09/08/99

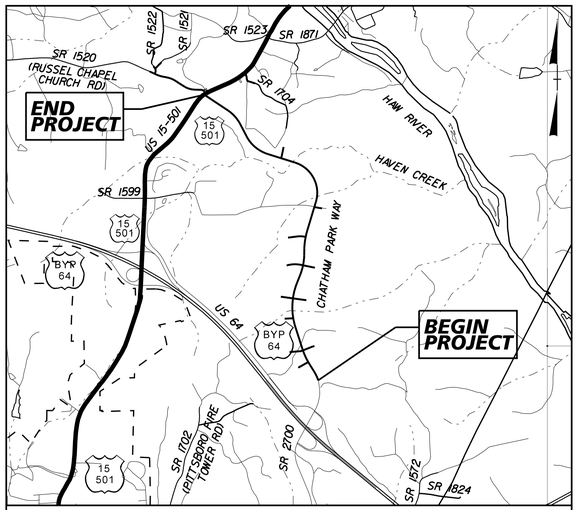
K:\RDT_Structures_Culvert\NCV0I1036532 - R-5930 North CPW\Cad\DgnVR-5930B\400_001_R5930B_TSH_001.dgn

2/13/2025

TIP PROJECT: R-5930B

CONTRACT: C204933

SEE SHEET 1A FOR INDEX OF SHEETS
SEE SHEET 1B FOR CONVENTIONAL PLAN SHEET SYMBOLS



VICINITY MAP

– – – – PITTSBORO CITY LIMITS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

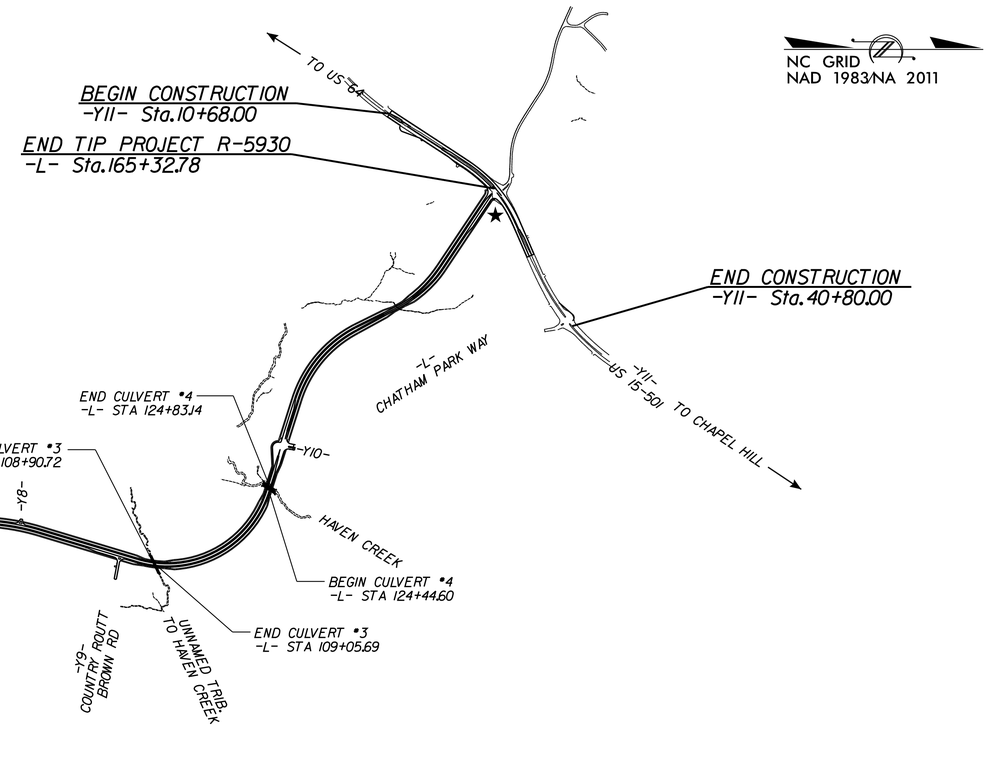
CHATHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5930B	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
48548.1.1		PE
48548.2.1		RW & UTIL
48548.3.1		CONST.

LOCATION: CHATHAM PARK WAY FROM US 64 TO US 15-501

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



★ TRAFFIC SIGNAL

STRUCTURES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

R-5930B DESIGN DATA

ADT 2025 = 0
ADT 2045 = 30000
K = 8%
D = 65
T = 5%*
V = 50 MPH
* (TTST 2% + DUAL 3%)
FUNCTIONAL CLASSIFICATION:
URBAN ARTERIAL
SUB-REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5930B	=	1.476 MILES
LENGTH STRUCTURE TIP PROJECT R-5930B	=	0.007 MILES
TOTAL LENGTH TIP PROJECT R-5930B	=	1.483 MILES

PLANS PREPARED FOR THE NCDOT BY:

Kimley»Horn

NC LICENSE #P0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

2024 STANDARD SPECIFICATIONS

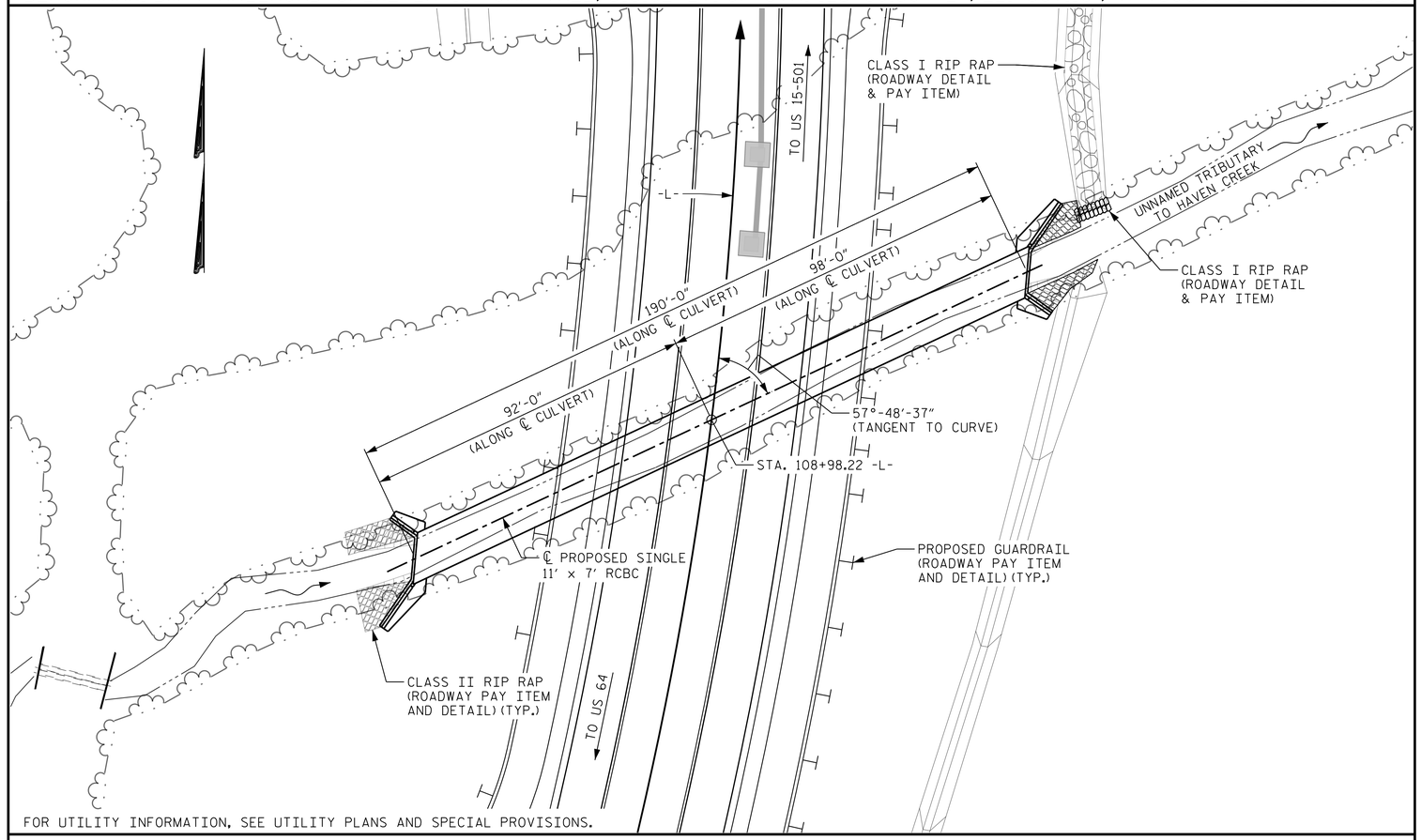
LETTING DATE: MARCH 18, 2025

ANDREW L. PHILLIPS, P.E.
PROJECT ENGINEER

REBEKAH M. KROL, P.E.
PROJECT DESIGN ENGINEER

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

BENCHMARK: BM#7 RAILROAD SPIKE IN 18" OAK TREE, 513.62' LT. OF STA. 123+89.50 -L-, EL. 367.10', N 730600 E 1955611 NAD83



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

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

DESIGN FILL ---------- 20'-9" (MAX.)

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

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH NCDOT STANDARD 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.

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

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

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACES OF THE EXTERIOR WALLS 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 SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

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

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

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

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

THE ENGINEER, IN CONSULTATION WITH DEO STAFF, SHALL REVIEW ALL MATERIAL TO BE USED AS BACKFILL PRIOR TO CONDUCTING THE BACKFILL ACTIVITY. BACKFILL SHALL CONSIST OF NATIVE MATERIAL ONLY UNLESS THE ENGINEER, IN CONSULTATION WITH DEO STAFF, DETERMINES THAT (1) THE NATIVE MATERIAL IS UNSUITABLE, OR (2) ADDITIONAL MATERIAL IS REQUIRED TO SUPPLEMENT THE NATIVE MATERIAL. THE CHOSEN BACKFILL MATERIAL SHALL NOT HAVE ADVERSE EFFECTS TO AQUATIC LIFE, AQUATIC LIFE PASSAGE, OR WATER QUALITY. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION.

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

EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE ---------- 370 CFS
FREQUENCY OF DESIGN FLOOD ------- 50 YR.
DESIGN HIGH WATER ELEVATION ----- 371.8
DRAINAGE AREA ---------- 0.39 SQ. MI.
BASE DISCHARGE (Q100) ---------- 410 CFS
BASE HIGH WATER ELEVATION ------ 372.20

OVERTOPPING FLOOD DATA

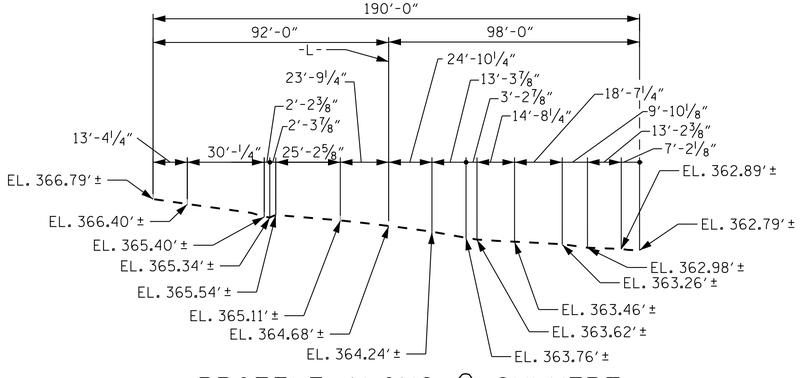
OVERTOPPING DISCHARGE ---------- 1477 CFS
FREQUENCY OF OVERTOPPING FLOOD --->500 YR.
OVERTOPPING FLOOD ELEVATION ------ 390.0 ✳
✳ OVERTOPPING WILL OCCUR AT THE SHOULDER POINT AT STA. 110+80.15 -L-

ROADWAY DATA

GRADE POINT EL. @ STA. 108+98.22 -L- = 389.03'
INVERT ELEVATION @ STA. 108+98.22 -L- = 363.80'
ROADWAY SLOPES 2 :1

-L- HORIZONTAL CURVE DATA

PI STA. 117+97.54
△ = 89°-13'-43.9" (LT)
D = 5°-12'-31.3"
L = 1,713.07'
T = 1085.29'
R = 1,100.00'



PROFILE ALONG ℄ CULVERT

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE

BARREL @	1.883 CY/FT	357.7	C.Y.
WINGS ETC.		22.7	C.Y.
SILLS		3.7	C.Y.
TOTAL		384.1	C.Y.

