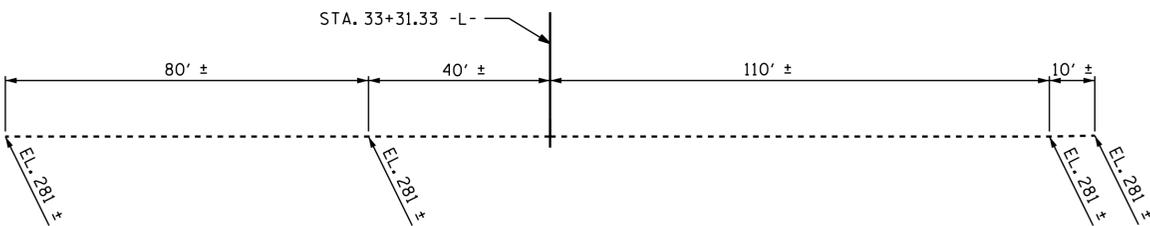


LOCATION SKETCH

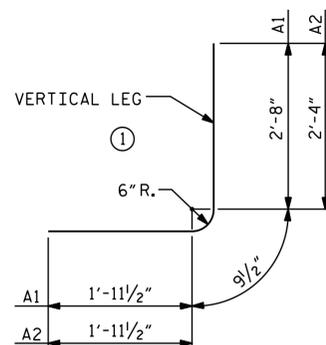


PROFILE ALONG CULVERT

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

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

BILL OF MATERIAL						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	252	#4	1	5'-5"	912	
A2	252	#4	1	5'-1"	856	
A100	126	#4	STR.	32'-6"	2735	
A200	126	#4	STR.	32'-6"	2735	
A300	126	#4	STR.	32'-6"	2735	
A400	126	#4	STR.	32'-6"	2735	
B1	126	#4	STR.	11'-11"	1003	
B2	252	#4	STR.	9'-4"	1571	
B3	212	#4	STR.	11'-11"	1688	
C1	244	#4	STR.	27'-2"	4428	
D1	58	#6	STR.	2'-6"	218	
G1	4	#5	STR.	32'-7"	136	
REINFORCING STEEL =					21,752	LBS.



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART		
BAR	SIZE	SPLICE LENGTH
A100	#4	1'-10"
A200	#4	2'-5"
A300	#4	1'-10"
A400	#4	1'-10"
B1	#4	1'-10"
B3	#4	1'-10"
C1	#4	2'-5"

NOTES

ASSUMED LIVE LOAD ----- HL 93 OR ALTERNATE LOADING.
 DESIGN FILL (MAX) ----- 14.86 FT.
 DESIGN FILL (MIN) ----- 12.54 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 WALL.
 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.
 THIS BARREL STANDARD TO BE USED ONLY ON CULVERT ON 90° SKEW AND TO BE USED WITH STANDARD WING SHEET WITH THE SAME SKEW AND VERTICAL CLEARANCE.
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
 TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
 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.
 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.

AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.

A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

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

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.

"FOR FAA NOTICE OF PROPOSED CONSTRUCTION," SEE SPECIAL PROVISIONS.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULIC DATA	
DESIGN DISCHARGE	= 3160 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YRS.
DESIGN HIGH WATER ELEVATION	= 292.4 FT.
DRAINAGE AREA	= 9.05 SQ. MI.
BASE DISCHARGE (Q100)	= 3850 CFS
BASE HIGH WATER ELEVATION	= 294.1 FT.
BASE DISCHARGE (FEMA)	= 929 CFS
BASE HIGH WATER ELEVATION (FEMA)	= 287.7 FT.
OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	= 2640 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 10 YRS.
OVERTOPPING FLOOD ELEVATION	= * 290.0 FT.
* APPROX. 28+50 -L- CL ON DRIVEWAY BETWEEN CULVERT AND SLATER ROAD	

GRADE DATA -L-	
GRADE POINT ELEV. @ STA. 33+31.33 -L-	= 305.01'
BED ELEVATION @ STA. 33+31.33 -L-	= 280.97'
ROADWAY SLOPES	= 2:1

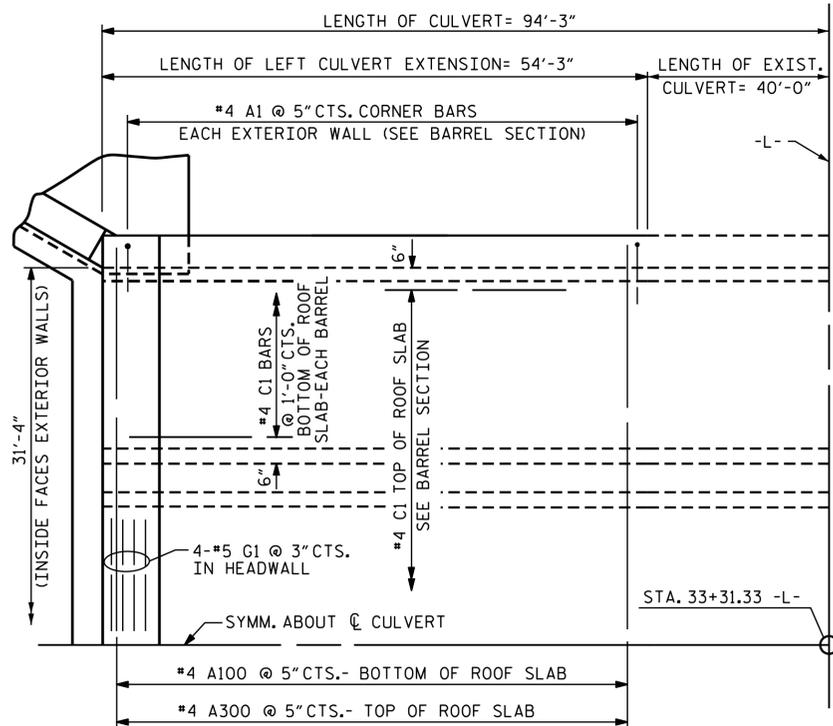
TOTAL STRUCTURE QUANTITIES	
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	141 TONS
CLASS A CONCRETE	
BARREL @ 4.039 CY/FT	219.1 C.Y.
INLET WINGS ETC.	18.9 C.Y.
TOTAL	238.0 C.Y.
REINFORCING STEEL	
BARREL	21,752 LBS.
WINGS ETC.	1,213 LBS.
TOTAL	22,965 LBS.

PROJECT NO. I-5700
 WAKE COUNTY
 STATION: 33+31.33 -L-

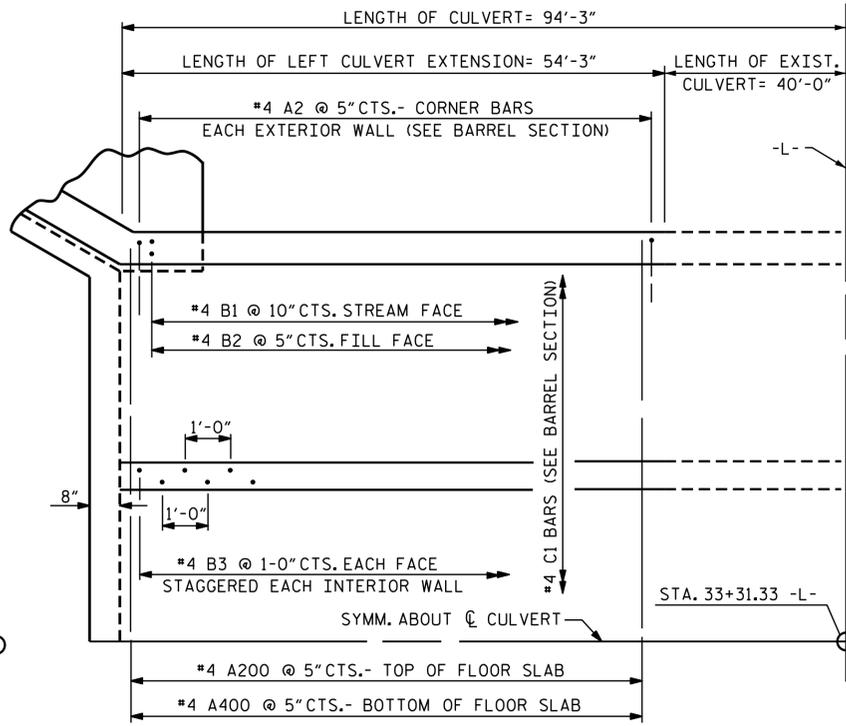
SHEET 1 OF 4

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH			
TRIPLE 10 FT. X 10 FT. CONCRETE BOX CULVERT 90° SKEW EXTENSION			
REVISIONS			SHEET NO.
NO.	BY:	DATE:	C1-1
1			TOTAL SHEETS 4
2			

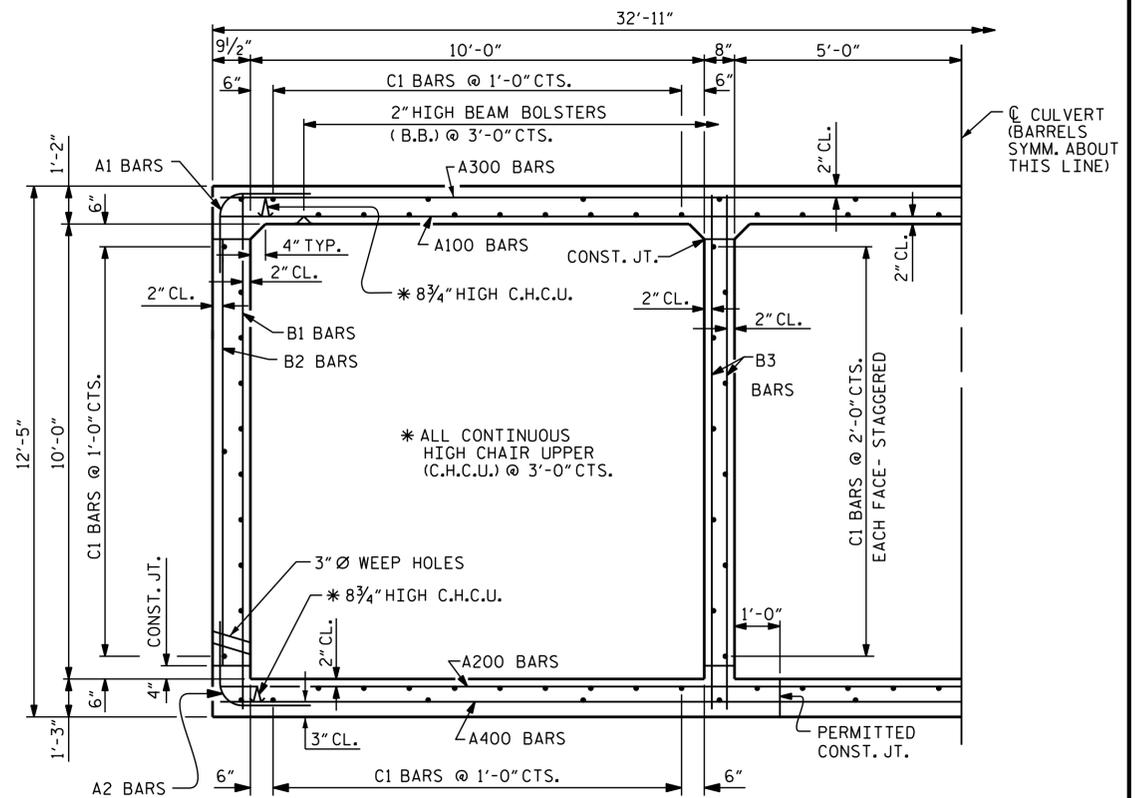
ASSEMBLED BY : O. T. NGUYEN DATE : 4/4/19
 CHECKED BY : S. N. MEGAHED DATE : 04/2019
 DRAWN BY : JEM 8/89 REV. 6/19 MAA/THC
 CHECKED BY : ARB 8/89



