09/08/09

TIP PROJECT: U-5797

CONTRACT: C205036

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

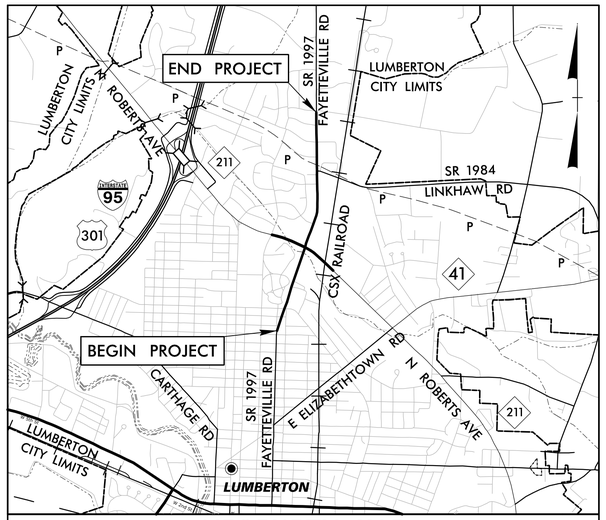
ROBESON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5797	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
44367.1.1	N/A	PE
44367.2.1	N/A	R.O.W.
44367.2.2	N/A	UTIL
44367.3.1	N/A	CONSTRUCTION

LOCATION: SR 1997 (FAYETTEVILLE ROAD) FROM FARRINGDOM STREET TO EAST 22ND STREET.

TYPE OF WORK: GRADING, PAVING, DRAINAGE, CULVERTS, AND SIGNALS



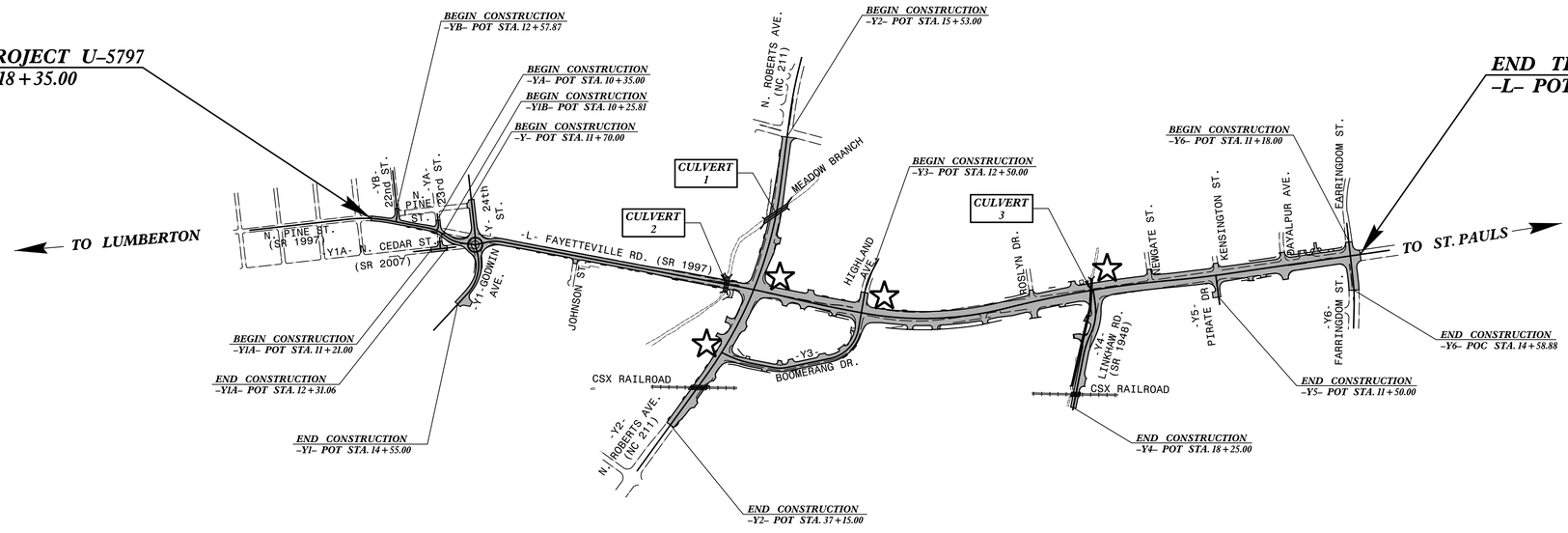
VICINITY MAP N.T.S.

FINAL PLANS

NAD 83/NA 2011

BEGIN TIP PROJECT U-5797
-L- POC STA. 18+35.00

END TIP PROJECT U-5797
-L- POT STA. 87+20.00



☆ UPGRADED SIGNAL

STRUCTURES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DESIGN DATA

ADT 2025 = 34,600
ADT 2045 = 41,600
K = 55 %
D = 9 %
T = 4 % *
V = 50 MPH
* TTST =1% DUAL =3%
FUNC CLASS =
URBAN ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-5797 = 1.299 MILES
LENGTH OF STRUCTURE TIP PROJECT U-5797 = 0.005 MILES
TOTAL LENGTH OF TIP PROJECT U-5797 = 1.304 MILES

NCDOT CONTACT: CRAIG A. FREEMAN JR., PE
NCDOT DIVISION 6
P.O. Box 1150
558 Gillespie Street (Delivery)
Fayetteville, NC 28302
910-364-0603 Office
910-364-0841 Direct
cafreeman2@ncdot.gov

PLANS PREPARED FOR THE NCDOT BY:

STV Engineers, Inc.
1600 Perimeter Park Dr.,Suite 225
Morrisville, NC 27560
NC License Number F-0991

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: July 22,2022

LETTING DATE: October 21, 2025

JASON T. GRISCOM, PE
PROJECT ENGINEER

SPENCER G. HENSLEY, PE
PROJECT DESIGNER

STRUCTURES ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM

8/14/2025

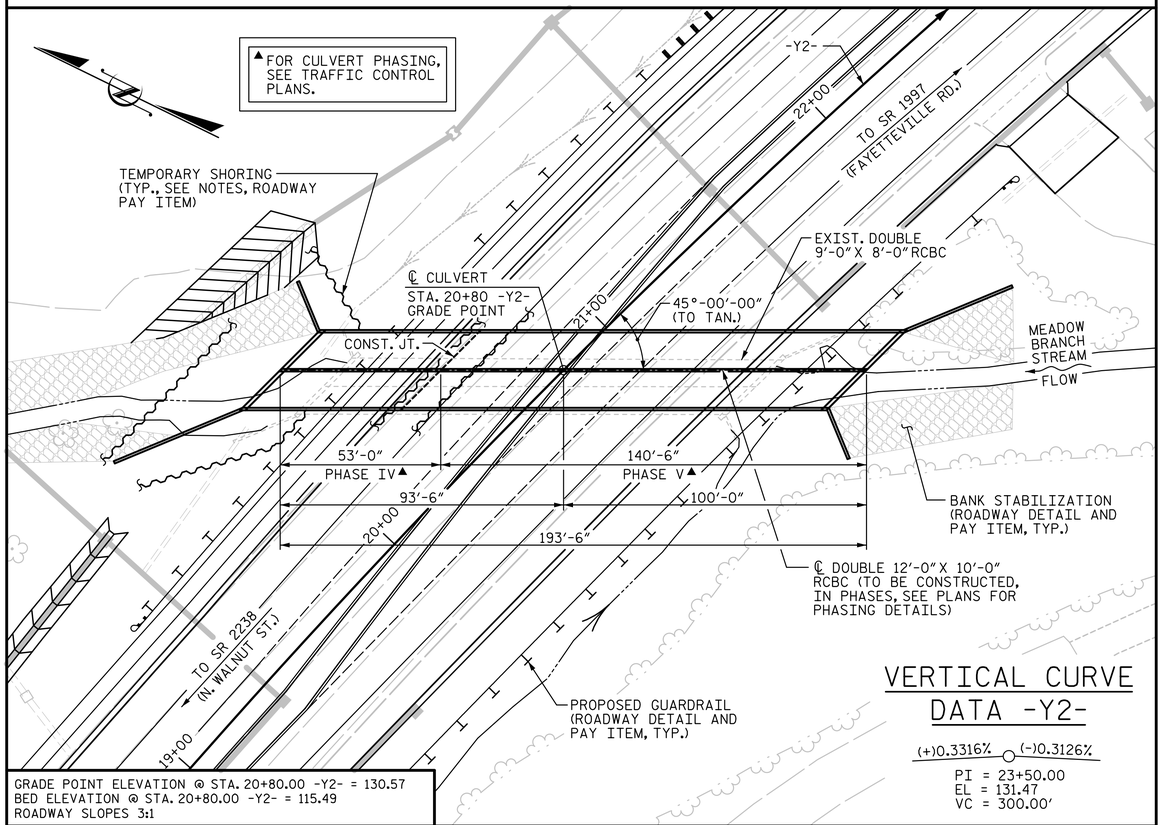
Signed by: Jason Griscom
E4ACD6E42EF244BA...

SIGNATURE: ***P.E.***

STATE OF NORTH CAROLINA * DEPARTMENT OF TRANSPORTATION *

8/14/2025
R:\Structures\04_Culverts\Culvert Title Sheet.dgn
jgriscom

BM-2: BENCHTIE IN 18" OAK, STA. 41+67.70 -L-, 168.50' LT., EL. 128.48, N 323306, E 1999369



GRADE POINT ELEVATION @ STA. 20+80.00 -Y2- = 130.57
BED ELEVATION @ STA. 20+80.00 -Y2- = 115.49
ROADWAY SLOPES 3:1

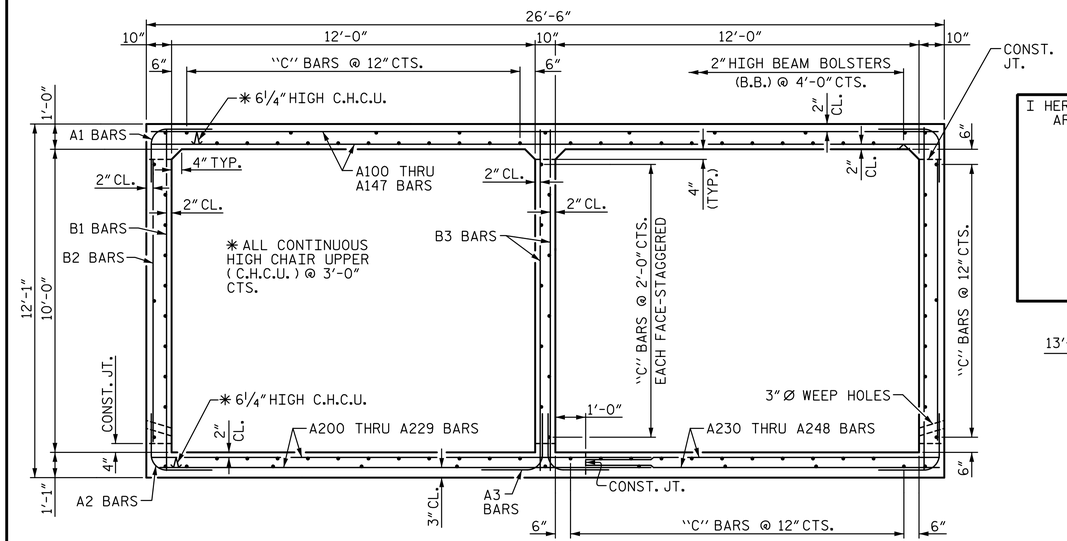
VERTICAL CURVE DATA -Y2-

(+)0.3316% ○ (-)0.3126%

PI = 23+50.00
EL = 131.47
VC = 300.00'

LOCATION SKETCH

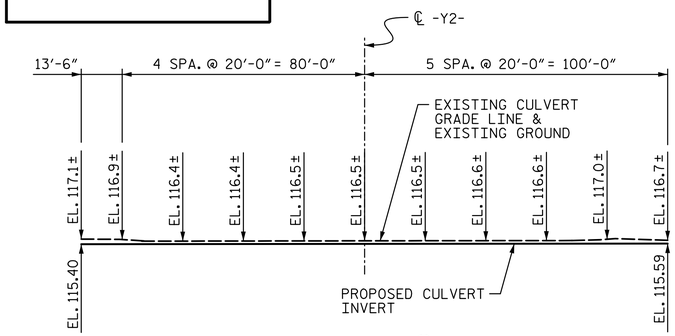
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.



RIGHT ANGLE SECTION OF BARREL

(LOOKING UPSTREAM)
THERE ARE 98 "C" BARS IN SECTION OF BARREL.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PROFILE ALONG ℄ CULVERT

HYDRAULIC DATA

DESIGN DISCHARGE:	1,540 CFS
FREQUENCY OF DESIGN FLOOD:	50 YRS.
DESIGN HIGH WATER ELEVATION:	128.5
DRAINAGE AREA:	4.39 SQ. MI.
BASE DISCHARGE (Q100):	1,730 CFS
BASE HIGH WATER ELEVATION:	129.1

OVERTOPPING DATA

OVERTOPPING DISCHARGE:	2,096 CFS
FREQUENCY OF OVERTOPPING FLOOD:	200± YRS.
OVERTOPPING FLOOD ELEVATION:	130.1

OVERTOPPING OCCURS AT ℄ AT THE SAG STA. 15+45.00 -Y2-

HORIZONTAL CURVE DATA -Y2-

PI = 26+21.60
Δ = 28°29'08.51" (RT.)
D = 2°02'46.60"
L = 1,392.07'
T = 710.74'
R = 2,800.00'

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
PHASE IV - STAGE 1	66.3 C.Y.
PHASE IV - STAGE 2	104.8 C.Y.
PHASE V - STAGE 3	206.8 C.Y.
PHASE V - STAGE 4	270.3 C.Y.
PHASE VI - STAGE 5	33.0 C.Y.
PHASE VI - STAGE 6	12.4 C.Y.
TOTAL	693.6 C.Y.
REINFORCING STEEL	
PHASE IV - STAGE 1	10,815 LBS.
PHASE IV - STAGE 2	19,469 LBS.
PHASE V - STAGE 3	31,923 LBS.
PHASE V - STAGE 4	45,493 LBS.
PHASE VI - STAGE 5	2,930 LBS.
PHASE VI - STAGE 6	1,127 LBS.
TOTAL	111,757 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
PHASE IV - STAGE 1	62 TONS
PHASE IV - STAGE 2	52 TONS
PHASE V - STAGE 3	165 TONS
PHASE V - STAGE 4	137 TONS
TOTAL	416 TONS
REMOVAL OF EXISTING STRUCTURE STA. 20+80.00 -Y2-	LUMP SUM

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

DESIGN FILL---------- 5.78' MAX. AND 2.72' MIN.

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

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

CONCRETE IN EACH STAGE 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, ROOF SLAB AND HEADWALLS FOLLOWED BY THE SILLS.

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 LAYOUTS AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEETS.

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

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

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

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING DOUBLE 9'-0" X 8'-0" RCBC LOCATED AT THE SAME LOCATION AS THE PROPOSED CULVERT SHALL BE REMOVED. THE EXISTING STRUCTURE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE STRUCTURE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED CULVERT, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

TRAFFIC ON NC 211 (N. ROBERTS AVE.) SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN PHASES AS SHOWN IN THE PLANS, SEE TRAFFIC CONTROL PLANS.

EXCAVATE FOUNDATION A MINIMUM OF 12" BELOW CULVERT BEARING ELEVATION. PLACE 12" OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

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

ENCAPSULATE ALL FOUNDATION CONDITIONING MATERIAL IN TYPE 4 GEOTEXTILE. FOR FOUNDATION CONDITIONING GEOTEXTILE, SEE BOX CULVERT EXCAVATION (SPECIAL) PROVISION.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 20+80.00 -Y2-

SHEET 1 OF 12 REPLACES STRUCTURE 770533

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 10'-0"
CONCRETE BOX CULVERT
45°-00'-00" SKEW

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

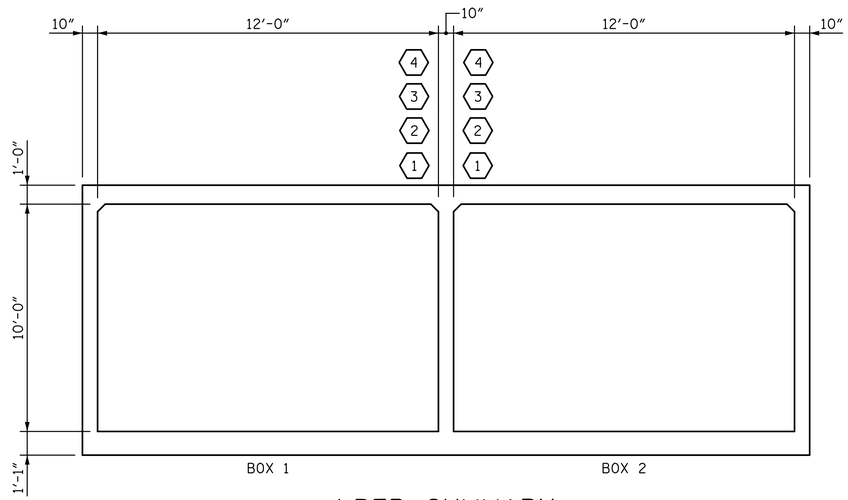
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-1
1			3			TOTAL SHEETS
2			4			12

DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

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

LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γLL)	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	1.23	1 & 2	EXTERIOR WALL	11.08′	1.04	1 & 2	TOP SLAB	12.83′/13.67′	
		HL-93 (OPERATING)	N/A		1.35	--	1.35	1.60	1 & 2	EXTERIOR WALL	11.08′	1.35	1 & 2	TOP SLAB	12.83′/13.67′	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.39	50.040	1.75	1.60	1 & 2	EXTERIOR WALL	11.08′	1.39	1 & 2	TOP SLAB	12.83′/13.67′	
		HS-20 (OPERATING)	36.000		1.80	64.800	1.35	2.07	1 & 2	EXTERIOR WALL	11.08′	1.80	1 & 2	TOP SLAB	12.83′/13.67′	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.46	33.210	1.40	2.46	1 & 2	EXTERIOR WALL	6.06′	2.63	1 & 2	TOP SLAB	12.83′/13.67′	
		SNGARBS2	20.000		2.41	48.200	1.40	2.41	1 & 2	EXTERIOR WALL	11.08′	2.41	1 & 2	TOP SLAB	12.83′/13.67′	
		SNAGRIS2	22.000		2.46	54.120	1.40	2.46	1 & 2	EXTERIOR WALL	606′	2.52	1 & 2	TOP SLAB	12.83′/13.67′	
		SNCOTTS3	27.250	⟨3⟩	1.42	38.695	1.40	1.62	1 & 2	EXTERIOR WALL	11.08′	1.42	1 & 2	TOP SLAB	12.83′/13.67′	
		SNAGGRS4	34.925		1.49	52.038	1.40	1.82	1 & 2	EXTERIOR WALL	11.08′	1.49	1 & 2	TOP SLAB	12.83′/13.67′	
		SNS5A	35.550		1.67	59.369	1.40	2.02	1 & 2	EXTERIOR WALL	11.08′	1.67	1 & 2	TOP SLAB	12.83′/13.67′	
		SNS6A	39.950		1.51	60.325	1.40	1.73	1 & 2	EXTERIOR WALL	11.08′	1.51	1 & 2	TOP SLAB	12.83′/13.67′	
		SNS7B	42.000		1.43	60.060	1.40	1.82	1 & 2	EXTERIOR WALL	11.08′	1.43	1 & 2	TOP SLAB	12.83′/13.67′	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.89	62.370	1.40	2.46	1 & 2	EXTERIOR WALL	6.06′	1.89	1 & 2	BOTTOM SLAB	12.83′/13.67′	
		TNT4A	33.075		1.63	53.912	1.40	1.81	1 & 2	EXTERIOR WALL	11.08′	1.63	1 & 2	TOP SLAB	12.83′/13.67′	
		TNT6A	41.600		1.56	64.896	1.40	1.83	1 & 2	EXTERIOR WALL	11.08′	1.56	1 & 2	TOP SLAB	12.83′/13.67′	
		TNT7A	42.000		1.65	69.300	1.40	1.81	1 & 2	EXTERIOR WALL	11.08′	1.65	1 & 2	TOP SLAB	12.83′/13.67′	
		TNT7B	42.000		1.50	63.000	1.40	1.77	1 & 2	EXTERIOR WALL	11.08′	1.50	1 & 2	TOP SLAB	12.83′/13.67′	
		TNAGRIT4	43.000		1.58	67.940	1.40	1.81	1 & 2	EXTERIOR WALL	11.08′	1.58	1 & 2	TOP SLAB	12.83′/13.67′	
		TNAGT5A	45.000		1.58	71.100	1.40	2.07	1 & 2	EXTERIOR WALL	11.08′	1.58	1 & 2	TOP SLAB	12.83′/13.67′	
		TNAGT5B	45.000		1.48	66.600	1.40	1.81	1 & 2	EXTERIOR WALL	11.08′	1.48	1 & 2	BOTTOM SLAB	12.83′/13.67′	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.84	52.900	1.30	2.09	1 & 2	EXTERIOR WALL	11.08′	1.84	1 & 2	TOP SLAB	12.83′/13.67′	
		EV3	43.000	⟨4⟩	1.23	52.890	1.30	1.52	1 & 2	EXTERIOR WALL	11.08′	1.23	1 & 2	TOP SLAB	12.83′/13.67′	



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.

1. FOR WALL ELEMENTS THE LEFT END OF ELEMENT IS LOCATED FROM THE BOTTOM OF THE BOTTOM SLAB.

COMMENTS:

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

⟨4⟩ EMERGENCY VEHICLE LAOD RATING **

** SEE CHART FOR VEHICLE TYPE

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

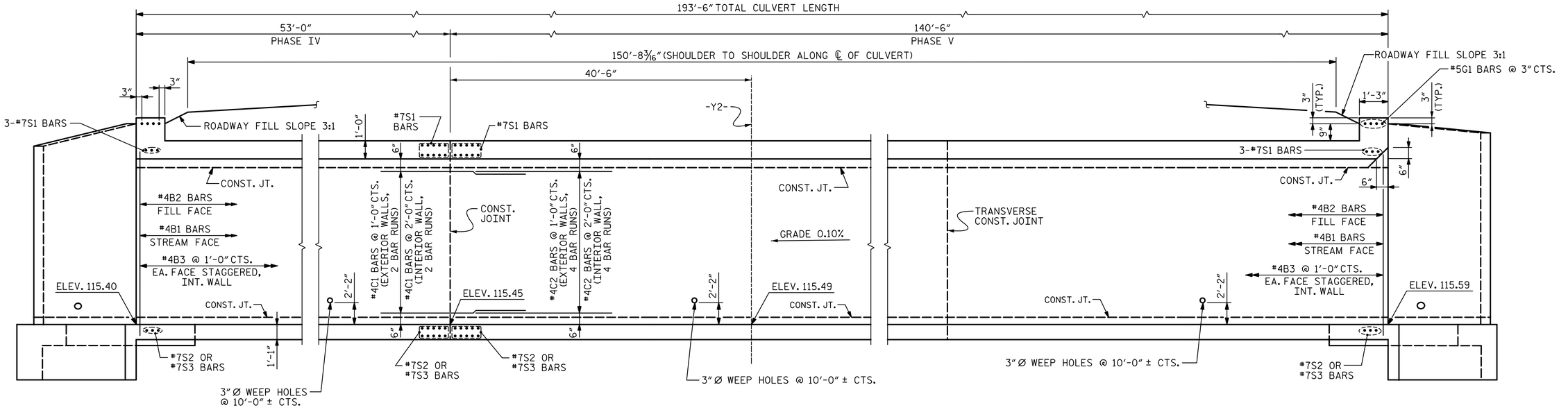
PROJECT NO. U-5797
ROBESON COUNTY
STATION: 20+80.00 -Y2-

SHEET 2 OF 12

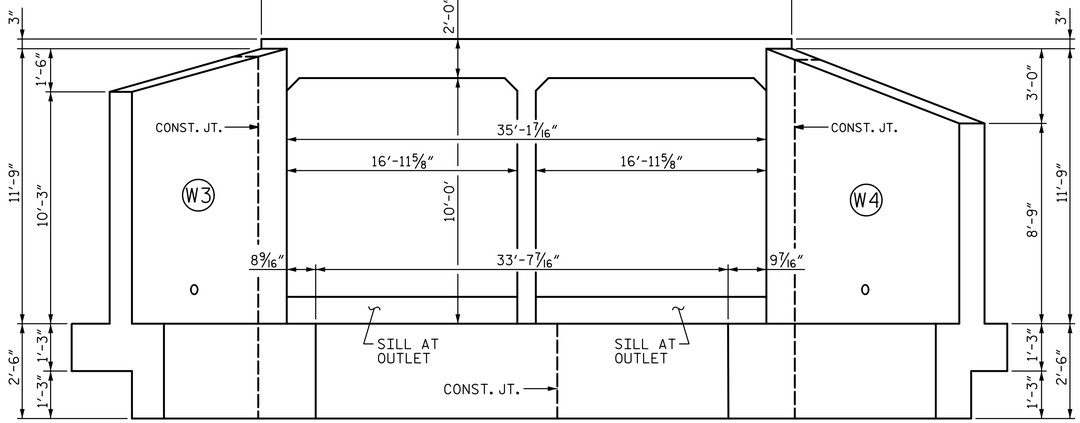
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

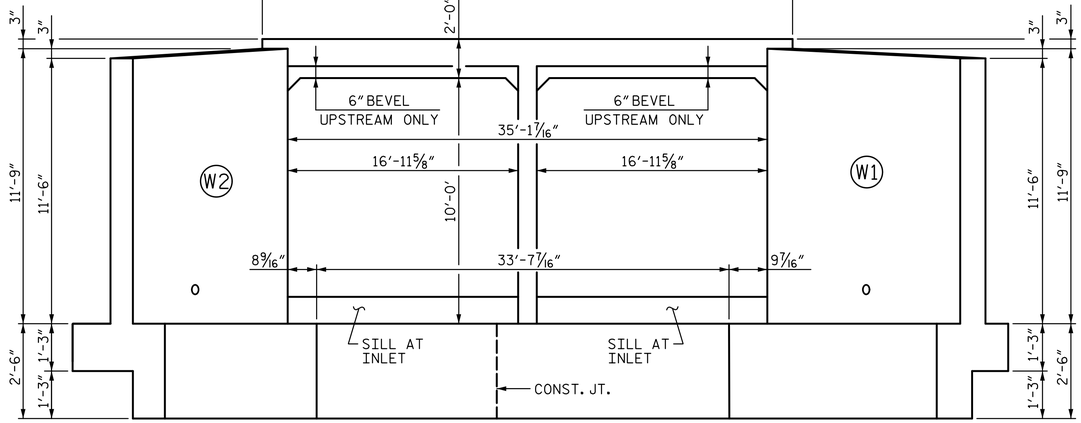
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS
2			4			12



CULVERT SECTION NORMAL TO ROADWAY



OUTLET ELEVATION NORMAL TO SKEW



INLET ELEVATION NORMAL TO SKEW

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 20+80.00 -Y2-

SHEET 3 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12′-0″ X 10′-0″
CONCRETE BOX CULVERT
45°-00′-00″ SKEW

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
1			3			TOTAL SHEETS
2			4			12

DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

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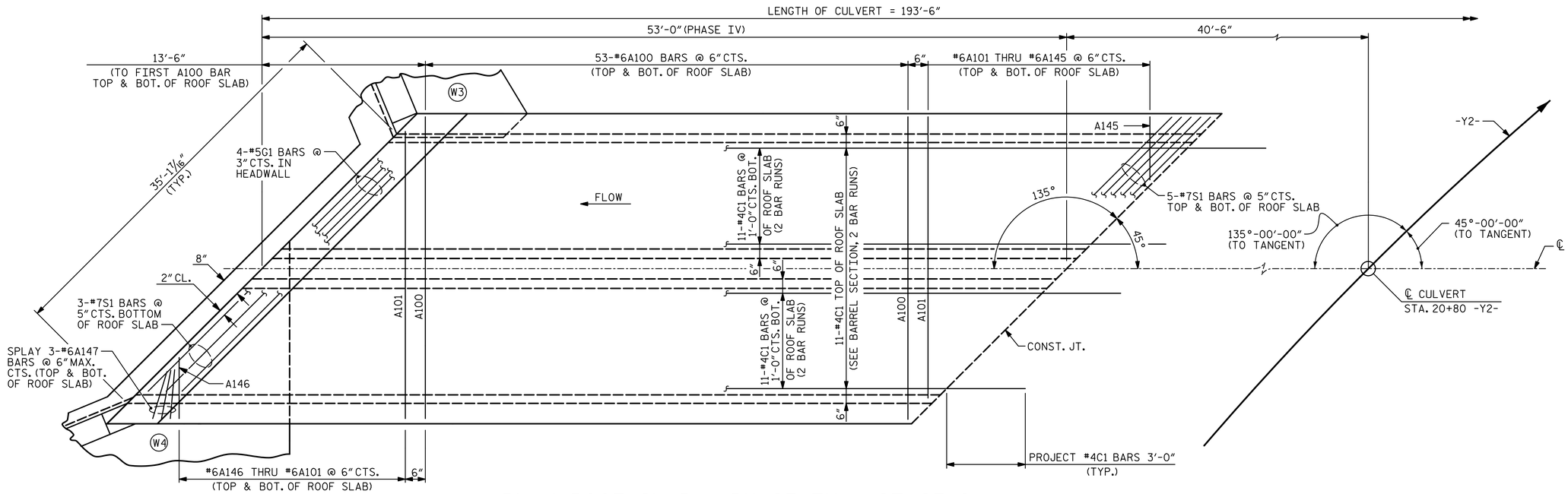
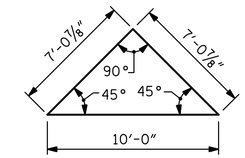
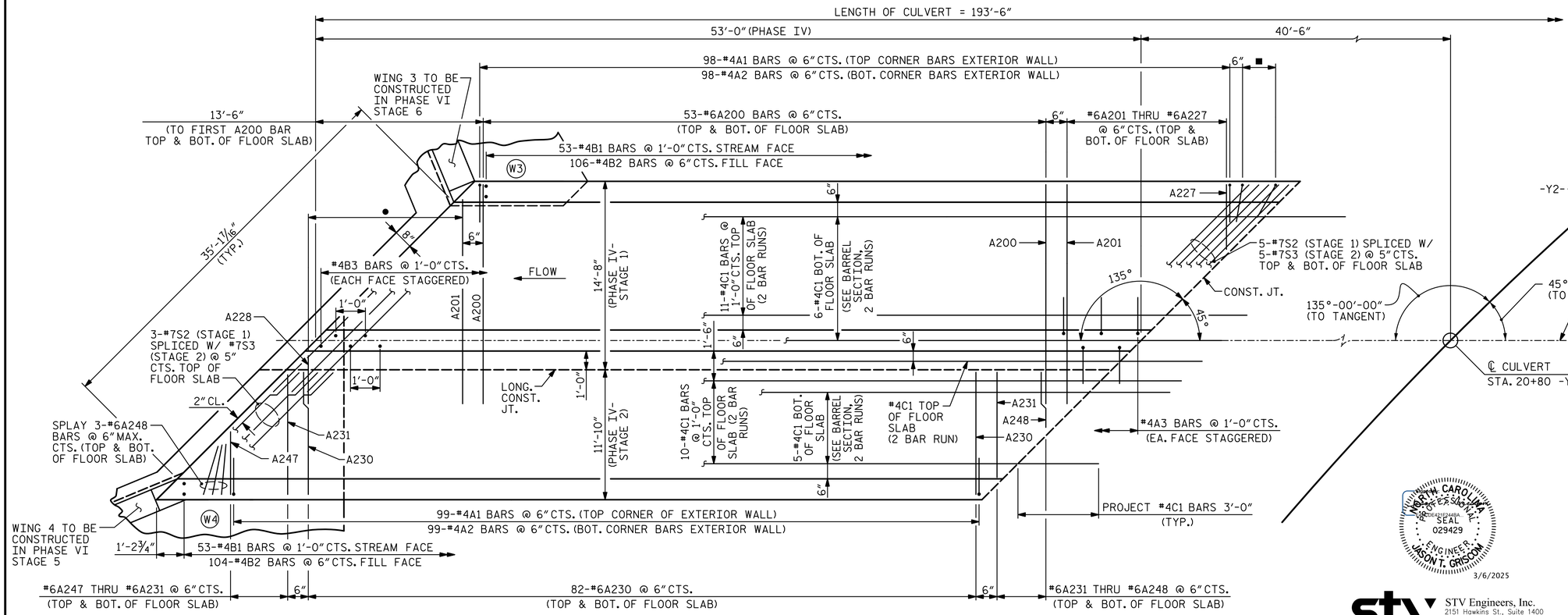


PLAN ROOF SLAB - PHASE IV - STAGE 2



SKEW TRIANGLE



PLAN FLOOR SLAB AND WALLS - PHASE IV - STAGES 1 & 2

NOTES:

SPLICE A2XX BARS IN STAGE 1 2'-9" MIN. WITH A2XX BARS IN STAGE 2.

