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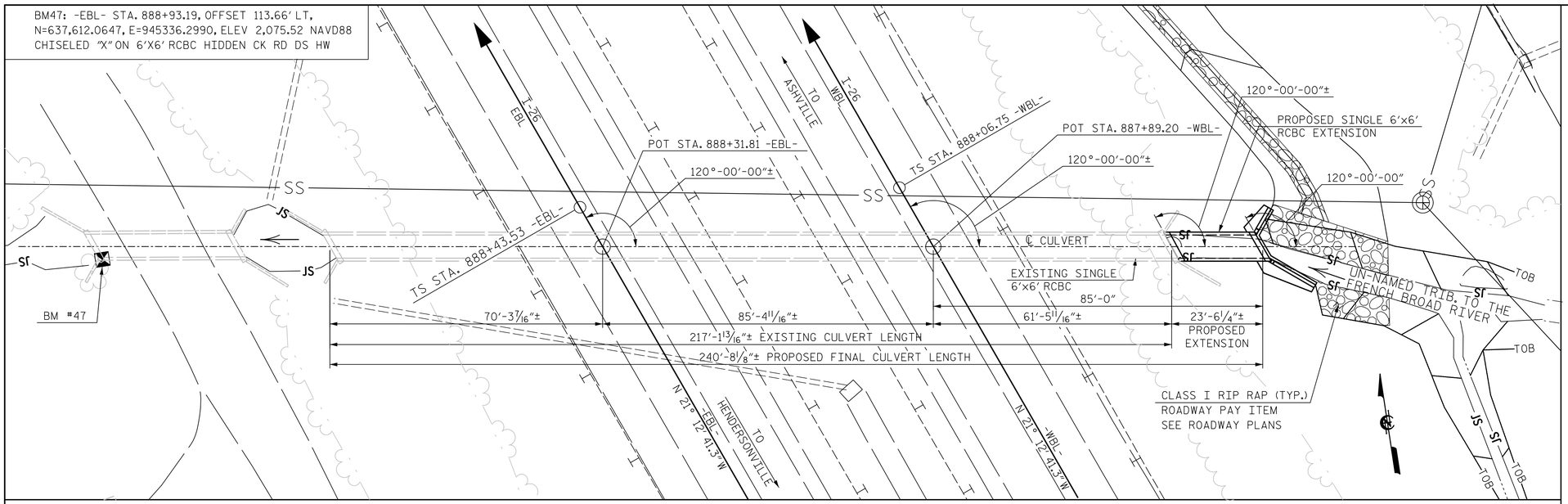


LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

F.A. PROJECT NO. IMNHF-026-1(86)9

HYDRAULIC DATA

DESIGN DISCHARGE	370 CFS
FREQUENCY OF DESIGN FLOOD	50 YR.
DESIGN HIGH WATER ELEV.	2083.7
DRAINAGE AREA	192.0 ACRES
BASIC DISCHARGE (Q100)	380 CFS
BASIC HIGH WATER ELEV.	2083.8

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	390+ CFS
FREQUENCY OF OVERTOPPING FLOOD	> 500+ YR.
OVERTOPPING FLOOD ELEV.	2088.0

TOTAL STRUCTURE QUANTITIES		
CLASS A CONCRETE		
BARREL @ 0.78 CY/FT	18.3	C.Y.
WING ETC.	8.7	C.Y.
TOTAL	27.0	C.Y.
REINFORCING STEEL		
BARREL	4,446	LBS.
WINGS ETC.	465	LBS.
TOTAL	4,911	LBS.
FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	12	TONS
CULVERT EXCAVATION AT STATION 887+89.20 -WBL-		LUMP SUM

NOTES:

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

DESIGN FILL----------20.98'

THIS CULVERT EXTENSION HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

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

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

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

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

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

AT THE CONTRACTOR'S OPTION, THE CONTRACTOR 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.

NO PRECAST REINFORCED CONCRETE BOX CULVERT OPTION WILL BE ALLOWED.

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

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

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

NO BACKFILLING OF EXTERIOR WALLS SHALL BE PERMITTED UNTIL ROOF SLAB HAS BEEN PLACED AND CURED. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY BRACING WALLS UNTIL TOP SLAB IS COMPLETE.

AT THE DIRECTION OF THE ENGINEER, UNDERCUT SOFT/LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL.

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

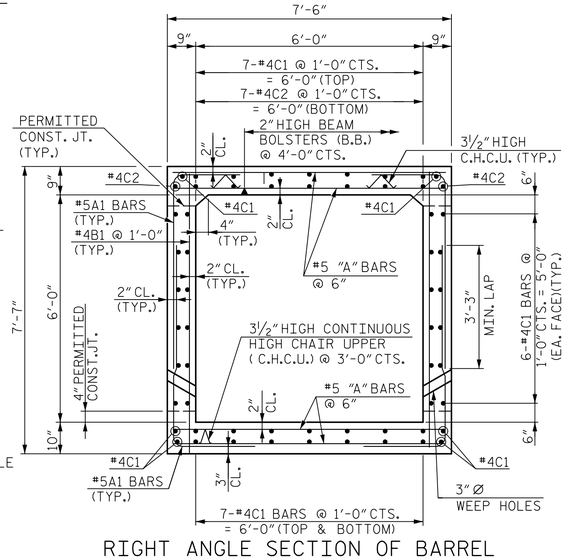
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.

EXCAVATE AT LEAST ONE FOOT BELOW BOTTOM OF CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.

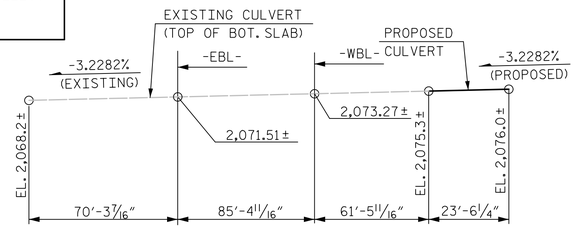
SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
1. DIVERT STREAM FLOW.
2. CONSTRUCT WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
3. CONSTRUCT THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.



RIGHT ANGLE SECTION OF BARREL

THERE ARE 60 "C" BARS IN SECTION OF BARREL



PROFILE ALONG ℄ CULVERT

GRADE DATA

GRADE POINT ELEV. @ STA. 887+89.20 -WBL- = 2099.55
CULVERT BED ELEVATION @ STA. 887+89.20 -WBL- = 2073.27
ROADWAY SLOPES 2:1

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

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

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 887+89.20 -WBL-

SHEET 1 OF 6

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/6/2019 ENGINEER DAVID W. HAWKINS

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DRAWN BY	M. WRIGHT	DATE 12/18
CHECKED BY	N. HART	DATE 1/19
DESIGN ENGINEER OF RECORD	D. HAWKINS	DATE 1/19

DWG. NO. 1

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

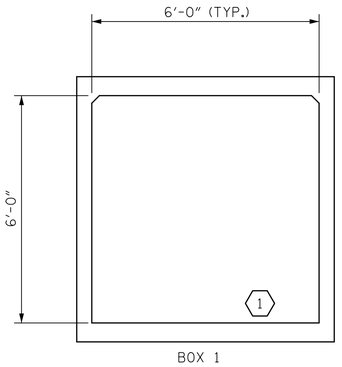
LOCATION SKETCH/ BARREL SECTION FOR SINGLE 6 FT. x 6 FT. CONCRETE BOX CULVERT

120 DEGREE SKEW
ON I-26 OVER UN-NAMED TRIB. TO THE FRENCH BROAD RIVER

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

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

	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			MOMENT				SHEAR			
			RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)
PERMANENT LOAD RATING	⟨1⟩	1.256	1.458	1	TOP SLAB	3.00	1.256	1	BOTTOM SLAB	5.40



BOX 1

LRFR SUMMARY

(LOOKING DOWNSTREAM)

PERMANENT LOAD FACTORS:

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

NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

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

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 887+89.20 -WBL-

SHEET 2 OF 6

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(DEEP FILLS)
120 DEGREE SKEW
ON I-26 OVER UN-NAMED TRIB.
TO THE FRENCH BROAD RIVER

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

STD. NO. LRFR6

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DWG. NO. 2

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ASSEMBLED BY : M. WRIGHT DATE : 1/19
CHECKED BY : N. HART DATE : 1/19

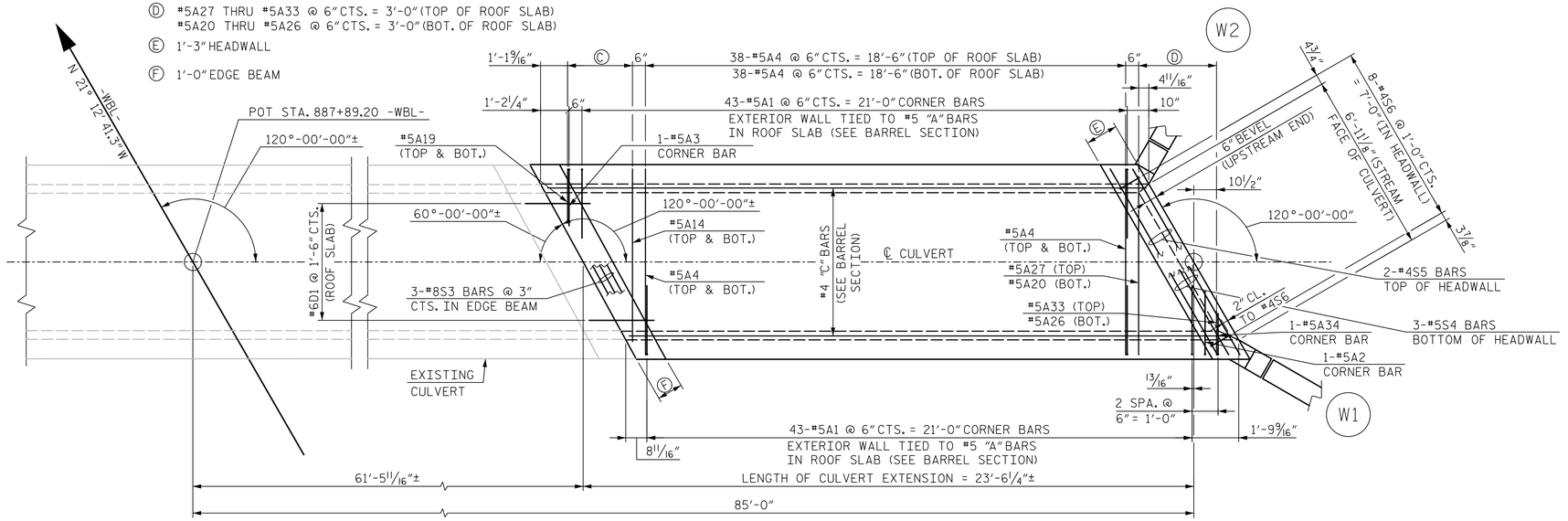
DRAWN BY : TMG 3/16
CHECKED BY : THC 7/17

Ⓒ #5A19 THRU #5A14 @ 6"CTS. = 2'-6"(TOP OF ROOF SLAB)
#5A19 THRU #5A14 @ 6"CTS. = 2'-6"(BOT. OF ROOF SLAB)

Ⓓ #5A27 THRU #5A33 @ 6"CTS. = 3'-0"(TOP OF ROOF SLAB)
#5A20 THRU #5A26 @ 6"CTS. = 3'-0"(BOT. OF ROOF SLAB)

Ⓔ 1'-3" HEADWALL

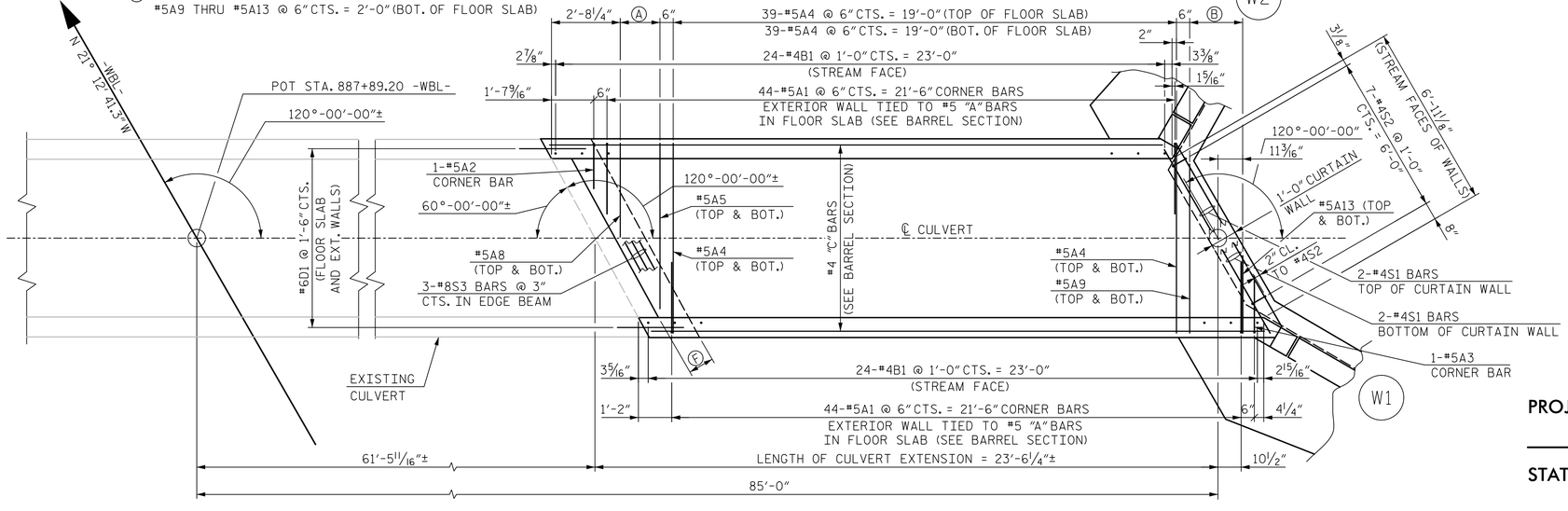
Ⓕ 1'-0" EDGE BEAM



PLAN - ROOF SLAB EXTENSION

Ⓐ #5A8 THRU #5A5 @ 6"CTS. = 1'-6"(TOP OF FLOOR SLAB)
#5A8 THRU #5A5 @ 6"CTS. = 1'-6"(BOT. OF FLOOR SLAB)

Ⓑ #5A9 THRU #5A13 @ 6"CTS. = 2'-0"(TOP OF FLOOR SLAB)
#5A9 THRU #5A13 @ 6"CTS. = 2'-0"(BOT. OF FLOOR SLAB)



PLAN - FLOOR SLAB EXTENSION

PROJECT NO. I-4700A
BUNCOMBE COUNTY
STATION: 887+89.20 -WBL-

SHEET 3 OF 6

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DWG. NO. 3

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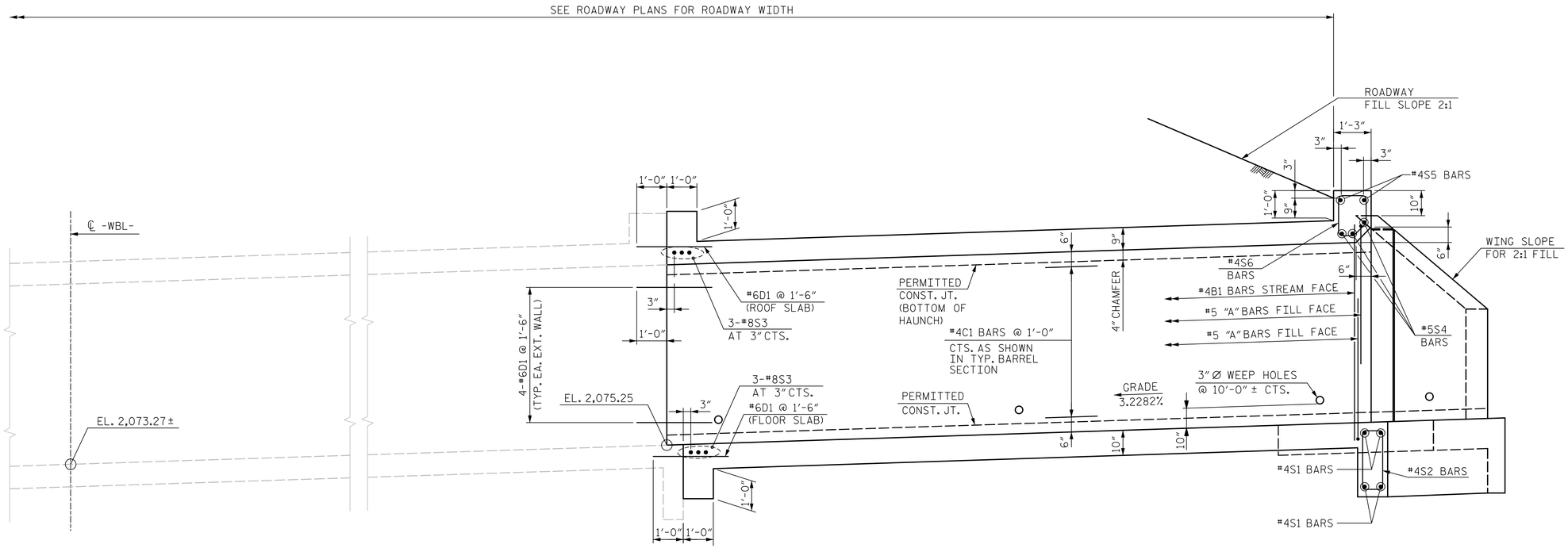
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

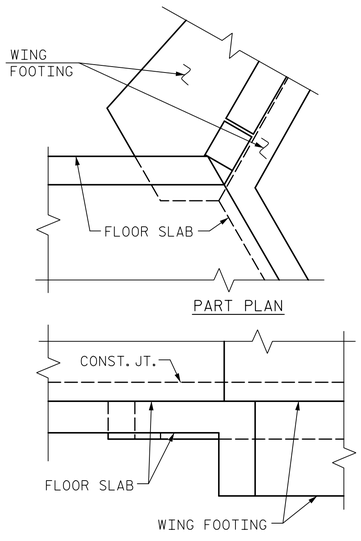
PLAN OF SLAB FOR SINGLE 6 FT. × 6 FT. CONCRETE BOX CULVERT

120 DEGREE SKEW
ON I-26 OVER UN-NAMED TRIB.
TO THE FRENCH BROAD RIVER

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



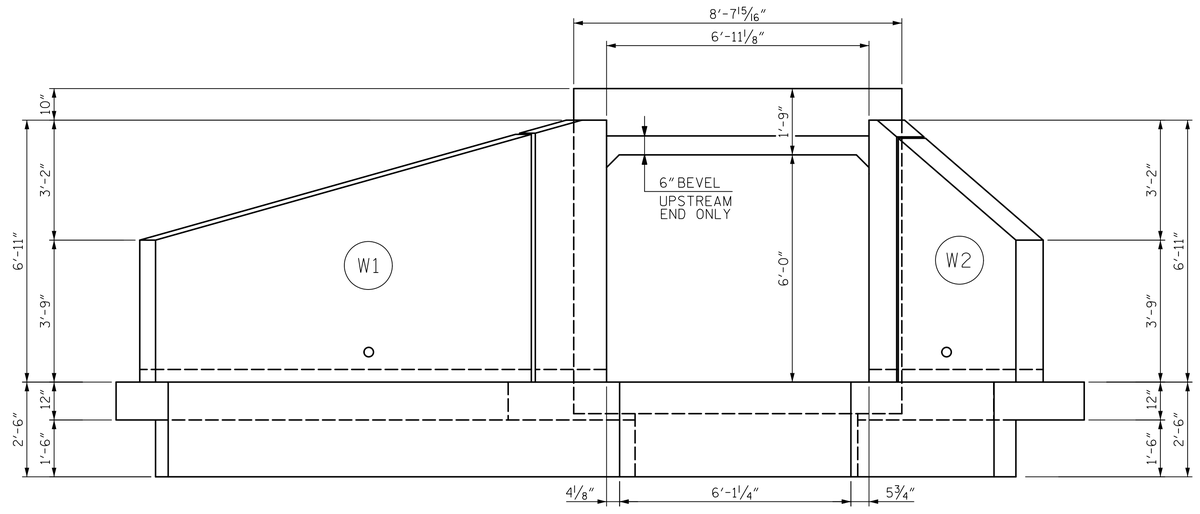
CULVERT SECTION NORMAL TO ROADWAY



PART PLAN

ELEVATION

WING FOOTING
FLOOR SLAB DETAIL



END ELEVATION NORMAL TO SKEW

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ENGINEER
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DWG. NO. 4

PROJECT NO. I-4700A
BUNCOMBE COUNTY
STATION: 887+89.20 -WBL-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SECTION AND ELEVATION FOR SINGLE 6 FT. x 6 FT. CONCRETE BOX CULVERT

