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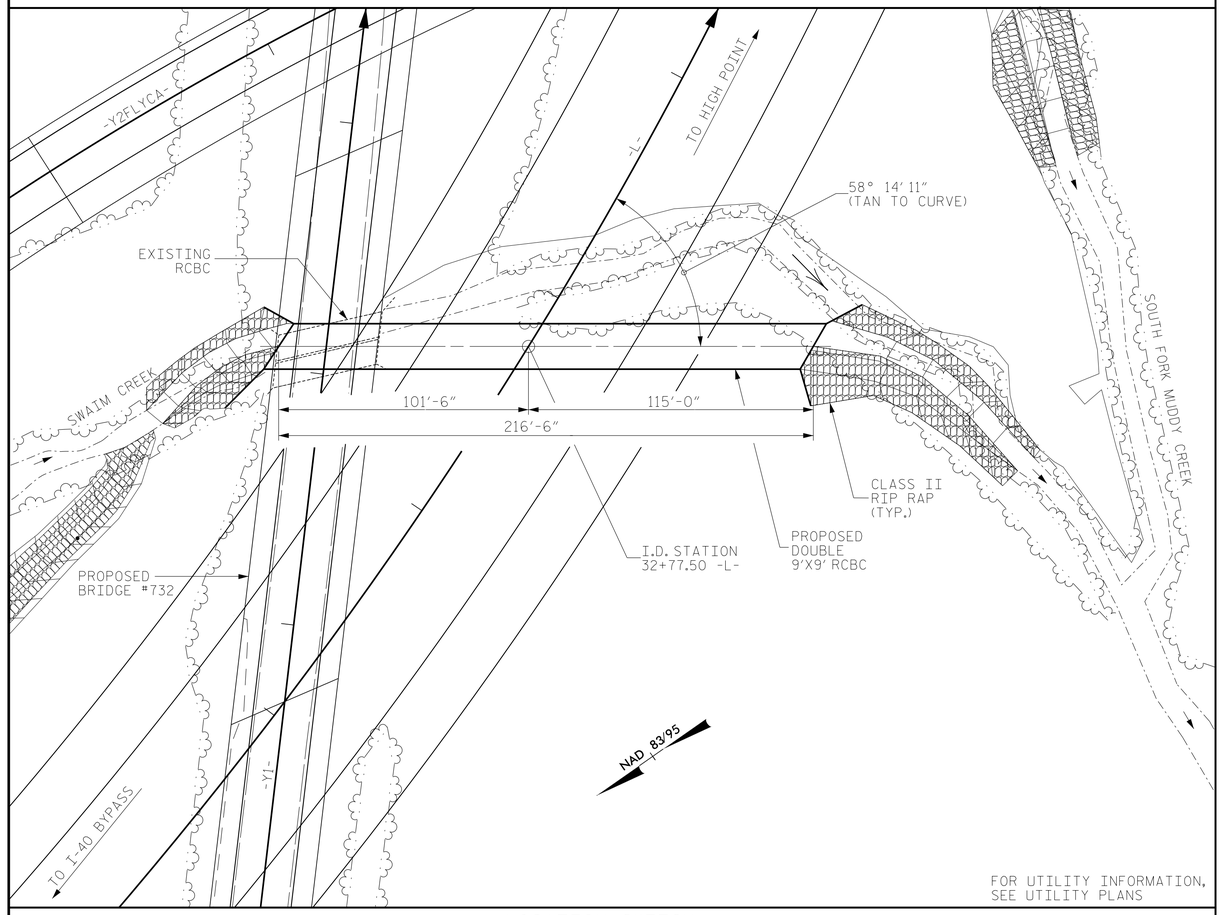
F.A. PROJECT NO. 0074226

BM# 4: -L- STA. 34+22.15 1365.82' LT. N 844967.23, E 1661470.75 EL. 876.61'



LOCATION SKETCH

NOTES:

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

DESIGN FILL ----- MAX.=10.33', MIN.=4.63'

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE STANDARD NOTES SHEET SN.

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.

CONCRETE IN CULVERT SHALL BE POURED IN THE FOLLOWING ORDER:

1. WINGS 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 FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED, CONSTRUCTION JOINT AT THE CONTRACOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.

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

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

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 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.

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.

TOTAL STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE	LUMP SUM	
ASBESTOS ASSESSMENT	LUMP SUM	
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	366	TONS
CLASS A CONCRETE		
BARREL @ 2.28 CY/FT	493.6	C.Y.
WINGS, SILLS, ETC.	37.6	C.Y.
TOTAL	531.2	C.Y.
REINFORCING STEEL		
BARREL	68,821	LBS.
WINGS ETC.	2,148	LBS.
TOTAL	70,969	LBS.
CLASS I RIP RAP	334	TONS
GEOTEXTILE FOR DRAINAGE	564	SY

HYDRAULIC DATA

DESIGN DISCHARGE	= 1200	CFS
FREQUENCY OF DESIGN DISCHARGE	= 50	YRS
DESIGN HIGH WATER ELEVATION	= 820.3	FT
DRAINAGE AREA	= 1.6	SQ MI
BASE DISCHARGE (Q100)	= 1300	CFS
BASE HIGH WATER ELEVATION	= 821.2	FT

OVERTOPPING DATA

OVERTOPPING DISCHARGE *	= 1500	CFS
FREQUENCY OF OVERTOPPING	= 500 (+)	YRS
OVERTOPPING ELEVATION	= 825.0	FT

* AT LOW SIDE SUPER EDGE OF PAVEMENT AT SAG -L- STA. 31+50

GRADE DATA

GRADE POINT ELEV. @ STATION 32+77.50 -L- = 827.37'
BED ELEV. @ STATION 32+77.50 -L- = 808.87'
ROADWAY SLOPES: 2:1

FOUNDATION NOTES

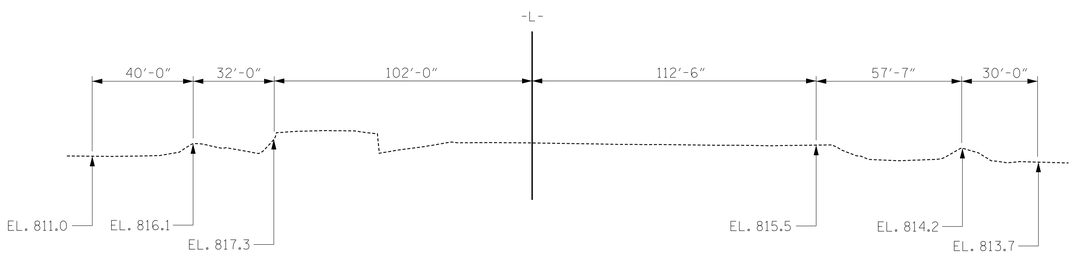
EXCAVATE 1 FOOT BELOW CULVERT AND FOOTINGS AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.

CULVERT EXCAVATION LUMP SUM PAY ITEM SHALL INCLUDE A MINIMUM OF 50 C.Y. OF ROCK EXCAVATION.

SAMPLE BAR REPLACEMENT

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

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



PROFILE ALONG CULVERT

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047287 L. WILLIS
DocuSigned by: Hardy Willis 207287FCFD223481...
8/8/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579AA
FORSYTH COUNTY
STATION: 32+77.50 -L-

SHEET 1 OF 6 CULVERT #59

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 9FT. X 9FT. CONCRETE BOX CULVERT 60° SKEW

ON I-74/US-311 BETWEEN SR 1003 & SR 2643

DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-1
1			3			TOTAL SHEETS
2			4			6

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_{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	**1.06**	--	1.75	1.40	1	BOTTOM SLAB	9.33′	**1.06**	1	EXT. WALL	**1.56′**	
		HL-93 (OPERATING)	N/A		1.37	--	1.35	1.82	1	BOTTOM SLAB	9.33′	1.37	1	EXT. WALL	1.56′	
		HS-20 (INVENTORY)	36.000	2	**1.06**	38.160	1.75	1.46	1	BOTTOM SLAB	9.33′	**1.06**	1	EXT. WALL	**1.56′**	
		HS-20 (OPERATING)	36.000		1.37	49.320	1.35	1.89	1	BOTTOM SLAB	9.33′	1.37	1	EXT. WALL	1.56′	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.36	18.360	1.40	3.41	1	BOTTOM SLAB	9.33′	1.36	1	EXT. WALL	1.56′	
		SNGARBS2	20.000		1.35	27.000	1.40	3.19	1	BOTTOM SLAB	9.33′	1.35	1	EXT. WALL	1.56′	
		SNAGRIS2	22.000		1.35	29.700	1.40	3.19	1	BOTTOM SLAB	9.33′	1.35	1	EXT. WALL	1.56′	
		SNCOTTS3	27.250	3	**1.32**	35.970	1.40	1.81	1	BOTTOM SLAB	9.33′	**1.32**	1	EXT. WALL	**1.56′**	
		SNAGGRS4	34.925		1.34	46.800	1.40	2.38	1	BOTTOM SLAB	9.33′	1.34	1	EXT. WALL	1.56′	
		SNS5A	35.550		1.35	47.993	1.40	3.06	1	BOTTOM SLAB	9.33′	1.35	1	EXT. WALL	1.56′	
		SNS6A	39.950		1.35	53.933	1.40	3.05	1	BOTTOM SLAB	9.33′	1.35	1	EXT. WALL	1.56′	
		SNS7B	42.000		1.33	55.860	1.40	2.15	1	BOTTOM SLAB	9.33′	1.33	1	EXT. WALL	1.56′	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.34	44.220	1.40	2.62	1	BOTTOM SLAB	9.33′	1.34	1	EXT. WALL	1.56′	
		TNT4A	33.075		1.33	43.990	1.40	2.15	1	BOTTOM SLAB	9.33′	1.33	1	EXT. WALL	1.56′	
		TNT6A	41.600		1.33	55.328	1.40	2.15	1	BOTTOM SLAB	9.33′	1.33	1	EXT. WALL	1.56′	
		TNT7A	42.000		1.35	56.700	1.40	3.35	1	BOTTOM SLAB	9.33′	1.35	1	EXT. WALL	1.56′	
		TNT7B	42.000		1.33	55.860	1.40	2.15	1	BOTTOM SLAB	9.33′	1.33	1	EXT. WALL	1.56′	
		TNAGRIT4	43.000		1.33	57.190	1.40	2.15	1	BOTTOM SLAB	9.33′	1.33	1	EXT. WALL	1.56′	
		TNAGT5A	45.000		1.33	59.850	1.40	2.15	1	BOTTOM SLAB	9.33′	1.33	1	EXT. WALL	1.56′	
		TNAGT5B	45.000		1.33	59.850	1.40	2.15	1	BOTTOM SLAB	9.33′	1.33	1	EXT. WALL	1.56′	

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.

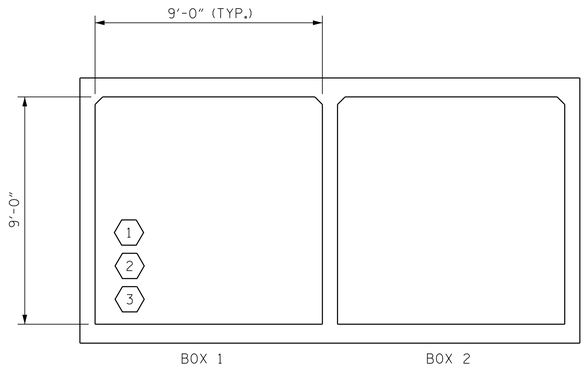
(#) CONTROLLING LOAD RATING

(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)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28774 — Electronically Signed By: Mark A. Willis — 7/25/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Vaughn & Melton
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Atlanta, GA 770-627-3590
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Charlotte, NC 704-357-0488

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 32+77.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

(NON-INTERSTATE TRAFFIC)

DRAWN BY :	WMC 7/11
CHECKED BY :	GM 7/11
REV.	10/1/11 MAA/GM
REV.	12/17 MAA/THC
DSG. ENG. OF RECORD.:	CMG
DWN. BY:	WDC DATE: 12/18
CHKD. BY:	HLW DATE: 12/18

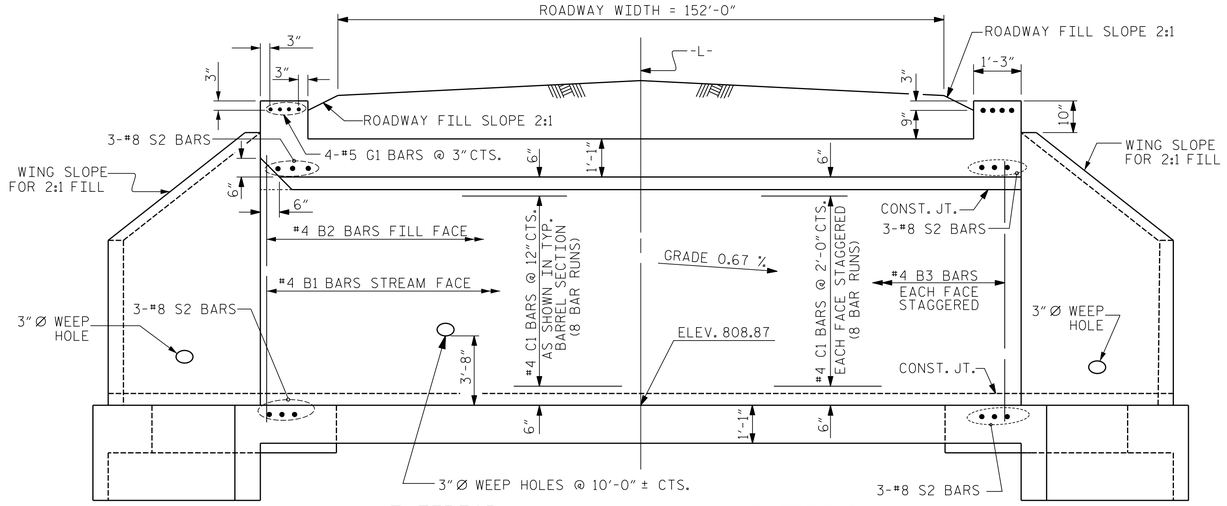
REVISIONS

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

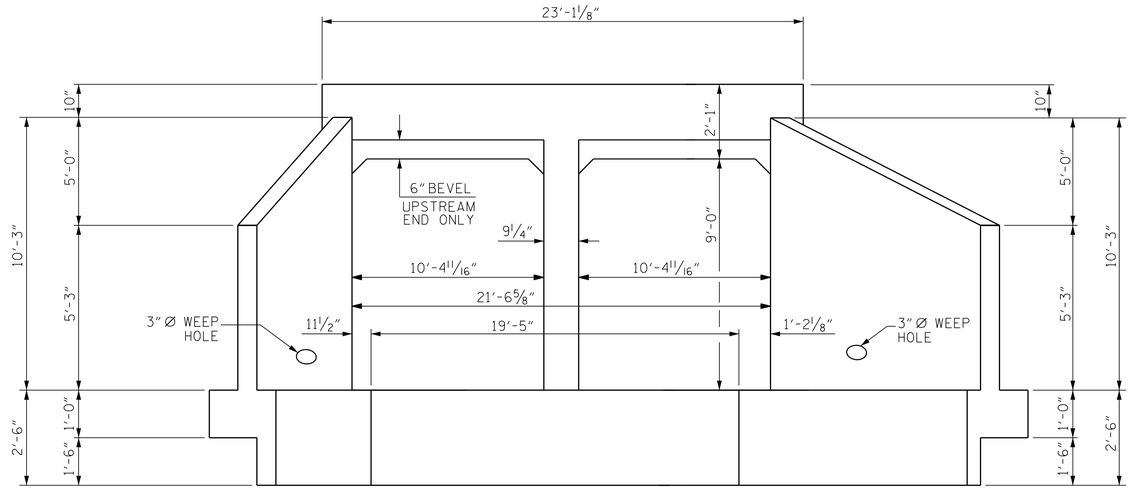
SHEET NO. C1-2

TOTAL SHEETS 6

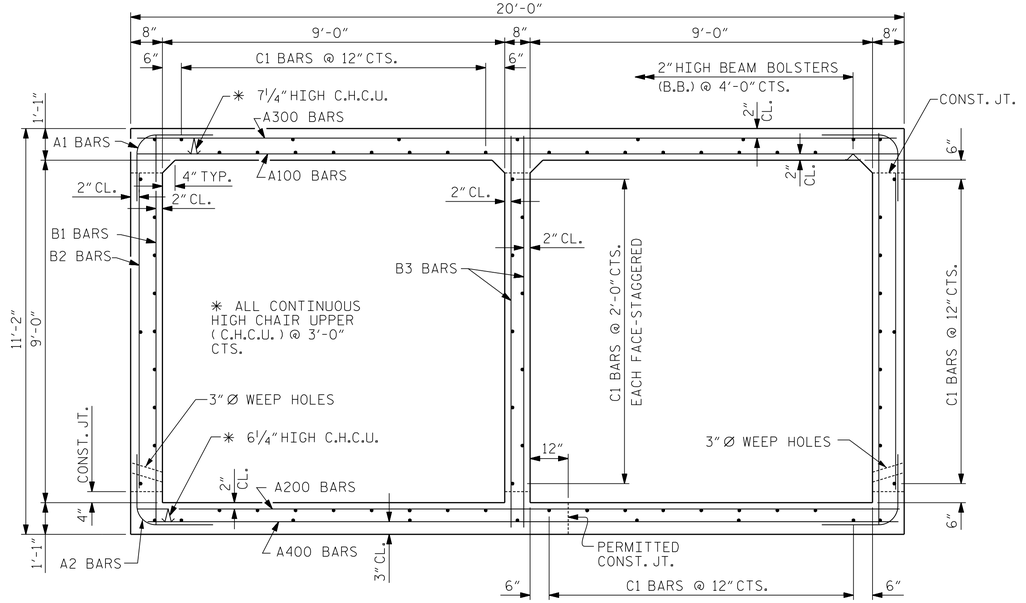
STD. NO. LRFR5



CULVERT SECTION NORMAL TO ROADWAY

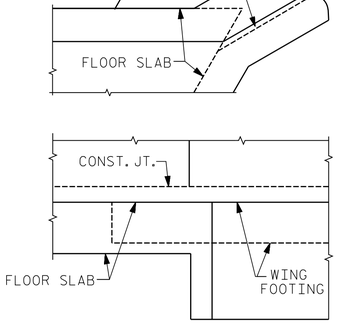


END ELEVATION NORMAL TO SKEW

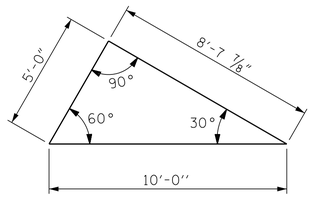


RIGHT ANGLE SECTION OF BARREL

THERE ARE 79 "C" BARS IN SECTION OF BARREL.
(8 BAR RUNS)