● #6A201 THRU #6A228 @ 6" CTS. (TOP & BOT. OF FLOOR SLAB)

■ SPLAY 7-#4A1 BARS @ 6" CTS. (TOP CORNER BARS EXTERIOR WALL) & 7-#4A2 BARS @ 6" CTS. (BOT. CORNER BARS EXTERIOR WALL)

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

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PROJECT NO. U-5797
ROBESON COUNTY
STATION: 20+80.00 -Y2-

SHEET 4 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 10'-0" CONCRETE BOX CULVERT 45°-00'-00" SKEW

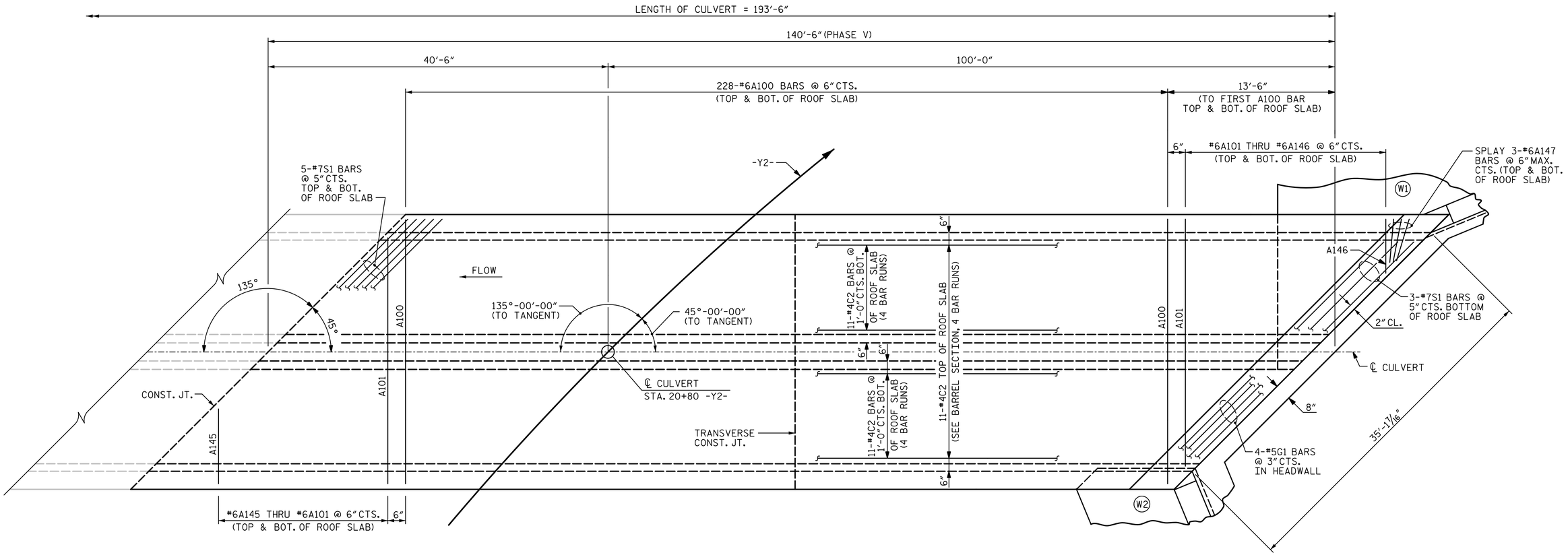
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			12

DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

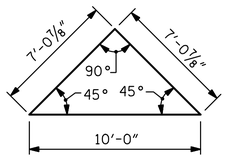
1/23/2025 1:35:20 PM R:\Structures\04_Culverts\Culvert 20+80 -Y2- (Culvert 1)\02_Ustation\03_Final Plans\411_007_U-5797_SMU_CU_004_770C01.dgn hensleeg

NOTES:

SPLICE #4C2 BARS 2'-5" MIN. TO #4C1 BARS IN PHASE IV - STAGES 1 & 2



PLAN ROOF SLAB - PHASE V - STAGE 4



SKEW TRIANGLE

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 20+80.00 -Y2-

SHEET 5 OF 12

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 10'-0" CONCRETE BOX CULVERT
45°-00'-00" SKEW

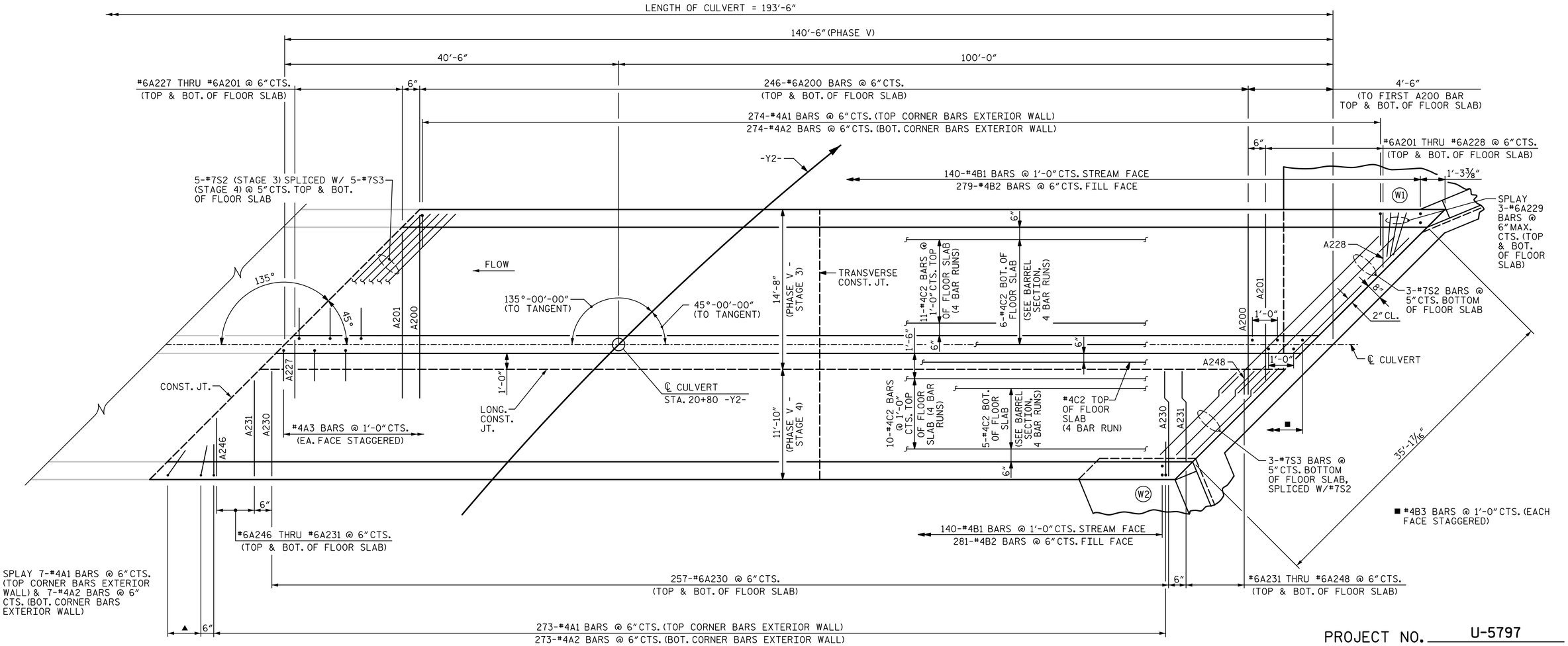
DRAWN BY :	SGH	DATE :	11-24
CHECKED BY :	MLO	DATE :	11-24
DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE :	11-24

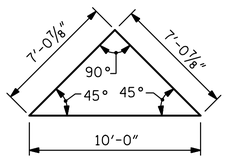
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5
1			3			TOTAL SHEETS
2			4			12

NOTES:

SPLICE #4C2 BARS 2'-5" MIN. TO #4C1 BARS IN PHASE IV - STAGES 1 & 2.

SPLICE A2XX BARS IN STAGE 3 2'-9" MIN. WITH A2XX BARS IN STAGE 4.





SKEW TRIANGLE

PLAN FLOOR SLAB AND WALLS - PHASE V - STAGES 3 & 4

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 20+80.00 -Y2-

SHEET 6 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 10'-0" CONCRETE BOX CULVERT 45°-00'-00" SKEW

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
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NC License Number F-0991

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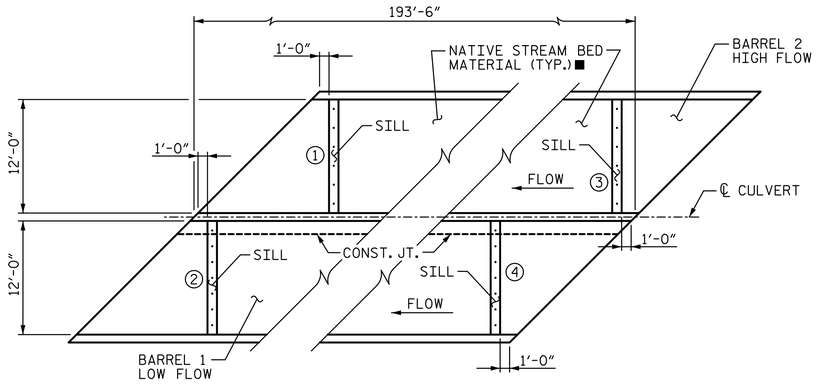
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-6
1			3			TOTAL SHEETS
2			4			12

DRAWN BY :	SGH	DATE : 11-24
CHECKED BY :	MLO	DATE : 11-24
DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE : 11-24



PLAN VIEW - LOCATION OF SILLS

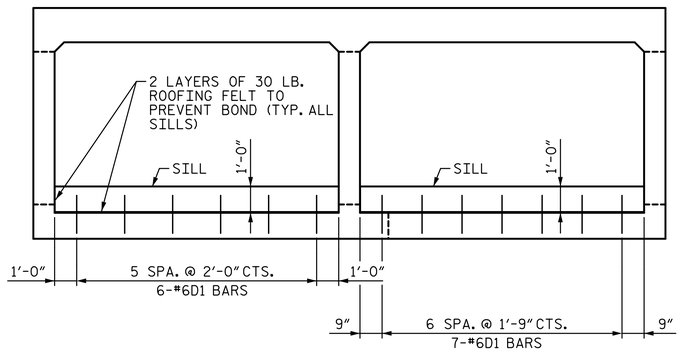
■ NATIVE STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT TO SILL HEIGHT BETWEEN SILLS. (SEE NOTE ON SHEET 1 OF 12)

① SILL TO BE CONSTRUCTED IN PHASE IV - STAGE 1

② SILL TO BE CONSTRUCTED IN PHASE IV - STAGE 2

③ SILL TO BE CONSTRUCTED IN PHASE V - STAGE 3

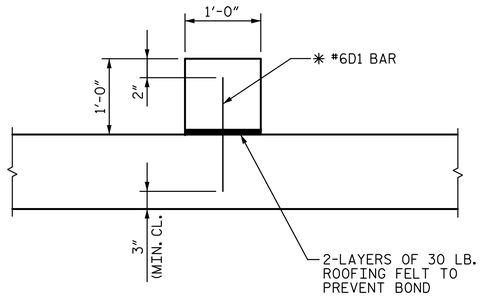
④ SILL TO BE CONSTRUCTED IN PHASE V - STAGE 4



ELEVATION

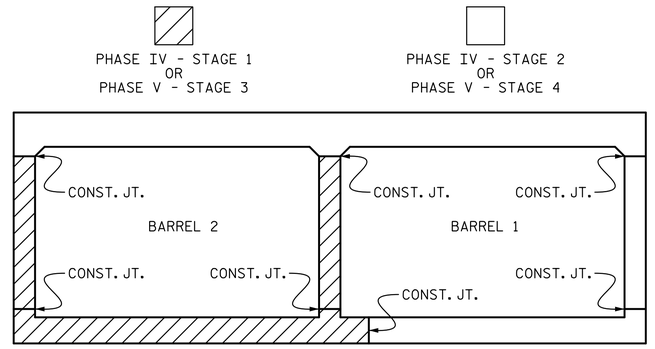
LOOKING UPSTREAM

ELEVATION AT OUTLET SHOWN, ELEVATION AT INLET SIMILAR.



SECTION THROUGH SILL

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



PHASE IV - STAGE 1 AND PHASE IV - STAGE 2

POUR 1: PHASE IV - STAGE 1 - FLOOR SLAB (INCLUDING PART OF WING 3 FOOTING) AND 4" OF VERTICAL WALLS/WING

POUR 2: PHASE IV - STAGE 1 - REMAINING PORTIONS OF EXTERIOR WALL AND INTERIOR WALL

POUR 3: PHASE IV - STAGE 2 - FLOOR SLAB (INCLUDING PART OF WING 4 FOOTING) AND 4" OF VERTICAL WALL/WING

POUR 4: PHASE IV - STAGE 2 - REMAINING PORTION OF EXTERIOR WALL

POUR 5: PHASE IV - STAGE 2 - ENTIRE ROOF SLAB AND OUTLET HEADWALL

PHASE V - STAGE 3 AND PHASE V - STAGE 4

POUR 1: PHASE V - STAGE 3 - FLOOR SLAB (INCLUDING WING 1 FOOTING) AND 4" OF VERTICAL WALLS/WING

POUR 2: PHASE V - STAGE 3 - REMAINING PORTIONS OF EXTERIOR WALL, WING 1 AND INTERIOR WALL

POUR 3: PHASE V - STAGE 4 - FLOOR SLAB (INCLUDING WING 2 FOOTING) AND 4" OF VERTICAL WALL/WING

POUR 4: PHASE V - STAGE 4 - REMAINING PORTION OF EXTERIOR WALL AND WING 2

POUR 5: PHASE V - STAGE 4 - ENTIRE ROOF SLAB AND INLET HEADWALL

PHASE VI - STAGE 5 AND PHASE VI - STAGE 6

POUR 1: PHASE VI - STAGE 5 - REMAINING PORTION OF WING 4

POUR 2: PHASE VI - STAGE 6 - REMAINING PORTION OF WING 3

CULVERT CONSTRUCTION SEQUENCE

LOOKING UPSTREAM

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
DocuSigned by: 3/6/2025

STV Engineers, Inc.
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PROJECT NO. U-5797

ROBESON COUNTY

STATION: 20+80.00 -Y2-

SHEET 7 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 10'-0" CONCRETE BOX CULVERT
45°-00'-00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-7
1			3			TOTAL SHEETS
2			4			12

DRAWN BY :	SGH	DATE :	11-24
CHECKED BY :	MLO	DATE :	11-24
DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE :	11-24

BILL OF MATERIAL
PHASE IV - STAGE 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	105	#4	1	5′-10″	409
A2	105	#4	1	5′-10″	409
A3	106	#4	1	5′-10″	413
A200	142	#6	STR	17′-3″	3,679
A201	4	#6	STR	16′-10″	101
A202	4	#6	STR	16′-4″	98
A203	4	#6	STR	15′-10″	95
A204	4	#6	STR	15′-4″	92
A205	4	#6	STR	14′-10″	89
A206	4	#6	STR	14′-4″	86
A207	4	#6	STR	13′-10″	83
A208	4	#6	STR	13′-4″	80
A209	4	#6	STR	12′-10″	77
A210	4	#6	STR	12′-4″	74
A211	4	#6	STR	11′-10″	71
A212	4	#6	STR	11′-4″	68
A213	4	#6	STR	10′-10″	65
A214	4	#6	STR	10′-4″	62
A215	4	#6	STR	9′-10″	59
A216	4	#6	STR	9′-4″	56
A217	4	#6	STR	8′-10″	53
A218	4	#6	STR	8′-4″	50
A219	4	#6	STR	7′-10″	47
A220	4	#6	STR	7′-4″	44
A221	4	#6	STR	6′-10″	41
A222	4	#6	STR	6′-4″	38
A223	4	#6	STR	5′-10″	35
A224	4	#6	STR	5′-4″	32
A225	4	#6	STR	4′-10″	29
A226	4	#6	STR	4′-4″	26
A227	4	#6	STR	3′-10″	23
A228	2	#6	STR	3′-4″	10
B1	53	#4	STR	11′-8″	413
B2	106	#4	STR	9′-4″	661
B3	106	#4	STR	11′-8″	826
C1	78	#4	STR	29′-2″	1,520
D1	6	#6	STR	1′-8″	15
S2	13	#7	STR	24′-0″	638

PHASE IV - STAGE 1 REINFORCING STEEL
10,667 LBS.

PHASE IV - STAGE 1 QUANTITIES

REINFORCING STEEL	
BARREL	10,667 LBS.
PORTION OF WING 3	148 LBS.
TOTAL	10,815 LBS.
CLASS A CONCRETE	
BARREL @ 1.185 CY/FT	62.8 CY
SILL	0.4 CY
END CURTAIN WALL	1.3 CY
PORTION OF WINGS 3 & 4	1.8 CY
TOTAL	66.3 CY

BILL OF MATERIAL
PHASE IV - STAGE 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	99	#4	1	5′-10″	386
A2	99	#4	1	5′-10″	386
A100	106	#6	STR	26′-2″	4,166
A101	4	#6	STR	25′-10″	155
A102	4	#6	STR	25′-4″	152
A103	4	#6	STR	24′-10″	149
A104	4	#6	STR	24′-4″	146
A105	4	#6	STR	23′-10″	143
A106	4	#6	STR	23′-4″	140
A107	4	#6	STR	22′-10″	137
A108	4	#6	STR	22′-4″	134
A109	4	#6	STR	21′-10″	131
A110	4	#6	STR	21′-4″	128
A111	4	#6	STR	20′-10″	125
A112	4	#6	STR	20′-4″	122
A113	4	#6	STR	19′-10″	119
A114	4	#6	STR	19′-4″	116
A115	4	#6	STR	18′-10″	113
A116	4	#6	STR	18′-4″	110
A117	4	#6	STR	17′-10″	107
A118	4	#6	STR	17′-4″	104
A119	4	#6	STR	16′-10″	101
A120	4	#6	STR	16′-4″	98
A121	4	#6	STR	15′-10″	95
A122	4	#6	STR	15′-4″	92
A123	4	#6	STR	14′-10″	89
A124	4	#6	STR	14′-4″	86
A125	4	#6	STR	13′-10″	83
A126	4	#6	STR	13′-4″	80
A127	4	#6	STR	12′-10″	77
A128	4	#6	STR	12′-4″	74
A129	4	#6	STR	11′-10″	71
A130	4	#6	STR	11′-4″	68
A131	4	#6	STR	10′-10″	65
A132	4	#6	STR	10′-4″	62
A133	4	#6	STR	9′-10″	59
A134	4	#6	STR	9′-4″	56
A135	4	#6	STR	8′-10″	53
A136	4	#6	STR	8′-4″	50
A137	4	#6	STR	7′-10″	47
A138	4	#6	STR	7′-4″	44
A139	4	#6	STR	6′-10″	41
A140	4	#6	STR	6′-4″	38
A141	4	#6	STR	5′-10″	35
A142	4	#6	STR	5′-4″	32
A143	4	#6	STR	4′-10″	29
A144	4	#6	STR	4′-4″	26
A145	4	#6	STR	3′-10″	23
A146	2	#6	STR	3′-4″	10
A147	6	#6	STR	2′-10″	26
A230	164	#6	STR	11′-8″	2,874
A231	4	#6	STR	11′-4″	68
A232	4	#6	STR	10′-10″	65
A233	4	#6	STR	10′-4″	62
A234	4	#6	STR	9′-10″	59
A235	4	#6	STR	9′-4″	56
A236	4	#6	STR	8′-10″	53
A237	4	#6	STR	8′-4″	50
A238	4	#6	STR	7′-10″	47
A239	4	#6	STR	7′-4″	44
A240	4	#6	STR	6′-10″	41
A241	4	#6	STR	6′-4″	38
A242	4	#6	STR	5′-10″	35
A243	4	#6	STR	5′-4″	32
A244	4	#6	STR	4′-10″	29
A245	4	#6	STR	4′-4″	26
A246	4	#6	STR	3′-10″	23
A247	4	#6	STR	3′-4″	20
A248	8	#6	STR	2′-10″	34

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	53	#4	STR	11′-8″	413
B2	104	#4	STR	9′-4″	648
C1	118	#4	STR	29′-2″	2,299
D1	7	#6	STR	1′-8″	18
G1	4	#5	STR	37′-0″	154
S1	13	#7	STR	37′-0″	983
S3	13	#7	STR	16′-3″	432

PHASE IV - STAGE 2 REINFORCING STEEL
17,582 LBS.

PHASE IV - STAGE 2 QUANTITIES

REINFORCING STEEL	
BARREL	17,582 LBS.
PORTION OF WING 4	1,887 LBS.
TOTAL	19,469 LBS.
CLASS A CONCRETE	
BARREL @ 1.794 CY/FT	95.1 CY
COUNTERFORT	1.1 CY
SILL	0.4 CY
END CURTAIN WALL	1.0 CY
PORTION OF WING 4	5.5 CY
HEADWALL	1.7 CY
TOTAL	104.8 CY

BILL OF MATERIAL
PHASE V - STAGE 3

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	274	#4	1	5′-10″	1,068
A2	274	#4	1	5′-10″	1,068
A3	282	#4	1	5′-10″	1,099
A200	492	#6	STR	17′-3″	12,747
A201	4	#6	STR	16′-10″	101
A202	4	#6	STR	16′-4″	98
A203	4	#6	STR	15′-10″	95
A204	4	#6	STR	15′-4″	92
A205	4	#6	STR	14′-10″	89
A206	4	#6	STR	14′-4″	86
A207	4	#6	STR	13′-10″	83
A208	4	#6	STR	13′-4″	80
A209	4	#6	STR	12′-10″	77
A210	4	#6	STR	12′-4″	74
A211	4	#6	STR	11′-10″	71
A212	4	#6	STR	11′-4″	68
A213	4	#6	STR	10′-10″	65
A214	4	#6	STR	10′-4″	62
A215	4	#6	STR	9′-10″	59
A216	4	#6	STR	9′-4″	56
A217	4	#6	STR	8′-10″	53
A218	4	#6	STR	8′-4″	50
A219	4	#6	STR	7′-10″	47
A220	4	#6	STR	7′-4″	44
A221	4	#6	STR	6′-10″	41
A222	4	#6	STR	6′-4″	38
A223	4	#6	STR	5′-10″	35
A224	4	#6	STR	5′-4″	32
A225	4	#6	STR	4′-10″	29
A226	4	#6	STR	4′-4″	26
A227	4	#6	STR	3′-10″	23
A228	2	#6	STR	3′-4″	10
A229	6	#6	STR	2′-10″	26
B1	140	#4	STR	11′-8″	1,091
B2	279	#4	STR	9′-4″	1,739
B3	282	#4	STR	11′-8″	2,198
C2	156	#4	STR	36′-10″	3,838
D1	6	#6	STR	1′-8″	15
S2	13	#7	STR	24′-0″	638

PHASE V - STAGE 3 REINFORCING STEEL
27,211 LBS.

PHASE V - STAGE 3 QUANTITIES

REINFORCING STEEL	
BARREL	27,211 LBS.
WING 1	4,712 LBS.
TOTAL	31,923 LBS.
CLASS A CONCRETE	
BARREL @ 1.185 CY/FT	166.5 CY
COUNTERFORT	1.1 CY
SILL	0.4 CY
END CURTAIN WALL	3.6 CY
WING 1	35.2 CY
TOTAL	206.8 CY

BILL OF MATERIAL
PHASE V - STAGE 4

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	280	#4	1	5′-10″	1,091
A2	280	#4	1	5′-10″	1,091
A100	456	#6	STR	26′-2″	17,922
A101	4	#6	STR	25′-10″	155
A102	4	#6	STR	25′-4″	152
A103	4	#6	STR	24′-10″	149
A104	4	#6	STR	24′-4″	146
A105	4	#6	STR	23′-10″	143
A106	4	#6	STR	23′-4″	140
A107	4	#6	STR	22′-10″	137
A108	4	#6	STR	22′-4″	134
A109	4	#6	STR	21′-10″	131
A110	4	#6	STR	21′-4″	128
A111	4	#6	STR	20′-10″	125
A112	4	#6	STR	20′-4″	122
A113	4	#6	STR	19′-10″	119
A114	4	#6	STR	19′-4″	116
A115	4	#6	STR	18′-10″	113
A116	4	#6	STR	18′-4″	110
A117	4	#6	STR	17′-10″	107
A118	4	#6	STR	17′-4″	104
A119	4	#6	STR	16′-10″	101
A120	4	#6	STR	16′-4″	98
A121	4	#6	STR	15′-10″	95
A122	4	#6	STR	15′-4″	92
A123	4	#6	STR	14′-10″	89
A124	4	#6	STR	14′-4″	86
A125	4	#6	STR	13′-10″	83
A126	4	#6	STR	13′-4″	80
A127	4	#6	STR	12′-10″	77
A128	4	#6	STR	12′-4″	74
A129	4	#6	STR	11′-10″	71
A130	4	#6	STR	11′-4″	68
A131	4	#6	STR	10′-10″	65
A132	4	#6	STR	10′-4″	62
A133	4	#6	STR	9′-10″	59
A134	4	#6	STR	9′-4″	56
A135	4	#6	STR	8′-10″	53
A136	4	#6	STR	8′-4″	50
A137	4	#6	STR	7′-10″	47
A138	4	#6	STR	7′-4″	44
A139	4	#6	STR	6′-10″	41
A140	4	#6	STR	6′-4″	38
A141	4	#6	STR	5′-10″	35
A142	4	#6	STR	5′-4″	32
A143	4	#6	STR	4′-10″	29
A144	4	#6	STR	4′-4″	26
A145	4	#6	STR	3′-10″	23
A146	2	#6	STR	3′-4″	10
A147	6	#6	STR	2′-10″	26
A230	514	#6	STR	11′-8″	9,007
A231	4	#6	STR	11′-4″	68
A232	4	#6	STR	10′-10″	65
A233	4	#6	STR	10′-4″	62
A234	4	#6	STR	9′-10″	59
A235	4	#6	STR	9′-4″	56
A236	4	#6	STR	8′-10″	53
A237	4	#6	STR	8′-4″	50
A238	4	#6	STR	7′-10″	47
A239	4	#6	STR	7′-4″	44
A240	4	#6	STR	6′-10″	41
A241	4	#6	STR	6′-4″	38
A242	4	#6	STR	5′-10″	35
A243	4	#6	STR	5′-4″	32
A244	4	#6	STR	4′-10″	29
A245	4	#6	STR	4′-4″	26
A246	4	#6	STR	3′-10″	23
A247	2	#6	STR	3′-4″	10
A248	2	#6	STR	2′-10″	9

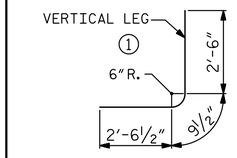
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	140	#4	STR	11′-8″	1,091
B2	281	#4	STR	9′-4″	1,752
C2	236	#4	STR	36′-10″	5,807
D1	7	#6	STR	1′-8″	18
G1	4	#5	STR	37′-0″	154
S1	13	#7	STR	37′-0″	983
S3	13	#7	STR	16′-3″	432

PHASE V - STAGE 4 REINFORCING STEEL
44,136 LBS.

PHASE V - STAGE 4 QUANTITIES

REINFORCING STEEL	
BARREL	44,136 LBS.
WING 2	1,357 LBS.
TOTAL	45,493 LBS.
CLASS A CONCRETE	
BARREL @ 1.794 CY/FT	252.1 CY
SILL	0.4 CY
END CURTAIN WALL	2.1 CY
WING 2	14.0 CY
HEADWALL	1.7 CY
TOTAL	270.3 CY

BAR TYPES



DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTHS

BAR	SIZE	LENGTH
"A"	#6	2′-9″
"B"	#4	1′-10″
"C"	#4	2′-5″
"S"	#7	3′-2″

PHASE VI - STAGE 5 QUANTITIES

REINFORCING STEEL	
PORTION OF WING 4	2,930 LBS.
TOTAL	2,930 LBS.
CLASS A CONCRETE	
END CURTAIN WALL	2.7 CY
PORTION OF WING 4	30.3 CY
TOTAL	33.0 CY

PHASE VI - STAGE 6 QUANTITIES

REINFORCING STEEL	
PORTION OF WING 3	1,127 LBS.
TOTAL	1,127 LBS.
CLASS A CONCRETE	
END CURTAIN WALL	1.0 CY
PORTION OF WING 3	11.4 CY
TOTAL	12.4 CY

PROJECT NO. U-5797
ROBESON COUNTY
STATION: 20+80.00 -Y2-

SHEET 8 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12′-0″ X 10′-0″
CONCRETE BOX CULVERT
45°-00′-00″ SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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2			4		

SHEET NO. C1-8
TOTAL SHEETS 12

DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

R:\Structures\04_Culverts\Culvert 20+80 -Y2- (Culvert I\02_Ustation\03_Final Plans\411_05_U-5797_SMU_CU_008_770C01.dgn
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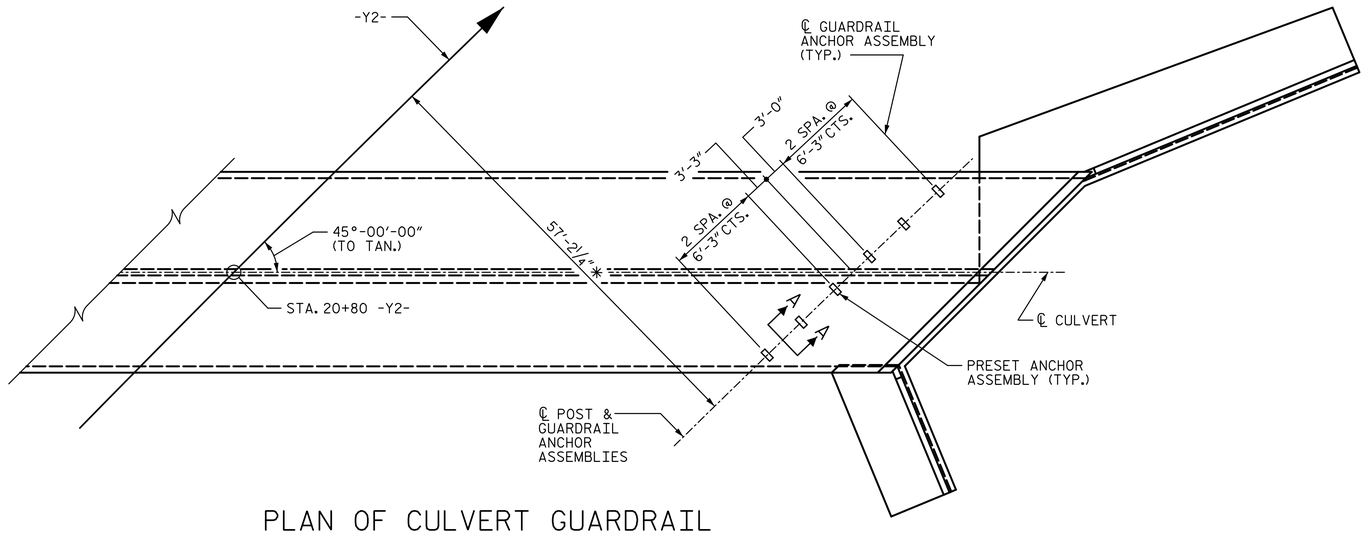
hensleg



PLAN OF CULVERT GUARDRAIL ANCHOR ASSEMBLY SPACING

* THIS DIMENSION TO BE CONFIRMED BY THE ENGINEER IN THE FIELD.

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½".

B. 4 - 1"Ø X 2¼" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1"Ø X 2 ¼" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 7/16"Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

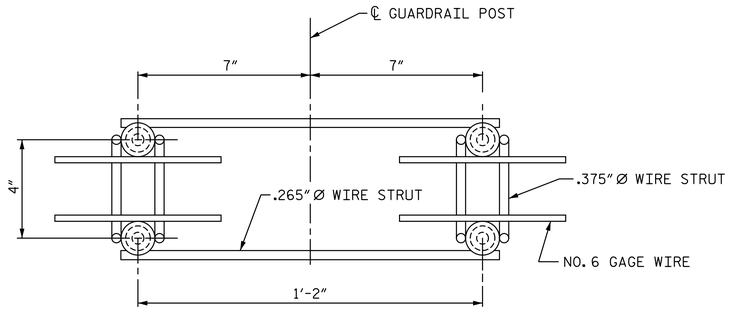
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

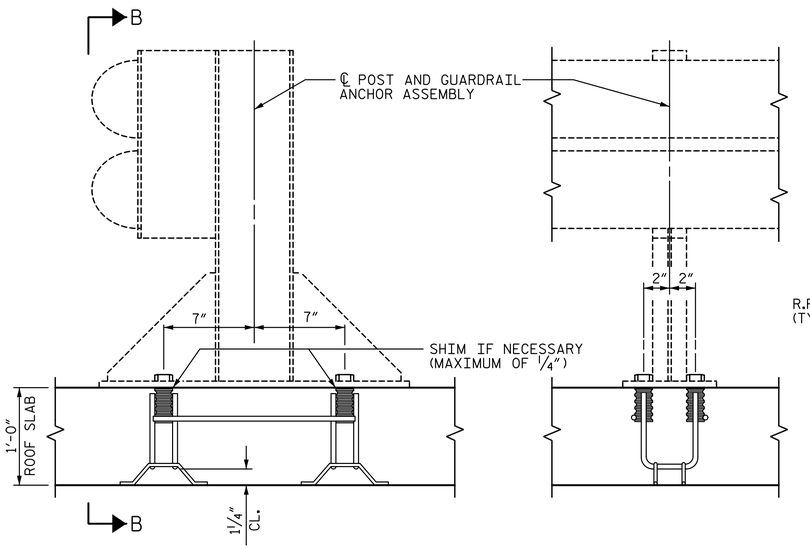
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1"Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

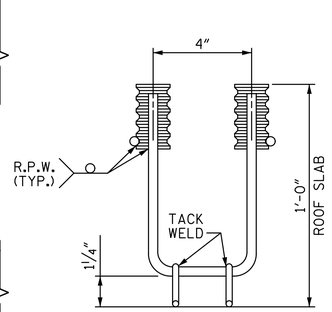


PLAN

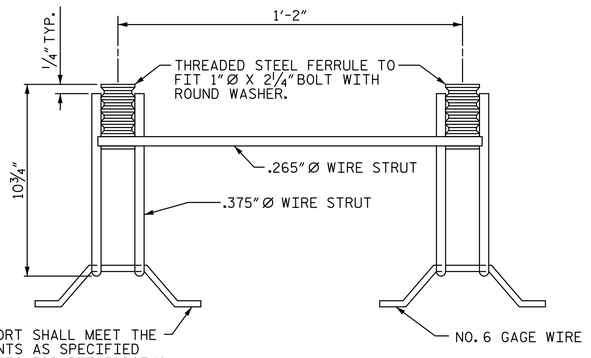


SECTION A-A

SECTION B-B



ELEVATION



THIS SUPPORT SHALL MEET THE REQUIREMENTS AS SPECIFIED FOR SUPPORTS FOR REINFORCING STEEL. SEE SPECIFICATIONS.

