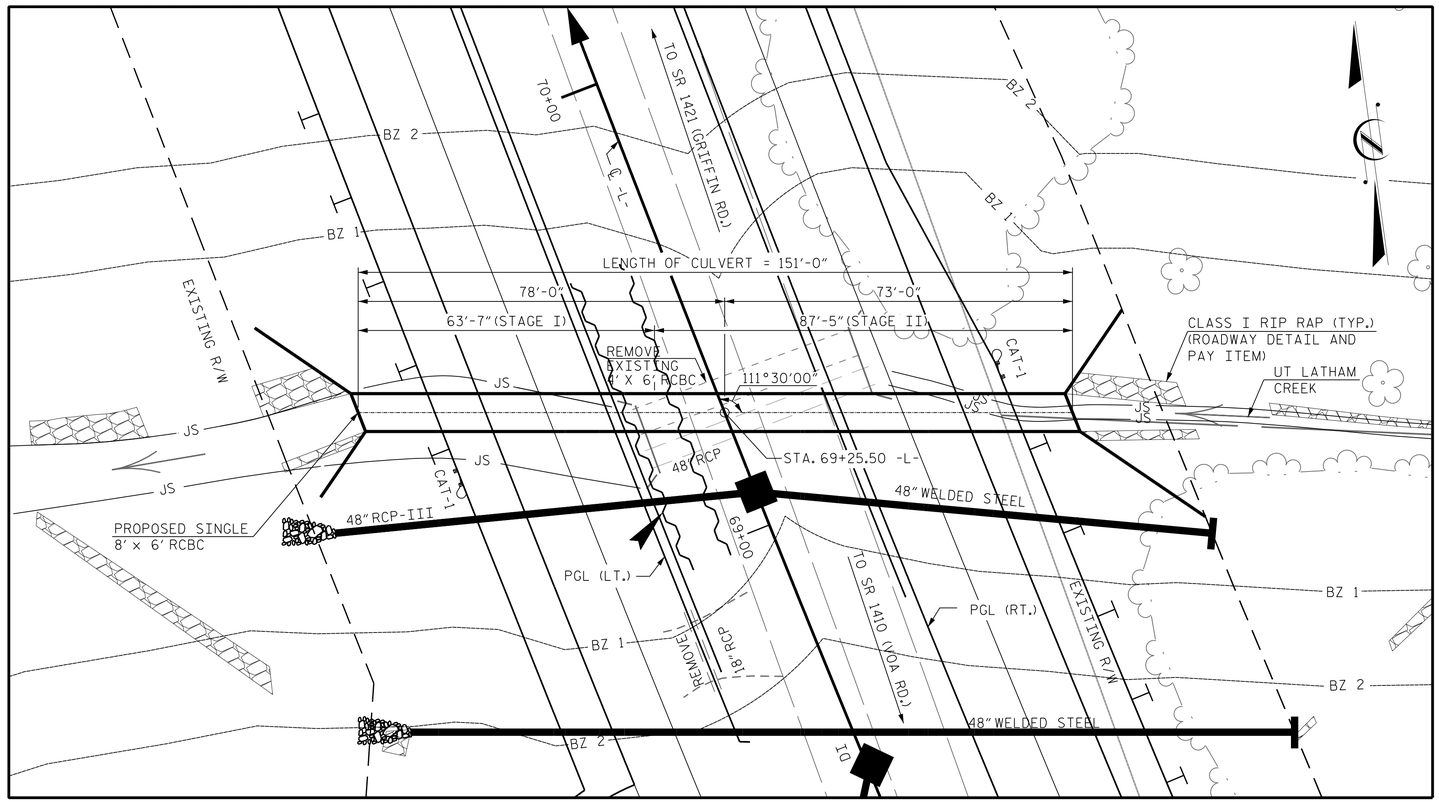
BENCH MARK: BM #2 -L- STA. 62+82.70, 109.4' RT, RR SPIKE SET IN 20" PINE, N 698481, E 2573081.5; EL. 42.25, NAVD 88



LOCATION SKETCH

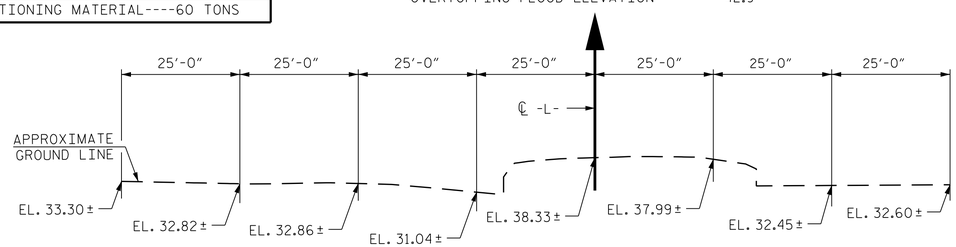
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS
GRADE POINT ELEVATIONS AT STA. 69+25.50 -L- ARE 42.94 (LT.) AND 42.93 (RT.)
BED ELEVATION AT STA. 69+25.50 -L- = 32.87
ROADWAY SLOPES = 3:1

HYDRAULIC DATA

DESIGN DISCHARGE----------260 C.F.S.
FREQUENCY OF DESIGN FLOOD----------50 YR.
DESIGN HIGH WATER ELEVATION----------37.7
DRAINAGE AREA----------0.7 SQ. MI.
BASE DISCHARGE (Q100)----------320 C.F.S.
BASE HIGH WATER ELEVATION----------38.1

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE----------733 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD-----500 YR. +
OVERTOPPING FLOOD ELEVATION---------42.9



PROFILE ALONG ℄ CULVERT

STAGE I STRUCTURE QUANTITIES

CLASS A CONCRETE				
BARREL @	0.88	CY/FT	55.7	C.Y.
WING ETC.	11.9			C.Y.
SILL	0.3			C.Y.
TOTAL	67.9			C.Y.
REINFORCING STEEL				
BARREL	8,354			LBS.
WINGS ETC.	711			LBS.
TOTAL	9,065			LBS.
CULVERT EXCAVATION ---------- LUMP SUM				
REMOVAL OF EXISTING STRUCTURE ------ LUMP SUM				
FOUNDATION CONDITIONING MATERIAL----60 TONS				

STAGE II STRUCTURE QUANTITIES

CLASS A CONCRETE				
BARREL @	0.88	CY/FT	76.6	C.Y.
WING ETC.	11.9			C.Y.
SILL	0.3			C.Y.
TOTAL	88.8			C.Y.
REINFORCING STEEL				
BARREL	11,317			LBS.
WINGS ETC.	711			LBS.
TOTAL	12,028			LBS.
CULVERT EXCAVATION ---------- LUMP SUM				
FOUNDATION CONDITIONING MATERIAL----82 TONS				

NOTES:

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

DESIGN FILL---------- 5.0 FT. (MAX.), 2.5 FT. (MIN.)

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

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.

CONCRETE IN STAGE I CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. STAGE I WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE I VERTICAL WALLS.
2. THE REMAINING PORTIONS OF STAGE I WALLS AND STAGE I WINGS FOR FULL HEIGHT.
3. STAGE I ROOF SLAB, HEADWALL, AND SILL.

CONCRETE IN STAGE II CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. STAGE II WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE II VERTICAL WALLS.
2. THE REMAINING PORTION OF STAGE II WALLS TO THE PERMITTED CONSTRUCTION JOINT AND STAGE II WINGS FOR FULL HEIGHT.
3. STAGE II ROOF SLAB, HEADWALL, AND SILL.

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

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

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

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

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

THE EXISTING STRUCTURE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COSTS INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

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

EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL (SELECT MATERIAL CLASS VI).

GEOTEXTILE FOR SOIL STABILIZATION IS REQUIRED BELOW THE FOUNDATION CONDITIONING MATERIAL. UNDERCUT ANY SOFT/LOOSE ALLUVIAL SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREA WITH FOUNDATION CONDITIONING MATERIAL.

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

THE EXISTING STRUCTURE CONSISTING OF SINGLE BARREL 4 FT X 6 FT RCBC WITH CONCRETE ENDWALLS LOCATED AT THE PROPOSED CULVERT SITE SHALL BE REMOVED.

PROJECT NO. R-2511
BEAUFORT COUNTY
STATION: 69+25.50 -L-

SHEET 1 OF 7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : M. ZIEHL DATE : JAN 2022
DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JAN 2022

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NORTH CAROLINA PROFESSIONAL SEAL 037704A 10966 ENGINEER RICKY V. KEITH
1/27/2022

CULVERT NO. 047

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 8 FT. X 6 FT.
CONCRETE BOX CULVERT
111° 30' 00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU-47-1
1			3			TOTAL SHEETS
2			4			7

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	(#) CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γL)	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)	1.04	--	1.75	1.04	1	BOTTOM SLAB	4.0	1.49	1	BOTTOM SLAB	0.1	
		HL-93 (OPERATING)	N/A		1.35	--	1.35	1.35	1	BOTTOM SLAB	4.0	1.93	1	BOTTOM SLAB	0.1	
		HS-20 (INVENTORY)	36.000	(2)	1.22	43.92	1.75	1.22	1	TOP SLAB	4.0	1.80	1	TOP SLAB	0.1	
		HS-20 (OPERATING)	36.000		1.59	57.24	1.35	1.59	1	TOP SLAB	4.0	2.34	1	TOP SLAB	0.1	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.67	36.05	1.40	2.67	1	TOP SLAB	4.0	3.94	1	TOP SLAB	0.1	
		SNGARBS2	20.000		2.50	50.00	1.40	2.50	1	TOP SLAB	4.0	3.69	1	TOP SLAB	0.1	
		SNAGRIS2	22.000		2.67	58.74	1.40	2.67	1	TOP SLAB	4.0	3.94	1	TOP SLAB	0.1	
		SNCOTTS3	27.250	(3)	1.70	46.33	1.40	1.70	1	BOTTOM SLAB	4.0	2.43	1	BOTTOM SLAB	0.1	
		SNAGGRS4	34.925		2.01	70.20	1.40	2.01	1	BOTTOM SLAB	4.0	2.81	1	BOTTOM SLAB	0.1	
		SNS5A	35.550		1.93	68.61	1.40	1.93	1	BOTTOM SLAB	4.0	2.72	1	BOTTOM SLAB	0.1	
		SNS6A	39.950		1.93	77.10	1.40	1.93	1	BOTTOM SLAB	4.0	2.71	1	BOTTOM SLAB	0.1	
		SNS7B	42.000		1.93	81.06	1.40	1.93	1	BOTTOM SLAB	4.0	2.71	1	BOTTOM SLAB	0.1	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.67	88.11	1.40	2.67	1	TOP SLAB	4.0	3.95	1	TOP SLAB	0.1	
		TNT4A	33.075		2.03	67.14	1.40	2.03	1	BOTTOM SLAB	4.0	2.90	1	BOTTOM SLAB	0.1	
		TNT6A	41.600		1.93	80.29	1.40	1.93	1	BOTTOM SLAB	4.0	2.72	1	BOTTOM SLAB	0.1	
		TNT7A	42.000		1.99	83.58	1.40	1.99	1	BOTTOM SLAB	4.0	2.81	1	BOTTOM SLAB	0.1	
		TNT7B	42.000		1.93	81.06	1.40	1.93	1	BOTTOM SLAB	4.0	2.72	1	BOTTOM SLAB	0.1	
		TNAGRIT4	43.000		2.03	87.29	1.40	2.03	1	BOTTOM SLAB	4.0	2.90	1	BOTTOM SLAB	0.1	
		TNAGT5A	45.000		2.03	91.35	1.40	2.03	1	BOTTOM SLAB	4.0	2.90	1	BOTTOM SLAB	0.1	
		TNAGT5B	45.000		2.03	91.35	1.40	2.03	1	BOTTOM SLAB	4.0	2.90	1	BOTTOM SLAB	0.1	

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. CULVERT RATING AT STA. 69+25.50 -L-
2.
3.
4.

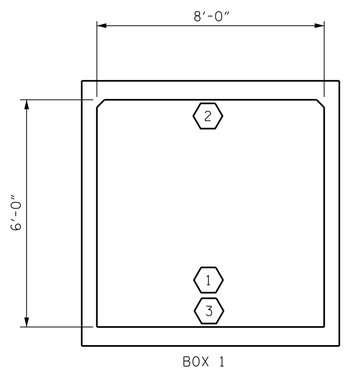
(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



BOX 1

LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. R-2511

BEAUFORT COUNTY

STATION: 69+25.50 -L-

SHEET 2 OF 7

CULVERT NO. 047

RK&K
P: (919) 878-9560
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NORTH CAROLINA PROFESSIONAL SEAL 10966 ENGINEER RICKY V. KEITH

1/27/2022

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_47-2
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : M. ZIEHL DATE : JAN 2022
DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JAN 2022

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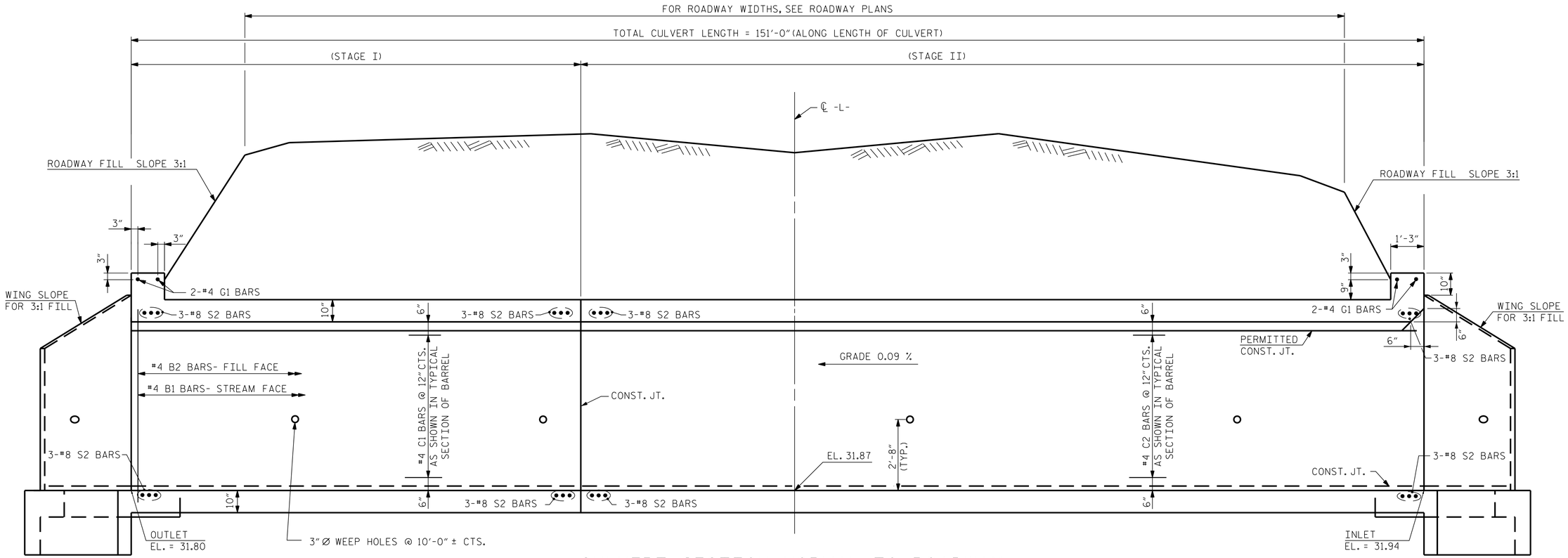
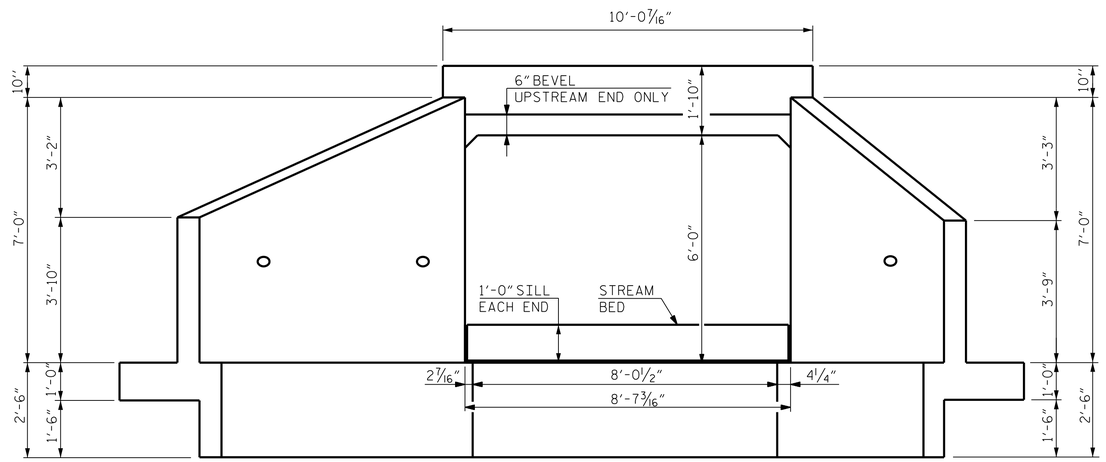


