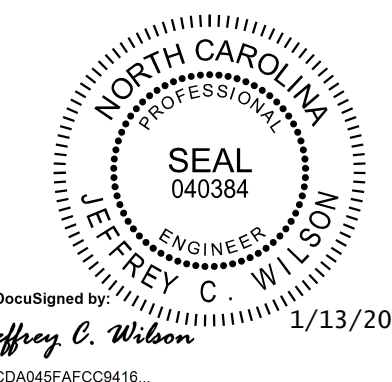
CULVERT EXCAVATION STA. 45+66.21 -Y4- LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	77 TONS
CLASS A CONCRETE	
BARREL @ 2.877 CY/FT	102.4 C.Y.
WINGS ETC.	57.6 C.Y.
EDGE BEAMS	2.8 C.Y.
TOTAL	162.8 C.Y.
REINFORCING STEEL	
BARREL	17,081 LBS.
WINGS ETC.	7,183 LBS.
TOTAL	24,326 LBS.



PROFILE ALONG CULVERT

PROJECT NO. U-2579BA  
FORSYTH COUNTY  
 STATION: 45+66.21 -Y4-

SHEET 1 OF 8 EXTENDS STR. NO. 367



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

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 8 FT. X 9 FT.  
 CONCRETE BOX CULVERT  
 45° SKEW

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

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K:\BIDI\_Structures\Culvert\NC\0101036480\_U-2579BA\Cadd\09\U2579B\_SML\_C01\_330367.dgn

DRAWN BY: J.I.KIMBLE DATE: 1/20  
 CHECKED BY: C.I.POOLE DATE: 1/20  
 DESIGN ENGINEER OF RECORD: J.C.WILSON DATE: 1/20



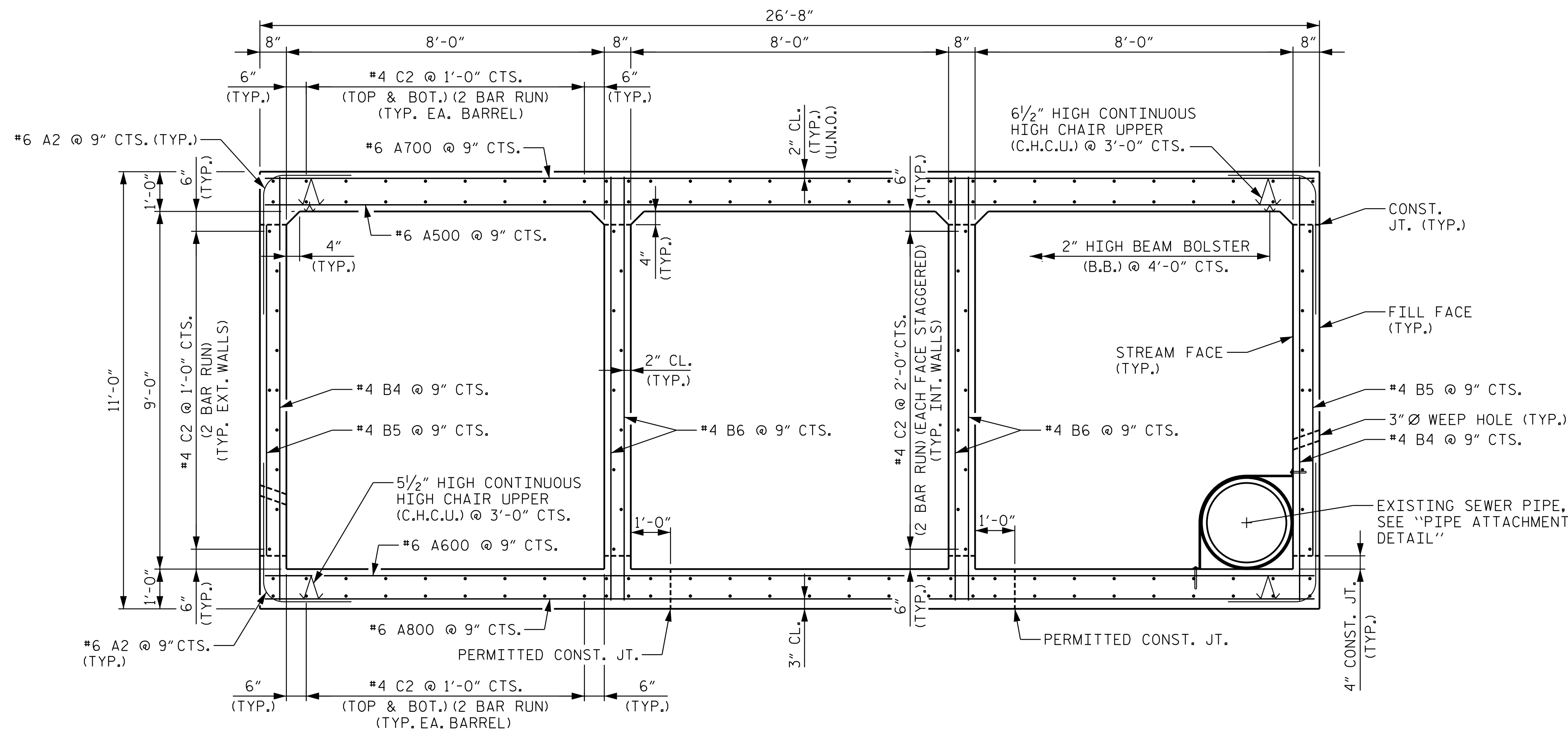
NOTES

GALVANIZED STEEL STRAP MAY BE SLIGHTLY SHIFTED TO MISS REINFORCING STEEL.

MAXIMUM GALVANIZED STEEL STRAP SPACING IS 10'-0".

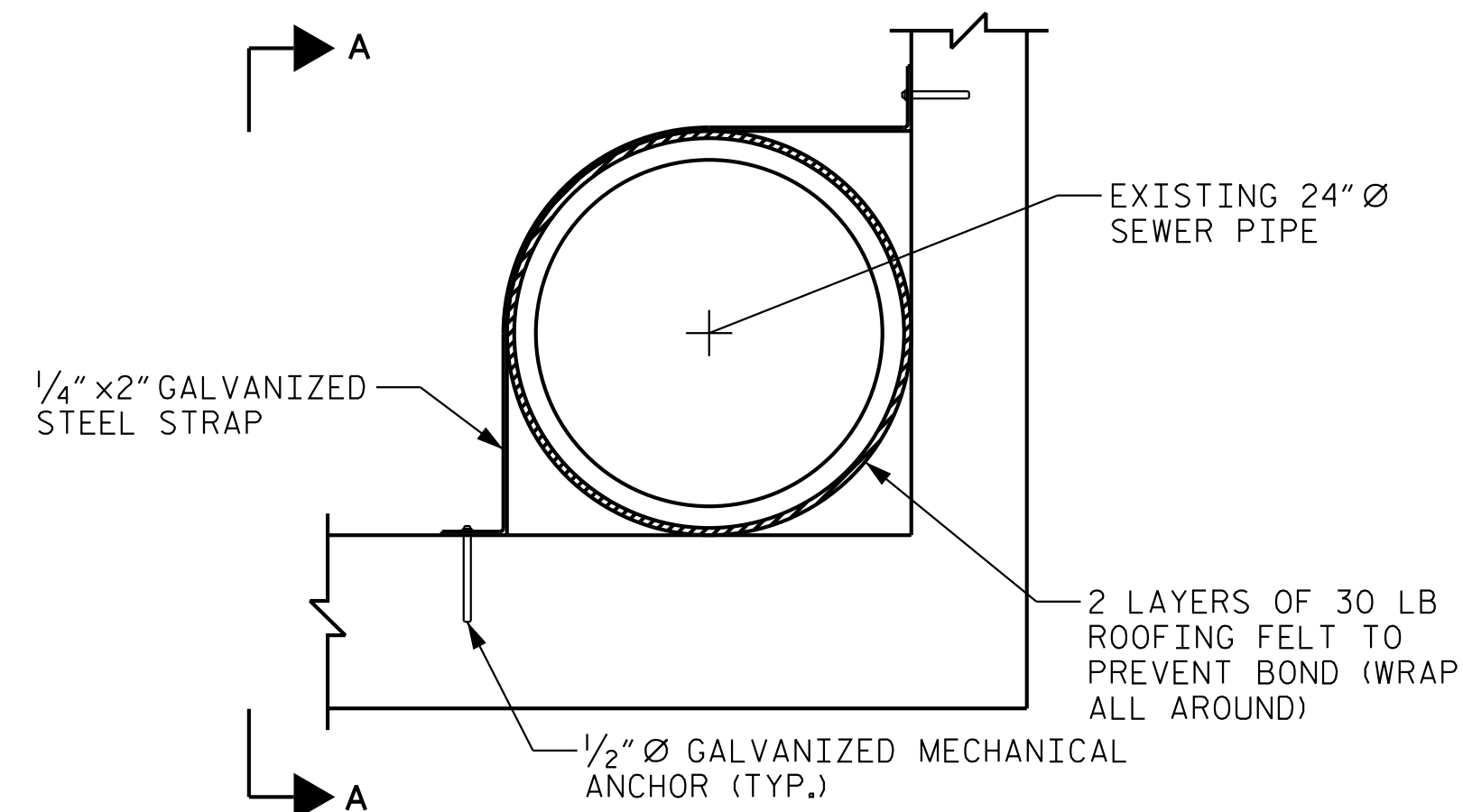
EXISTING SEWER PIPE DIMENSIONS AND ELEVATIONS BASED ON FIELD MEASUREMENT. CONTRACTOR TO VERIFY AND NOTIFY THE ENGINEER IMMEDIATELY IF THE DIMENSIONS OR ELEVATIONS VARY FROM THE PLANS.

CONTRACTOR SHALL LOCATE REINFORCING STEEL PRIOR TO DRILLING HOLES FOR MECHANICAL ANCHORS. MECHANICAL ANCHORS SHALL BE LOCATED SUCH THAT IT DOES NOT INTERFERE WITH REINFORCING STEEL. IF REINFORCING STEEL IS ENCOUNTERED WHILE DRILLING, CONTRACTOR SHALL STOP DRILLING, PATCH THE HOLE, AND FIND A NEW LOCATION FOR MECHANICAL ANCHOR.