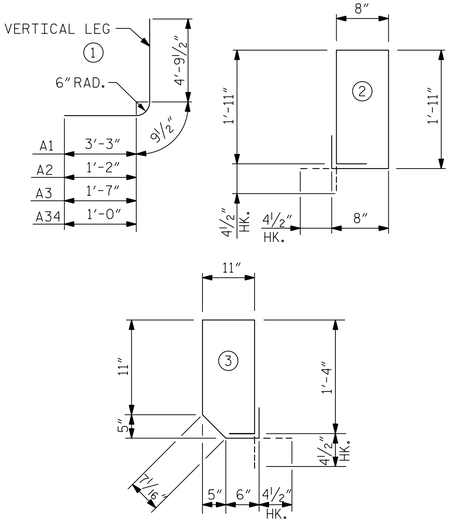
120 DEGREE SKEW
ON I-26 OVER UN-NAMED TRIB.
TO THE FRENCH BROAD RIVER

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

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	174	5	1	8′-10″	1,603
A2	2	5	1	6′-9″	14
A3	2	5	1	7′-2″	15
A4	154	5	STR	7′-2″	1,151
A5	2	5	STR	6′-3″	13
A6	2	5	STR	5′-4″	11
A7	2	5	STR	4′-5″	9
A8	2	5	STR	3′-6″	7
A9	2	5	STR	6′-4″	13
A10	2	5	STR	5′-6″	11
A11	2	5	STR	4′-7″	10
A12	2	5	STR	3′-9″	8
A13	2	5	STR	2′-11″	6
A14	2	5	STR	6′-7″	14
A15	2	5	STR	5′-8″	12
A16	2	5	STR	4′-9″	10
A17	2	5	STR	3′-10″	8
A18	2	5	STR	3′-0″	6
A19	2	5	STR	2′-1″	4
A20	1	5	STR	6′-7″	7
A21	1	5	STR	5′-9″	6
A22	1	5	STR	4′-10″	5
A23	1	5	STR	4′-0″	4
A24	1	5	STR	3′-1″	3
A25	1	5	STR	2′-3″	2
A26	1	5	STR	1′-5″	1
A27	1	5	STR	6′-10″	7
A28	1	5	STR	6′-0″	6
A29	1	5	STR	5′-1″	5
A30	1	5	STR	4′-3″	4
A31	1	5	STR	3′-5″	4
A32	1	5	STR	2′-6″	3
A33	1	5	STR	1′-8″	2
A34	1	5	1	6′-7″	7
B1	48	4	STR	7′-2″	230
C1	51	4	STR	23′-1″	786
C2	9	4	STR	22′-10″	137
D1	16	6	STR	2′-6″	60
S1	4	4	STR	7′-11″	21
S2	7	4	2	5′-11″	28
S3	6	8	STR	8′-1″	129
S4	3	5	STR	8′-3″	26
S5	2	4	STR	8′-3″	11
S6	8	4	3	5′-0″	27
REINFORCING STEEL				LBS.	4,446

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART

BAR	SIZE	SPLICE LENGTH
A1	#5	3′-3″
B1	#4	2′-4″

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 887+89.20 -WBL-

SHEET 5 OF 6

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DWG. NO. 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BILL OF MATERIAL FOR SINGLE 6 FT. x 6 FT. CONCRETE BOX CULVERT

120 DEGREE SKEW
ON I-26 OVER UN-NAMED TRIB.
TO THE FRENCH BROAD RIVER

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C1-5
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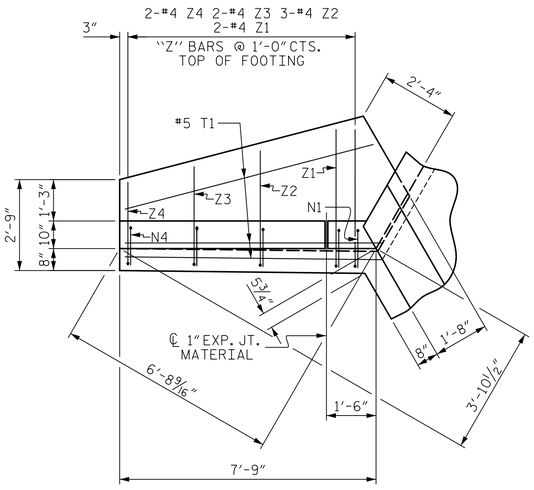
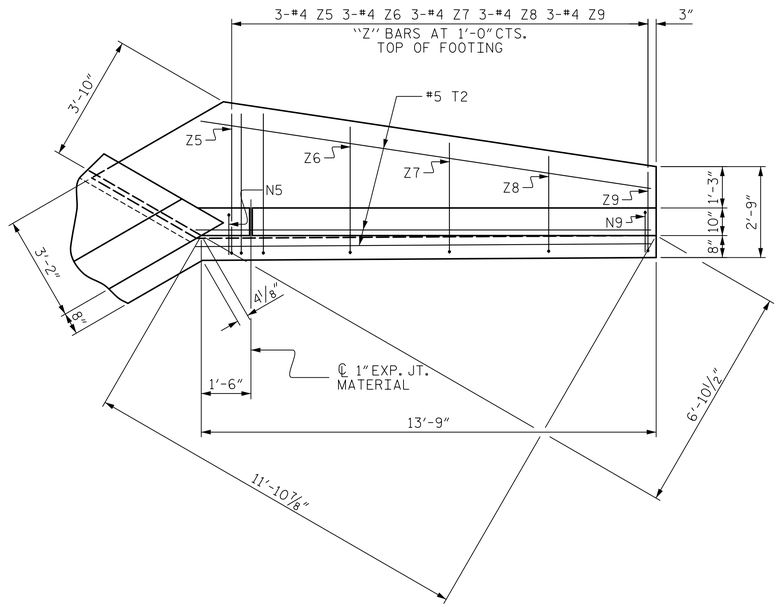
2			4			6



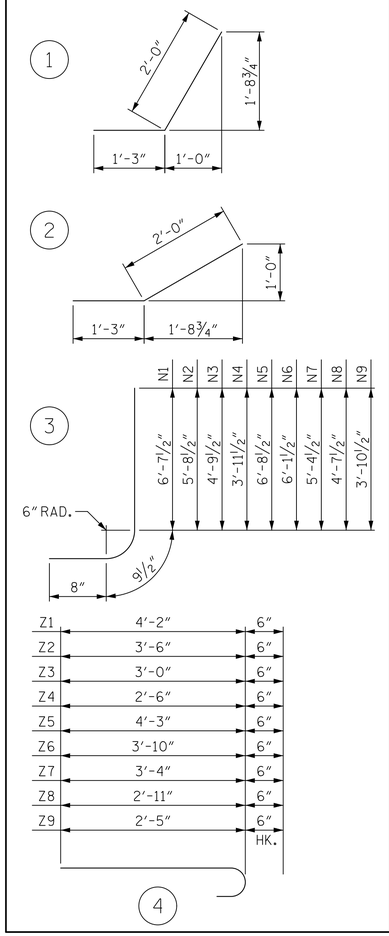
PLAN W2



PLAN W1

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.

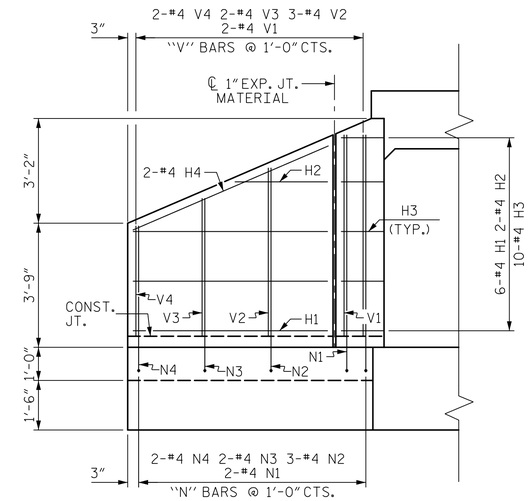


BILL OF MATERIAL

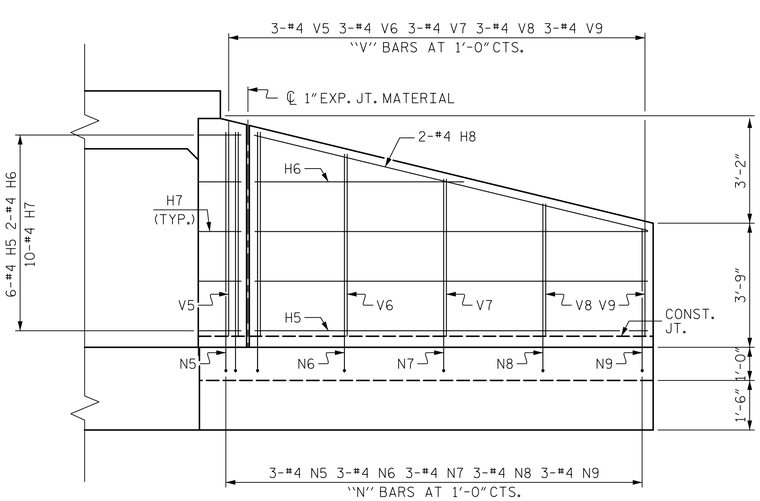
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	5'-10"	23
H2	2	#4	STR	2'-9"	4
H3	10	#4	1	3'-3"	22
H4	2	#4	STR	6'-5"	9
H5	6	#4	STR	11'-10"	47
H6	2	#4	STR	6'-3"	8
H7	10	#4	2	3'-3"	22
H8	2	#4	STR	12'-2"	16
N1	2	#4	3	8'-1"	11
N2	3	#4	3	7'-2"	14
N3	2	#4	3	6'-3"	8
N4	2	#4	3	5'-5"	7
N5	3	#4	3	8'-2"	16
N6	3	#4	3	7'-7"	15
N7	3	#4	3	6'-10"	14
N8	3	#4	3	6'-1"	12
N9	3	#4	3	5'-4"	11
T1	3	#5	STR	7'-9"	24
T2	3	#5	STR	13'-9"	43
V1	2	#4	STR	6'-1"	8
V2	3	#4	STR	5'-1"	10
V3	2	#4	STR	4'-2"	6
V4	2	#4	STR	3'-4"	4
V5	3	#4	STR	6'-2"	12
V6	3	#4	STR	5'-6"	11
V7	3	#4	STR	4'-9"	10
V8	3	#4	STR	4'-0"	8
V9	3	#4	STR	3'-3"	7
Z1	2	#4	4	4'-8"	6
Z2	3	#4	4	4'-0"	8
Z3	2	#4	4	3'-6"	5
Z4	2	#4	4	3'-0"	4
Z5	3	#4	4	4'-9"	10
Z6	3	#4	4	4'-4"	9
Z7	3	#4	4	3'-10"	8
Z8	3	#4	4	3'-5"	7
Z9	3	#4	4	2'-11"	6

REINFORCING STEEL FOR 2 WINGS	465 LBS

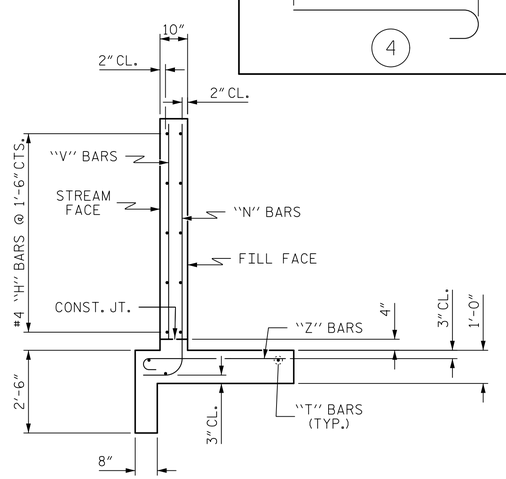
CLASS A CONCRETE		
2 WINGS	7.2	CY
1 HEADWALL	0.4	CY
1 END CURTAIN WALL	0.5	CY
2 EXTENSION HEADWALLS	0.6	CY
TOTAL	8.7	CY



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

DocuSigned by: David W. Hawkins
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27812 3/6/2019 DAVID W. HAWKINS

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 887+89.20 -WBL-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 6'-0" SLOPE = 2:1

120 DEGREE SKEW
ON I-26 OVER UN-NAMED TRIB.
TO THE FRENCH BROAD RIVER

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

STD. NO. CW6000

ASSEMBLED BY :	M. WRIGHT	DATE :	12/18
CHECKED BY :	N. HART	DATE :	1/19
DRAWN BY :	CCJ	11/99	
CHECKED BY :	RWW	03/00	

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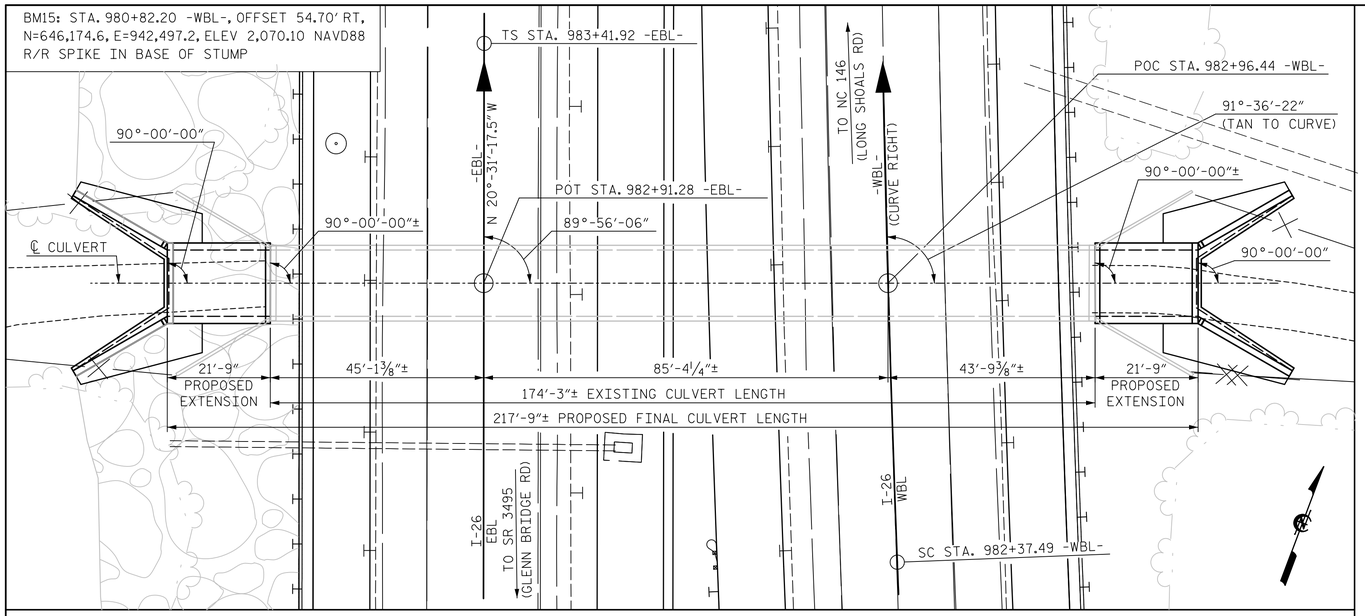
DRAWN BY	M. WRIGHT	DATE	12/18
CHECKED BY	N. HART	DATE	1/19
DESIGN ENGINEER OF RECORD	D. HAWKINS	DATE	1/19

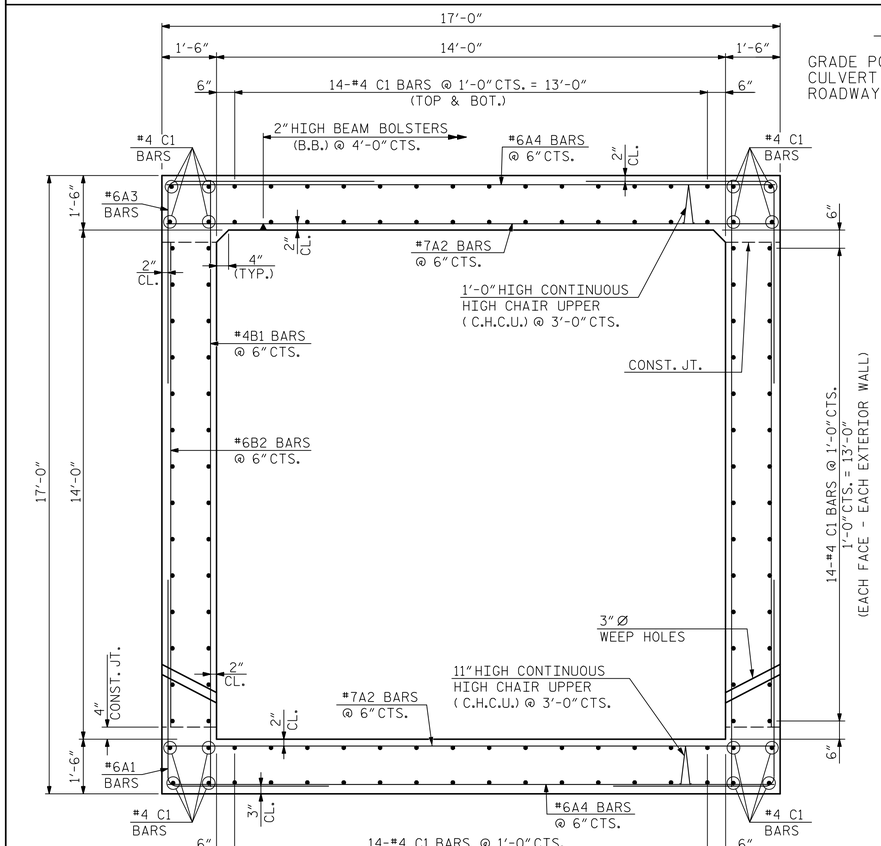
DWG. NO. 6

F.A. PROJECT NO. IMNHF-026-1(86)9



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.



RIGHT ANGLE SECTION OF BARREL

THERE ARE 128 "C" BARS IN SECTION OF BARREL

GRADE DATA

GRADE POINT ELEV. @ STA. 982+96.44 -WBL- = 2,062.98
CULVERT BED ELEVATION @ STA. 982+96.44 -WBL- = 2,038.42
ROADWAY SLOPES 2:1

TOTAL STRUCTURE QUANTITIES		
CLASS A CONCRETE		
BARREL @ 3.45 CY/FT	150.0	C.Y.
LEFT EXTENSION	75.0	C.Y.
RIGHT EXTENSION	75.0	C.Y.
WING ETC.	99.5	C.Y.
TOTAL	249.5	C.Y.
REINFORCING STEEL		
BARREL	25,820	LBS.
LEFT EXTENSION	12,910	LBS.
RIGHT EXTENSION	12,910	LBS.
WINGS ETC.	11,332	LBS.
TOTAL	37,152	LBS.
FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	52	TONS
CULVERT EXCAVATION AT POC STATION 982+96.44 -WBL-	LUMP SUM	

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

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

NOTES

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

DESIGN FILL----------12.54'

THIS CULVERT EXTENSION HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

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

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.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

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

SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.

EXCAVATE AT LEAST ONE FOOT BELOW BOTTOM OF CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.

SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.

NO BACKFILLING OF EXTERIOR WALLS SHALL BE PERMITTED UNTIL TOP SLAB HAS BEEN PLACED AND CURED. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY BRACING WALLS UNTIL TOP SLAB IS COMPLETED.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

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.

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

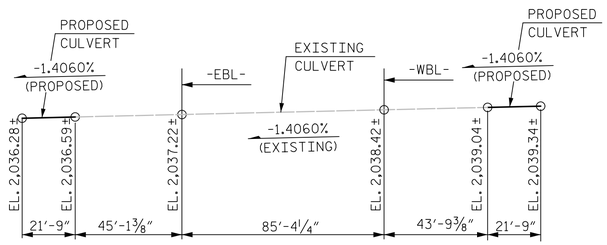
AT THE DIRECTION OF THE ENGINEER, UNDERCUT SOFT/LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL.

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

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

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

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
1. CONSTRUCT WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. CONSTRUCT THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.



PROFILE ALONG ℄ CULVERT

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 ENGINEER DAVID W. HAWKINS 3/6/2019

PROJECT NO. I-4700A
BUNCOMBE COUNTY
STATION: 982+96.44 -WBL-

SHEET 1 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LOCATION SKETCH/ BARREL SECTION FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT
90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY M. WRIGHT DATE 1/19
CHECKED BY J. BARCOMB DATE 1/19
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

DWG. NO. 1

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

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
								MOMENT				SHEAR				
							LIVE-LOAD FACTORS (γ_{LL})	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	3.14	--	1.75	6.05	1	TOP SLAB	7.00	3.14	1	BOTTOM SLAB	12.86	--
		HL-93 (OPERATING)	N/A	--	4.07	--	1.35	7.84	1	TOP SLAB	7.00	4.07	1	BOTTOM SLAB	12.86	--
		HS-20 (INVENTORY)	36.000	⟨2⟩	3.83	138.0	1.75	7.39	1	TOP SLAB	7.00	3.83	1	BOTTOM SLAB	12.86	--
		HS-20 (OPERATING)	36.000	--	4.97	178.9	1.35	9.58	1	TOP SLAB	7.00	4.97	1	BOTTOM SLAB	12.86	--
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH	12.500	--	6.62	82.7	1.40	12.55	1	TOP SLAB	7.00	6.62	1	BOTTOM SLAB	12.86	--
		S3C	21.500	--	6.24	134.1	1.40	12.01	1	TOP SLAB	7.00	6.24	1	BOTTOM SLAB	12.86	--
		S3A	22.750	--	5.48	124.7	1.40	10.56	1	TOP SLAB	7.00	5.48	1	BOTTOM SLAB	12.86	--
		S4A	26.750	--	5.36	143.5	1.40	10.33	1	TOP SLAB	7.00	5.36	1	BOTTOM SLAB	12.86	--
		S5A	30.500	--	5.32	162.3	1.40	10.25	1	TOP SLAB	7.00	5.32	1	BOTTOM SLAB	12.86	--
		S6A	34.500	--	5.25	181.1	1.40	10.11	1	TOP SLAB	7.00	5.25	1	BOTTOM SLAB	12.86	--
		S7B	38.500	⟨3⟩	5.19	199.8	1.40	10.00	1	TOP SLAB	7.00	5.19	1	BOTTOM SLAB	12.86	--
		S7A	40.000	--	5.58	223.3	1.40	10.76	1	TOP SLAB	7.00	5.58	1	BOTTOM SLAB	12.86	--
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250	--	5.91	167.0	1.40	11.39	1	TOP SLAB	7.00	5.91	1	BOTTOM SLAB	12.86	--
		T5B	32.000	--	5.80	185.8	1.40	11.18	1	TOP SLAB	7.00	5.80	1	BOTTOM SLAB	12.86	--
		T6A	36.000	--	5.68	204.5	1.40	10.95	1	TOP SLAB	7.00	5.68	1	BOTTOM SLAB	12.86	--
		T7A	40.000	--	5.58	223.3	1.40	10.76	1	TOP SLAB	7.00	5.58	1	BOTTOM SLAB	12.86	--
		T7B	40.000	--	5.58	223.3	1.40	10.76	1	TOP SLAB	7.00	5.58	1	BOTTOM SLAB	12.86	--

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

1.
2.
3.
4.