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



SKEW TRIANGLE

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 32+77.50 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD
DOUBLE 9FT. X 9FT. CONCRETE BOX CULVERT 60° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20771 H. LEE WILLIS JR. 7/25/2022

DocuSigned by: H. Lee Willis

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DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

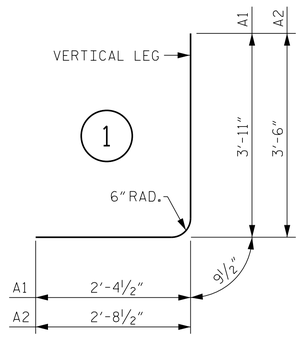
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
1			3			TOTAL SHEETS
2			4			6

STD. NO. CB32

DRAWN BY : B. WYNN/D.DONOVAN DATE : SEPT. 1990
CHECKED BY : A.R. BISSETTE DATE : OCT. 90

STANDARD

BAR TYPE



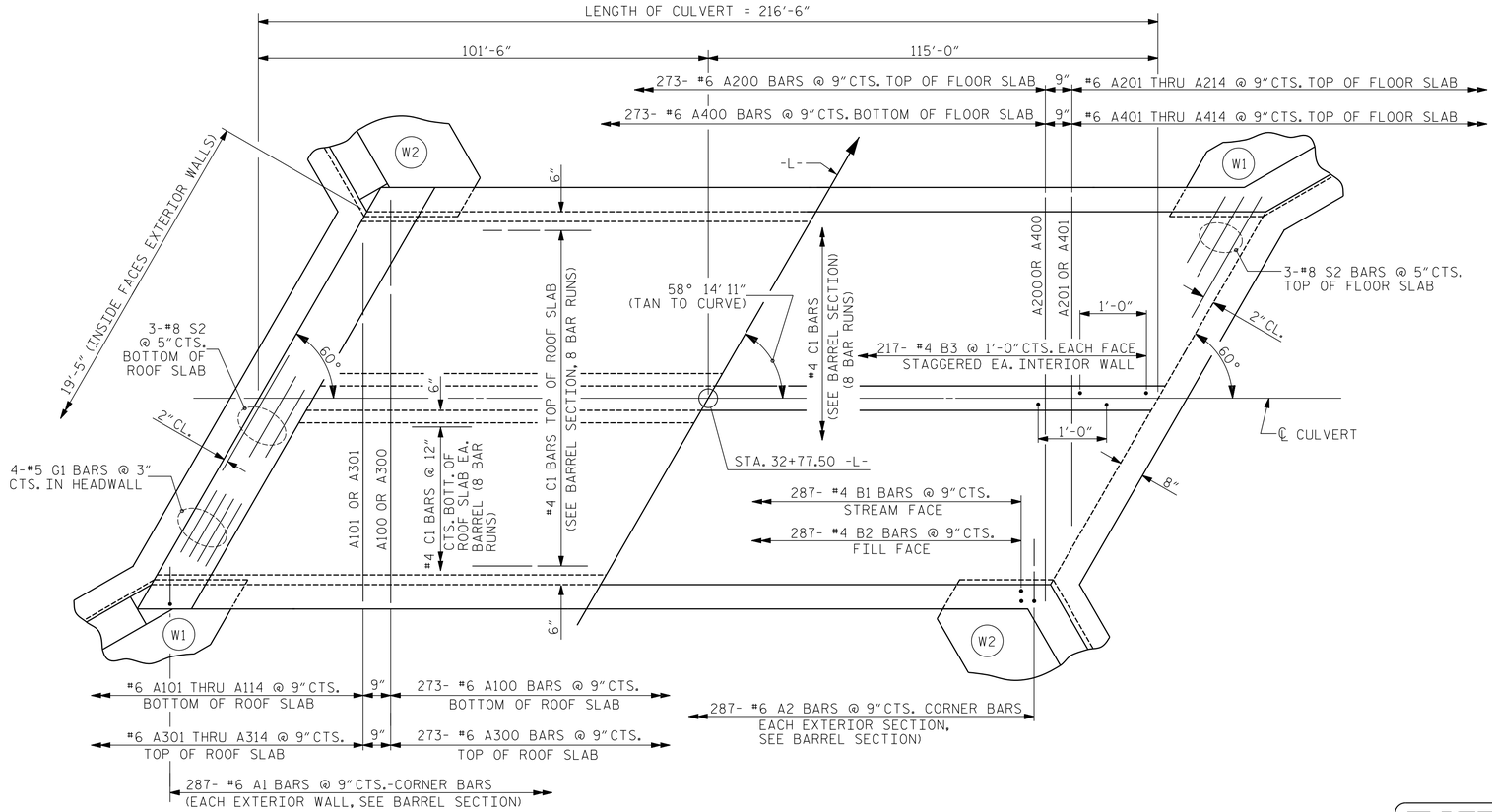
BAR DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTH CHART

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

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	574	6	①	7'-1"	6107	A300	273	6	STR.	19'-7"	8030
A2	574	6	①	6'-8"	5748	A301	2	6	STR.	19'-0"	57
						A302	2	6	STR.	17'-8"	53
A100	273	6	STR.	19'-7"	8030	A303	2	6	STR.	16'-5"	49
A101	2	6	STR.	19'-0"	57	A304	2	6	STR.	15'-1"	45
A102	2	6	STR.	17'-8"	53	A305	2	6	STR.	13'-9"	41
A103	2	6	STR.	16'-5"	49	A306	2	6	STR.	12'-6"	38
A104	2	6	STR.	15'-1"	45	A307	2	6	STR.	11'-2"	34
A105	2	6	STR.	13'-9"	41	A308	2	6	STR.	9'-11"	30
A106	2	6	STR.	12'-6"	38	A309	2	6	STR.	8'-7"	26
A107	2	6	STR.	11'-2"	34	A310	2	6	STR.	7'-4"	22
A108	2	6	STR.	9'-11"	30	A311	2	6	STR.	6'-0"	18
A109	2	6	STR.	8'-7"	26	A312	2	6	STR.	4'-8"	14
A110	2	6	STR.	7'-4"	22	A313	2	6	STR.	3'-5"	10
A111	2	6	STR.	6'-0"	18	A314	2	6	STR.	2'-1"	6
A112	2	6	STR.	4'-8"	14						
A113	2	6	STR.	3'-5"	10	A400	273	6	STR.	19'-7"	8030
A114	2	6	STR.	2'-1"	6	A401	2	6	STR.	19'-0"	57
						A402	2	6	STR.	17'-8"	53
A200	273	6	STR.	19'-7"	8030	A403	2	6	STR.	16'-5"	49
A201	2	6	STR.	19'-0"	57	A404	2	6	STR.	15'-1"	45
A202	2	6	STR.	17'-8"	53	A405	2	6	STR.	13'-9"	41
A203	2	6	STR.	16'-5"	49	A406	2	6	STR.	12'-6"	38
A204	2	6	STR.	15'-1"	45	A407	2	6	STR.	11'-2"	34
A205	2	6	STR.	13'-9"	41	A408	2	6	STR.	9'-11"	30
A206	2	6	STR.	12'-6"	38	A409	2	6	STR.	8'-7"	26
A207	2	6	STR.	11'-2"	34	A410	2	6	STR.	7'-4"	22
A208	2	6	STR.	9'-11"	30	A411	2	6	STR.	6'-0"	18
A209	2	6	STR.	8'-7"	26	A412	2	6	STR.	4'-8"	14
A210	2	6	STR.	7'-4"	22	A413	2	6	STR.	3'-5"	10
A211	2	6	STR.	6'-0"	18	A414	2	6	STR.	2'-1"	6
A212	2	6	STR.	4'-8"	14						
A213	2	6	STR.	3'-5"	10	B1	574	4	STR.	9'-6"	3643
A214	2	6	STR.	2'-1"	6	B2	574	4	STR.	8'-8"	3323
						B3	434	4	STR.	10'-8"	3092
						C1	632	4	STR.	28'-7"	12067
						D1	8	6	STR.	2'-6"	30
						G1	8	5	STR.	22'-9"	190
						S2	12	8	STR.	22'-9"	729
						REINFORCING STEEL					68,821 LBS.



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 32+77.50 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD

DOUBLE 9FT. X 9FT. CONCRETE BOX CULVERT 60° SKEW

V&M Vaughn & Melton
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Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL SEAL 20770 ENGINEER HARRY L. WILLIS
Digitally signed by Harry Willis
7/25/2022

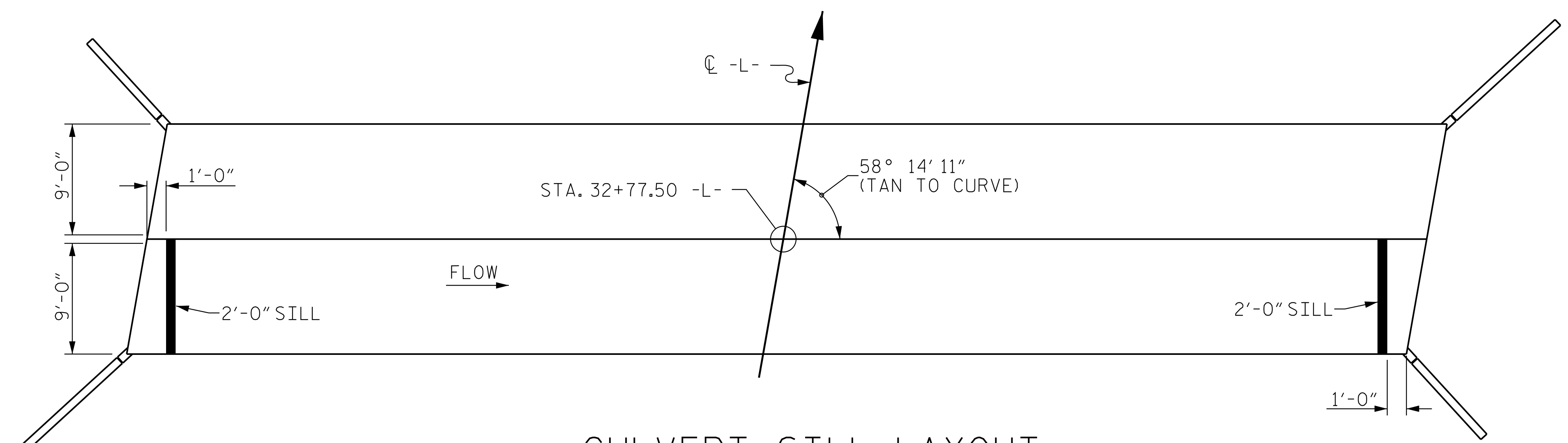
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			6

DRAWN BY : B. WYNN/D.DONOVAN DATE : SEPT. 1990
CHECKED BY : A.R. BISSETTE DATE : OCT. 90
STANDARD

STD. NO. CB32



CULVERT SILL LAYOUT

NOTES:

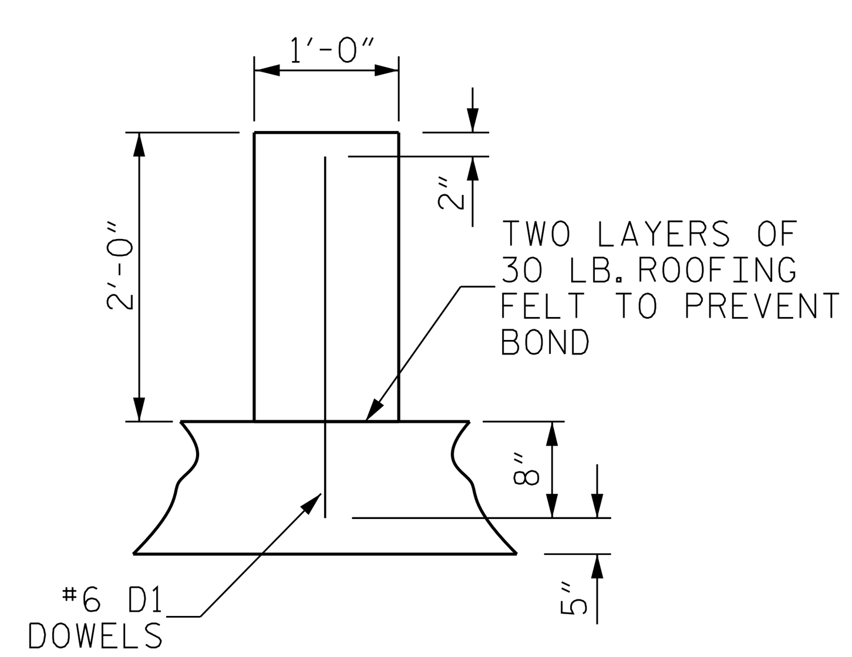
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP-RAP MAY BE USED TO SUPPLEMENT THE NATIVE 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 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.

2) SILLS ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

3) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

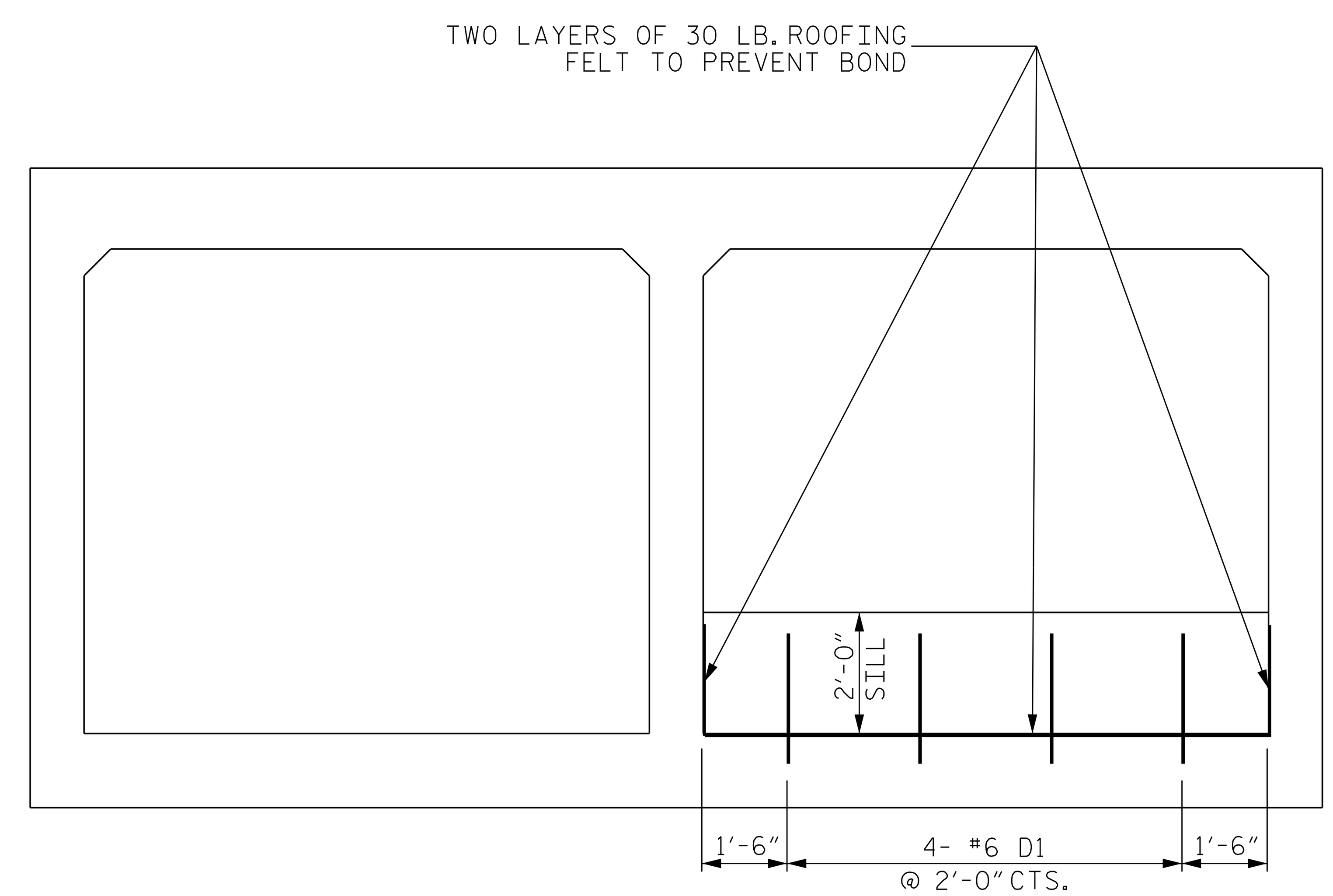
4) DO NOT SET ELEVATION OF HIGH SILLS ABOVE BANK FULL.

5) NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SECTION THROUGH SILL

DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOATED.