PART PLAN - ROOF SLAB

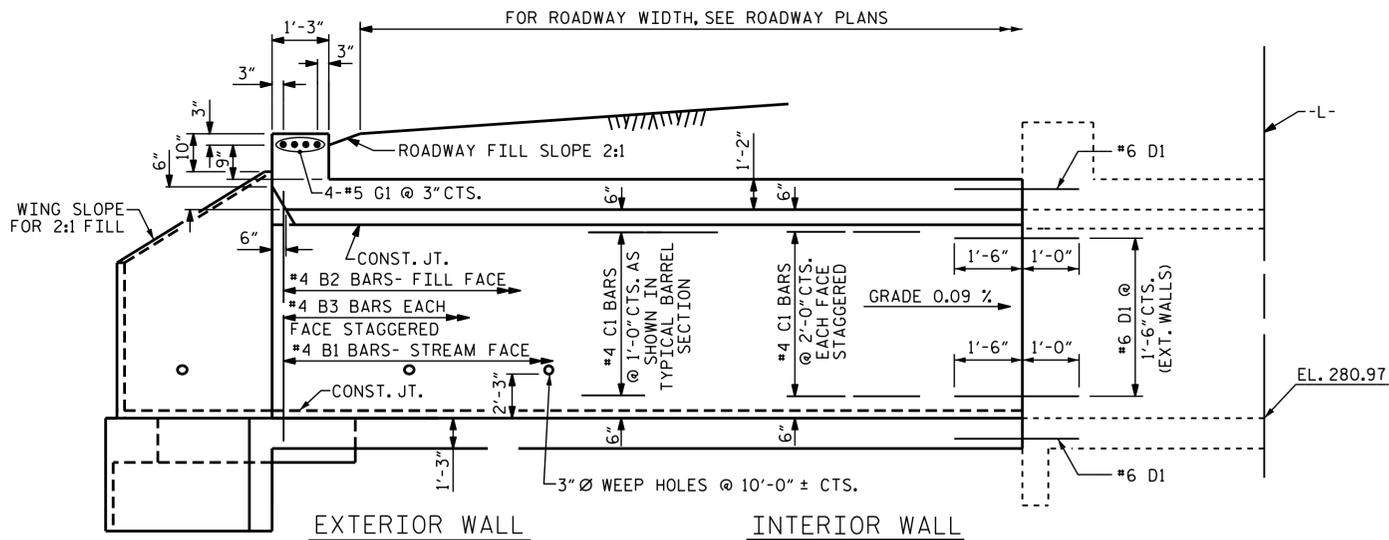


PART PLAN - FLOOR SLAB

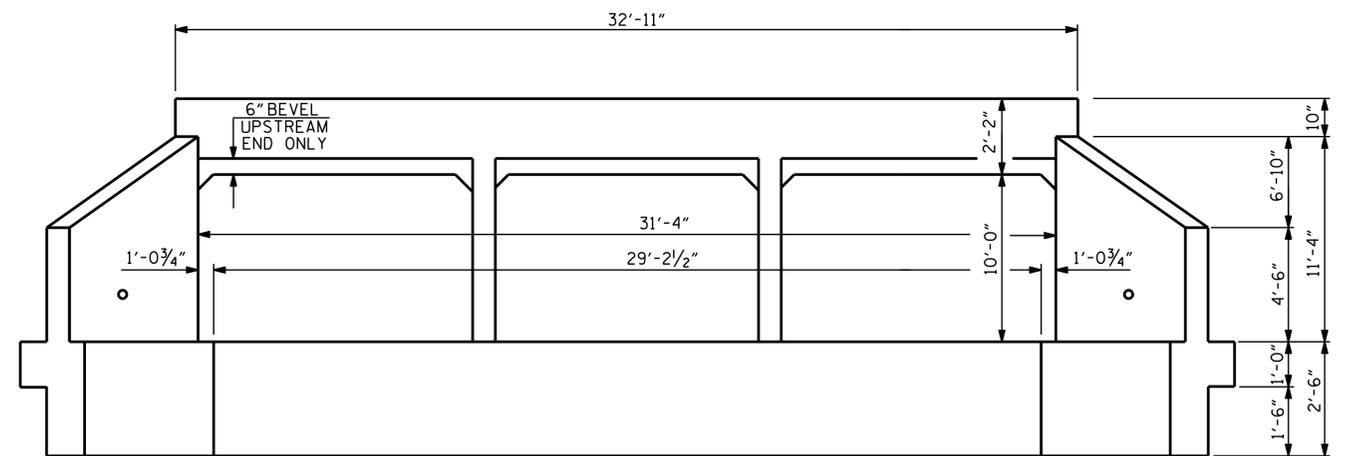


RIGHT ANGLE SECTION OF BARREL

THERE ARE 122 "C" BARS IN SECTION OF BARREL



CULVERT SECTION NORMAL TO ROADWAY

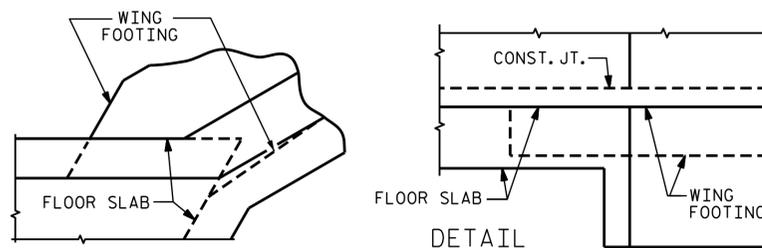


END ELEVATION

PROJECT NO. I-5700
 WAKE COUNTY
 STATION: 33+31.33 -L-

SHEET 2 OF 4

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



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

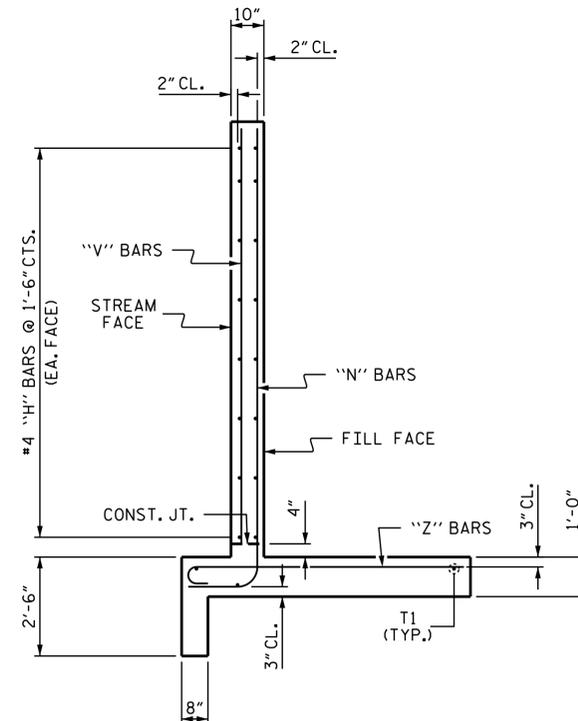
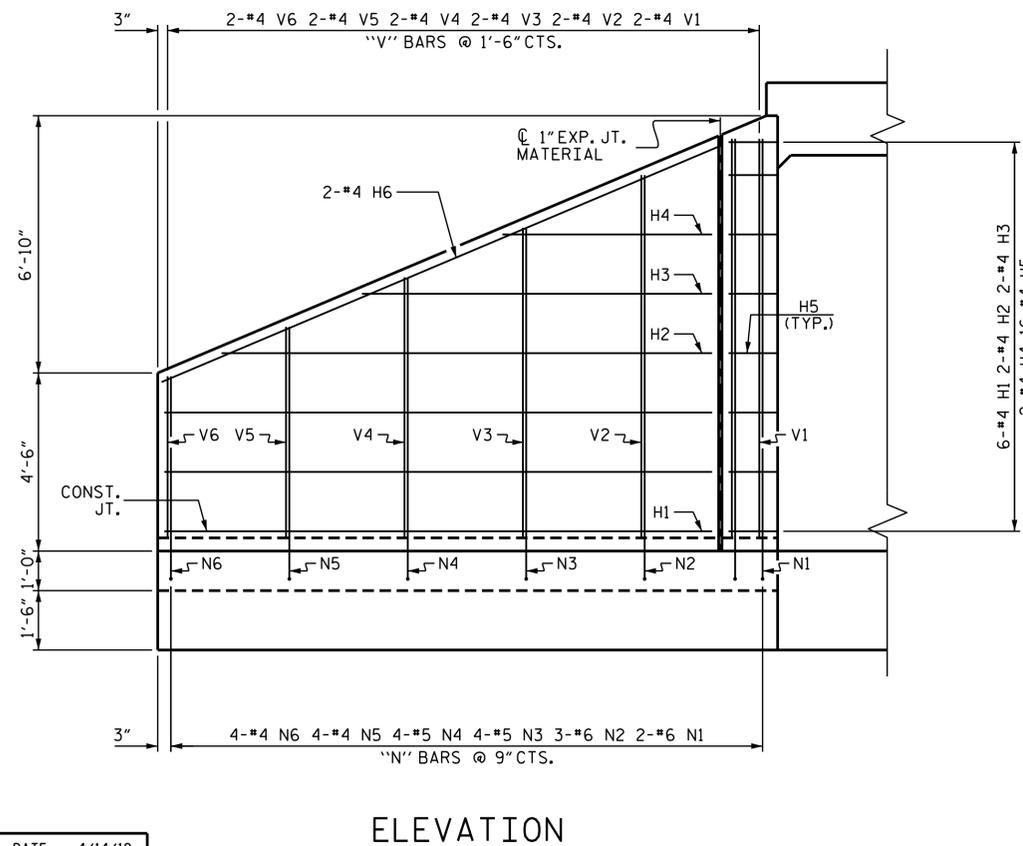
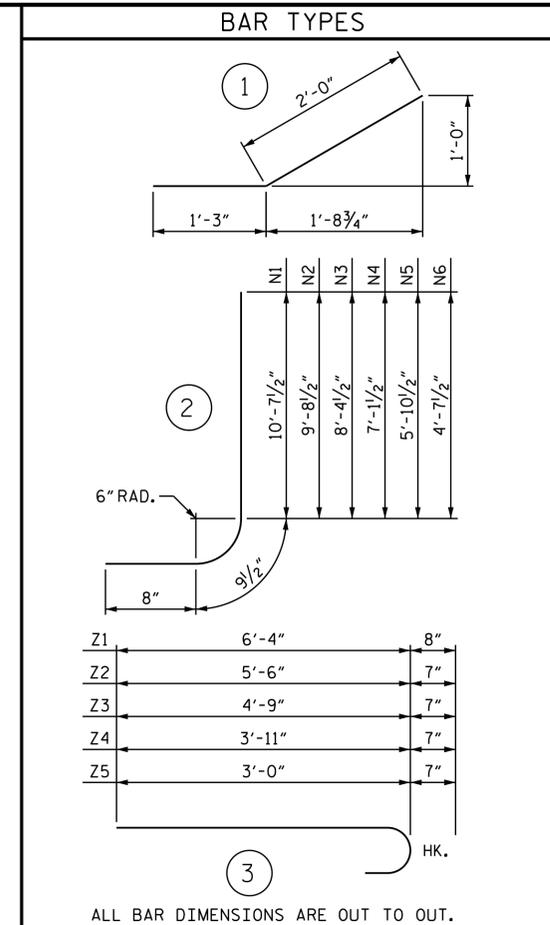
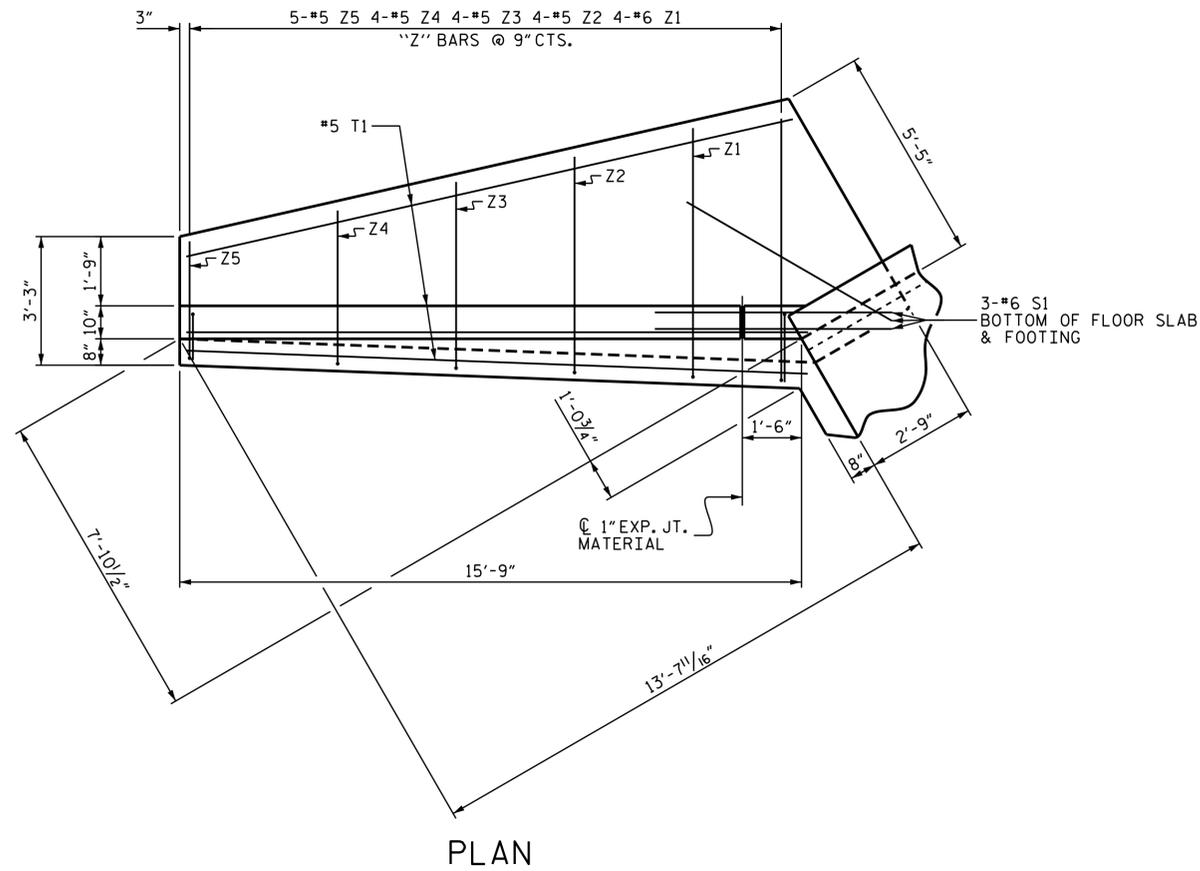
ASSEMBLED BY : O. T. NGUYEN DATE : 4/14/19
 CHECKED BY : S. N. MEGAHAD DATE : 04/20/19
 DRAWN BY : TSS REV. 6/19 MAA/THC
 CHECKED BY : ARB REV. 11/90

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 10 FT. X 10 FT. CONCRETE BOX CULVERT 90° SKEW EXTENSION

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



PROJECT NO. I-5700
WAKE COUNTY
STATION: 33+31.33 -L-

SHEET 3 OF 4



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD WINGS
FOR
CONCRETE BOX CULVERT
H = 10'-0" SLOPE = 2:1
90° SKEW

ASSEMBLED BY : O. T. NGUYEN DATE : 4/14/19
CHECKED BY : S. N. MEGAHED DATE : 04/2019
DRAWN BY : CCJ 10/99
CHECKED BY : RWW 03/00

REV. 6/19 MAA/THC

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

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

TOTAL SHEETS 4

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (VLL)	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	2.51	--	1.75	3.32	1	EXTERIOR WALL	5.88	2.51	1	EXTERIOR WALL	10.01		
	HL-93 (OPERATING)	N/A		3.25	--	1.35	4.31	1	EXTERIOR WALL	5.88	3.25	1	EXTERIOR WALL	10.01		
	HS-20 (INVENTORY)	36.000	②	2.51	90.40	1.75	3.32	1	EXTERIOR WALL	5.88	2.51	1	EXTERIOR WALL	10.01		
	HS-20 (OPERATING)	36.000		3.26	117.18	1.35	4.31	1	EXTERIOR WALL	5.88	3.26	1	EXTERIOR WALL	10.01		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.21	43.27	1.40	4.14	1	EXTERIOR WALL	5.88	3.21	1	EXTERIOR WALL	10.01	
		SNGARBS2	20.000		3.20	64.05	1.40	4.14	1	EXTERIOR WALL	5.88	3.20	1	EXTERIOR WALL	10.01	
		SNAGRIS2	22.000		3.20	70.45	1.40	4.14	1	EXTERIOR WALL	5.88	3.20	1	EXTERIOR WALL	10.01	
		SNCOTTS3	27.250		3.13	85.33	1.40	4.14	1	EXTERIOR WALL	5.88	3.13	1	EXTERIOR WALL	10.01	
		SNAGGRS4	34.925		3.18	111.17	1.40	4.14	1	EXTERIOR WALL	5.88	3.18	1	EXTERIOR WALL	10.01	
		SNS5A	35.550		3.12	110.85	1.40	3.98	1	TOP SLAB	4.83	3.12	1	TOP SLAB	9.51	
		SNS6A	39.950		3.12	124.57	1.40	4.14	1	EXTERIOR WALL	5.88	3.12	1	TOP SLAB	9.50	
		SNS7B	42.000		3.05	128.05	1.40	4.08	1	TOP SLAB	4.83	3.05	1	TOP SLAB	9.51	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		3.20	105.54	1.40	4.14	1	EXTERIOR WALL	5.88	3.20	1	EXTERIOR WALL	10.01	
		TNT4A	33.075		3.19	105.48	1.40	4.14	1	EXTERIOR WALL	5.88	3.19	1	EXTERIOR WALL	10.01	
		TNT6A	41.600		3.19	132.56	1.40	4.14	1	EXTERIOR WALL	5.88	3.19	1	EXTERIOR WALL	10.01	
		TNT7A	42.000		3.13	131.56	1.40	4.14	1	EXTERIOR WALL	5.88	3.13	1	EXTERIOR WALL	10.01	
		TNT7B	42.000		3.13	131.40	1.40	4.14	1	EXTERIOR WALL	5.88	3.13	1	EXTERIOR WALL	10.01	
		TNAGRIT4	43.000		3.19	137.20	1.40	4.14	1	EXTERIOR WALL	5.88	3.19	1	TOP SLAB	9.51	
TNAGT5A	45.000		3.12	140.32	1.40	4.14	1	EXTERIOR WALL	5.88	3.12	1	BOTTOM SLAB	9.50			
TNAGT5B	45.000		③	2.98	134.13	1.40	4.14	1	EXTERIOR WALL	5.88	2.98	1	BOTTOM SLAB	9.50		

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

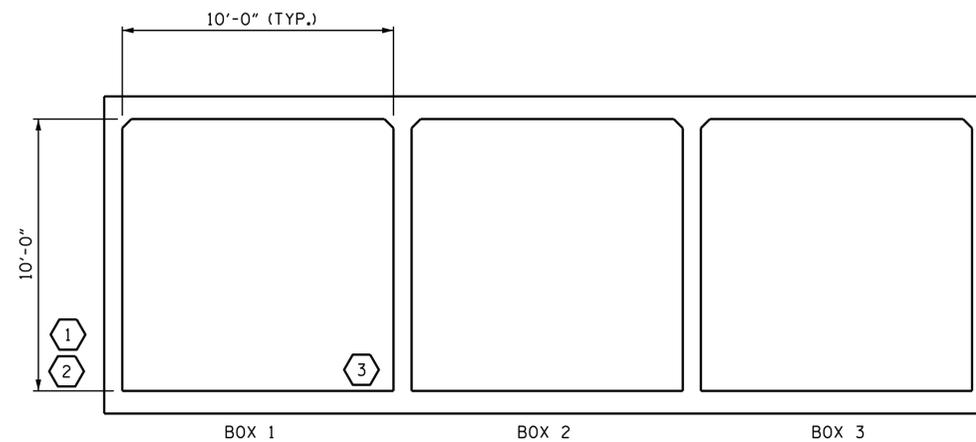
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

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



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. I-5700

WAKE COUNTY

STATION: 33+31.33 -L-

SHEET 4 OF 4



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

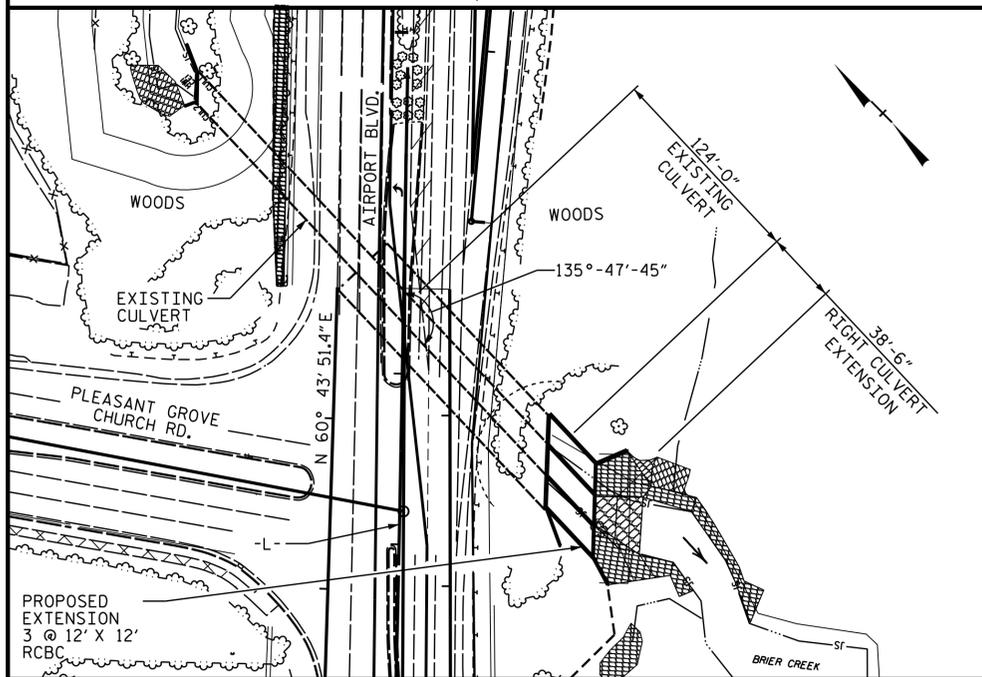
ASSEMBLED BY : O. T. NGUYEN	DATE : 4/4/19
CHECKED BY : S. N. MEGAHED	DATE : 04/2019
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

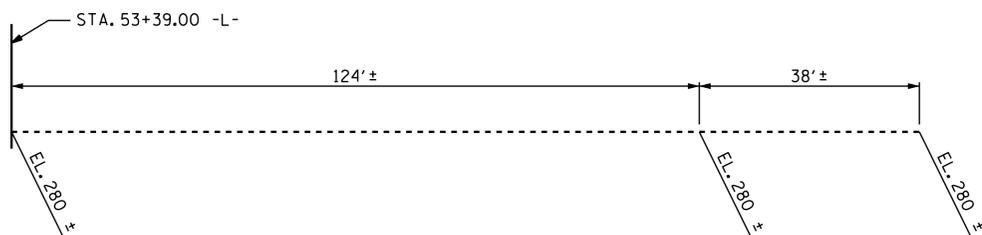
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			4

BM #1 : 49+41.59.60' LT (NAIL WITH TAG IN 17" PINE), EL. 325.83

F. A. PROJECT NO. NHPP-040-1(259)286



LOCATION SKETCH



PROFILE ALONG CULVERT

HYDRAULIC DATA

DESIGN DISCHARGE = 376 CFS
 FREQUENCY OF DESIGN FLOOD = 50 YRS.
 DESIGN HIGH WATER ELEVATION = 288.3 FT.
 DRAINAGE AREA = 11.6 SQ. MI.
 BASE DISCHARGE (Q100) = 423 CFS
 BASE HIGH WATER ELEVATION = 289.3 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 1850 CFS
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YRS.
 OVERTOPPING FLOOD ELEVATION = * 310.3 FT.

* OVERTOPS PROPOSED SHLDR PT. @ APPROX. STA. 59+00 -L- AT EL. 310.3

GRADE DATA -L-

GRADE POINT ELEV. @ STA. 53+39.00 -L- = 319.67'
 BED ELEVATION @ STA. 53+39.00 -L- = 280.6'
 ROADWAY SLOPES = 2:1

TOTAL STRUCTURE QUANTITIES

CULVERT EXCAVATION	LUMP SUM
FOUNDATION	
CONDITIONING MATERIAL	120 TONS
CLASS A CONCRETE	
BARREL @ 7.889 CY/FT	303.7 C.Y.
OUTLET WINGS ETC.	62.2 C.Y.
TOTAL	365.9 C.Y.
REINFORCING STEEL	
BARREL	27,587 LBS.
WINGS ETC.	5,903 LBS.
TOTAL	33,490 LBS.

NOTES

ASSUMED LIVE LOAD ----- HL 93 OR ALTERNATE LOADING.
 DESIGN FILL (MAX) ----- 28.33 FT.
 DESIGN FILL (MIN) ----- 26.79 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 WALL.
 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.
 THIS BARREL STANDARD TO BE USED ONLY ON CULVERT ON 60° SKEW AND TO BE USED WITH STANDARD WING SHEET WITH THE SAME SKEW AND VERTICAL CLEARANCE.
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
 TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
 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.
 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.
 AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.

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.
 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.
 A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

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.

DETAILED DRAWINGS FOR FALSEWORK AND FORMS FOR THIS CULVERT SHALL BE SUBMITTED. SEE SHEET SN.

*FOR FAA NOTICE OF PROPOSED CONSTRUCTION, 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"

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

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PROJECT NO. I-5700
WAKE COUNTY
 STATION: 53+39.00 -L-

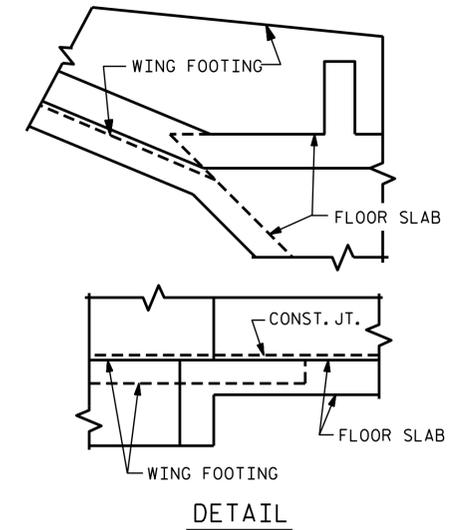
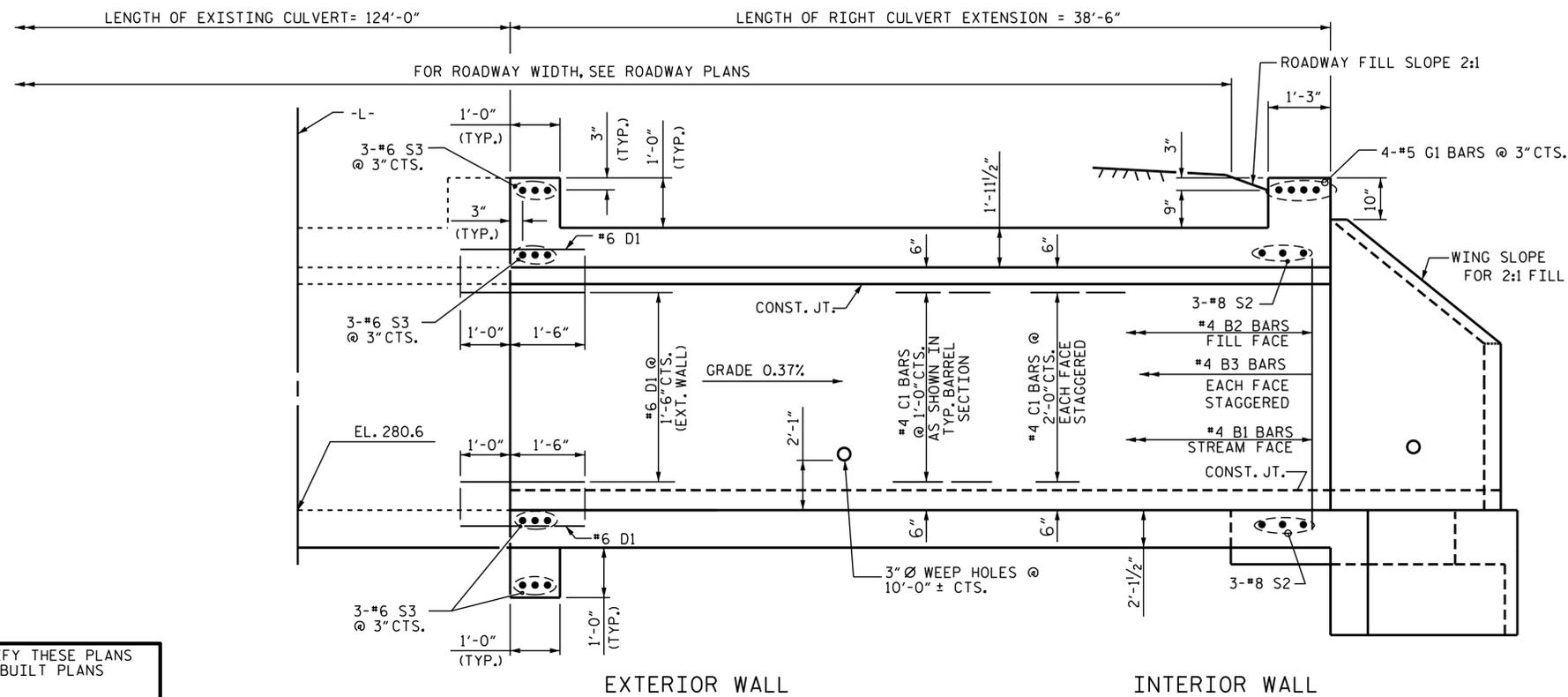
SHEET 1 OF 6
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 12 FT. X 12 FT.
 CONCRETE BOX CULVERT
 135° SKEW
 EXTENSION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-1
1			3			TOTAL SHEETS
2			4			6

