

09, 08, / 99

TIP PROJECT: A-0009CC

CONTRACT: C204812

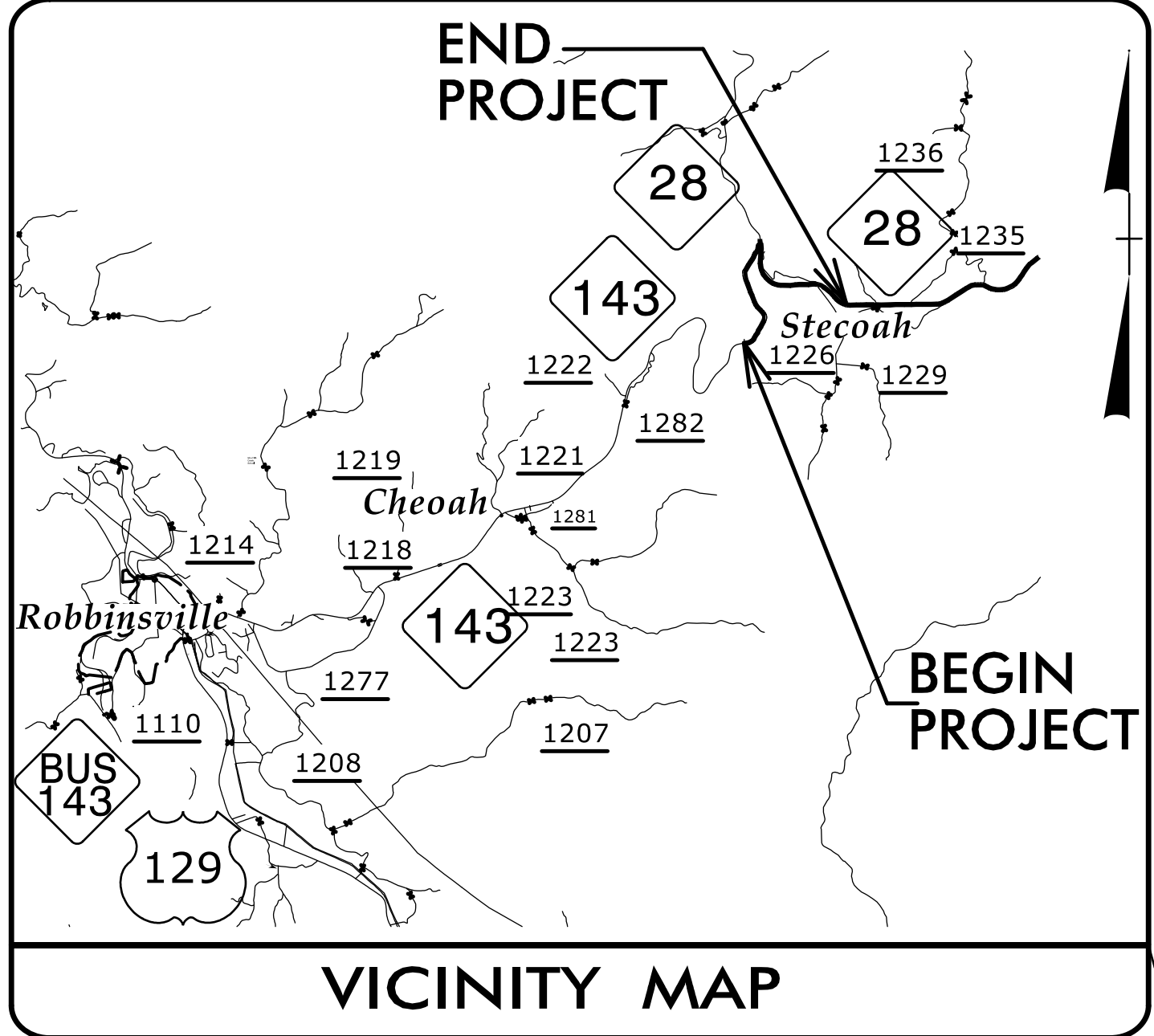
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GRAHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CC		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
32572.1.FS10	APD-007(178)	PE	
32572.2.15	0143011	ROW	
32572.2.17	0143011	UTIL.	
32572.3.15	0143011	CONST.	

