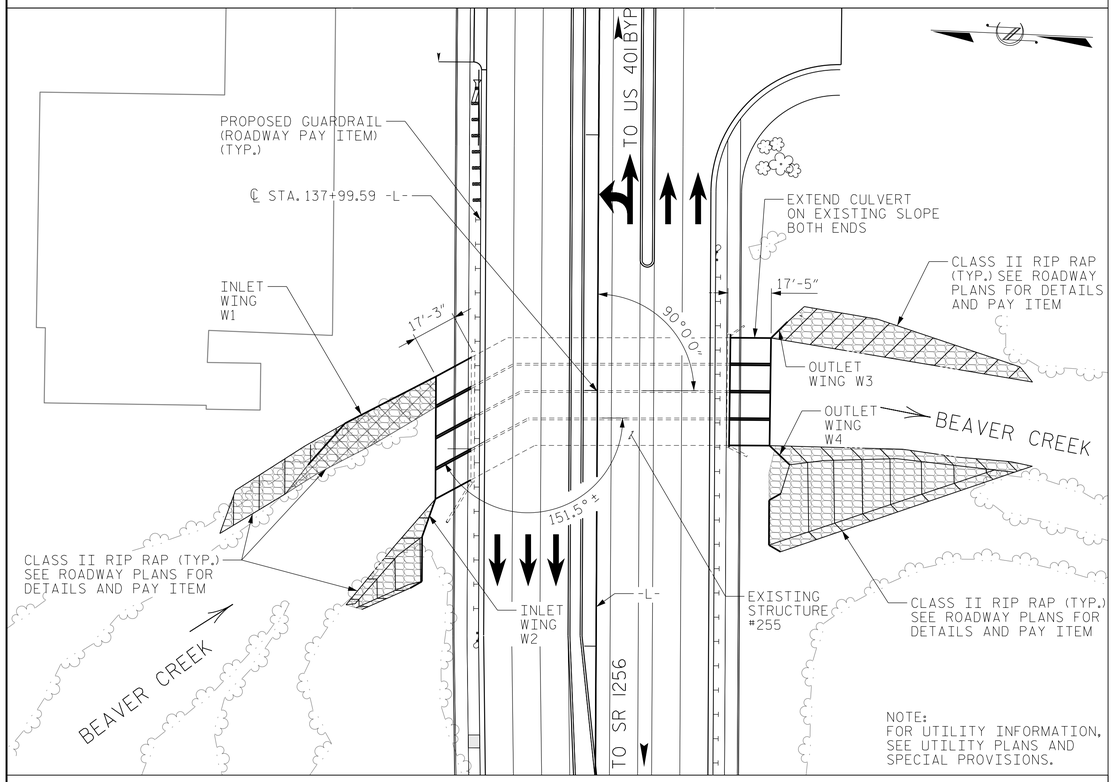
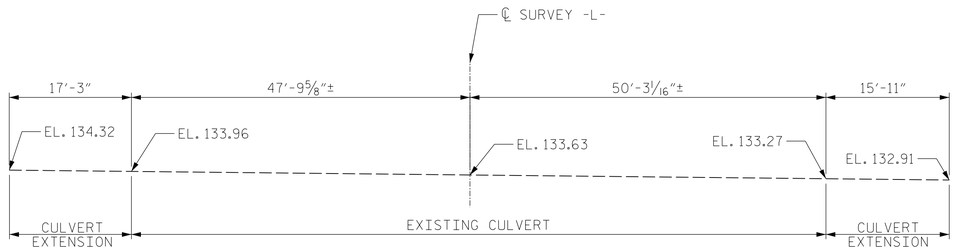
F. A. PROJECT NO. SPTDA-0401(301)

BM7 ELEVATION = 192.81, N 470648 E 2005724, -L- STATION 128+40.00, 366 RIGHT BENCH TIE IN POWER POLE



LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

TOP OF FLOOR SLAB

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"

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
CHECKED BY : JACOB H. DUKE DATE : 5-22-18
DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

10/31/2024
**_SMU_ CU01_C1-1_C255.dgn
jduke

HYDROGRAPHIC DATA

GRADE POINT ELEV. @ STA. 137+99.59 -L-	=	150.07
BED ELEV. @ STA. 137+99.59 -L-	=	133.58
ROADWAY SLOPES	=	3:1
DESIGN DISCHARGE	=	4720 CFS
FREQUENCY OF DESIGN FLOOD	=	50 YRS
DESIGN HIGH WATER ELEVATION	=	150.0'
DRAINAGE AREA	=	25 SQ. MI.
BASE DISCHARGE (Q100)	=	5250 CFS
BASE HIGH WATER ELEVATION	=	150.7'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	=	4540 CFS
FREQUENCY OF OVERTOPPING FLOOD	=	50+/- YRS
OVERTOPPING FLOOD ELEVATION	=	150.0'
OVERTOPPING LOCATION	=	SAG AT STA. 136+32 -L- ℄

CULVERT EXTENSION - TOTAL QUANTITIES

CLASS A CONCRETE		
PHASE I		79.2 C.Y.
PHASE II		82.4 C.Y.
PHASE III		57.6 C.Y.
	TOTAL	219.2 C.Y.
REINFORCING STEEL		
PHASE I		11,067 LBS.
PHASE II		9,728 LBS.
PHASE III		8,404 LBS.
	TOTAL	29,199 LBS.
FOUNDATION CONDITIONING MATERIAL		
PHASE I		62 TONS
PHASE II		55 TONS
PHASE II		- TONS
	TOTAL	117 TONS
CULVERT EXCAVATION		LUMP SUM
CHANNEL EXCAVATION		160 C.Y.
REMOVAL OF EXISTING STRUCTURE		LUMP SUM
ANCHORED SHEET PILE WALL		
PHASE I		2,363 SQ. FT.
	TOTAL	2,363 SQ. FT.
CONCRETE VALLEY GUTTER		
PHASE III		64.0 LIN. FT.
	TOTAL	64.0 LIN. FT.
CHAIN LINK FENCE, 72" FABRIC		
PHASE III		199 LIN. FT.
	TOTAL	199 LIN. FT.
METAL LINE POSTS FOR 72" CHAIN LINK FENCE		
PHASE III		21 EA.
	TOTAL	21 EA.
METAL TERMINAL POSTS FOR 72" CHAIN LINK FENCE		
PHASE III		13 EA.
	TOTAL	13 EA.

NOTES:

ASSUMED LIVE LOAD HL-93.

INLET DESIGN FILL IS 2.9 FEET.

OUTLET DESIGN FILL IS 4.0 FEET.

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTES SHEET.

INSTALL INLET WING W1 (ANCHORED SHEET PILE WALL) PRIOR TO POURING CONCRETE IN CULVERTS.

CONCRETE IN CULVERTS TO BE CAST IN THE FOLLOWING ORDER:

PHASE I:
1. OUTLET WING W3 FOOTING AND FLOOR SLAB OF BARRELS #1 AND #2, INCLUDING 4" OF EXTERIOR WALL OF BARREL #1, AND INTERIOR WALLS OF BARREL #2.
2. THE REMAINING PORTIONS OF OUTLET WING W3 WALL, EXTERIOR WALL OF BARREL #1, AND INTERIOR WALLS OF BARREL #2.

PHASE II:
1. INLET WING W2 FOOTING AND FLOOR SLAB OF BARRELS #3 AND #4, INCLUDING 4" OF EXTERIOR WALL OF BARREL #4, AND INTERIOR WALL OF BARREL #4.
2. THE REMAINING PORTIONS OF INLET WING W2 WALL, EXTERIOR WALL OF BARREL #4, AND INTERIOR WALL OF BARREL #4.

PHASE III:
1. INLET AND OUTLET ROOF SLAB AND HEADWALLS ACROSS ALL BARRELS.

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 PROVIDED AS IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONSTRACTOR.

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.

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.

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 WALLS COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINTS.

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 EXTENSIONS 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.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

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

FOR CONSTRUCTION SEQUENCE, SEE SHEETS C-2 THRU C-4.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR ANCHORED SHEET PILE WALL, SEE SPECIAL PROVISIONS.

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 1 OF 18 CULVERT No. 255

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE 11/1/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

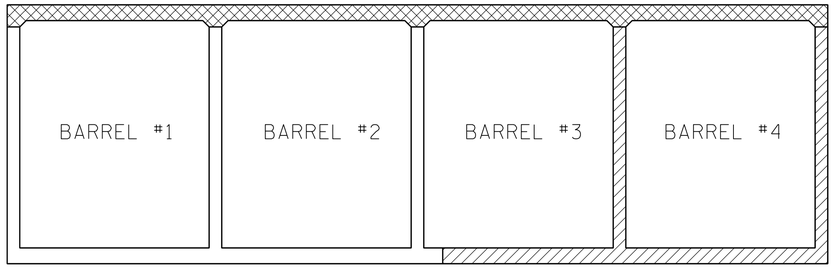
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

LEFT AND RIGHT EXTENSION TITLE SHEET

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-1
1			3			TOTAL SHEETS
2			4			18



PHASE I CONSTRUCTION (ACTIVE)

PHASE II CONSTRUCTION

PHASE III CONSTRUCTION

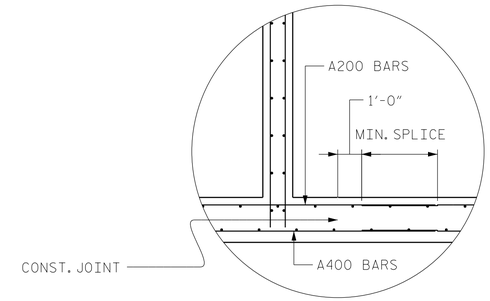
CONSTRUCTION PHASING

LOOKING DOWNSTREAM

NOTES:

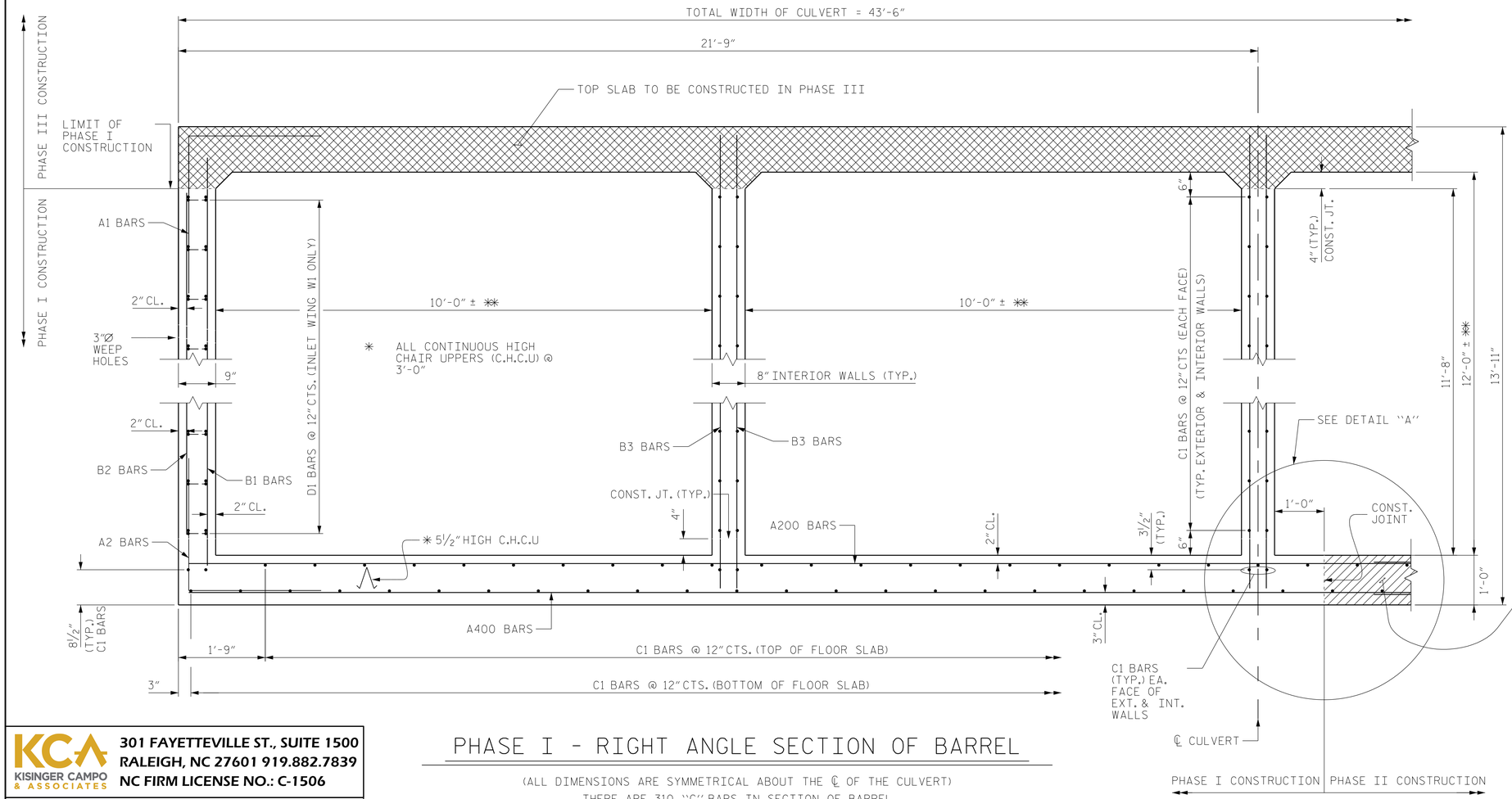
THE CONTRACTOR IS RESPONSIBLE FOR TEMPORARY BRACING INTERIOR AND EXTERIOR WALLS OF THE CULVERT AFTER PHASE I IS COMPLETED. TEMPORARY BRACING MAY BE REMOVED UPON COMPLETION OF PHASE III.

** MATCH EXISTING CULVERT DIMENSIONS



DETAIL ''A''

(SEE MIN. SPLICE LENGTH IN TITLE SHEET)



PHASE I - RIGHT ANGLE SECTION OF BARREL

(ALL DIMENSIONS ARE SYMMETRICAL ABOUT THE ℄ OF THE CULVERT)
THERE ARE 310 ''C'' BARS IN SECTION OF BARREL

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 2 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

PHASE I - SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS
2			4			18

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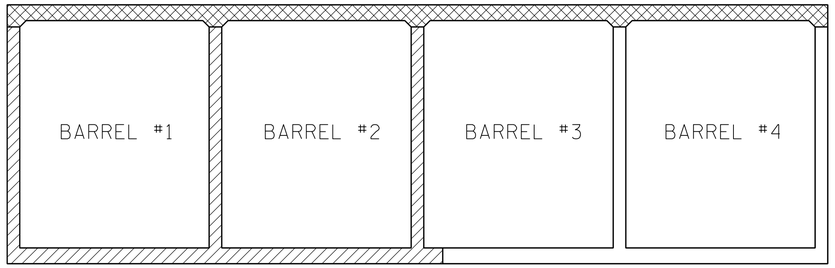
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
CHECKED BY : JACOB H. DUKE DATE : 5-22-18
DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