OUTLET END ELEVATION

LOOKING DOWNSTREAM

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 32+77.50 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 9FT. X 9FT. CONCRETE BOX CULVERT 60° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
DocuSigned by: Hardy Willis
7/25/2022

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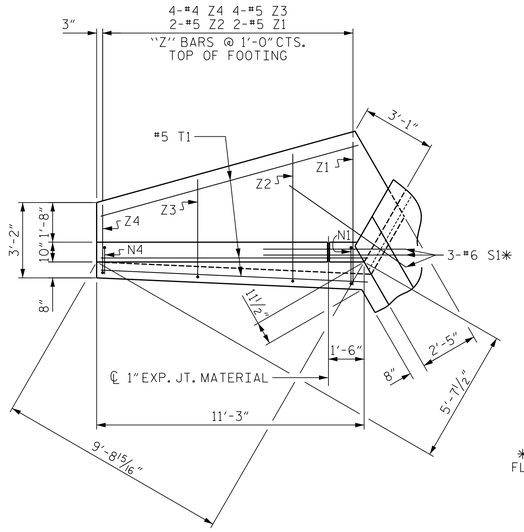
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488

DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

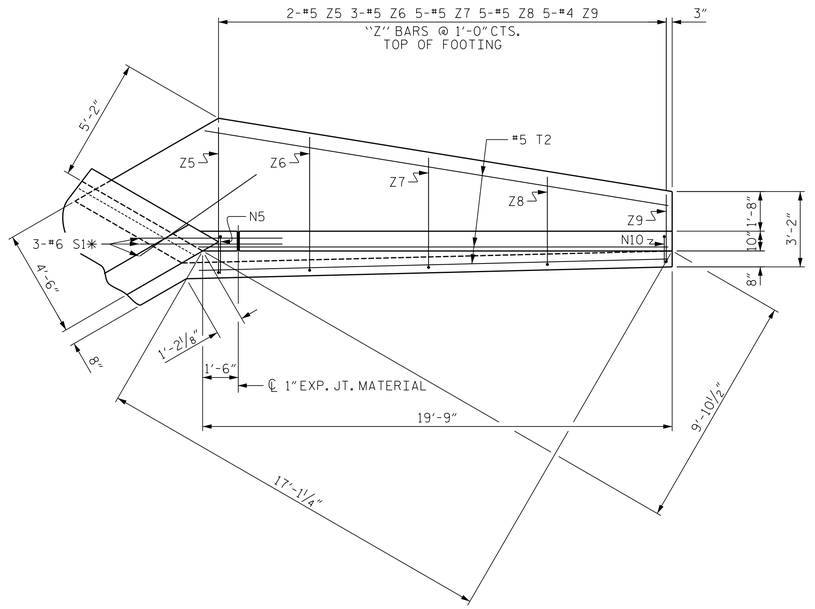
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. C1-5
TOTAL SHEETS 6

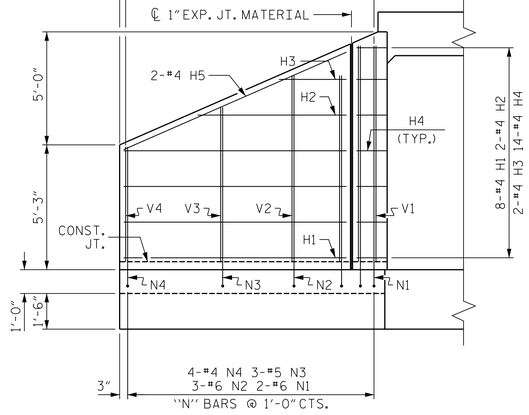


* S1 BARS @ BOTTOM OF FLOOR SLAB AND FOOTING

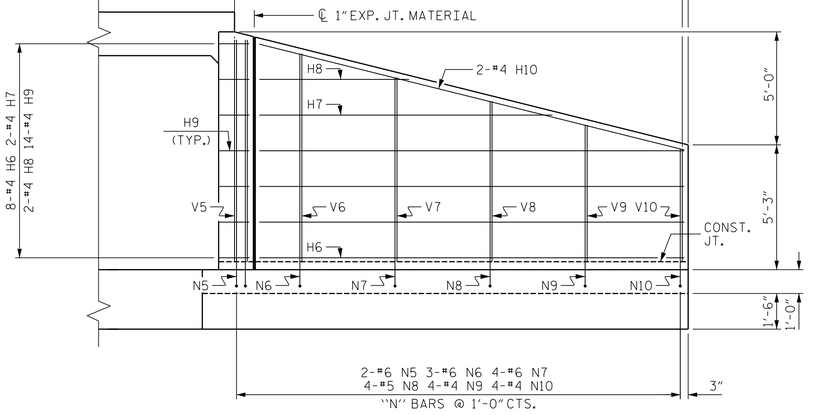
PLAN W2



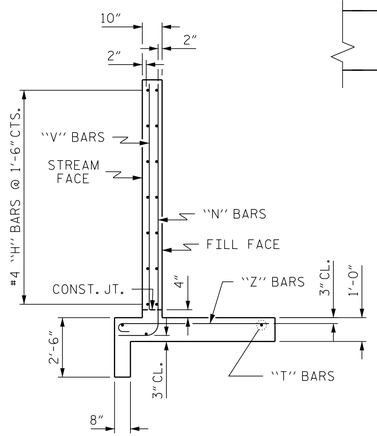
PLAN W1



ELEVATION W2



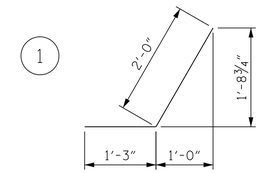
ELEVATION W1

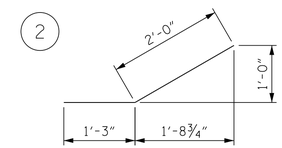


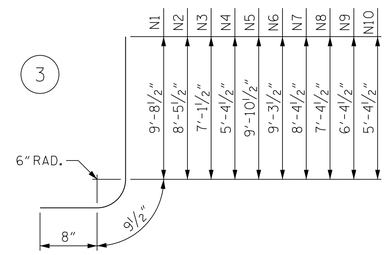
TYPICAL WING SECTION

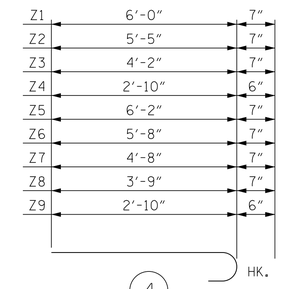
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.









BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	16	#4	STR	9'-4"	100
H2	4	#4	STR	6'-3"	17
H3	4	#4	STR	2'-10"	8
H4	28	#4	1	3'-3"	61
H5	4	#4	STR	10'-2"	27
H6	16	#4	STR	17'-10"	191
H7	4	#4	STR	12'-4"	33
H8	4	#4	STR	6'-3"	17
H9	28	#4	2	3'-3"	61
H10	4	#4	STR	18'-5"	49
N1	4	#6	3	11'-2"	67
N2	6	#6	3	9'-11"	89
N3	6	#5	3	8'-7"	54
N4	8	#4	3	6'-10"	37
N5	4	#6	3	11'-4"	68
N6	6	#6	3	10'-9"	97
N7	8	#6	3	9'-10"	118
N8	8	#5	3	8'-10"	74
N9	8	#4	3	7'-10"	42
N10	8	#4	3	6'-10"	37
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	11'-3"	70
T2	6	#5	STR	19'-9"	124
V1	4	#4	STR	9'-1"	24
V2	6	#4	STR	7'-10"	31
V3	6	#4	STR	6'-6"	26
V4	8	#4	STR	4'-10"	26
V5	4	#4	STR	9'-4"	25
V6	6	#4	STR	8'-9"	35
V7	8	#4	STR	7'-9"	41
V8	8	#4	STR	6'-9"	36
V9	8	#4	STR	5'-9"	31
V10	8	#4	STR	4'-9"	25
Z1	4	#5	4	6'-7"	27
Z2	4	#5	4	6'-0"	25
Z3	8	#5	4	4'-9"	40
Z4	8	#4	4	3'-4"	18
Z5	4	#5	4	6'-9"	28
Z6	6	#5	4	6'-3"	39
Z7	10	#5	4	5'-3"	55
Z8	10	#5	4	4'-4"	45
Z9	10	#4	4	3'-4"	22

REINFORCING STEEL FOR 4 WINGS 2148 LBS

CLASS A CONCRETE

4 WINGS	30.2	CY
2 HEADWALLS	2.1	CY
2 END CURTAIN WALLS	4.0	CY
2 SILLS	1.3	CY
TOTAL	37.6	CY

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 32+77.50 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 9'-0" SLOPE = 2:1
60° OR 120° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 29777 HARRY L. WILLIS

DocuSigned by: Harry Willis 7/25/2022

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DRAWN BY : CCJ 12/99
CHECKED BY : RWW 03/00

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Charlotte, NC 704-357-0488

DSG. ENG. OF RECORD.: CMG
DWN. BY: MAF DATE: 07/18
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-6
1			3			TOTAL SHEETS
2			4			6

STD. NO. CW6009

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 ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" 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 ¼" 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 ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

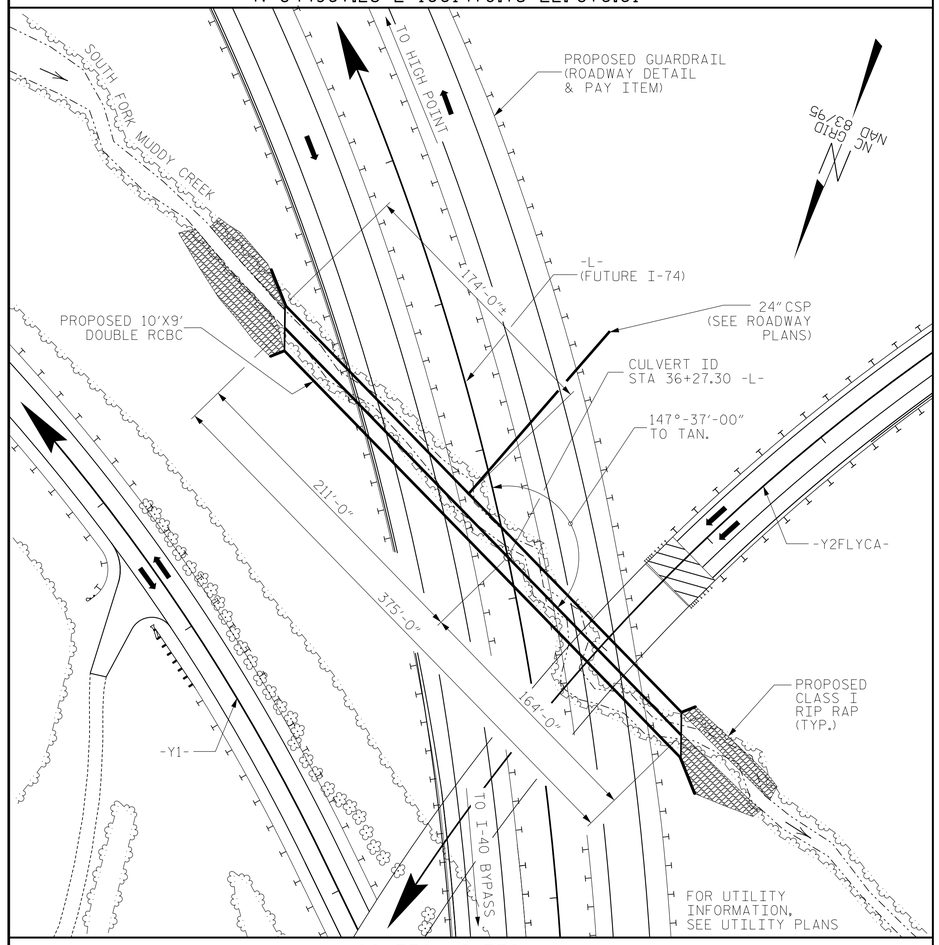
JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (✓) RGW
REV. 8-16-99 RWW (✓) LES
REV. 5-7-03 RWW (✓) JTE
REV. 5-1-06 TLA (✓) GM
REV. 10-1-11 MAA (✓) GM
REV. 12-17 MAA (✓) THC

F.A. PROJECT NO. 0074226

BM# 4 : -BL- STA. 34+22.15 1365.82' LT
N 844967.23 E 1661470.75 EL. 876.61'



LOCATION SKETCH

NOTES:

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

DESIGN FILL----------MIN. = 8.84' MAX. = 14.42'

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.

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.

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.

FOUNDATION NOTES

EXCAVATE 1 FOOT BELOW THE CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARICLE 414 OF THE STANDARD SPECIFICATIONS.

UNDERCUT SOFT OR LOOSE SOILS TO A MINIMUM DEPTH OF 3 FEET BELOW THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL AND BACKFILL WITH FOUNDATION CONDITIONING MATERIAL AS DIRECTED BY THE ENGINEER.

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

A 3'-0" STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

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.

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

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

GRADE DATA

GRADE POINT ELEV. @
STATION 36+27.30 -L- = 832.25' ±

BED ELEV. @
STATION 36+27.30 -L- = 809.2' ±

ROADWAY SLOPES: 3:1

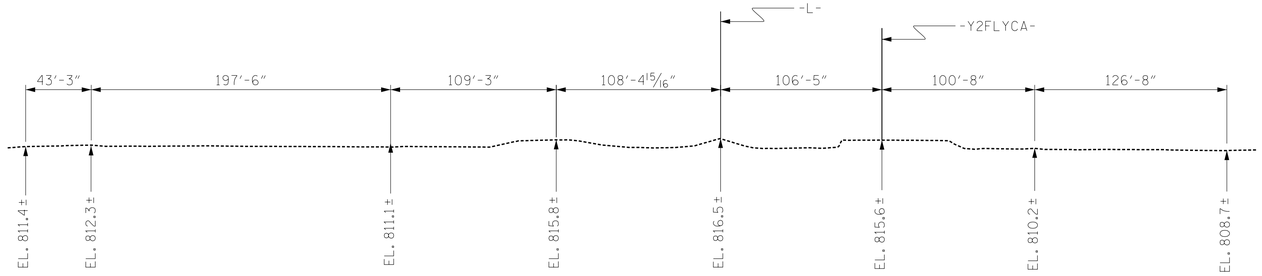
HYDRAULIC DATA

DESIGN DISCHARGE	= 1100	CFS
FREQUENCY OF DESIGN DISCHARGE	= 50	YRS
DESIGN HIGH WATER ELEVATION	= 820.5	FT
DRAINAGE AREA	= 1.3	SQ MI
BASE DISCHARGE (Q100)	= 1100	CFS
BASE HIGH WATER ELEVATION	= 820.8	FT

OVERTOPPING DATA

OVERTOPPING DISCHARGE *	= 1200	CFS
FREQUENCY OF OVERTOPPING	= 200 (+)	YRS
OVERTOPPING ELEVATION	= 821.8	FT

* OVERTOPPING OCCURS AT BERM BETWEEN WALL & -L- FILL -Y1- 33+50 RT.



PROFILE ALONG CULVERT

TOTAL STRUCTURE QUANTITIES

CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	696	TONS
CLASS A CONCRETE		
BARREL @ 2.92 CY/FT =	1096.1	C.Y.
WINGS, SILLS, ETC.	42.5	C.Y.
TOTAL	1138.6	C.Y.
REINFORCING STEEL		
BARREL	145,628	LBS.
WINGS ETC.	2,516	LBS.
TOTAL	148,144	LBS.
CLASS I RIP RAP	311	TONS
GEOTEXTILE FOR DRAINAGE	523	SY

I HEREBY CERTIFY THAT THESE PLANS ARE THE AS-BUILT PLANS.

DocuSigned by: Hardy Willis
HLW0287AGP0223481...
8/8/2022

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Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
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Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488

PROJECT NO. U-2579AA
FORSYTH COUNTY
STATION: 36+27.30 -L-
SHEET 1 OF 6 CULVERT #813

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE BARREL 10'X9' RCBC SKEW 147°37'

ON FUTURE I-74 BETWEEN SR 1003 & SR 2643

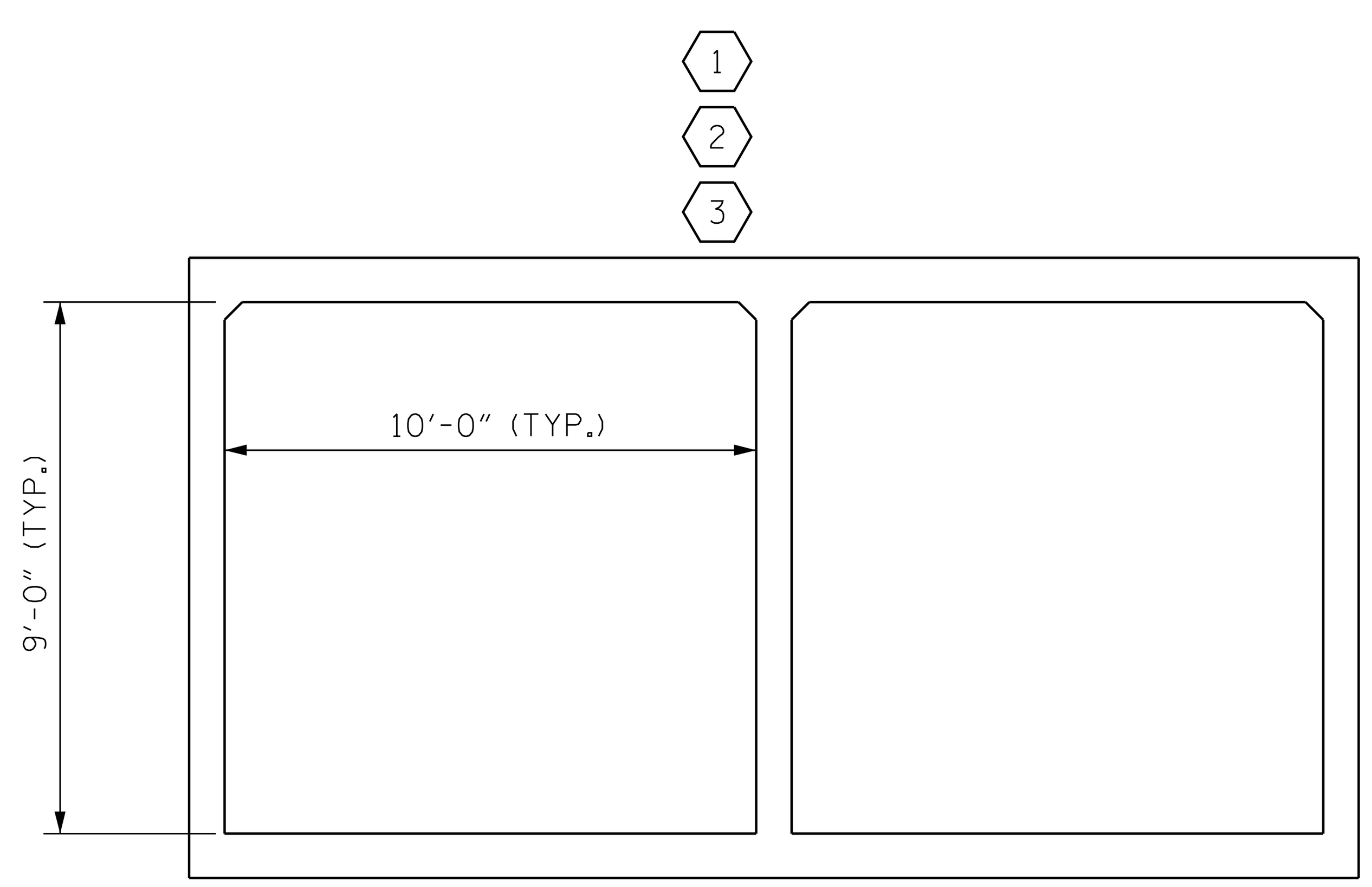
DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