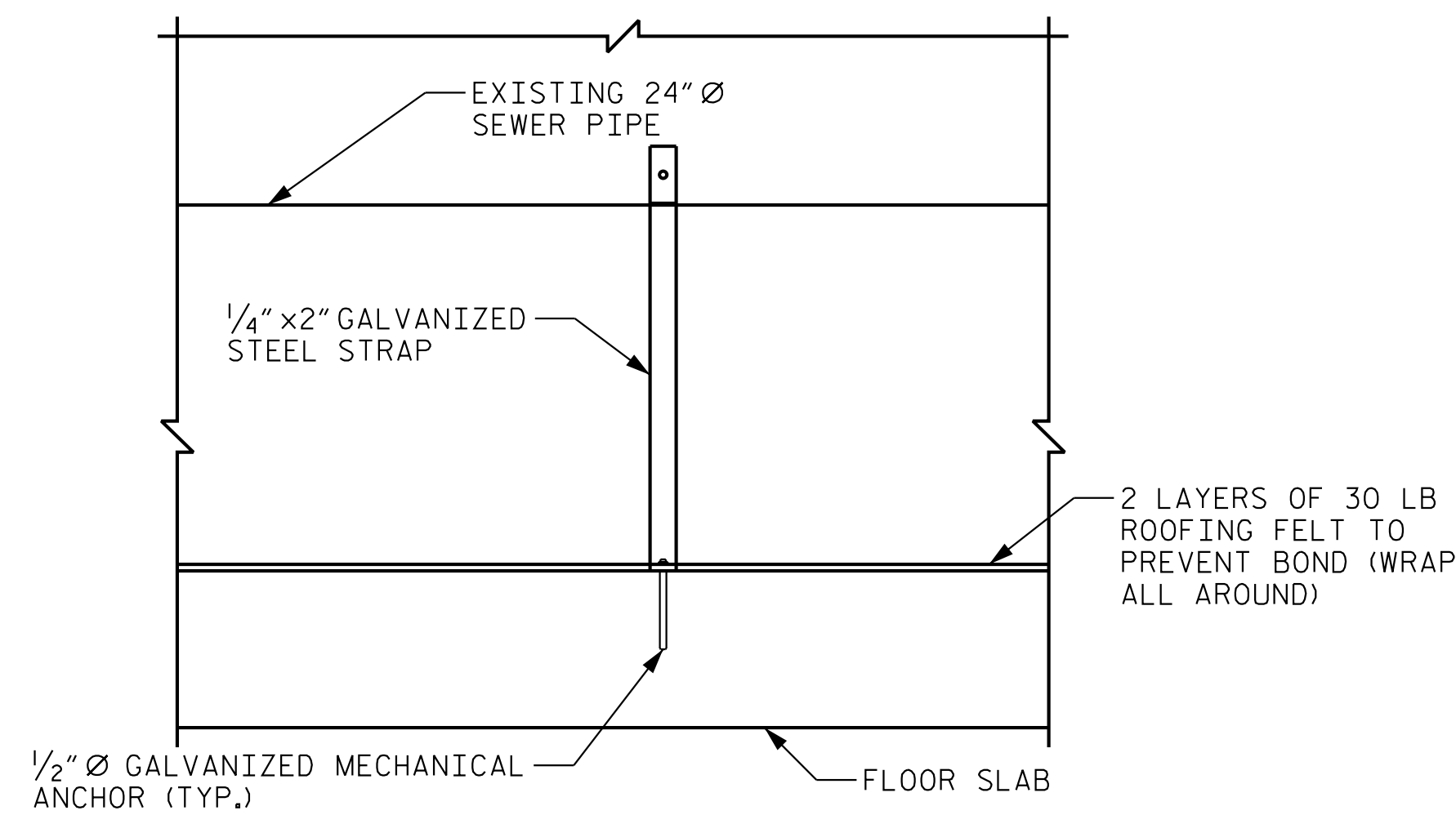


RIGHT ANGLE SECTION OF BARREL

(LOOKING DOWNSTREAM)  
THERE ARE 158 "C" BARS IN SECTION OF BARREL



PIPE ATTACHMENT DETAIL  
(LOOKING DOWNSTREAM)



SECTION A-A

PROJECT NO. U-2579BA  
FORSYTH COUNTY  
STATION: 45+66.21 -Y4-

SHEET 2 OF 8

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

TRIPLE 8 FT. X 9 FT.  
CONCRETE BOX CULVERT  
45° SKEW



Drawn/Designed by: Jeffrey C. Wilson 1/13/2020  
CD040384

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

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

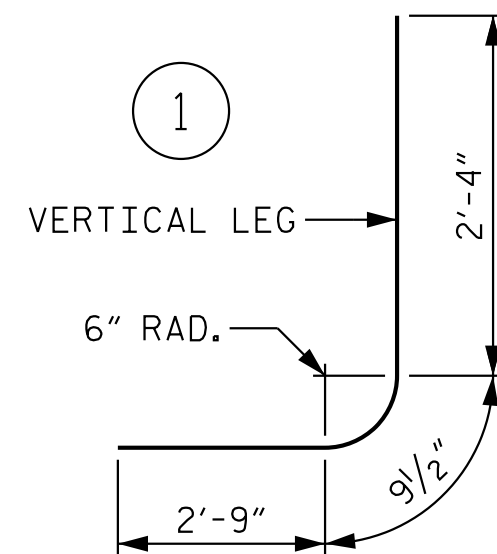
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DRAWN BY: J.I.KIMBLE DATE: 1/20  
CHECKED BY: C.T.POOLE DATE: 1/20  
DESIGN ENGINEER OF RECORD: J.C.WILSON DATE: 1/20

BARREL BILL OF MATERIAL

Table with columns: BAR NO., SIZE, TYPE, LENGTH, WEIGHT. Lists materials A2 through A706 and A800 through A810, including quantities and weights.

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

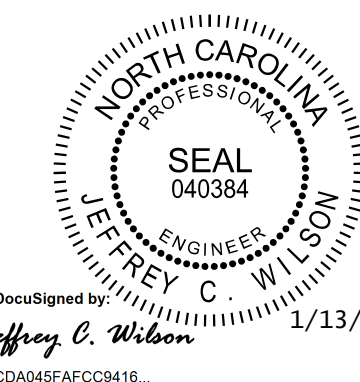
Table with columns: BAR SIZE, SPLICE LENGTH. Lists splice lengths for bar sizes #4 through #8.

OUTLET REINFORCING STEEL 17,081 LBS.

Vertical text on the left margin: K:\B01\_Structures\... U-2579BA\... 3/30/2020

PROJECT NO. U-2579BA
FORSYTH COUNTY
STATION: 45+66.21 -Y4-

SHEET 3 OF 8



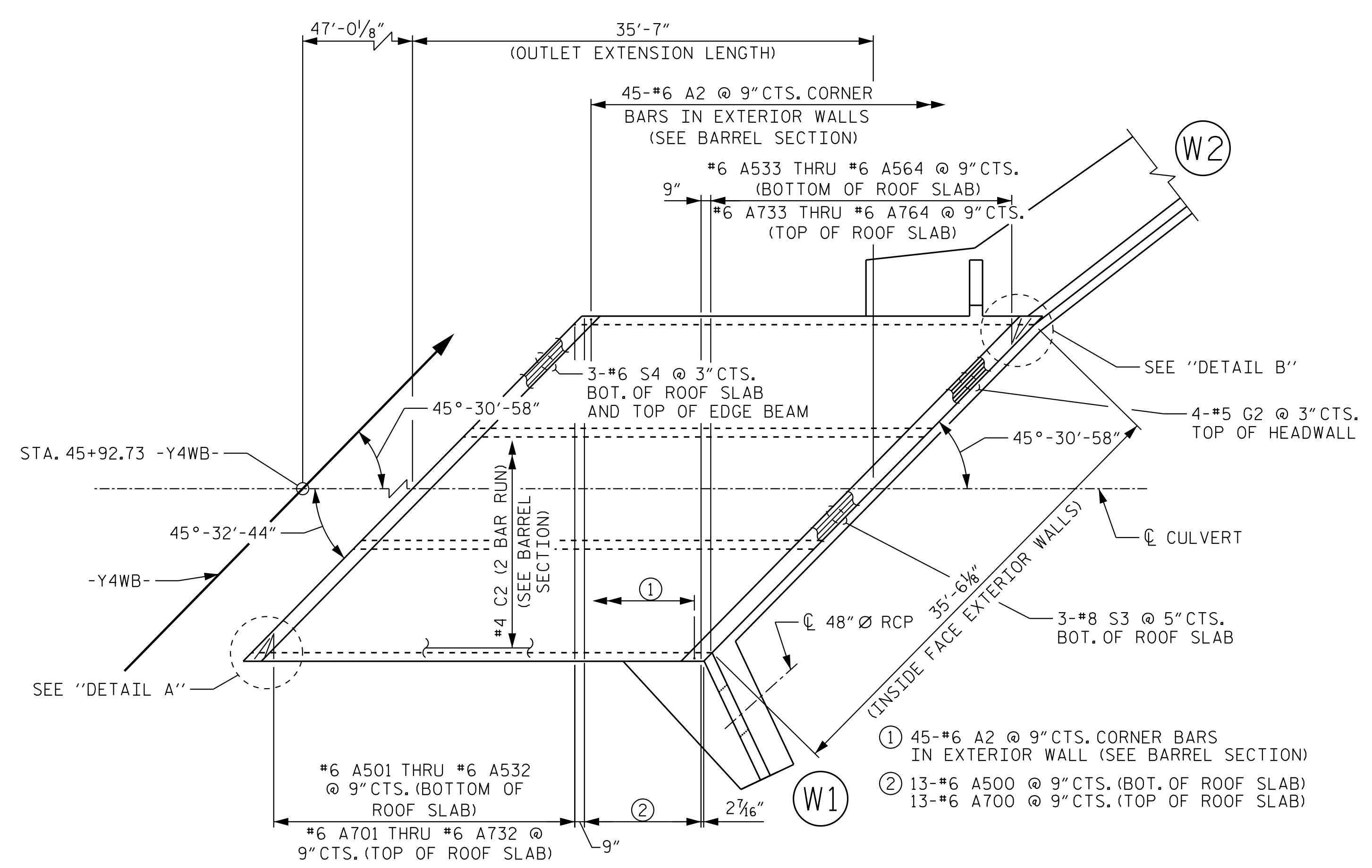
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH
TRIPLE 8 FT. X 9 FT. CONCRETE BOX CULVERT 45° SKEW
REVISIONS table and SHEET NO. C-3