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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PROJECT NO. U-5797
ROBESON COUNTY
STATION: 20+80.00 -Y2-

SHEET 9 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

REVISIONS						SHEET NO.
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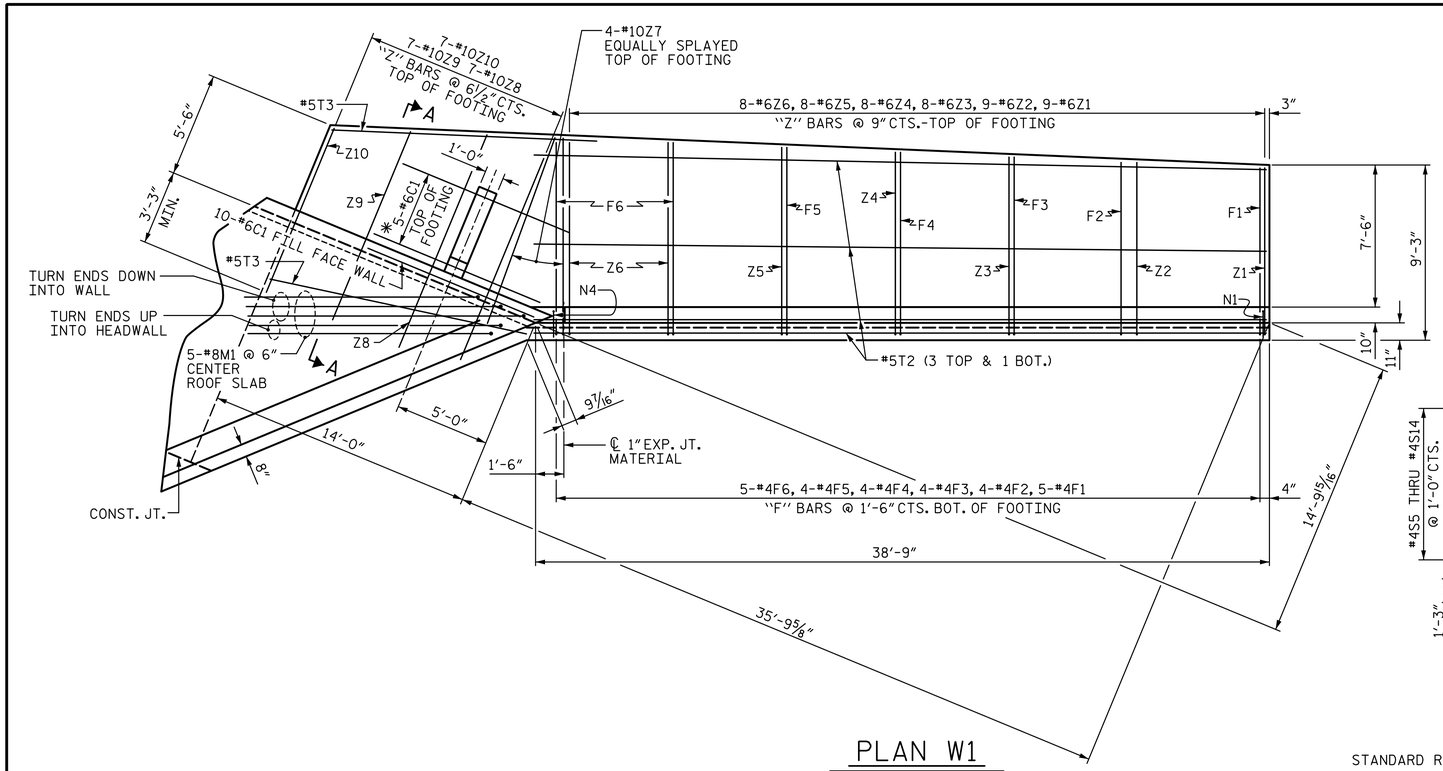
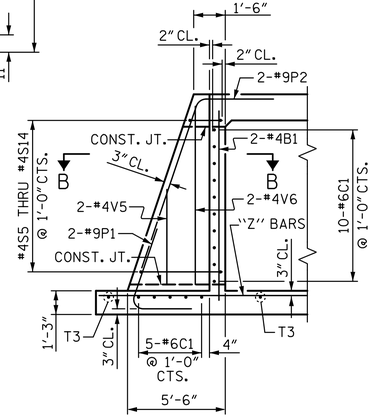
1			3			TOTAL SHEETS
2			4			12



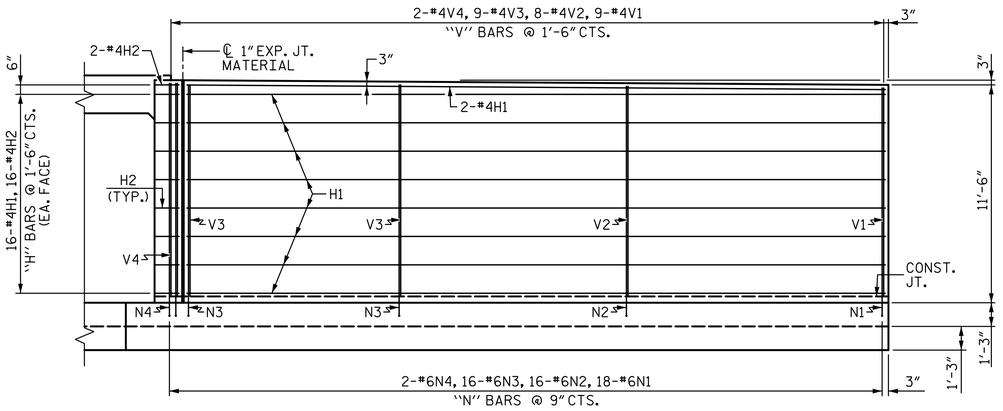
PLAN W1

*CENTER ALL #6C1 BARS ON ℄ COUNTERFORT

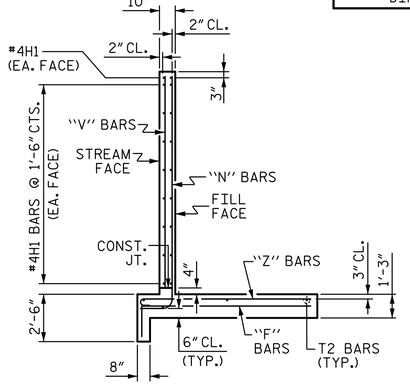


SECTION A-A

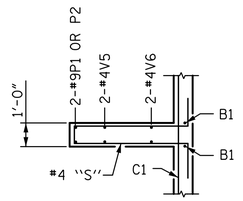
STANDARD REINFORCING STEEL IN BARREL NOT SHOWN



ELEVATION W1

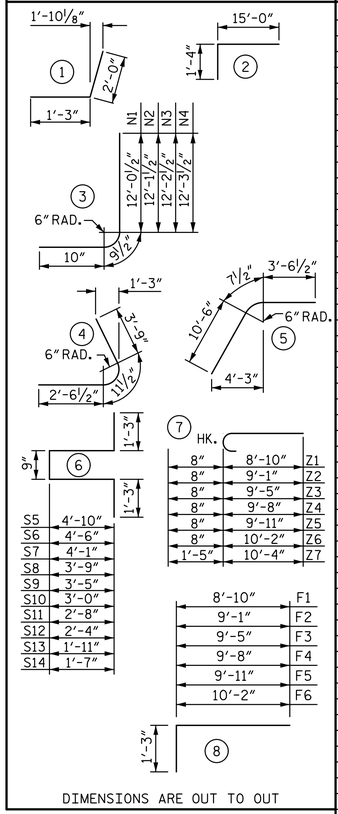


WING SECTION



SECTION B-B

BAR TYPES



DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	2	#4	STR	11'-0"	15
C1	15	#6	STR	10'-0"	225
H1	18	#4	STR	36'-10"	443
H2	18	#4	1	3'-3"	39
M1	5	#8	2	16'-4"	218
N1	18	#6	3	13'-8"	369
N2	16	#6	3	13'-9"	330
N3	16	#6	3	13'-10"	332
N4	2	#6	3	13'-11"	42
P1	2	#9	4	7'-3"	49
P2	2	#9	5	14'-8"	100
S5	1	#4	6	12'-11"	9
S6	1	#4	6	12'-3"	8
S7	1	#4	6	11'-5"	8
S8	1	#4	6	10'-9"	7
S9	1	#4	6	10'-1"	7
S10	1	#4	6	9'-3"	6
S11	1	#4	6	8'-7"	6
S12	1	#4	6	7'-11"	5
S13	1	#4	6	7'-1"	5
S14	1	#4	6	6'-5"	4
F1	5	#4	8	10'-1"	34
F2	4	#4	8	10'-4"	28
F3	4	#4	8	10'-8"	29
F4	4	#4	8	10'-11"	29
F5	4	#4	8	11'-2"	30
F6	5	#4	8	11'-5"	38
T2	4	#5	STR	38'-8"	161
T3	2	#5	STR	14'-0"	29
V1	9	#4	STR	11'-0"	66
V2	8	#4	STR	11'-1"	59
V3	9	#4	STR	11'-2"	67
V4	2	#4	STR	11'-3"	15
V5	2	#4	STR	5'-0"	7
V6	2	#4	STR	9'-6"	13
Z1	9	#6	7	9'-6"	128
Z2	9	#6	7	9'-9"	132
Z3	8	#6	7	10'-1"	121
Z4	8	#6	7	10'-4"	124
Z5	8	#6	7	10'-7"	127
Z6	8	#6	7	10'-10"	130
Z7	4	#10	7	11'-9"	202
Z8	7	#10	STR	11'-6"	346
Z9	7	#10	STR	10'-1"	304
Z10	7	#10	STR	8'-10"	266
REINFORCING STEEL					4,712 LBS.

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 20+80.00 -Y2-

SHEET 10 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 1 FOR CONCRETE BOX CULVERT

H = 10'-0" SLOPE = 3:1

45° SKEW

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2			4			12

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

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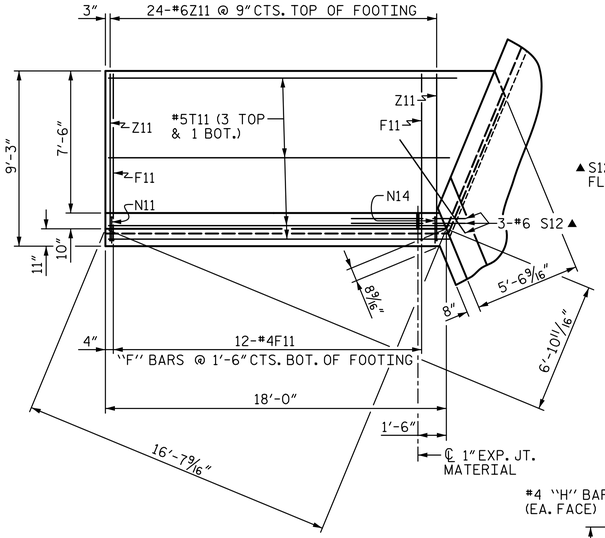
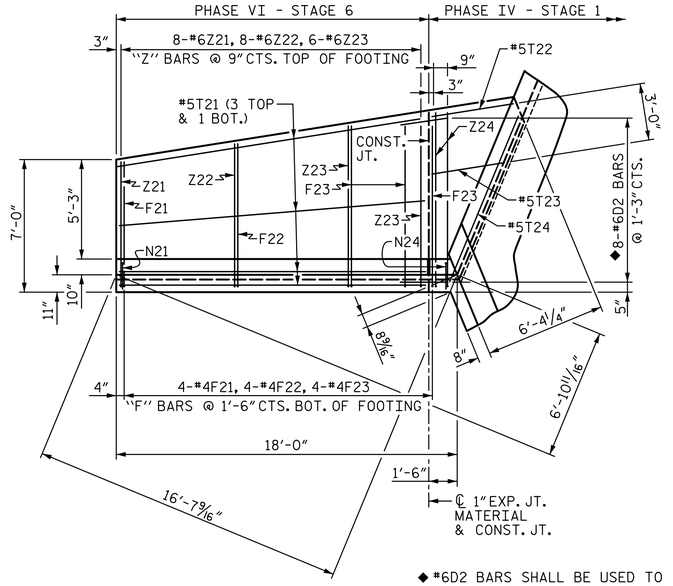
DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE :	11-24

hensleg 1/23/2025 1:37:36 PM R:\Structures\04_Culverts\Culvert 20+80 -Y2- (Culvert 1)\02_Ustation\03_Final Plans\411_09_U-5797_SMU_CU_010_77OC01.dgn



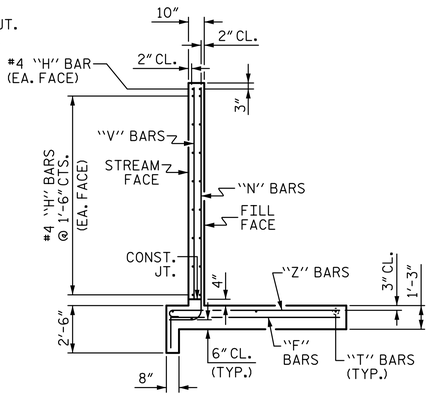
▲S12 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

PLAN W2

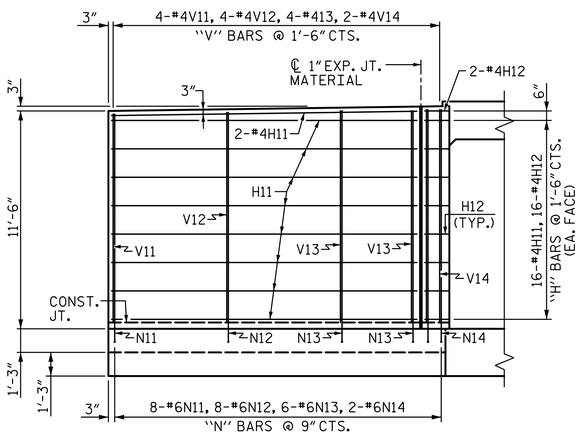


PLAN W3

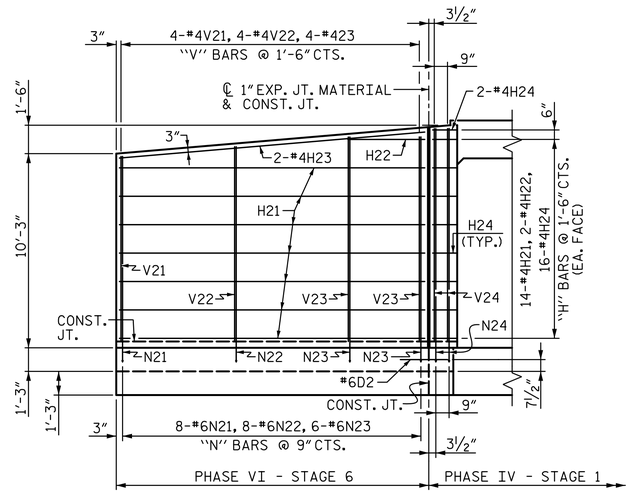
◆ #6D2 BARS SHALL BE USED TO CONNECT THE PHASE VI-STAGE 6 PORTION OF THE FOOTING TO THE PHASE IV-STAGE 1 PORTION OF THE FOOTING. NO FIELD TESTING IS REQUIRED. FOR PLACEMENT REQUIREMENTS, SEE "STANDARD NOTES" SHEET.



WING SECTION

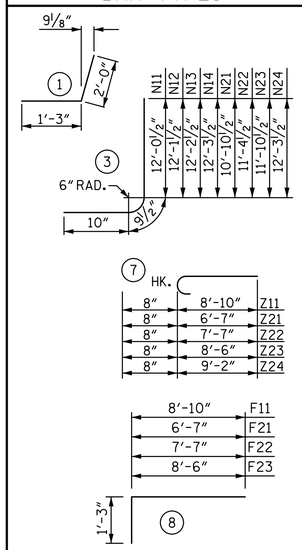


ELEVATION W2



ELEVATION W3

BAR TYPES



DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR WING 3 (PHASE IV - STAGE 1)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F23	1	#4	8	9'-9"	7
H24	16	#4	1	3'-3"	35
N24	2	#6	3	13'-11"	42
T22	1	#5	STR	4'-4"	5
T23	1	#5	STR	3'-10"	4
T24	1	#5	STR	9'-5"	10
V24	2	#4	STR	11'-2"	15
Z24	2	#6	7	9'-10"	30

REINFORCING STEEL FOR WING 3 (PHASE IV - STAGE 1) 148 LBS.

BILL OF MATERIAL FOR WING 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F11	12	#4	8	10'-1"	81
H11	18	#4	STR	16'-1"	193
H12	18	#4	1	3'-3"	39
N11	8	#6	3	13'-8"	164
N12	8	#6	3	13'-9"	165
N13	6	#6	3	13'-10"	125
N14	2	#6	3	13'-11"	42
S12	3	#6	STR	6'-0"	27
T11	4	#5	STR	18'-0"	75
V11	4	#4	STR	11'-0"	29
V12	4	#4	STR	11'-1"	30
V13	4	#4	STR	11'-2"	30
V14	2	#4	STR	11'-3"	15
Z11	24	#6	7	9'-6"	342

REINFORCING STEEL FOR WING 2 1,357 LBS.

BILL OF MATERIAL FOR WING 3 (PHASE VI - STAGE 6)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F21	4	#4	8	7'-10"	21
F22	4	#4	8	8'-10"	24
F23	3	#4	8	9'-9"	20
D2	8	#6	STR	3'-3"	39
H21	14	#4	STR	16'-1"	150
H22	2	#4	STR	4'-0"	5
H23	2	#4	STR	16'-2"	22
N21	8	#6	3	12'-6"	150
N22	8	#6	3	13'-0"	156
N23	6	#6	3	13'-6"	122
T21	4	#5	STR	16'-2"	67
V21	4	#4	STR	9'-9"	26
V22	4	#4	STR	10'-3"	27
V23	4	#4	STR	10'-9"	29
Z21	8	#6	7	7'-3"	87
Z22	8	#6	7	8'-3"	99
Z23	6	#6	7	9'-2"	83

REINFORCING STEEL FOR WING 3 (PHASE V1 - STAGE 6) 1,127 LBS.

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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ROBESON COUNTY
STATION: 20+80.00 -Y2-

SHEET 11 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS 2 & 3 FOR CONCRETE BOX CULVERT

H = 10'-0" SLOPE = 3:1
45° SKEW

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			12

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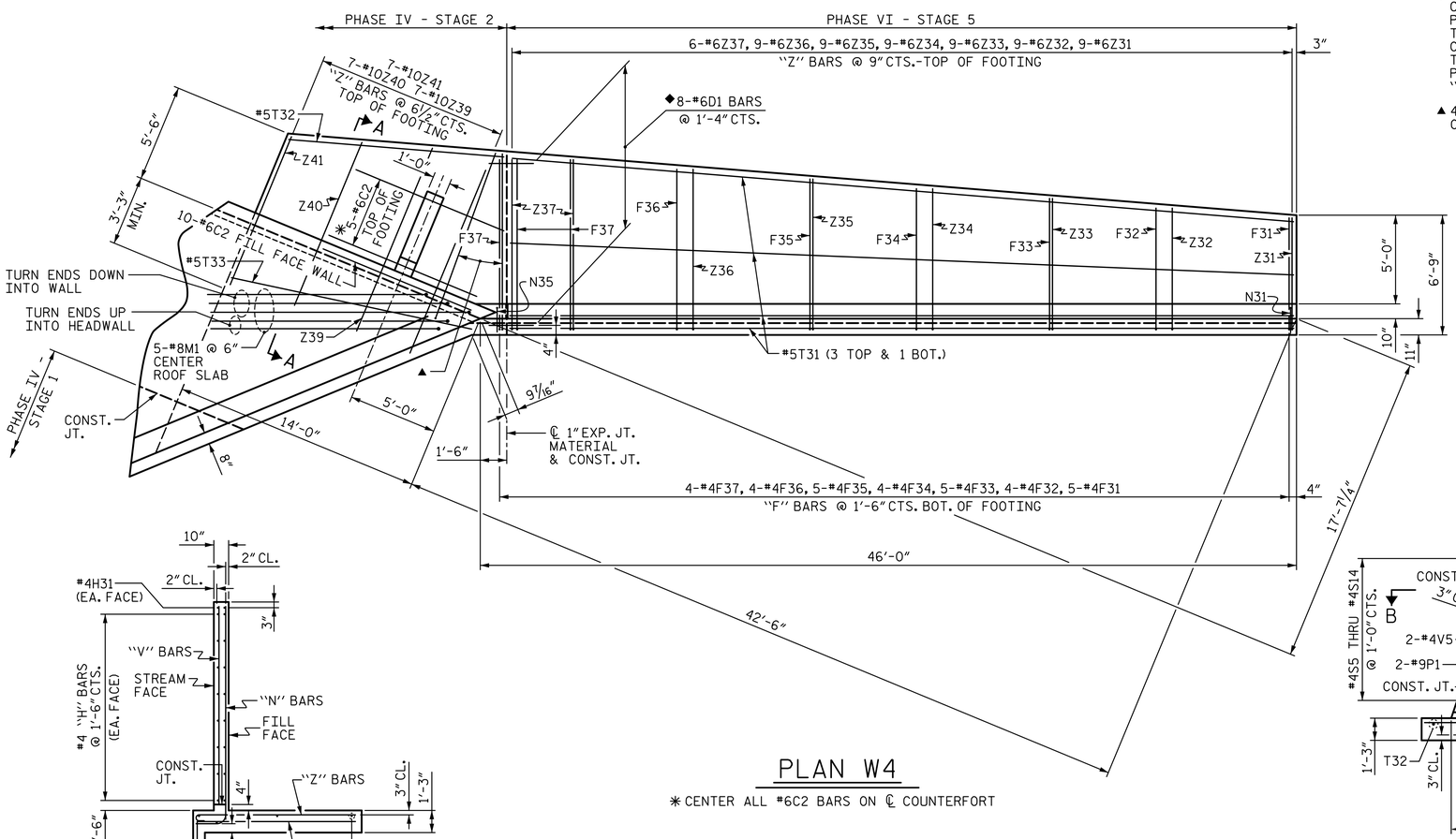
DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE : 11-24

◆ #6D2 BARS SHALL BE USED TO CONNECT THE PHASE VI-STAGE 5 PORTION OF THE FOOTING TO THE PHASE IV-STAGE 2 PORTION OF THE FOOTING. NO FIELD TESTING IS REQUIRED. FOR PLACEMENT REQUIREMENTS, SEE "STANDARD NOTES" SHEET.

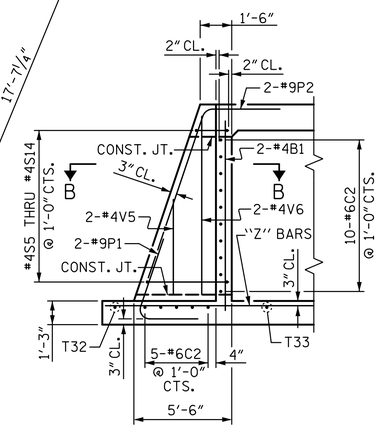
▲ 4-#10Z38 EQUALLY SPLAYED TOP OF FOOTING



* CENTER ALL #6C2 BARS ON ℄ COUNTERFORT

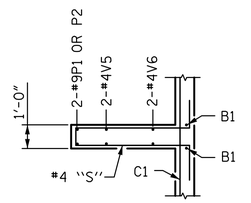
PLAN W4

WING SECTION

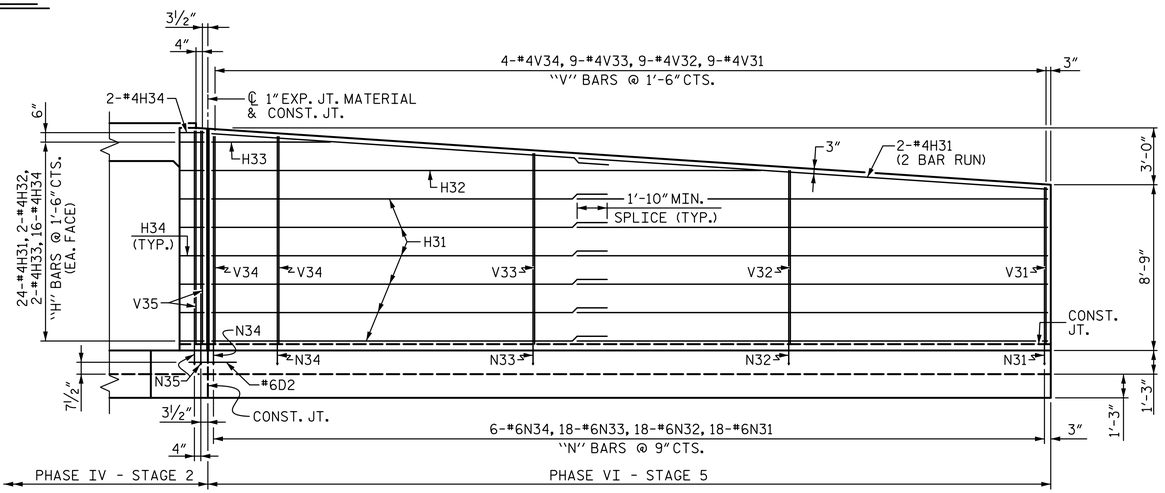


SECTION A-A

STANDARD REINFORCING STEEL IN BARREL NOT SHOWN

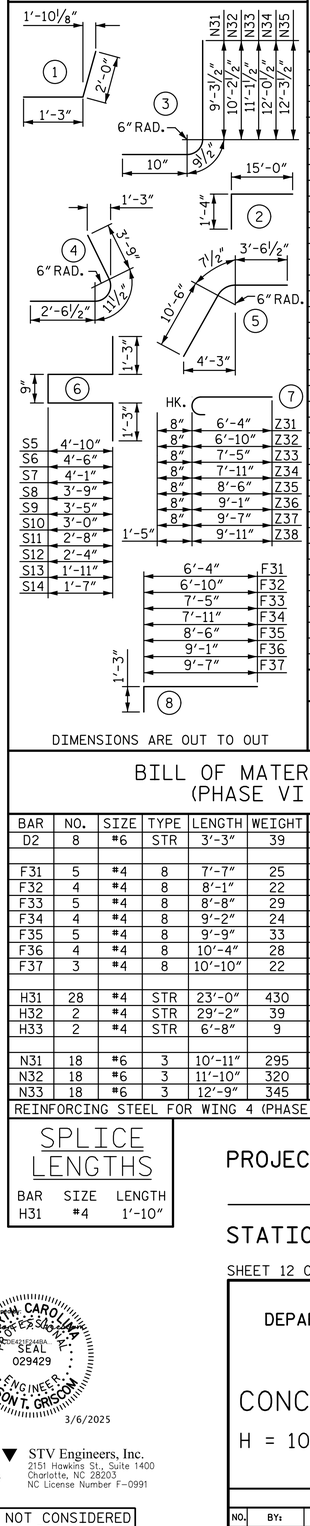


SECTION B-B



ELEVATION W4

BAR TYPES



DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR WING 4 (PHASE IV - STAGE 2)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	2	#4	STR	11'-0"	15
C2	15	#6	STR	8'-8"	195
F37	1	#4	8	10'-10"	7
H34	18	#4	1	3'-3"	39
M1	5	#8	2	16'-4"	218
N35	2	#6	3	13'-11"	42
P1	2	#9	4	7'-3"	49
P2	2	#9	5	14'-8"	100
S5	1	#4	6	12'-11"	9
S6	1	#4	6	12'-3"	8
S7	1	#4	6	11'-5"	8
S8	1	#4	6	10'-9"	7
S9	1	#4	6	10'-1"	7
S10	1	#4	6	9'-3"	6
S11	1	#4	6	8'-7"	6
S12	1	#4	6	7'-11"	5
S13	1	#4	6	7'-1"	5
S14	1	#4	6	6'-5"	4
T32	1	#5	STR	12'-0"	13
T33	1	#5	STR	14'-0"	15
V5	2	#4	STR	5'-0"	7
V6	2	#4	STR	9'-6"	13
V35	2	#4	STR	11'-3"	15
Z38	4	#10	7	11'-4"	195
Z39	7	#10	STR	11'-1"	334
Z40	7	#10	STR	9'-11"	299
Z41	7	#10	STR	8'-10"	266

REINFORCING STEEL FOR WING 4 (PHASE IV - STAGE 2) 1,887 LBS.

BILL OF MATERIAL FOR WING 4 (PHASE VI - STAGE 5)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D2	8	#6	STR	3'-3"	39	N34	6	#6	3	13'-8"	123
F31	5	#4	8	7'-7"	25	T31	4	#5	STR	44'-2"	184
F32	4	#4	8	8'-1"	22						
F33	5	#4	8	8'-8"	29	V31	9	#4	STR	8'-3"	50
F34	4	#4	8	9'-2"	24	V32	9	#4	STR	9'-1"	55
F35	5	#4	8	9'-9"	33	V33	9	#4	STR	10'-0"	60
F36	4	#4	8	10'-4"	28	V34	4	#4	STR	10'-11"	29
F37	3	#4	8	10'-10"	22						
						Z31	9	#6	7	7'-0"	95
H31	28	#4	STR	23'-0"	430	Z32	9	#6	7	7'-6"	101
H32	2	#4	STR	29'-2"	39	Z33	9	#6	7	8'-1"	109
H33	2	#4	STR	6'-8"	9	Z34	9	#6	7	8'-7"	116
						Z35	9	#6	7	9'-2"	124
N31	18	#6	3	10'-11"	295	Z36	9	#6	7	9'-9"	132
N32	18	#6	3	11'-10"	320	Z37	6	#6	7	10'-3"	92
N33	18	#6	3	12'-9"	345						

REINFORCING STEEL FOR WING 4 (PHASE VI - STAGE 5) 2,930 LBS.

SPLICE LENGTHS

BAR	SIZE	LENGTH
H31	#4	1'-10"

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 20+80.00 -Y2-

SHEET 12 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 4 FOR CONCRETE BOX CULVERT

H = 10'-0" SLOPE = 3:1

45° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-12
1			3			TOTAL SHEETS
2			4			12

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

stv STV Engineers, Inc.
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NC License Number F-0991

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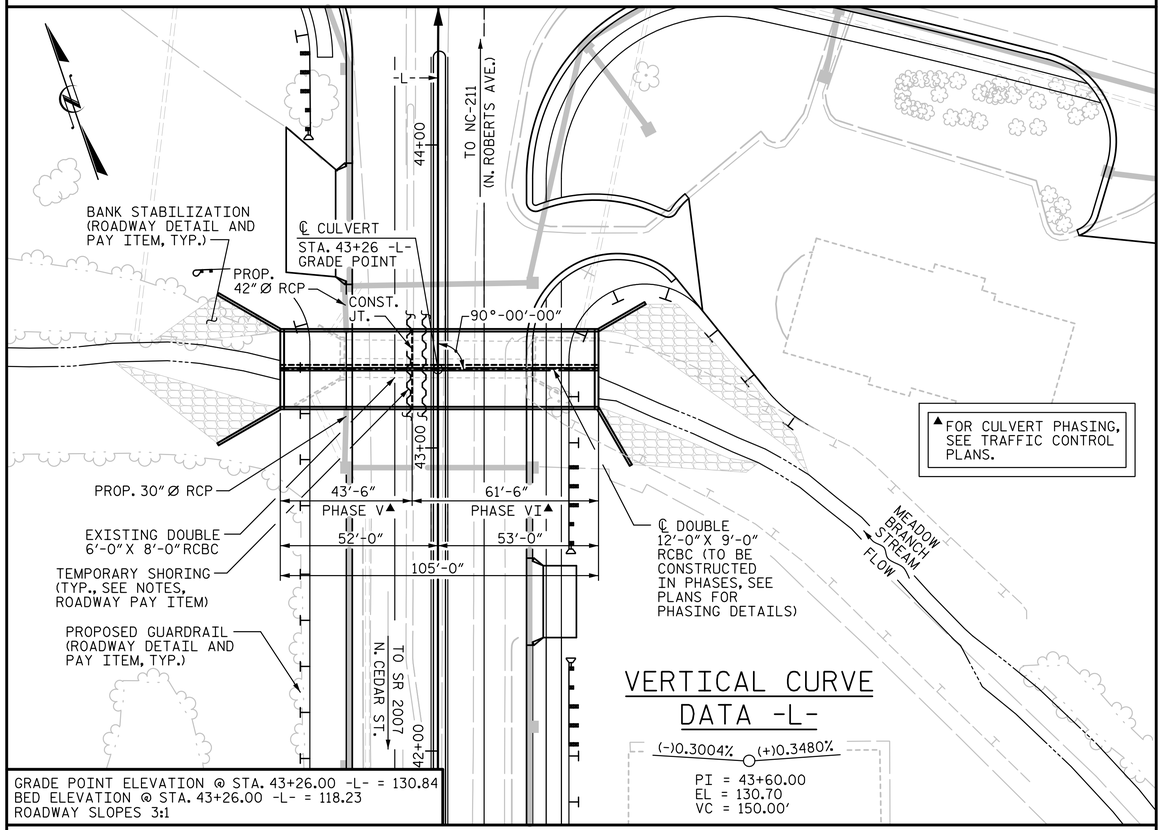
DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

hensleg 1/23/2025 1:38:18 PM R:\Structures\04_Culverts\Culvert 20+80 -Y2- (Culvert I)\02_Ustation\03_Final Plans\4ll_023_U-5797_SMU_CU_012_T7OC01.dgn

BM-2: BENCHTIE IN 18" OAK, STA. 41+67.70 -L-, 168.50' LT., EL. 128.48, N 323306, E 1999369



GRADE POINT ELEVATION @ STA. 43+26.00 -L- = 130.84
BED ELEVATION @ STA. 43+26.00 -L- = 118.23
ROADWAY SLOPES 3:1

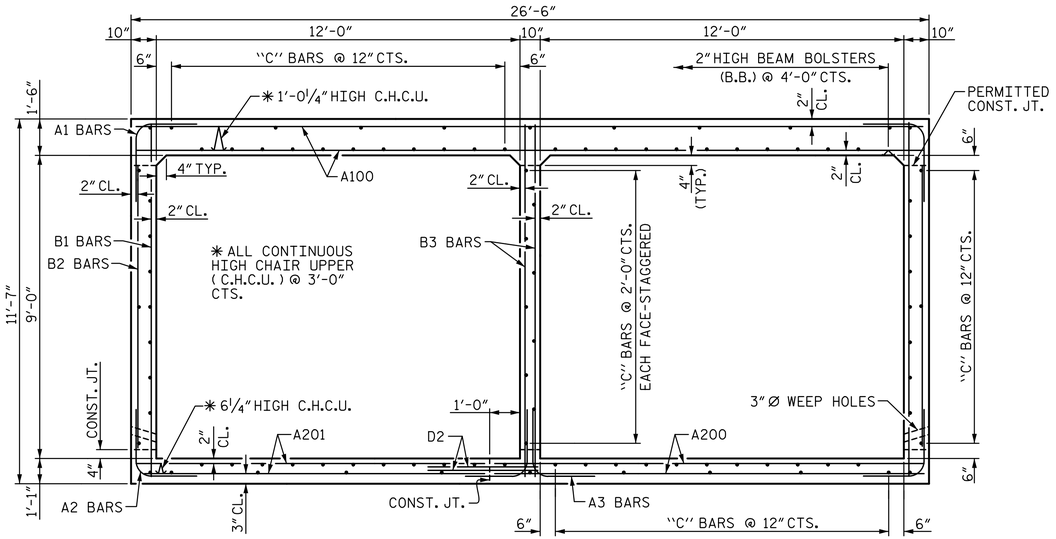
VERTICAL CURVE DATA -L-

(-)0.3004% (+)0.3480%

PI = 43+60.00
EL = 130.70
VC = 150.00'

LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.



RIGHT ANGLE SECTION OF BARREL

(LOOKING UPSTREAM)
THERE ARE 95 "C" BARS IN SECTION OF BARREL.

DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

HYDRAULIC DATA

DESIGN DISCHARGE:	1,340 CFS
FREQUENCY OF DESIGN FLOOD:	50 YRS.
DESIGN HIGH WATER ELEVATION:	130.0
DRAINAGE AREA:	3.76 SQ. MI.
BASE DISCHARGE (Q100):	1,520 CFS
BASE HIGH WATER ELEVATION:	130.8

OVERTOPPING DATA

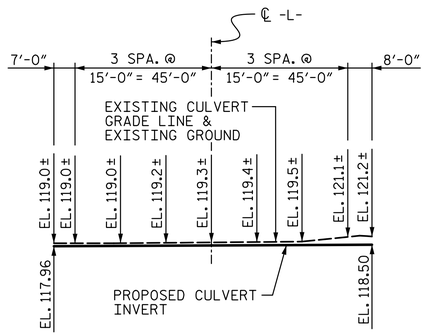
OVERTOPPING DISCHARGE:	1,520 CFS
FREQUENCY OF OVERTOPPING FLOOD:	100± YRS.
OVERTOPPING FLOOD ELEVATION:	130.8

OVERTOPPING OCCURS AT ℄ AT THE SAG STA. 43+54.50 -L-

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
PHASE V - STAGE 1	68.8 C.Y.
PHASE V - STAGE 2	121.0 C.Y.
PHASE VI - STAGE 3	88.5 C.Y.
PHASE VI - STAGE 4	158.1 C.Y.
TOTAL	436.4 C.Y.
REINFORCING STEEL	
PHASE V - STAGE 1	9,212 LBS.
PHASE V - STAGE 2	16,680 LBS.
PHASE VI - STAGE 3	12,033 LBS.
PHASE VI - STAGE 4	21,996 LBS.
TOTAL	59,921 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
PHASE V - STAGE 1	51 TONS
PHASE V - STAGE 2	42 TONS
PHASE VI - STAGE 3	72 TONS
PHASE VI - STAGE 4	60 TONS
TOTAL	225 TONS
REMOVAL OF EXISTING STRUCTURE STA. 43+26.00 -L-	LUMP SUM

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PROFILE ALONG ℄ CULVERT

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

DESIGN FILL---------- 2.29' MAX. AND 1.06' MIN.

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

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

CONCRETE IN EACH STAGE 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, ROOF SLAB AND HEADWALLS FOLLOWED BY THE SILLS.

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 LAYOUTS AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEETS.

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

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

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING DOUBLE 6'-0" X 8'-0" RCBC LOCATED AT THE SAME LOCATION AS THE PROPOSED CULVERT SHALL BE REMOVED. THE EXISTING STRUCTURE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE STRUCTURE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED CULVERT, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

TRAFFIC ON SR 1997 (FAYETTEVILLE RD.) SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN PHASES AS SHOWN IN THE PLANS, SEE TRAFFIC CONTROL PLANS.