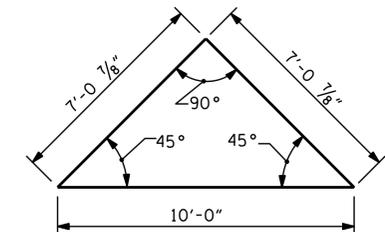
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ADDED 11-90

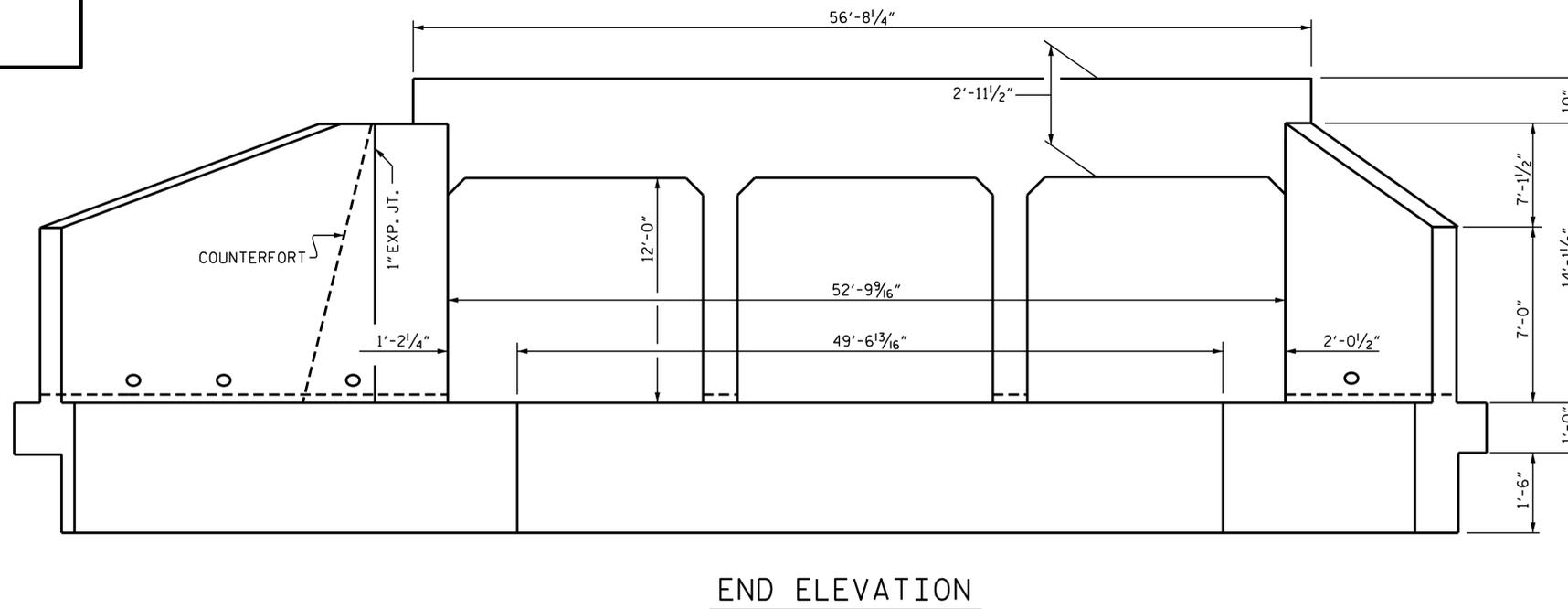
ASSEMBLED BY :	M. WELDON	DATE :	07/2019
CHECKED BY :	F. LEA	DATE :	07/2019
DRAWN BY :	JR 10/89	REV. 6/19	MAA/THC
CHECKED BY :	ARB 10/89		



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



SKEW TRIANGLE



END ELEVATION

PROJECT NO. I-5700
WAKE COUNTY
 STATION: 53+39.00 -L-
 SHEET 2 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 12 FT. X 12 FT.
 CONCRETE BOX CULVERT
 135° SKEW
 EXTENSION

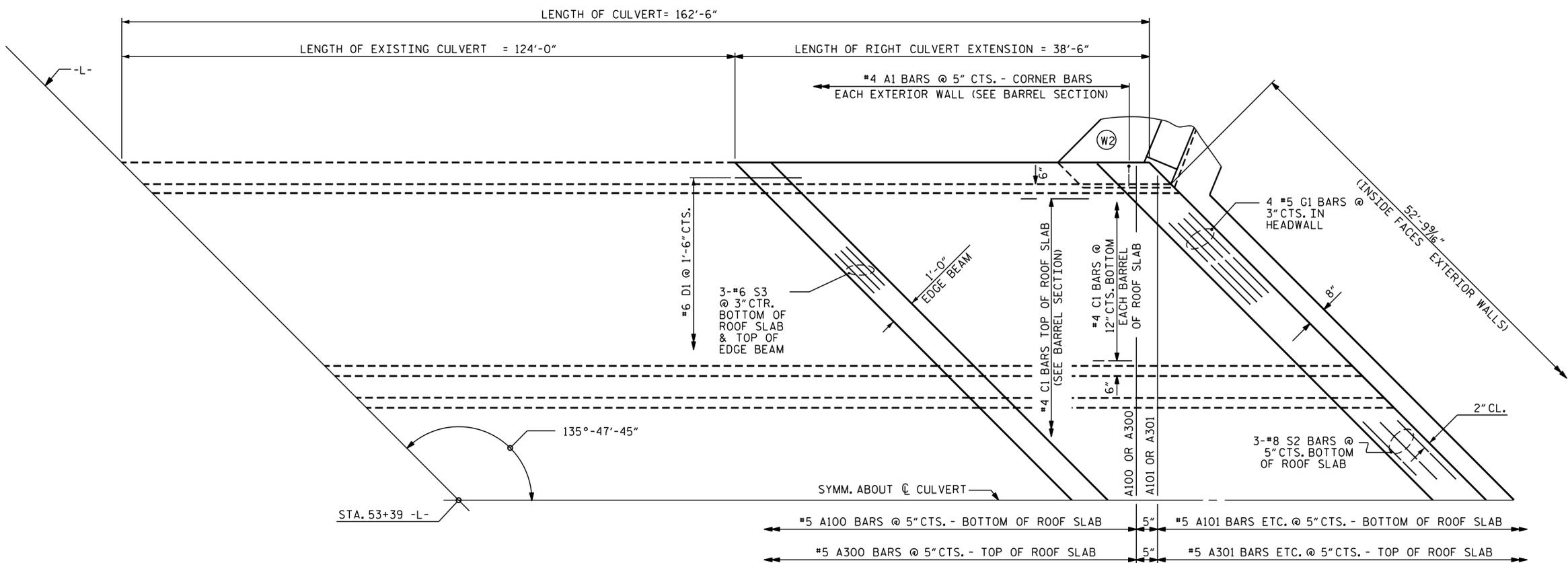


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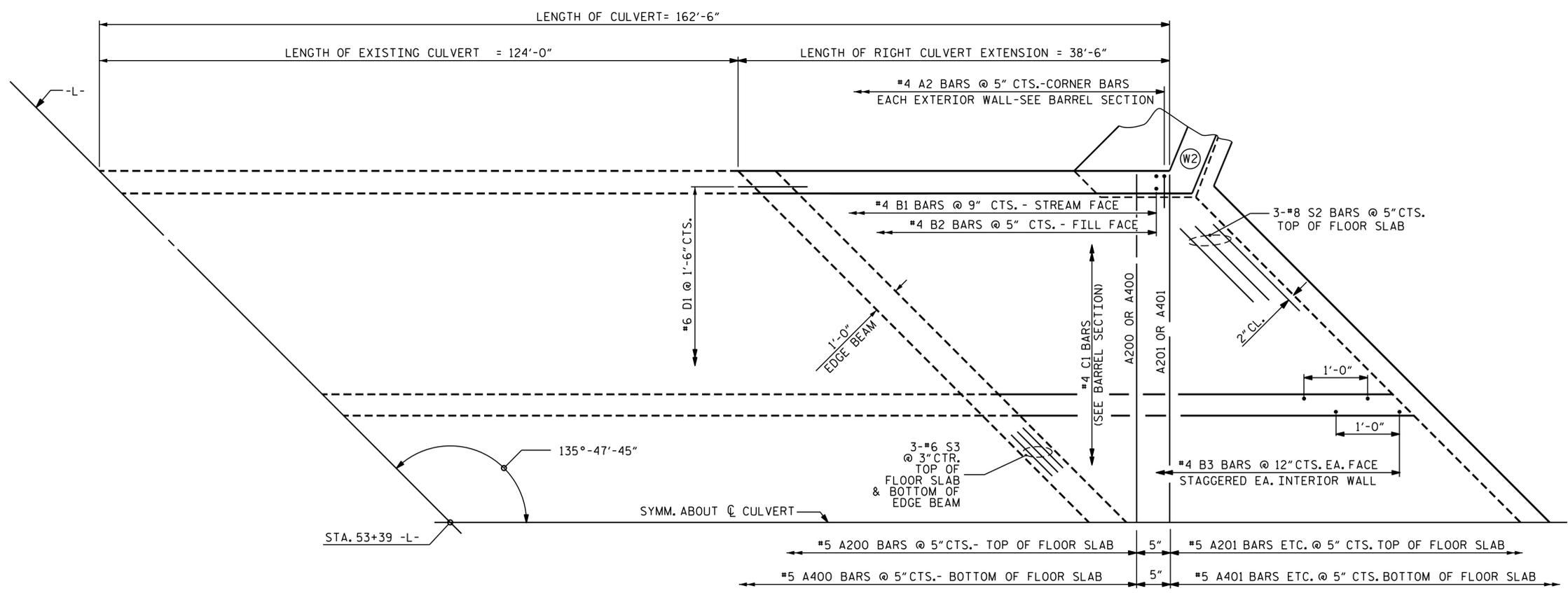
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			6

I HEREBY CERTIFY THESE PLANS
 ARE THE AS-BUILT PLANS

ASSEMBLED BY :	M. WELDON	DATE :	07/2019
CHECKED BY :	F. LEA	DATE :	07/2019
DRAWN BY :	JR	10/89	REV. 6/19
CHECKED BY :	ARB	10/89	MAA/THC



PART PLAN - ROOF SLAB



PART PLAN - FLOOR SLAB

PROJECT NO. I-5700
WAKE COUNTY
 STATION: 53+39.00 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TRIPLE 12 FT. X 12 FT.
 CONCRETE BOX CULVERT
 135° SKEW
 EXTENSION**

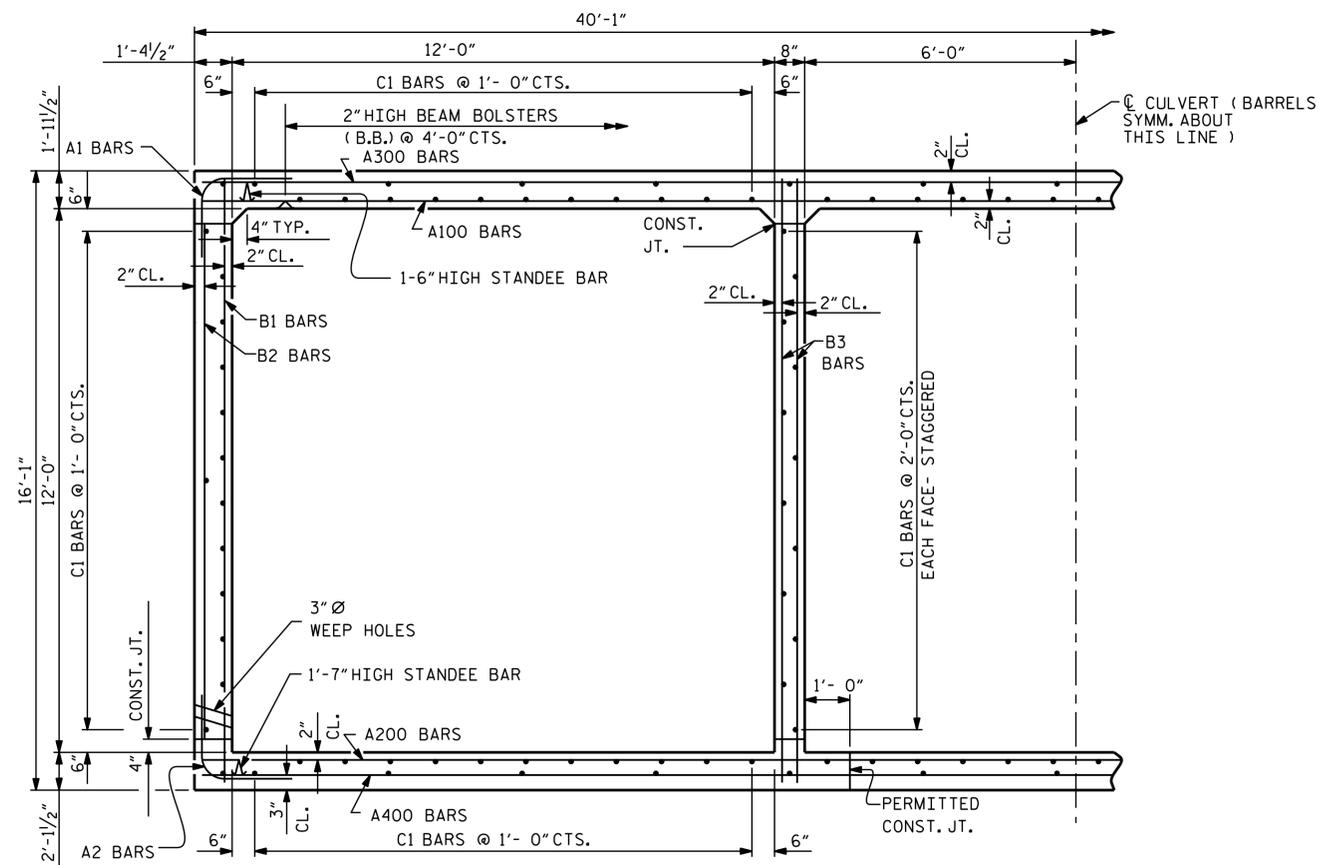


REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-3
1			3			TOTAL SHEETS
2			4			6

DOCUMENT NOT CONSIDERED
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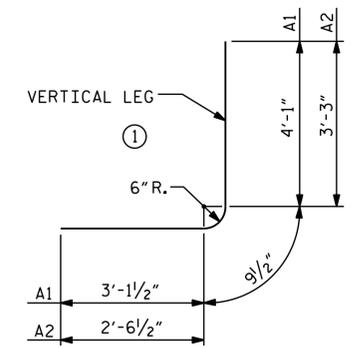
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
 REDRAWN 10-11-89 BY J. ROUSE CHECKED BY A.R.B.

ASSEMBLED BY :	M. WELDON	DATE :	07/2019
CHECKED BY :	F. LEA	DATE :	07/2019
DRAWN BY :	RWW	REV. 6/19	MAA/THC
CHECKED BY :	ARB	8/89	



RIGHT ANGLE SECTION OF BARREL

THERE ARE 187 "C" BARS IN SECTION OF BARREL.



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART

BAR	SIZE	SPLICE LENGTH
A200	#5	3'-0"
A400	#5	2'-4"
B1	#4	1'-10"
B3	#4	1'-10"
C1	#4	2'-5"

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	186	#4	1	8'-0"	994	A208	8	#5	STR	24'-9"	207	A319	8	#5	STR	6'-5"	54	B1	104	#4	STR	15'-7"	1083	
A2	186	#4	1	6'-7"	818	A209	8	#5	STR	23'-1"	193	A320	8	#5	STR	4'-9"	40	B2	186	#4	STR	11'-4"	1408	
						A210	8	#5	STR	21'-5"	179	A321	8	#5	STR	3'-1"	26	B3	156	#4	STR	15'-7"	1624	
A100	4	#5	STR	39'-8"	165	A211	8	#5	STR	19'-9"	165													
A101	8	#5	STR	36'-5"	304	A212	8	#5	STR	18'-1"	151	A400	4	#5	STR	39'-8"	165	C1	187	#4	STR	38'-0"	4747	
A102	8	#5	STR	34'-9"	290	A213	8	#5	STR	16'-5"	137	A401	8	#5	STR	36'-5"	304							
A103	8	#5	STR	33'-1"	276	A214	8	#5	STR	14'-9"	123	A402	8	#5	STR	34'-9"	290	D1	70	#6	STR	2'-6"	263	
A104	8	#5	STR	31'-5"	262	A215	8	#5	STR	13'-1"	109	A403	8	#5	STR	33'-1"	276							
A105	8	#5	STR	29'-9"	248	A216	8	#5	STR	11'-5"	95	A404	8	#5	STR	31'-5"	262	G1	4	#5	STR	56'-2"	234	
A106	8	#5	STR	28'-1"	234	A217	8	#5	STR	9'-9"	81	A405	8	#5	STR	29'-9"	248							
A107	8	#5	STR	26'-5"	220	A218	8	#5	STR	8'-1"	67	A406	8	#5	STR	28'-1"	234	S2	6	#8	STR	56'-2"	900	
A108	8	#5	STR	24'-9"	207	A219	8	#5	STR	6'-5"	54	A407	8	#5	STR	26'-5"	220	S3	12	#6	STR	56'-2"	1012	
A109	8	#5	STR	23'-1"	193	A220	8	#5	STR	4'-9"	40	A408	8	#5	STR	24'-9"	207							
A110	8	#5	STR	21'-5"	179	A221	8	#5	STR	3'-1"	26	A409	8	#5	STR	23'-1"	193							
A111	8	#5	STR	19'-9"	165							A410	8	#5	STR	21'-5"	179							
A112	8	#5	STR	18'-1"	151	A300	4	#5	STR	39'-8"	165	A411	8	#5	STR	19'-9"	165							
A113	8	#5	STR	16'-5"	137	A301	8	#5	STR	36'-5"	304	A412	8	#5	STR	18'-1"	151							
A114	8	#5	STR	14'-9"	123	A302	8	#5	STR	34'-9"	290	A413	8	#5	STR	16'-5"	137							
A115	8	#5	STR	13'-1"	109	A303	8	#5	STR	33'-1"	276	A414	8	#5	STR	14'-9"	123							
A116	8	#5	STR	11'-5"	95	A304	8	#5	STR	31'-5"	262	A415	8	#5	STR	13'-1"	109							
A117	8	#5	STR	9'-9"	81	A305	8	#5	STR	29'-9"	248	A416	8	#5	STR	11'-5"	95							
A118	8	#5	STR	8'-1"	67	A306	8	#5	STR	28'-1"	234	A417	8	#5	STR	9'-9"	81							
A119	8	#5	STR	6'-5"	54	A307	8	#5	STR	26'-5"	220	A418	8	#5	STR	8'-1"	67							
A120	8	#5	STR	4'-9"	40	A308	8	#5	STR	24'-9"	207	A419	8	#5	STR	6'-5"	54							
A121	8	#5	STR	3'-1"	26	A309	8	#5	STR	23'-1"	193	A420	8	#5	STR	4'-9"	40							
						A310	8	#5	STR	21'-5"	179	A421	8	#5	STR	3'-1"	26							
A200	4	#5	STR	39'-8"	165	A311	8	#5	STR	19'-9"	165													
A201	8	#5	STR	36'-5"	304	A312	8	#5	STR	18'-1"	151													
A202	8	#5	STR	34'-9"	290	A313	8	#5	STR	16'-5"	137													
A203	8	#5	STR	33'-1"	276	A314	8	#5	STR	14'-9"	123													
A204	8	#5	STR	31'-5"	262	A315	8	#5	STR	13'-1"	109													
A205	8	#5	STR	29'-9"	248	A316	8	#5	STR	11'-5"	95													
A206	8	#5	STR	28'-1"	234	A317	8	#5	STR	9'-9"	81													
A207	8	#5	STR	26'-5"	220	A318	8	#5	STR	8'-1"	67													

REINFORCED STEEL 27,587 LBS.



