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NOTES

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.  
 DESIGN FILL-----MAX 7.9 FT. MIN 7.1 FT.  
 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.

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

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

EXCAVATE FOUNDATION A MINIMUM OF 1.0 FT BELOW CULVERT BEARING ELEVATION. PLACE 1.0 FT OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

OVEREXCAVATE LOOSE/SOFT MATERIAL IF PRESENT TO SUITABLE BEARING MATERIALS AND REPLACE WITH ADDITIONAL CLASS VI FOUNDATION CONDITIONING MATERIAL.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

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.

THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 2 AT 10' (W) X 6' (H) SIZE, 63'-3"± LONG AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE RETAINED.

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.

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

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.

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 SHALL BE PAID FOR BY THE CONTRACTOR.

HYDROGRAPHIC DATA

DESIGN DISCHARGE ..... = 650 CFS  
 FREQUENCY OF DESIGN FLOOD ..... = 50 YRS.  
 DESIGN HIGH WATER ELEVATION ..... = 1929.4 FT.  
 DRAINAGE AREA ..... = 1.57 SQ. MI.  
 BASE DISCHARGE (Q100) ..... = 800 CFS  
 BASE HIGH WATER ELEVATION ..... = 1929.7 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE ..... = 2125 CFS  
 FREQUENCY OF OVERTOPPING FLOOD ..... = 500+ YRS.  
 OVERTOPPING FLOOD ELEVATION ..... = 1938.8 FT.

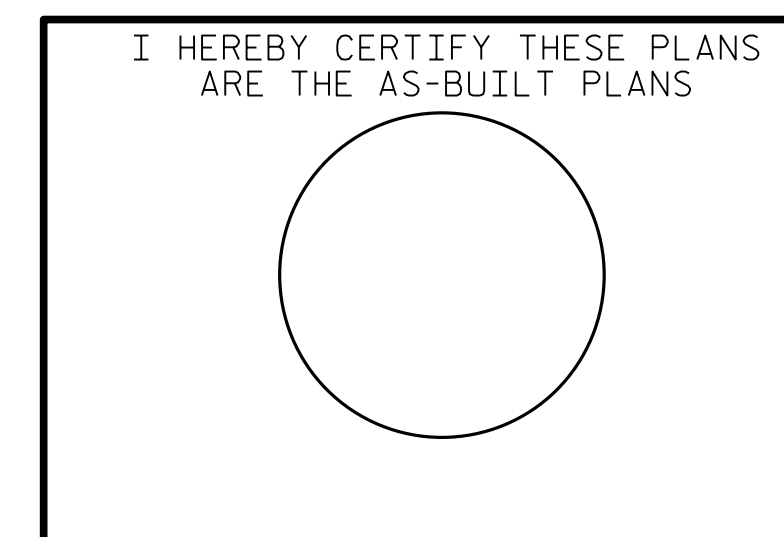
-L- PROFILE DATA

PVI STA. 96+40.00 -L-  
 PVI EL. = 1930.96  
 VC = 760.00  
 g1 = -2.3341%  
 g2 = +5.5322%

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
BARREL @ 2.29 CY/FT	169.2 C.Y.
WING ETC.	46.1 C.Y.
TOTAL	215.3 C.Y.
REINFORCING STEEL	
BARREL	27,881 LBS.
WINGS ETC.	2,918 LBS.
TOTAL	30,799 LBS.

CULVERT EXCAVATION -----	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	132.0 TONS
REMOVAL OF EXISTING STRUCTURE ---	LUMP SUM
ASBESTOS ASSESSMENT -----	LUMP SUM



PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-

SHEET 1 OF 10 CULVERT NO. 210106

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

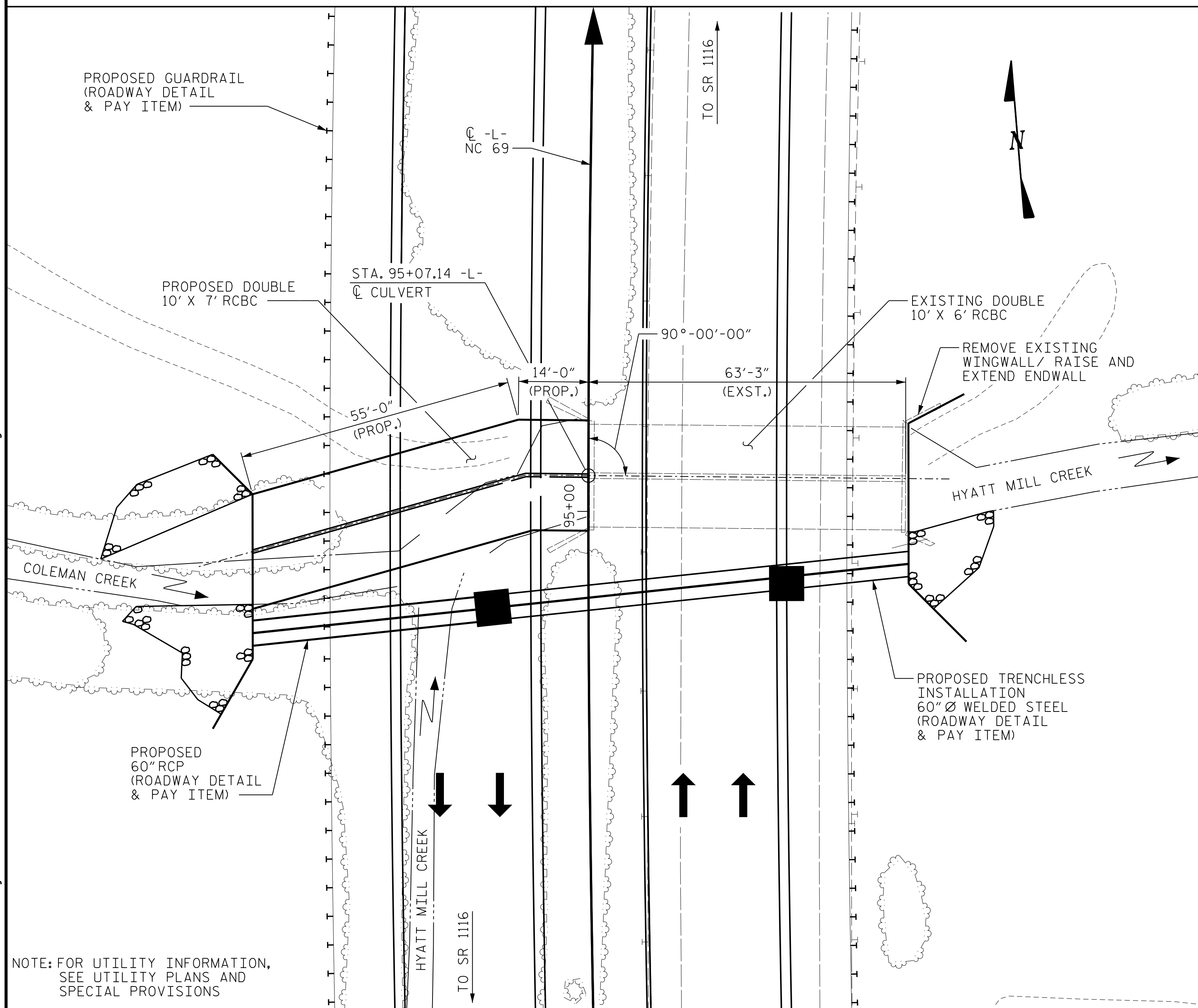
DOUBLE 10 FT. X 7 FT.  
 CONCRETE BOX  
 CULVERT EXTENSION

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

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

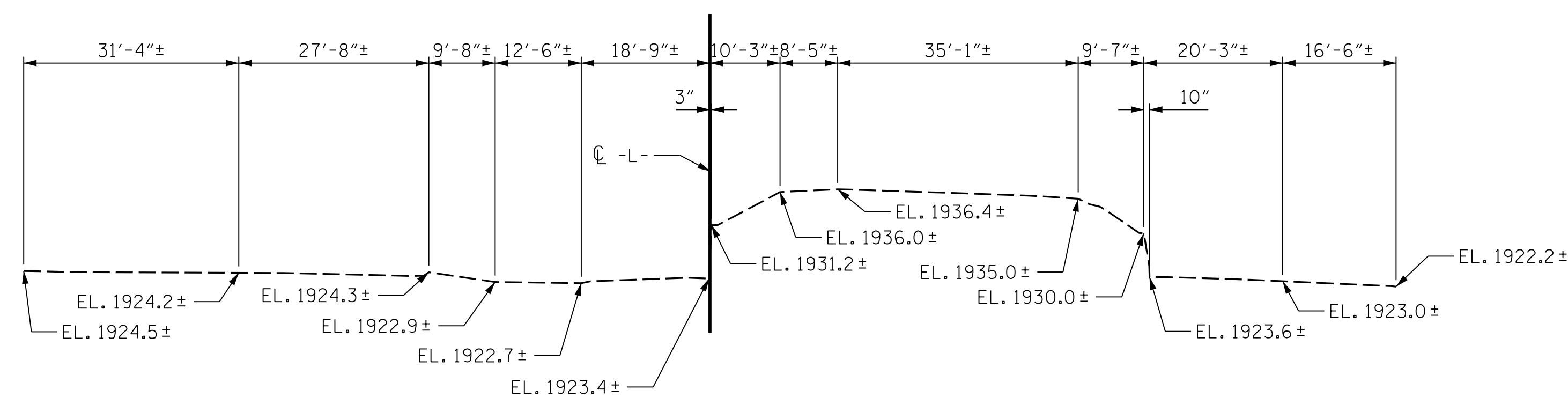
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CI-1
1			3			TOTAL SHEETS
2			4			10

BM #8: CHISELED "X" ON CONCRETE HEADWALL, 82.5' LT. OF STA. 92+12.33 -L-, EL. 1935.65



LOCATION SKETCH

GRADE POINT ELEVATION @ 95+07.14 -L- = 1937.22  
 BED ELEVATION @ 95+07.15 -L- = 1922.24  
 ROADWAY SLOPES = 2:1



PROFILE ALONG CULVERT

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

8/12/2019 12:18:44 PM User: jlsraelnaim  
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### LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W 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	1.89	--	1.75	2.39	2	TOP SLAB	5.00	1.89	2	TOP SLAB	1.00		
	HL-93 (OPERATING)	N/A		2.45	--	1.35	3.09	2	TOP SLAB	5.00	2.45	2	TOP SLAB	1.00		
	HS-20 (INVENTORY)	36,000	②	1.89	68.04	1.75	2.39	2	TOP SLAB	5.00	1.89	2	TOP SLAB	1.00		
	HS-20 (OPERATING)	36,000		2.45	88.20	1.35	3.09	2	TOP SLAB	5.00	2.45	2	TOP SLAB	1.00		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		3.61	48.74	1.40	4.30	1	EXT. WALL	3.50	3.61	2	TOP SLAB	1.00	1
		SNGARBS2	20,000		3.31	66.20	1.40	4.11	1	TOP SLAB	5.00	3.31	2	TOP SLAB	1.00	
		SNAGRIS2	22,000		3.47	76.34	1.40	4.11	1	TOP SLAB	5.00	3.47	2	TOP SLAB	1.00	
		SNCOTTS3	27,250	③	1.86	50.69	1.40	2.21	1	TOP SLAB	5.00	1.86	2	TOP SLAB	1.00	
		SNAGGRS4	34,925		2.01	70.20	1.40	2.21	1	TOP SLAB	5.00	2.01	2	TOP SLAB	1.00	
		SNS5A	35,550		1.91	67.90	1.40	2.21	1	TOP SLAB	5.00	1.91	2	TOP SLAB	1.00	
		SNS6A	39,950		1.87	74.71	1.40	2.21	1	TOP SLAB	5.00	1.87	2	TOP SLAB	1.00	
		SNS7B	42,000		1.86	78.12	1.40	2.21	1	TOP SLAB	5.00	1.86	2	TOP SLAB	1.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		3.19	105.27	1.40	4.30	1	EXT. WALL	3.50	3.19	2	TOP SLAB	1.00	1
		TNT4A	33,075		2.16	71.44	1.40	2.62	2	TOP SLAB	5.00	2.16	2	TOP SLAB	1.00	
		TNT6A	41,600		1.98	82.37	1.40	2.51	2	TOP SLAB	5.00	1.98	2	TOP SLAB	1.00	
		TNT7A	42,000		2.06	86.52	1.40	2.51	2	TOP SLAB	5.00	2.06	2	TOP SLAB	1.00	
		TNT7B	42,000		2.01	84.42	1.40	2.51	1	TOP SLAB	5.00	2.01	2	TOP SLAB	1.00	
		TNAGRIT4	43,000		2.11	90.73	1.40	2.51	1	TOP SLAB	5.00	2.11	2	TOP SLAB	1.00	
TNAGT5A	45,000		2.09	94.05	1.40	2.51	1	TOP SLAB	5.00	2.09	2	TOP SLAB	1.00			
TNAGT5B	45,000		2.05	92.25	1.40	2.51	1	TOP SLAB	5.00	2.05	2	TOP SLAB	1.00			

#### 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	--

#### NOTE:

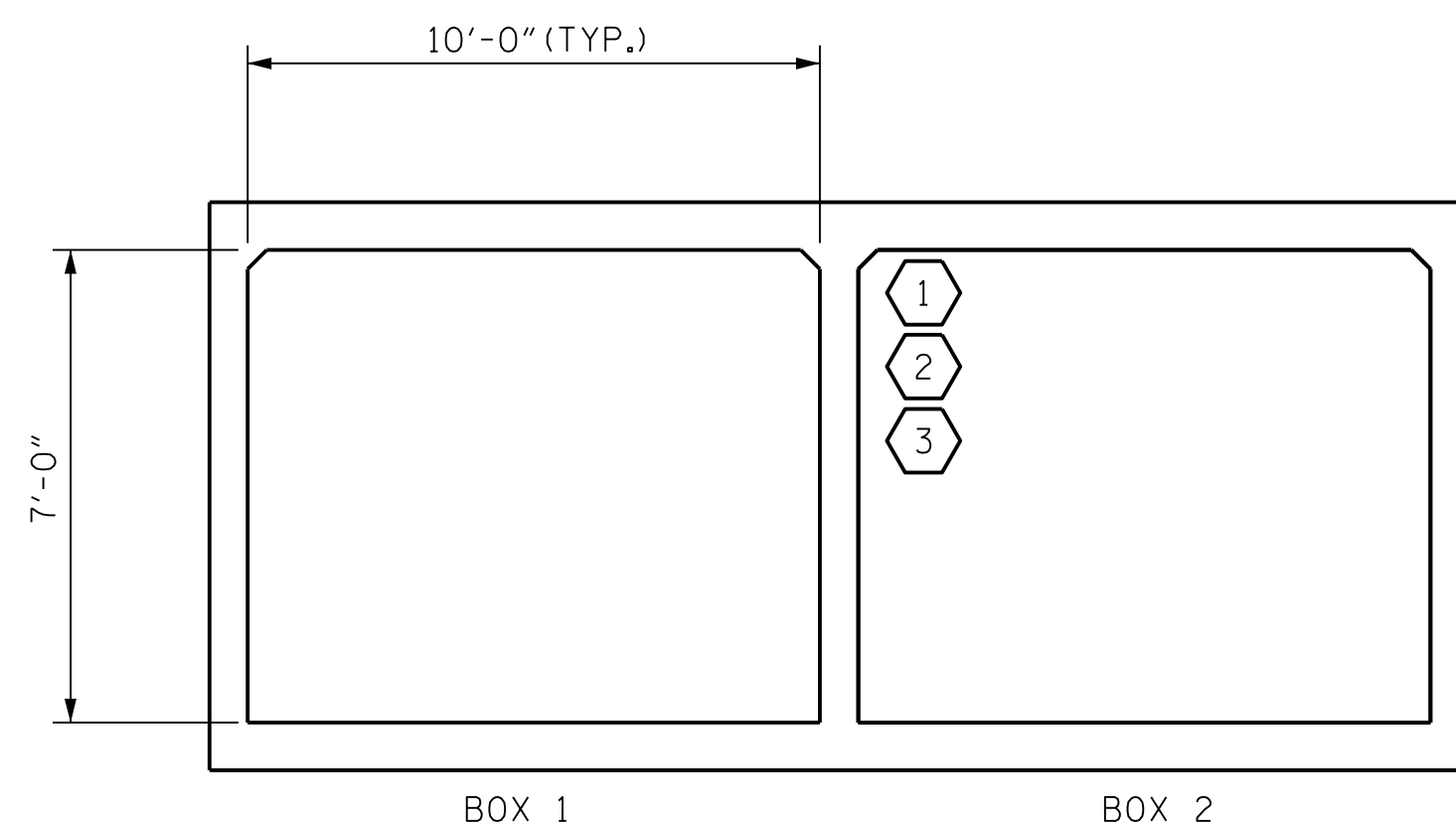
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

THE LIVE LOAD RATING FOR VEHICLES ON -L- WERE COMPUTED WITH A DESIGN FILL DEPTH OF MAX 7.9 FT. AND MIN 7.1 FT.

#### COMMENTS:

1. VERTICAL ELEMENTS ARE REFERENCED STARTING AT THE BOTTOM.

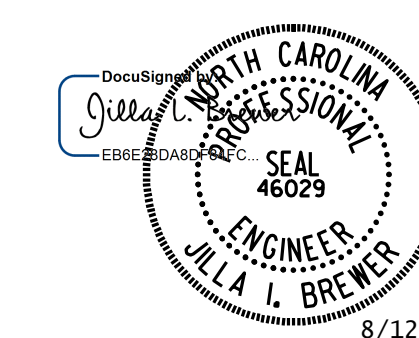
#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
**	SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY  
(LOOKING DOWNSTREAM)

PROJECT NO. A-0011C  
CLAY COUNTY  
STATION: 95+07.14 -L-

SHEET 2 OF 10



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

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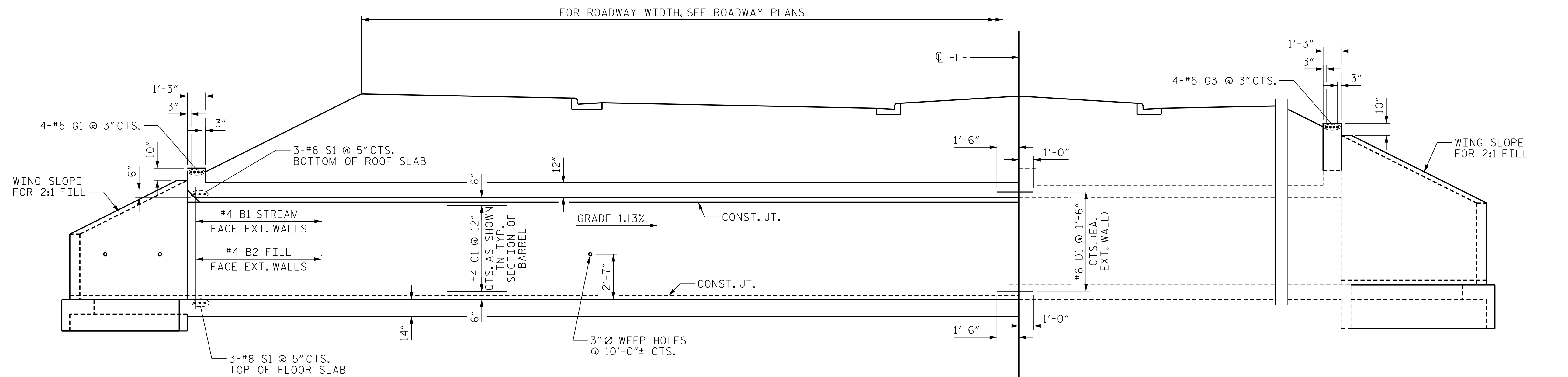
MI ENGINEERING  
1011 SCHAUB DRIVE, SUITE 100  
RALEIGH, NC 27606  
(919) 851-6606  
FIRM PE NUMBER : P-0671

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

ASSEMBLED BY : J.I. BREWER	DATE: 07/19
CHECKED BY : M. ISRAELNAIM	DATE: 07/19
DESIGN ENGINEER OF RECORD: J.I. BREWER	DATE: 07/19
DRAWN BY : WMC 7/II	REV. 10/1/II MMA/GM
CHECKED BY : GM 7/II	

8/12/2019 12:20:00 PM

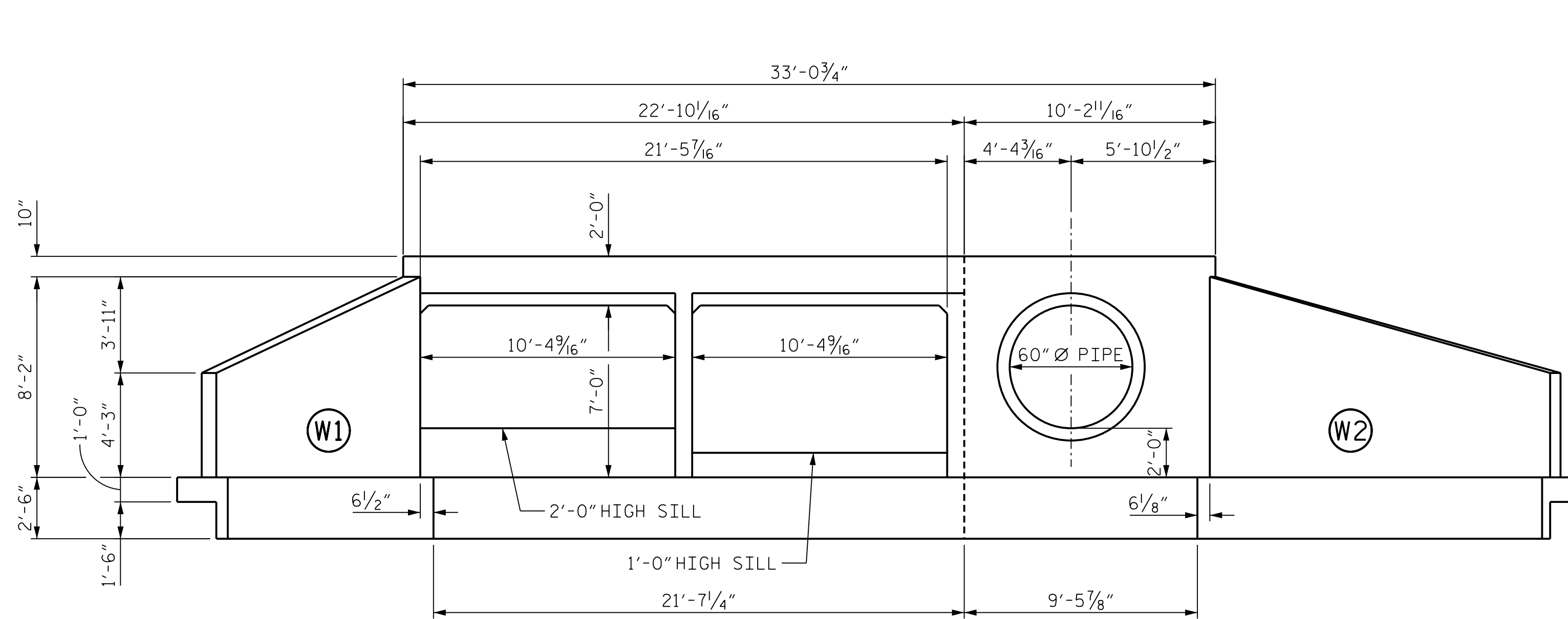
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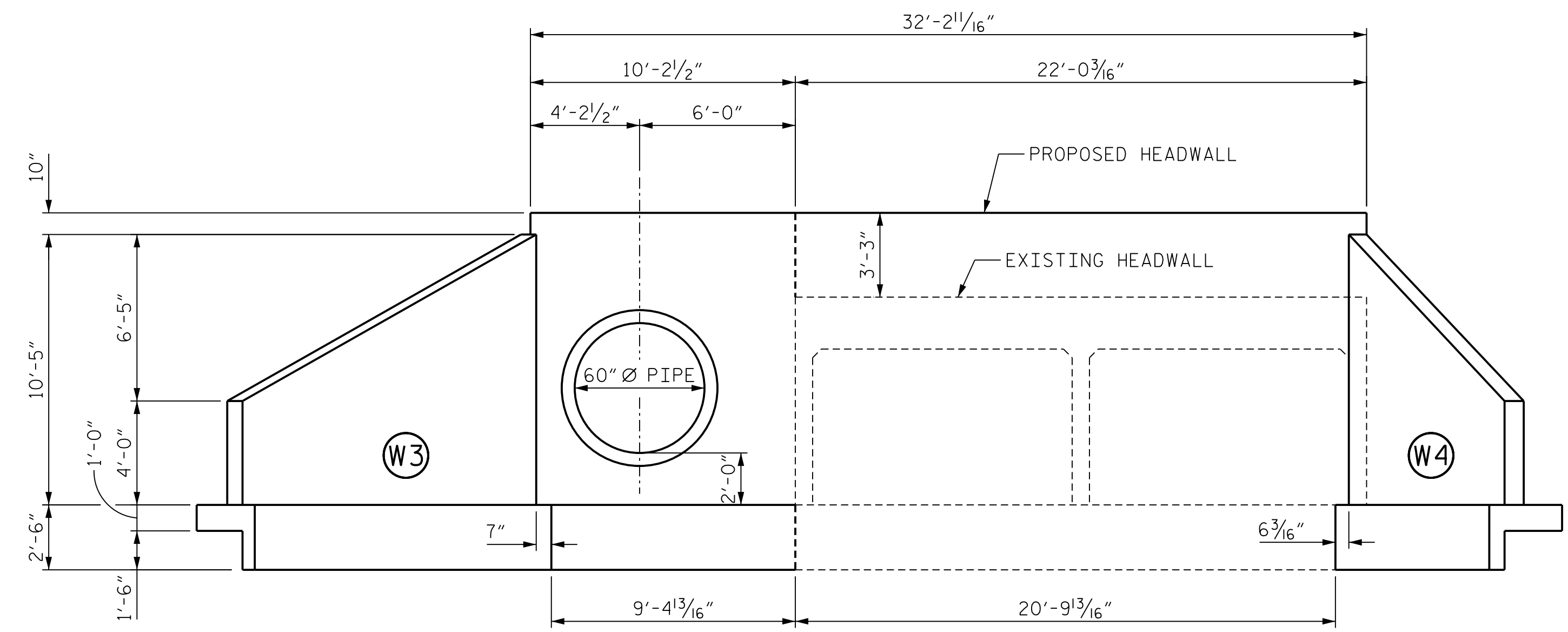
PROPOSED EXTENSION

EXISTING CULVERT PROPOSED HEADWALL & WINGS

CULVERT SECTION NORMAL TO ROADWAY



INLET END

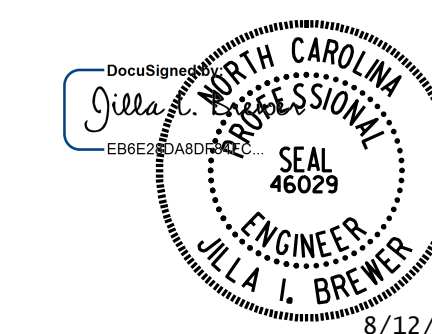


OUTLET END

ELEVATIONS NORMAL TO SKEW

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-

SHEET 3 OF 10



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

DOUBLE 10 FT. X 7 FT.  
CONCRETE BOX  
CULVERT EXTENSION

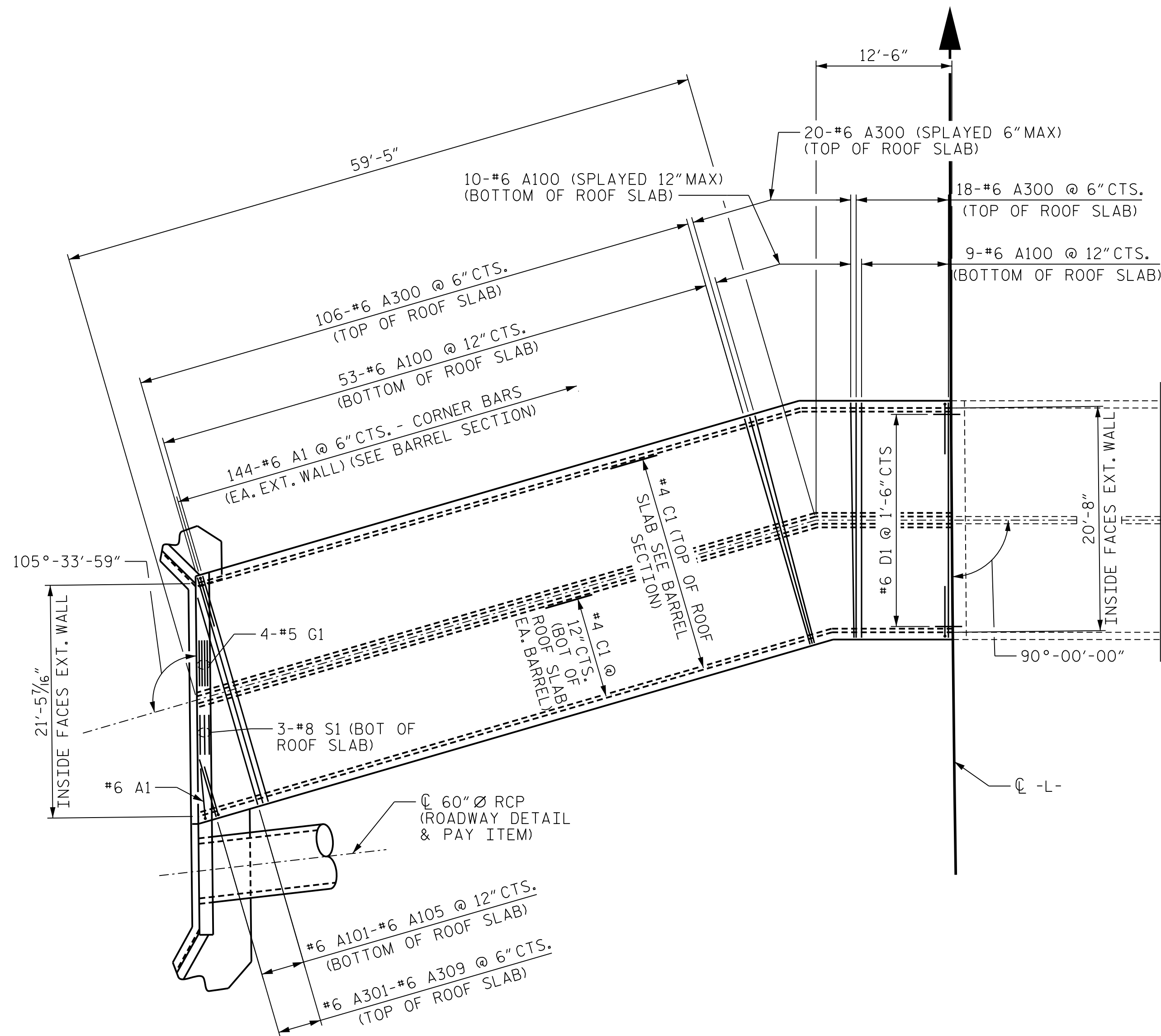
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FIRM PE NUMBER : P-0671

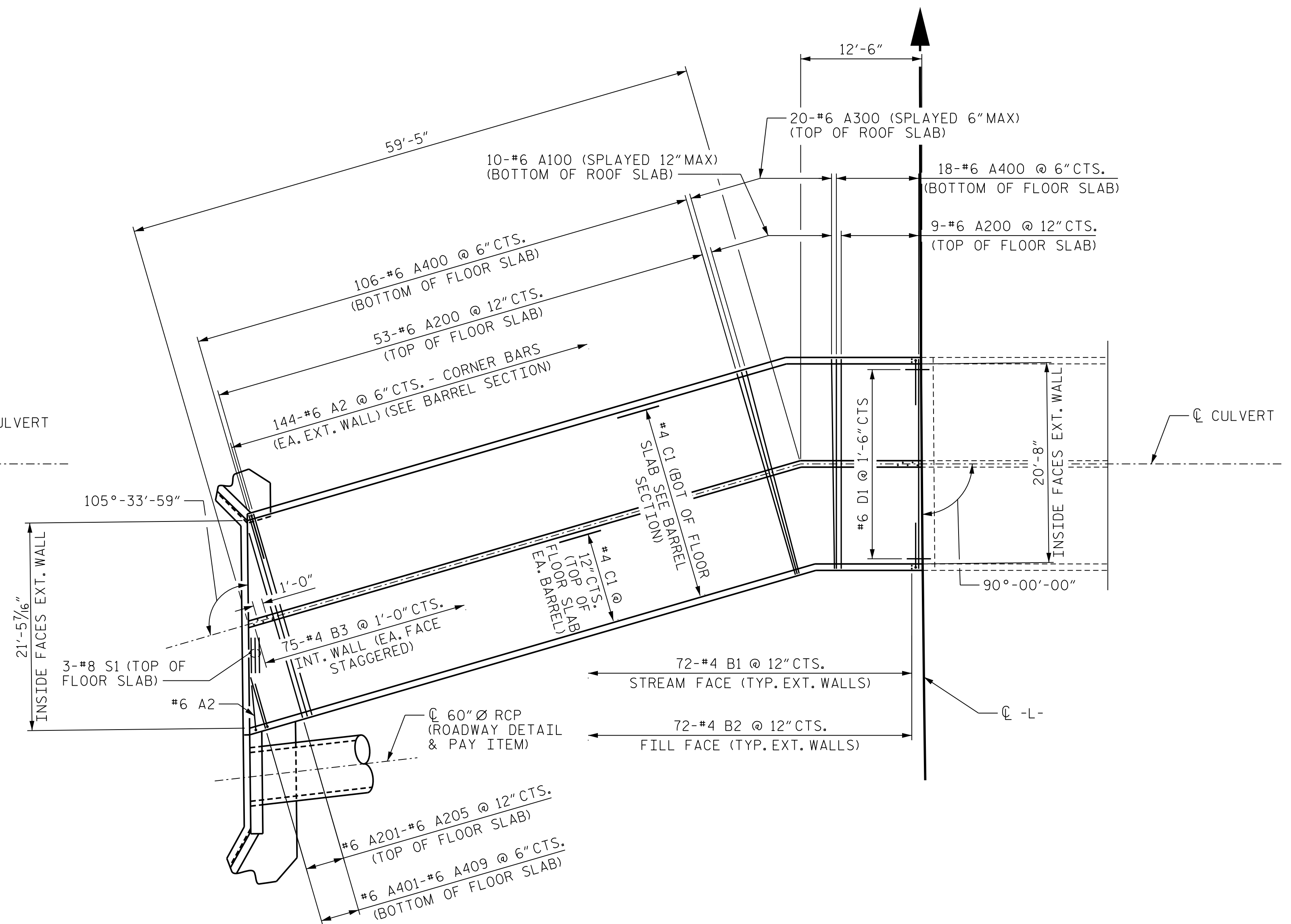
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
1			3			TOTAL SHEETS
2			4			10

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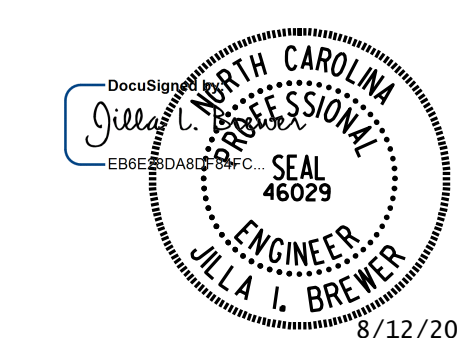
**PLAN OF ROOF SLAB**  
FIELD BEND C1 BARS AS NECESSARY



**PLAN OF FLOOR SLAB**  
FIELD BEND C1 BARS AS NECESSARY  
(SILL NOT SHOWN, SEE SHEET 10 OF 10 FOR LOCATIONS.)

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-

SHEET 4 OF 10



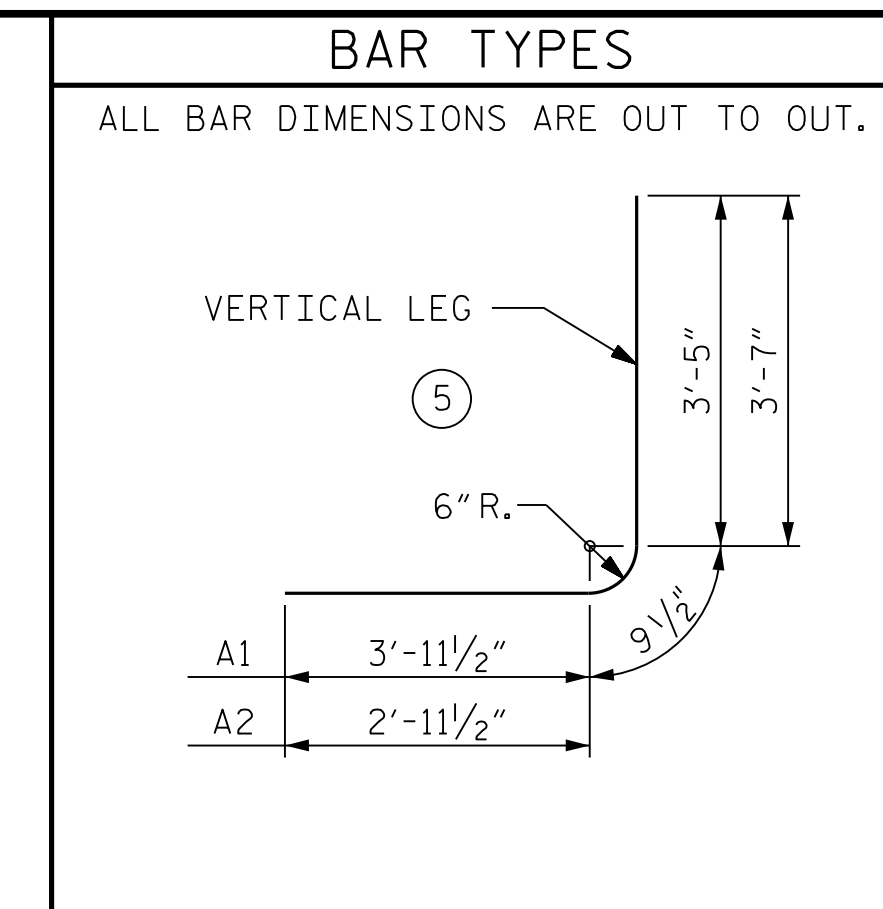
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 10 FT. X 7 FT.  
 CONCRETE BOX  
 CULVERT EXTENSION**

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**MI ENGINEERING**  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

REVISIONS						SHEET NO. <b>CI-4</b>
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS <b>10</b>
2			4			

DRAWN BY : <u>J.I. BREWER</u>	DATE : <u>06/19</u>
CHECKED BY : <u>M. ISRAELNAIM</u>	DATE : <u>07/19</u>
DESIGN ENGINEER OF RECORD : <u>J.I. BREWER</u>	DATE : <u>07/19</u>

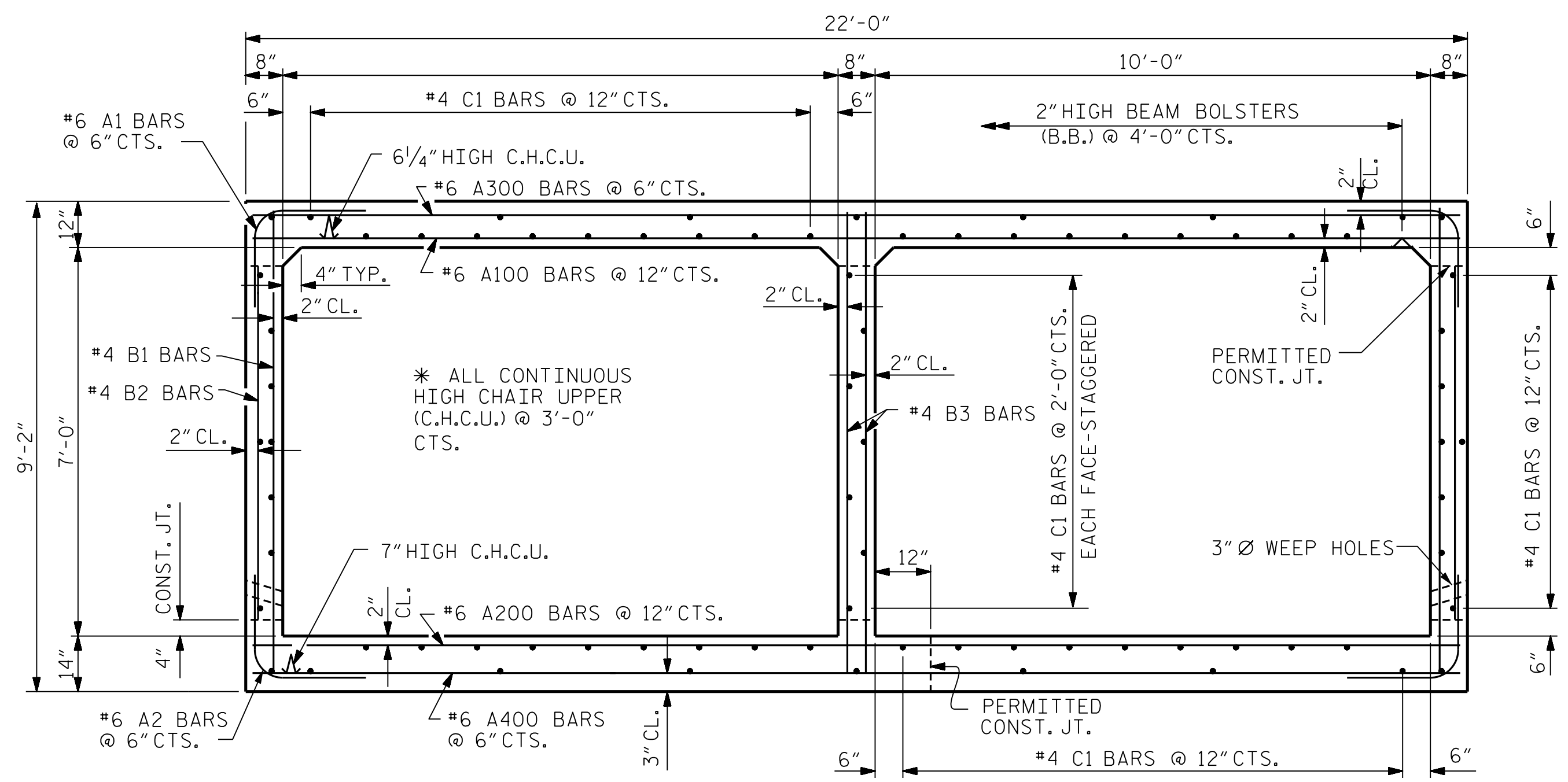
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BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	288	#6	5	8'-2"	3,533
A2	288	#6	5	7'-6"	3,244
A100	72	#6	STR	21'-8"	2,343
A101	1	#6	STR	19'-10"	30
A102	1	#6	STR	16'-3"	24
A103	1	#6	STR	12'-8"	19
A104	1	#6	STR	9'-1"	14
A105	1	#6	STR	5'-6"	8
A200	72	#6	STR	21'-8"	2,343
A201	1	#6	STR	19'-10"	30
A202	1	#6	STR	16'-3"	24
A203	1	#6	STR	12'-8"	19
A204	1	#6	STR	9'-1"	14
A205	1	#6	STR	5'-6"	8
A300	144	#6	STR	21'-8"	4,686
A301	1	#6	STR	19'-10"	30
A302	1	#6	STR	18'-0"	27
A303	1	#6	STR	16'-3"	24
A304	1	#6	STR	14'-5"	22
A305	1	#6	STR	12'-8"	19
A306	1	#6	STR	10'-10"	16
A307	1	#6	STR	9'-1"	14
A308	1	#6	STR	7'-3"	11
A309	1	#6	STR	5'-6"	8
A400	144	#6	STR	21'-8"	4,686
A401	1	#6	STR	19'-10"	30
A402	1	#6	STR	18'-0"	27
A403	1	#6	STR	16'-3"	24
A404	1	#6	STR	14'-5"	22
A405	1	#6	STR	12'-8"	19
A406	1	#6	STR	10'-10"	16
A407	1	#6	STR	9'-1"	14
A408	1	#6	STR	7'-3"	11
A409	1	#6	STR	5'-6"	8
B1	144	#4	STR	8'-9"	842
B2	144	#4	STR	6'-4"	609
B3	75	#4	STR	8'-9"	438
C1	152	#4	STR	37'-3"	3,782
D1	38	#6	STR	2'-6"	143
D2	8	#6	STR	2'-9"	25
D3	8	#6	STR	1'-9"	16
G1	4	#5	STR	32'-8"	136
S1	6	#8	STR	32'-8"	523
<b>REINFORCING STEEL</b>					<b>27,881 LBS.</b>

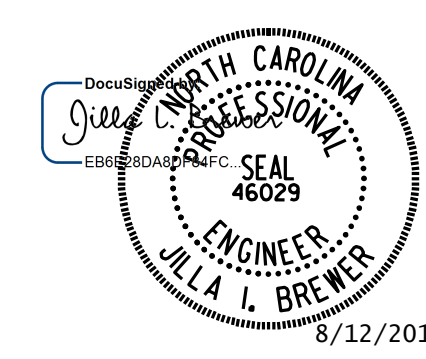
**SPLICE LENGTH CHART**

BAR	SIZE	SPLICE LENGTH
A200	#6	2'-9"
A400	#6	2'-9"
B1	#4	1'-10"
B3	#4	1'-10"
C1	#4	2'-5"



**RIGHT ANGLE SECTION OF BARREL**  
THERE ARE 76 "C" BARS IN SECTION OF BARREL.

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-  
 SHEET 5 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 10 FT. X 7 FT.  
 CONCRETE BOX  
 CULVERT EXTENSION**

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

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

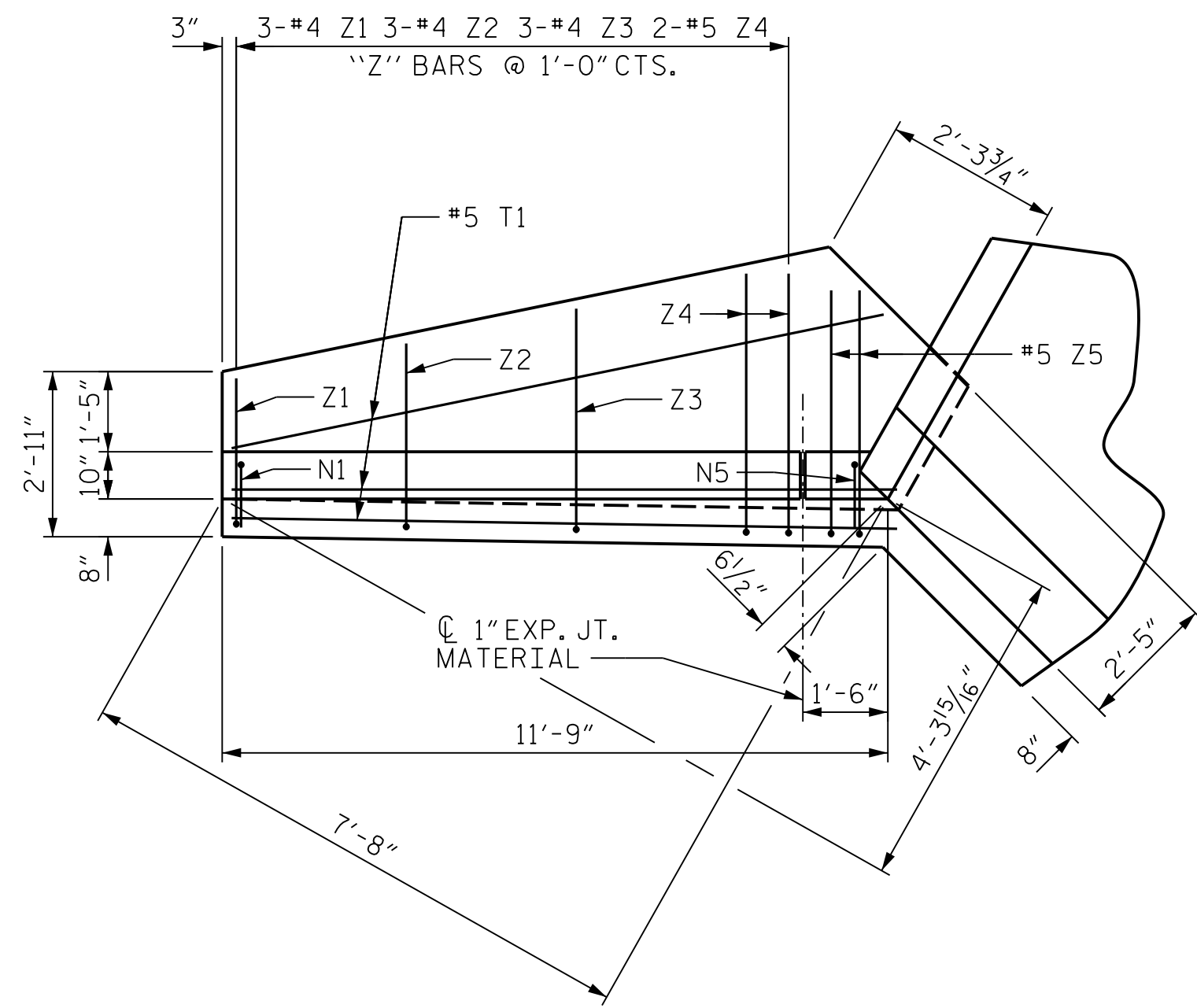
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5
1			3			TOTAL SHEETS
2			4			10