EXCAVATE FOUNDATION A MINIMUM OF 12" BELOW CULVERT BEARING ELEVATION. PLACE 12" OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

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

ENCAPSULATE ALL FOUNDATION CONDITIONING MATERIAL IN TYPE 4 GEOTEXTILE. FOR FOUNDATION CONDITIONING GEOTEXTILE, SEE BOX CULVERT EXCAVATION (SPECIAL) PROVISION.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 43+26.00 -L-

SHEET 1 OF 11 STRUCTURE 770581

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 9'-0" CONCRETE BOX CULVERT 90°-00'-00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-1
1			3			TOTAL SHEETS
2			4			11

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

LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γLL)	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	2.28	1 & 2	TOP SLAB	5.55′/20.95′	1.04	1 & 2	TOP SLAB	12.83′/13.67′	
		HL-93 (OPERATING)	N/A		1.35	--	1.35	2.95	1 & 2	TOP SLAB	5.55′/20.95′	1.35	1 & 2	TOP SLAB	12.83′/13.67′	
		HS-20 (INVENTORY)	36.000	2	1.52	54.720	1.75	2.70	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.52	1 & 2	TOP SLAB	12.83′/13.67′	
		HS-20 (OPERATING)	36.000		1.97	70.920	1.35	3.51	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.97	1 & 2	TOP SLAB	12.83′/13.67′	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.40	45.900	1.40	4.72	1 & 2	EXTERIOR WALL	10.08′	3.40	1 & 2	TOP SLAB	12.83′/13.67′	
		SNGARBS2	20.000		2.96	59.200	1.40	4.59	1 & 2	EXTERIOR WALL	10.08′	2.96	1 & 2	TOP SLAB	12.83′/13.67′	
		SNAGRIS2	22.000		3.11	68.420	1.40	4.47	1 & 2	EXTERIOR WALL	1.08′	3.11	1 & 2	TOP SLAB	12.83′/13.67′	
		SNCOTTS3	27.250		1.47	40.058	1.40	3.05	1 & 2	TOP SLAB	5.55′/20.95′	1.47	1 & 2	TOP SLAB	12.83′/13.67′	
		SNAGGRS4	34.925		1.70	59.373	1.40	3.00	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.70	1 & 2	TOP SLAB	12.83′/13.67′	
		SNS5A	35.550		1.62	57.591	1.40	2.93	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.62	1 & 2	TOP SLAB	12.83′/13.67′	
		SNS6A	39.950		1.60	63.920	1.40	2.85	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.60	1 & 2	TOP SLAB	12.83′/13.67′	
		SNS7B	42.000		1.59	66.780	1.40	2.86	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.59	1 & 2	BOTTOM SLAB	12.83′/13.67′	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.93	63.690	1.40	3.32	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.93	1 & 2	BOTTOM SLAB	12.83′/13.67′	
		TNT4A	33.075		1.74	57.551	1.40	3.18	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.74	1 & 2	TOP SLAB	12.83′/13.67′	
		TNT6A	41.600		1.57	65.312	1.40	2.96	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.57	1 & 2	TOP SLAB	12.83′/13.67′	
		TNT7A	42.000		1.55	65.100	1.40	2.79	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.55	1 & 2	BOTTOM SLAB	12.83′/13.67′	
		TNT7B	42.000		1.68	70.560	1.40	2.92	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.68	1 & 2	TOP SLAB	12.83′/13.67′	
		TNAGRIT4	43.000	3	1.33	57.190	1.40	2.51	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.33	1 & 2	BOTTOM SLAB	12.83′/13.67′	
		TNAGT5A	45.000		1.58	71.100	1.40	2.86	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.58	1 & 2	BOTTOM SLAB	12.83′/13.67′	
		TNAGT5B	45.000		1.37	61.650	1.40	2.59	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.37	1 & 2	BOTTOM SLAB	12.83′/13.67′	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.04	58.650	1.30	3.54	1 & 2	TOP SLAB	5.55′/20.95′	2.04	1 & 2	TOP SLAB	12.83′/13.67′	
		EV3	43.000	4	1.16	49.880	1.30	2.58	1 & 2	BOTTOM SLAB	12.83′/13.67′	1.16	1 & 2	TOP SLAB	12.83′/13.67′	

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.

1. FOR WALL ELEMENTS THE LEFT END OF ELEMENT IS LOCATED FROM THE BOTTOM OF THE BOTTOM SLAB.

COMMENTS:

(#) CONTROLLING LOAD RATING

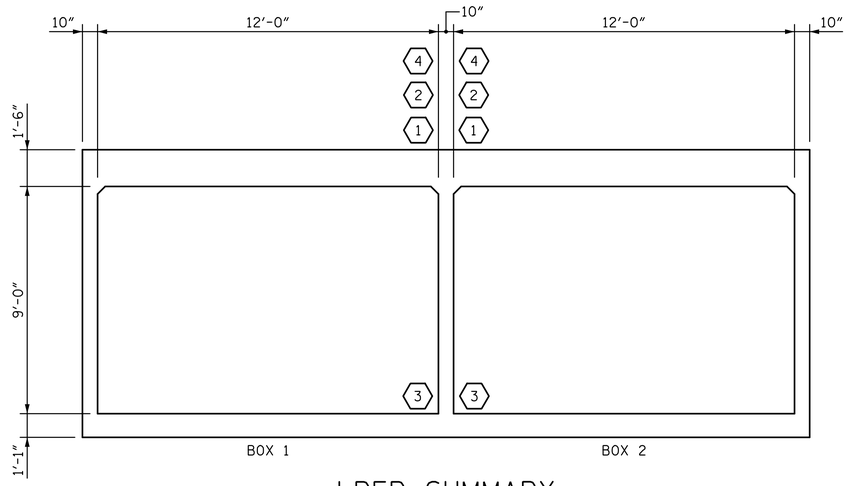
(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

(4) EMERGENCY VEHICLE LAOD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 43+26.00 -L-

SHEET 2 OF 11

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM

3/6/2025

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NC License Number F-0991

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			11

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DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

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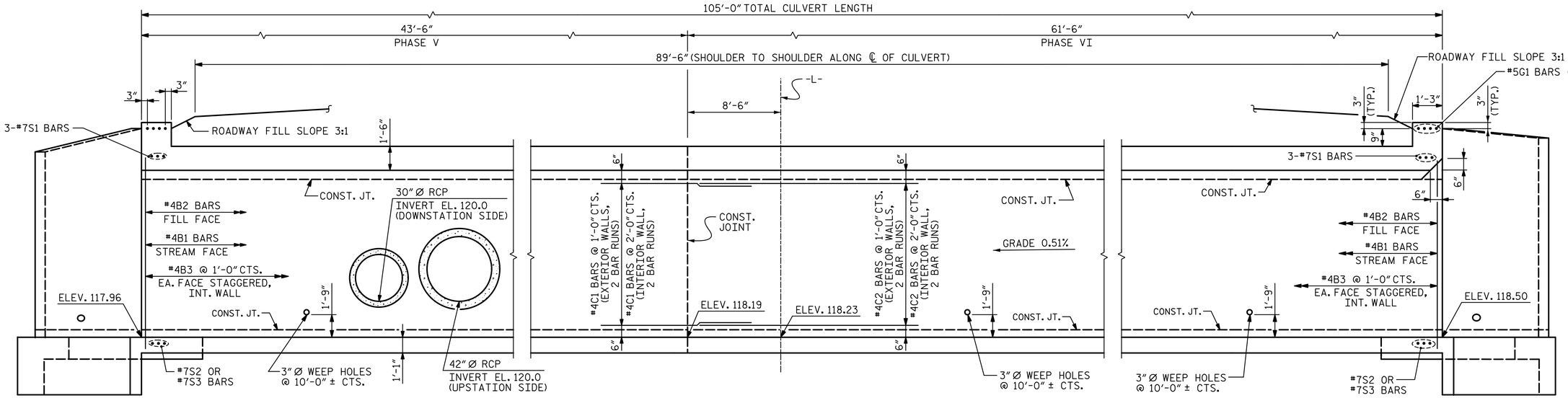
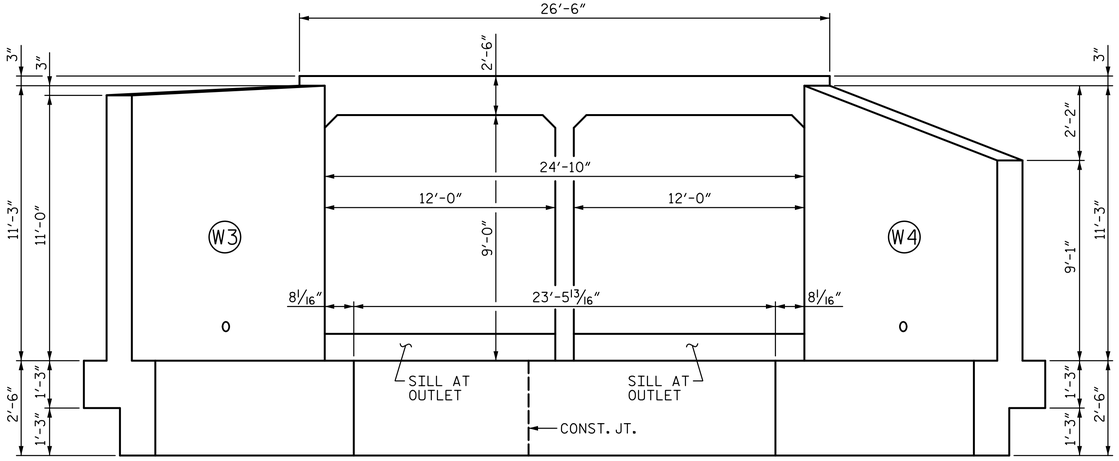
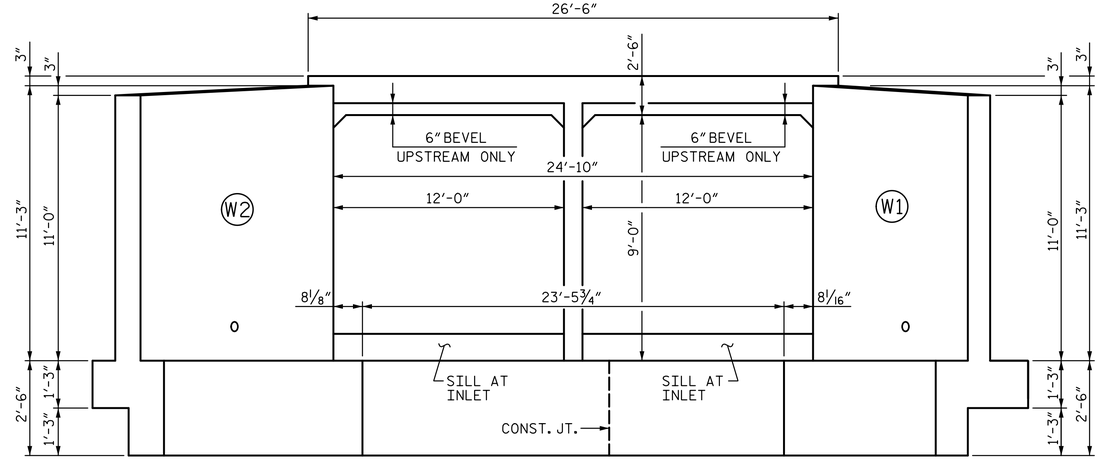


CULVERT SECTION NORMAL TO ROADWAY

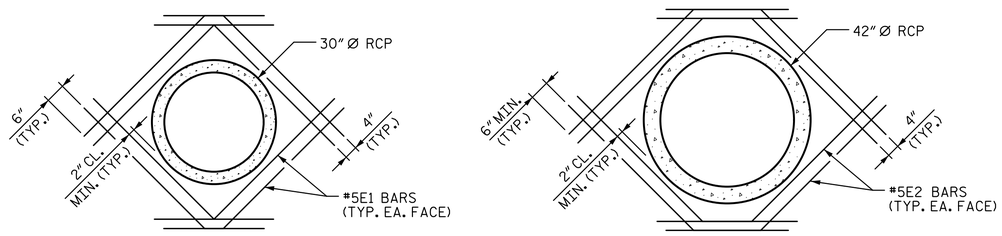
FOR APPROXIMATE PLAN VIEW LOCATION OF PIPES, SEE LOCATION SKETCH ON SHEET 1 OF 11



OUTLET ELEVATION NORMAL TO SKEW



INLET ELEVATION NORMAL TO SKEW



DETAIL OF REINFORCING AROUND RCP

THE 30" Ø AND 42" Ø PIPES THROUGH THE SIDEWALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER.
"E" BARS MAY BE SHIFTED, AS NECESSARY TO MAINTAIN 2" MINIMUM CLEARANCE.

DRAWN BY : SGH DATE : 11-24
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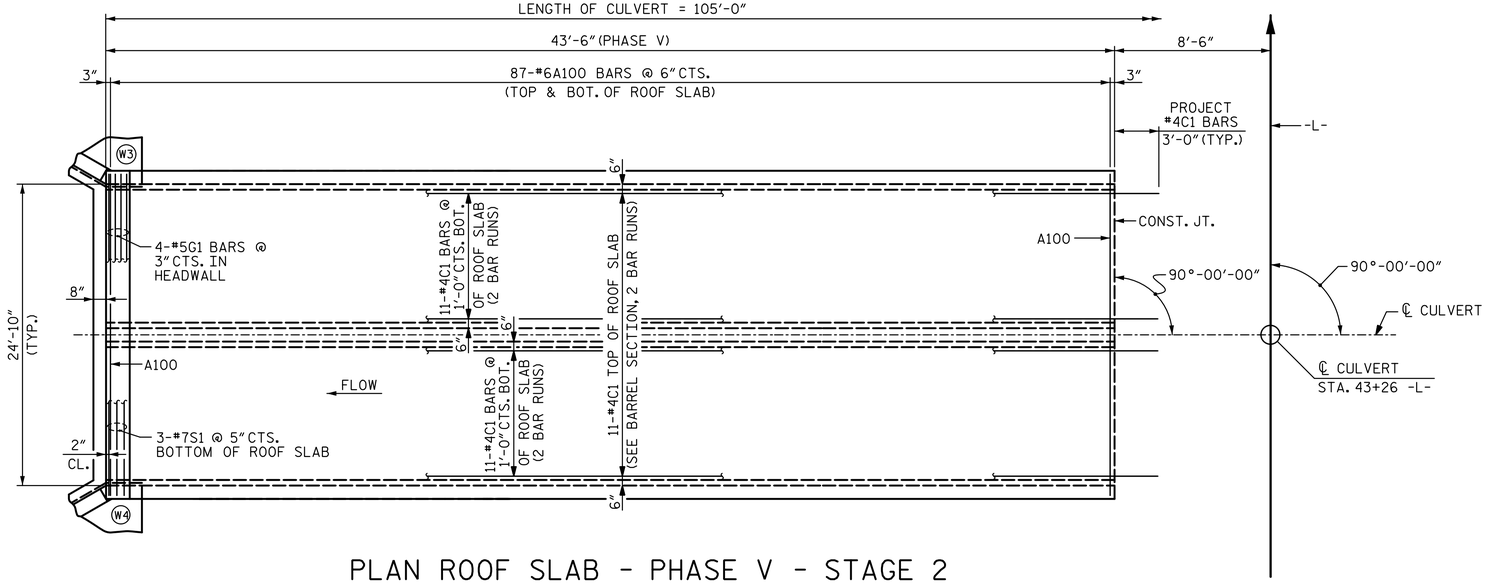
PROJECT NO. U-5797
ROBESON COUNTY
STATION: 43+26.00 -L-

SHEET 3 OF 11

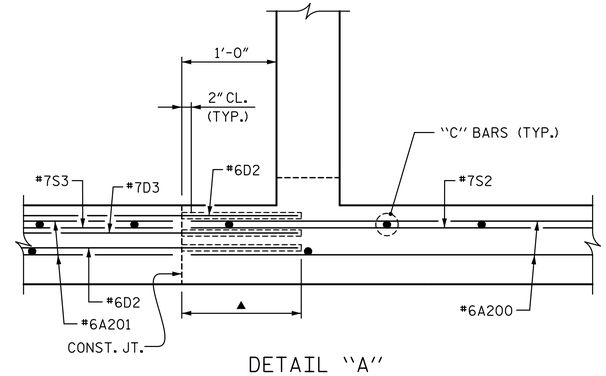
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 9'-0"
CONCRETE BOX CULVERT
90°-00'-00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-3
1			3			TOTAL SHEETS
2			4			11



PLAN ROOF SLAB - PHASE V - STAGE 2



DETAIL "A"

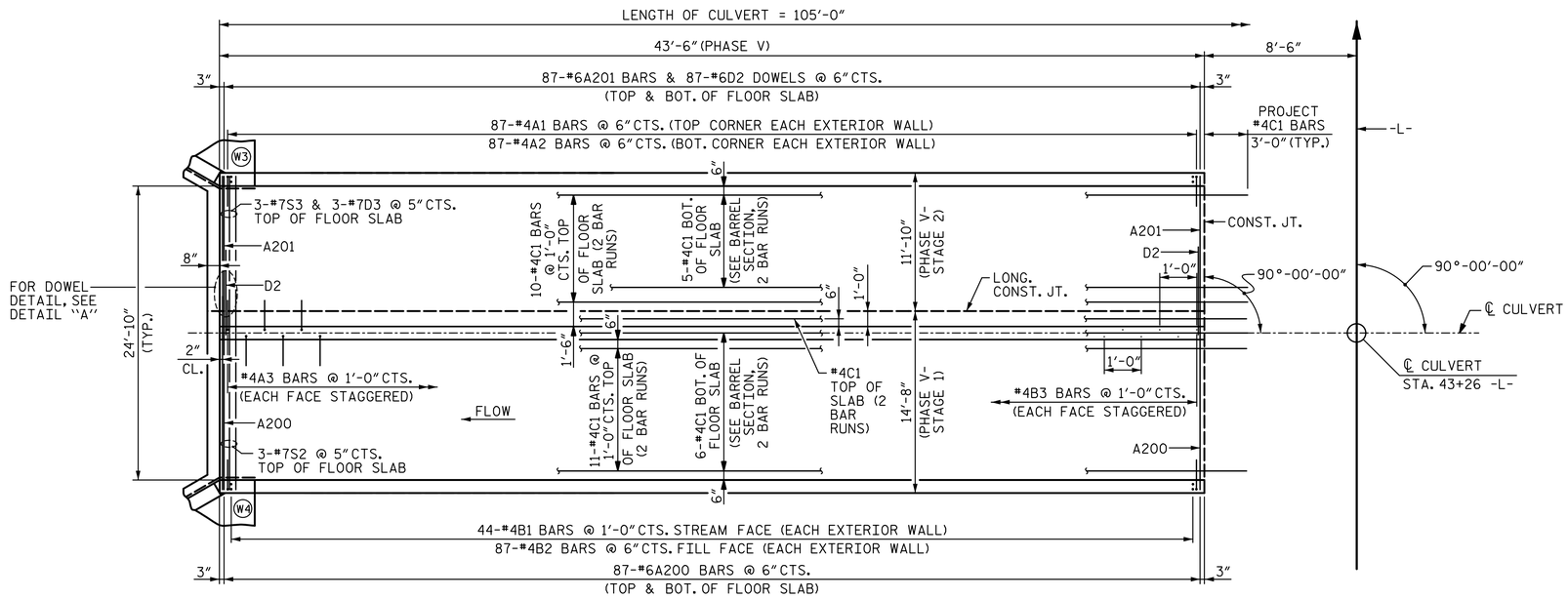
(A3 AND B3 BARS IN INTERIOR WALL NOT SHOWN FOR CLARITY.)

▲ EMBEDMENT SHALL BE PER MANUFACTURER'S RECOMMENDATION AND THE STANDARD SPECIFICATIONS.

THE CONTRACTOR SHALL USE ADHESIVELY ANCHORED DOWELS TO CONNECT EACH STAGE. LEVEL ONE FIELD TESTING IS REQUIRED. THE YIELD LOAD OF THE #6D2 DOWELS IS 26.4 KIPS AND THE YIELD LOAD OF THE #7D3 DOWELS IS 36.0 KIPS. FOR ADHESIVELY ANCHORED DOWELS, SEE STANDARD SPECIFICATIONS.

#6D2 DOWELS SHALL BE PLACED IN THE SAME HORIZONTAL PLANE AS THE TOP AND BOTTOM FLOOR SLAB REINFORCING.

#7D3 DOWELS SHALL BE PLACED IN THE SAME HORIZONTAL PLANE AS THE #7 S2 & S3 BARS.



PLAN FLOOR SLAB AND WALLS - PHASE V - STAGES 1 & 2

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 43+26.00 -L-

SHEET 4 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 9'-0"
CONCRETE BOX CULVERT
90°-00'-00" SKEW

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

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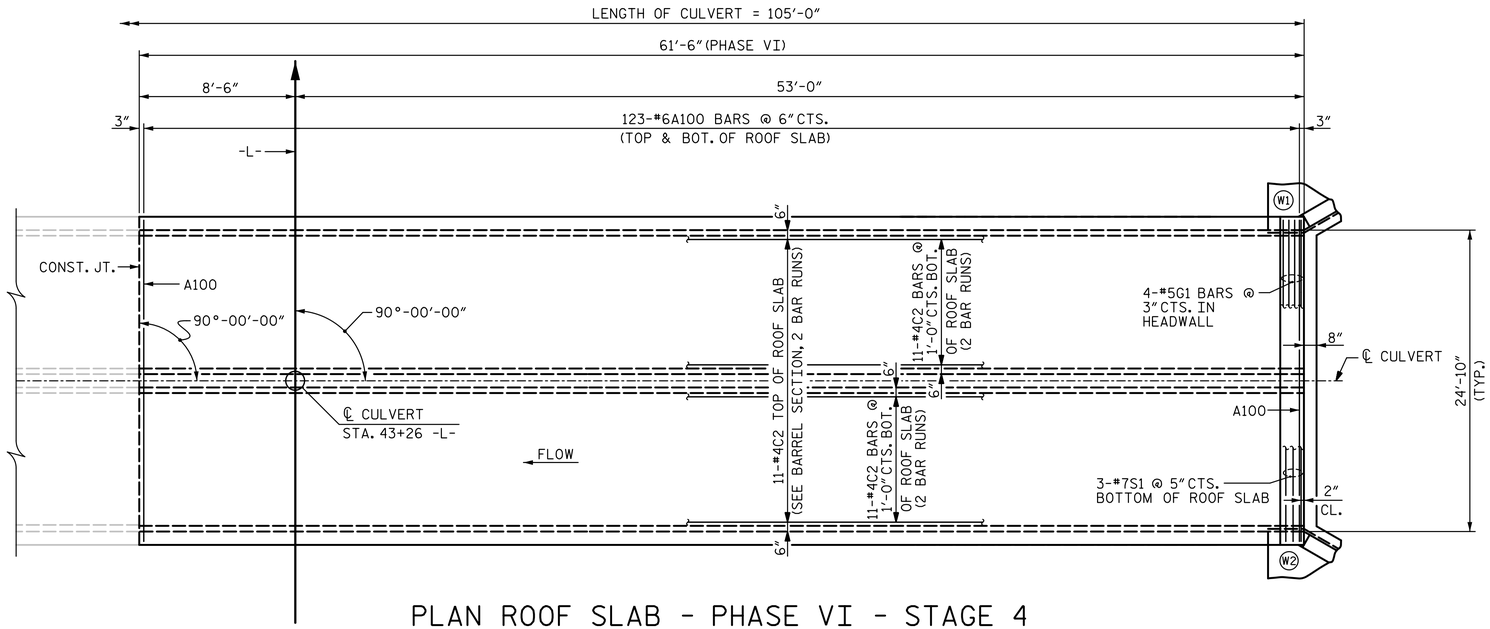
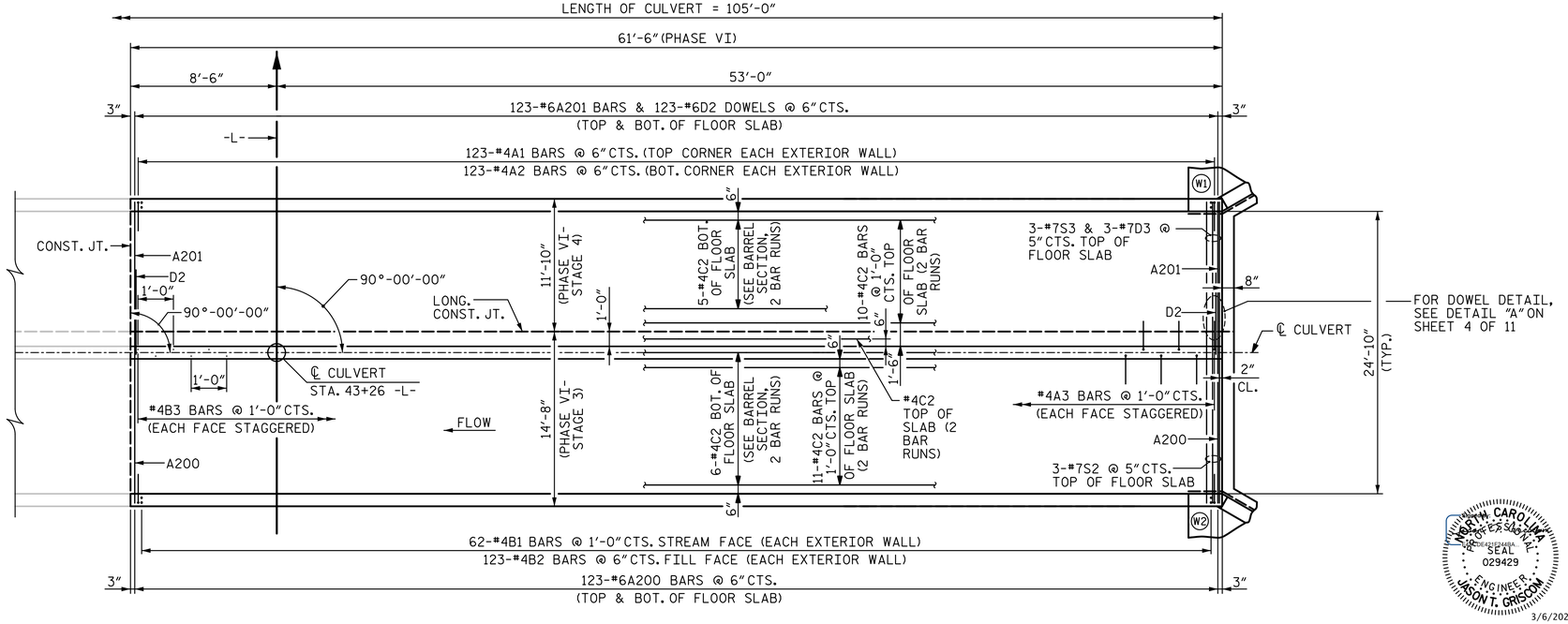
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-4
1			3			TOTAL SHEETS
2			4			11

NOTES:

SPLICE #4C2 BARS 2'-5" MIN. TO #4C1 BARS IN PHASE V - STAGES 1 & 2



PLAN ROOF SLAB - PHASE VI - STAGE 4



PLAN FLOOR SLAB AND WALLS - PHASE VI - STAGES 3 & 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM
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NC License Number F-0991

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DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE :	11-24

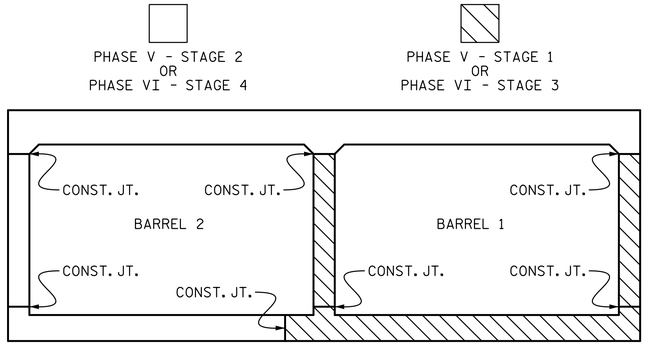
PROJECT NO. U-5797
ROBESON COUNTY
STATION: 43+26.00 -L-

SHEET 5 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 9'-0"
CONCRETE BOX CULVERT
90°-00'-00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-5
1			3			TOTAL SHEETS
2			4			11



PHASE V - STAGE 1 AND PHASE V - STAGE 2

POUR 1: PHASE V - STAGE 1 - FLOOR SLAB AND 4"OF VERTICAL WALLS/WING

POUR 2: PHASE V - STAGE 1 - REMAINING PORTIONS OF EXTERIOR WALL, WING 4 AND INTERIOR WALL

POUR 3: PHASE V - STAGE 2 - FLOOR SLAB AND 4"OF VERTICAL WALL/WING

POUR 4: PHASE V - STAGE 2 - REMAINING PORTION OF EXTERIOR WALL AND WING 3

POUR. 5: PHASE V - STAGE 2 - ENTIRE ROOF SLAB AND OUTLET HEADWALL

PHASE VI - STAGE 3 AND PHASE VI - STAGE 4

POUR 1: PHASE VI - STAGE 3 - FLOOR SLAB AND 4"OF VERTICAL WALLS/WING

POUR 2: PHASE VI - STAGE 3 - REMAINING PORTIONS OF EXTERIOR WALL, WING 2 AND INTERIOR WALL

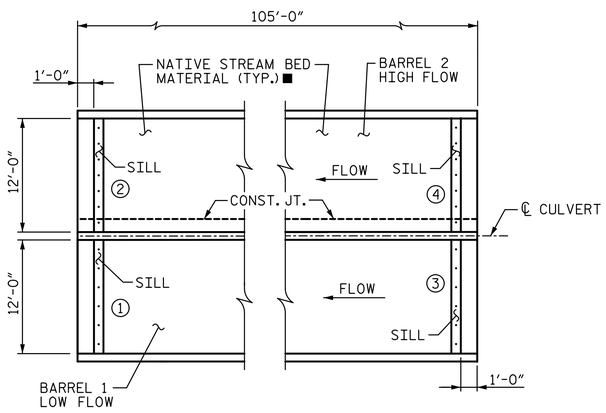
POUR 3: PHASE VI - STAGE 4 - FLOOR SLAB AND 4"OF VERTICAL WALL/WING

POUR 4: PHASE VI - STAGE 4 - REMAINING PORTION OF EXTERIOR WALL AND WING 1

POUR 5: PHASE VI - STAGE 4 - ENTIRE ROOF SLAB AND INLET HEADWALL

CULVERT CONSTRUCTION SEQUENCE

LOOKING UPSTREAM



PLAN VIEW - LOCATION OF SILLS

■ NATIVE STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT TO SILL HEIGHT BETWEEN SILLS.(SEE NOTE ON SHEET 1 OF 11)

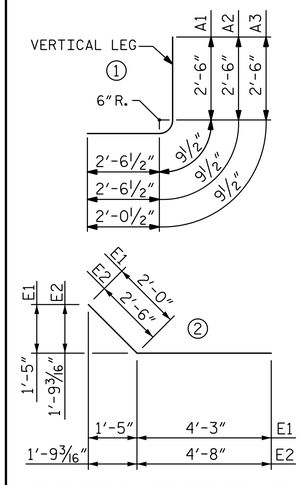
① SILL TO BE CONSTRUCTED IN PHASE V - STAGE 1

② SILL TO BE CONSTRUCTED IN PHASE V - STAGE 2

③ SILL TO BE CONSTRUCTED IN PHASE VI - STAGE 3

④ SILL TO BE CONSTRUCTED IN PHASE VI - STAGE 4

BAR TYPES



DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTHS

BAR	SIZE	LENGTH
"A"	#6	2'-9"
"B"	#4	1'-10"
"C"	#4	2'-5"
"S"	#7	3'-2"

BILL OF MATERIAL PHASE V - STAGE 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	87	#4	1	5'-10"	339
A2	87	#4	1	5'-10"	339
A3	87	#4	1	5'-4"	310
A200	174	#6	STR	14'-4"	3,746
B1	44	#4	STR	11'-2"	328
B2	87	#4	STR	8'-4"	484
B3	87	#4	STR	11'-2"	649
C1	74	#4	STR	24'-5"	1,207
D1	6	#6	STR	1'-8"	15
E1	16	#5	2	6'-3"	104
S2	3	#7	STR	14'-4"	88

PHASE V - STAGE 1 REINFORCING STEEL 7,609 LBS.

PHASE V - STAGE 1 QUANTITIES

REINFORCING STEEL	
BARREL	7,609 LBS.
WING 4	1,603 LBS.
TOTAL	9,212 LBS.
CLASS A CONCRETE	
BARREL @ 1.123 CY/FT	48.9 CY
SILL	0.4 CY
END CURTAIN WALL	2.3 CY
WING 4	17.2 CY
TOTAL	68.8 CY

BILL OF MATERIAL PHASE V - STAGE 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	87	#4	1	5'-10"	339
A2	87	#4	1	5'-10"	339
A100	174	#6	STR	26'-2"	6,839
A201	174	#6	STR	11'-6"	3,006
B1	44	#4	STR	11'-2"	328
B2	87	#4	STR	8'-4"	484
B3	87	#4	STR	11'-2"	649
C1	116	#4	STR	24'-5"	1,892
D1	7	#6	STR	1'-8"	18
D2	174	#6	STR	4'-6"	1,176
D3	3	#7	STR	4'-10"	30
E2	16	#5	2	7'-2"	120
G1	4	#5	STR	26'-2"	109
S1	3	#7	STR	26'-2"	160
S3	3	#7	STR	11'-6"	71

PHASE V - STAGE 2 REINFORCING STEEL 14,911 LBS.

PHASE V - STAGE 2 QUANTITIES

REINFORCING STEEL	
BARREL	14,911 LBS.
WING 3	1,769 LBS.
TOTAL	16,680 LBS.
CLASS A CONCRETE	
BARREL @ 2.254 CY/FT	98.0 CY
SILL	0.4 CY
END CURTAIN WALL	2.1 CY
WING 3	19.3 CY
HEADWALL	1.2 CY
TOTAL	121.0 CY

BILL OF MATERIAL PHASE VI - STAGE 3

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	123	#4	1	5'-10"	479
A2	123	#4	1	5'-10"	479
A3	123	#4	1	5'-4"	438
A100	246	#6	STR	26'-2"	9,668
A200	246	#6	STR	14'-4"	5,296
A201	246	#6	STR	11'-6"	4,249
B1	62	#4	STR	11'-2"	462
B2	123	#4	STR	8'-4"	685
B3	123	#4	STR	11'-2"	917
C2	74	#4	STR	31'-10"	1,574
D1	6	#6	STR	1'-8"	15
S2	3	#7	STR	14'-4"	88

PHASE VI - STAGE 3 REINFORCING STEEL 10,433 LBS.

PHASE VI - STAGE 3 QUANTITIES

REINFORCING STEEL	
BARREL	10,433 LBS.
WING 2	1,600 LBS.
TOTAL	12,033 LBS.
CLASS A CONCRETE	
BARREL @ 1.123 CY/FT	69.1 CY
SILL	0.4 CY
END CURTAIN WALL	2.2 CY
WING 2	16.8 CY
TOTAL	88.5 CY

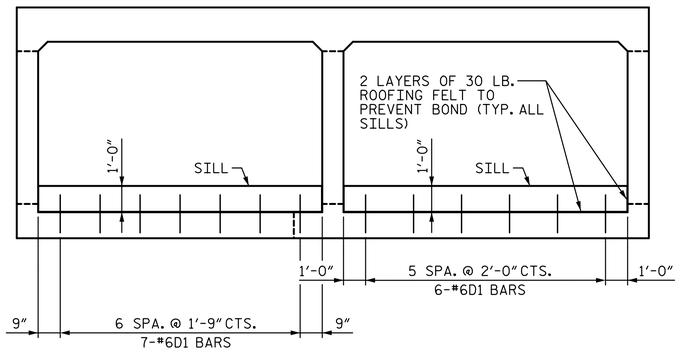
BILL OF MATERIAL PHASE VI - STAGE 4

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	123	#4	1	5'-10"	479
A2	123	#4	1	5'-10"	479
A100	246	#6	STR	26'-2"	9,668
A201	246	#6	STR	11'-6"	4,249
B1	62	#4	STR	11'-2"	462
B2	123	#4	STR	8'-4"	685
C2	116	#4	STR	31'-10"	2,467
D1	7	#6	STR	1'-8"	18
D2	246	#6	STR	4'-6"	1,663
D3	3	#7	STR	4'-10"	30
G1	4	#5	STR	26'-2"	109
S1	3	#7	STR	26'-2"	160
S3	3	#7	STR	11'-6"	71

PHASE VI - STAGE 4 REINFORCING STEEL 20,540 LBS.

PHASE VI - STAGE 4 QUANTITIES

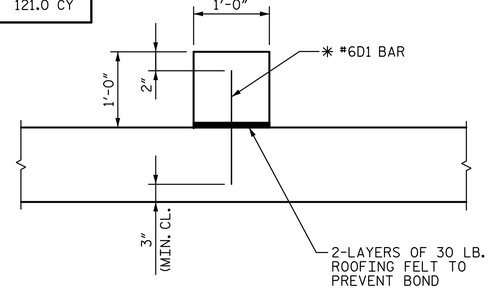
REINFORCING STEEL	
BARREL	20,540 LBS.
WING 1	1,456 LBS.
TOTAL	21,996 LBS.
CLASS A CONCRETE	
BARREL @ 2.254 CY/FT	138.6 CY
SILL	0.4 CY
END CURTAIN WALL	1.9 CY
WING 1	16.0 CY
HEADWALL	1.2 CY
TOTAL	158.1 CY



ELEVATION

LOOKING UPSTREAM

ELEVATION AT OUTLET SHOWN, ELEVATION AT INLET SIMILAR.