REINFORCING STEEL

BARREL	60,118	LBS.
WINGS ETC.	1,321	LBS.
TOTAL	61,439	LBS.

CULVERT EXCAVATION STA. 108+98.22 -L-	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	224 TONS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ANDREW L. PHILLIPS
2/10/2025

PROJECT NO. R-5930B
CHATHAM COUNTY
STATION: 108+98.22 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 11 FT. X 7 FT. CONCRETE BOX CULVERT 60° SKEW

DRAWN BY: D. D. LOWERY DATE: 10/2023
CHECKED BY: C. T. POOLE DATE: 01/2024
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 03/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

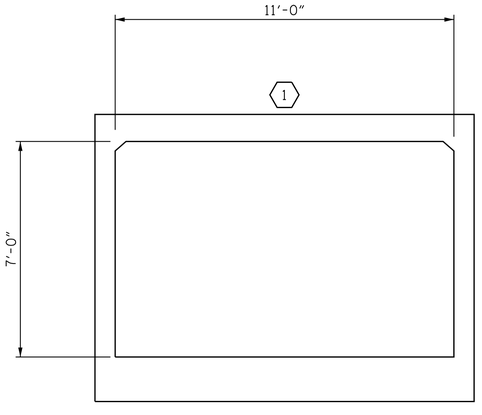
Kimley»Horn
421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
Phone (919) 677-2000
NC LICENSE # F-0102

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

CULVERT 42C003

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)	1.14	1.14	1	TOP SLAB	6'-4"	1.45	1	TOP SLAB	10"



LRFR SUMMARY

PERMANENT LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
	1.25	.90
DW	1.50	.65
EV	1.30	.90
EH	1.35	.90
ES	1.35	.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.

ASSEMBLED BY : D. D. LOWERY	DATE : 10/2023
CHECKED BY : A. L. PHILLIPS	DATE : 03/2024
DRAWN BY : BNB 6/19	
CHECKED BY : THC 6/19	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ANDREW L. PHILLIPS
2/10/2025

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421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
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NC LICENSE # F-0102

PROJECT NO. R-5930B
CHATHAM COUNTY
STATION: 108+98.22 -L-

SHEET 2 OF 6

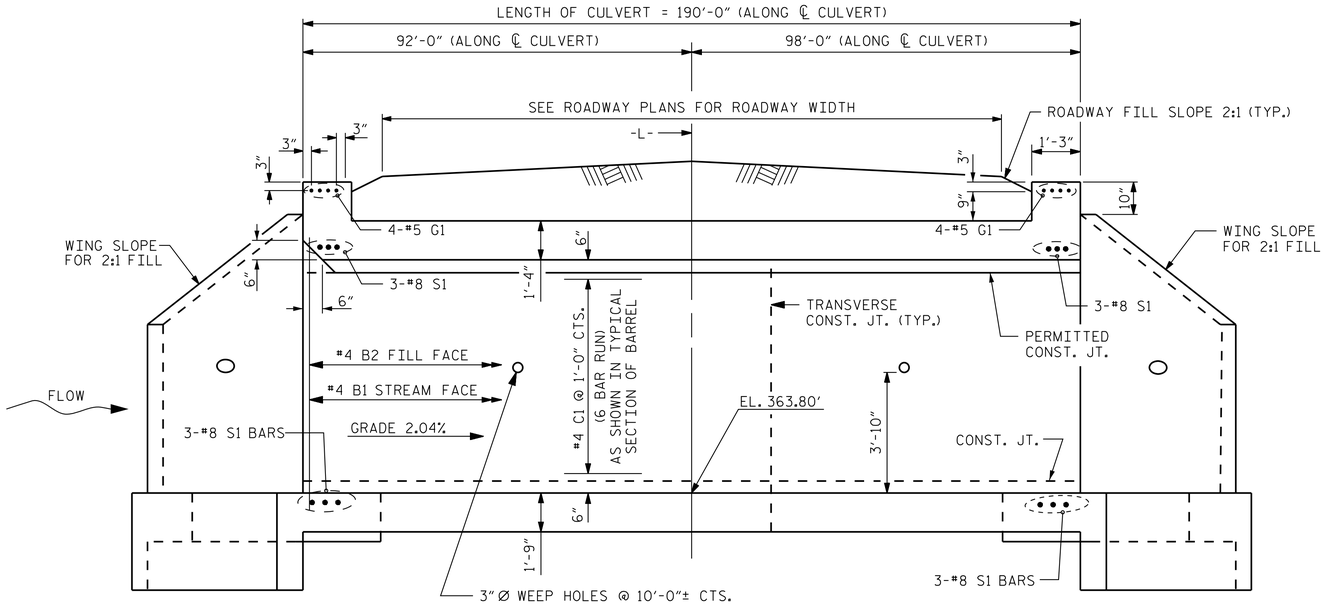
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

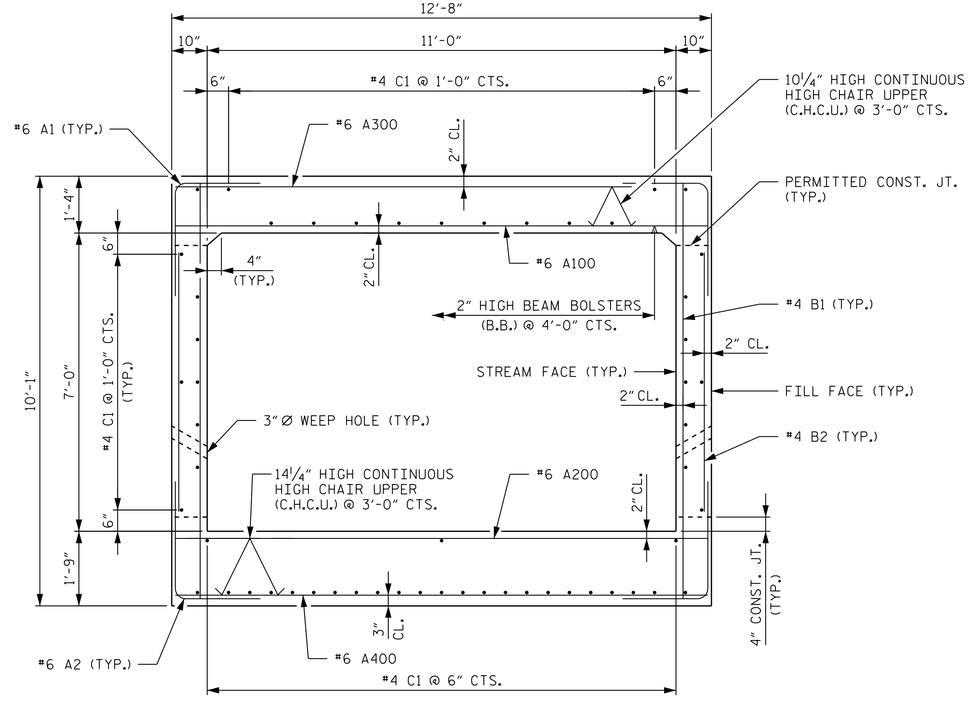
LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (DEEP FILLS)

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

CULVERT 42C003 STD. NO. LRFR7

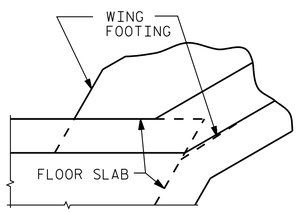


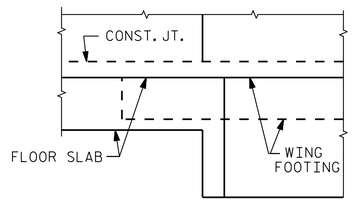
CULVERT SECTION NORMAL TO ROADWAY



RIGHT ANGLE SECTION OF BARREL

THERE ARE 57 "C" BARS IN SECTION OF BARREL





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

BAR SIZE	SPLICE LENGTH
#4 B1	1'-10"
#4 C1	2'-5"

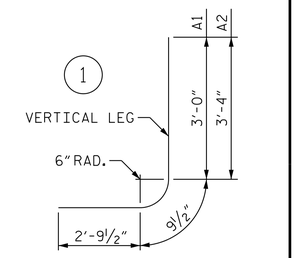
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	760	6	1	6'-7"	7,515
A2	760	6	1	6'-11"	7,896
A100	366	6	STR	12'-4"	6,780
A101	2	6	STR	11'-5"	34
A102	2	6	STR	10'-6"	32
A103	2	6	STR	9'-8"	29
A104	2	6	STR	8'-10"	27
A105	2	6	STR	8'-0"	24
A106	2	6	STR	7'-1"	21
A107	2	6	STR	6'-3"	19
A108	2	6	STR	5'-4"	16
A109	2	6	STR	4'-6"	14
A110	2	6	STR	3'-8"	11
A111	2	6	STR	2'-9"	8
A112	6	6	STR	1'-11"	17
A200	366	6	STR	12'-4"	6,780
A201	2	6	STR	11'-5"	34
A202	2	6	STR	10'-6"	32
A203	2	6	STR	9'-8"	29
A204	2	6	STR	8'-10"	27
A205	2	6	STR	8'-0"	24
A206	2	6	STR	7'-1"	21
A207	2	6	STR	6'-3"	19
A208	2	6	STR	5'-4"	16
A209	2	6	STR	4'-6"	14
A210	2	6	STR	3'-8"	11
A211	2	6	STR	2'-9"	8
A212	6	6	STR	1'-11"	17

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A300	366	6	STR	12'-4"	6,780
A301	2	6	STR	11'-5"	34
A302	2	6	STR	10'-6"	32
A303	2	6	STR	9'-8"	29
A304	2	6	STR	8'-10"	27
A305	2	6	STR	8'-0"	24
A306	2	6	STR	7'-1"	21
A307	2	6	STR	6'-3"	19
A308	2	6	STR	5'-4"	16
A309	2	6	STR	4'-6"	14
A310	2	6	STR	3'-8"	11
A311	2	6	STR	2'-9"	8
A312	6	6	STR	1'-11"	17
A400	366	6	STR	12'-4"	6,780
A401	2	6	STR	11'-5"	34
A402	2	6	STR	10'-6"	32
A403	2	6	STR	9'-8"	29
A404	2	6	STR	8'-10"	27
A405	2	6	STR	8'-0"	24
A406	2	6	STR	7'-1"	21
A407	2	6	STR	6'-3"	19
A408	2	6	STR	5'-4"	16
A409	2	6	STR	4'-6"	14
A410	2	6	STR	3'-8"	11
A411	2	6	STR	2'-9"	8
A412	6	6	STR	1'-11"	17
B1	760	4	STR	9'-8"	4,908
B2	760	4	STR	6'-4"	3,215
C1	342	4	STR	33'-8"	7,691
D1	54	6	STR	2'-4"	189
G1	8	5	STR	14'-3"	119
S1	12	8	STR	14'-3"	457

REINFORCING STEEL LBS. 60,118

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 108+98.22 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 11 FT. X 7 FT. CONCRETE BOX CULVERT 60° SKEW