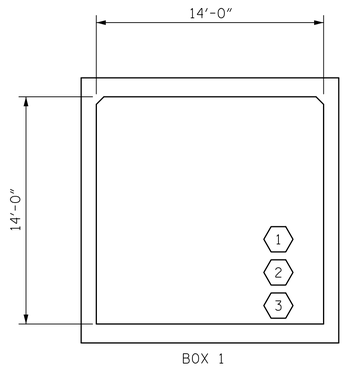
⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



BOX 1

LRFR SUMMARY

(LOOKING UPSTATION)

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 982+96.44 -WBL-

SHEET 2 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(INTERSTATE TRAFFIC)
90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

Digitally signed by: David W. Hawkins
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27812 4/22/2019 ENGINEER DAVID W. HAWKINS

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DRAWN BY M. WRIGHT DATE 1/19
CHECKED BY J. BARCOMB DATE 1/19
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

DWG. NO. 2

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

ASSEMBLED BY : M. WRIGHT DATE : 1/19
CHECKED BY : J. BARCOMB DATE : 1/19

DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11

REV. 10/1/11 MAA/GM
REV. 12/17 MAA/THC

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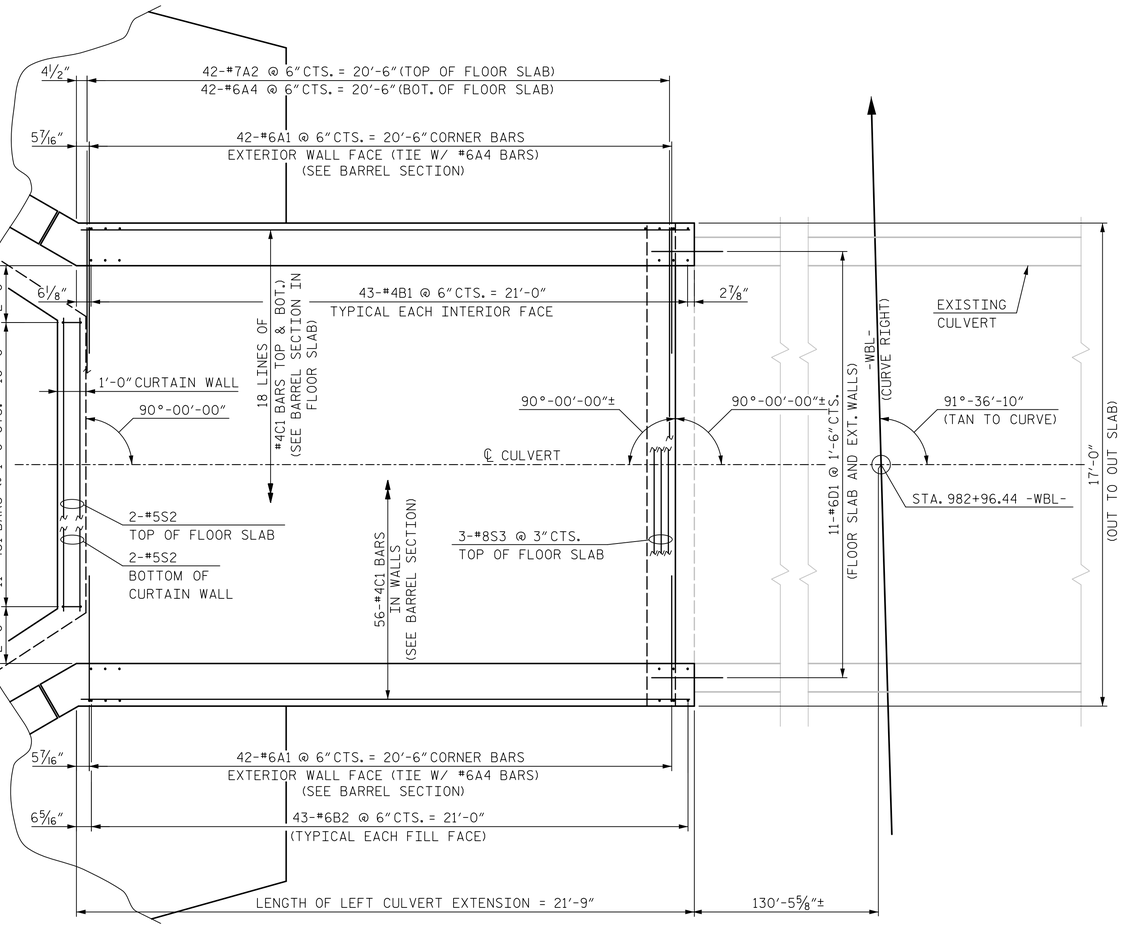
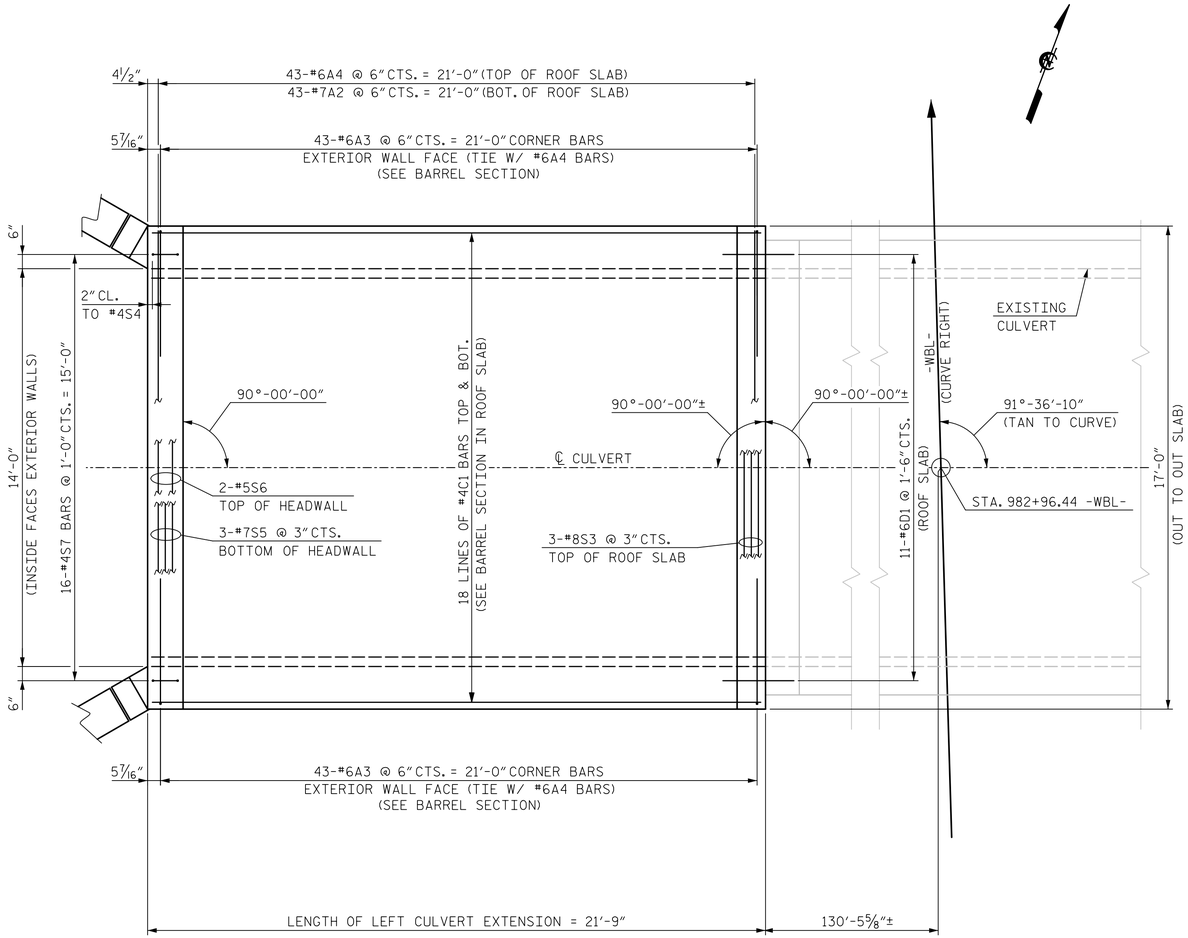
STD. NO. LRFR6



PLAN - LEFT FLOOR SLAB EXTENSION



PLAN - LEFT ROOF SLAB EXTENSION

PROJECT NO. I-4700A

BUNCOMBE **COUNTY**

STATION: 982+96.44 -WBL-

SHEET 3 OF 10

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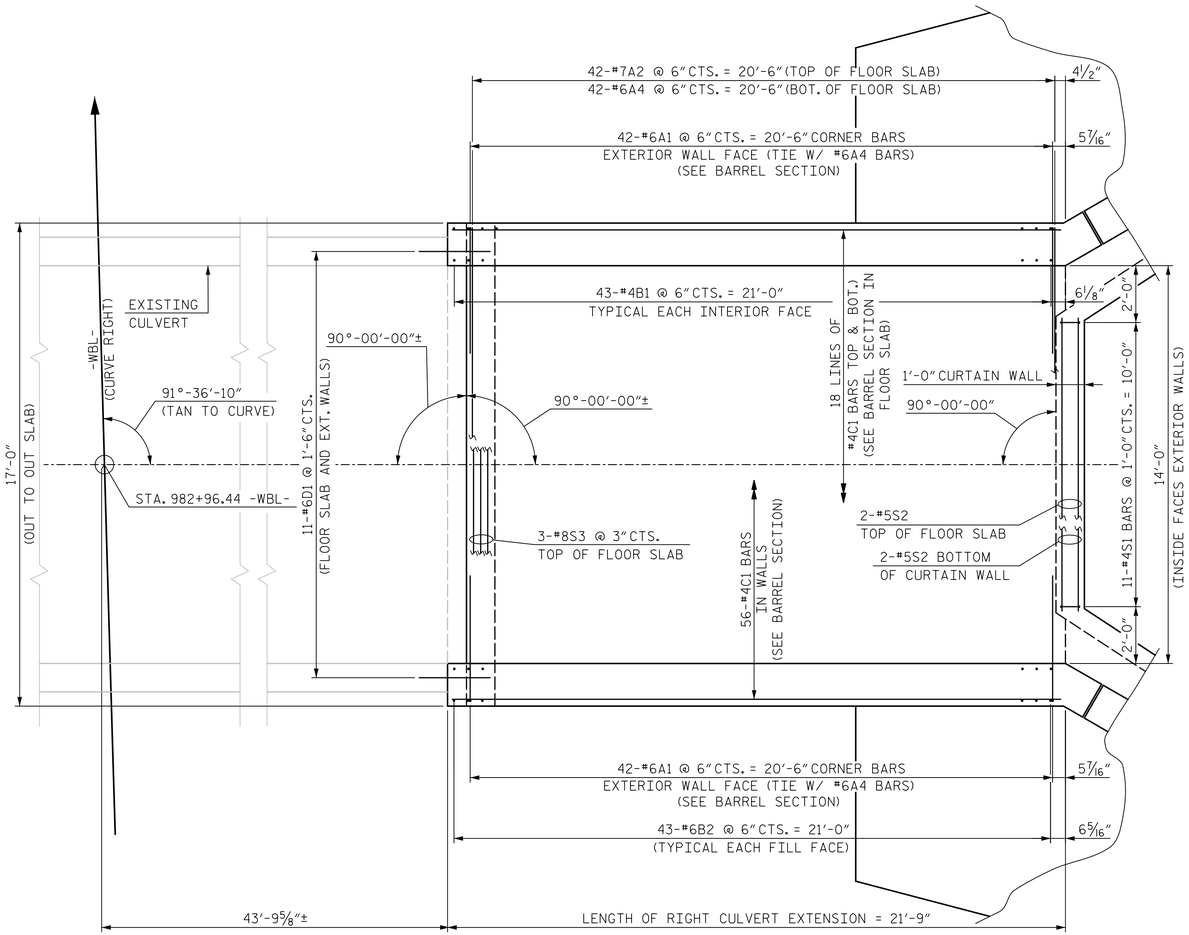
DWG. NO. 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

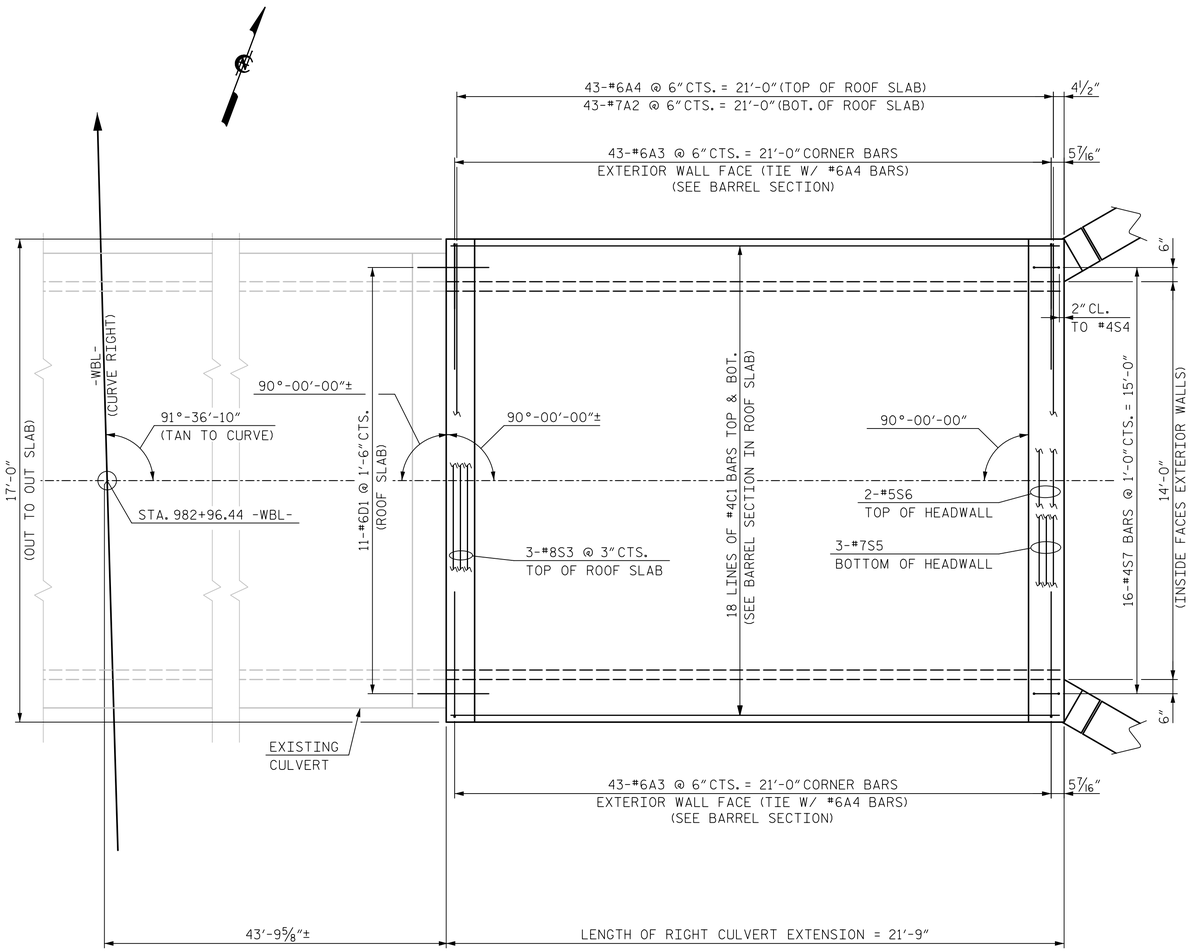
PLAN OF SLAB FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT LEFT EXTENSION

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

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



PLAN - RIGHT FLOOR SLAB EXTENSION



PLAN - RIGHT ROOF SLAB EXTENSION

PROJECT NO. I-4700A

BUNCOMBE **COUNTY**

STATION: 982+96.44 -WBL-

SHEET 4 OF 10

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DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

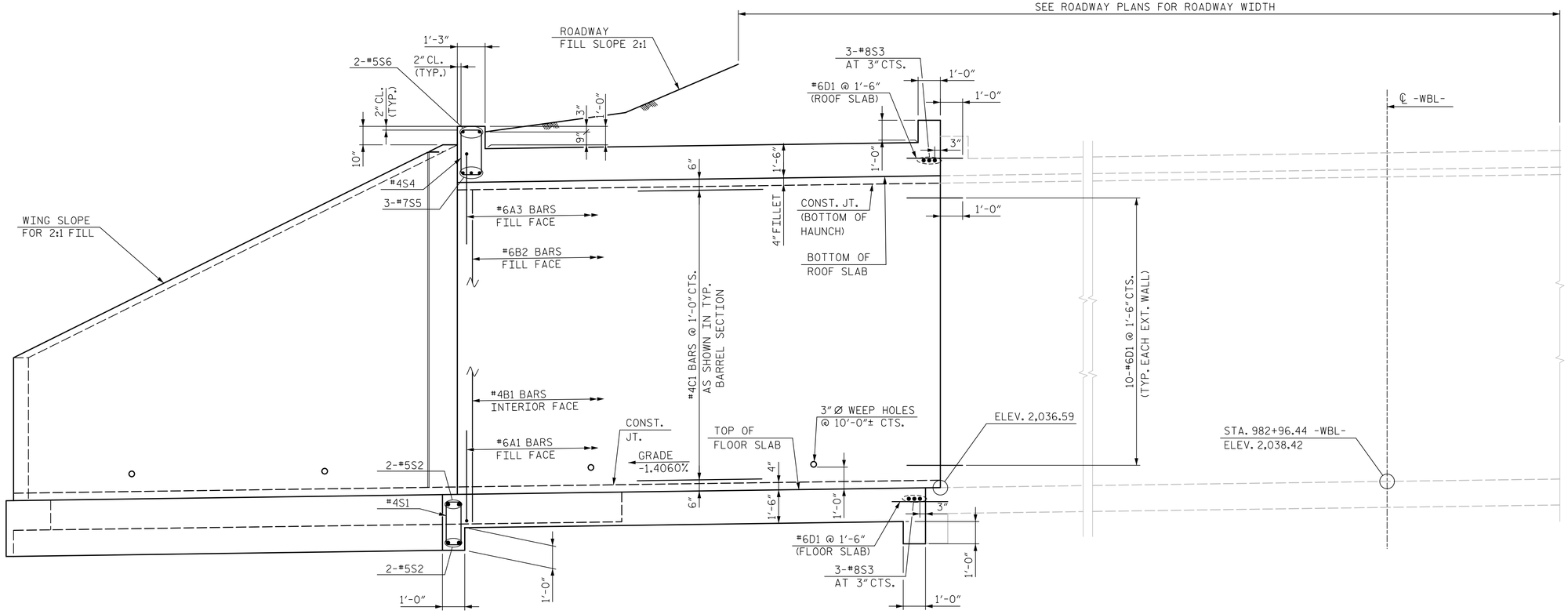
DWG. NO. 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF SLAB FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT RIGHT EXTENSION

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

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



LEFT CULVERT EXTENSION SECTION NORMAL TO ROADWAY

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 982+96.44 -WBL-

SHEET 5 OF 10

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 ENGINEER DAVID W. HAWKINS 3/6/2019

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DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

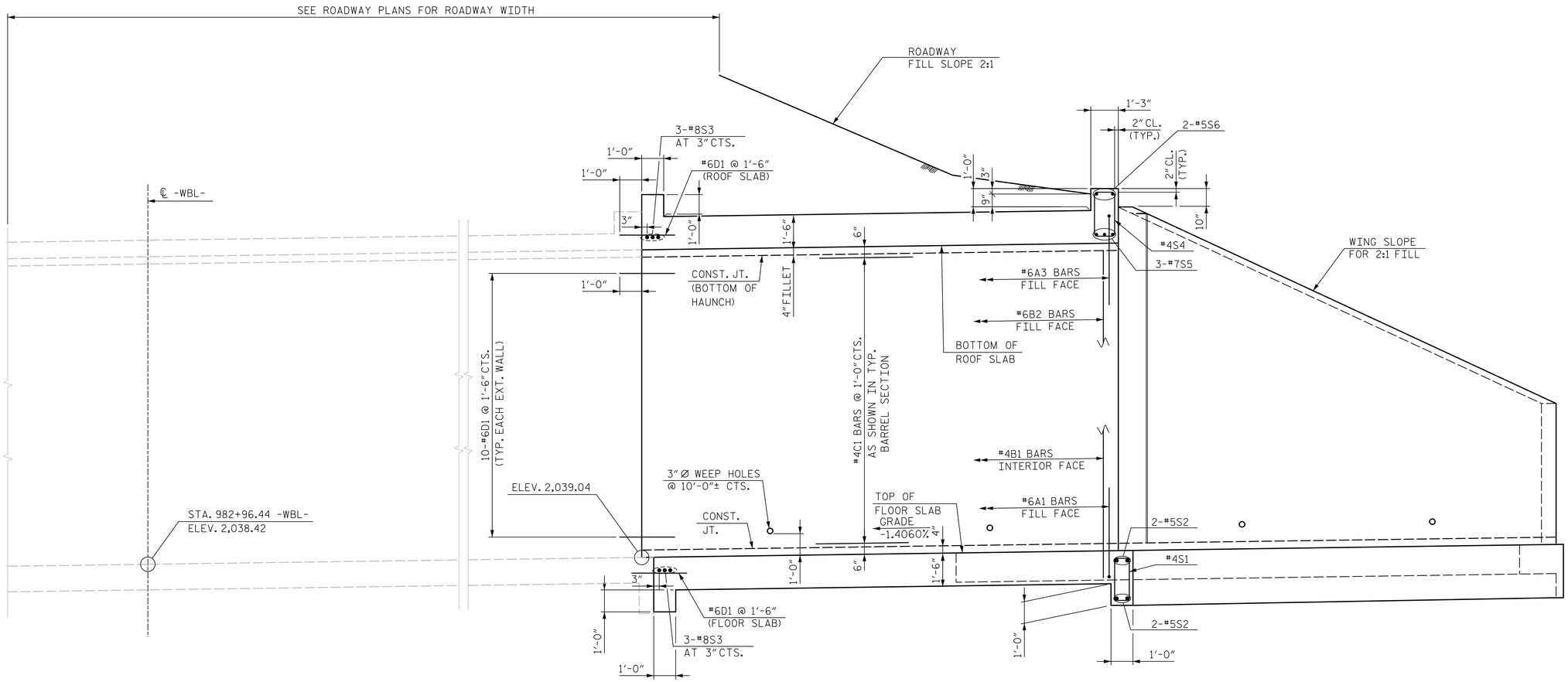
DWG. NO. 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SECTION FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT LEFT EXTENSION