CULVERT SECTION NORMAL TO ROADWAY

(LOOKING UPSTATION)



END ELEVATION NORMAL TO SKEW

PROJECT NO. R-2511

BEAUFORT COUNTY

STATION: 69+25.50 -L-

SHEET 3 OF 7

CULVERT NO. 047

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 8 FT. X 6 FT.
CONCRETE BOX CULVERT
111° 30' 00" SKEW

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1			3		
2			4		

SHEET NO. CU_47-3

TOTAL SHEETS 7

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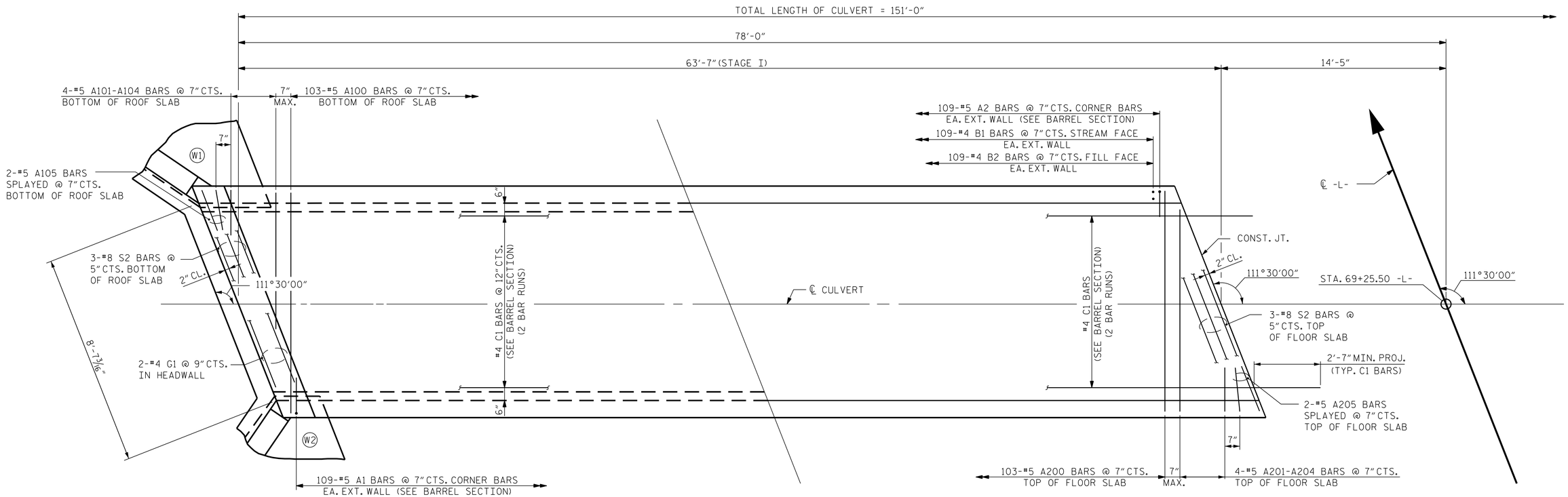

PART PLAN ROOF SLAB

PART PLAN FLOOR SLAB

STAGE I

NOTE:

3-#8 S2 BARS AT 5"CTS. BOTTOM ROOF SLAB
AT CONSTRUCTION JOINT, SEE SHEET CU_47-3
CULVERT SECTION NORMAL TO ROADWAY

PROJECT NO. R-2511

BEAUFORT COUNTY

STATION: 69+25.50 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 8 FT. X 6 FT.
CONCRETE BOX CULVERT
STAGE I
111°30'00" SKEW

CULVERT NO. 047

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Ricky Keith
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DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JAN 2022

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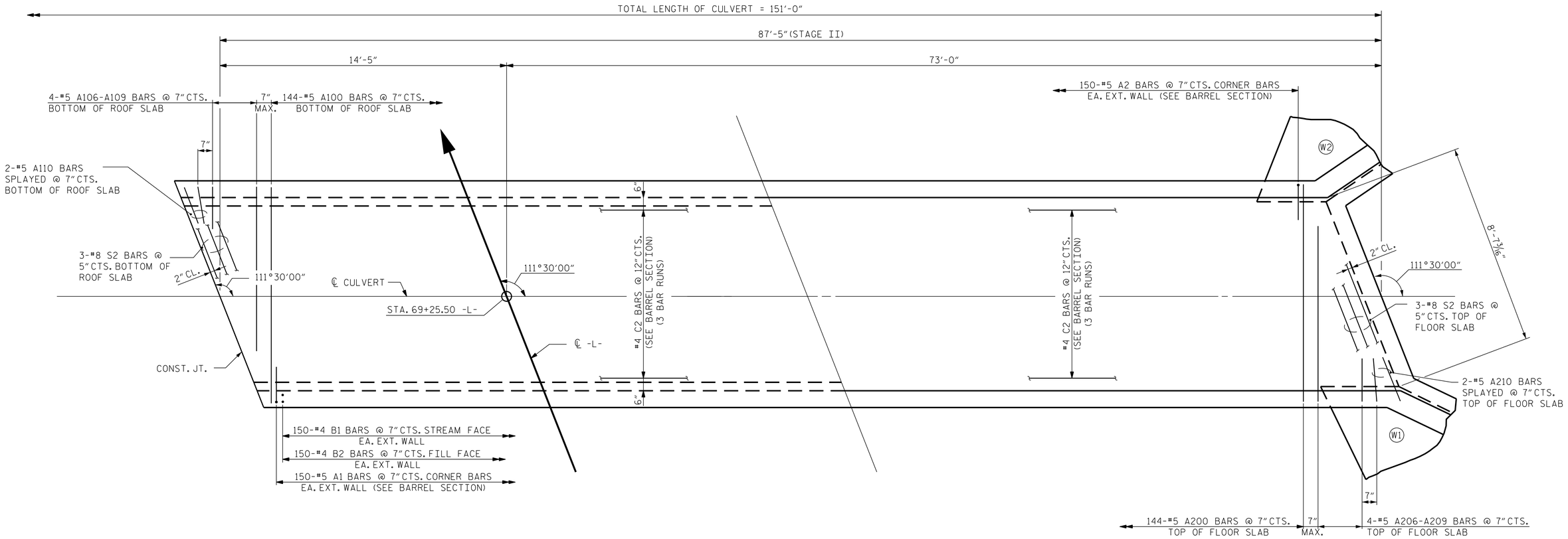

PART PLAN ROOF SLAB

PART PLAN FLOOR SLAB

STAGE II

NOTE:

3-#8 S2 BARS @ 5"CTS. BOTTOM OF ROOF SLAB AT CONSTRUCTION JOINT, SEE SHEET CU_47-3 CULVERT SECTION NORMAL TO ROADWAY

PROJECT NO. R-2511

BEAUFORT COUNTY

STATION: 69+25.50 -L-

SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 8 FT. X 6 FT.
CONCRETE BOX CULVERT
STAGE II
111°30'00" SKEW

CULVERT NO. 047

NORTH CAROLINA PROFESSIONAL SEAL 10966 ENGINEER RICKY V. KEITH
1/27/2022

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1			3			TOTAL SHEETS
2			4			7

DRAWN BY : B. H. GONFA DATE : JAN 2022
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DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JAN 2022

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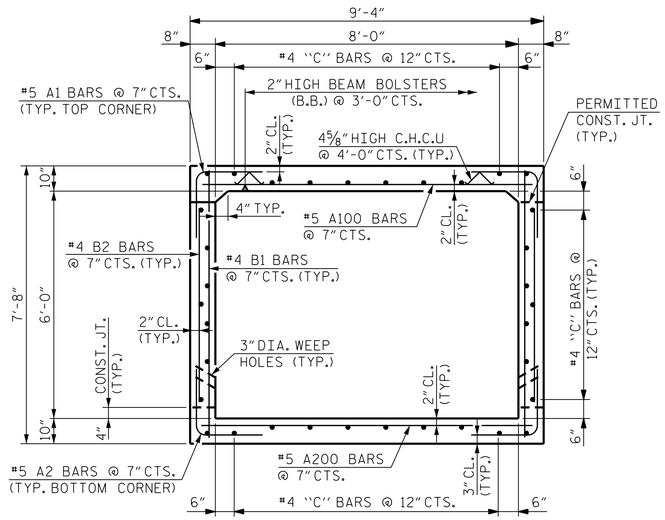
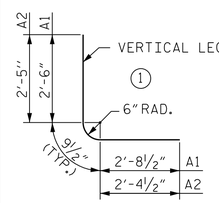


RIGHT ANGLE SECTION OF BARREL

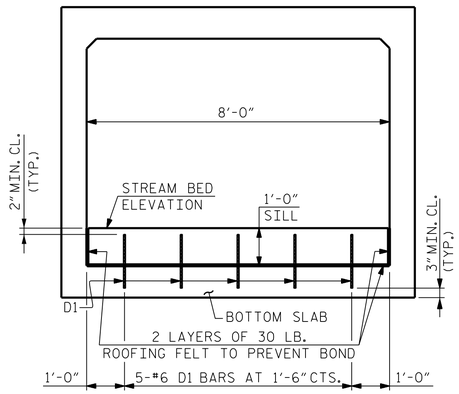
(THERE ARE 34 "C" BARS IN SECTION OF BARREL)

SPLICE LENGTHS		
BAR	SIZE	SPLICE LENGTHS
B1	#4	1'-10"
B2	#4	1'-10"
C1	#4	2'-5"
C2	#4	2'-5"

BAR TYPE



DIMENSIONS ARE OUT TO OUT



SILL ELEVATION

DOWEL SPACING SHOWN PERPENDICULAR TO CULVERT BARREL

BILL OF MATERIAL (STAGE I)

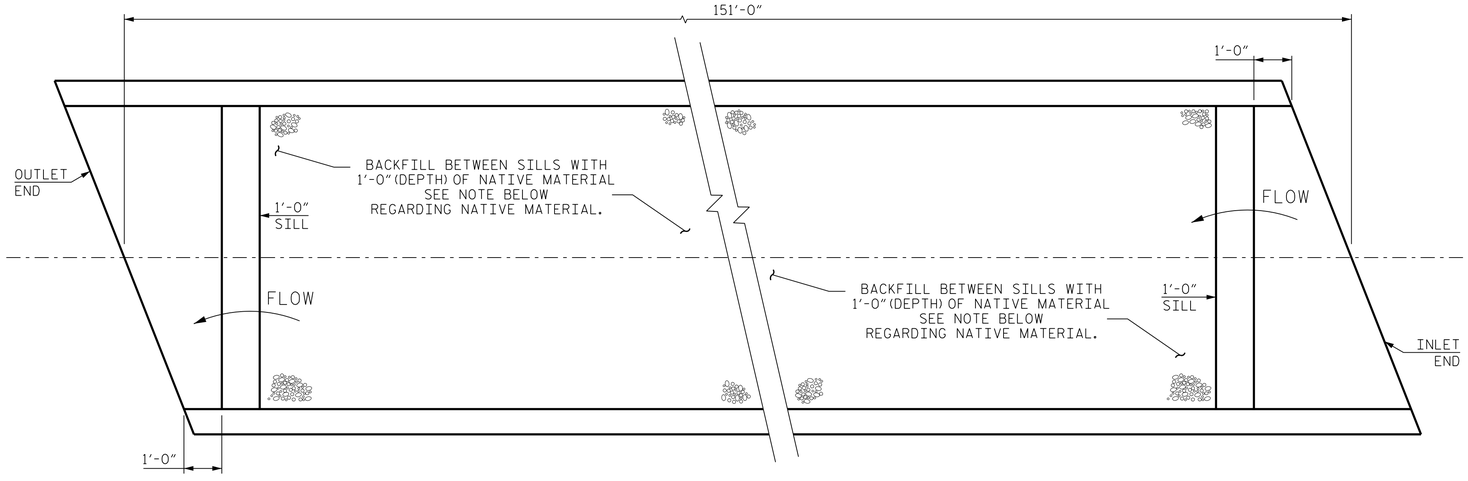
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	218	#5	1	6'-0"	1,364
A2	218	#5	1	5'-7"	1,270
A100	103	#5	STR.	9'-0"	967
A101	2	#5	STR.	7'-8"	16
A102	2	#5	STR.	6'-2"	13
A103	2	#5	STR.	4'-8"	10
A104	2	#5	STR.	3'-2"	7
A105	4	#5	STR.	2'-4"	10
A200	103	#5	STR.	9'-0"	967
A201	2	#5	STR.	7'-8"	16
A202	2	#5	STR.	6'-2"	13
A203	2	#5	STR.	4'-8"	10
A204	2	#5	STR.	3'-2"	7
A205	4	#5	STR.	2'-4"	10
B1	218	#4	STR.	7'-3"	1,056
B2	218	#4	STR.	5'-0"	728
C1	68	#4	STR.	34'-3"	1,556
D1	5	#6	STR.	1'-5"	11
G1	2	#4	STR.	9'-8"	13
S2	12	#8	STR.	9'-8"	310

REINFORCING STEEL 8,354 LBS.

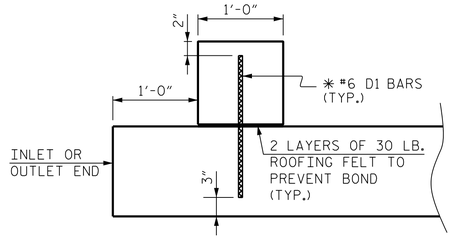
BILL OF MATERIAL (STAGE II)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	300	#5	1	6'-0"	1,877
A2	300	#5	1	5'-7"	1,747
A100	144	#5	STR.	9'-0"	1,352
A106	2	#5	STR.	7'-6"	16
A107	2	#5	STR.	6'-1"	13
A108	2	#5	STR.	4'-7"	10
A109	2	#5	STR.	3'-1"	6
A110	4	#5	STR.	2'-4"	10
A200	144	#5	STR.	9'-0"	1,352
A206	2	#5	STR.	7'-6"	16
A207	2	#5	STR.	6'-1"	13
A208	2	#5	STR.	4'-7"	10
A209	2	#5	STR.	3'-1"	6
A210	4	#5	STR.	2'-4"	10
B1	300	#4	STR.	7'-3"	1,453
B2	300	#4	STR.	5'-0"	1,002
C2	102	#4	STR.	30'-8"	2,090
D1	5	#6	STR.	1'-5"	11
G1	2	#4	STR.	9'-8"	13
S2	12	#8	STR.	9'-8"	310

REINFORCING STEEL 11,317 LBS.



SILL PLAN



SECTION THROUGH SILL

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

NOTES:

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAMBED MAY BE USED TO LINE THE BOTTOM OF THE CULVERT BARREL.

NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

PROJECT NO. R-2511

BEAUFORT COUNTY

STATION: 69+25.50 -L-

SHEET 6 OF 7

CULVERT NO. 047

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 8 FT. X 6 FT.
CONCRETE BOX CULVERT
111° 30' 00" SKEW

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NORTH CAROLINA PROFESSIONAL SEAL 10966 ENGINEER RICKY V. KEITH
1/27/2022

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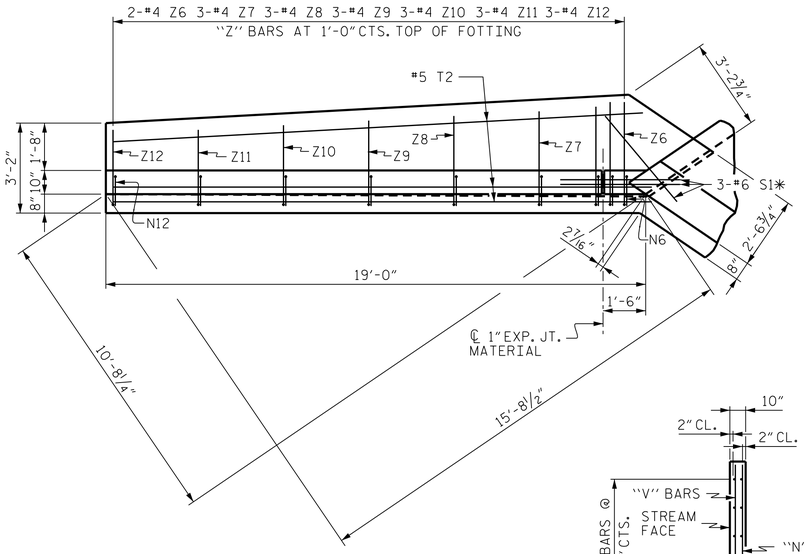
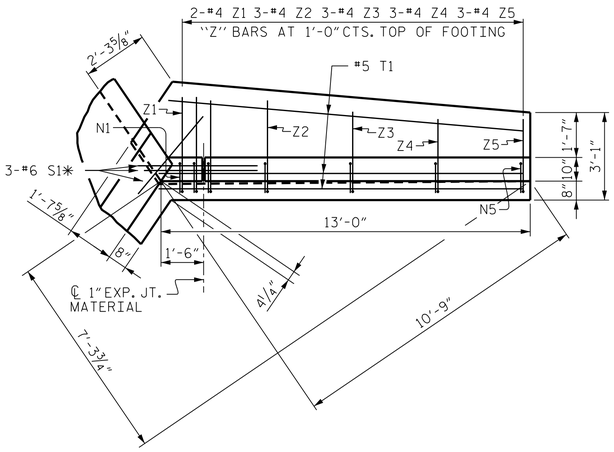
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_47-6
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : M. ZIEHL DATE : JAN 2022
DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JAN 2022

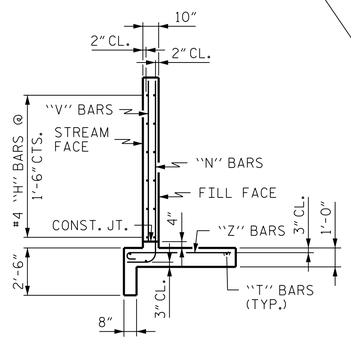
tboyd
1/27/2022 R:\Structures\Culvert\DGN\Culvert 47\Final\R2511_SMU_CU_47-6_060000.dgn



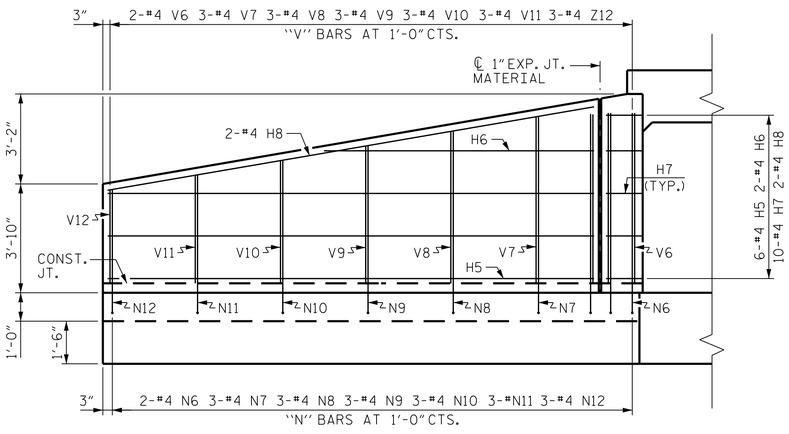
PLAN W1



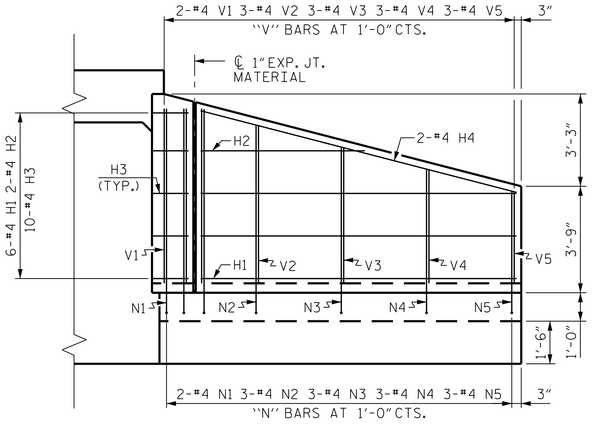
PLAN W2



TYPICAL WING SECTION

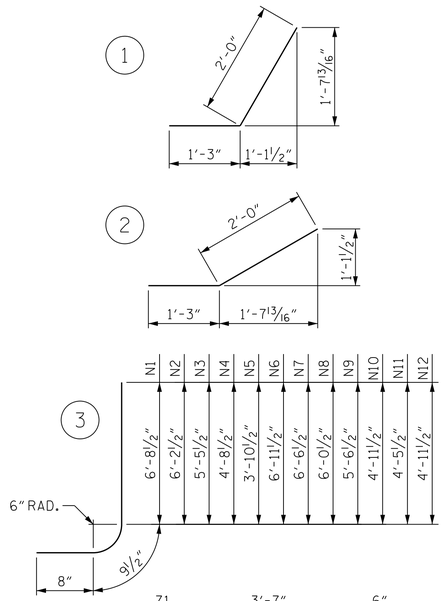


ELEVATION W1



ELEVATION W2

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

STAGE I CONSTRUCTION		
REINFORCING STEEL FOR 2 WINGS	711	LBS
CLASS A CONCRETE		
2 WINGS	5.4	CY
1 HEADWALL	0.5	CY
1 END CURTAIN WALL	1.5	CY
TOTAL	11.9	CY
STAGE II CONSTRUCTION		
REINFORCING STEEL FOR 2 WINGS	711	LBS
CLASS A CONCRETE		
2 WINGS	5.4	CY
1 HEADWALL	0.5	CY
1 END CURTAIN WALL	3.0	CY
TOTAL	11.9	CY

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR.	11'-1"	44
H2	2	#4	STR.	5'-9"	8
H3	10	#4	1	3'-3"	22
H4	2	#4	STR.	11'-5"	15
H5	6	#4	STR.	17'-1"	68
H6	2	#4	STR.	9'-6"	13
H7	10	#4	2	3'-3"	22
H8	2	#4	STR.	17'-4"	23
N1	2	#4	3	8'-2"	11
N2	3	#4	3	7'-8	15
N3	3	#4	3	6'-11"	14
N4	3	#4	3	6'-2"	12
N5	3	#4	3	5'-4"	11
N6	2	#4	3	8'-5"	11
N7	3	#4	3	8'-0"	16
N8	3	#4	3	7'-6"	15
N9	3	#4	3	7'-0"	14
N10	3	#4	3	6'-5"	13
N11	3	#4	3	5'-11"	12
N12	3	#4	3	5'-5"	11
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	12'-6"	39
T2	3	#5	STR	18'-8"	58
V1	2	#4	STR.	6'-1"	8
V2	3	#4	STR.	5'-7"	11
V3	3	#4	STR.	4'-10"	10
V4	3	#4	STR.	4'-1"	8
V5	3	#4	STR.	3'-3"	7
V6	2	#4	STR.	6'-4"	8
V7	3	#4	STR.	5'-11"	12
V8	3	#4	STR.	5'-5"	11
V9	3	#4	STR.	4'-11"	10
V10	3	#4	STR.	4'-4"	9
V11	3	#4	STR.	3'-10"	8
V12	3	#4	STR.	3'-4"	7
Z1	2	#4	4	4'-1"	5
Z2	3	#4	4	3'-10"	8
Z3	3	#4	4	3'-7"	7
Z4	3	#4	4	3'-4"	7
Z5	3	#4	4	3'-1"	6
Z6	2	#4	4	4'-1"	5
Z7	3	#4	4	3'-11"	8
Z8	3	#4	4	3'-10"	8
Z9	3	#4	4	3'-8"	7
Z10	3	#4	4	3'-6"	7
Z11	3	#4	4	3'-4"	7
Z12	3	#4	4	3'-2"	6

PROJECT NO. R-2511

BEAUFORT COUNTY

STATION: 69+25.50 -L-

SHEET 7 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR
CONCRETE BOX CULVERT
H = 6'-0" SLOPE : 3:1
111°30' 00" SKEW

CULVERT NO. 047

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NORTH CAROLINA PROFESSIONAL SEAL 10966 ENGINEER RICKY V. KEITH
Ricky Keith
DocuSigned by: 1/27/2022

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_47-7
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : M. ZIEHL DATE : JAN 2022
DESIGN ENGINEER OF RECORD : R. V. KEITH DATE : JAN 2022

tboyd
1/27/2022 R:\Structures\Culvert\DGN\Culvert 47\Final\R2511_SMU_CU_47-7_060000.dgn

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.

PROJECT NO. R-2511

BEAUFORT COUNTY

STATION: 69+25.50 -L-

SHEET 8 OF 8

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD NOTES

CULVERT NO. 047

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NORTH CAROLINA PROFESSIONAL SEAL 046053 ENGINEER MICHELE L. ZIEHL
Sealed by: Michele L. Ziehl
7/26/2021

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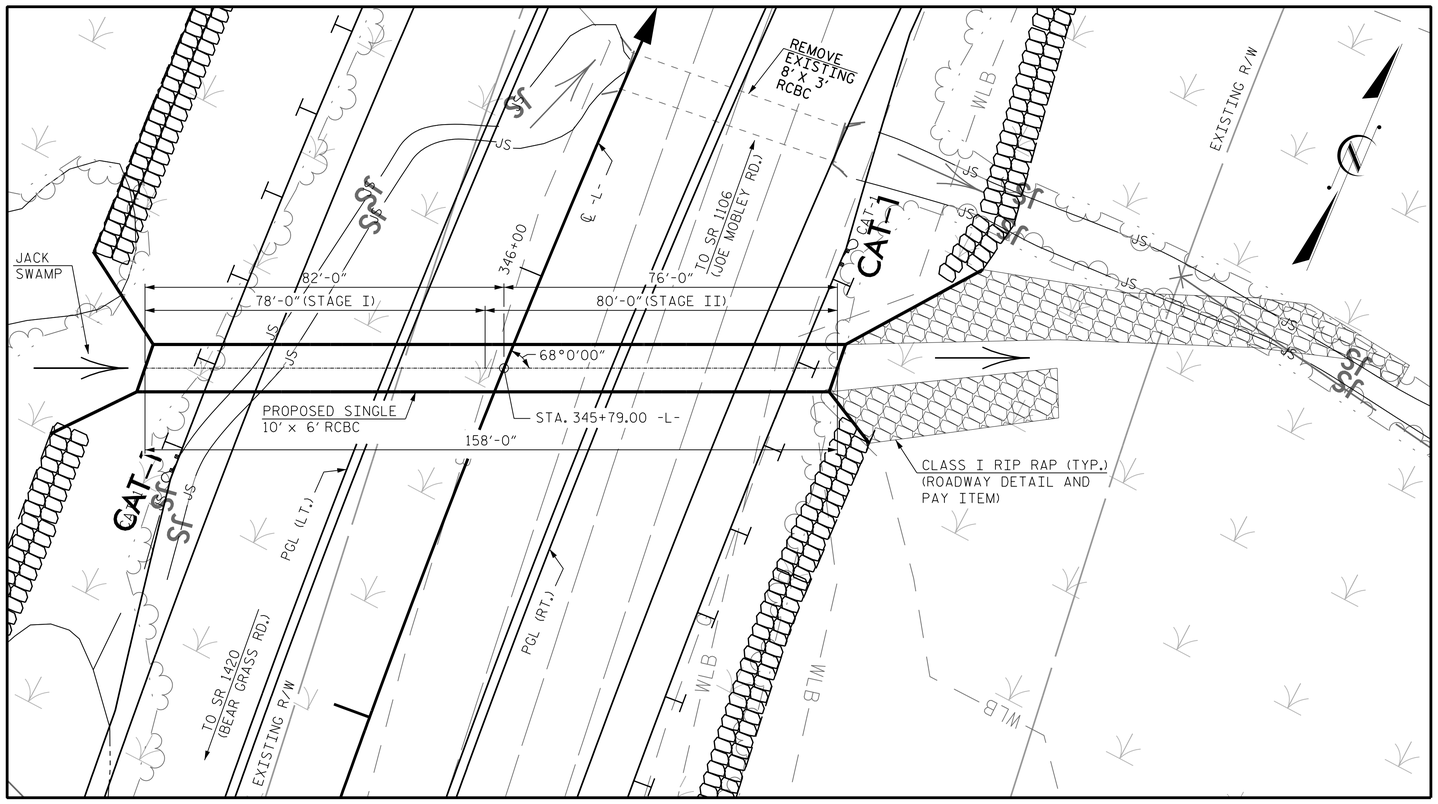
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_47-8
1			3			TOTAL SHEETS
2			4			8

DRAWN BY : B. H. GONFA DATE : JUN 2021
CHECKED BY : M. ZIEHL DATE : JUN 2021
DESIGN ENGINEER OF RECORD : M. ZIEHL DATE : JUN 2021

bgonfa
7/26/2021 R:\Structures\Culvert\DGN\Culvert 47\Final\R2511_SMU_CU_47-8_060000.dgn

BENCH MARK: BM #13 STA. 330+93.30 -L-, 74.4' LT, RR SPIKE SET IN PP, N 724268, E 2571063; EL. 53.04, NAVD 88



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS
GRADE POINT ELEVATION FOR CULVERT AT STA. 345+79.00 -L-
ARE 49.86' LT AND 49.97' RT
BED ELEVATION AT STA. 345+79.00 = 39.3'
ROADWAY SLOPES = 3:1

HYDRAULIC DATA

DESIGN DISCHARGE----------780 C.F.S.
FREQUENCY OF DESIGN FLOOD----------50 YR.
DESIGN HIGH WATER ELEVATION----------42.6
DRAINAGE AREA----------1.53 SQ. MI.
BASE DISCHARGE (Q100)----------950 C.F.S.
BASE HIGH WATER ELEVATION----------43.20

OVERTOPING FLOOD DATA

OVERTOPPING DISCHARGE----------2,200 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD----500 YR. +
OVERTOPPING FLOOD ELEVATION---------46.90

STAGE I STRUCTURE QUANTITIES

CLASS A CONCRETE

BARREL @	1.11	CY/FT	86.6	C.Y.
WING ETC.	12.7			C.Y.
SILLS	0.4			C.Y.
TOTAL	99.7			C.Y.

REINFORCING STEEL

BARREL	15,973	LBS.
WINGS ETC.	747	LBS.
TOTAL	16,720	LBS.

CULVERT EXCAVATION ---------- LUMP SUM
REMOVAL OF EXISTING STRUCTURE ------ LUMP SUM
FOUNDATION CONDITIONING MATERIAL----253 TONS

STAGE II STRUCTURE QUANTITIES

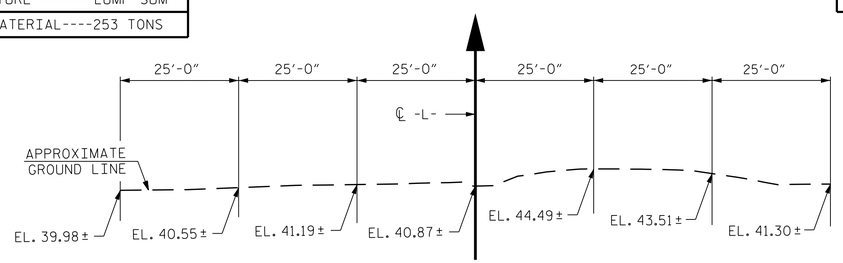
CLASS A CONCRETE

BARREL @	1.11	CY/FT	88.8	C.Y.
WING ETC.	12.7			C.Y.
SILLS	0.4			C.Y.
TOTAL	101.9			C.Y.

REINFORCING STEEL

BARREL	16,342	LBS.
WINGS ETC.	747	LBS.
TOTAL	17,089	LBS.

CULVERT EXCAVATION ---------- LUMP SUM
FOUNDATION CONDITIONING MATERIAL----260 TONS



PROFILE ALONG ℄ CULVERT

NOTES:

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

DESIGN FILL---------- 5.7 FT. (MAX.), 1.2 FT. (MIN.)

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

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.

CONCRETE IN STAGE I CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. STAGE I WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE I VERTICAL WALLS.
2. THE REMAINING PORTIONS OF STAGE I WALLS TO THE PERMITTED CONSTRUCTION JOINT AND STAGE I WINGS FOR FULL HEIGHT.
3. STAGE I ROOF SLAB, HEADWALL, AND SILL.

CONCRETE IN STAGE II CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. STAGE II WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE II VERTICAL WALLS.
2. THE REMAINING PORTION OF STAGE II WALLS TO THE PERMITTED CONSTRUCTION JOINT AND STAGE II WINGS FOR FULL HEIGHT.
3. STAGE II ROOF SLAB, HEADWALL, AND SILL.