NORTH CAROLINA SEAL 040769 ENGINEER ANDREW L. PHILLIPS
2/10/2025

DRAWN BY: D. D. LOWERY DATE: 10/2023
CHECKED BY: C. T. POOLE DATE: 01/2024
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 03/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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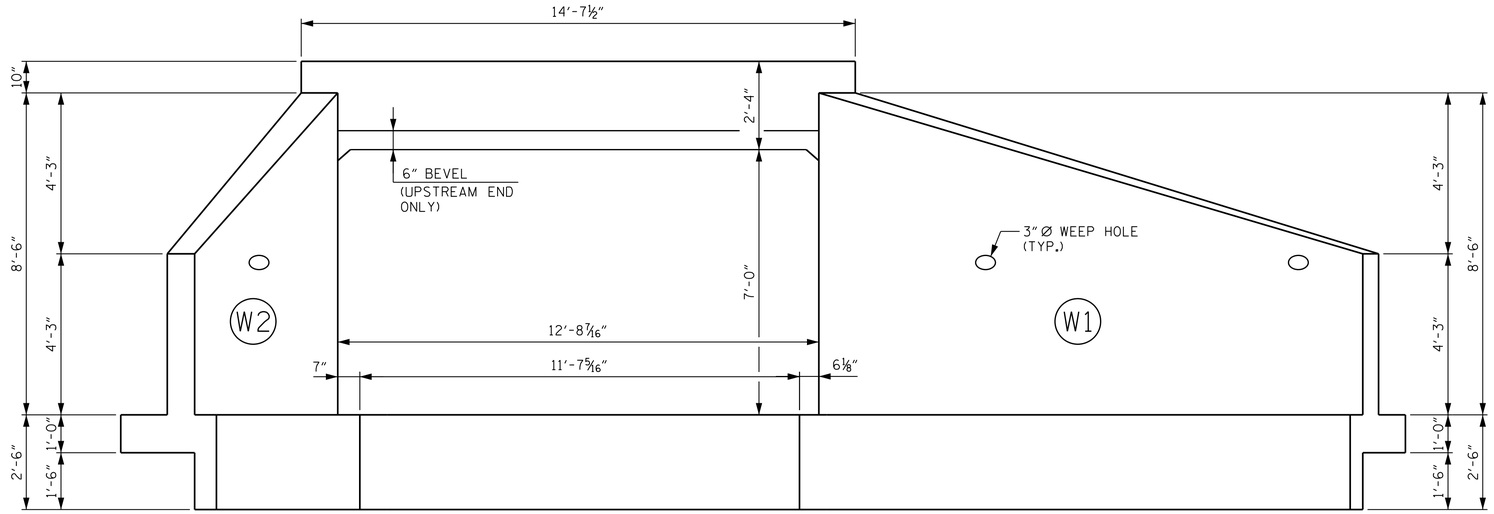
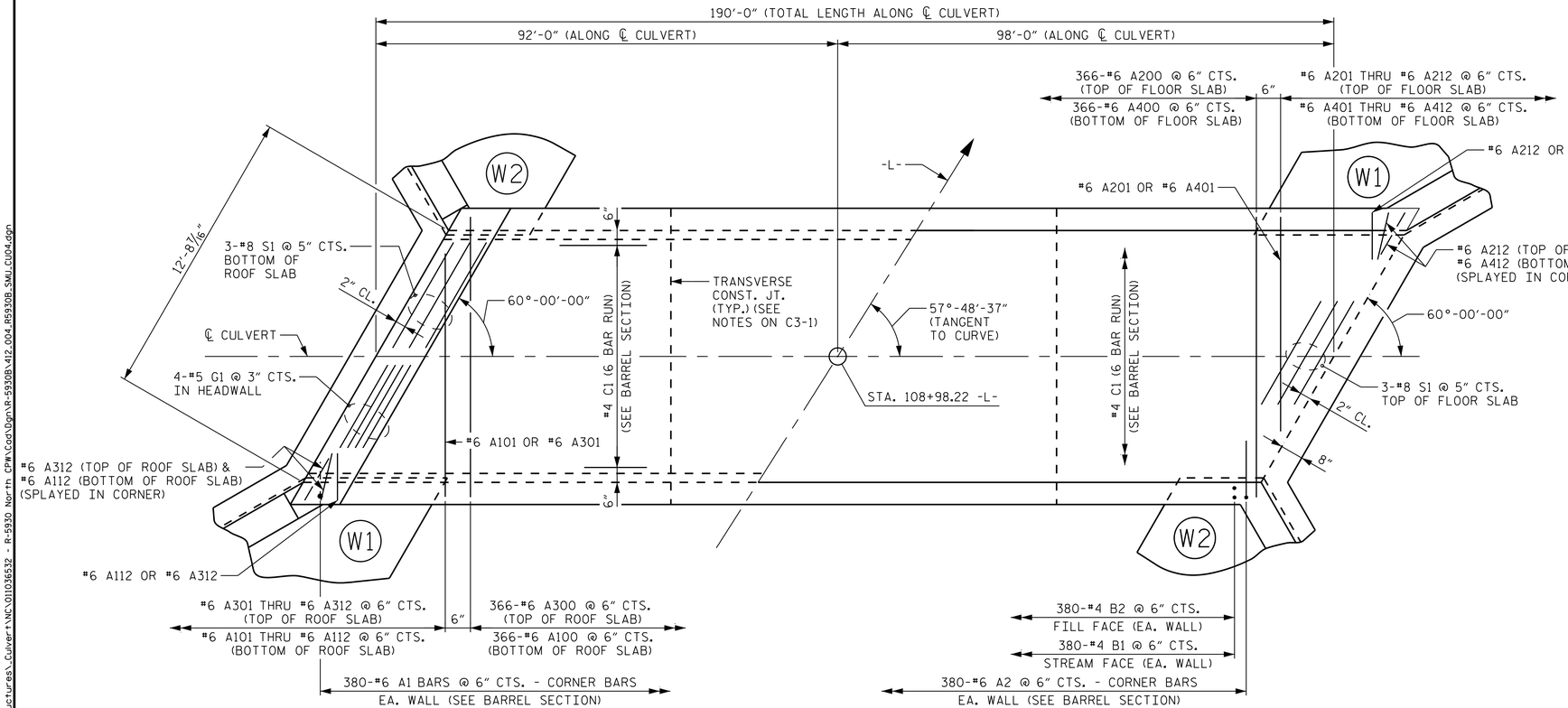
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-3
1			3			TOTAL SHEETS
2			4			6

CULVERT 42C003



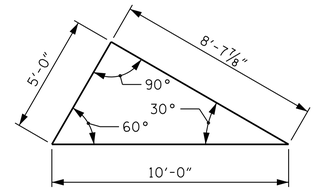
END ELEVATION NORMAL TO SKEW

(LOW FLOW SILL/BAFFLE NOT SHOWN FOR CLARITY, SEE SHEET C3-5 FOR DETAILS)



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB



SKEW TRIANGLE

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 108+98.22 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 11 FT. X 7 FT. CONCRETE BOX CULVERT 60° SKEW

NORTH CAROLINA PE SEAL 040769 ENGINEER ANDREW L. PHILLIPS
2/10/2025

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

DRAWN BY: D. D. LOWERY DATE: 10/2023
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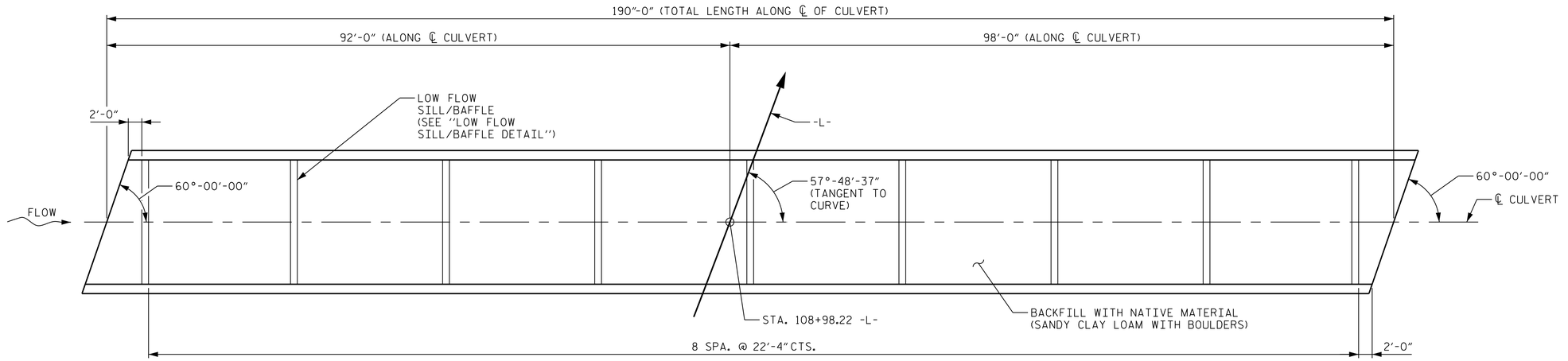
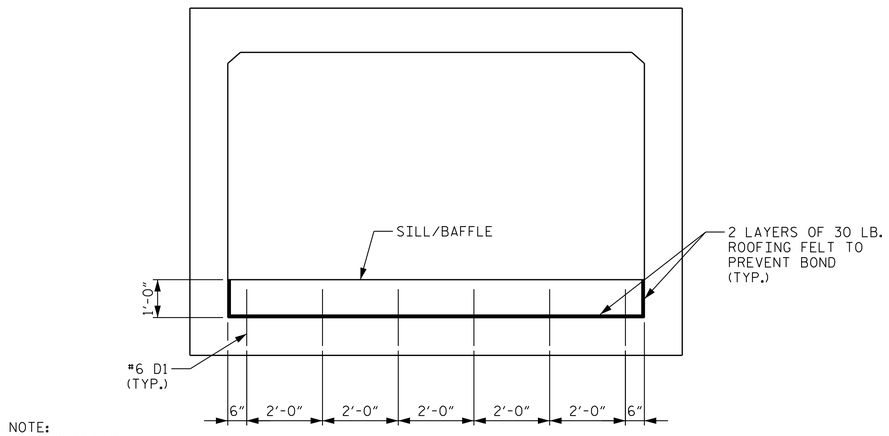
CULVERT 42C003

10/23/2024 K:\RDT_Structures_Culvert\NC\011036532 - R-5930 North CPW\Cad\Dgn\R-5930B\412_004_R5930B_SMU_CU04.dgn



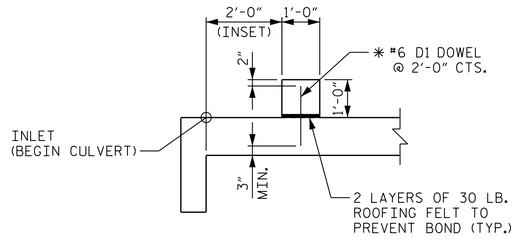
PLAN VIEW SHOWING SILL/BAFFLE LOCATIONS



NOTE:
WING WALLS NOT
SHOWN FOR CLARITY.

SILL/BAFFLE DETAIL - ELEVATION

(LOOKING DOWNSTREAM)



SECTION THRU SILL

(INLET END SHOWN, OUTLET END SIMILAR)

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

NOTE: SILL/BAFFLES ARE TO BE CAST NORMAL TO CULVERT WALLS.