DRAWN BY: J.I.KIMBLE DATE: 1/20
CHECKED BY: C.I.POOLE DATE: 1/20
DESIGN ENGINEER OF RECORD: J.C.WILSON DATE: 1/20

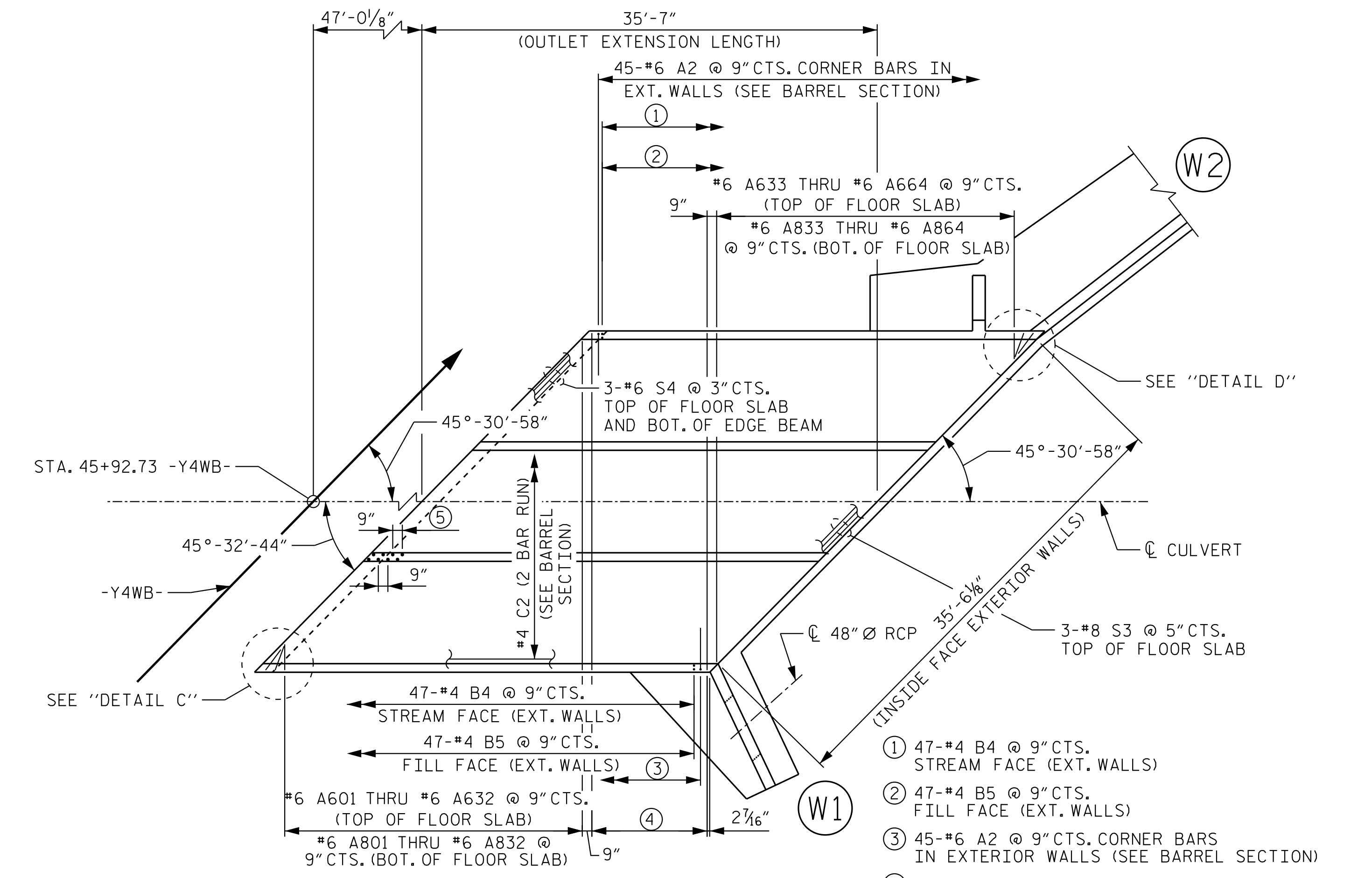
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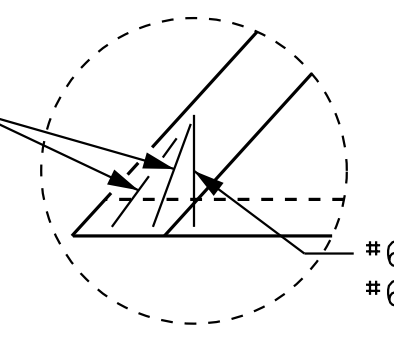
ROOF SLAB PLAN



FLOOR SLAB PLAN

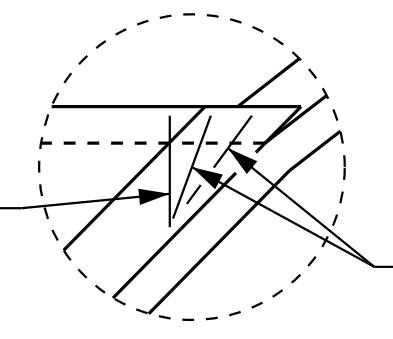
- ① 47-#4 B4 @ 9" CTS. STREAM FACE (EXT. WALLS)
- ② 47-#4 B5 @ 9" CTS. FILL FACE (EXT. WALLS)
- ③ 45-#6 A2 @ 9" CTS. CORNER BARS IN EXTERIOR WALLS (SEE BARREL SECTION)
- ④ 13-#6 A600 @ 9" CTS. (TOP OF FLOOR SLAB) 13-#6 A800 @ 9" CTS. (BOT. OF FLOOR SLAB)
- ⑤ #4 B6 @ 9" CTS. EACH FACE STAGGERED IN INTERIOR WALLS (TYP.) (SEE BARREL SECTION)

SPLAY BARS  
#6 A532 (BOT. OF ROOF SLAB)  
#6 A732 (TOP OF ROOF SLAB)



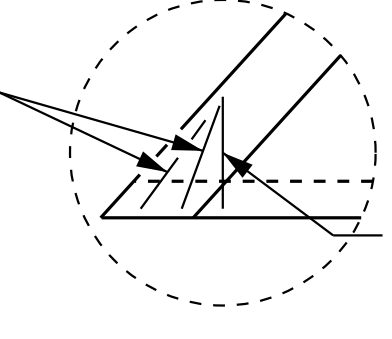
DETAIL A

#6 A564 (BOT. OF ROOF SLAB)  
#6 A764 (TOP OF ROOF SLAB)



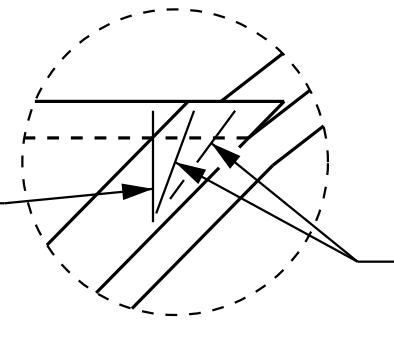
DETAIL B

SPLAY BARS  
#6 A632 (TOP OF FLOOR SLAB)  
#6 A832 (BOT. OF FLOOR SLAB)



DETAIL C

#6 A664 (TOP OF FLOOR SLAB)  
#6 A864 (BOT. OF FLOOR SLAB)



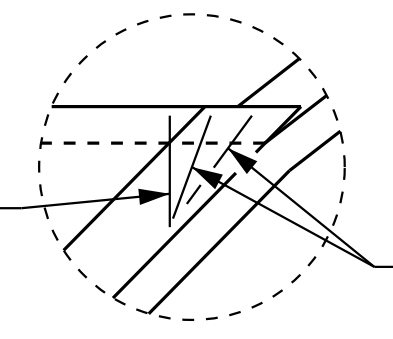
DETAIL D

- Ⓒ 45°-30'-58"
- Ⓓ 44°-29'-02"

SPLAY BARS  
#6 A532 (BOT. OF ROOF SLAB)  
#6 A732 (TOP OF ROOF SAB)

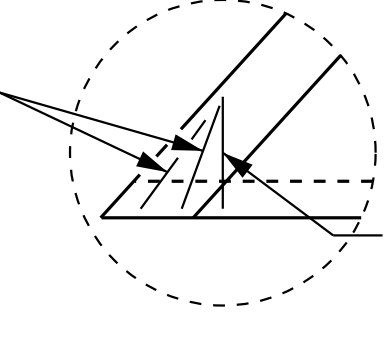
DETAIL A

#6 A564 (BOT. OF ROOF SLAB)  
#6 A764 (TOP OF ROOF SLAB)



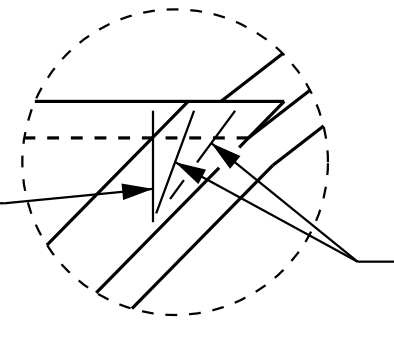
DETAIL B

SPLAY BARS  
#6 A632 (TOP OF FLOOR SLAB)  
#6 A832 (BOT. OF FLOOR SLAB)



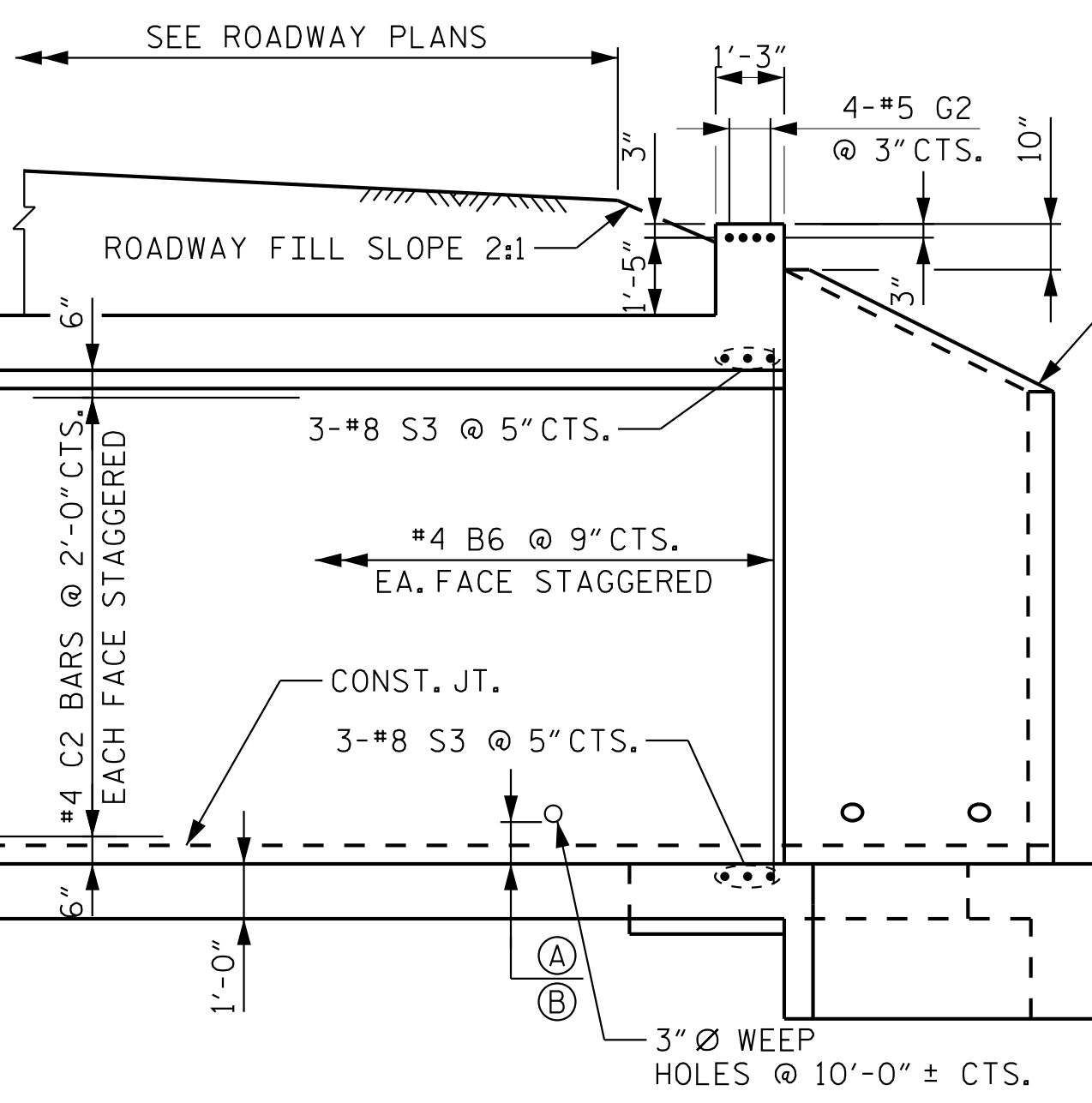
DETAIL C

#6 A664 (TOP OF FLOOR SLAB)  
#6 A864 (BOT. OF FLOOR SLAB)