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

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

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

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

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

THE EXISTING STRUCTURE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COSTS INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NO PRECAST BOX CULVERT OPTION WILL BE ALLOWED.

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

EXCAVATE 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL (SELECT MATERIAL, CLASS VI). UNDERCUT AN ADDITIONAL 2 FEET AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL.

GEOTEXTILE FOR SOIL STABALIZATION IS REQUIRED BELOW THE FOUNDATION CONDITIONING MATERIAL. UNDERCUT ANY SOFT/LOOSE ALLUVIAL SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREA WITH FOUNDATION CONDITIONING MATERIAL.

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

THE EXISTING STRUCTURE CONSISTING OF SINGLE BARREL 8 FT X 3 FT RCBC WITH CONCRETE ENDWALLS LOCATED AT THE PROPOSED CULVERT SITE SHALL BE REMOVED.

PROJECT NO. R-2511
MARTIN COUNTY
STATION: 345+79.00 -L-

SHEET 1 OF 7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : K. HAWKINS DATE : JAN 2022
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JAN 2022

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NORTH CAROLINA PROFESSIONAL SEAL 052784 ENGINEER KELLY HAWKINS
1/27/2022

CULVERT NO. 048

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 10 FT. X 6 FT.
CONCRETE BOX CULVERT
68°00' 00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU-48-1
1			3			TOTAL SHEETS
2			4			7

tboyd
1/27/2022 R:\Structures\Culvert\DGN\Culvert 48\Final\R2511_SMU_CU_48-1_060000.dgn

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
								MOMENT				SHEAR				
							LIVE-LOAD FACTORS (γL)	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⟩	1.24	--	1.75	1.3	1	BOTTOM SLAB	5.0	1.24	1	TOP SLAB	0.1	
		HL-93 (OPERATING)	N/A		1.6	--	1.35	1.69	1	BOTTOM SLAB	5.0	1.6	1	TOP SLAB	0.1	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.32	47.52	1.75	1.32	1	TOP SLAB	5.0	1.55	1	TOP SLAB	0.1	
		HS-20 (OPERATING)	36.000		1.71	61.56	1.35	1.71	1	TOP SLAB	5.0	2.01	1	TOP SLAB	0.1	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.45	46.58	1.40	3.45	1	TOP SLAB	5.0	5.12	1	TOP SLAB	0.1	
		SNGARBS2	20.000		3.23	64.60	1.40	3.23	1	TOP SLAB	5.0	4.69	1	TOP SLAB	0.1	
		SNAGRIS2	22.000		3.45	75.90	1.40	3.45	1	TOP SLAB	5.0	5.12	1	TOP SLAB	0.1	
		SNCOTTS3	27.250		2.34	63.77	1.40	2.34	1	BOTTOM SLAB	5.0	2.43	1	TOP SLAB	0.1	
		SNAGGRS4	34.925	⟨3⟩	2.25	78.58	1.40	2.25	1	BOTTOM SLAB	5.0	2.59	1	BOTTOM SLAB	0.1	
		SNS5A	35.550		2.37	84.25	1.40	2.37	1	BOTTOM SLAB	5.0	2.82	1	BOTTOM SLAB	0.1	
		SNS6A	39.950		2.37	94.68	1.40	2.37	1	BOTTOM SLAB	5.0	2.81	1	BOTTOM SLAB	0.1	
		SNS7B	42.000		2.37	99.54	1.40	2.37	1	BOTTOM SLAB	5.0	2.81	1	BOTTOM SLAB	0.1	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.9	95.70	1.40	2.9	1	BOTTOM SLAB	5.0	3.36	1	BOTTOM SLAB	0.1	
		TNT4A	33.075		2.79	92.28	1.40	2.79	1	BOTTOM SLAB	5.0	3.12	1	TOP SLAB	0.1	
		TNT6A	41.600		2.38	99.01	1.40	2.38	1	BOTTOM SLAB	5.0	2.84	1	BOTTOM SLAB	0.1	
		TNT7A	42.000		2.58	108.36	1.40	2.58	1	BOTTOM SLAB	5.0	3.08	1	TOP SLAB	0.1	
		TNT7B	42.000		2.37	99.54	1.40	2.37	1	BOTTOM SLAB	5.0	2.82	1	BOTTOM SLAB	0.1	
		TNAGRIT4	43.000		2.79	119.97	1.40	2.79	1	BOTTOM SLAB	5.0	3.1	1	TOP SLAB	0.1	
		TNAGT5A	45.000		2.79	125.55	1.40	2.79	1	BOTTOM SLAB	5.0	3.13	1	TOP SLAB	0.1	
		TNAGT5B	45.000		2.79	125.55	1.40	2.79	1	BOTTOM SLAB	5.0	3.11	1	TOP SLAB	0.1	

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. CULVERT RATING AT 345+79.00 -L-
2.
3.
4.

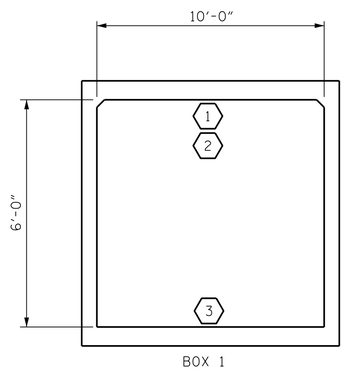
⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



BOX 1

LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 345+79.00 -L-

SHEET 2 OF 7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : K. HAWKINS DATE : JAN 2022
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JAN 2022

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CULVERT NO. 048

NORTH CAROLINA PROFESSIONAL SEAL 052784 ENGINEER KELLY HAWKINS

1/27/2022

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_48-2
1			3			TOTAL SHEETS
2			4			7

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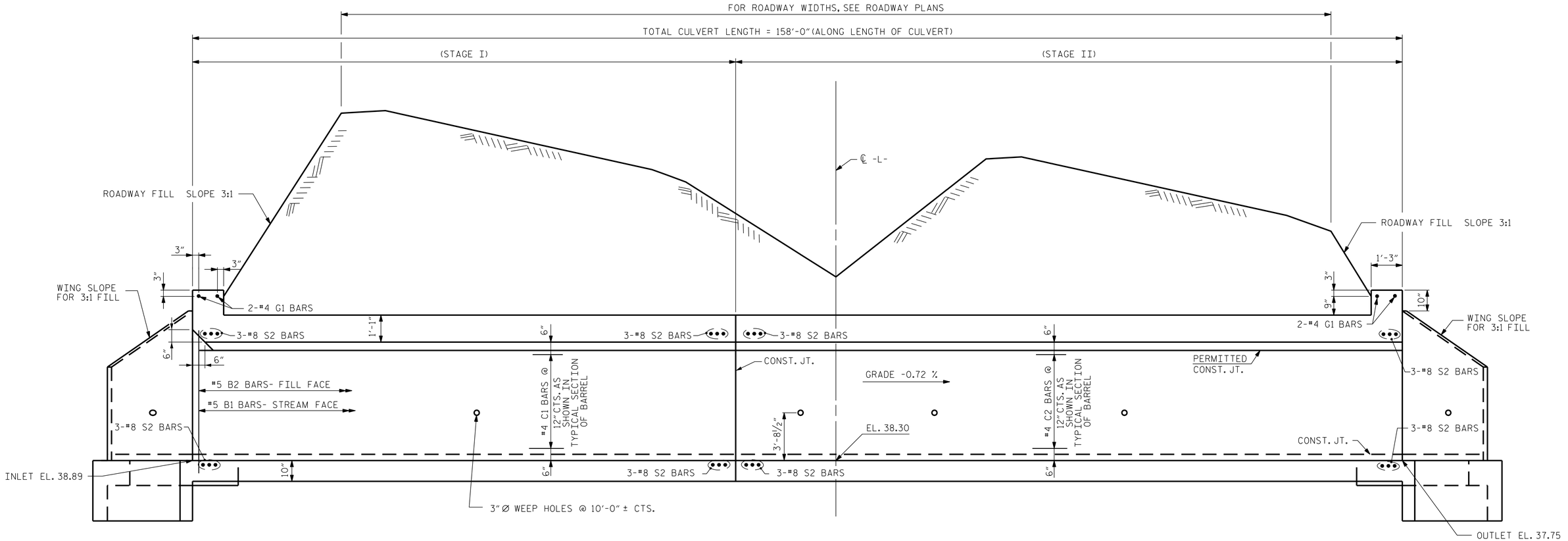
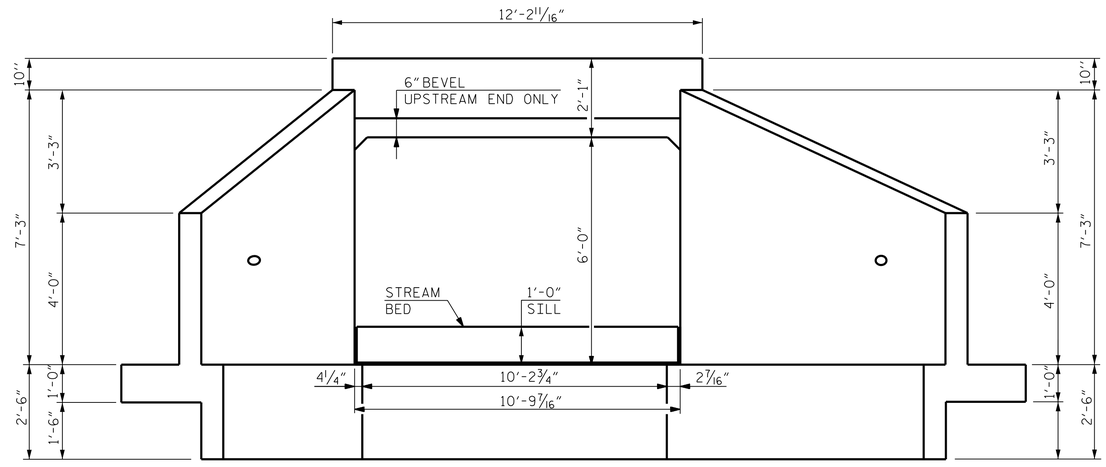


CULVERT SECTION NORMAL TO ROADWAY

(FOR SILL LOCATION, SEE SHEET 6 OF 8)



END ELEVATION NORMAL TO SKEW

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 345+79.00 -L-

SHEET 3 OF 7

CULVERT NO. 048

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 10 FT. X 6 FT.
CONCRETE BOX CULVERT
68°00' 00" SKEW

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NORTH CAROLINA PROFESSIONAL SEAL 052784 ENGINEER KELLY HAWKINS
DocuSigned by: Kelly Hawkins
1/27/2022

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_48-3
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : K. HAWKINS DATE : JAN 2022
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JAN 2022

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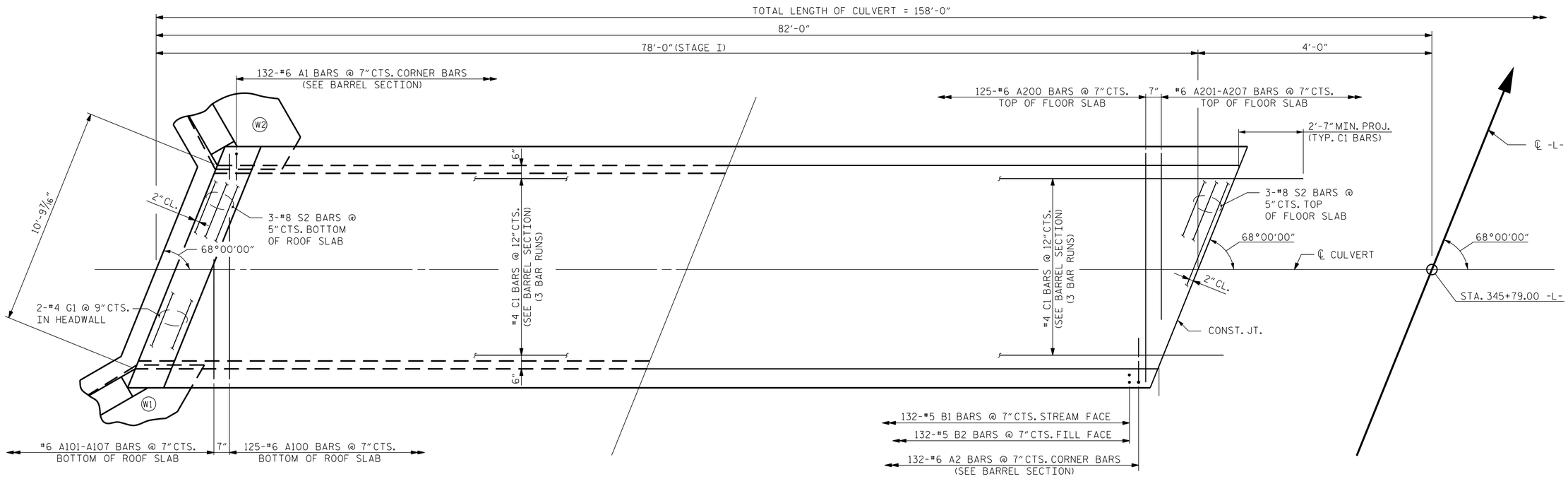

PART PLAN ROOF SLAB

PART PLAN FLOOR SLAB

STAGE I

NOTE:
3-#8 S2 BARS AT 5" CTS. BOTTOM ROOF SLAB AT CONST. JT., SEE CU_48_3 CULVERT SECTION NORMAL TO ROADWAY.

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 345+79.00 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 10 FT. X 6 FT.
CONCRETE BOX CULVERT
STAGE I
68°00' 00" SKEW

CULVERT NO. 048

NORTH CAROLINA PROFESSIONAL SEAL 052784 ENGINEER KEVIN HAWKINS
1/27/2022

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1			3			TOTAL SHEETS
2			4			7

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CHECKED BY : K. HAWKINS DATE : JAN 2022
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JAN 2022

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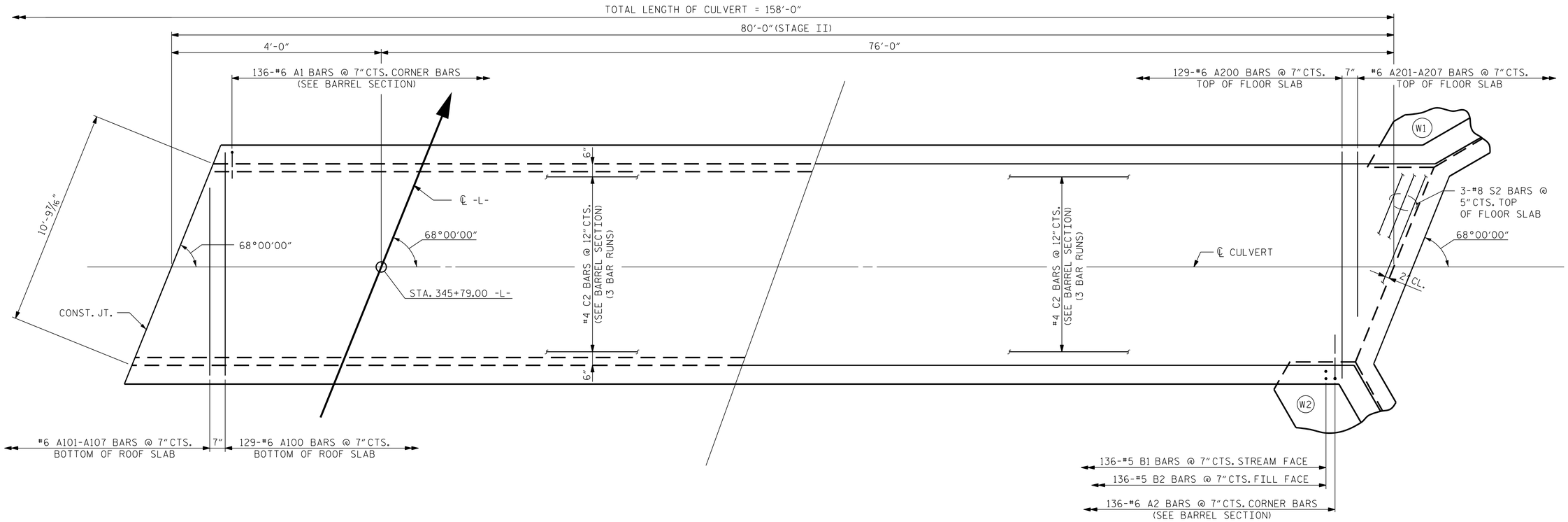

PART PLAN ROOF SLAB

PART PLAN FLOOR SLAB

STAGE II

NOTE:
3-#8 S2 BARS AT 5" CTS. BOTTOM ROOF SLAB AT CONST. JT., SEE CU_48_3 CULVERT SECTION NORMAL TO ROADWAY.