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C2-5
1			3			TOTAL SHEETS
2			4			10



RIGHT CULVERT EXTENSION SECTION NORMAL TO ROADWAY

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 982+96.44 -WBL-

SHEET 6 OF 10

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 ENGINEER DAVID W. HAWKINS 3/6/2019

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DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

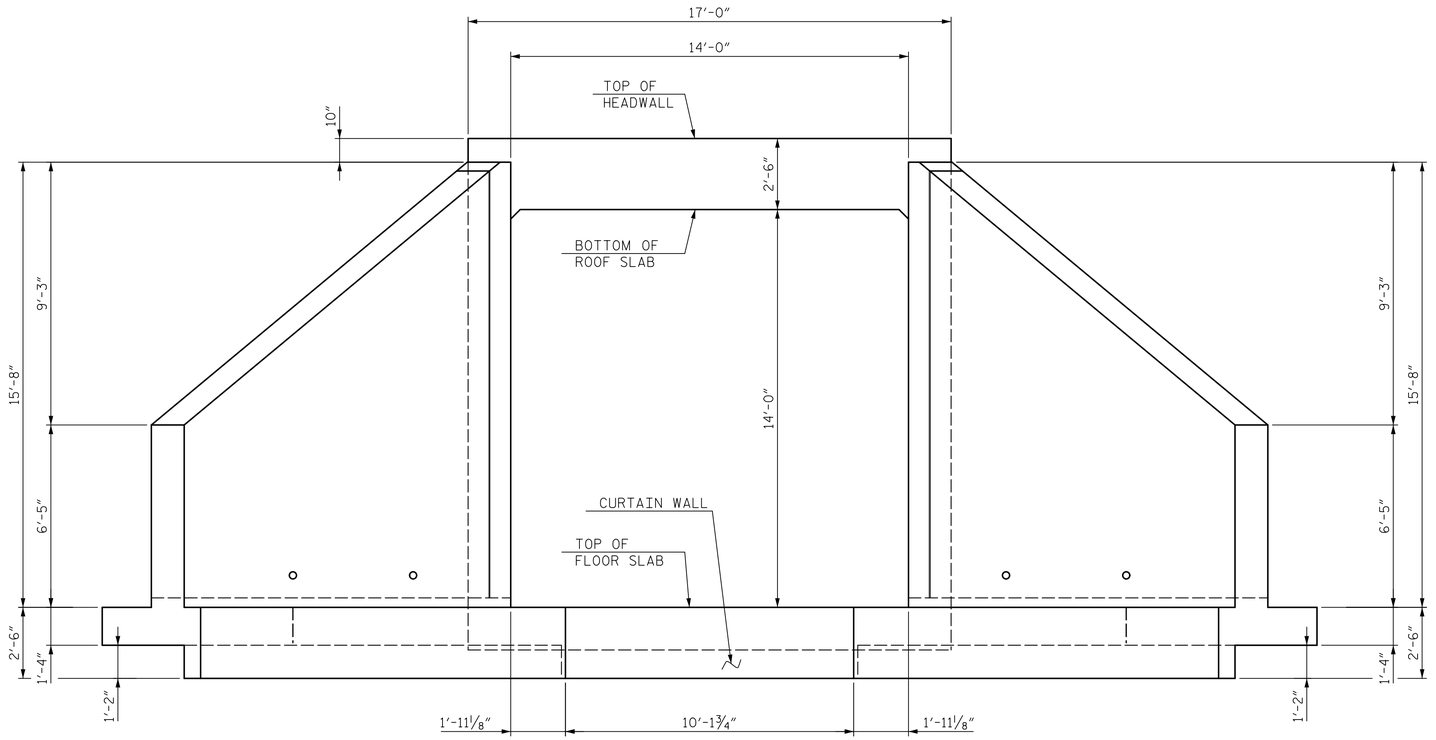
DWG. NO. 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

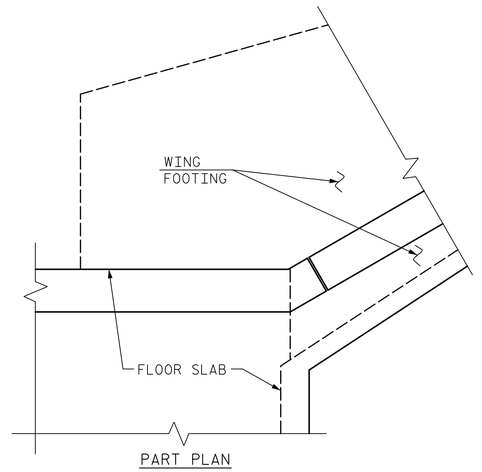
SECTION FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT RIGHT EXTENSION

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

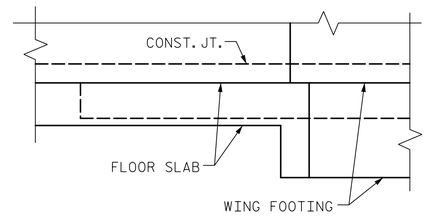
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C2-6
1			3			TOTAL SHEETS
2			4			10



END ELEVATION NORMAL TO SKEW



PART PLAN



ELEVATION

WING FOOTING FLOOR SLAB DETAIL

PROJECT NO. I-4700A

BUNCOMBE **COUNTY**

STATION: 982+96.44 -WBL-

SHEET 7 OF 10

DocuSigned by: David W. Hawkins

NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 27812 3/6/2019 DAVID W. HAWKINS

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DRAWN BY	M. WRIGHT	DATE	1/19
CHECKED BY	J. BARCOMB	DATE	1/19
DESIGN ENGINEER OF RECORD	D. HAWKINS	DATE	1/19

DWG. NO. 7

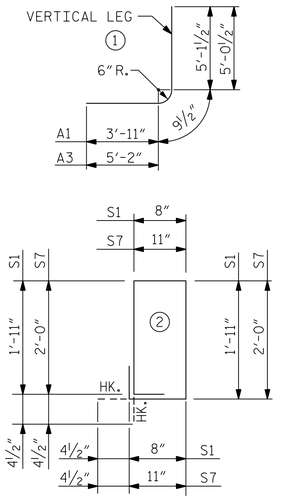
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ELEVATION FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C2-7
1			3			TOTAL SHEETS
2			4			10

BAR TYPE



BILL OF MATERIAL
LEFT EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	84	6	1	9'-10"	1,241
A2	85	7	STR	16'-8"	2,896
A3	86	6	1	11'-0"	1,421
A4	85	6	STR	16'-8"	2,128
B1	86	4	STR	16'-7"	953
B2	86	6	STR	13'-4"	1,722
C1	128	4	STR	21'-5"	1,831
D1	42	6	STR	2'-6"	158
S1	11	4	2	5'-11"	43
S2	4	5	STR	10'-3"	43
S3	6	8	STR	16'-8"	267
S4	16	4	3	6'-7"	70
S5	3	7	STR	16'-8"	102
S6	2	5	STR	16'-8"	35
REINFORCING STEEL				LBS.	12,910

BILL OF MATERIAL
RIGHT EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	84	6	1	9'-10"	1,241
A2	85	7	STR	16'-8"	2,896
A3	86	6	1	11'-0"	1,421
A4	85	6	STR	16'-8"	2,128
B1	86	4	STR	16'-7"	953
B2	86	6	STR	13'-4"	1,722
C1	128	4	STR	21'-5"	1,831
D1	42	6	STR	2'-6"	158
S1	11	4	2	5'-11"	43
S2	4	5	STR	10'-3"	43
S3	6	8	STR	16'-8"	267
S4	16	4	3	6'-7"	70
S5	3	7	STR	16'-8"	102
S6	2	5	STR	16'-8"	35
REINFORCING STEEL				LBS.	12,910

BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART

BAR	SIZE	SPLICE LENGTH
B1	#4	2'-4"

PROJECT NO. I-4700A

BUNCOMBE **COUNTY**

STATION: 982+96.44 -WBL-

SHEET 8 OF 10

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27819 ENGINEER DAVID W. HAWKINS

3/1/2019

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DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

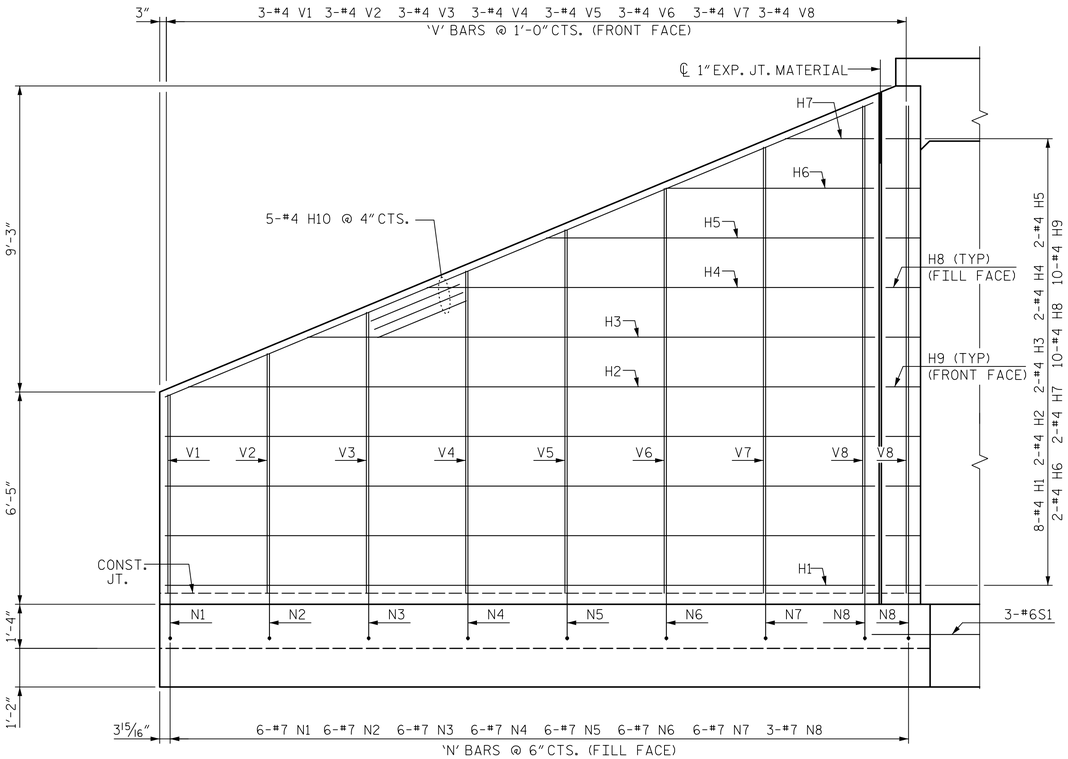
DWG. NO. 8

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

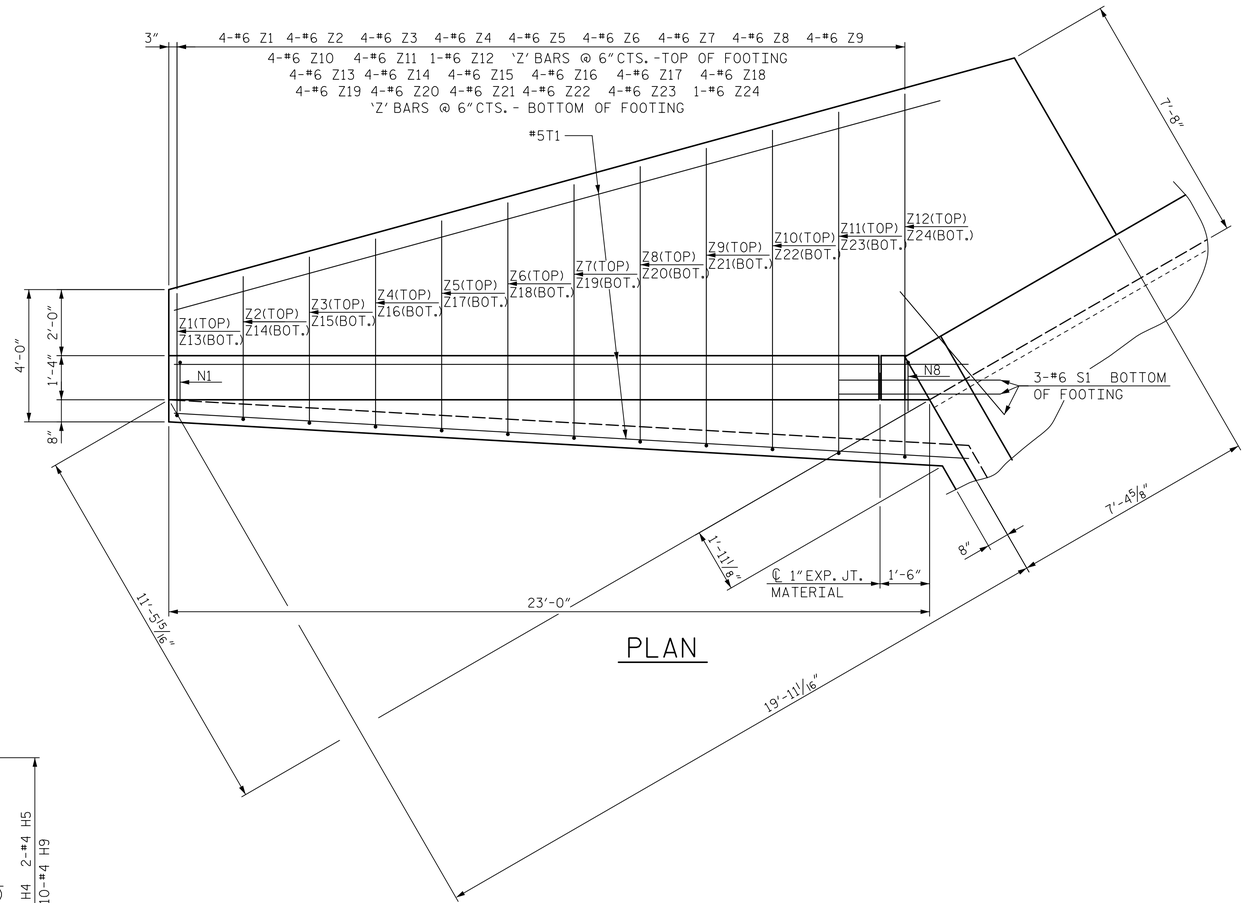
BILL OF MATERIAL FOR SINGLE 14 FT. × 14 FT. CONCRETE BOX CULVERT

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C2-8
1			3			TOTAL SHEETS
2			4			10



ELEVATION



PLAN

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 982+96.44 -WBL-

SHEET 9 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

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NORTH CAROLINA PROFESSIONAL SEAL 27812 ENGINEER DAVID W. HAWKINS
3/1/2019

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DWG. NO. 9

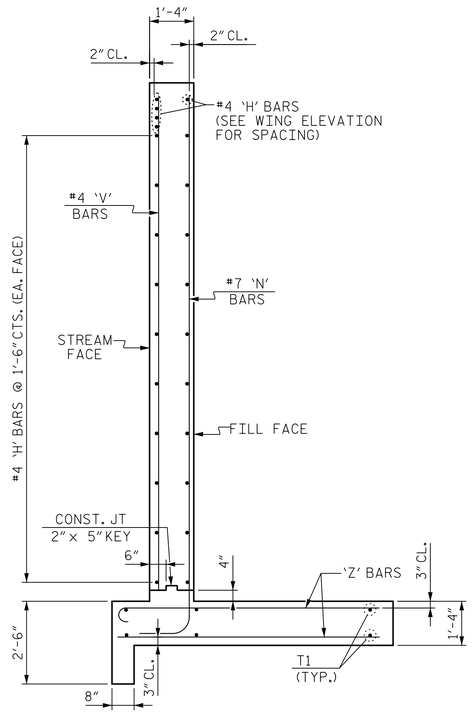
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C2-9
1			3			TOTAL SHEETS
2			4			10

NOTES:

AT THE CONTRACTOR'S OPTION, THE VERTICAL REINFORCING STEEL IN THE FILL FACE OF THE WING ABOVE THE WING CONSTRUCTION JOINT MAY BE SPLICED. THE SPLICE LENGTH SHALL BE:

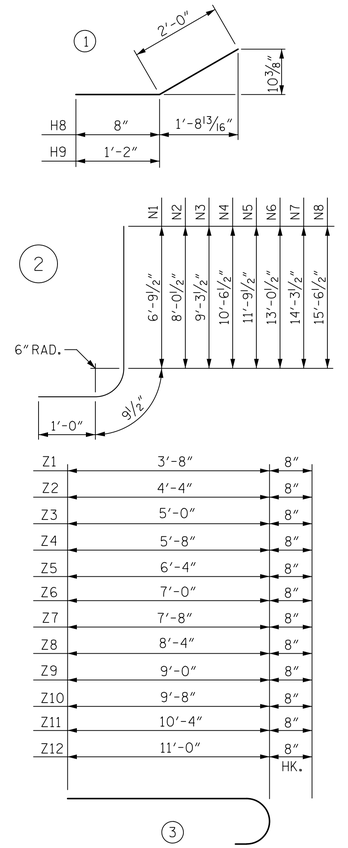
#7 'N' BAR 4'-7"

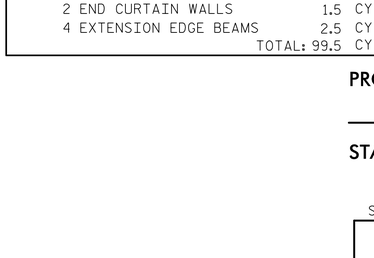
EXTRA WEIGHT OF THE STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.



TYPICAL WING SECTION

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT.