NORTH CAROLINA
PROFESSIONAL ENGINEER
SEAL
040769
ENGINEER
ANDREW L. PHILLIPS
2/10/2025

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421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
Phone (919) 677-2000
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PROJECT NO. R-5930B
CHATHAM COUNTY
STATION: 108+98.22 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 11 FT. X 7 FT. CONCRETE BOX CULVERT 60° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-5
1			3			TOTAL SHEETS
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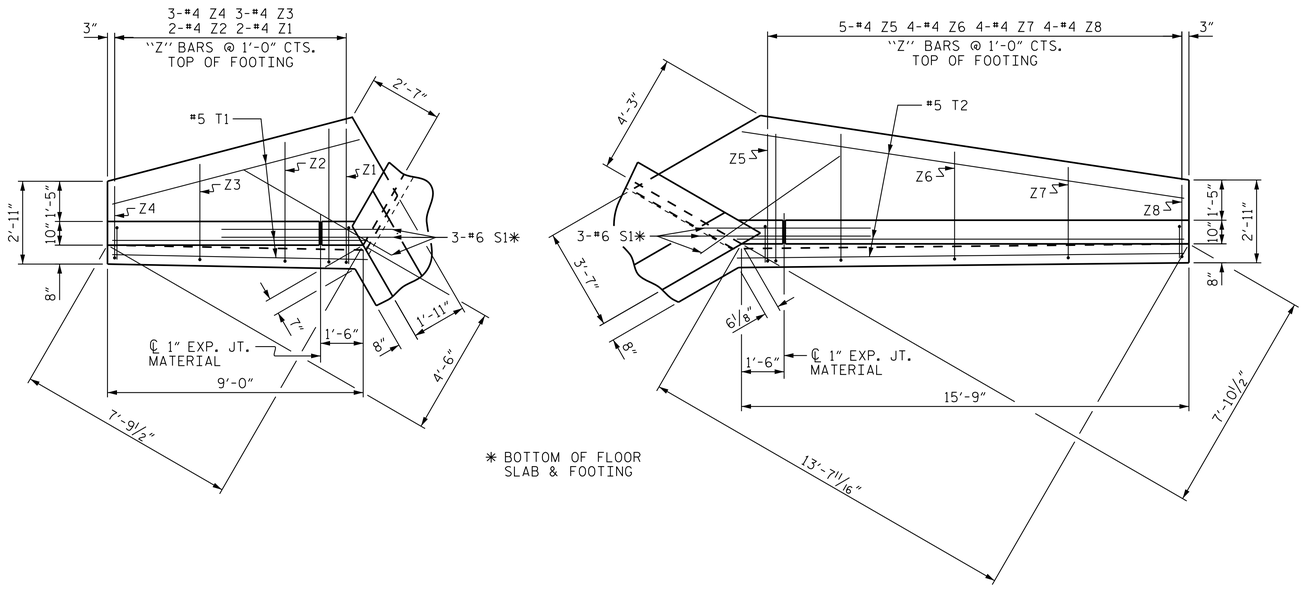
DRAWN BY: D. D. LOWERY DATE: 10/2023
CHECKED BY: C. T. POOLE DATE: 01/2024
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 03/2024

10/23/2024 K:\RDT.Structures_Culvert\NC\011036532 - R-5930 North CPW\Cad\Dgn\R-5930B\412_005_R5930B_SMU_CU05.dgn

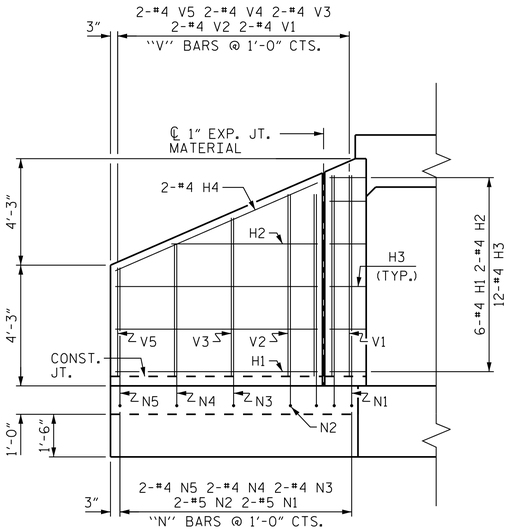
CULVERT 42C003



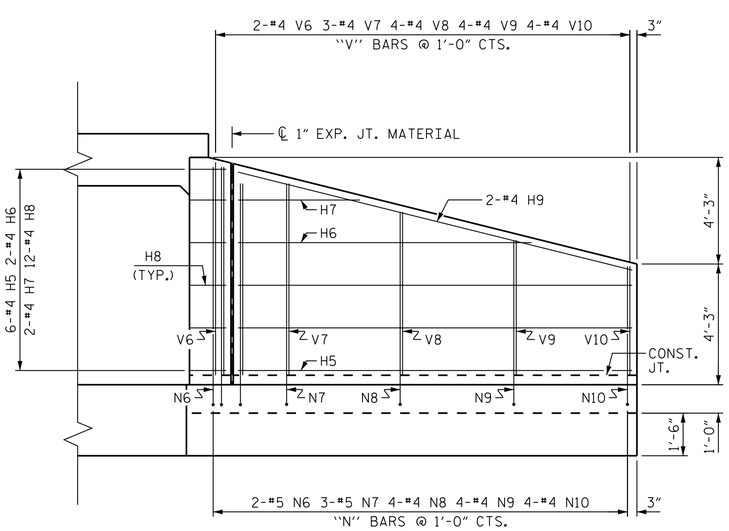
* BOTTOM OF FLOOR SLAB & FOOTING

PLAN W2

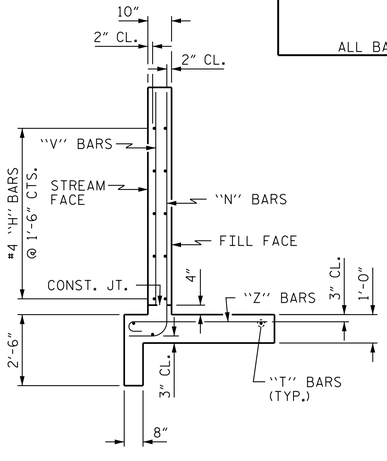
PLAN W1



ELEVATION W2

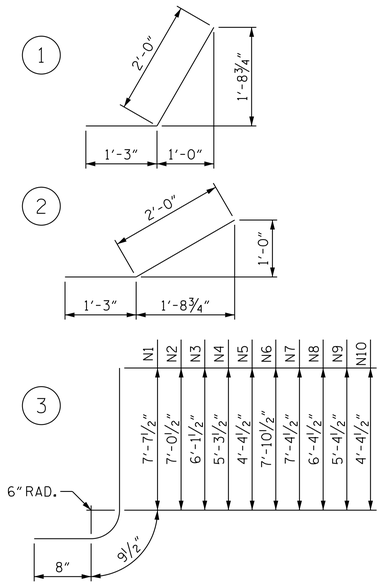


ELEVATION W1



TYPICAL WING SECTION

BAR TYPES



Z1	4'-9"	6"
Z2	4'-3"	6"
Z3	3'-5"	6"
Z4	2'-7"	6"
Z5	4'-6"	6"
Z6	3'-10"	6"
Z7	3'-3"	6"
Z8	2'-7"	6"

HK.

4

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	7'-1"	57
H2	4	#4	STR	5'-2"	14
H3	24	#4	1	3'-3"	52
H4	4	#4	STR	7'-9"	21
H5	12	#4	STR	13'-10"	111
H6	4	#4	STR	10'-4"	28
H7	4	#4	STR	4'-3"	11
H8	24	#4	2	3'-3"	52
H9	4	#4	STR	14'-3"	38
N1	4	#5	3	9'-1"	38
N2	4	#5	3	8'-6"	35
N3	4	#4	3	7'-7"	20
N4	4	#4	3	6'-9"	18
N5	4	#4	3	5'-10"	16
N6	4	#5	3	9'-4"	39
N7	6	#5	3	8'-10"	55
N8	8	#4	3	7'-10"	42
N9	8	#4	3	6'-10"	37
N10	8	#4	3	5'-10"	31
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	9'-0"	56
T2	6	#5	STR	15'-9"	99
V1	4	#4	STR	7'-1"	19
V2	4	#4	STR	6'-5"	17
V3	4	#4	STR	5'-7"	15
V4	4	#4	STR	4'-8"	12
V5	4	#4	STR	3'-10"	10
V6	4	#4	STR	7'-4"	20
V7	6	#4	STR	6'-9"	27
V8	8	#4	STR	5'-9"	31
V9	8	#4	STR	4'-9"	25
V10	8	#4	STR	3'-10"	20
Z1	4	#4	4	5'-3"	14
Z2	4	#4	4	4'-9"	13
Z3	6	#4	4	3'-11"	16
Z4	6	#4	4	3'-1"	12
Z5	10	#4	4	5'-0"	33
Z6	8	#4	4	4'-4"	23
Z7	8	#4	4	3'-9"	20
Z8	8	#4	4	3'-1"	16

REINFORCING STEEL FOR 4 WINGS	1321 LBS
CLASS A CONCRETE	
4 WINGS	19.8 CY
2 HEADWALLS	1.4 CY
2 END CURTAIN WALLS	1.5 CY
TOTAL	22.7 CY

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 108+98.22 -L-

SHEET 6 OF 6

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ANDREW L. PHILLIPS
2/10/2025

Kimley»Horn
421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
Phone (919) 677-2000
NC LICENSE # F-0102

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 7'-0" SLOPE = 2:1
60° SKEW

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

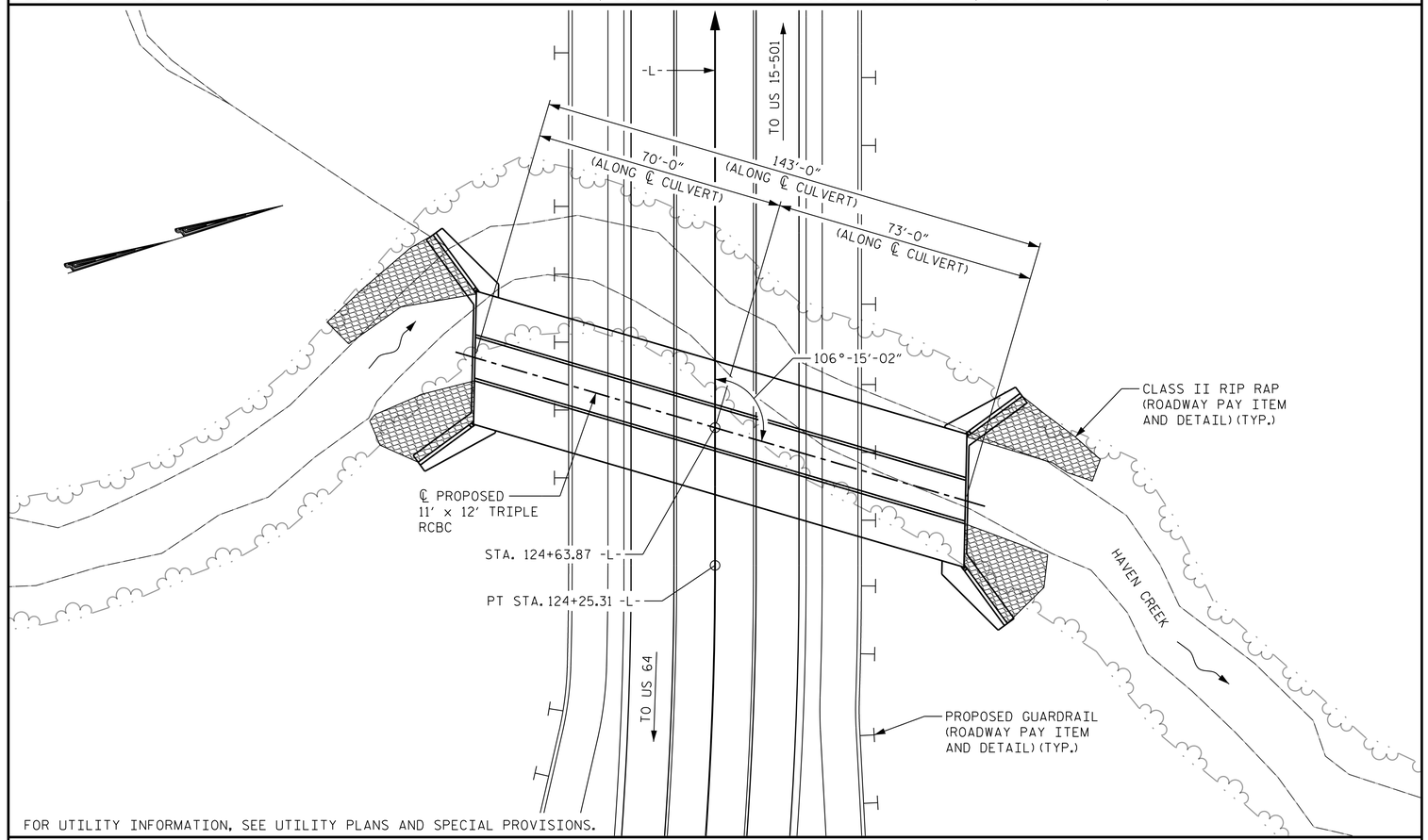
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : D. D. LOWERY	DATE : 10/2023	
CHECKED BY : A. L. PHILLIPS	DATE : 03/2024	
DRAWN BY : CCJ 11/99	REV. 6/19	MAA/THC
CHECKED BY : RWW 03/00		

10/23/2024 K:\RDT_Structures_Culvert\NC\011036532 - R-5930 North CPW\Cad\Dgn\R-5930B\412.006_R5930B_SMU_CU06.dgn

CULVERT 42C003 STD. NO. CW6007

BENCHMARK: BM#7 RAILROAD SPIKE IN 18" OAK TREE, 513.62' LT. OF STA. 123+89.50 -L-, EL. 367.10', N 730600 E 1955611 NAD83



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

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

DESIGN FILL ---------- 13'-3" (MAX.)