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 345+79.00 -L-

SHEET 5 OF 7

CULVERT NO. 048

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 10 FT. X 6 FT. CONCRETE BOX CULVERT STAGE II 68°00' 00" SKEW

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			7

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CHECKED BY : K. HAWKINS DATE : JAN 2022
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JAN 2022

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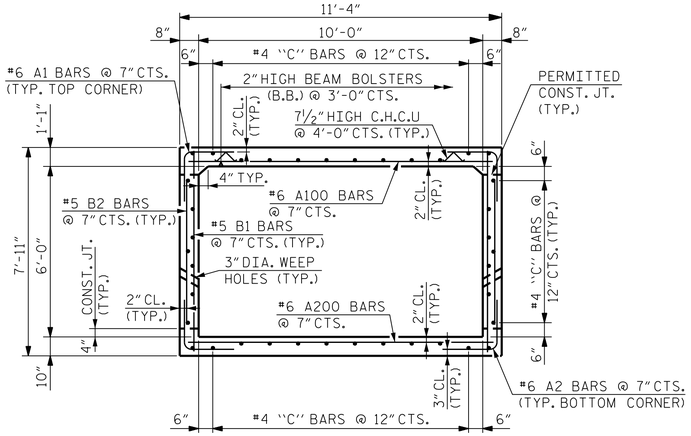
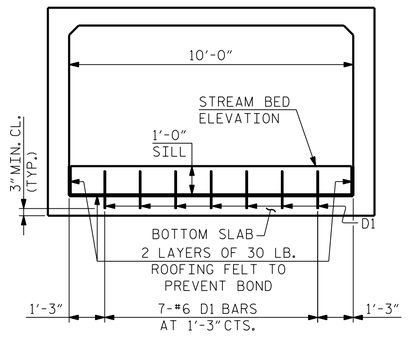
1/27/2022 R:\Structures\Culvert\DGN\Culvert 48\Final\R2511_SMU_CU_48-5_060000.dgn



RIGHT ANGLE SECTION OF BARREL

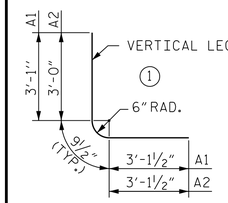
(THERE ARE 38 "C" BARS IN SECTION OF BARREL)



SILL ELEVATION

DOWEL SPACING SHOWN PERPENDICULAR TO CULVERT BARREL

BAR TYPE



DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS		
BAR	SIZE	SPLICE LENGTHS
B1	#5	2'-4"
B2	#5	2'-4"
C1	#4	2'-5"
C2	#4	2'-5"

BILL OF MATERIAL (STAGE I)

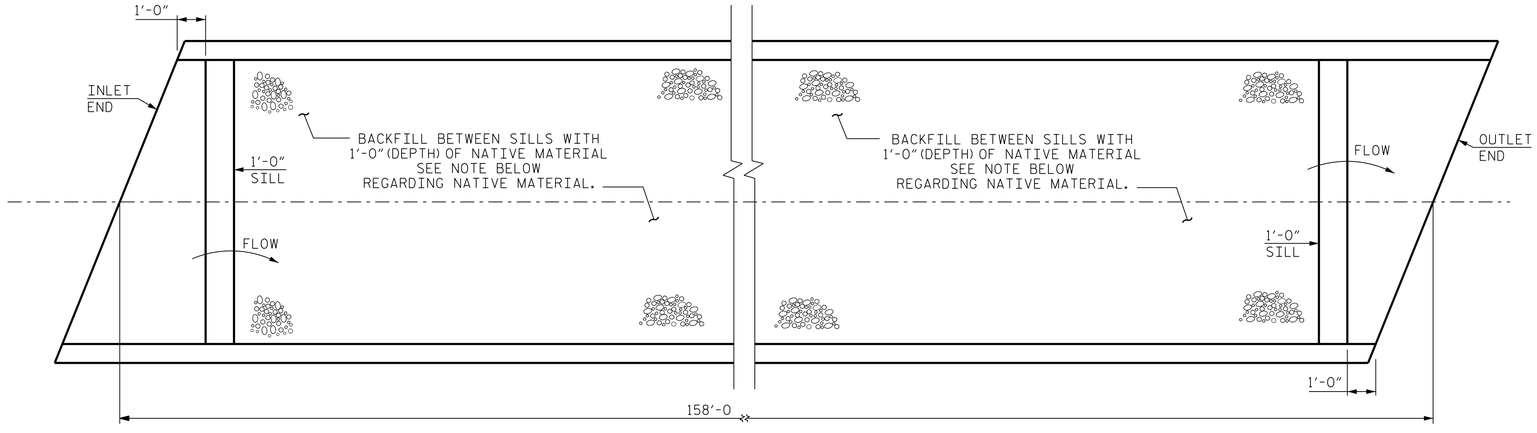
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	264	#6	1	7'-0"	2,776
A2	264	#6	1	6'-11"	2,743
A100	125	#6	STR.	11'-0"	2,065
A101	2	#6	STR.	10'-7"	32
A102	2	#6	STR.	9'-2"	27
A103	2	#6	STR.	7'-8"	23
A104	2	#6	STR.	6'-3"	19
A105	2	#6	STR.	4'-10"	14
A106	2	#6	STR.	3'-4"	10
A107	2	#6	STR.	1'-11"	6
A200	125	#6	STR.	11'-0"	2,065
A201	2	#6	STR.	10'-7"	32
A202	2	#6	STR.	9'-2"	27
A203	2	#6	STR.	7'-8"	23
A204	2	#6	STR.	6'-3"	19
A205	2	#6	STR.	4'-10"	14
A206	2	#6	STR.	3'-4"	10
A207	2	#6	STR.	1'-11"	6
B1	264	#5	STR.	7'-6"	2,065
B2	264	#5	STR.	5'-2"	1,423
C1	114	#4	STR.	28'-5"	2,164
D1	7	#6	STR.	1'-5"	15
G1	2	#4	STR.	11'-10"	16
S2	12	#8	STR.	11'-10"	379

REINFORCING STEEL 15,973 LBS.

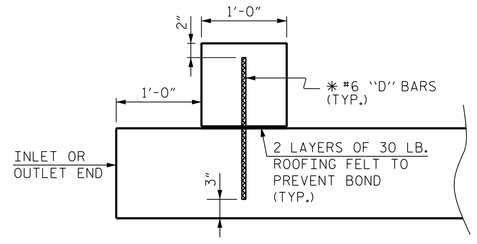
BILL OF MATERIAL (STAGE II)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	272	#6	1	7'-0"	2,860
A2	272	#6	1	6'-11"	2,826
A100	129	#6	STR.	11'-0"	2,131
A101	2	#6	STR.	10'-2"	31
A102	2	#6	STR.	8'-9"	26
A103	2	#6	STR.	7'-3"	22
A104	2	#6	STR.	5'-10"	17
A105	2	#6	STR.	4'-5"	13
A106	2	#6	STR.	2'-11"	9
A107	2	#6	STR.	1'-6"	4
A200	129	#6	STR.	11'-0"	2,131
A201	2	#6	STR.	10'-2"	31
A202	2	#6	STR.	8'-9"	26
A203	2	#6	STR.	7'-3"	22
A204	2	#6	STR.	5'-10"	17
A205	2	#6	STR.	4'-5"	13
A206	2	#6	STR.	2'-11"	9
A207	2	#6	STR.	1'-6"	4
B1	272	#5	STR.	7'-6"	2,128
B2	272	#5	STR.	5'-2"	1,466
C2	114	#4	STR.	28'-2"	2,145
D1	7	#6	STR.	1'-5"	15
G1	2	#4	STR.	11'-10"	16
S2	12	#8	STR.	11'-10"	380

REINFORCING STEEL 16,342 LBS.



SILL PLAN



SECTION THROUGH SILL

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

NOTE:
NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAMBED MAY BE USED TO LINE THE BOTTOM OF THE CULVERT BARREL.

NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

PROJECT NO. R-2511
MARTIN COUNTY
STATION: 345+79.00 -L-

SHEET 6 OF 7

CULVERT NO. 048

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NORTH CAROLINA PROFESSIONAL SEAL 052784 ENGINEER KELLY HAWKINS
DocuSigned by: Kelly Hawkins
1/27/2022

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 10 FT. X 6 FT. CONCRETE BOX CULVERT 68°00' 00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_48-6
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : K. HAWKINS DATE : JAN 2022
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JAN 2022

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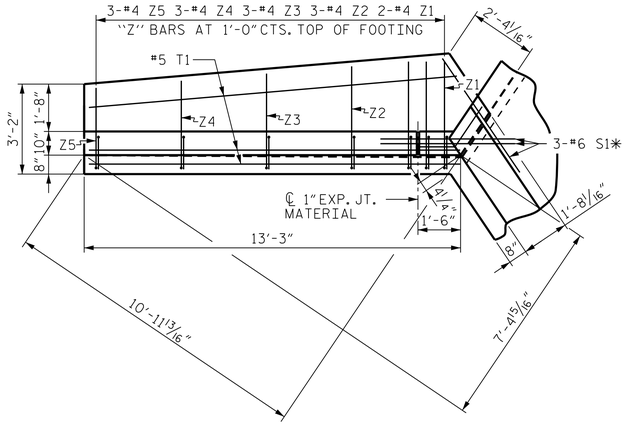
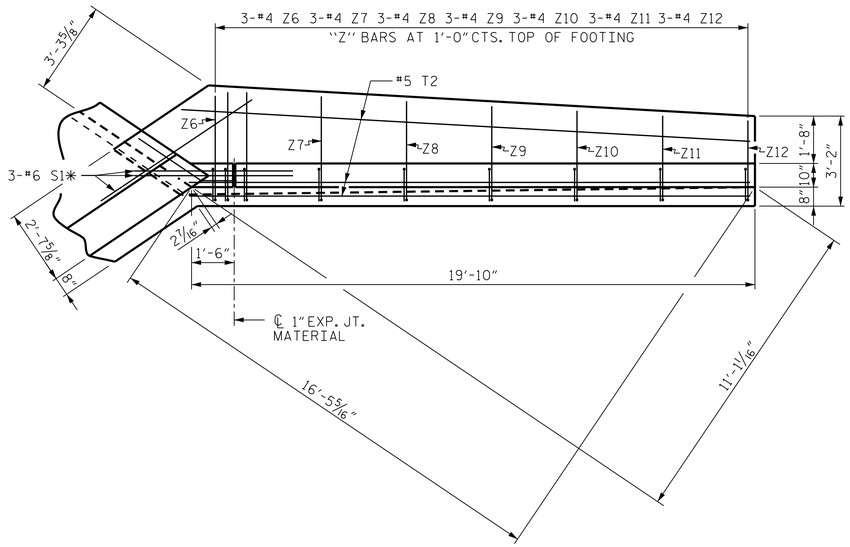


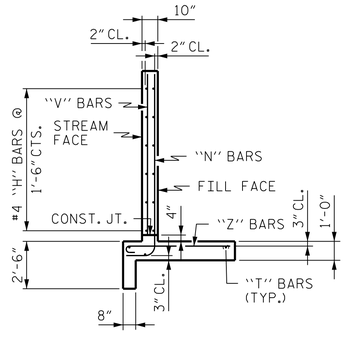
PLAN W1



PLAN W2

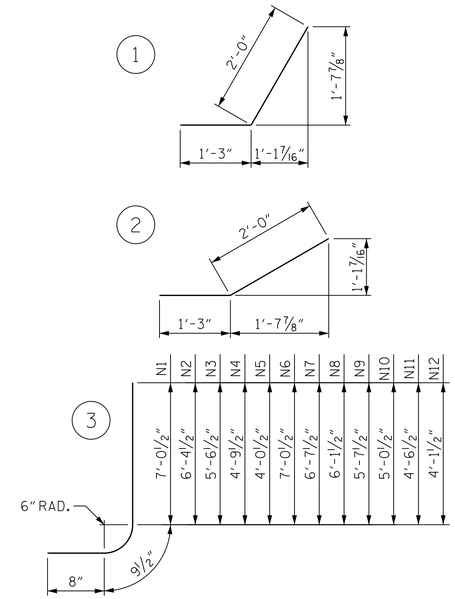
ELEVATION W1

ELEVATION W2



TYPICAL WING SECTION

BAR TYPES



Z1	3'-10" 6"
Z2	3'-7" 6"
Z3	3'-4" 6"
Z4	3'-1" 6"
Z5	2'-10" 6"
Z6	3'-10" 6"
Z7	3'-8" 6"
Z8	3'-6" 6"
Z9	3'-4" 6"
Z10	3'-2" 6"
Z11	3'-0" 6"
Z12	2'-10" 6"

HK.

4

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	11'-4"	91
H2	4	#4	STR	6'-10"	18
H3	20	#4	1	3'-3"	43
H4	4	#4	STR	11'-8"	31
H5	12	#4	STR	17'-10"	143
H6	4	#4	STR	11'-2"	30
H7	20	#4	2	3'-3"	44
H8	4	#4	STR	18'-1"	48
N1	4	#4	3	8'-6"	23
N2	6	#4	3	7'-10"	31
N3	6	#4	3	7'-0"	28
N4	6	#4	3	6'-3"	25
N5	6	#4	3	5'-6"	22
N6	6	#4	3	8'-6"	34
N7	6	#4	3	8'-1"	32
N8	6	#4	3	7'-7"	30
N9	6	#4	3	7'-1"	28
N10	6	#4	3	6'-6"	26
N11	6	#4	3	6'-0"	24
N12	6	#4	3	5'-7"	22
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	13'-0"	81
T2	6	#5	STR	19'-9"	124
V1	4	#4	STR	6'-6"	17
V2	6	#4	STR	5'-10"	23
V3	6	#4	STR	5'-1"	20
V4	6	#4	STR	4'-4"	17
V5	6	#4	STR	3'-6"	14
V6	6	#4	STR	6'-6"	26
V7	6	#4	STR	6'-1"	24
V8	6	#4	STR	5'-7"	22
V9	6	#4	STR	5'-0"	20
V10	6	#4	STR	4'-6"	18
V11	6	#4	STR	4'-0"	16
V12	6	#4	STR	3'-6"	14
Z1	4	#4	4	4'-4"	12
Z2	6	#4	4	4'-1"	16
Z3	6	#4	4	3'-10"	15
Z4	6	#4	4	3'-7"	14
Z5	6	#4	4	3'-4"	13
Z6	6	#4	4	4'-3"	17
Z7	6	#4	4	4'-2"	17
Z8	6	#4	4	4'-0"	16
Z9	6	#4	4	3'-10"	15
Z10	6	#4	4	3'-8"	15
Z11	6	#4	4	3'-6"	14
Z12	6	#4	4	3'-4"	13

REINFORCING STEEL FOR 4 WINGS 1,494 LBS

CLASS A CONCRETE

4 WINGS	23.0	CY
2 HEADWALLS	1.1	CY
2 END CURTAIN WALLS	1.3	CY
TOTAL	25.4	CY

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 345+79.00 -L-

SHEET 7 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR
CONCRETE BOX CULVERT
H = 6'-0" SLOPE : 3:1
68°00' 00" SKEW

CULVERT NO. 048

NORTH CAROLINA PROFESSIONAL SEAL 052784 ENGINEER KELLY HAWKINS
DocuSigned by: Kelly Hawkins
1/27/2022

RK&K
P: (919) 878-9560
8601 Six Forks Road, Forum 1 Suite 700
Raleigh, North Carolina 27615 | NC License No. F-0112
Engineers | Construction Managers | Planners | Scientists
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_48-7
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : K. HAWKINS DATE : JAN 2022
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : JAN 2022

tboyd
1/27/2022 R:\Structures\Culvert\DGN\Culvert 48\Final\R2511_SMU_CU_48-7_060000.dgn

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.