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

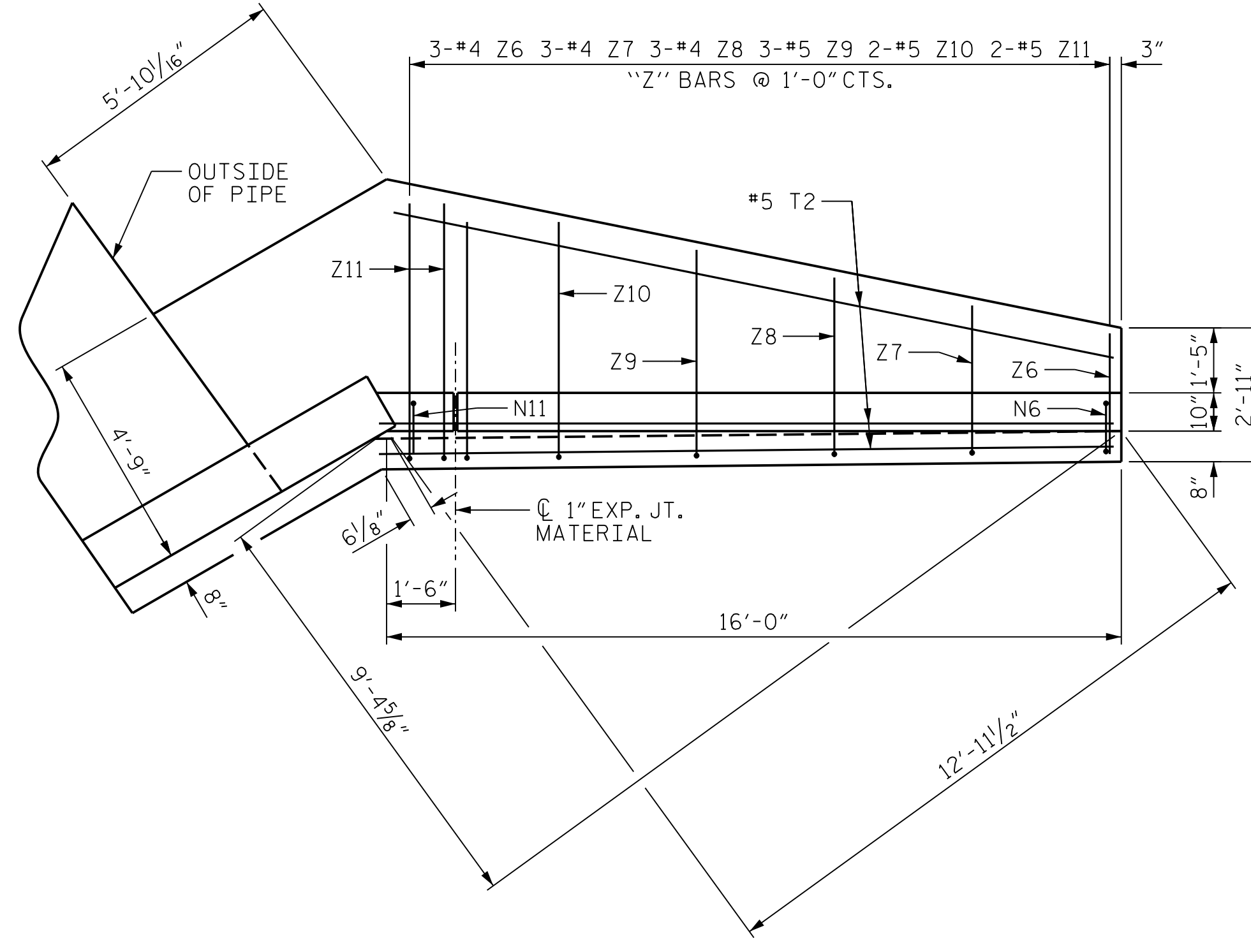




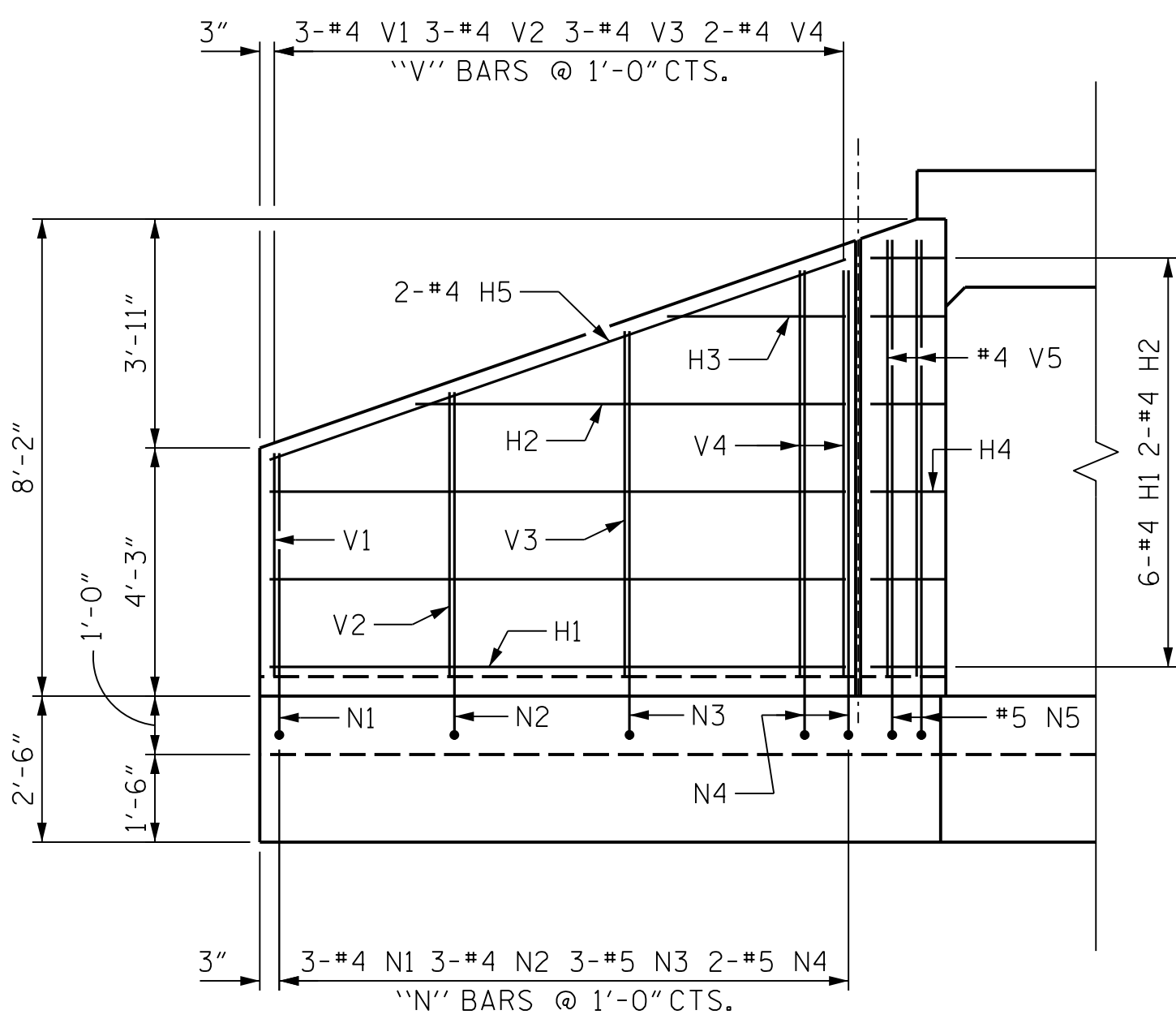
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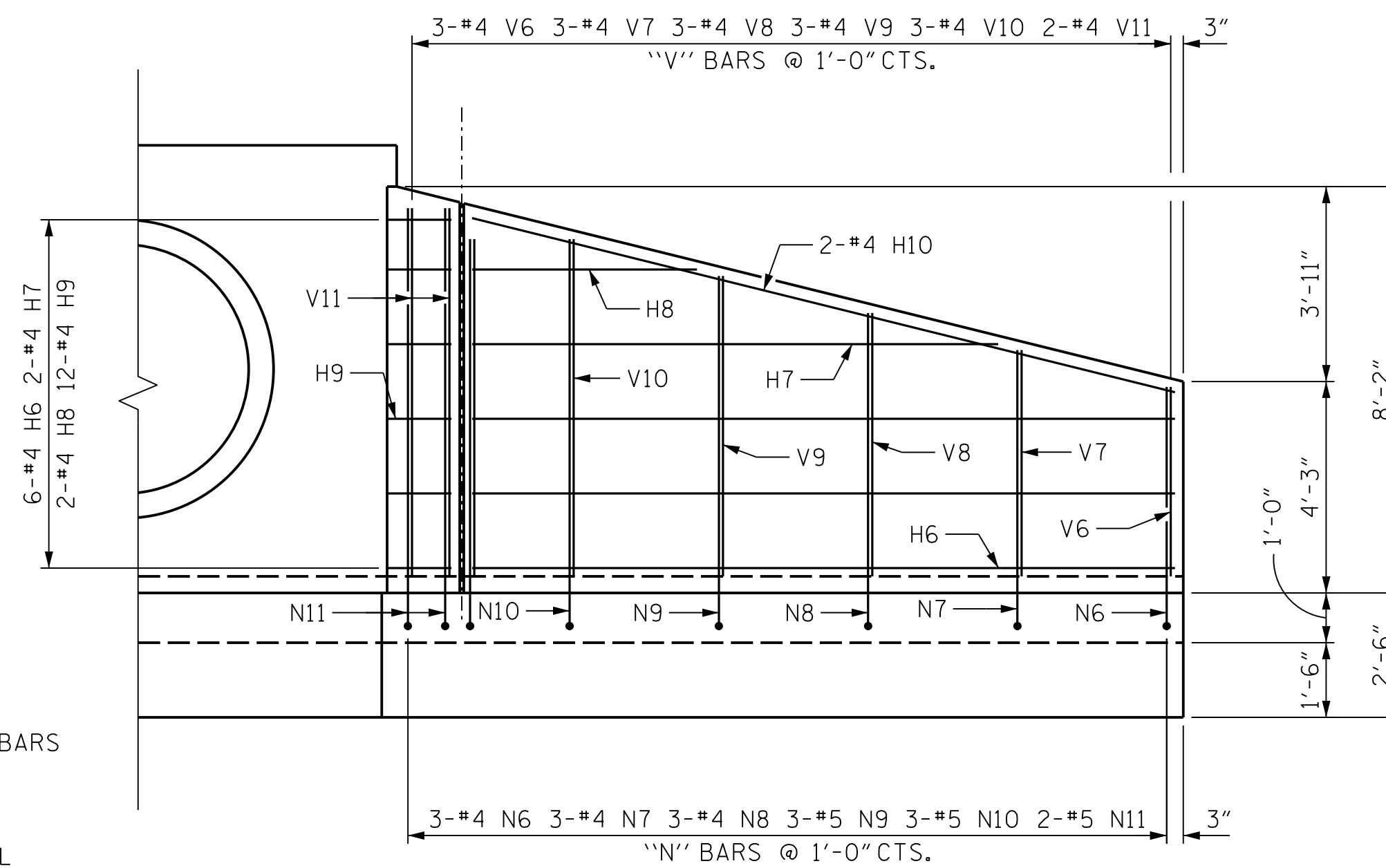
PLAN W1



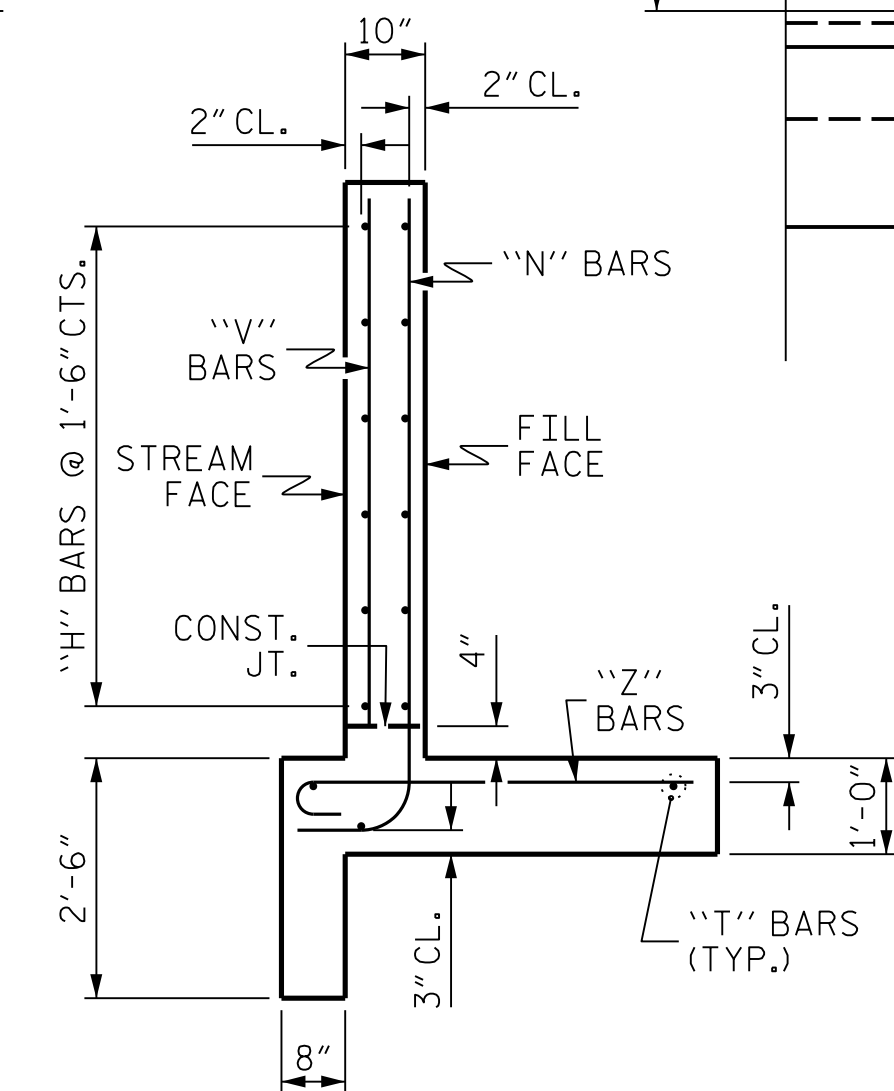
PLAN W2



ELEVATION W1

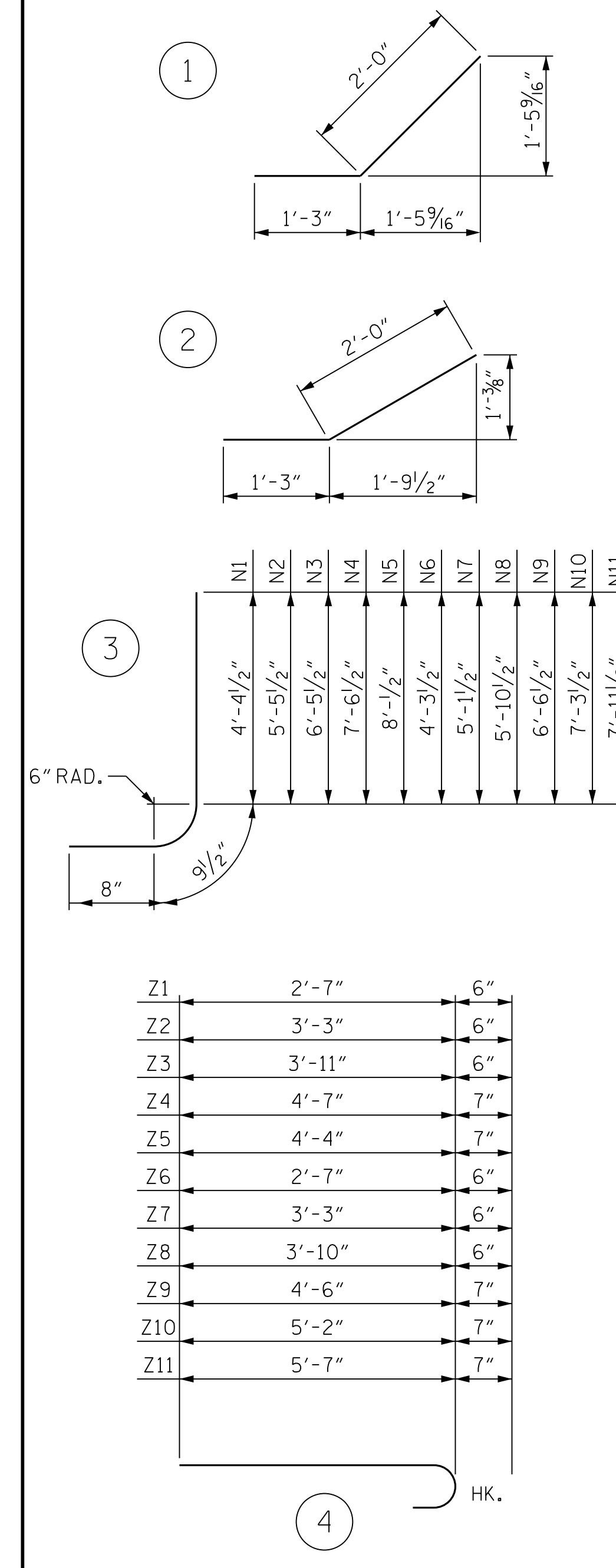


ELEVATION W2



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

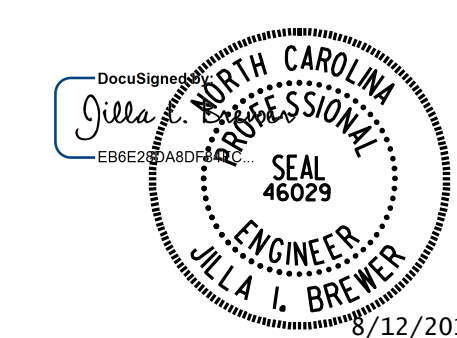
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	#4	STR	9'-10"	39
H2	#4	STR	7'-4"	10
H3	#4	STR	3'-0"	4
H4	#4	1	3'-3"	26
H5	#4	STR	10'-5"	14
H6	#4	STR	14'-1"	56
H7	#4	STR	10'-6"	14
H8	#4	STR	4'-6"	6
H9	#4	2	3'-3"	26
H10	#4	STR	14'-6"	19
N1	#4	3	5'-10"	12
N2	#4	3	6'-11"	14
N3	#5	3	7'-11"	25
N4	#5	3	9'-0"	28
N5	#5	3	9'-6"	20
N6	#4	3	5'-9"	12
N7	#4	3	6'-7"	13
N8	#4	3	7'-4"	15
N9	#5	3	8'-0"	25
N10	#5	3	8'-9"	27
N11	#5	3	9'-5"	20
T1	#5	STR	11'-9"	37
T2	#5	STR	16'-0"	50
V1	#4	STR	3'-9"	8
V2	#4	STR	4'-11"	10
V3	#4	STR	5'-11"	12
V4	#4	STR	6'-11"	9
V5	#4	STR	7'-5"	10
V6	#4	STR	3'-9"	8
V7	#4	STR	4'-6"	9
V8	#4	STR	5'-3"	11
V9	#4	STR	6'-0"	12
V10	#4	STR	6'-9"	14
V11	#4	STR	7'-4"	10
Z1	#4	4	3'-1"	6
Z2	#4	4	3'-9"	8
Z3	#4	4	4'-5"	9
Z4	#5	4	4'-7"	14
Z5	#5	4	4'-4"	9
Z6	#4	4	3'-1"	6
Z7	#4	4	3'-9"	8
Z8	#4	4	4'-4"	9
Z9	#5	4	5'-1"	16
Z10	#5	4	5'-9"	12
Z11	#5	4	5'-7"	12

REINFORCING STEEL	727 LBS
CLASS A CONCRETE	
2 WINGS	12.8 CY
1 HEADWALLS	2.1 CY
1 END CURTAIN WALLS	1.9 CY
TOTAL	16.8 CY

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-

SHEET 7 OF 10

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 WINGS 1 AND 2 FOR  
 CONCRETE BOX CULVERT  
 H = 7'-0" SLOPE = 2:1  
 105° SKEW



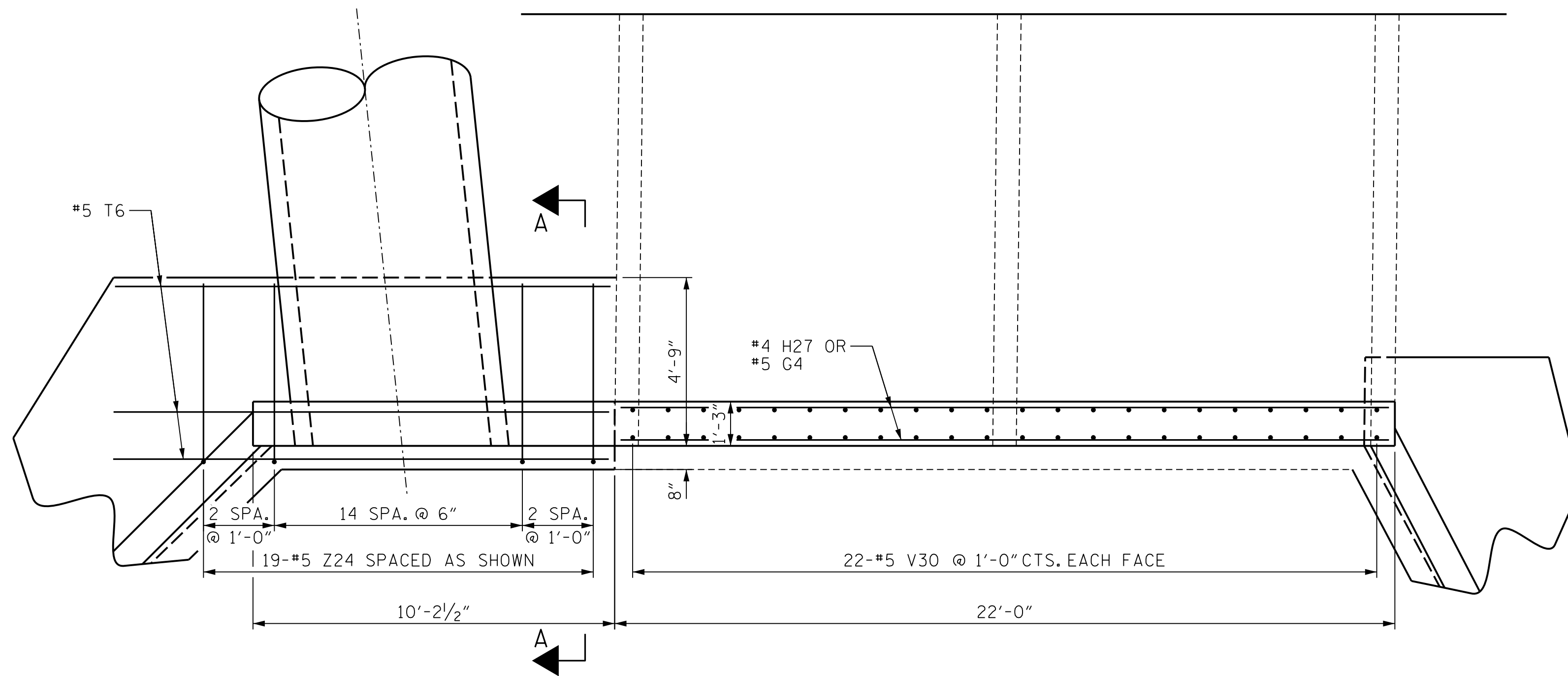
DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

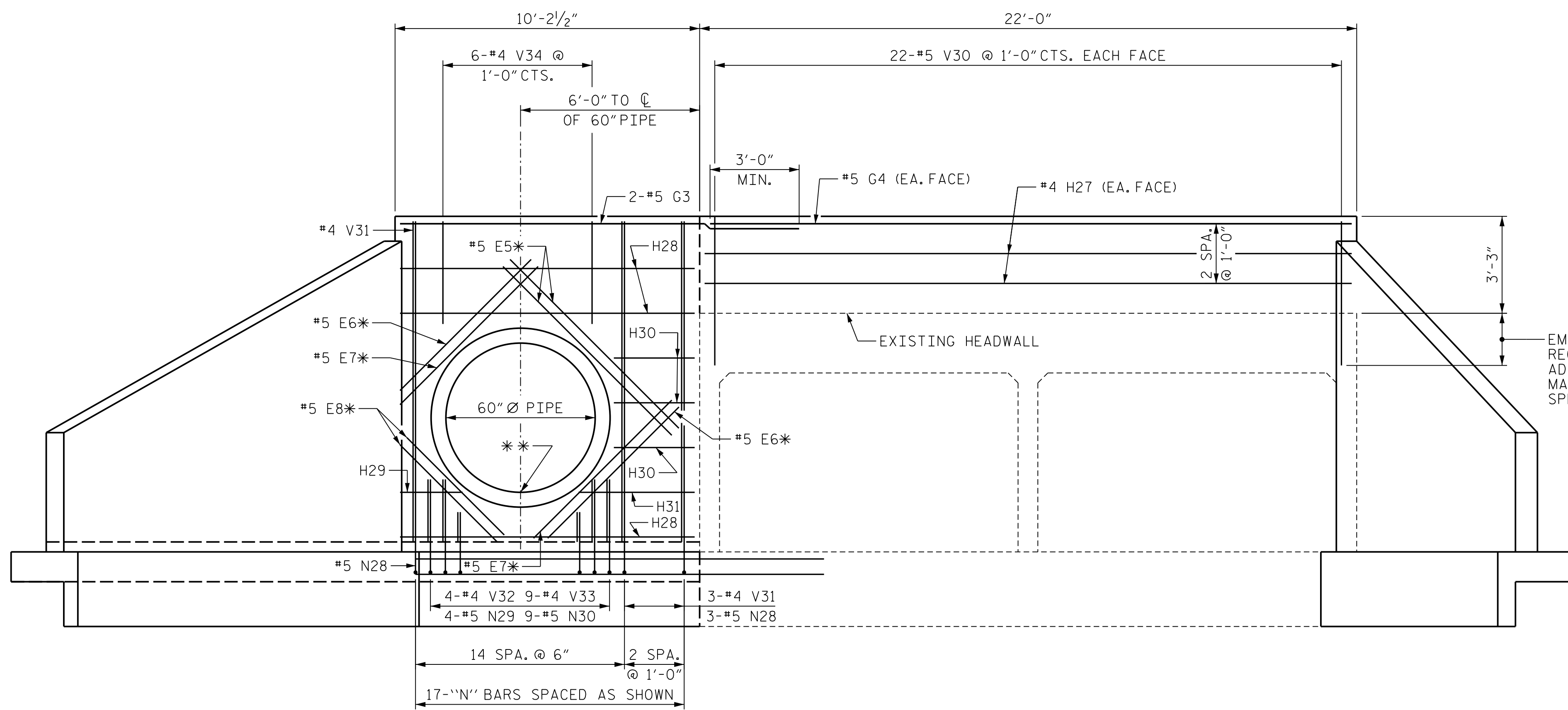
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CI-7
1			3			TOTAL SHEETS
2			4			10

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

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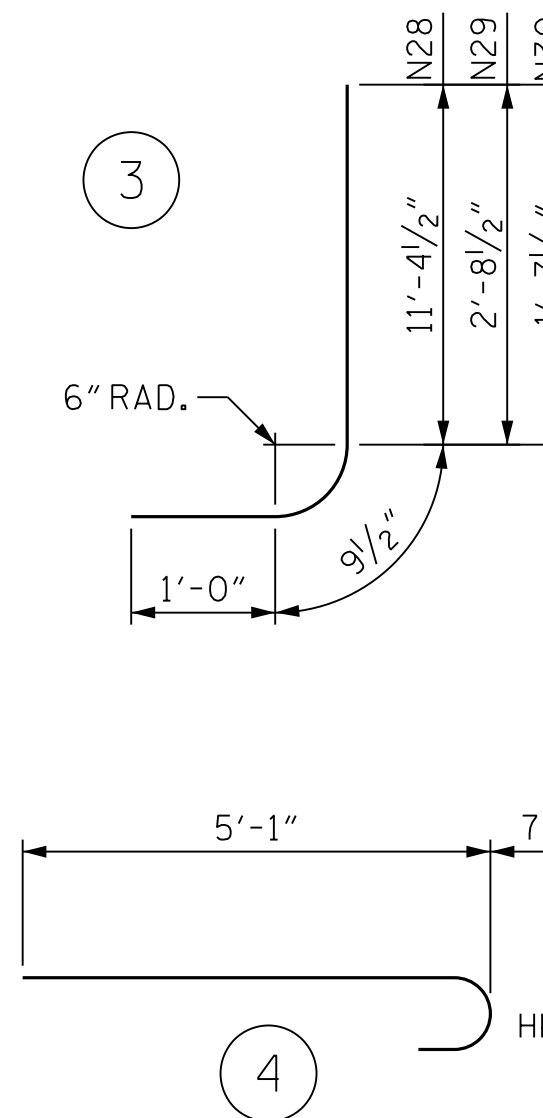
PLAN - 60" Ø PIPE HEADWALL



ELEVATION - 60" PIPE HEADWALL

\* #5 "E" BARS EA. FACE  
 \*\* PIPE INVERT 2'-0" ABOVE BOTTOM SLAB

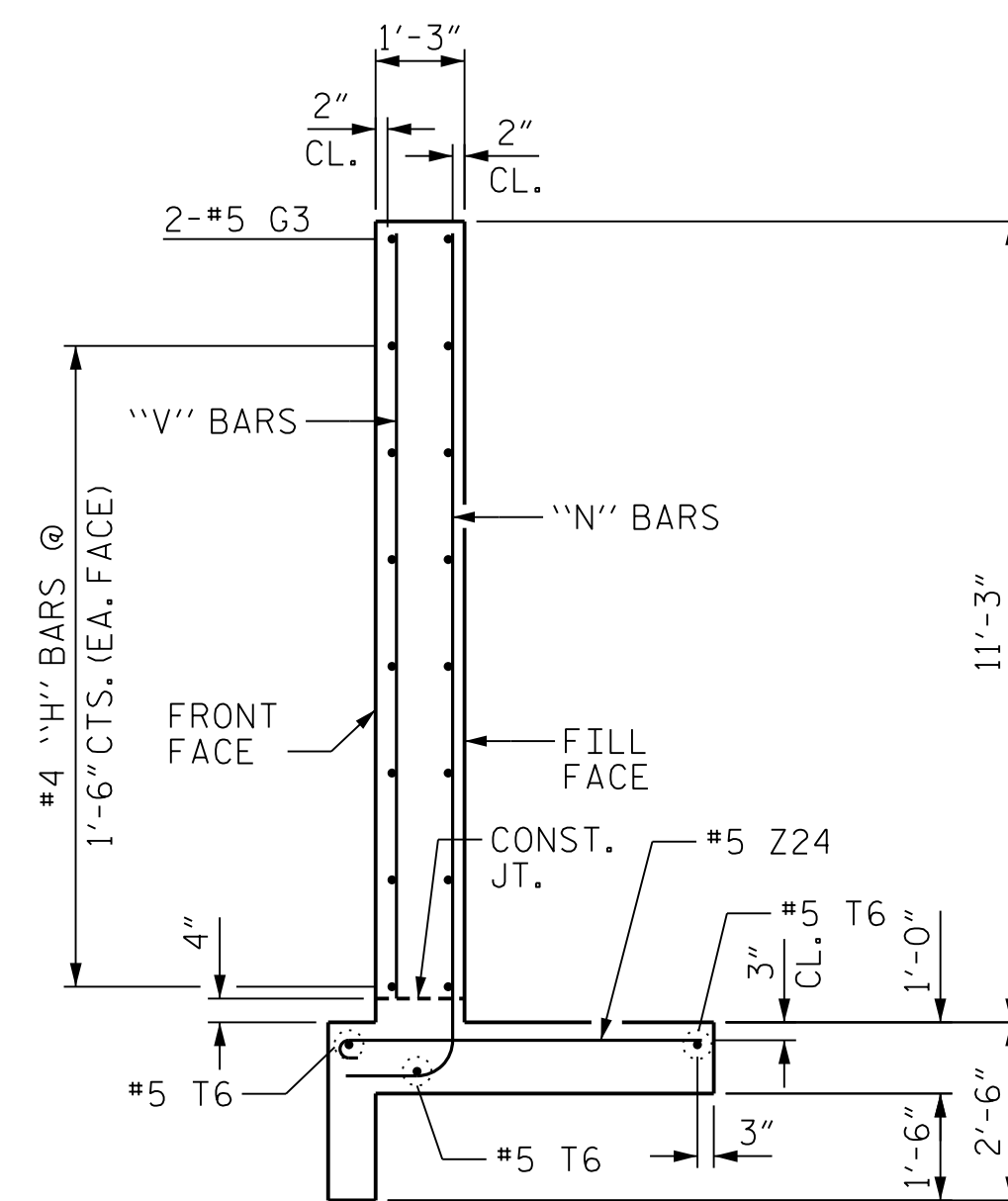
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

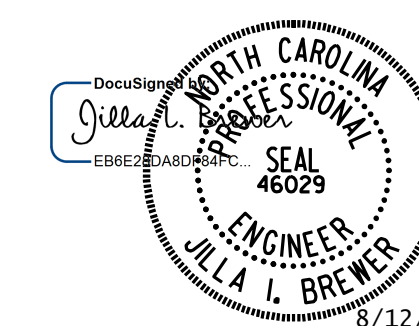
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
E5	4	#5	STR	8'-0"	33
E6	4	#5	STR	6'-2"	26
E7	4	#5	STR	6'-6"	27
E8	4	#5	STR	4'-7"	19
G3	2	#5	STR	13'-6"	28
G4	2	#5	STR	21'-8"	45
H27	4	#4	STR	21'-8"	58
H28	6	#4	STR	9'-10"	39
H29	2	#4	STR	2'-1"	3
H30	6	#4	STR	2'-8"	11
H31	2	#4	STR	3'-10"	5
N28	4	#5	3	13'-2"	55
N29	4	#5	3	4'-6"	19
N30	9	#5	3	3'-5"	32
T6	3	#5	STR	18'-5"	58
V30	44	#5	STR	4'-10"	222
V31	4	#4	STR	10'-9"	29
V32	4	#4	STR	2'-1"	6
V33	9	#4	STR	1'-0"	6
V34	6	#4	STR	3'-5"	14
Z24	19	#5	4	5'-8"	112
REINFORCING STEEL					847 LBS
CLASS A CONCRETE					10.0 C.Y.

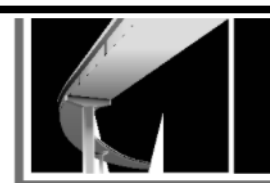


SECTION A-A PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-

SHEET 8 OF 10



DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED



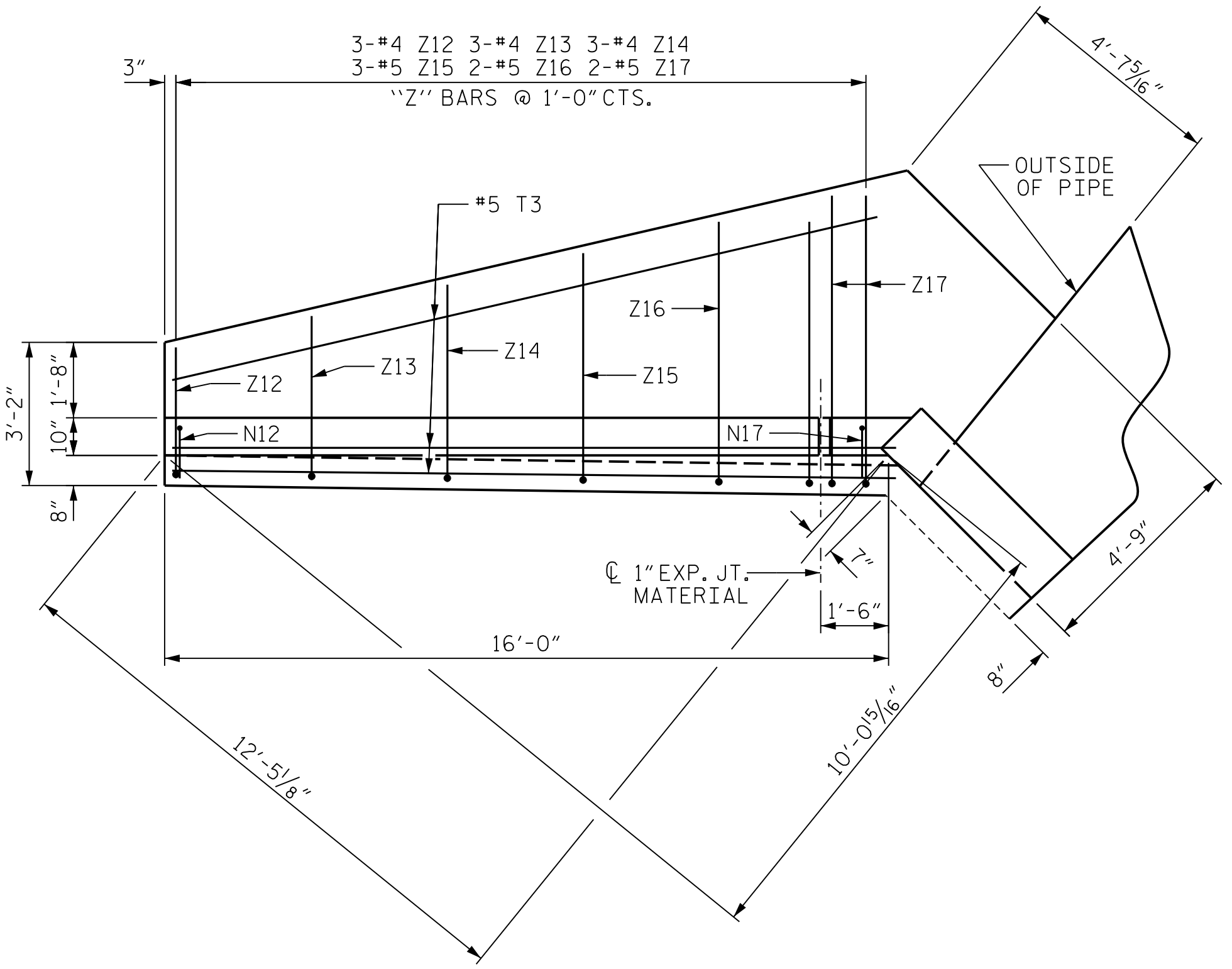
MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
60" Ø PIPE HEADWALL (RIGHT HEADWALL)					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

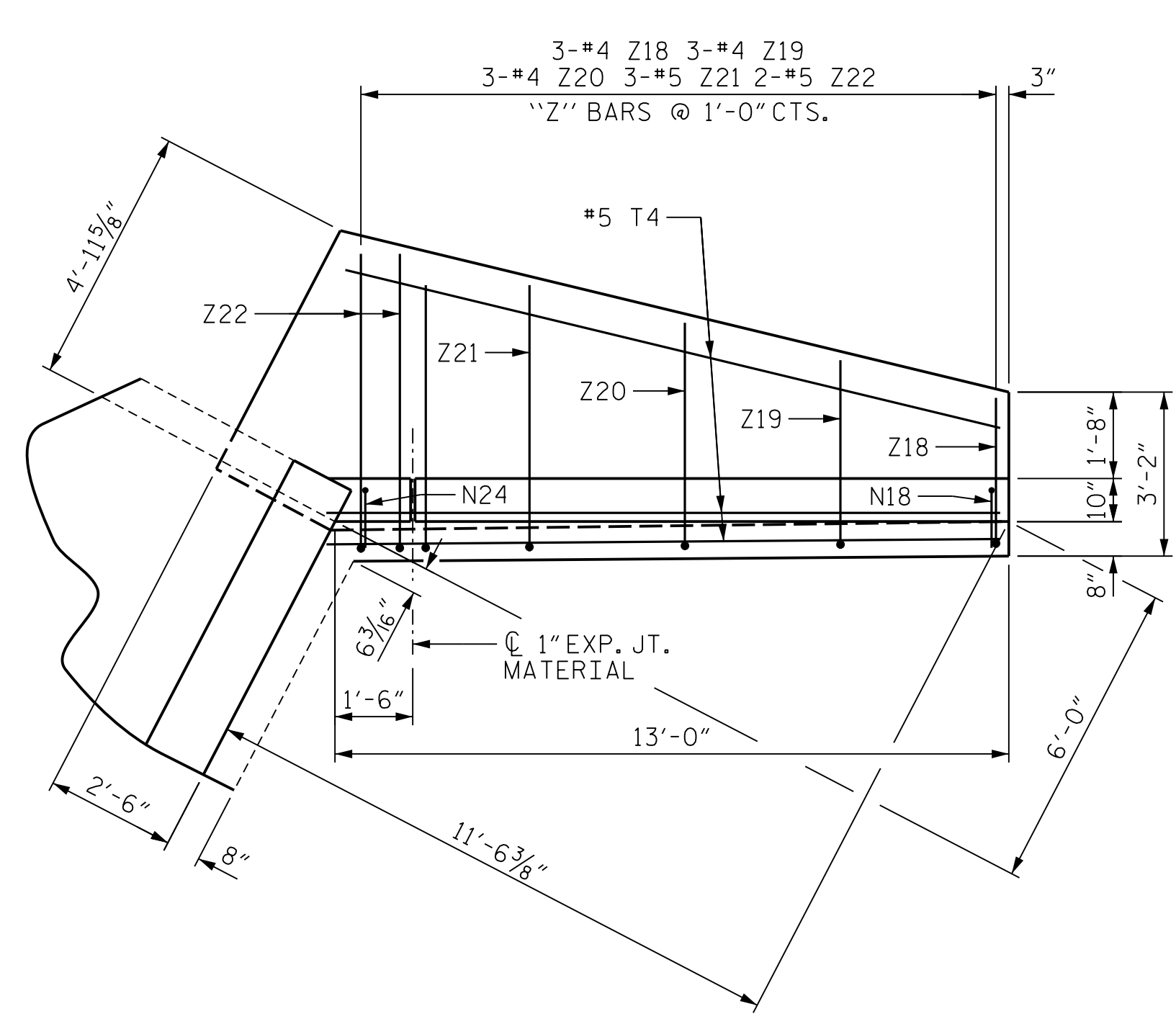
DRAWN BY : <u>J.I. BREWER</u>	DATE : <u>06/19</u>
CHECKED BY : <u>M. ISRAELNAIM</u>	DATE : <u>07/19</u>
DESIGN ENGINEER OF RECORD : <u>J.I. BREWER</u>	DATE : <u>07/19</u>

SHEET NO. <b>CI-8</b>
TOTAL SHEETS <b>10</b>

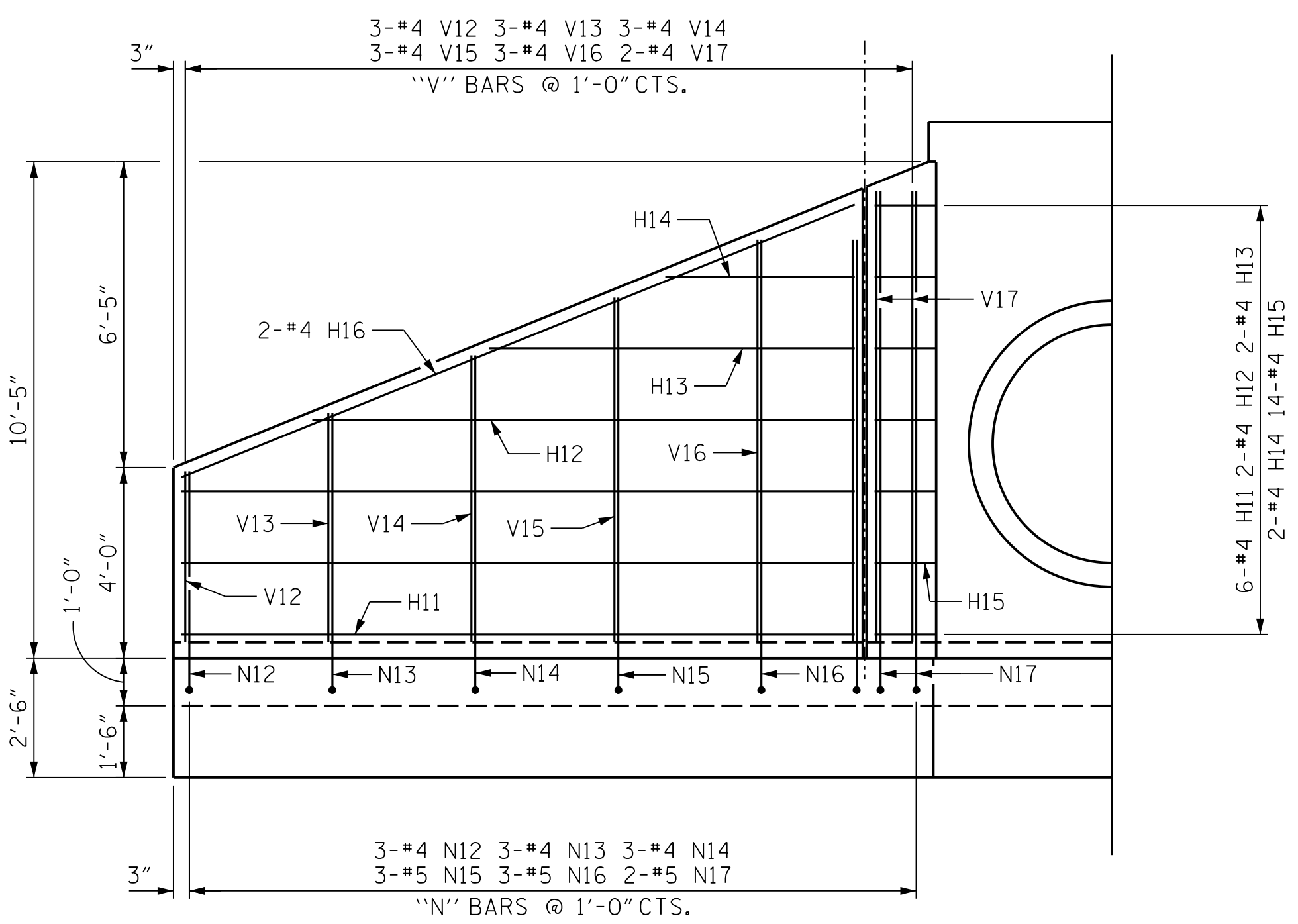
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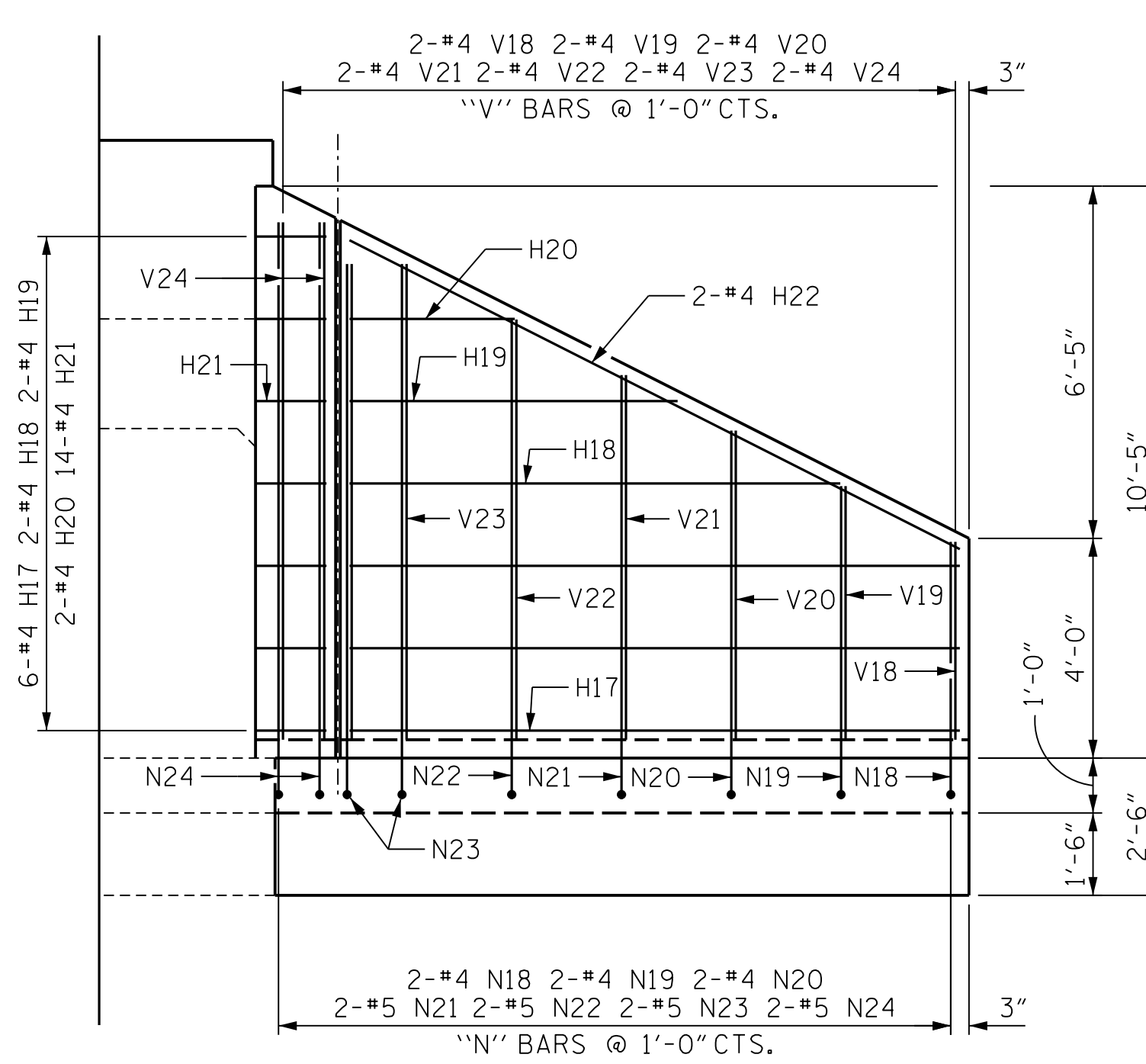
PLAN W3



PLAN W4

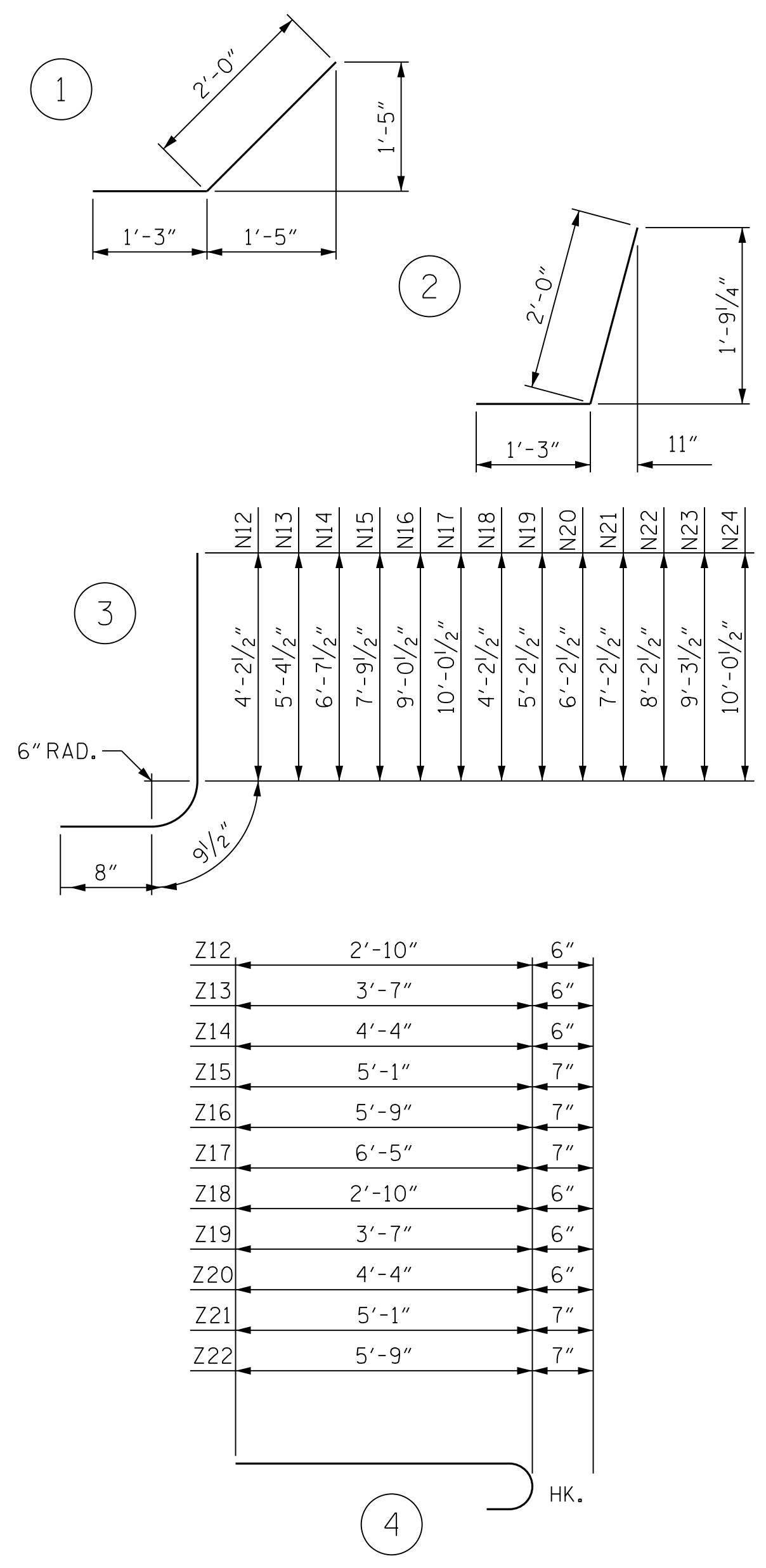


ELEVATION W3



ELEVATION W4

BAR TYPES				BILL OF MATERIAL					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H11	6	#4	STR	14'-1"	56				
H12	2	#4	STR	11'-4"	15				
H13	2	#4	STR	7'-8"	10				
H14	2	#4	STR	3'-11"	5				
H15	14	#4	1	3'-3"	30				
H16	2	#4	STR	15'-2"	20				
H17	6	#4	STR	11'-1"	44				
H18	2	#4	STR	8'-11"	12				
H19	2	#4	STR	5'-11"	8				
H20	2	#4	STR	3'-0"	4				
H21	14	#4	2	3'-3"	30				
H22	2	#4	STR	12'-5"	17				
N12	3	#4	3	5'-8"	11				
N13	3	#4	3	6'-10"	14				
N14	3	#4	3	8'-1"	16				
N15	3	#5	3	9'-3"	29				
N16	3	#5	3	10'-6"	33				
N17	2	#5	3	11'-6"	24				
N18	2	#4	3	5'-8"	8				
N19	2	#4	3	6'-8"	9				
N20	2	#4	3	7'-8"	10				
N21	2	#5	3	8'-8"	18				
N22	2	#5	3	9'-8"	20				
N23	2	#5	3	10'-9"	22				
N24	2	#5	3	11'-6"	24				
T3	3	#5	STR	16'-0"	50				
T4	3	#5	STR	13'-0"	41				
V12	3	#4	STR	3'-7"	7				
V13	3	#4	STR	4'-9"	10				
V14	3	#4	STR	6'-0"	12				
V15	3	#4	STR	7'-2"	14				
V16	3	#4	STR	8'-5"	17				
V17	2	#4	STR	9'-5"	13				
V18	2	#4	STR	3'-7"	5				
V19	2	#4	STR	4'-7"	6				
V20	2	#4	STR	5'-7"	7				
V21	2	#4	STR	6'-7"	9				
V22	2	#4	STR	7'-7"	10				
V23	2	#4	STR	8'-8"	12				
V24	2	#4	STR	9'-5"	13				
Z12	3	#4	4	3'-4"	17				
Z13	3	#4	4	4'-1"	8				
Z14	3	#4	4	4'-10"	10				
Z15	3	#5	4	5'-8"	18				
Z16	3	#5	4	6'-4"	20				
Z17	2	#5	4	7'-0"	15				
Z18	3	#4	4	3'-4"	7				
Z19	3	#4	4	4'-1"	8				
Z20	3	#4	4	4'-10"	10				
Z21	3	#5	4	5'-8"	18				
Z22	2	#5	4	6'-4"	13				
CLASS A CONCRETE				13.7	CY				
2 WINGS						REINFORCING STEEL 849 LBS			



ALL BAR DIMENSIONS ARE OUT TO OUT.