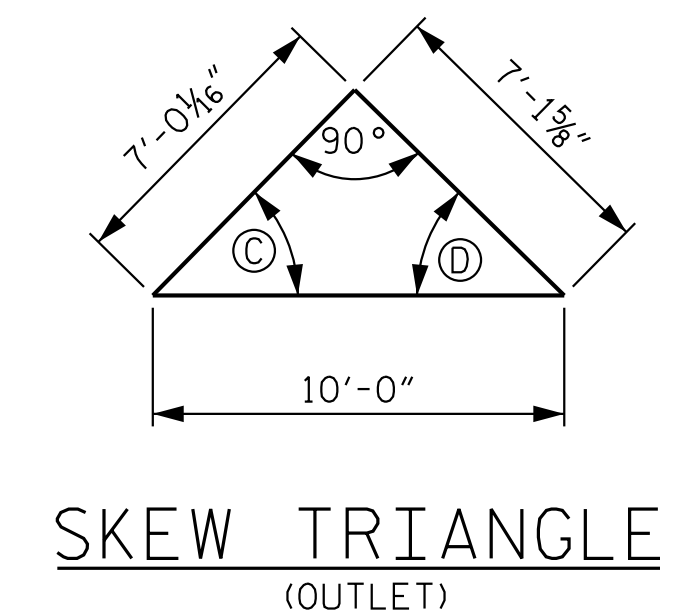


DETAIL D

- Ⓒ 45°-30'-58"
- Ⓓ 44°-29'-02"



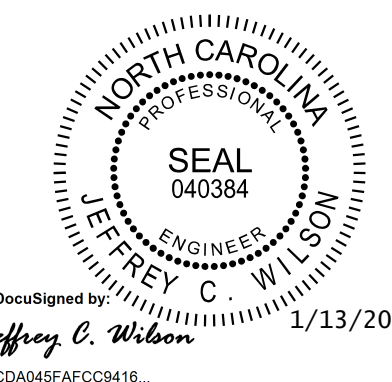
EXTERIOR WALL INTERIOR WALL  
CULVERT SECTION NORMAL TO ROADWAY



SKEW TRIANGLE (OUTLET)

PROJECT NO. U-2579BA  
FORSYTH COUNTY  
STATION: 45+66.21 -Y4-

SHEET 4 OF 8



**Kimley»Horn**  
241 Fayetteville Street, Suite 600  
Raleigh, NC 27601-1772  
Phone (919) 677-2000 NC LICENSE # F-0102

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DEPARTMENT OF TRANSPORTATION  
RALEIGH

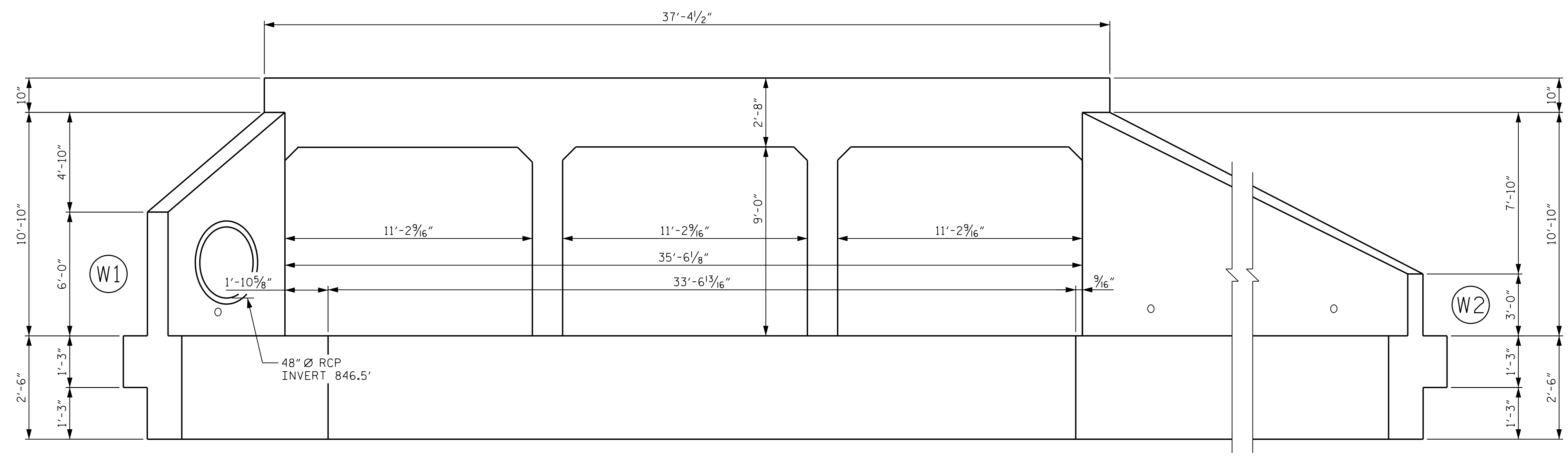
TRIPLE 8 FT. X 9 FT.  
CONCRETE BOX CULVERT  
45° SKEW

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

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1/3/2020  
DRAWN BY: J.I.KIMBLE DATE: 1/20  
CHECKED BY: C.T.POOLE DATE: 1/20  
DESIGN ENGINEER OF RECORD: J.C.WILSON DATE: 1/20

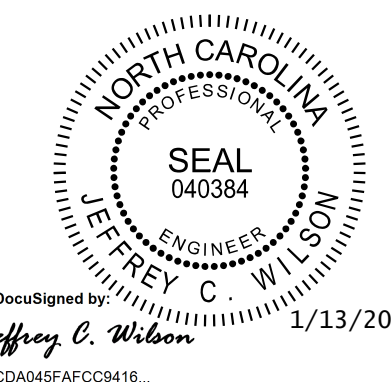
K:\RDI\_Structures\Calver\NC\01036480\_U-2579BA\Cad\09\U2579B\_SML\_CU05\_330367.dgn



**END ELEVATION NORMAL TO SKEW**  
 (LOOKING UPSTREAM)  
 (FOR APPROXIMATE PLAN VIEW LOCATION OF R.C. PIPE, SEE SHEET C-1)

PROJECT NO. U-2579BA  
FORSYTH COUNTY  
 STATION: 45+66.21 -Y4-

SHEET 5 OF 8



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

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**TRIPLE 8 FT. X 9 FT.  
 CONCRETE BOX CULVERT  
 45° SKEW**

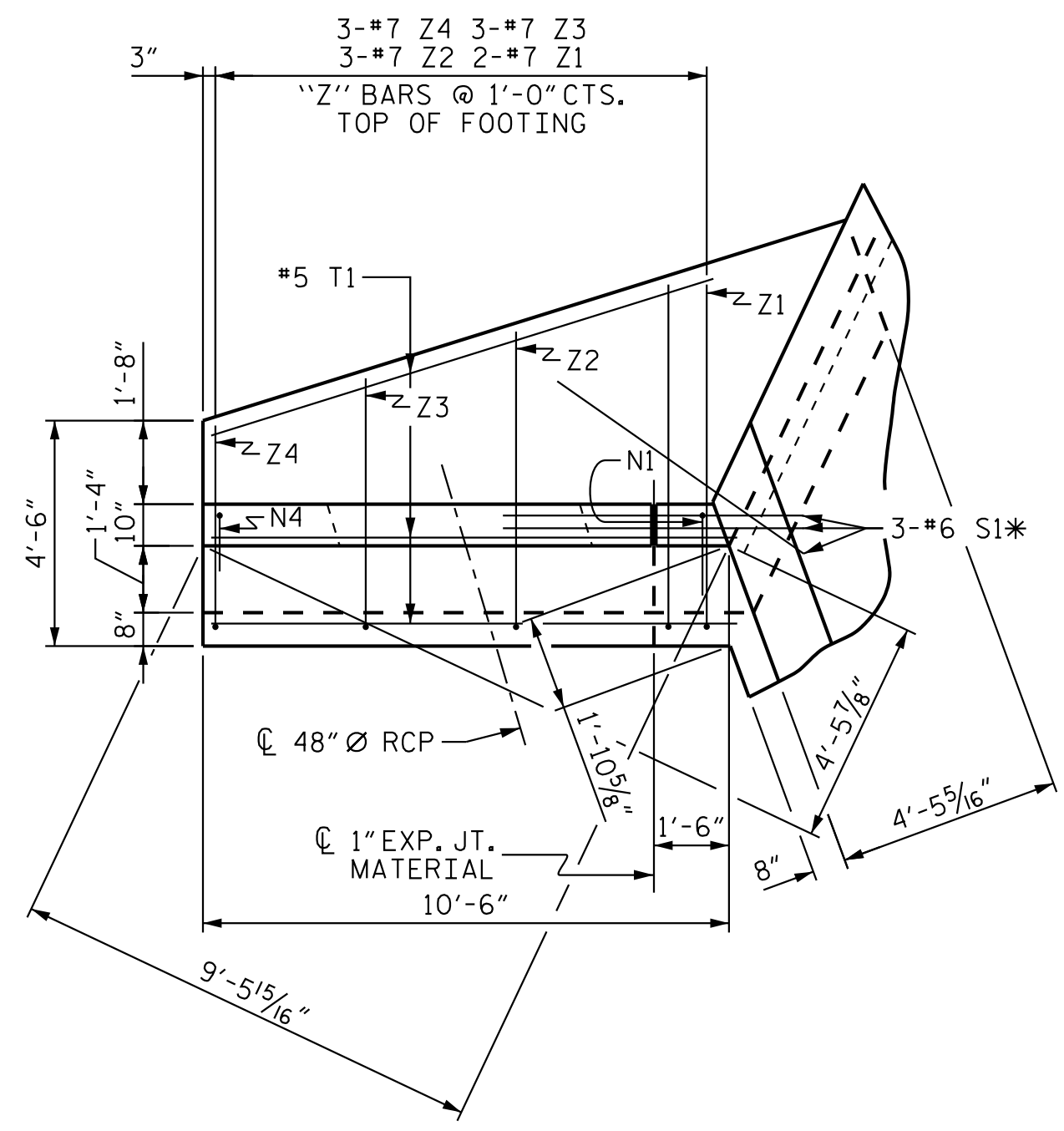
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			8

DRAWN BY: J.I.KIMBLE DATE: 1/20  
 CHECKED BY: C. I. POOLE DATE: 1/20  
 DESIGN ENGINEER OF RECORD: J. C. WILSON DATE: 1/20