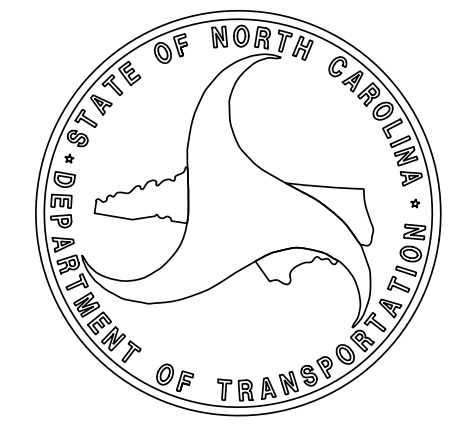
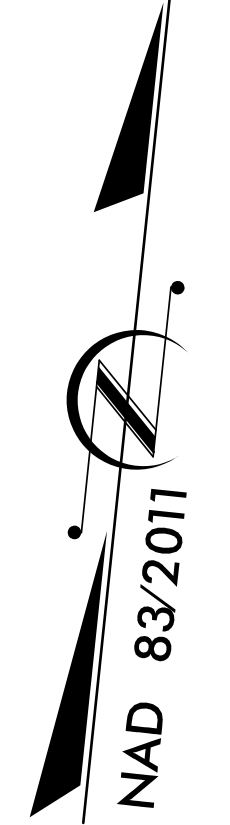
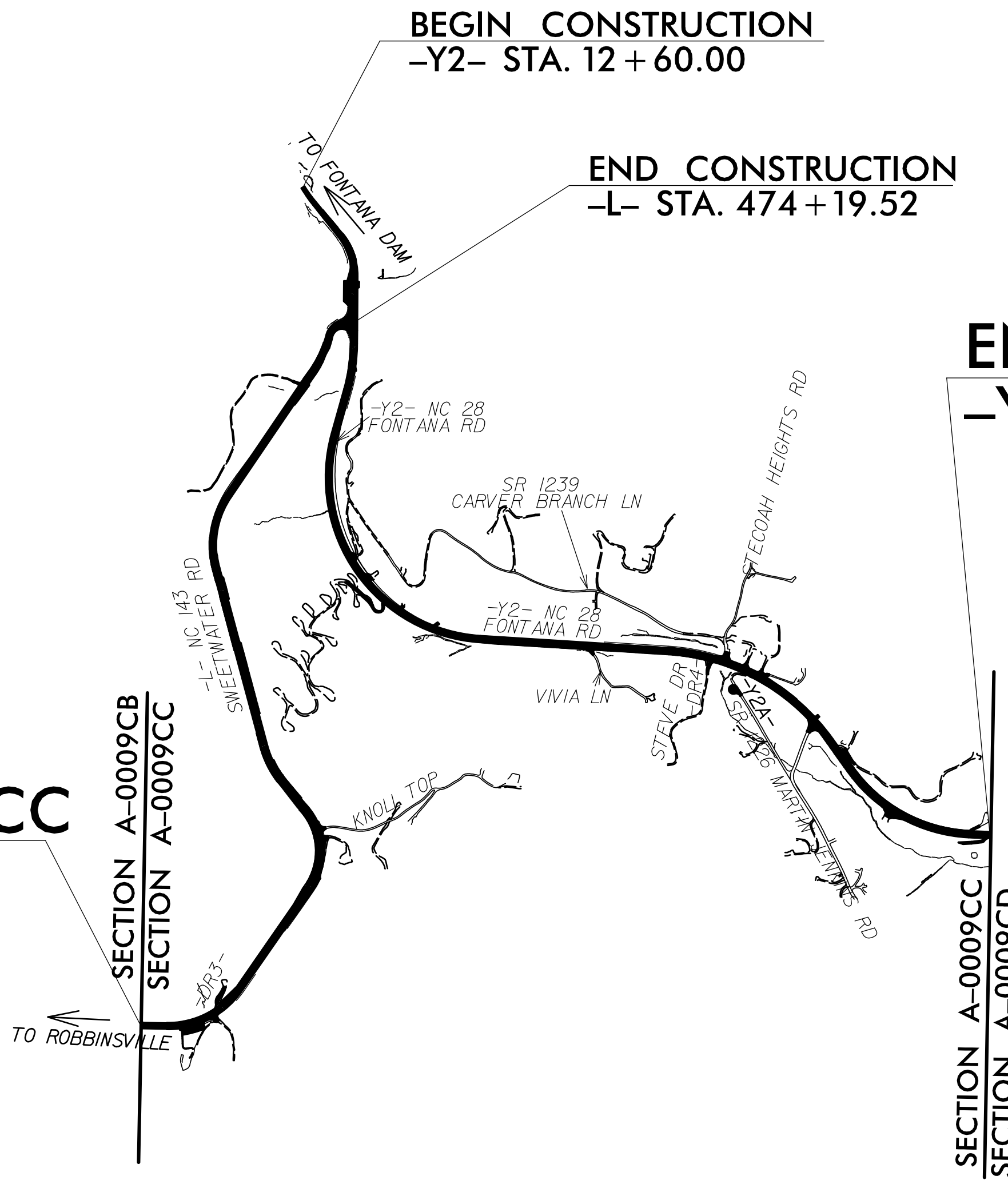
LOCATION: UPGRADE NC 143 FROM 0.5 MILES NORTH OF APPALACHIAN TRAIL TO NC 28. UPGRADE NC 28 FROM 0.2 MILES WEST OF NC 143 TO 0.2 MILES EAST OF SR 1228 (STECOAH RD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, CULVERTS, & RETAINING WALLS