REINFORCING STEEL FOR 1 WING	2,833	LBS
REINFORCING STEEL FOR 4 WINGS	11,332	LBS
CLASS A CONCRETE		
4 WINGS	93.9	CY
2 HEADWALLS	1.6	CY
2 END CURTAIN WALLS	1.5	CY
4 EXTENSION EDGE BEAMS	2.5	CY
TOTAL:	99.5	CY

BILL OF MATERIAL FOR ONE WING

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	21'-5"	114
H2	2	#4	STR	20'-8"	28
H3	2	#4	STR	17'-1"	23
H4	2	#4	STR	13'-5"	18
H5	2	#4	STR	9'-10"	13
H6	2	#4	STR	6'-3"	8
H7	2	#4	STR	2'-8"	4
H8	10	#4	1	2'-8"	18
H9	10	#4	1	3'-2"	21
H10	5	#4	STR	23'-2"	77
N1	6	#7	2	8'-7"	105
N2	6	#7	2	9'-10"	121
N3	6	#7	2	11'-1"	136
N4	6	#7	2	12'-4"	151
N5	6	#7	2	13'-7"	167
N6	6	#7	2	14'-10"	182
N7	6	#7	2	16'-1"	197
N8	3	#7	2	17'-4"	106
S1	3	#6	STR	6'-0"	27
T1	6	#5	STR	24'-0"	150
V1	3	#4	STR	5'-11"	12
V2	3	#4	STR	7'-2"	14
V3	3	#4	STR	8'-5"	17
V4	3	#4	STR	9'-8"	19
V5	3	#4	STR	10'-11"	22
V6	3	#4	STR	12'-2"	24
V7	3	#4	STR	13'-5"	27
V8	3	#4	STR	14'-8"	29
Z1	4	#6	3	4'-4"	26
Z2	4	#6	3	5'-0"	30
Z3	4	#6	3	5'-8"	34
Z4	4	#6	3	6'-4"	38
Z5	4	#6	3	7'-0"	42
Z6	4	#6	3	7'-8"	46
Z7	4	#6	3	8'-4"	50
Z8	4	#6	3	9'-0"	54
Z9	4	#6	3	9'-8"	58
Z10	4	#6	3	10'-4"	62
Z11	4	#6	3	11'-0"	66
Z12	1	#6	3	11'-8"	18
Z13	4	#6	STR	3'-8"	22
Z14	4	#6	STR	4'-4"	26
Z15	4	#6	STR	5'-0"	30
Z16	4	#6	STR	5'-8"	34
Z17	4	#6	STR	6'-4"	38
Z18	4	#6	STR	7'-0"	42
Z19	4	#6	STR	7'-8"	46
Z20	4	#6	STR	8'-4"	50
Z21	4	#6	STR	9'-0"	54
Z22	4	#6	STR	9'-8"	58
Z23	4	#6	STR	10'-4"	62
Z24	1	#6	STR	11'-0"	17

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 982+96.44 -WBL-

SHEET 10 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR SINGLE 14 FT. x 14 FT. CONCRETE BOX CULVERT

90 DEGREE SKEW
ON I-26 OVER CP&L ACCESS ROAD

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27812 3/6/2019 DAVID W. HAWKINS
DocuSigned by: David W. Hawkins

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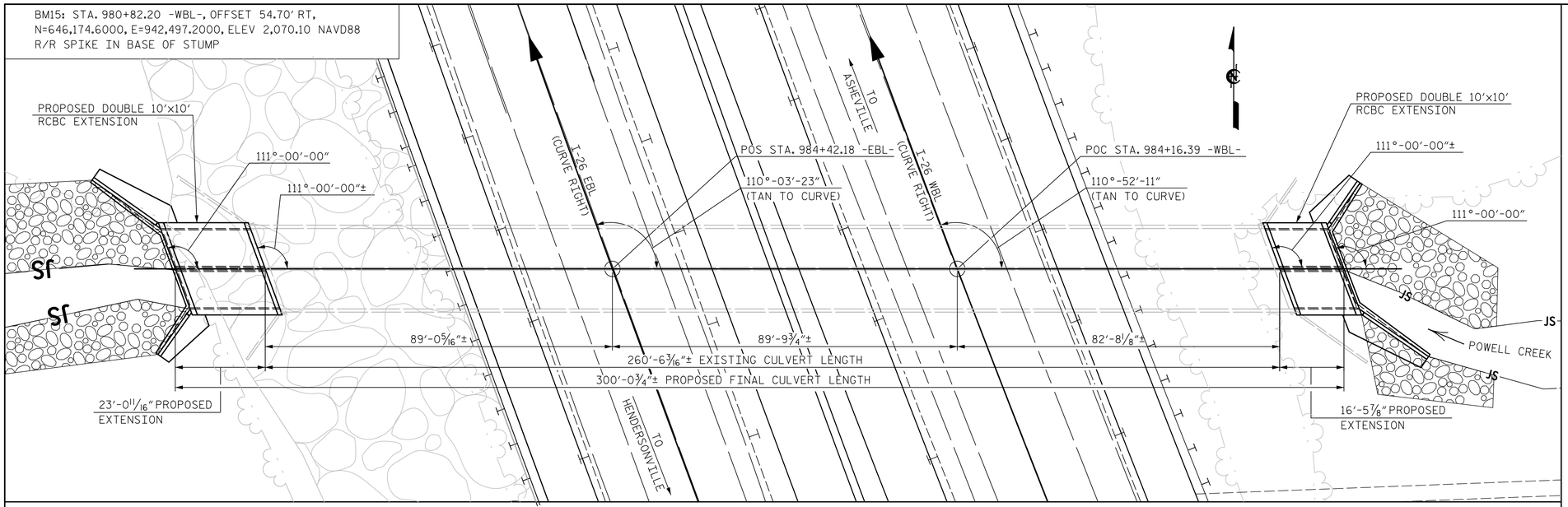
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

DWG. NO. 10

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

F.A. PROJECT NO. IMNHF-026-1(86)9

BM15: STA. 980+82.20 -WBL-, OFFSET 54.70' RT.
N=646,174.6000, E=942,497.2000, ELEV 2,070.10 NAVD88
R/R SPIKE IN BASE OF STUMP



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	2,700 CFS
FREQUENCY OF DESIGN FLOOD	50 YR.
DESIGN HIGH WATER ELEV.	2,038.9
DRAINAGE AREA	5.00 SQ. MI.
BASIC DISCHARGE (Q100)	2,900 CFS
BASIC HIGH WATER ELEV.	2,039.5

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	3,400+ CFS
FREQUENCY OF OVERTOPPING FLOOD	> 500+ YR.
OVERTOPPING FLOOD ELEV.	2,061.5

TOTAL STRUCTURE QUANTITIES		
CLASS A CONCRETE		
BARREL @ 4.6 CY/FT	181.4	C.Y.
LEFT EXTENSION	105.8	C.Y.
RIGHT EXTENSION	75.6	C.Y.
WING ETC.	48.5	C.Y.
TOTAL	229.9	C.Y.
REINFORCING STEEL		
BARREL	34,975	LBS.
LEFT EXTENSION	20,341	LBS.
RIGHT EXTENSION	14,634	LBS.
WINGS ETC.	5,484	LBS.
TOTAL	40,459	LBS.
FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	77	TONS
CULVERT EXCAVATION AT POC STATION 984+16.39 -WBL-		LUMP SUM

NOTES

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

DESIGN FILL----------31.84'

THIS CULVERT EXTENSION HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

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

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

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

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

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

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

NO PRECAST REINFORCED CONCRETE BOX CULVERT OPTION WILL BE ALLOWED.

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

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

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.

EXCAVATE AT LEAST ONE FOOT BELOW BOTTOM OF CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414-4 OF THE STANDARD SPECIFICATIONS.

SUBGRADE SHOULD BE VERIFIED BY ENGINEER OR THEIR REPRESENTATIVE PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL.

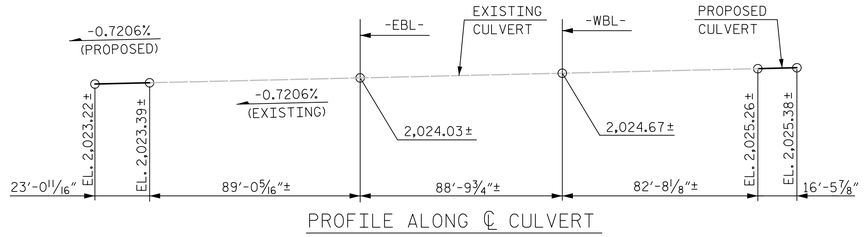
NO BACKFILLING OF EXTERIOR WALLS SHALL BE PERMITTED UNTIL ROOF SLAB HAS BEEN PLACED AND CURED. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY BRACING WALLS UNTIL TOP SLAB IS COMPLETE.

AT THE DIRECTION OF THE ENGINEER, UNDERCUT SOFT/LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL.

FOR PHASING DETAILS, SEE BILL OF MATERIAL SHEET.

GRADE DATA

GRADE POINT ELEV. @ STA. 984+16.39 -WBL- = 2,063.19
CULVERT BED ELEVATION @ STA. 984+16.39 -WBL- = 2,024.67
ROADWAY SLOPES 2:1



PROFILE ALONG ℄ CULVERT

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

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

PROJECT NO. I-4700A
BUNCOMBE COUNTY
STATION: 984+16.39 -WBL-

SHEET 1 OF 12 BRIDGE NO. 100101

Approved by: David W. Hawkins
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27812 5/7/2019 ENGINEER DAVID W. HAWKINS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LOCATION SKETCH FOR DOUBLE 10 FT. x 10 FT. CONCRETE BOX CULVERT

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

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

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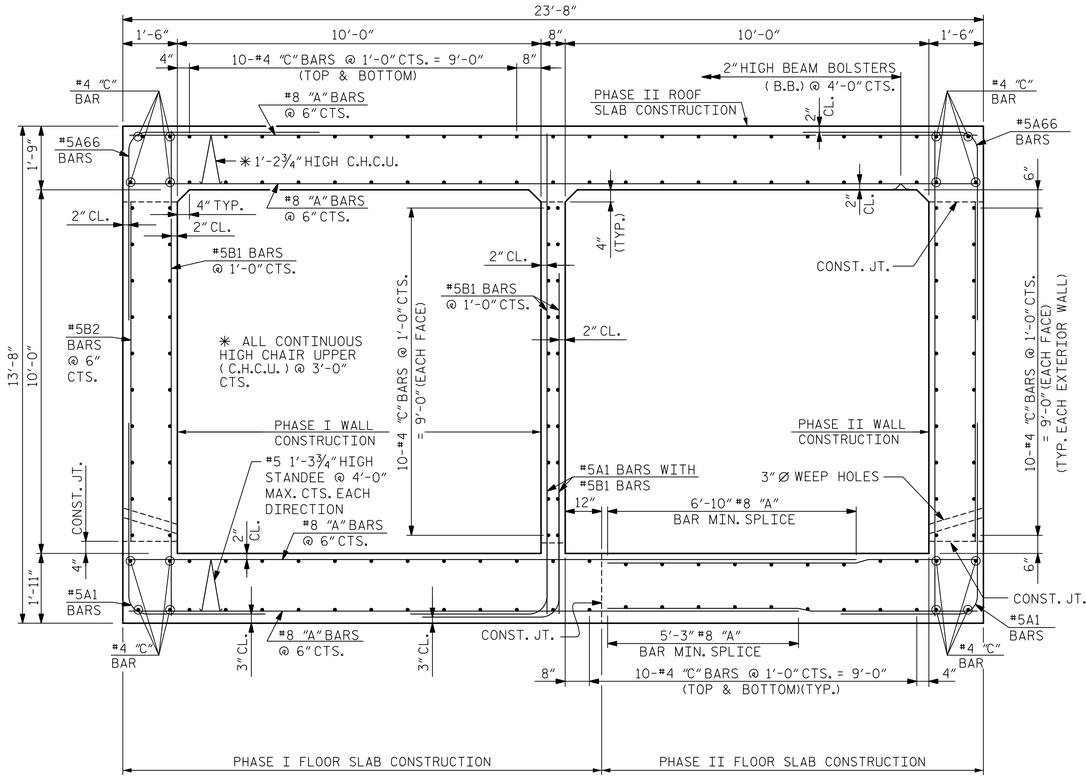

RIGHT ANGLE SECTION OF BARREL

THERE ARE 160 "C" BARS IN SECTION OF BARREL

PROJECT NO. I-4700A

BUNCOMBE **COUNTY**

STATION: 984+16.39 -WBL-

SHEET 2 OF 12

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27812 5/7/2019 DAVID W. HAWKINS

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DWG. NO. 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

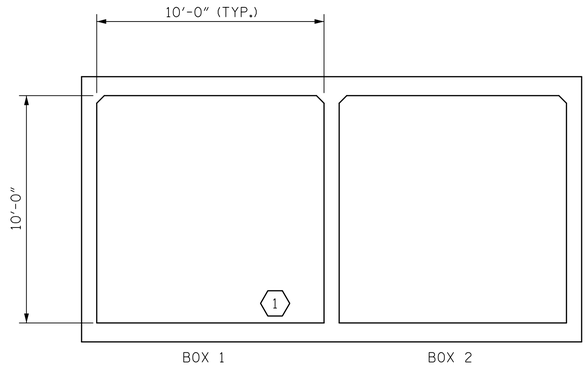
BARREL SECTION FOR DOUBLE 10 FT. x 10 FT. CONCRETE BOX CULVERT

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

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

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

	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			MOMENT				SHEAR			
			RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)
PERMANENT LOAD RATING	⟨1⟩	1.055	2.062	1	TOP SLAB	10.00	1.055	1	BOTTOM SLAB	8.50



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PERMANENT LOAD FACTORS:

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

NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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

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

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 984+16.39 -WBL-

SHEET 3 OF 12

ASSEMBLED BY : M. WRIGHT DATE : 1/19
CHECKED BY : N. HART DATE : 1/19

DRAWN BY : TMG 3/16
CHECKED BY : THC 7/17

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

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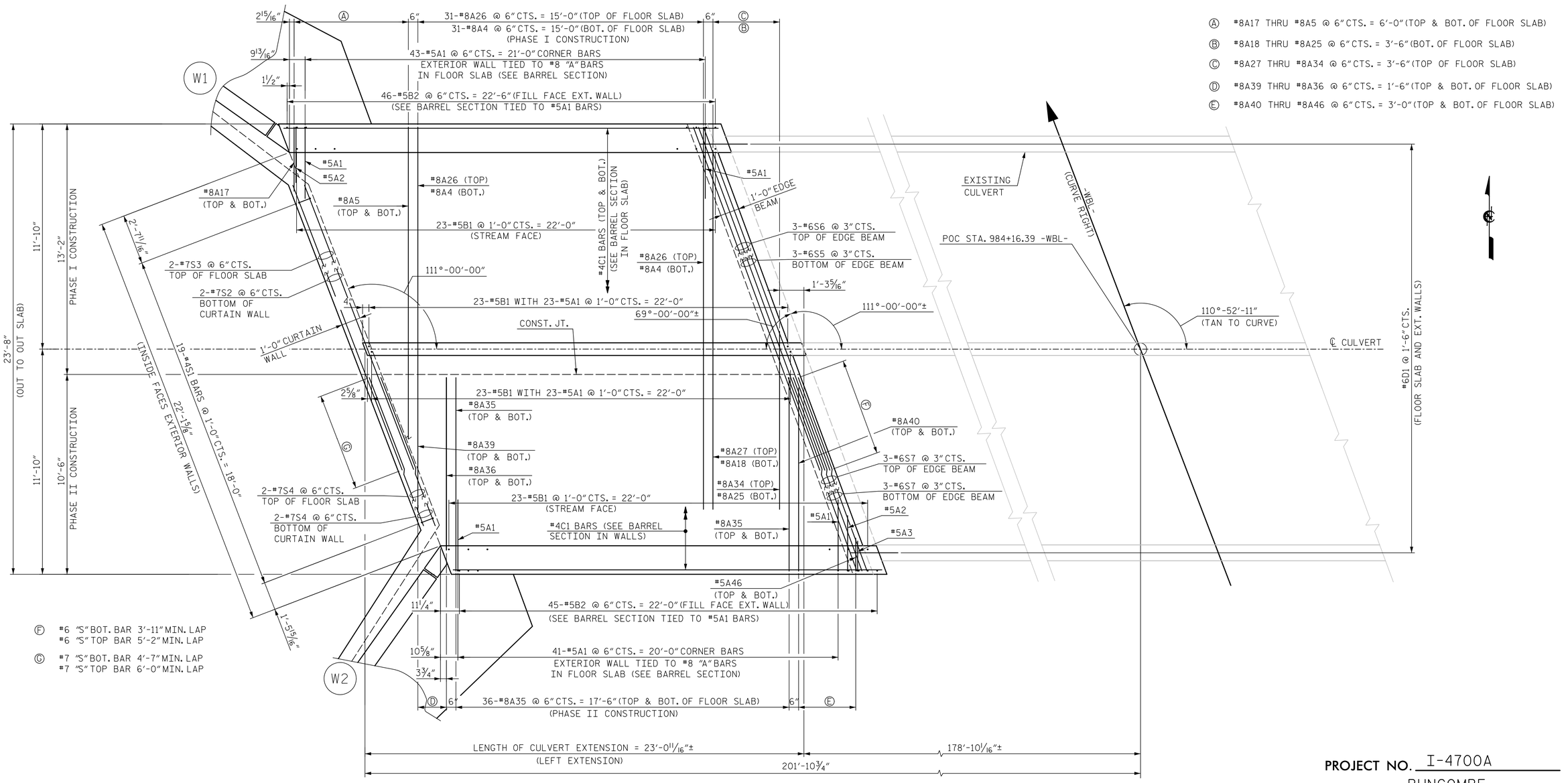
DWG. NO. 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(DEEP FILLS)
111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

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

STD. NO. LRFR6



PLAN - FLOOR SLAB (LEFT EXTENSION)
(PHASE I & II CONSTRUCTION)

PROJECT NO. I-4700A
BUNCOMBE COUNTY
STATION: 984+16.39 -WBL-

SHEET 4 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FLOOR SLAB PLAN FOR DOUBLE 10 FT. x 10 FT. CONCRETE BOX CULVERT LEFT EXTENSION

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27812 5/7/2019 DAVID W. HAWKINS
Signed by: David W. Hawkins

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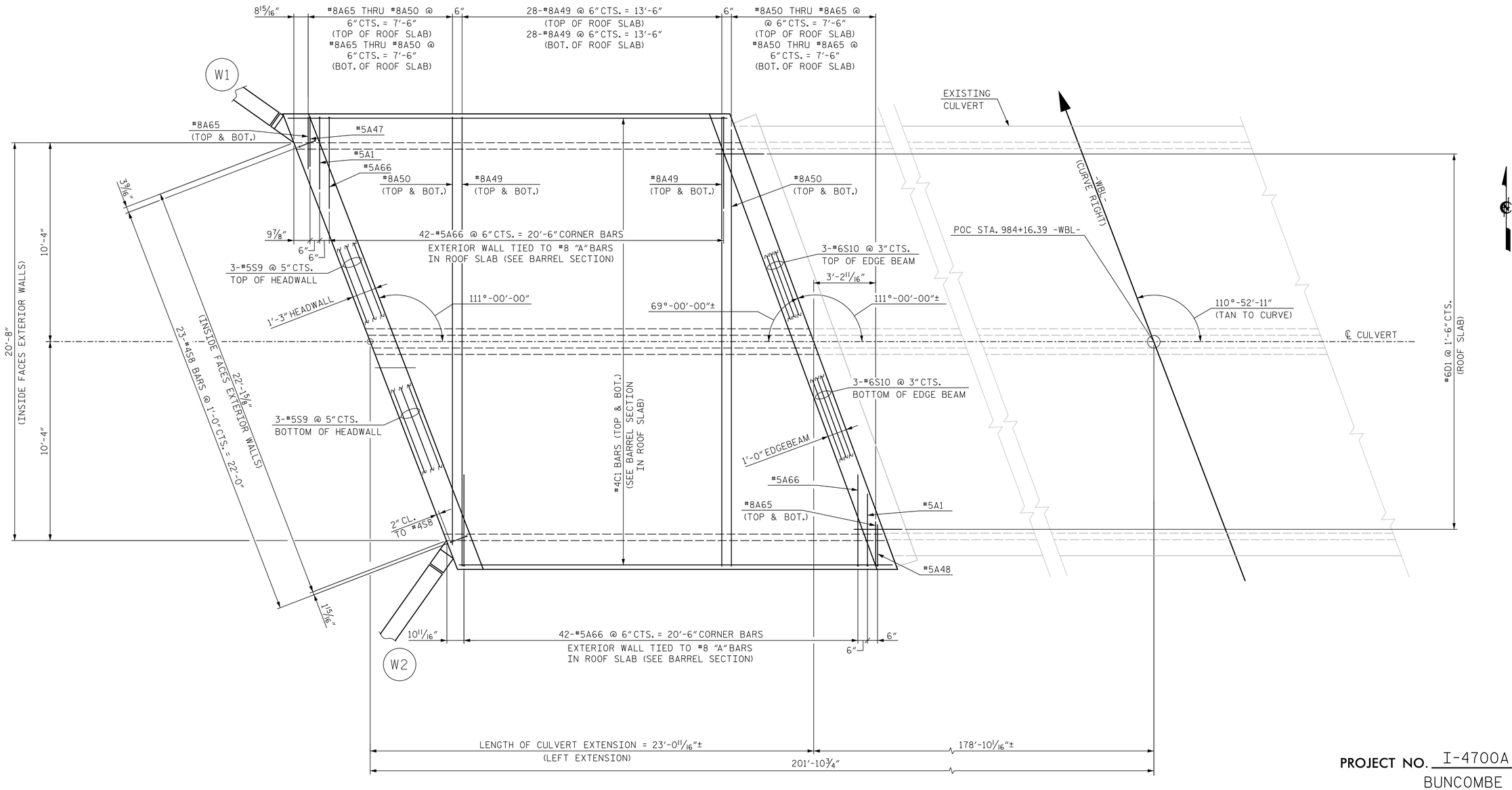
DWG. NO. 4

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



PLAN - ROOF SLAB (LEFT EXTENSION)

(PHASE II CONSTRUCTION)

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 984+16.39 -WBL-

SHEET 5 OF 12

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

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343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY M. WRIGHT DATE 1/19
CHECKED BY N. HART DATE 1/19
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

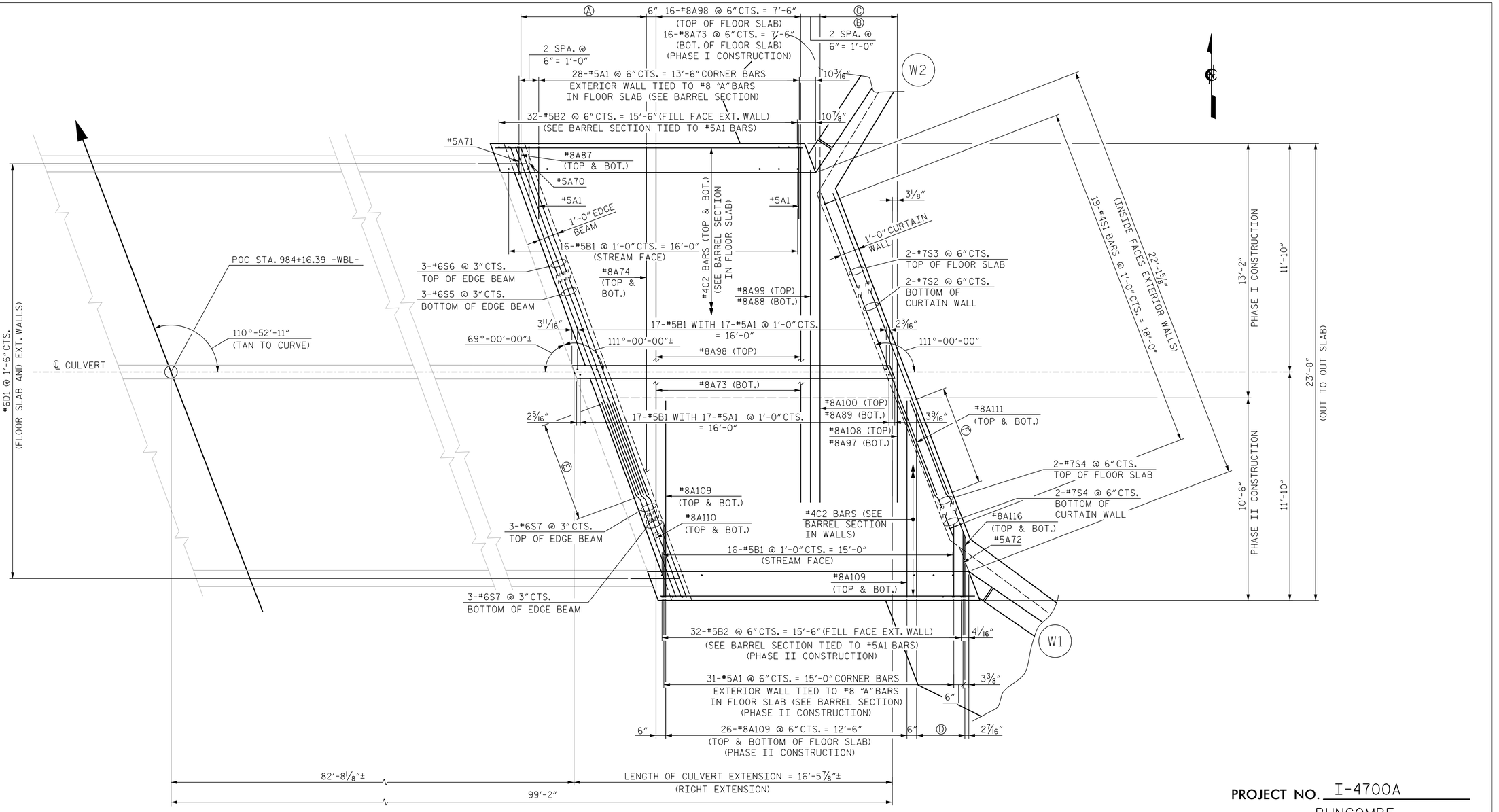
DWG. NO. 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ROOF SLAB PLAN FOR DOUBLE 10 FT. x 10 FT. CONCRETE BOX CULVERT LEFT EXTENSION