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

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH NCDOT STANDARD 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.

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

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

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACES OF THE EXTERIOR WALLS 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 SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

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

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

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

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

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

THE ENGINEER, IN CONSULTATION WITH DEO STAFF, SHALL REVIEW ALL MATERIAL TO BE USED AS BACKFILL PRIOR TO CONDUCTING THE BACKFILL ACTIVITY. BACKFILL SHALL CONSIST OF NATIVE MATERIAL ONLY UNLESS THE ENGINEER, IN CONSULTATION WITH DEO STAFF, DETERMINES THAT (1) THE NATIVE MATERIAL IS UNSUITABLE, OR (2) ADDITIONAL MATERIAL IS REQUIRED TO SUPPLEMENT THE NATIVE MATERIAL. THE CHOSEN BACKFILL MATERIAL SHALL NOT HAVE ADVERSE EFFECTS TO AQUATIC LIFE, AQUATIC LIFE PASSAGE, OR WATER QUALITY. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION.

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

EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE ---------- 1400 CFS
FREQUENCY OF DESIGN FLOOD ------- 50 YR.
DESIGN HIGH WATER ELEVATION ----- 366.3
DRAINAGE AREA ---------- 2.11 SQ. MI.
BASE DISCHARGE (Q100) ---------- 1600 CFS
BASE HIGH WATER ELEVATION ------ 366.8

OVERTOPPING FLOOD DATA

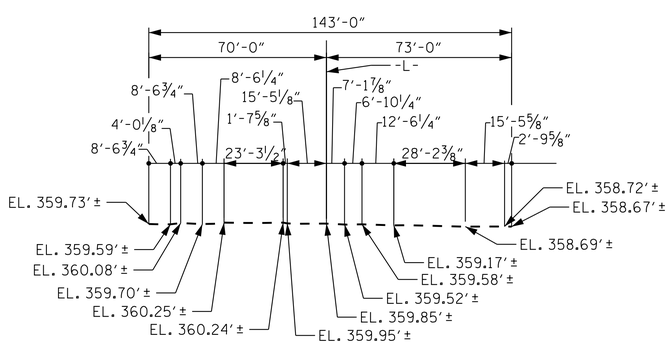
OVERTOPPING DISCHARGE ---------- 7300 CFS
FREQUENCY OF OVERTOPPING FLOOD ---> 500 YR.
OVERTOPPING FLOOD ELEVATION ------ 382.3 ✳
✳ OVERTOPPING WILL OCCUR AT STA. 124+89.45 -L-

ROADWAY DATA

GRADE POINT EL. @ STA. 124+63.87 -L- = 382.34'
INVERT ELEVATION @ STA. 124+63.87 -L- = 358.09'
ROADWAY SLOPES 2 : 1

-L- HORIZONTAL CURVE DATA

PI STA. 117+97.54
△ = 89°-13'-43.9" (LT)
D = 5°-12'-31.3"
L = 1,713.07'
T = 1,085.29'
R = 1,100.00'



PROFILE ALONG ℄ CULVERT

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @	5.216 CY/FT	745.9	C.Y.
WINGS ETC.		71.2	C.Y.
SILLS		1.6	C.Y.
TOTAL		818.7	C.Y.
REINFORCING STEEL			
BARREL		104,834	LBS.
WINGS ETC.		10,825	LBS.
TOTAL		115,659	LBS.
CULVERT EXCAVATION STA. 124+63.87 -L-		LUMP SUM	
FOUNDATION CONDITIONING MATERIAL		414 TONS	

PROJECT NO. R-5930B
CHATHAM COUNTY
STATION: 124+63.87 -L-

SHEET 1 OF 7 BRIDGE NO. 180538

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ENGINEER ANDREW L. PHILLIPS
2/10/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 11 FT. X 12 FT. CONCRETE BOX CULVERT 106° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-1
1			3			TOTAL SHEETS
2			4			7

DRAWN BY: D. D. LOWERY DATE: 10/2023
CHECKED BY: B. M. KROL DATE: 01/2024
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 03/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Kimley»Horn
421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
Phone (919) 677-2000
NC LICENSE # F-0102

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

LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
								MOMENT				SHEAR				
							LIVE-LOAD FACTORS (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		HL-93 (INVENTORY)	N/A	⟨1⟩	1.33	--	1.75	1.33	1	EXTERIOR WALL	1.00	1.57	3	TOP SLAB	36.00	
		HL-93 (OPERATING)	N/A		1.72	--	1.35	1.72	1	EXTERIOR WALL	1.00	2.04	3	TOP SLAB	36.00	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.34	48.24	1.75	1.34	1	EXTERIOR WALL	1.00	1.95	3	TOP SLAB	36.00	
		HS-20 (OPERATING)	36.000		1.73	62.28	1.35	1.73	1	EXTERIOR WALL	1.00	2.53	3	TOP SLAB	36.00	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		1.69	22.82	1.40	1.69	1	EXTERIOR WALL	1.00	5.56	1	EXTERIOR WALL	0.50	
		SNGARBS2	20.000		1.69	33.80	1.40	1.69	1	EXTERIOR WALL	1.00	4.52	3	TOP SLAB	36.00	
		SNAGRIS2	22.000		1.69	37.18	1.40	1.69	1	EXTERIOR WALL	1.00	4.29	3	TOP SLAB	36.00	
		SNCOTTS3	27.250	⟨3⟩	1.67	45.51	1.40	1.67	1	EXTERIOR WALL	1.00	2.80	3	TOP SLAB	36.00	
		SNAGGRS4	34.925		1.67	58.32	1.40	1.67	1	EXTERIOR WALL	1.00	2.62	3	TOP SLAB	36.00	
		SNS5A	35.550		1.67	59.37	1.40	1.67	1	EXTERIOR WALL	1.00	2.47	3	TOP SLAB	36.00	
		SNS6A	39.950		1.67	66.72	1.40	1.67	1	EXTERIOR WALL	1.00	2.34	3	TOP SLAB	36.00	
		SNS7B	42.000		1.67	70.14	1.40	1.67	1	EXTERIOR WALL	1.00	2.27	3	TOP SLAB	36.00	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.68	55.44	1.40	1.68	1	EXTERIOR WALL	1.00	3.17	3	TOP SLAB	36.00	
		TNT4A	33.075		1.67	55.24	1.40	1.67	1	EXTERIOR WALL	1.00	2.90	3	TOP SLAB	36.00	
		TNT6A	41.600		1.67	69.47	1.40	1.67	1	EXTERIOR WALL	1.00	2.68	3	TOP SLAB	36.00	
		TNT7A	42.000		1.67	70.14	1.40	1.67	1	EXTERIOR WALL	1.00	2.71	3	TOP SLAB	36.00	
		TNT7B	42.000		1.67	70.14	1.40	1.67	1	EXTERIOR WALL	1.00	2.49	3	TOP SLAB	36.00	
		TNAGRIT4	43.000		1.67	71.81	1.40	1.67	1	EXTERIOR WALL	1.00	2.48	3	TOP SLAB	36.00	
		TNAGT5A	45.000		1.67	75.15	1.40	1.67	1	EXTERIOR WALL	1.00	2.45	3	TOP SLAB	36.00	
		TNAGT5B	45.000		1.67	75.15	1.40	1.67	1	EXTERIOR WALL	1.00	2.23	3	TOP SLAB	36.00	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.81	52.04	1.30	1.81	1	EXTERIOR WALL	1.00	3.71	3	TOP SLAB	36.00	
		EV3	43.000	⟨4⟩	1.79	76.97	1.30	1.79	1	EXTERIOR WALL	1.00	2.41	3	TOP SLAB	36.00	

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.

⟨#⟩ CONTROLLING LOAD RATING

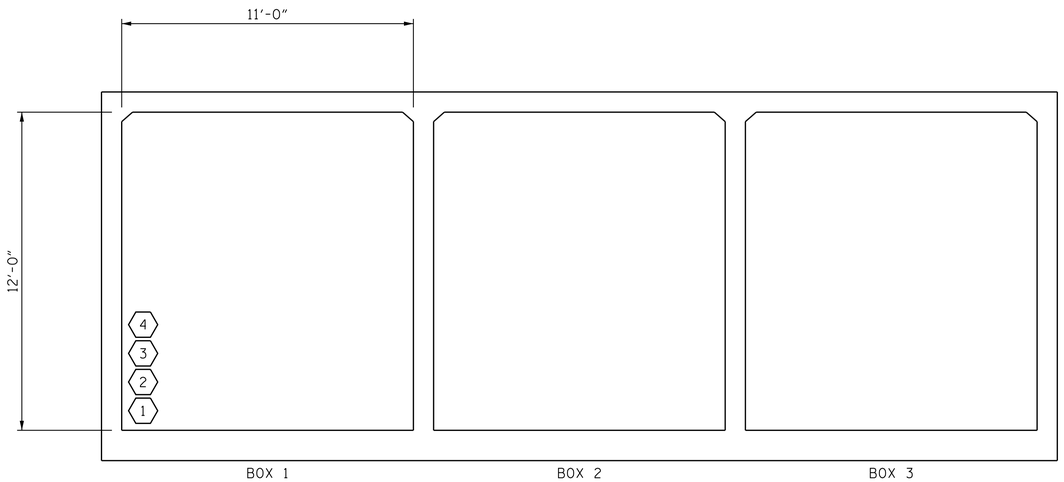
⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

⟨4⟩ EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 124+63.87 -L-

SHEET 2 OF 7

90% PLANS
DO NOT USE FOR CONSTRUCTION

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:	C4-2
1			3			TOTAL SHEETS
2			4			7

ASSEMBLED BY : D.D. LOWERY		DATE : 10/2023	
CHECKED BY : C.T. POOLE		DATE : 03/2024	
DRAWN BY : WMC	7/11	REV. 10/1/11	MAA/GM
CHECKED BY : GM	7/11	REV. 12/17	MAA/THC
		REV. 04/23	BNB/AAI

10/23/2024 K:\RDT_Structures_Culvert\NC\01036532 - R-5930 North CPW\Cad\Dgn\R-5930B\413.002_R5930B_SMU_CU02.dgn