CULVERTS

BEGIN TIP PROJECT A-0009CC
-L- STA. 414 + 50.00



-L- DESIGN DATA

ADT 2022 =	6590
ADT 2045 =	8800
K =	11 %
D =	57.5 %
T =	7 % *
V =	60 MPH
* TTST = 2% DUAL = 5%	
FUNC CLASS = RURAL ARTERIAL REGIONAL TIER	

-Y2- DESIGN DATA

ADT 2022 =	3800
ADT 2045 =	5200
K =	11 %
D =	67.5 %
T =	7 % *
V =	50 MPH
* TTST = 2% DUAL = 5%	
FUNC CLASS = RURAL ARTERIAL REGIONAL TIER	

PROJECT LENGTH

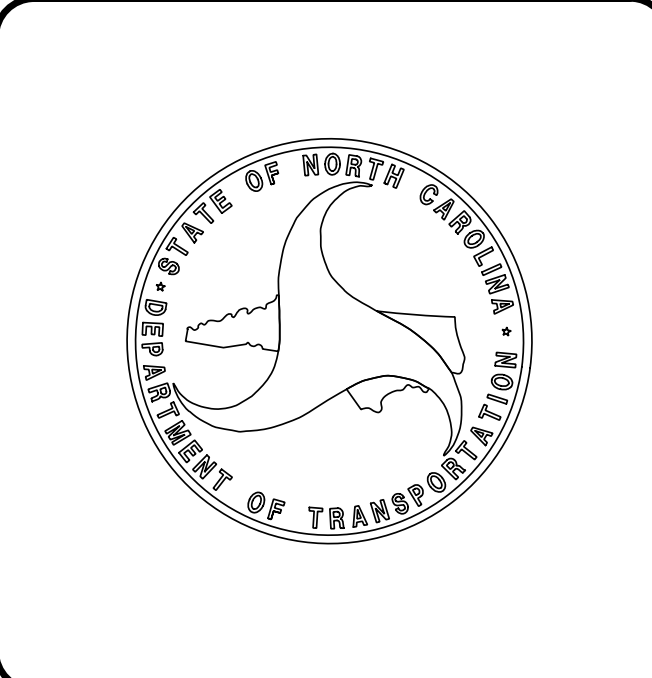
LENGTH ROADWAY TIP PROJECT A-0009CC:	
-L-	= 1.131 MILES
-Y2-	= 2.964 MILES
TOTAL LENGTH TIP PROJECT A-0009CC	= 4.104 MILES

NCDOT CONTACT: WANDA H. AUSTIN, PE

PLANS PREPARED BY:	PLANS PREPARED FOR:
 TGS ENGINEERS 201 W. MARION ST SHELBY, NC 28150 PH (704) 476-0003 CORP. LICENSE NO.: C-0275	NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION 14 252 Webster Rd Sylva, NC 28779
LETTING DATE: DECEMBER 20, 2022	MARC CHEEK, PE STRUCTURES DESIGN ENGINEER
2018 STANDARD SPECIFICATIONS	