CLASS A CONCRETE  
2 WINGS

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-

SHEET 9 OF 10



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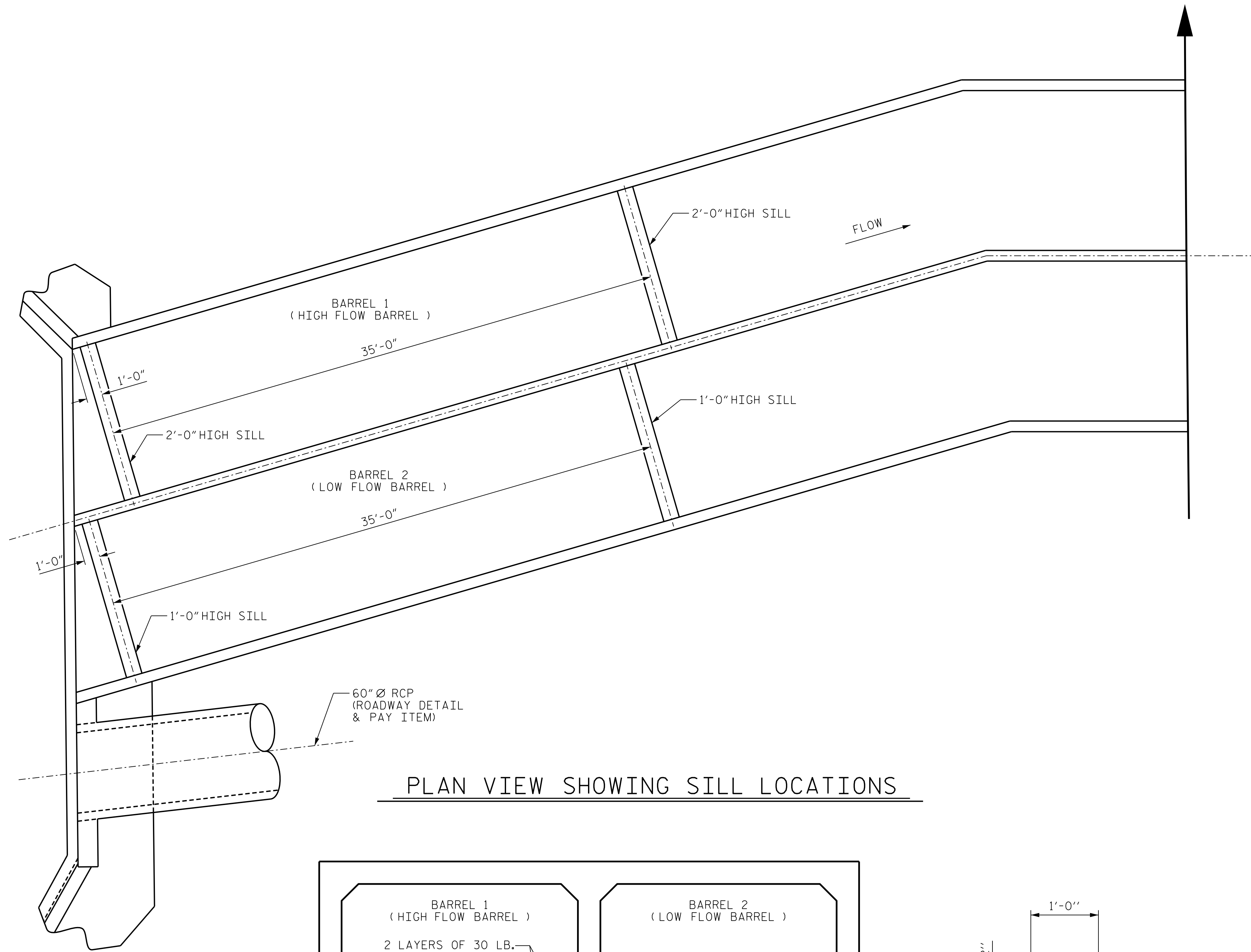
**MI ENGINEERING**  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 WINGS 3 AND 4 FOR  
 CONCRETE BOX CULVERT  
 H = 9'-0" SLOPE = 2:1  
 90° SKEW

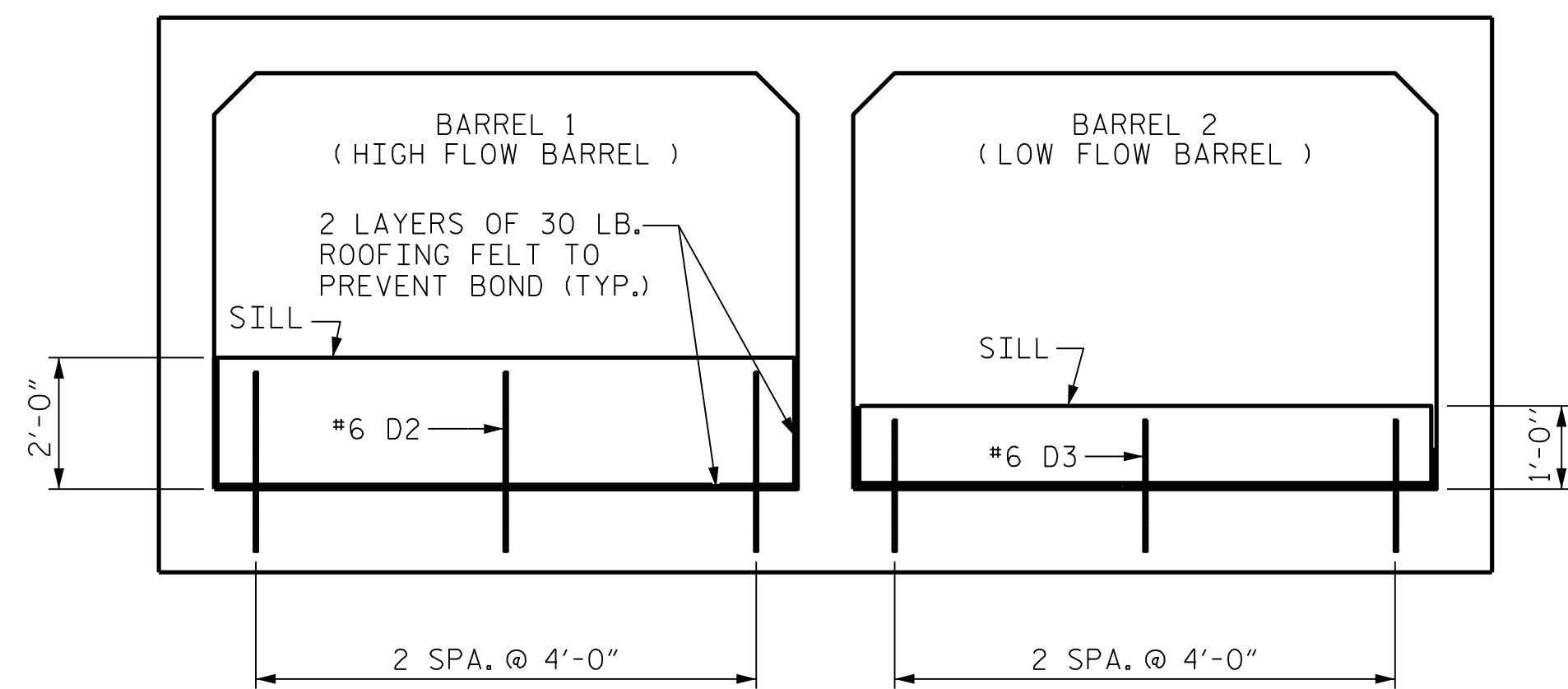
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-9
1			3			TOTAL SHEETS
2			4			10

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

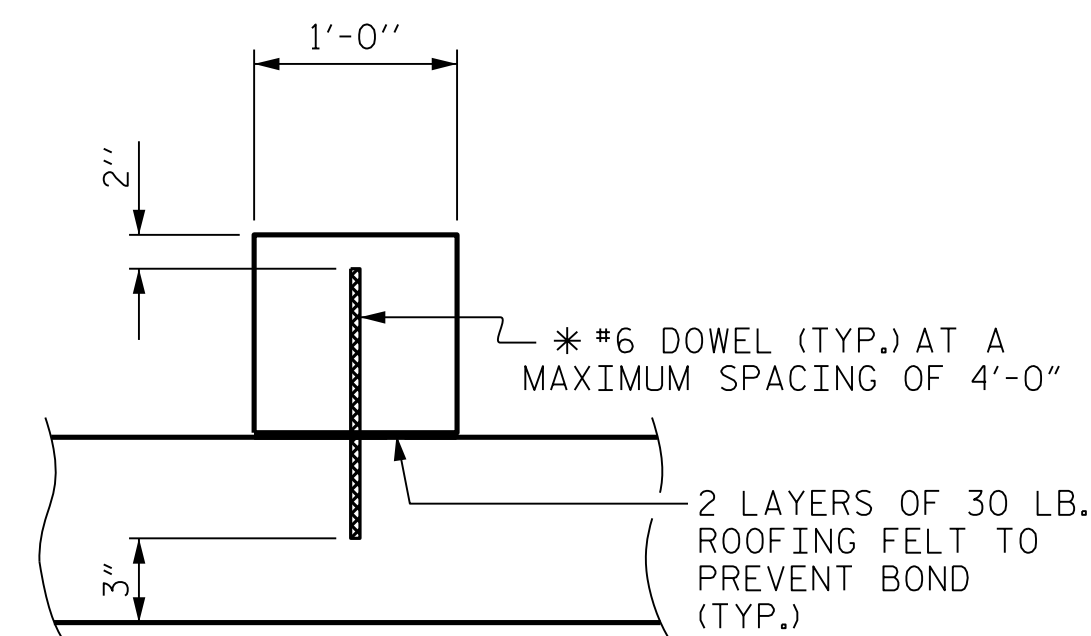
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PLAN VIEW SHOWING SILL LOCATIONS



ELEVATION



SECTION THROUGH SILL

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

CULVERT SILL DETAILS

NOTES

NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP-RAP MAY BE USED TO SUPPLEMENT THE NATIVE BED MATERIAL IN THE HIGH FLOW CULVERT BARREL. IF RIP-RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL, NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL THE 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.

SILLS ARE TO BE 1'-0" WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM.

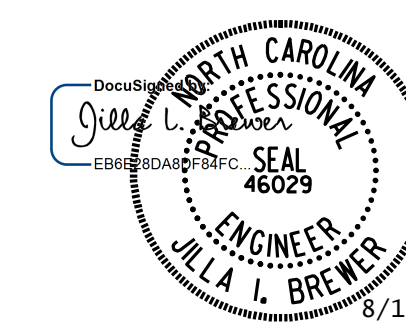
DO NOT SET ELEVATION OF HIGH SILLS ABOVE BANK FULL.

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

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

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 95+07.14 -L-

SHEET 10 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

DOUBLE 10 FT. X 7 FT.  
 CONCRETE BOX  
 CULVERT EXTENSION

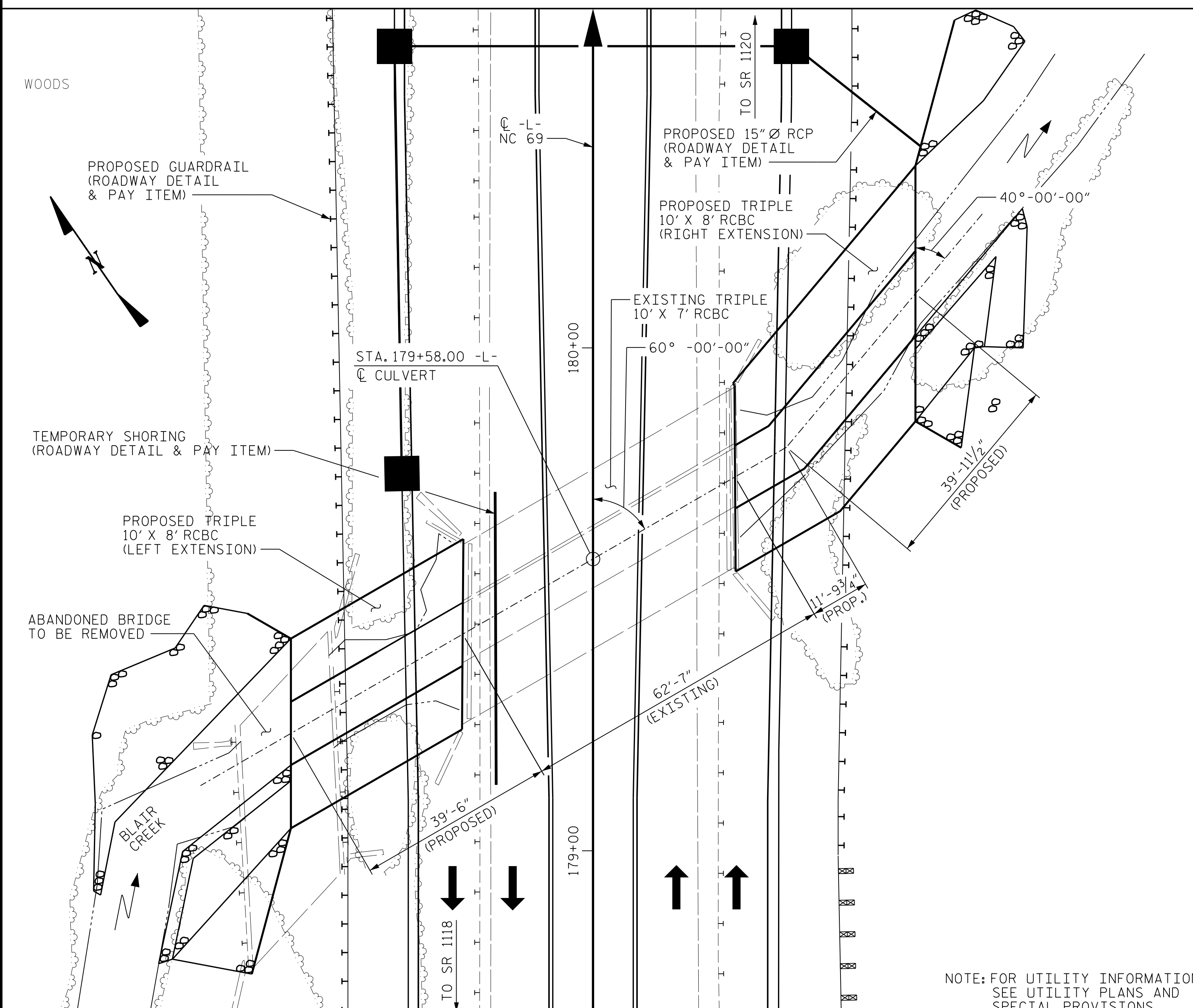
DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

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

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

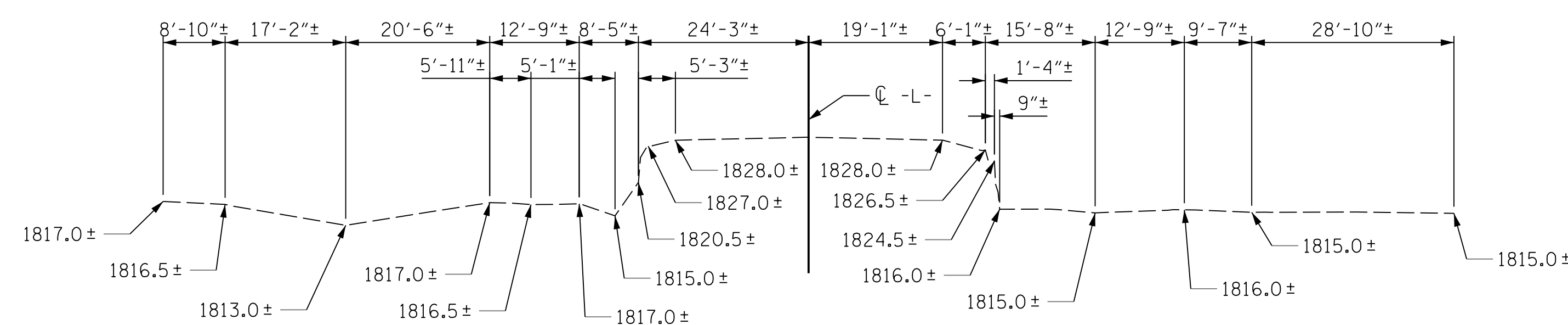
BM #16: NAIL IN BASE OF SIGN POST, 40.8' LT. OF STA. 183+84.63 -L-, EL. 1828.88



NOTE: FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS

**LOCATION SKETCH**

GRADE POINT ELEVATION @ 179+58.00 -L- = 1829.02  
 BED ELEVATION @ 179+58.00 -L- = 1815.93  
 ROADWAY SLOPES = 2:1



**PROFILE ALONG CULVERT**

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.  
 DESIGN FILL----- MAX 5.5 FT. MIN 3.9 FT.  
 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.  
 THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 3 AT 10' (W) X 7' (H) SIZE, 62'-7"± LONG AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE RETAINED.  
 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.  
 DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.  
 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.  
 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 SHALL BE PAID FOR BY THE CONTRACTOR.

**HYDROGRAPHIC DATA**

DESIGN DISCHARGE ..... = 1100 CFS  
 FREQUENCY OF DESIGN FLOOD ..... = 50 YRS.  
 DESIGN HIGH WATER ELEVATION ..... = 1823.4 FT.  
 DRAINAGE AREA ..... = 3.25 SQ. MI.  
 BASE DISCHARGE (0100) ..... = 1300 CFS  
 BASE HIGH WATER ELEVATION ..... = 1824.0 FT.

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE ..... = 2050 CFS  
 FREQUENCY OF OVERTOPPING FLOOD ..... = 500+ YRS.  
 OVERTOPPING FLOOD ELEVATION ..... = 1829.3 FT.

**-L- PROFILE DATA**

PVI STA. 180+60.00 -L-  
 PVI EL. = 1828.70  
 VC = 100.00  
 g1 = -0.3091%  
 g2 = +0.3091%

**TOTAL STRUCTURE QUANTITIES**

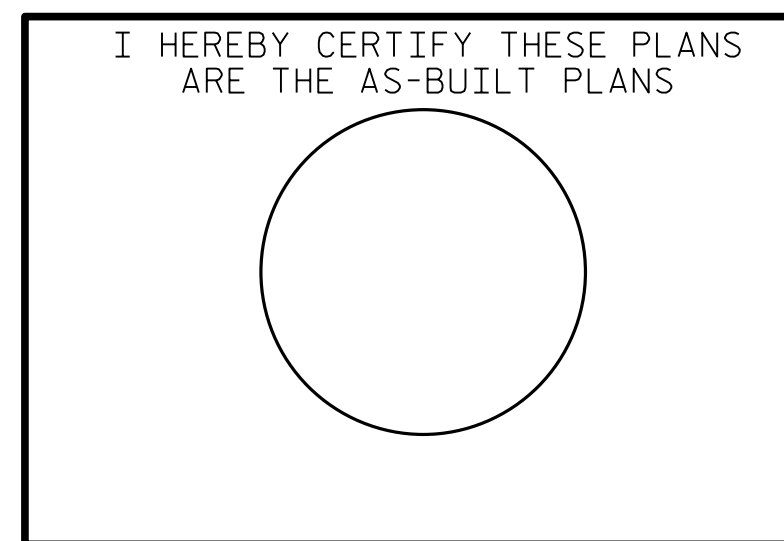
<b>CLASS A CONCRETE</b>	
BARREL @ 3.22 CY/FT	294.1 C.Y.
WING ETC.	60.5 C.Y.
<b>TOTAL</b>	<b>354.6 C.Y.</b>
<b>REINFORCING STEEL</b>	
BARREL	26,195 LBS.
WINGS ETC.	3,710 LBS.
<b>TOTAL</b>	<b>29,905 LBS.</b>

CULVERT EXCAVATION -----	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	236 TONS
REMOVAL OF EXISTING STRUCTURE ---	LUMP SUM
ASBESTOS ASSESSMENT -----	LUMP SUM

**NOTES**

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS, FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.  
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.  
 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.  
 THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.  
 EXCAVATE FOUNDATION A MINIMUM OF 1.0 FT BELOW CULVERT BEARING ELEVATION. PLACE 1.0 FT OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.  
 OVEREXCAVATE LOOSE/SOFT MATERIAL IF PRESENT TO SUITABLE BEARING MATERIALS AND REPLACE WITH ADDITIONAL CLASS VI FOUNDATION CONDITIONING MATERIAL.  
 THE 15"Ø PIPE THROUGH THE WINGWALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECESSARY TO CLEAR PIPE.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.  
 FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

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



PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-

SHEET 1 OF 12 CULVERT NO. 210008

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**TRIPLE 10 FT. X 8 FT. CONCRETE BOX CULVERT EXTENSION**

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

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-1
1			3			TOTAL SHEETS 12
2			4			

8/21/2019 2:07:24 PM User: jlsrce@ncdm File: N:\NC\_Bridges\MI5007-MA\_Eng-A-0011C-NC\_69\_Culverts\Site 2\_Culvert\_Ext\_3\_Barr-rel-Bigir\_Creek\_of\_NC\_69\Structures\411.001.A0011C-SMU-CUL-210008.dgn

DRAWN BY : W.O. KEITH DATE : 05/19  
 CHECKED BY : J.I. BREWER DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

**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>L</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	1.27	--	1.75	1.27	3	BOTTOM SLAB	1.00	1.45	2	TOP SLAB	1.00		
	HL-93 (OPERATING)	N/A		1.65	--	1.35	1.65	3	BOTTOM SLAB	1.00	1.88	2	TOP SLAB	1.00		
	HS-20 (INVENTORY)	36,000	②	1.27	45.72	1.75	1.27	3	BOTTOM SLAB	1.00	1.45	2	TOP SLAB	1.00		
	HS-20 (OPERATING)	36,000		1.65	59.40	1.35	1.65	3	BOTTOM SLAB	1.00	1.88	2	TOP SLAB	1.00		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13,500		2.60	35.10	1.40	2.60	1	INT. WALL	7.00	2.70	2	TOP SLAB	1.00	1
		SNGARBS2	20,000		2.44	48.80	1.40	2.44	1	INT. WALL	7.00	2.51	2	TOP SLAB	1.00	1
		SNAGRIS2	22,000		2.45	53.90	1.40	2.45	3	BOTTOM SLAB	1.00	2.51	2	TOP SLAB	1.00	
		SNCOTTS3	27,250		1.35	36.79	1.40	1.35	1	INT. WALL	7.00	1.56	2	TOP SLAB	1.00	1
		SNAGGRS4	34,925		1.54	53.78	1.40	1.54	3	BOTTOM SLAB	1.00	1.56	2	TOP SLAB	1.00	
		SNS5A	35,550		1.52	54.04	1.40	1.52	1	INT. WALL	7.00	1.56	2	TOP SLAB	1.00	1
		SNS6A	39,950		1.45	57.93	1.40	1.45	3	BOTTOM SLAB	1.00	1.56	2	TOP SLAB	1.00	
	SNS7B	42,000		1.56	65.52	1.40	1.67	3	BOTTOM SLAB	1.00	1.56	2	TOP SLAB	1.00		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		1.72	56.76	1.40	1.72	3	BOTTOM SLAB	1.00	2.37	2	BOTTOM SLAB	1.00	
		TNT4A	33,075		1.67	55.24	1.40	1.67	3	BOTTOM SLAB	1.00	1.81	2	TOP SLAB	1.00	
		TNT6A	41,600		1.44	59.90	1.40	1.44	3	BOTTOM SLAB	1.00	1.75	2	TOP SLAB	1.00	
		TNT7A	42,000		1.44	60.48	1.40	1.44	3	BOTTOM SLAB	1.00	1.77	2	TOP SLAB	1.00	
		TNT7B	42,000		1.43	60.06	1.40	1.43	2	BOTTOM SLAB	1.00	1.71	2	TOP SLAB	1.00	
		TNAGRIT4	43,000		1.36	58.48	1.40	1.36	3	BOTTOM SLAB	1.00	1.71	2	TOP SLAB	1.00	
		TNAGT5A	45,000		1.28	57.60	1.40	1.28	3	BOTTOM SLAB	1.00	1.71	2	TOP SLAB	1.00	
TNAGT5B		45,000		③	1.27	57.15	1.40	1.27	3	BOTTOM SLAB	1.00	1.71	2	TOP SLAB	1.00	

**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	--

**NOTE:**

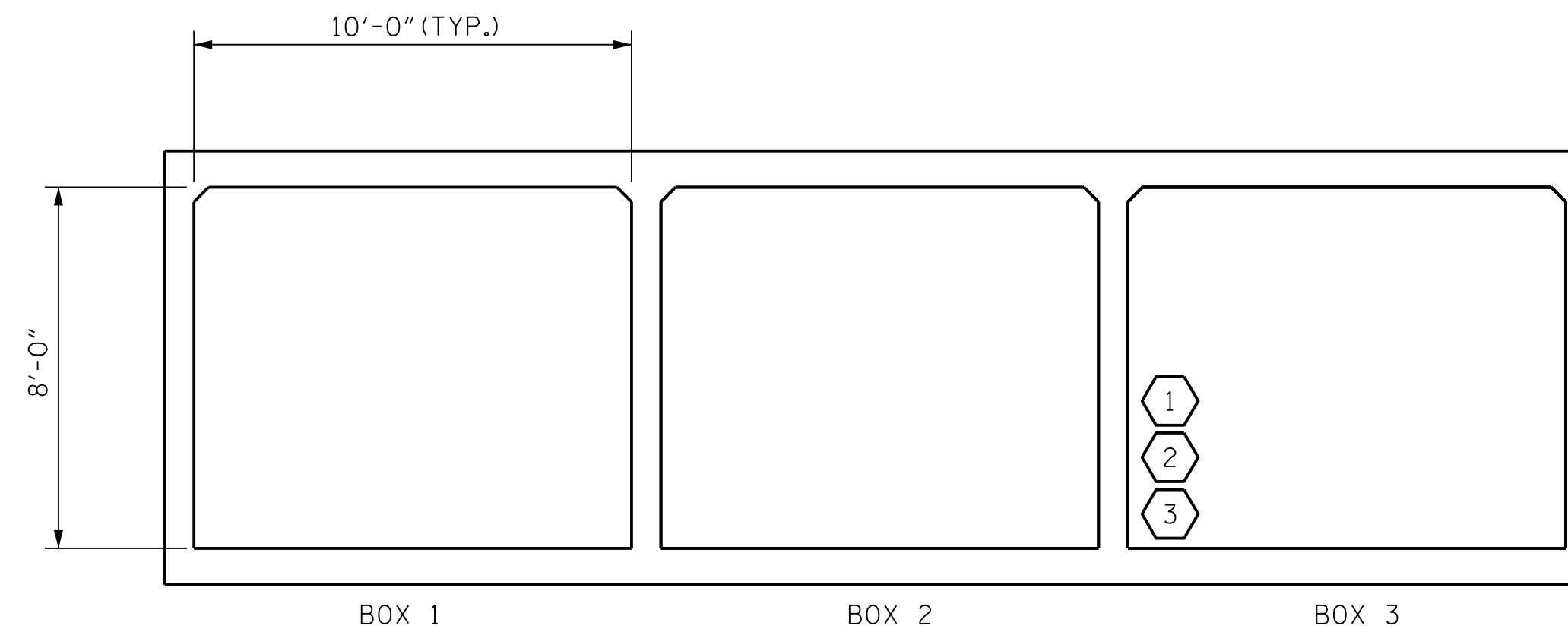
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

THE LIVE LOAD RATING FOR VEHICLES ON -L- WERE COMPUTED WITH A DESIGN FILL DEPTH OF MAX 5.5 FT. AND MIN 3.9 FT.

**COMMENTS:**

1. VERTICAL ELEMENTS ARE REFERENCED STARTING AT THE BOTTOM.

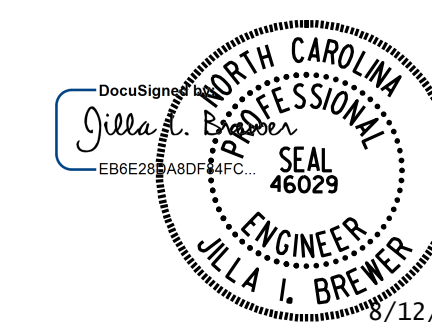
#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
**	SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. A-0011C  
CLAY COUNTY  
STATION: 179+58.00 -L-

SHEET 2 OF 12



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

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

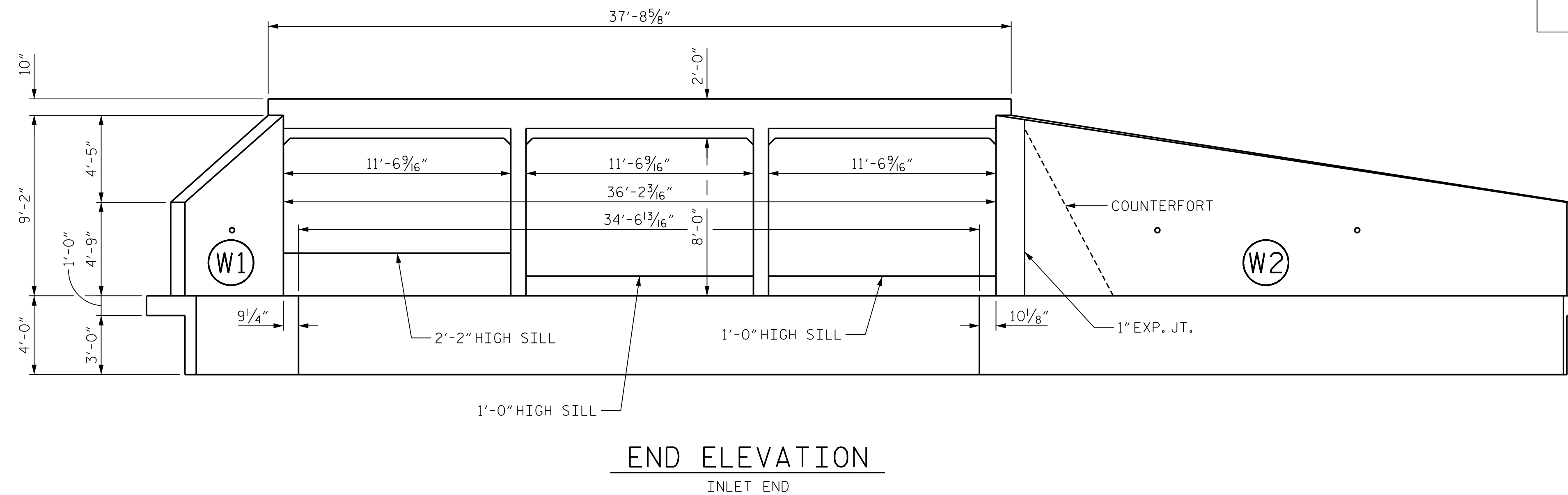
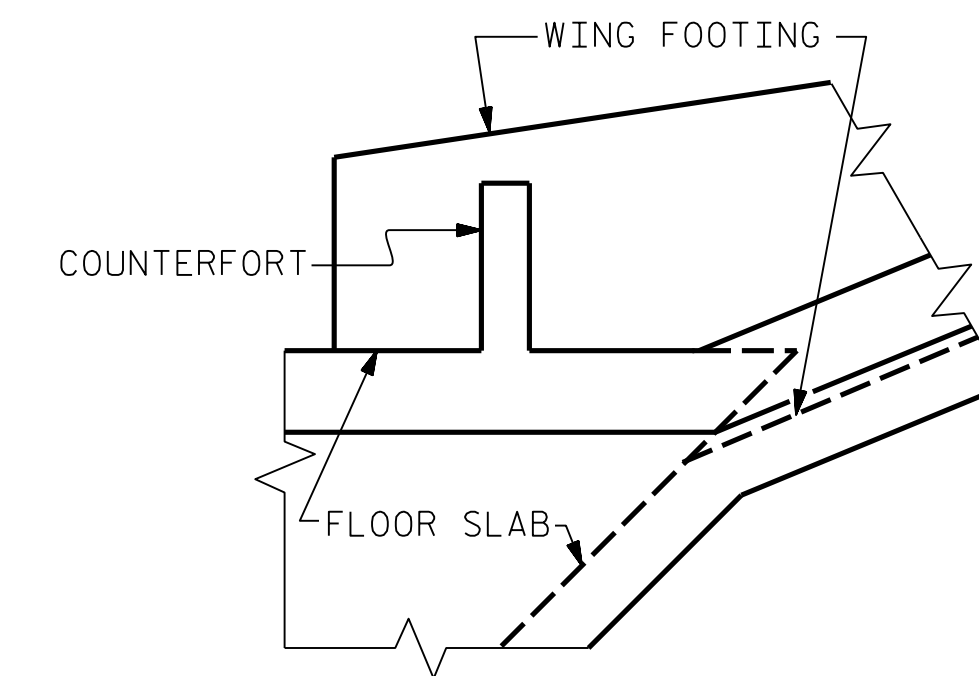
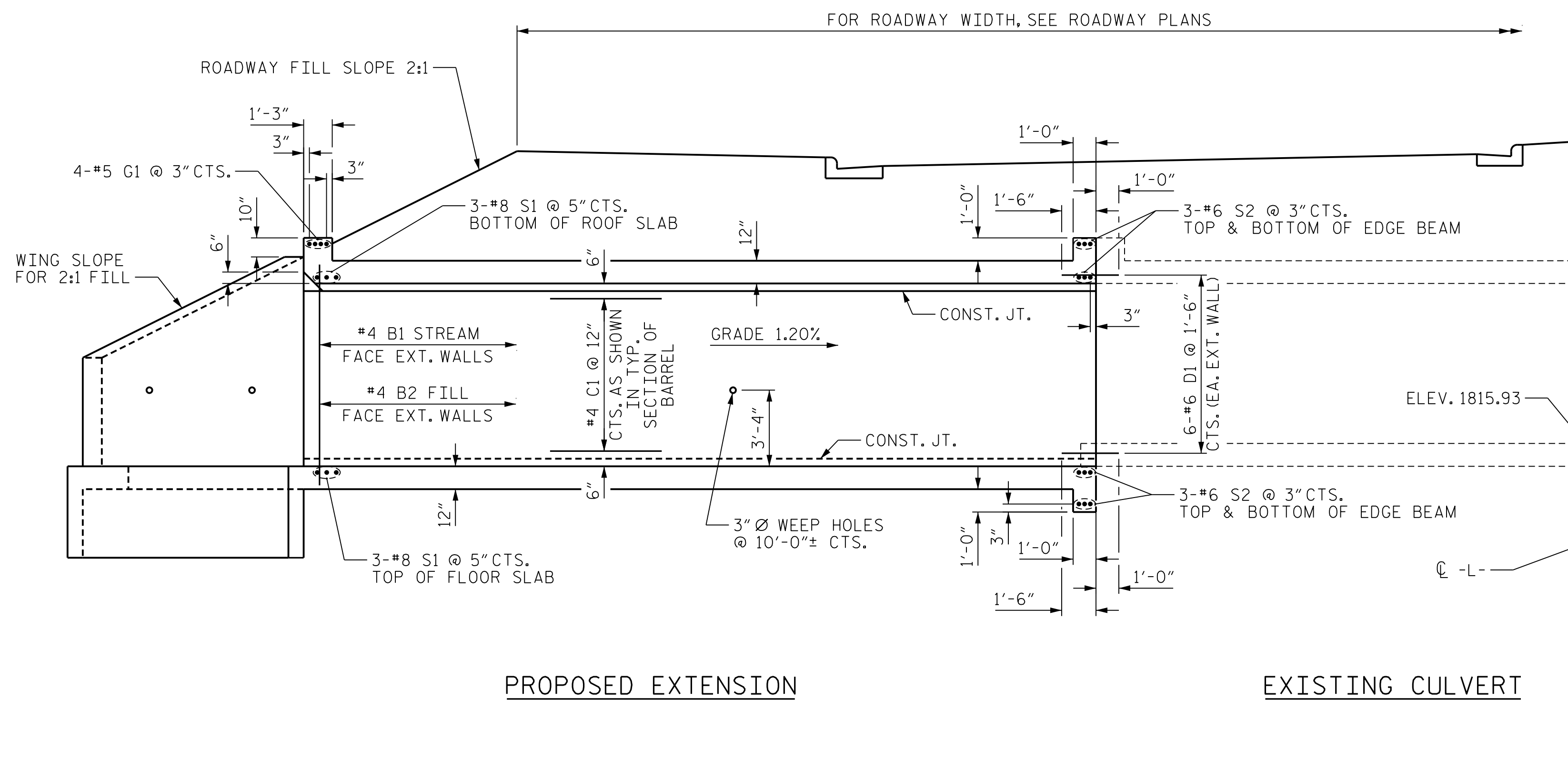
**MI ENGINEERING**  
1011 SCHAUB DRIVE, SUITE 100  
RALEIGH, NC 27606  
(919) 851-6606  
FIRM PE NUMBER : P-0671

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			12

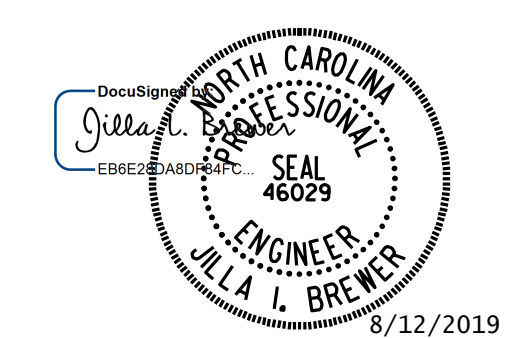
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CHECKED BY: M. ISRAELNAIM	DATE: 07/19
DESIGN ENGINEER OF RECORD: J.I. BREWER	DATE: 07/19
DRAWN BY: WMC 7/11	REV. 10/17 MMA/GM
CHECKED BY: GM 7/11	REV. 12/17 MMA/THC

8/12/2019 12:31:38 PM User: jlsraeinaim File: N:\NC Bridges\MI5007-MA Eng-A-0011C-NC 69 Culverts\Site 2\Culvert Ext-3 Barrel\Bigir Creek at NC 69\Structures\411.003.A0011C.SMU.C2-2.10008.dgn

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PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-  
 SHEET 3 OF 12



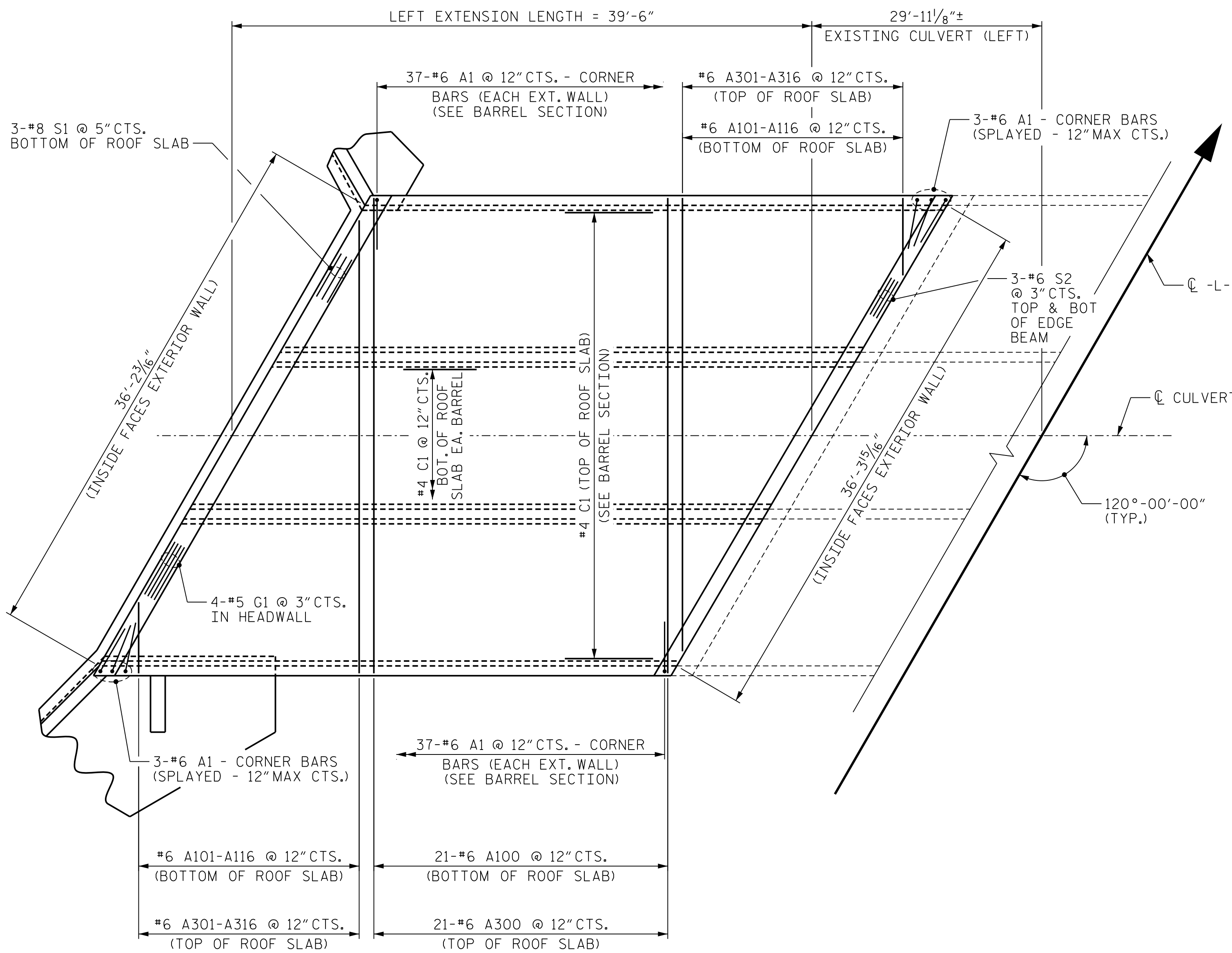
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 10 FT. X 8 FT.  
 CONCRETE BOX CULVERT  
 LEFT EXTENSION**

**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**  
 MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-3
1			3			TOTAL SHEETS
2			4			12

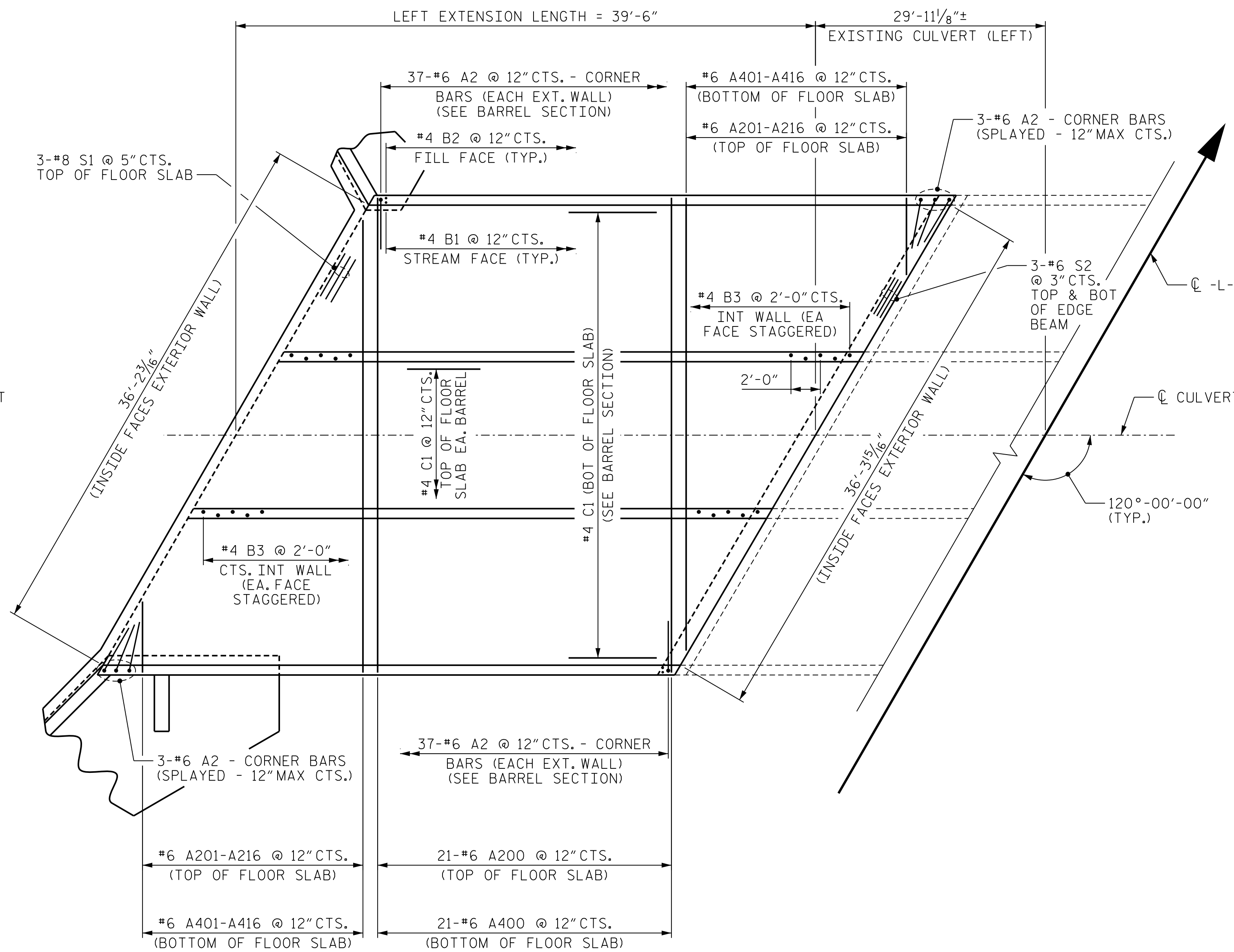
DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