PROJECT NO. I-5700
WAKE COUNTY
 STATION: 53+39.00 -L-

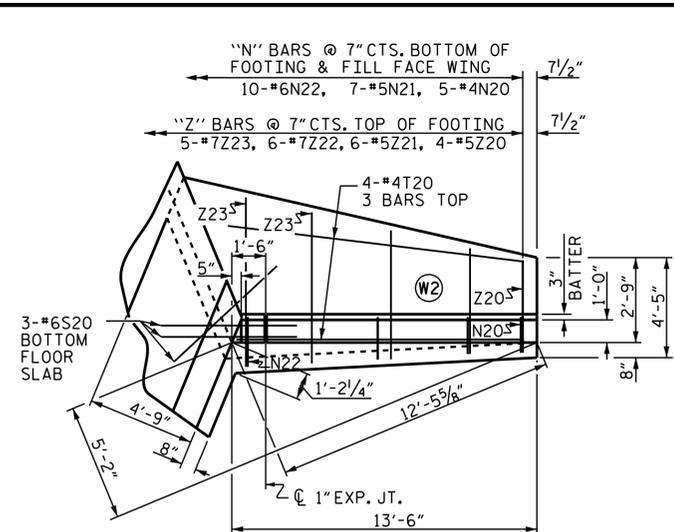
SHEET 4 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TRIPLE 12 FT. X 12 FT.
 CONCRETE BOX CULVERT
 135° SKEW
 EXTENSION**

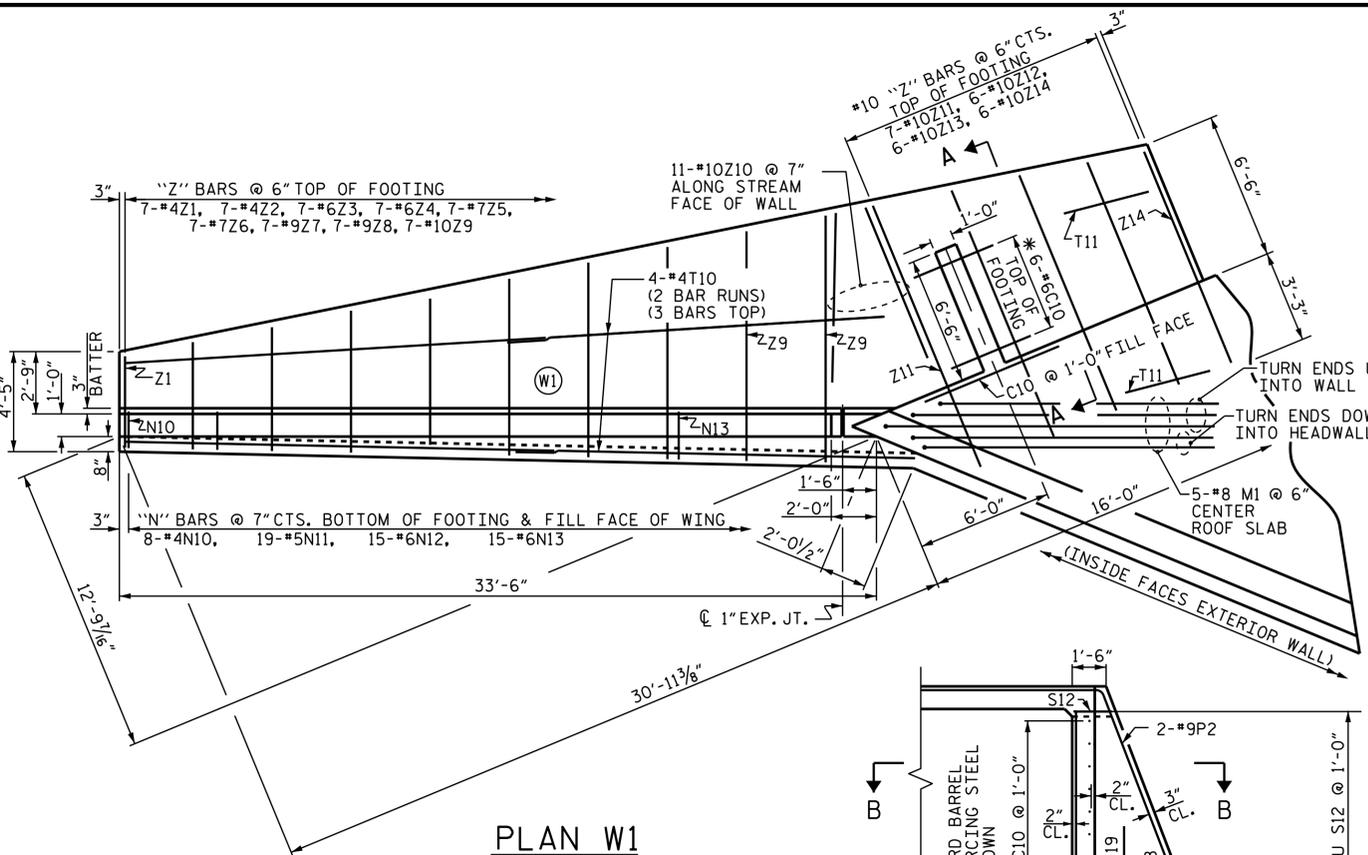
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-4
1			3			TOTAL SHEETS
2			4			6

ASSEMBLED BY : M. WELDON DATE : 07/2019
 CHECKED BY : F. LEA DATE : 07/2019
 DRAWN BY : JR 10/89 REV. 6/19 MAA/THC
 CHECKED BY : ARB 10/89

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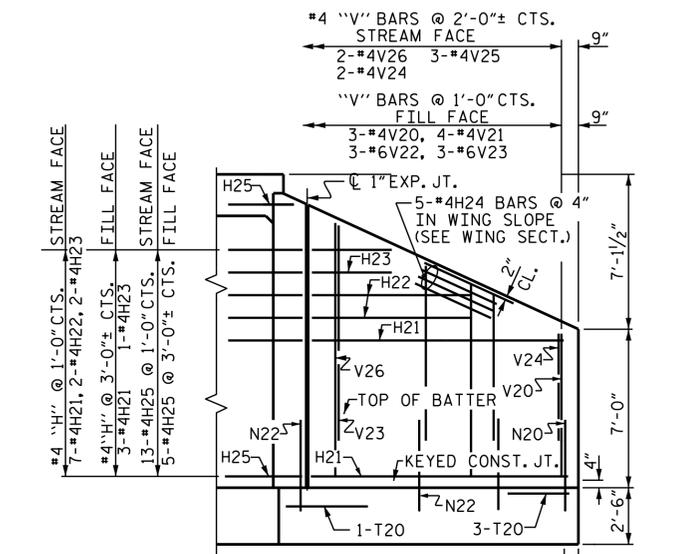


PLAN W2

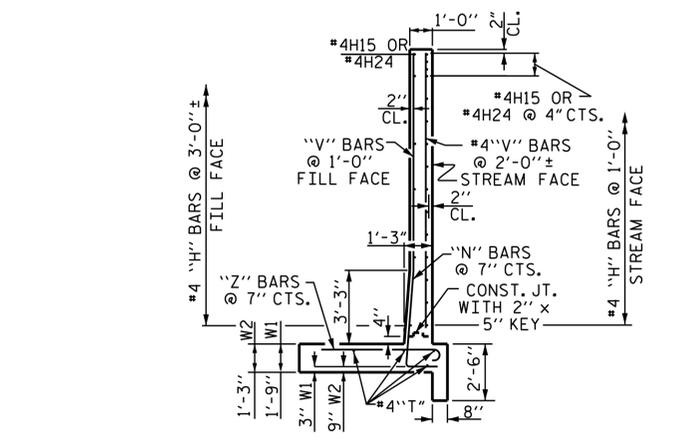


PLAN W1

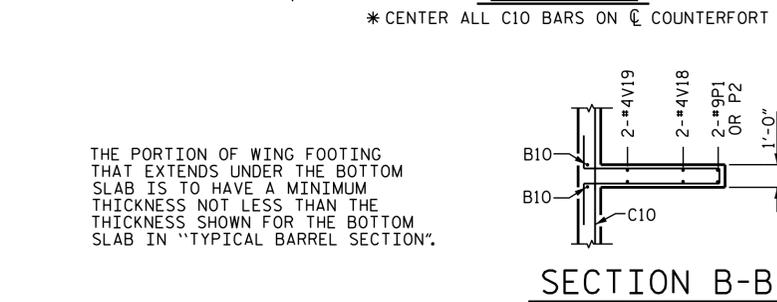
* CENTER ALL C10 BARS ON \bar{C} COUNTERFORT



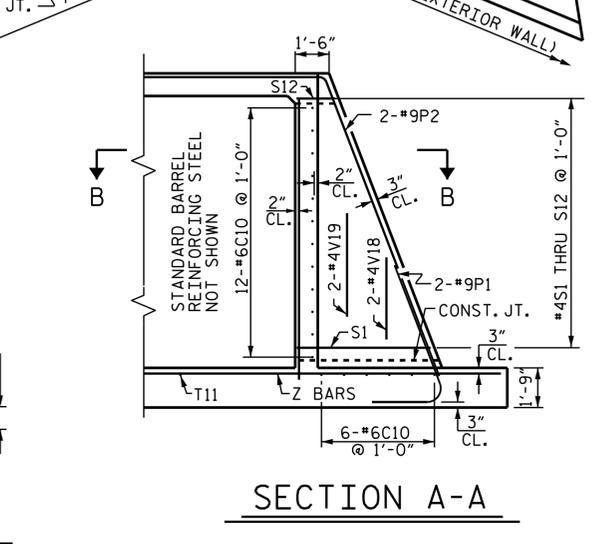
ELEVATION - SHORT WING W2



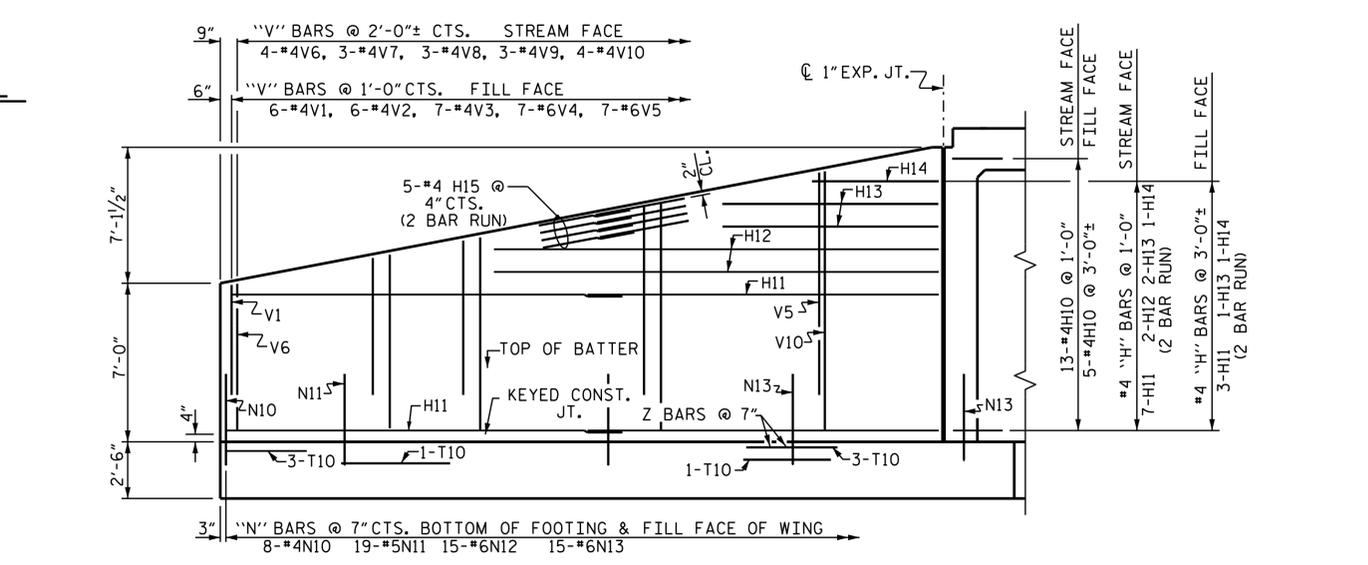
TYPICAL WING SECTION



SECTION B-B



SECTION A-A



ELEVATION LONG WING W1

SHORT WING W2									
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT					
H21	10	4	STR.	11'-7"	77				
H22	2	4	STR.	8'-1"	11				
H23	3	4	STR.	3'-7"	7				
H24	5	4	STR.	12'-2"	41				
H25	18	4	4	3'-6"	42				
N20	5	4	3	5'-8"	19				
N21	7	5	3	5'-10"	43				
N22	10	6	3	6'-1"	91				
S20	3	6	STR.	6'-0"	27				
T20	4	4	STR.	13'-6"	36				
V20	3	4	STR.	5'-9"	12				
V21	4	4	STR.	7'-3"	19				
V22	3	6	STR.	9'-6"	43				
V23	3	6	STR.	11'-0"	50				
V24	2	4	STR.	6'-0"	8				
V25	3	4	STR.	8'-0"	16				
V26	2	4	STR.	10'-6"	14				
Z20	5	4	1	4'-9"	16				
Z21	6	5	1	5'-7"	35				
Z22	6	7	1	6'-10"	84				
Z23	5	7	1	7'-10"	80				

LONG WING W1									
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT					
B10	2	4	STR.	13'-0"	17				
C10	18	6	STR.	12'-0"	324				
H10	18	4	4	3'-6"	42				
H11	20	4	STR.	16'-6"	220				
H12	2	4	STR.	22'-0"	29				
H13	3	4	STR.	11'-0"	22				
H14	2	4	STR.	6'-0"	8				
H15	10	4	STR.	16'-6"	110				
M1	5	8	5	16'-0"	214				
N10	8	4	3	5'-8"	30				
N11	19	5	3	5'-9"	114				
N12	15	6	3	6'-0"	135				
N13	15	6	3	6'-2"	139				
P1	2	9	7	8'-3"	56				
P2	2	9	6	16'-5"	112				
S1	1	4	2	14'-11"	10				
S2	1	4	2	14'-1"	9				
S3	1	4	2	13'-3"	9				
S4	1	4	2	12'-7"	8				
S5	1	4	2	11'-9"	8				
S6	1	4	2	10'-11"	7				
S7	1	4	2	10'-3"	7				
S8	1	4	2	9'-5"	6				
S9	1	4	2	8'-9"	6				
S10	1	4	2	7'-11"	5				
S11	1	4	2	7'-1"	5				
S12	1	4	2	6'-5"	4				
T10	8	4	STR.	17'-9"	95				
T11	2	4	STR.	16'-0"	21				
V1	6	4	STR.	5'-9"	23				
V2	6	4	STR.	7'-0"	28				
V3	7	4	STR.	8'-0"	37				
V4	7	6	STR.	9'-9"	103				
V5	7	6	STR.	11'-0"	116				
V6	4	4	STR.	6'-9"	18				
V7	3	4	STR.	8'-3"	17				
V8	3	4	STR.	9'-3"	19				
V9	3	4	STR.	10'-3"	21				
V10	4	4	STR.	11'-6"	31				
V18	2	4	STR.	6'-0"	8				
V19	2	4	STR.	11'-6"	15				
Z1	7	4	1	4'-6"	21				
Z2	7	4	1	5'-3"	25				
Z3	7	6	1	6'-2"	65				
Z4	7	6	1	6'-10"	72				
Z5	7	7	1	7'-8"	110				
Z6	7	7	1	8'-5"	120				
Z7	7	9	1	9'-7"	228				
Z8	7	9	1	10'-4"	246				
Z9	7	10	1	11'-3"	339				
Z10	11	10	1	11'-11"	564				
Z11	7	10	STR.	11'-6"	346				
Z12	6	10	STR.	10'-9"	278				
Z13	6	10	STR.	10'-3"	265				
Z14	6	10	STR.	9'-6"	245				

BAR TYPES									
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT					
Z1	7	4	1	4'-6"	21				
Z2	7	4	1	5'-3"	25				
Z3	7	6	1	6'-2"	65				
Z4	7	6	1	6'-10"	72				
Z5	7	7	1	7'-8"	110				
Z6	7	7	1	8'-5"	120				
Z7	7	9	1	9'-7"	228				
Z8	7	9	1	10'-4"	246				
Z9	7	10	1	11'-3"	339				
Z10	11	10	1	11'-11"	564				
Z11	7	10	STR.	11'-6"	346				
Z12	6	10	STR.	10'-9"	278				
Z13	6	10	STR.	10'-3"	265				
Z14	6	10	STR.	9'-6"	245				

REINFORCING STEEL		5,903 LBS.
CLASS A CONCRETE		52.3 C.Y.
2 WINGS		52.3 C.Y.
1 HEADWALL AND END CURTAIN WALL		5.7 C.Y.
2 EDGE BEAMS		4.2 C.Y.
TOTAL		62.2 C.Y.

PROJECT NO. I-5700
 WAKE COUNTY
 STATION: 53+39.00 -L-



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 MULTIPLE BOX CULVERT
 H=12'-0" SLOPE 2:1
 SKEW 135°

ASSEMBLED BY :	M. WELDON	DATE :	07/2019
CHECKED BY :	F. LEA	DATE :	07/2019
DRAWN BY :	MAA	REV.	6/19
CHECKED BY :	BHB	REV.	MAA/THC

28-SEP-2019 16:11
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REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

**LOAD AND RESISTANCE FACTOR RATING (LRFR)
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS**

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						LIVE-LOAD FACTORS (LL)	MOMENT				SHEAR					
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	2.20	--	1.75	4.66	1	EXTERIOR WALL	7.37	2.20	1	BOTTOM SLAB	11.02		
	HL-93 (OPERATING)	N/A		2.85	--	1.35	6.05	1	EXTERIOR WALL	7.37	2.85	1	BOTTOM SLAB	11.02		
	HS-20 (INVENTORY)	36.00	②	2.20	79.26	1.75	4.66	1	EXTERIOR WALL	7.37	2.20	1	BOTTOM SLAB	11.02		
	HS-20 (OPERATING)	36.00		2.85	102.74	1.35	6.05	1	EXTERIOR WALL	7.37	2.85	1	BOTTOM SLAB	11.02		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.50		5.82	78.50	1.40	5.82	1	EXTERIOR WALL	7.37	6.19	1	EXTERIOR WALL	2.05	
		SNGARBS2	20.00		4.53	90.65	1.40	5.82	1	EXTERIOR WALL	7.37	4.53	1	BOTTOM SLAB	11.02	
		SNAGRIS2	22.00		4.28	94.18	1.40	5.82	1	EXTERIOR WALL	7.37	4.28	1	BOTTOM SLAB	11.02	
		SNCOTTS3	27.25		3.08	83.99	1.40	5.82	1	EXTERIOR WALL	7.37	3.08	1	BOTTOM SLAB	11.02	
		SNAGGRS4	34.93		2.57	89.70	1.40	5.82	1	EXTERIOR WALL	7.37	2.57	1	BOTTOM SLAB	11.02	
		SNS5A	35.55		2.49	88.36	1.40	5.82	1	EXTERIOR WALL	7.37	2.49	1	BOTTOM SLAB	11.02	
		SNS6A	39.95		2.27	90.54	1.40	5.82	1	EXTERIOR WALL	7.37	2.27	1	BOTTOM SLAB	11.02	
		SNS7B	42.00		2.20	92.46	1.40	5.82	1	EXTERIOR WALL	7.37	2.20	1	BOTTOM SLAB	11.02	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.00		2.85	94.18	1.40	5.82	1	EXTERIOR WALL	7.37	2.85	1	BOTTOM SLAB	11.02	
		TNT4A	33.08		2.85	94.39	1.40	5.82	1	EXTERIOR WALL	7.37	2.85	1	BOTTOM SLAB	11.02	
		TNT6A	41.60		2.33	97.13	1.40	5.82	1	EXTERIOR WALL	7.37	2.33	1	BOTTOM SLAB	11.02	
		TNT7A	42.00		2.33	98.07	1.40	5.82	1	EXTERIOR WALL	7.37	2.33	1	BOTTOM SLAB	11.02	
		TNT7B	42.00		2.41	101.13	1.40	5.82	1	EXTERIOR WALL	7.37	2.41	1	BOTTOM SLAB	11.02	
		TNAGRIT4	43.00		2.20	94.67	1.40	5.82	1	EXTERIOR WALL	7.37	2.20	1	BOTTOM SLAB	11.02	
		TNAGT5A	45.00		2.14	96.32	1.40	5.82	1	EXTERIOR WALL	7.37	2.14	1	BOTTOM SLAB	11.02	
		TNAGT5B	45.00	③	2.08	93.71	1.40	5.82	1	EXTERIOR WALL	7.37	2.08	1	BOTTOM SLAB	11.02	