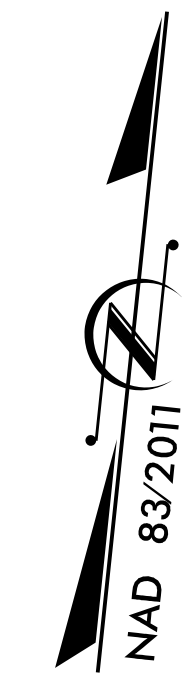
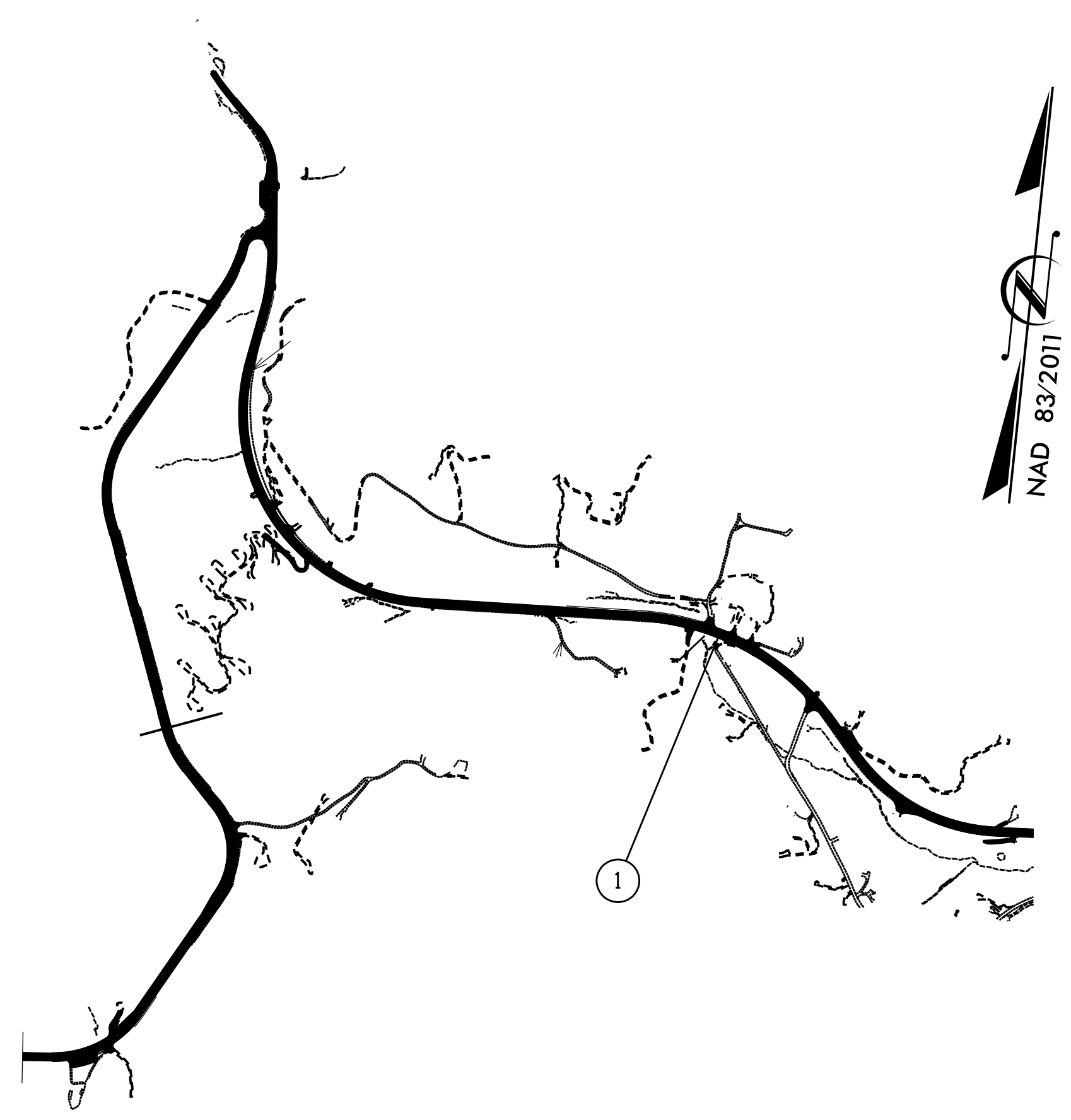
STRUCTURES DESIGN ENGINEER

10/28/2022 | 1:35 PM EDT



10/28/2022
\$\$\$\$\$\$\$\$\$DCN\$\$\$\$\$
User:ZSmITH

INDEX			
STR.	STATION	DESCRIPTION	SHEET NUMBERS
1	66+85.00 -Y2-	SINGLE 6 FT.X 6 FT. REINFORCED CONCRETE BOX CULVERT RIGHT EXT.	C1-1 THRU C1-7
W21	420+39.00 -L- TO 436+65.00 -L-	SOIL NAIL RETAINING WALL	W21-1 THRU W21-5
W22	438+96.00 -L- TO 442+58.00 -L-	SOIL NAIL RETAINING WALL	W22-1 THRU W22-3
W23	448+40.00 -L- TO 452+25.00 -L-	SOIL NAIL RETAINING WALL	W23-1 THRU W23-3
W24	453+25.00 -L- TO 456+25.00 -L-	SOIL NAIL RETAINING WALL	W24-1 THRU W24-3
W25	468+75.00 -L- TO 471+75.00 -L-	SOIL NAIL RETAINING WALL	W25-1 THRU W25-3
W26	421+36.00 -L- TO 423+54.00 -L-	MSE RETAINING WALL	W26-1 THRU W26-3
W27	427+36.00 -L- TO 431+45.00 -L-	SHORED MSE RETAINING WALL	W27-1 THRU W27-8
W30	26+50.00 -Y2- TO 28+75.00 -Y2-	SHORED MSE RETAINING WALL	W30-1 THRU W30-7
W32	58+90.00 -Y2- TO 66+83.00 -Y2-	SHORED MSE RETAINING WALL	W32-1 THRU W32-7
W33	63+75.00 -Y2- TO 66+03.00 -Y2-	SOIL NAIL RETAINING WALL	W33-1 THRU W33-3
W34	71+25.00 -Y2- TO 72+75.00 -Y2-	CAST-IN-PLACE GRAVITY RETAINING WALL	W34-1 THRU W34-2
W35	77+94.00 -Y2- TO 88+25.00 -Y2-	SOIL NAIL RETAINING WALL	W35-1 THRU W35-4
W39	14+59.00 -Y2- TO 16+25.00 -Y2-	SOIL NAIL RETAINING WALL	W39_40-1 THRU W39_40-3
W40	16+75.00 -Y2- TO 18+70.00 -Y2-	SOIL NAIL RETAINING WALL	W39_40-1 THRU W39_40-3