10/31/2024
**_SMU_ CU02_C1-2_C255.dgn
jduke



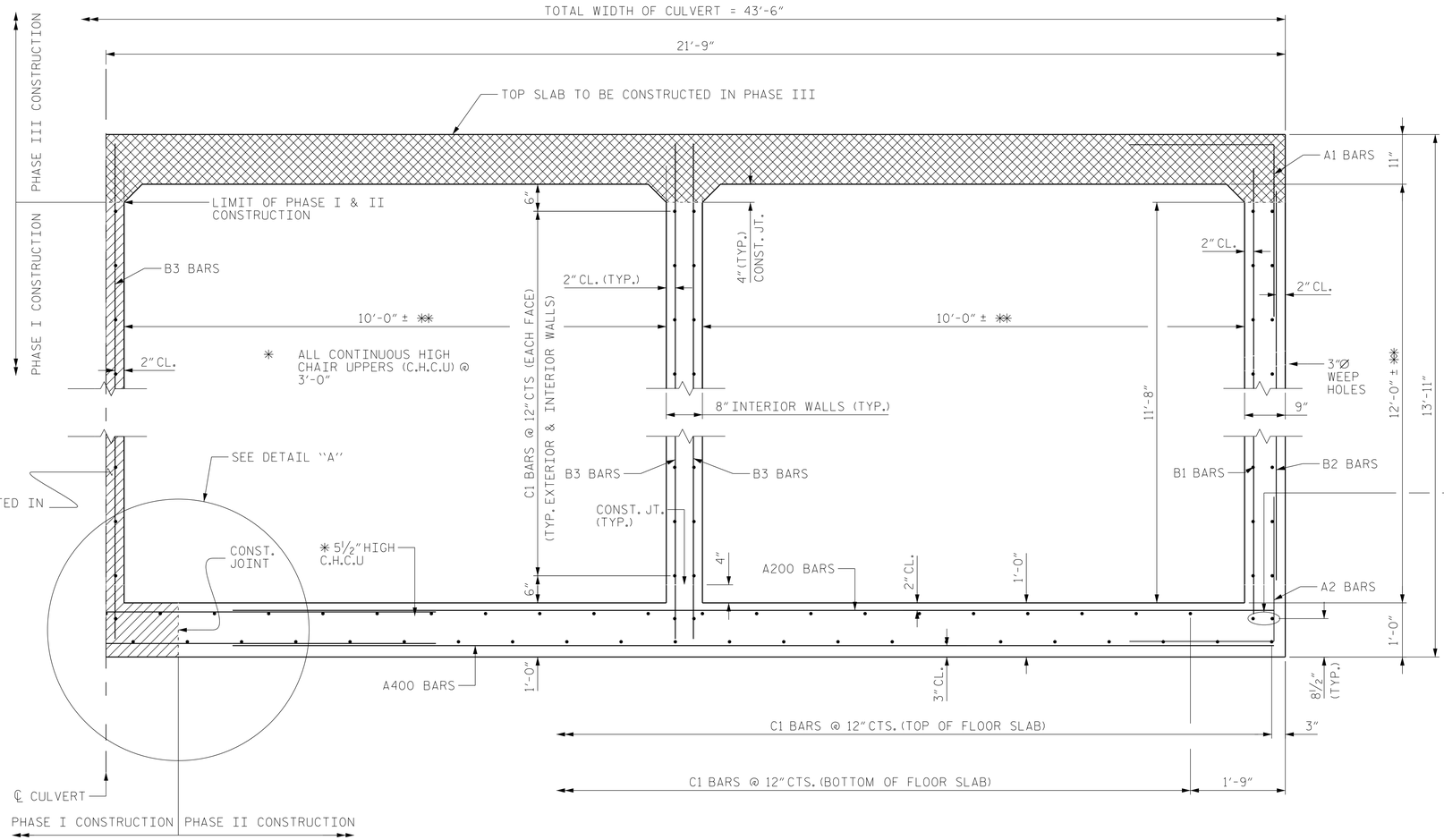
PHASE I CONSTRUCTION

PHASE II CONSTRUCTION (ACTIVE)

PHASE III CONSTRUCTION

CONSTRUCTION PHASING

LOOKING DOWNSTREAM



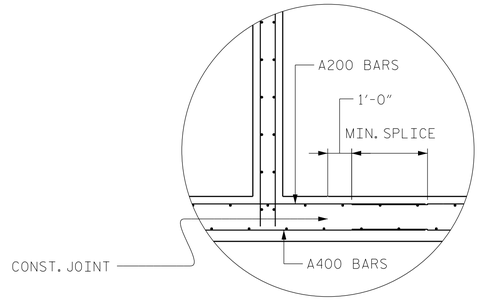
PHASE II - RIGHT ANGLE SECTION OF BARREL

(ALL DIMENSIONS ARE SYMMETRICAL ABOUT THE ℄ OF THE CULVERT)
THERE ARE 310 "C" BARS IN SECTION OF BARREL

NOTES:

THE CONTRACTOR IS RESPONSIBLE FOR TEMPORARY BRACING INTERIOR AND EXTERIOR WALLS OF THE CULVERT AFTER PHASE II IS COMPLETED. TEMPORARY BRACING MAY BE REMOVED UPON COMPLETION OF PHASE III.

** MATCH EXISTING CULVERT DIMENSIONS



DETAIL "A"

(SEE MIN. SPLICE LENGTH IN TITLE SHEET)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 3 OF 18

NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE 11/1/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

PHASE II - SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
1			3			TOTAL SHEETS
2			4			18

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RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

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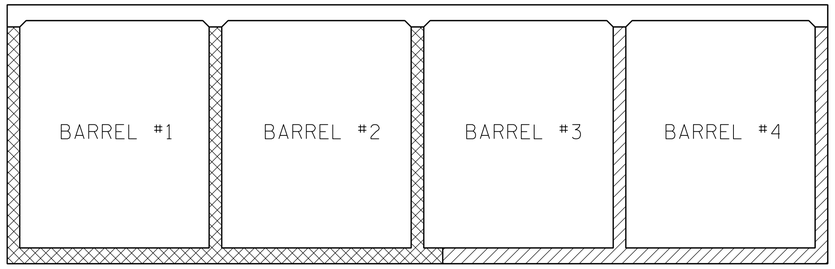
CHECKED BY : JACOB H. DUKE DATE : 5-22-18
DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

10/31/2024
**_SMU_ CU03_C1-3_C255.dgn
jduke

NOTES:

** MATCH EXISTING CULVERT DIMENSIONS



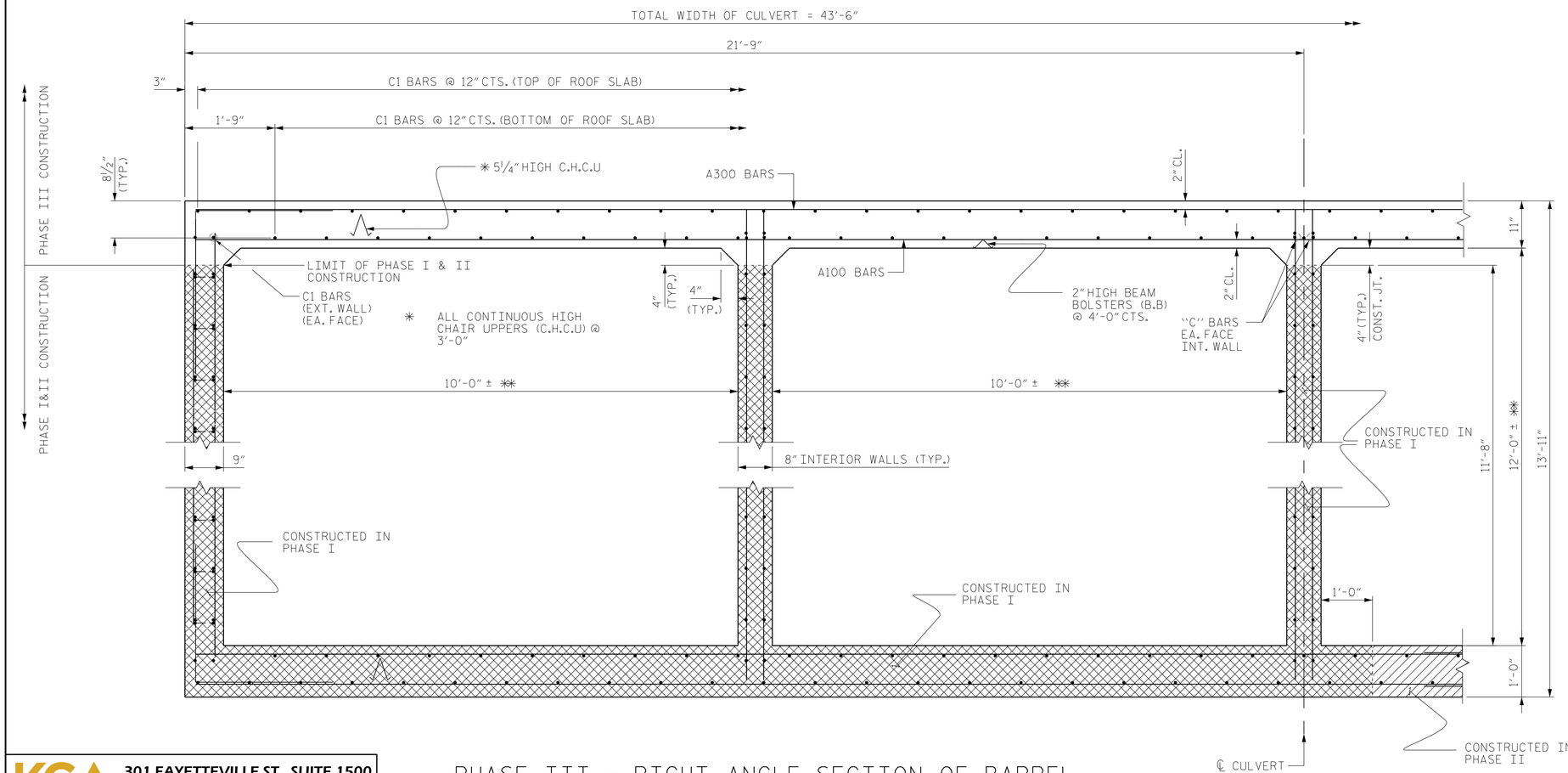
PHASE I CONSTRUCTION

PHASE II CONSTRUCTION

PHASE III CONSTRUCTION (ACTIVE)

CONSTRUCTION PHASING

LOOKING DOWNSTREAM



PHASE III - RIGHT ANGLE SECTION OF BARREL

(ALL DIMENSIONS ARE SYMMETRICAL ABOUT THE ℄ OF THE CULVERT)

THERE ARE 310 "C" BARS IN SECTION OF BARREL

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 4 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

PHASE III - SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			18

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043777 JACOB H DUKE 11/1/2024

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RALEIGH, NC 27601 919.882.7839
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10/31/2024
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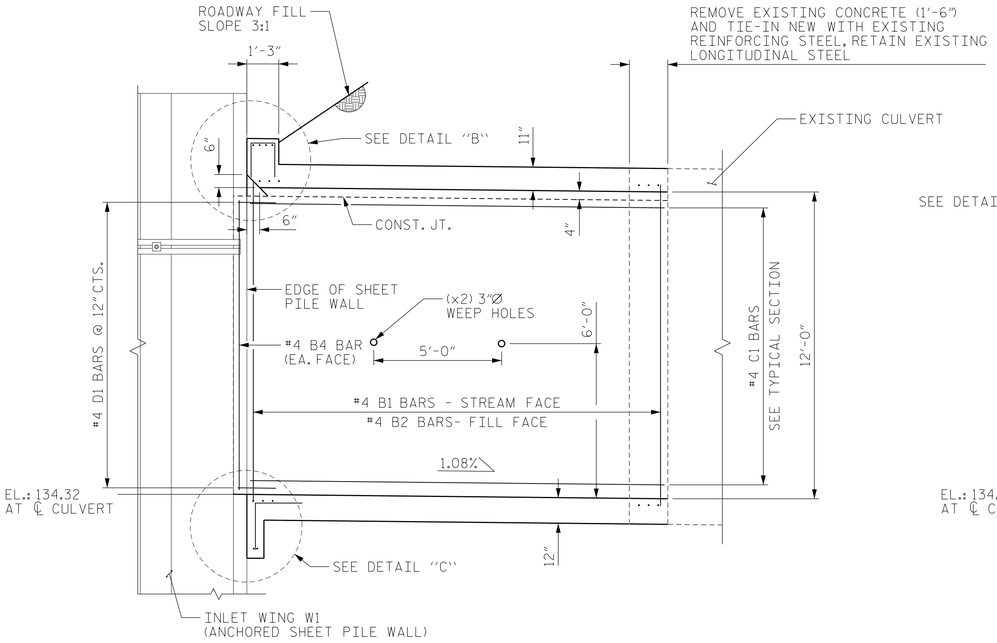
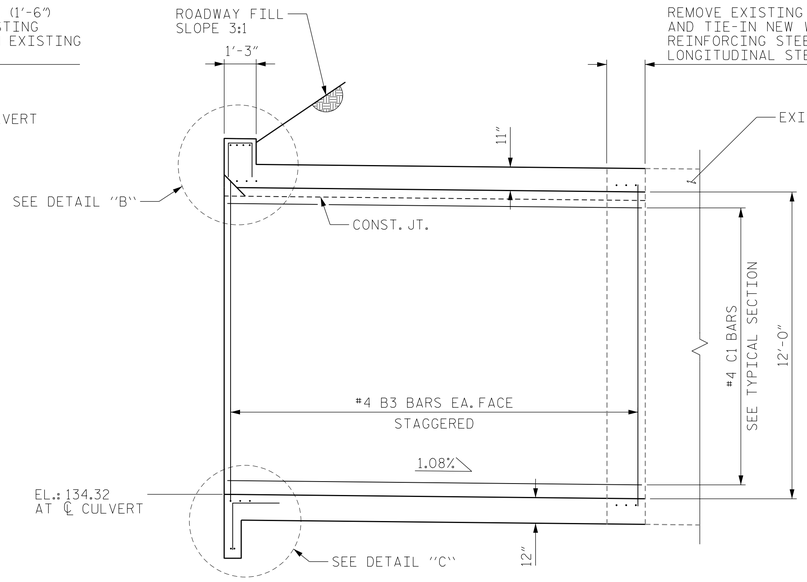
jduke



EXTERIOR WALL

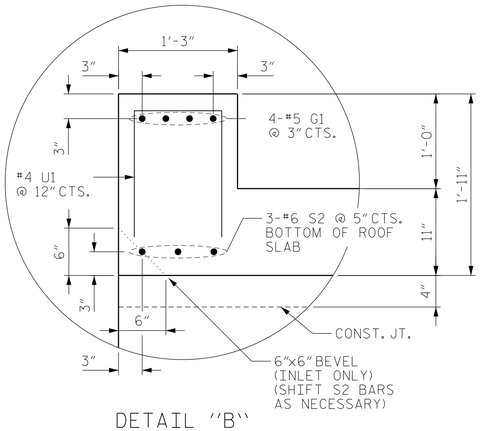
CHAIN LINK FENCE NOT SHOWN FOR CLARITY



INTERIOR WALL

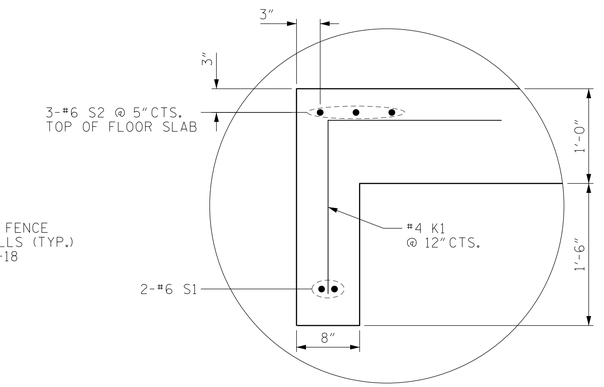
CHAIN LINK FENCE NOT SHOWN FOR CLARITY

CULVERT SECTION NORMAL TO HEADWALL - INLET



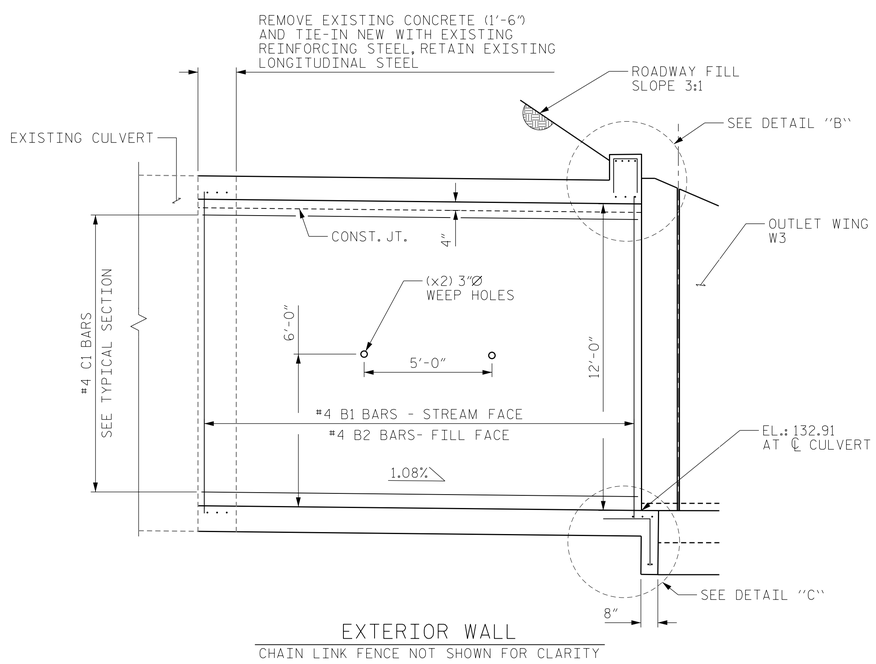
DETAIL "B"