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	0.00
WA	1.00	0.00

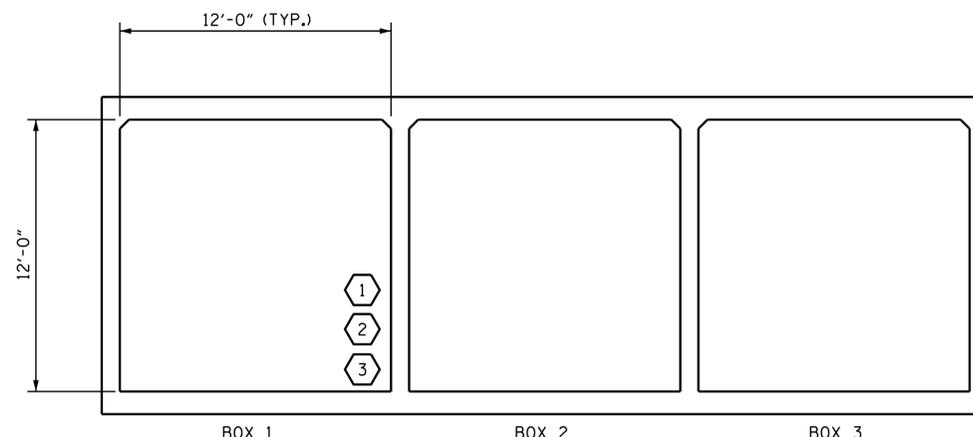
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

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



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. I-5700
WAKE COUNTY
 STATION: 53+39.00 -L-

SHEET 6 OF 6

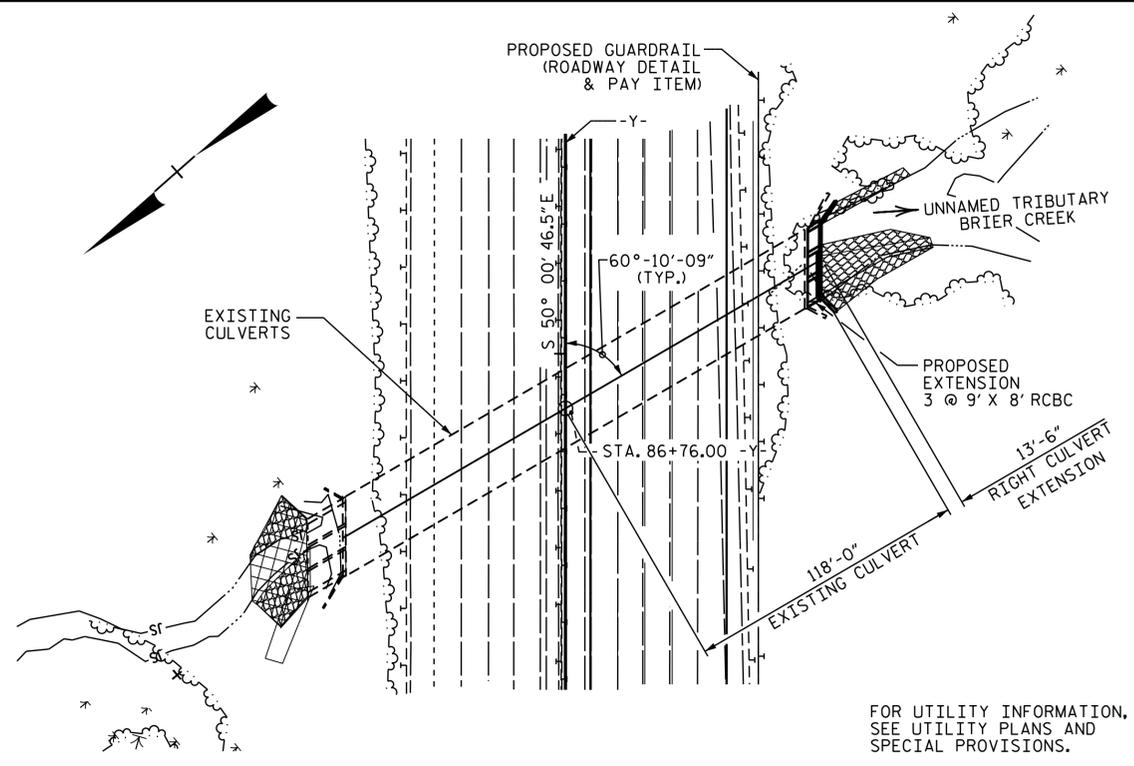


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD
LRFR SUMMARY FOR
REINFORCED CONCRETE
BOX CULVERTS
 (NON-INTERSTATE TRAFFIC)

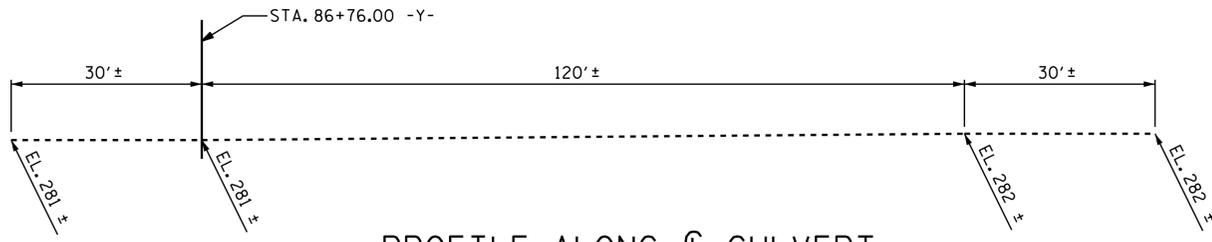
ASSEMBLED BY : M. WELDON	DATE : 07/2019		
CHECKED BY : F. LEA	DATE : 07/2019		
DRAWN BY : WMC	7/11	REV. 10/1/11	MAA/GM
CHECKED BY : GM	7/11	REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-6
1			3			TOTAL SHEETS
2			4			6



LOCATION SKETCH



PROFILE ALONG CULVERT

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

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

NOTES

ASSUMED LIVE LOAD ----- HL 93 OR ALTERNATE LOADING.
 DESIGN FILL (MAX) ----- 14.94 FT.
 DESIGN FILL (MIN) ----- 12.93 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 WALL.
 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.
 THIS BARREL STANDARD TO BE USED ONLY ON CULVERT ON 60° SKEW AND TO BE USED WITH STANDARD WING SHEET WITH THE SAME SKEW AND VERTICAL CLEARANCE.
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
 TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
 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.
 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.
 AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.
 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.
 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.
 A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 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.
 *FOR FAA NOTICE OF PROPOSED CONSTRUCTION, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 450 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 285.8 FT.
DRAINAGE AREA	= 0.55 SQ. MI.
BASE DISCHARGE (Q100)	= 510 CFS
BASE HIGH WATER ELEVATION	= 286.1 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 550 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500- YRS.
OVERTOPPING FLOOD ELEVATION	= * 286.3 FT.
* OVERTOPS TO ANOTHER DA @ APPROX. STA. 78+80 -Y- LT AT EL. 286.2	

GRADE DATA -Y-

GRADE POINT ELEV. @ STA. 86+76.00 -Y-	= 302.86'
BED ELEVATION @ STA. 86.76.00 -L-	= 281.12'
ROADWAY SLOPES	= 2:1

TOTAL STRUCTURE QUANTITIES

ITEM	QUANTITY	UNIT
CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MATERIAL	32	TONS
CLASS A CONCRETE		
BARREL @ 3.229	43.6	C.Y.
OUTLET WINGS ETC.	18.9	C.Y.
TOTAL	62.5	C.Y.
REINFORCING STEEL		
BARREL	5,876	LBS.
WINGS ETC.	833	LBS.
TOTAL	6,709	LBS.

PROJECT NO. I-5700
WAKE COUNTY
 STATION: 86+76.00 -Y-

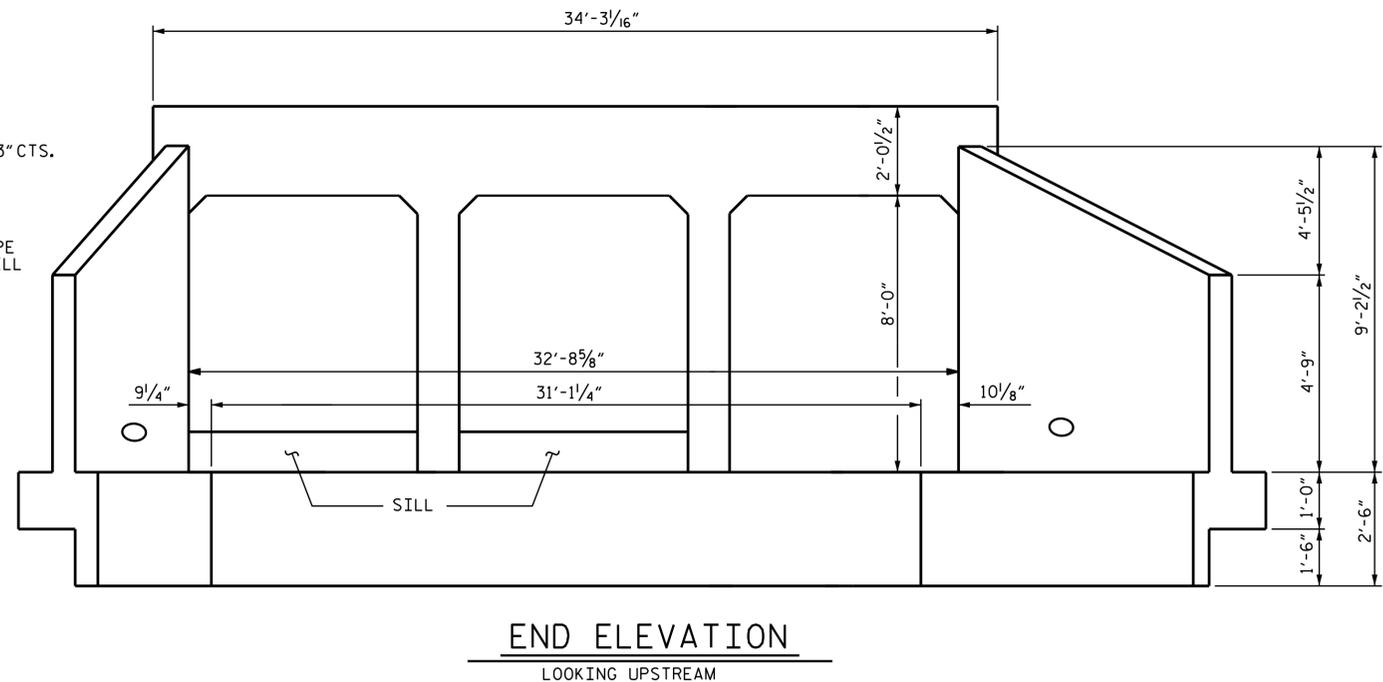
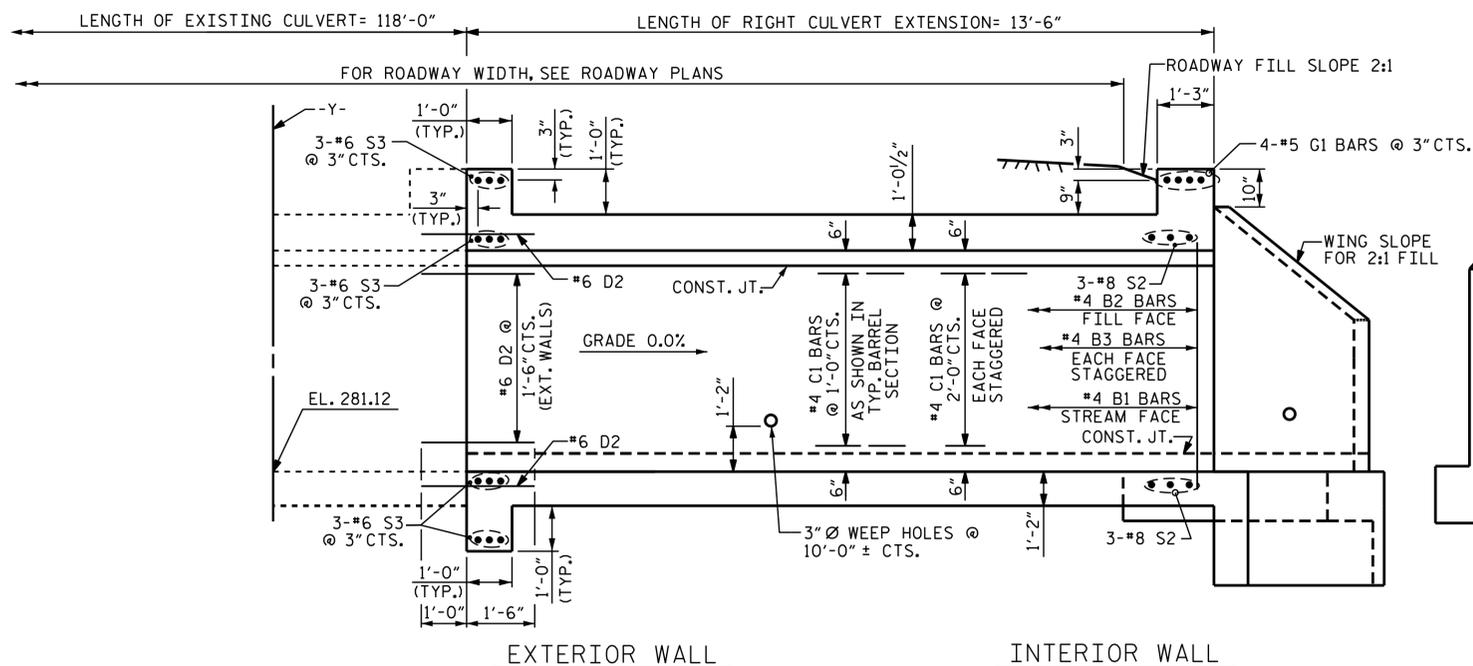
SHEET 1 OF 5



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TRIPLE 9 FT. X 8 FT.
 CONCRETE BOX CULVERT
 60° SKEW
 EXTENSION**

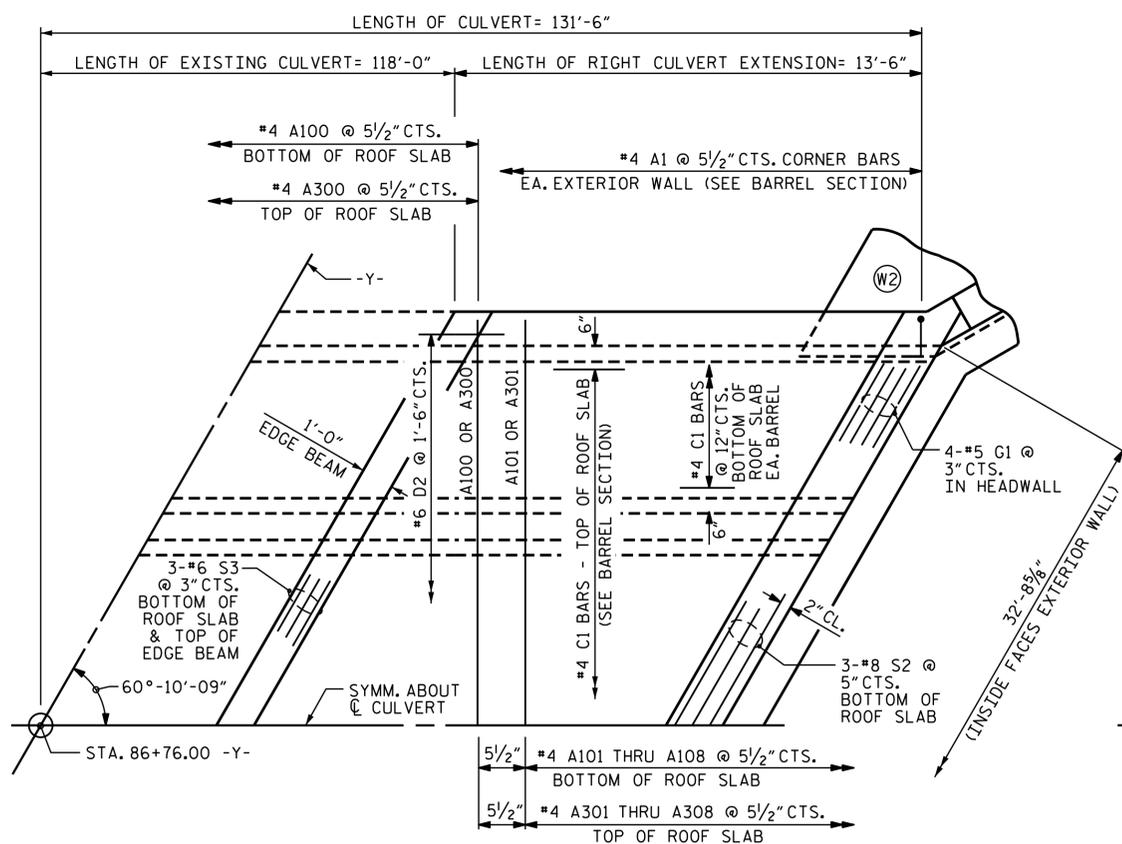
ASSEMBLED BY :	O. T. NGUYEN	DATE :	4/16/19
CHECKED BY :	F. LEA	DATE :	06/19
DRAWN BY :	BMM	REV. 6/19	MAA/THC
CHECKED BY :	ELR	10/30	

REVISIONS						SHEET NO. C3-1
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 5
2			4			