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

SHEET NO. C2-1
TOTAL SHEETS 6

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: LIVE-LOAD FACTORS (γ_{LL})	MOMENT: RATING FACTOR	MOMENT: BOX NO.	MOMENT: ELEMENT TYPE	MOMENT: DISTANCE FROM LEFT END OF ELEMENT (ft)	SHEAR: RATING FACTOR	SHEAR: BOX NO.	SHEAR: ELEMENT TYPE	SHEAR: DISTANCE FROM LEFT END OF ELEMENT (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.76	--	1.75	2.03	1	TOP SLAB	10.83′	**1.76**	1	TOP SLAB	9.90′	
		HL-93 (OPERATING)	N/A		2.28	--	1.35	2.63	1	TOP SLAB	10.83′	2.28	1	TOP SLAB	9.90′	
		HS-20 (INVENTORY)	36.00	2	1.76	63.360	1.75	2.12	1	TOP SLAB	10.83′	**1.76**	1	TOP SLAB	9.90′	
		HS-20 (OPERATING)	36.00		2.28	82.080	1.35	2.74	1	TOP SLAB	10.83′	2.28	1	TOP SLAB	9.90′	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.27	30.645	1.40	5.98	1	EXT. WALL	5.81′	2.27	1	EXT. WALL	1.93′	
		SNGARBS2	20.00		2.27	45.400	1.40	4.61	1	TOP SLAB	10.83′	2.27	1	EXT. WALL	1.93′	
		SNAGRIS2	22.00		2.27	49.940	1.40	4.19	1	TOP SLAB	10.83′	2.27	1	EXT. WALL	1.93′	
		SNCOTTS3	27.25		2.18	59.405	1.40	2.43	1	TOP SLAB	10.83′	2.18	1	TOP SLAB	9.90′	
		SNAGGRS4	34.925		1.89	66.008	1.40	2.19	1	TOP SLAB	10.83′	1.89	1	TOP SLAB	9.90′	
		SNS5A	35.55		1.94	68.967	1.40	2.27	1	TOP SLAB	10.83′	1.94	1	TOP SLAB	9.90′	
		SNS6A	39.95		1.66	66.317	1.40	2.09	1	TOP SLAB	10.83′	1.66	1	TOP SLAB	9.90′	
		SNS7B	42.00		1.62	68.040	1.40	1.97	1	TOP SLAB	10.83′	1.62	1	TOP SLAB	9.90′	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.00		1.99	65.670	1.40	2.61	1	TOP SLAB	10.83′	1.99	1	TOP SLAB	9.90′	
		TNT4A	33.075		1.95	64.496	1.40	2.39	1	TOP SLAB	10.83′	1.95	1	TOP SLAB	9.90′	
		TNT6A	41.60		1.74	72.384	1.40	2.04	1	TOP SLAB	10.83′	1.74	1	TOP SLAB	9.90′	
		TNT7A	42.00		1.72	72.240	1.40	2.11	1	TOP SLAB	10.83′	1.72	1	TOP SLAB	9.90′	
		TNT7B	42.00		1.91	80.220	1.40	2.26	1	TOP SLAB	10.83′	1.91	1	TOP SLAB	9.90′	
		TNAGRIT4	43.00		1.57	67.510	1.40	2.03	1	TOP SLAB	10.83′	1.57	1	TOP SLAB	9.90′	
		TNAGT5A	45.00		1.70	76.500	1.40	1.91	1	TOP SLAB	10.83′	1.70	1	TOP SLAB	9.90′	
		TNAGT5B	45.00	3	1.45	65.250	1.40	1.85	1	TOP SLAB	10.83′	**1.45**	1	TOP SLAB	9.90′	



BOX 1 BOX 2

LRFR SUMMARY

(LOOKING DOWNSTREAM)

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025461 — DocuSigned by: Harley L. Willis — 7/26/2022

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PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 36+27.30 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (INTERSTATE TRAFFIC)

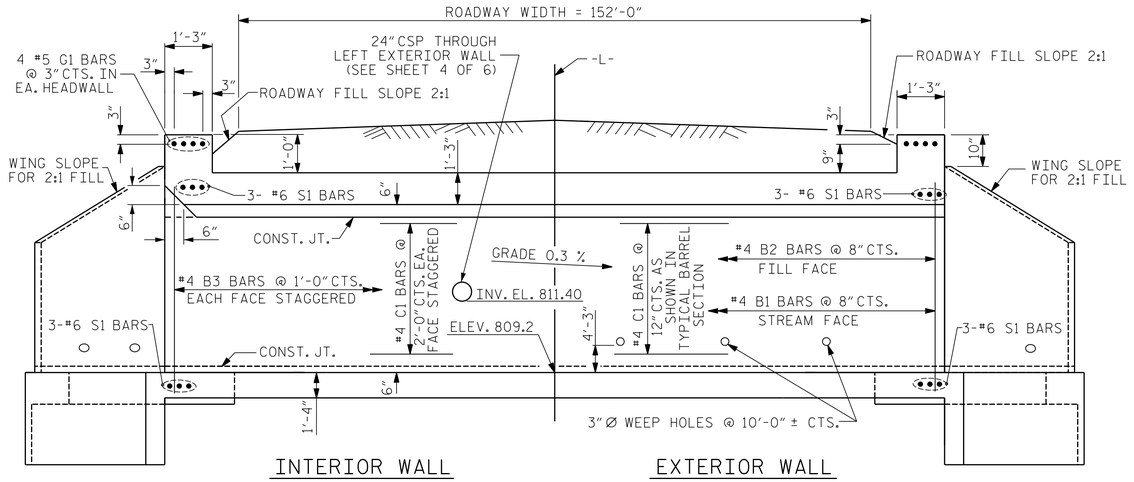
DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

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

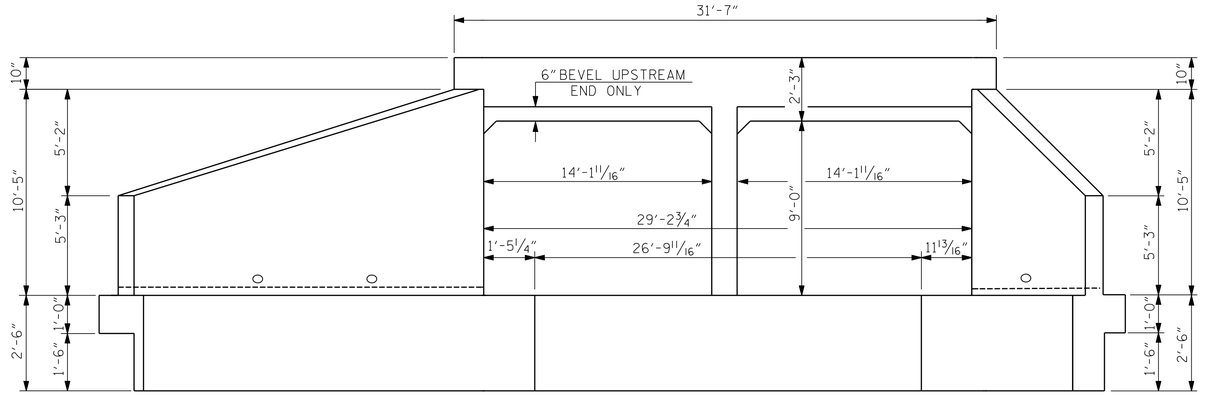
SHEET NO. C2-2
TOTAL SHEETS 6

DRAWN BY : WMC 7/11 · CHECKED BY : GM 7/11
REV. 10/1/11 MAA/GM
REV. 12/17 MAA/THC

STD. NO. LRFR6



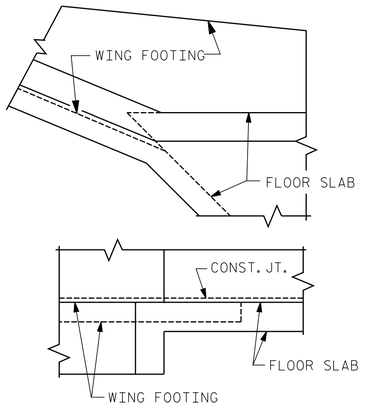
CULVERT SECTION NORMAL TO ROADWAY



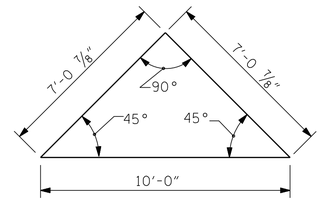
END ELEVATION NORMAL TO SKEW

RIGHT ANGLE SECTION OF BARREL

THERE ARE 83 "C" BARS IN SECTION OF BARREL.



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



SKEW TRIANGLE

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REDRAWN BY: COC 11/90 CHECKED BY: ELR 10/90

DRAWN BY : RALPH D. UNDERWOOD DATE : APR. 1972
CHECKED BY : HASON A. JUDEH DATE : 5-23-1972
STANDARD

I HEREBY CERTIFY THAT THESE PLANS ARE THE AS-BUILT PLANS.

Docusigned by: Harold Willis 7/26/2022

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DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
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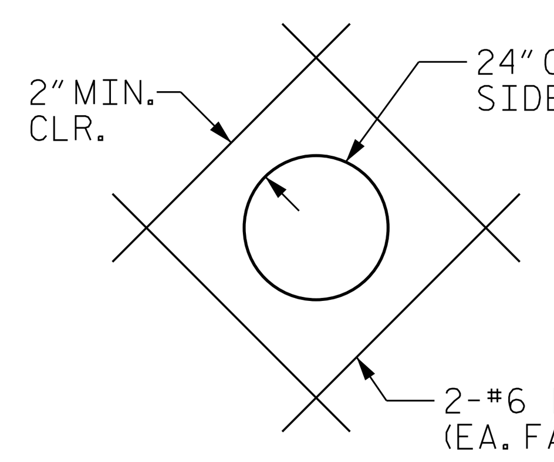
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD DOUBLE 10 FT. X 9 FT. CONCRETE BOX CULVERT WITH VERTICAL CLEARANCE OF 8 FT. OR MORE 135° SKEW

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

PROJECT NO. U-2579AA
FORSYTH COUNTY
STATION: 36+27.30 -L-
SHEET 3 OF 6
STD. NO. CB552



DETAIL 'A'

THE 24" DIA. 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.

BILL OF MATERIAL

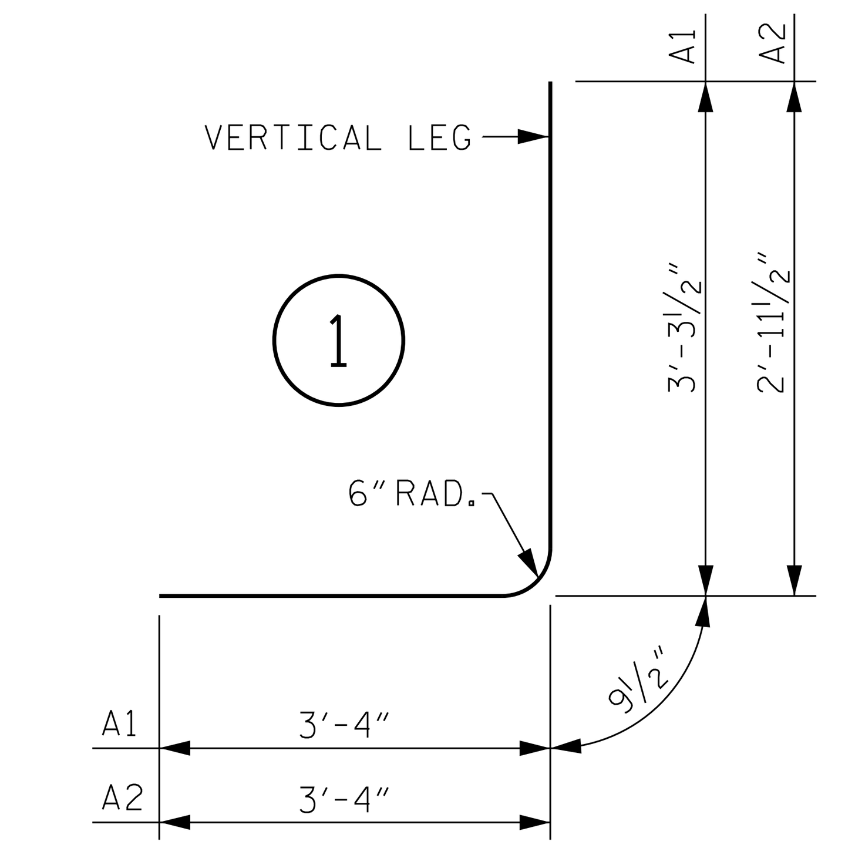
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	529	6	STR.	21'-11"	17,414
A101	4	6	STR.	20'-7"	124
A102	4	6	STR.	19'-3"	116
A103	4	6	STR.	17'-11"	108
A104	4	6	STR.	16'-7"	100
A105	4	6	STR.	15'-3"	92
A106	4	6	STR.	13'-11"	84
A107	4	6	STR.	12'-7"	76
A108	4	6	STR.	11'-3"	68
A109	4	6	STR.	9'-11"	60
A110	4	6	STR.	8'-7"	52
A111	4	6	STR.	7'-3"	44
A112	4	6	STR.	5'-11"	36
A113	4	6	STR.	4'-7"	28
A114	4	6	STR.	3'-3"	20

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A200	605	6	STR.	21'-11"	19,916
A201	6	6	STR.	20'-2"	182
A202	6	6	STR.	18'-5"	166
A203	6	6	STR.	16'-8"	150
A204	6	6	STR.	14'-11"	134
A205	6	6	STR.	13'-2"	119
A206	6	6	STR.	11'-5"	103
A207	6	6	STR.	9'-8"	87
A208	6	6	STR.	7'-11"	71
A209	6	6	STR.	6'-2"	56
A210	6	6	STR.	4'-5"	40
A211	6	6	STR.	2'-8"	24

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A300	529	6	STR.	21'-11"	17,414
A301	4	6	STR.	20'-7"	124
A302	4	6	STR.	19'-3"	116
A303	4	6	STR.	17'-11"	108
A304	4	6	STR.	16'-7"	100
A305	4	6	STR.	15'-3"	92
A306	4	6	STR.	13'-11"	84
A307	4	6	STR.	12'-7"	76
A308	4	6	STR.	11'-3"	68
A309	4	6	STR.	9'-11"	60
A310	4	6	STR.	8'-7"	52
A311	4	6	STR.	7'-3"	44
A312	4	6	STR.	5'-11"	36
A313	4	6	STR.	4'-7"	28
A314	4	6	STR.	3'-3"	20

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A400	605	6	STR.	21'-11"	19,916
A401	6	6	STR.	20'-2"	182
A402	6	6	STR.	18'-5"	166
A403	6	6	STR.	16'-8"	150
A404	6	6	STR.	14'-11"	134
A405	6	6	STR.	13'-2"	119
A406	6	6	STR.	11'-5"	103
A407	6	6	STR.	9'-8"	87
A408	6	6	STR.	7'-11"	71
A409	6	6	STR.	6'-2"	56
A410	6	6	STR.	4'-5"	40
A411	6	6	STR.	2'-8"	24
A1	1126	6	1	7'-5"	12,543
A2	1126	6	1	7'-1"	11,980
B1	1126	4	STR.	9'-6"	7,146
B2	1126	4	STR.	8'-8"	6,519
B3	750	4	STR.	11'-1"	5,553
B100	8	6	STR.	3'-6"	42
C1	1162	4	STR.	28'-5"	22,057
D1	8	6	STR.	2'-6"	30
G1	8	5	STR.	31'-0"	259
S1	12	6	STR.	31'-0"	559
REINFORCING STEEL					145,628 LBS.

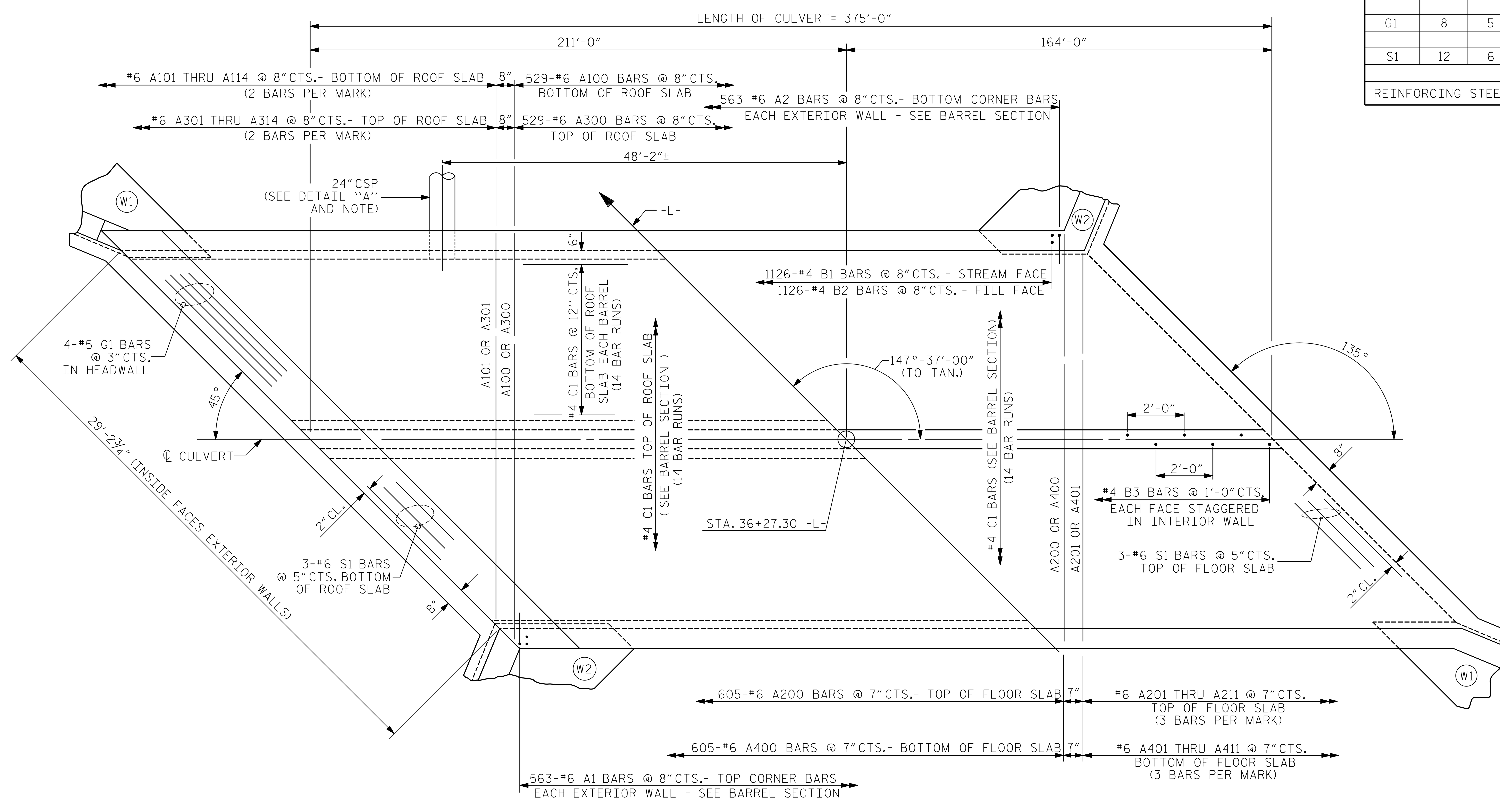
BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTH CHART

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



PARTIAL ROOF PLAN

PARTIAL FLOOR PLAN

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER HARDY L. WILLIS
DocuSigned by: Hardy Willis
7/26/2022

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Consulting Engineers
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PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 36+27.30 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE BARREL
10'X9' RCBC
SKEW 147°37'

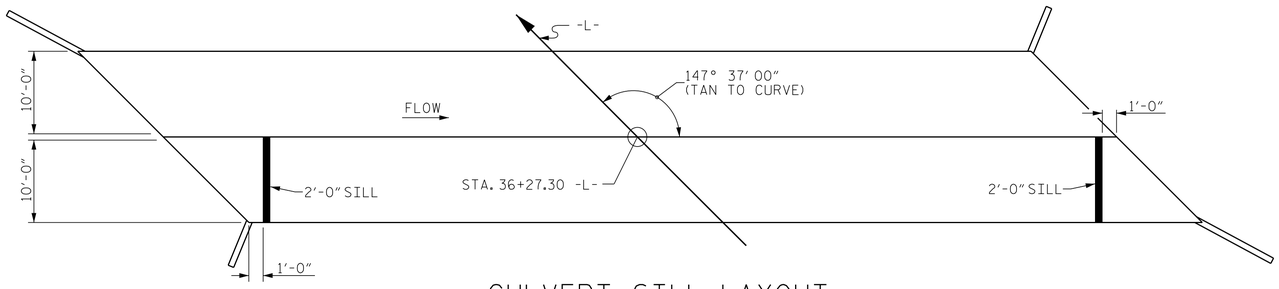
ON FUTURE I-74 BETWEEN
SR 1003 & SR 2643

DSG. ENG. OF RECORD.: CMG	
DWN. BY: WDC	DATE: 12/18
CHKD. BY: HLW	DATE: 12/18

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

SHEET NO. C2-4

TOTAL SHEETS 6



CULVERT SILL LAYOUT

NOTES:

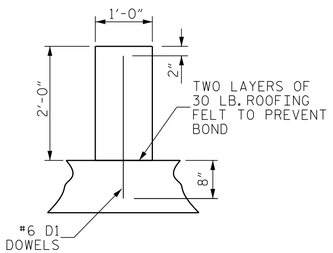
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOOD-PLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP-RAP MAY BE USED TO SUPPLEMENT THE NATIVE 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 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.