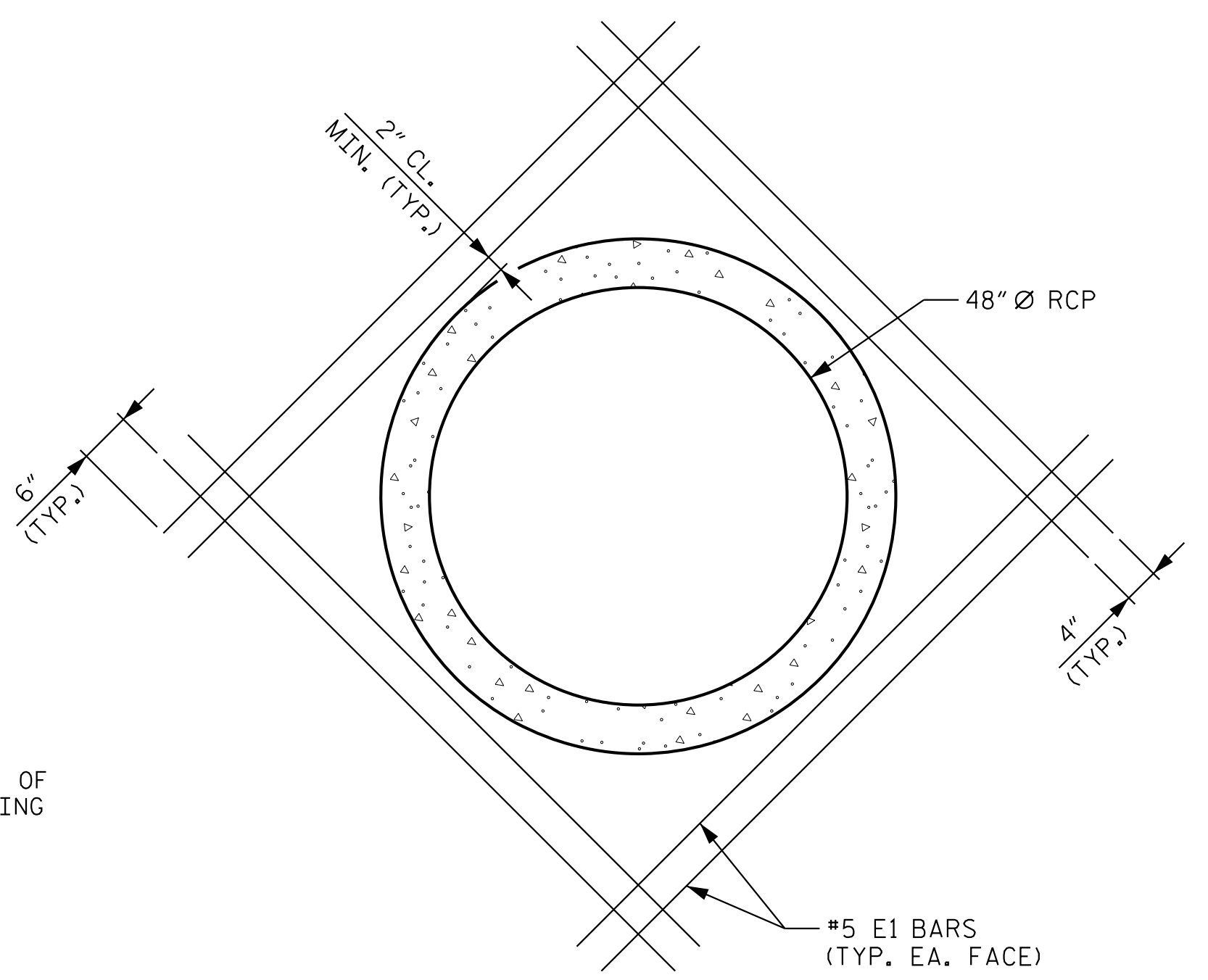
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**PLAN W1**  
(FOR APPROXIMATE PLAN VIEW LOCATION OF R.C. PIPE, SHEET C-1)



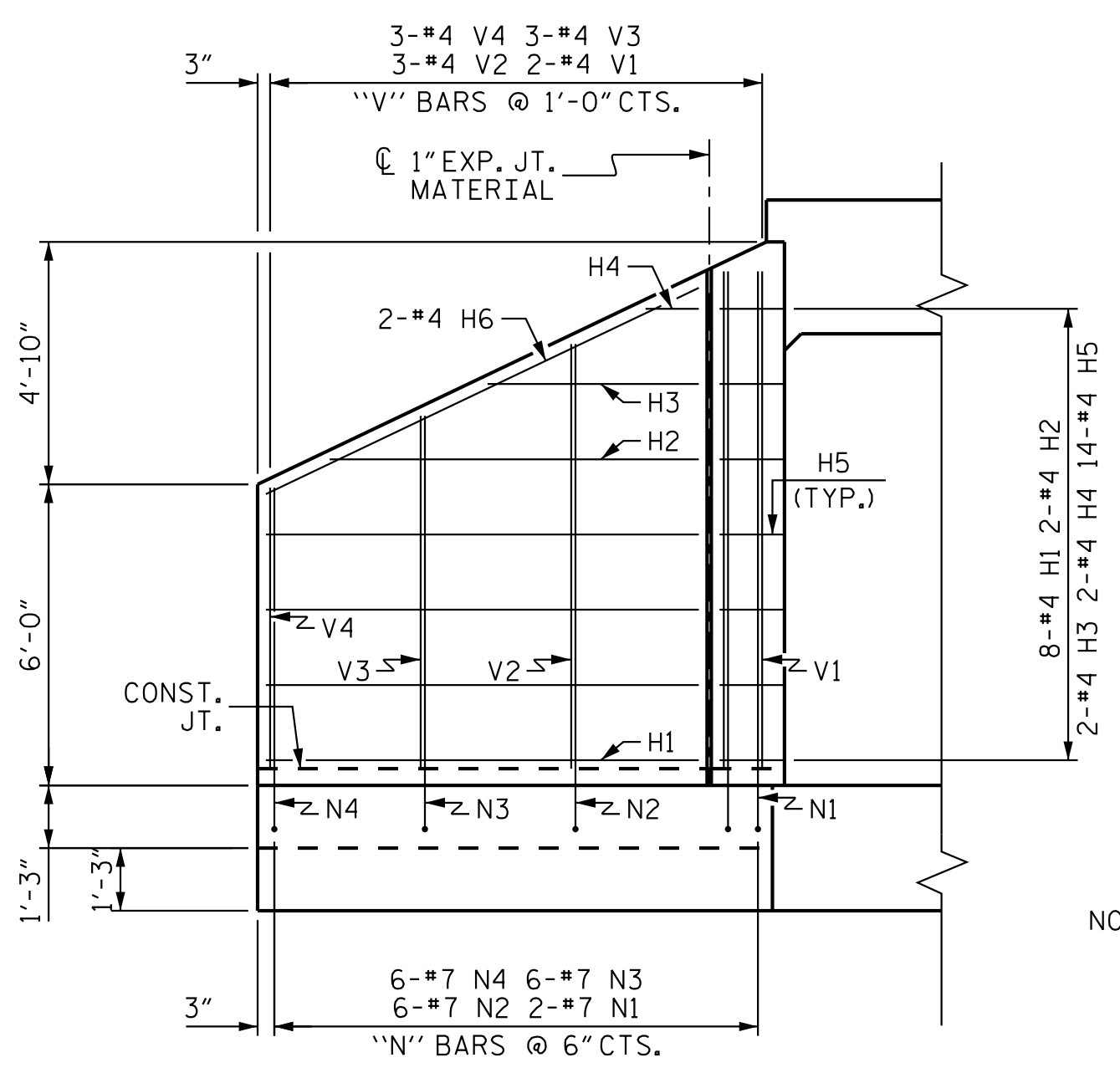
\* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

**DETAIL OF REINFORCING AROUND 48" Ø RCP**

**BAR TYPES**

ALL BAR DIMENSIONS ARE OUT TO OUT.

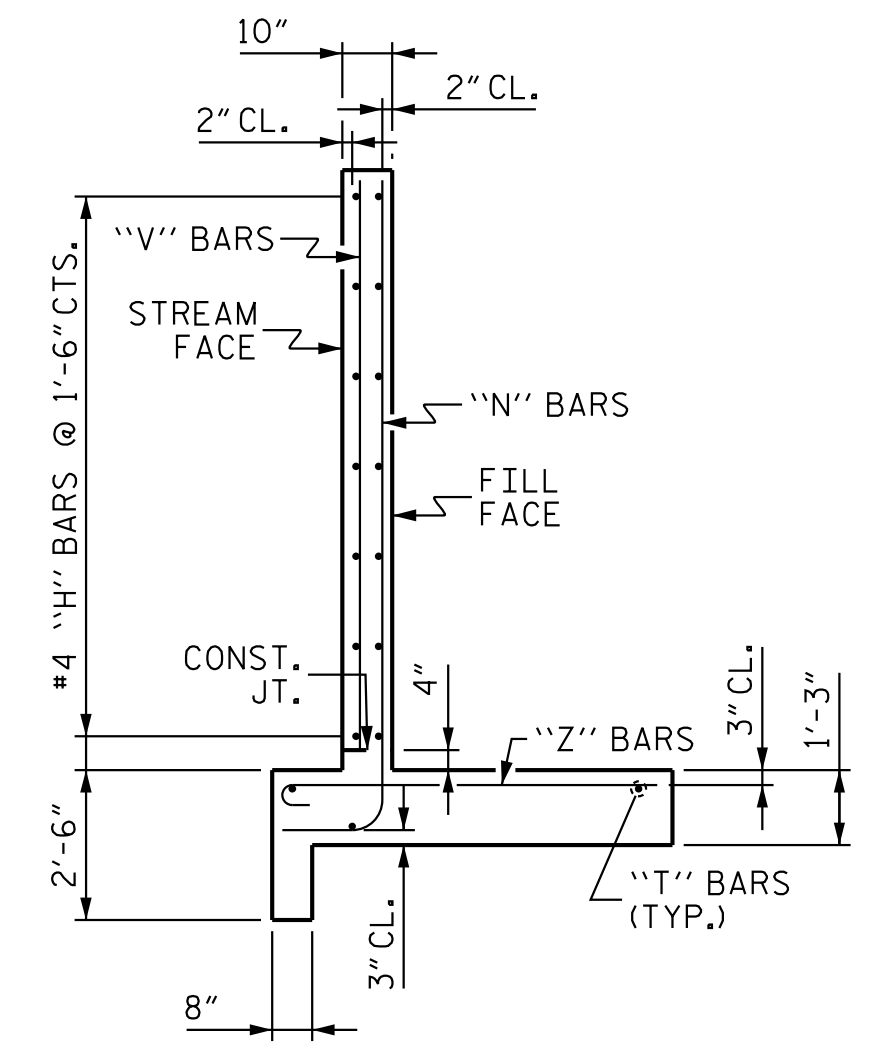
WING 1 BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
E1	16	5	STR	6'-10"	114
H1	8	4	STR	8'-7"	46
H2	2	4	STR	7'-4"	10
H3	2	4	STR	4'-2"	6
H4	2	4	STR	1'-0"	1
H5	14	4	1	3'-3"	30
H6	2	4	STR	9'-6"	13
N1	2	7	2	12'-4"	50
N2	6	7	2	10'-10"	133
N3	6	7	2	9'-5"	115
N4	6	7	2	8'-0"	98
S1	3	6	STR	6'-0"	27
T1	3	5	STR	10'-6"	33
V1	2	4	STR	9'-10"	13
V2	3	4	STR	8'-5"	17
V3	3	4	STR	7'-0"	14
V4	3	4	STR	5'-7"	11
Z1	2	7	3	7'-2"	29
Z2	3	7	3	6'-3"	38
Z3	3	7	3	5'-4"	33
Z4	3	7	3	4'-4"	27
REINFORCING STEEL FOR 1 WING					858 LBS
CLASS A CONCRETE					
1 WING					6.3 CY
1 HEADWALL					2.9 CY
1 END CURTAIN WALL					2.1 CY
TOTAL					11.3 CY



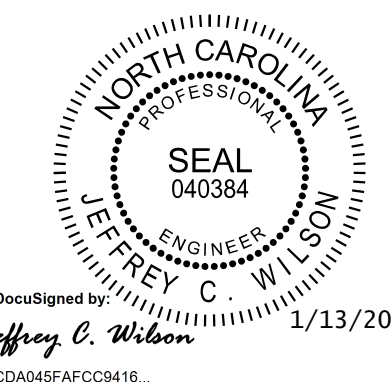
**ELEVATION W1**

NOTE: THE 48" Ø PIPE THROUGH THE WING WALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECESSARY TO CLEAR THE PIPE.