10/18/2022 | 9:49 AM EDT
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 UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
 706 HILLSBOROUGH STREET
 SUITE 200
 RALEIGH, NC 27603
 PH (919) 773-8887
 CORP. LICENSE NO.: C-0275

PROJECT NO. A-0009CC
GRAHAM COUNTY

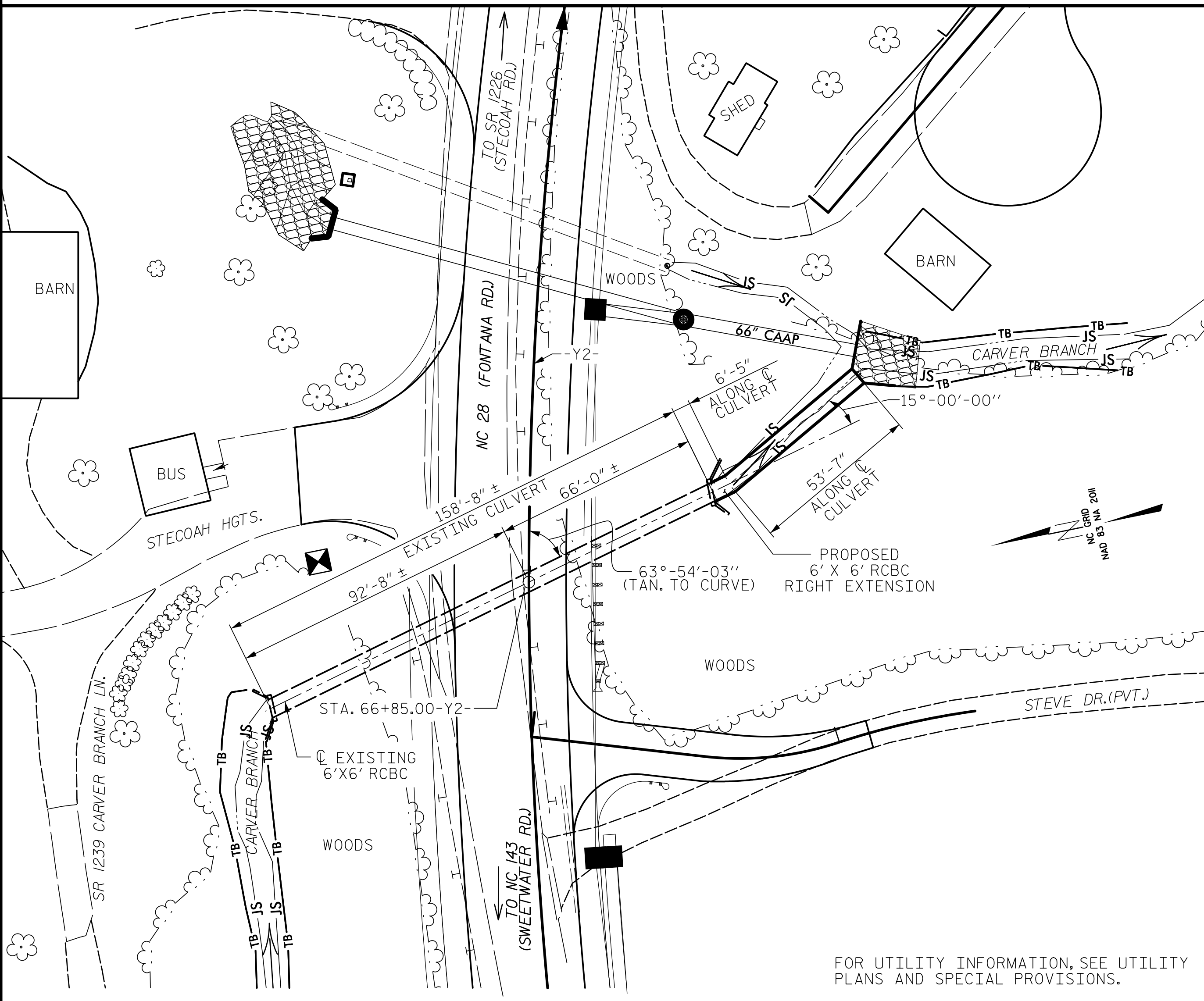
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