2) SILLS ARE TO BE 1.0 FT/ WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

3) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

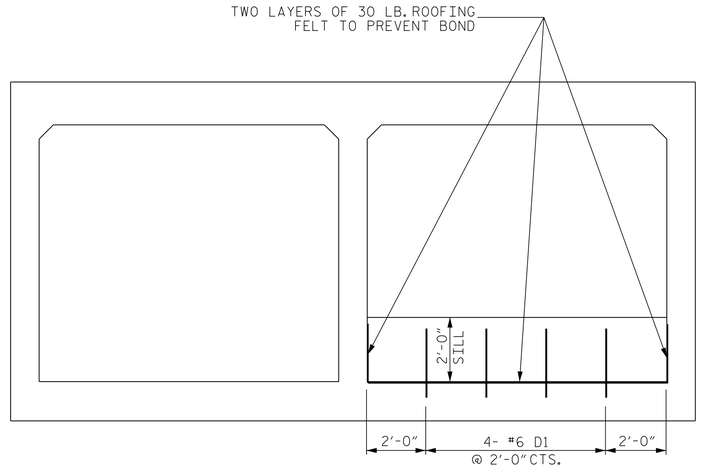
4) DO NOT SET ELEVATION OF HIGH STILLS ABOVE BANK FULL.

5) NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SECTION THROUGH SILL

DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOATED.



OUTLET END ELEVATION

LOOKING DOWNSTREAM

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 36+27.30 -L-

SHEET 5 OF 6

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047281 HARRY L. WILLIS

Digitally signed by Harry Willis
2022.07.26 14:03:01...

7/26/2022

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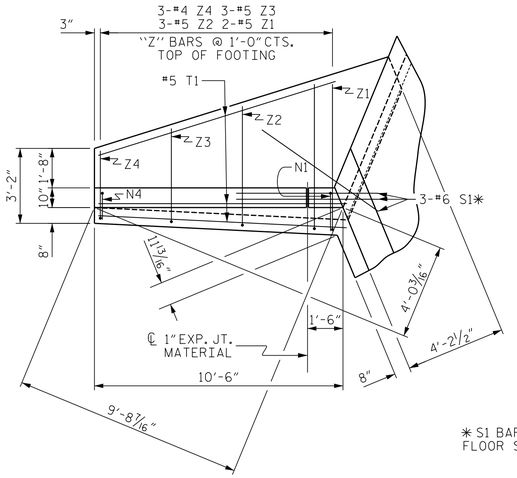
DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE BARREL 10'X9' RCBC SKEW 147°37'

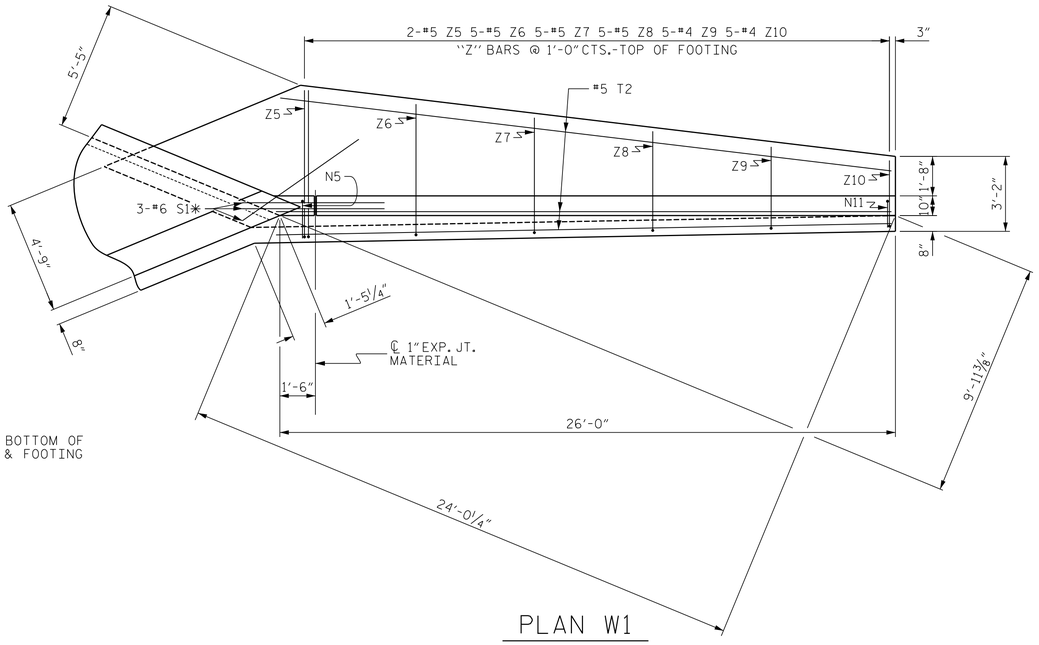
ON FUTURE I-74 BETWEEN SR 1003 & SR 2643

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-5
1			3			TOTAL SHEETS
2			4			6

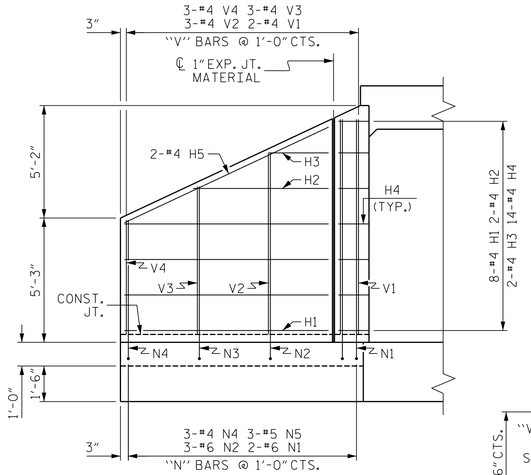


PLAN W2

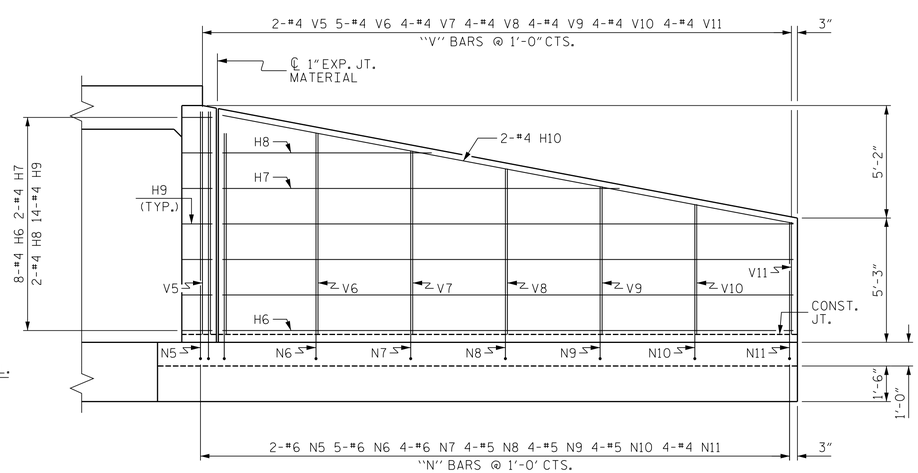
* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING



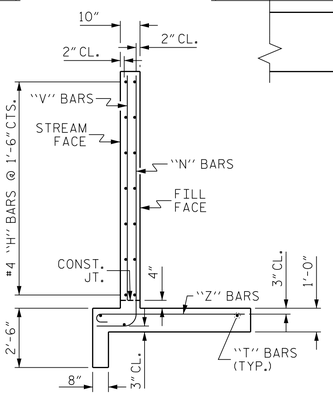
PLAN W1



ELEVATION W2



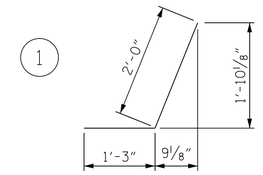
ELEVATION W1

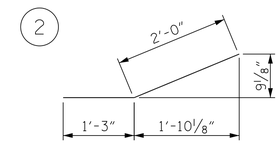


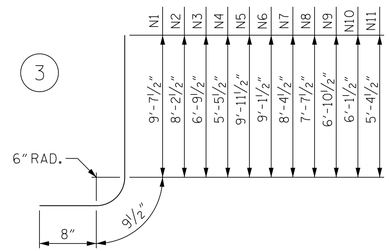
TYPICAL WING SECTION

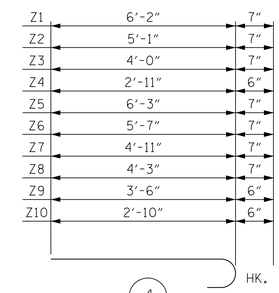
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.









BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	16	#4	STR	8'-7"	92
H2	4	#4	STR	5'-8"	15
H3	4	#4	STR	2'-6"	7
H4	28	#4	1	3'-3"	61
H5	4	#4	STR	9'-6"	25
H6	16	#4	STR	24'-1"	257
H7	4	#4	STR	16'-9"	45
H8	4	#4	STR	8'-10"	24
H9	28	#4	2	3'-3"	61
H10	4	#4	STR	24'-6"	65
N1	4	#6	3	11'-1"	67
N2	6	#6	3	9'-8"	87
N3	6	#5	3	8'-3"	52
N4	6	#4	3	6'-11"	28
N5	4	#6	3	11'-5"	69
N6	10	#6	3	10'-7"	159
N7	8	#6	3	9'-10"	118
N8	8	#5	3	9'-1"	76
N9	8	#5	3	8'-4"	70
N10	8	#5	3	7'-7"	63
N11	8	#4	3	6'-10"	37
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	10'-6"	66
T2	6	#5	STR	26'-0"	163
V1	4	#4	STR	9'-1"	24
V2	6	#4	STR	7'-8"	31
V3	6	#4	STR	6'-3"	25
V4	6	#4	STR	4'-10"	19
V5	4	#4	STR	9'-5"	25
V6	10	#4	STR	8'-6"	57
V7	8	#4	STR	7'-9"	41
V8	8	#4	STR	7'-0"	37
V9	8	#4	STR	6'-3"	33
V10	8	#4	STR	5'-6"	29
V11	8	#4	STR	4'-9"	25
Z1	4	#5	4	6'-9"	28
Z2	6	#5	4	5'-8"	35
Z3	6	#5	4	4'-7"	29
Z4	6	#4	4	3'-5"	14
Z5	4	#5	4	6'-10"	29
Z6	10	#5	4	6'-2"	64
Z7	10	#5	4	5'-6"	57
Z8	10	#5	4	4'-10"	50
Z9	10	#4	4	4'-0"	27
Z10	10	#4	4	3'-4"	22

REINFORCING STEEL FOR 4 WINGS	2,516 LBS
CLASS A CONCRETE	
4 WINGS	36.1 CY
2 HEADWALLS	2.9 CY
2 END CURTAIN WALLS	2.0 CY
2 SILLS	1.5 CY
TOTAL	42.5 CY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 29771 Harold Wills 7/26/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 36+27.30 -L-

SHEET 6 OF 6

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 9'-0" SLOPE = 2:1
45° OR 135° SKEW

DSG. ENG. OF RECORD.: CMG
DWN. BY: WDC DATE: 12/18
CHKD. BY: HLW DATE: 12/18

DRAWN BY : CCJ 01/00
CHECKED BY : RWW 03/00

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

SHEET NO. C2-6
TOTAL SHEETS 6

STD. NO. CW4509

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 ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" 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 ¼" 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 ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

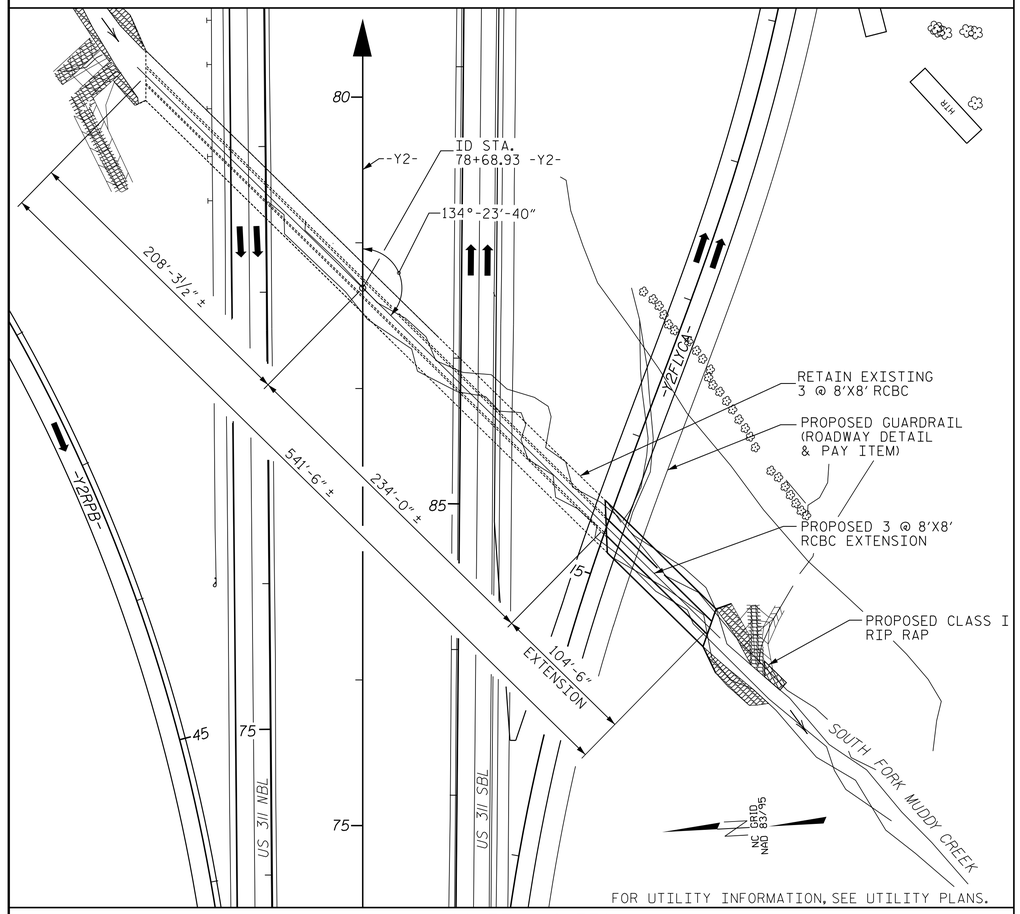
ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (✓) RGW
REV. 8-16-99 RWW (✓) LES
REV. 5-7-03 RWW (✓) JTE
REV. 5-1-06 TLA (✓) GM
REV. 10-1-11 MAA (✓) GM
REV. 12-17 MAA (✓) THC

BM#8 : -BY13- STA. 26+90.31 122.24' LT N 840060.12 E 1659637.42 ELEV. 864.85

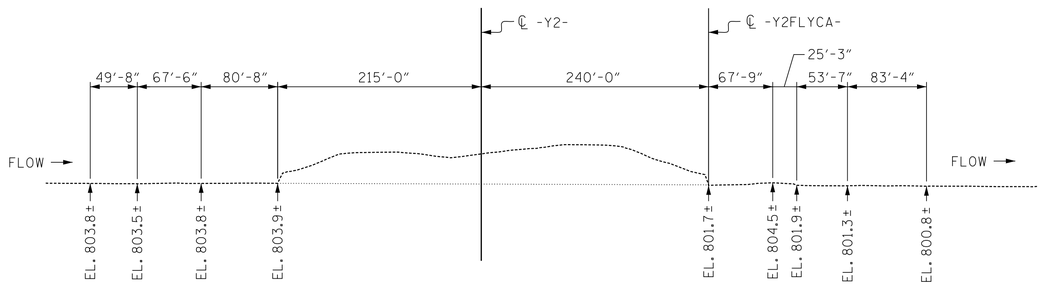


LOCATION SKETCH

GRADE DATA

GRADE POINT ELEV. @ STATION STA. 15+34.67 -Y2FLYCA- = 842.7
BED ELEVATION @ STATION STA. 15+34.67 -Y2FLYCA- = 801.6
ROADWAY SLOPES: 2:1 AT EXTENSION

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PROFILE ALONG CULVERT

V & M PROJECT NO.: 31748-44

NOTES:

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

DESIGN FILL----------MIN. = 30.81' MAX. = 31.65'

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.