FOR APPROXIMATE PLAN VIEW LOCATION OF R.C. PIPE, SEE SHEET C-1.



**TYPICAL WING SECTION**



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

PROJECT NO. U-2579BA  
FORSYTH COUNTY  
STATION: 45+66.21 -Y4-

SHEET 6 OF 8

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

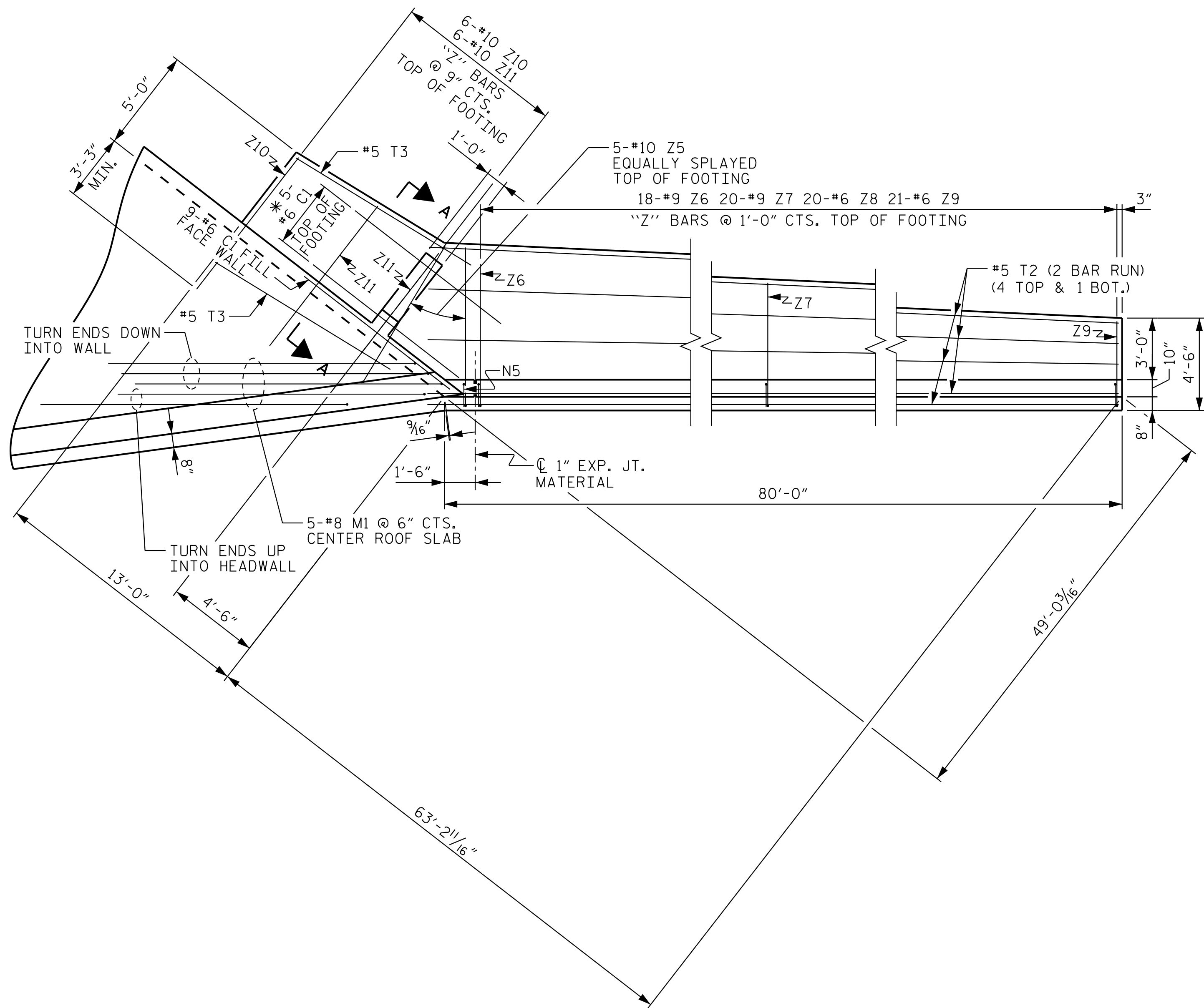
**OUTLET WING DETAILS FOR CONCRETE BOX CULVERT**  
H = 9'-0" SLOPE = 2:1  
45° OR 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6
1			3			TOTAL SHEETS
2			4			8

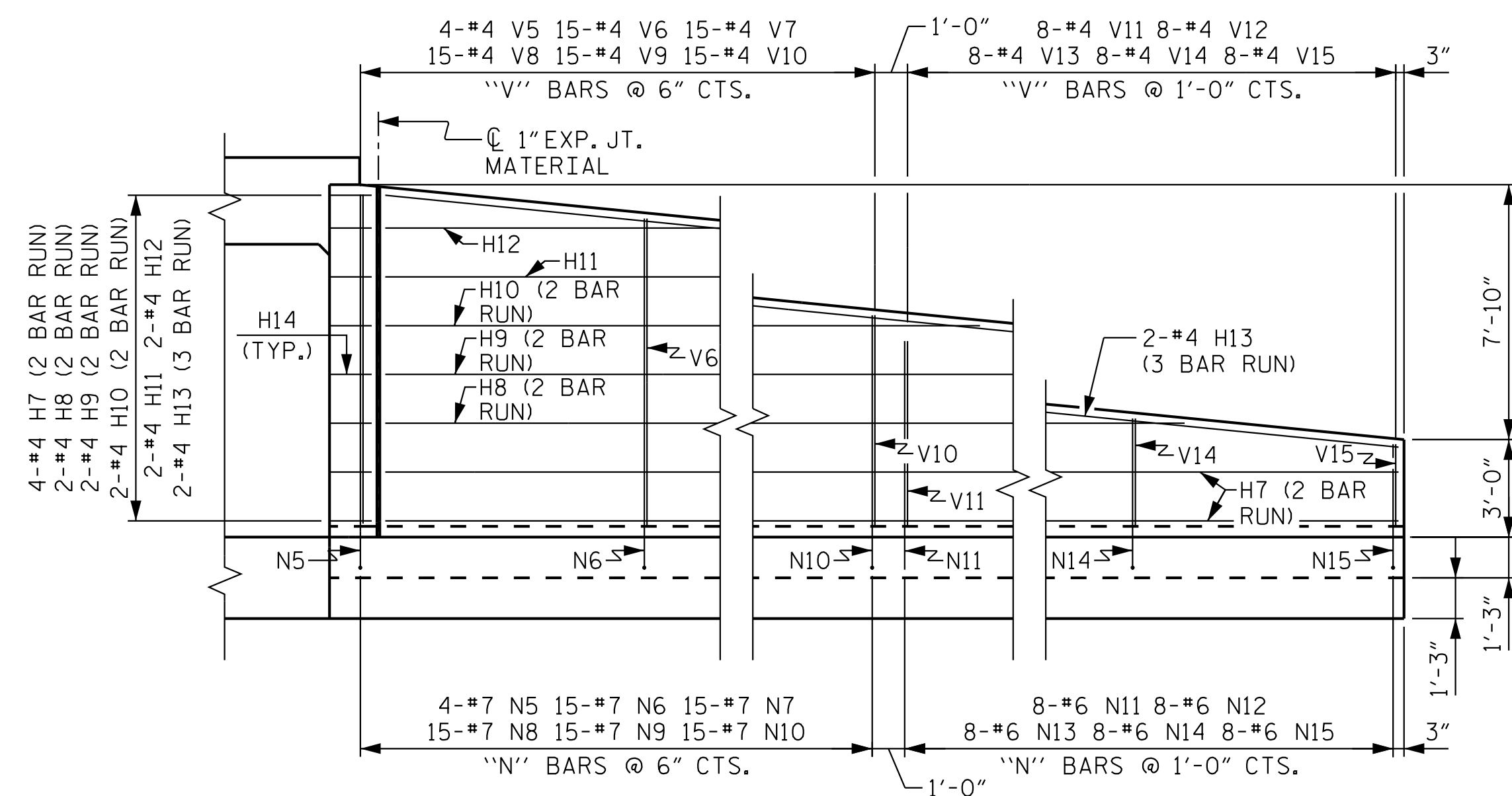
**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

K:\BIDI\_Structures\Calver\NC\01036480\_U-2579BA\Cad\09\U2579B\_SML\_C006\_330367.dgn