HEADWALL REINFORCEMENT



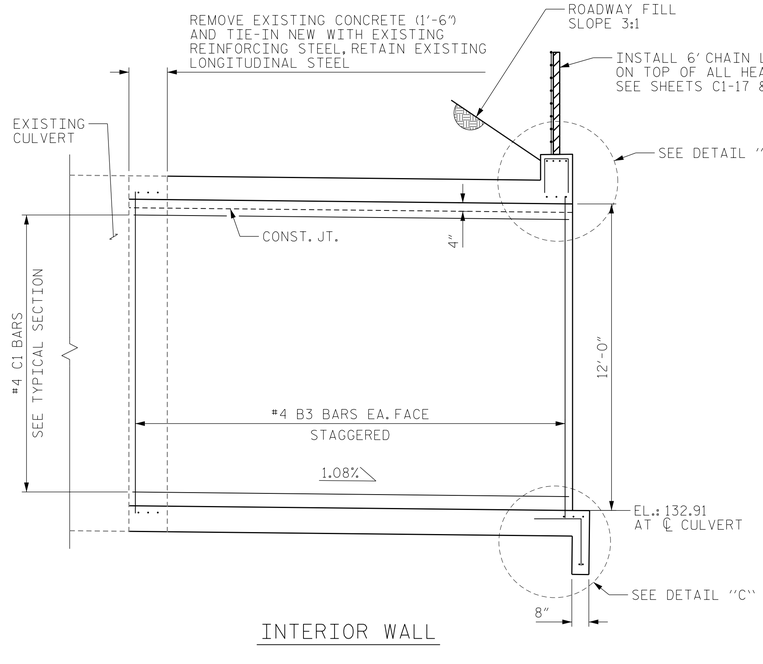
DETAIL "C"

END CURTAIN WALL REINFORCEMENT



EXTERIOR WALL

CHAIN LINK FENCE NOT SHOWN FOR CLARITY



INTERIOR WALL

CULVERT SECTION NORMAL TO HEADWALL - OUTLET

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 5 OF 18

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT.
CONCRETE BOX CULVERT

CULVERT SECTION
NORMAL TO HEADWALL

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
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10/31/2024
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NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE 11/1/2024

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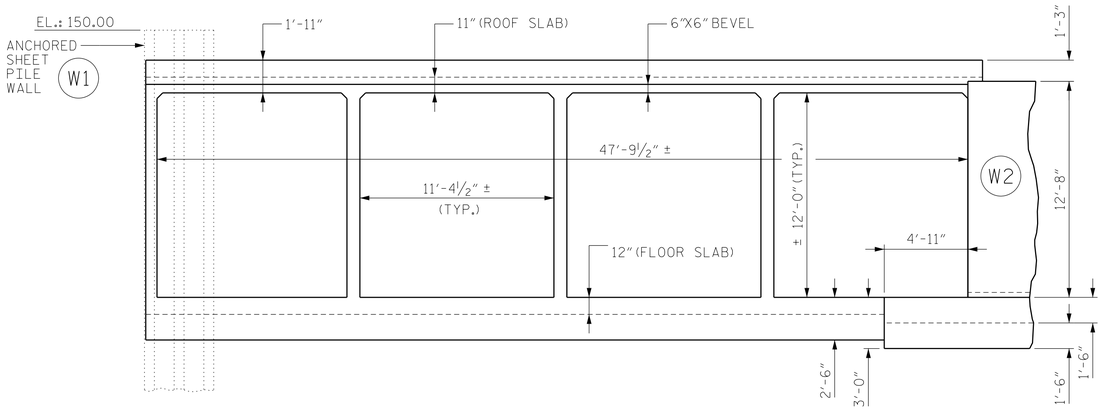
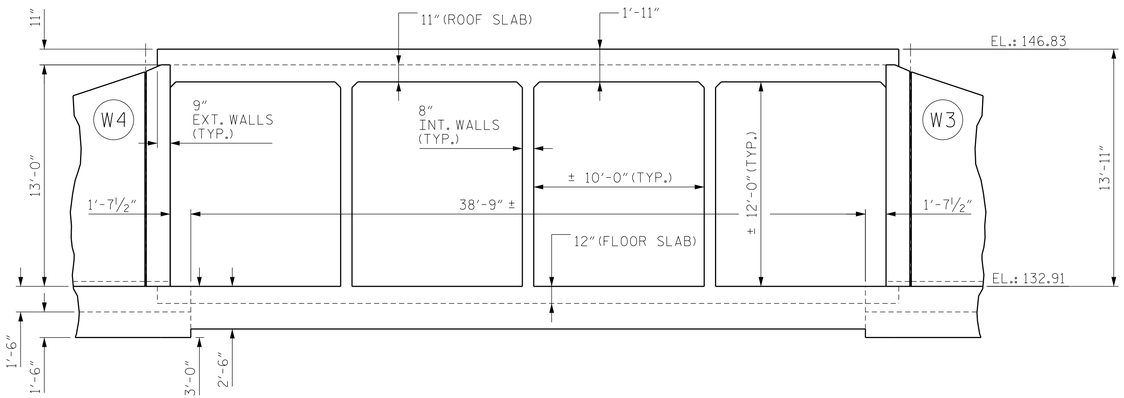
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5
1			3			TOTAL SHEETS
2			4			18



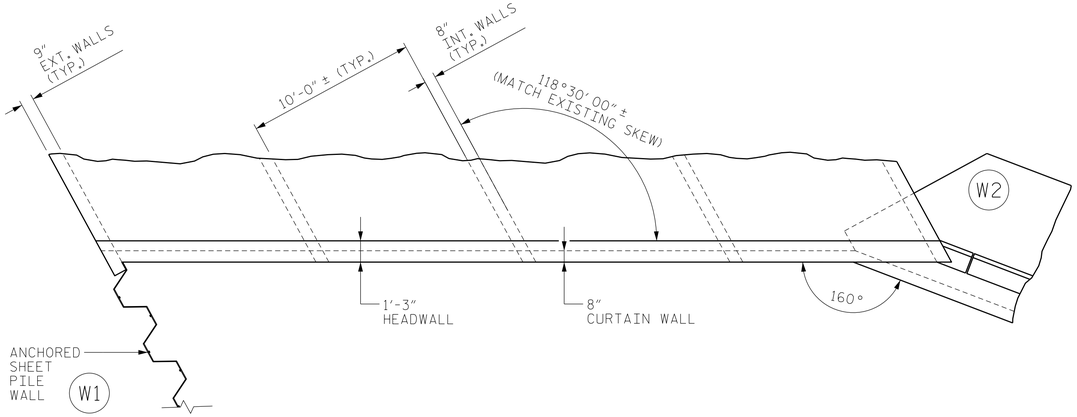
END INLET ELEVATION NORMAL TO SKEW

(LOOKING DOWNSTREAM)

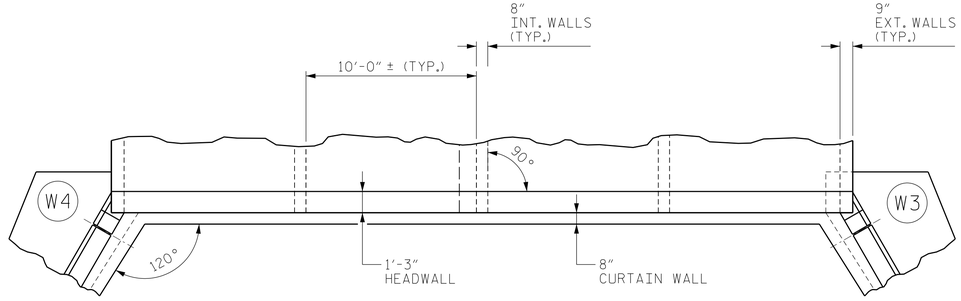


END OUTLET ELEVATION

(LOOKING UPSTREAM)



END INLET PLAN



END OUTLET PLAN

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 6 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION - PHASE I

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

END ELEVATION AND PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043777 JACOB H DUKE
11/1/2024

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-6
1			3			TOTAL SHEETS
2			4			18

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RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

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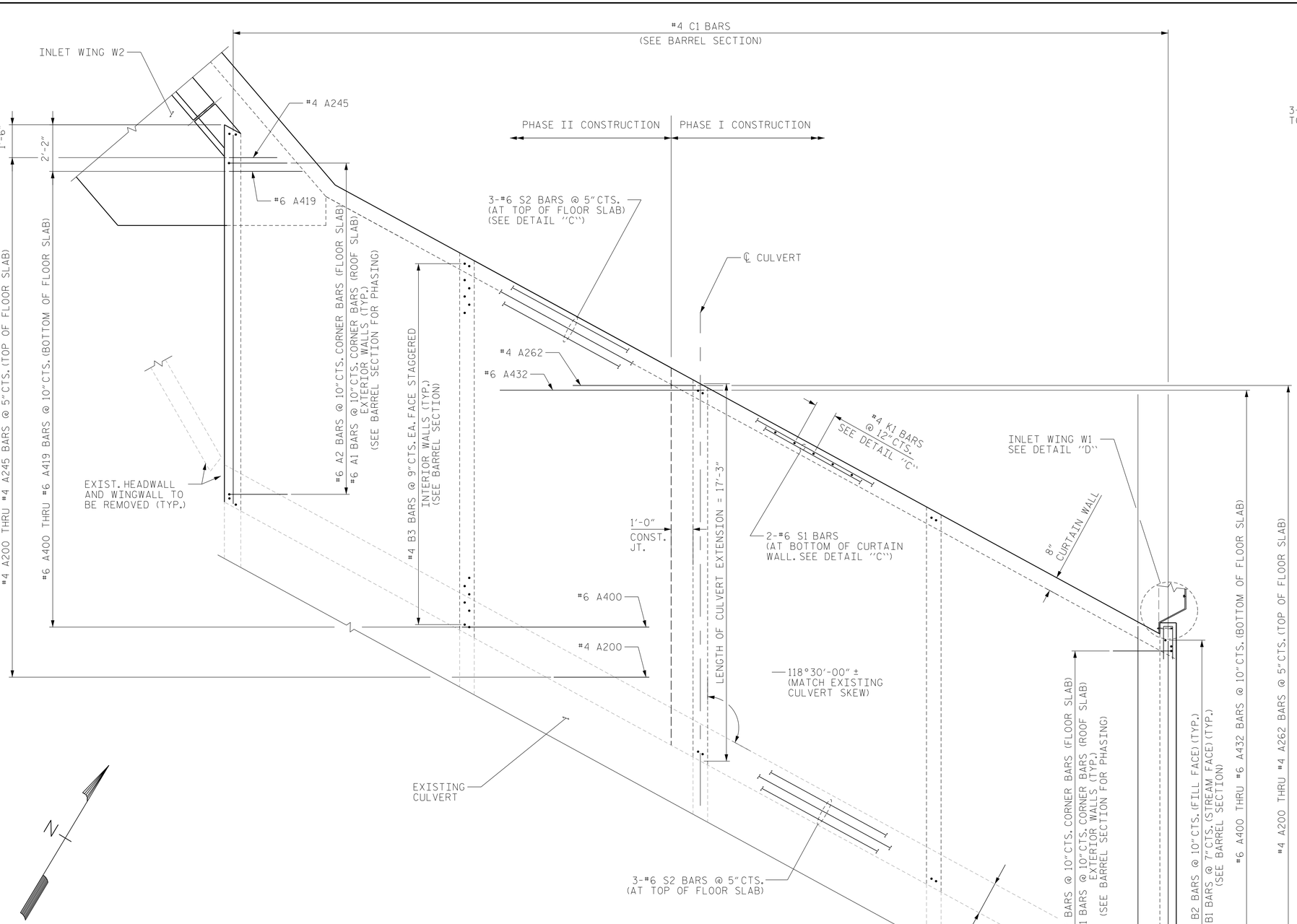
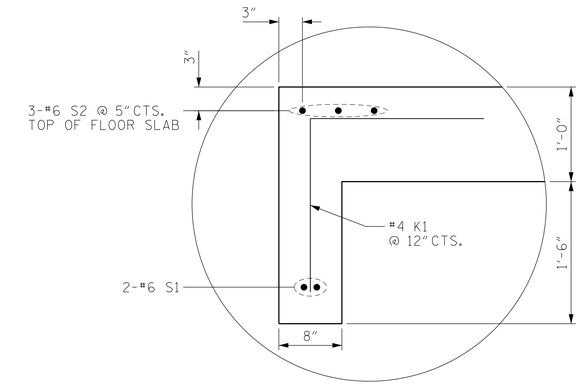
10/31/2024
"_SMU_ CU06_C1-6_C255.dgn
jduke



PLAN OF FLOOR SLAB

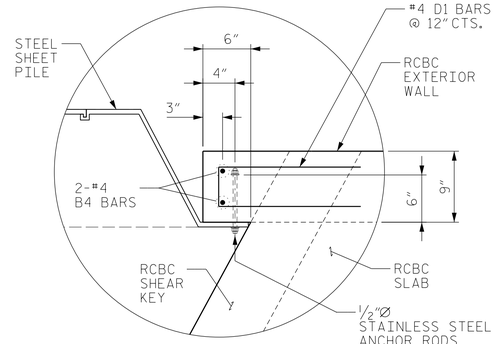
INLET - PHASE I AND PHASE II

REMOVE EXISTING CONCRETE (1'-6") AND SPLICE NEW WITH EXISTING REINFORCING STEEL IN SLABS AND WALLS, EXISTING LONGITUDINAL REINFORCING TO REMAIN. THE MINIMUM SPLICE LENGTH FOR LONGITUDINAL REINFORCING STEEL SHALL BE 1'-3".



DETAIL "C"

END CURTAIN WALL REINFORCEMENT



DETAIL "D"

SEE INLET WING W1 SHEET FOR ANCHORED SHEET PILE WALL DETAILS

NOTES:

SPLICE S1 AND S2 BARS STARTING AT 1'-0" BEYOND CONSTRUCTION JOINT. SEE SPLICE LENGTH TABLE IN TITLE SHEET.

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 7 OF 18

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
CHECKED BY : JACOB H. DUKE DATE : 5-22-18
DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043777 JACOB H DUKE 11/1/2024

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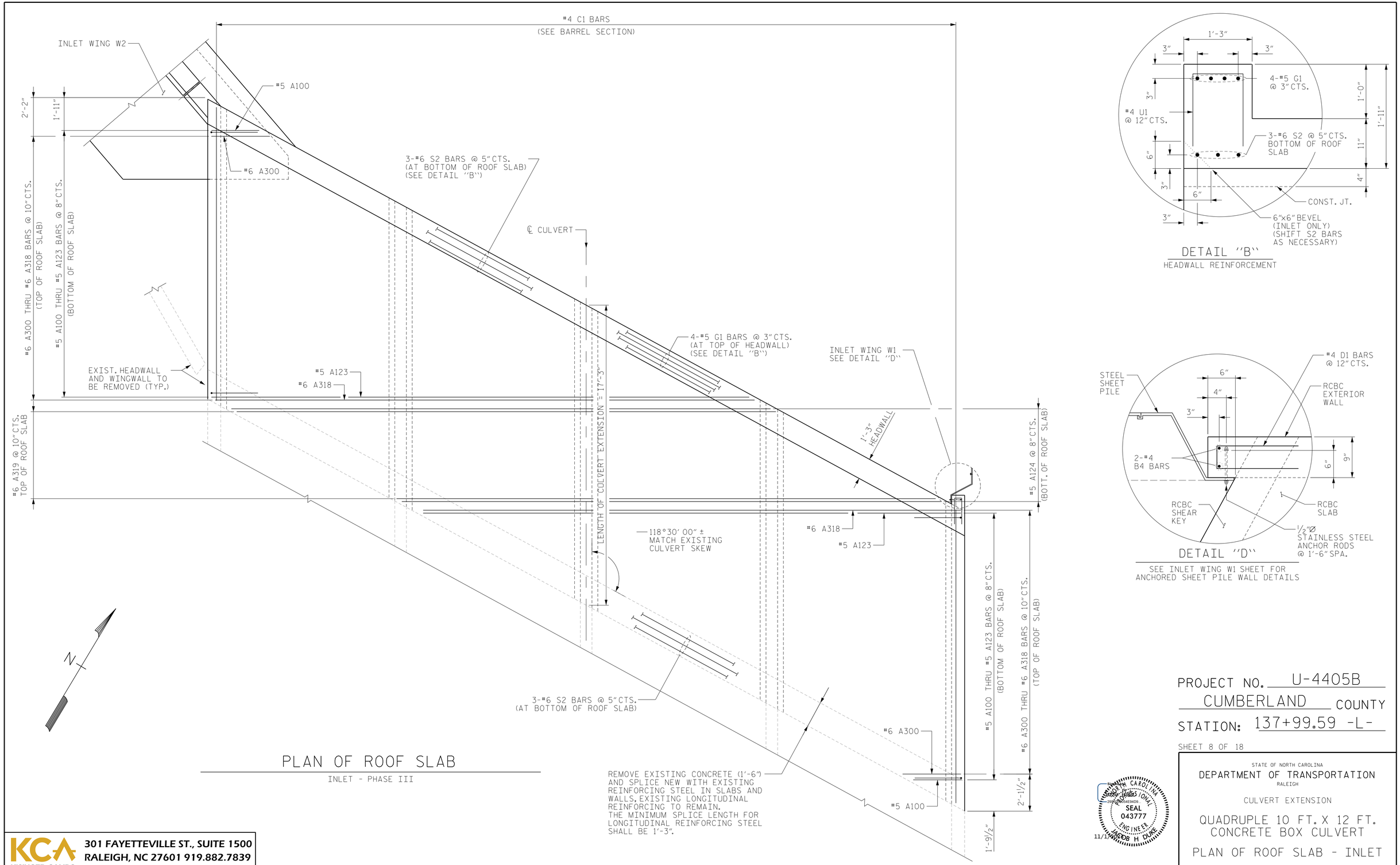
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT.
CONCRETE BOX CULVERT