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.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

FOR EROSION CONTROL, SEE ROADWAY PLANS.

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.

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

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

A 3'-0" STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

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

SAWCUT AND REMOVE EXISTING WINGS AT EXTENSION ENDS.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSION. IN THIS CASE, THE FOOTINGS OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE FOOTING CONCRETE HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, 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.

HYDRAULIC DATA

DESIGN DISCHARGE	= 1900	CFS
FREQUENCY OF DESIGN DISCHARGE	= 50	YRS
DESIGN HIGH WATER ELEVATION	= 812.4	FT
DRAINAGE AREA	= 3.2	SQ MI
BASE DISCHARGE (Q100)	= 2100	CFS
BASE HIGH WATER ELEVATION	= 813.9	FT

OVERTOPPING DATA

OVERTOPPING DISCHARGE	= 2600 (+)	CFS
FREQUENCY OF OVERTOPPING	= 500 (+)	YRS
OVERTOPPING ELEVATION	= 826.2	FT

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
STAGE I BARREL @ 1.856 CY/FT	194.0	C.Y.
STAGE II BARREL @ 2.519 CY/FT	263.3	C.Y.
WINGS, ETC.	16.9	C.Y.
TOTAL	474.2	C.Y.
REINFORCING STEEL		
STAGE I BARREL	19,334	LBS.
STAGE II BARREL	22,768	LBS.
WINGS ETC.	838	LBS.
TOTAL	42,940	LBS.
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION CONDITIONING MATERIAL	231	TONS
RIP RAP, CLASS I	77	TONS
GEOTEXTILE FOR DRAINAGE	108	SY

SAMPLE BAR REPLACEMENT

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

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

FOUNDATION NOTES

EXCAVATE 1 FOOT BELOW THE CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARICLE 414 OF THE STANDARD SPECIFICATIONS.

UNDERCUT SOFT OR LOOSE SOILS TO A MINIMUM DEPTH OF 3 FEET BELOW THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL AND BACKFILL WITH FOUNDATION CONDITIONING MATERIAL AS DIRECTED BY THE ENGINEER.

NORTH CAROLINA PROFESSIONAL SEAL 29779 ENGINEER — Docusigned by: Randy Wells — 7/26/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488

PROJECT NO. U-2579AA
FORSYTH COUNTY
STATION: 78+68.93 -Y2-

SHEET 1 OF 7 CULVERT #393

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8'X8' RCBC EXTENSION (OUTLET END)

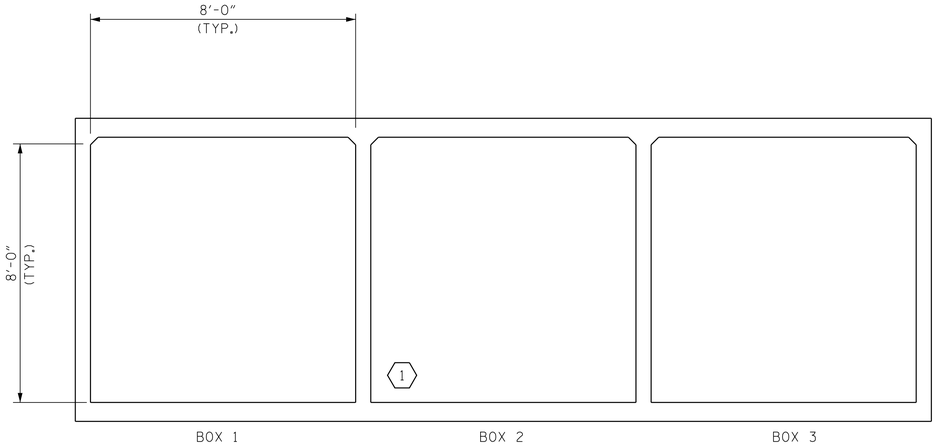
ON I-74/US-311 BETWEEN SR 2698 & SR 2643

DSG. ENG. OF RECORD.: AML
DWN. BY: WDC DATE: 2/19
CHKD. BY: HLW DATE: 2/19

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-1
1			3			TOTAL SHEETS
2			4			7

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

	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			MOMENT				SHEAR			
			RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)
PERMANENT LOAD RATING	⟨1⟩	1.01	1.09	2	BOTTOM SLAB	0.33	1.01	2	BOTTOM SLAB	1.57



LRFR SUMMARY

(LOOKING DOWNSTREAM)

LOAD FACTORS:

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

NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

THE EFFECTS OF LIVE LOAD ON DESIGN AND LOAD RATING MAY BE NEGLECTED FOR CULVERTS WITH CERTAIN FILL DEPTHS DESCRIBED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

CULVERTS WITH NEGLIGIBLE LIVE LOAD SHOULD BE LOAD RATED FOR PERMANENT LOADS ONLY IN ACCORDANCE WITH THE AASHTO MANUAL FOR BRIDGE EVALUATION.

V & M PROJECT NO.: 31748-44

DRAWN BY : WMC	7/11	REV. 10/1/11 MAA/GM
CHECKED BY : GM	7/11	

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796

Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20771 HARRY L. WILLIS JR. ENGINEER

7/26/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DSG. ENG. OF RECORD.: AML		
DWN. BY: WDC	DATE: 2/19	
CHKD. BY: HLW	DATE: 2/19	

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 78+68.93 -Y2-

SHEET 2 OF 7

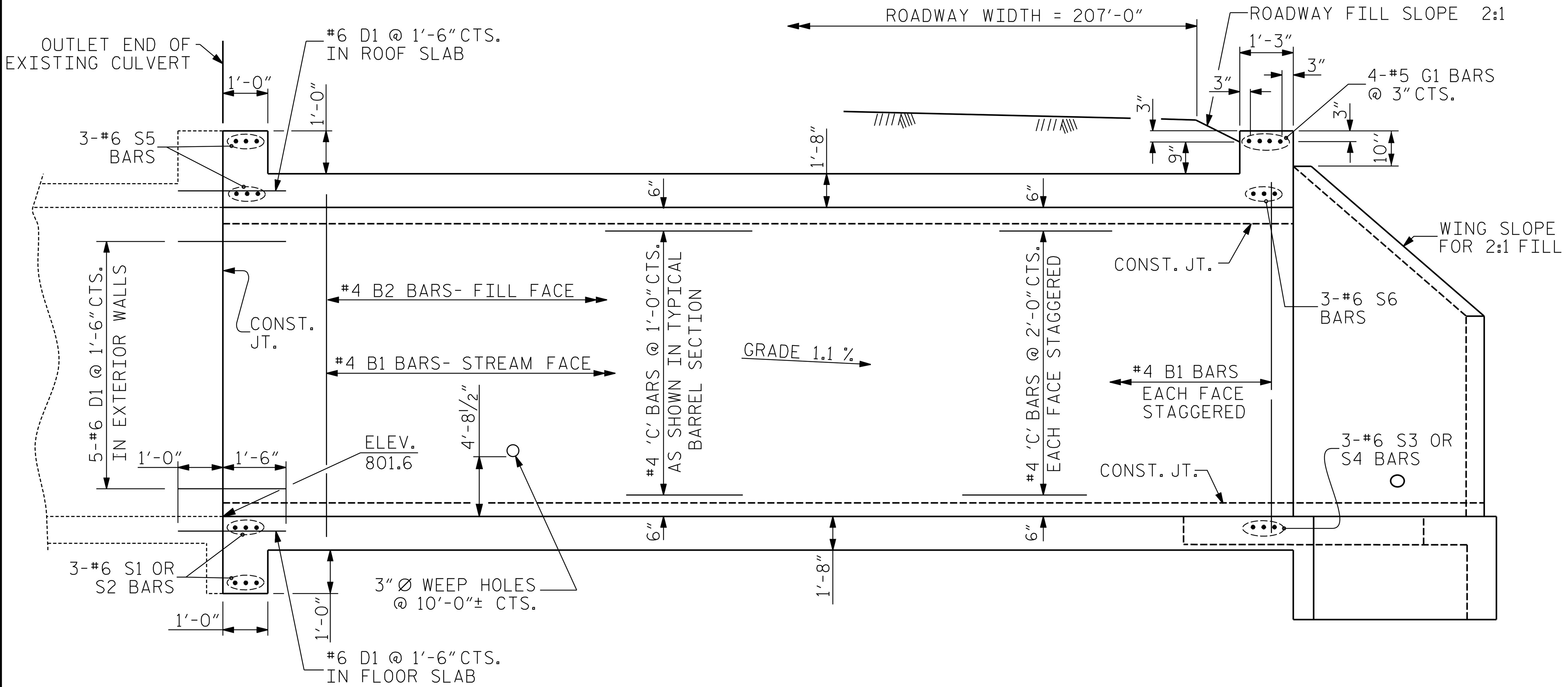
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

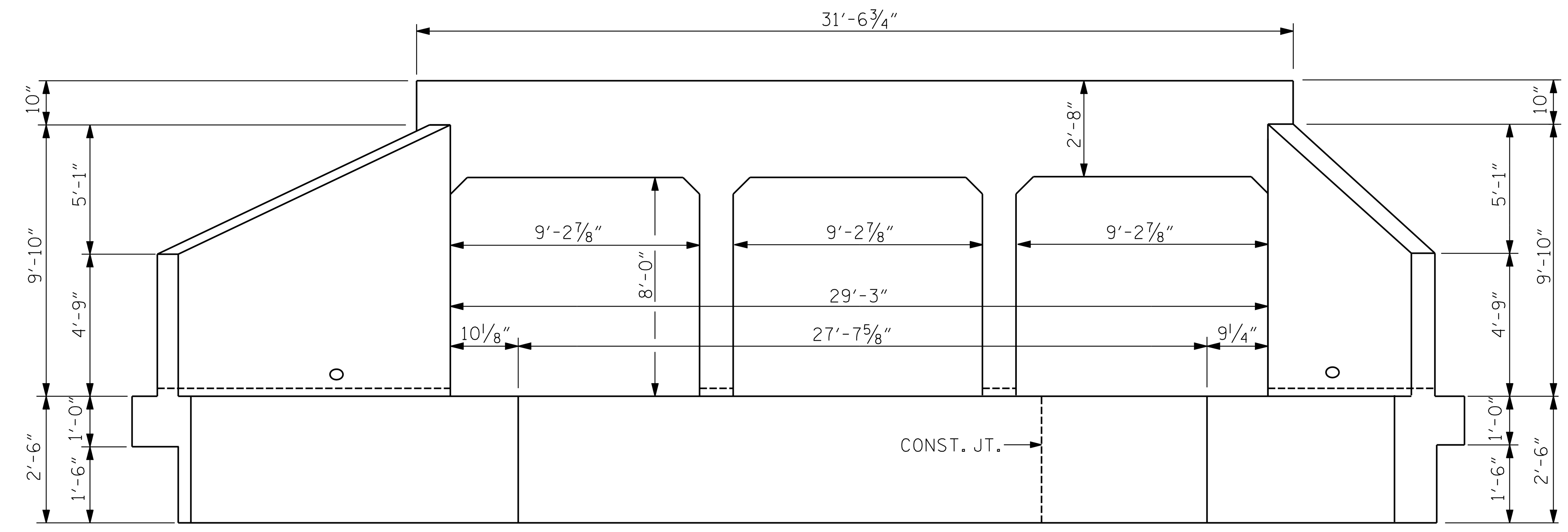
(DEEP FILLS)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-2
1			3			TOTAL SHEETS
2			4			7