STRUCTURE INDEX

DRAWN BY : S.B. WILLIAMS DATE : 10-22
 CHECKED BY : MGC DATE : 10-22

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

BENCH MARK #31: SPIKE NAIL IN BASE OF 26" POPLAR; 30' LT STA. 68+35.00 -L-; ELEV. = 2178.05'



LOCATION SKETCH

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
BARREL @ 0.73 CY/FT	44.1 C.Y.
WINGS, ETC.	10.6 C.Y.
TOTAL	54.7 C.Y.
REINFORCING STEEL	
BARREL	6,066 LBS.
WINGS, ETC.	518 LBS.
TOTAL	6,584 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	48 TONS

ROADWAY DATA	
GRADE POINT ELEV. @ STA. 66+85.00-Y2-	= 2181.31
BED ELEV. @ STA. 66+85.00-Y2-	= 2139.0±
ROADWAY SLOPES	= 2:1
HYDROGRAPHIC DATA	
DESIGN DISCHARGE	= 440 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS
DESIGN HIGH WATER ELEVATION	= 2154.0
DRAINAGE AREA	= 0.62 SQ. MI.
BASE DISCHARGE (Q100)	= 550 CFS
BASE HIGH WATER ELEVATION	= 2156.9
OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	= 730 CFS
FREQUENCY OF OVERTOPPING FLOOD	= >100 YRS
OVERTOPPING FLOOD ELEVATION	= 2163.1

NOTES:

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.
- DESIGN FILL----- 20.4'
- FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTES SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN CULVERT TO BE POURED IN THE FOLLOWING ORDER:
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
- 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.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS, EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.

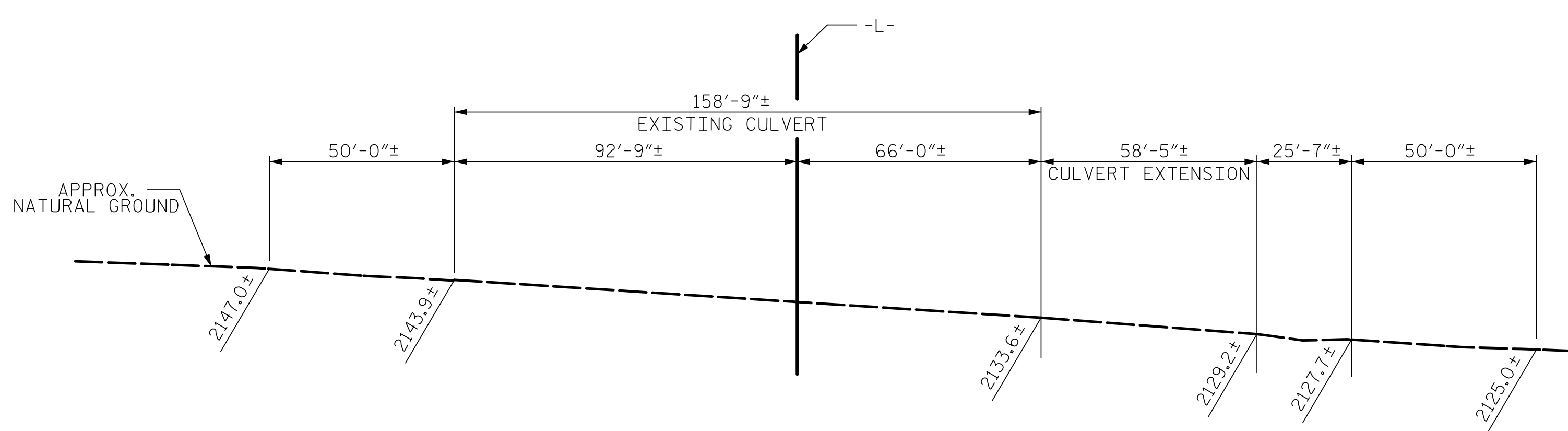
THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPICED 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.

EXCAVATE 12 INCHES BELOW THE BOTTOM OF THE CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414 OF THE STANDARD SPECIFICATIONS. FOUNDATION CONDITIONING MATERIAL SHOULD CONSIST OF SELECT MATERIAL CLASS V OR VI FOR CULVERTS.

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

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

IF REQUIRED, UNDERCUT LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL.



PROFILE ALONG CULVERT

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

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

PROJECT NO. A-0009CC
GRAHAM COUNTY
 STATION: 66+85.00 -Y2-

SHEET 1 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SEAL
 20125
 ENGINEER
 MARSHALL G. CHECK, JR.