PLAN OF FLOOR SLAB - INLET

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-7
1			3			TOTAL SHEETS
2			4			18



PLAN OF ROOF SLAB

INLET - PHASE III

DETAIL "B"

HEADWALL REINFORCEMENT

DETAIL "D"

SEE INLET WING W1 SHEET FOR
ANCHORED SHEET PILE WALL DETAILS

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 8 OF 18

KCA KISINGER CAMPO & ASSOCIATES
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RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043777 JACOB H DUKE
11/1/2024

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DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT.
CONCRETE BOX CULVERT

PLAN OF ROOF SLAB - INLET

REVISIONS						SHEET NO.
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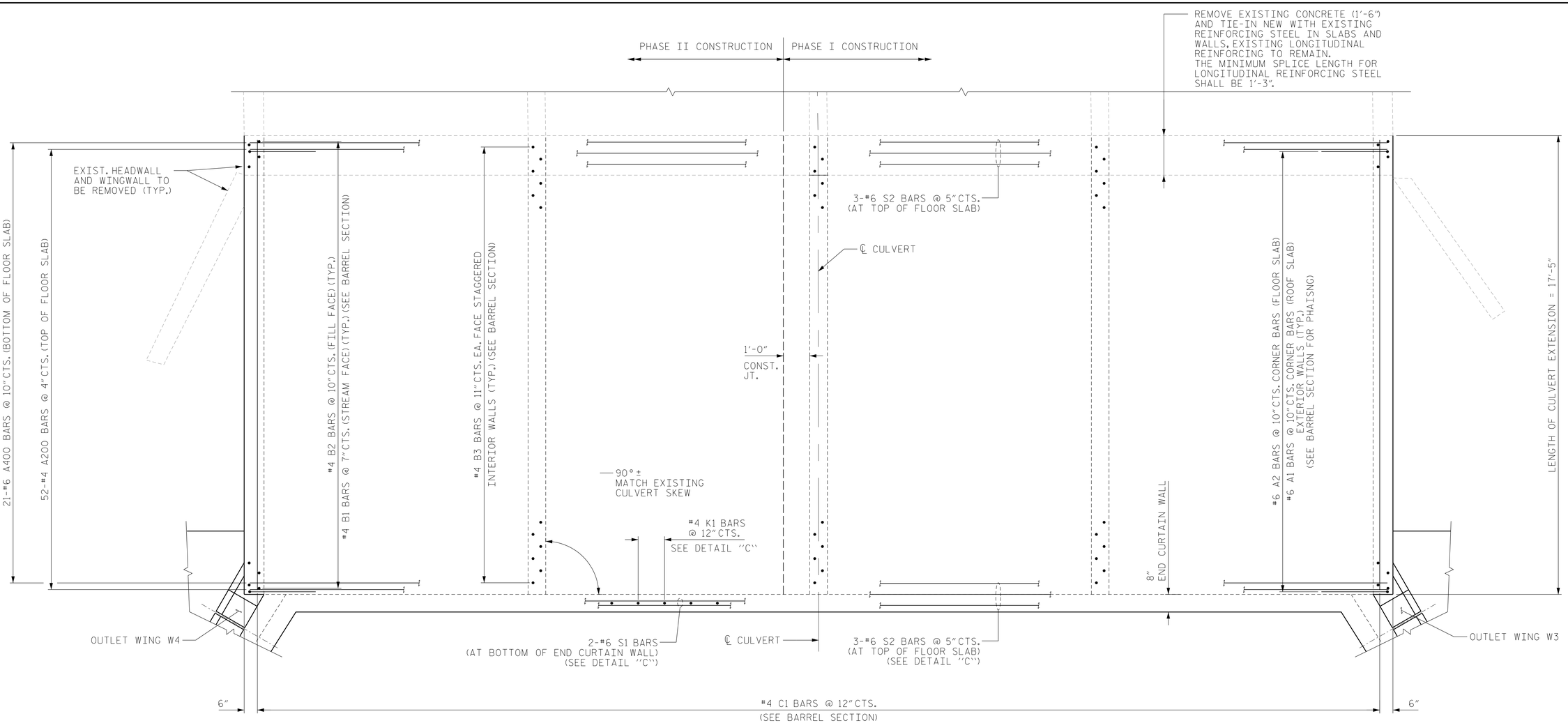
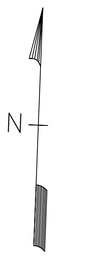
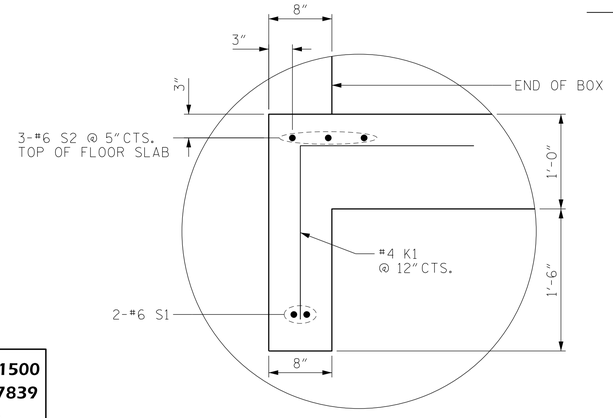
1			3			TOTAL SHEETS
2			4			18



PLAN OF FLOOR SLAB

OUTLET - PHASE I AND PHASE II





DETAIL "C"

END CURTAIN WALL REINFORCEMENT

NOTES:

SPLICE S1 AND S2 BARS STARTING AT 1'-0" BEYOND PERMITTED CONSTRUCTION JOINT. SEE SPLICE LENGTH TABLE IN TITLE SHEET.

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 9 OF 18

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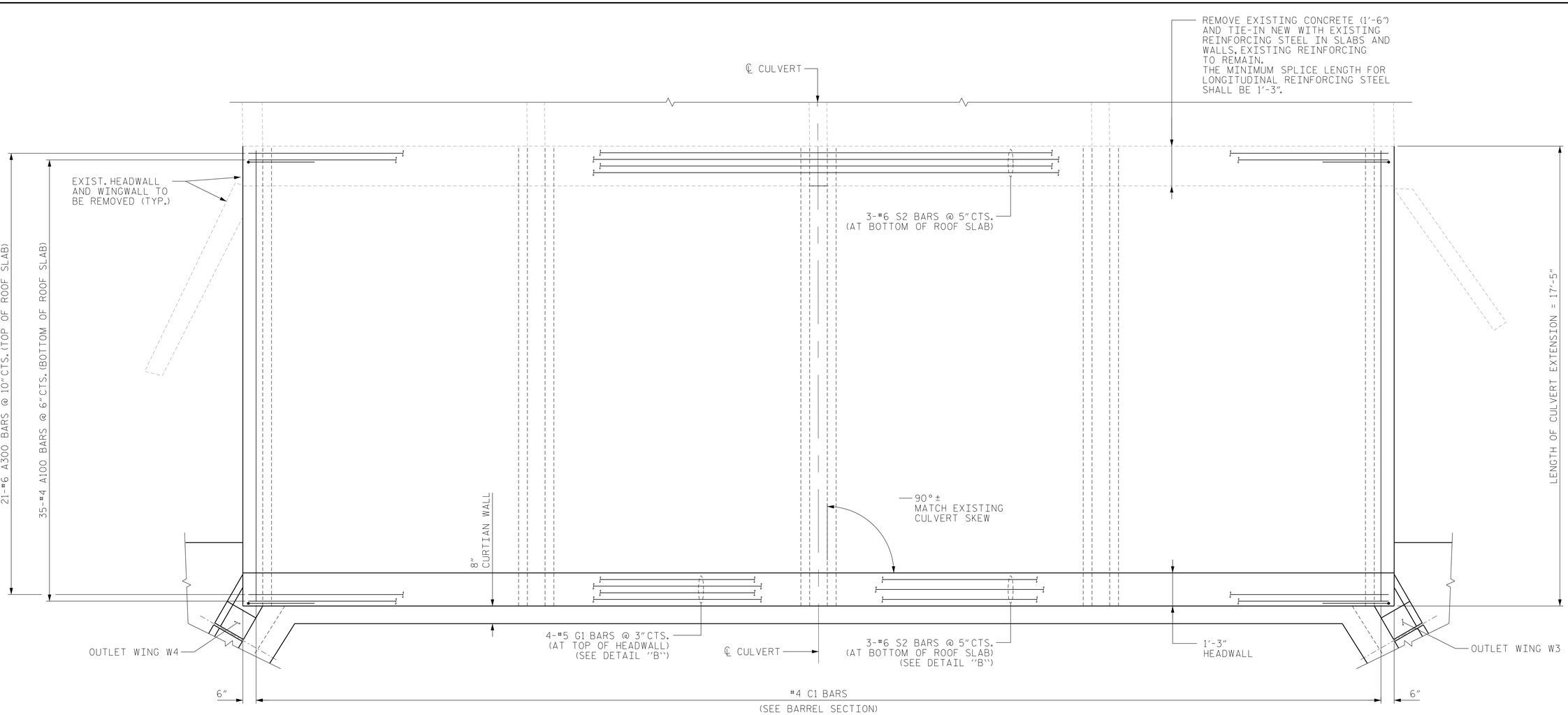
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

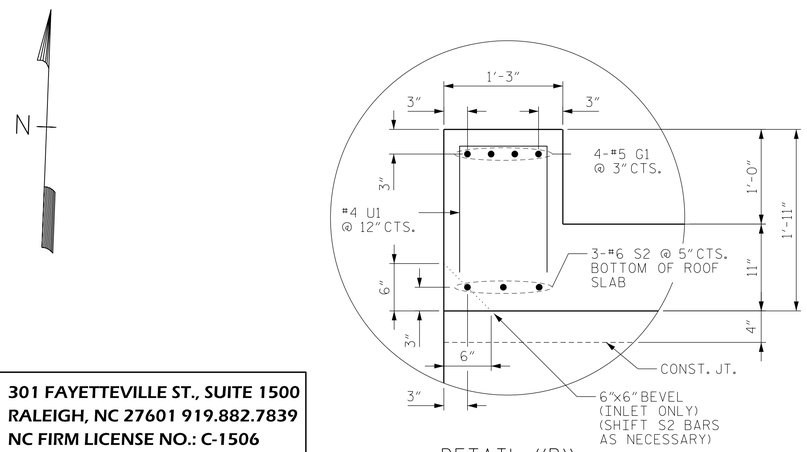
PLAN OF FLOOR SLAB - OUTLET

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-9
1			3			TOTAL SHEETS
2			4			18



PLAN OF ROOF SLAB

OUTLET - PHASE III



DETAIL "B"

HEADWALL REINFORCEMENT

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY :	DIEGO A. AGUIRRE	DATE :	5-18-18
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PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 10 OF 18

NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE 11/7/2024

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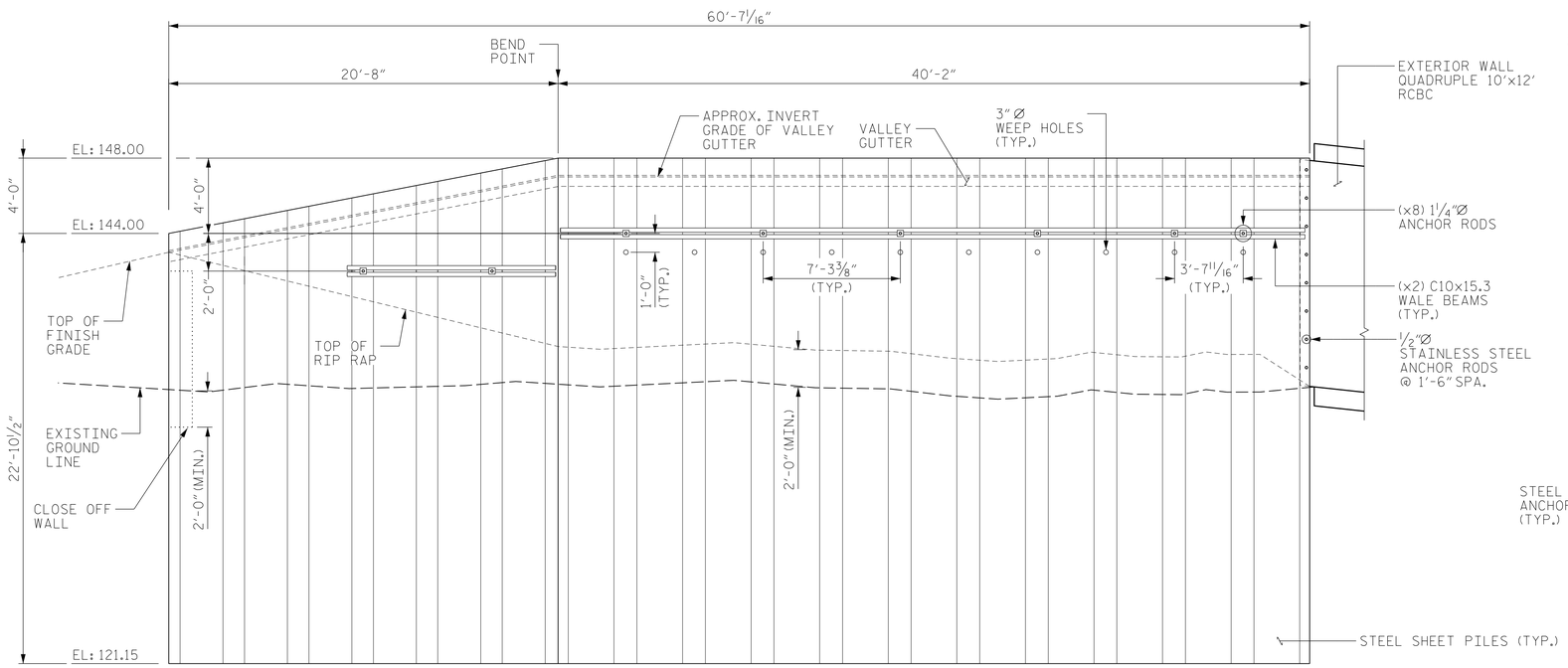
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