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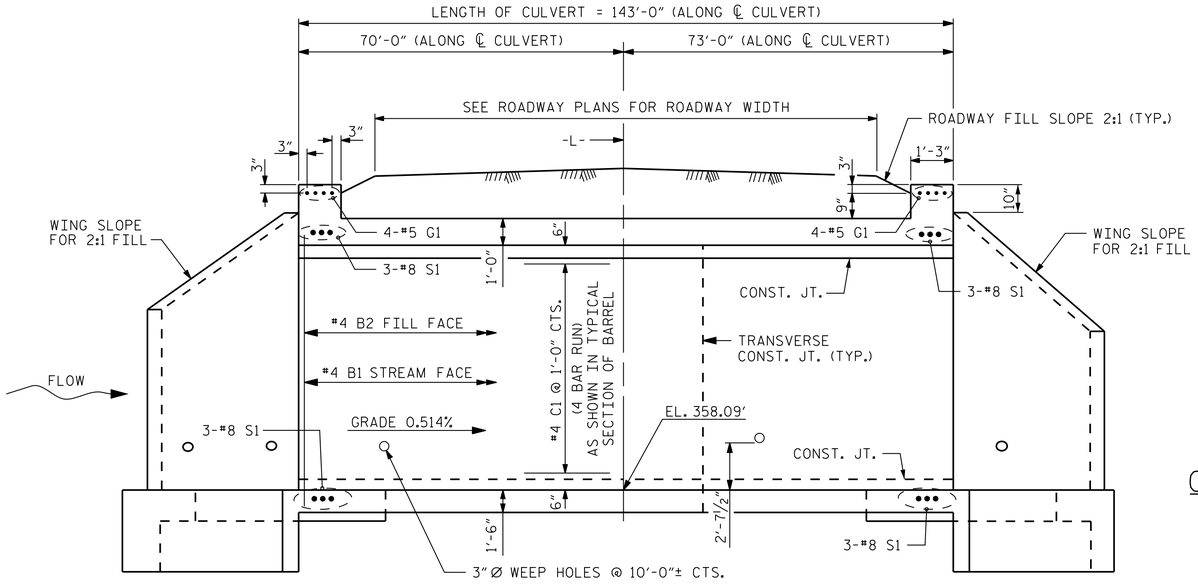
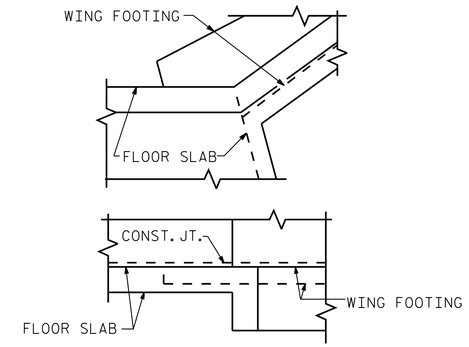
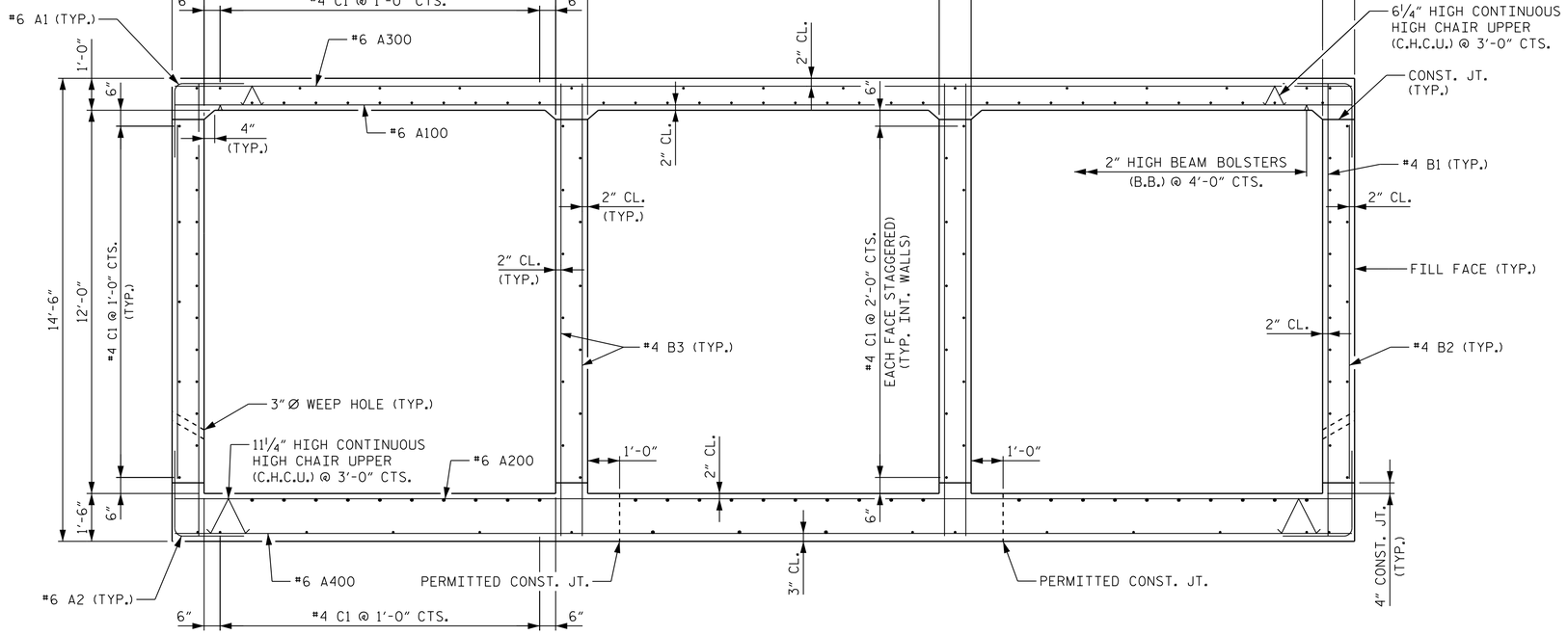


CULVERT SECTION NORMAL TO ROADWAY



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



RIGHT ANGLE SECTION OF BARREL

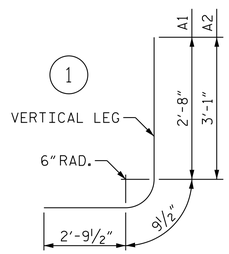
THERE ARE 142 C1 BARS IN SECTION OF BARREL

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	572	6	1	6'-3"	5,370	A300	266	6	STR	36'-8"	14,650
A2	572	6	1	6'-8"	5,728	A301	2	6	STR	35'-5"	106
						A302	2	6	STR	33'-5"	100
A100	266	6	STR	36'-8"	14,650	A303	2	6	STR	31'-8"	95
A101	2	6	STR	35'-5"	106	A304	2	6	STR	29'-9"	89
A102	2	6	STR	33'-5"	100	A305	2	6	STR	27'-11"	84
A103	2	6	STR	31'-8"	95	A306	2	6	STR	26'-1"	78
A104	2	6	STR	29'-9"	89	A307	2	6	STR	24'-2"	73
A105	2	6	STR	27'-11"	84	A308	2	6	STR	22'-4"	67
A106	2	6	STR	26'-1"	78	A309	2	6	STR	20'-5"	61
A107	2	6	STR	24'-2"	73	A310	2	6	STR	18'-7"	56
A108	2	6	STR	22'-4"	67	A311	2	6	STR	16'-9"	50
A109	2	6	STR	20'-5"	61	A312	2	6	STR	14'-10"	45
A110	2	6	STR	18'-7"	56	A313	2	6	STR	13'-0"	39
A111	2	6	STR	16'-9"	50	A314	2	6	STR	11'-1"	33
A112	2	6	STR	14'-10"	45	A315	2	6	STR	9'-3"	28
A113	2	6	STR	13'-0"	39	A316	2	6	STR	7'-5"	22
A114	2	6	STR	11'-1"	33	A317	2	6	STR	5'-6"	17
A115	2	6	STR	9'-3"	28	A318	2	6	STR	3'-8"	11
A116	2	6	STR	7'-5"	22	A319	4	6	STR	1'-9"	11
A117	2	6	STR	5'-6"	17						
A118	2	6	STR	3'-8"	11	A400	266	6	STR	35'-5"	14,650
A119	4	6	STR	1'-9"	11	A401	2	6	STR	33'-5"	106
						A402	2	6	STR	31'-8"	100
A200	266	6	STR	36'-8"	14,650	A403	2	6	STR	29'-9"	95
A201	2	6	STR	35'-5"	106	A404	2	6	STR	27'-11"	89
A202	2	6	STR	33'-5"	100	A405	2	6	STR	27'-6"	84
A203	2	6	STR	31'-8"	95	A406	2	6	STR	26'-1"	78
A204	2	6	STR	29'-9"	89	A407	2	6	STR	24'-2"	73
A205	2	6	STR	27'-11"	84	A408	2	6	STR	22'-4"	67
A206	2	6	STR	26'-1"	78	A409	2	6	STR	20'-5"	61
A207	2	6	STR	24'-2"	73	A410	2	6	STR	18'-7"	56
A208	2	6	STR	22'-4"	67	A411	2	6	STR	16'-9"	50
A209	2	6	STR	20'-5"	61	A412	2	6	STR	14'-10"	45
A210	2	6	STR	18'-7"	56	A413	2	6	STR	13'-0"	39
A211	2	6	STR	16'-9"	50	A414	2	6	STR	11'-1"	33
A212	2	6	STR	14'-10"	45	A415	2	6	STR	9'-3"	28
A213	2	6	STR	13'-0"	39	A416	2	6	STR	7'-5"	22
A214	2	6	STR	11'-1"	33	A417	2	6	STR	5'-6"	17
A215	2	6	STR	9'-3"	28	A418	2	6	STR	3'-8"	11
A216	2	6	STR	7'-5"	22	A419	4	6	STR	1'-9"	11
A217	2	6	STR	5'-6"	17						
A218	2	6	STR	3'-8"	11	B1	572	4	STR	14'-1"	5,381
A219	4	6	STR	1'-9"	11	B2	572	4	STR	11'-3"	4,299
						B3	572	4	STR	14'-1"	5,381
						C1	568	4	STR	37'-6"	14,228
						D1	12	6	STR	3'-1"	56
						G1	8	5	STR	37'-11"	316
						S1	12	8	STR	37'-11"	1,215

REINFORCING STEEL LBS. 104,834

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BAR SIZE	SPLICE LENGTH
#6 A200	2'-9"
#6 A400	3'-7"
#4 B1	1'-10"
#4 C1	2'-5"

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 124+63.87 -L-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 11 FT. X 12 FT. CONCRETE BOX CULVERT 106° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ENGINEER ANDREW L. PHILLIPS
2/10/2025

Kimley»Horn
421 Fayetteville Street, Suite 600
Raleigh, NC 27601-1772
Phone (919) 677-2000
NC LICENSE # F-0102

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-3
1			3			TOTAL SHEETS
2			4			7

DRAWN BY: D. D. LOWERY DATE: 10/2023
CHECKED BY: B. M. KROL DATE: 01/2024
DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 03/2024