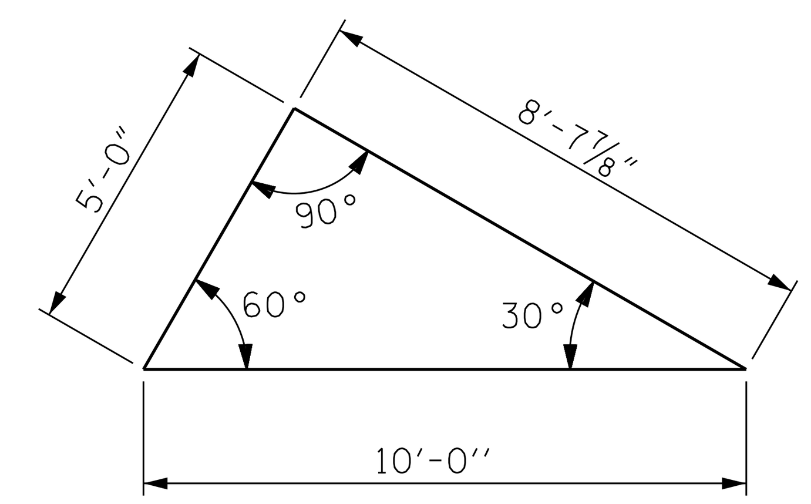
EXTERIOR WALL INTERIOR WALL

CULVERT SECTION NORMAL TO ROADWAY

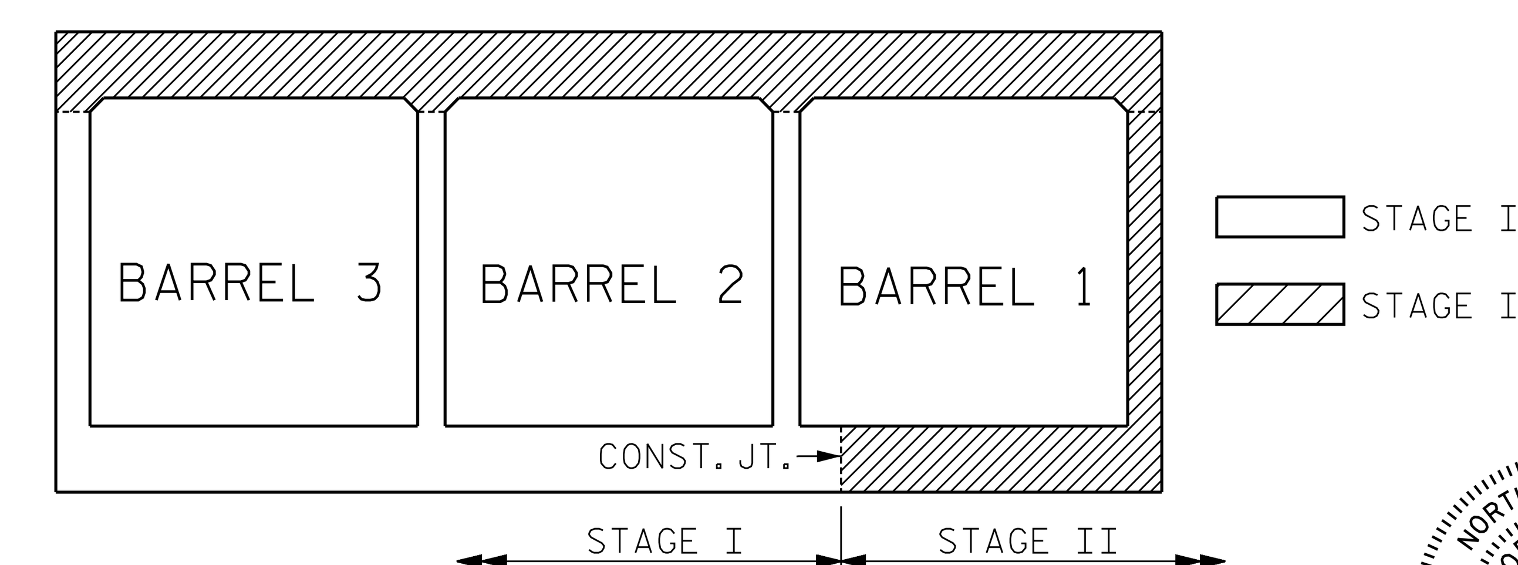


END ELEVATION NORMAL TO SKEW

LOOKING UPSTREAM



SKEW TRIANGLE



STAGING DIAGRAM

LOOKING UPSTREAM

Document Signed by: 7/26/2022

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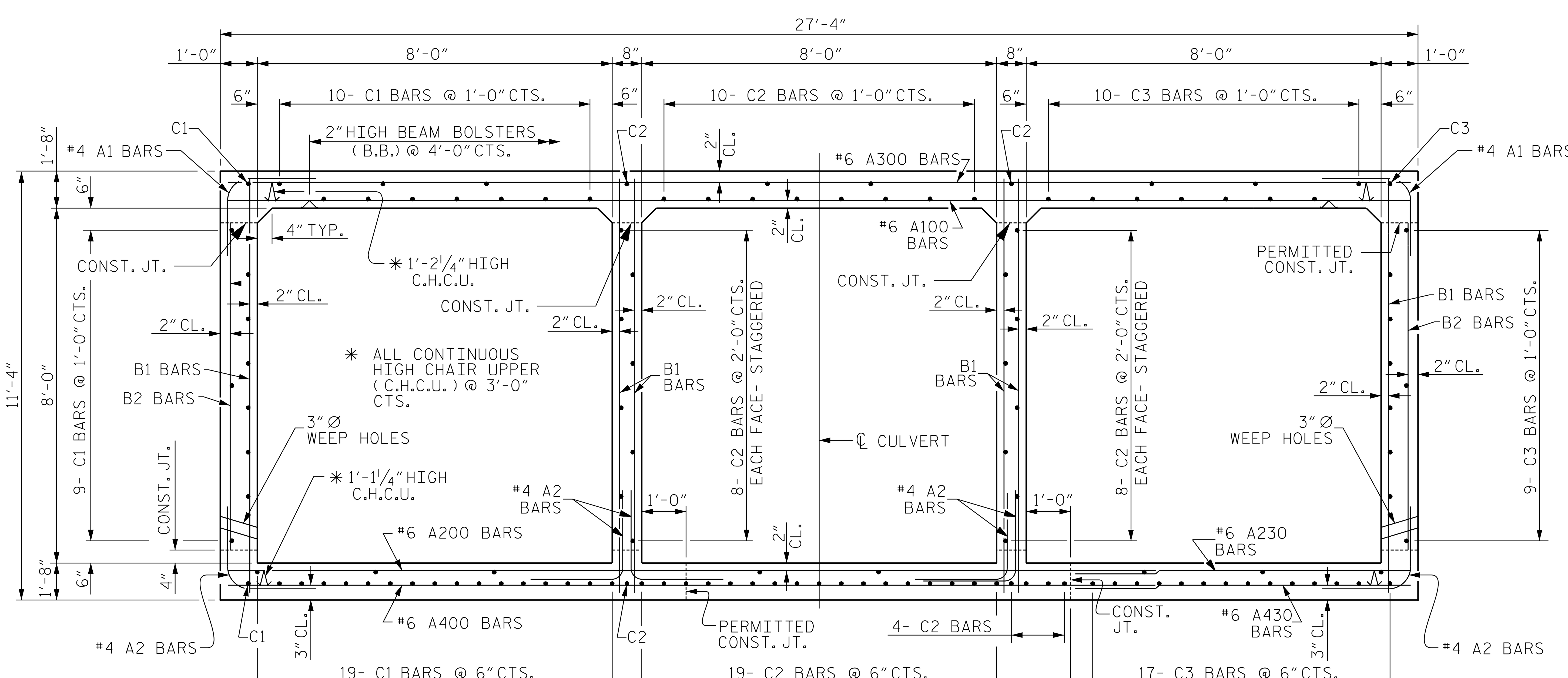
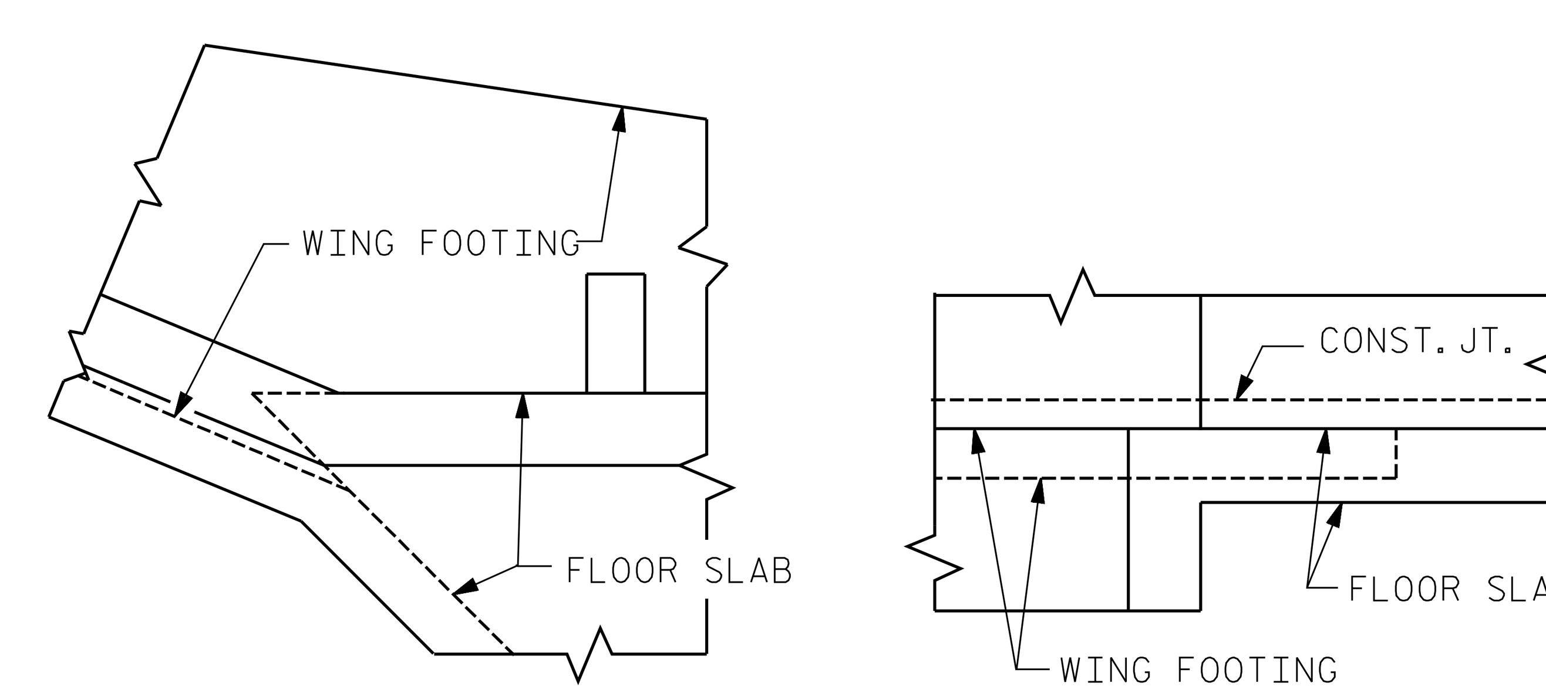


RIGHT ANGLE SECTION OF BARREL

THERE ARE 129 "C" BARS IN SECTION OF BARREL.
LOOKING UPSTREAM
THERE ARE 69 'C' BARS IN STAGE I SECTION OF BARREL.
THERE ARE 60 'C' BARS IN STAGE II SECTION OF BARREL.



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

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933; Tri-Cities, TN 423-467-8401; Knoxville, TN 865-546-5800; Spartanburg, SC 864-574-4775; Charleston, SC 843-974-5650; Middlesboro, KY 606-248-6600; Atlanta, GA 770-627-3590; Raleigh, NC 919-977-9455; Charlotte, NC 704-357-0488

PROJECT NO. U-2579AA
FORSYTH COUNTY
STATION: 78+68.93 -Y2-

SHEET 3 OF 7

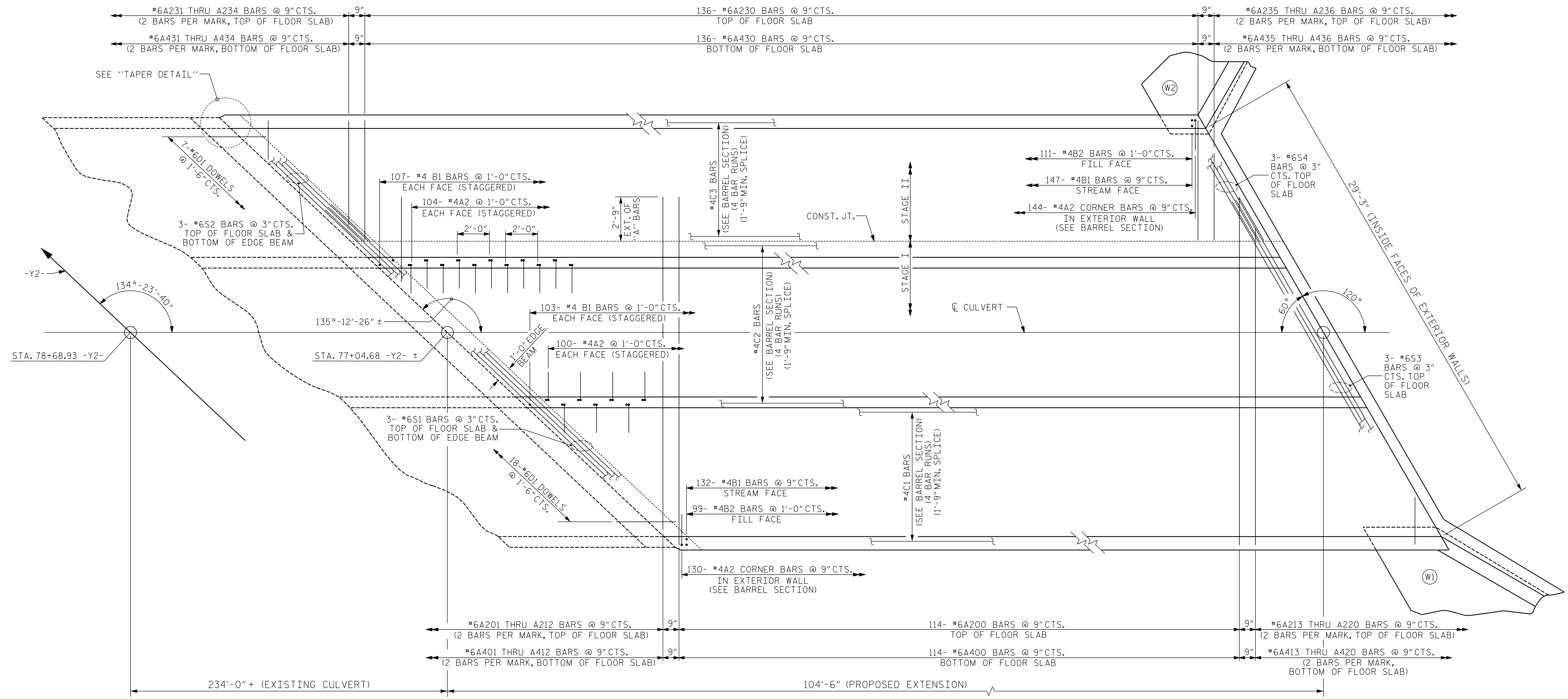
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8'X8' RCBC EXTENSION (OUTLET END)
ON I-74/US-311 BETWEEN SR 2698 & SR 2643

DSG. ENG. OF RECORD.: AML
DWN. BY: WDC DATE: 2/19
CHKD. BY: HLW DATE: 2/19

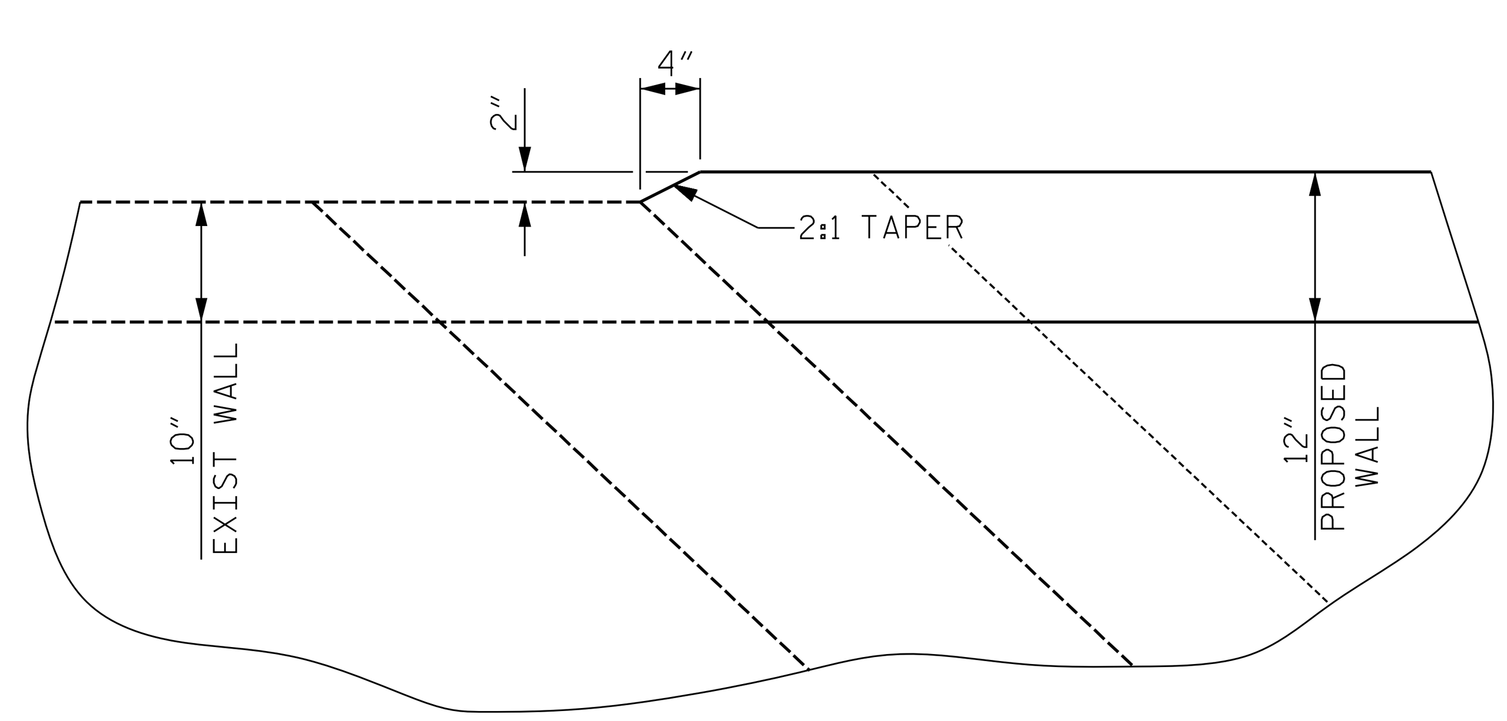
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. C3-3
TOTAL SHEETS 7



FLOOR PLAN

(STAGE I & STAGE II)



TAPER DETAIL

(TYP. EACH EXT. WALL)

(ANY REINFORCING STEEL IN THE AREA OF THE TAPER SHALL BE ADJUSTED OR FIELD BENT TO MAINTAIN 2" CL. FROM THE OUTSIDE FACE OF THE WALL)

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 78+68.93 -Y2-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8'X8' RCBC EXTENSION (OUTLET END)

ON I-74/US-311 BETWEEN SR 2698 & SR 2643

7/26/2022

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DSG. ENG. OF RECORD.: AML	
DWN. BY: WDC	DATE: 2/19
CHKD. BY: HLW	DATE: 2/19

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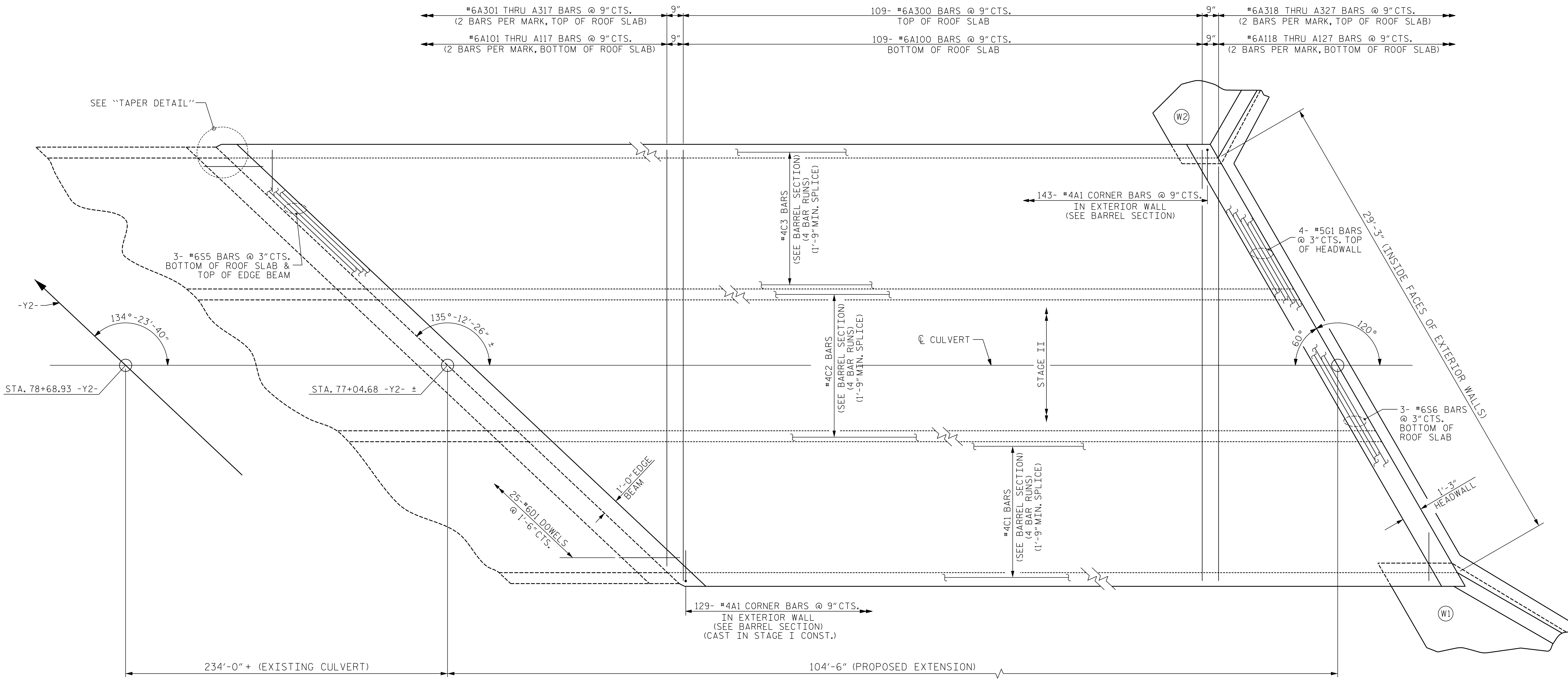
1			3			
2			4			

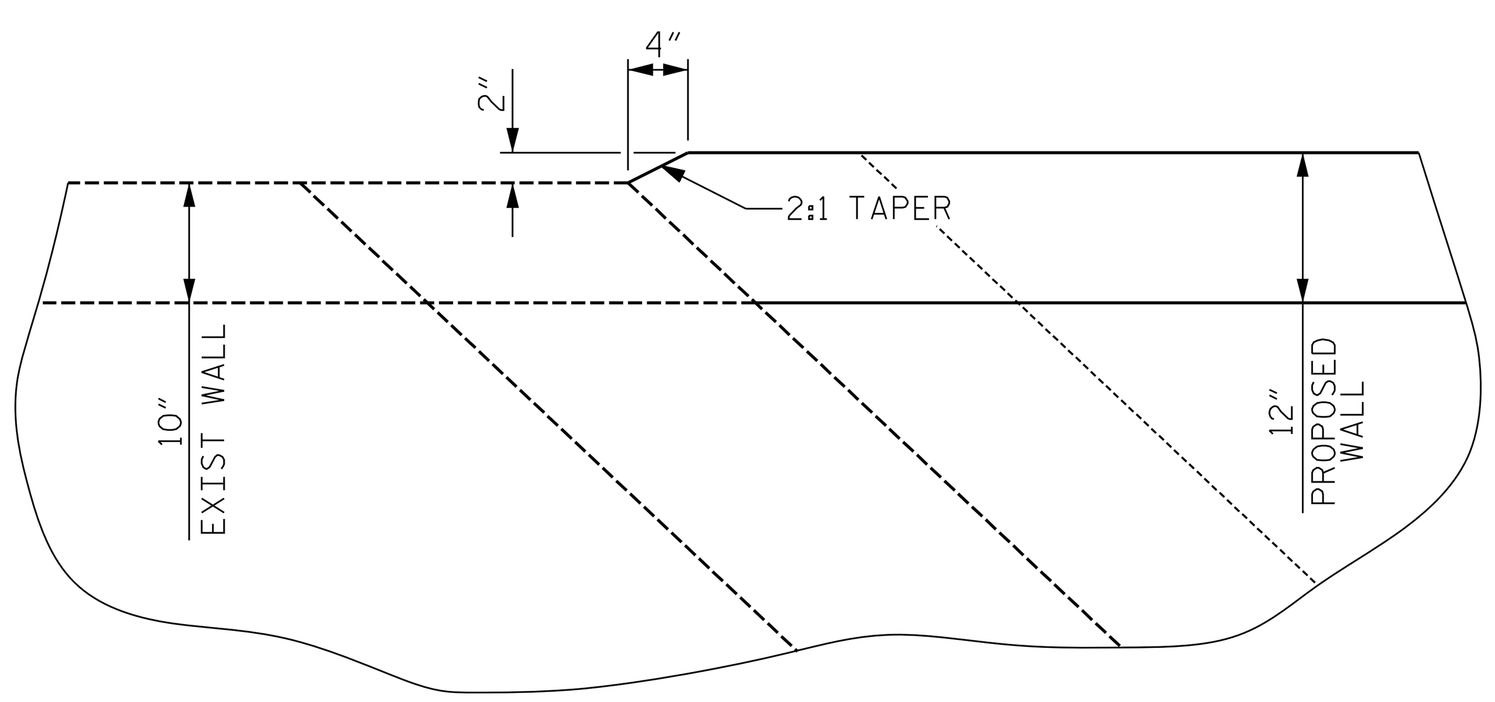
SHEET NO. C3-4

TOTAL SHEETS 7



ROOF PLAN

(STAGE II)