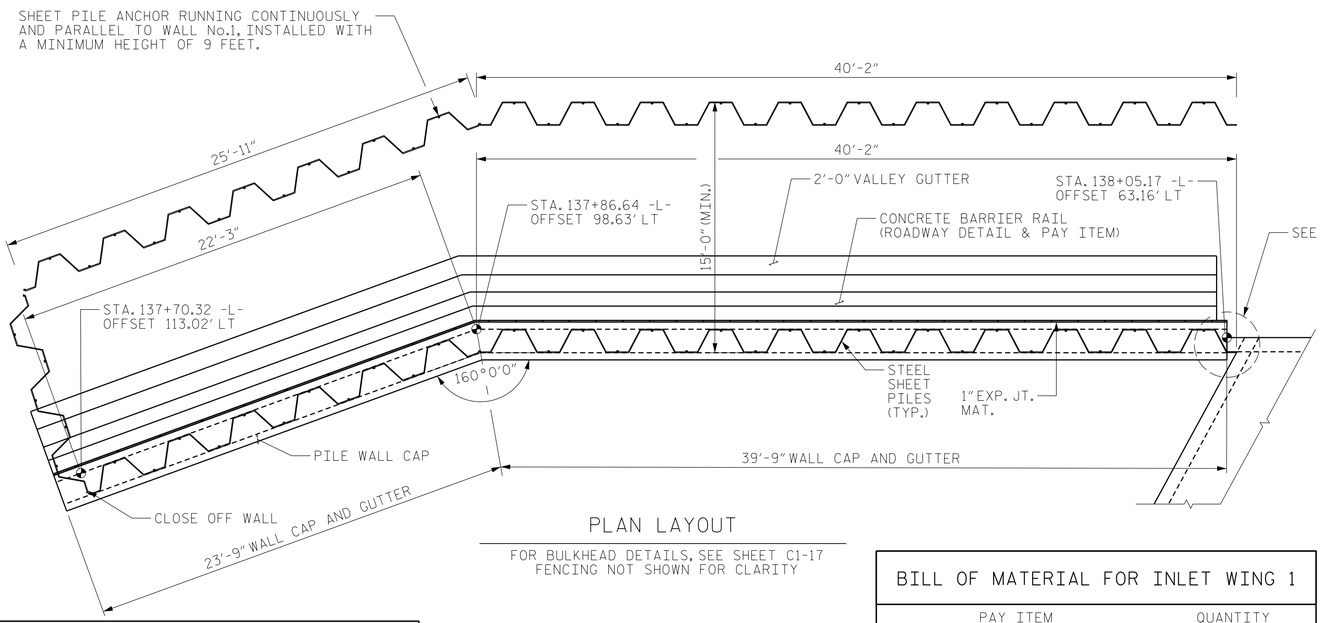
PLAN OF ROOF SLAB - OUTLET

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-10
1			3			TOTAL SHEETS
2			4			18



ELEVATION

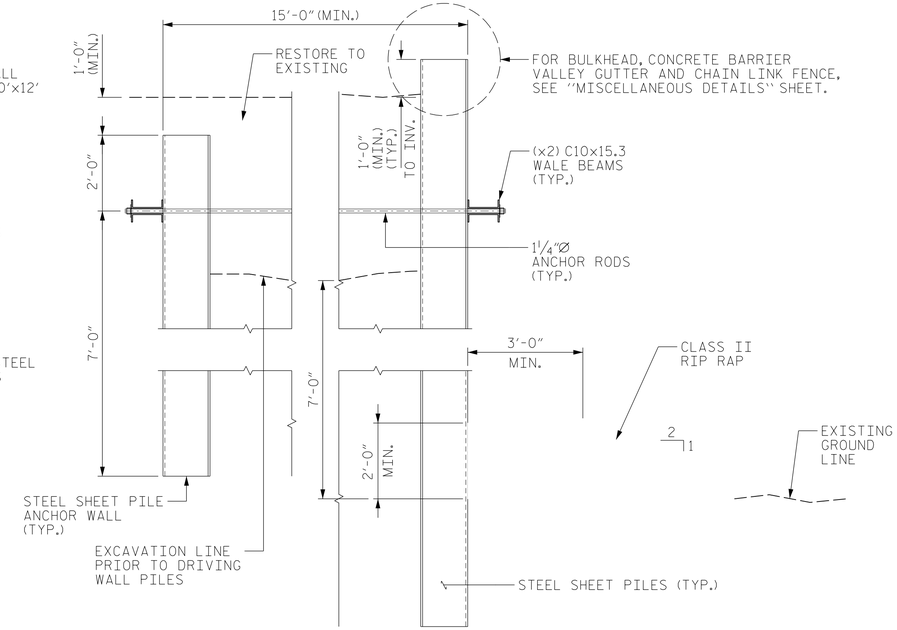
BULKHEAD, CONCRETE BARRIER AND SHEET PILE ANCHOR WALL NOT SHOWN FOR CLARITY



PLAN LAYOUT

FOR BULKHEAD DETAILS, SEE SHEET C1-17
FENCING NOT SHOWN FOR CLARITY

BILL OF MATERIAL FOR INLET WING 1	
PAY ITEM	QUANTITY
ANCHORED SHEET PILE WALL	2,363 SQ. FT.
CONCRETE VALLEY GUTTER	64.0 LIN. FT.

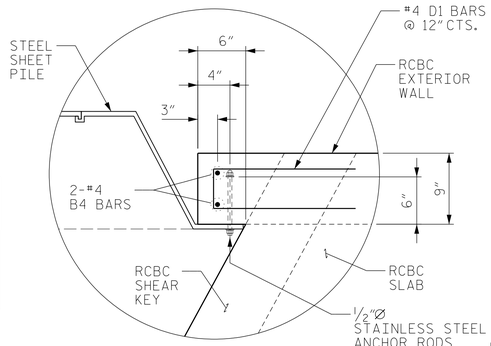


WALL No. 1 - TYPICAL SECTION

SHEET PILE ANCHORED WALL

ANCHORED SHEET PILE WALL NOTES:

1. FOR ANCHORED SHEET PILE WALL, SEE SPECIAL PROVISIONS.
2. FOR STEEL SHEET PILES, SEE SECTION 1084-2 OF THE STANDARD SPECIFICATIONS.
3. STEEL SHEET PILES SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.
4. SHEETING SHALL BE CONTINUOUS ALONG THE LENGTH OF THE WALL. INSTALL SHEET PILING TO THE MINIMUM DEPTH SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.
5. FURNISH 1 1/4"Ø HOT DIP GALVANIZED STEEL THREADED RODS IN ACCORDANCE WITH ASTM F1554 GRADE 55. ANCHOR RODS AT WALL No. 1 SHALL BE CONNECTED TO THE SHEET PILE ANCHOR AS SHOWN IN TYPICAL SECTION. A MINIMUM TIE-BACK LOAD OF 6 KIPS IS REQUIRED FOR EACH ANCHOR ROD (LOCK-OFF LOAD). ANCHOR RODS MAY BE SLIGHTLY SHIFTED AS NECESSARY TO MAINTAIN A 12" COVER FROM THE FINISHED GRADE.
6. FURNISH 1/2"Ø STAINLESS STEEL ANCHOR RODS IN ACCORDANCE ASTM A193 GRADE B8M. FURNISH STAINLESS STEEL NUTS IN ACCORDANCE WITH ASTM F594 TYPE 316. FURNISH STAINLESS STEEL WASHERS UNDER HEADS AND NUTS, COMPATIBLE WITH BOLTS, THREADED RODS, AND NUTS. KEEP THREADS ON BOLTS, THREADED RODS, AND NUTS FREE FROM DIRT, COARSE GRIME AND SAND TO PREVENT GALLING AND SEIZING DURING TIGHTENING.
7. SHEET PILE ANCHOR SHALL BE INSTALLED AT LEAST 15 FEET AWAY FROM WALL No. 1, RUNNING CONTINUOUSLY AND PARALLEL ALONG THE ENTIRE LENGTH OF THE WALL. THE SHEET PILE ANCHOR SHALL BE INSTALLED WITH A MINIMUM HEIGHT OF 9 FEET.
8. ANCHORED SHEET PILE WALL No. 1 WAS DESIGNED USING A MAXIMUM FILL HEIGHT OF 15 FEET AND A LIVE LOAD SURCHARGE OF 240 PSF. ACCORDINGLY, STEEL SHEET PILES SHALL HAVE MINIMUM MOMENT OF INERTIA I = 360 IN⁴/FT AND A MINIMUM SECTION MODULUS S = 48.5 IN³/FT. THE MAXIMUM FILL, OR EXCAVATION HEIGHT, PRIOR TO ANCHOR ROD INSTALLATION IS 7 FEET.
9. FURNISH GALVANIZED C-SHAPE WALE BEAMS IN ACCORDANCE WITH ASTM A36. WALE BEAMS SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.
10. FOR VALLEY GUTTER, SEE SECTION 846 OF THE STANDARD SPECIFICATIONS.



DETAIL "D"

PROJECT NO. U-4405B
CUMBERLAND COUNTY
STATION: 137+99.59 -L-

SHEET 11 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

INLET WING W1
ANCHORED SHEET PILE WALL

NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE
11/1/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-11
1			3			TOTAL SHEETS
2			4			18

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
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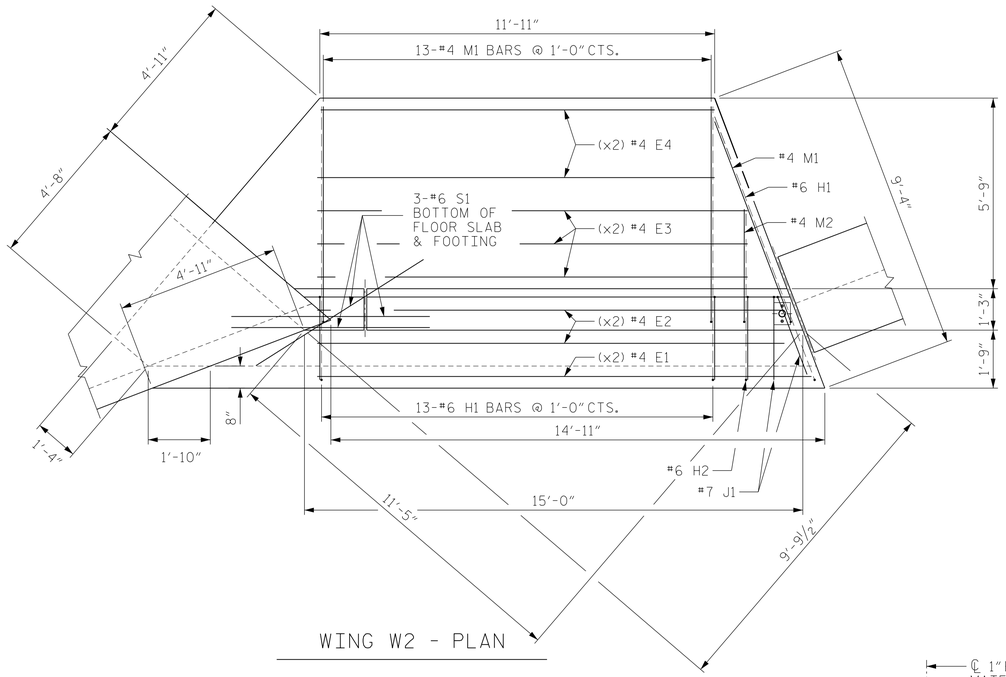
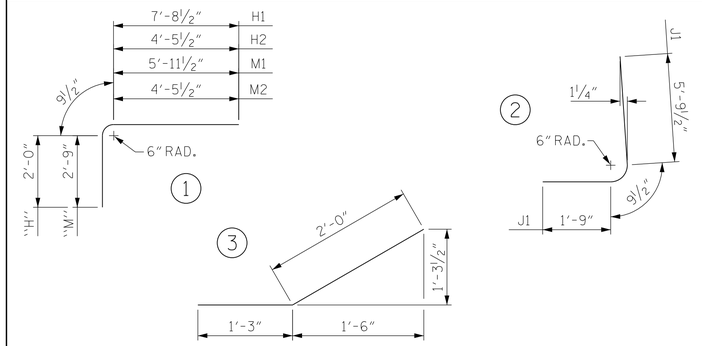


WING W2 - PLAN



BAR TYPES

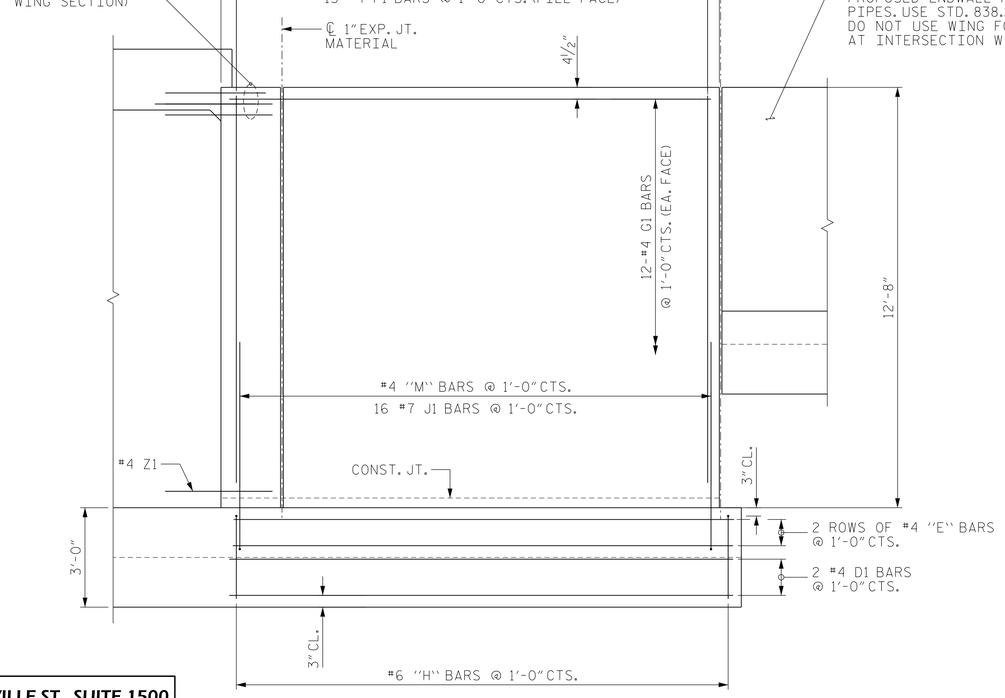
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIALS

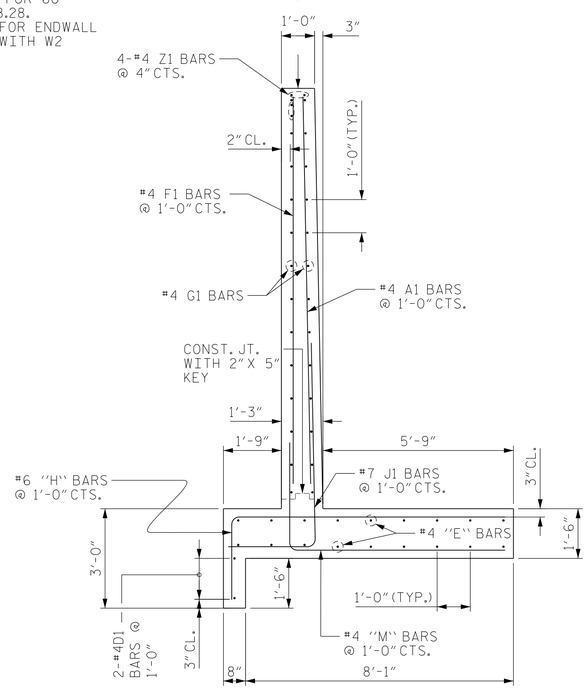
WING W2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	15	#4	STR	11'-9"	118
D1	2	#4	STR	15'-3"	21
E1	2	#4	STR	14'-11"	20
E2	4	#4	STR	14'-0"	38
E3	6	#4	STR	13'-0"	53
E4	4	#4	STR	11'-10"	32
F1	15	#4	STR	11'-9"	118
G1	24	#4	STR	13'-9"	221
H1	14	#6	1	10'-6"	221
H2	13	#6	1	7'-3"	142
J1	16	#7	2	8'-4"	272
M1	14	#4	1	9'-6"	89
M2	1	#4	1	8'-0"	6
S1	3	#6	STR	6'-0"	28
Z1	5	#4	3	3'-3"	11

REINFORCING STEEL	1,390 LBS
CLASS A CONCRETE	16.9 CY



WING W2 - ELEVATION



WING W2 - TYPICAL SECTION

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 12 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT.
CONCRETE BOX CULVERT

INLET WING W2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-12
1			3			TOTAL SHEETS
2			4			18

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RALEIGH, NC 27601 919.882.7839
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10/31/2024
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NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H. DUKE
11/1/2024