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C3-5
1			3			TOTAL SHEETS
2			4			12



PLAN - FLOOR SLAB (RIGHT EXTENSION)

(PHASE I & II CONSTRUCTION)

Ⓐ #8A87 THRU #8A74 @ 6"CTS. = 6'-6" (TOP & BOT. OF FLOOR SLAB)

Ⓑ #8A89 THRU #8A97 @ 6"CTS. = 4'-0" (BOT. OF FLOOR SLAB)

Ⓒ #8A100 THRU #8A108 @ 6"CTS. = 4'-0" (TOP OF FLOOR SLAB)

Ⓓ #8A111 THRU #8A116 @ 6"CTS. = 2'-6" (TOP & BOT. OF FLOOR SLAB)
(PHASE II CONSTRUCTION)

Ⓔ #6 "S" BOT. BAR 3'-11" MIN. LAP
#6 "S" TOP BAR 5'-2" MIN. LAP

Ⓕ #7 "S" BOT. BAR 4'-7" MIN. LAP
#7 "S" TOP BAR 6'-0" MIN. LAP

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 984+16.39 -WBL-

SHEET 6 OF 12

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27812 5/7/2019 DAVID W. HAWKINS

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DESIGN ENGINEER OF RECORD	D. HAWKINS	DATE 1/19

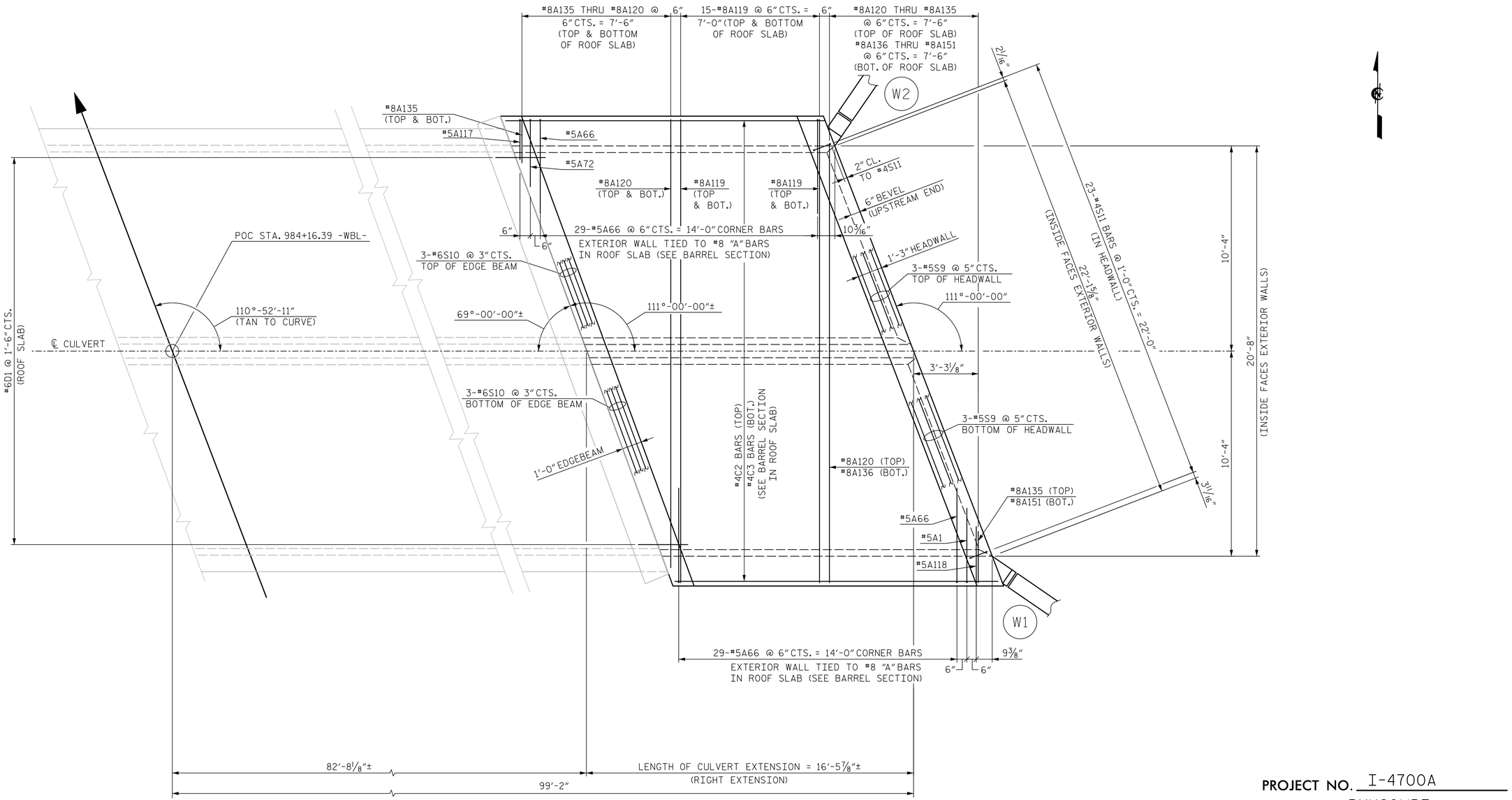
DWG. NO. 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FLOOR SLAB PLAN FOR DOUBLE 10 FT. x 10 FT. CONCRETE BOX CULVERT RIGHT EXTENSION

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C3-6
1			3			TOTAL SHEETS
2			4			12



PLAN - ROOF SLAB (RIGHT EXTENSION)

(PHASE II CONSTRUCTION)

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 984+16.39 -WBL-

SHEET 7 OF 12

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

ROOF SLAB PLAN FOR DOUBLE 10 FT. x 10 FT. CONCRETE BOX CULVERT RIGHT EXTENSION

111 DEGREE SKEW

ON I-26 OVER POWELL CREEK

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

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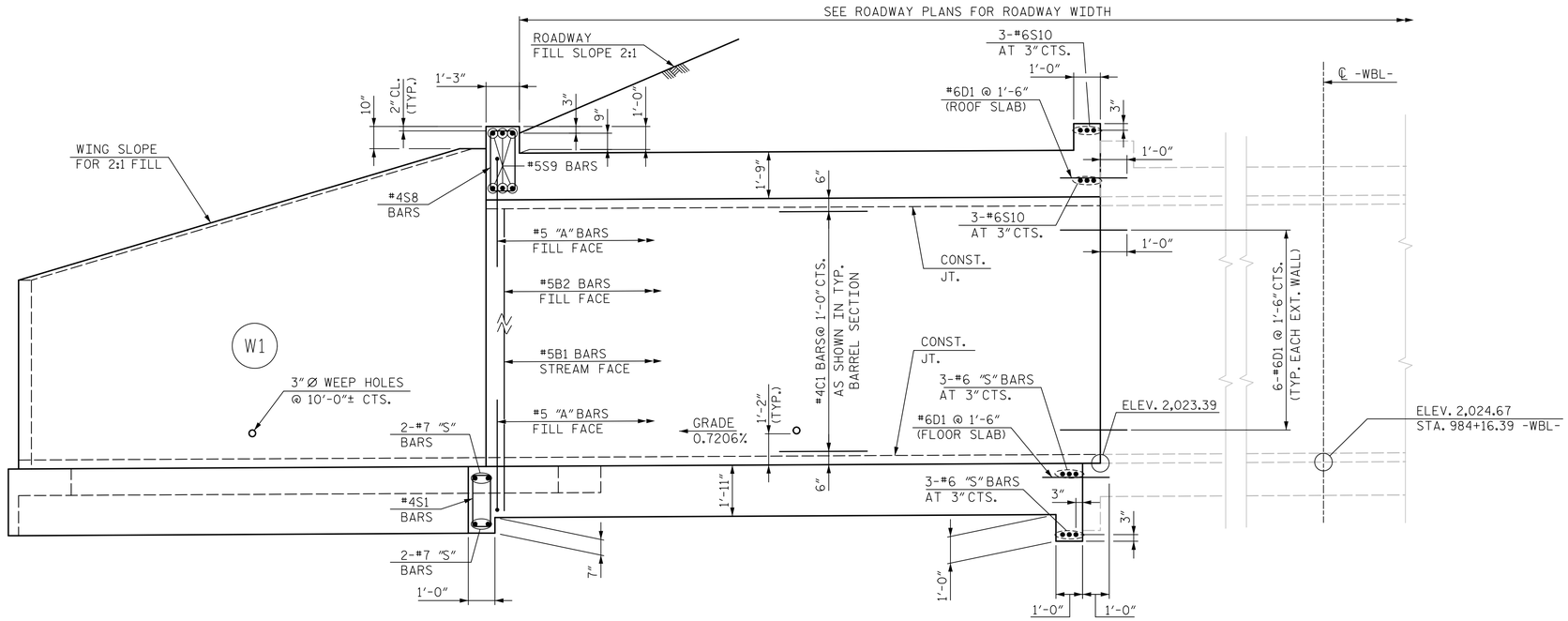
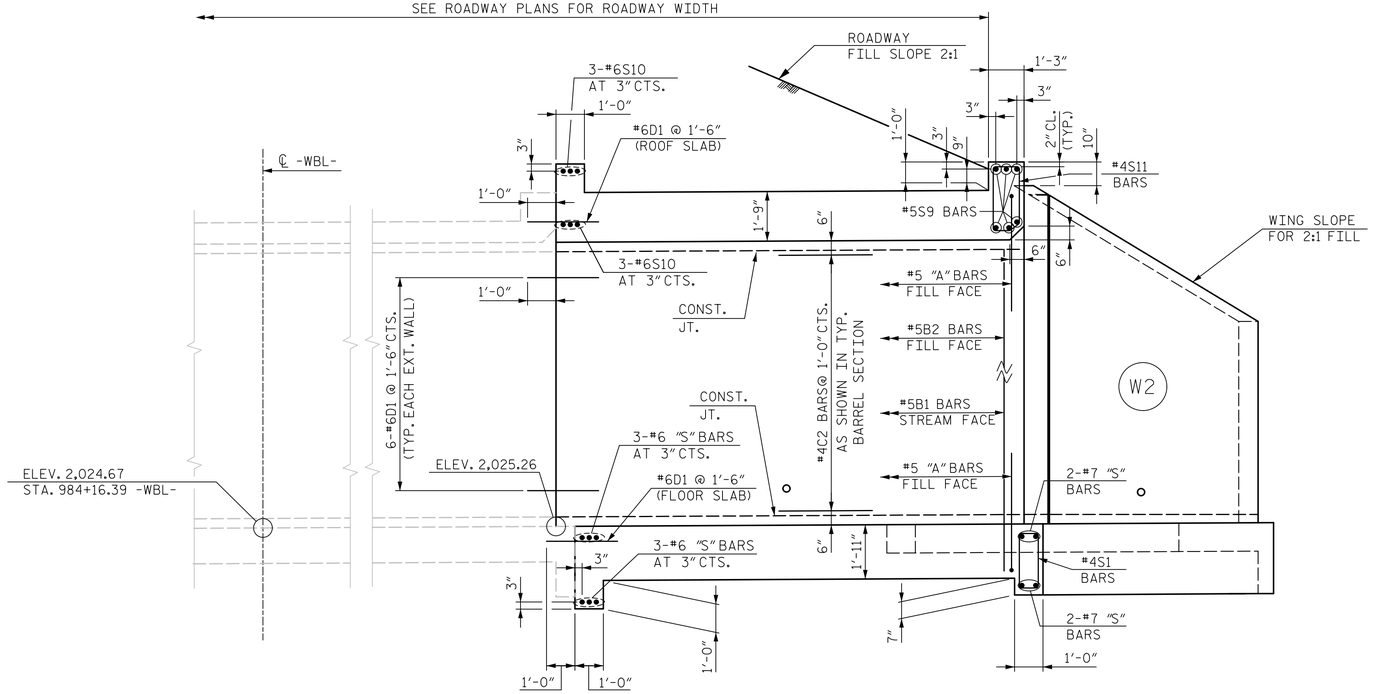
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

DWG. NO. 7

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C3-7
1			3			TOTAL SHEETS
2			4			12



CULVERT LEFT SECTION NORMAL TO ROADWAY



CULVERT RIGHT SECTION NORMAL TO ROADWAY

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 984+16.39 -WBL-

SHEET 8 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SECTION FOR DOUBLE 10 FT. × 10 FT. CONCRETE BOX CULVERT

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

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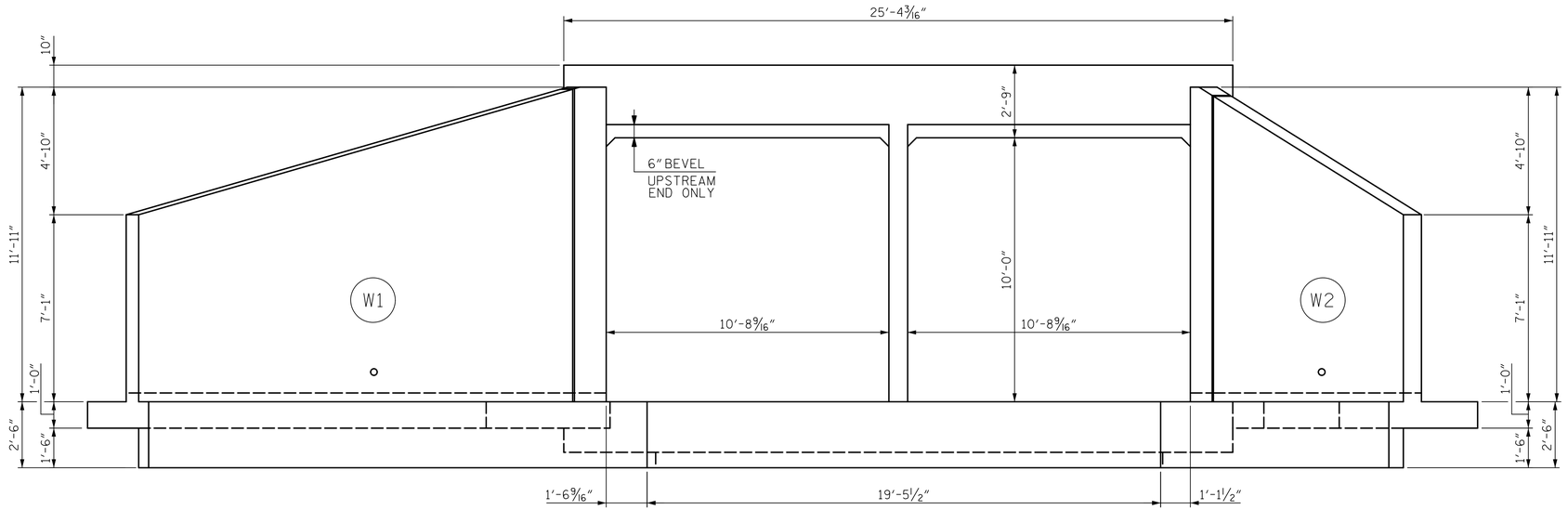
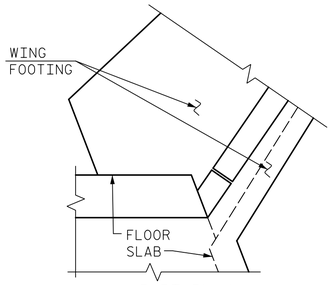
DWG. NO. 8

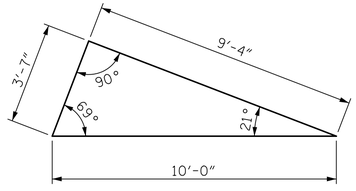
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C3-8
1			3			TOTAL SHEETS
2			4			12



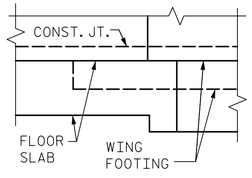
END ELEVATION NORMAL TO SKEW



PART PLAN



SKEW TRIANGLE



ELEVATION

WING FOOTING
FLOOR SLAB DETAIL

PROJECT NO. I-4700A

BUNCOMBE **COUNTY**

STATION: 984+16.39 -WBL-

SHEET 9 OF 12

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

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DWG. NO. 9

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ELEVATION FOR DOUBLE 10 FT. × 10 FT. CONCRETE BOX CULVERT

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C3-9
1			3			TOTAL SHEETS
2			4			12

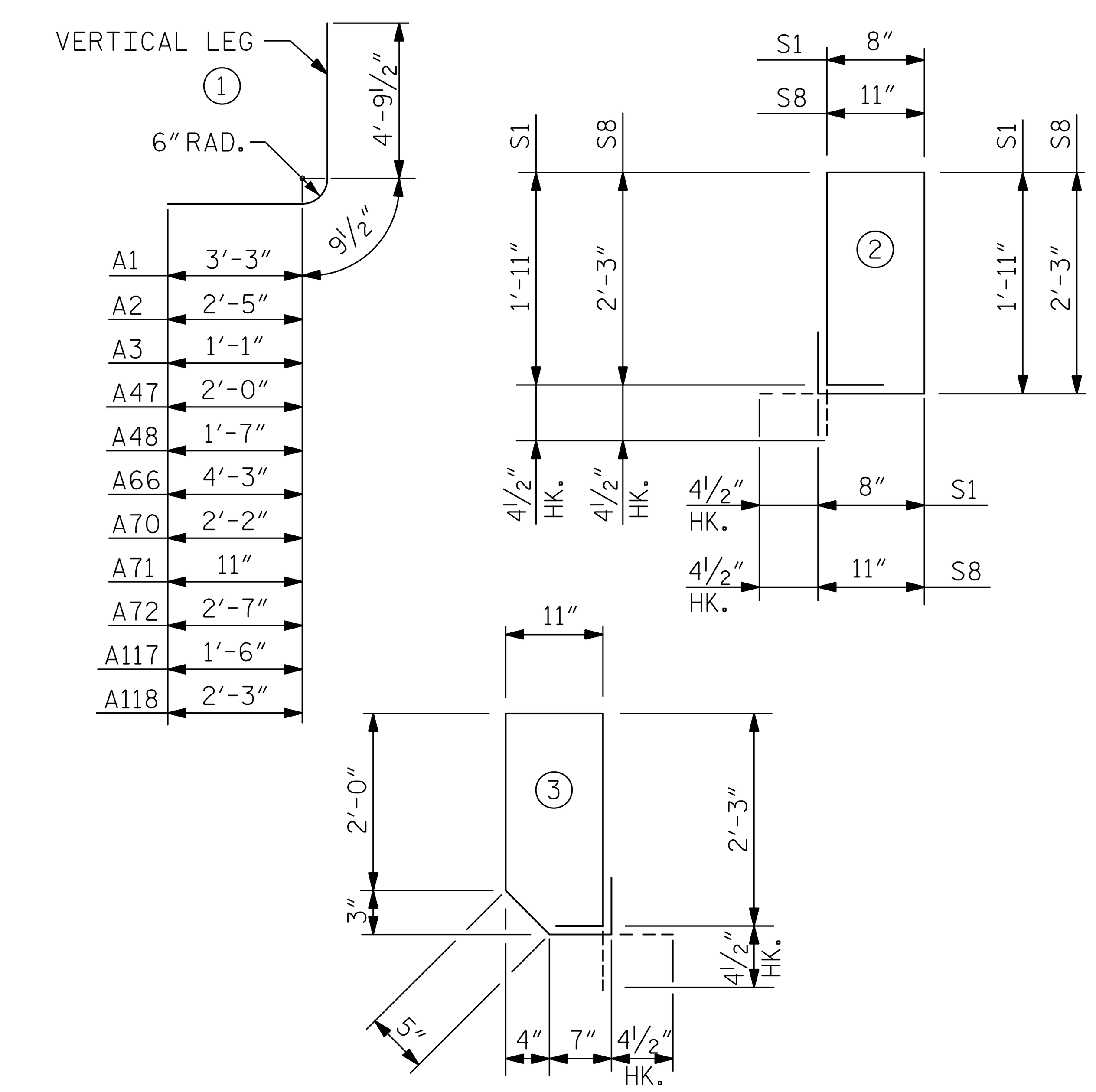
BILL OF MATERIAL - LEFT EXTENSION

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	132	5	1	8′-10″	1216	A52	4	8	STR	19′-11″	213
A2	2	5	1	8′-0″	17	A53	4	8	STR	18′-7″	198
A3	1	5	1	6′-8″	7	A54	4	8	STR	17′-2″	183
A4	31	8	STR	18′-5″	1,524	A55	4	8	STR	15′-10″	169
A5	2	8	STR	18′-10″	101	A56	4	8	STR	14′-6″	155
A6	2	8	STR	17′-6″	93	A57	4	8	STR	13′-2″	141
A7	2	8	STR	16′-3″	87	A58	4	8	STR	11′-9″	125
A8	2	8	STR	14′-11″	80	A59	4	8	STR	10′-5″	111
A9	2	8	STR	13′-8″	73	A60	4	8	STR	9′-1″	97
A10	2	8	STR	12′-4″	66	A61	4	8	STR	7′-8″	82
A11	2	8	STR	11′-0″	59	A62	4	8	STR	6′-4″	68
A12	2	8	STR	9′-9″	52	A63	4	8	STR	5′-0″	53
A13	2	8	STR	8′-5″	45	A64	4	8	STR	3′-7″	38
A14	2	8	STR	7′-1″	38	A65	4	8	STR	2′-3″	24
A15	2	8	STR	5′-7″	30	A66	84	5	1	9′-10″	862
A16	2	8	STR	4′-6″	24						
A17	2	8	STR	3′-2″	17	B1	92	5	STR	13′-3″	1,271
A18	1	8	STR	17′-3″	46	B2	91	5	STR	9′-4″	886
A19	1	8	STR	15′-10″	42						
A20	1	8	STR	14′-6″	39	C1	160	4	STR	22′-6″	2,405
A21	1	8	STR	13′-2″	35						
A22	1	8	STR	11′-10″	32	D1	40	6	STR	2′-6″	150
A23	1	8	STR	10′-5″	28						
A24	1	8	STR	9′-1″	24	S1	19	4	2	5′-11″	75
A25	1	8	STR	7′-9″	21	S2	2	7	STR	16′-2″	66
A26	31	8	STR	20′-0″	1,655	S3	2	7	STR	17′-7″	72
A27	1	8	STR	18′-9″	50	S4	4	7	STR	7′-7″	62
A28	1	8	STR	17′-4″	46	S5	3	6	STR	18′-0″	81
A29	1	8	STR	16′-0″	43	S6	3	6	STR	19′-3″	87
A30	1	8	STR	14′-8″	39	S7	6	6	STR	10′-9″	97
A31	1	8	STR	13′-4″	36	S8	23	4	2	7′-1″	109
A32	1	8	STR	11′-11″	32	S9	6	5	STR	24′-10″	155
A33	1	8	STR	10′-5″	28	S10	6	6	STR	24′-10″	224
A34	1	8	STR	9′-3″	25						
A35	72	8	STR	10′-2″	1,954						
A36	2	8	STR	9′-6″	51						
A37	2	8	STR	9′-11″	53						
A38	2	8	STR	8′-8″	46						
A39	2	8	STR	7′-4″	39						
A40	2	8	STR	9′-10″	53						
A41	2	8	STR	8′-6″	45						
A42	2	8	STR	7′-2″	38						
A43	2	8	STR	5′-9″	31						
A44	2	8	STR	4′-5″	24						
A45	2	8	STR	3′-1″	16						
A46	2	8	STR	1′-8″	9						
A47	1	5	1	7′-7″	8						
A48	1	5	1	7′-2″	7						
A49	56	8	STR	23′-4″	3,489						
A50	4	8	STR	22′-8″	242						
A51	4	8	STR	21′-3″	227						
						REINFORCING STEEL				LBS.	20,341