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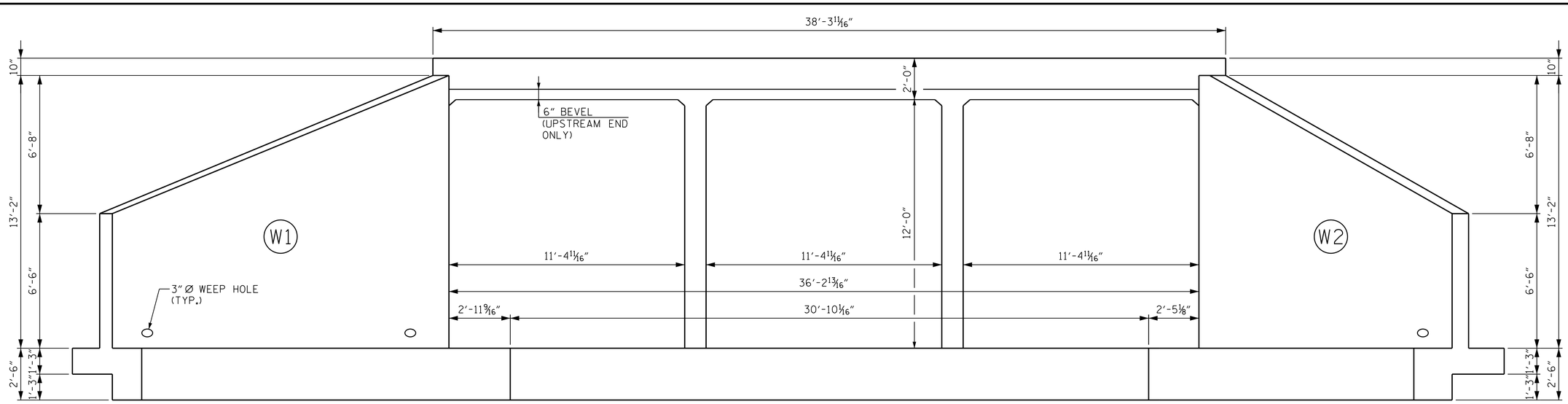
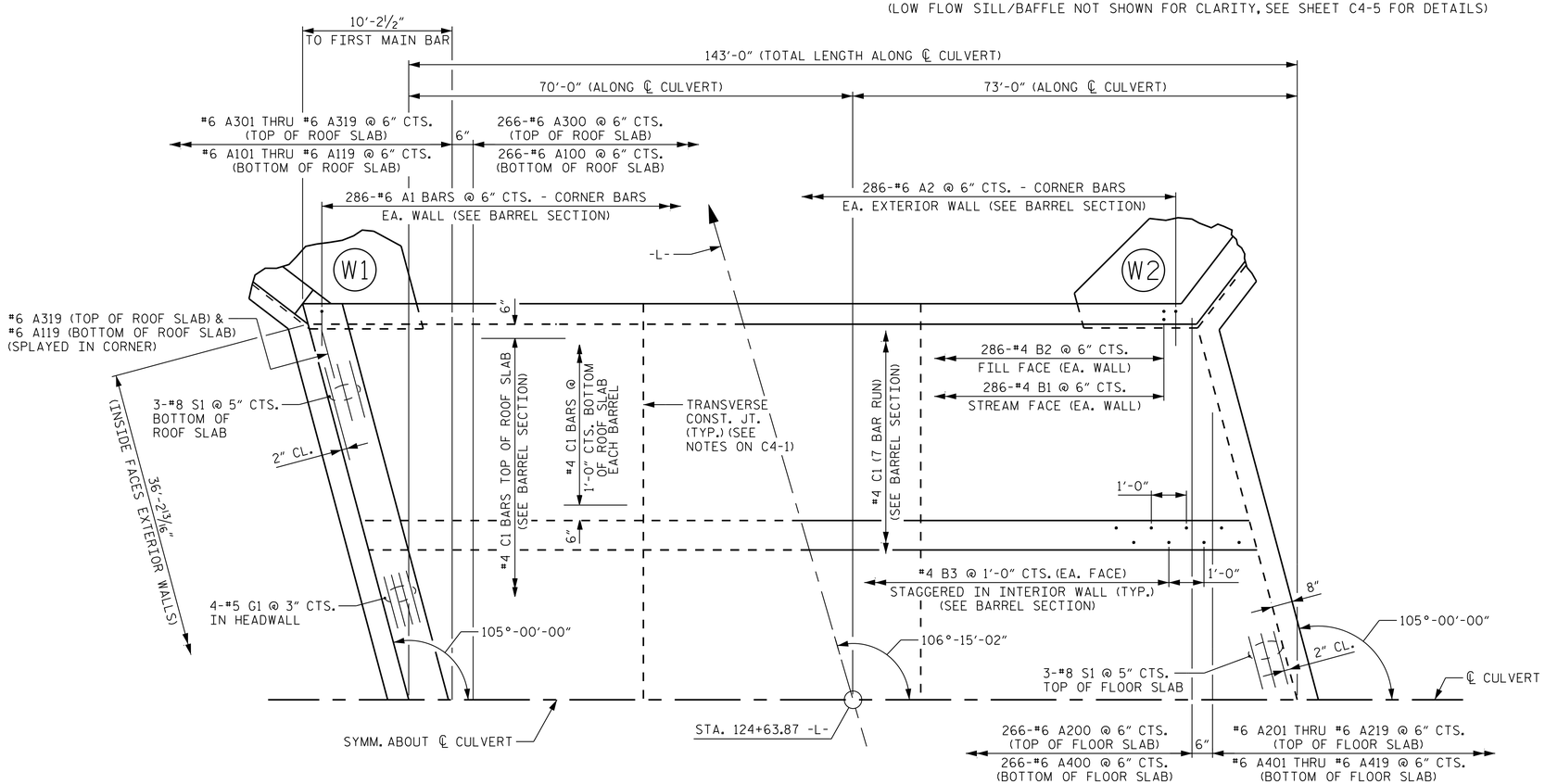
CULVERT 42C004



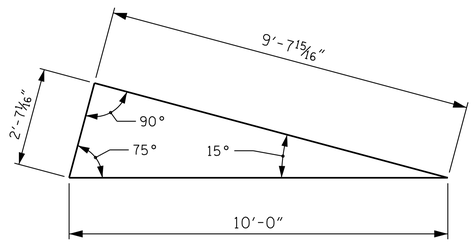
END ELEVATION NORMAL TO SKEW

(LOW FLOW SILL/BAFFLE NOT SHOWN FOR CLARITY, SEE SHEET C4-5 FOR DETAILS)



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB



SKEW TRIANGLE

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 124+63.87 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 11 FT. X 12 FT. CONCRETE BOX CULVERT 106° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ANDREW L. PHILLIPS
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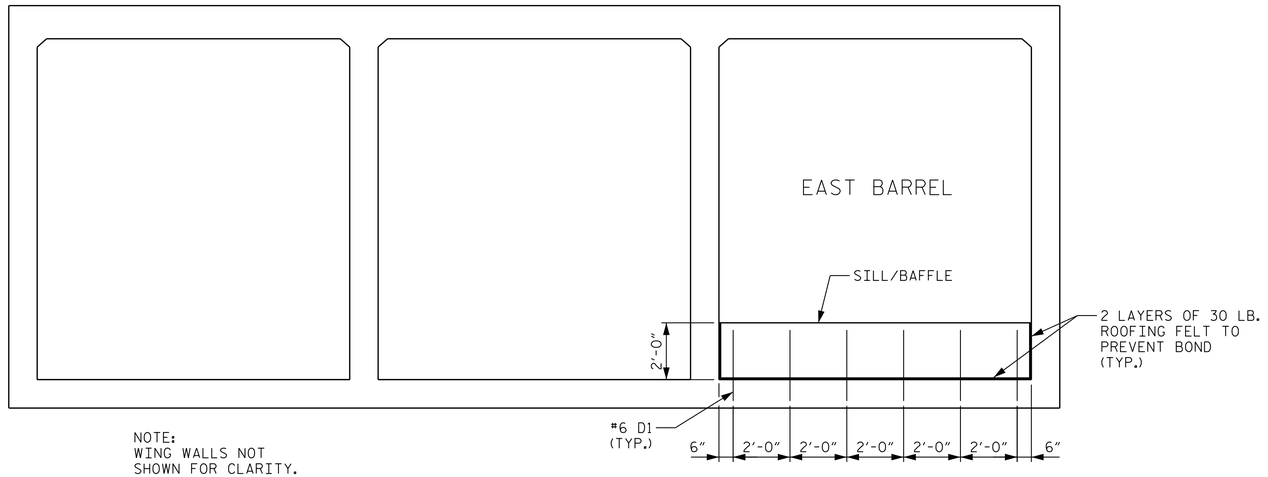
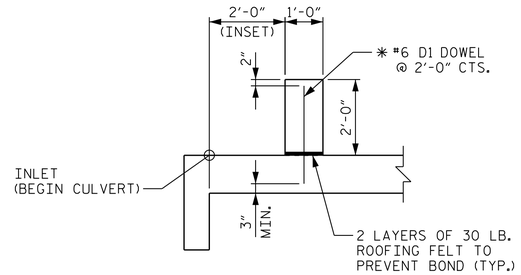
CULVERT 42C004



NOTE:
WING WALLS NOT SHOWN FOR CLARITY.

SILL/BAFFLE DETAIL - ELEVATION

(LOOKING DOWNSTREAM)



SECTION THRU SILL

(INLET END SHOWN, OUTLET END SIMILAR)

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

NOTE: SILL/BAFFLES ARE TO BE CAST NORMAL TO CULVERT WALLS.

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 124+63.87 -L-

SHEET 5 OF 7

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ANDREW L. PHILLIPS
2/10/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 11 FT. X 12 FT. CONCRETE BOX CULVERT 106° SKEW

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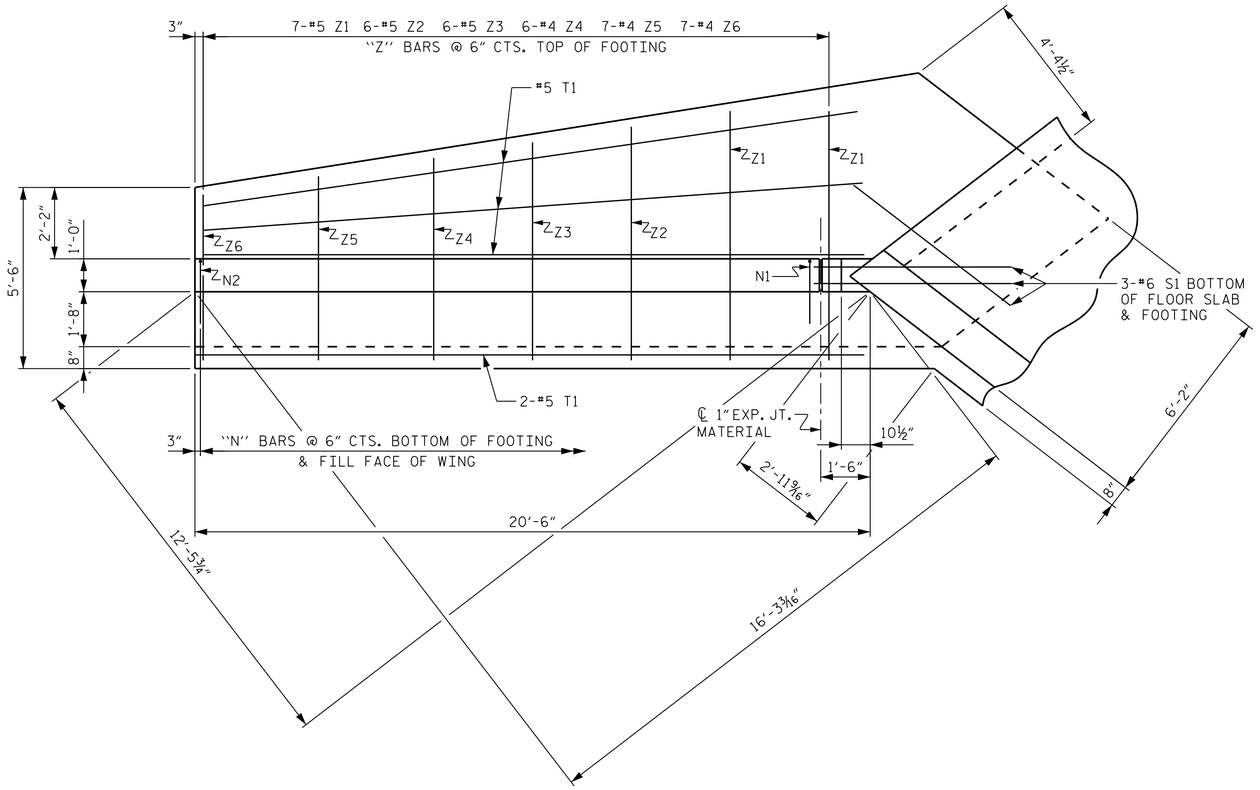
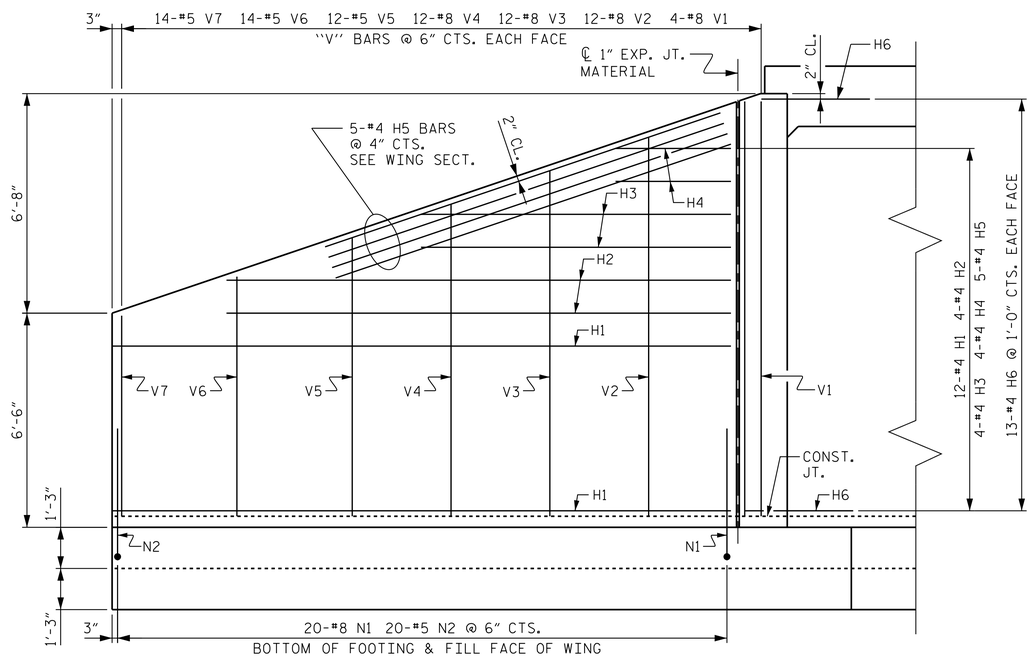
CULVERT 42C004