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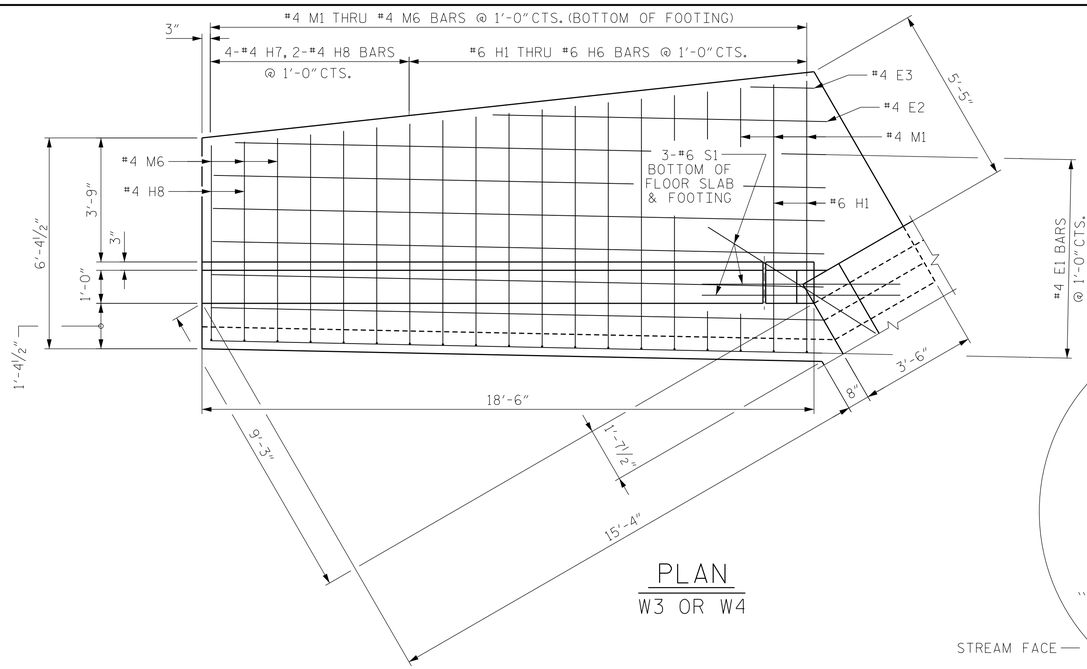
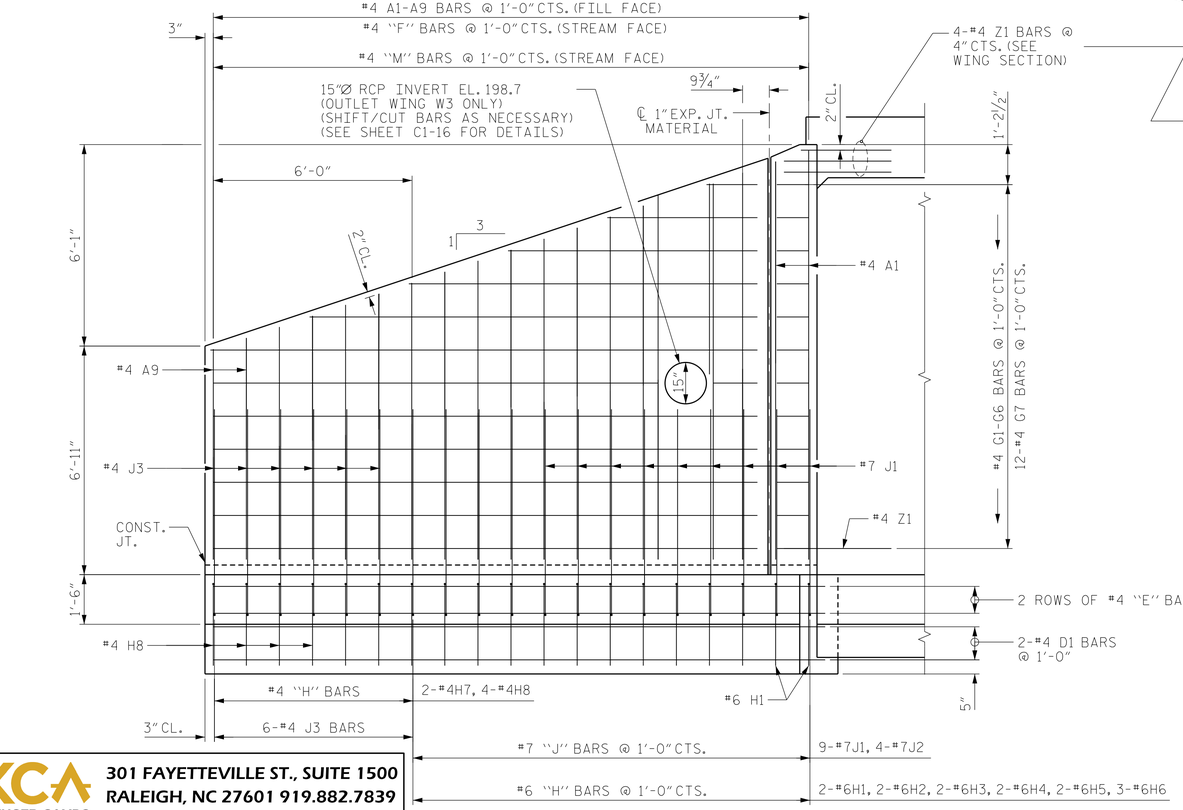
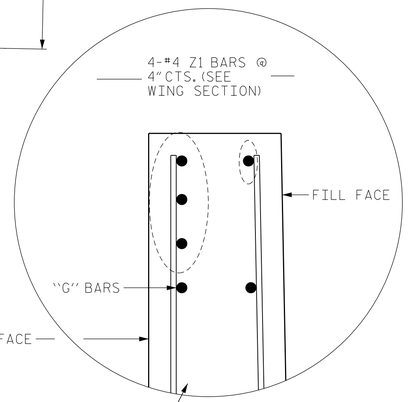
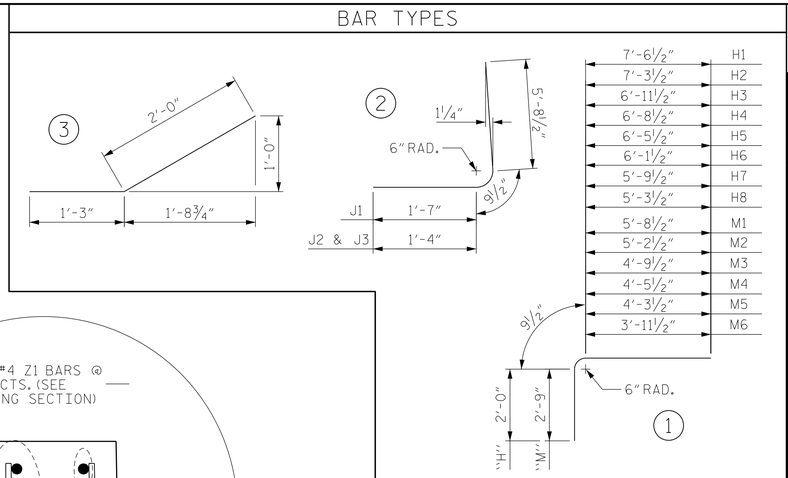


PLAN
W3 OR W4



ELEVATION
W3 OR W4



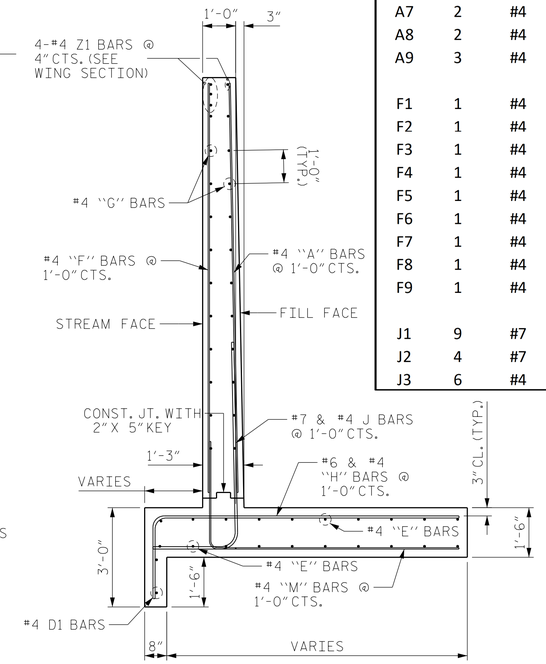


ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIALS

FOR ONE WING (W3 OR W4)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	2	#4	STR	12'-0"	17
A2	2	#4	STR	11'-4"	16
A3	2	#4	STR	10'-8"	15
A4	2	#4	STR	10'-0"	14
A5	2	#4	STR	9'-4"	13
A6	2	#4	STR	8'-8"	12
A7	2	#4	STR	8'-0"	11
A8	2	#4	STR	7'-4"	10
A9	3	#4	STR	6'-4"	13
F1	1	#4	STR	12'-0"	9
F2	1	#4	STR	11'-4"	8
F3	1	#4	STR	10'-8"	8
F4	1	#4	STR	10'-0"	7
F5	1	#4	STR	9'-4"	7
F6	1	#4	STR	8'-8"	6
F7	1	#4	STR	8'-0"	6
F8	1	#4	STR	7'-4"	5
F9	1	#4	STR	6'-4"	5
				1	
J1	9	#7	2	8'-1"	149
J2	4	#7	2	7'-10"	65
J3	6	#4	2	7'-10"	32



TYPICAL WING SECTION
W3 OR W4

NOTE: THE 15"Ø PIPE THROUGH THE SIDEWALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STELL SHALL BE FIELD BENT AS NECESSARY TO CLEAR THE PIPE, SEE SHEET C1-16 FOR DETAILS.

BILL OF MATERIALS (CONT.)

FOR ONE WING (W3 OR W4)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
M1	3	#4	1	9'-3"	19
M2	4	#4	1	8'-9"	24
M3	4	#4	1	8'-4"	23
M4	3	#4	1	8'-0"	17
M5	2	#4	1	7'-10"	11
M6	3	#4	1	7'-6"	16
H1	2	#6	1	10'-4"	32
H2	2	#6	1	10'-1"	31
H3	2	#6	1	9'-9"	30
H4	2	#6	1	9'-6"	29
H5	2	#6	1	9'-3"	28
H6	3	#6	1	8'-11"	41
H7	2	#4	1	8'-7"	12
H8	4	#4	1	8'-1"	22
D1	2	#4	STR	16'-8"	23
E1	7	#4	STR	18'-6"	87
E2	1	#4	STR	10'-1"	7
E3	1	#4	STR	1'-11"	2
G1	1	#4	STR	1'-6"	2
G2	1	#4	STR	4'-6"	4
G3	1	#4	STR	7'-6"	6
G4	1	#4	STR	10'-6"	8
G5	1	#4	STR	13'-6"	10
G6	7	#4	STR	16'-6"	78
G7	12	#4	STR	0'-11"	8
S1	3	#6	STR	6'-0"	28
Z1	5	#4	3	3'-3"	11
P1 (P1- W3 ONLY)	16	#5	STR	3'-8"	62

REINFORCING STEEL	
WING W3	1,099 LBS
WING W4	1,037 LBS
FOR BOTH WINGS (W3 & W4)	2,136 LBS

CLASS A CONCRETE	
FOR ONE WING (W3 OR W4)	16.1 CY

PROJECT NO. U-4405B
CUMBERLAND COUNTY
STATION: 137+99.59 -L-
SHEET 13 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

WING W3 & W4

KCA KISINGER CAMPO & ASSOCIATES
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RALEIGH, NC 27601 919.882.7839
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DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
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NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE
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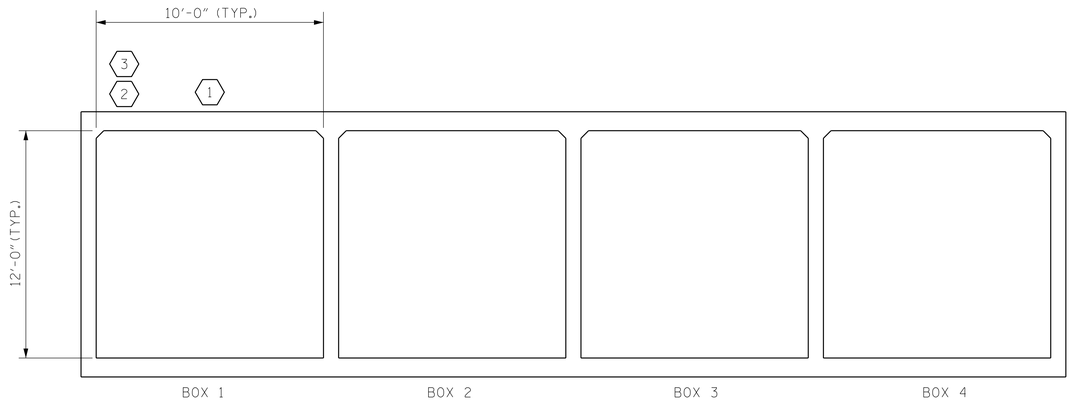
2			4			18

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.15	--	1.75	1.15	1	TOP SLAB	5.35	1.17	1	EXTERIOR WALL	1.04	
		HL-93 (OPERATING)	N/A		1.49	--	1.35	1.49	1	TOP SLAB	5.35	1.51	1	EXTERIOR WALL	1.04	
		HS-20 (INVENTORY)	36.000	2	1.17	42.12	1.75	1.29	1	TOP SLAB	5.35	1.17	1	EXTERIOR WALL	1.04	
		HS-20 (OPERATING)	36.000		1.51	54.36	1.35	1.68	1	TOP SLAB	5.35	1.51	1	EXTERIOR WALL	1.04	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.53	20.66	1.40	2.04	1	EXTERIOR WALL	6.48	1.53	1	EXTERIOR WALL	1.04	
		SNGARBS2	20.000		1.51	30.20	1.40	2.18	1	EXTERIOR WALL	6.48	1.51	1	EXTERIOR WALL	1.04	
		SNAGRIS2	22.000		1.51	33.22	1.40	2.35	1	TOP SLAB	5.35	1.51	1	EXTERIOR WALL	1.04	
		SNCOTTS3	27.250		1.50	40.88	1.40	2.38	1	EXTERIOR WALL	0.50	1.50	1	EXTERIOR WALL	1.04	
		SNAGGRS4	34.925		1.47	51.34	1.40	2.24	1	TOP SLAB	0.33	1.47	1	EXTERIOR WALL	1.04	
		SNS5A	35.550		1.48	52.61	1.40	2.24	1	EXTERIOR WALL	0.50	1.48	1	EXTERIOR WALL	1.04	
		SNS6A	39.950		1.48	59.13	1.40	2.22	1	EXTERIOR WALL	0.50	1.48	1	EXTERIOR WALL	1.04	
		SNS7B	42.000		1.49	62.58	1.40	2.23	1	EXTERIOR WALL	0.50	1.49	1	EXTERIOR WALL	1.04	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.47	48.51	1.40	2.28	1	EXTERIOR WALL	0.50	1.47	1	EXTERIOR WALL	1.04	
		TNT4A	33.075		1.49	49.28	1.40	2.27	1	EXTERIOR WALL	0.50	1.49	1	EXTERIOR WALL	1.04	
		TNT6A	41.600		1.49	61.98	1.40	2.24	1	EXTERIOR WALL	0.50	1.49	1	EXTERIOR WALL	1.04	
		TNT7A	42.000		1.50	63.00	1.40	2.29	1	EXTERIOR WALL	0.50	1.50	1	EXTERIOR WALL	1.04	
		TNT7B	42.000		1.50	63.00	1.40	2.29	1	EXTERIOR WALL	0.50	1.50	1	EXTERIOR WALL	1.04	
		TNAGRIT4	43.000	3	1.45	62.35	1.40	2.16	1	EXTERIOR WALL	0.50	1.45	1	EXTERIOR WALL	1.04	
		TNAGT5A	45.000		1.47	66.15	1.40	2.18	1	EXTERIOR WALL	0.50	1.47	1	EXTERIOR WALL	1.04	
		TNAGT5B	45.000		1.47	66.15	1.40	2.18	1	EXTERIOR WALL	0.50	1.47	1	EXTERIOR WALL	1.04	



LRFR SUMMARY

(LOOKING DOWNSTREAM)

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

1.

2.

3.