7/13/2022

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TGS ENGINEERS
 706 HILLSBOROUGH STREET
 SUITE 200
 RALEIGH, NC 27603
 PH (919) 773-8887
 CORP. LICENSE NO.: C-0275

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

SHEET NO. C1-1

DRAWN BY :	ZCS	DATE :	05/21
CHECKED BY :	MGC	DATE :	09/21
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	11/21

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (γ _{LL})	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	1	3.74	--	1.75	4.50	1	TOP SLAB	3.67	3.74	1	EXTERIOR WALL	0.33		
	HL-93 (OPERATING)	N/A		4.85	--	1.35	5.83	1	TOP SLAB	3.67	4.85	1	EXTERIOR WALL	0.33		
	HS-20 (INVENTORY)	36.000	2	3.78	136.08	1.75	6.27	1	TOP SLAB	3.67	3.78	1	EXTERIOR WALL	0.33		
	HS-20 (OPERATING)	36.000		4.90	176.40	1.35	8.12	1	TOP SLAB	3.67	4.90	1	EXTERIOR WALL	0.33		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		4.83	65.21	1.40	10.78	1	EXTERIOR WALL	0.33	4.83	1	EXTERIOR WALL	0.33		
		SNGARBS2	20,000	4.79	95.80	1.40	9.68	1	EXTERIOR WALL	0.33	4.79	1	EXTERIOR WALL	0.33		
		SNAGRIS2	22,000	4.78	105.16	1.40	9.39	1	EXTERIOR WALL	0.33	4.78	1	EXTERIOR WALL	0.33		
		SNCOTTS3	27,250	4.70	128.08	1.40	6.81	1	TOP SLAB	3.67	4.70	1	EXTERIOR WALL	0.33		
		SNAGGRS4	34,925	4.66	162.75	1.40	4.97	1	TOP SLAB	3.67	4.66	1	EXTERIOR WALL	0.33		
		SNS5A	35,550	4.66	165.66	1.40	5.14	1	TOP SLAB	3.67	4.66	1	EXTERIOR WALL	0.33		
		SNS6A	39,950	4.65	185.77	1.40	4.90	1	TOP SLAB	3.67	4.65	1	EXTERIOR WALL	0.33		
	SNS7B	42,000	4.66	195.72	1.40	4.92	1	TOP SLAB	3.67	4.66	1	EXTERIOR WALL	0.33			
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		4.69	154.77	1.40	5.97	1	TOP SLAB	3.67	4.69	1	EXTERIOR WALL	0.33	
		TNT4A	33,075		4.69	155.12	1.40	6.01	1	TOP SLAB	3.67	4.69	1	EXTERIOR WALL	0.33	
		TNT6A	41,600		4.63	192.61	1.40	4.69	1	TOP SLAB	3.67	4.63	1	BOTTOM SLAB	0.33	
		TNT7A	42,000		4.57	191.94	1.40	4.59	1	TOP SLAB	3.67	4.57	1	BOTTOM SLAB	0.33	
		TNT7B	42,000		4.63	194.46	1.40	4.71	1	TOP SLAB	3.67	4.63	1	EXTERIOR WALL	0.67	
		TNAGRIT4	43,000		4.64	199.52	1.40	4.74	1	TOP SLAB	3.67	4.64	1	EXTERIOR WALL	0.67	
TNAGT5A		45,000		4.55	204.75	1.40	4.55	1	TOP SLAB	3.67	4.63	1	EXTERIOR WALL	0.33		
TNAGT5B	45,000	3	4.29	193.05	1.40	4.39	1	TOP SLAB	3.67	4.29	1	BOTTOM SLAB	0.67			

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

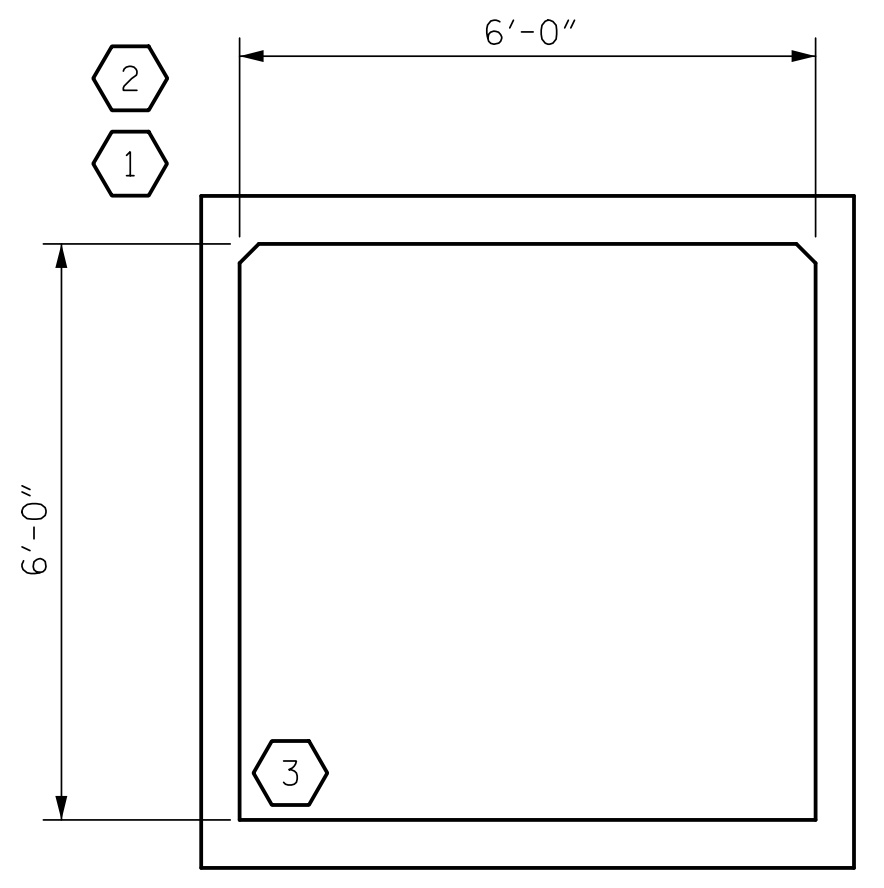
CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. A-0009CC
GRAHAM COUNTY
 STATION: 66+85.00 -Y2-