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 345+79.00 -L-

SHEET 8 OF 8

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD NOTES

CULVERT NO. 048

RK&K
P: (919) 878-9560
8601 Six Forks Road, Forum 1 Suite 700
Raleigh, North Carolina 27615 | NC License No. F-0112
Engineers | Construction Managers | Planners | Scientists
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NORTH CAROLINA PROFESSIONAL SEAL 48850 ENGINEER JINDONG J. PAITE
Docusigned by: Jindong Paite
8/9/2021

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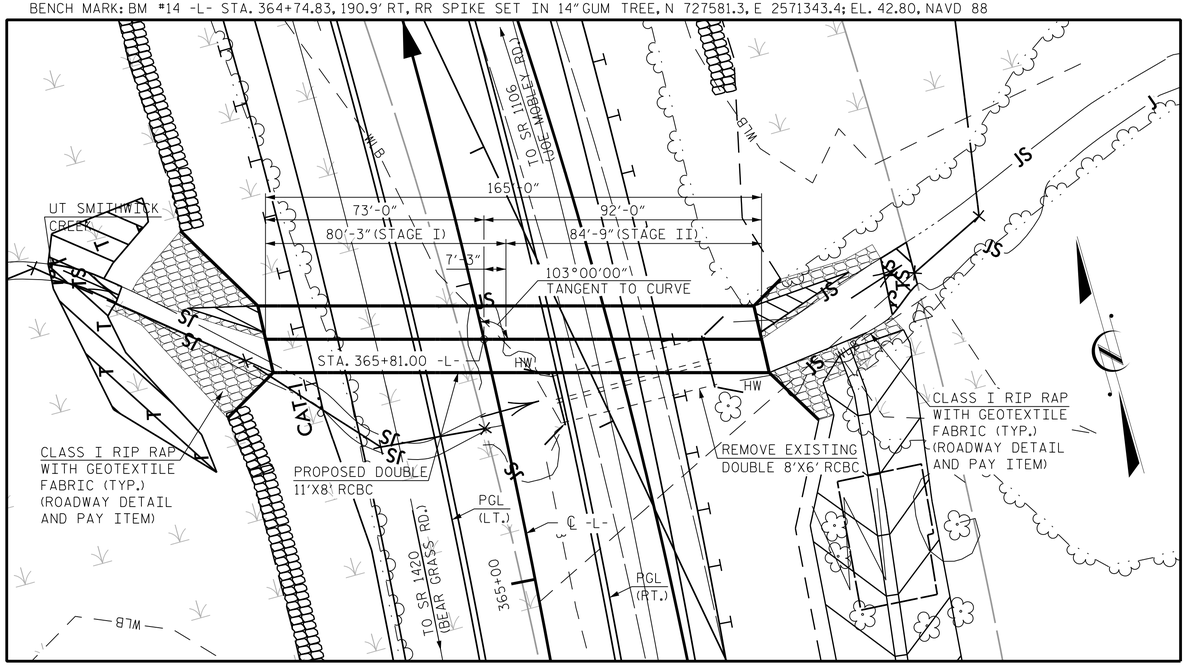
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_48-8
1			3			TOTAL SHEETS
2			4			8

DRAWN BY : B. H. GONFA DATE : AUG 2021
CHECKED BY : K. HAWKINS DATE : AUG 2021
DESIGN ENGINEER OF RECORD : K. HAWKINS DATE : AUG 2021

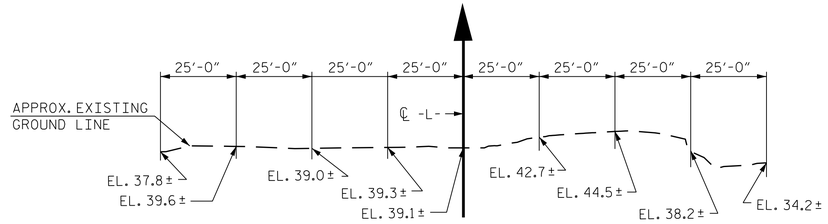
bgonfa
8/9/2021
R:\Structures\Culvert\DGN\Culvert 48\Final\R2511_SMU_CU_48-8_060000.dgn

BENCH MARK: BM #14 -L- STA. 364+74.83, 190.9' RT, RR SPIKE SET IN 14" GUM TREE, N 727581.3, E 2571343.4; EL. 42.80, NAVD 88



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS
GRADE POINT ELEVATIONS AT STA. 365+81.00 -L- ARE 51.0 (LT.) & 50.9 (RT.)
BED ELEVATION AT STA. 365+81.00 -L- = 34.9
ROADWAY SLOPES = 3:1



PROFILE ALONG ℄ CULVERT

STAGE I STRUCTURE QUANTITIES

CLASS A CONCRETE				
BARREL @	2.82	CY/FT	226.5	C.Y.
WING ETC.	19.8			C.Y.
SILLS/BAFFLES	4.9			C.Y.
TOTAL	251.2			C.Y.
REINFORCING STEEL				
BARREL	27,900			LBS.
WINGS ETC.	1,169			LBS.
TOTAL	29,069			LBS.
CULVERT EXCAVATION ---------- LUMP SUM				
REMOVAL OF EXISTING STRUCTURE ------ LUMP SUM				
FOUNDATION CONDITIONING MATERIAL----158 TONS				

STAGE II STRUCTURE QUANTITIES

CLASS A CONCRETE				
BARREL @	2.82	CY/FT	239.3	C.Y.
WING ETC.	19.8			C.Y.
SILLS/BAFFLES	4.9			C.Y.
TOTAL	264.0			C.Y.
REINFORCING STEEL				
BARREL	29,222			LBS.
WINGS ETC.	1,169			LBS.
TOTAL	30,391			LBS.
CULVERT EXCAVATION ---------- LUMP SUM				
FOUNDATION CONDITIONING MATERIAL----167 TONS				

NOTES:

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

DESIGN FILL---------- 11.1 FT. (MAX.), 5.2 FT. (MIN.)

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

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.

CONCRETE IN STAGE I CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. STAGE I WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE I VERTICAL WALLS.
2. THE REMAINING PORTIONS OF STAGE I WALLS TO THE PERMITTED CONSTRUCTION JOINT AND STAGE I WINGS FOR FULL HEIGHT.
3. STAGE I ROOF SLAB, HEADWALL, AND SILLS/BAFFLES.

CONCRETE IN STAGE II CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. STAGE II WING FOOTINGS, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF STAGE II VERTICAL WALLS.
2. THE REMAINING PORTION OF STAGE II WALLS TO THE PERMITTED CONSTRUCTION JOINT AND STAGE II WINGS FOR FULL HEIGHT.
3. STAGE II ROOF SLAB, HEADWALL, AND SILLS/BAFFLES.

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

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

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

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

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

THE EXISTING STRUCTURE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COSTS INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING STRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NO PRECAST BOX CULVERT OPTION WILL BE ALLOWED.

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

EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS (SELECT MATERIAL, CLASS VI).

GEOTEXTILE FOR SOIL STABLIZATION IS REQUIRED BELOW THE FOUNDATION CONDITIONING MATERIAL. UNDERCUT ANY SOFT/LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL.

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

TRAFFIC SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN STAGES. SEE TRANSPORTATION MANAGEMENT PLANS.

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

THE EXISTING STRUCTURE CONSISTING OF DOUBLE BARREL 8 FT X 6 FT RCBC WITH CONCRETE ENDWALLS LOCATED AT THE PROPOSED CULVERT SITE SHALL BE REMOVED.

HYDRAULIC DATA

DESIGN DISCHARGE----------780 C.F.S.
FREQUENCY OF DESIGN FLOOD----------50 YR.
DESIGN HIGH WATER ELEVATION---------42.6
DRAINAGE AREA----------3.18 SQ. MI.
BASE DISCHARGE (Q100)----------950 C.F.S.
BASE HIGH WATER ELEVATION----------43.2

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE----------2,200 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD-----500 YR. +
OVERTOPPING FLOOD ELEVATION---------46.9

PROJECT NO. R-2511
MARTIN COUNTY
STATION: 365+81.00 -L-

SHEET 1 OF 9

CULVERT NO. 049

NORTH CAROLINA PROFESSIONAL SEAL 31579 ENGINEER AARON LEE STROUD
1/27/2022

RK&K
P: (919) 878-9560
8601 Six Forks Road, Forum 1 Suite 700
Raleigh, North Carolina 27615 | NC License No. F-0112
Engineers | Construction Managers | Planners | Scientists
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 11 FT. X 8 FT.
CONCRETE BOX CULVERT
103°00' 00" SKEW

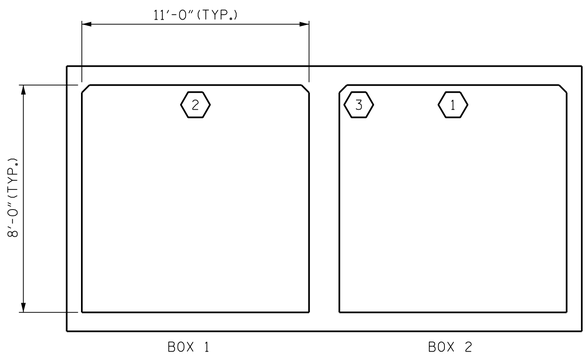
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_49-1
1			3			TOTAL SHEETS
2			4			9

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : A. L. STROUD DATE : JAN 2022
DESIGN ENGINEER OF RECORD : A. L. STROUD DATE : JAN 2022

tboyd
1/27/2022 R:\Structures\Culvert\DGN\Culvert 49\Final\R2511_SMU_CU_49-1_060000.dgn

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
								MOMENT				SHEAR				
							LIVE-LOAD FACTORS $\gamma_{(LL)}$	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	1.41	--	1.75	1.41	2	TOP SLAB	5.5	1.41	2	TOP SLAB	5.5	
		HL-93 (OPERATING)	N/A		1.83	--	1.35	1.83	2	TOP SLAB	5.5	1.83	2	TOP SLAB	0.1	
		HS-20 (INVENTORY)	36.000	2	1.79	64.44	1.75	1.79	1	TOP SLAB	5.5	1.89	2	TOP SLAB	0.1	
		HS-20 (OPERATING)	36.000		2.32	83.52	1.35	2.32	1	TOP SLAB	5.5	2.45	2	TOP SLAB	0.1	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.70	63.45	1.40	4.70	1	TOP SLAB	5.5	5.09	2	TOP SLAB	0.1	
		SNGARBS2	20.000		4.40	88.00	1.40	4.40	1	TOP SLAB	5.5	4.68	2	TOP SLAB	0.1	
		SNAGRIS2	22.000		4.70	103.40	1.40	4.70	1	TOP SLAB	5.5	4.93	2	TOP SLAB	0.1	
		SNCOTTS3	27.250		2.50	68.13	1.40	2.55	1	TOP SLAB	5.5	2.50	2	TOP SLAB	0.1	
		SNAGGRS4	34.925		2.52	88.01	1.40	3.00	2	BOTTOM SLAB	0.1	2.52	2	TOP SLAB	0.1	
		SNS5A	35.550		2.43	86.39	1.40	2.90	1	TOP SLAB	5.5	2.43	2	TOP SLAB	0.1	
		SNS6A	39.950		2.41	96.28	1.40	2.77	2	BOTTOM SLAB	0.1	2.41	2	TOP SLAB	0.1	
		SNS7B	42.000		2.34	98.28	1.40	2.70	2	BOTTOM SLAB	0.1	2.34	2	TOP SLAB	0.1	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		3.45	113.85	1.40	3.52	1	BOTTOM SLAB	11	3.45	2	TOP SLAB	0.1	
		TNT4A	33.075		2.88	95.26	1.40	3.03	2	TOP SLAB	5.5	2.88	2	TOP SLAB	0.1	
		TNT6A	41.600		2.58	107.33	1.40	2.96	2	TOP SLAB	5.5	2.58	2	TOP SLAB	0.1	
		TNT7A	42.000		2.72	114.24	1.40	2.93	2	BOTTOM SLAB	0.1	2.72	2	TOP SLAB	0.1	
		TNT7B	42.000		2.57	107.94	1.40	2.96	1	TOP SLAB	5.5	2.57	2	TOP SLAB	0.1	
		TNAGRIT4	43.000		2.78	119.54	1.40	2.81	2	BOTTOM SLAB	0.1	2.78	2	TOP SLAB	0.1	
		TNAGT5A	45.000		2.76	124.20	1.40	2.86	1	BOTTOM SLAB	11	2.76	2	TOP SLAB	0.1	
		TNAGT5B	45.000	3	2.54	114.30	1.40	2.54	2	BOTTOM SLAB	0.1	2.70	2	TOP SLAB	0.1	



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. CULVERT RATING AT -L- 365+81.00
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

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 365+81.00 -L-

SHEET 2 OF 9

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : A. L. STROUD DATE : JAN 2022
DESIGN ENGINEER OF RECORD : A. L. STROUD DATE : JAN 2022

RK&K
P: (919) 878-9560
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NORTH CAROLINA PROFESSIONAL SEAL 31579 ENGINEER AARON LEE STROUD
DocuSigned by: Aaron Lee Stroud
1/27/2022

CULVERT NO. 049

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_49-2
1			3			TOTAL SHEETS
2			4			9

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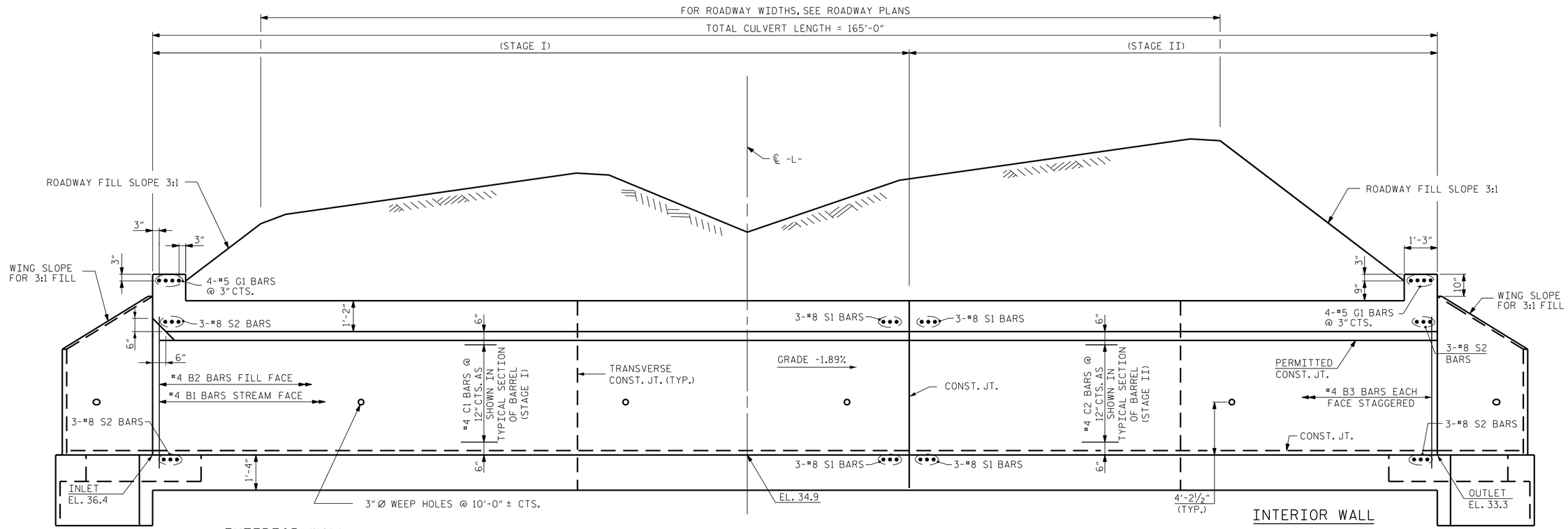
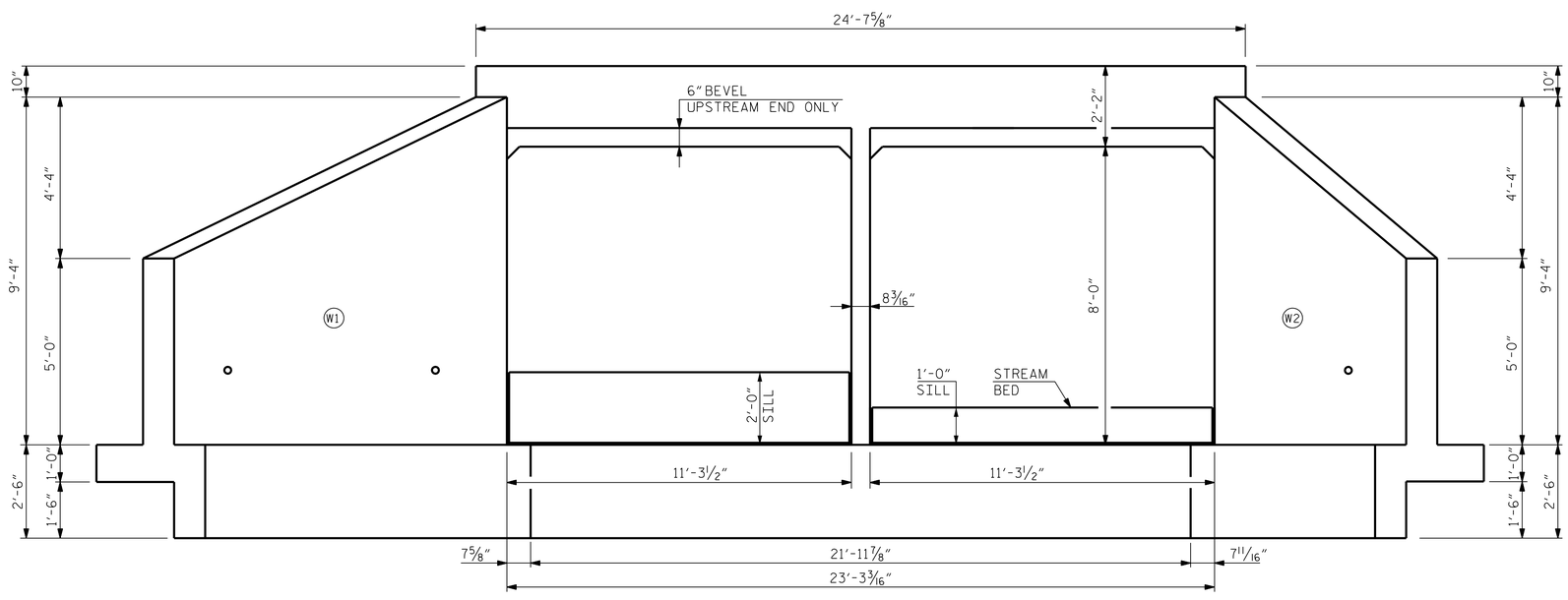
1/27/2022 R:\Structures\Culvert\DGN\Culvert 49\Final\R2511_SMU_CU_49-2_060000.dgn