8/12/2019 12:32:55 PM User: jlsraelnaim  
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**PLAN - ROOF SLAB**

DOWEL #6 D1 BARS @ 1'-6" CTS INTO EXISTING CULVERT BELOW EDGE BEAM (SEE SHEET 3 OF 12)

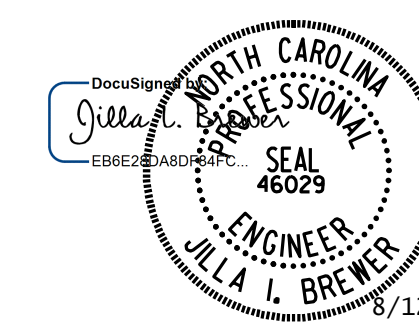


**PLAN - FLOOR SLAB**

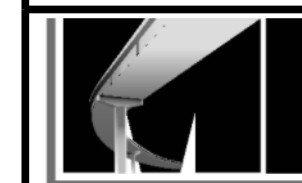
DOWEL #6 D1 BARS @ 1'-6" CTS INTO EXISTING CULVERT ABOVE EDGE BEAM (SEE SHEET 3 OF 12)  
 SILLS NOT SHOWN, SEE SHEET 12 OF 12 FOR LOCATIONS

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-

SHEET 4 OF 12



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MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

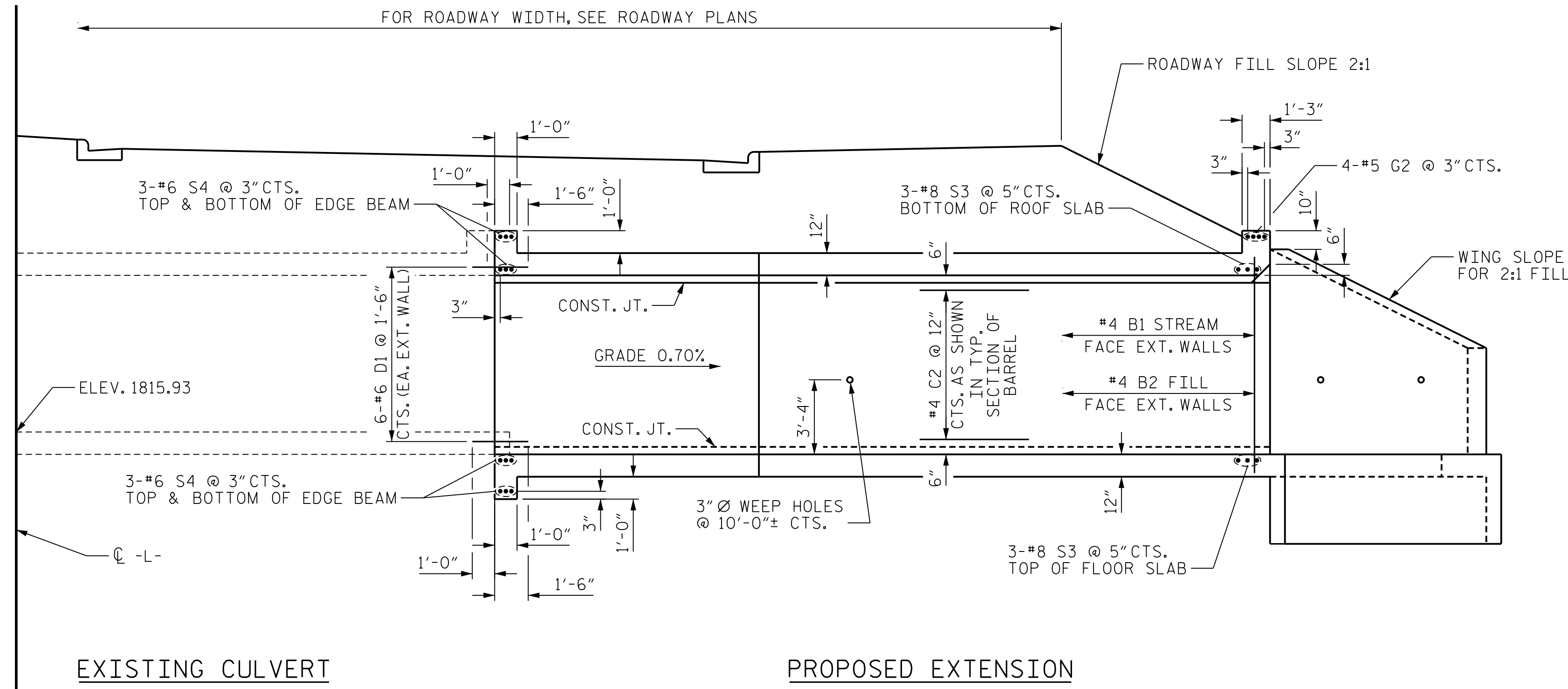
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 10 FT. X 8 FT.  
 CONCRETE BOX CULVERT  
 LEFT EXTENSION**

DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

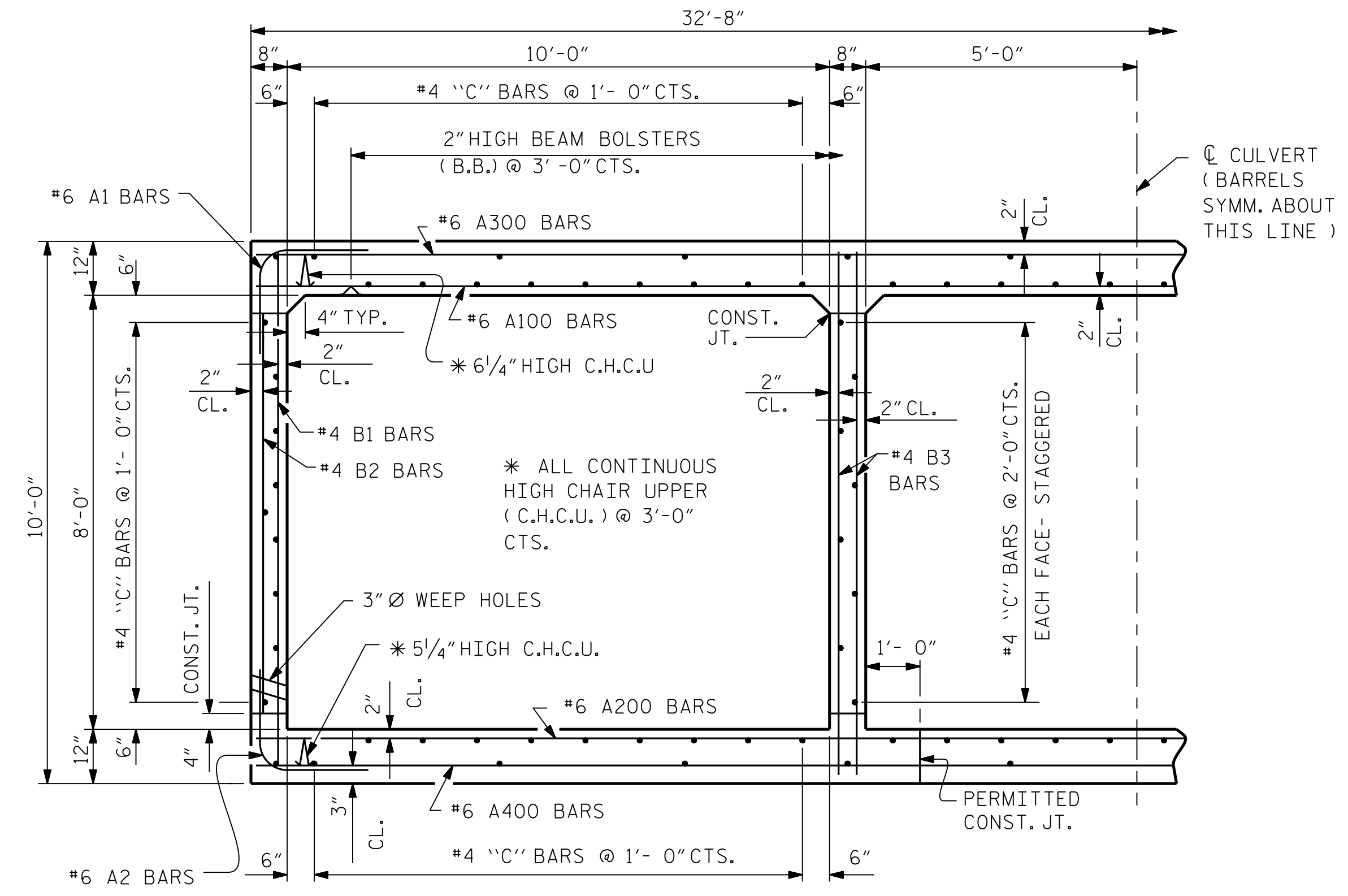
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1			3			TOTAL SHEETS
2			4			12



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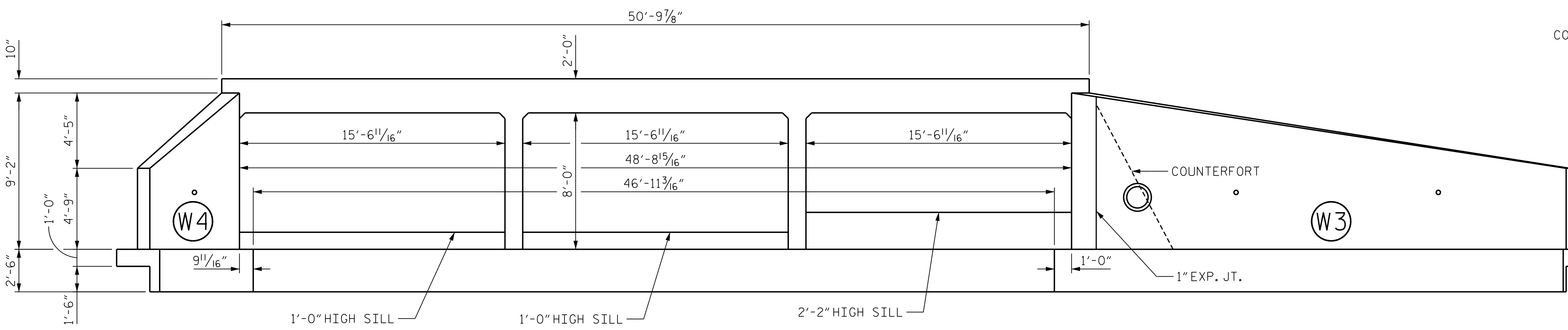


CULVERT SECTION NORMAL TO ROADWAY



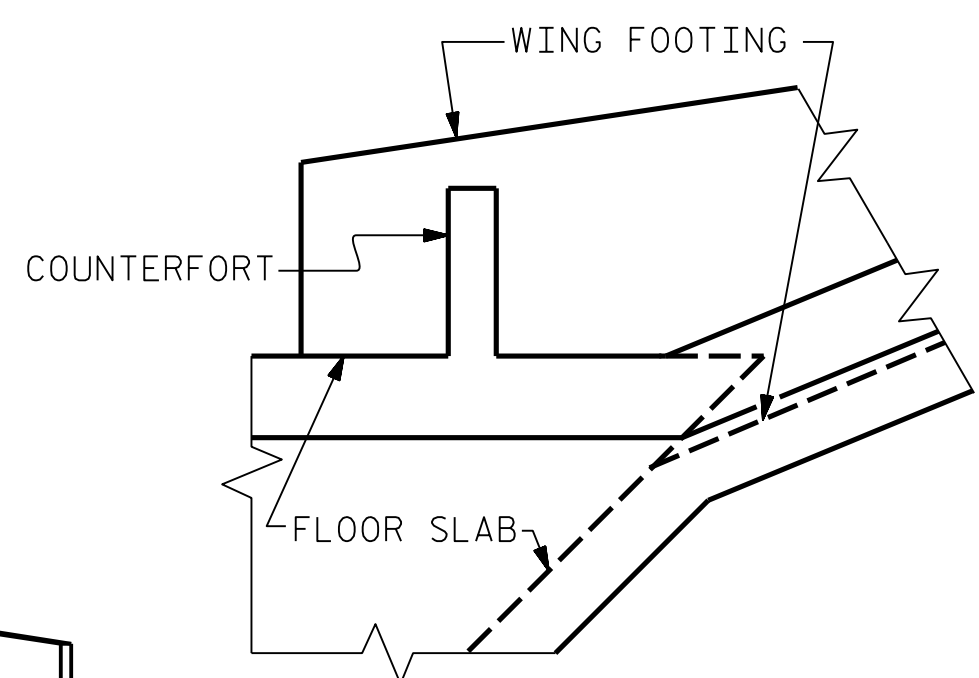
RIGHT ANGLE SECTION OF BARREL

THERE ARE 114 "C" BARS IN SECTION OF BARREL.



END ELEVATION

OUTLET END



PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-

SHEET 5 OF 12



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

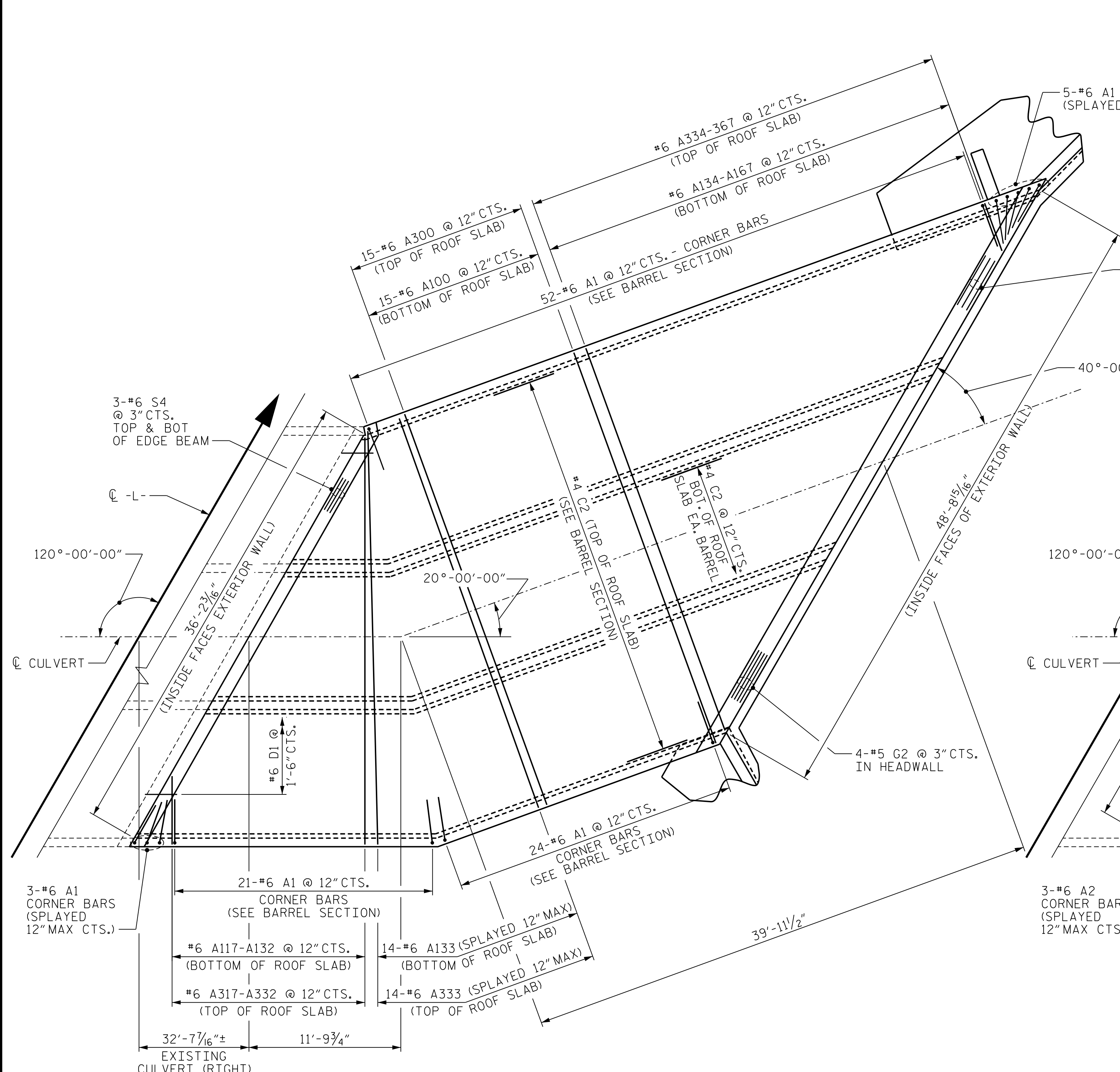
**MI ENGINEERING**  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 10 FT. X 8 FT.  
 CONCRETE BOX CULVERT  
 RIGHT EXTENSION**

DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

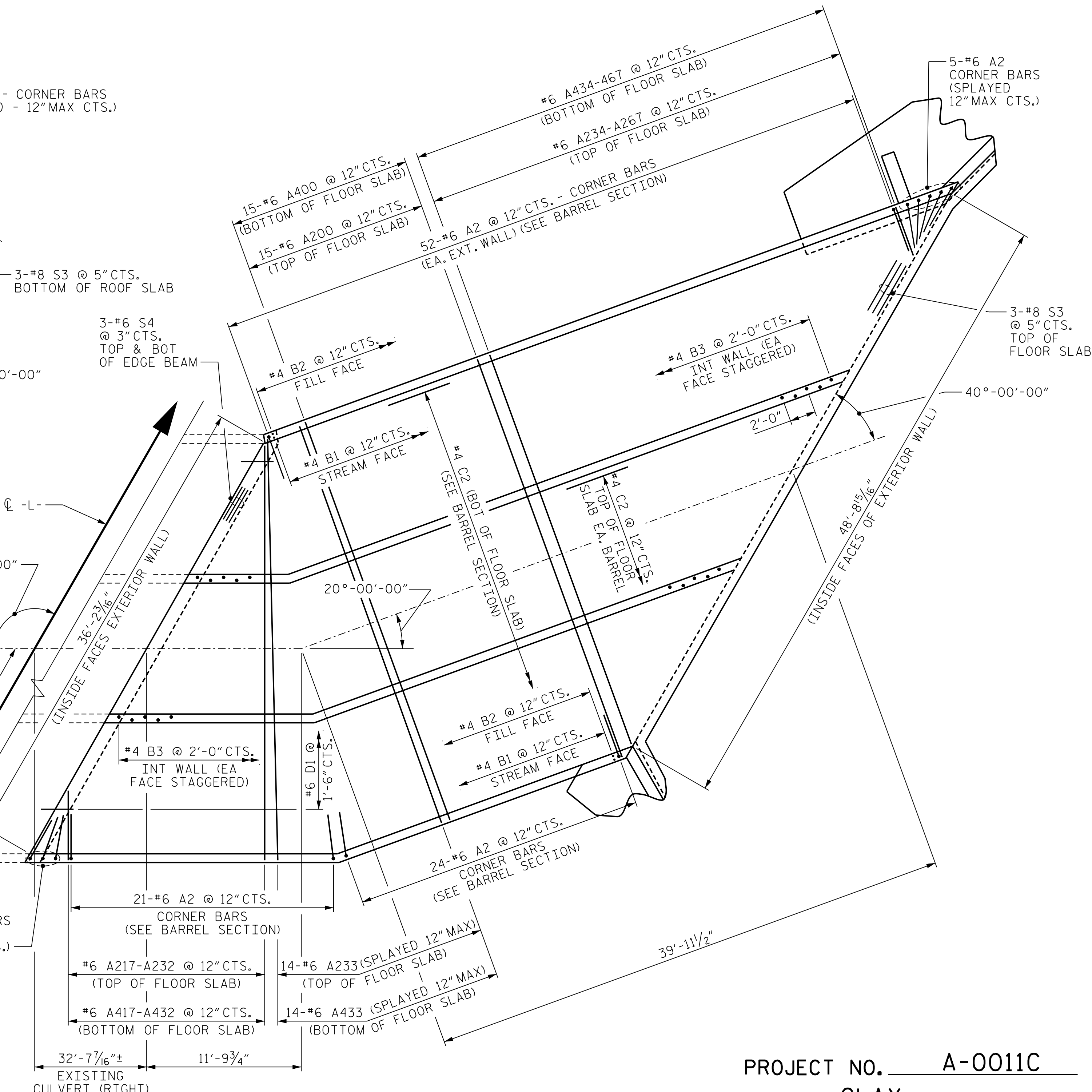
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NO.	BY:	DATE:	NO.	BY:	DATE:	C2-5
1			3			TOTAL SHEETS
2			4			12

8/12/2019 12:39:42 PM User: jlsrce@naim  
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**PLAN - ROOF SLAB**

DOWEL #6 D1 BARS @ 1'-6" CTS INTO EXISTING CULVERT BELOW EDGE BEAM (SEE SHEET 5 OF 12)  
 FIELD BEND C2 BARS AS NECESSARY

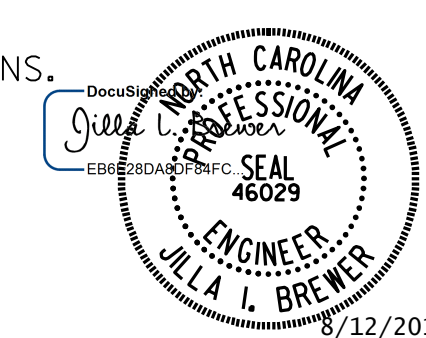


**PLAN - FLOOR SLAB**

DOWEL #6 D1 BARS @ 1'-6" CTS INTO EXISTING CULVERT BELOW EDGE BEAM (SEE SHEET 5 OF 12)  
 FIELD BEND C2 BARS AS NECESSARY  
 SILLS NOT SHOWN. SEE SHEET 12 OF 12 FOR LOCATIONS.

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-

SHEET 6 OF 12



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

**MI ENGINEERING**  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

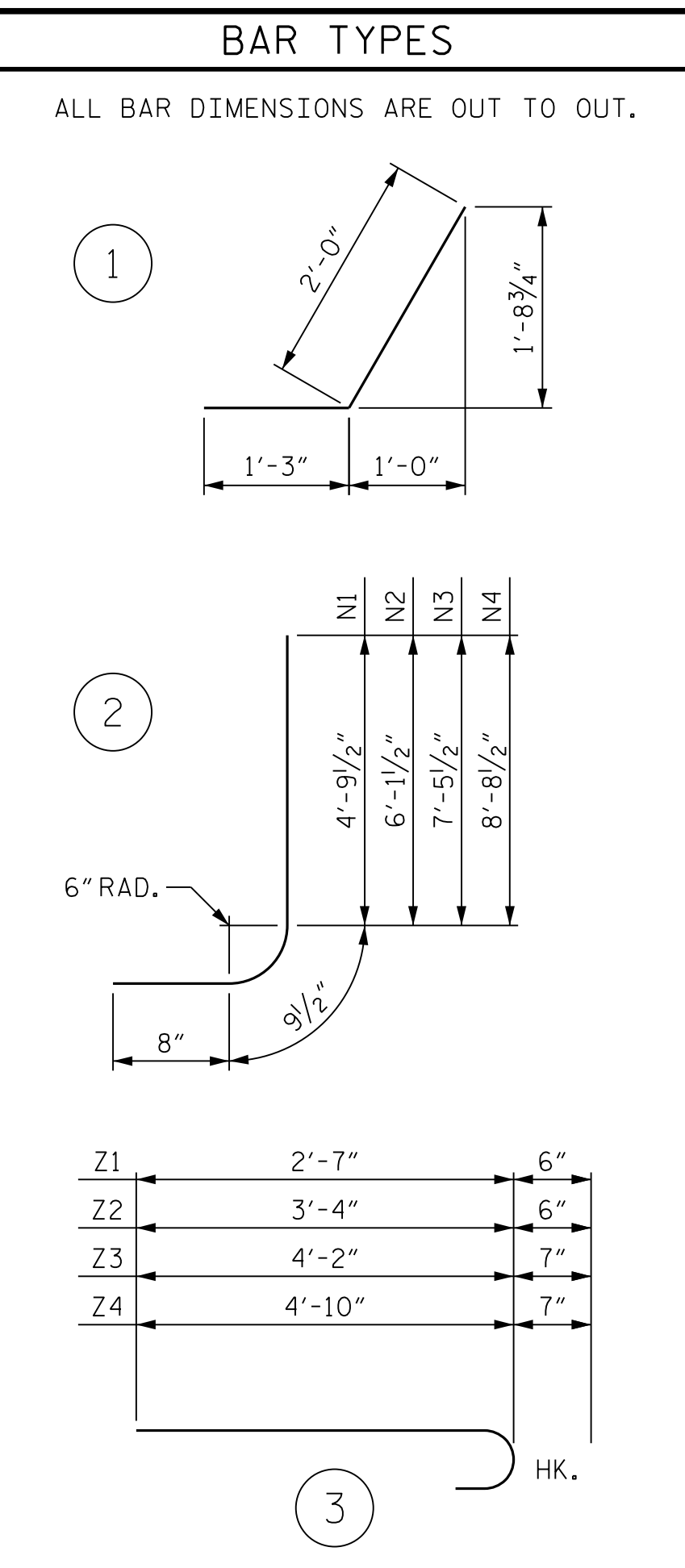
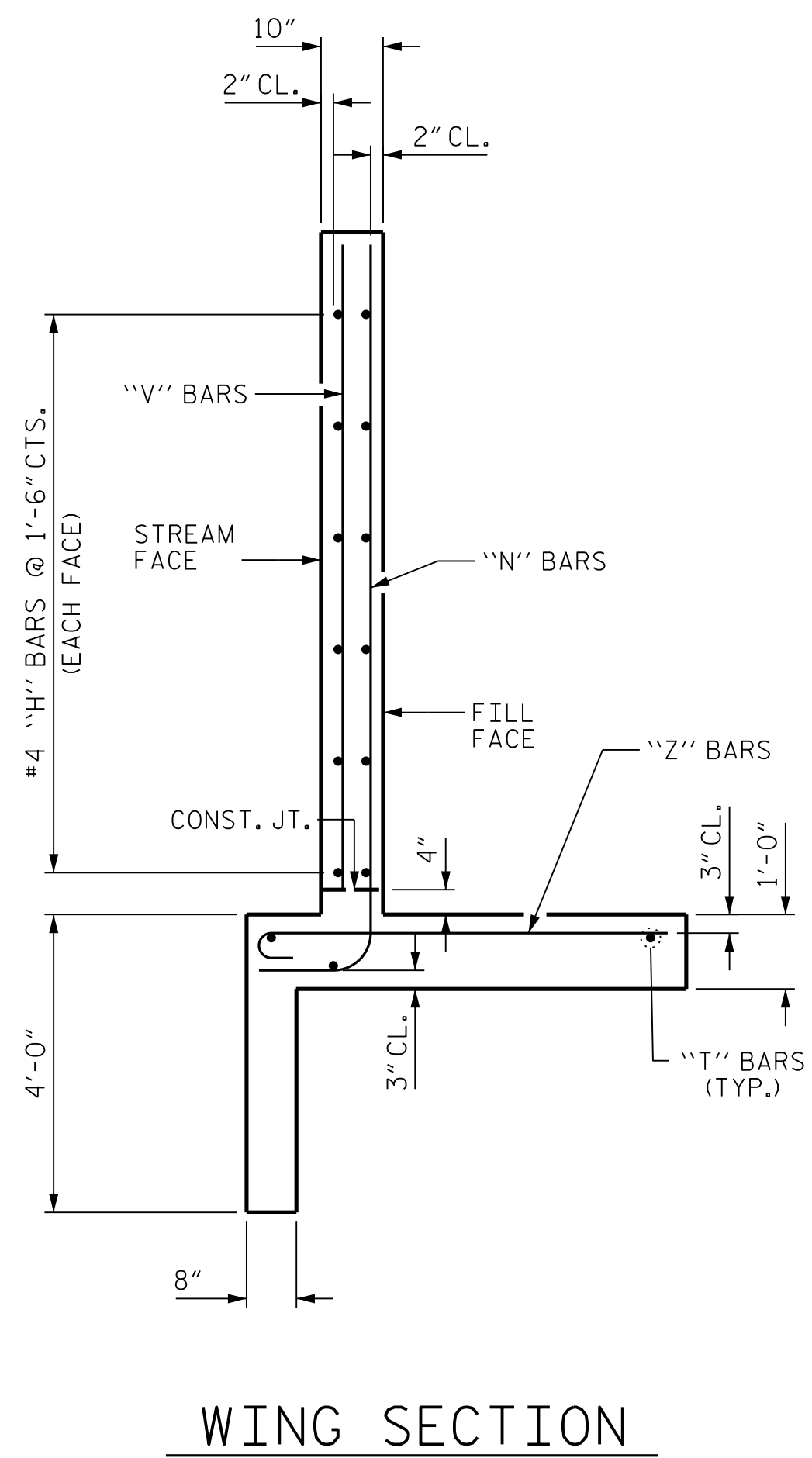
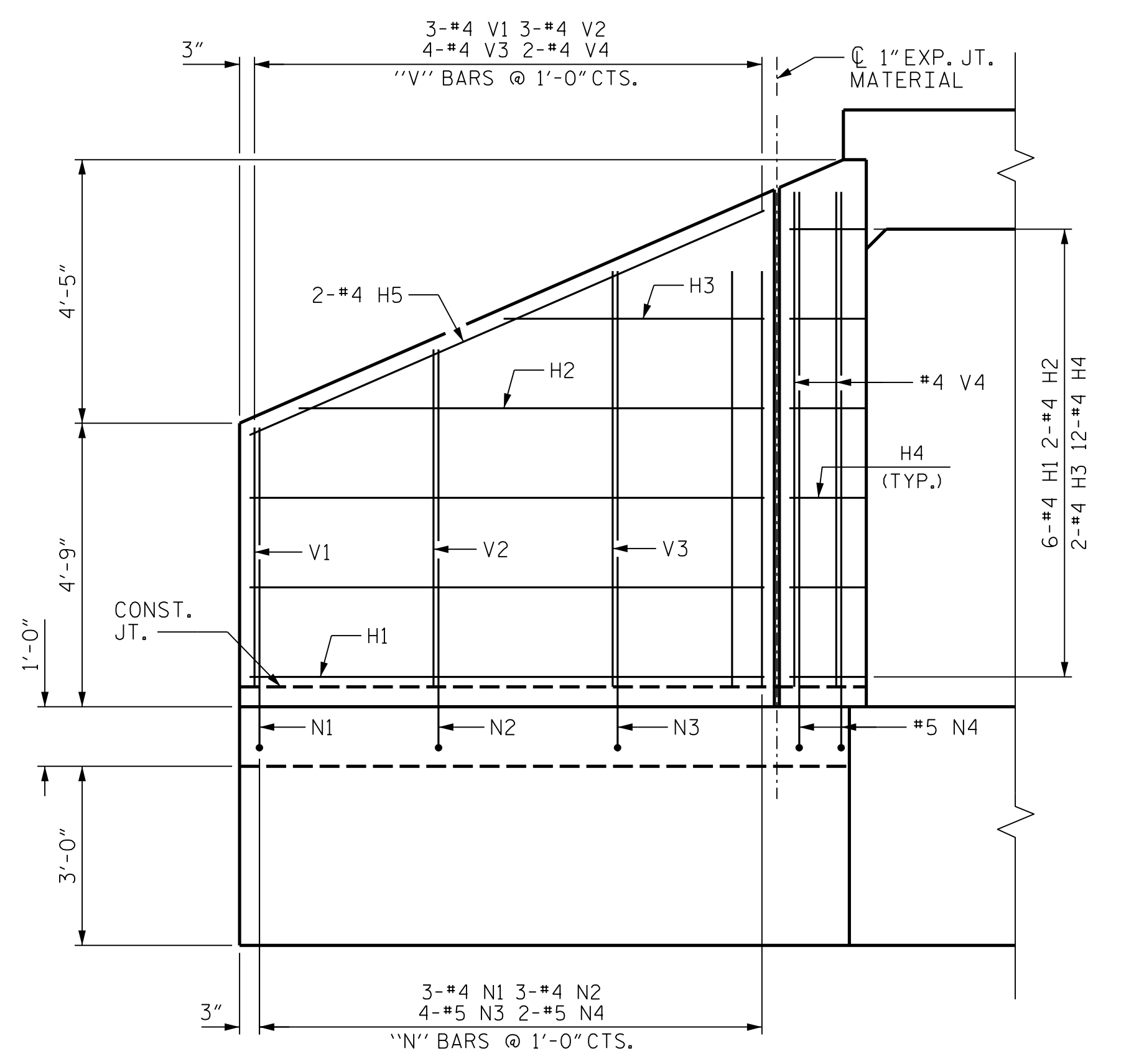
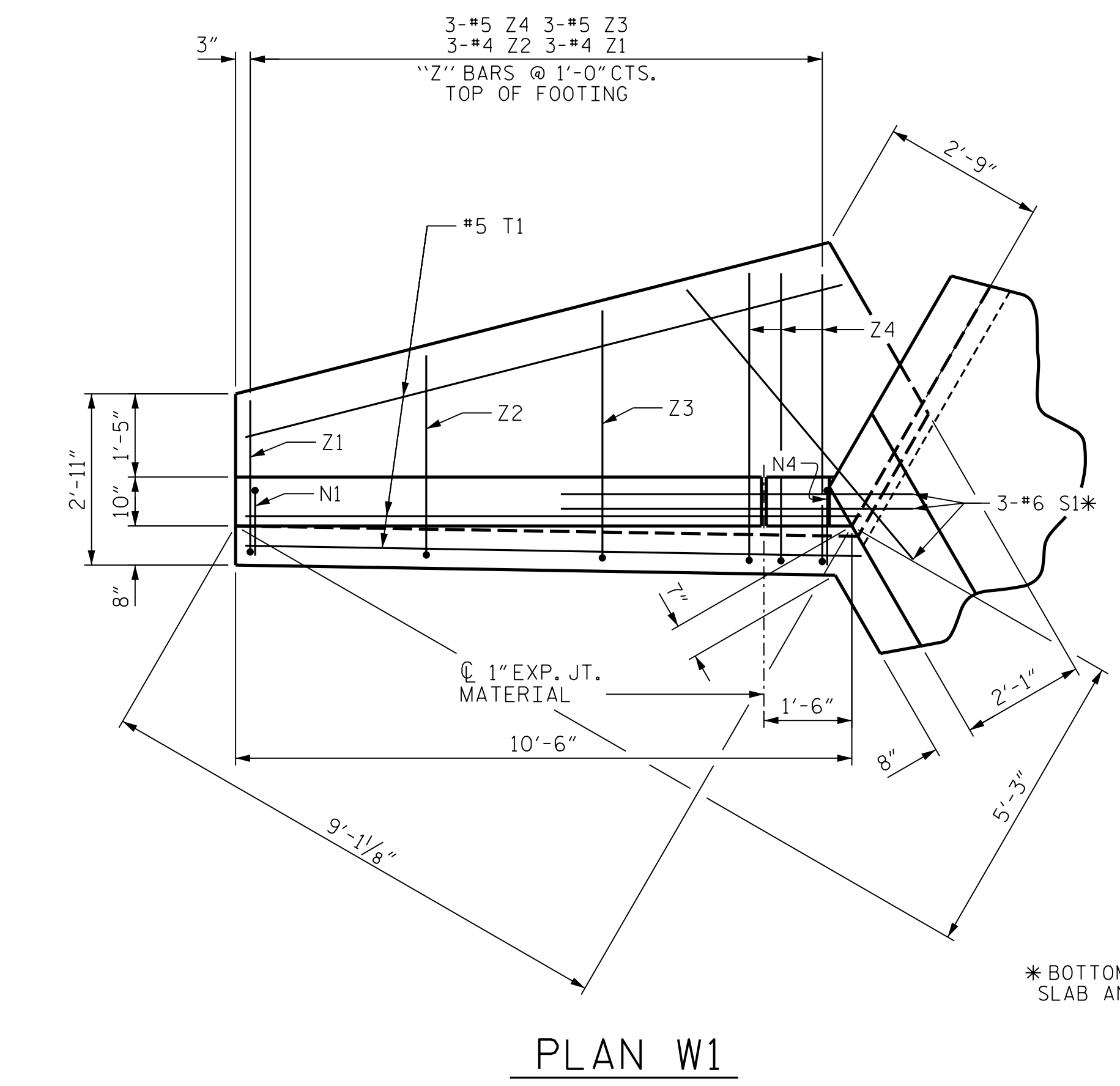
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 10 FT. X 8 FT. CONCRETE BOX CULVERT RIGHT EXTENSION**

DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

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



8/12/2019 12:35:11 PM User: jlsrce@naim  
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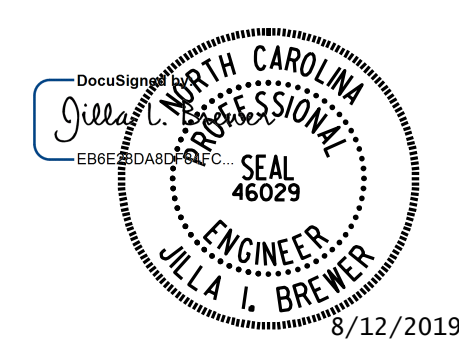


BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	8'-7"	34
H2	2	#4	STR	7'-8"	10
H3	2	#4	STR	4'-3"	6
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	9'-4"	12
N1	3	#4	2	6'-3"	13
N2	3	#4	2	7'-7"	15
N3	4	#5	2	8'-11"	37
N4	2	#5	2	10'-2"	21
S1	3	#6	STR	6'-0"	27
T1	3	#5	STR	10'-6"	33
V1	3	#4	STR	4'-4"	9
V2	3	#4	STR	5'-7"	11
V3	4	#4	STR	6'-11"	18
V4	2	#4	STR	8'-3"	11
Z1	3	#4	3	3'-1"	6
Z2	3	#4	3	3'-10"	8
Z3	3	#5	3	4'-8"	15
Z4	3	#5	3	5'-4"	17

REINFORCING STEEL 329 LBS  
 CLASS A CONCRETE 4.5 CY

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

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671



PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-  
 SHEET 8 OF 12

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

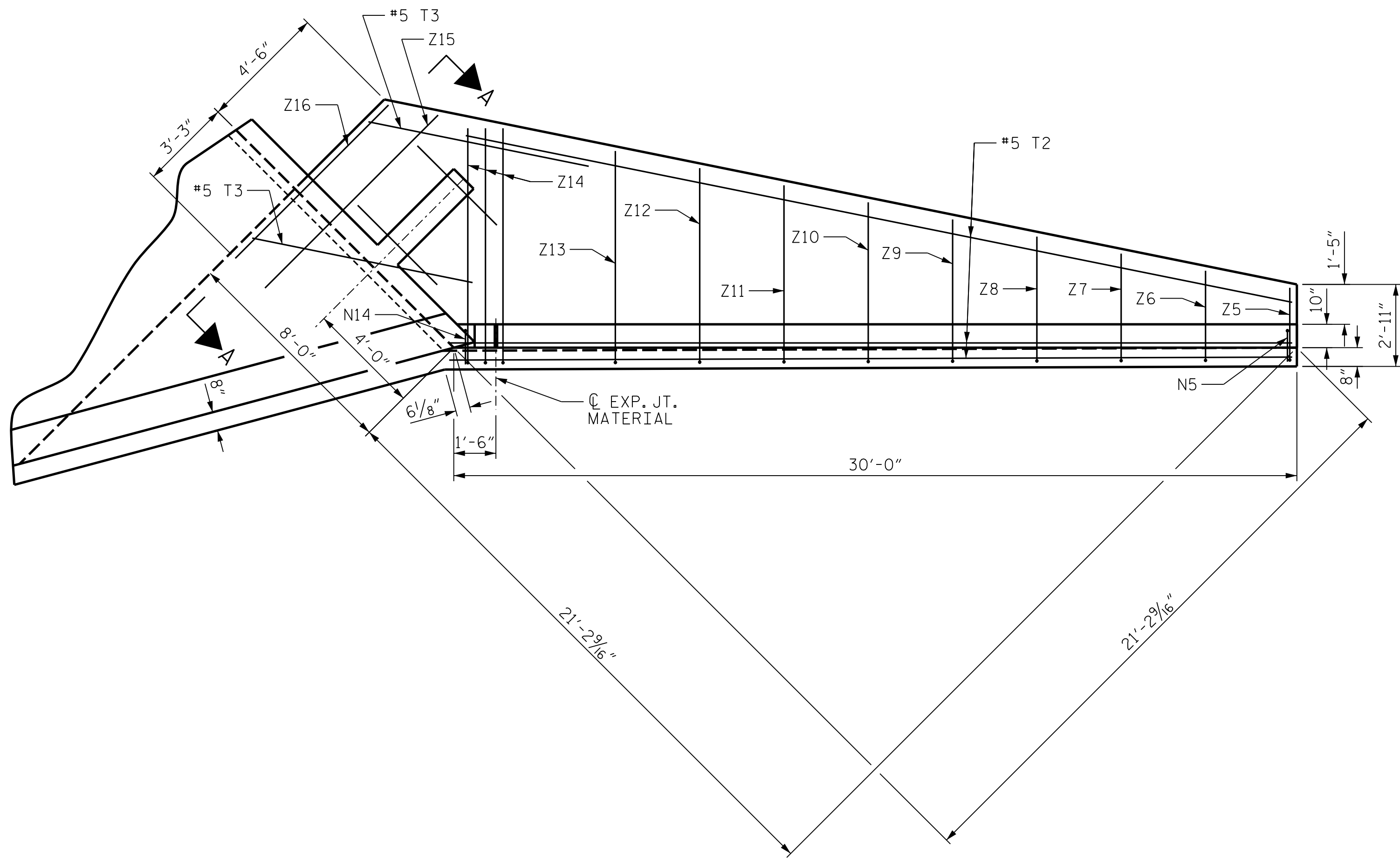
**WING 1 FOR  
 CONCRETE BOX CULVERT**

H = 8'-0" SLOPE = 2:1  
 60° SKEW

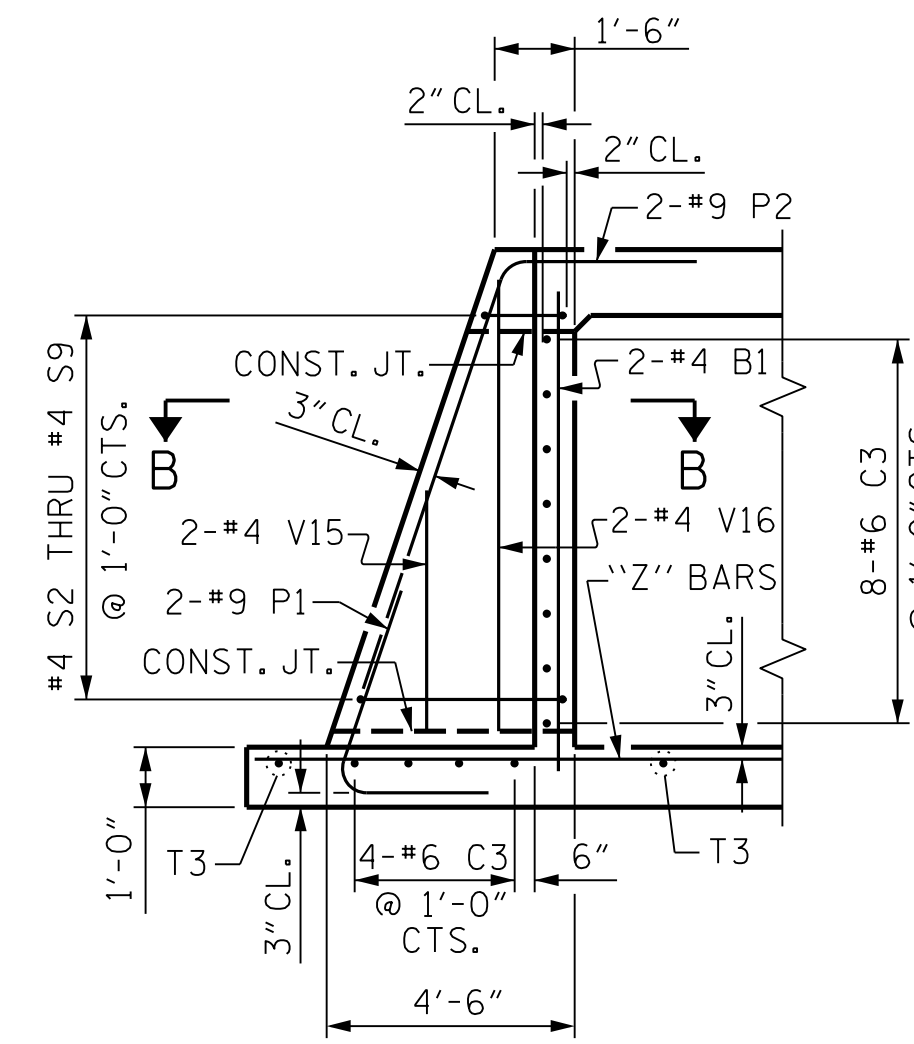
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-8
1			3			TOTAL SHEETS 12
2			4			

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

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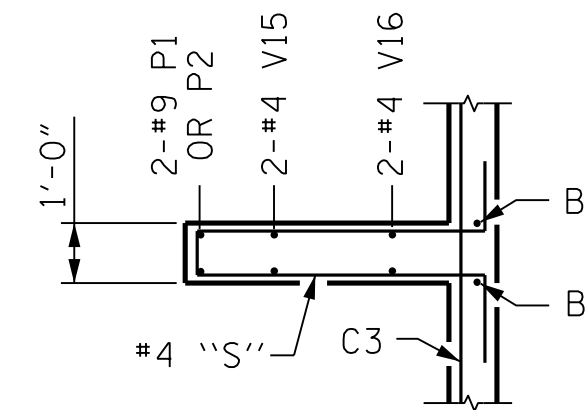


PLAN W2

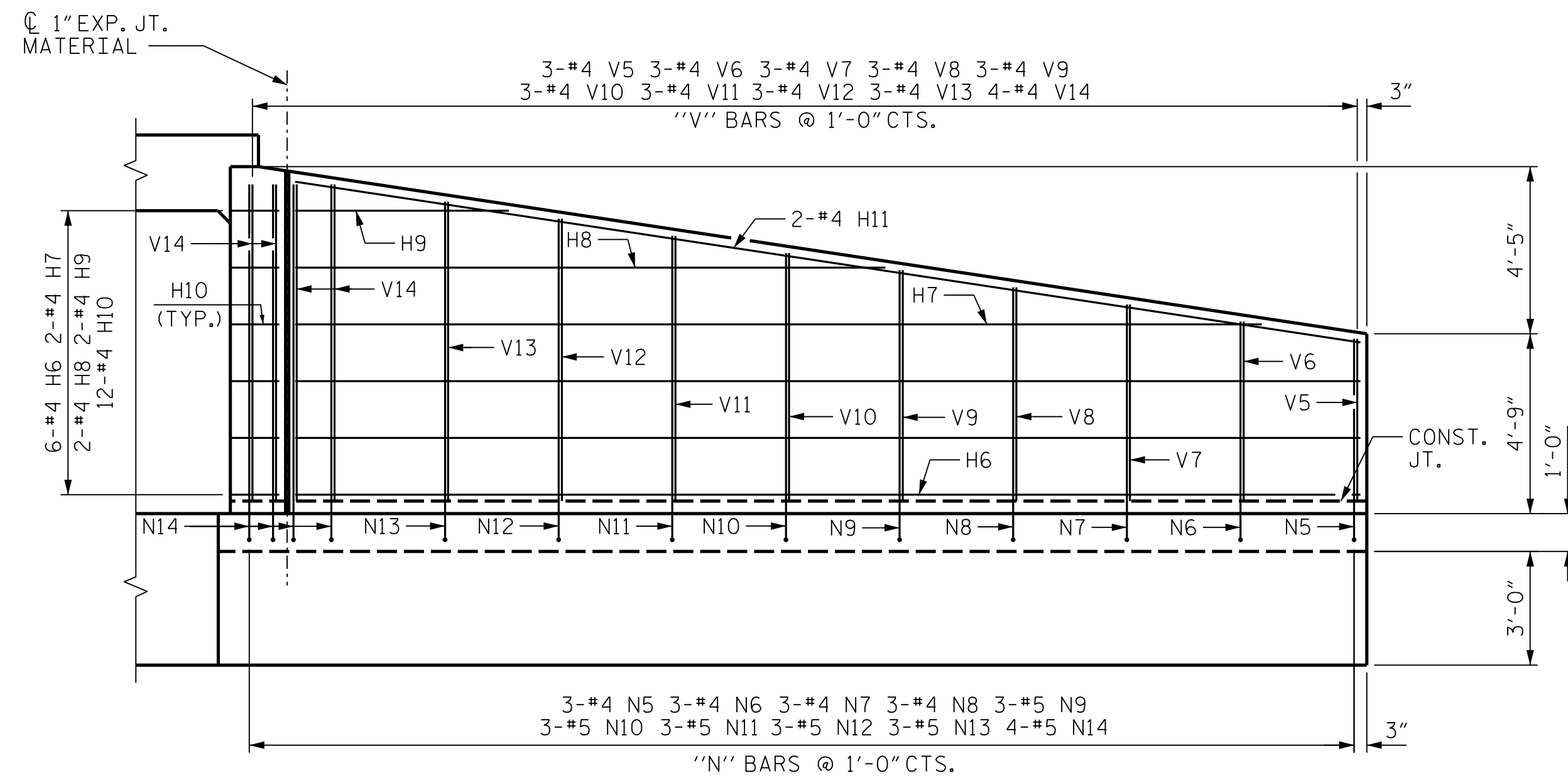


SECTION A-A

STANDARD REINFORCING STEEL IN BARREL NOT SHOWN



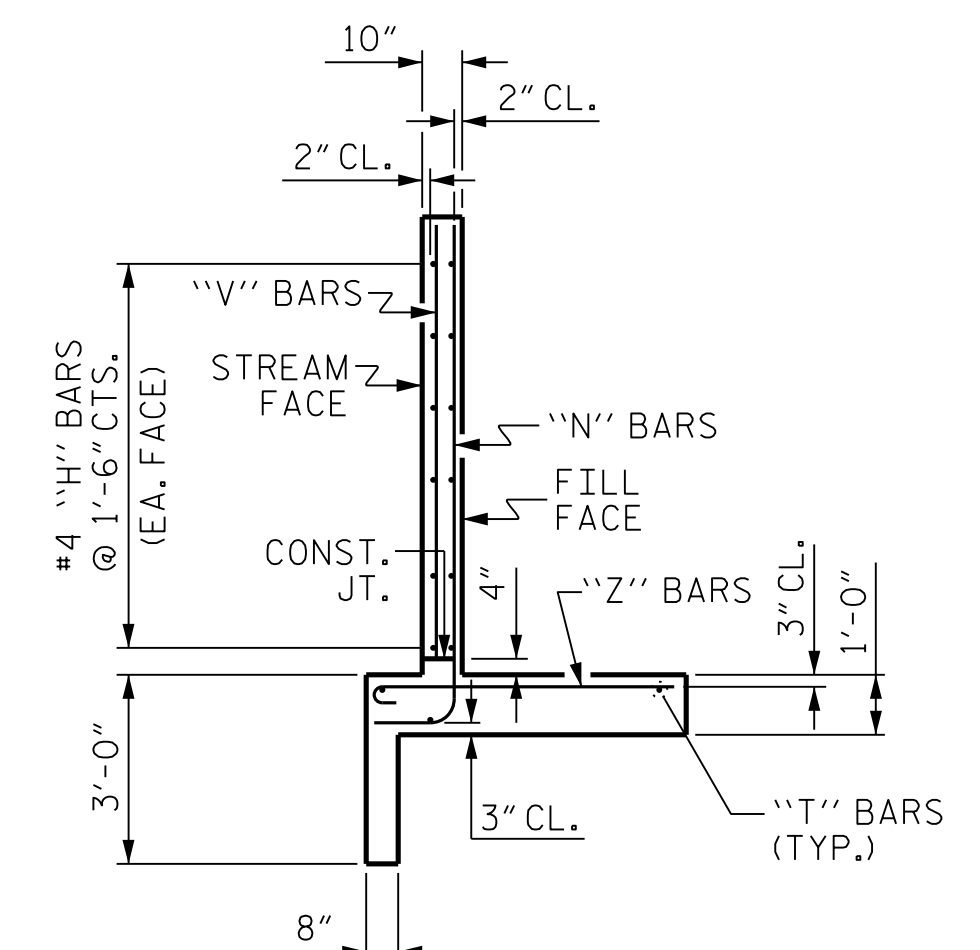
SECTION B-B



ELEVATION W2

BAR TYPES		BILL OF MATERIAL				
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
B1	#4	STR	9'-0"	12		
C3	#6	STR	4'-0"	72		
H6	#4	STR	28'-1"	113		
H7	#4	STR	25'-4"	34		
H8	#4	STR	15'-5"	21		
H9	#4	STR	5'-5"	7		
H10	#4	STR	3'-3"	26		
H11	#4	STR	28'-5"	38		
N5	#4	2	6'-3"	13		
N6	#4	2	6'-8"	13		
N7	#4	2	7'-2"	14		
N8	#4	2	7'-7"	15		
N9	#5	2	8'-0"	25		
N10	#5	2	8'-6"	27		
N11	#5	2	8'-11"	28		
N12	#5	2	9'-5"	29		
N13	#5	2	9'-10"	31		
N14	#5	2	10'-4"	43		
P1	#9	4	6'-9"	46		
P2	#9	5	12'-6"	85		
S2	#4	6	11'-3"	8		
S3	#4	6	10'-5"	7		
S4	#4	6	9'-9"	7		
S5	#4	6	9'-1"	6		
S6	#4	6	8'-5"	6		
S7	#4	6	7'-9"	5		
S8	#4	6	7'-1"	5		
S9	#4	6	6'-5"	4		
T2	#5	STR	30'-0"	94		
T3	#5	STR	8'-0"	17		
V5	#4	STR	4'-3"	9		
V6	#4	STR	4'-8"	9		
V7	#4	STR	5'-2"	10		
V8	#4	STR	5'-7"	11		
V9	#4	STR	6'-1"	12		
V10	#4	STR	6'-6"	13		
V11	#4	STR	7'-0"	14		
V12	#4	STR	7'-5"	15		
V13	#4	STR	7'-10"	16		
V14	#4	STR	8'-4"	22		
V15	#4	STR	4'-11"	7		
V16	#4	STR	8'-5"	11		
Z5	#4	3	3'-1"	6		
Z6	#4	3	3'-8"	7		
Z7	#4	3	4'-4"	9		
Z8	#4	3	4'-11"	10		
Z9	#5	3	5'-6"	17		
Z10	#5	3	6'-1"	19		
Z11	#5	3	6'-9"	21		
Z12	#5	3	7'-4"	23		
Z13	#5	3	7'-11"	33		
Z14	#5	3	8'-9"	27		
Z15	#10	STR	8'-8"	112		
Z16	#10	STR	7'-8"	99		
REINFORCING STEEL				1,383	LBS.	
CLASS A CONCRETE				18.8	C.Y.	