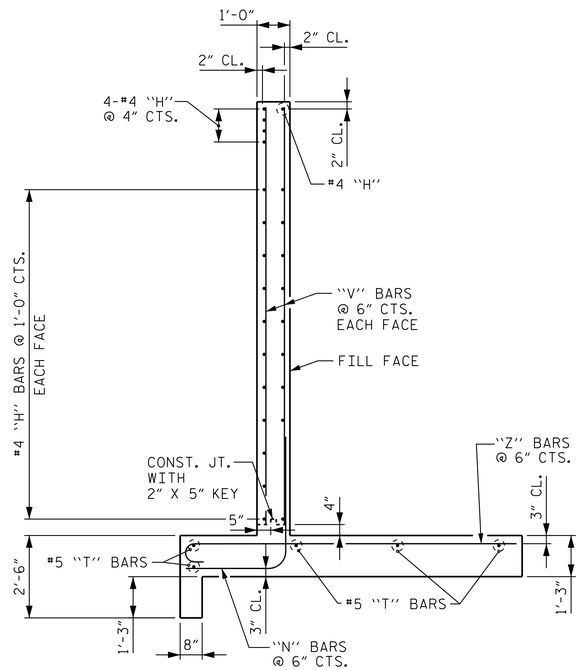
PLAN W1



ELEVATION W1

NOTES

SEE SHEET C4-7 FOR BILL OF MATERIAL.



TYPICAL WING SECTION

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 124+63.87 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING DETAILS FOR CONCRETE BOX CULVERT

H = 12'-0" SLOPE = 2:1
105° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-6
1			3			TOTAL SHEETS
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NORTH CAROLINA
SEAL
040769
ENGINEER
ANDREW L. PHILLIPS
2/10/2025

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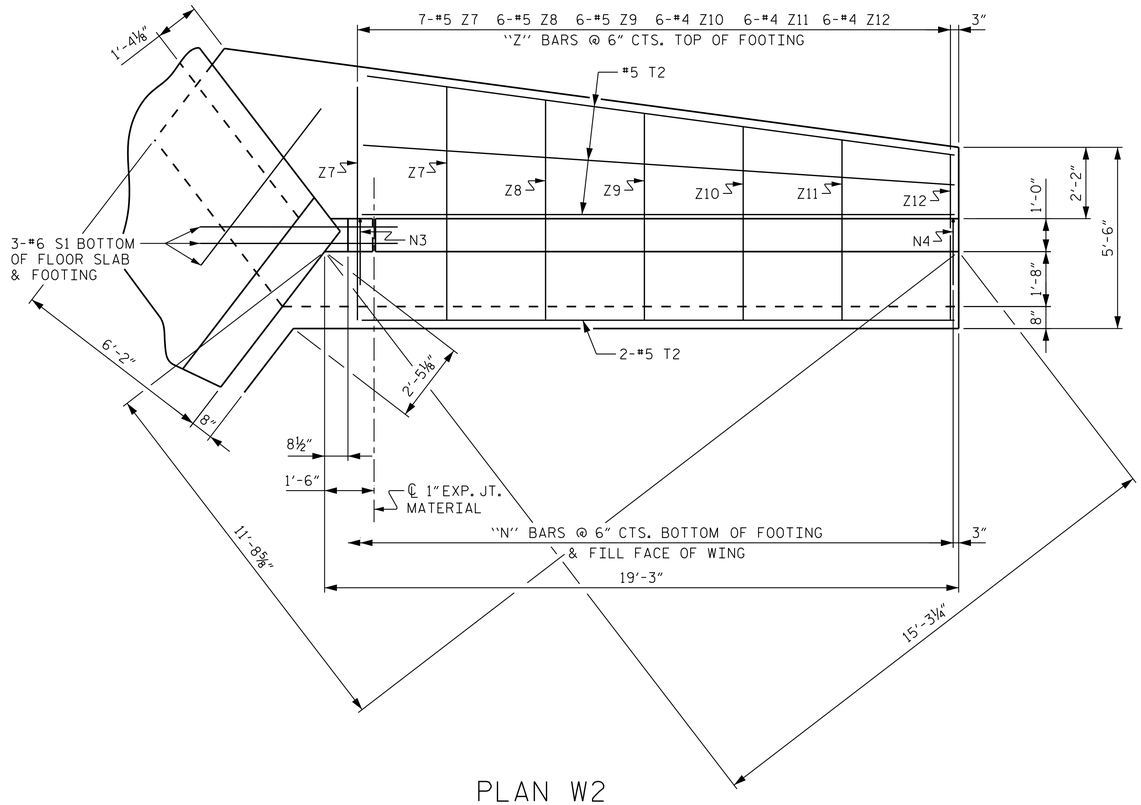
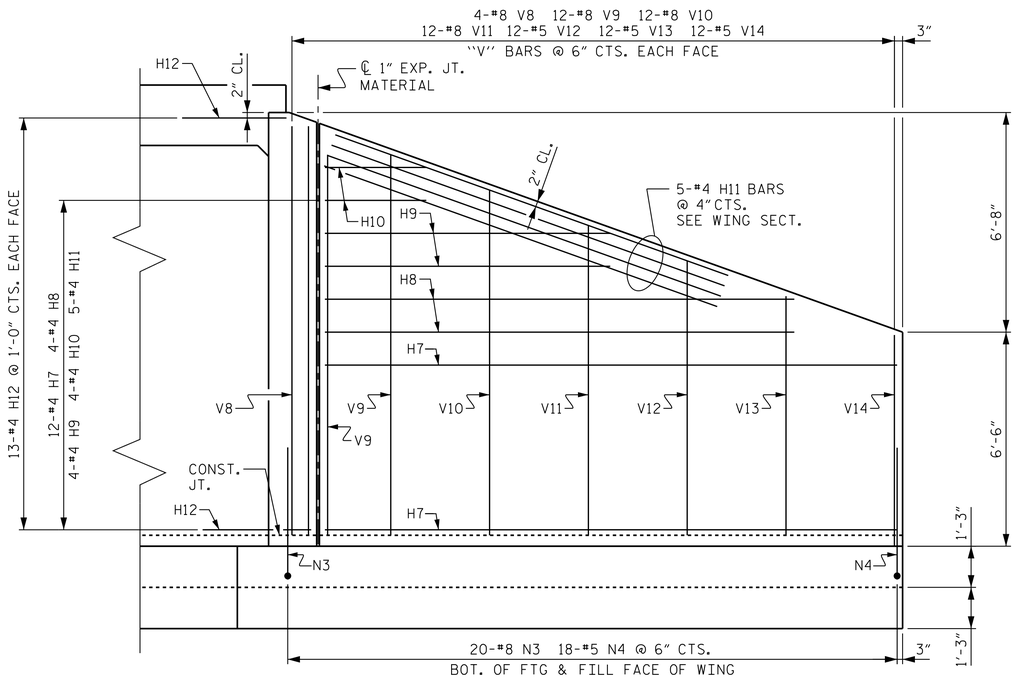
CULVERT 42C004



PLAN W2



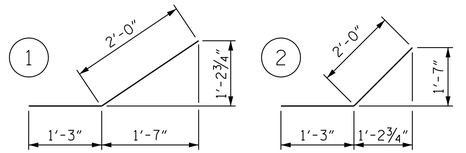
ELEVATION W2

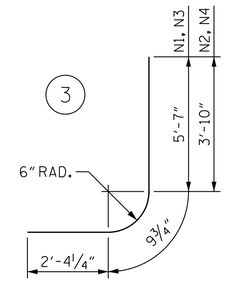
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	24	4	STR	18'-7"	298
H2	8	4	STR	15'-3"	81
H3	8	4	STR	9'-4"	50
H4	8	4	STR	3'-6"	19
H5	10	4	STR	19'-8"	131
H6	52	4	1	3'-3"	113
H7	24	4	STR	17'-4"	278
H8	8	4	STR	14'-3"	76
H9	8	4	STR	8'-7"	46
H10	8	4	STR	3'-0"	16
H11	10	4	STR	18'-5"	123
H12	52	4	2	3'-3"	113
N1	40	8	3	8'-9"	935
N2	40	5	3	7'-0"	292
N3	40	8	3	8'-9"	935
N4	36	5	3	7'-0"	263
S1	12	6	STR	6'-0"	108
T1	10	5	STR	19'-6"	203
T2	10	5	STR	18'-0"	188
V1	8	8	STR	12'-7"	269
V2	24	8	STR	11'-6"	737
V3	24	8	STR	10'-5"	668
V4	24	8	STR	9'-5"	603
V5	24	5	STR	8'-5"	211
V6	28	5	STR	7'-3"	212
V7	28	5	STR	6'-1"	178
V8	8	8	STR	12'-5"	265
V9	24	8	STR	11'-5"	732
V10	24	8	STR	10'-4"	662
V11	24	8	STR	9'-3"	593
V12	24	5	STR	8'-2"	204
V13	24	5	STR	7'-1"	177
V14	24	5	STR	6'-0"	150
Z1	14	5	4	8'-1"	118
Z2	12	5	4	7'-8"	96
Z3	12	5	4	7'-2"	90
Z4	12	4	4	6'-7"	53
Z5	14	4	4	6'-1"	57
Z6	14	4	4	5'-6"	51
Z7	14	5	4	7'-8"	112
Z8	12	5	4	7'-3"	91
Z9	12	5	4	6'-10"	86
Z10	12	4	4	6'-4"	51
Z11	12	4	4	5'-11"	47
Z12	12	4	4	5'-6"	44

REINFORCING STEEL FOR 4 WINGS	10,825 LBS
CLASS A CONCRETE	
4 WINGS	63.8 CY
2 HEADWALL	3.5 CY
2 END CURTAIN WALL	3.9 CY
TOTAL	71.2 CY

BAR TYPES





Z1	7'-6"	7"
Z2	7'-1"	7"
Z3	6'-7"	7"
Z4	6'-1"	6"
Z5	5'-7"	6"
Z6	5'-0"	6"
Z7	7'-1"	7"
Z8	6'-8"	7"
Z9	6'-3"	7"
Z10	5'-10"	6"
Z11	5'-5"	6"
Z12	5'-0"	6"
		HK.

4

ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. R-5930B

CHATHAM COUNTY

STATION: 124+63.87 -L-

SHEET 7 OF 7

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040769 ANDREW L. PHILLIPS 2/10/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING DETAILS FOR CONCRETE BOX CULVERT

H = 12'-0" SLOPE = 2:1

105° SKEW

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-7
1			3			TOTAL SHEETS
2			4			7

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DESIGN ENGINEER OF RECORD: A. L. PHILLIPS DATE: 03/2024

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CULVERT 42C004

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 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 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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