SECTION THROUGH SILL

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

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 43+26.00 -L-

SHEET 6 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12'-0" X 9'-0"
CONCRETE BOX CULVERT
90°-00'-00" SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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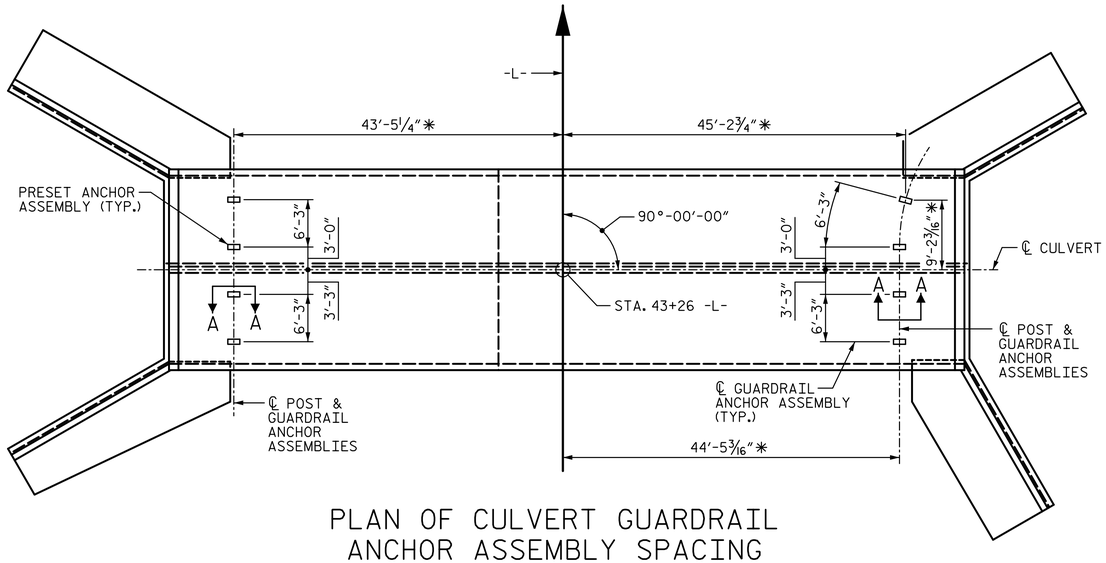


PLAN OF CULVERT GUARDRAIL ANCHOR ASSEMBLY SPACING

* THIS DIMENSION TO BE CONFIRMED BY THE ENGINEER IN THE FIELD.

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½″.

B. 4 - 1″Ø X 2¼″BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1″Ø X 2 ¼″GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 7/16″Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

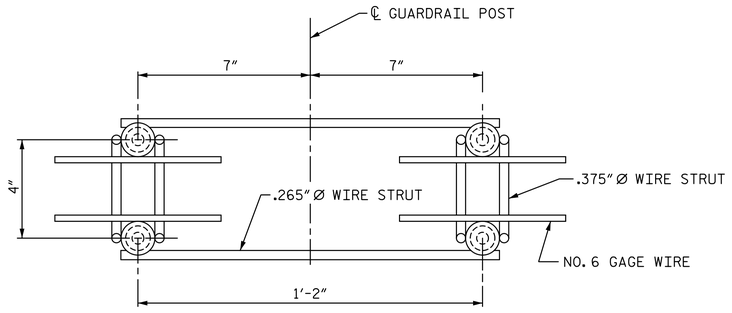
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

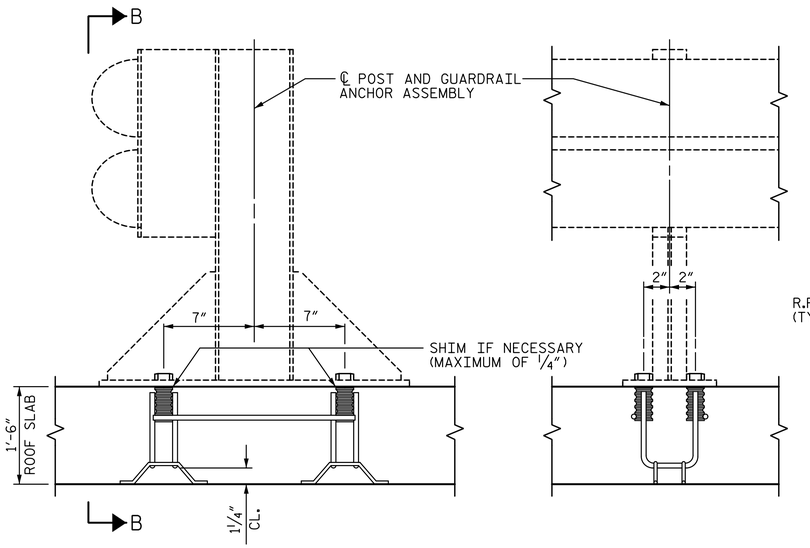
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1″Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

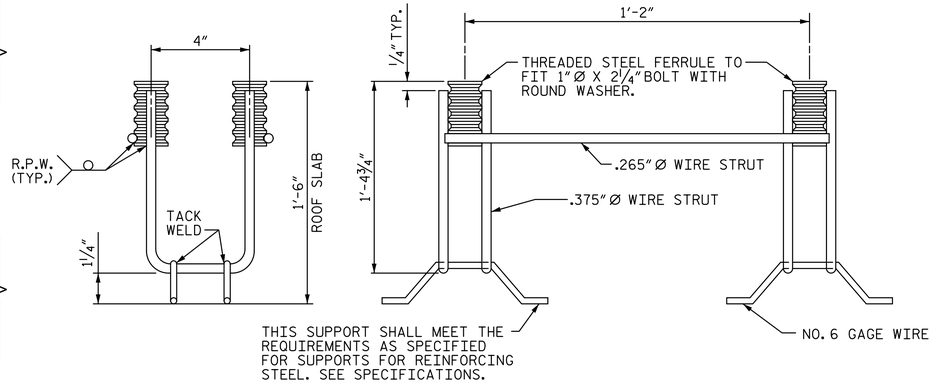


PLAN



SECTION A-A

SECTION B-B



ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

NORTH CAROLINA PROFESSIONAL SEAL REGISTERED SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

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Charlotte, NC 28203
NC License Number F-0991

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ROBESON COUNTY
STATION: 43+26.00 -L-

SHEET 7 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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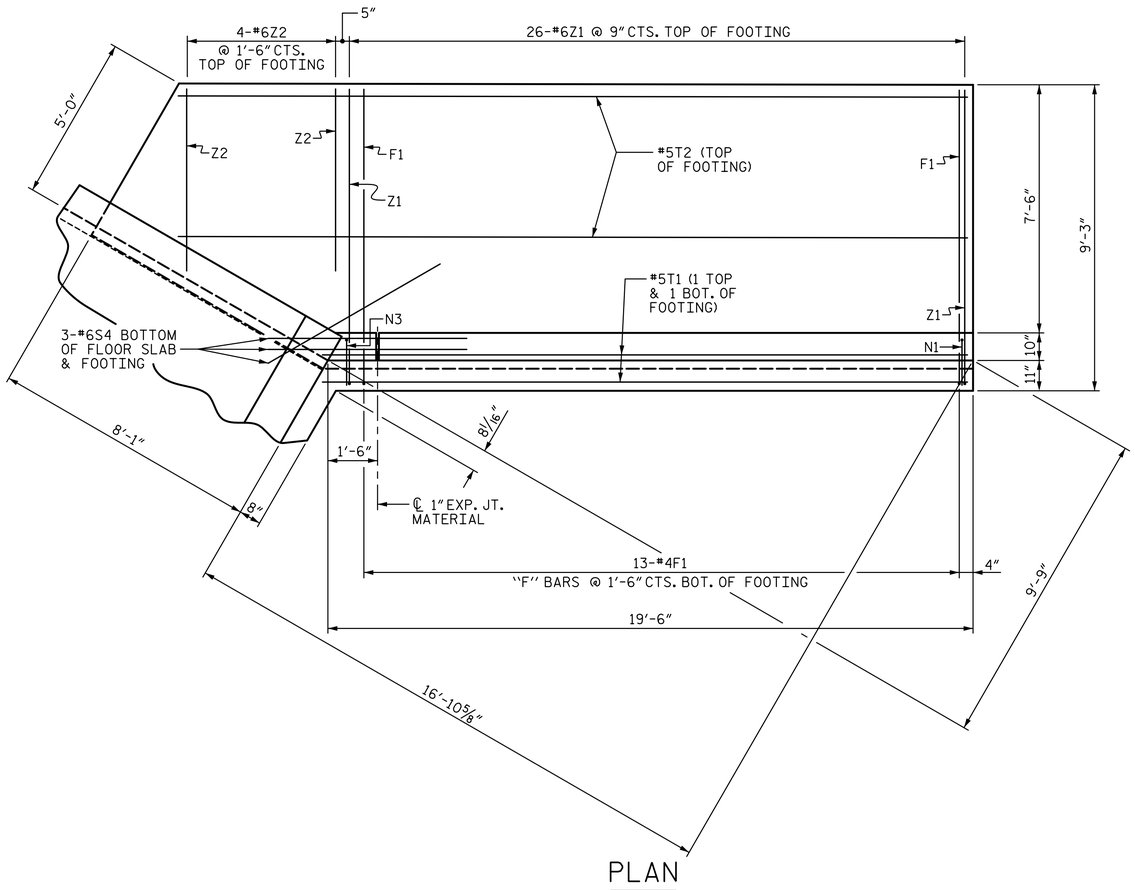
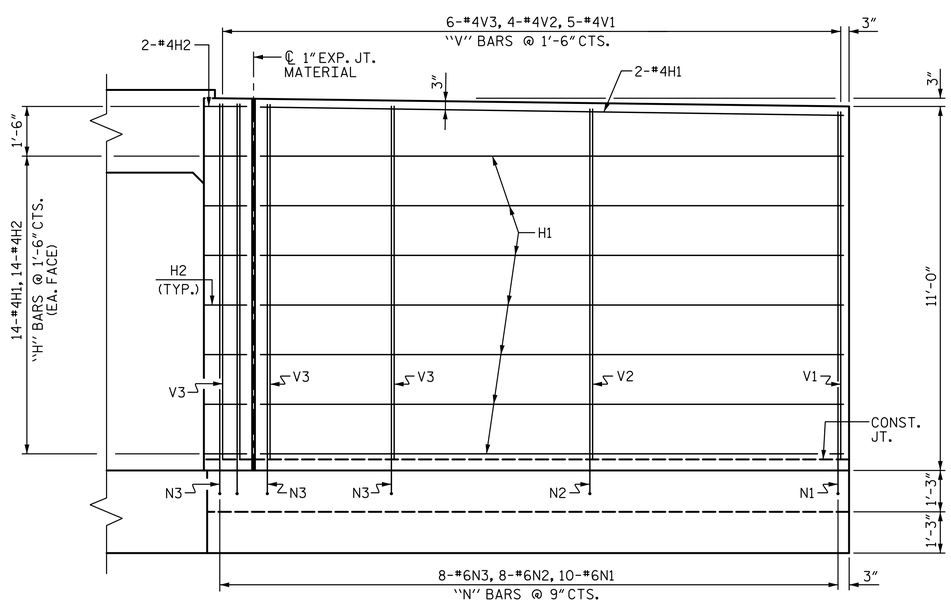


PLAN



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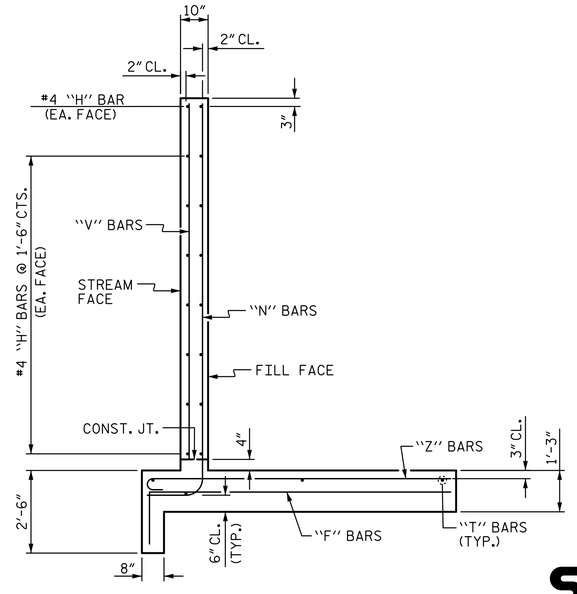
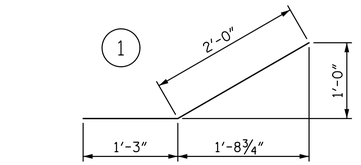
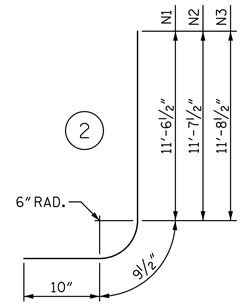
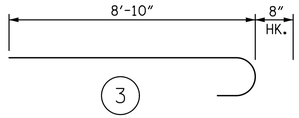


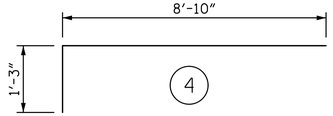
TYPICAL WING SECTION

BAR TYPES









ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F1	13	#4	4	10'-1"	88
H1	16	#4	STR	17'-7"	188
H2	16	#4	1	3'-3"	35
N1	10	#6	2	13'-2"	198
N2	8	#6	2	13'-3"	159
N3	8	#6	2	13'-4"	160
S4	3	#6	STR	6'-0"	27
T1	2	#5	STR	19'-6"	41
T2	2	#5	STR	23'-10"	50
V1	5	#4	STR	10'-6"	35
V2	4	#4	STR	10'-7"	28
V3	6	#4	STR	10'-8"	43
Z1	26	#6	3	9'-6"	371
Z2	4	#6	STR	5'-6"	33

REINFORCING STEEL 1,456 LBS.

STV Engineers, Inc.
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NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM 3/6/2025

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ROBESON COUNTY
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SHEET 8 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 1 FOR CONCRETE BOX CULVERT

H = 9'-0" SLOPE = 3:1
90° SKEW

REVISIONS						SHEET NO.
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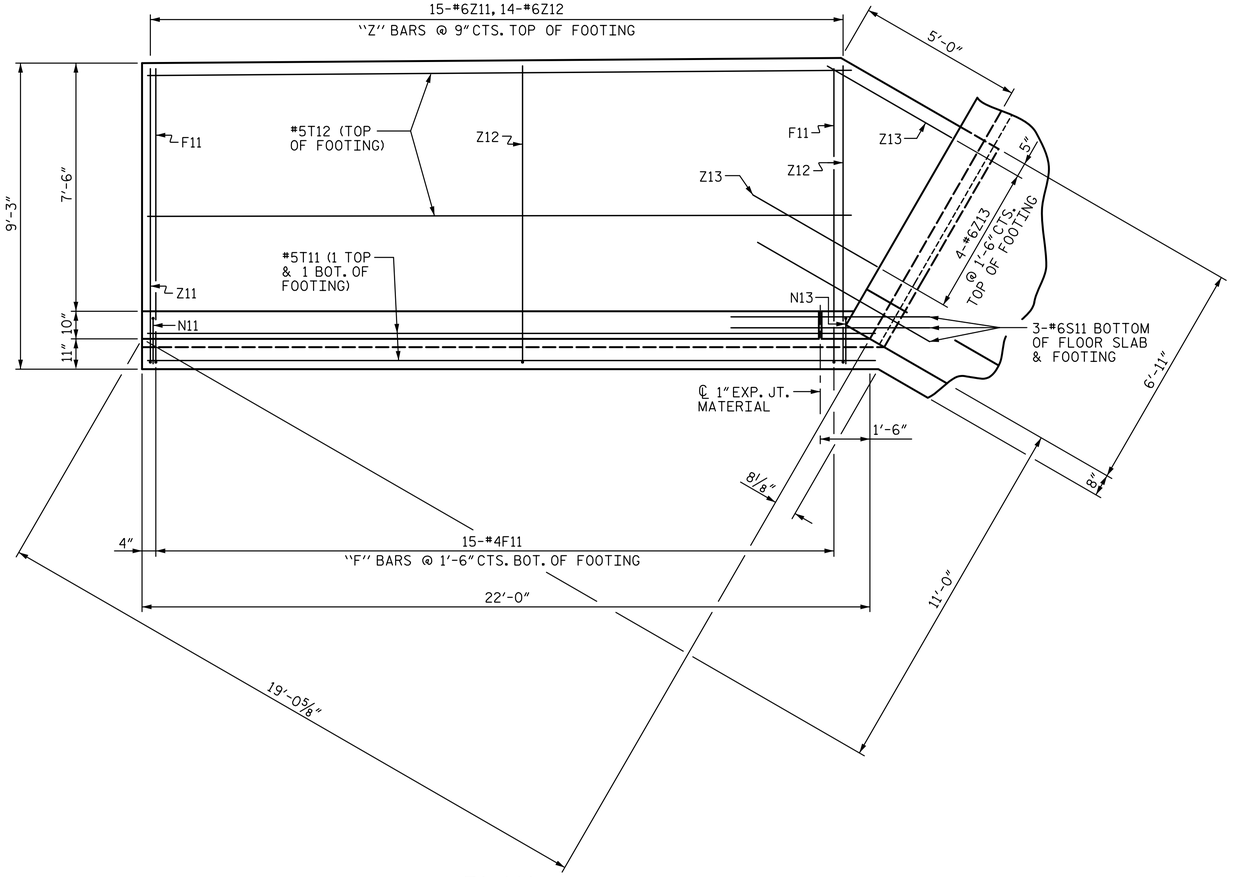
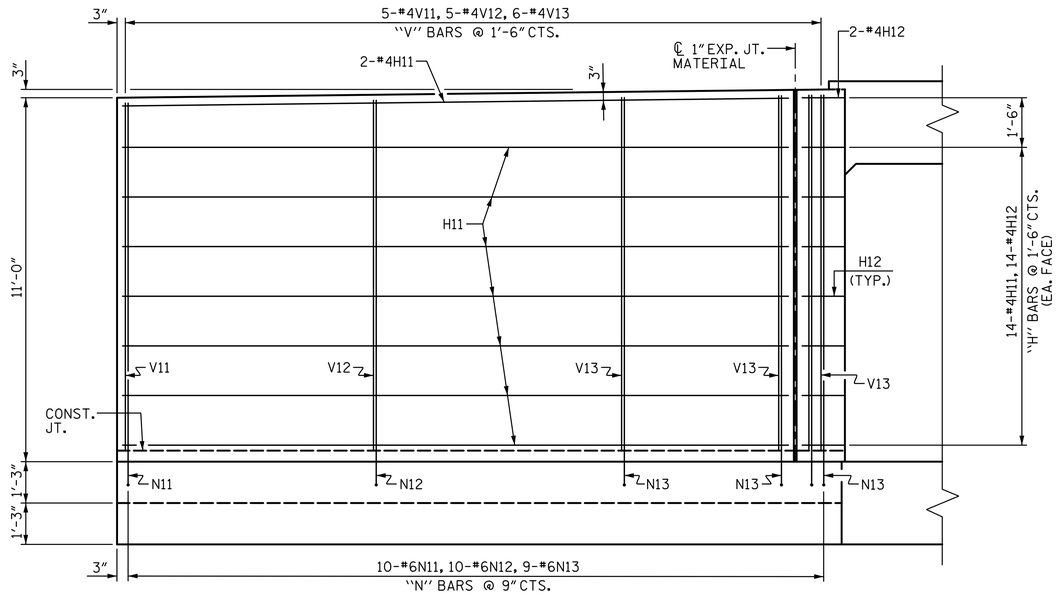
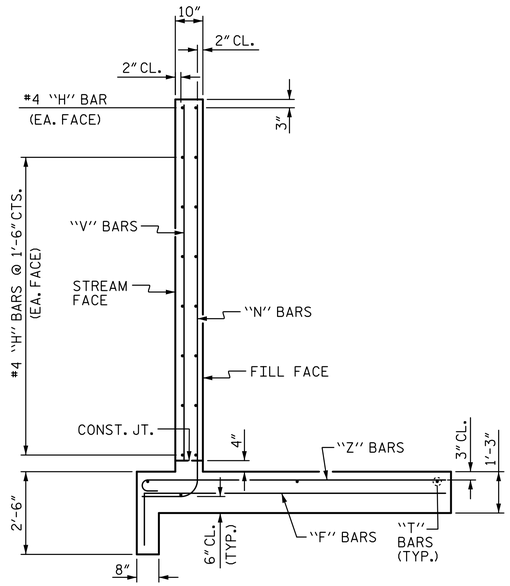
1			3			TOTAL SHEETS
2			4			11



PLAN

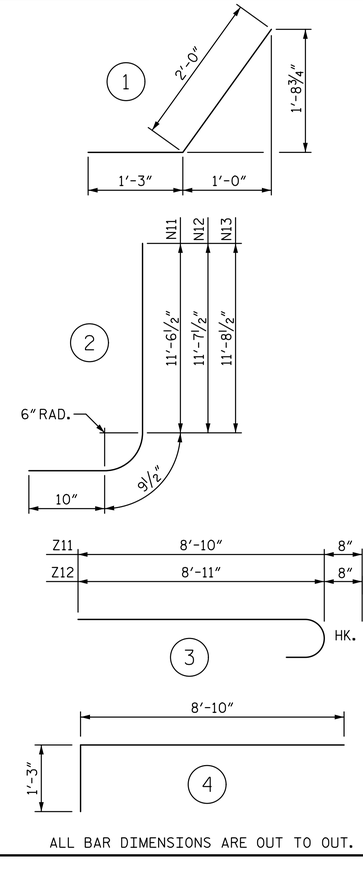


ELEVATION



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F11	15	#4	4	10'-1"	101
H11	16	#4	STR	20'-1"	215
H12	16	#4	1	3'-3"	35
N11	10	#6	2	13'-2"	198
N12	10	#6	2	13'-3"	199
N13	9	#6	2	13'-4"	180
S11	3	#6	STR	6'-0"	27
T11	2	#5	STR	22'-0"	46
T12	2	#5	STR	21'-3"	44
V11	5	#4	STR	10'-6"	35
V12	5	#4	STR	10'-7"	35
V13	6	#4	STR	10'-8"	43
Z11	15	#6	3	9'-6"	214
Z12	14	#6	3	9'-7"	202
Z13	4	#6	STR	4'-4"	26
REINFORCING STEEL					1,600 LBS.

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DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

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PROJECT NO. U-5797
ROBESON COUNTY
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SHEET 9 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 2 FOR CONCRETE BOX CULVERT

H = 9'-0" SLOPE = 3:1
90° SKEW

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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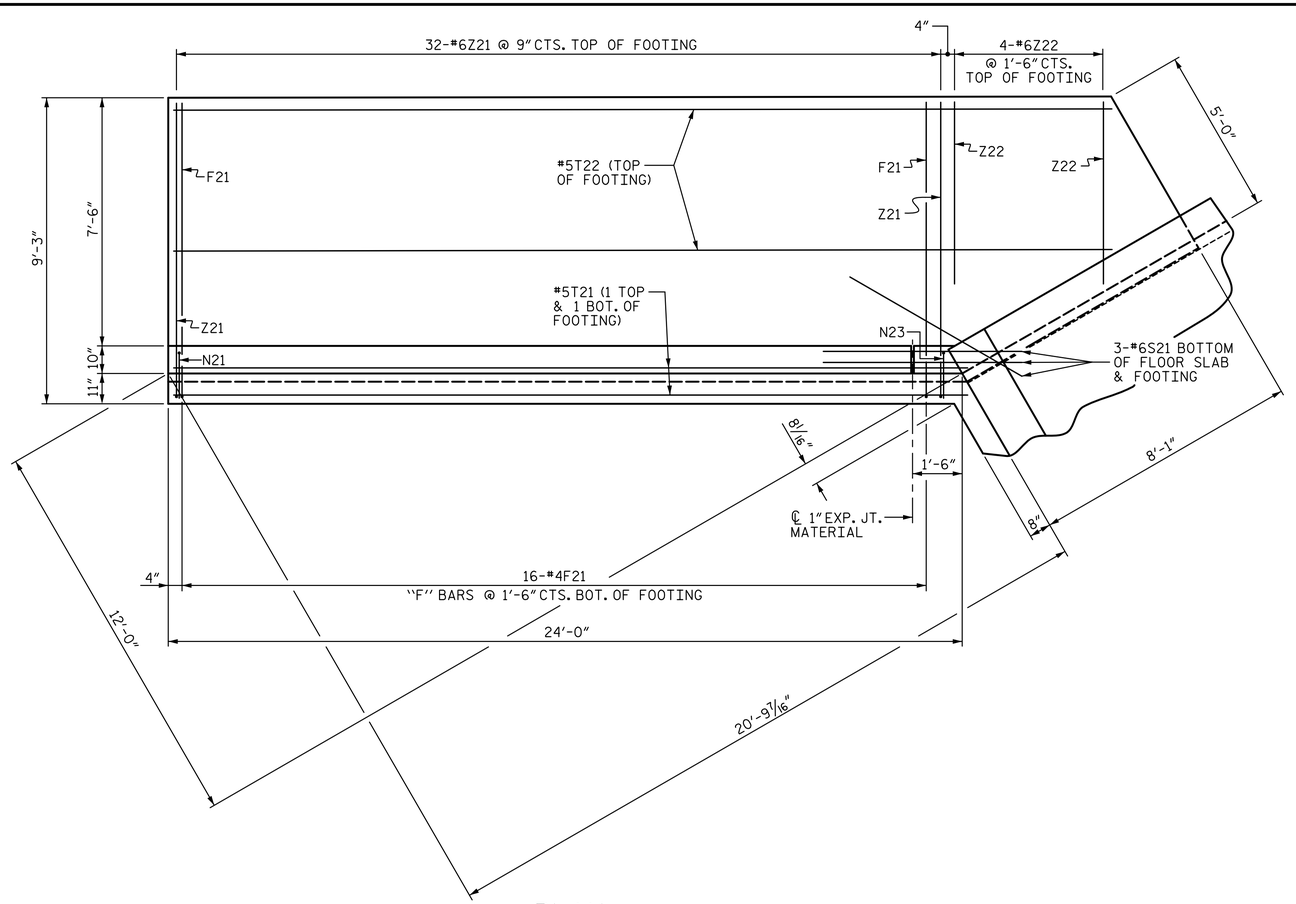
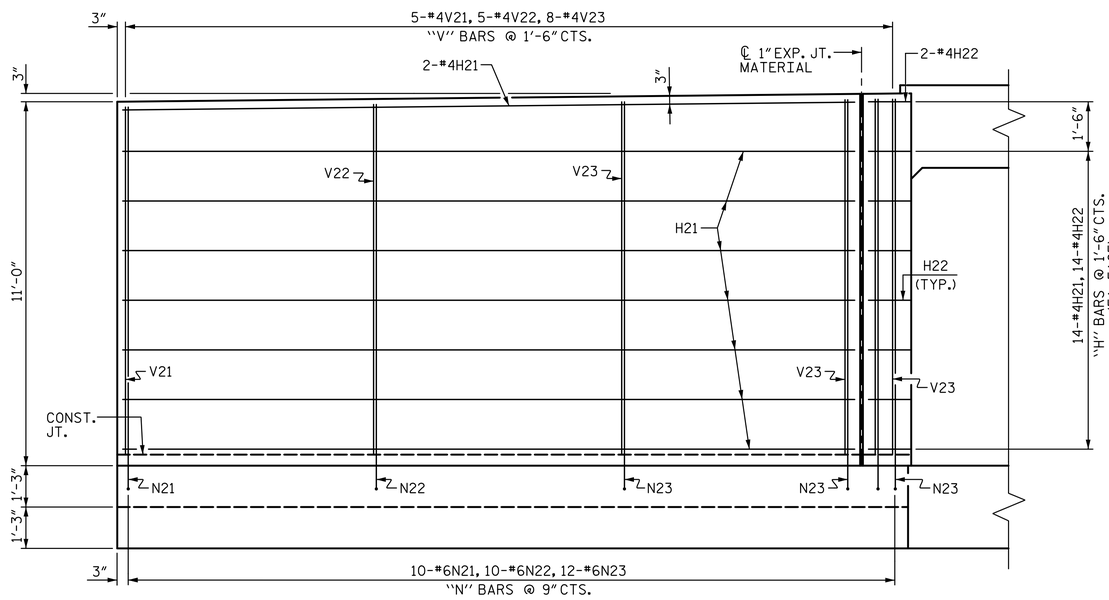
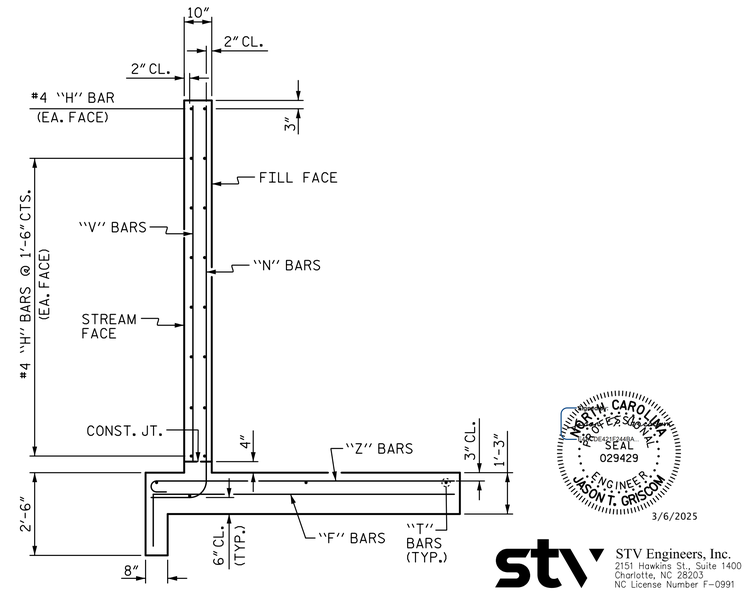


PLAN

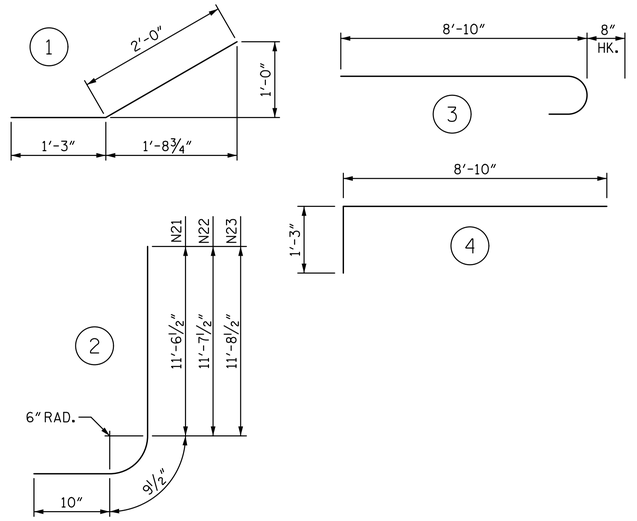


ELEVATION



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F21	16	#4	4	10'-1"	108
H21	16	#4	STR	22'-1"	236
H22	16	#4	1	3'-3"	35
N21	10	#6	2	13'-2"	198
N22	10	#6	2	13'-3"	199
N23	12	#6	2	13'-4"	240
S21	3	#6	STR	6'-0"	27
T21	2	#5	STR	24'-0"	50
T22	2	#5	STR	28'-4"	59
V21	5	#4	STR	10'-6"	35
V22	5	#4	STR	10'-7"	35
V23	8	#4	STR	10'-8"	57
Z21	32	#6	3	9'-6"	457
Z22	4	#6	STR	5'-6"	33
REINFORCING STEEL					1,769 LBS.

DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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PROJECT NO. U-5797
ROBESON COUNTY
STATION: 43+26.00 -L-

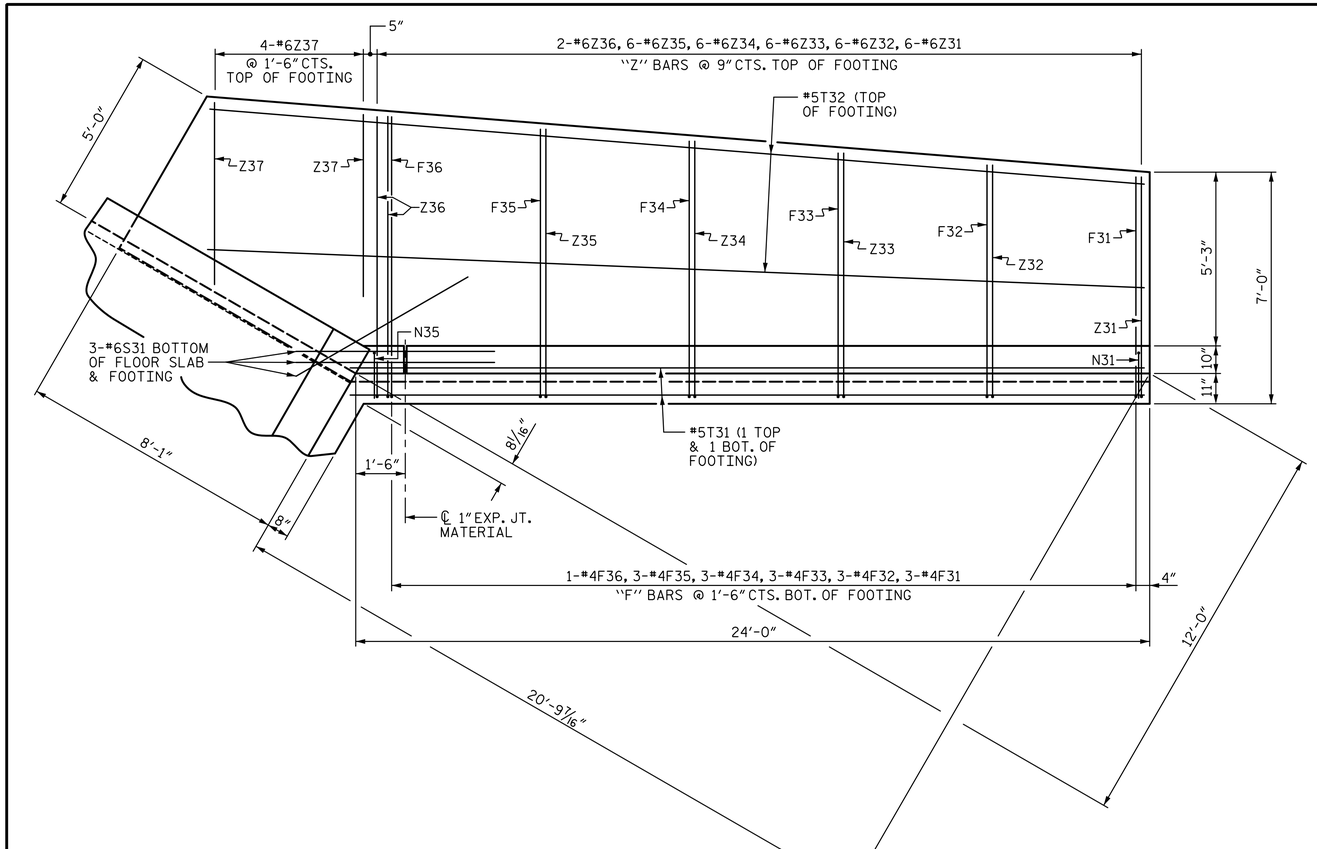
SHEET 10 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

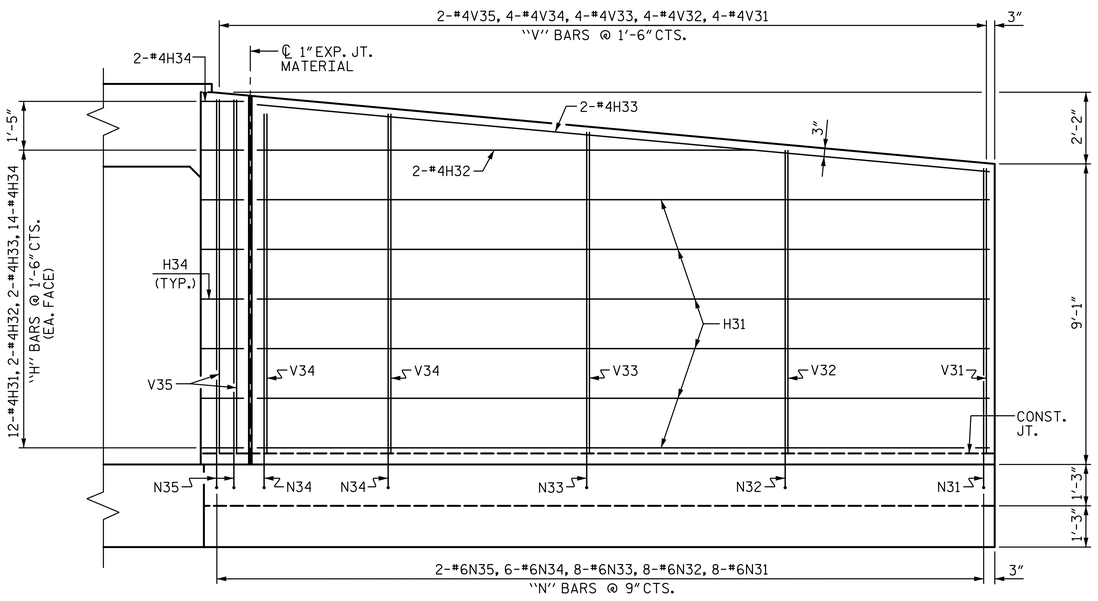
WING 3 FOR CONCRETE BOX CULVERT

H = 9'-0" SLOPE = 3:1
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-10
1			3			TOTAL SHEETS
2			4			11

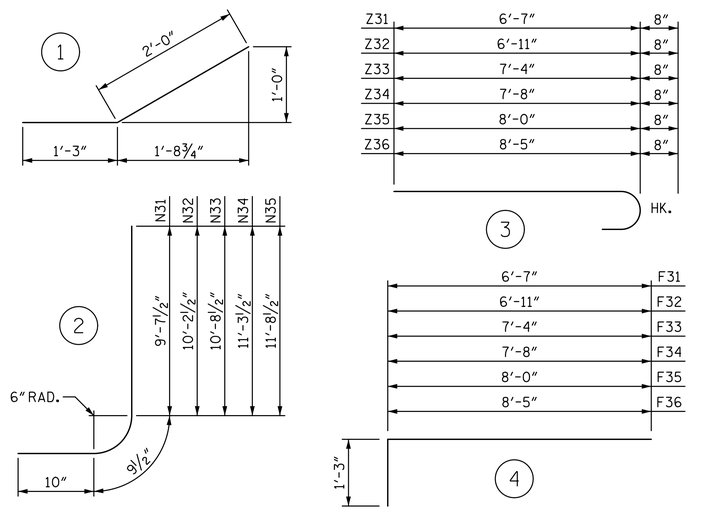


PLAN



ELEVATION

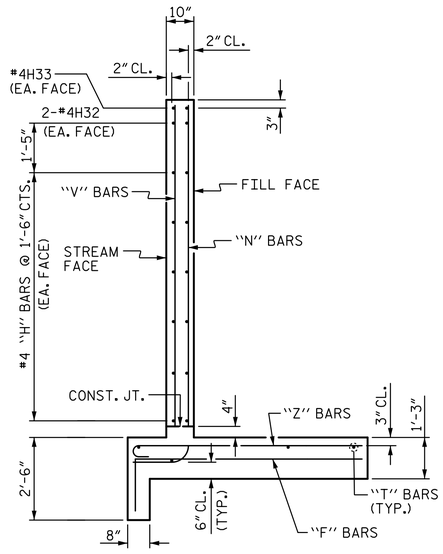
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F31	3	#4	4	7'-10"	16
F32	3	#4	4	8'-2"	16
F33	3	#4	4	8'-7"	17
F34	3	#4	4	8'-11"	18
F35	3	#4	4	9'-3"	19
F36	1	#4	4	9'-8"	6
H31	12	#4	STR	22'-1"	177
H32	2	#4	STR	14'-11"	20
H33	2	#4	STR	22'-2"	30
H34	16	#4	1	3'-3"	35
N31	8	#6	2	11'-3"	135
N32	8	#6	2	11'-10"	142
N33	8	#6	2	12'-4"	148
N34	6	#6	2	12'-11"	116
N35	2	#6	2	13'-4"	40
S31	3	#6	STR	6'-0"	27
T31	2	#5	STR	24'-0"	50
T32	2	#5	STR	28'-4"	59
V31	4	#4	STR	8'-7"	23
V32	4	#4	STR	9'-1"	24
V33	4	#4	STR	9'-8"	26
V34	4	#4	STR	10'-3"	27
V35	2	#4	STR	10'-8"	14
Z31	6	#6	3	7'-3"	65
Z32	6	#6	3	7'-7"	68
Z33	6	#6	3	8'-0"	72
Z34	6	#6	3	8'-4"	75
Z35	6	#6	3	8'-8"	78
Z36	2	#6	3	9'-1"	27
Z37	4	#6	STR	5'-6"	33
REINFORCING STEEL					1,603 LBS.