BILL OF MATERIAL - RIGHT EXTENSION

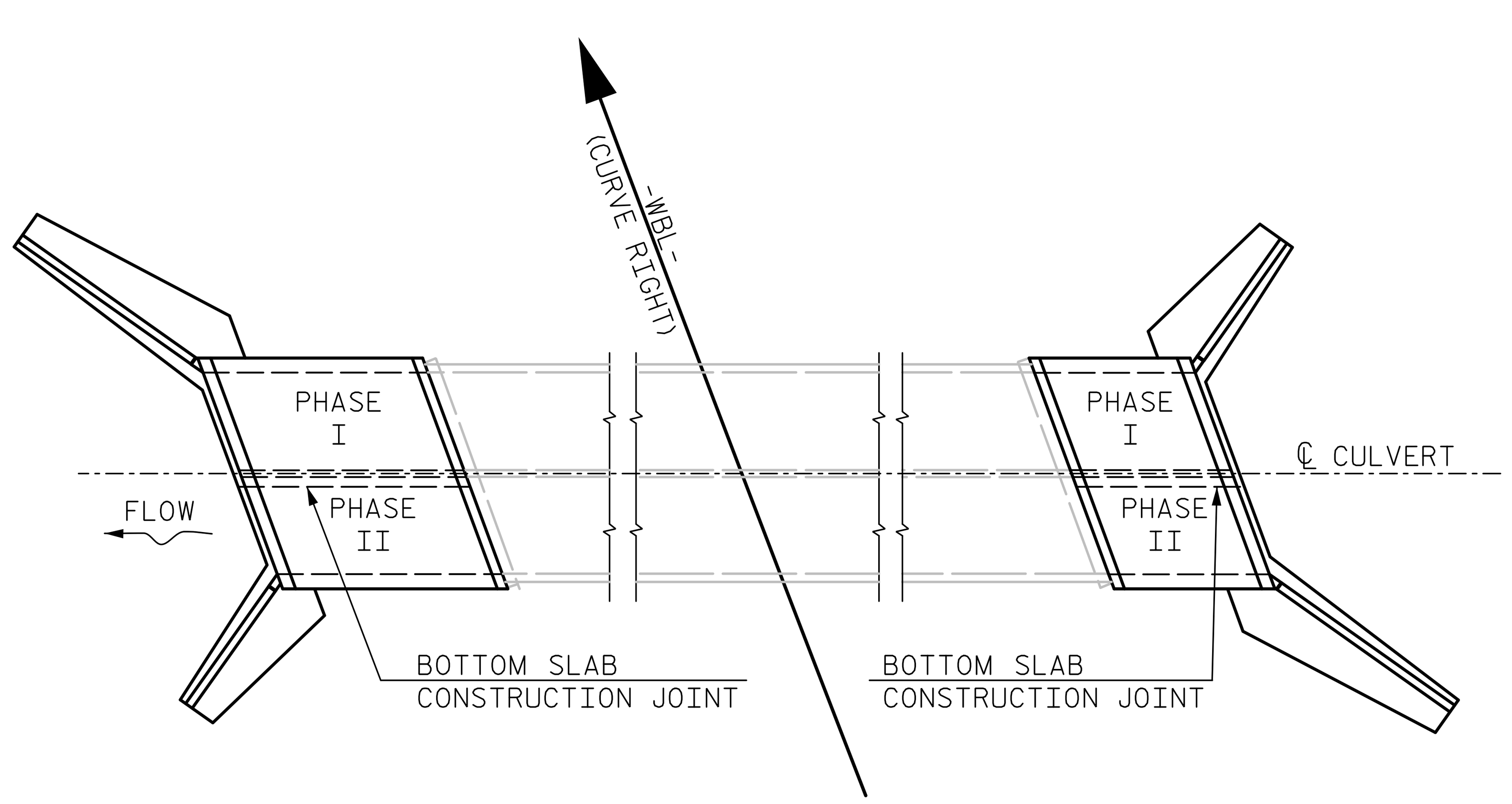
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	94	5	1	8′-10″	866	A120	3	8	STR	22′-1″	177
A66	58	5	1	9′-10″	595	A121	3	8	STR	20′-9″	166
A70	1	5	1	7′-9″	8	A122	3	8	STR	19′-5″	156
A71	1	5	1	6′-6″	7	A123	3	8	STR	18′-1″	145
A72	2	5	1	8′-2″	17	A124	3	8	STR	16′-9″	134
A73	16	8	STR	18′-5″	787	A125	3	8	STR	15′-5″	123
A74	2	8	STR	19′-2″	102	A126	3	8	STR	14′-1″	113
A75	2	8	STR	17′-9″	95	A127	3	8	STR	12′-9″	102
A76	2	8	STR	16′-5″	88	A128	3	8	STR	11′-5″	91
A77	2	8	STR	15′-1″	81	A129	3	8	STR	10′-1″	81
A78	2	8	STR	13′-8″	73	A130	3	8	STR	8′-9″	70
A79	2	8	STR	12′-4″	66	A131	3	8	STR	7′-5″	59
A80	2	8	STR	11′-0″	59	A132	3	8	STR	6′-1″	49
A81	2	8	STR	9′-8″	52	A133	3	8	STR	4′-10″	39
A82	2	8	STR	8′-3″	44	A134	3	8	STR	3′-6″	28
A83	2	8	STR	6′-11″	37	A135	3	8	STR	2′-2″	17
A84	2	8	STR	5′-7″	30	A136	1	8	STR	21′-5″	57
A85	2	8	STR	4′-2″	22	A137	1	8	STR	20′-1″	54
A86	2	8	STR	2′-10″	15	A138	1	8	STR	18′-9″	50
A87	2	8	STR	1′-6″	8	A139	1	8	STR	17′-6″	47
A88	1	8	STR	17′-3″	46	A140	1	8	STR	16′-2″	43
A89	1	8	STR	17′-9″	47	A141	1	8	STR	14′-10″	40
A90	1	8	STR	16′-6″	44	A142	1	8	STR	13′-7″	36
A91	1	8	STR	15′-2″	40	A143	1	8	STR	12′-6″	33
A92	1	8	STR	13′-10″	37	A144	1	8	STR	10′-11″	29
A93	1	8	STR	12′-7″	34	A145	1	8	STR	9′-8″	26
A94	1	8	STR	11′-3″	30	A146	1	8	STR	8′-4″	22
A95	1	8	STR	10′-0″	27	A147	1	8	STR	7′-1″	19
A96	1	8	STR	8′-8″	23	A148	1	8	STR	5′-9″	15
A97	1	8	STR	7′-4″	20	A149	1	8	STR	4′-5″	12
A98	16	8	STR	20′-0″	854	A150	1	8	STR	3′-2″	8
A99	1	8	STR	18′-10″	50	A151	1	8	STR	1′-10″	5
A100	1	8	STR	19′-4″	52						
A101	1	8	STR	18′-1″	48	B1	66	5	STR	13′-3″	912
A102	1	8	STR	16′-9″	45	B2	64	5	STR	9′-4″	623
A103	1	8	STR	15′-5″	41						
A104	1	8	STR	14′-2″	38	C2	135	4	STR	15′-11″	1,435
A105	1	8	STR	12′-10″	34	C3	25	4	STR	15′-7″	260
A106	1	8	STR	11′-7″	31						
A107	1	8	STR	10′-3″	27	D1	40	6	STR	2′-6″	150
A108	1	8	STR	8′-11″	24						
A109	52	8	STR	10′-2″	1,412	S1	19	4	2	5′-11″	75
A110	2	8	STR	7′-6″	40	S2	2	7	STR	16′-2″	66
A111	2	8	STR	9′-7″	51	S3	2	7	STR	17′-7″	72
A112	2	8	STR	8′-4″	45	S4	4	7	STR	7′-7″	62
A113	2	8	STR	7′-0″	37	S5	3	6	STR	18′-0″	81
A114	2	8	STR	5′-8″	30	S6	3	6	STR	19′-3″	87
A115	2	8	STR	4′-5″	24	S7	6	6	STR	10′-9″	97
A116	2	8	STR	3′-1″	16	S9	6	5	STR	24′-10″	155
A117	1	5	1	7′-1″	7	S10	6	6	STR	24′-10″	224
A118	1	5	1	7′-10″	8	S11	23	4	3	6′-11″	106
A119	30	8	STR	23′-4″	1,869	REINFORCING STEEL				LBS.	14,634

BAR TYPE



SPLICE LENGTH CHART

BAR	SIZE	SPLICE LENGTH
"A"	#8	5′-3″(BOTTOM BARS)
"A"	#8	6′-10″(TOP BARS)
"B"	#5	3′-3″
"S"	#6	5′-2″(TOP BARS)
"S"	#6	3′-11″(BOTTOM BARS)
"S"	#7	6′-0″(TOP BARS)
"S"	#7	4′-7″(BOTTOM BARS)



CONSTRUCTION SEQUENCE

PHASING REQUIRES CREEK FLOW DIVERSION - SEE EROSION CONTROL PLANS.

PHASING NOTES

CONCRETE IN CULVERT TO BE POURED IN THE FOLLOWING ORDER:

PHASE I: AFTER SHIFTING STREAM FLOW.

1. INSTALL IMPERVIOUS DIKE TO SHIFT STREAM FLOW FROM PHASE I AND DEWATER CONSTRUCTION AREA.
2. CONSTRUCT PHASE I WING FOOTINGS AND FLOOR SLAB INCLUDING 4″ OF VERTICAL WALLS.
3. CONSTRUCT REMAINING PHASE I PORTIONS OF THE WALLS AND WINGS FULL HEIGHT.

PHASE II:

1. RECONFIGURE IMPERVIOUS DIKE AND SHIFT STREAM FLOW THROUGH PHASE I CELL.
2. CONSTRUCT PHASE II WING FOOTINGS AND FLOOR SLAB INCLUDING 4″ OF REMAINING VERTICAL WALL.
3. CONSTRUCT REMAINING PHASE II PORTION OF WALL AND WINGS FULL HEIGHT.
4. CONSTRUCT ENTIRE ROOF SLAB AND HEADWALLS.

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 984+16.39 -WBL-

SHEET 10 OF 12

NORTH CAROLINA PROFESSIONAL SEAL 27812 ENGINEER DAVID W. HAWKINS 5/7/2019

DocuSigned by: David W. Hawkins A5BD752AB855487...

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BILL OF MATERIAL
FOR DOUBLE
10 FT. x 10 FT.
CONCRETE BOX CULVERT
111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

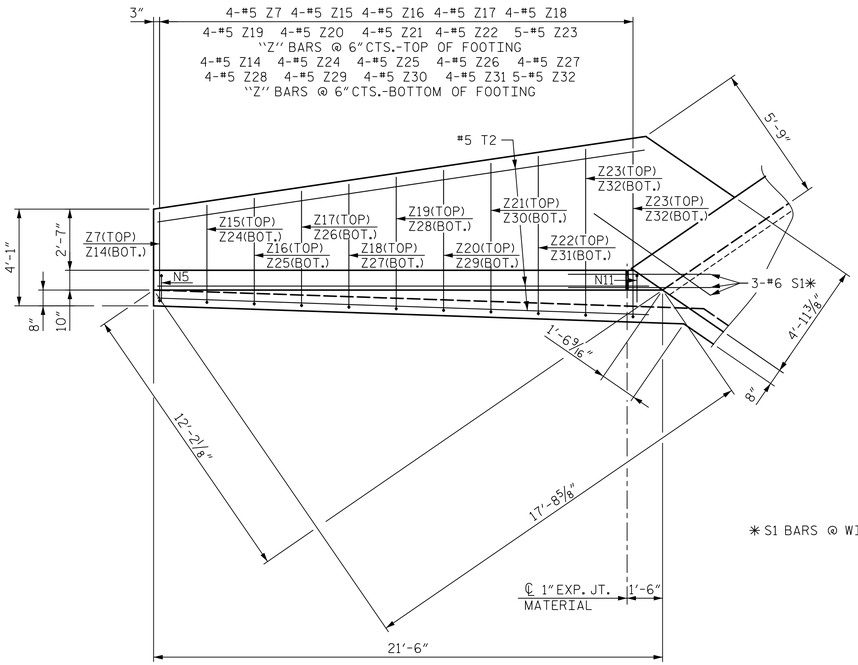
DRAWN BY	M. WRIGHT	DATE	1/19
CHECKED BY	N. HART	DATE	1/19
DESIGN ENGINEER OF RECORD	D. HAWKINS	DATE	1/19

DWG. NO. 10

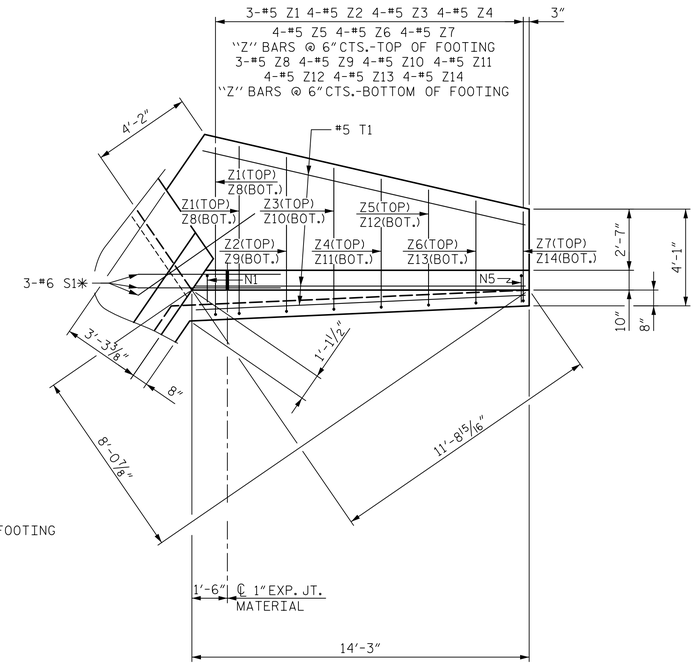
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. C3-10

TOTAL SHEETS 12



PLAN W1



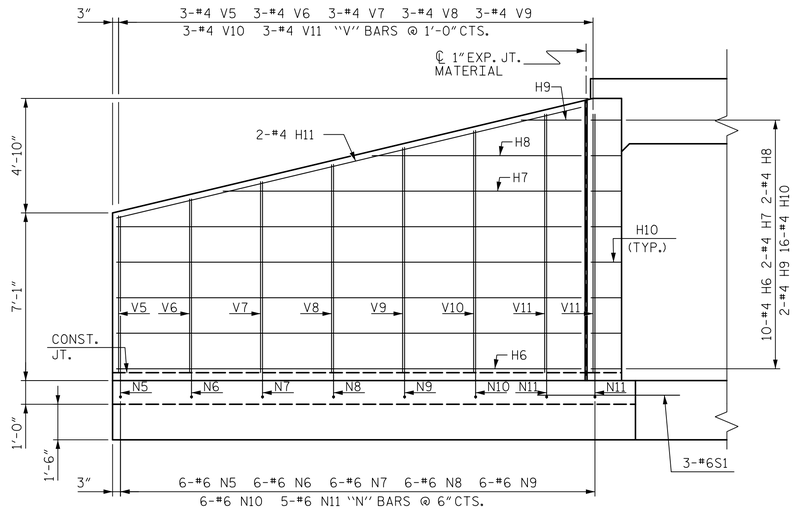
PLAN W2

* S1 BARS @ WING FOOTING

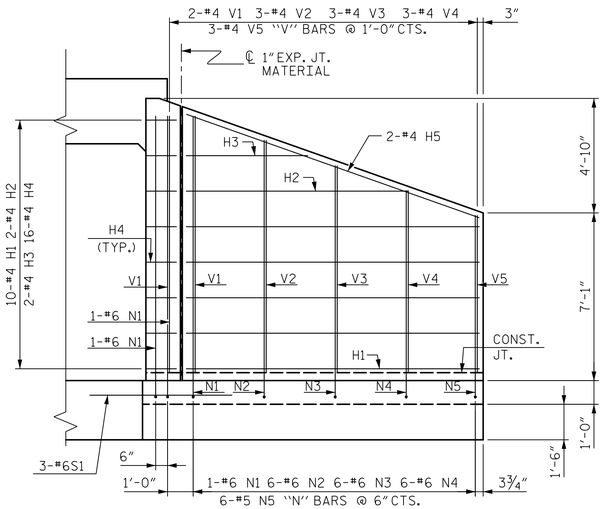
NOTE: AT THE CONTRACTOR'S OPTION, THE VERTICAL REINFORCING STEEL IN THE FILL FACE OF THE WING ABOVE THE CONSTRUCTION JOINT MAY BE SPLICED. THE SPLICE LENGTHS SHALL BE AS FOLLOWS:

#6 "N" BARS 3'-11"

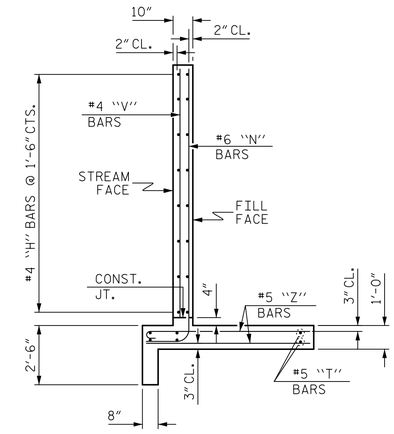
EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.