4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 14 OF 18

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18

CHECKED BY : JACOB H. DUKE DATE : 5-22-18

DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

10/31/2024
**_SMU_ CU15_C1-14_C255.dgn
jduke

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043777 JACOB H DUKE 11/1/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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:	C1-14
1			3			TOTAL SHEETS
2			4			18

STD. NO. LRFR5

-- BAR SCHEDULE PHASE 1 --

BILL OF MATERIALS
OUTLET
PHASE 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A200	52	#4	STR	25'-10"	898
A400	21	#6	STR	26'-8"	842
C1	123	#4	STR	17'-0"	1397
A1	21	#6	1	5'-8"	179
A2	21	#6	1	5'-4"	169
B1	30	#4	STR	12'-6"	251
B2	21	#4	STR	11'-0"	155
B3	76	#4	STR	13'-5"	682
S1	2	#6	STR	26'-8"	81
S2	6	#6	STR	26'-8"	241
K1	31	#4	1	3'-6"	73
REINFORCING STEEL			LBS.		4968

BILL OF MATERIALS
INLET
PHASE 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A200	1	#4	STR	2'-2"	2
A201	1	#4	STR	2'-11"	2
A202	1	#4	STR	3'-9"	3
A203	1	#4	STR	4'-6"	4
A204	1	#4	STR	5'-3"	4
A205	1	#4	STR	6'-0"	5
A206	1	#4	STR	6'-9"	5
A207	1	#4	STR	7'-6"	6
A208	1	#4	STR	8'-4"	6
A209	1	#4	STR	9'-1"	7
A210	1	#4	STR	9'-10"	7
A211	1	#4	STR	10'-7"	8
A212	1	#4	STR	11'-4"	8
A213	1	#4	STR	12'-2"	9
A214	1	#4	STR	12'-11"	9
A215	1	#4	STR	13'-8"	10
A216	1	#4	STR	14'-5"	10
A217	1	#4	STR	15'-2"	11
A218	1	#4	STR	15'-11"	11
A219	1	#4	STR	16'-9"	12
A220	1	#4	STR	17'-6"	12
A221	1	#4	STR	18'-3"	13
A222	1	#4	STR	19'-0"	13
A223	1	#4	STR	19'-9"	14
A224	1	#4	STR	20'-7"	14
A225	1	#4	STR	21'-4"	15
A226	1	#4	STR	22'-1"	15
A227	1	#4	STR	22'-10"	16
A228	1	#4	STR	23'-7"	16
A229	1	#4	STR	24'-5"	17
A230	1	#4	STR	25'-2"	17
A231	1	#4	STR	25'-11"	18
A232	1	#4	STR	26'-8"	18
A233	5	#4	STR	25'-10"	87
A234	1	#4	STR	25'-6"	18
A235	1	#4	STR	24'-9"	17

BILL OF MATERIALS
INLET (CONT.)
PHASE 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A236	1	#4	STR	23'-11"	16
A237	1	#4	STR	23'-3"	16
A238	1	#4	STR	22'-5"	15
A239	1	#4	STR	21'-8"	15
A240	1	#4	STR	20'-11"	14
A241	1	#4	STR	20'-2"	14
A242	1	#4	STR	19'-4"	13
A243	1	#4	STR	18'-7"	13
A244	1	#4	STR	17'-10"	12
A245	1	#4	STR	17'-0"	12
A246	1	#4	STR	16'-3"	11
A247	1	#4	STR	15'-7"	11
A248	1	#4	STR	14'-9"	10
A249	1	#4	STR	14'-0"	10
A250	1	#4	STR	13'-3"	9
A251	1	#4	STR	12'-6"	9
A252	1	#4	STR	11'-8"	8
A253	1	#4	STR	10'-11"	8
A254	1	#4	STR	10'-2"	7
A255	1	#4	STR	9'-5"	7
A256	1	#4	STR	8'-8"	6
A257	1	#4	STR	7'-11"	6
A258	1	#4	STR	7'-0"	5
A259	1	#4	STR	6'-4"	5
A260	1	#4	STR	5'-7"	4
A261	1	#4	STR	4'-10"	4
A262	1	#4	STR	4'-0"	3
A400	1	#6	STR	3'-4"	6
A401	1	#6	STR	4'-10"	8
A402	1	#6	STR	6'-5"	10
A403	1	#6	STR	7'-11"	12
A404	1	#6	STR	9'-5"	15
A405	1	#6	STR	11'-0"	17
A406	1	#6	STR	12'-6"	19
A407	1	#6	STR	14'-0"	22
A408	1	#6	STR	15'-7"	24
A409	1	#6	STR	17'-1"	26
A410	1	#6	STR	18'-8"	29
A411	1	#6	STR	20'-2"	31
A412	1	#6	STR	21'-8"	33
A413	1	#6	STR	23'-3"	35
A414	1	#6	STR	24'-9"	38
A415	1	#6	STR	26'-3"	40
A416	1	#6	STR	27'-10"	42
A417	1	#6	STR	29'-4"	45
A418	1	#6	STR	30'-8"	47
A419	1	#6	STR	25'-2"	38
A420	1	#6	STR	23'-8"	36
A421	1	#6	STR	22'-1"	34
A422	1	#6	STR	20'-7"	31
A423	1	#6	STR	19'-0"	29
A424	1	#6	STR	17'-6"	27
A425	1	#6	STR	16'-0"	25
A426	1	#6	STR	14'-5"	22
A427	1	#6	STR	12'-11"	20
A428	1	#6	STR	11'-5"	18
A429	1	#6	STR	9'-10"	15
A430	1	#6	STR	8'-4"	13
A431	1	#6	STR	6'-10"	11
A432	1	#6	STR	5'-3"	8

-- BAR SCHEDULE PHASE 2 --

BILL OF MATERIALS
OUTLET
PHASE 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A200	52	#4	STR	19'-2"	666
A400	21	#6	STR	19'-2"	605
C1	92	#4	STR	17'-0"	1045
A1	21	#6	1	5'-8"	179
A2	21	#6	1	5'-4"	169
B1	30	#4	STR	12'-6"	251
B2	21	#4	STR	11'-0"	155
B3	38	#4	STR	13'-5"	341
S1	2	#6	STR	17'-9"	54
S2	6	#6	STR	19'-0"	172
K1	19	#4	1	3'-6"	45
REINFORCING STEEL			LBS.		3682

BILL OF MATERIALS
INLET
PHASE 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A200	1	#4	STR	4'-4"	3
A201	1	#4	STR	5'-1"	4
A202	1	#4	STR	5'-10"	4
A203	1	#4	STR	6'-7"	5
A204	1	#4	STR	7'-5"	5
A205	1	#4	STR	8'-2"	6
A206	1	#4	STR	8'-11"	6
A207	1	#4	STR	9'-8"	7
A208	1	#4	STR	10'-5"	7
A209	1	#4	STR	11'-3"	8
A210	1	#4	STR	12'-0"	9
A211	1	#4	STR	12'-9"	9
A212	1	#4	STR	13'-6"	10
A213	1	#4	STR	14'-3"	10
A214	1	#4	STR	15'-1"	11
A215	1	#4	STR	15'-10"	11

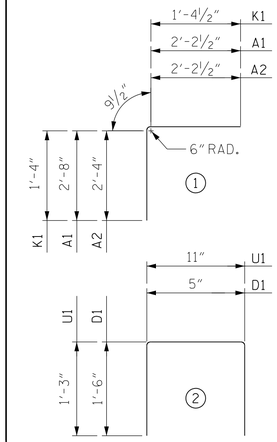
BILL OF MATERIALS
INLET (CONT.)
PHASE 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	2	#6	STR	30'-0"	91
S2	6	#6	STR	30'-0"	271
K1	30	#4	1	3'-8"	74
C1	123	#4	STR	16'-10"	1384
D1	12	#4	2	3'-5"	28
A1	21	#6	1	5'-8"	179
A2	21	#6	1	5'-4"	169
B1	30	#4	STR	12'-6"	251
B2	21	#4	STR	11'-8"	164
B3	92	#4	STR	13'-5"	825
B4	2	#4	STR	11'-3"	16
REINFORCING STEEL			LBS.		5000

BILL OF MATERIALS
INLET (CONT.)
PHASE 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A216	1	#4	STR	16'-7"	12
A217	1	#4	STR	17'-4"	12
A218	1	#4	STR	18'-1"	13
A219	1	#4	STR	18'-10"	13
A220	13	#4	STR	19'-2"	167
A221	1	#4	STR	20'-2"	14
A222	1	#4	STR	19'-9"	14
A223	1	#4	STR	19'-0"	13
A224	1	#4	STR	18'-3"	13
A225	1	#4	STR	17'-6"	12
A226	1	#4	STR	16'-8"	12
A227	1	#4	STR	15'-11"	11
A228	1	#4	STR	15'-2"	11
A229	1	#4	STR	14'-5"	10
A230	1	#4	STR	13'-8"	10
A231	1	#4	STR	12'-11"	9
A232	1	#4	STR	12'-1"	9
A233	1	#4	STR	11'-4"	8
A234	1	#4	STR	10'-7"	8
A235	1	#4	STR	9'-10"	7
A236	1	#4	STR	9'-1"	7
A237	1	#4	STR	8'-3"	6
A238	1	#4	STR	7'-6"	6
A239	1	#4	STR	6'-9"	5
A240	1	#4	STR	6'-0"	5
A241	1	#4	STR	5'-3"	4
A242	1	#4	STR	4'-6"	4
A243	1	#4	STR	3'-8"	3
A244	1	#4	STR	2'-11"	2
A245	1	#4	STR	2'-2"	2
A400	1	#6	STR	8'-6"	13
A401	1	#6	STR	10'-1"	16
A402	1	#6	STR	11'-7"	18
A403	1	#6	STR	13'-1"	20
A404	1	#6	STR	14'-8"	23
A405	1	#6	STR	16'-2"	25
A406	1	#6	STR	17'-9"	27
A407	7	#6	STR	19'-2"	202
A408	1	#6	STR	20'-2"	31
A409	1	#6	STR	18'-8"	29
A410	1	#6	STR	17'-1"	26
A411	1	#6	STR	15'-7"	24
A412	1	#6	STR	14'-0"	22
A413	1	#6	STR	12'-6"	19
A414	1	#6	STR	11'-0"	17
A415	1	#6	STR	9'-5"	15
A416	1	#6	STR	7'-11"	12
A417	1	#6	STR	6'-5"	10
A418	1	#6	STR	4'-10"	8
A419	1	#6	STR	3'-4"	6
S1	2	#6	STR	21'-9"	66
S2	6	#6	STR	21'-9"	197
K1	23	#4	1	3'-6"	54
C1	92	#4	STR	16'-10"	1035
A1	21	#6	1	5'-8"	179
A2	21	#6	1	5'-4"	169
B1	30	#4	STR	12'-6"	251
B2	21	#4	STR	11'-0"	155
B3	46	#4	STR	13'-5"	413
REINFORCING STEEL			LBS.		3619

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
CHECKED BY : JACOB H. DUKE DATE : 5-22-18
DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

10/31/2024
**_SMU_ CU15_C1-15_C255.dgn
jduke

PROJECT NO. U-4405B
CUMBERLAND COUNTY
STATION: 137+99.59 -L-

SHEET 15 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT.
CONCRETE BOX CULVERT

BILL OF MATERIALS

SEAL 043777 ENGINEER JACOB H DUKE 11/1/24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

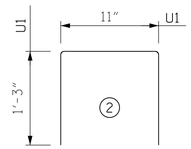
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-15
1			3			TOTAL SHEETS
2			4			18

-- BAR SCHEDULE PHASE 3 --

BILL OF MATERIALS
OUTLET
PHASE 3

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	35	#4	STR	43'-1"	1008
A300	21	#6	STR	43'-1"	1359
C1	95	#4	STR	17'-0"	1079
S2	6	#6	STR	43'-1"	389
G1	4	#5	STR	43'-1"	180
U1	44	#4	2	3'-5"	101
REINFORCING STEEL			LBS.		4116

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIALS
INLET
PHASE 3

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	2	#5	STR	2'-9"	6
A101	2	#5	STR	3'-11"	9
A102	2	#5	STR	5'-2"	11
A103	2	#5	STR	6'-5"	14
A104	2	#5	STR	7'-7"	16
A105	2	#5	STR	8'-10"	19
A106	2	#5	STR	10'-1"	22
A107	2	#5	STR	11'-3"	24
A108	2	#5	STR	12'-6"	27
A109	2	#5	STR	13'-9"	29
A110	2	#5	STR	14'-11"	32
A111	2	#5	STR	16'-2"	34
A112	2	#5	STR	17'-5"	37
A113	2	#5	STR	18'-8"	39
A114	2	#5	STR	19'-10"	42
A115	2	#5	STR	21'-1"	44
A116	2	#5	STR	22'-4"	47
A117	2	#5	STR	23'-6"	50
A118	2	#5	STR	24'-9"	52
A119	2	#5	STR	26'-0"	55
A120	2	#5	STR	27'-2"	57
A121	2	#5	STR	28'-5"	60
A122	2	#5	STR	29'-8"	62
A123	2	#5	STR	30'-10"	65
A124	9	#5	STR	30'-11"	291
A300	2	#6	STR	3'-4"	11
A301	2	#6	STR	4'-10"	15
A302	2	#6	STR	6'-5"	20
A303	2	#6	STR	7'-11"	24
A304	2	#6	STR	9'-5"	29
A305	2	#6	STR	11'-0"	34
A306	2	#6	STR	12'-6"	38
A307	2	#6	STR	14'-0"	43
A308	2	#6	STR	15'-7"	47
A309	2	#6	STR	17'-1"	52
A310	2	#6	STR	18'-8"	57
A311	2	#6	STR	20'-2"	61
A312	2	#6	STR	21'-8"	66
A313	2	#6	STR	23'-3"	70
A314	2	#6	STR	24'-9"	75
A315	2	#6	STR	26'-3"	79
A316	2	#6	STR	27'-10"	84
A317	2	#6	STR	29'-4"	89
A318	2	#6	STR	30'-8"	93
A319	7	#6	STR	30'-11"	326
S2	6	#6	STR	49'-0"	442
G1	4	#5	STR	49'-0"	205
U1	50	#4	2	3'-5"	115
C1	95	#4	STR	16'-10"	1069
REINFORCING STEEL			LBS.		4288

SUMMARY OF QUANTITIES

CULVERT EXTENSION QUANTITIES - PHASE I

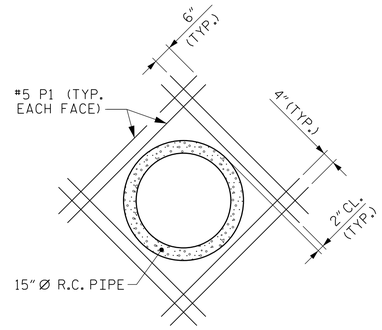
CLASS A CONCRETE		
INLET BARREL	31.2	C.Y.
OUTLET BARREL	31.9	C.Y.
WING W3	16.1	C.Y.
TOTAL	79.2	C.Y.
REINFORCING STEEL		
INLET BARREL	5,000	LBS.
OUTLET BARREL	4,968	LBS.
WING W3	1,099	LBS.
TOTAL	11,067	LBS.
FOUNDATION CONDITIONING MATERIAL		
INLET BARREL	31	TONS
OUTLET BARREL	31	TONS
TOTAL	62	TONS
CULVERT EXCAVATION	LUMP SUM	

CULVERT EXTENSION QUANTITIES - PHASE II

CLASS A CONCRETE		
INLET BARREL	24.3	C.Y.
OUTLET BARREL	25.0	C.Y.
WINGS W2 & W4	33.1	C.Y.
TOTAL	82.4	C.Y.
REINFORCING STEEL		
INLET BARREL	3,619	LBS.
OUTLET BARREL	3,682	LBS.
WINGS W2 & W4	2,427	LBS.
TOTAL	9,728	LBS.
FOUNDATION CONDITIONING MATERIAL		
INLET BARREL	27	TONS
OUTLET BARREL	28	TONS
TOTAL	55	TONS
CULVERT EXCAVATION	LUMP SUM	

CULVERT EXTENSION QUANTITIES - PHASE III

CLASS A CONCRETE		
INLET BARREL	26.5	C.Y.
OUTLET BARREL	26.8	C.Y.
HEADWALLS	4.3	C.Y.
TOTAL	57.6	C.Y.
REINFORCING STEEL		
INLET BARREL	4,288	LBS.
OUTLET BARREL	4,116	LBS.
TOTAL	8,404	LBS.