TYPICAL WING SECTION

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM
3/6/2025

DRAWN BY : SGH DATE : 11-24
CHECKED BY : MLO DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

PROJECT NO. U-5797
ROBESON COUNTY
STATION: 43+26.00 -L-

SHEET 11 OF 11

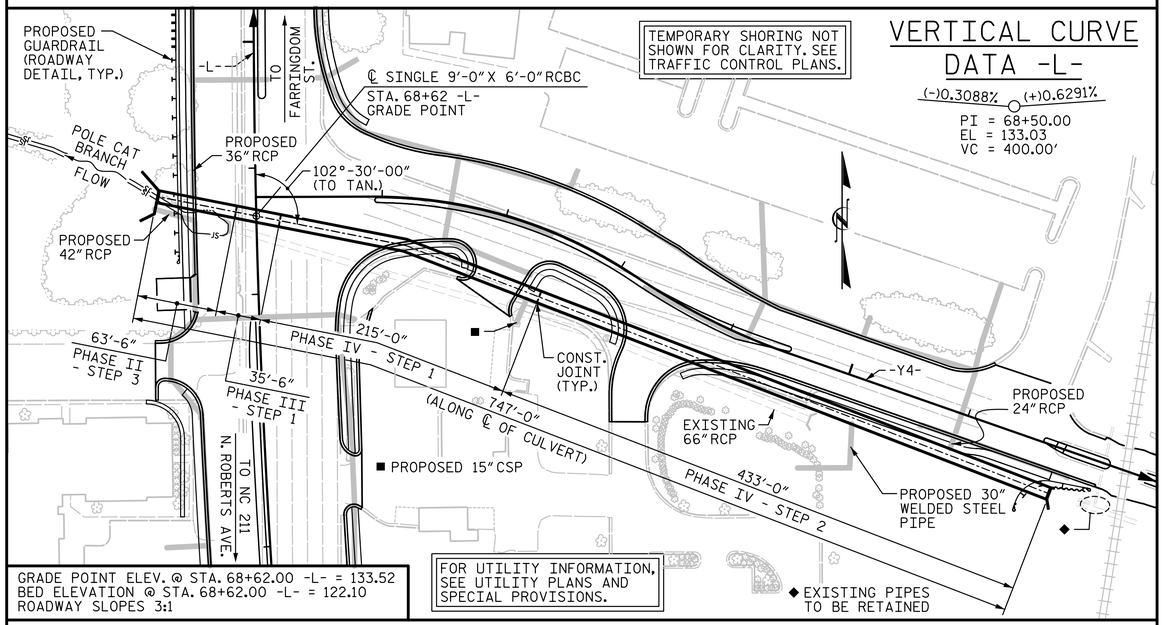
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 4 FOR CONCRETE BOX CULVERT

H = 9'-0" SLOPE = 3:1
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-11
1			3			TOTAL SHEETS
2			4			11

BM#5: FIRE HYDRANT - BOLT AT '0' IN 'OPEN', STA. 70+34.63 -L-, 722.76' RT., EL. 135.07, N 326039, E 2000689



GRADE POINT ELEV. @ STA. 68+62.00 -L- = 133.52
BED ELEVATION @ STA. 68+62.00 -L- = 122.10
ROADWAY SLOPES 3:1

LOCATION SKETCH

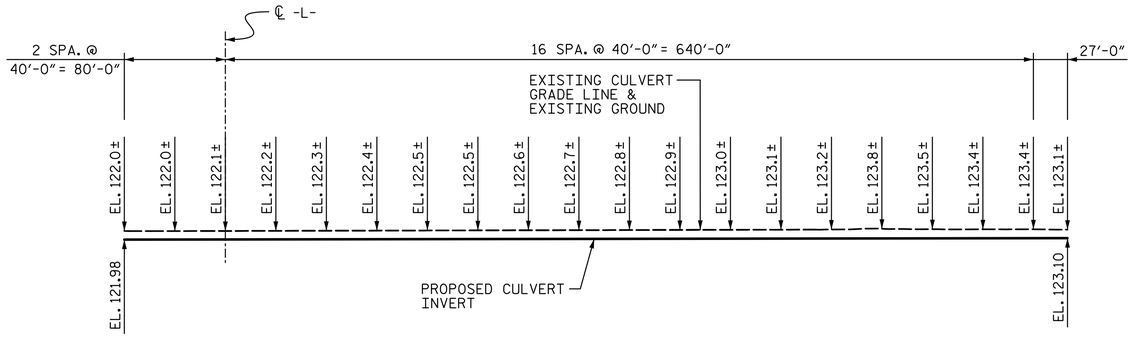
VERTICAL CURVE DATA -L-

(-)0.3088% (+)0.6291%

PI = 68+50.00
EL = 133.03
VC = 400.00'

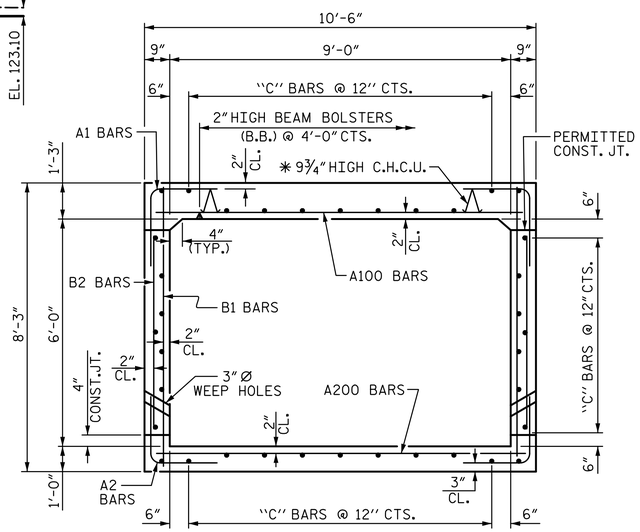
HORIZONTAL CURVE DATA -L-

PI = 68+34.47
Δ = 9°04'59.48" (RT.)
D = 0°47'40.91"
L = 1,142.97'
T = 572.69'
R = 7,209.75'



TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
BARREL	1.213 CY/FT
PHASE II - STEP 3 - STAGE 1	9.8 C.Y.
PHASE II - STEP 3 - STAGE 2	88.3 C.Y.
PHASE III - STEP 1	43.1 C.Y.
PHASE IV - STEP 1	260.8 C.Y.
PHASE IV - STEP 2	531.6 C.Y.
TOTAL	933.6 C.Y.
REINFORCING STEEL	
PHASE II - STEP 3 - STAGE 1	1,003 LBS.
PHASE II - STEP 3 - STAGE 2	10,530 LBS.
PHASE III - STEP 1	5,219 LBS.
PHASE IV - STEP 1	31,805 LBS.
PHASE IV - STEP 2	64,277 LBS.
TOTAL	112,834 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
PHASE II - STEP 3 - STAGE 2	65 TONS
PHASE III - STEP 1	36 TONS
PHASE IV - STEP 1	220 TONS
PHASE IV - STEP 2	443 TONS
TOTAL	764 TONS
SHEET PILE RETAINING WALLS	
PHASE IV - STEP 2	225 S.F.



RIGHT ANGLE SECTION OF BARREL

THERE ARE 36 "C" BARS IN SECTION OF BARREL

HYDRAULIC DATA

DESIGN DISCHARGE:	423 CFS
FREQUENCY OF DESIGN FLOOD:	50 YRS.
DESIGN HIGH WATER ELEVATION:	131.5
DRAINAGE AREA:	0.72 SQ. MI.
BASE DISCHARGE (Q100):	485 CFS
BASE HIGH WATER ELEVATION:	132.6

OVERTOPPING DATA

OVERTOPPING DISCHARGE:	645 CFS
FREQUENCY OF OVERTOPPING FLOOD:	500+/- YRS.
OVERTOPPING FLOOD ELEVATION:	133.5

OVERTOPPING OCCURS AT ℄ AT THE SAG STA. 67+81.71 -L-

NOTES:

ASSUMED LIVE LOAD = HL-93.

DESIGN FILL---------- 10.90' MAX. AND 5.16' MIN.

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 IN EACH STAGE:

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 THE SILLS AND BAFFLES.
3. ROOF SLAB AND HEADWALLS

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

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

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

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

FOR CULVERT DIVERSION DETAILS, SEE EROSION CONTROL PLANS.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

EXCAVATE FOUNDATION A MINIMUM OF 12" BELOW CULVERT BEARING ELEVATION. PLACE 12" OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS.

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

ENCAPSULATE ALL FOUNDATION CONDITIONING MATERIAL IN TYPE 4 GEOTEXTILE. FOR FOUNDATION CONDITIONING GEOTEXTILE, SEE BOX CULVERT EXCAVATION (SPECIAL) PROVISION.

SHEET PILE WALL 1 SHALL BE PZ35 ASTM A572 GRADE 60. IF MINIMUM EMBEDMENT IS NOT ACHIEVED, NOTIFY THE ENGINEER. STEEL SHEET PILES SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. GALVANIZATION OF THE STEEL SHEET PILES SHALL BE INCLUDED IN THE PAY ITEM "SHEET PILE RETAINING WALLS".

THE MAXIMUM DESIGN HEIGHT OF THE SHEET PILE WALL IS 9'-0".

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

TRAFFIC ON SR 1997 (FAYETTEVILLE RD.) SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN PHASES AS SHOWN IN THESE PLANS, SEE TRAFFIC CONTROL PLANS.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

SHEET 1 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9'-0" X 6'-0"
CONCRETE BOX CULVERT
102°-30'-00" SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-1
1			3			TOTAL SHEETS
2			4			15

DRAWN BY : SGH DATE : 11-24
CHECKED BY : JAD DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

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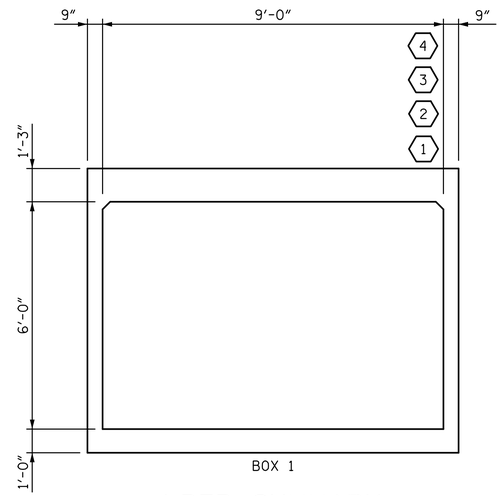
LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LOAD TYPE		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 (γLL)	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		HL-93 (INVENTORY)	N/A	1	1.19	--	1.75	2.13	1	TOP SLAB	5.25′	1.19	1	TOP SLAB	9.75′	
		HL-93 (OPERATING)	N/A		1.55	--	1.35	2.76	1	TOP SLAB	5.25′	1.55	1	TOP SLAB	9.75′	
		HS-20 (INVENTORY)	36.000	2	1.51	54.360	1.75	2.28	1	TOP SLAB	5.25′	1.51	1	TOP SLAB	9.75′	
		HS-20 (OPERATING)	36.000		1.96	70.560	1.35	2.95	1	TOP SLAB	5.25′	1.96	1	TOP SLAB	9.75′	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		3.06	41.310	1.40	4.15	1	TOP SLAB	5.25′	3.06	1	TOP SLAB	9.75′	
		SNGARBS2	20.000		2.79	55.800	1.40	3.88	1	TOP SLAB	5.25′	2.79	1	TOP SLAB	9.75′	
		SNAGRIS2	22.000		3.06	67.320	1.40	4.15	1	TOP SLAB	5.25′	3.06	1	TOP SLAB	9.75′	
		SNCOTTS3	27.250	3	1.57	42.783	1.40	2.85	1	TOP SLAB	5.25′	1.57	1	TOP SLAB	9.75′	
		SNAGGRS4	34.925		1.97	68.802	1.40	3.33	1	EXTERIOR WALL	1.00′	1.97	1	TOP SLAB	9.75′	
		SNS5A	35.550		1.83	65.057	1.40	3.31	1	TOP SLAB	5.25′	1.83	1	TOP SLAB	9.75′	
		SNS6A	39.950		1.83	73.109	1.40	3.30	1	TOP SLAB	5.25′	1.83	1	TOP SLAB	9.75′	
		SNS7B	42.000		1.83	76.860	1.40	3.30	1	TOP SLAB	5.25′	1.83	1	TOP SLAB	9.75′	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		3.00	99.000	1.40	4.14	1	TOP SLAB	5.25′	3.00	1	TOP SLAB	9.75′	
		TNT4A	33.075		1.87	61.850	1.40	3.39	1	TOP SLAB	5.25′	1.87	1	TOP SLAB	9.75′	
		TNT6A	41.600		1.83	76.128	1.40	3.31	1	TOP SLAB	5.25′	1.83	1	TOP SLAB	9.75′	
		TNT7A	42.000		1.85	77.700	1.40	3.38	1	TOP SLAB	5.25′	1.85	1	TOP SLAB	9.75′	
		TNT7B	42.000		1.83	76.860	1.40	3.31	1	TOP SLAB	5.25′	1.83	1	TOP SLAB	9.75′	
		TNAGRIT4	43.000		1.87	80.410	1.40	3.39	1	TOP SLAB	5.25′	1.87	1	TOP SLAB	9.75′	
		TNAGT5A	45.000		1.87	84.150	1.40	3.39	1	TOP SLAB	5.25′	1.87	1	TOP SLAB	9.75′	
		TNAGT5B	45.000		1.87	84.150	1.40	3.39	1	TOP SLAB	5.25′	1.87	1	TOP SLAB	9.75′	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.94	55.775	1.30	2.93	1	TOP SLAB	5.25′	1.94	1	TOP SLAB	9.75′	
		EV3	43.000	4	1.36	58.480	1.30	2.47	1	TOP SLAB	5.25′	1.36	1	TOP SLAB	9.75′	



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.

FOR WALL ELEMENTS, THE LEFT END OF ELEMENT IS LOCATED AT THE BOTTOM OF THE BOTTOM SLAB.

COMMENTS:

(#) CONTROLLING LOAD RATING

1. DESIGN LOAD RATING (HL-93)
2. DESIGN LOAD RATING (HS-20)
3. LEGAL LOAD RATING **
4. EMERGENCY VEHICLE LAOD RATING **

** SEE CHART FOR VEHICLE TYPE

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

SHEET 2 OF 15

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM

3/6/2025

STV Engineers, Inc.
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NC License Number F-0991

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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:	C3-2
1			3			TOTAL SHEETS
2			4			15

DRAWN BY : SGH DATE : 11-24
CHECKED BY : JAD DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

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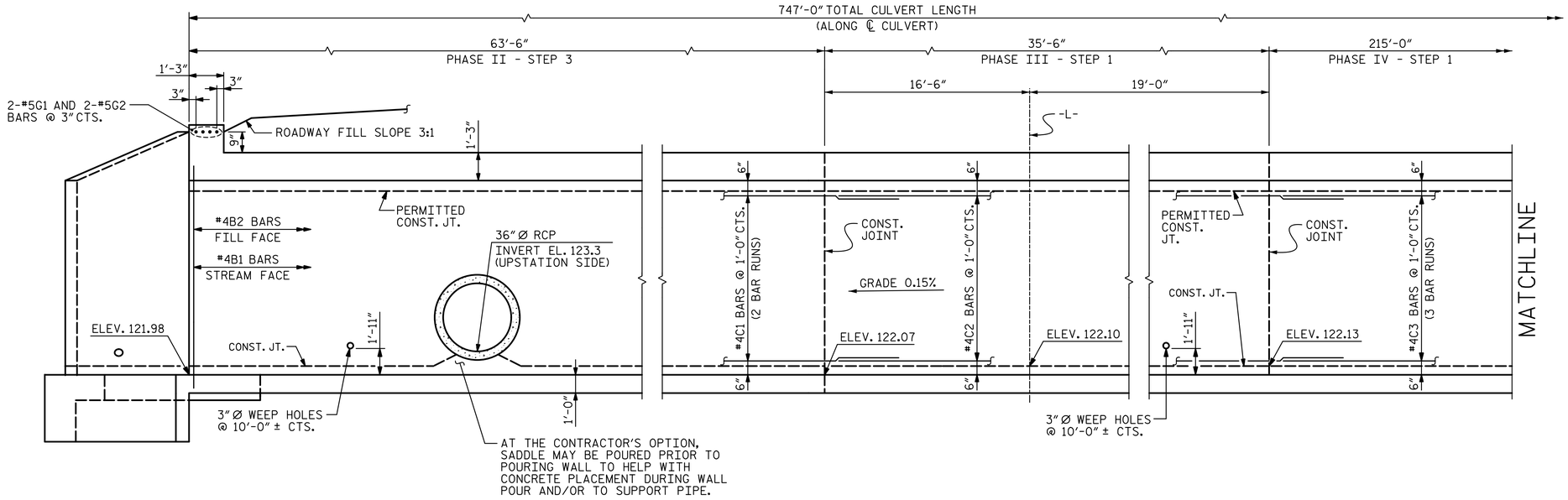

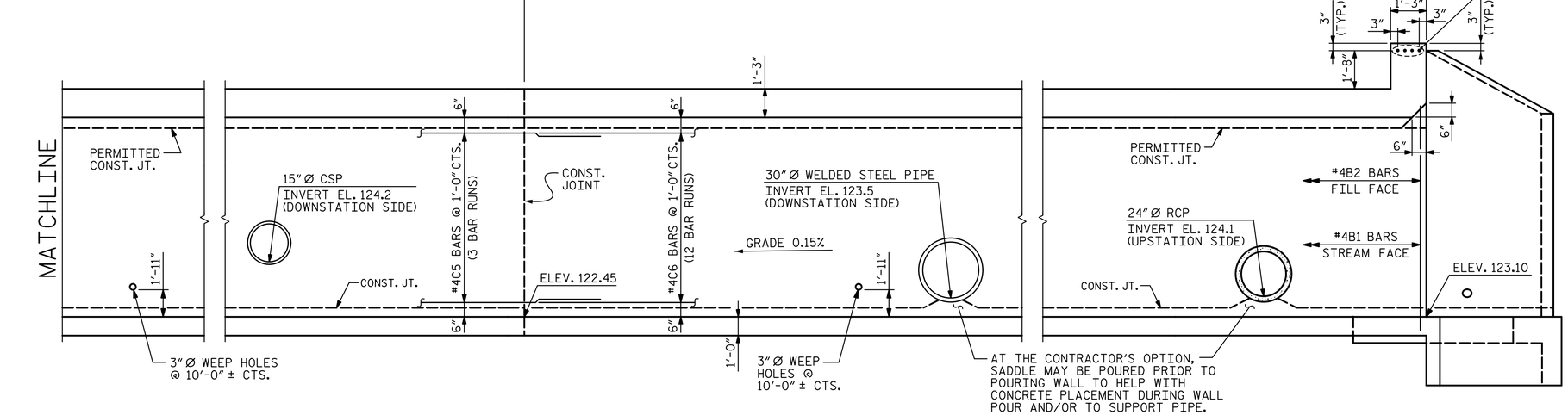

CULVERT SECTION NORMAL TO -L-

FOR APPROXIMATE PLAN VIEW LOCATION OF PIPES, SEE LOCATION SKETCH ON SHEET 1 OF 15

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

SHEET 3 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9'-0" X 6'-0"
CONCRETE BOX CULVERT
102°-30'-00" SKEW

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-3
1			3			TOTAL SHEETS
2			4			15

DRAWN BY : SGH DATE : 11-24
CHECKED BY : JAD DATE : 11-24
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

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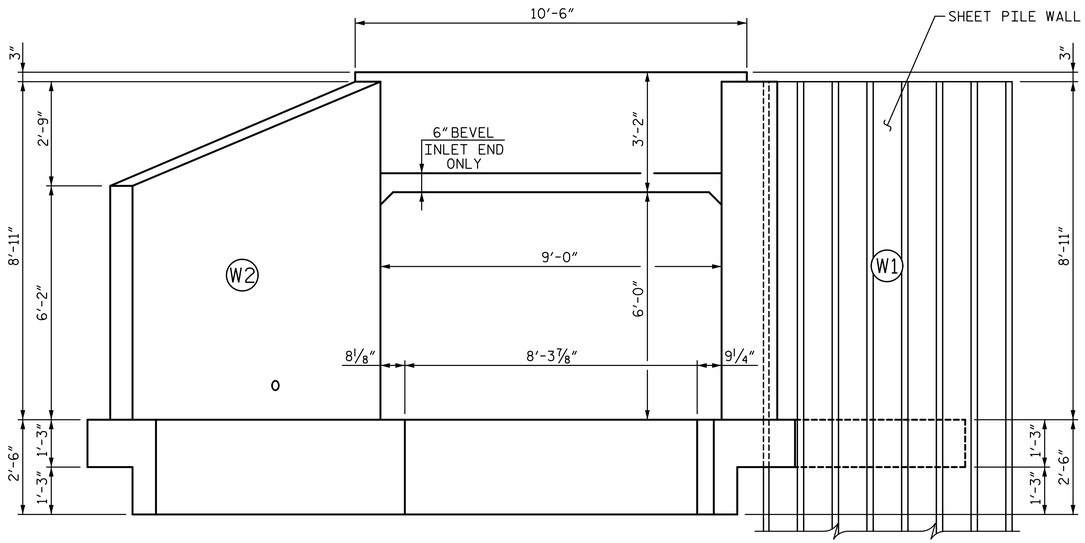
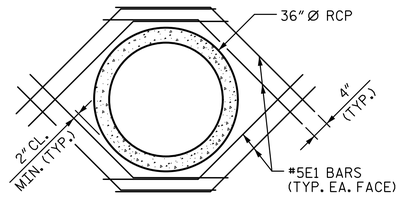
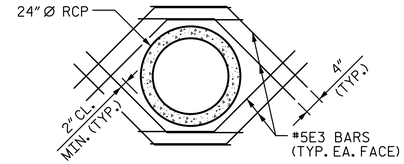


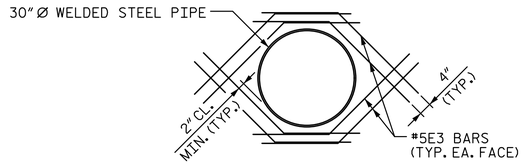
INLET END ELEVATION NORMAL TO SKEW





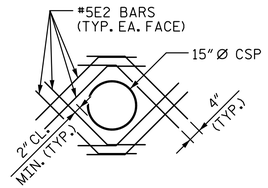
DETAIL OF REINFORCING AROUND RCP

''E'' BARS MAY BE SHIFTED, AS NECESSARY TO MAINTAIN 2″ MINIMUM CLEARANCE TO PIPE.
PLACE ''E'' BARS BELOW THE PIPE WITH FLOOR SLAB REINFORCING IF NECESSARY.



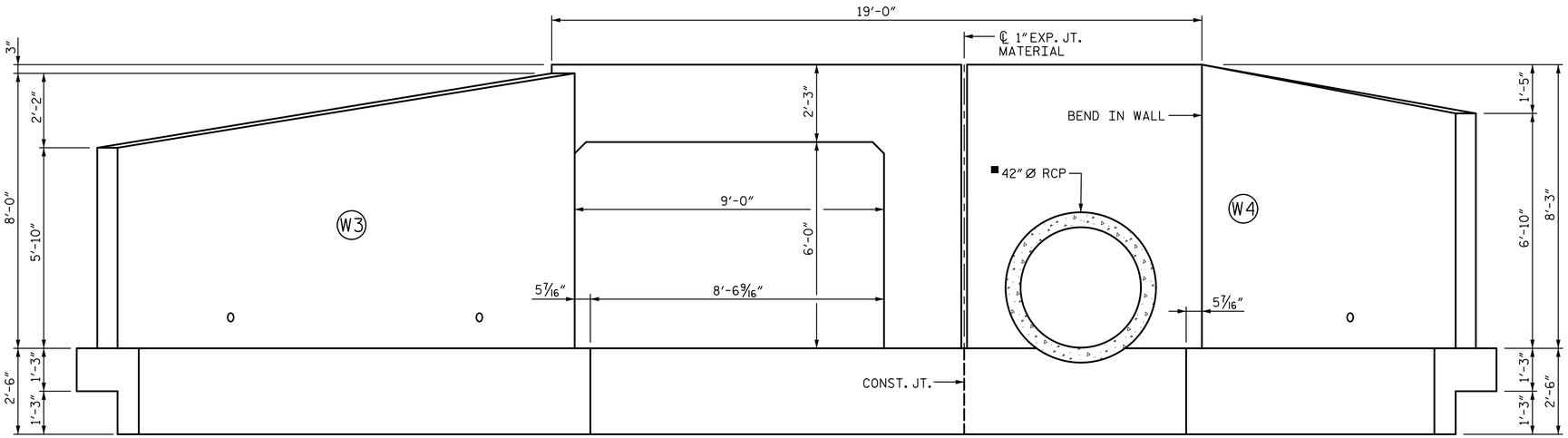
DETAIL OF REINFORCING AROUND WELDED STEEL PIPE

E3 BARS MAY BE SHIFTED, AS NECESSARY TO MAINTAIN 2″ MINIMUM CLEARANCE TO PIPE.
PLACE E3 BARS BELOW THE PIPE WITH FLOOR SLAB REINFORCING IF NECESSARY.



DETAIL OF REINFORCING AROUND CSP

E2 BARS MAY BE SHIFTED, AS NECESSARY TO MAINTAIN 2″ MINIMUM CLEARANCE



OUTLET END ELEVATION NORMAL TO SKEW

■ FOR DETAIL OF REINFORCING AROUND 42″ Ø RCP
SEE ''WING 4 FOR CONCRETE BOX CULVERT'' SHEET.

PROJECT NO. U-5797
ROBESON COUNTY
STATION: 68+62.00 -L-

SHEET 4 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 12′-0″ X 9′-0″
CONCRETE BOX CULVERT
102°-30′-00″ SKEW

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-4
1			3			TOTAL SHEETS
2			4			15

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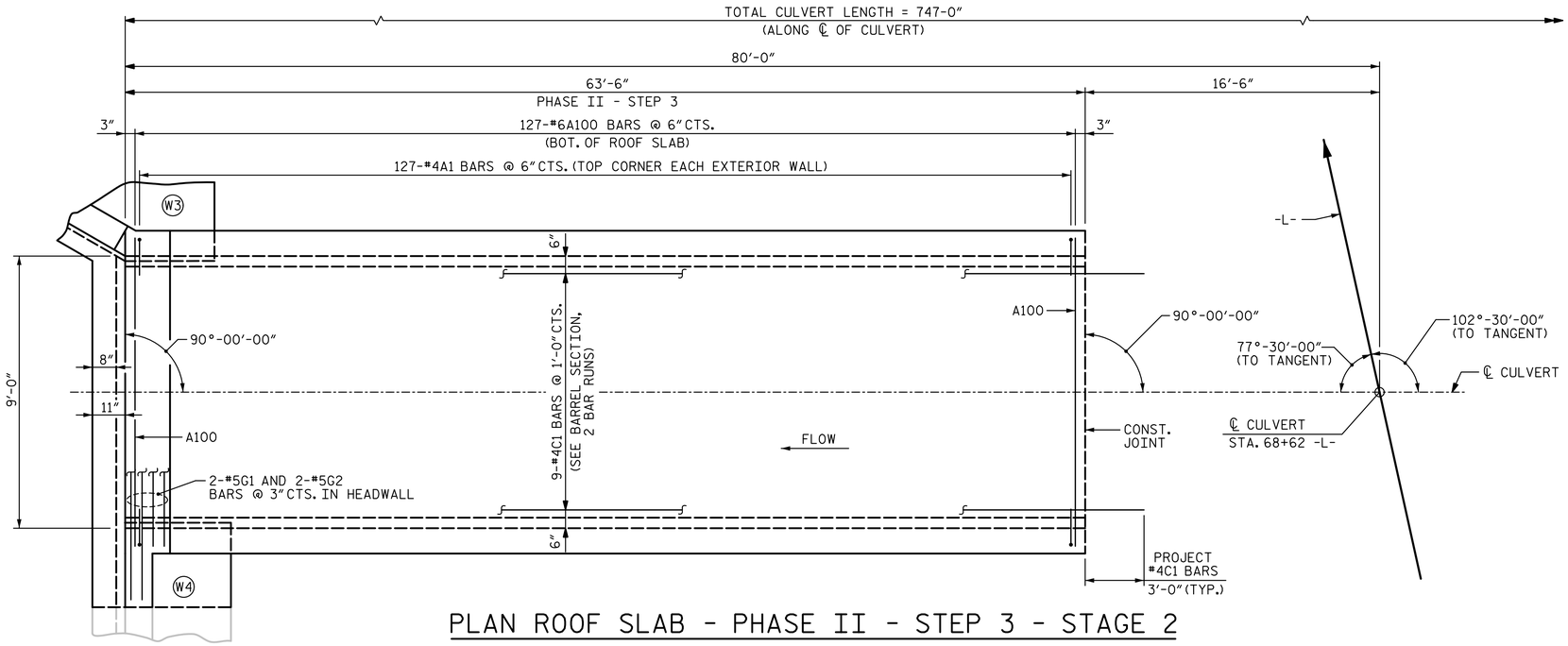
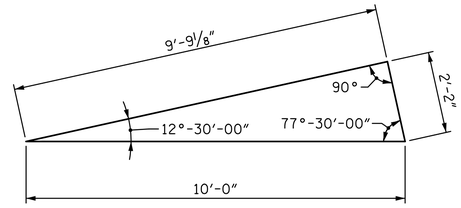
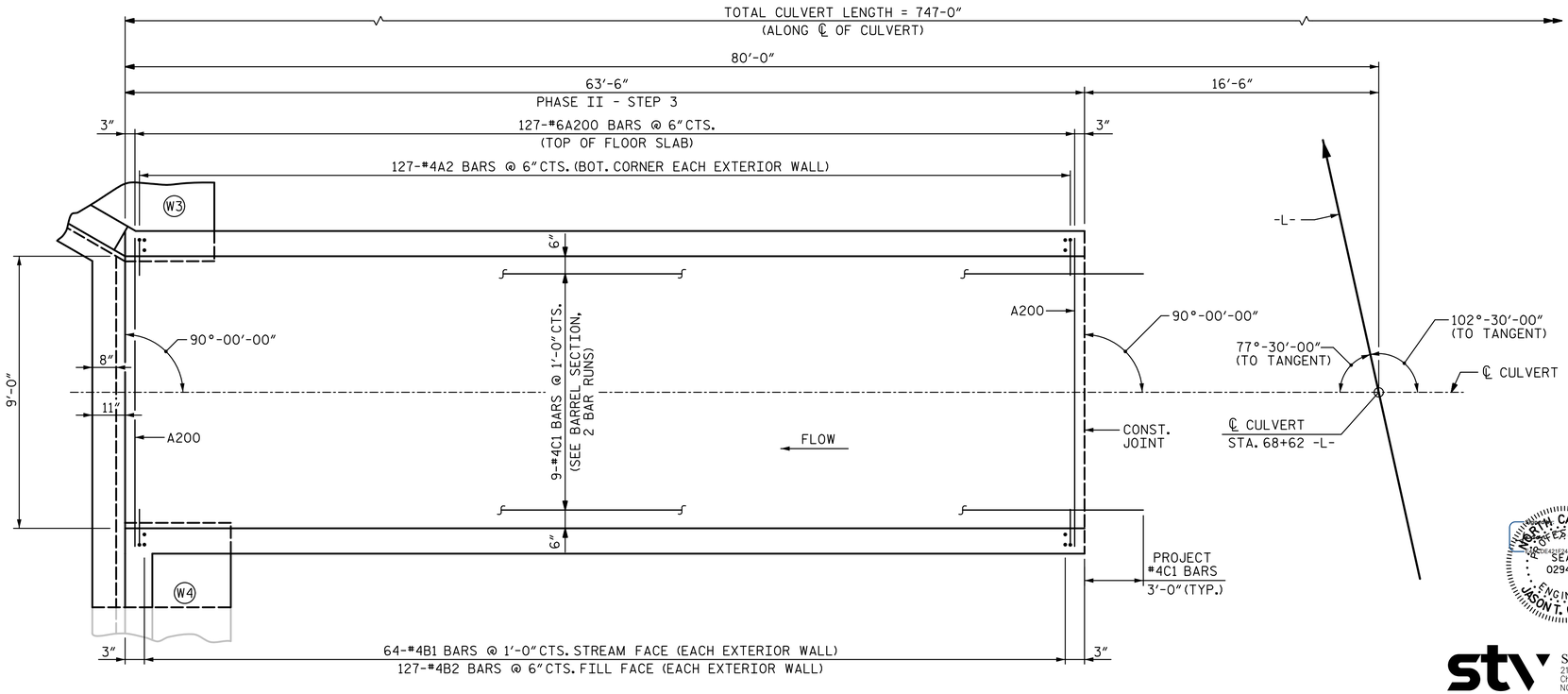
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24