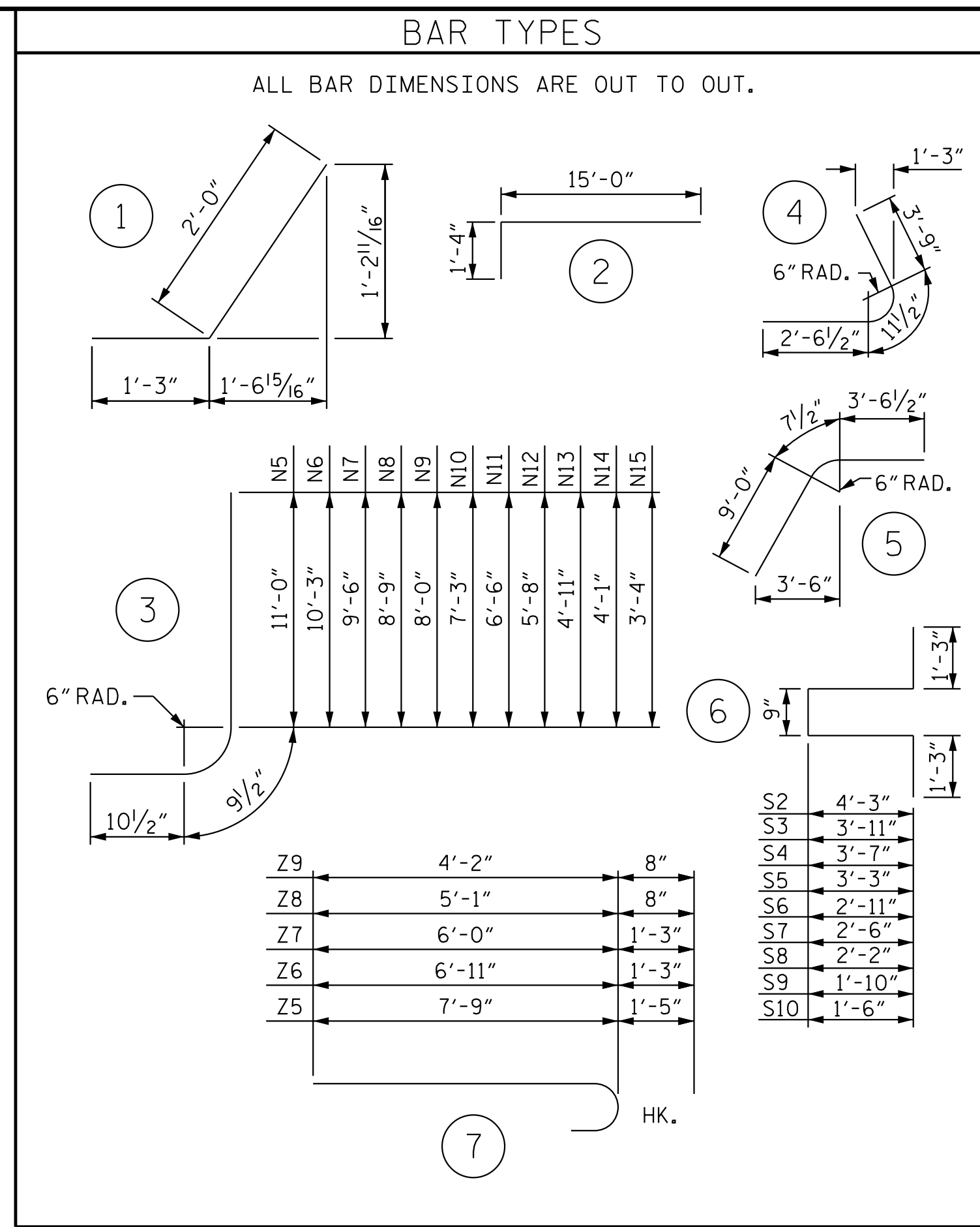
1/3/2020  
DRAWN BY: J.I.KIMBLE DATE: 1/20  
CHECKED BY: C.I.POOLE DATE: 1/20  
DESIGN ENGINEER OF RECORD: J.C.WILSON DATE: 1/20



PLAN W2  
\* CENTER ALL #6 C1 BARS ON C COUNTERFORT



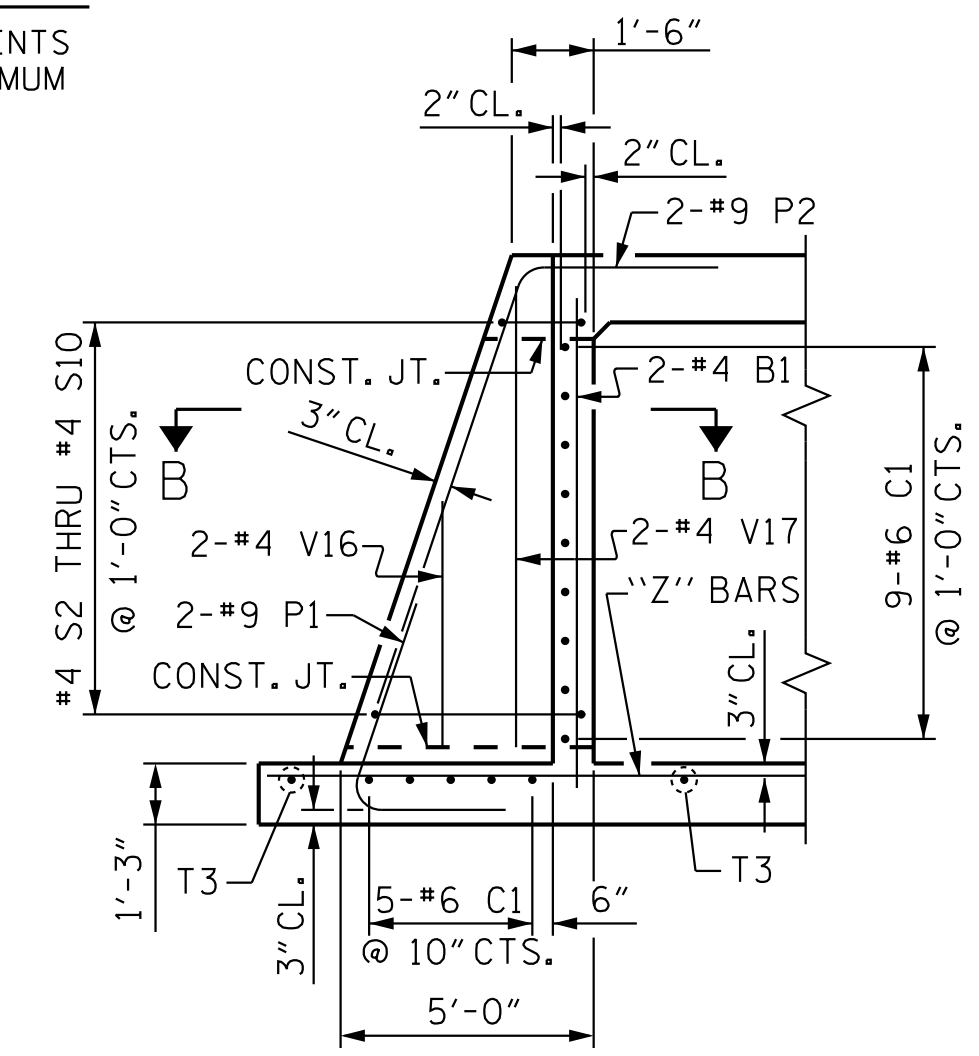
ELEVATION W2



NOTES  
PROVIDE VERTICAL CONTRACTION JOINTS IN THE WING WALL STEM AT A MAXIMUM SPACING OF 30'-0".

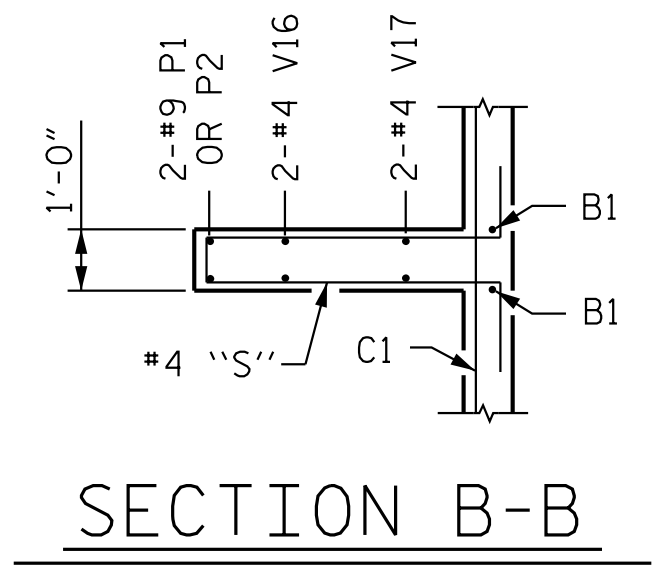
WING 2 BILL OF MATERIAL											
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
B1	2	4	STR	10'-0"	13	T2	10	5	STR	41'-6"	433
C1	14	6	STR	9'-0"	189	T3	2	5	STR	10'-0"	21
H7	8	4	STR	40'-0"	214	V5	4	4	STR	10'-2"	27
H8	4	4	STR	36'-9"	98	V6	15	4	STR	9'-5"	94
H9	4	4	STR	29'-2"	78	V7	15	4	STR	8'-8"	87
H10	4	4	STR	21'-7"	58	V8	15	4	STR	7'-11"	79
H11	2	4	STR	26'-1"	35	V9	15	4	STR	7'-2"	72
H12	2	4	STR	10'-11"	15	V10	15	4	STR	6'-5"	64
H13	6	4	STR	27'-5"	110	V11	8	4	STR	5'-8"	30
H14	16	4	1	3'-3"	35	V12	8	4	STR	4'-10"	26
M1	5	8	2	16'-4"	218	V13	8	4	STR	4'-1"	22
N5	4	7	3	12'-8"	104	V14	8	4	STR	3'-3"	17
N6	15	7	3	11'-11"	365	V15	8	4	STR	2'-6"	13
N7	15	7	3	11'-2"	342	V16	2	4	STR	4'-6"	6
N8	15	7	3	10'-5"	319	V17	2	4	STR	8'-9"	12
N9	15	7	3	9'-8"	296	Z5	5	10	7	9'-2"	197
N10	15	7	3	8'-11"	273	Z6	18	9	7	8'-2"	500
N11	8	6	3	8'-2"	98	Z7	20	9	7	7'-3"	493
N12	8	6	3	7'-4"	88	Z8	20	6	7	5'-9"	173
N13	8	6	3	6'-7"	79	Z9	21	6	7	4'-10"	152
N14	8	6	3	5'-9"	69	Z10	6	10	STR	8'-7"	222
N15	8	6	3	5'-0"	60	Z11	6	10	STR	9'-1"	235
P1	2	9	4	7'-3"	49						
P2	2	9	5	13'-2"	90						
S2	1	4	6	11'-9"	8						
S3	1	4	6	11'-1"	7						
S4	1	4	6	10'-5"	7						
S5	1	4	6	9'-9"	7						
S6	1	4	6	9'-1"	6						
S7	1	4	6	8'-5"	6						
S8	1	4	6	7'-7"	5						
S9	1	4	6	6'-11"	5						
S10	1	4	6	6'-3"	4						
									REINFORCING STEEL FOR 1 WING	6,325 LBS	
									CLASS A CONCRETE 1 WING	46.3 CY	

\* FOR HEADWALL AND END CURTAIN WALL, SHEET 6 OF 8.