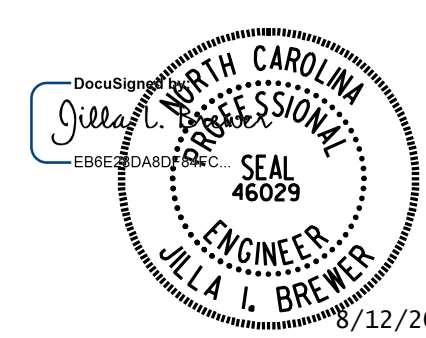
DIMENSIONS ARE OUT TO OUT



WING SECTION

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-

SHEET 9 OF 12



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 WING 2 FOR  
 CONCRETE BOX CULVERT  
 H = 8'-0" SLOPE = 2:1  
 60° SKEW

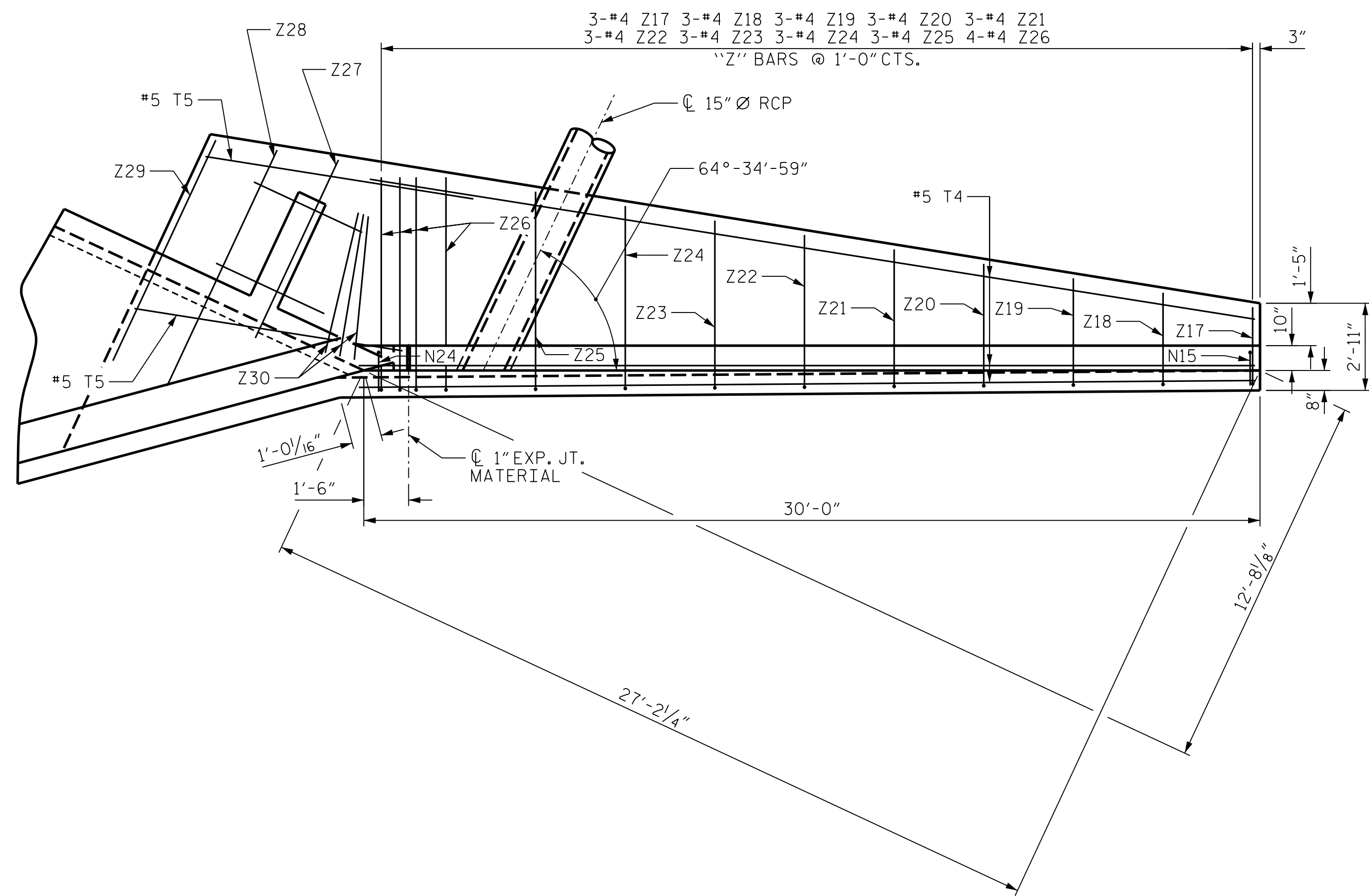
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

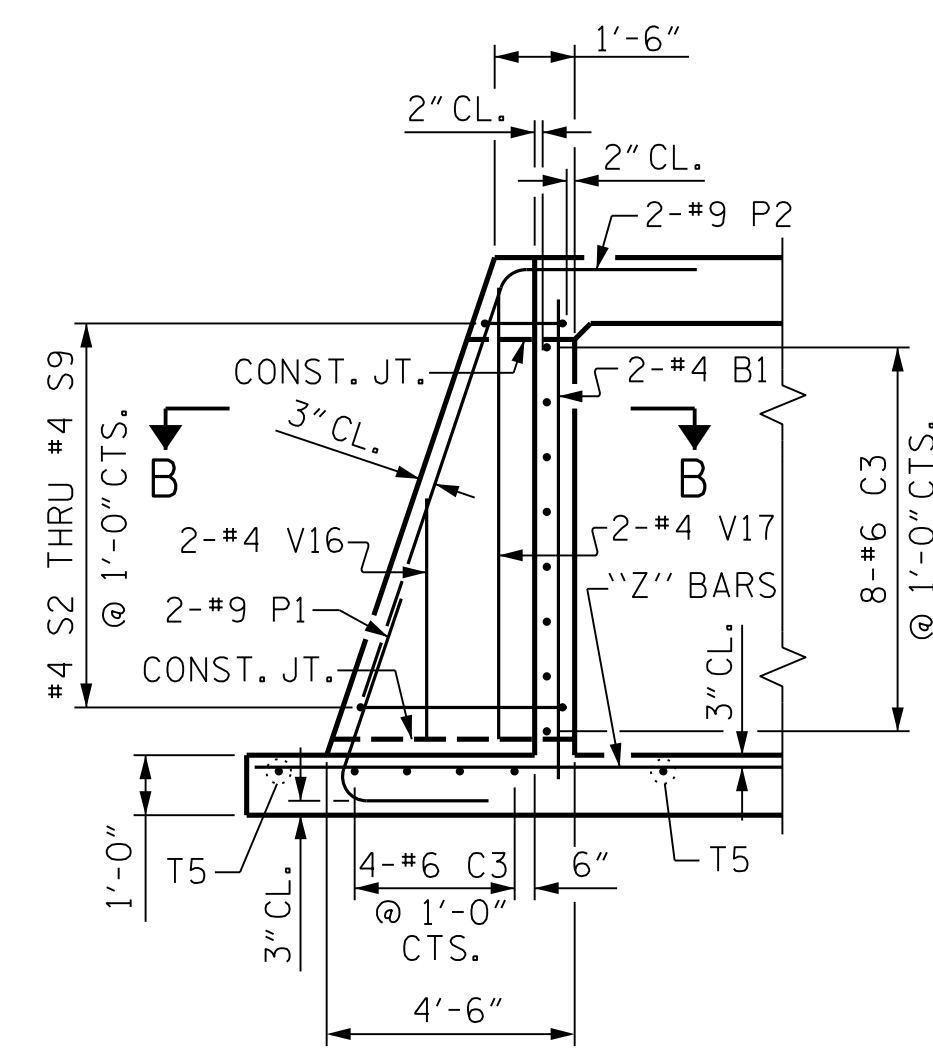
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-9
1			3			TOTAL SHEETS
2			4			12

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

8/12/2019 12:36:32 PM User: jlsrce@naim File: C:\Users\jlsrce\Documents\Projects\MI5007.MA Eng-A-0011C.NC 69 Culverts\Site 2\Culvert Ext.3 Barrel.Bglr- Creek at NC 69\Structures\411.019\_A0011C.SMU.CUIO.210008.dgn

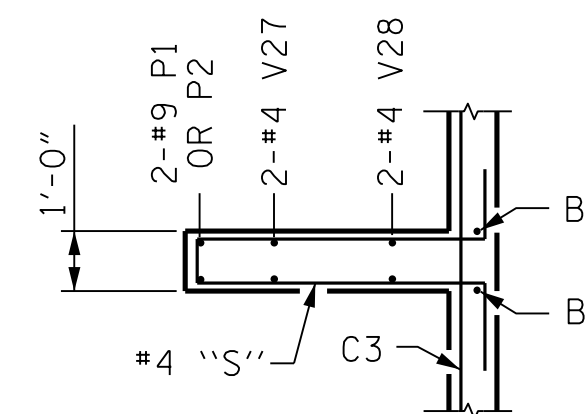


PLAN W3

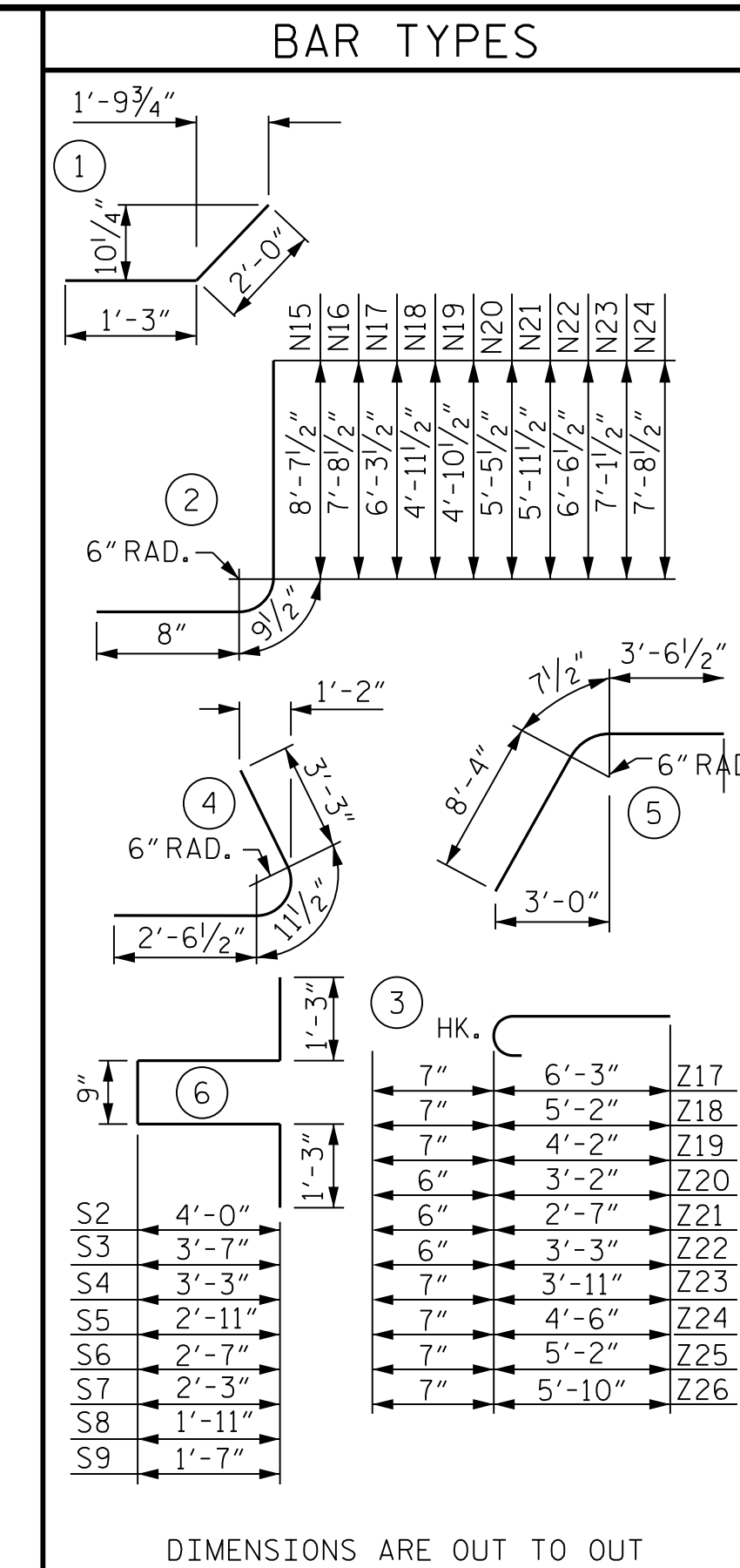


SECTION A-A

STANDARD REINFORCING STEEL IN BARREL NOT SHOWN

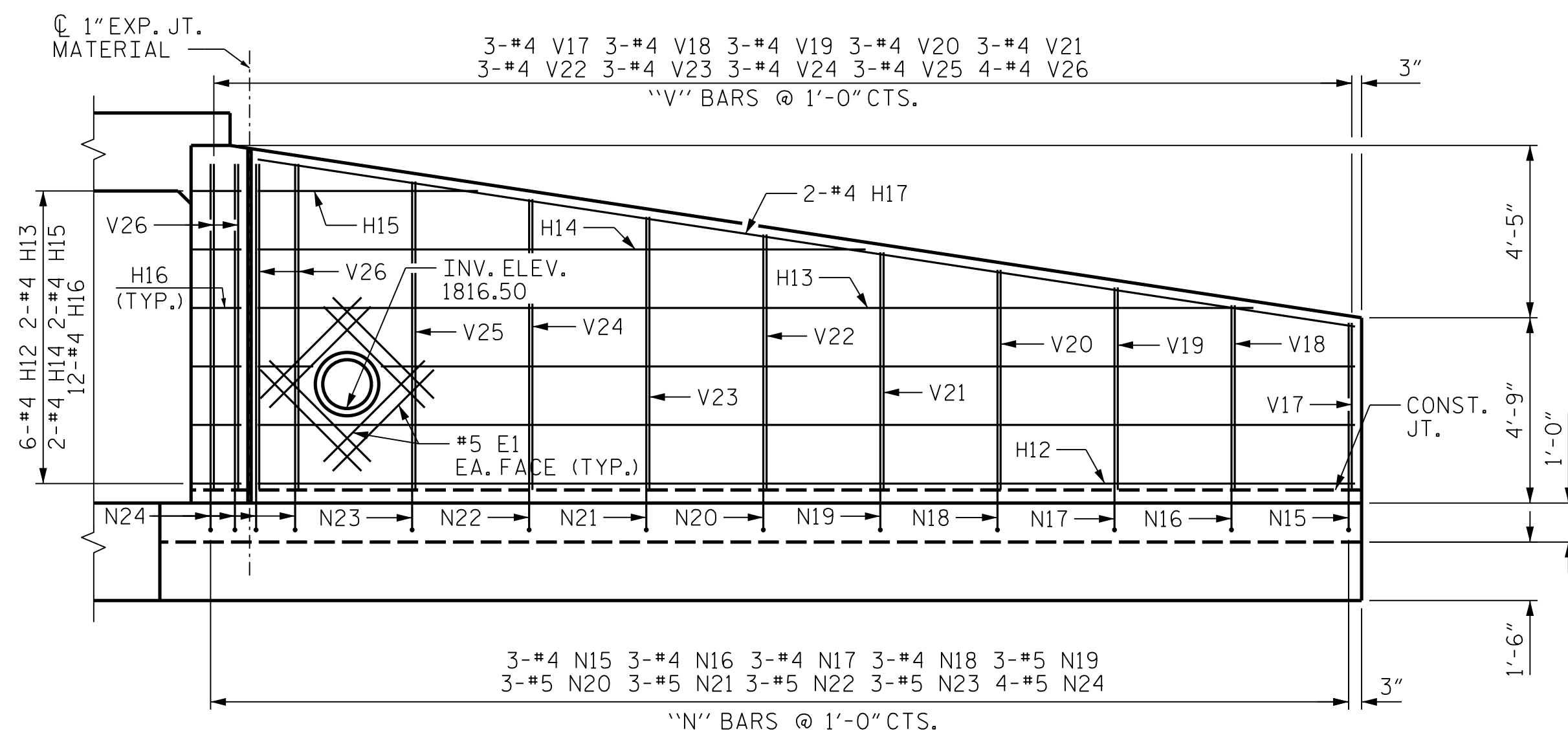


SECTION B-B



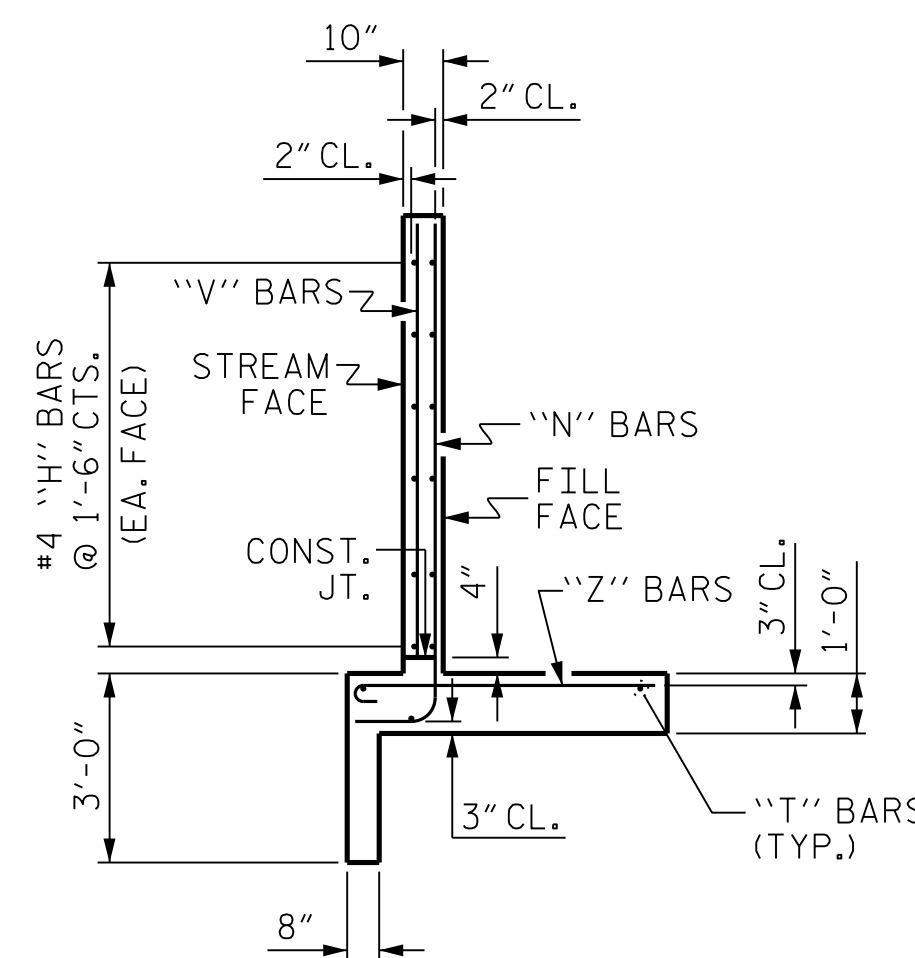
DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	2	#4	STR	9'-0"	12
C3	12	#6	STR	4'-0"	72
E1	16	#5	STR	4'-0"	67
H12	6	#4	STR	28'-1"	113
H13	2	#4	STR	25'-4"	34
H14	2	#4	STR	15'-6"	21
H15	2	#4	STR	5'-8"	8
H16	12	#4	1	3'-3"	26
H17	2	#4	STR	28'-5"	38
N15	3	#4	2	6'-3"	13
N16	3	#4	2	6'-8"	13
N17	3	#4	2	7'-2"	14
N18	3	#4	2	7'-7"	15
N19	3	#5	2	8'-1"	25
N20	3	#5	2	8'-6"	27
N21	3	#5	2	9'-0"	28
N22	3	#5	2	9'-5"	29
N23	3	#5	2	9'-11"	31
N24	4	#5	2	10'-4"	43
P1	2	#9	4	6'-9"	46
P2	2	#9	5	12'-6"	85
S2	1	#4	6	11'-3"	8
S3	1	#4	6	10'-5"	7
S4	1	#4	6	9'-9"	7
S5	1	#4	6	9'-1"	6
S6	1	#4	6	8'-5"	6
S7	1	#4	6	7'-9"	5
S8	1	#4	6	7'-1"	5
S9	1	#4	6	6'-5"	4
T4	3	#5	STR	30'-0"	94
T5	2	#5	STR	8'-0"	17
V17	3	#4	STR	4'-3"	9
V18	3	#4	STR	4'-8"	9
V19	3	#4	STR	5'-2"	10
V20	3	#4	STR	5'-7"	11
V21	3	#4	STR	6'-1"	12
V22	3	#4	STR	6'-6"	13
V23	3	#4	STR	7'-0"	14
V24	3	#4	STR	7'-5"	15
V25	3	#4	STR	7'-11"	16
V26	4	#4	STR	8'-4"	22
V27	2	#4	STR	4'-11"	7
V28	2	#4	STR	8'-5"	11
Z17	3	#4	3	3'-1"	6
Z18	3	#4	3	3'-7"	7
Z19	3	#4	3	4'-1"	8
Z20	3	#4	3	4'-7"	9
Z21	3	#5	3	5'-1"	16
Z22	3	#5	3	5'-7"	17
Z23	3	#5	3	6'-1"	19
Z24	3	#5	3	6'-7"	21
Z25	3	#5	3	7'-1"	22
Z26	4	#5	3	7'-7"	32
Z27	3	#10	STR	6'-7"	85
Z28	4	#10	STR	8'-8"	149
Z29	4	#10	STR	8'-1"	139
Z30	3	#10	STR	4'-9"	61
REINFORCING STEEL				1,659	LBS.
CLASS A CONCRETE				17.5	C.Y.

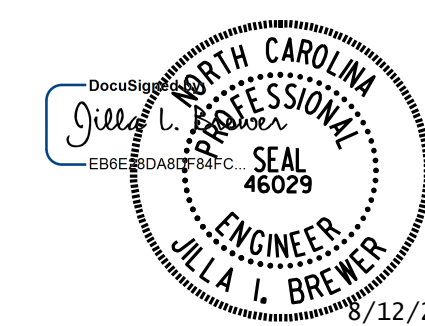


ELEVATION W3

NOTE: CUT REINFORCING AS NECESSARY TO PROVIDE 2" MIN CLEARANCE TO 15" Ø RCP AND TO CONST. JOINTS.



WING SECTION



PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-

SHEET 10 OF 12

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**WING 3 FOR  
 CONCRETE BOX CULVERT**  
 H = 8'-0" SLOPE = 2:1  
 40° SKEW

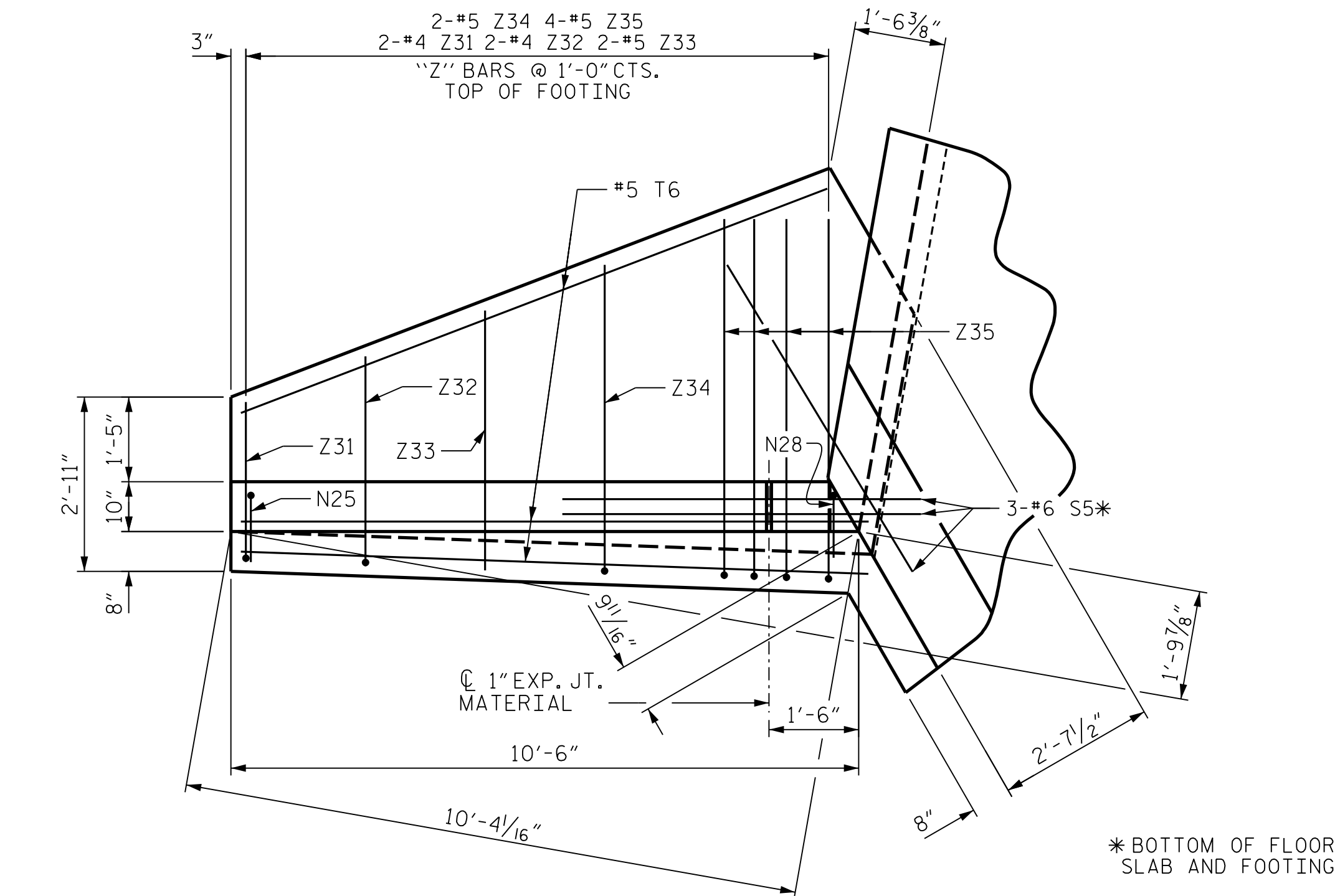
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

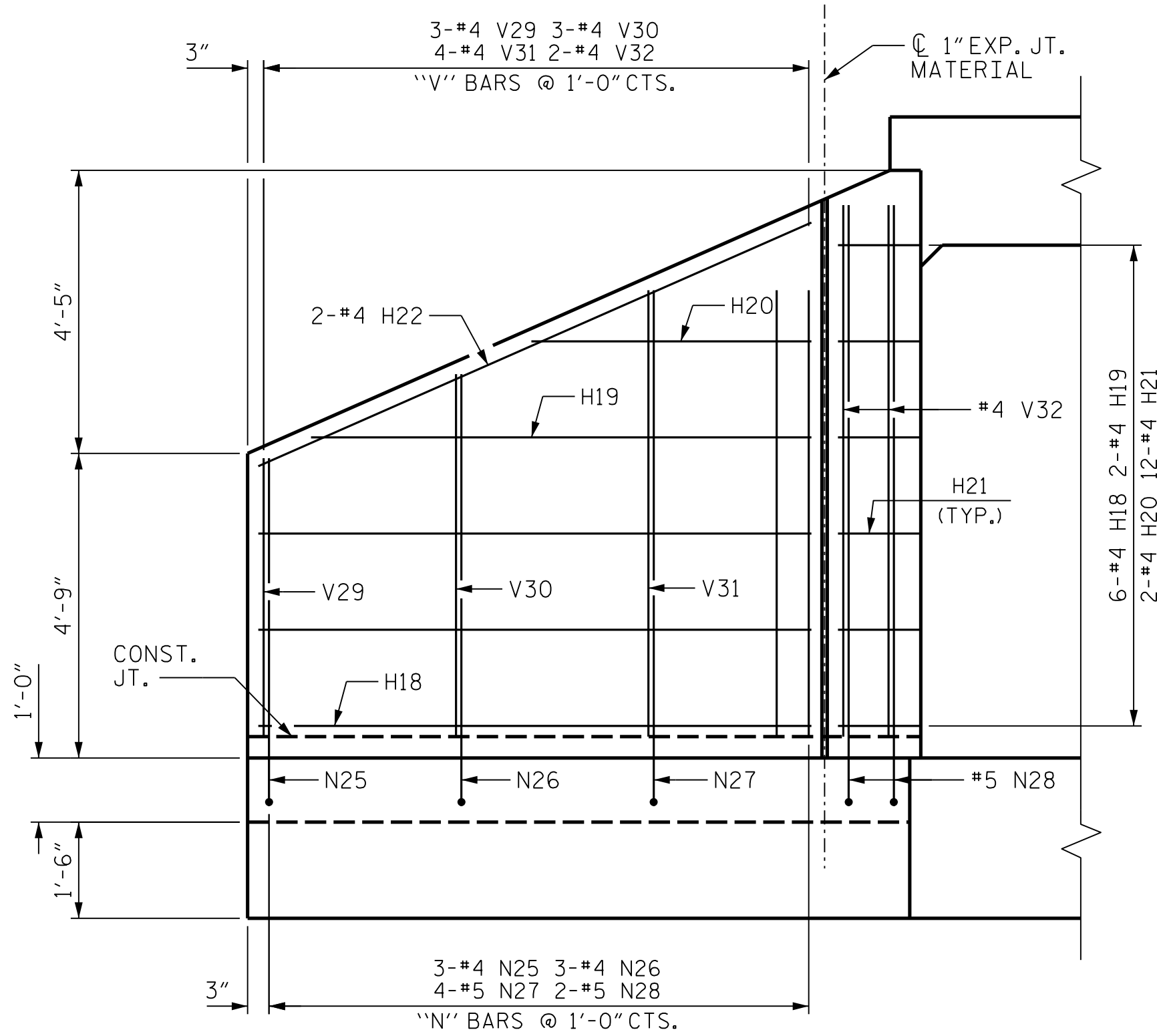
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			12
2			4			

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

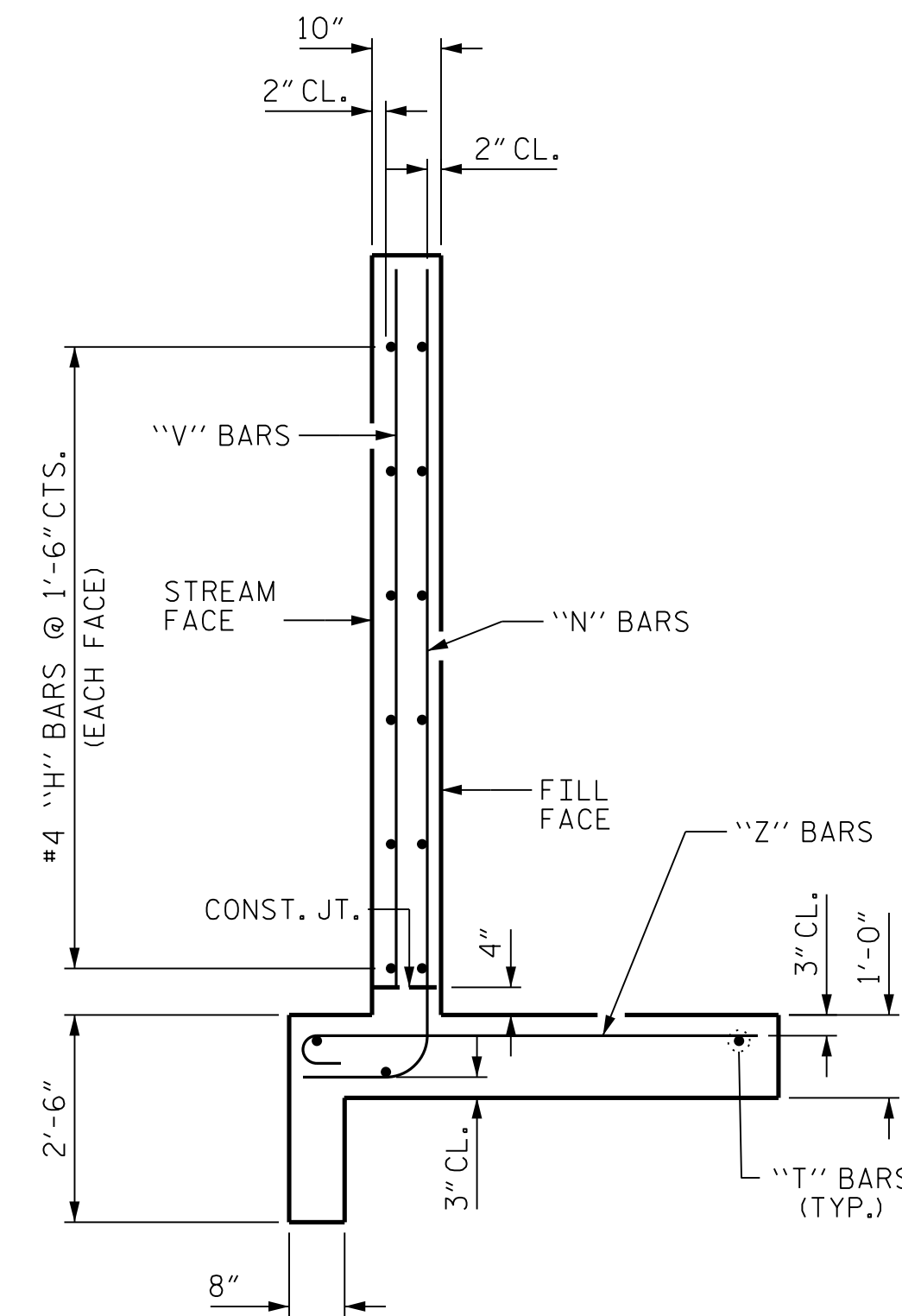
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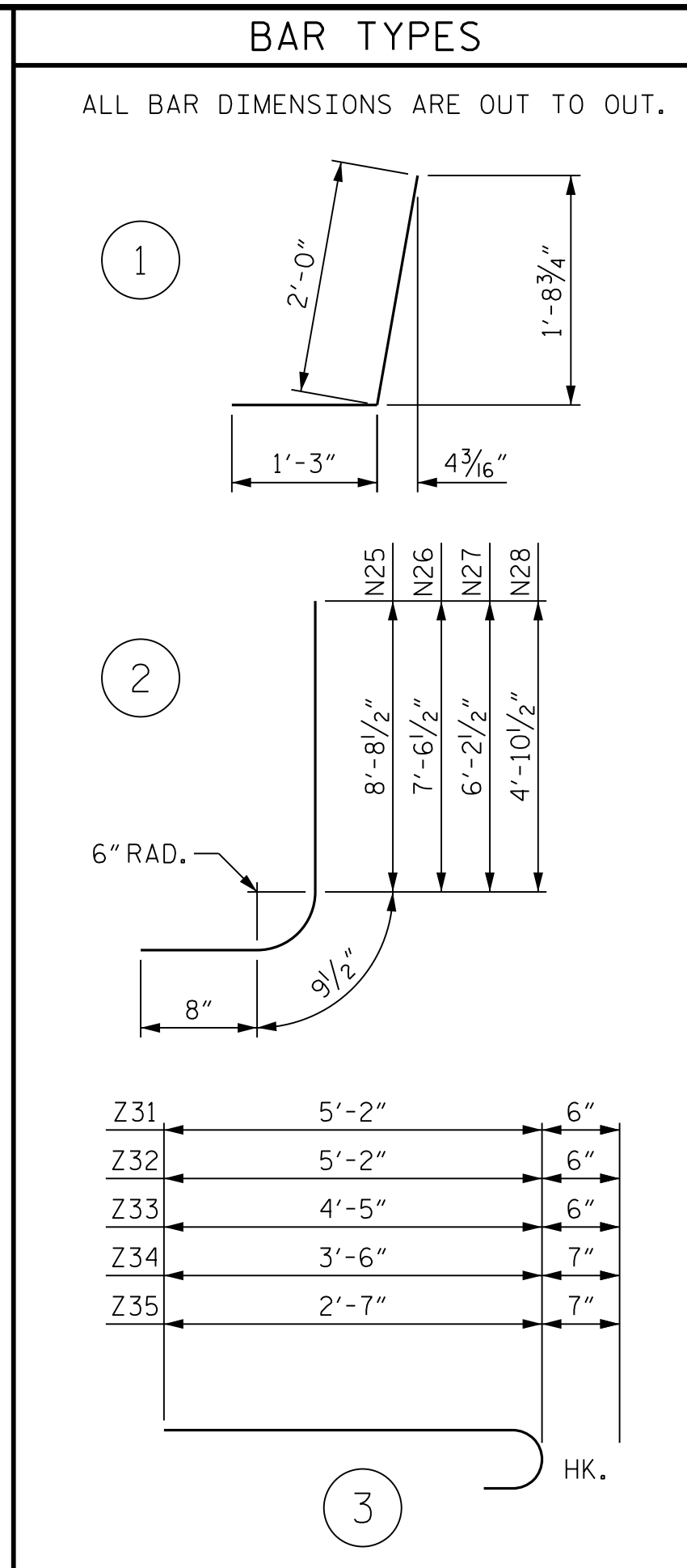
PLAN W4



ELEVATION W4



WING SECTION

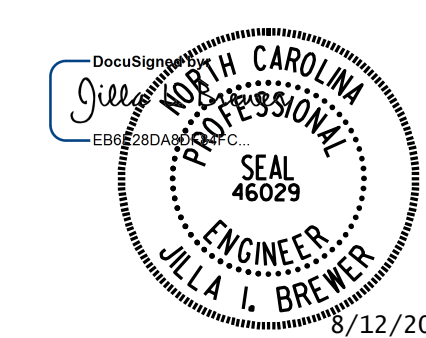


BAR TYPES					
ALL BAR DIMENSIONS ARE OUT TO OUT.					
1					
2					
3					

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H18	6	#4	STR	8'-7"	34
H19	2	#4	STR	7'-9"	10
H20	2	#4	STR	4'-4"	6
H21	12	#4	1	3'-3"	26
H22	2	#4	STR	9'-4"	12
N25	3	#4	2	6'-3"	13
N26	3	#4	2	7'-7"	15
N27	4	#5	2	8'-11"	37
N28	2	#5	2	10'-3"	21
T6	3	#6	STR	6'-0"	27
T6	3	#5	STR	10'-6"	33
V29	3	#4	STR	4'-4"	9
V30	3	#4	STR	5'-7"	11
V31	4	#4	STR	6'-11"	18
V32	2	#4	STR	8'-3"	11
Z31	2	#4	3	3'-1"	4
Z32	2	#4	3	3'-11"	5
Z33	2	#5	3	4'-8"	10
Z34	2	#5	3	5'-6"	11
Z35	4	#5	3	6'-3"	26

REINFORCING STEEL 339 LBS  
 CLASS A CONCRETE 4.8 CY

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-  
 SHEET 11 OF 12



**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**  
 MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
<b>WING 4 FOR CONCRETE BOX CULVERT</b> H = 8'-0" SLOPE = 2:1 40° SKEW					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					TOTAL SHEETS 12

DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

NOTES

NATIVE MATERIAL BETWEEN SILLS AT ENTRANCE AND EXIT IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP-RAP MAY BE USED TO SUPPLEMENT THE NATIVE BED MATERIAL IN THE HIGH FLOW CULVERT BARRELS. IF RIP-RAP IS USED TO LINE THE HIGH FLOW CULVERT BARRELS, 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.

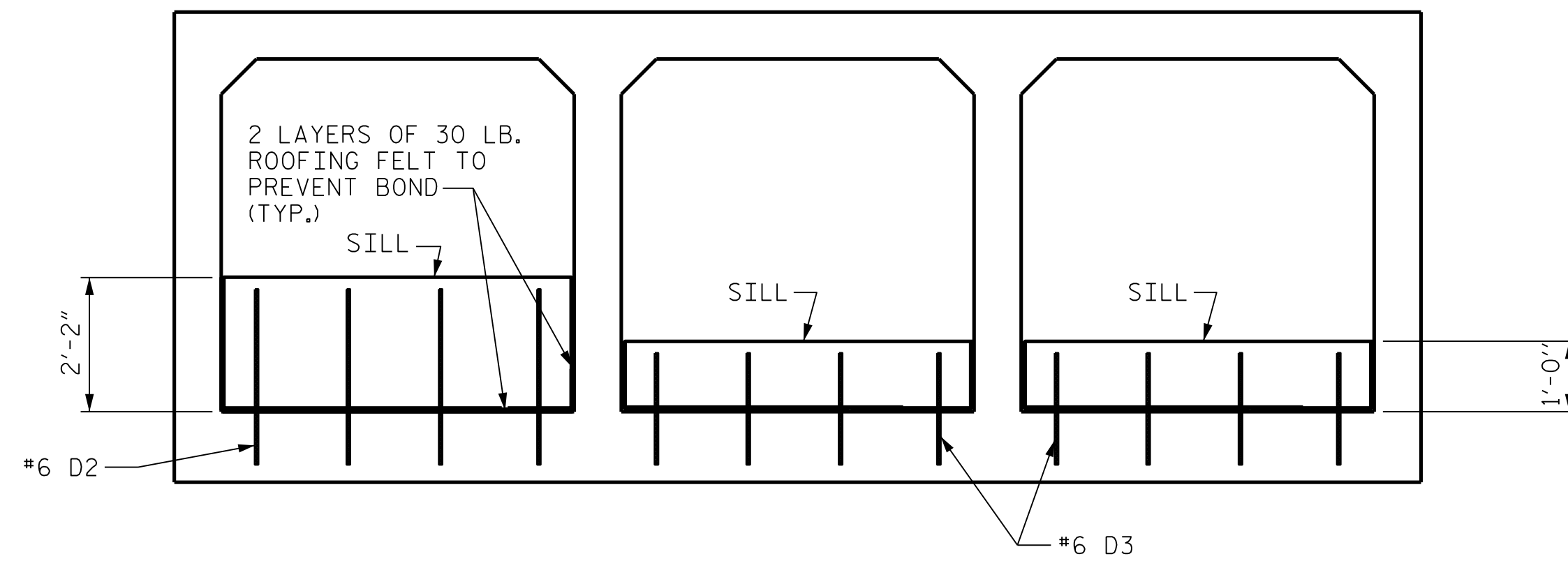
SILLS ARE TO BE 1'-0" WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM.

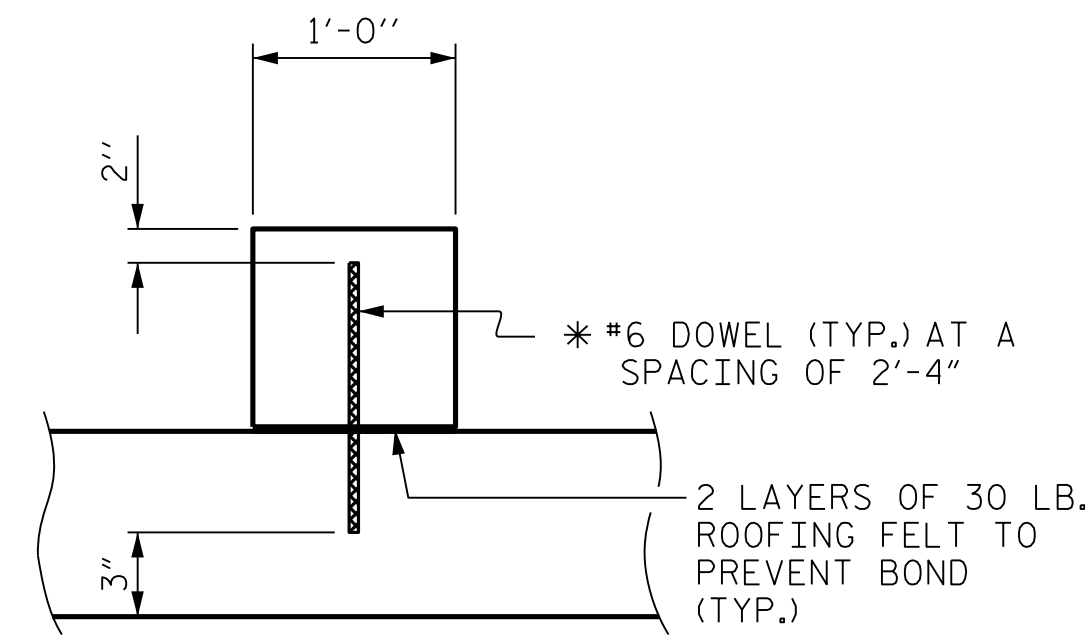
DO NOT SET ELEVATION OF HIGH SILLS ABOVE BANK FULL.