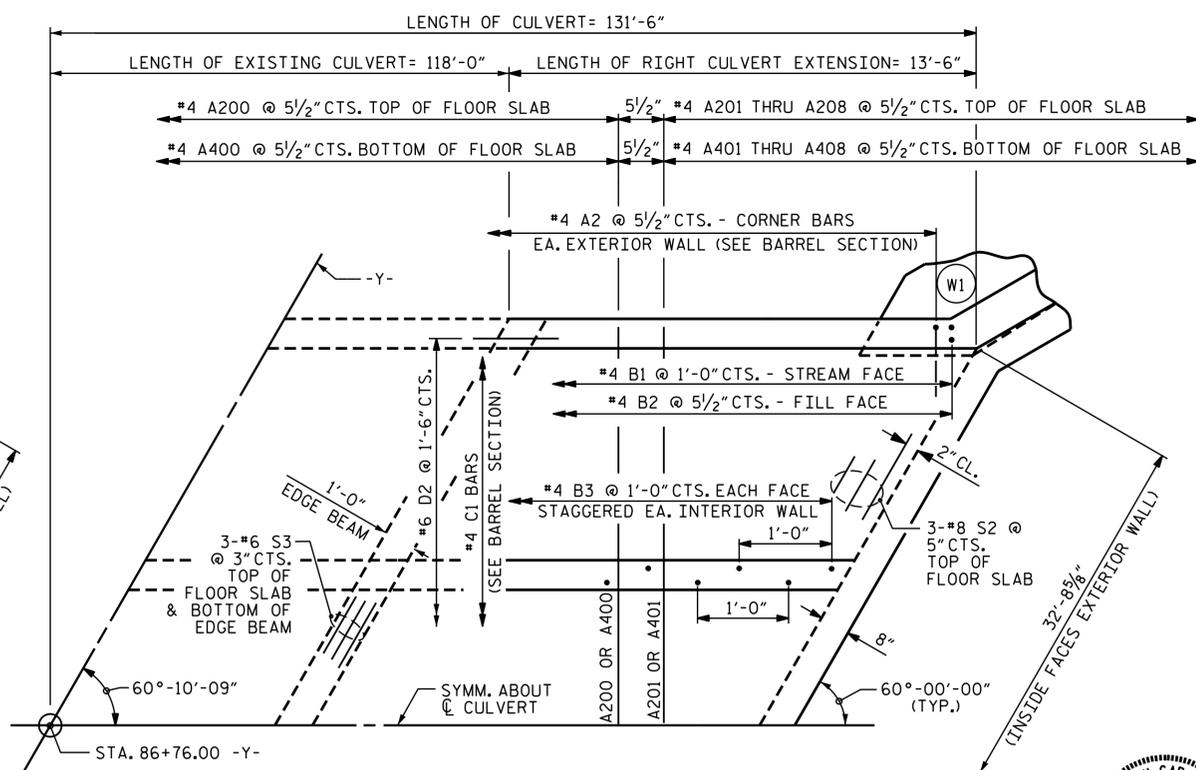


EXTERIOR WALL INTERIOR WALL
CULVERT SECTION NORMAL TO ROADWAY

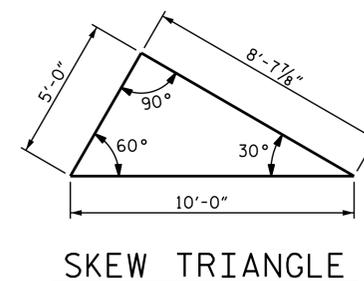
END ELEVATION
 LOOKING UPSTREAM



PART PLAN - ROOF SLAB



PART PLAN - FLOOR SLAB



SKEW TRIANGLE

PROJECT NO. I-5700
WAKE COUNTY
 STATION: 86+76.00 -Y-

SHEET 2 OF 5

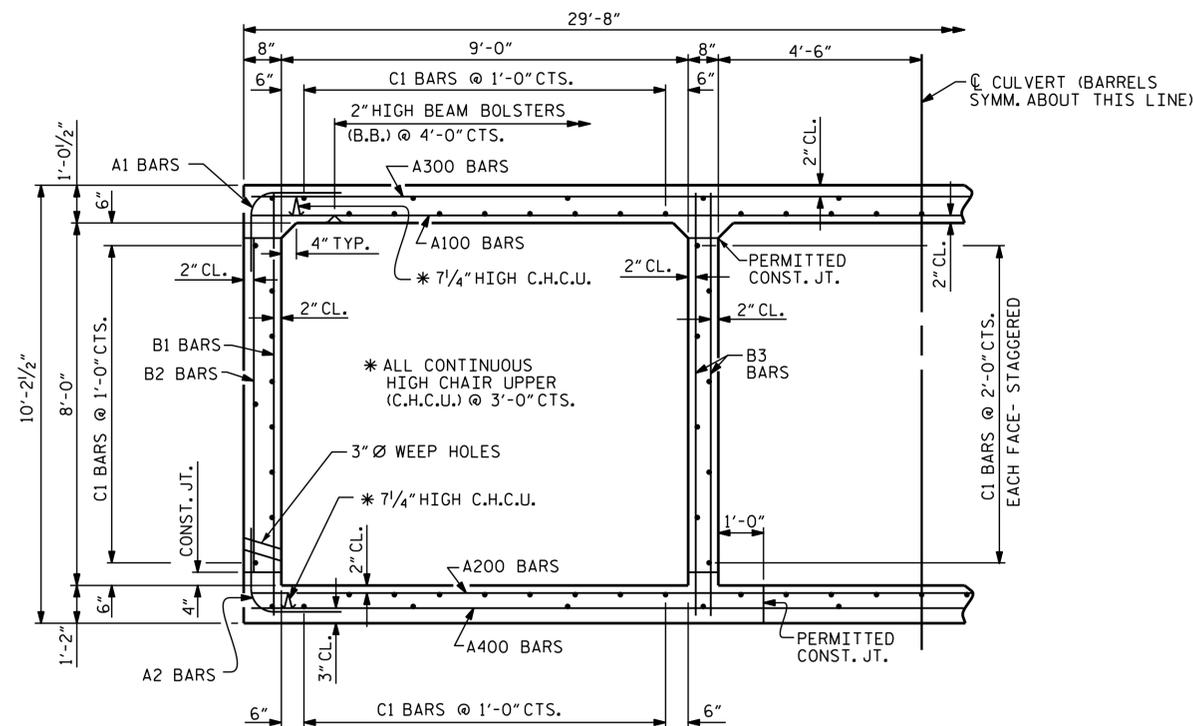


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TRIPLE 9 FT. X 8 FT.
 CONCRETE BOX CULVERT
 60° SKEW
 EXTENSION**

ASSEMBLED BY :	O. T. NGUYEN	DATE :	4/19
CHECKED BY :	F. LEA	DATE :	6/19
DRAWN BY :	BEW	REV. 6/19	MAA/THC
CHECKED BY :	MAJ		

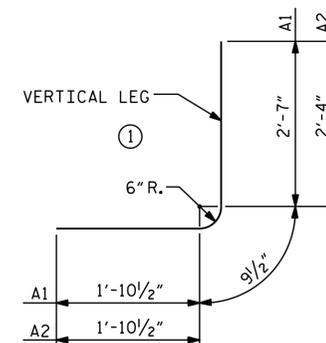
DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

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



RIGHT ANGLE SECTION OF BARREL

THERE ARE 108 "C" BARS IN SECTION OF BARREL.



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

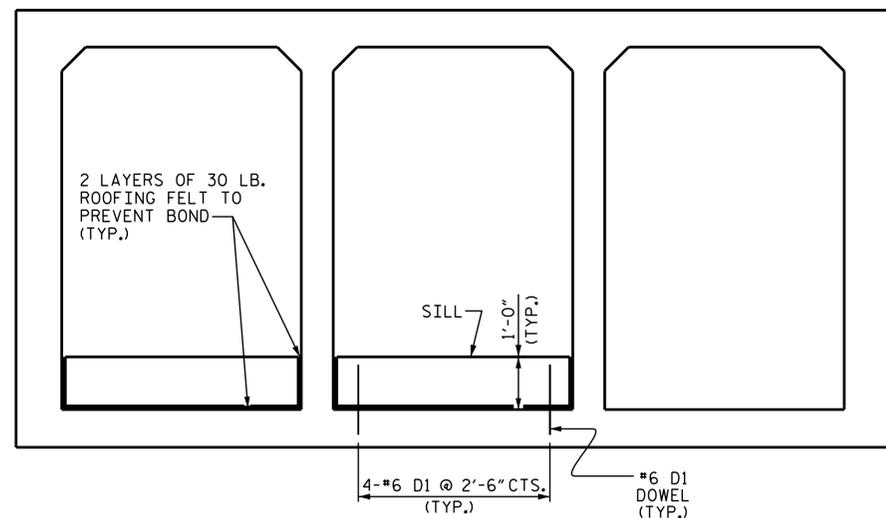
SPLICE LENGTHS CHART

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

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	60	#4	1	5'-3"	210
A2	60	#4	1	5'-0"	200
A100	8	#4	STR	29'-3"	156
A101	6	#4	STR	20'-6"	82
A102	6	#4	STR	18'-1"	72
A103	6	#4	STR	15'-8"	63
A104	6	#4	STR	13'-4"	53
A105	6	#4	STR	10'-11"	44
A106	6	#4	STR	8'-7"	34
A107	6	#4	STR	6'-2"	25
A108	6	#4	STR	3'-9"	15
A200	8	#4	STR	29'-3"	156
A201	6	#4	STR	20'-6"	82
A202	6	#4	STR	18'-1"	72
A203	6	#4	STR	15'-8"	63
A204	6	#4	STR	13'-4"	53
A205	6	#4	STR	10'-11"	44
A206	6	#4	STR	8'-7"	34
A207	6	#4	STR	6'-2"	25
A208	6	#4	STR	3'-9"	15
A300	8	#4	STR	29'-3"	156
A301	6	#4	STR	20'-6"	82
A302	6	#4	STR	18'-1"	72
A303	6	#4	STR	15'-8"	63
A304	6	#4	STR	13'-4"	53
A305	6	#4	STR	10'-11"	44
A306	6	#4	STR	8'-7"	34
A307	6	#4	STR	6'-2"	25
A308	6	#4	STR	3'-9"	15
A400	8	#4	STR	29'-3"	156
A401	6	#4	STR	20'-6"	82
A402	6	#4	STR	18'-1"	72
A403	6	#4	STR	15'-8"	63
A404	6	#4	STR	13'-4"	53
A405	6	#4	STR	10'-11"	44
A406	6	#4	STR	8'-7"	34
A407	6	#4	STR	6'-2"	25
A408	6	#4	STR	3'-9"	15
B1	28	#4	STR	9'-8"	181
B2	60	#4	STR	7'-4"	294
B3	56	#4	STR	9'-8"	362
C1	108	#4	STR	13'-1"	944
D1	8	#6	STR	1'-9"	21
D2	52	#6	STR	2'-6"	195
G1	4	#5	STR	33'-10"	141
S2	6	#8	STR	33'-10"	542
S3	12	#6	STR	33'-10"	610

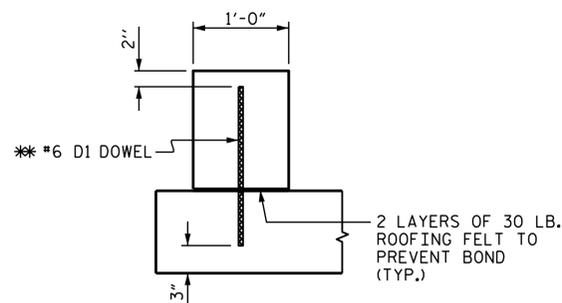
REINFORCING STEEL = 5,876 LBS.



ELEVATION

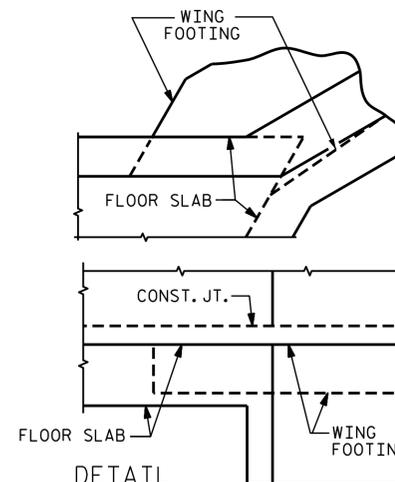
SILL DETAILS

LOOKING UPSTREAM
INSTALL 1 FT CONCRETE SILL
(2 FT INSET INTO DOWNSTREAM FACE)



SECTION

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



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

PROJECT NO. I-5700
WAKE COUNTY
STATION: 86+76.00 -Y-

SHEET 3 OF 5

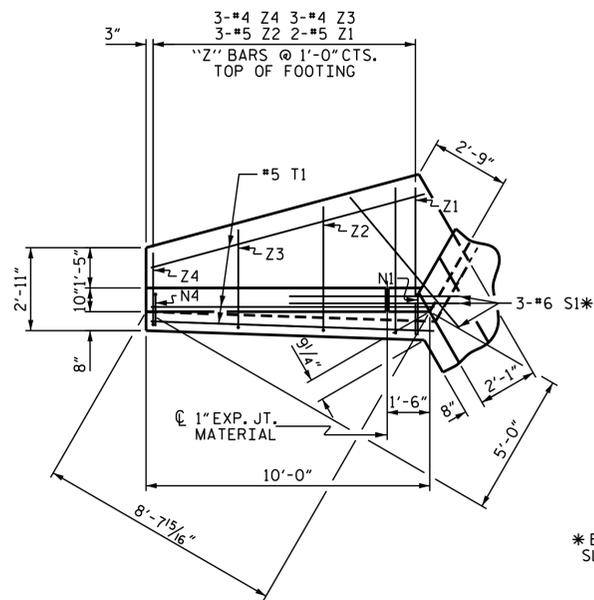


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
**TRIPLE 9 FT. X 8 FT. CONCRETE BOX CULVERT
60° SKEW EXTENSION**

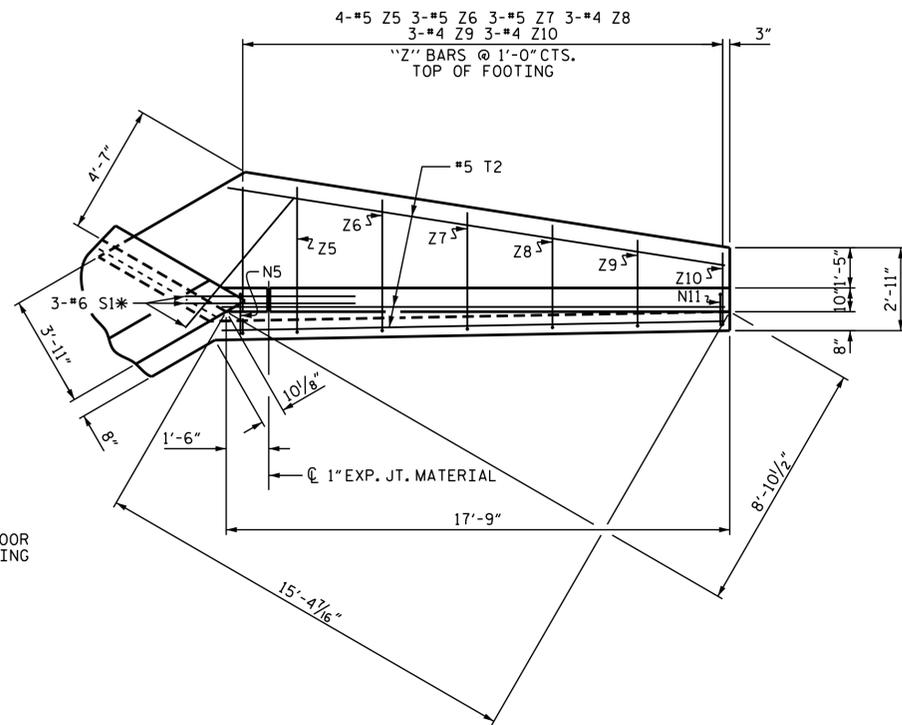
DRAWN BY : O. T. NGUYEN DATE : 4/19
CHECKED BY : F. LEA DATE : 6/19
DESIGN ENGINEER OF RECORD : R. L. CHESSON DATE : 04/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

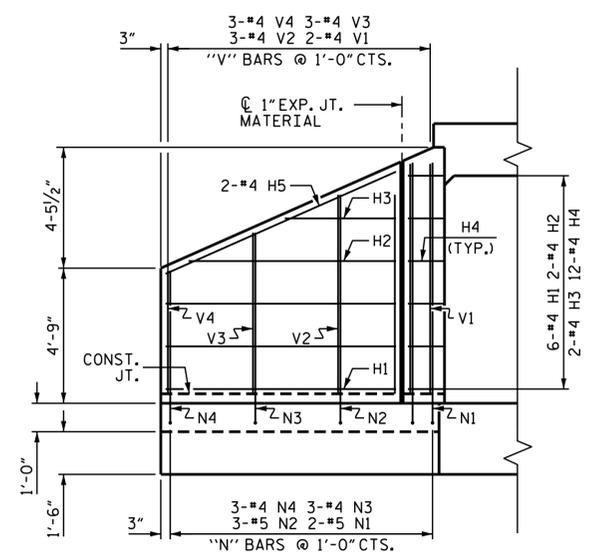
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-3
1			3			TOTAL SHEETS
2			4			5



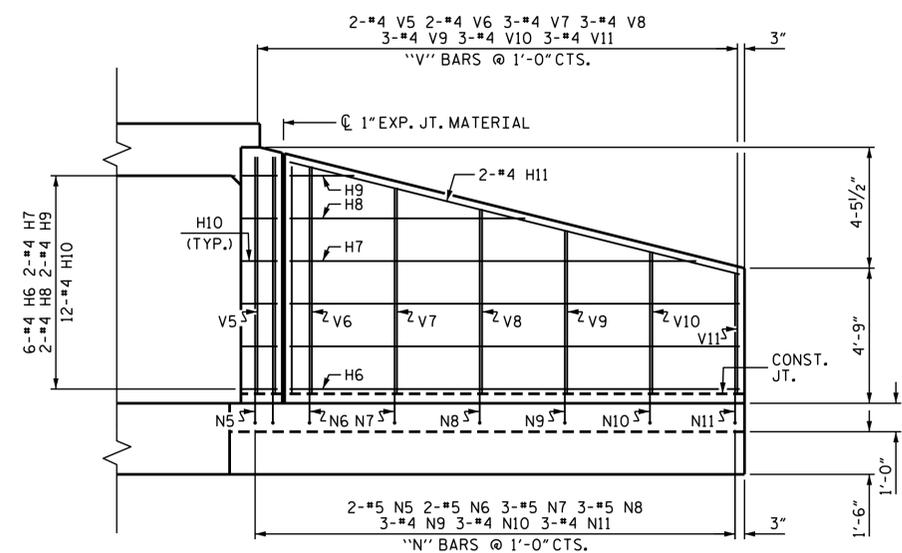
PLAN W2



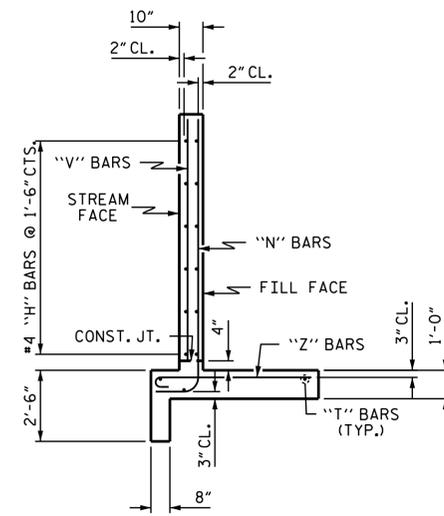
PLAN W1



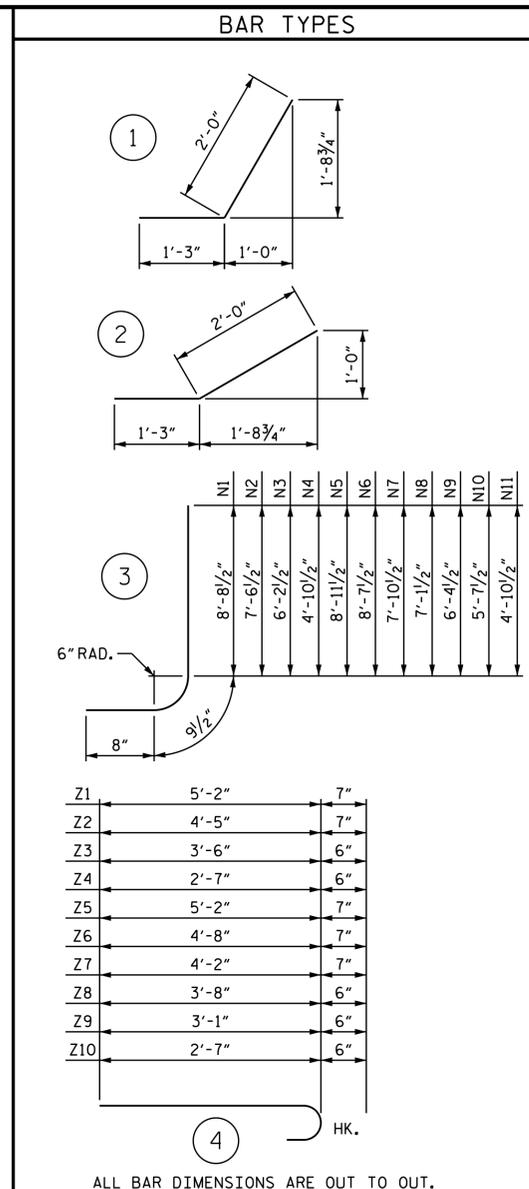
ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION



Z1	5'-2"	7"
Z2	4'-5"	7"
Z3	3'-6"	6"
Z4	2'-7"	6"
Z5	5'-2"	7"
Z6	4'-8"	7"
Z7	4'-2"	7"
Z8	3'-8"	6"
Z9	3'-1"	6"
Z10	2'-7"	6"

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	8'-1"	32
H2	2	#4	STR	7'-3"	10
H3	2	#4	STR	3'-11"	5
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	8'-10"	12
H6	6	#4	STR	15'-10"	63
H7	2	#4	STR	14'-4"	19
H8	2	#4	STR	8'-3"	11
H9	2	#4	STR	2'-3"	3
H10	12	#4	2	3'-3"	26
H11	2	#4	STR	16'-4"	22
N1	2	#5	3	10'-2"	21
N2	3	#5	3	9'-0"	28
N3	3	#4	3	7'-8"	15
N4	3	#4	3	6'-4"	13
N5	2	#5	3	10'-5"	22
N6	2	#5	3	10'-1"	21
N7	3	#5	3	9'-4"	29
N8	3	#5	3	8'-7"	27
N9	3	#4	3	7'-10"	16
N10	3	#4	3	7'-1"	14
N11	3	#4	3	6'-4"	13
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	10'-0"	31
T2	3	#5	STR	17'-9"	56
V1	2	#4	STR	8'-1"	11
V2	3	#4	STR	7'-0"	14
V3	3	#4	STR	5'-8"	11
V4	3	#4	STR	4'-4"	9
V5	2	#4	STR	8'-4"	11
V6	2	#4	STR	8'-0"	11
V7	3	#4	STR	7'-3"	15
V8	3	#4	STR	6'-6"	13
V9	3	#4	STR	5'-9"	12
V10	3	#4	STR	5'-0"	10
V11	3	#4	STR	4'-3"	9
Z1	2	#5	4	5'-9"	12
Z2	3	#5	4	5'-0"	16
Z3	3	#4	4	4'-0"	8
Z4	3	#4	4	3'-1"	6
Z5	4	#5	4	5'-9"	24
Z6	3	#5	4	5'-3"	16
Z7	3	#5	4	4'-9"	15
Z8	3	#4	4	4'-2"	8
Z9	3	#4	4	3'-7"	7
Z10	3	#4	4	3'-1"	6
REINFORCING STEEL					833 LBS.
FOR 2 WINGS					
CLASS A CONCRETE					
2 WINGS					12.2 C.Y.
1 HEADWALL					1.6 C.Y.
END CURTAIN WALL					1.9 C.Y.
SILLS					0.7 C.Y.
EDGE BEAMS					2.5 C.Y.
TOTAL					18.9 C.Y.

ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. I-5700
 WAKE COUNTY
 STATION: 86+76.00 -Y-
 SHEET 4 OF 5



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

ASSEMBLED BY :	O. T. NGUYEN	DATE :	4/16/19
CHECKED BY :	F. LEA	DATE :	6/19
DRAWN BY :	CCJ	REV. 6/19	MAA/THC
CHECKED BY :	RWW	03/00	

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

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

**LOAD AND RESISTANCE FACTOR RATING (LRFR)
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS**

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (LL)	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	2.36	--	1.75	3.29	1	TOP SLAB	4.35	2.36	1	TOP SLAB	8.56		
	HL-93 (OPERATING)	N/A		3.05	--	1.35	4.26	1	TOP SLAB	4.35	3.05	1	TOP SLAB	8.56		
	HS-20 (INVENTORY)	36.000	②	2.46	88.73	1.75	4.66	1	TOP SLAB	4.35	2.46	1	TOP SLAB	8.56		
	HS-20 (OPERATING)	36.000		3.19	115.02	1.35	6.03	1	TOP SLAB	4.35	3.19	1	TOP SLAB	8.56		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH		3.96	49.52	1.40	6.27	1	EXTERIOR WALL	4.78	3.96	1	EXTERIOR WALL	8.04		
		S3C	21.500		3.93	84.42	1.40	5.41	1	TOP SLAB	4.35	3.93	1	TOP SLAB	8.56	
		S3A	22.750		3.45	78.55	1.40	5.41	1	TOP SLAB	4.35	3.45	1	TOP SLAB	8.56	
		S4A	26.750		3.58	95.66	1.40	5.17	1	TOP SLAB	4.11	3.58	1	TOP SLAB	8.56	
		S5A	30.500		2.86	87.25	1.40	4.18	1	TOP SLAB	4.35	3.86	1	TOP SLAB	8.56	
		S6A	34.500		2.90	100.13	1.40	4.42	1	TOP SLAB	4.35	2.90	1	TOP SLAB	8.56	
		S7B	38.500	③	2.82	108.59	1.40	4.30	1	TOP SLAB	4.35	2.82	1	TOP SLAB	8.56	
		S7A	40.000		2.90	116.09	1.40	4.47	1	TOP SLAB	4.35	2.90	1	TOP SLAB	8.56	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		3.64	102.86	1.40	5.41	1	TOP SLAB	4.35	3.64	1	TOP SLAB	8.56	
		T5B	32.000		3.39	108.61	1.40	5.22	1	TOP SLAB	4.35	3.39	1	TOP SLAB	8.56	
		T6A	36.000		3.13	112.64	1.40	4.69	1	TOP SLAB	4.11	3.13	1	TOP SLAB	8.56	
		T7A	40.000		3.39	135.77	1.40	5.35	1	TOP SLAB	4.35	3.39	1	TOP SLAB	8.56	
	T7B	40.000		3.18	127.15	1.40	4.95	1	TOP SLAB	4.11	3.18	1	TOP SLAB	8.56		

DESIGN LOAD RATING FACTORS

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

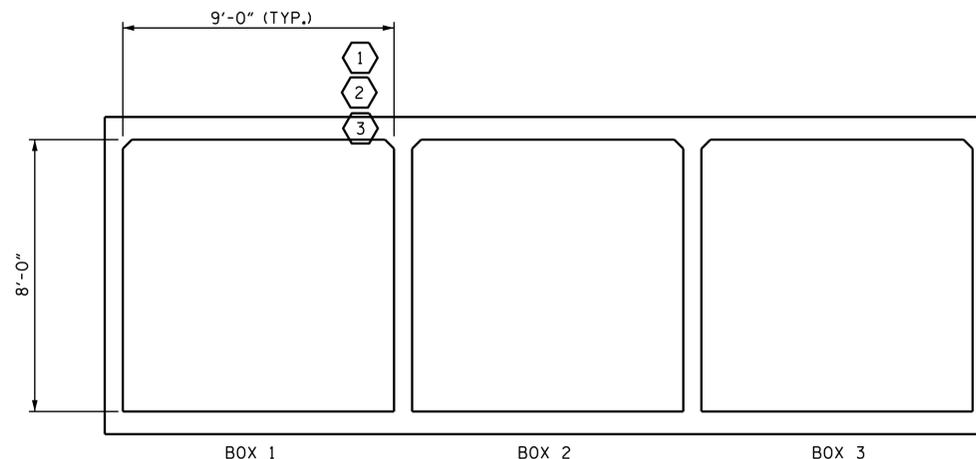
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

#	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. I-5700
WAKE COUNTY
 STATION: 86+76.00 -Y-

SHEET 5 OF 5

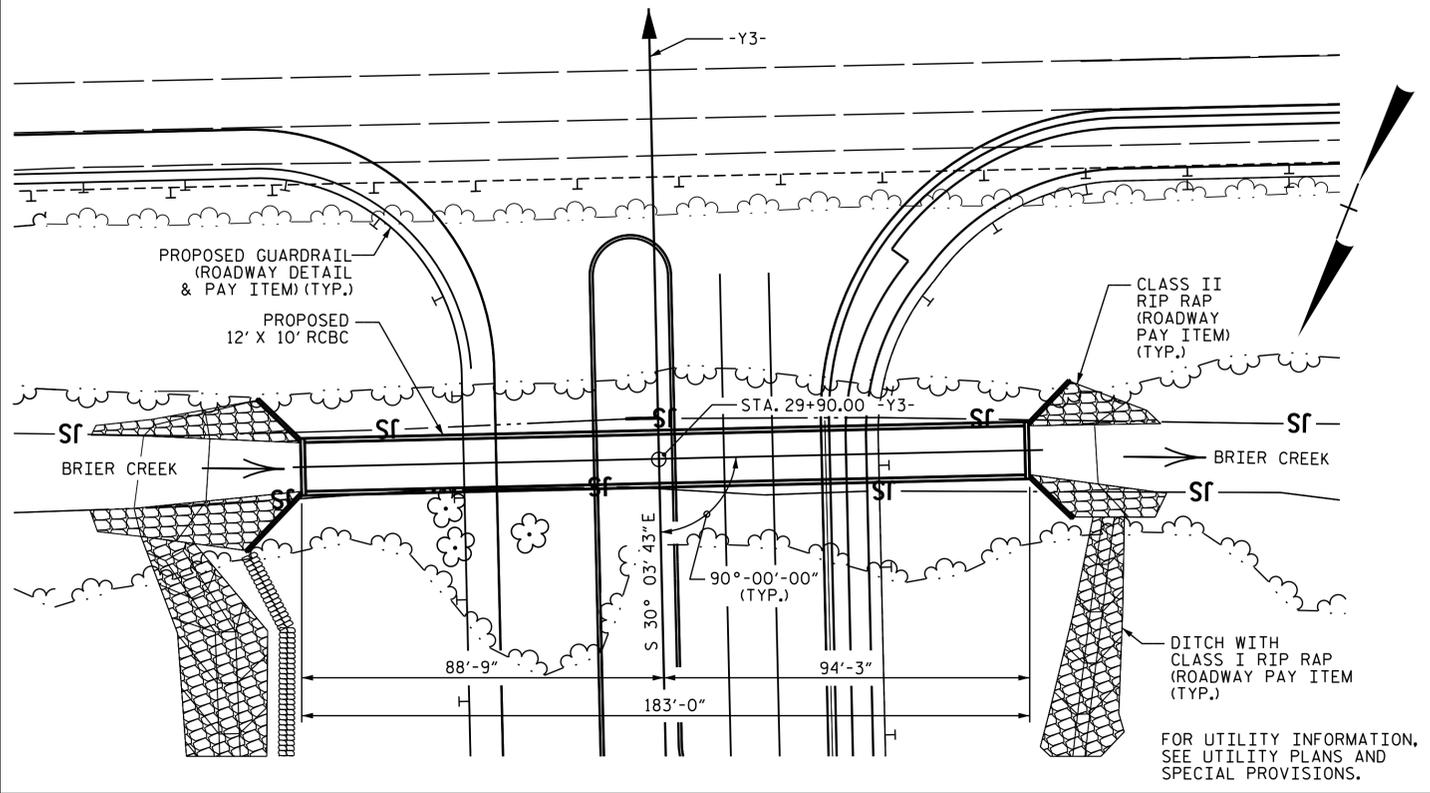


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (INTERSTATE TRAFFIC)**

ASSEMBLED BY : O. T. NGUYEN	DATE : 4/16/19
CHECKED BY : F. LEA	DATE : 6/19
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-5
1			3			TOTAL SHEETS
2			4			5



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD ----- HL 93 OR ALTERNATE LOADING.
 DESIGN FILL (MAX) ----- 20.30 FT.
 DESIGN FILL (MIN) ----- 18.73 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.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL 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.

AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.

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.

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

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

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.

"FOR FAA NOTICE OF PROPOSED CONSTRUCTION," SEE SPECIAL PROVISIONS.

HYDRAULIC DATA	
DESIGN DISCHARGE	= 376 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 288.8 FT.
DRAINAGE AREA	= 11.5 SQ. MI.
BASE DISCHARGE (Q100)	= 423 CFS
BASE HIGH WATER ELEVATION	= 289.7 FT.
BASE DISCHARGE (FEMA)	= 423 CFS
BASE HIGH WATER ELEVATION (FEMA)	= 289.3 FT.

OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	= 1580 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500 YRS+.
OVERTOPPING FLOOD ELEVATION	= * 309.8 FT.

* APPROX. 30+00 -Y3- AT ROADWAY MEDIAN

GRADE DATA -L-	
GRADE POINT EL. @ STA. 29+90.00 -Y3-	= 309.31'
BED ELEVATION @ STA. 29+90.00 -Y3-	= 279.85'
ROADWAY SLOPES	= 2:1

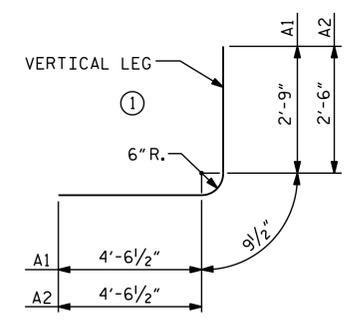
SAMPLE BAR REPLACEMENT	
SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

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

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

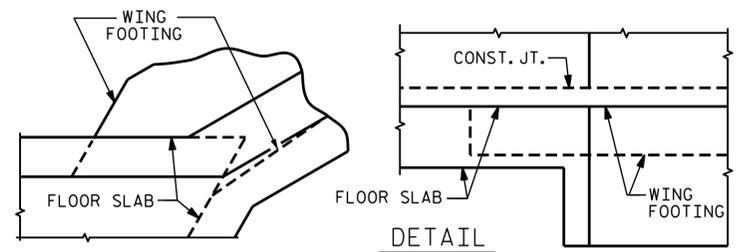
TOTAL STRUCTURE QUANTITIES	
CULVERT EXCAVATION	LUMP SUM
FOUNDATION	
CONDITIONING MATERIAL	226 TONS
CLASS A CONCRETE	
BARREL @ 1.851 CY/FT	338.7 C.Y.
OUTLET WINGS ETC.	34.7 C.Y.
TOTAL	373.4 C.Y.
REINFORCING STEEL	
BARREL	47,432 LBS.
WINGS ETC.	2,427 LBS.
TOTAL	49,859 LBS.

BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	1098	#4	1	8'-1"	5929
A2	1098	#4	1	7'-10"	5746
A100	440	#6	STR.	13'-1"	8647
A200	440	#6	STR.	13'-1"	8647
B1	366	#4	STR.	12'-1"	2954
B2	1098	#4	STR.	9'-4"	6846
C1	330	#4	STR.	38'-6"	8487
D1	4	#6	STR.	2'-0"	12
F1	38	#4	STR.	5'-1"	129
G1	4	#4	STR.	13'-2"	35
REINFORCING STEEL =				47,432 LBS.	

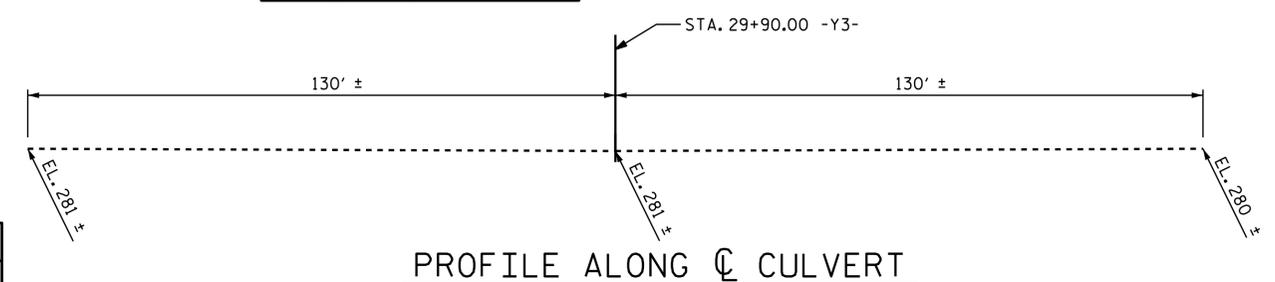


BAR TYPE
BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART		
BAR	SIZE	SPLICE LENGTH
B1	#4	1'-10"
C1	#4	2'-5"



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



PROFILE ALONG CULVERT

ASSEMBLED BY :	O. T. NGUYEN	DATE :	7/3/19
CHECKED BY :	F. LEA	DATE :	07/2019
DRAWN BY :	RWW	REV.	8/89
CHECKED BY :	ARB	REV.	8/89

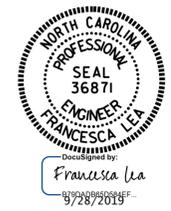
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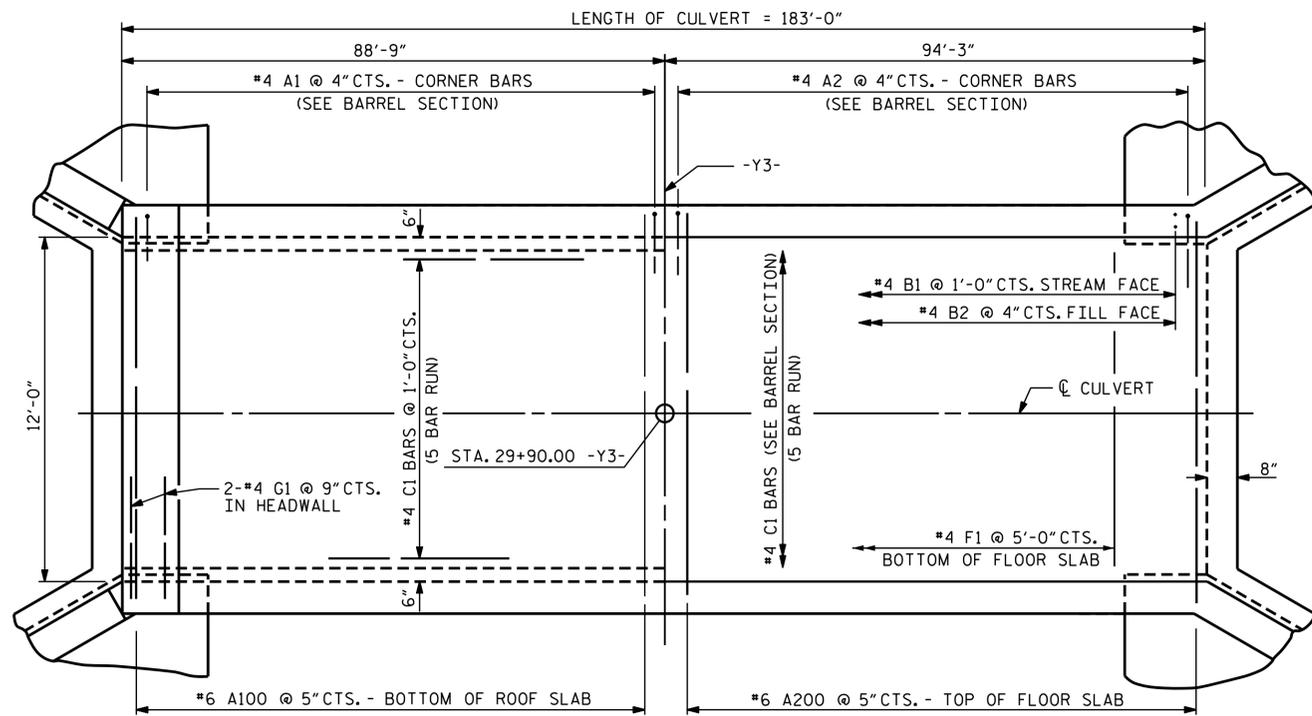
REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 12 FT. X 10 FT.
 CONCRETE BOX CULVERT
 90° SKEW

PROJECT NO. I-5700
 WAKE COUNTY
 STATION: 29+90.00 -Y3-

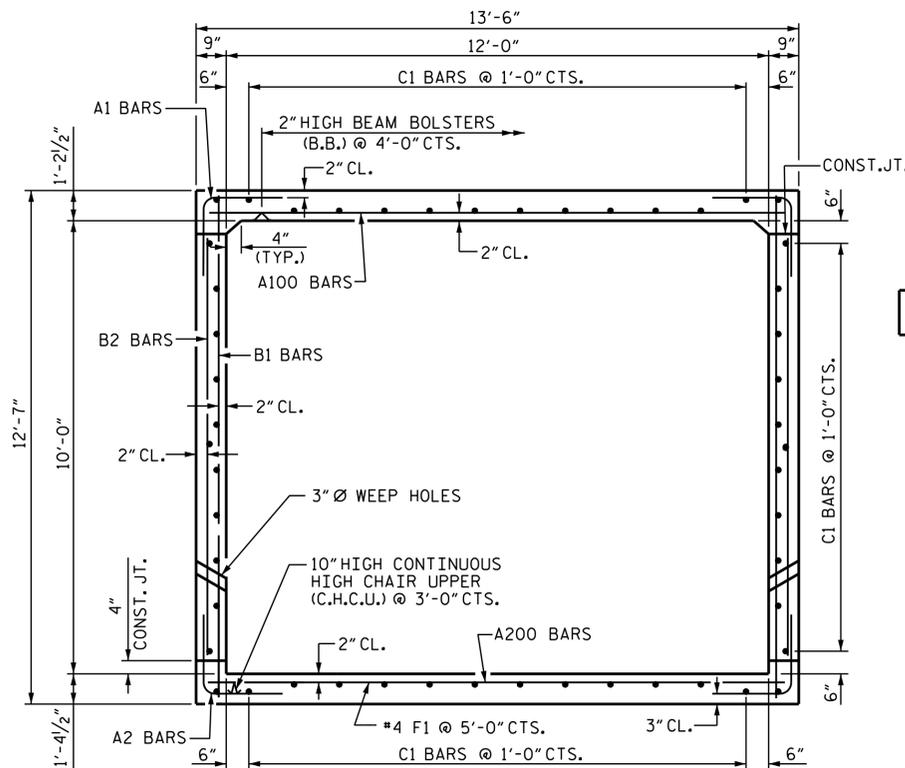
SHEET 1 OF 4





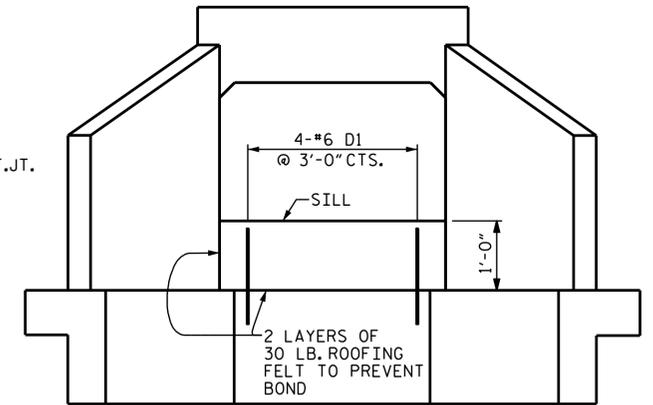
PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