ELEVATION W1



ELEVATION W2



TYPICAL WING SECTION

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 984+16.39 -WBL-

SHEET 11 OF 12

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY M. WRIGHT DATE 1/19
CHECKED BY N. HART DATE 1/19
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

DWG. NO. 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR DOUBLE 10 FT. x 10 FT. CONCRETE BOX CULVERT

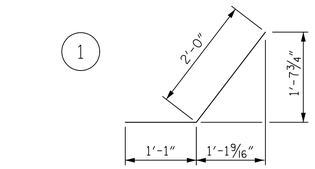
111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

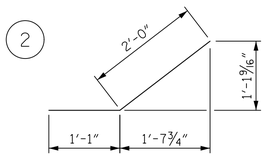
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C3-11
1			3			TOTAL SHEETS
2			4			12

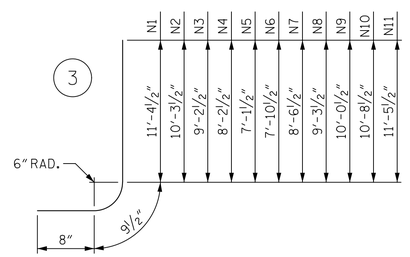
BILL OF MATERIAL

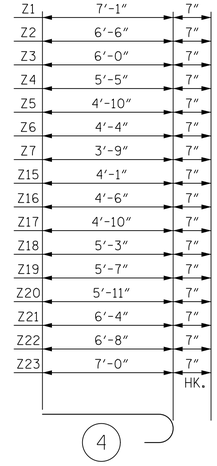
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	10	#4	STR	12′-4″	82
H2	2	#4	STR	9′-4″	12
H3	2	#4	STR	5′-1″	7
H4	16	#4	1	3′-1″	33
H5	2	#4	STR	13′-1″	17
H6	10	#4	STR	19′-7″	131
H7	2	#4	STR	15′-1″	20
H8	2	#4	STR	8′-10″	12
H9	2	#4	STR	2′-6″	3
H10	16	#4	2	3′-1″	33
H11	2	#4	STR	20′-1″	27
N1	3	#6	3	12′-10″	58
N2	6	#6	3	11′-9″	106
N3	6	#6	3	10′-8″	96
N4	6	#6	3	9′-8″	87
N5	12	#6	3	8′-7″	155
N6	6	#6	3	9′-4″	84
N7	6	#6	3	10′-0″	90
N8	6	#6	3	10′-9″	97
N9	6	#6	3	11′-6″	104
N10	6	#6	3	12′-2″	110
N11	5	#6	3	12′-11″	97
S1	6	#6	STR	6′-0″	54
T1	6	#5	STR	13′-11″	87
T2	6	#5	STR	20′-9″	130
V1	2	#4	STR	10′-10″	14
V2	3	#4	STR	9′-9″	20
V3	3	#4	STR	8′-8″	17
V4	3	#4	STR	7′-8″	15
V5	6	#4	STR	6′-7″	26
V6	3	#4	STR	7′-4″	15
V7	3	#4	STR	8′-0″	16
V8	3	#4	STR	8′-9″	18
V9	3	#4	STR	9′-6″	19
V10	3	#4	STR	10′-2″	20
V11	3	#4	STR	10′-11″	22
Z1	3	#5	4	7′-8″	24
Z2	4	#5	4	7′-1″	30
Z3	4	#5	4	6′-7″	27
Z4	4	#5	4	6′-0″	25
Z5	4	#5	4	5′-5″	23
Z6	4	#5	4	4′-11″	21
Z7	8	#5	4	4′-4″	36
Z8	3	#5	STR	7′-1″	22
Z9	4	#5	STR	6′-6″	27
Z10	4	#5	STR	6-0″	25
Z11	4	#5	STR	5′-5″	23
Z12	4	#5	STR	4′-10″	20
Z13	4	#5	STR	4′-4″	18
Z14	8	#5	STR	3′-9″	31
Z15	4	#5	4	4′-8″	19
Z16	4	#5	4	5′-1″	21
Z17	4	#5	4	5′-5″	23
Z18	4	#5	4	5′-10″	24
Z19	4	#5	4	6′-2″	26
Z20	4	#5	4	6′-6″	27
Z21	4	#5	4	6′-11″	29
Z22	4	#5	4	7′-3″	30
Z23	5	#5	4	7′-7″	40
Z24	4	#5	STR	4′-1″	17
Z25	4	#5	STR	4′-6″	19
Z26	4	#5	STR	4′-10″	20
Z27	4	#5	STR	5′-3″	22
Z28	4	#5	STR	5′-7″	23
Z29	4	#5	STR	5′-11″	25
Z30	4	#5	STR	6′-4″	26
Z31	4	#5	STR	6′-8″	28
Z32	5	#5	STR	7′-0″	37
REINFORCING STEEL FOR ONE EXTENSION (2 WINGS)					2,742 LBS.

BAR TYPES









ALL BAR DIMENSIONS ARE OUT TO OUT.

REINFORCING STEEL FOR 4 WINGS	5,484 LBS
CLASS A CONCRETE	
4 WINGS	37.0 CY
2 HEADWALLS	2.3 CY
2 END CURTAIN WALLS	5.5 CY
4 EDGE BEAMS	3.7 CY
TOTAL	48.5 CY

PROJECT NO. I-4700A

BUNCOMBE **COUNTY**

STATION: 984+16.39 -WBL-

SHEET 12 OF 12

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

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DRAWN BY M. WRIGHT DATE 1/19
CHECKED BY N. HART DATE 1/19
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 1/19

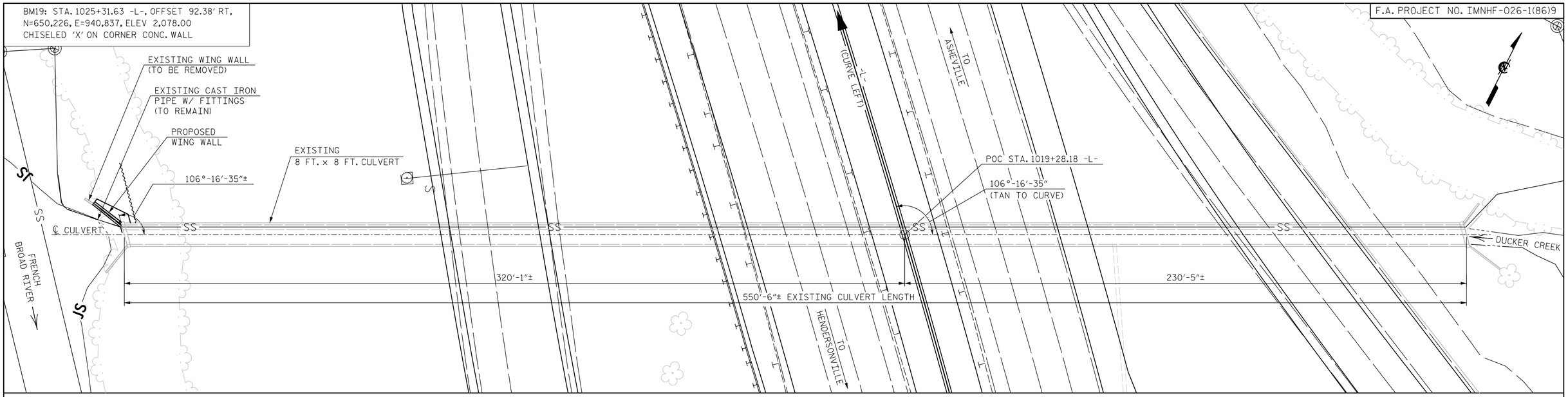
DWG. NO. 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR DOUBLE 10 FT. × 10 FT. CONCRETE BOX CULVERT

111 DEGREE SKEW
ON I-26 OVER POWELL CREEK

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



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

NOTES

THIS WING REPLACEMENT HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

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

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

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

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

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROTECT THE EXISTING CAST IRON SANITARY SEWER PIPE DURING CONSTRUCTION. THE CONTRACTOR SHALL HAVE NO CLAIM AGAINST THE DEPARTMENT FOR DAMAGES RELATED TO CONSTRUCTION.

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.

DETAILED DRAWINGS FOR FALSEWORK AND FORMS FOR THIS WING WALL REHABILITATION SHALL BE SUBMITTED. SEE SHEET SN.

SEE SECTION 414 OF THE STANDARD SPECIFICATIONS FOR CULVERT EXCAVATION AND BACKFILLING.

AT THE DIRECTION OF THE ENGINEER, UNDERCUT SOFT/LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL.

TEMPOARY SHEETING SHALL BE INSTALLED PRIOR TO COMMENCING ANY EARTHWORK AT THE CULVERT AT STA. 1019+28.18 -L-.

GRADE DATA

CULVERT BED ELEVATION @ STA. 1019+28.18 -L- = 2,035.36

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

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

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE WING	6.2 C.Y.
REINFORCING STEEL WING	438 LBS.
CULVERT EXCAVATION AT STATION 1019+28.18 -L-	LUMP SUM
REMOVAL OF EXISTING STRUCTURE AT STATION 1019+28.18 -L-	LUMP SUM

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

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DRAWN BY M. WRIGHT DATE 2/19
CHECKED BY J. BARCOMB DATE 2/19
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 2/19

DWG. NO. 1

PROJECT NO. I-4700A
BUNCOMBE COUNTY
STATION: 1019+28.18 -L-

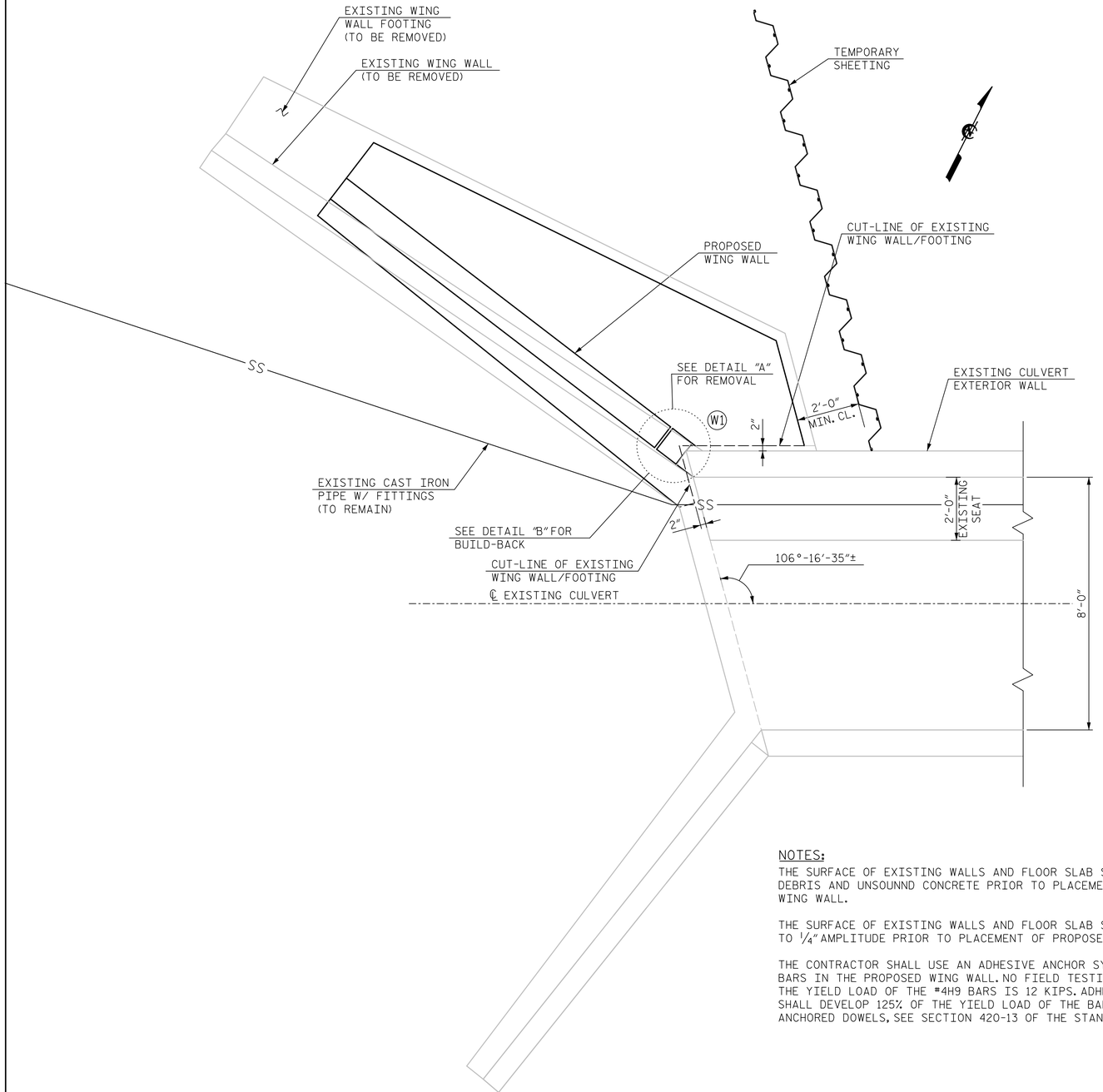
SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

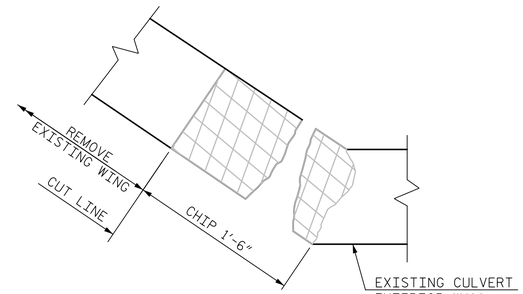
LOCATION SKETCH FOR SINGLE 8 FT. x 8 FT. CONCRETE BOX CULVERT WING WALL

ON I-26 OVER DUCKER CREEK

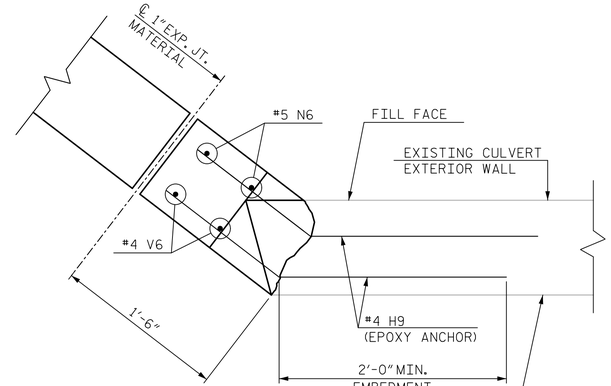
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	C4-1
1			3			TOTAL SHEETS 3
2			4			



WING W1 PLAN



DETAIL "A"
EXISTING WING WALL
REMOVAL



DETAIL "B"
PROPOSED WING WALL
BUILD-BACK

NOTES:

THE SURFACE OF EXISTING WALLS AND FLOOR SLAB SHALL BE FREE OF DEBRIS AND UNSOUNND CONCRETE PRIOR TO PLACEMENT OF PROPOSED WING WALL.

THE SURFACE OF EXISTING WALLS AND FLOOR SLAB SHALL BE ROUGHENED TO 1/4" AMPLITUDE PRIOR TO PLACEMENT OF PROPOSED WING WALL.

THE CONTRACTOR SHALL USE AN ADHESIVE ANCHOR SYSTEM FOR THE #4H9 BARS IN THE PROPOSED WING WALL. NO FIELD TESTING IS REQUIRED. THE YIELD LOAD OF THE #4H9 BARS IS 12 KIPS. ADHESIVE ANCHOR SYSTEM SHALL DEVELOP 125% OF THE YIELD LOAD OF THE BAR. FOR ADHESIVELY ANCHORED DOWELS, SEE SECTION 420-13 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. I-4700A
BUNCOMBE COUNTY
STATION: 1019+28.18 -L-

SHEET 2 OF 3

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DETAILS FOR SINGLE 8 FT. x 8 FT. CONCRETE BOX CULVERT WING WALL

ON I-26 OVER DUCKER CREEK

HNTB NORTH CAROLINA, P.C.
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343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY M. WRIGHT DATE 2/19
CHECKED BY J. BARCOMB DATE 2/19
DESIGN ENGINEER OF RECORD D. HAWKINS DATE 2/19

DWG. NO. 2

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

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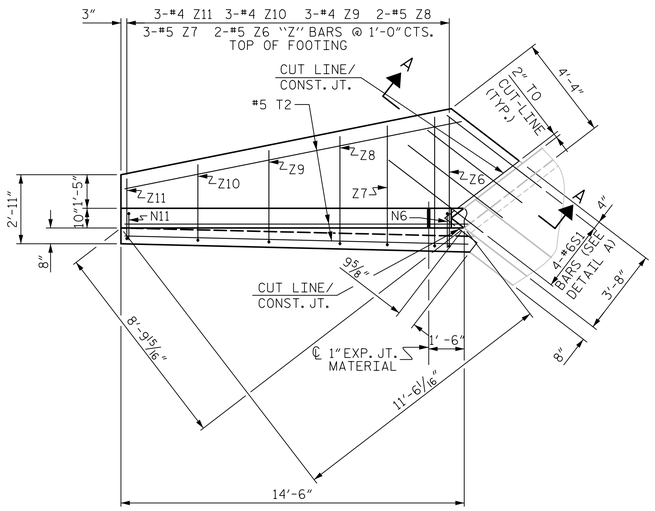


PLAN W1

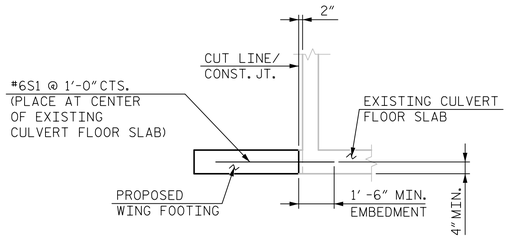
NOTES:

THE SURFACE OF EXISTING WALLS AND FLOOR SLAB SHALL BE FREE OF DEBRIS AND UNSOUNND CONCRETE PRIOR TO PLACEMENT OF PROPOSED WING WALL.

THE SURFACE OF EXISTING WALLS AND FLOOR SLAB SHALL BE ROUGHENED TO 1/4" AMPLITUDE PRIOR TO PLACEMENT OF PROPOSED WING WALL.

THE CONTRACTOR SHALL USE AN ADHESIVE ANCHOR SYSTEM FOR THE #6S1 BARS IN THE PROPOSED FOOTING. NO FIELD TESTING IS REQUIRED. THE YIELD LOAD OF THE #6S1 BARS IS 26.4 KIPS. ADHESIVE ANCHOR SYSTEM SHALL DEVELOP 125% OF THE YIELD LOAD OF THE BAR. FOR ADHESIVELY ANCHORED DOWELS, SEE SECTION 420-13 OF THE STANDARD SPECIFICATIONS.

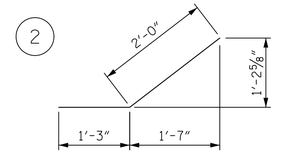
REMOVE EXISTING FOOTING REINFORCING TO CUT-LINE OF EXISTING WING WALL/FOOTING.

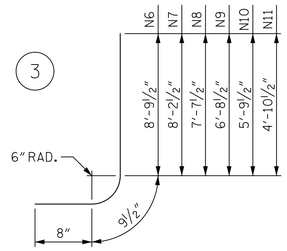


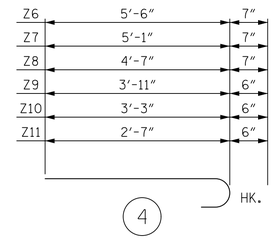
SECTION A-A

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.





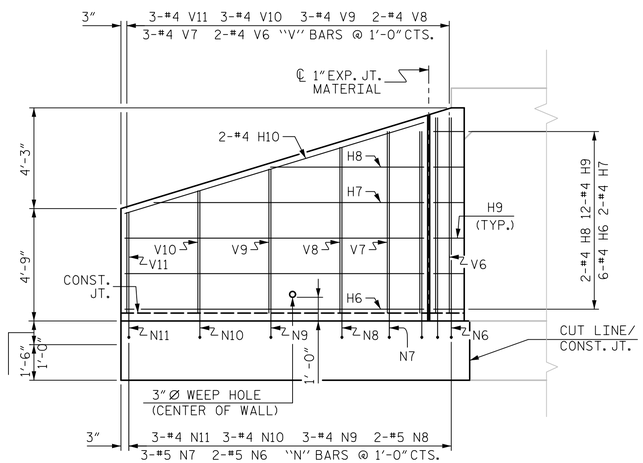


BILL OF MATERIAL

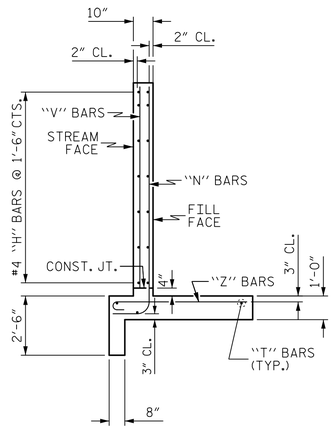
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	6	#4	STR	12'-7"	50
H7	2	#4	STR	11'-4"	15
H8	2	#4	STR	6'-5"	9
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	13'-2"	18
N6	2	#5	3	10'-3"	21
N7	3	#5	3	9'-8"	30
N8	2	#5	3	9'-1"	19
N9	3	#4	3	8'-2"	16
N10	3	#4	3	7'-3"	15
N11	3	#4	3	6'-4"	13
S1	4	#6	STR	5'-0"	30
T2	3	#5	STR	14'-6"	45
V6	2	#4	STR	8'-3"	11
V7	3	#4	STR	7'-8"	15
V8	2	#4	STR	7'-0"	9
V9	3	#4	STR	6'-1"	12
V10	3	#4	STR	5'-2"	10
V11	3	#4	STR	4'-3"	9
Z6	2	#5	4	6'-1"	13
Z7	3	#5	4	5'-8"	18
Z8	2	#5	4	5'-2"	11
Z9	3	#4	4	4'-5"	9
Z10	3	#4	4	3'-9"	8
Z11	3	#4	4	3'-1"	6

REINFORCING STEEL FOR 1 WING 438 LBS

CLASS A CONCRETE
1 WING 6.2 CY



ELEVATION W1



TYPICAL WING SECTION

PROJECT NO. I-4700A

BUNCOMBE COUNTY

STATION: 1019+28.18 -L-

SHEET 3 OF 3

DocuSigned by: David W. Hawkins

NORTH CAROLINA PROFESSIONAL SEAL 27812 3/1/2019 ENGINEER DAVID W. HAWKINS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 8'-0" 105° SKEW SLOPE = 2:1

ON I-26 OVER DUCKER CREEK

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

ASSEMBLED BY : M. WRIGHT	DATE : 2/19	
CHECKED BY : P. BARBER	DATE : 2/19	
DRAWN BY : CCJ	01/00	
CHECKED BY : RWW	03/00	

HNTB HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	M. WRIGHT	DATE 2/19	DWG. NO. 3
CHECKED BY	J. BARCOMB	DATE 2/19	
DESIGN ENGINEER OF RECORD	D. HAWKINS	DATE 2/19	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STD. NO. CW7508

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A ¼" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

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