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

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



ELEVATION



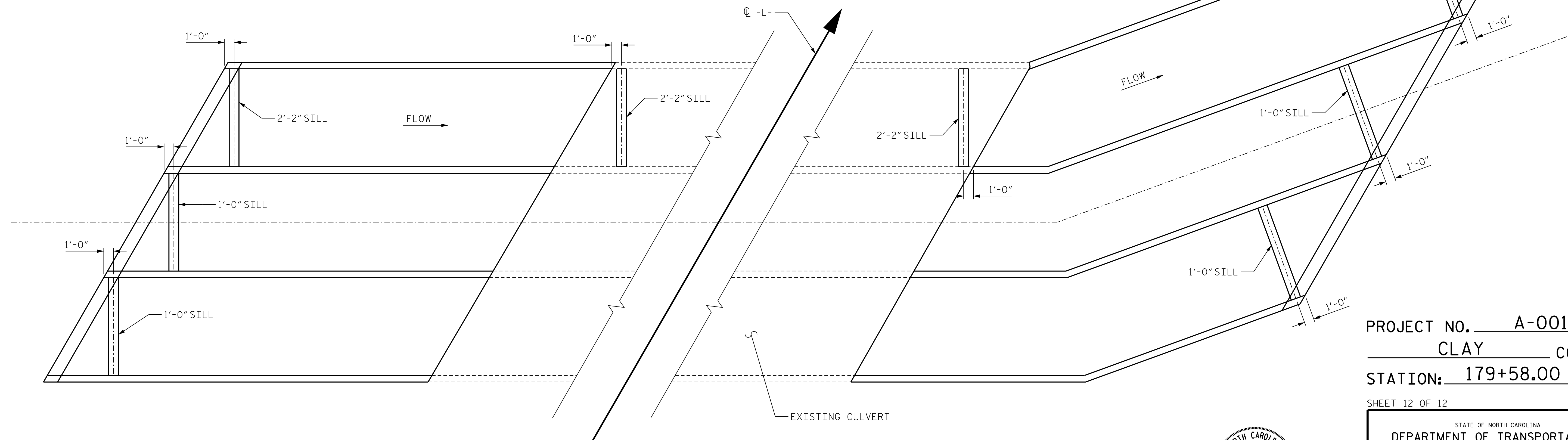
SECTION THROUGH SILL

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

DOWELS SHALL BE DRILLED AND GROUTED FOR SILLS LOCATED IN EXISTING CULVERT.

CULVERT SILL DETAILS

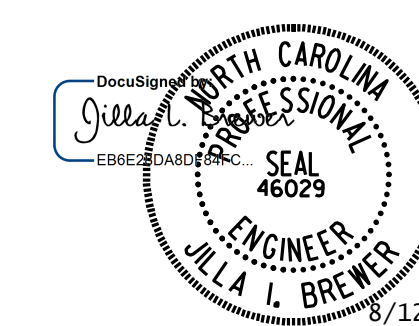
(LOOKING DOWNSTREAM)



PLAN VIEW SHOWING SILL LOCATIONS

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 179+58.00 -L-

SHEET 12 OF 12



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

TRIPLE 10 FT. X 8 FT.  
 CONCRETE BOX  
 CULVERT EXTENSION

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-12
1			3			TOTAL SHEETS
2			4			12

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

8/12/2019 12:37:30 PM User: jlsraelnaim File: N:\NC Bridges\MI5007-MA Eng-A-0011C-NC 69 Culverts\Site 2\Culvert Ext-3 Barrel-Blair-Creek-ot-NC 69\Structures\411.023.A0011C.SMU-CUI2.210008.dgn



NOTES

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.  
 DESIGN FILL-----9.95 FT.  
 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.

THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 1 AT 8' (W) X 5' (H) SIZE, 75'-11"± LONG AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE RETAINED.

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.

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

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.

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

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.

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

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

EXCAVATE FOUNDATION A MINIMUM OF 3 FT BELOW CULVERT BEARING ELEVATION.

INSTALL GEOTEXTILE FOR SOIL STABILIZATION, TYPE 4, TO A MINIMUM DISTANCE OF 1.5 FT BEYOND THE EXTENTS OF THE CULVERT FOUNDATION IN ACCORDANCE WITH SECTION 270 OF THE STANDARD SPECIFICATIONS. FOR GEOTEXTILE FOR SOIL STABILIZATION DETAILS AND PAY ITEM SEE ROADWAY PLANS.

PLACE 3 FT OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

OVEREXCAVATE LOOSE/SOFT MATERIAL IF PRESENT TO SUITABLE BEARING MATERIALS AND REPLACE WITH ADDITIONAL CLASS VI FOUNDATION CONDITIONING MATERIAL.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

HYDROGRAPHIC DATA

DESIGN DISCHARGE ..... = 350 CFS  
 FREQUENCY OF DESIGN FLOOD ..... = 50 YRS.  
 DESIGN HIGH WATER ELEVATION ..... = 1826.2 FT.  
 DRAINAGE AREA ..... = 0.24 SQ. MI.  
 BASE DISCHARGE (Q100) ..... = 400 CFS  
 BASE HIGH WATER ELEVATION ..... = 1827.5 FT.

OVERTOPPING FLOOD DATA

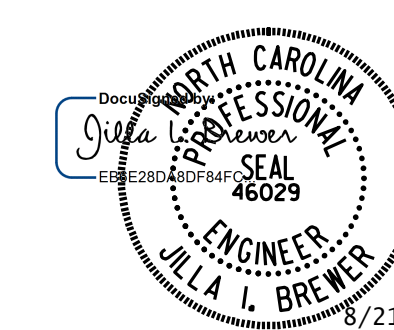
OVERTOPPING DISCHARGE ..... = 570 CFS  
 FREQUENCY OF OVERTOPPING FLOOD ..... = 100+ YRS.  
 OVERTOPPING FLOOD ELEVATION ..... = 1831.9 FT.

-L- PROFILE DATA

PVI STA. 186+50.00 -L-  
 PVI EL. = 1832.70  
 VC = 100  
 g1 = +1.1462%  
 g2 = +1.6638%

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
BARREL @ 1.10 CY/FT	61.0 C.Y.
WING ETC.	25.3 C.Y.
TOTAL	86.3 C.Y.
REINFORCING STEEL	
BARREL	8,081 LBS.
WINGS ETC.	1,686 LBS.
TOTAL	9,767 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	169 TONS



DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

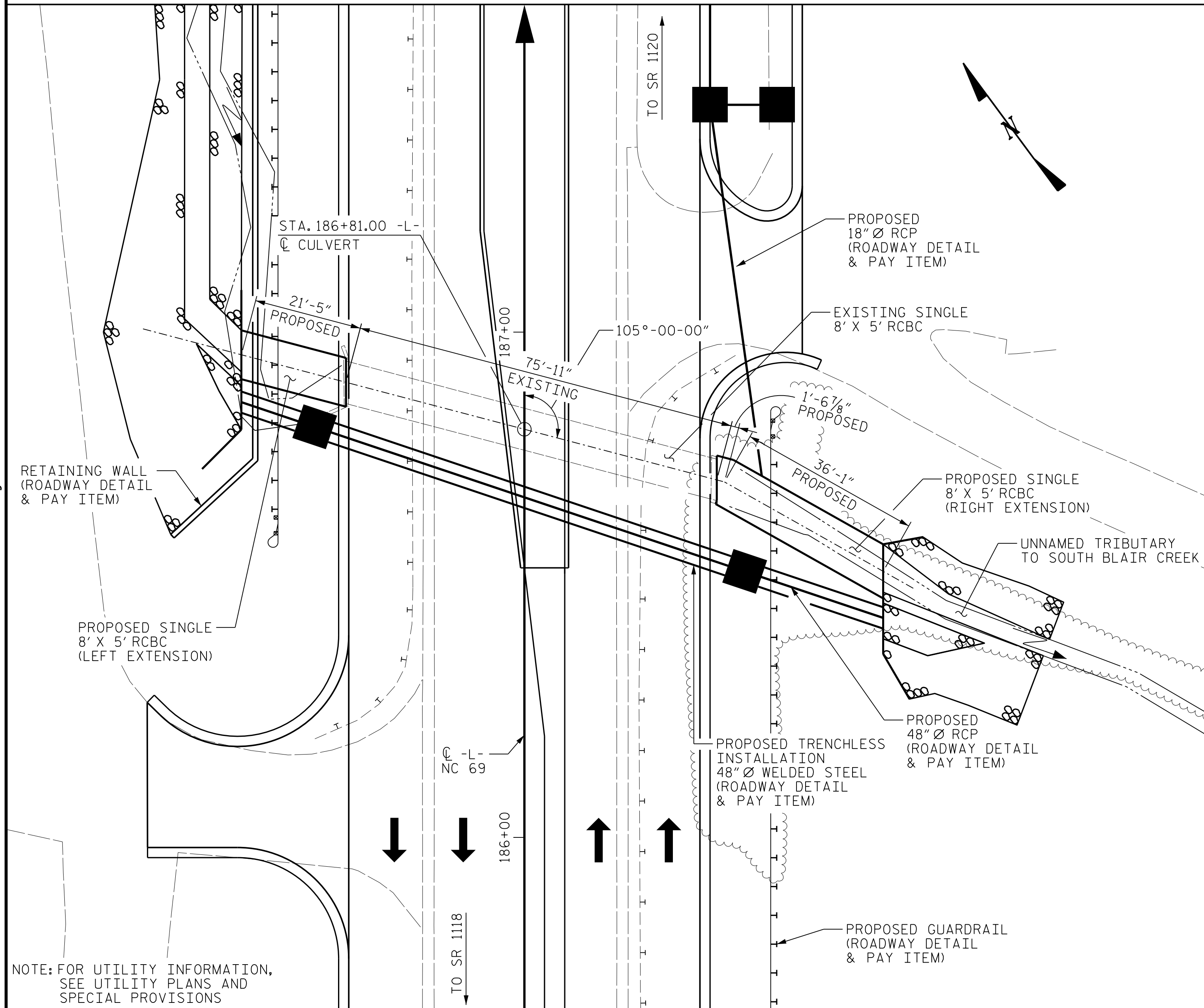
MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-

SHEET 1 OF 11  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SINGLE 8 FT. X 5 FT.  
 CONCRETE BOX  
 CULVERT EXTENSION**

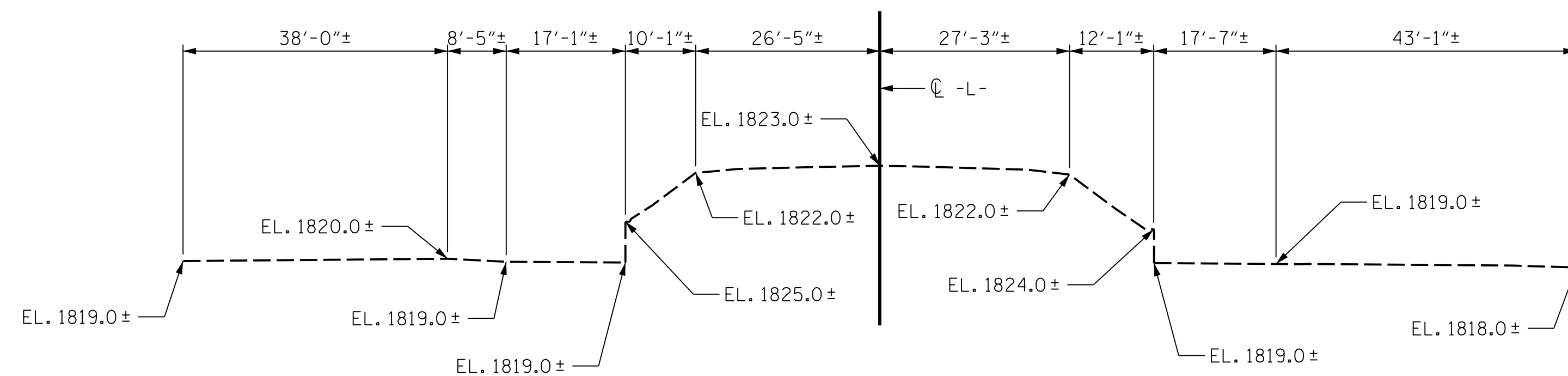
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-1
1			3			TOTAL SHEETS
2			4			II

BM #16: NAIL IN BASE OF SIGN POST, 40.8' LT. OF STA. 183+84.63 -L-, EL. 1828.88



LOCATION SKETCH

GRADE POINT ELEVATION @ 186+81.00 -L- = 1833.22  
 BED ELEVATION @ 186+81.00 -L- = 1817.67  
 ROADWAY SLOPES = 2:1



PROFILE ALONG CULVERT

DRAWN BY : J.I. BREWER DATE : 05/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

8/21/2019 2:10:17 PM  
 User: jlsrce@naim  
 Filename: N:\NC\_Bridges\M15007-MA\_Eng-A-0011C-NC\_69\_Culverts\Site\_3\_Culvert\_Ext-1\_Borrel\Unnamed\_Creek\_of\_NC\_69\Structures\412\_001\_A0011C-SMU-CUL.dgn

**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	2.48	--	1.75	2.48	1	BOTTOM SLAB	4.00	8.25	1	BOTTOM SLAB	1.00		
	HL-93 (OPERATING)	N/A		3.21	--	1.35	3.21	1	BOTTOM SLAB	4.00	10.70	1	BOTTOM SLAB	1.00		
	HS-20 (INVENTORY)	36.000	②	2.48	89.28	1.75	2.48	1	BOTTOM SLAB	4.00	8.25	1	BOTTOM SLAB	1.00		
	HS-20 (OPERATING)	36.000		3.21	115.56	1.35	3.21	1	BOTTOM SLAB	4.00	10.70	1	BOTTOM SLAB	1.00		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.54	61.29	1.40	4.54	1	BOTTOM SLAB	4.00	15.13	1	BOTTOM SLAB	1.00	
		SNGARBS2	20.000		4.25	85.00	1.40	4.25	1	BOTTOM SLAB	4.00	14.16	1	BOTTOM SLAB	1.00	
		SNAGRIS2	22.000		4.54	99.88	1.40	4.54	1	BOTTOM SLAB	4.00	14.16	1	BOTTOM SLAB	1.00	
		SNCOTTS3	27.250		2.10	57.23	1.40	2.10	1	BOTTOM SLAB	4.00	7.05	1	BOTTOM SLAB	1.00	
		SNAGGRS4	34.925		2.22	77.53	1.40	2.22	1	BOTTOM SLAB	4.00	7.05	1	BOTTOM SLAB	1.00	
		SNS5A	35.550		2.06	73.23	1.40	2.06	1	BOTTOM SLAB	4.00	6.91	1	BOTTOM SLAB	1.00	
		SNS6A	39.950	③	2.02	80.70	1.40	2.02	1	BOTTOM SLAB	4.00	6.76	1	BOTTOM SLAB	1.00	
		SNS7B	42.000		2.02	84.84	1.40	2.02	1	BOTTOM SLAB	4.00	6.76	1	BOTTOM SLAB	1.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		3.36	110.88	1.40	3.36	1	BOTTOM SLAB	4.00	11.31	1	BOTTOM SLAB	1.00	
		TNT4A	33.075		2.50	82.69	1.40	2.50	1	BOTTOM SLAB	4.00	8.39	1	BOTTOM SLAB	1.00	
		TNT6A	41.600		2.25	93.60	1.40	2.25	1	BOTTOM SLAB	4.00	7.52	1	BOTTOM SLAB	1.00	
		TNT7A	42.000		2.37	99.54	1.40	2.37	1	BOTTOM SLAB	4.00	7.52	1	BOTTOM SLAB	1.00	
		TNT7B	42.000		2.20	92.40	1.40	2.20	1	BOTTOM SLAB	4.00	7.34	1	BOTTOM SLAB	1.00	
		TNAGRIT4	43.000		2.50	107.50	1.40	2.50	1	BOTTOM SLAB	4.00	7.34	1	BOTTOM SLAB	1.00	
		TNAGT5A	45.000		2.50	112.50	1.40	2.50	1	BOTTOM SLAB	4.00	7.34	1	BOTTOM SLAB	1.00	
TNAGT5B	45.000		2.50	112.50	1.40	2.50	1	BOTTOM SLAB	4.00	7.34	1	BOTTOM SLAB	1.00			

**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	--

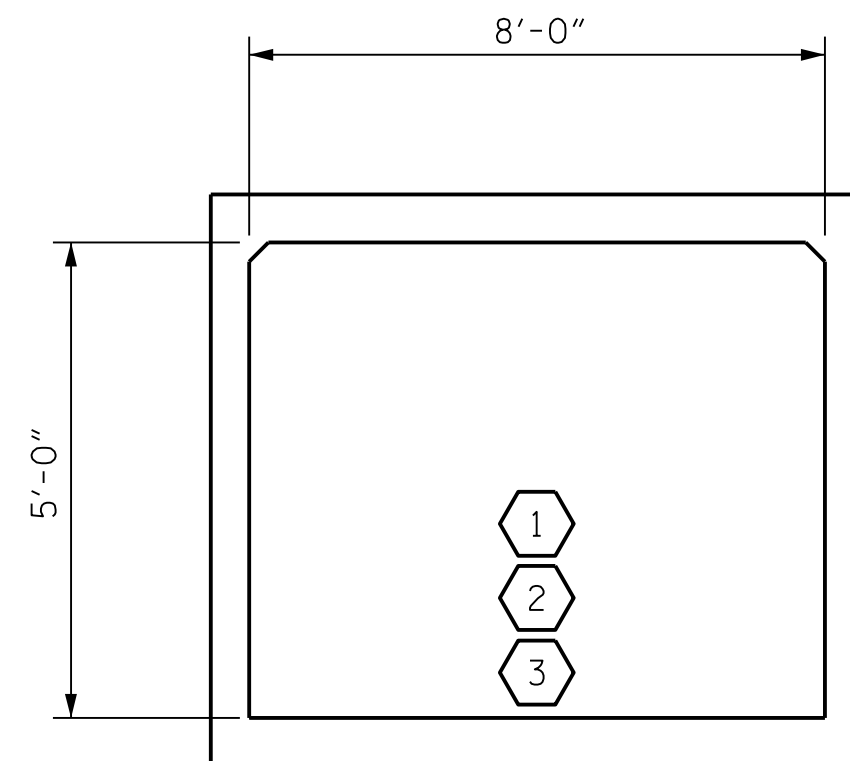
**NOTE:**

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

THE LIVE LOAD RATING FOR VEHICLES ON -L- WERE COMPUTED WITH A DESIGN FILL DEPTH OF 9.95 FT.

**COMMENTS:**

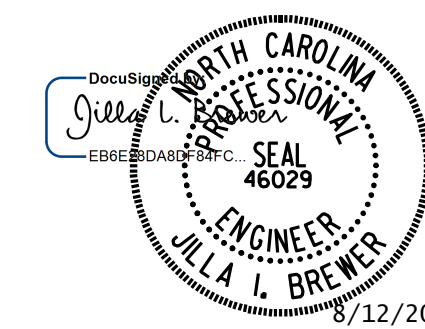
- ③ CONTROLLING LOAD RATING
- ① DESIGN LOAD RATING (HL-93)
- ② DESIGN LOAD RATING (HS-20)
- ③ LEGAL LOAD RATING \*\*
- \*\* SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. A-0011C  
CLAY COUNTY  
STATION: 186+81.00 -L-

SHEET 2 OF 11



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

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

**MI ENGINEERING**  
1011 SCHAUB DRIVE, SUITE 100  
RALEIGH, NC 27606  
(919) 851-6606  
FIRM PE NUMBER : P-0671

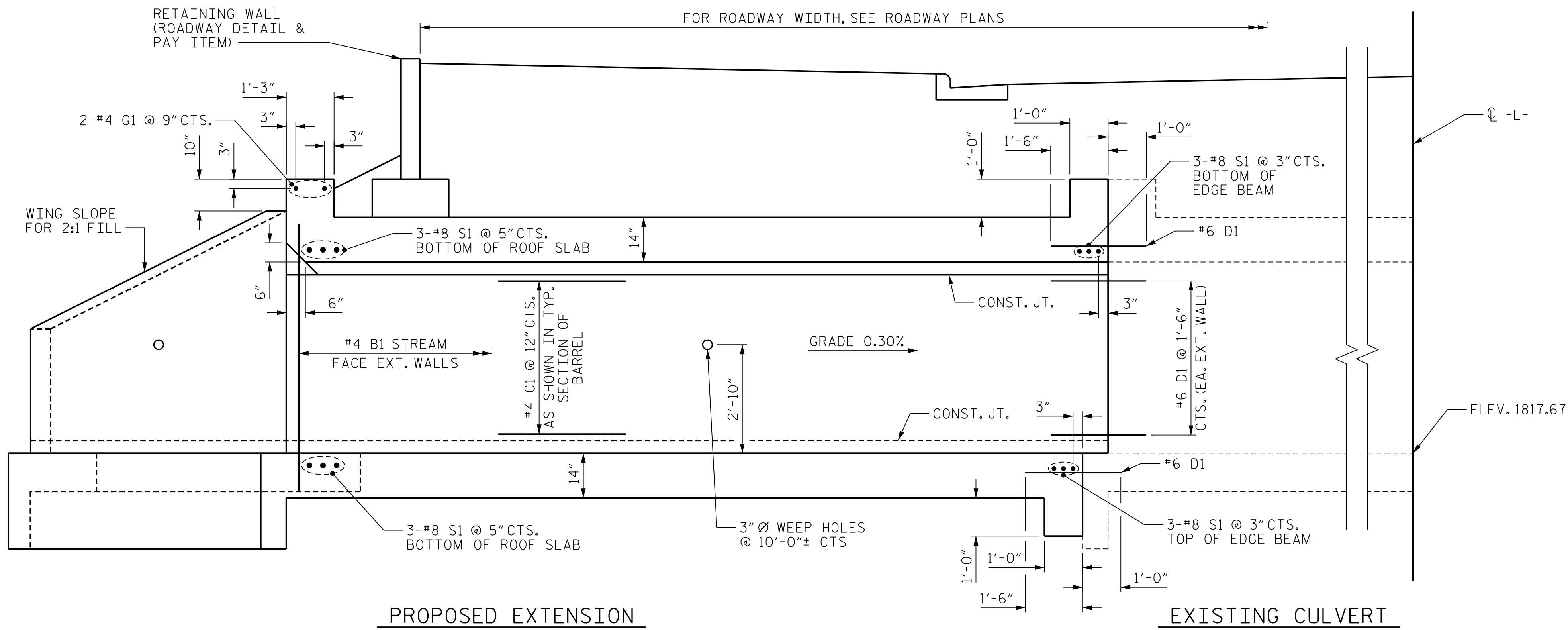
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.  
**C3-2**  
TOTAL SHEETS  
**11**

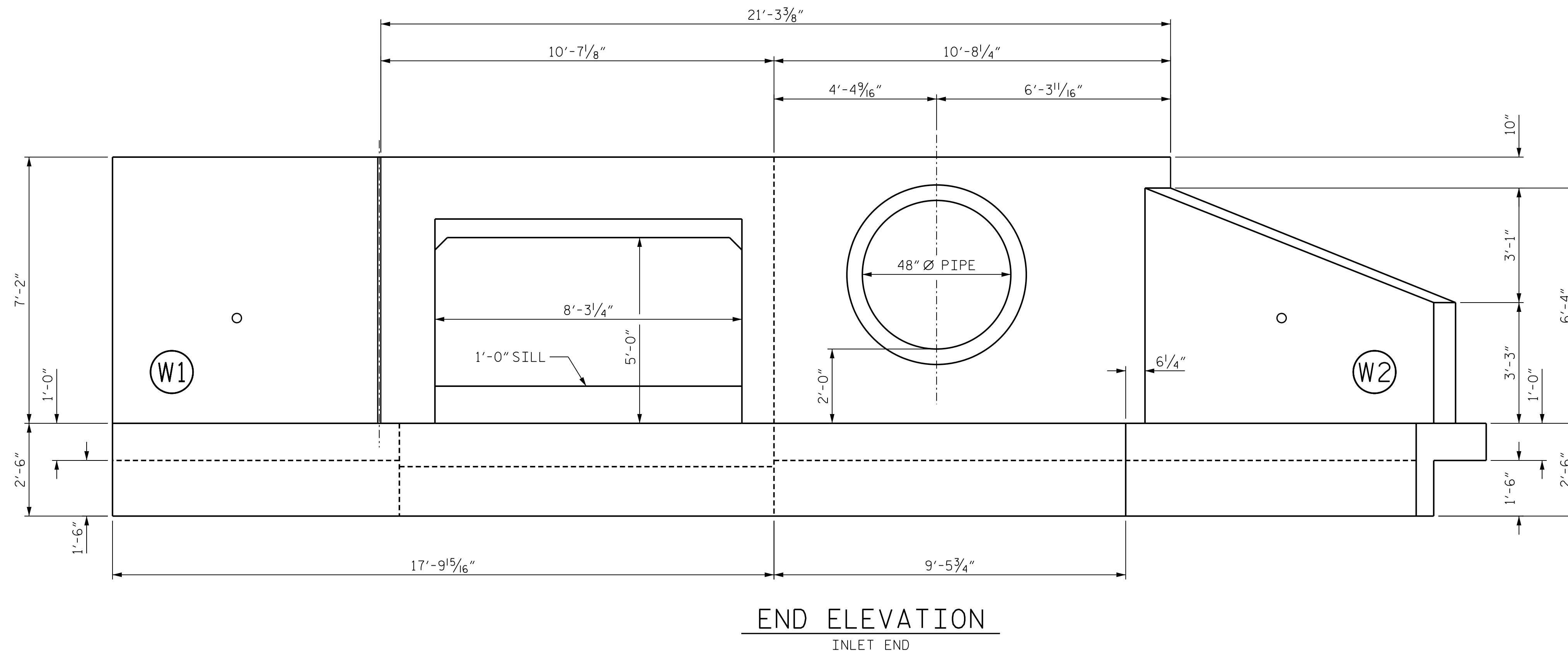
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ASSEMBLED BY: J.I. BREWER	DATE: 07/19
CHECKED BY: M. ISRAELNAIM	DATE: 07/19
DESIGN ENGINEER OF RECORD: J.I. BREWER	DATE: 07/19
DRAWN BY: WMC 7/11	REV. 10/17 MMA/GM
CHECKED BY: GM 7/11	REV. 12/17 MMA/THC

8/12/2019 12:42:38 PM User: jlsrceinam  
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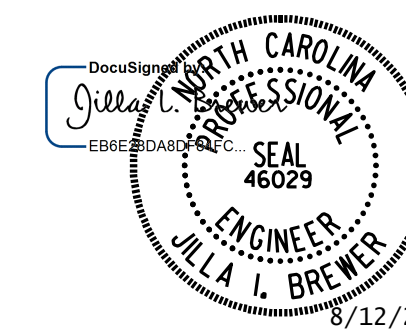
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION  
INLET END

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-

SHEET 3 OF 11



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SINGLE 8 FT. X 5 FT.  
 CONCRETE BOX CULVERT  
 LEFT EXTENSION**

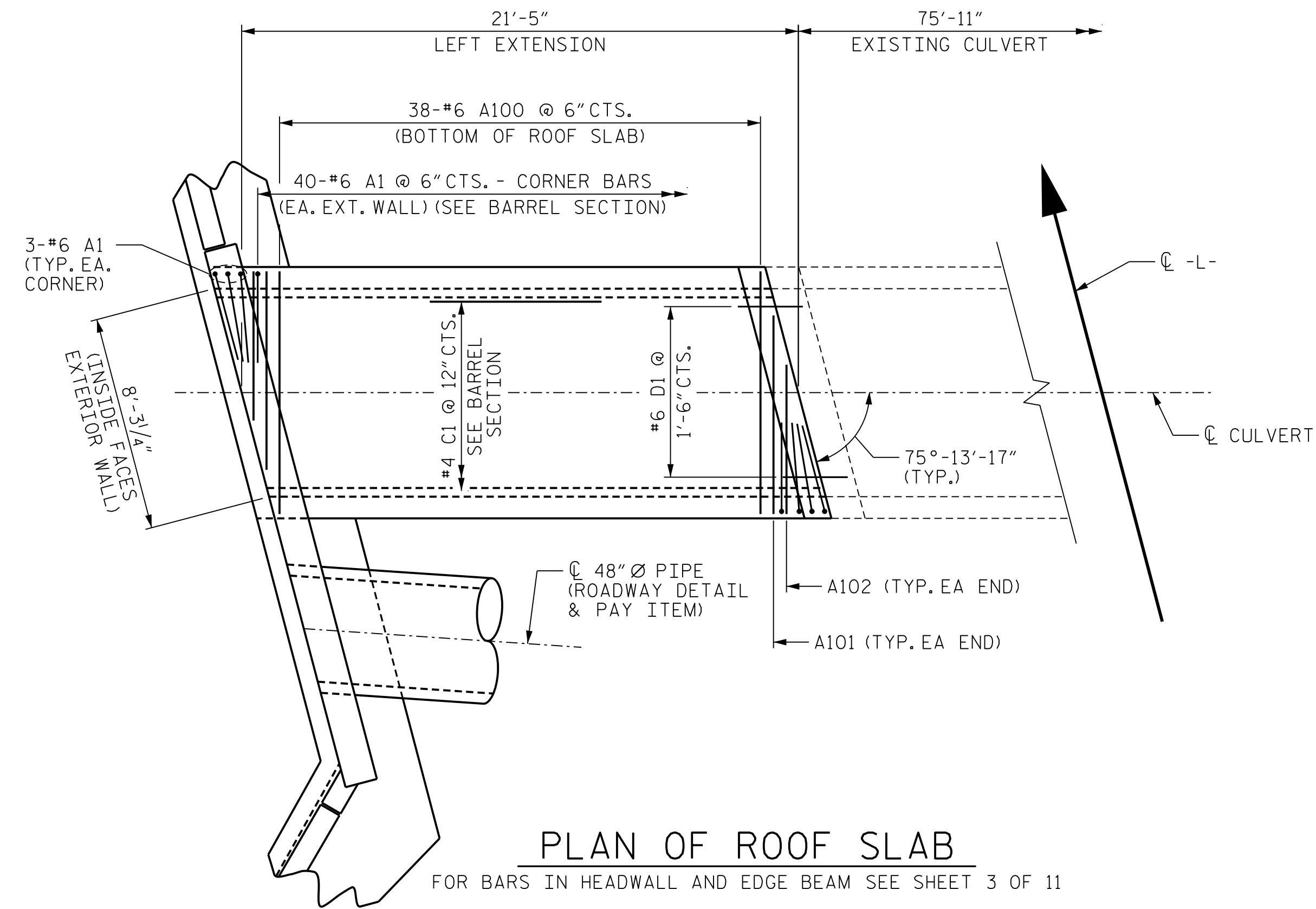
**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

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

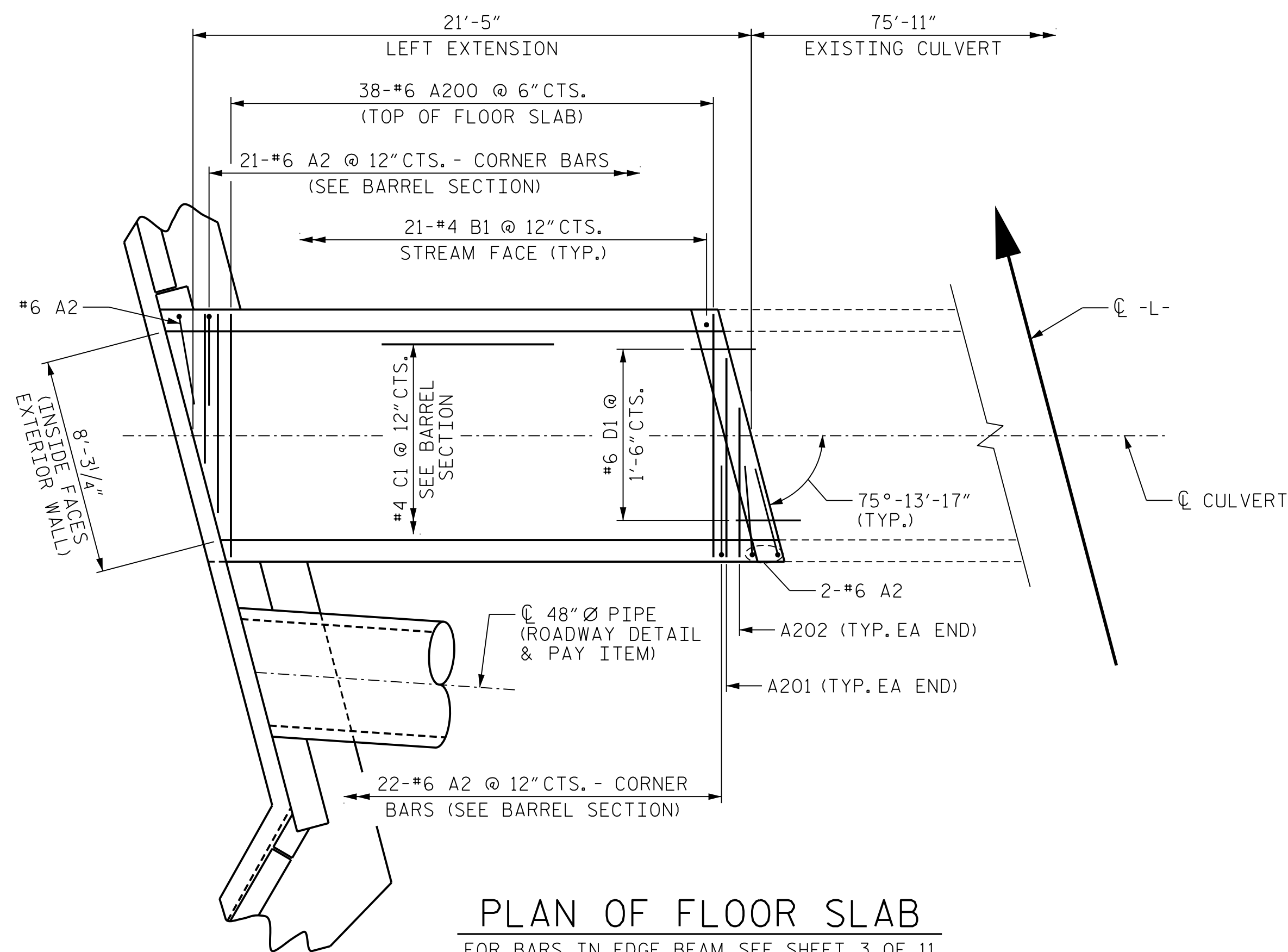
DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

8/12/2019 12:43:42 PM User: jlsrce@naim File: N:\NC\_Bridges\MI5007-MA\_Eng-A-0011C.NC 69 Culverts\Site 3\Culvert Ext.1\Barrel\_Unnamed Creek at NC 69\Structures\412\_007\_A0011C-SMU-CU4.dgn



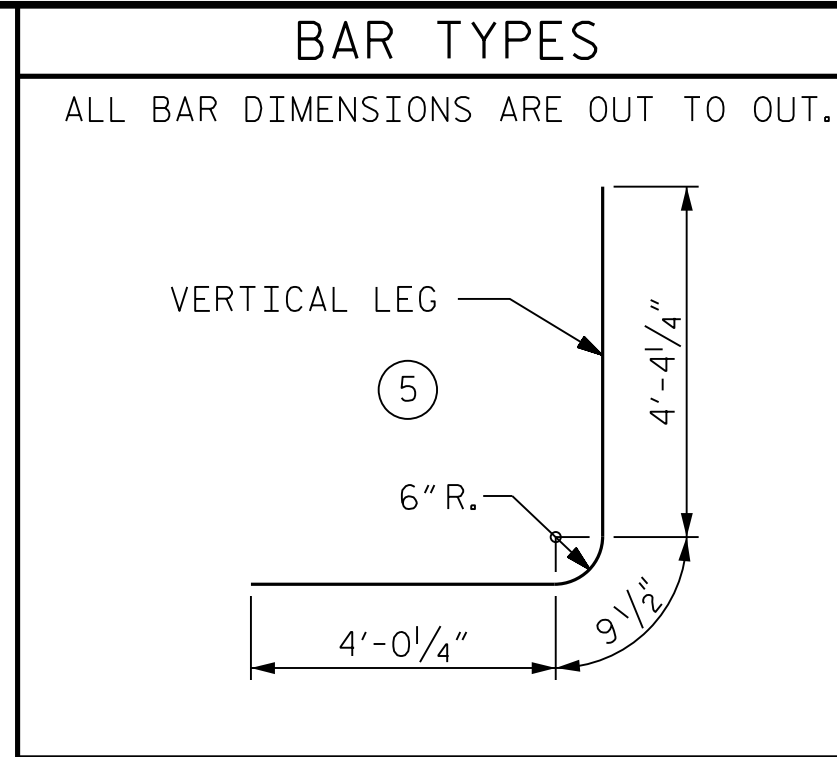
**PLAN OF ROOF SLAB**

FOR BARS IN HEADWALL AND EDGE BEAM SEE SHEET 3 OF 11



**PLAN OF FLOOR SLAB**

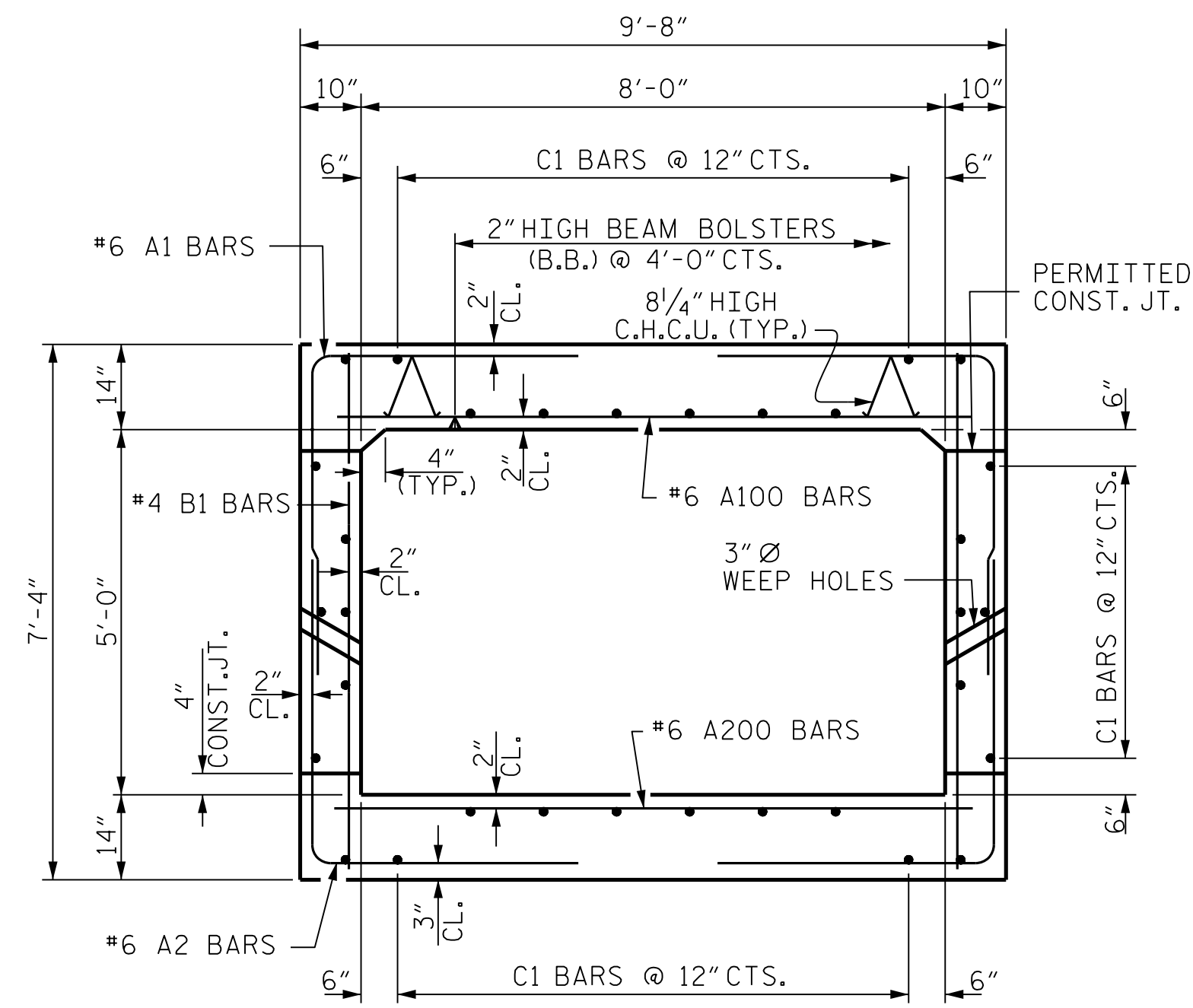
FOR BARS IN EDGE BEAM SEE SHEET 3 OF 11  
SILLS NOT SHOWN. SEE SHEET 11 OF 11 FOR LOCATIONS



BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	86	#6	5	9'-2"	1,184
A2	46	#6	5	9'-2"	633
A100	38	#6	STR	9'-4"	533
A101	2	#6	STR	7'-7"	23
A102	2	#6	STR	5'-8"	17
A200	38	#6	STR	9'-4"	533
A201	2	#6	STR	7'-7"	23
A202	2	#6	STR	5'-8"	17
B1	42	#4	STR	6'-11"	194
C1	32	#4	STR	21'-1"	451
D1	24	#6	STR	2'-6"	90
D2	6	#6	STR	1'-9"	16
G1	2	#4	STR	10'-3"	14
S1	12	#8	STR	9'-7"	307
REINFORCING STEEL					4,035 LBS.

**SPLICE LENGTH CHART**

BAR	SIZE	SPLICE LENGTH
B1	#4	1'-10"

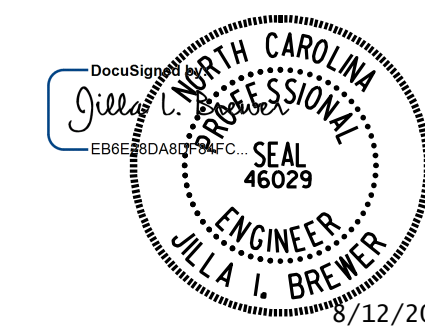


**RIGHT ANGLE SECTION OF BARREL**

THERE ARE 32 "C" BARS IN SECTION OF BARREL

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-

SHEET 4 OF 11



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SINGLE 8 FT. X 5 FT.  
 CONCRETE BOX CULVERT  
 LEFT EXTENSION**

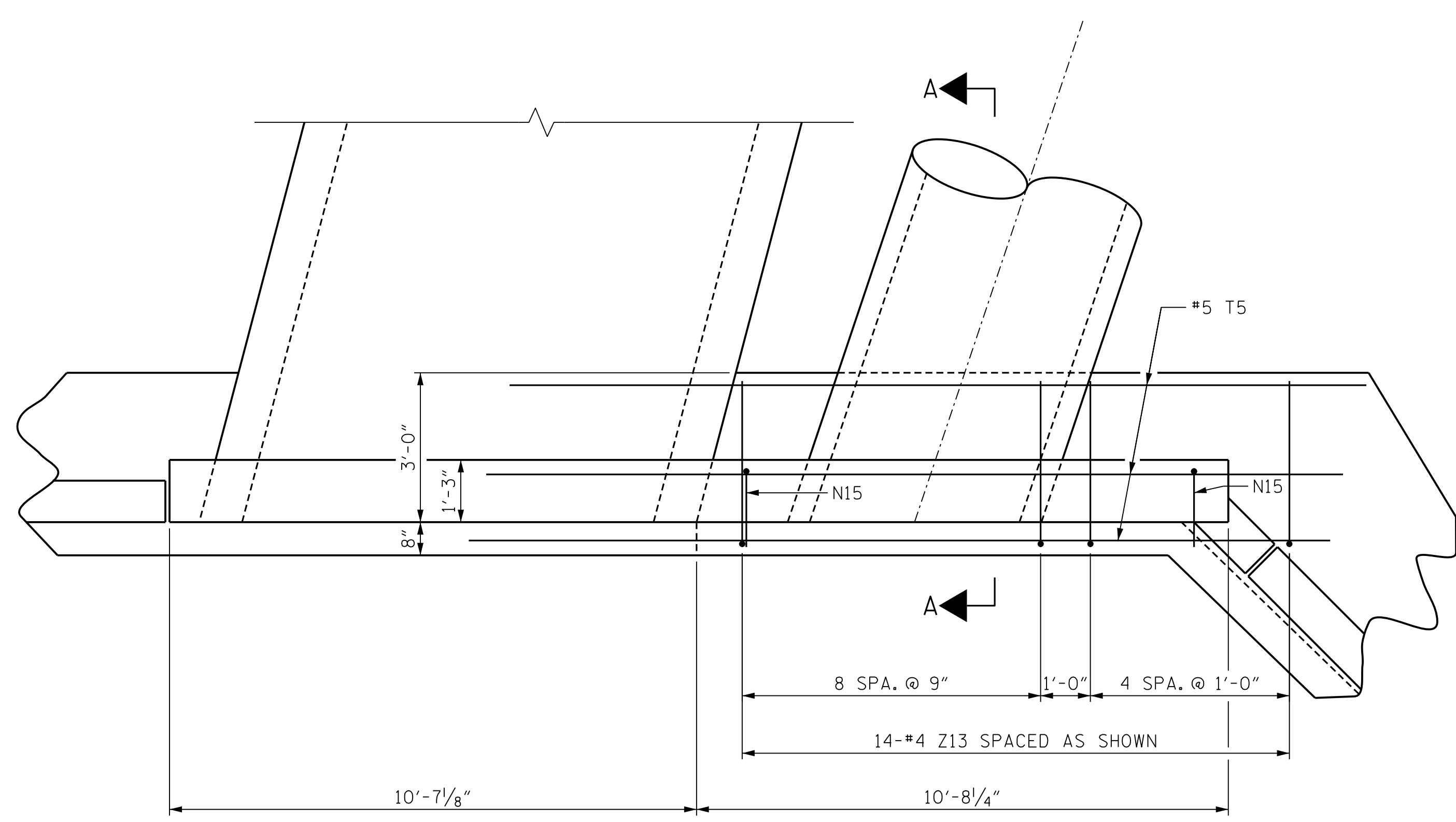
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

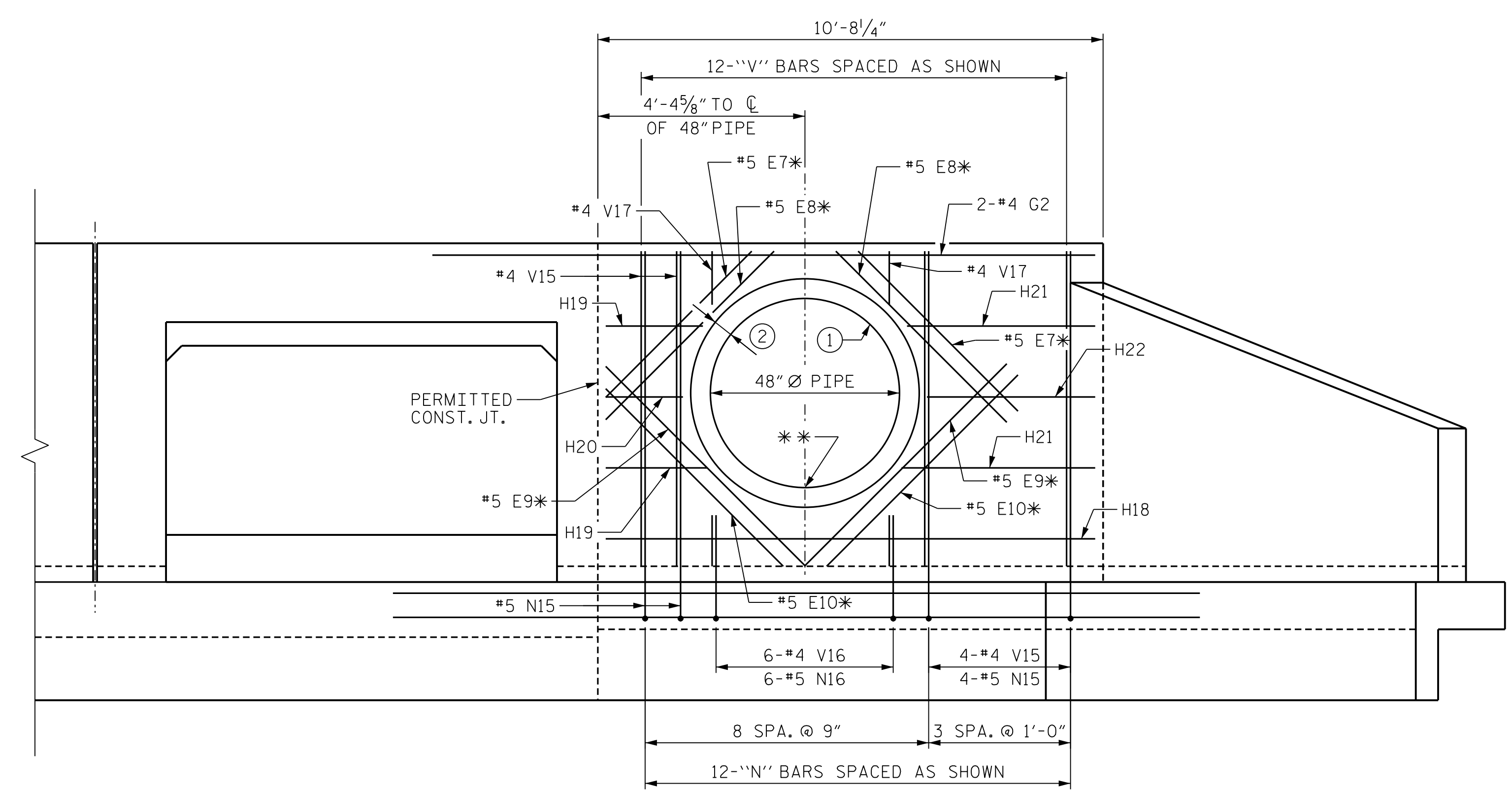
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-4
1			3			TOTAL SHEETS
2			4			II

DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

8/12/2019 12:44:11 PM User: jlsrceinam  
 Filename: N:\NC\_Bridges\MI5007-MA\_Eng-A-0011C-NC\_69\_Culverts\Site\_3\_Culvert\_Ext\_1\_Barrel\_Unnamed\_Creek\_of\_NC\_69\Structures\412\_009\_A0011C-SMU-CU5.dgn



PLAN - 48" Ø PIPE HEADWALL

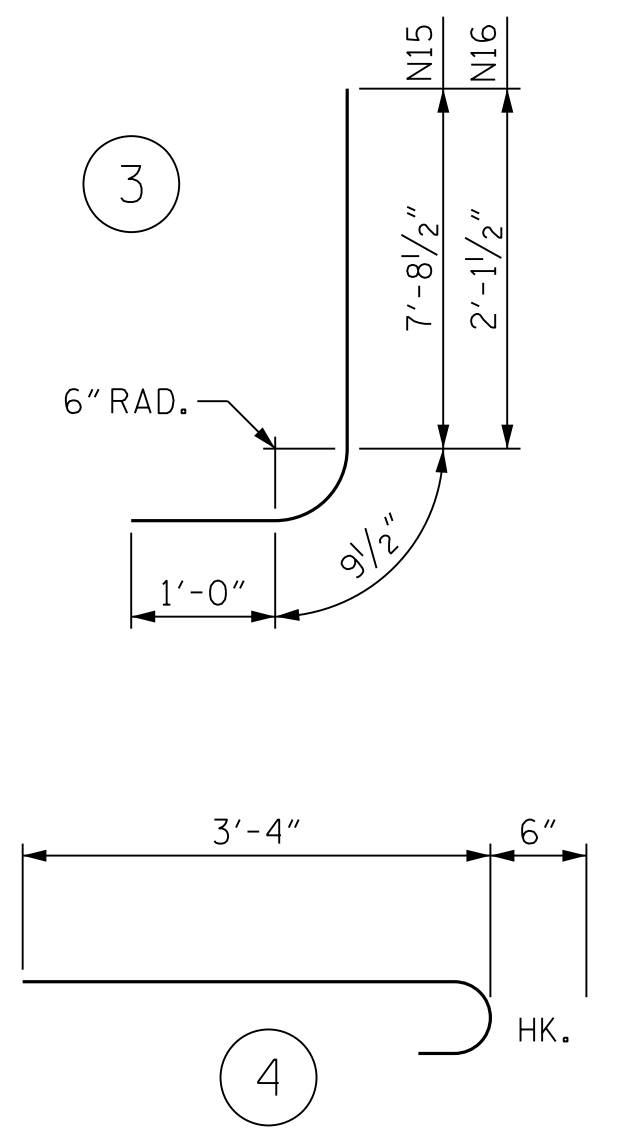


ELEVATION - 48" PIPE HEADWALL

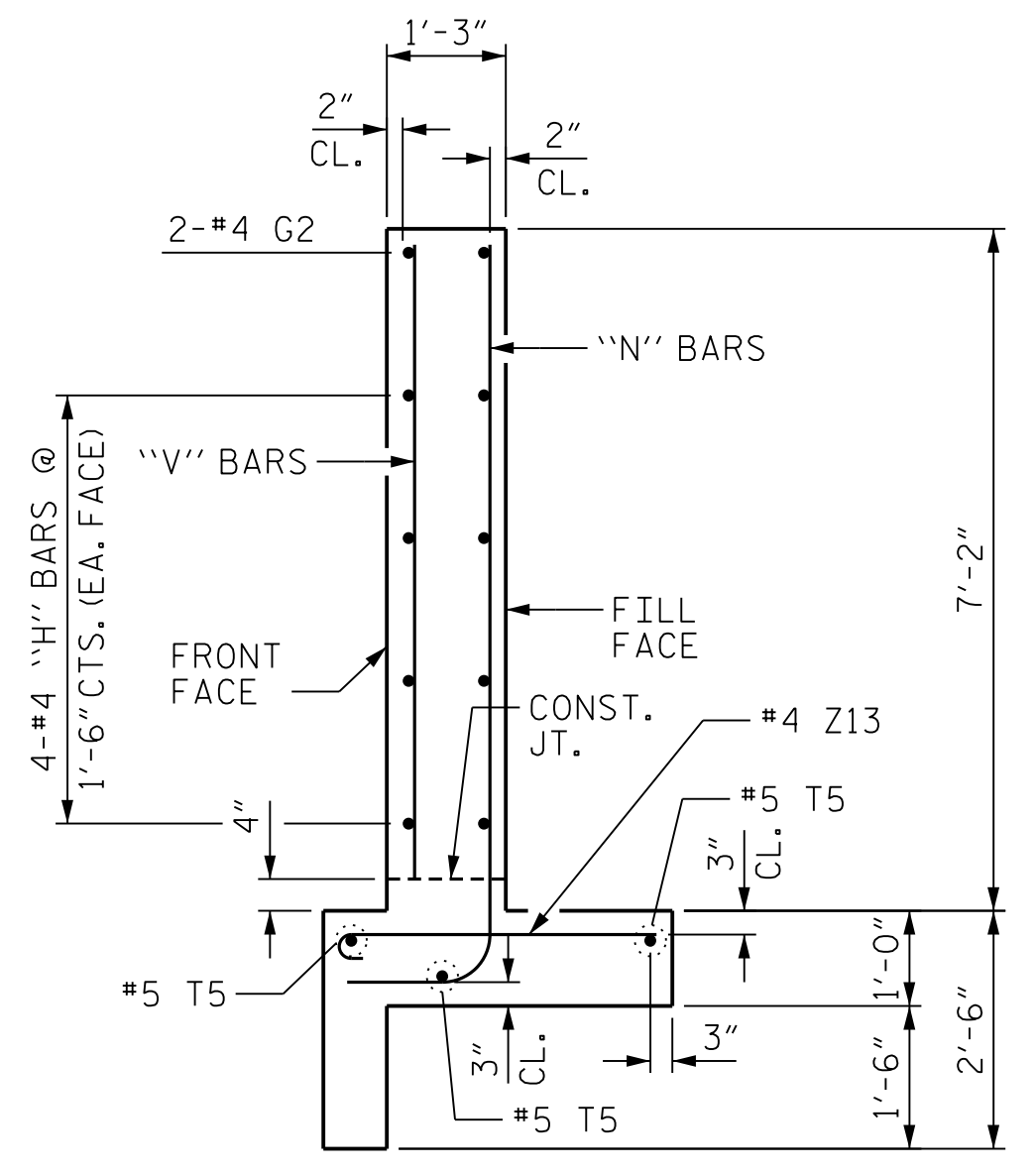
\* #5 "E" BARS EA. FACE  
 \*\* PIPE INVERT 2'-0" ABOVE BOTTOM SLAB

- ① 6" BEVEL AROUND PIPE (TYP.)
- ② 8" MIN. (TYP.)