PLAN ROOF SLAB - PHASE II - STEP 3 - STAGE 2



SKEW TRIANGLE



PLAN FLOOR SLAB - PHASE II - STEP 3 - STAGE 2

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DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE :	11-24

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

SHEET 5 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9'-0" X 6'-0"
CONCRETE BOX CULVERT
102°-30'-00" SKEW

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

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REVISIONS						SHEET NO.
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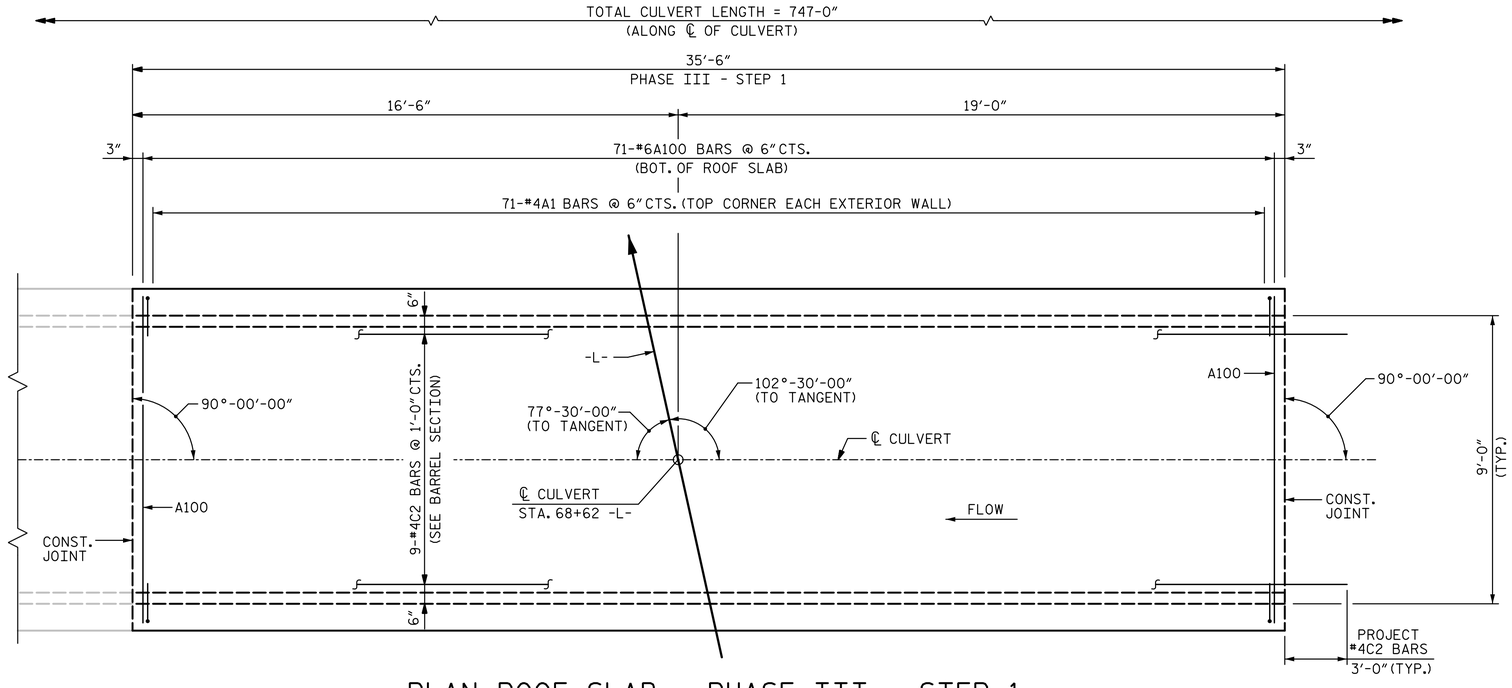
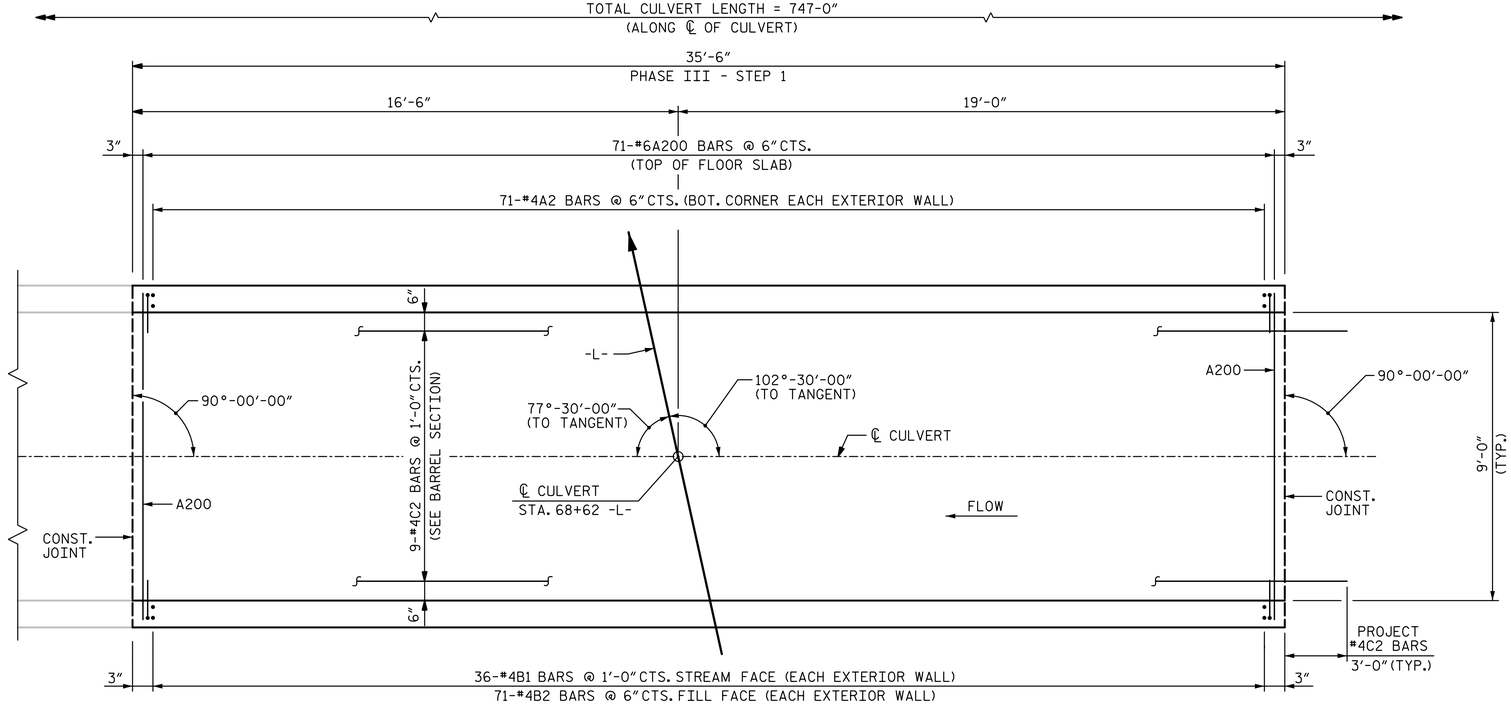
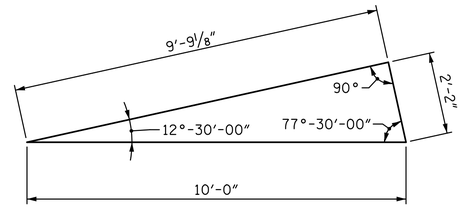


PLAN ROOF SLAB - PHASE III - STEP 1



PLAN FLOOR SLAB - PHASE III - STEP 1



SKEW TRIANGLE

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DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE :	11-24

NORTH CAROLINA PROFESSIONAL SEAL
SEAL 029429
ENGINEER
JASON T. GRISCOM
3/6/2025

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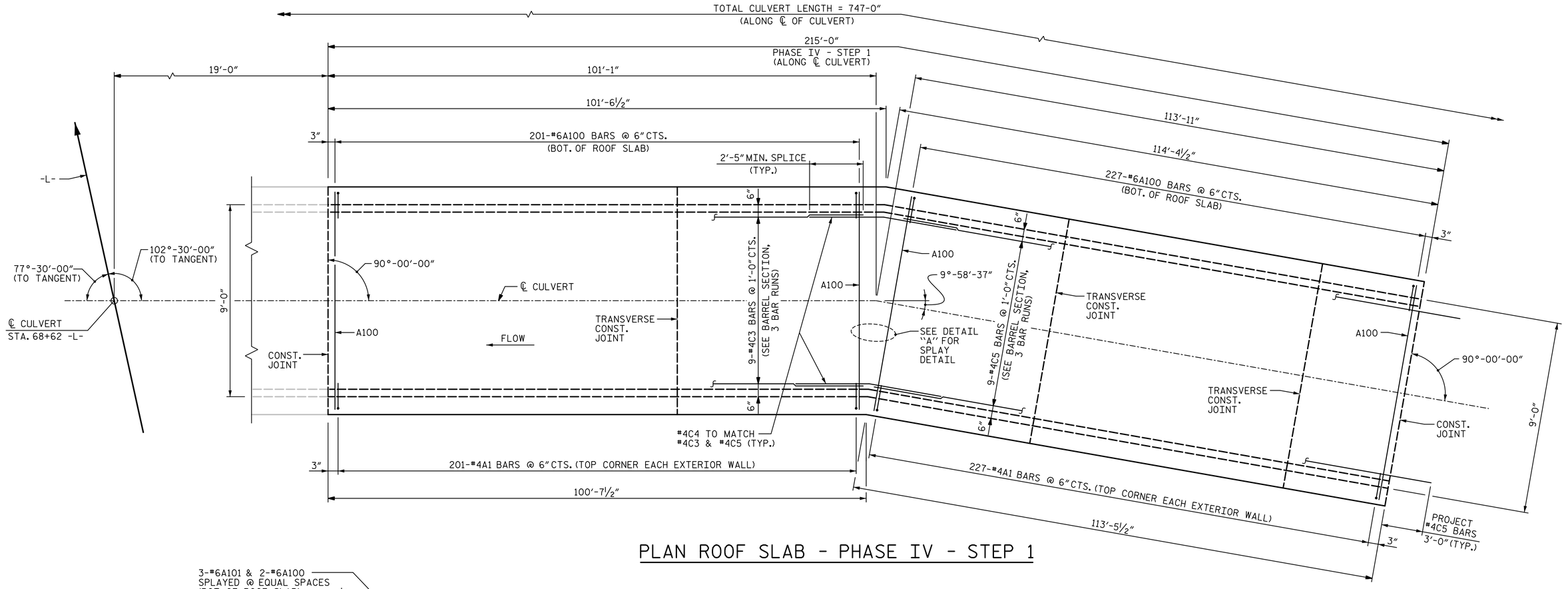
PROJECT NO. U-5797
ROBESON COUNTY
STATION: 68+62.00 -L-

SHEET 6 OF 15

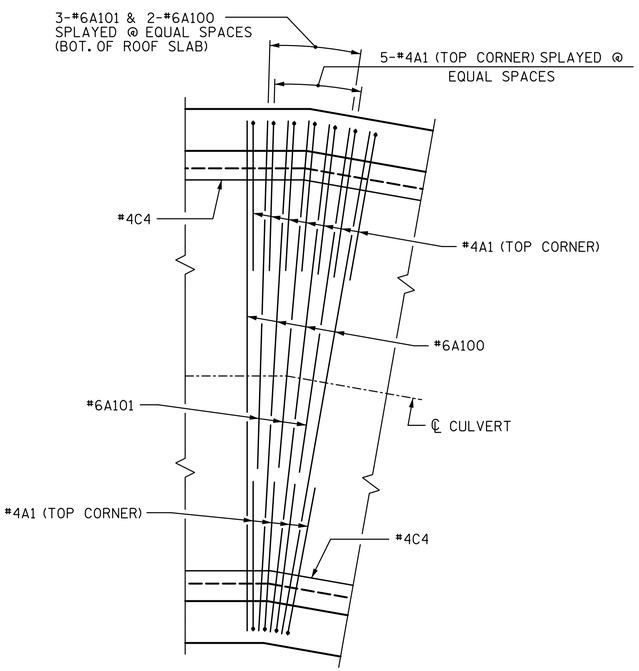
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9'-0" X 6'-0"
CONCRETE BOX CULVERT
102°-30'-00" SKEW

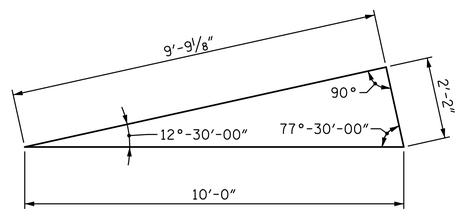
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-6
1			3			TOTAL SHEETS
2			4			15



PLAN ROOF SLAB - PHASE IV - STEP 1



DETAIL "A"



SKEW TRIANGLE

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3/6/2025

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PROJECT NO. U-5797
ROBESON COUNTY
STATION: 68+62.00 -L-

SHEET 7 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9'-0" X 6'-0"
CONCRETE BOX CULVERT
102°-30'-00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-7
1			3			TOTAL SHEETS
2			4			15

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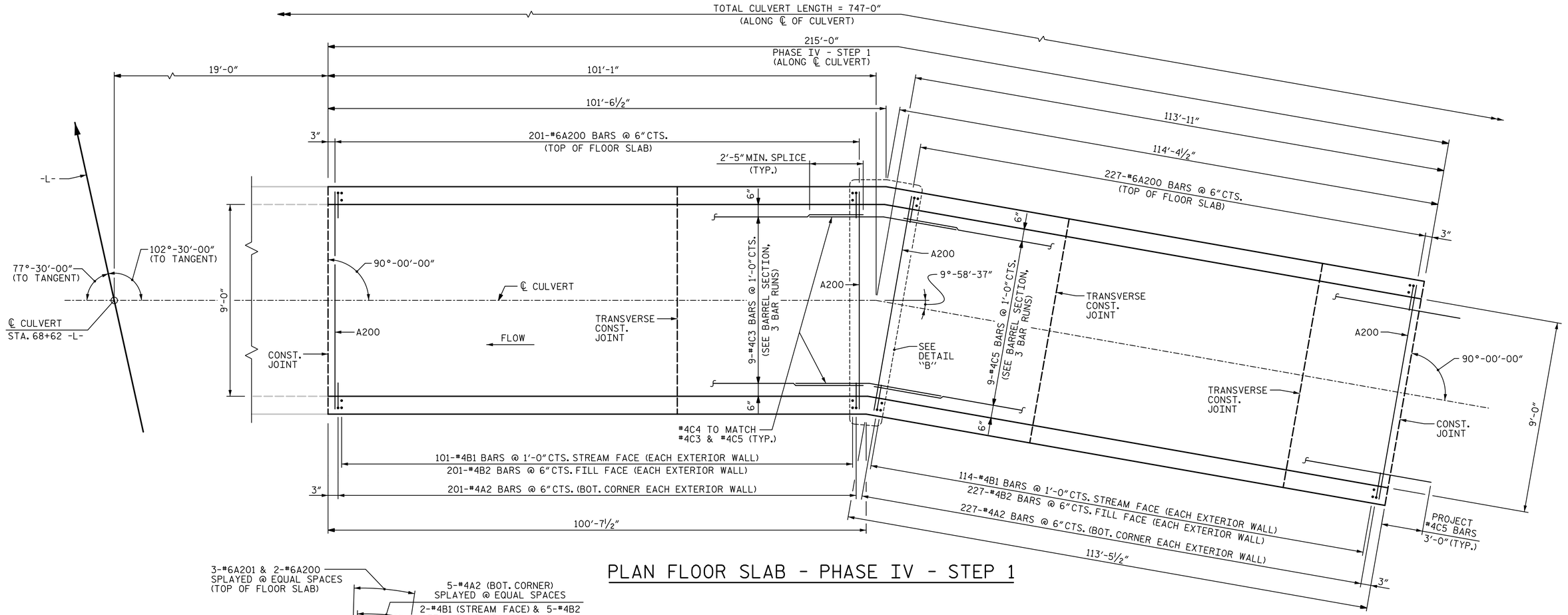
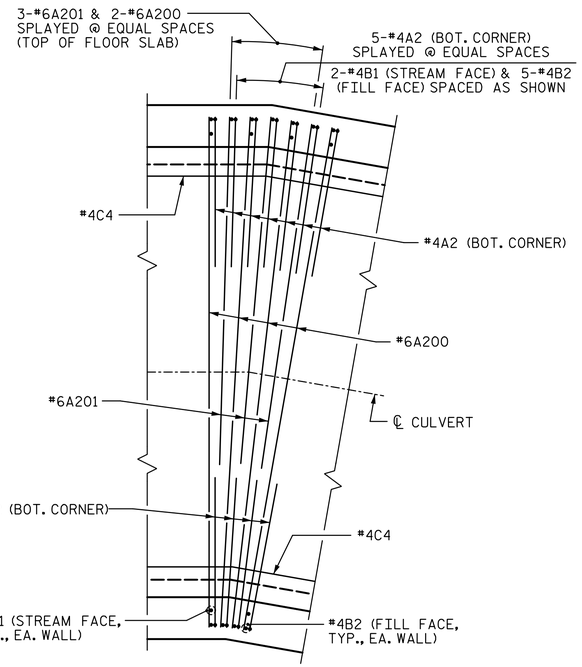


PLAN FLOOR SLAB - PHASE IV - STEP 1



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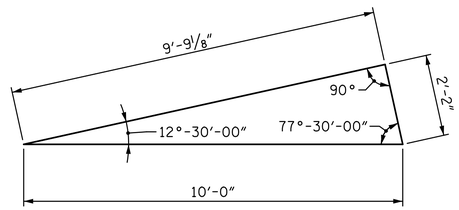

SKEW TRIANGLE

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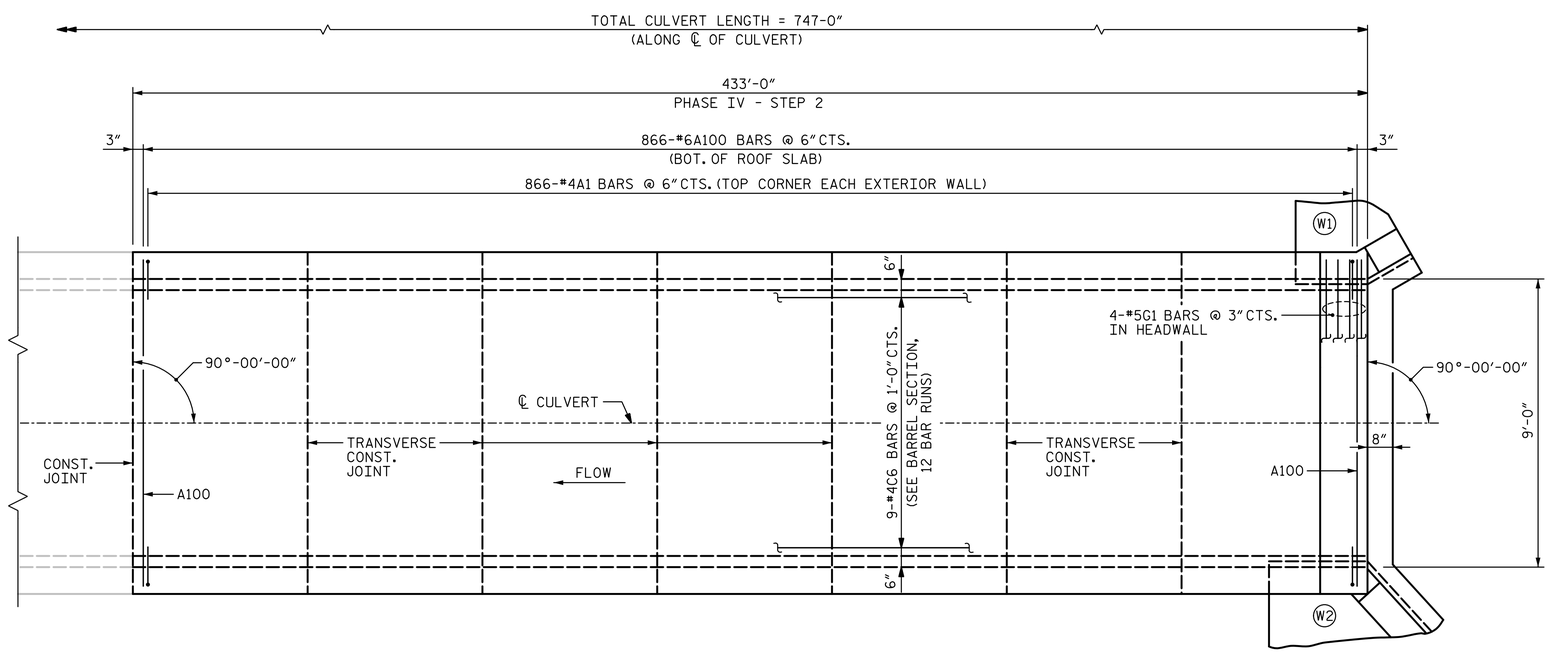
PROJECT NO. U-5797
ROBESON COUNTY
STATION: 68+62.00 -L-

SHEET 8 OF 15

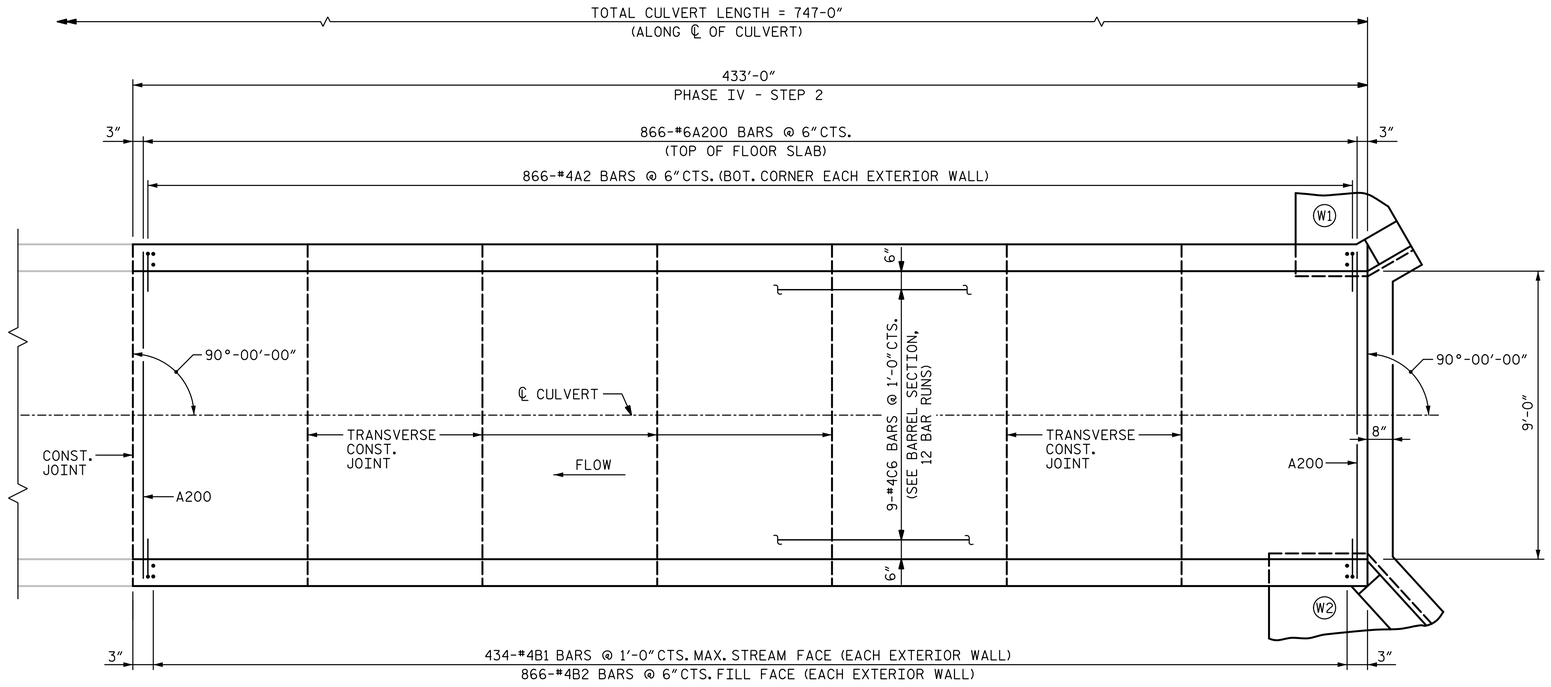
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9'-0" X 6'-0"
CONCRETE BOX CULVERT
102°-30'-00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-8
1			3			TOTAL SHEETS
2			4			15



PLAN ROOF SLAB - PHASE IV - STEP 2



PLAN FLOOR SLAB - PHASE IV - STEP 2

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PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

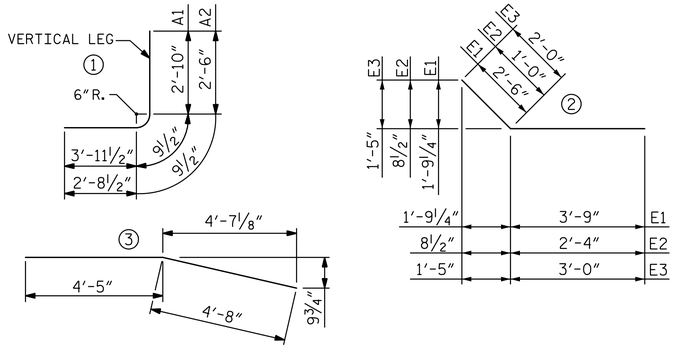
SHEET 9 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9′-0″ X 6′-0″
CONCRETE BOX CULVERT
102°-30′-00″ SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-9
1			3			TOTAL SHEETS
2			4			15

BAR TYPES



DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTHS

BAR	SIZE	LENGTH
"B"	#4	1'-10"
"C"	#4	2'-5"

BILL OF MATERIAL PHASE II - STEP 3 - STAGE 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	254	#4	1	7'-7"	1,287
A2	254	#4	1	6'-0"	1,018
A100	127	#6	STR	10'-2"	1,939
A200	127	#6	STR	10'-2"	1,939
B1	128	#4	STR	7'-10"	670
B2	254	#4	STR	5'-0"	848
C1	72	#4	STR	34'-5"	1,655
E1	8	#5	2	6'-3"	52
G1	2	#5	STR	10'-2"	21
G2	2	#5	STR	11'-8"	24

PHASE II - STEP 3 - STAGE 2
REINFORCING STEEL 9,505 LBS.

PHASE II - STEP 3 - STAGE 2 QUANTITIES

REINFORCING STEEL
BARREL 9,505 LBS.
WING 3 & PORTION OF WING 4 1,025 LBS.
TOTAL 10,530 LBS.

CLASS A CONCRETE
BARREL @ 1.213 CY/FT 76.7 CY
END CURTAIN WALL 2.0 CY
WING 3 & PORTION OF WING 4 9.1 CY
HEADWALL 0.5 CY
TOTAL 88.3 CY

BILL OF MATERIAL PHASE III - STEP 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	142	#4	1	7'-7"	719
A2	142	#4	1	6'-0"	569
A100	71	#6	STR	10'-2"	1,084
A200	71	#6	STR	10'-2"	1,084
B1	72	#4	STR	7'-10"	377
B2	142	#4	STR	5'-0"	474
C2	36	#4	STR	37'-11"	912

PHASE III - STEP 1
REINFORCING STEEL 5,219 LBS.

PHASE III - STEP 1 QUANTITIES

REINFORCING STEEL
BARREL 5,219 LBS.
TOTAL 5,219 LBS.

CLASS A CONCRETE
BARREL @ 1.213 CY/FT 43.1 CY
TOTAL 43.1 CY

BILL OF MATERIAL PHASE IV - STEP 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	861	#4	1	7'-7"	4,362
A2	861	#4	1	6'-0"	3,451
A100	430	#6	STR	10'-2"	6,566
A101	3	#6	STR	6'-11"	31
A200	430	#6	STR	10'-2"	6,566
A201	3	#6	STR	6'-11"	31
B1	432	#4	STR	7'-10"	2,261
B2	861	#4	STR	5'-0"	2,876
C3	108	#4	STR	34'-8"	2,501
C4	36	#4	3	9'-1"	218
C5	108	#4	STR	40'-0"	2,886
E2	8	#5	2	3'-4"	28

PHASE IV - STEP 1
REINFORCING STEEL 31,805 LBS.

PHASE IV - STEP 1 QUANTITIES

REINFORCING STEEL
BARREL 31,805 LBS.
TOTAL 31,805 LBS.

CLASS A CONCRETE
BARREL @ 1.213 CY/FT 260.8 CY
TOTAL 260.8 CY

BILL OF MATERIAL PHASE IV - STEP 2

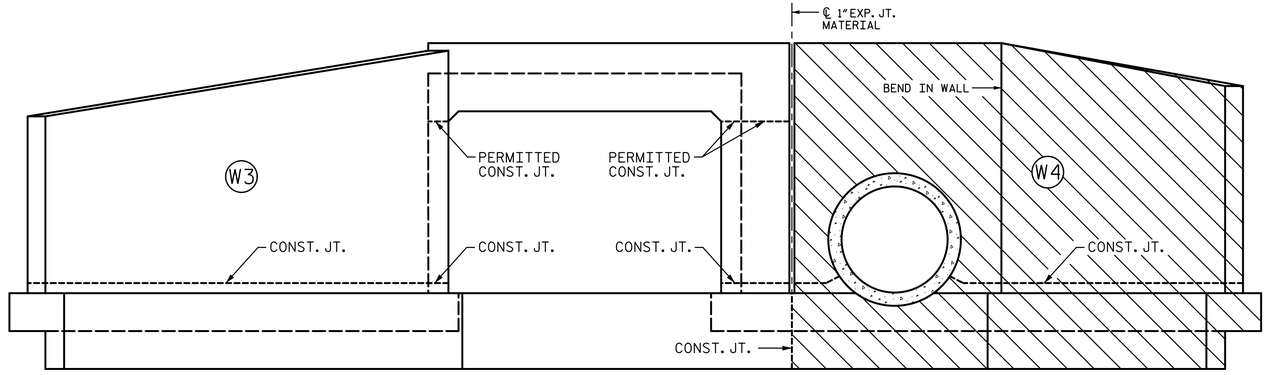
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	1,732	#4	1	7'-7"	8,774
A2	1,732	#4	1	6'-0"	6,942
A100	866	#6	STR	10'-2"	13,224
A200	866	#6	STR	10'-2"	13,224
B1	868	#4	STR	7'-10"	4,542
B2	1,732	#4	STR	5'-0"	5,785
C6	432	#4	STR	38'-3"	11,038
E3	16	#5	2	5'-0"	83
G1	4	#5	STR	10'-2"	42

PHASE IV - STEP 2
REINFORCING STEEL 63,738 LBS.

PHASE IV - STEP 2 QUANTITIES

REINFORCING STEEL
BARREL 63,738 LBS.
WINGS 1 & 2 539 LBS.
TOTAL 64,277 LBS.

CLASS A CONCRETE
BARREL @ 1.213 CY/FT 525.0 CY
END CURTAIN WALL 1.1 CY
WINGS 1 & 2 4.6 CY
HEADWALL 0.9 CY
TOTAL 531.6 CY



PHASE II - STEP 3 - STAGE 1

PHASE II - STEP 3 - STAGE 2
OR
PHASE III - STEP 1
OR
PHASE IV - STEP 1
OR
PHASE IV - STEP 2

BILL OF MATERIAL PHASE II - STEP 3 - STAGE 1

REINFORCING STEEL
PORTION OF WING 4 1,003 LBS.
TOTAL 1,003 LBS.

CLASS A CONCRETE
END CURTAIN WALL 1.1 CY
PORTION OF WING 4 8.7 CY
TOTAL 9.8 CY

CULVERT CONSTRUCTION SEQUENCE

LOOKING UPSTREAM/NORMAL TO OUTLET END

PHASE II - STEP 3 - STAGE 1
POUR 1: PART OF W4 FOOTING & 4" OF W4 VERTICAL WALL

POUR 2: REMAINING PORTIONS OF W4 VERTICAL WALL

PHASE II - STEP 3 - STAGE 2
POUR 1: BARREL FLOOR SLAB, 4" OF VERTICAL WALLS, W3 FOOTING AND REMAINING PORTION OF W4 FOOTING, 4" OF W3 VERTICAL WALL & 4" OF REMAINING PORTION OF W4 VERTICAL WALL

POUR 2: REMAINING PORTIONS OF BARREL, W3 & W4 VERTICAL WALLS

POUR 3: ROOF SLAB, HEADWALL & REMIANING PORTION OF W4 VERTICAL WALL

PHASE III - STEP 1
POUR 1: FLOOR SLAB & 4" OF VERTICAL WALLS

POUR 2: REMAINING PORTIONS OF VERTICAL WALLS

POUR 3: ROOF SLAB

PHASE IV - STEP 1
POUR 1: FLOOR SLAB & 4" OF VERTICAL WALLS

POUR 2: REMAINING PORTIONS OF VERTICAL WALLS

POUR 3: ROOF SLAB

PHASE IV - STEP 2
POUR 1: W1 & W2 FOOTINGS, FLOOR SLAB, 4" BARREL, W1 & W2 VERTICAL WALLS

POUR 2: REMAINING PORTIONS OF BARREL, W1 & W2 VERTICAL WALLS

POUR 3: ROOF SLAB & HEADWALL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM
3/6/2025

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PROJECT NO. U-5797
ROBESON COUNTY
STATION: 68+62.00 -L-
SHEET 10 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9'-0" X 6'-0"
CONCRETE BOX CULVERT
102°-30'-00" SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-10
1			3			TOTAL SHEETS
2			4			15

DRAWN BY : SGH DATE : 11-24
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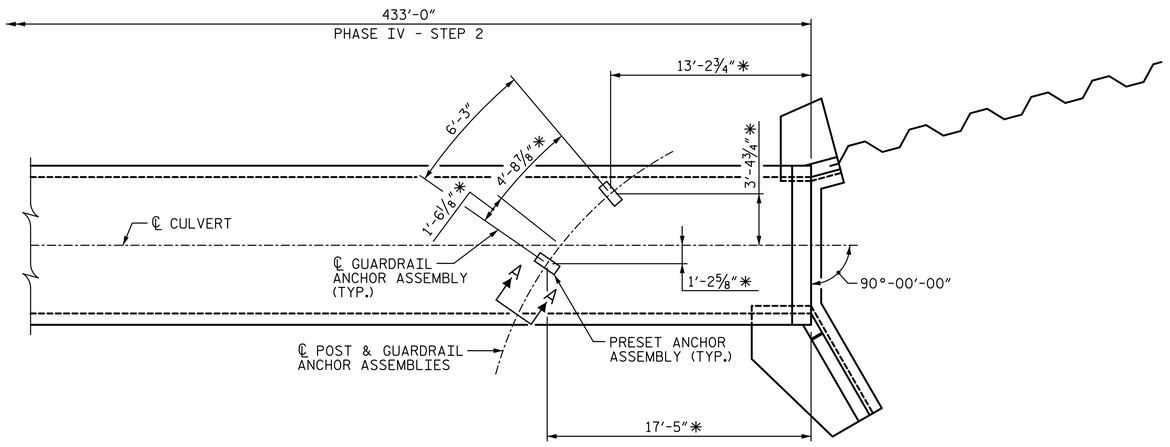


PLAN OF CULVERT GUARDRAIL ANCHOR ASSEMBLY SPACING AT INLET END

* THIS DIMENSION SHALL BE CONFIRMED BY THE ENGINEER IN THE FIELD.