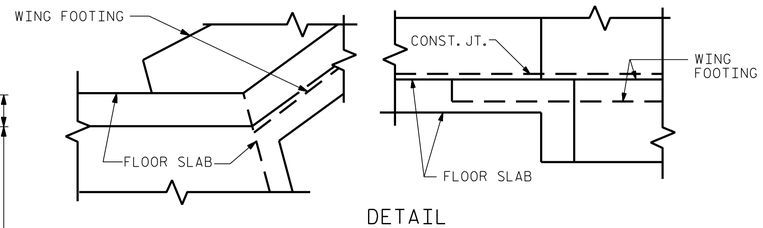


CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW

(INLET)
(LOOKING DOWNSTREAM)



DETAIL

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

PROJECT NO. R-2511
MARTIN COUNTY
STATION: 365+81.00 -L-

SHEET 3 OF 9

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 11 FT. X 8 FT.
CONCRETE BOX CULVERT
103°00' 00" SKEW

CULVERT NO. 049

NORTH CAROLINA PROFESSIONAL SEAL 51579 ENGINEER AARON LEE STROUD
DocuSigned by: Aaron Lee Stroud
1/27/2022

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PLAN - ROOF SLAB

STAGE I

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 365+81.00 -L-

SHEET 4 OF 9

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 11 FT. X 8 FT.
CONCRETE BOX CULVERT
STAGE I
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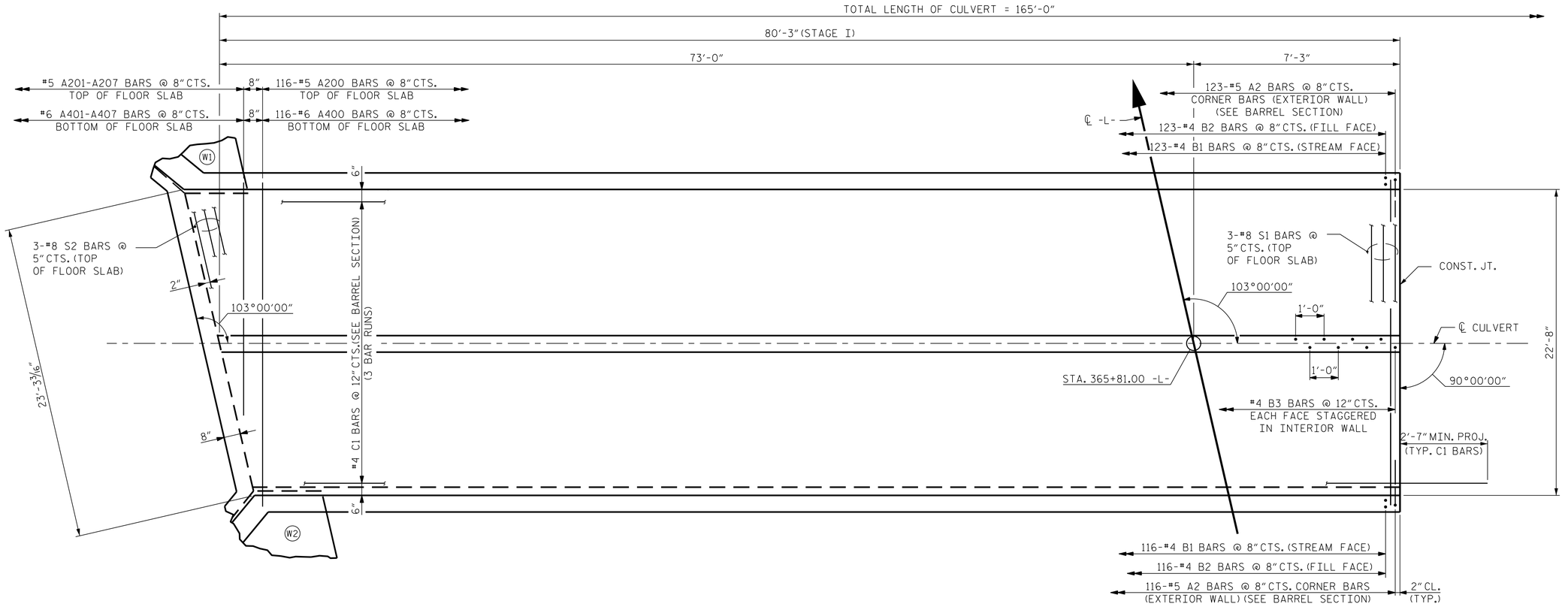

PLAN - FLOOR SLAB

STAGE I

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 365+81.00 -L-

SHEET 5 OF 9

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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STAGE I
103°00' 00" SKEW

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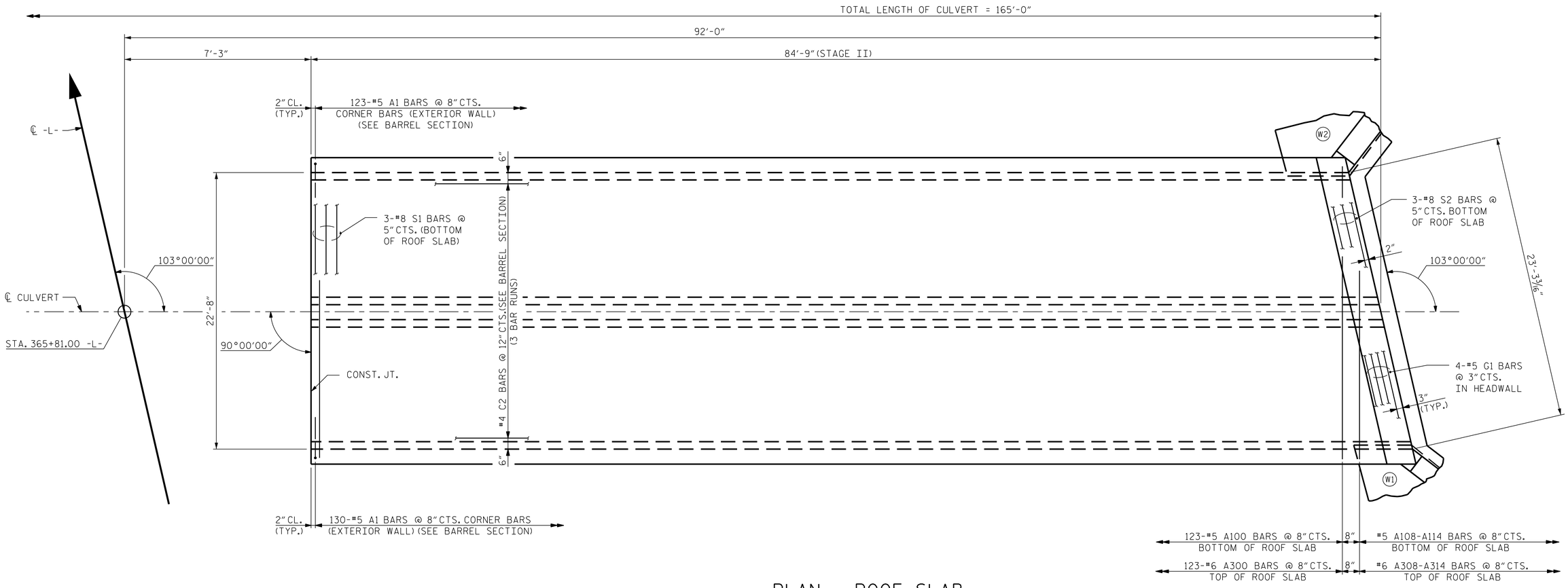

PLAN - ROOF SLAB

STAGE II

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 365+81.00 -L-

SHEET 6 OF 9

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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STAGE II
103°00' 00" SKEW

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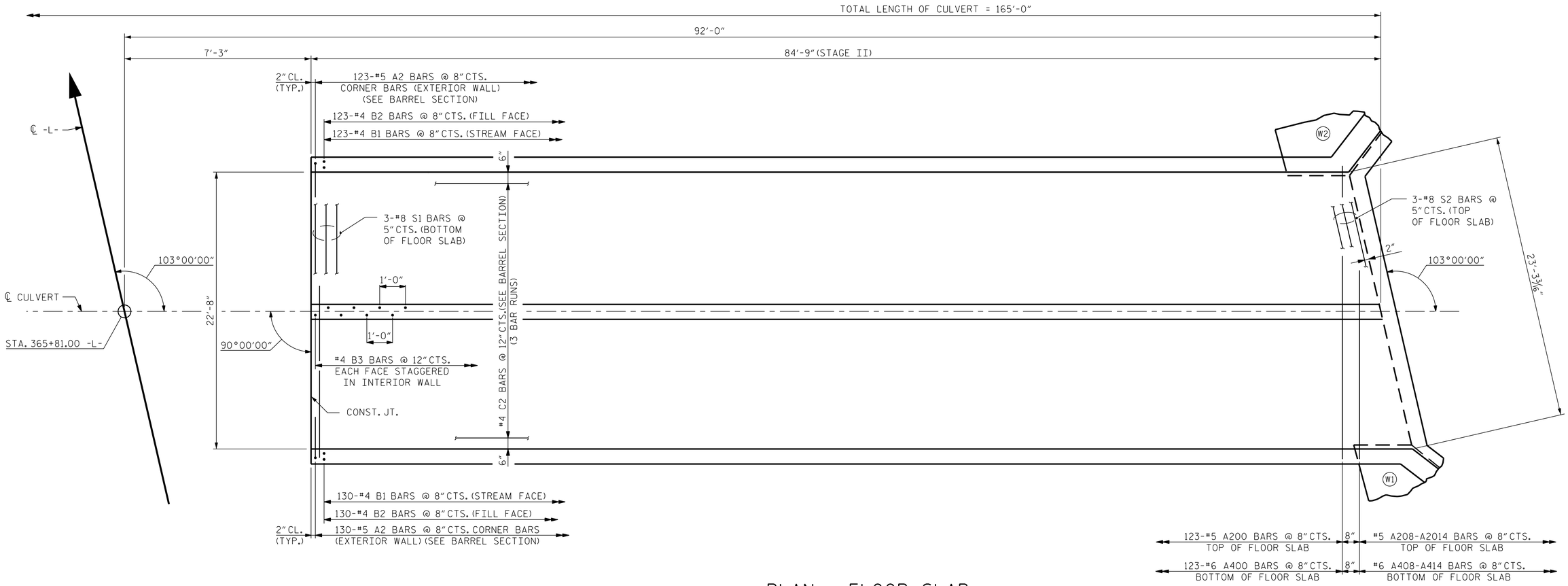

PLAN - FLOOR SLAB

STAGE II

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 365+81.00 -L-

SHEET 7 OF 9

STATE OF NORTH CAROLINA
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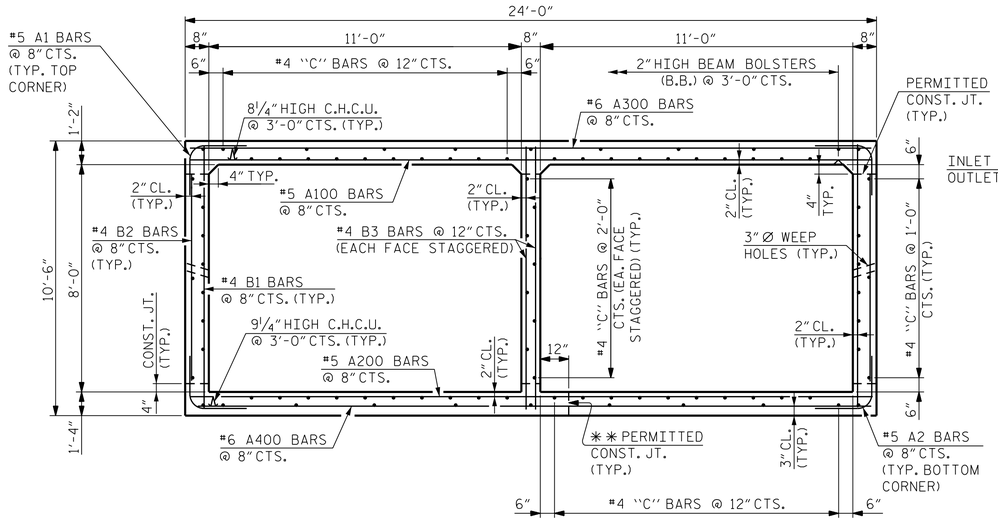


RIGHT ANGLE SECTION OF BARREL

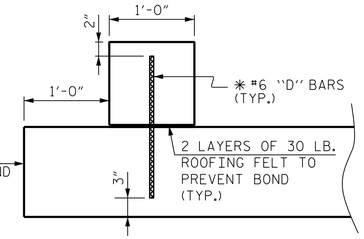
(THERE ARE 88 "C" BARS IN SECTION OF BARREL)

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

NOTE:
NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAMBED MAY BE USED TO LINE THE BOTTOM OF THE CULVERT BARREL. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW BARREL.

IF RIP RAP IS USED TO LINE THE HIGH FLOW BARREL, NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT PASSAGE FOR ANIMAL PASSAGE.

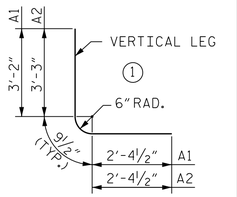
NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.