DETAIL OF REINFORCING AROUND 15" Ø PIPE

PIPE SIZE	#5 P1 LENGTH
15"	3'-8"

PROJECT NO. U-4405B
CUMBERLAND COUNTY
STATION: 137+99.59 -L-

SHEET 16 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

QUADRUPLE 10 FT. X 12 FT. CONCRETE BOX CULVERT

BILL OF MATERIALS

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
CHECKED BY : JACOB H. DUKE DATE : 5-22-18
DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

10/31/2024
"_SMU_ CU15_C1-16_C255.dgn
jduke

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043777 JACOB H DUKE
11/1/2024

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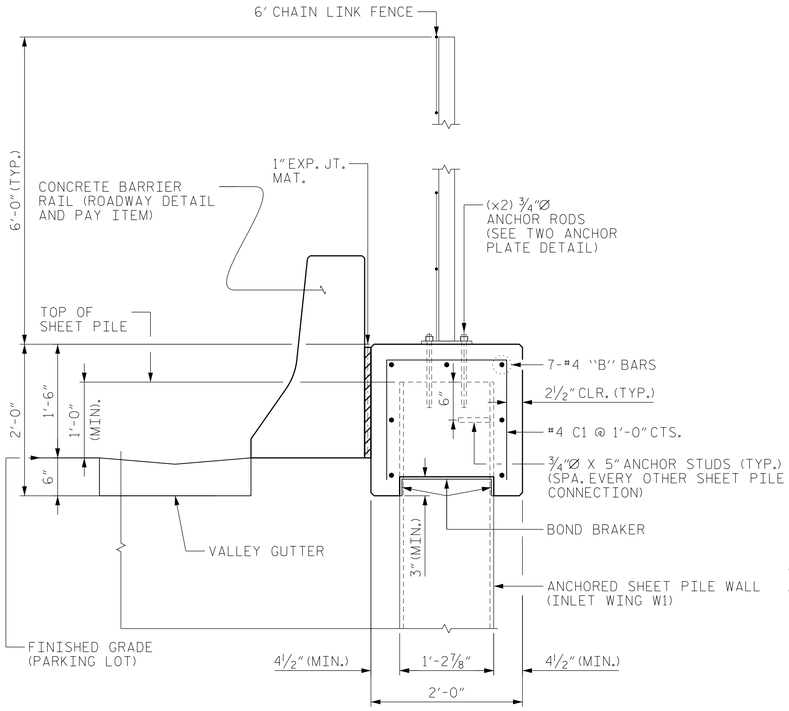
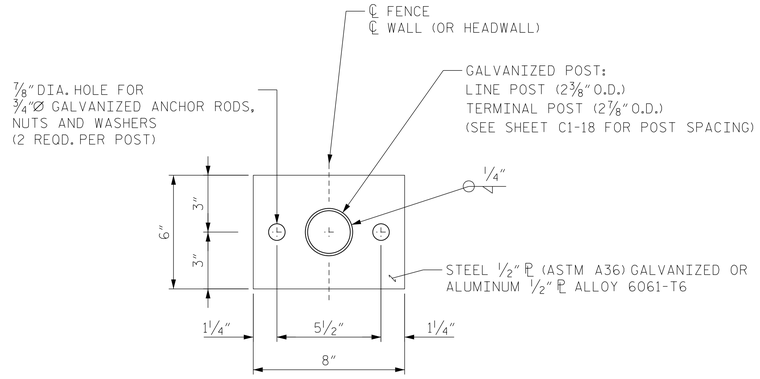
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. C1-16
TOTAL SHEETS 18

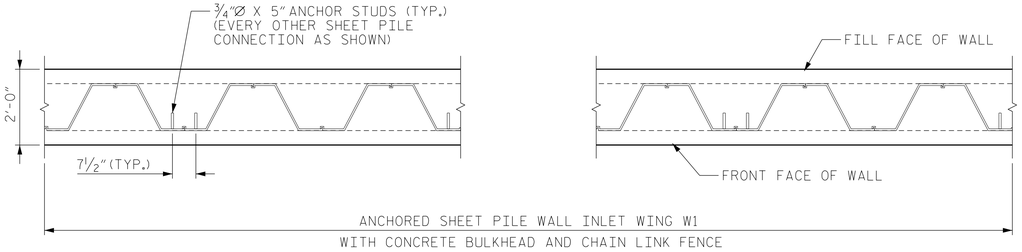


CONCRETE BULKHEAD AND CHAIN LINK FENCE DETAIL

TYPICAL SECTION



TOP VIEW - TWO ANCHOR PLATE DETAIL



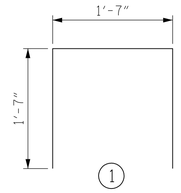
PARTIAL PLAN

ANCHOR RODS AND CHAIN LINK FENCE NOT SHOWN FOR CLARITY

BILL OF MATERIAL FOR CONCRETE BULKHEAD AT INLET WING W1

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
B1	7	#4	STR	23'-4"	110
B2	7	#4	STR	39'-6"	185
C1	63	#4	1	4'-9"	200
REINFORCING STEEL				LBS.	495
CLASS "A" CONCRETE				CU. YDS.	9.3

BAR TYPES

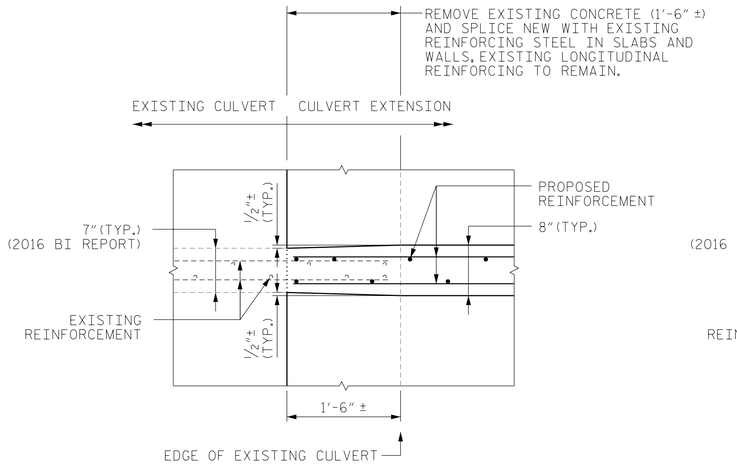


ALL BAR DIMENSIONS ARE OUT TO OUT

NOTES:

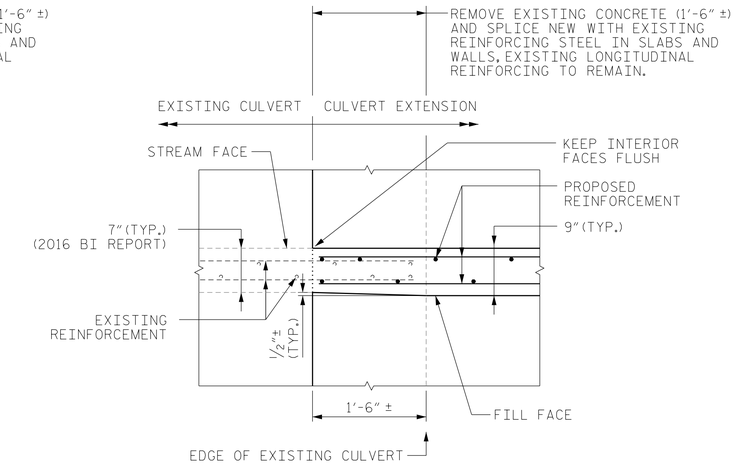
1. FOR ANCHORED SHEET PILE WALL, SEE SPECIAL PROVISIONS.
2. COORDINATE THIS SHEET WITH INFORMATION ON SHEET C1-18.
3. ALL FENCE POST MOUNTING SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE METAL CHAIN LINK FENCE POSTS.

INLET WING W1 BULKHEAD AND FENCE DETAILS



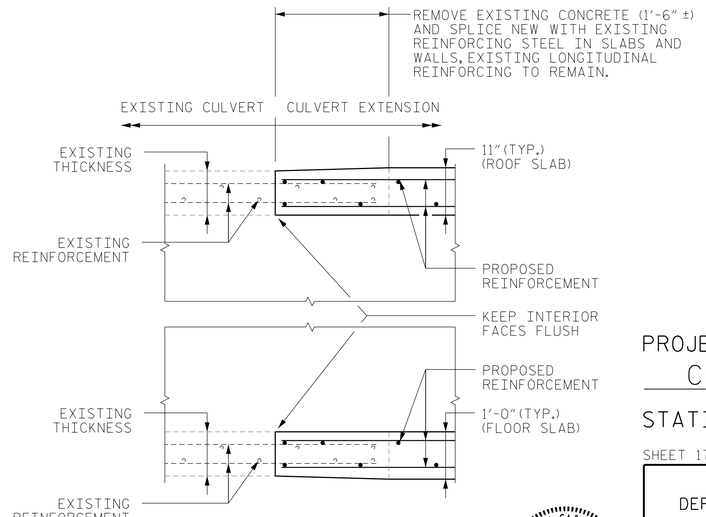
INTERIOR WALLS

(PLAN)



EXTERIOR WALLS

(PLAN)



FLOOR AND ROOF SLAB

(ELEVATION)

TRANSITIONING WALL AND SLAB THICKNESS DETAIL

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 17 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

MISCELLANEOUS DETAILS

(1 OF 2)

NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE 11/1/2024

KCA KISINGER CAMPO & ASSOCIATES
301 FAYETTEVILLE ST., SUITE 1500
RALEIGH, NC 27601 919.882.7839
NC FIRM LICENSE NO.: C-1506

DRAWN BY : DIEGO A. AGUIRRE DATE : 5-18-18
CHECKED BY : JACOB H. DUKE DATE : 5-22-18
DESIGN ENGINEER OF RECORD : JACOB H. DUKE DATE : 5-25-18

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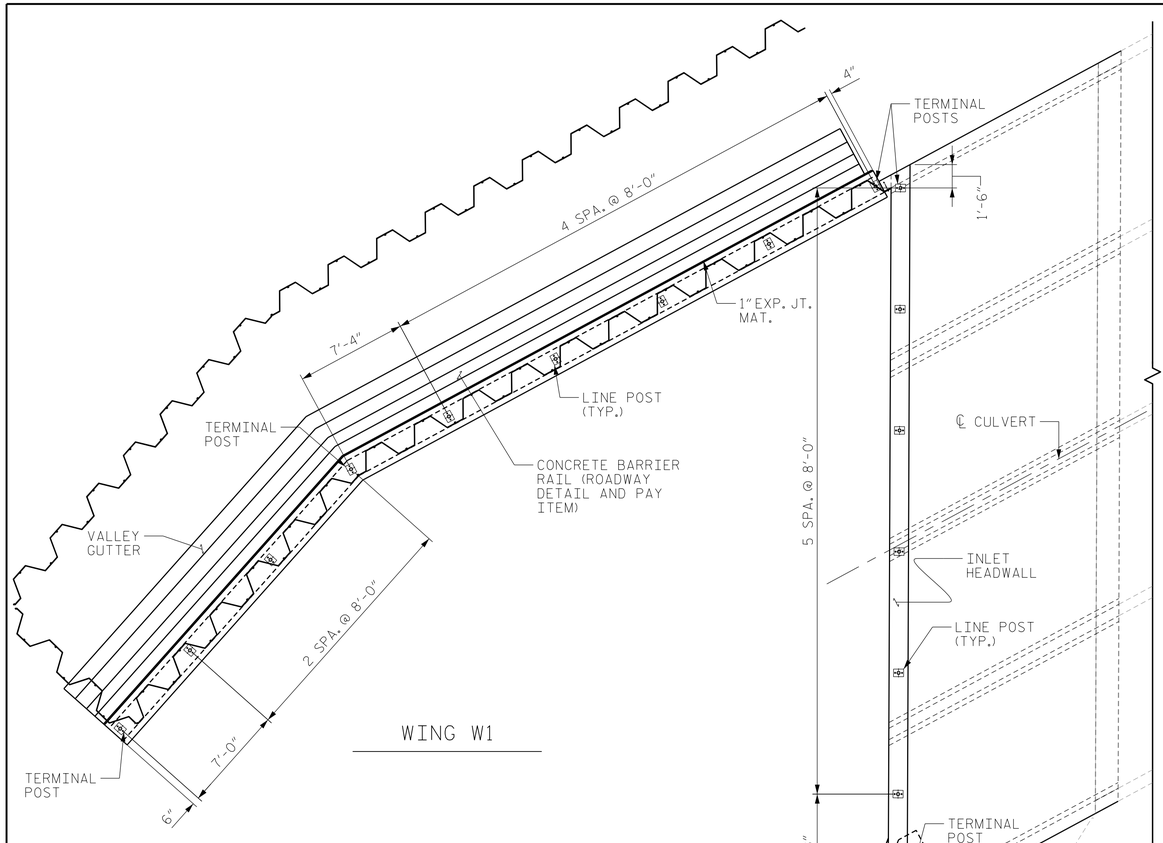
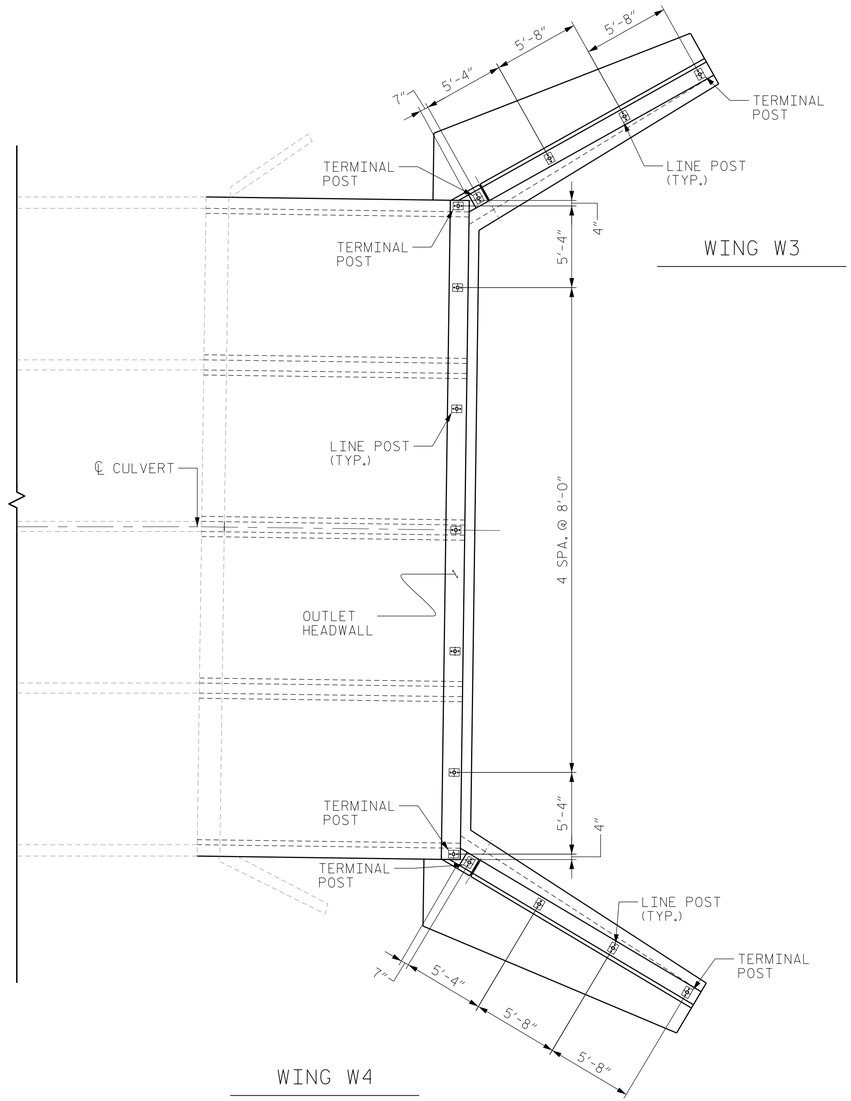
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-17
1			3			TOTAL SHEETS
2			4			18



WING W1

BILL OF MATERIAL FOR CHAIN LINK FENCE, 72" FABRIC		
CHAIN LINK FENCE, 72" FABRIC	LIN. FT.	199
METAL LINE POSTS FOR 72" CHAIN LINK FENCE	EA.	21
METAL TERMINAL POSTS FOR 72" CHAIN LINK FENCE	EA.	13

WING W2



WING W3

WING W4

FENCING NOTES:

1. INSTALL FENCING IN ACCORDANCE WITH SECTION 866 OF THE STANDARD SPECIFICATIONS.
2. COORDINATE THIS SHEET WITH INFORMATION ON SHEET C1-17.

INLET POST SPACING

OUTLET POST SPACING

FENCE POST SPACING

PROJECT NO. U-4405B

CUMBERLAND COUNTY

STATION: 137+99.59 -L-

SHEET 18 OF 18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT EXTENSION

MISCELLANEOUS DETAILS (2 OF 2)

NORTH CAROLINA PROFESSIONAL SEAL 043777 ENGINEER JACOB H DUKE
11/1/2024

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-18
1			3			TOTAL SHEETS
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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:

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 $\frac{7}{8}$" ∅ SHEAR STUDS FOR THE $\frac{3}{4}$" ∅ STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - $\frac{7}{8}$" ∅ STUDS FOR 4 - $\frac{3}{4}$" ∅ STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF $\frac{7}{8}$" ∅ STUDS ALONG THE BEAM AS SHOWN FOR $\frac{3}{4}$" ∅ STUDS BASED ON THE RATIO OF 3 - $\frac{7}{8}$"∅ STUDS FOR 4 - $\frac{3}{4}$" ∅ 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 $\frac{5}{16}$" 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 $\frac{1}{16}$" 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.