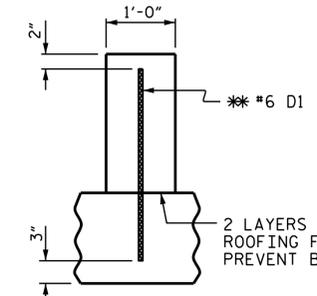


RIGHT ANGLE SECTION OF BARREL

THERE ARE 50 "C" BARS IN SECTION OF BARREL



ELEVATION



SECTION THROUGH SILL

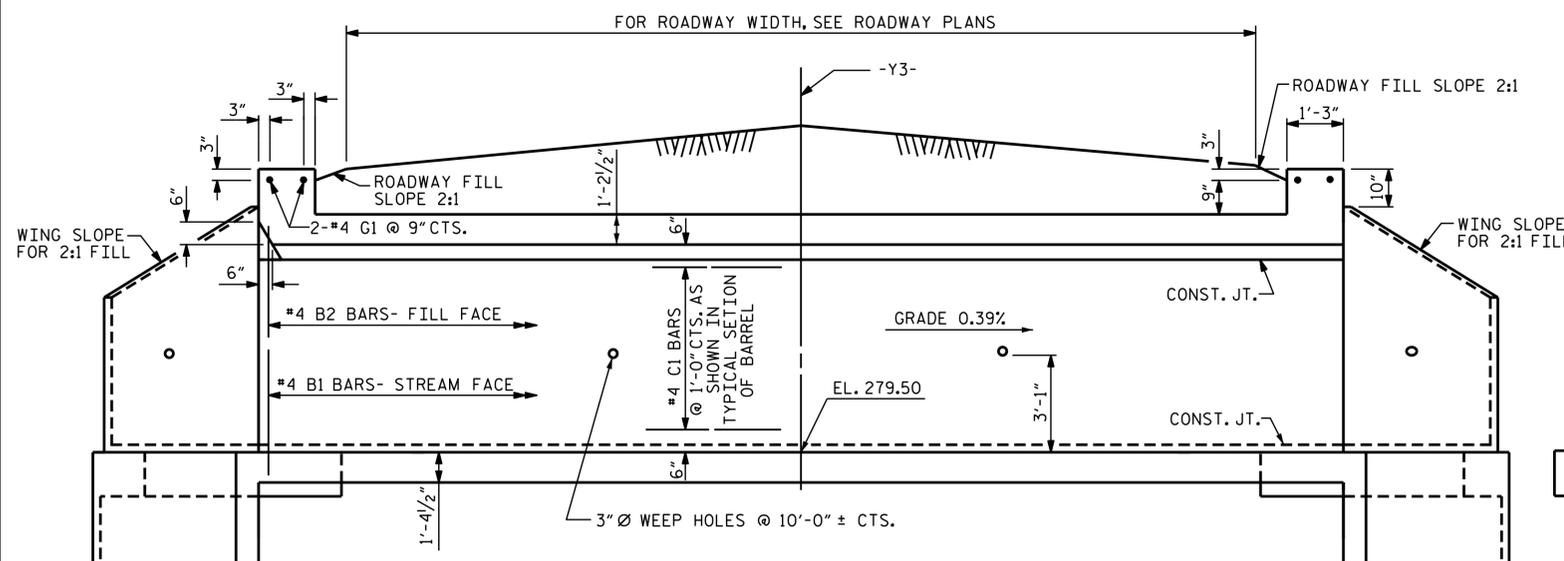
** DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

SILL DETAILS

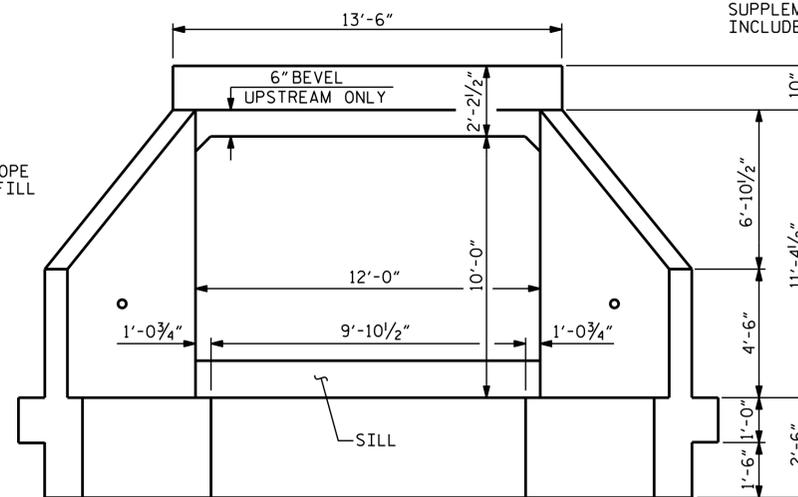
INSTALL 1 FT CONCRETE SILL (2 FT INSET INTO DOWNSTREAM AND UPSTREAM FACE)

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

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



CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PROJECT NO. I-5700
WAKE COUNTY
STATION: 29+90.00 -Y3-

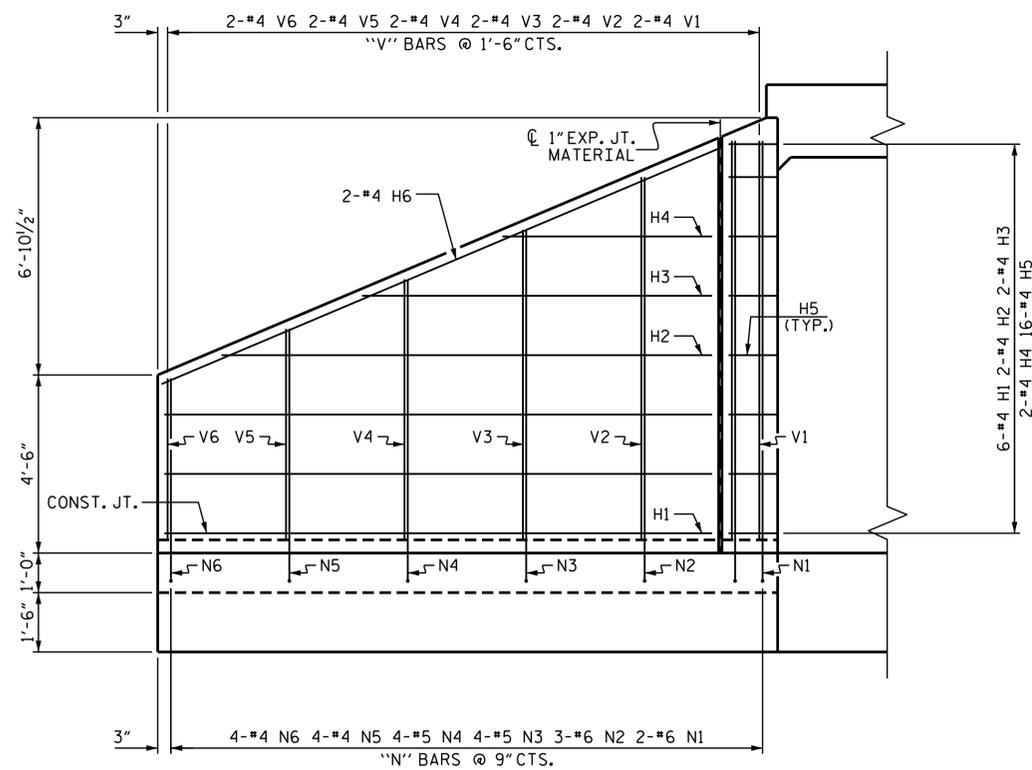
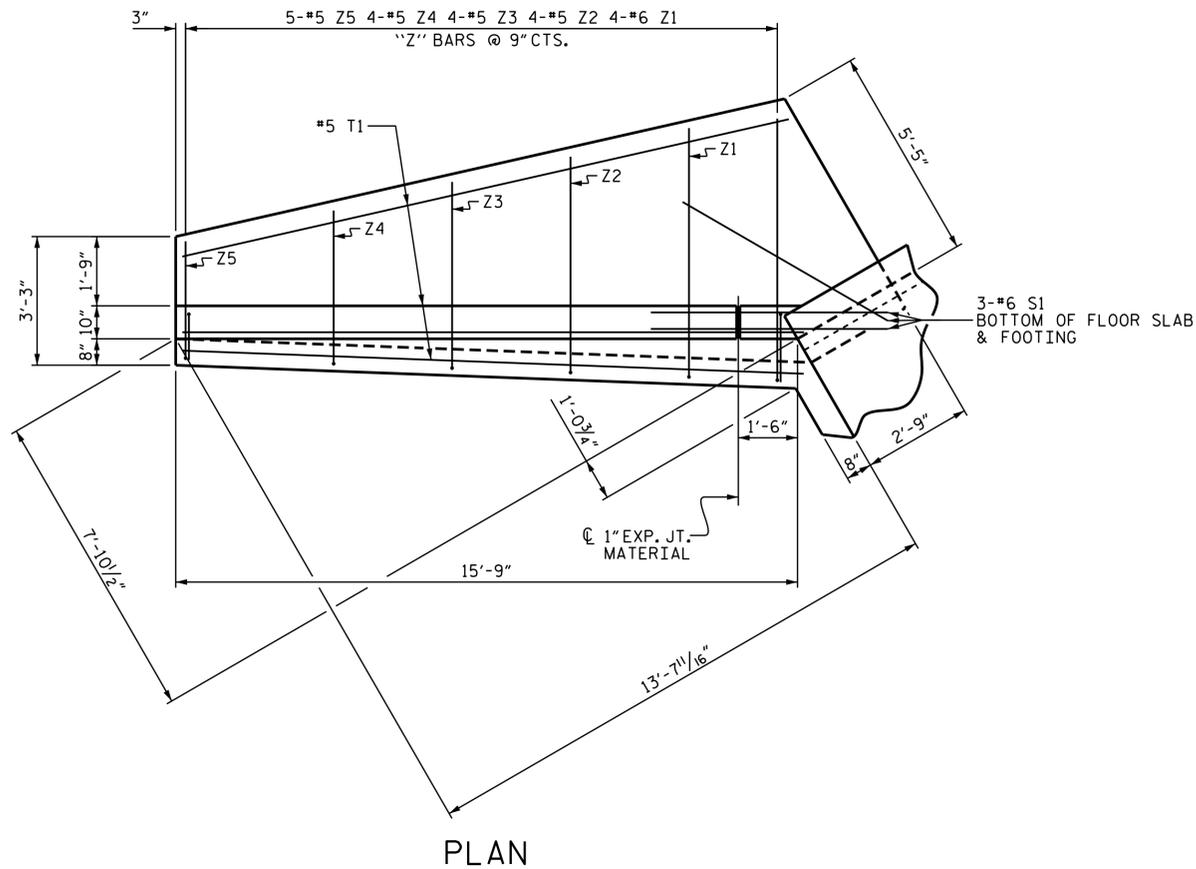
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SINGLE 12 FT. X 10 FT.
CONCRETE BOX CULVERT
90° SKEW

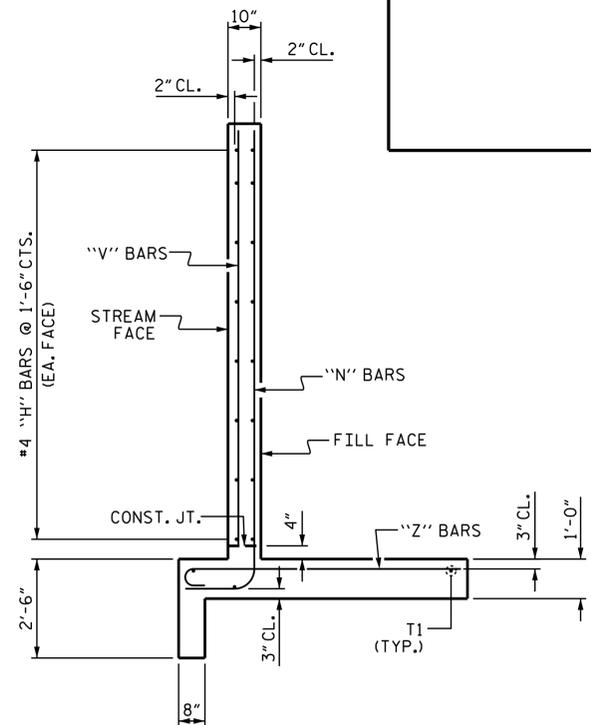
ASSEMBLED BY :	O. T. NGUYEN	DATE :	7/3/19
CHECKED BY :	F. LEA	DATE :	07/2019
DRAWN BY :	RWW	REV.	6/19
CHECKED BY :	ARB	DATE :	8/89

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

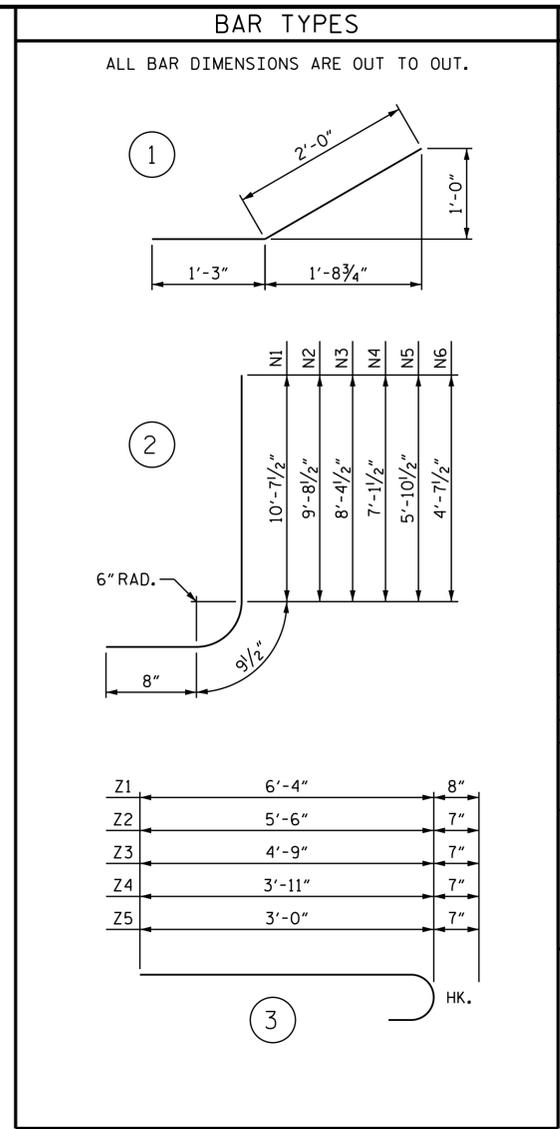
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-2	
1			3			TOTAL SHEETS	
2			4			4	



ELEVATION



TYPICAL WING SECTION



BILL OF MATERIAL				BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	24	#4	STR	13'-10"	222			
H2	8	#4	STR	12'-5"	66			
H3	8	#4	STR	8'-10"	47			
H4	8	#4	STR	5'-4"	29			
H5	64	#4	1	3'-3"	139			
H6	8	#4	STR	15'-5"	82			
N1	8	#6	2	12'-1"	146			
N2	12	#6	2	11'-2"	201			
N3	16	#5	2	9'-10"	164			
N4	16	#5	2	8'-7"	143			
N5	16	#4	2	7'-4"	78			
N6	16	#4	2	6'-1"	65			
S1	12	#6	STR	6'-0"	108			
T1	12	#5	STR	15'-9"	197			
V1	8	#4	STR	10'-1"	54			
V2	8	#4	STR	9'-2"	49			
V3	8	#4	STR	7'-10"	42			
V4	8	#4	STR	6'-7"	35			
V5	8	#4	STR	5'-4"	29			
V6	8	#4	STR	4'-1"	22			
Z1	16	#6	3	7'-0"	168			
Z2	16	#5	3	6'-1"	102			
Z3	16	#5	3	5'-4"	89			
Z4	16	#5	3	4'-6"	75			
Z5	20	#5	3	3'-7"	75			
REINFORCING STEEL FOR 4 WINGS							2,427 LBS.	
CLASS A CONCRETE								
4 WINGS							31.2 C.Y.	
2 HEADWALLS							1.3 C.Y.	
END CURTAIN WALLS							1.2 C.Y.	
2 SILLS							1.0 C.Y.	
TOTAL							34.7 C.Y.	

PROJECT NO. I-5700
WAKE COUNTY
 STATION: 29+90.00 -Y3-

SHEET 3 OF 4



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT**
 H = 10'-0" SLOPE = 2:1
 90° SKEW

ASSEMBLED BY : O. T. NGUYEN	DATE : 7/3/19
CHECKED BY : F. LEA	DATE : 07/2019
DRAWN BY : CCJ	10/99
CHECKED BY : RWW	03/00
REV. 6/19	MAA/THC

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

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

**LOAD AND RESISTANCE FACTOR RATING (LRFR)
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS**

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER	
						MOMENT				SHEAR					
						LIVE-LOAD FACTORS (ILL)	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	2.03	--	1.75	2.03	1	BOTTOM CORNER WALL	10.73	2.18	1	EXTERIOR WALL	10.06	
	HL-93 (OPERATING)	N/A		2.63	--	1.35	2.63	1	BOTTOM CORNER WALL	10.73	2.82	1	EXTERIOR WALL	10.06	
	HS-20 (INVENTORY)	36.000	2	2.03	73.08	1.75	2.03	1	BOTTOM CORNER WALL	10.73	2.18	1	EXTERIOR WALL	10.06	
	HS-20 (OPERATING)	36.000		2.63	94.73	1.35	2.63	1	BOTTOM CORNER WALL	10.73	2.82	1	EXTERIOR WALL	10.06	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	3	2.54	34.26	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		SNGARBS2		2.54	50.75	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		SNAGRIS2		2.54	55.82	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		SNCOTTS3		2.54	69.14	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		SNAGGRS4		2.54	88.62	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		SNS5A		2.54	90.20	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		SNS6A		2.54	101.37	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		SNS7B		2.54	106.57	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
	TRUCK TRACTOR SEMI-TRAILER (TTS1)	TNAGRIT3		2.54	83.73	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		TNT4A		2.54	83.92	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		TNT6A		2.54	105.56	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		TNT7A		2.54	106.57	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		TNT7B		2.54	106.57	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
		TNAGRIT4		2.54	109.11	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06	
	TNAGT5A		2.54	114.18	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06		
	TNAGT5B		2.54	114.18	1.40	2.54	1	BOTTOM CORNER WALL	10.73	2.72	1	EXTERIOR WALL	10.06		

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

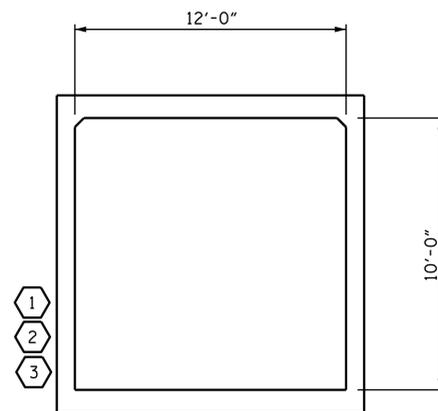
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

#	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. I-5700
WAKE COUNTY
 STATION: 29+90.00 -Y3-

SHEET 4 OF 4



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

ASSEMBLED BY : O. T. NGUYEN	DATE : 7/3/19
CHECKED BY : F. LEA	DATE : 07/20/19
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-4
1			3			TOTAL SHEETS
2			4			4