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½".

B. 4 - 1"Ø X 2¼" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1"Ø X 2¼" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 7/16"Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

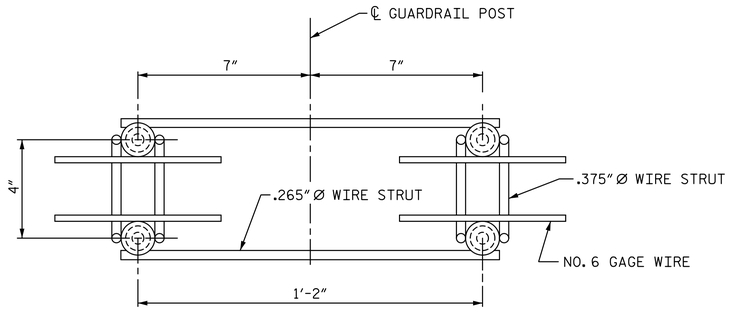
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

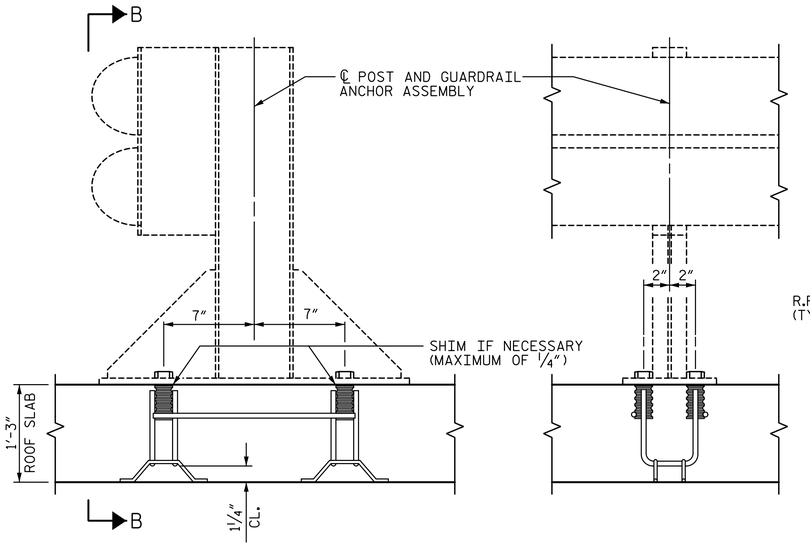
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1"Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

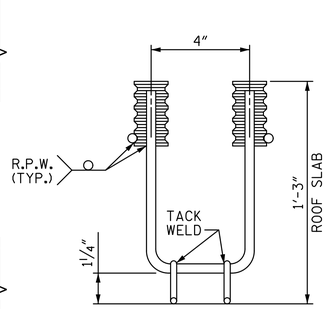


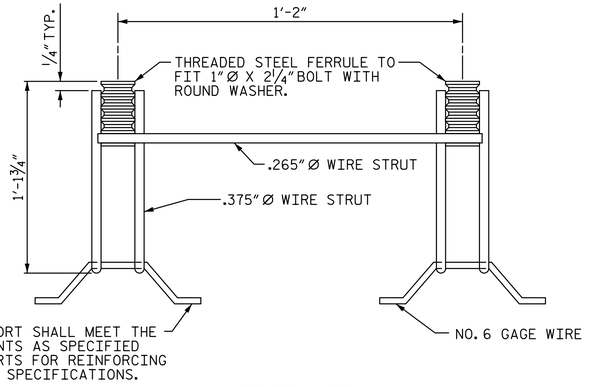
PLAN



SECTION A-A

SECTION B-B





THIS SUPPORT SHALL MEET THE REQUIREMENTS AS SPECIFIED FOR SUPPORTS FOR REINFORCING STEEL. SEE SPECIFICATIONS.

ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM 3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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PROJECT NO. U-5797

ROBESON COUNTY

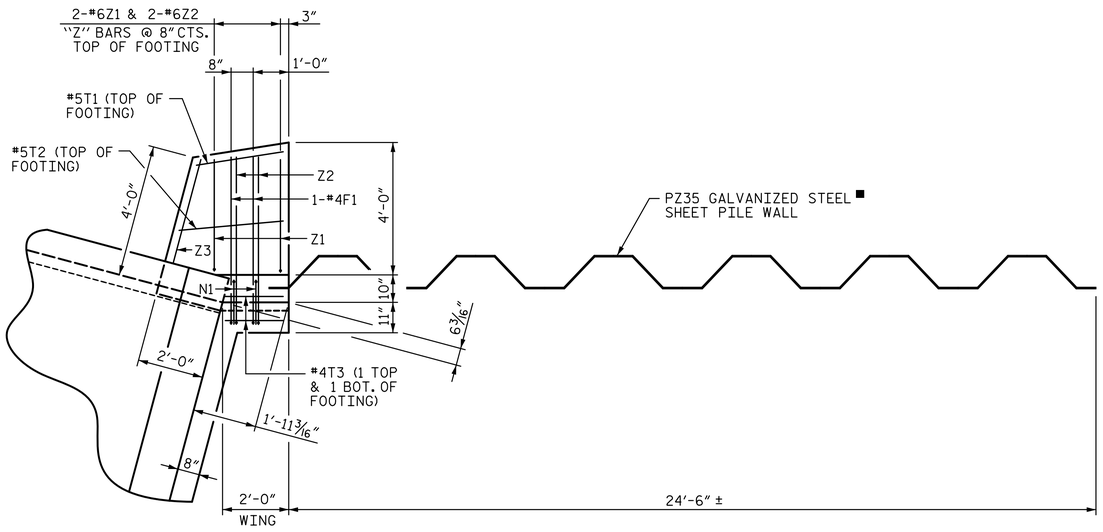
STATION: 68+62.00 -L-

SHEET 11 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

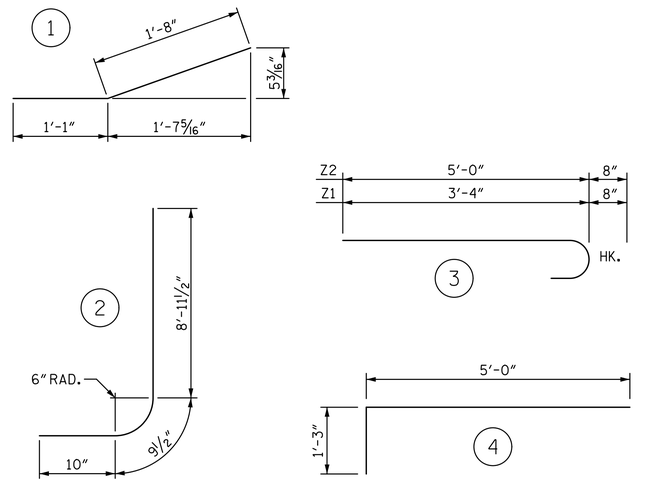
ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-11
1			3			TOTAL SHEETS
2			4			15



PLAN (W1)

BAR TYPES



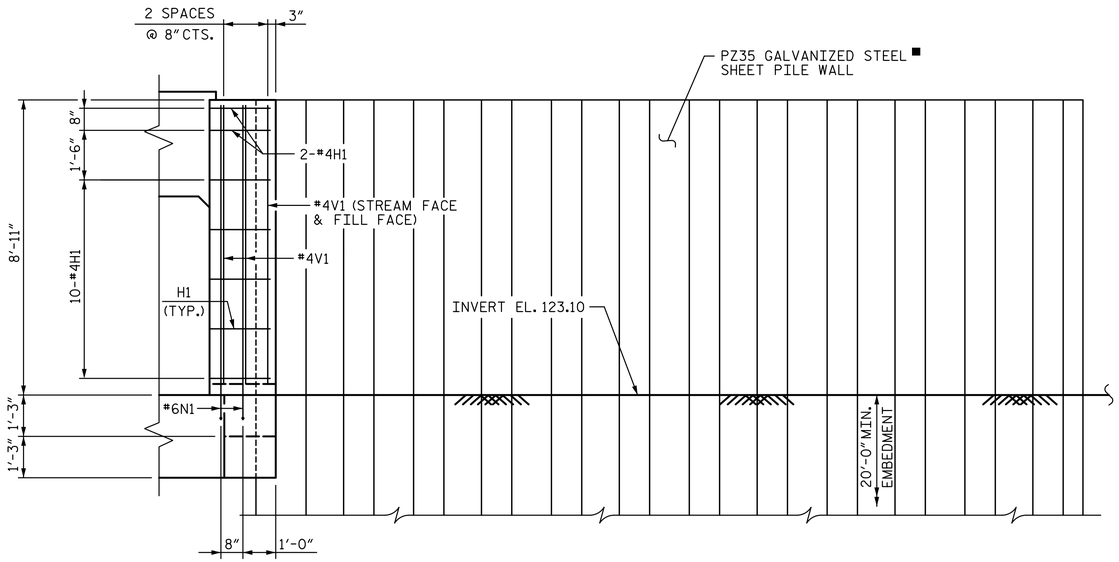
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

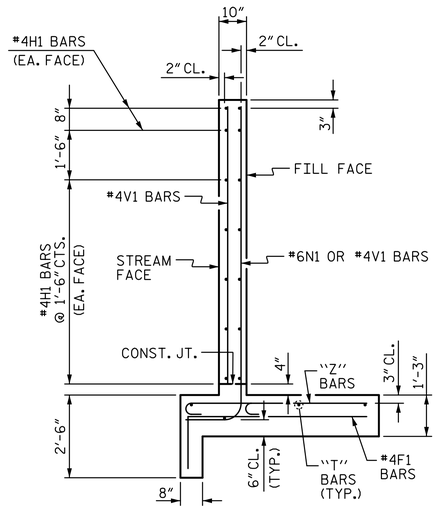
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F1	2	#4	4	6'-3"	8
H1	14	#4	1	2'-9"	26
N1	2	#6	2	10'-7"	32
T1	1	#5	STR	2'-7"	3
T2	1	#5	STR	3'-2"	3
T3	2	#4	STR	1'-9"	2
V1	4	#4	STR	8'-5"	23
Z1	2	#6	3	4'-0"	12
Z2	2	#6	3	5'-8"	17
Z3	1	#6	STR	3'-3"	5

REINFORCING STEEL (W1) 131 LBS.

■ GALVANIZED STEEL SHEET PILE SHALL BE EMBEDDED INTO CONCRETE WING A MIN. OF 6"



ELEVATION (W1)



WING SECTION

SHEET PILE WALL NOT SHOWN FOR CLARITY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM
3/6/2025

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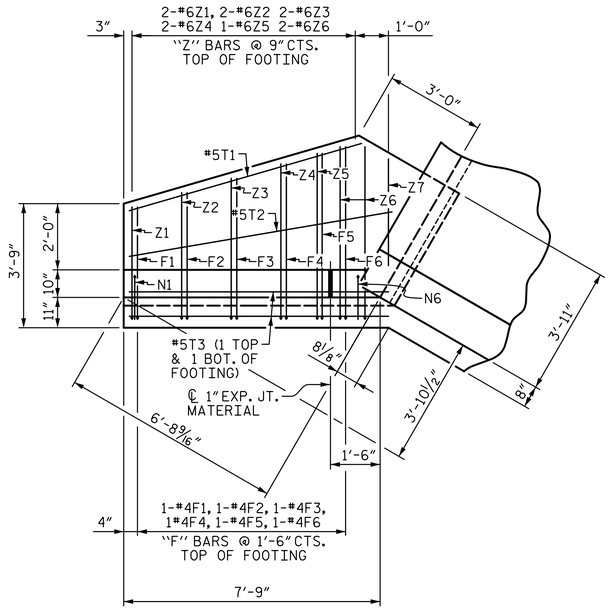
PROJECT NO. U-5797
ROBESON COUNTY
STATION: 68+62.00 -L-
SHEET 12 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

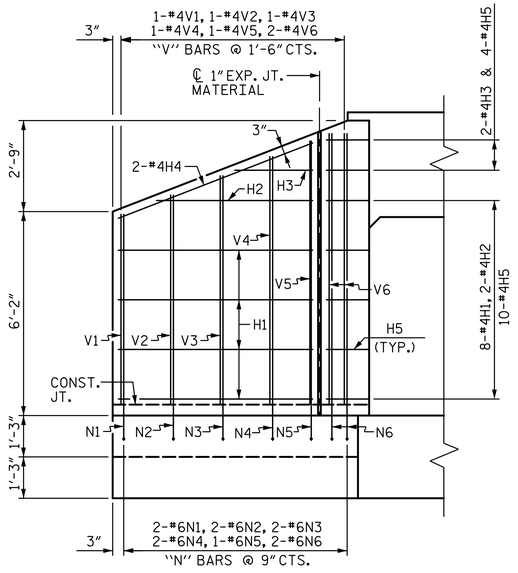
WING 1 FOR CONCRETE BOX CULVERT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-12
1			3			TOTAL SHEETS
2			4			15

hensleyg 1/23/2025 2:00:43 PM R:\Structures\04_Culverts\Culvert 68+62 -L- (Culvert 3)\02_Ustation\03_Final Plans\413_023_U-5797_SMU_CU_02_TTOC03.dgn

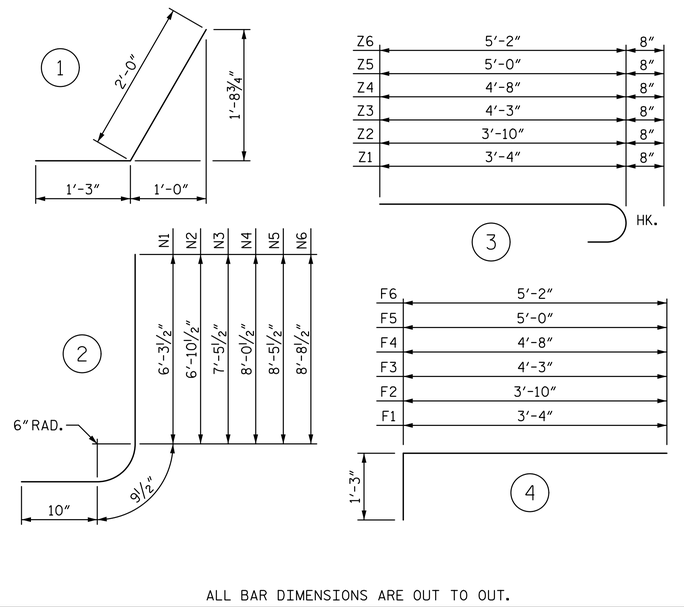


PLAN (W2)



ELEVATION (W2)

BAR TYPES

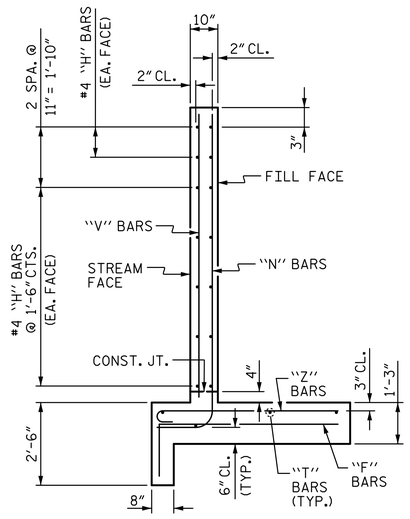


ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F1	1	#4	4	4'-7"	3
F2	1	#4	4	5'-1"	3
F3	1	#4	4	5'-6"	4
F4	1	#4	4	5'-11"	4
F5	1	#4	4	6'-3"	4
F6	1	#4	4	6'-5"	4
H1	8	#4	STR	5'-10"	31
H2	2	#4	STR	4'-8"	6
H3	2	#4	STR	2'-4"	3
H4	2	#4	STR	6'-3"	8
H5	14	#4	1	3'-3"	30
N1	2	#6	2	7'-11"	24
N2	2	#6	2	8'-6"	26
N3	2	#6	2	9'-1"	27
N4	2	#6	2	9'-8"	29
N5	1	#6	2	10'-1"	15
N6	2	#6	2	10'-4"	31
T1	1	#5	STR	7'-3"	8
T2	1	#5	STR	8'-0"	8
T3	2	#5	STR	7'-10"	16
V1	1	#4	STR	5'-9"	4
V2	1	#4	STR	6'-4"	4
V3	1	#4	STR	6'-11"	5
V4	1	#4	STR	7'-6"	5
V5	1	#4	STR	7'-11"	5
V6	2	#4	STR	8'-2"	11
Z1	2	#6	3	4'-0"	12
Z2	2	#6	3	4'-6"	14
Z3	2	#6	3	4'-11"	15
Z4	2	#6	3	5'-4"	16
Z5	1	#6	3	5'-8"	9
Z6	2	#6	3	5'-10"	18
Z7	1	#6	STR	3'-9"	6

REINFORCING STEEL
FOR 1 WING (W2) 408 LBS.



TYPICAL WING SECTION

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 2 FOR CONCRETE BOX CULVERT

H = 6'-0"
90° SKEW

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

SHEET 13 OF 15

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029429 JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
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2			4			15

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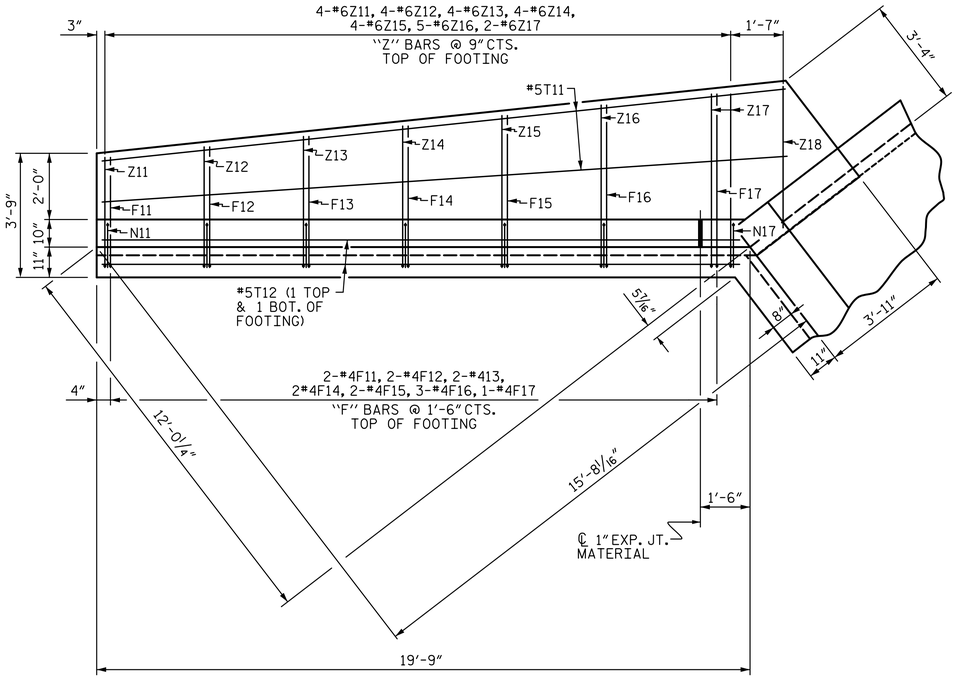
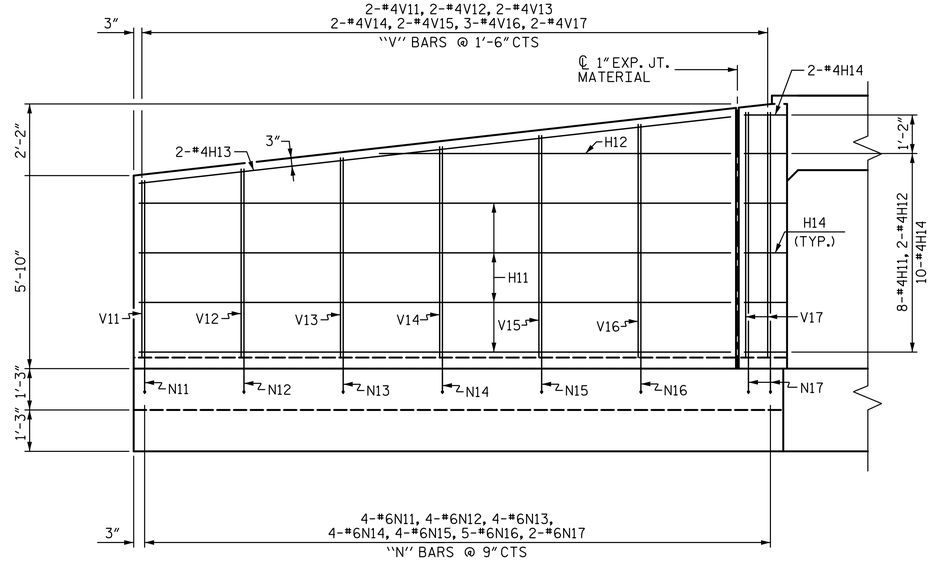
DESIGN ENGINEER OF RECORD : J. GRISCOM DATE : 11-24

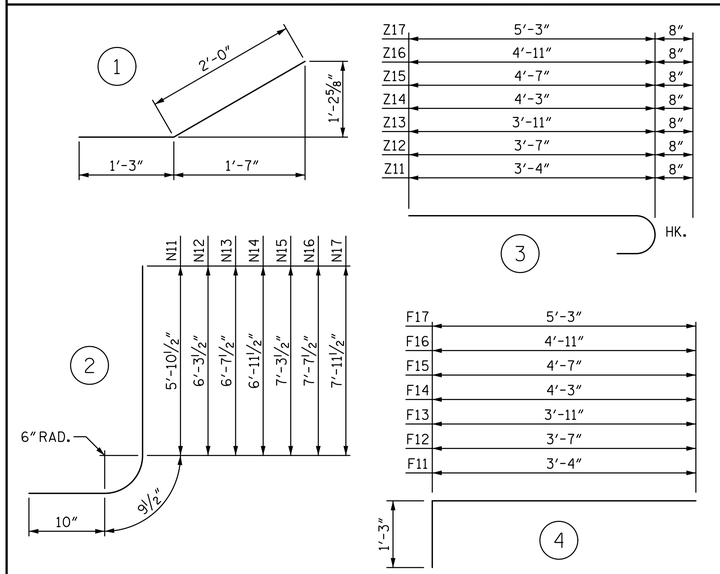


PLAN (W3)



ELEVATION (W3)

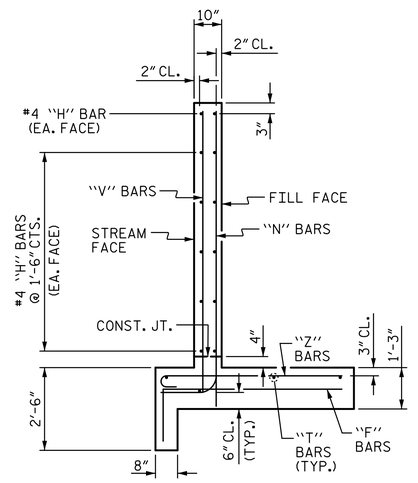
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
F11	2	#4	4	4'-7"	6
F12	2	#4	4	4'-10"	6
F13	2	#4	4	5'-2"	7
F14	2	#4	4	5'-6"	7
F15	2	#4	4	5'-10"	8
F16	3	#4	4	6'-2"	12
F17	1	#4	4	6'-6"	4
H11	8	#4	STR	17'-10"	95
H12	2	#4	STR	10'-7"	14
H13	2	#4	STR	17'-11"	24
H14	12	#4	1	3'-3"	26
N11	4	#6	2	7'-6"	45
N12	4	#6	2	7'-11"	48
N13	4	#6	2	8'-3"	50
N14	4	#6	2	8'-7"	52
N15	4	#6	2	8'-11"	54
N16	5	#6	2	9'-3"	69
N17	2	#6	2	9'-7"	29
T11	2	#5	STR	20'-9"	43
T12	2	#5	STR	19'-3"	40
V11	2	#4	STR	5'-4"	7
V12	2	#4	STR	5'-8"	8
V13	2	#4	STR	6'-0"	8
V14	2	#4	STR	6'-4"	8
V15	2	#4	STR	6'-8"	9
V16	3	#4	STR	7'-0"	14
V17	2	#4	STR	7'-5"	10
Z11	4	#6	3	4'-0"	24
Z12	4	#6	3	4'-3"	26
Z13	4	#6	3	4'-7"	28
Z14	4	#6	3	4'-11"	30
Z15	4	#6	3	5'-3"	32
Z16	5	#6	3	5'-7"	42
Z17	2	#6	3	5'-11"	18
Z18	1	#6	STR	4'-3"	6
REINFORCING STEEL FOR 1 WING (W3)					909 LBS.



TYPICAL WING SECTION

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

SHEET 14 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 3 FOR CONCRETE BOX CULVERT

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
Charlotte, NC 28203
NC License Number F-0991

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2			4			15

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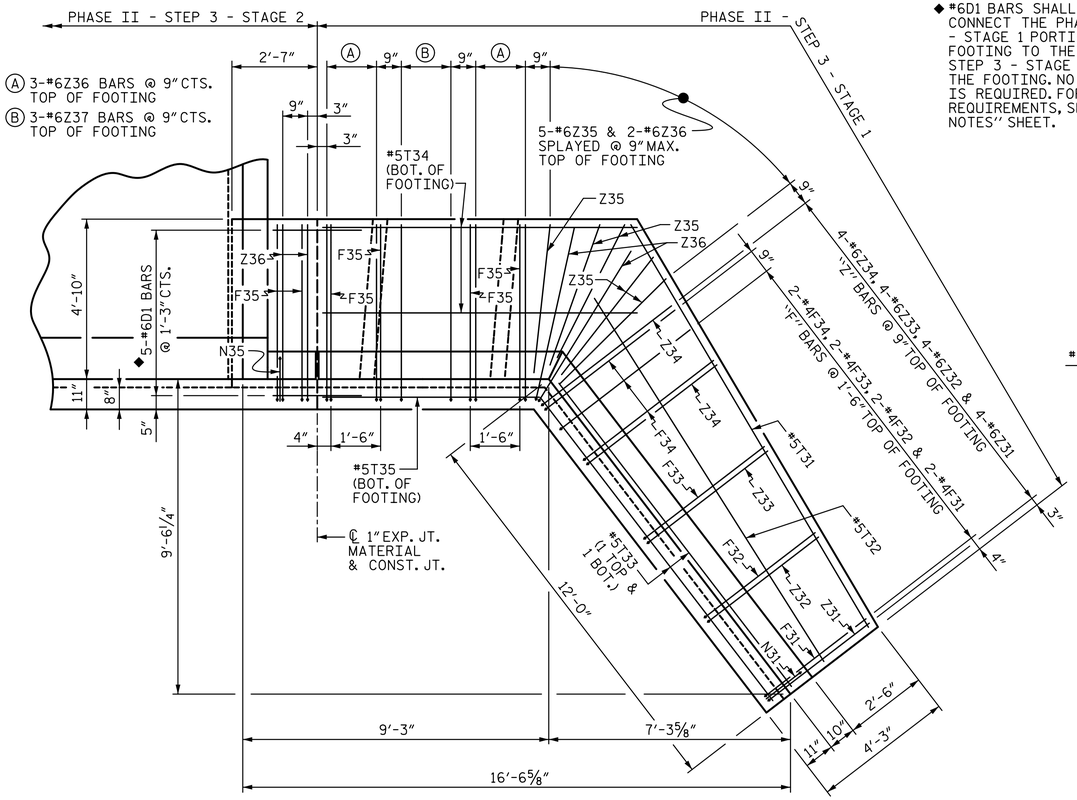
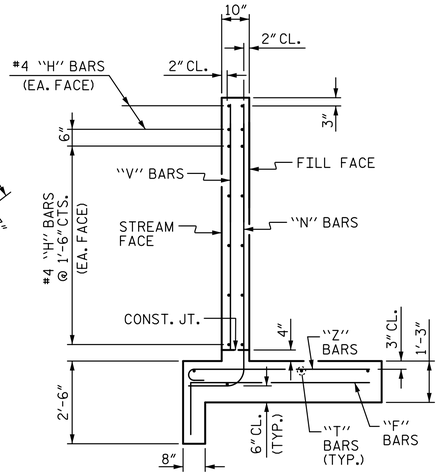
DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE : 11-24



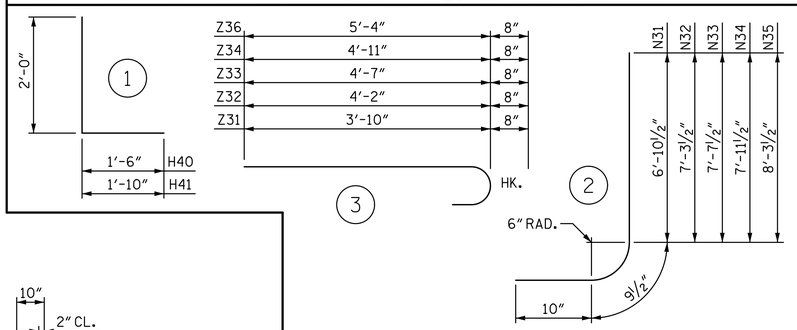
PLAN (W4)

◆ #6D1 BARS SHALL BE USED TO CONNECT THE PHASE II - STEP 3 - STAGE 1 PORTION OF THE FOOTING TO THE PHASE II - STEP 3 - STAGE 2 PORTION OF THE FOOTING. NO FIELD TESTING IS REQUIRED. FOR PLACEMENT REQUIREMENTS, SEE "STANDARD NOTES" SHEET.



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR WING 4 (PHASE II - STEP 3 - STAGE 1)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
E1	12	#5	6	5'-2"	65
F31	2	#4	4	5'-1"	7
F32	2	#4	4	5'-5"	7
F33	2	#4	4	5'-10"	8
F34	3	#4	4	6'-2"	12
F35	4	#4	4	6'-7"	18
H31	6	#4	6	13'-2"	53
H32	4	#4	STR	11'-11"	32
H33	2	#4	STR	9'-2"	12
H34	1	#4	STR	12'-1"	8
H35	1	#4	STR	11'-11"	8
H36	1	#4	STR	7'-1"	5
H37	1	#4	STR	6'-11"	5
H38	6	#4	6	9'-3"	37
H39	6	#4	STR	11"	4
N31	4	#6	2	8'-6"	51
N32	4	#6	2	8'-11"	54
N33	4	#6	2	9'-3"	56
N34	5	#6	2	9'-7"	72
N35	4	#6	2	9'-11"	60
N36	6	#6	STR	3'-11"	35
T31	1	#5	STR	14'-1"	15
T32	1	#5	STR	12'-11"	13
T33	2	#5	STR	11'-6"	24
T34	2	#5	STR	9'-6"	20
T35	1	#5	STR	6'-6"	7
V31	2	#4	STR	6'-3"	8
V32	2	#4	STR	6'-8"	9
V33	2	#4	STR	7'-0"	9
V34	3	#4	STR	7'-5"	15
V35	2	#4	STR	7'-9"	10
V36	3	#4	STR	3'-11"	8
Z31	4	#6	3	4'-6"	27
Z32	4	#6	3	4'-10"	29
Z33	4	#6	3	5'-3"	32
Z34	4	#6	3	5'-7"	34
Z35	5	#6	STR	4'-6"	34
Z36	8	#6	3	6'-0"	72
Z37	3	#6	5	6'-2"	28
REINFORCING STEEL (W4)					1,003 LBS.

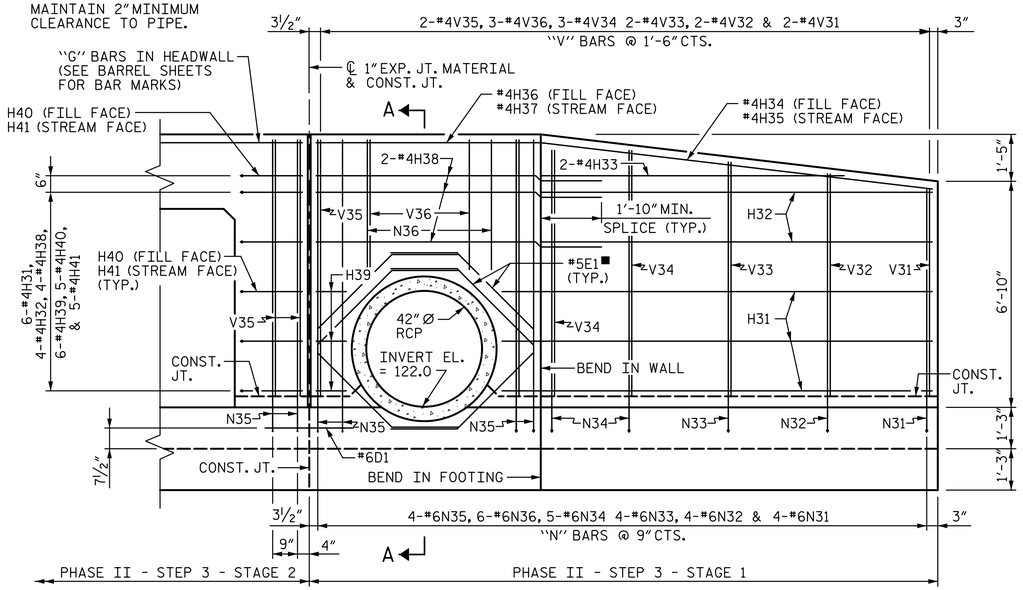
SPLICE LENGTHS

BAR	SIZE	LENGTH
"H"	#4	1'-10"

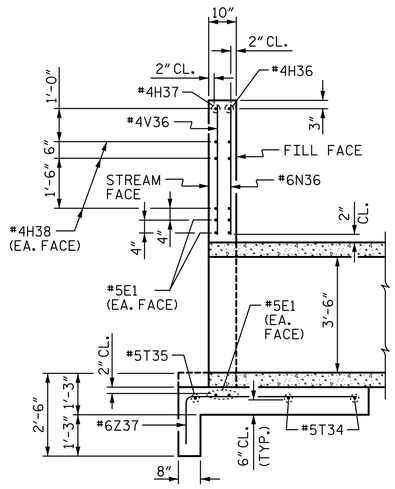
BILL OF MATERIAL FOR WING 4 (PHASE II - STEP 3 - STAGE 2)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D1	5	#6	STR	2'-8"	20	N35	2	#6	2	9'-11"	30
F35	2	#4	4	6'-7"	9	V35	2	#4	STR	7'-9"	10
H40	6	#4	1	3'-6"	14	Z36	2	#6	3	6'-0"	18
H41	6	#4	1	3'-10"	15						
REINFORCING STEEL (W4)					116 LBS.						

■ E1 BARS TYP. EA. FACE. BARS MAY BE SHIFTED, AS NECESSARY TO MAINTAIN 2" MINIMUM CLEARANCE TO PIPE.



ELEVATION (W4)



SECTION A-A

PROJECT NO. U-5797

ROBESON COUNTY

STATION: 68+62.00 -L-

SHEET 15 OF 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING 4 FOR CONCRETE BOX CULVERT

NORTH CAROLINA PROFESSIONAL SEAL 029429 ENGINEER JASON T. GRISCOM
3/6/2025

STV Engineers, Inc.
2151 Hawkins St., Suite 1400
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NC License Number F-0991

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NO.	BY:	DATE:	NO.	BY:	DATE:	C3-15
1			3			TOTAL SHEETS
2			4			15

DRAWN BY :	SGH	DATE : 11-24
CHECKED BY :	JAD	DATE : 11-24
DESIGN ENGINEER OF RECORD :	J. GRISCOM	DATE : 11-24

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	AASHTO (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE AASHTO
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 AASHTO
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 2024 "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" 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.

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	AASHTO (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE AASHTO
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 AASHTO
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 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED $\frac{3}{4}$" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO $1\frac{1}{2}$" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A $\frac{1}{4}$" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A $\frac{1}{4}$" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

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