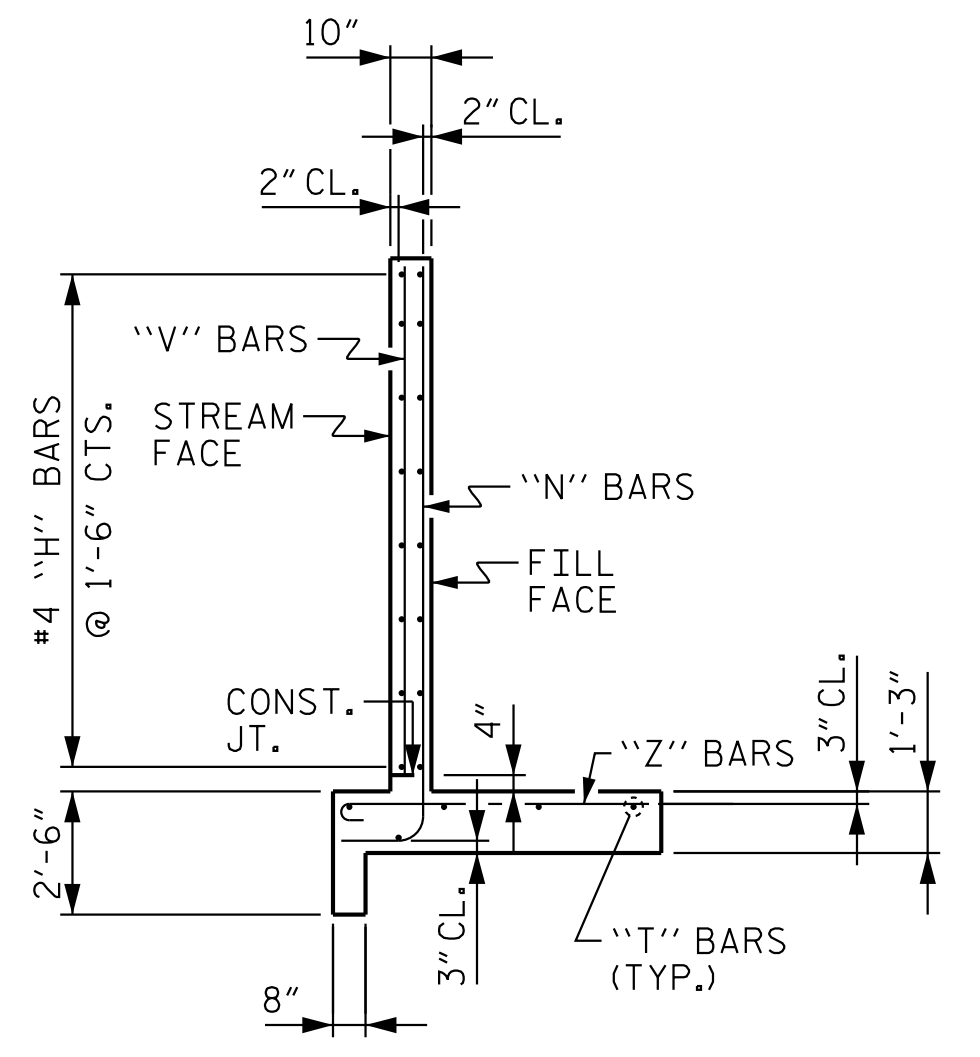


SECTION A-A

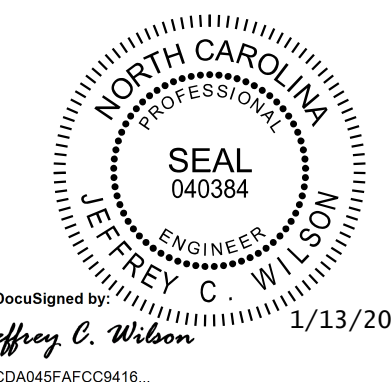
STANDARD REINFORCING STEEL IN BARREL NOT SHOWN



SECTION B-B



TYPICAL WING SECTION



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Phone (919) 677-2000 NC LICENSE # F-0102

PROJECT NO. U-2579BA  
FORSYTH COUNTY  
STATION: 45+66.21 -Y4-

SHEET 7 OF 8  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
OUTLET WING DETAILS  
FOR  
CONCRETE BOX CULVERT  
H = 9'-0" SLOPE = 2:1  
45° OR 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-7
1			3			TOTAL SHEETS
2			4			8

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K:\BIDI\_Structures\Calver\1\NC\01036480\_U-2579BA\Code\09\N2579B\_SML\C007\_330367.dgn

DRAWN BY: J.I.KIMBLE DATE: 1/20  
CHECKED BY: C.T.POOLE DATE: 1/20  
DESIGN ENGINEER OF RECORD: J.C.WILSON DATE: 1/20



LOAD FACTORS:

DESIGN LOAD RATING FACTORS

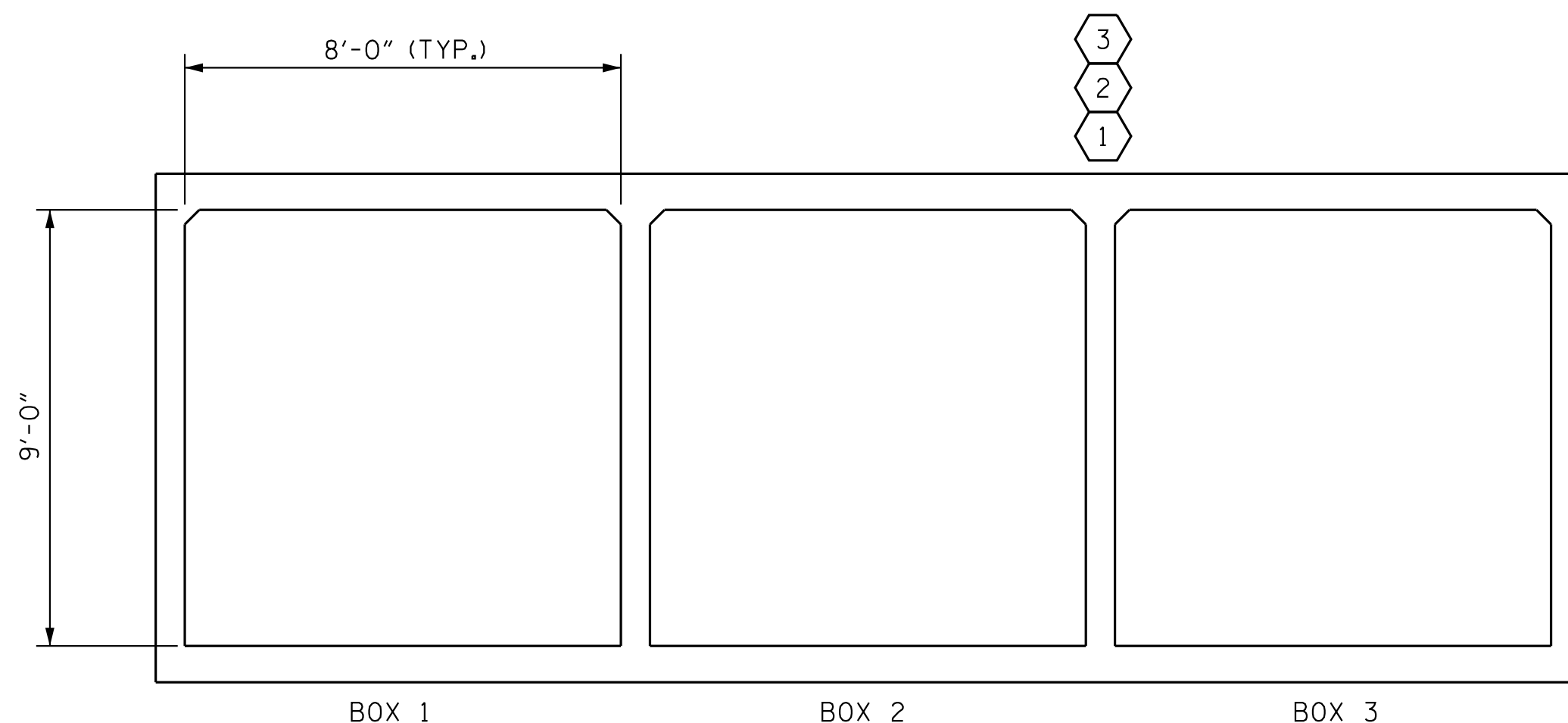
LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

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

COMMENTS:  
1.  
2.  
3.  
4.

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS															
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER	
						LIVE-LOAD FACTORS (γ <sub>LL</sub> )	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	1.13	--	1.75	1.47	2	TOP SLAB	13.21	1.13	2	TOP SLAB	17.33	
	HL-93 (OPERATING)	N/A		1.47	--	1.35	1.90	2	TOP SLAB	13.21	1.47	2	TOP SLAB	17.33	
	HS-20 (INVENTORY)	36,000	②	1.26	45.36	1.75	1.56	2	TOP SLAB	13.21	1.26	2	TOP SLAB	17.33	
	HS-20 (OPERATING)	36,000		1.63	58.68	1.35	2.02	2	TOP SLAB	13.21	1.63	2	TOP SLAB	17.33	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH		3.05	41.18	1.40	3.30	2	TOP SLAB	13.21	3.05	2	TOP SLAB	17.33	
		S3C	21,500		1.91	41.07	1.40	3.26	2	TOP SLAB	13.21	1.91	2	TOP SLAB	17.33
		S3A	22,750		1.91	43.45	1.40	3.26	2	TOP SLAB	13.21	1.91	2	TOP SLAB	17.33
		S4A	26,750		1.88	50.29	1.40	3.20	2	TOP SLAB	13.21	1.88	2	TOP SLAB	17.33
		S5A	30,500		1.86	56.73	1.40	3.17	2	TOP SLAB	13.21	1.86	2	TOP SLAB	17.33
		S6A	34,500		1.86	64.17	1.40	3.19	2	TOP SLAB	13.21	1.86	2	TOP SLAB	17.33
		S7B	38,500	③	1.85	71.23	1.40	3.19	2	TOP SLAB	13.21	1.85	2	TOP SLAB	17.33
		S7A	40,000		1.85	74.00	1.40	3.16	2	TOP SLAB	13.21	1.85	2	TOP SLAB	17.33
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28,250		1.89	53.39	1.40	3.19	2	TOP SLAB	13.21	1.89	2	TOP SLAB	17.33
		T5B	32,000		1.88	60.16	1.40	3.20	2	TOP SLAB	13.21	1.88	2	TOP SLAB	17.33
		T6A	36,000		1.88	67.68	1.40	3.18	2	TOP SLAB	13.21	1.88	2	TOP SLAB	17.33
		T7A	40,000		1.88	75.20	1.40	3.13	2	TOP SLAB	13.21	1.88	2	TOP SLAB	17.33
	T7B	40,000		1.87	74.80	1.40	3.19	2	TOP SLAB	13.21	1.87	2	TOP SLAB	17.33	

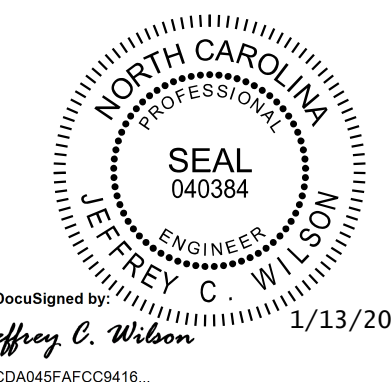
#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
**	SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY  
(LOOKING DOWNSTREAM)

PROJECT NO. U-2579BA  
FORSYTH COUNTY  
STATION: 45+66.21 -Y4-

SHEET 8 OF 8



**Kimley»Horn**  
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Phone (919) 677-2000 NC LICENSE # F-0102

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

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

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

This document, together with the concepts and designs presented herein, is an integral part of the contract for the project. It is to be used only in accordance with the written authorization and approval of Kimley-Horn and Associates, Inc. It shall be without liability to Kimley-Horn and Associates, Inc.

STD. NO. LRFR6

K:\BIDI\_Structures\U-2579BA\Culvert\U-2579BA\Cad\Drawings\U2579B\_SML\_CU08-330367.dgn

ASSEMBLED BY : J.J. KIMBLE	DATE : 1/20
CHECKED BY : J.C. WILSON	DATE : 1/20
DRAWN BY : WMC 7/11	REV. 10/1/11 MAA/GM
CHECKED BY : GM 7/11	REV. 12/17 MAA/THG

## 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  $\frac{3}{4}$ " 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  $\frac{7}{8}$ "  $\emptyset$  SHEAR STUDS FOR THE  $\frac{3}{4}$ "  $\emptyset$  STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{7}{8}$ "  $\emptyset$  STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ "  $\emptyset$  STUDS BASED ON THE RATIO OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  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  $\frac{1}{16}$  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.

# ENGLISH

JANUARY, 1990