TAPER DETAIL

(TYP. EACH EXT. WALL)

(ANY REINFORCING STEEL IN THE AREA OF THE TAPER SHALL BE ADJUSTED OR FIELD BENT TO MAINTAIN 2" CL. FROM THE OUTSIDE FACE OF THE WALL)

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — DocuSigned by: Hardy Willis — 7/26/2022

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PROJECT NO. U-2579AA
FORSYTH COUNTY
STATION: 78+68.93 -Y2-
SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8'X8' RCBC EXTENSION (OUTLET END)

ON I-74/US-311 BETWEEN SR 2698 & SR 2643

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		C3-5
1			3				TOTAL SHEETS
2			4				7

BILL OF MATERIAL

STAGE I

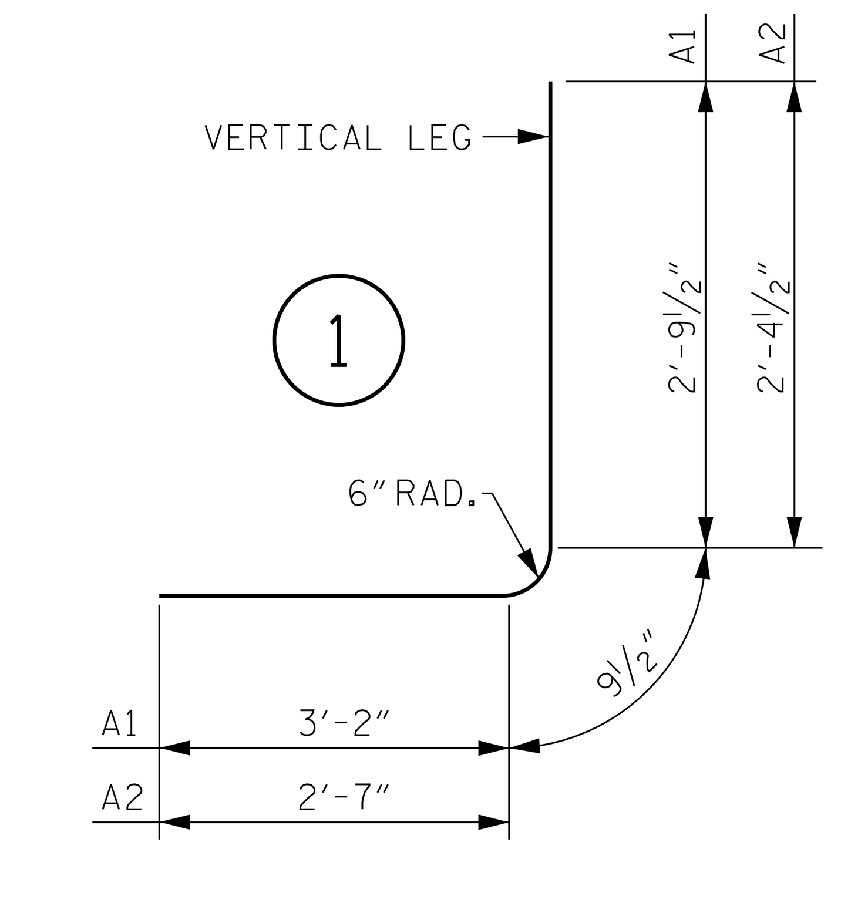
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A200	114	6	STR.	21'-11"	3753
A201	2	6	STR.	20'-8"	62
A202	2	6	STR.	19'-1"	57
A203	2	6	STR.	17'-8"	53
A204	2	6	STR.	16'-2"	49
A205	2	6	STR.	14'-8"	44
A206	2	6	STR.	13'-2"	40
A207	2	6	STR.	11'-8"	35
A208	2	6	STR.	10'-3"	31
A209	2	6	STR.	8'-9"	26
A210	2	6	STR.	7'-3"	22
A211	2	6	STR.	5'-9"	17
A212	2	6	STR.	4'-3"	13
A213	2	6	STR.	20'-6"	62
A214	2	6	STR.	17'-11"	54
A215	2	6	STR.	15'-3"	46
A216	2	6	STR.	12'-8"	38
A217	2	6	STR.	10'-1"	30
A218	2	6	STR.	7'-6"	23
A219	2	6	STR.	4'-11"	15
A220	2	6	STR.	2'-3"	7
A400	114	6	STR.	21'-11"	3753
A401	2	6	STR.	20'-8"	62
A402	2	6	STR.	19'-1"	57
A403	2	6	STR.	17'-8"	53
A404	2	6	STR.	16'-2"	49
A405	2	6	STR.	14'-8"	44
A406	2	6	STR.	13'-2"	40
A407	2	6	STR.	11'-8"	35
A408	2	6	STR.	10'-3"	31
A409	2	6	STR.	8'-9"	26
A410	2	6	STR.	7'-3"	22
A411	2	6	STR.	5'-9"	17
A412	2	6	STR.	4'-3"	13
A413	2	6	STR.	20'-6"	62
A414	2	6	STR.	17'-11"	54
A415	2	6	STR.	15'-3"	46
A416	2	6	STR.	12'-8"	38
A417	2	6	STR.	10'-1"	30
A418	2	6	STR.	7'-6"	23
A419	2	6	STR.	4'-11"	15
A420	2	6	STR.	2'-3"	7
A1	129	4	(1)	6'-9"	582
A2	334	4	(1)	5'-9"	1283
B1	342	4	STR.	10'-11"	2494
B2	99	4	STR.	7'-4"	485
C1	116	4	STR.	26'-10"	2079
C2	160	4	STR.	28'-0"	2993
D1	23	6	STR.	2'-6"	86
S1	6	6	STR.	30'-0"	270
S3	3	6	STR.	24'-11"	112
REINFORCING STEEL					19,334 LBS.

STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	109	6	STR.	27'-0"	4420
A101	2	6	STR.	26'-5"	79
A102	2	6	STR.	24'-11"	75
A103	2	6	STR.	23'-5"	70
A104	2	6	STR.	21'-11"	66
A105	2	6	STR.	20'-5"	61
A106	2	6	STR.	18'-11"	57
A107	2	6	STR.	17'-6"	53
A108	2	6	STR.	16'-0"	48
A109	2	6	STR.	14'-6"	44
A110	2	6	STR.	13'-0"	39
A111	2	6	STR.	11'-6"	35
A112	2	6	STR.	10'-0"	30
A113	2	6	STR.	8'-6"	26
A114	2	6	STR.	7'-0"	21
A115	2	6	STR.	5'-7"	17
A116	2	6	STR.	4'-1"	12
A117	2	6	STR.	2'-7"	8
A118	2	6	STR.	25'-8"	77
A119	2	6	STR.	23'-1"	69
A120	2	6	STR.	20'-6"	62
A121	2	6	STR.	17'-10"	54
A122	2	6	STR.	15'-3"	46
A123	2	6	STR.	12'-8"	38
A124	2	6	STR.	10'-1"	30
A125	2	6	STR.	7'-6"	23
A126	2	6	STR.	4'-11"	15
A127	2	6	STR.	2'-3"	7
A300	109	6	STR.	27'-0"	4420
A301	2	6	STR.	26'-5"	79
A302	2	6	STR.	24'-11"	75
A303	2	6	STR.	23'-5"	70
A304	2	6	STR.	21'-11"	66
A305	2	6	STR.	20'-5"	61
A306	2	6	STR.	18'-11"	57
A307	2	6	STR.	17'-6"	53
A308	2	6	STR.	16'-0"	48
A309	2	6	STR.	14'-6"	44
A310	2	6	STR.	13'-0"	39
A311	2	6	STR.	11'-6"	35
A312	2	6	STR.	10'-0"	30
A313	2	6	STR.	8'-6"	26
A314	2	6	STR.	7'-0"	21
A315	2	6	STR.	5'-7"	17
A316	2	6	STR.	4'-1"	12
A317	2	6	STR.	2'-7"	8
A318	2	6	STR.	25'-8"	77
A319	2	6	STR.	23'-1"	69
A320	2	6	STR.	20'-6"	62
A321	2	6	STR.	17'-10"	54
A322	2	6	STR.	15'-3"	46
A323	2	6	STR.	12'-8"	38
A324	2	6	STR.	10'-1"	30
A325	2	6	STR.	7'-6"	23
A326	2	6	STR.	4'-11"	15
A327	2	6	STR.	2'-3"	7

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A230	136	6	STR.	7'-10"	1600
A231	2	6	STR.	7'-1"	21
A232	2	6	STR.	5'-7"	17
A233	2	6	STR.	4'-1"	12
A234	2	6	STR.	2'-7"	8
A235	2	6	STR.	5'-2"	16
A236	2	6	STR.	2'-7"	8
A430	136	6	STR.	7'-10"	1600
A431	2	6	STR.	7'-1"	21
A432	2	6	STR.	5'-7"	17
A433	2	6	STR.	4'-1"	12
A434	2	6	STR.	2'-7"	8
A435	2	6	STR.	5'-2"	16
A436	2	6	STR.	2'-7"	8
A1	143	4	(1)	6'-9"	645
A2	144	4	(1)	5'-9"	553
B1	147	4	STR.	10'-11"	1072
B2	111	4	STR.	7'-4"	544
C1	44	4	STR.	26'-10"	789
C2	48	4	STR.	28'-0"	898
C3	148	4	STR.	28'-10"	2851
D1	37	6	STR.	2'-6"	139
G1	4	5	STR.	31'-2"	130
S2	6	6	STR.	11'-1"	100
S4	3	6	STR.	9'-0"	41
S5	6	6	STR.	38'-3"	345
S6	3	6	STR.	31'-2"	140
REINFORCING STEEL					22,768 LBS.

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTH CHART

BAR	SIZE	SPLICE LENGTH
"C"	#4	1'-9"
A100, A200, A300, A400	#6	2'-9"

PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 78+68.93 -Y2-

SHEET 6 OF 7

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
DocuSigned by: Hardy Willis
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 8'X8' RCBC
EXTENSION (OUTLET END)

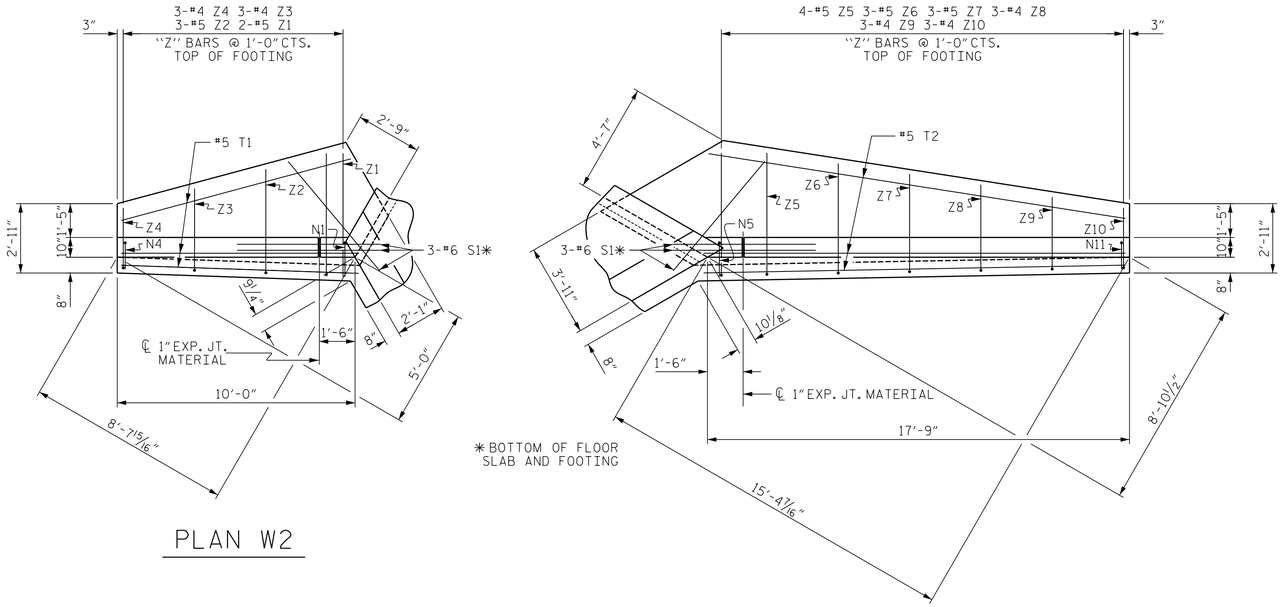
ON I-74/US-311 BETWEEN
SR 2698 & SR 2643

DSG. ENG. OF RECORD.: AML

DWN. BY: MAF DATE: 2/19

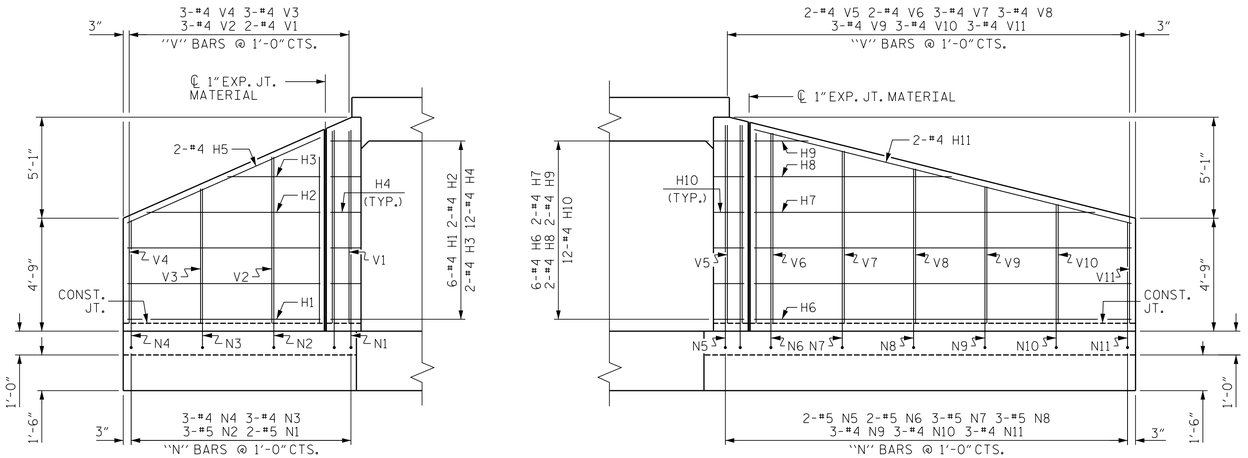
CHKD. BY: HLW DATE: 2/19

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-6
1			3			TOTAL SHEETS
2			4			7



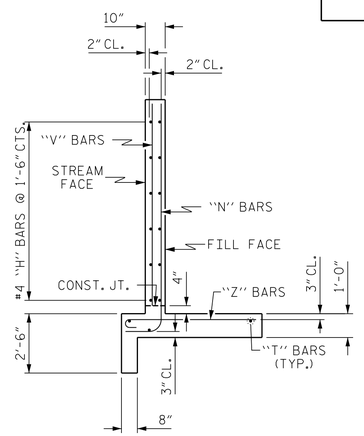
PLAN W2

PLAN W1



ELEVATION W2

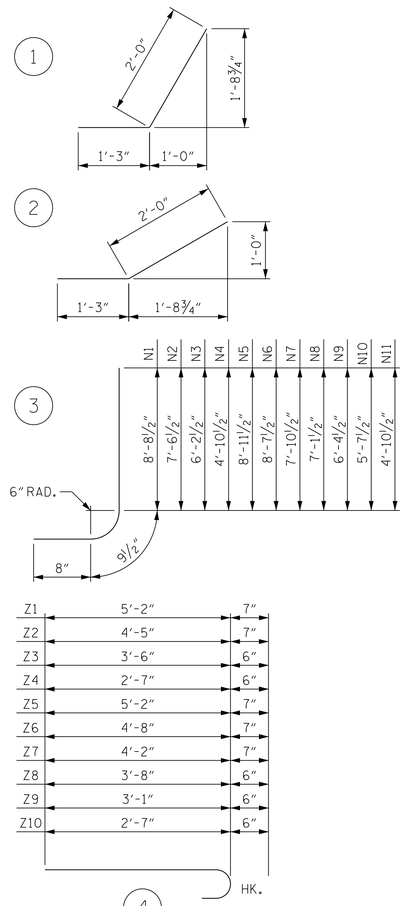
ELEVATION W1



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	8'-1"	32
H2	2	#4	STR	7'-3"	15
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 FOR 2 WINGS 838 LBS

CLASS A CONCRETE

2 WINGS	12.2	CY
1 HEADWALL	1.5	CY
1 END CURTAIN WALL	0.9	CY
2 EDGE BEAMS	2.3	CY
TOTAL	16.9	CY

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PROJECT NO. U-2579AA

FORSYTH COUNTY

STATION: 78+68.93 -Y2-

SHEET 7 OF 7

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 8'-0" SLOPE = 2:1
60° OR 120° SKEW

DRAWN BY : CCJ 11/99
CHECKED BY : RWW 03/00

DSG. ENG. OF RECORD.: AML
DWN. BY: WDC DATE: 2/19
CHKD. BY: HLW DATE: 2/19

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-7
1			3			TOTAL SHEETS
2			4			7

STD. NO. CW6008

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 ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" 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 ¼" 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 ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (✓) RGW
REV. 8-16-99 RWW (✓) LES
REV. 5-7-03 RWW (✓) JTE
REV. 5-1-06 TLA (✓) GM
REV. 10-1-11 MAA (✓) GM
REV. 12-17 MAA (✓) THC