BAR TYPES					BILL OF MATERIAL						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
E7	4	#5	STR	4'-4"	18	G2	2	#4	STR	13'-9"	18
E8	4	#5	STR	5'-0"	21	H18	2	#4	STR	10'-0"	13
E9	4	#5	STR	5'-11"	25	H19	4	#4	STR	2'-0"	5
E10	4	#5	STR	5'-3"	22	H20	2	#4	STR	1'-7"	2
						H21	4	#4	STR	3'-11"	10
						H22	2	#4	STR	3'-6"	5
						N15	6	#5	3	9'-6"	59
						N16	6	#5	3	3'-11"	25
						T5	3	#5	STR	17'-2"	54
						V15	6	#4	STR	6'-8"	27
						V16	6	#4	STR	1'-1"	4
						V17	2	#4	STR	1'-1"	1
						Z13	14	#4	4	3'-10"	36
REINFORCING STEEL										345	LBS
CLASS A CONCRETE										4.2	C.Y.



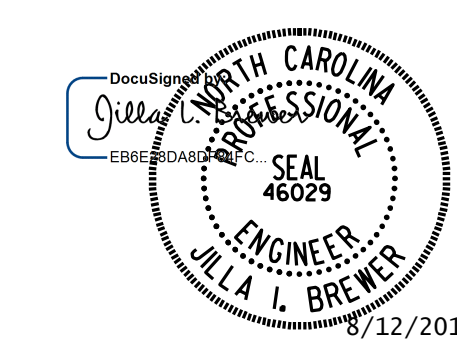
ALL BAR DIMENSIONS ARE OUT TO OUT.



SECTION A-A

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-

SHEET 5 OF 11



**DOCUMENT NOT CONSIDERED FINAL  
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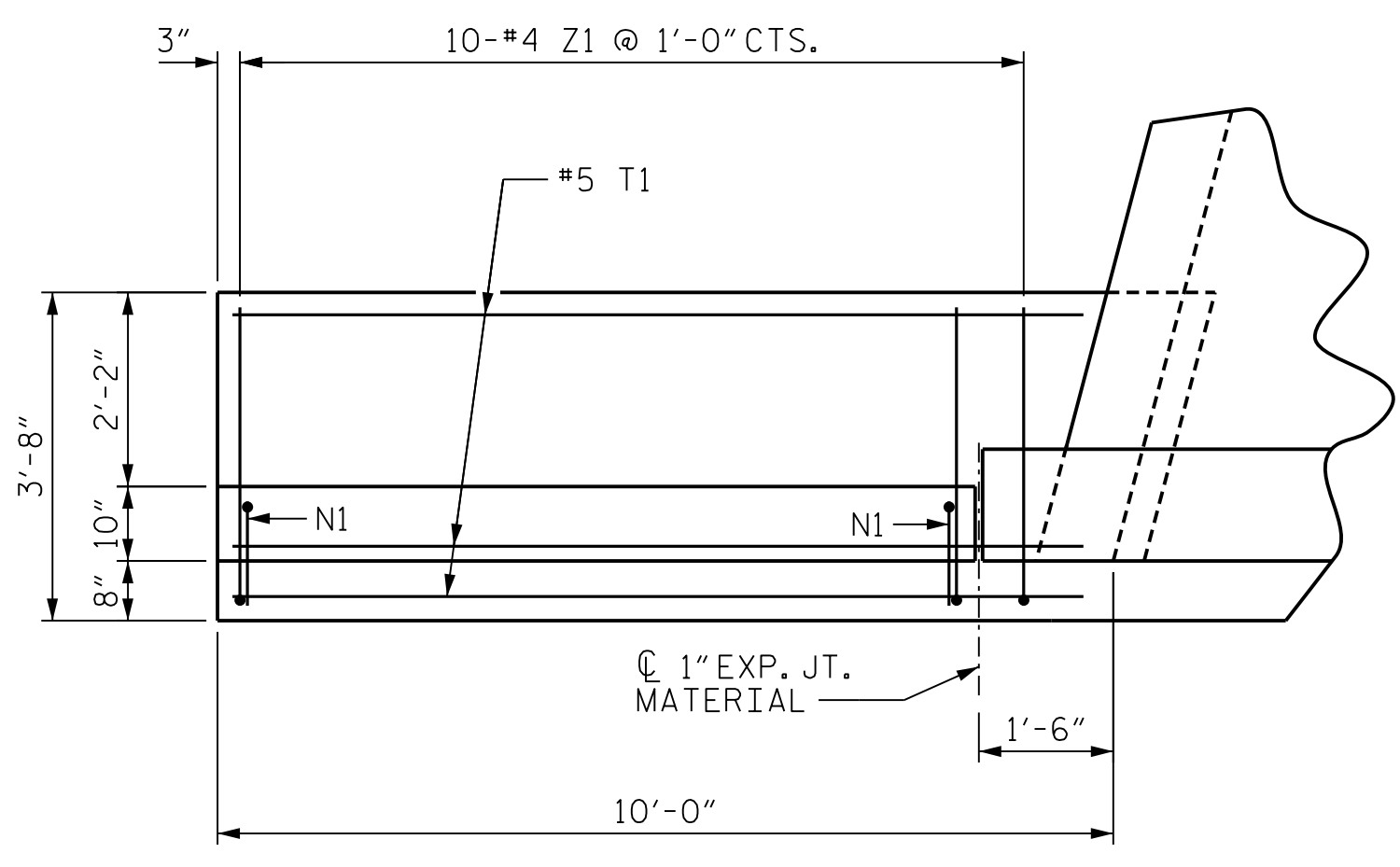
**MI ENGINEERING**  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
48" Ø PIPE HEADWALL (LEFT EXTENSION)					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

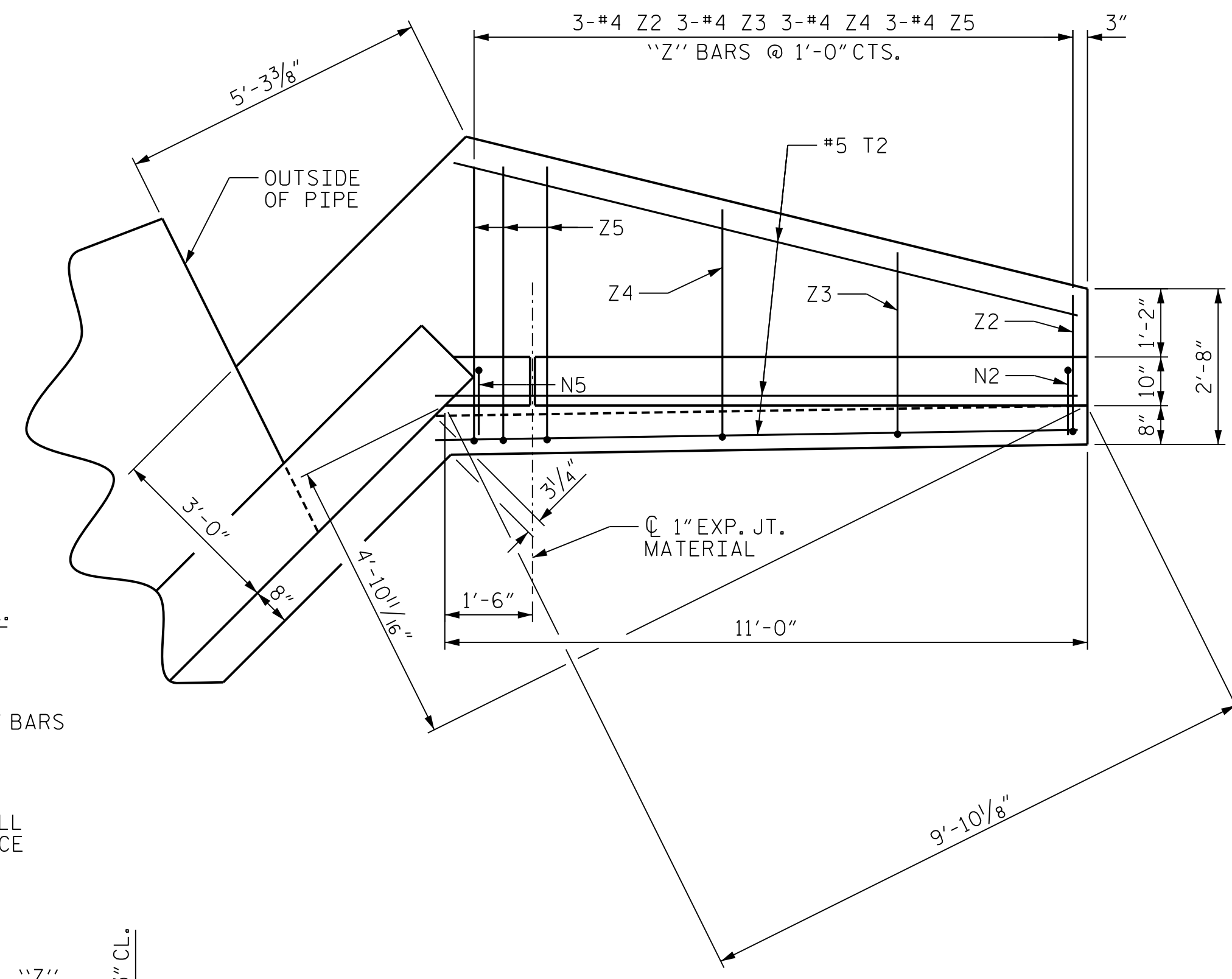
DRAWN BY : J.I. BREWER	DATE : 06/19
CHECKED BY : M. ISRAELNAIM	DATE : 07/19
DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

SHEET NO.  
**C3-5**  
 TOTAL SHEETS  
 11

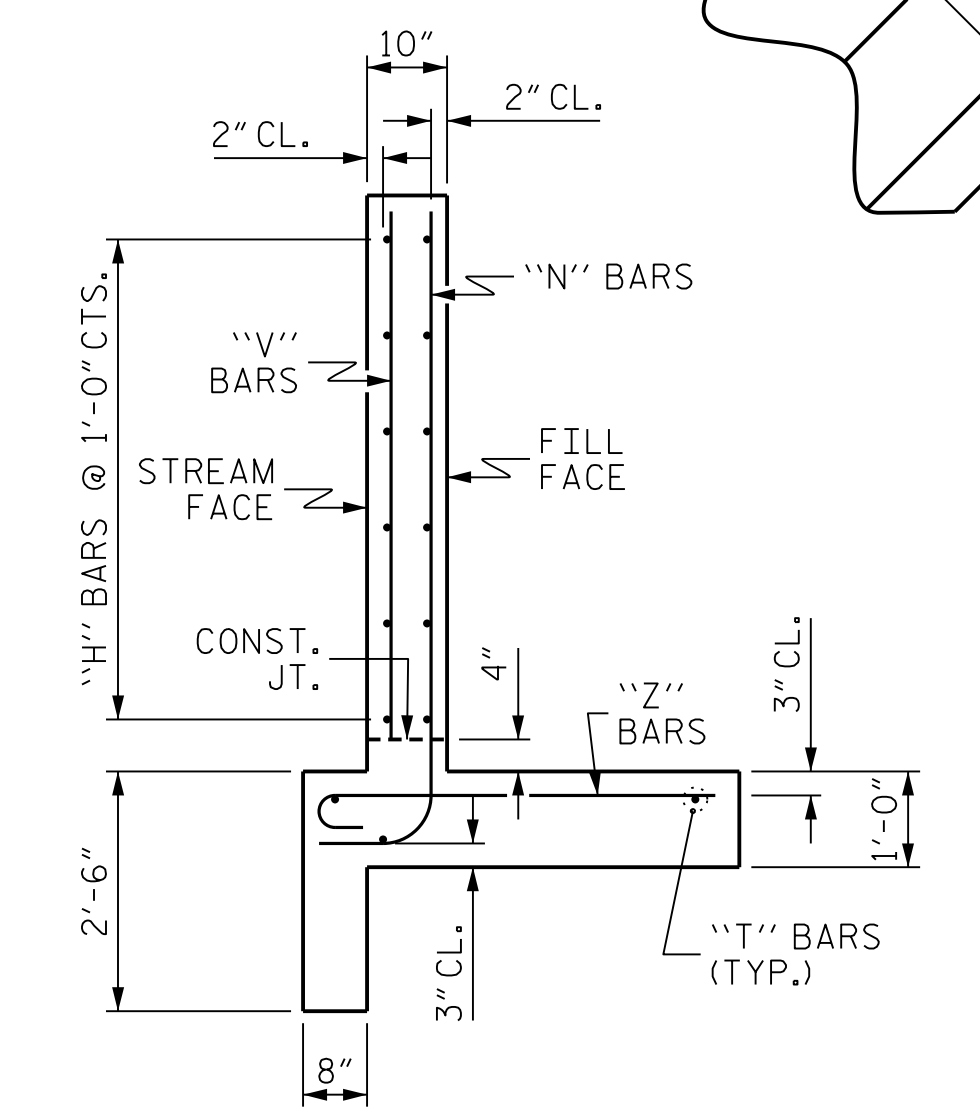
8/12/2019 12:44:42 PM User: jlsraelnaim  
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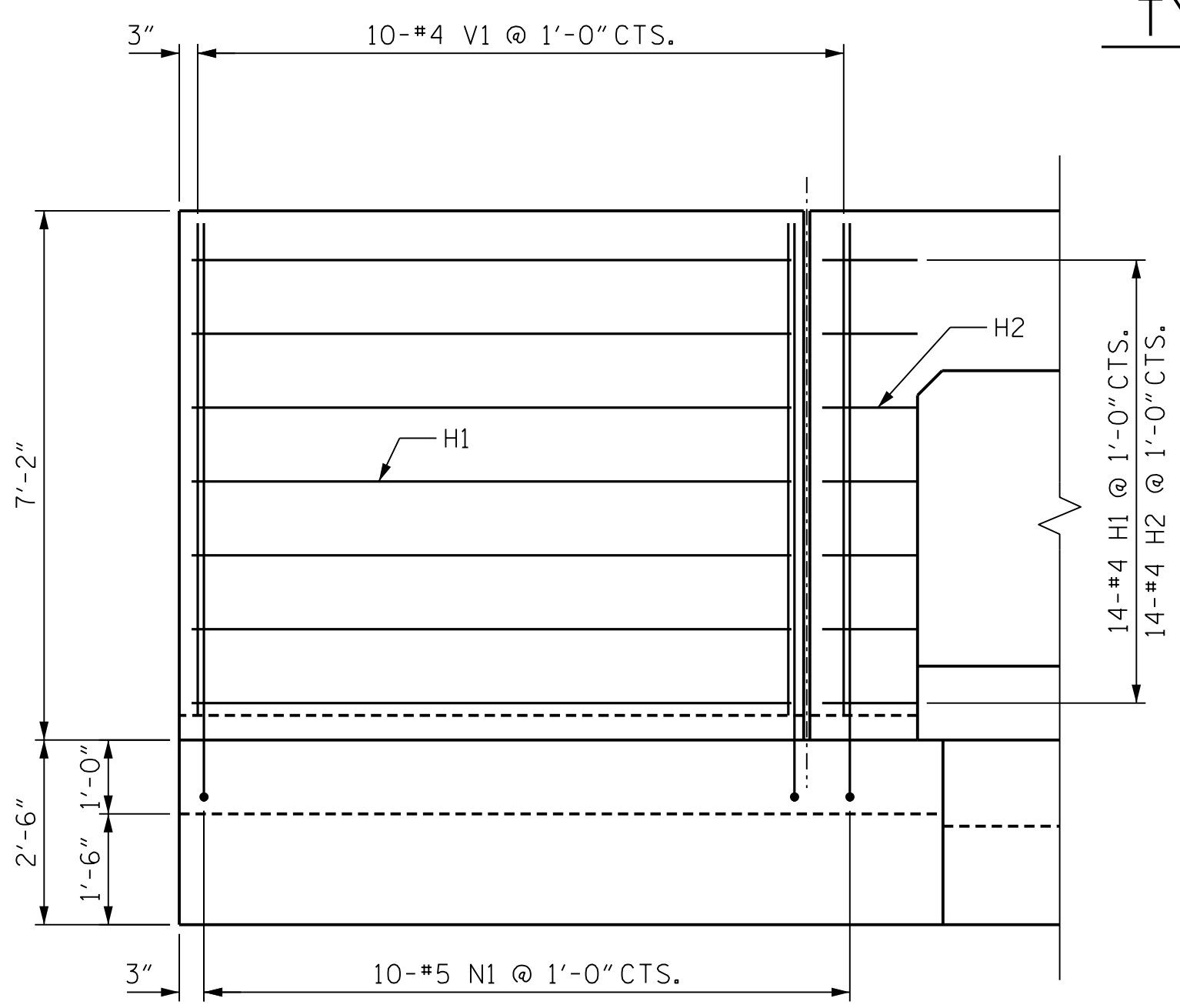
PLAN W1



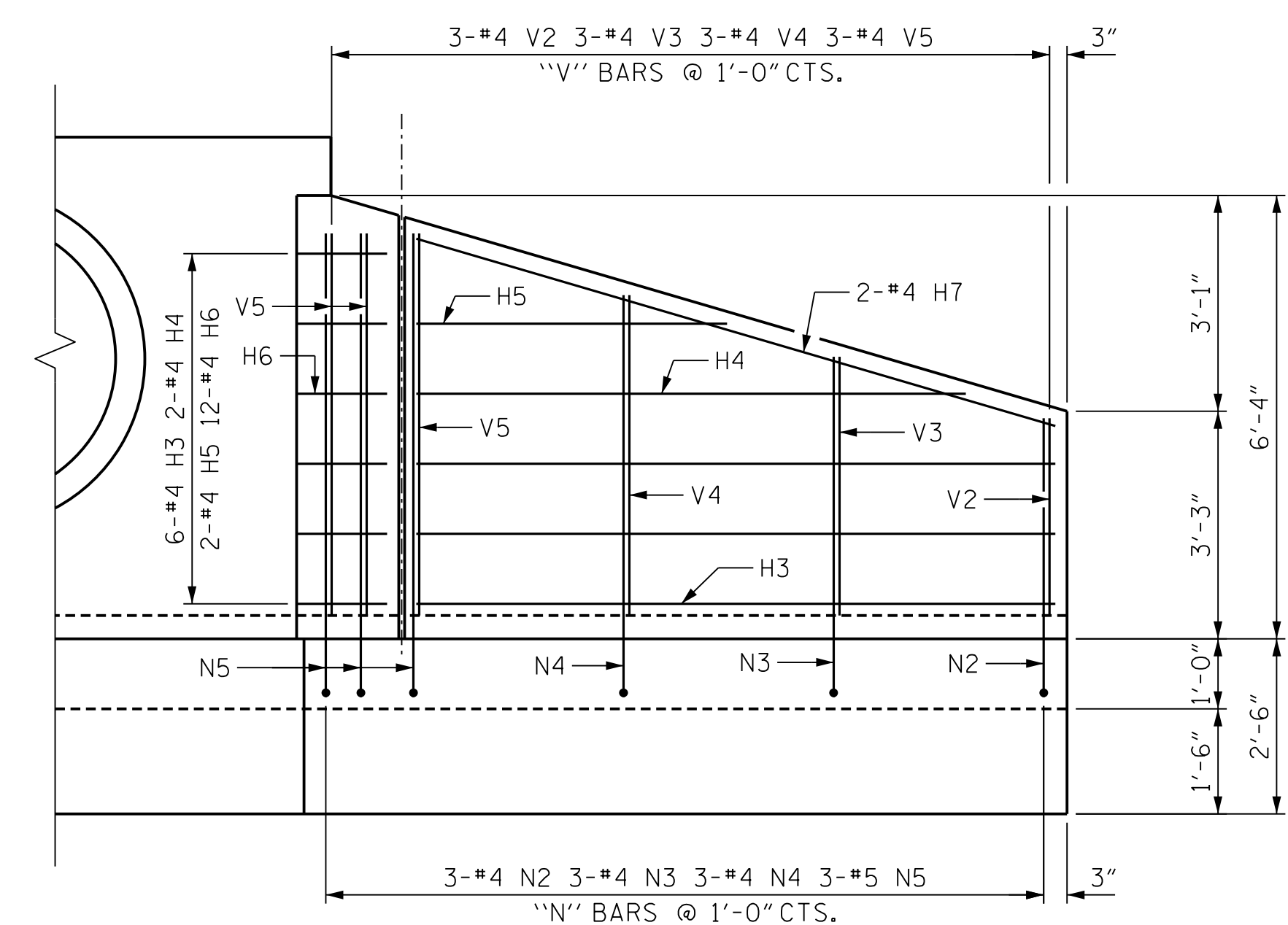
PLAN W2



TYPICAL WING SECTION



ELEVATION W1



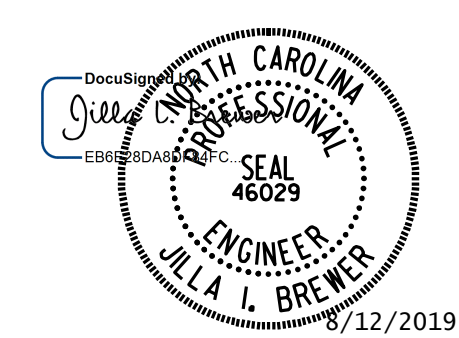
ELEVATION W2

**BAR TYPES**

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
H1	14	#4	STR	8'-1"	76	
H2	14	#4	1	3'-3"	30	
H3	6	#4	STR	9'-1"	36	
H4	2	#4	STR	7'-9"	10	
H5	2	#4	STR	4'-4"	6	
H6	12	#4	2	3'-3"	26	
H7	2	#4	STR	9'-5"	13	
N1	10	#5	3	8'-8"	90	
N2	3	#4	3	4'-9"	10	
N3	3	#4	3	5'-8"	11	
N4	3	#4	3	6'-6"	13	
N5	3	#5	3	7'-5"	23	
T1	3	#5	STR	9'-6"	30	
T2	3	#5	STR	11'-0"	34	
V1	10	#4	STR	6'-8"	45	
V2	3	#4	STR	2'-9"	6	
V3	3	#4	STR	3'-8"	7	
V4	3	#4	STR	4'-6"	9	
V5	3	#4	STR	5'-5"	11	
Z1	10	#4	4	3'-10"	26	
Z2	3	#4	4	2'-10"	6	
Z3	3	#4	4	3'-7"	7	
Z4	3	#4	4	4'-4"	9	
Z5	3	#4	4	5'-1"	10	
REINFORCING STEEL				544 LBS		
CLASS A CONCRETE						
2 WINGS				8.1 CY		
1 HEADWALLS				0.5 CY		
1 END CURTAIN WALLS				0.5 CY		
TOTAL				9.1 CY		

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-  
 SHEET 6 OF 11



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**WINGS 1 AND 2 FOR CONCRETE BOX CULVERT**  
 H = 5'-0" SLOPE = 2:1  
 105° SKEW

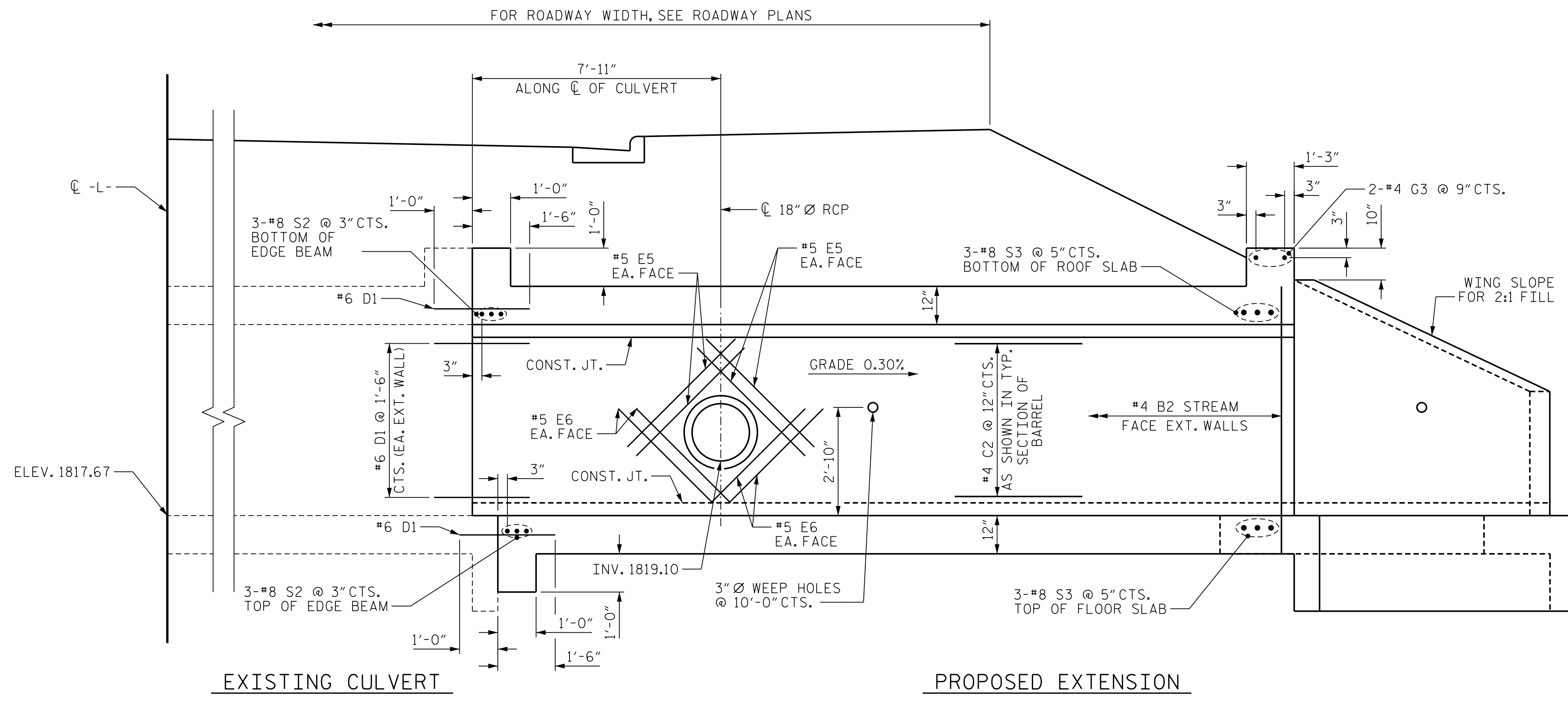
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

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

DRAWN BY : J.I. BREWER DATE : 06/19  
 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
 DESIGN ENGINEER OF RECORD : J.I. BREWER DATE : 07/19

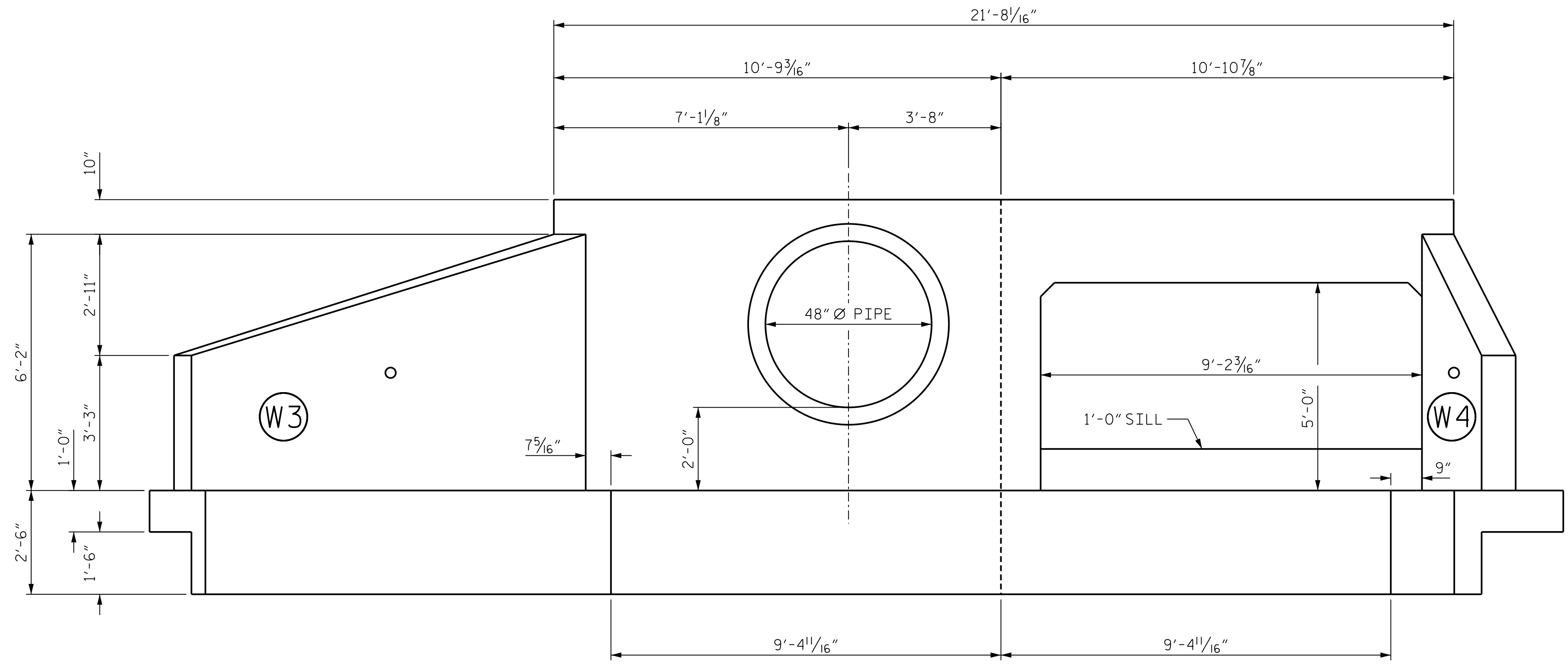
MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

8/12/2019 12:45:10 PM User: jlsr@elnaim  
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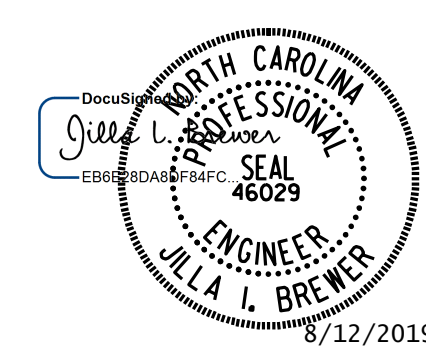
**CULVERT SECTION NORMAL TO ROADWAY**

NOTE: CUT REINFORCING STEEL AS NECESSARY TO PROVIDE 2" MIN. CLEAR TO 18" Ø RCP.



**END ELEVATION**  
OUTLET END

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-  
 SHEET 7 OF 11

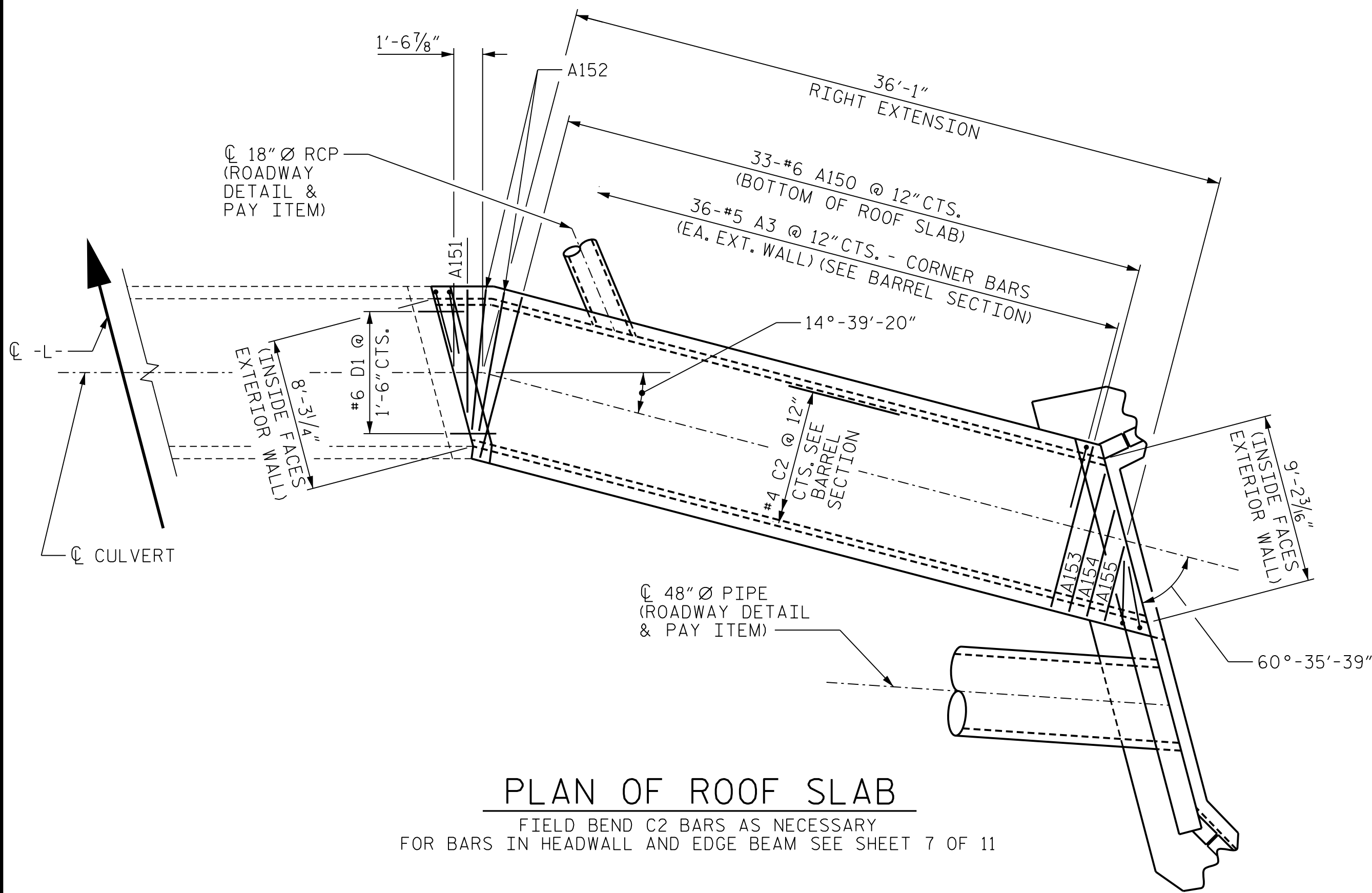


**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**  
 MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

STATE OF NORTH CAROLINA					
DEPARTMENT OF TRANSPORTATION					
RALEIGH					
SINGLE 8 FT. X 5 FT. CONCRETE BOX CULVERT RIGHT EXTENSION					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. <b>C3-7</b>					TOTAL SHEETS <b>11</b>

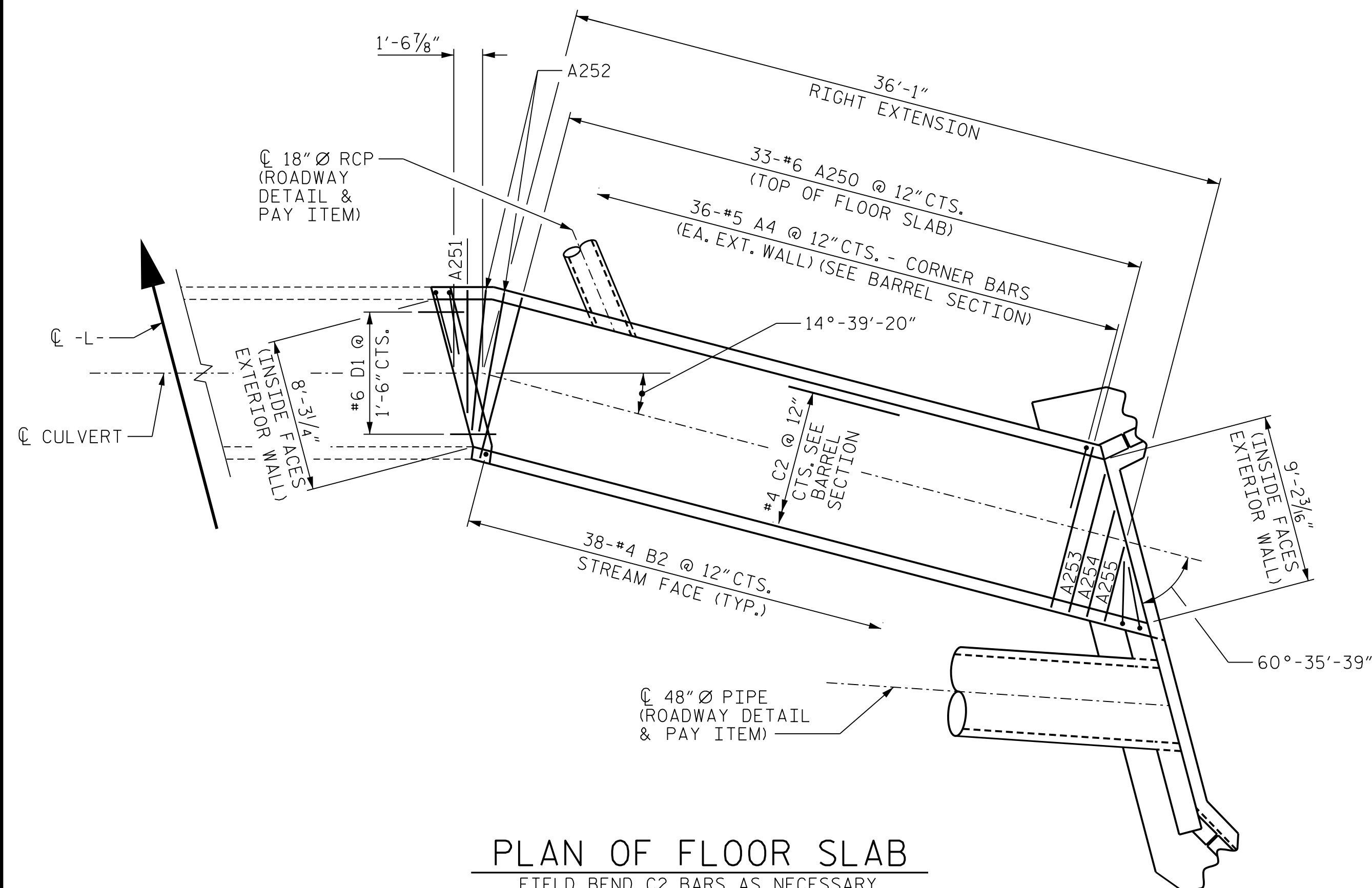
DRAWN BY : <u>J.I. BREWER</u>	DATE : <u>06/19</u>
CHECKED BY : <u>M. ISRAELNAIM</u>	DATE : <u>07/19</u>
DESIGN ENGINEER OF RECORD : <u>J.I. BREWER</u>	DATE : <u>07/19</u>

8/12/2019 12:45:40 PM User: jlsraelnaim File: C:\Users\jlsraelnaim\Documents\Projects\3.Culvert\Site 3.Culvert Ext.1.Barrel.Unnamed Creek at NC 69\Structures\412.015\_A0011C.SMU.CUB.dgn



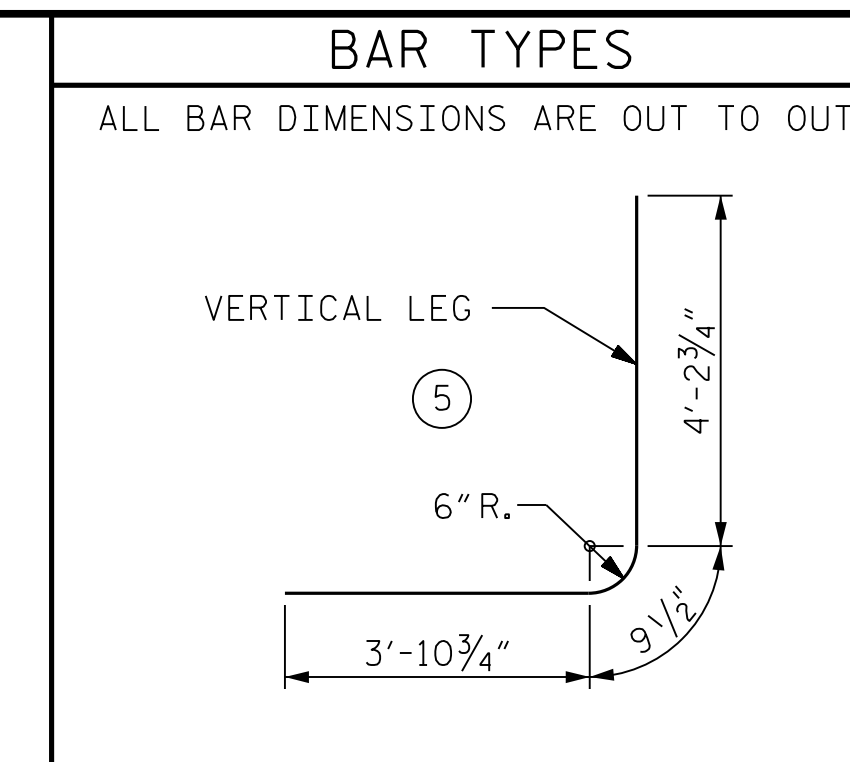
**PLAN OF ROOF SLAB**

FIELD BEND C2 BARS AS NECESSARY  
FOR BARS IN HEADWALL AND EDGE BEAM SEE SHEET 7 OF 11



**PLAN OF FLOOR SLAB**

FIELD BEND C2 BARS AS NECESSARY  
FOR BARS IN EDGE BEAM SEE SHEET 7 OF 11  
SILLS NOT SHOWN, SEE SHEET 11 OF 11 FOR LOCATIONS