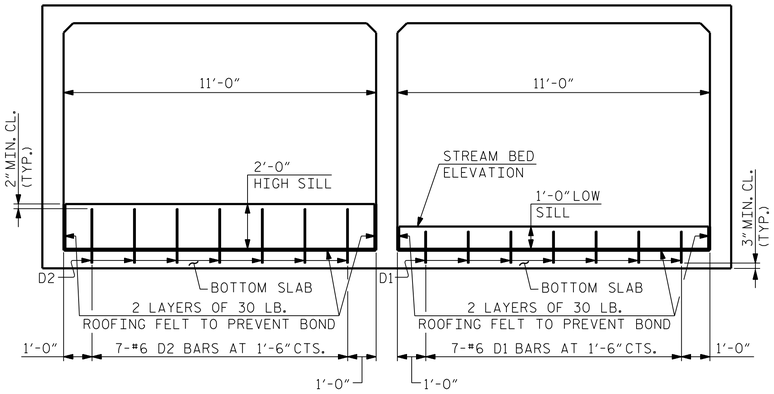
SECTION THROUGH SILL

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

BAR TYPE

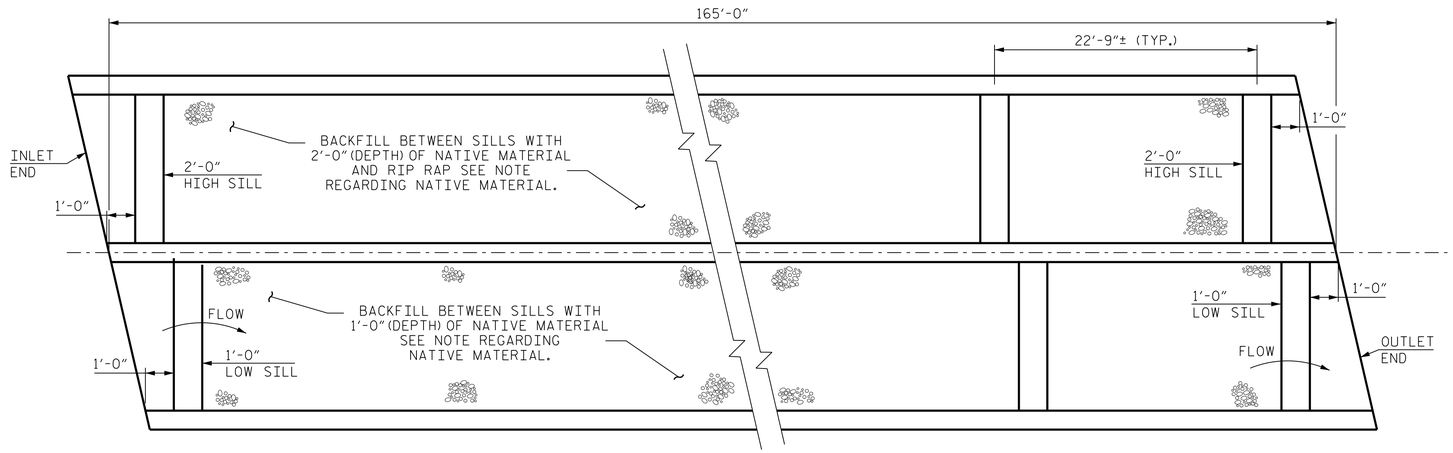


DIMENSIONS ARE OUT TO OUT



SILL ELEVATION

DOWEL SPACING SHOWN PERPENDICULAR TO CULVERT BARREL



SILL PLAN

BILL OF MATERIAL (STAGE I)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	239	#5	1	6'-4"	1,579
A2	239	#5	1	6'-5"	1,600
A100	116	#5	STR.	23'-8"	2,863
A101	1	#5	STR.	22'-8"	24
A102	1	#5	STR.	19'-9"	21
A103	1	#5	STR.	16'-10"	18
A104	1	#5	STR.	13'-11"	15
A105	1	#5	STR.	11'-0"	11
A106	1	#5	STR.	8'-1"	8
A107	1	#5	STR.	5'-2"	5
A200	116	#5	STR.	23'-8"	2,863
A201	1	#5	STR.	22'-8"	24
A202	1	#5	STR.	19'-9"	21
A203	1	#5	STR.	16'-10"	18
A204	1	#5	STR.	13'-11"	15
A205	1	#5	STR.	11'-0"	11
A206	1	#5	STR.	8'-1"	8
A207	1	#5	STR.	5'-2"	5
A300	116	#6	STR.	23'-8"	4,123
A301	1	#6	STR.	22'-8"	34
A302	1	#6	STR.	19'-9"	30
A303	1	#6	STR.	16'-10"	25
A304	1	#6	STR.	13'-11"	21
A305	1	#6	STR.	11'-0"	17
A306	1	#6	STR.	8'-1"	12
A307	1	#6	STR.	5'-2"	8
A400	116	#6	STR.	23'-8"	4,123
A401	1	#6	STR.	22'-8"	34
A402	1	#6	STR.	19'-9"	30
A403	1	#6	STR.	16'-10"	25
A404	1	#6	STR.	13'-11"	21
A405	1	#6	STR.	11'-0"	17
A406	1	#6	STR.	8'-1"	12
A407	1	#6	STR.	5'-2"	8
B1	239	#4	STR.	10'-1"	1,610
B2	239	#4	STR.	7'-4"	1,171
B3	160	#4	STR.	10'-1"	1,078
C1	264	#4	STR.	30'-2"	5,320
D1	28	#6	STR.	1'-11"	81
D2	28	#6	STR.	2'-11"	123
G1	4	#5	STR.	24'-3"	101
S1	6	#8	STR.	23'-8"	379
S2	6	#8	STR.	24'-3"	388
REINFORCING STEEL				27,900 LBS.	

BILL OF MATERIAL (STAGE II)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	253	#5	1	6'-4"	1,671
A2	253	#5	1	6'-5"	1,693
A100	123	#5	STR.	23'-8"	3,036
A108	1	#5	STR.	21'-11"	23
A109	1	#5	STR.	19'-0"	20
A110	1	#5	STR.	16'-1"	17
A111	1	#5	STR.	13'-2"	14
A112	1	#5	STR.	10'-3"	11
A113	1	#5	STR.	7'-4"	8
A114	1	#5	STR.	4'-5"	5
A200	123	#5	STR.	23'-8"	3,036
A208	1	#5	STR.	21'-11"	23
A209	1	#5	STR.	19'-0"	20
A210	1	#5	STR.	16'-1"	17
A211	1	#5	STR.	13'-2"	14
A212	1	#5	STR.	10'-3"	11
A213	1	#5	STR.	7'-4"	8
A214	1	#5	STR.	4'-5"	5
A300	123	#6	STR.	23'-8"	4,372
A308	1	#6	STR.	21'-11"	33
A309	1	#6	STR.	19'-0"	29
A310	1	#6	STR.	16'-1"	24
A311	1	#6	STR.	13'-2"	20
A312	1	#6	STR.	10'-3"	15
A313	1	#6	STR.	7'-4"	11
A314	1	#6	STR.	4'-5"	7
A400	123	#6	STR.	23'-8"	4,372
A408	1	#6	STR.	21'-11"	33
A409	1	#6	STR.	19'-0"	29
A410	1	#6	STR.	16'-1"	24
A411	1	#6	STR.	13'-2"	20
A412	1	#6	STR.	10'-3"	15
A413	1	#6	STR.	7'-4"	11
A414	1	#6	STR.	4'-5"	7
B1	253	#4	STR.	10'-1"	1,704
B2	253	#4	STR.	7'-4"	1,239
B3	170	#4	STR.	10'-1"	1,145
C2	264	#4	STR.	30'-8"	5,408
D1	28	#6	STR.	1'-11"	81
D2	28	#6	STR.	2'-11"	123
G1	4	#5	STR.	24'-3"	101
S1	6	#8	STR.	23'-8"	379
S2	6	#8	STR.	24'-3"	388
REINFORCING STEEL				29,222 LBS.	

SPLICE LENGTHS

BAR	SIZE	SPLICE LENGTHS
B2	#4	1'-10"
C1	#4	2'-5"
C2	#4	2'-5"

PROJECT NO. R-2511
MARTIN COUNTY
STATION: 365+81.00 -L-

SHEET 8 OF 9

STATE OF NORTH CAROLINA
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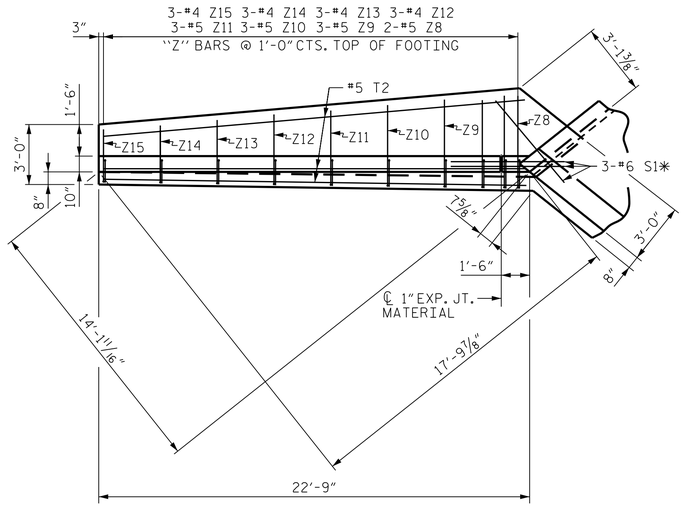

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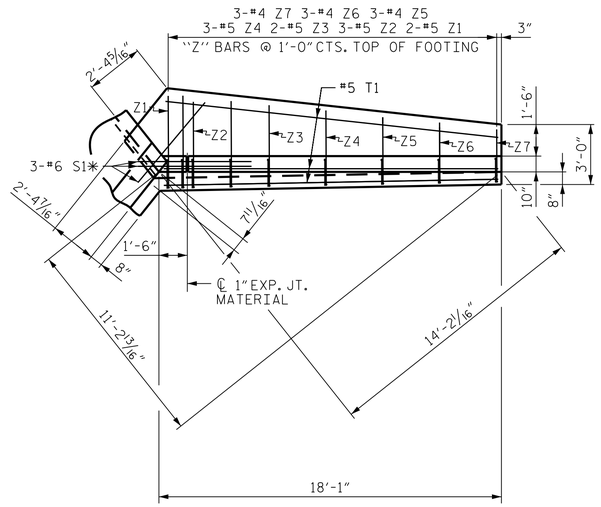

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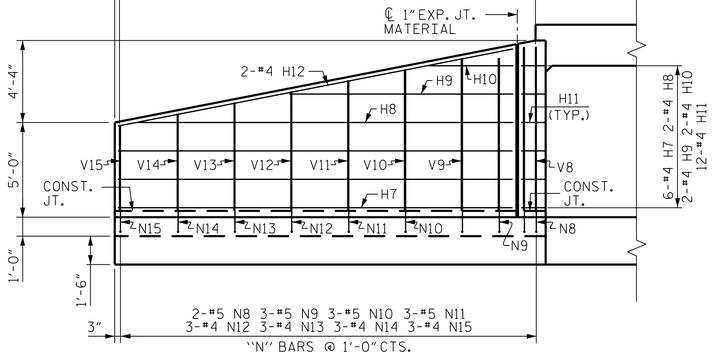
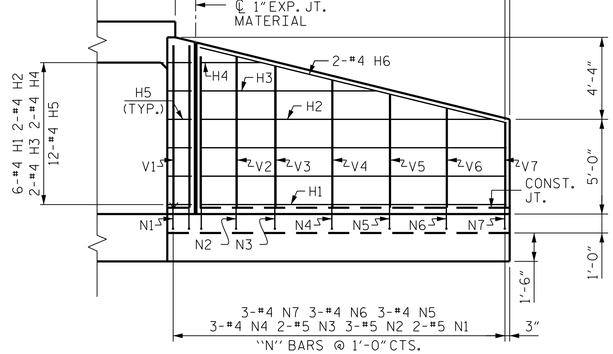
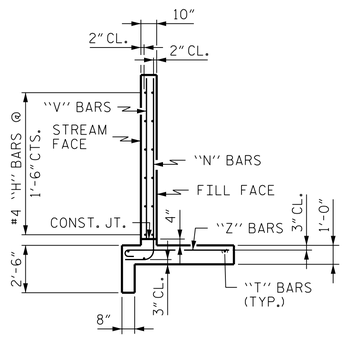


ELEVATION W1



ELEVATION W2



TYPICAL WING SECTION

BILL OF MATERIAL

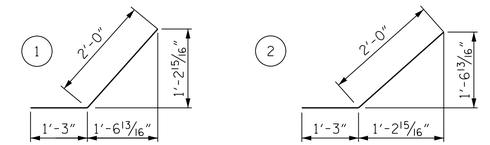
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR.	16'-1"	129
H2	4	#4	STR.	15'-5"	41
H3	4	#4	STR.	9'-4"	25
H4	4	#4	STR.	3'-3"	9
H5	24	#4	2	3'-3"	52
H6	4	#4	STR.	16'-7"	44
H7	12	#4	STR.	20'-9"	166
H8	4	#4	STR.	19'-11"	53
H9	4	#4	STR.	12'-2"	33
H10	4	#4	STR.	4'-6"	12
H11	24	#4	1	3'-3"	52
H12	4	#4	STR.	21'-2"	57
N1	4	#5	3	10'-7"	44
N2	6	#5	3	10'-0"	63
N3	4	#5	3	9'-6"	40
N4	6	#5	3	8'-9"	55
N5	6	#4	3	8'-0"	32
N6	6	#4	3	7'-3"	29
N7	6	#4	3	6'-6"	26
N8	4	#5	3	10'-8"	45
N9	6	#5	3	10'-0"	63
N10	6	#5	3	9'-5"	59
N11	6	#5	3	8'-10"	55
N12	6	#4	3	8'-3"	33
N13	6	#4	3	7'-8"	31
N14	6	#4	3	7'-1"	28
N15	6	#4	3	6'-6"	26
S1	12	#6	STR.	6'-0"	108
T1	6	#5	STR.	17'-7"	110
T2	6	#5	STR.	22'-4"	140
V1	4	#4	STR.	8'-7"	23
V2	6	#4	STR.	8'-0"	32
V3	4	#4	STR.	7'-6"	20
V4	6	#4	STR.	6'-9"	27
V5	6	#4	STR.	6'-0"	24
V6	6	#4	STR.	5'-3"	21
V7	6	#4	STR.	4'-6"	18
V8	4	#4	STR.	8'-8"	23
V9	6	#4	STR.	8'-0"	32
V10	6	#4	STR.	7'-5"	30
V11	6	#4	STR.	6'-10"	27
V12	6	#4	STR.	6'-3"	25
V13	6	#4	STR.	5'-8"	23
V14	6	#4	STR.	5'-1"	20
V15	6	#4	STR.	4'-6"	18
Z1	4	#5	4	5'-4"	22
Z2	6	#5	4	5'-0"	31
Z3	4	#5	4	4'-9"	20
Z4	6	#5	4	4'-5"	28
Z5	6	#4	4	3'-11"	16
Z6	6	#4	4	3'-6"	14
Z7	6	#4	4	3'-2"	13
Z8	4	#5	4	5'-5"	23
Z9	6	#5	4	5'-1"	32
Z10	6	#5	4	4'-9"	30
Z11	6	#5	4	4'-5"	28
Z12	6	#4	4	4'-1"	16
Z13	6	#4	4	3'-9"	15
Z14	6	#4	4	3'-5"	14
Z15	6	#4	4	3'-2"	13

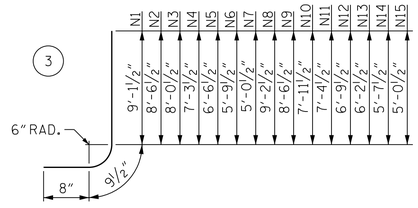
REINFORCING STEEL FOR 4 WINGS 2,338 LBS

CLASS A CONCRETE

4 WINGS	34.4	CY
2 HEADWALLS	2.4	CY
2 END CURTAIN WALLS	2.8	CY
TOTAL	39.6	CY

BAR TYPES





Z1	4'-9"	7"
Z2	4'-5"	7"
Z3	4'-2"	7"
Z4	3'-10"	7"
Z5	3'-5"	6"
Z6	3'-0"	6"
Z7	2'-8"	6"
Z8	4'-10"	7"
Z9	4'-6"	7"
Z10	4'-2"	7"
Z11	3'-10"	7"
Z12	3'-7"	6"
Z13	3'-3"	6"
Z14	2'-11"	6"
Z15	2'-8"	6"

4 HK.

ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 365+81.00 -L-

SHEET 9 OF 9

CULVERT NO. 049

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR

CONCRETE BOX CULVERT
H = 8'-0" SLOPE = 3:1
103°00' 00" SKEW

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8601 Six Forks Road, Forum 1 Suite 700
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NORTH CAROLINA PROFESSIONAL SEAL 51579 ENGINEER AARON LEE STROUD
DocuSigned by: Aaron Lee Stroud
1/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_49-9
1			3			TOTAL SHEETS
2			4			9

DRAWN BY : B. H. GONFA DATE : JAN 2022
CHECKED BY : A. L. STROUD DATE : JAN 2022
DESIGN ENGINEER OF RECORD : A. L. STROUD DATE : JAN 2022

tboyd
1/27/2022 R:\Structures\Culvert\DGN\Culvert 49\Final\R2511_SMU_CU_49-9_060000.dgn

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.

PROJECT NO. R-2511

MARTIN COUNTY

STATION: 365+81.00 -L-

SHEET 10 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD NOTES

CULVERT NO. 049

RK&K
P: (919) 878-9560
8601 Six Forks Road, Forum 1 Suite 700
Raleigh, North Carolina 27615 | NC License No. F-0112
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NORTH CAROLINA PROFESSIONAL SEAL 51579 ENGINEER AARON LEE STROUD
Digitally signed by Aaron Lee Stroud
7/27/2021

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	CU_49-10
1			3			TOTAL SHEETS
2			4			10

DRAWN BY : B. H. GONFA DATE : JUL 2021
CHECKED BY : A. L. STROUD DATE : JUL 2021
DESIGN ENGINEER OF RECORD : A. L. STROUD DATE : JUL 2021

bgonfa
7/26/2021 R:\Structures\Culvert\DGN\Culvert 49\Final\R2511_SMU_CU_49-10_060000.dgn