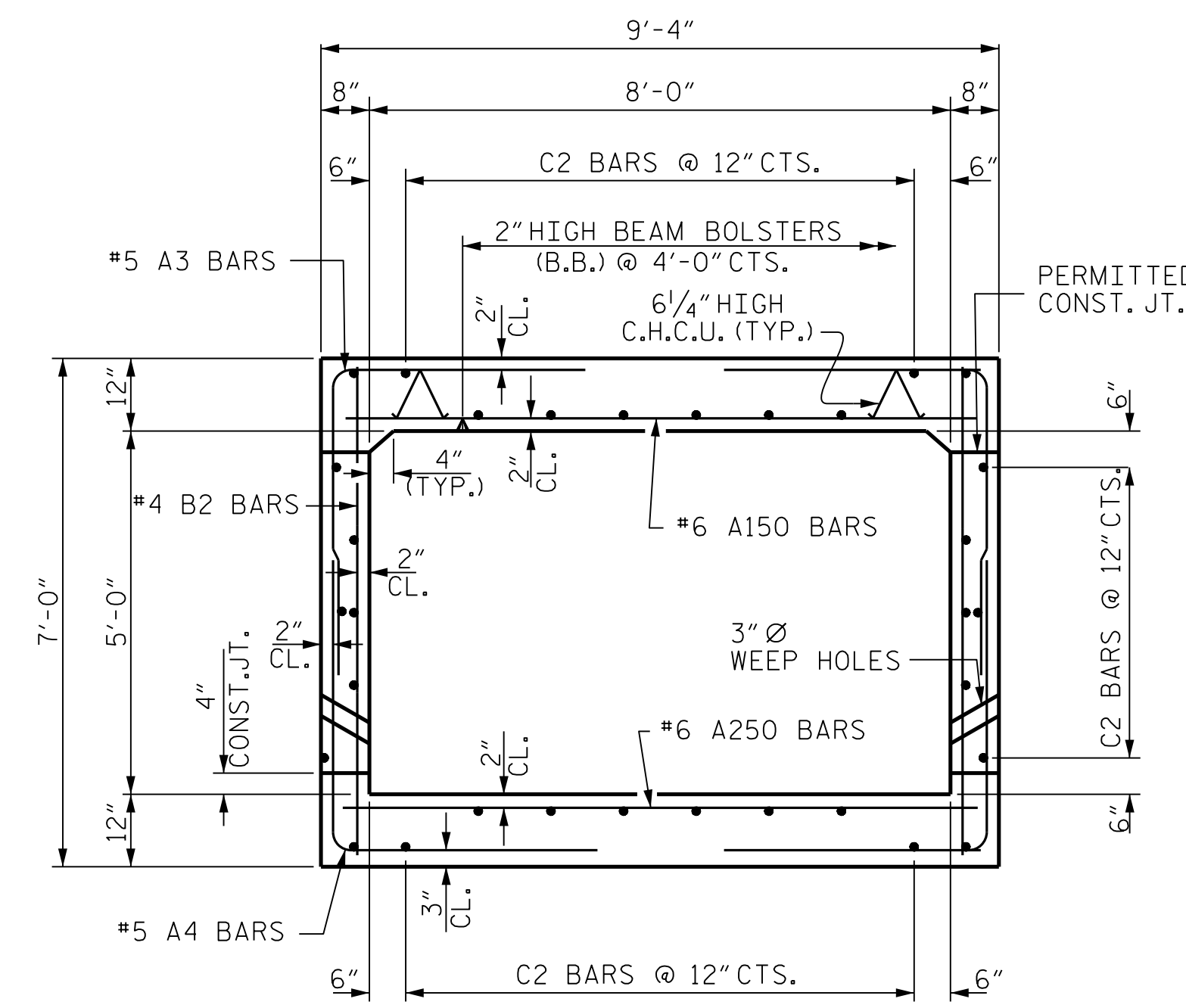


**SPLICE LENGTH CHART**

BAR	SIZE	SPLICE LENGTH
B2	#4	1'-10"

**BILL OF MATERIAL**

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
A3	#5	5	8'-11"	707
A4	#5	5	8'-11"	707
A150	#6	STR	9'-0"	446
A151	#6	STR	6'-8"	10
A152	#6	STR	7'-7"	23
A153	#6	STR	7'-8"	12
A154	#6	STR	5'-11"	9
A155	#6	STR	4'-2"	6
A250	#6	STR	9'-0"	446
A251	#6	STR	6'-8"	10
A252	#6	STR	7'-7"	23
A253	#6	STR	7'-8"	12
A254	#6	STR	5'-11"	9
A255	#6	STR	4'-2"	6
B2	#4	STR	6'-7"	334
C2	#4	STR	37'-4"	798
D1	#6	STR	2'-6"	90
D3	#6	STR	1'-9"	16
E5	#6	STR	4'-0"	33
E6	#6	STR	3'-5"	29
G3	#4	STR	10'-4"	15
S2	#8	STR	8'-9"	140
S3	#8	STR	10'-4"	166
<b>REINFORCING STEEL</b>				<b>4,046 LBS.</b>

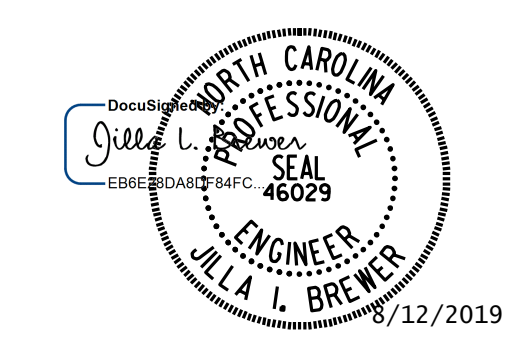


**RIGHT ANGLE SECTION OF BARREL**

THERE ARE 32 "C" BARS IN SECTION OF BARREL

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-

SHEET 8 OF 11



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SINGLE 8 FT. X 5 FT.  
 CONCRETE BOX CULVERT  
 RIGHT EXTENSION**

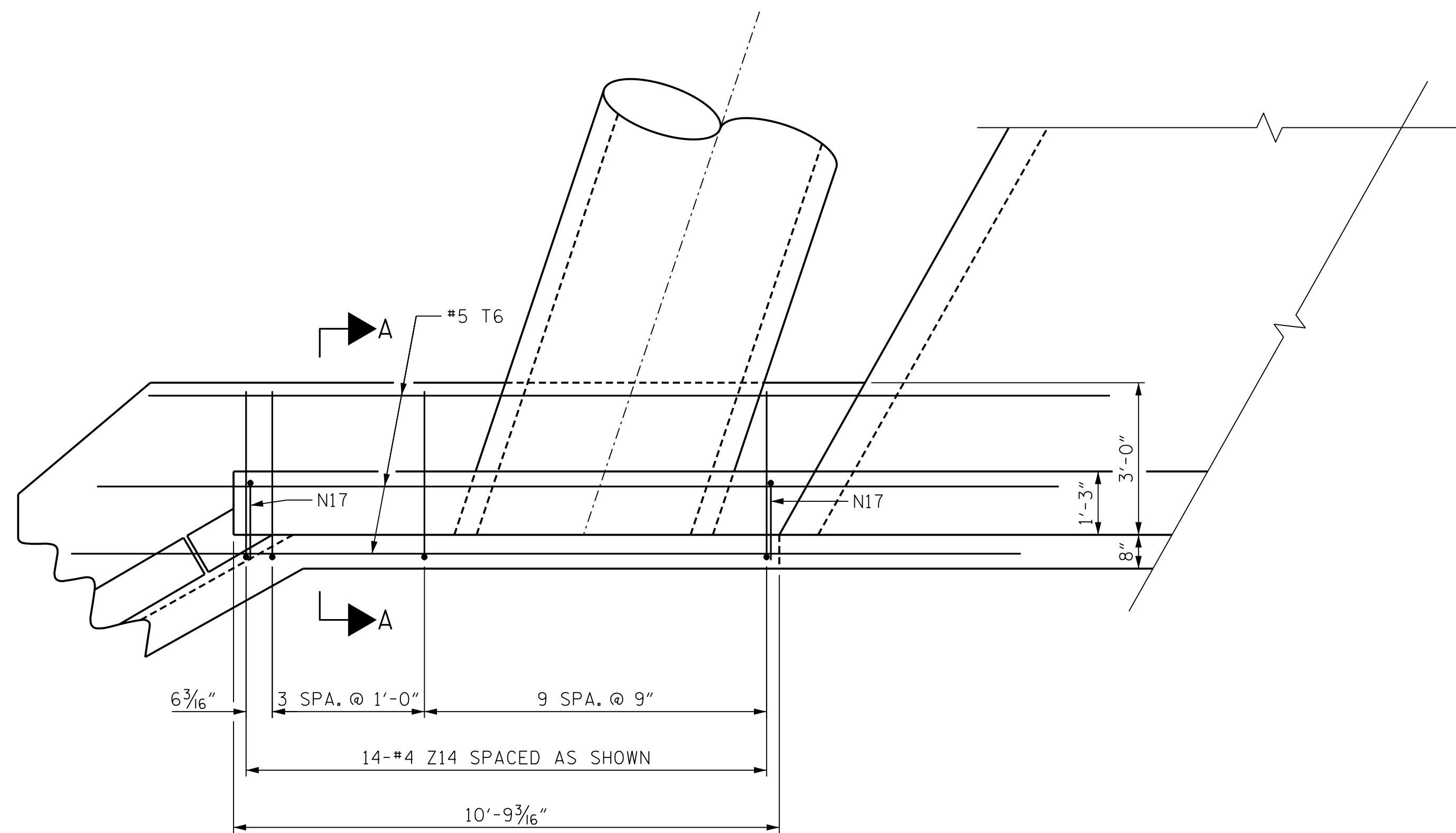
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**MI ENGINEERING**  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

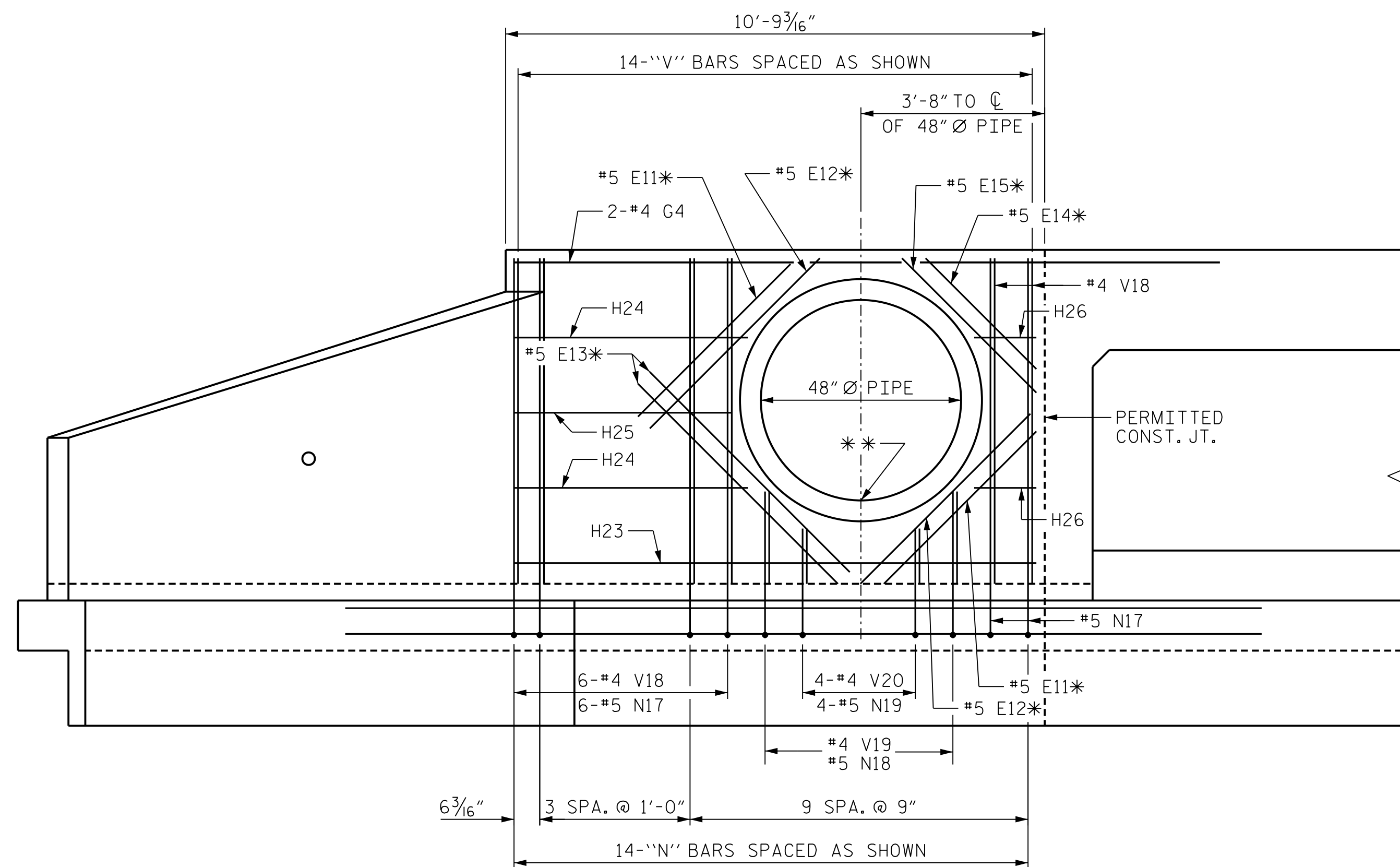
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-8
1			3			TOTAL SHEETS
2			4			II

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DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19



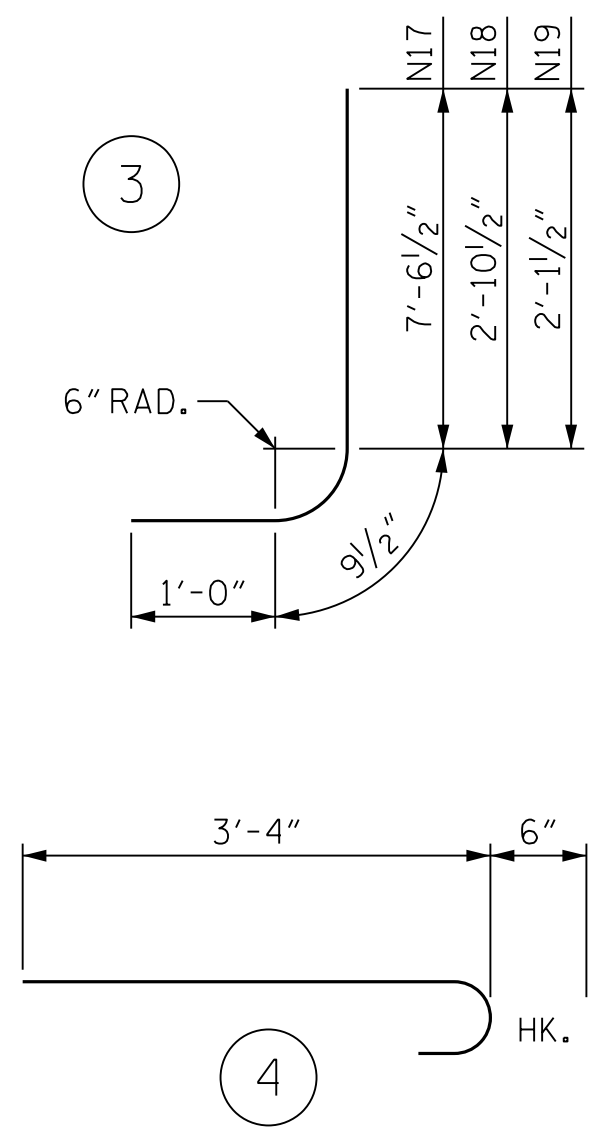


PLAN - 48" Ø PIPE HEADWALL

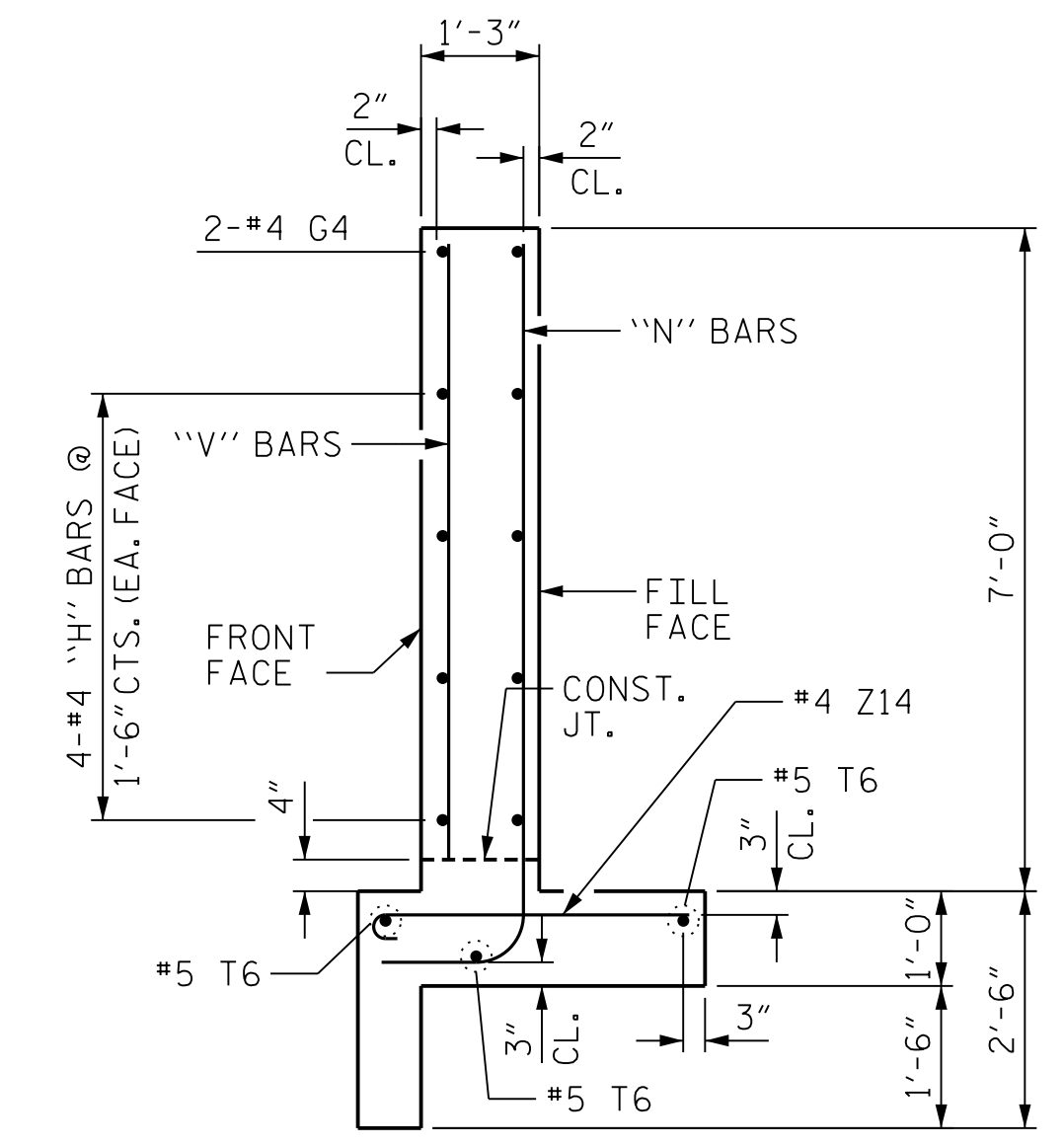


ELEVATION - 48" Ø PIPE HEADWALL

BAR TYPES				BILL OF MATERIAL		
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
E11	4	#5	STR	4'-3"	18	
E12	4	#5	STR	4'-9"	20	
E13	4	#5	STR	5'-7"	23	
E14	2	#5	STR	3'-1"	6	
E15	2	#5	STR	3'-9"	8	
G4	2	#4	STR	14'-8"	20	
H23	2	#4	STR	10'-6"	14	
H24	4	#4	STR	4'-8"	12	
H25	2	#4	STR	4'-4"	6	
H26	4	#4	STR	1'-2"	3	
N17	8	#5	3	9'-4"	78	
N18	2	#5	3	4'-8"	10	
N19	4	#5	3	3'-11"	16	
T6	3	#5	STR	18'-11"	59	
V18	8	#4	STR	6'-6"	35	
V19	2	#4	STR	1'-10"	2	
V20	4	#4	STR	1'-1"	3	
Z14	14	#4	4	3'-10"	36	
REINFORCING STEEL					369	LBS
CLASS A CONCRETE					4.4	C.Y.



ALL BAR DIMENSIONS ARE OUT TO OUT.



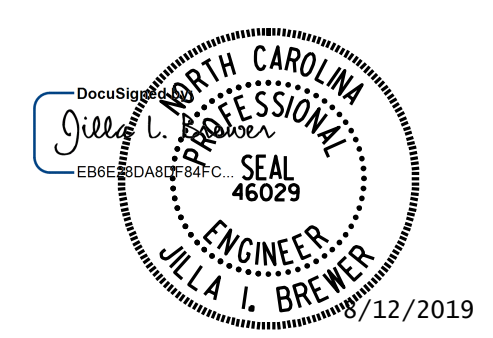
SECTION A-A

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-

SHEET 9 OF 11

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**48" Ø PIPE HEADWALL**  
 (RIGHT EXTENSION)



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MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

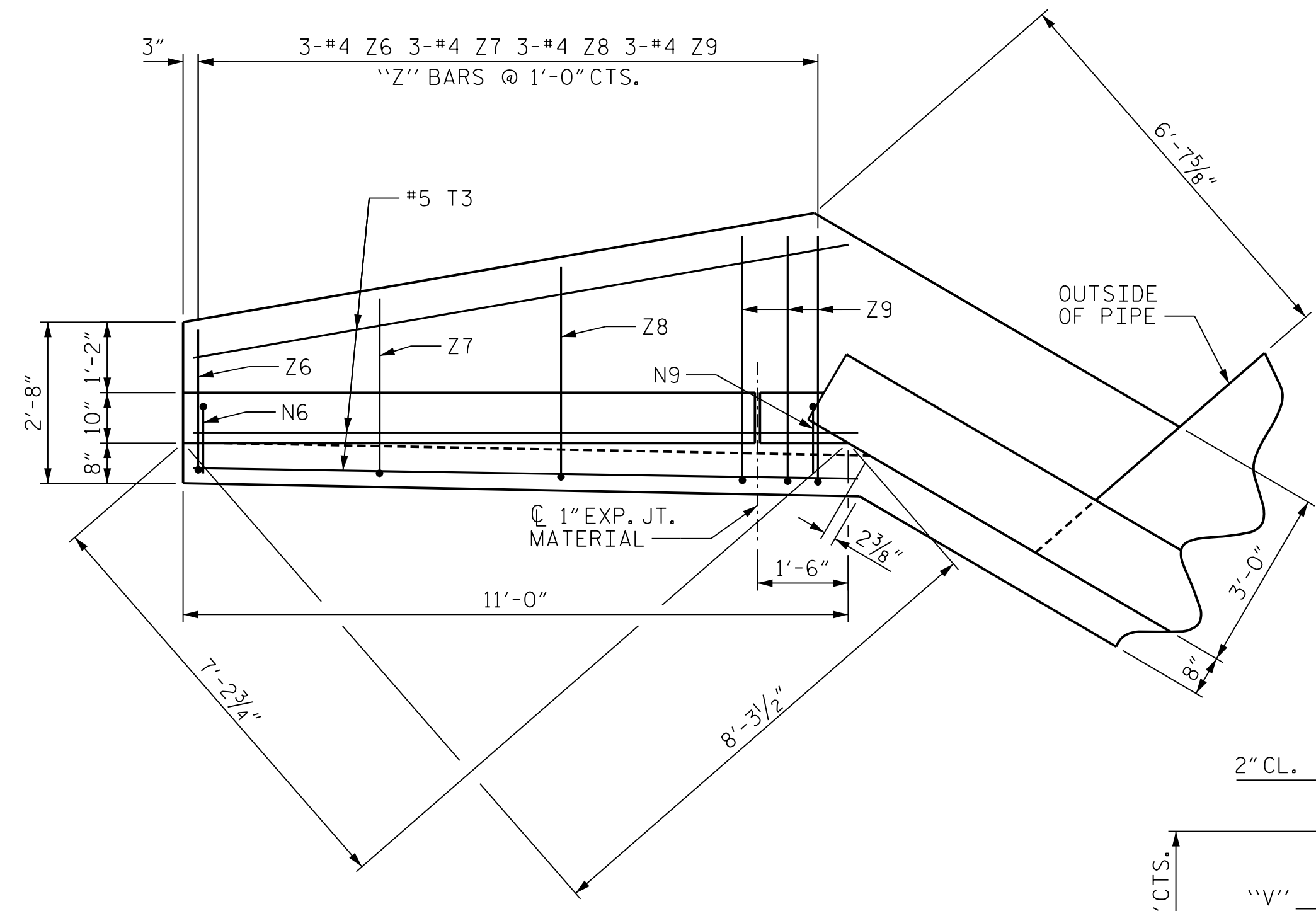
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-9
1			3			TOTAL SHEETS
2			4			II

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DESIGN ENGINEER OF RECORD : J.I. BREWER	DATE : 07/19

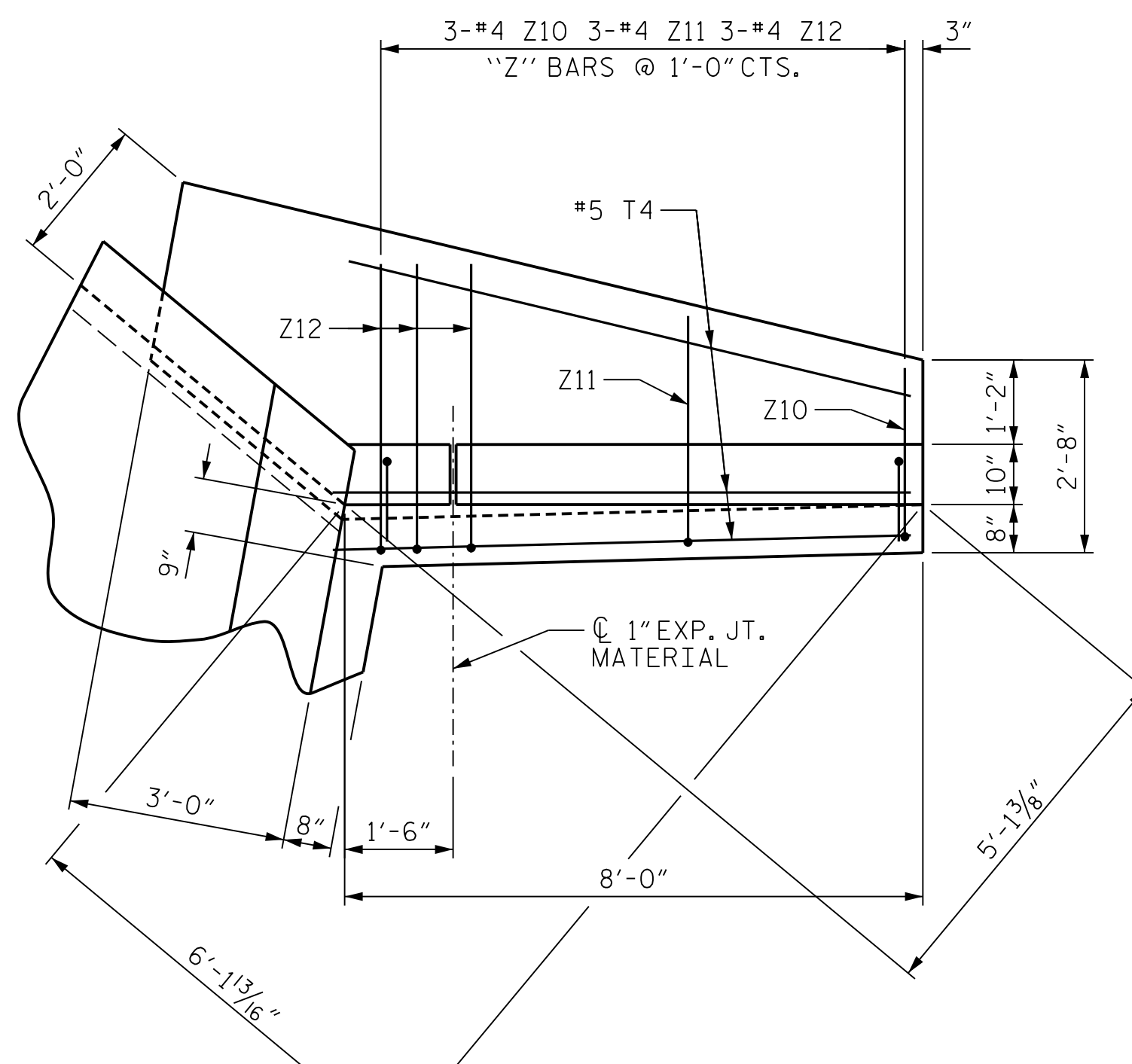
\* #5 "E" BARS EA. FACE  
 \*\* PIPE INVERT 2'-0" ABOVE BOTTOM SLAB

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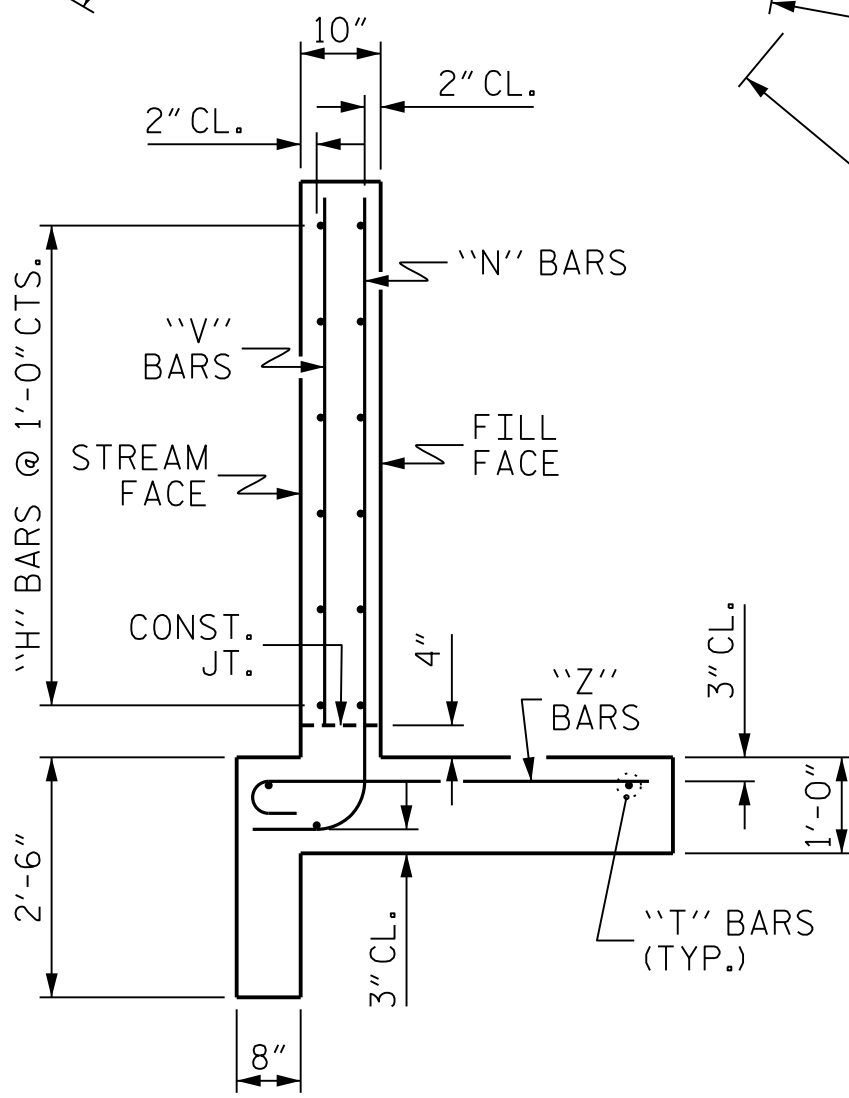
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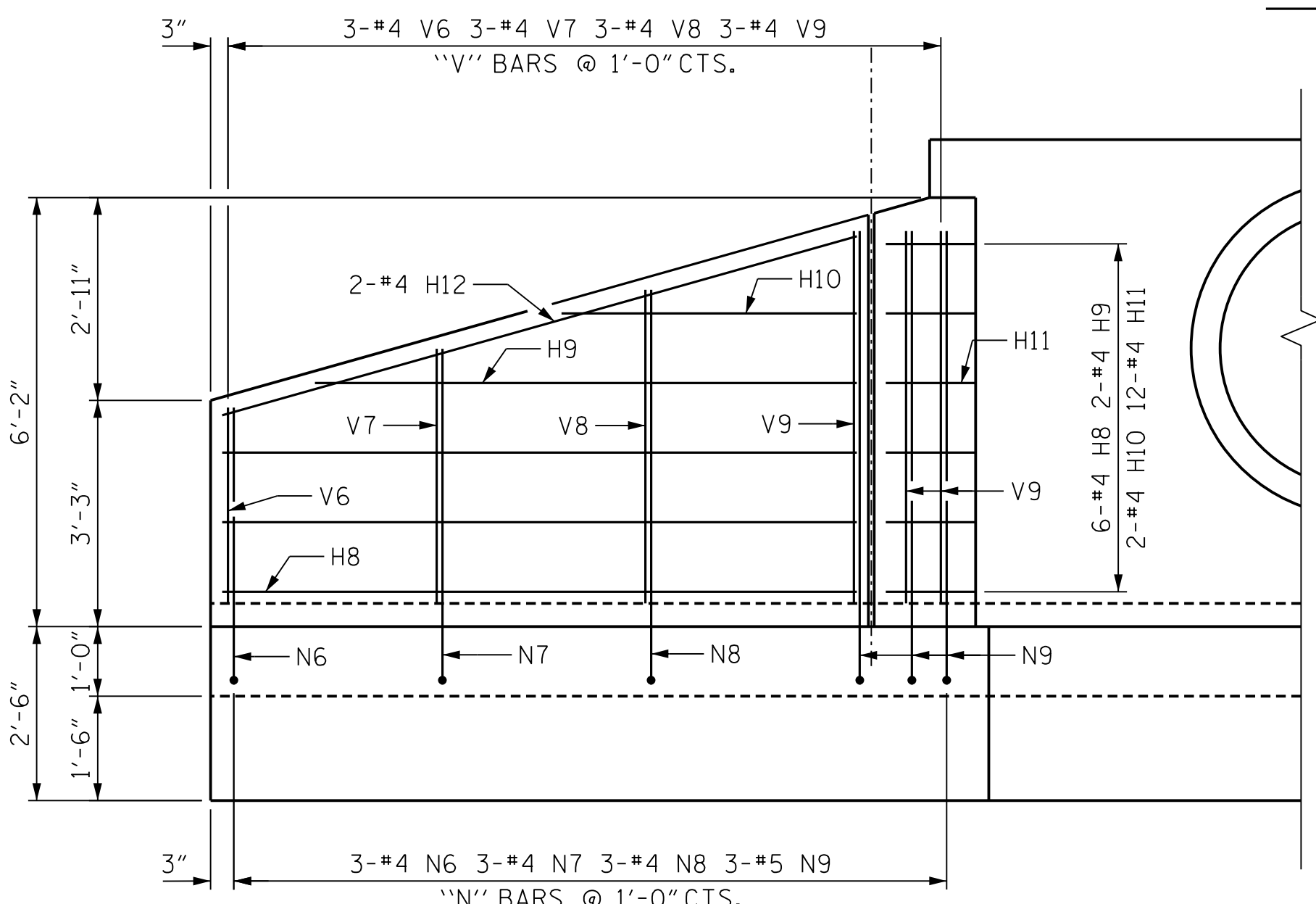
PLAN W3



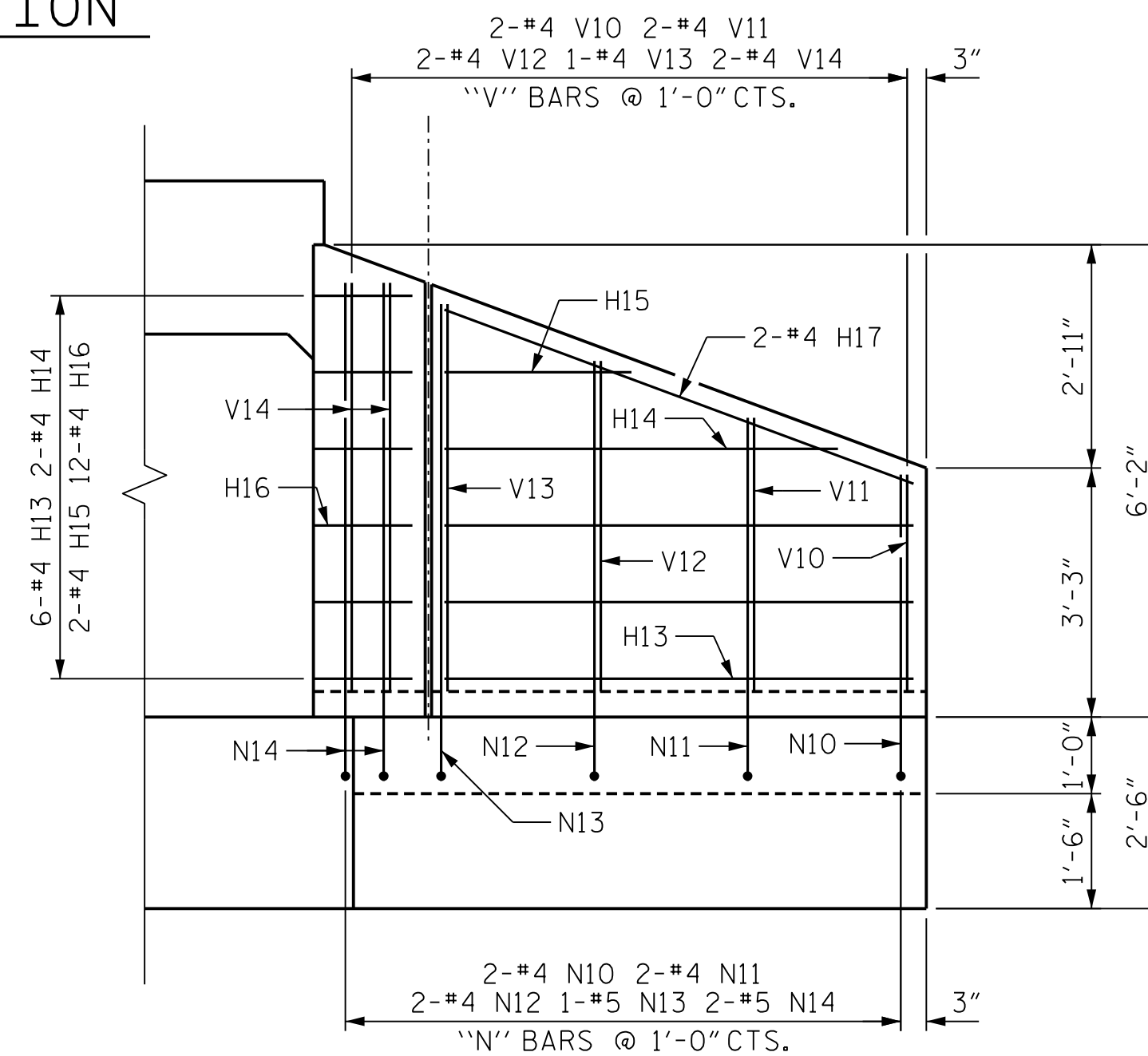
PLAN W4



TYPICAL WING SECTION



ELEVATION W3

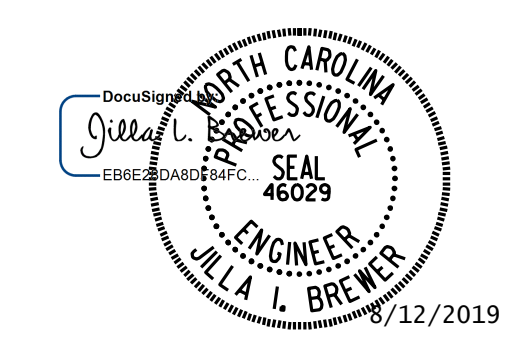


ELEVATION W4

BAR TYPES		BILL OF MATERIAL				
NO.	DESCRIPTION	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
1	(Diagram 1)	H8	#4	STR	9'-1"	36
		H9	#4	STR	7'-8"	10
		H10	#4	STR	4'-1"	5
		H11	#4	1	3'-3"	26
		H12	#4	STR	9'-5"	13
		H13	#4	STR	6'-1"	24
		H14	#4	STR	5'-0"	7
		H15	#4	STR	2'-4"	3
		H16	#4	2	3'-3"	26
		H17	#4	STR	6'-6"	9
2	(Diagram 2)	N6	#4	3	4'-9"	10
		N7	#4	3	5'-7"	11
		N8	#4	3	6'-5"	13
		N9	#5	3	7'-3"	23
		N10	#4	3	4'-9"	6
		N11	#4	3	5'-6"	7
		N12	#4	3	6'-3"	8
		N13	#5	3	7'-0"	7
		N14	#5	3	7'-3"	15
3	(Diagram 3)	T3	#5	STR	11'-0"	34
		T4	#5	STR	8'-0"	25
		V6	#4	STR	2'-9"	6
		V7	#4	STR	3'-7"	7
		V8	#4	STR	4'-6"	9
		V9	#4	STR	5'-4"	11
		V10	#4	STR	2'-9"	4
		V11	#4	STR	3'-6"	5
		V12	#4	STR	4'-3"	6
		V13	#4	STR	5'-0"	3
		V14	#4	STR	5'-3"	7
		Z6	#4	4	2'-10"	6
		Z7	#4	4	3'-5"	7
		Z8	#4	4	3'-11"	8
		Z9	#4	4	4'-6"	9
		Z10	#4	4	2'-10"	6
		Z11	#4	4	3'-7"	7
		Z12	#4	4	4'-4"	9
REINFORCING STEEL						428 LBS
CLASS A CONCRETE						
2 WINGS						6.6 CY
1 HEADWALLS						0.5 CY
1 END CURTAIN WALLS						0.5 CY
TOTAL						7.6 CY

ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-  
 SHEET 10 OF 11



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 MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
WINGS 3 AND 4 FOR CONCRETE BOX CULVERT					
H = 5'-0" SLOPE = 2:1 120° SKEW					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					TOTAL SHEETS II

DRAWN BY : J.I. BREWER DATE : 06/19  
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NOTES

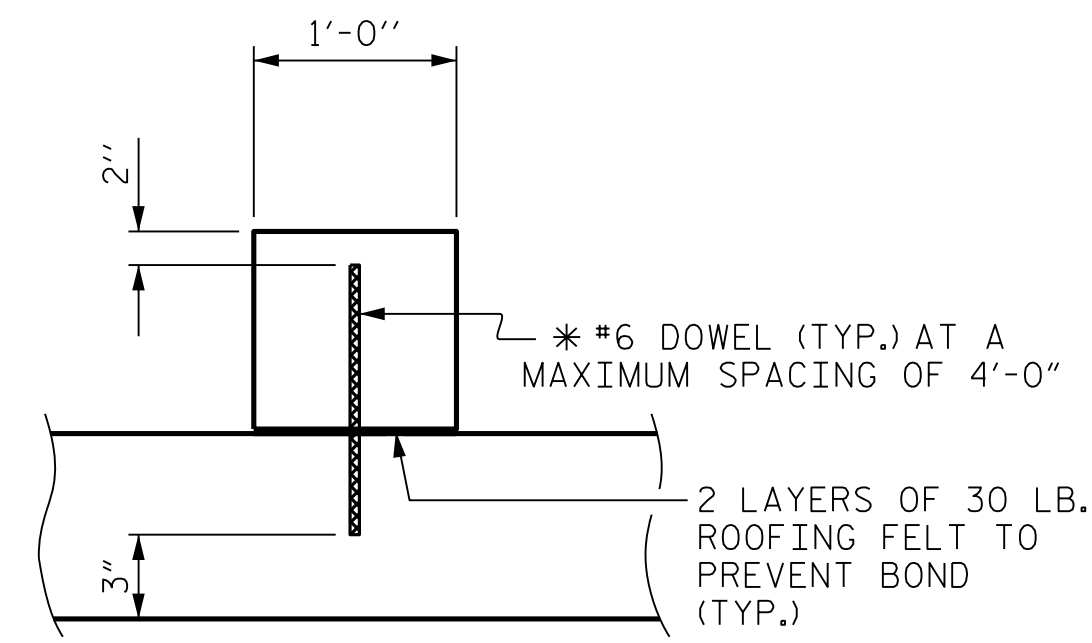
NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

SILLS ARE TO BE 1'-0" WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

TOP OF SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM.

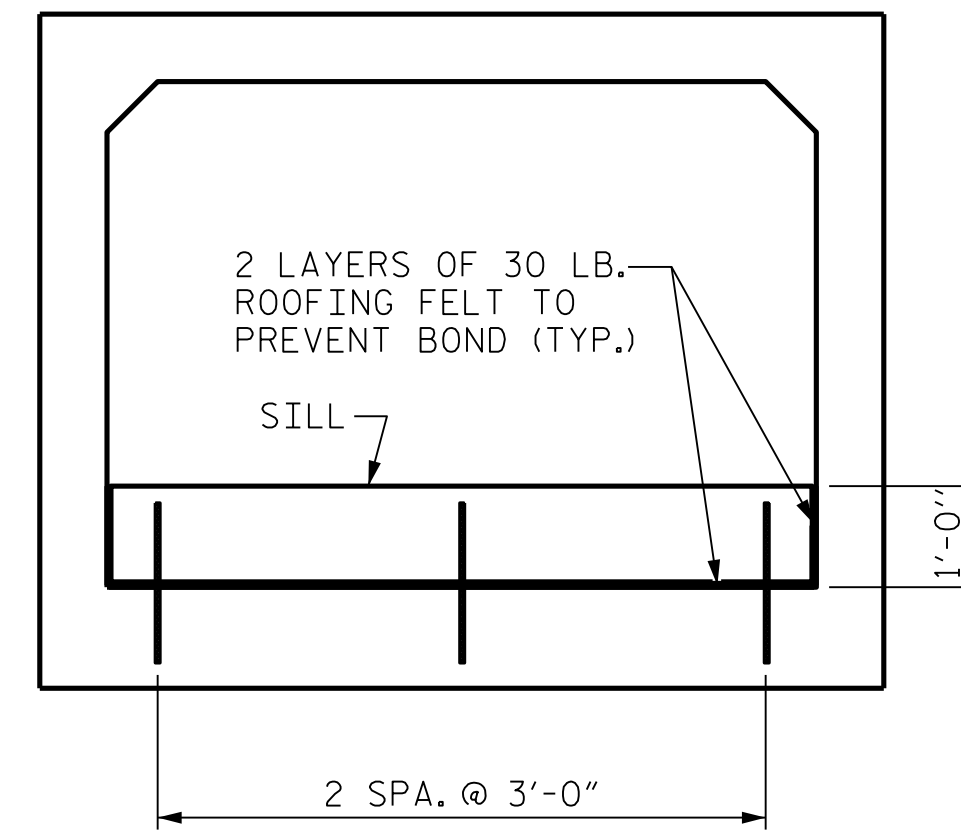
THE ENTIRE COST OF THE WORK REQUIRED TO PLACE EXCAVATED OR SUPPLEMENTAL MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

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



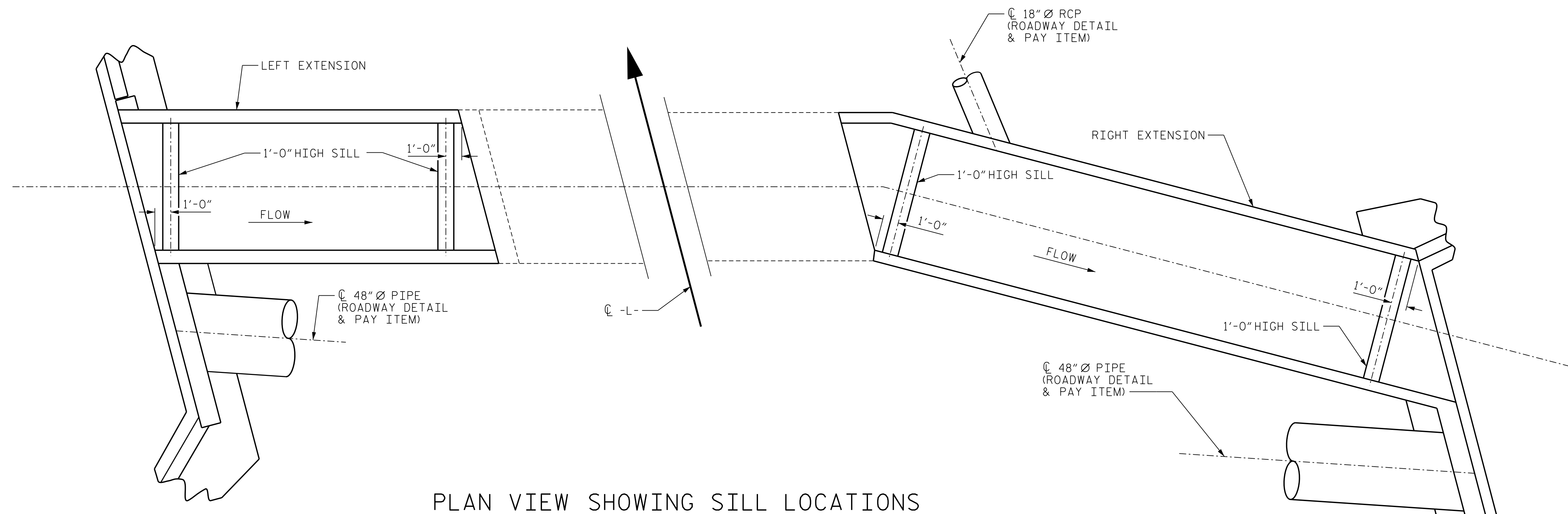
SECTION THROUGH SILL

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



ELEVATION

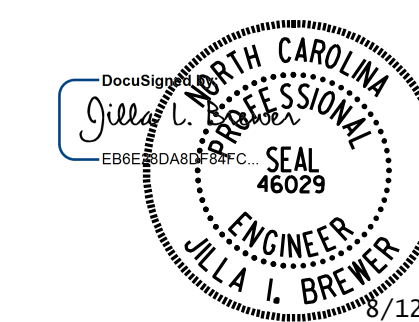
CULVERT SILL DETAILS



PLAN VIEW SHOWING SILL LOCATIONS

PROJECT NO. A-0011C  
CLAY COUNTY  
 STATION: 186+81.00 -L-

SHEET 11 OF 11



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SINGLE 8 FT. X 5 FT.  
 CONCRETE BOX  
 CULVERT EXTENSION

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MI ENGINEERING  
 1011 SCHAUB DRIVE, SUITE 100  
 RALEIGH, NC 27606  
 (919) 851-6606  
 FIRM PE NUMBER : P-0671

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

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 CHECKED BY : M. ISRAELNAIM DATE : 07/19  
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8/12/2019 12:47:24 PM User: jlsraelnaim  
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## 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  $\frac{1}{2}$ " 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.

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