SHEET 2 OF 7

7/13/2022

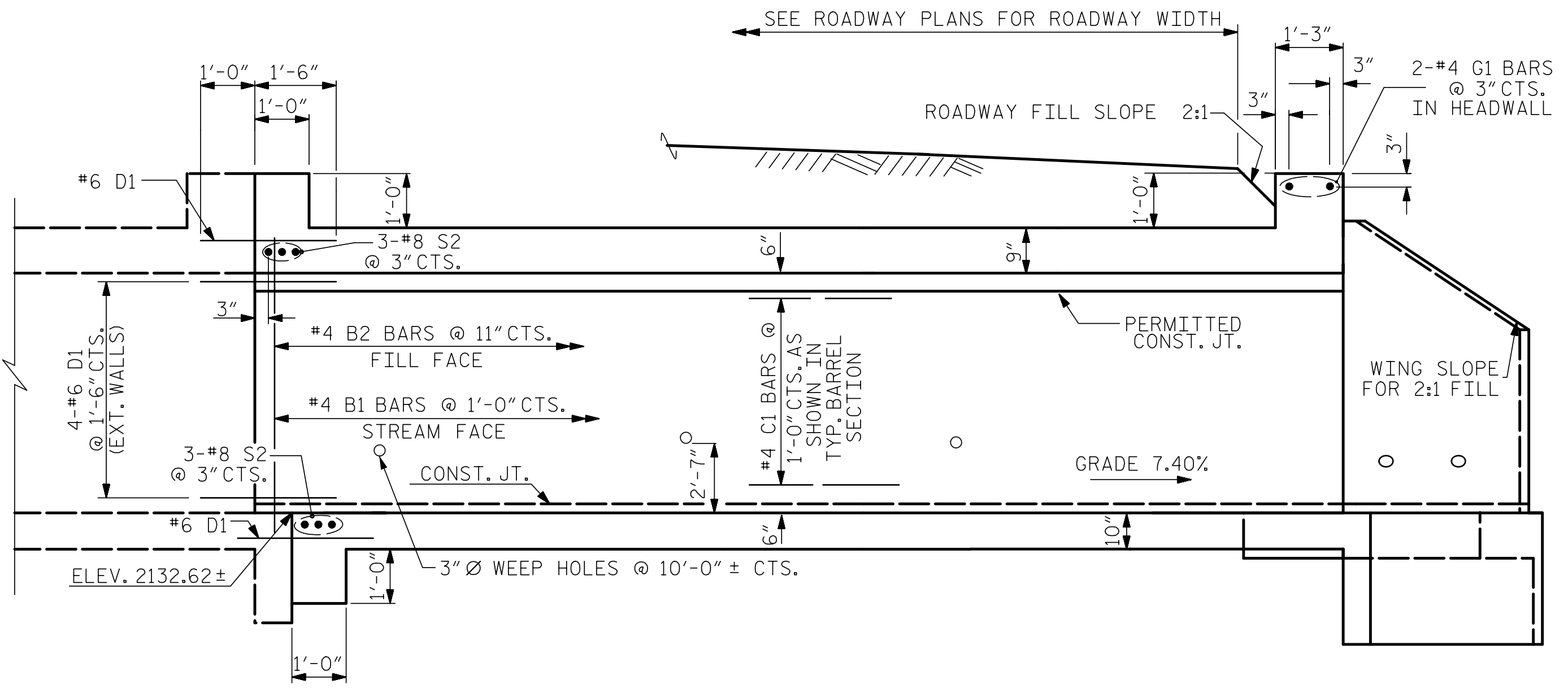
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

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

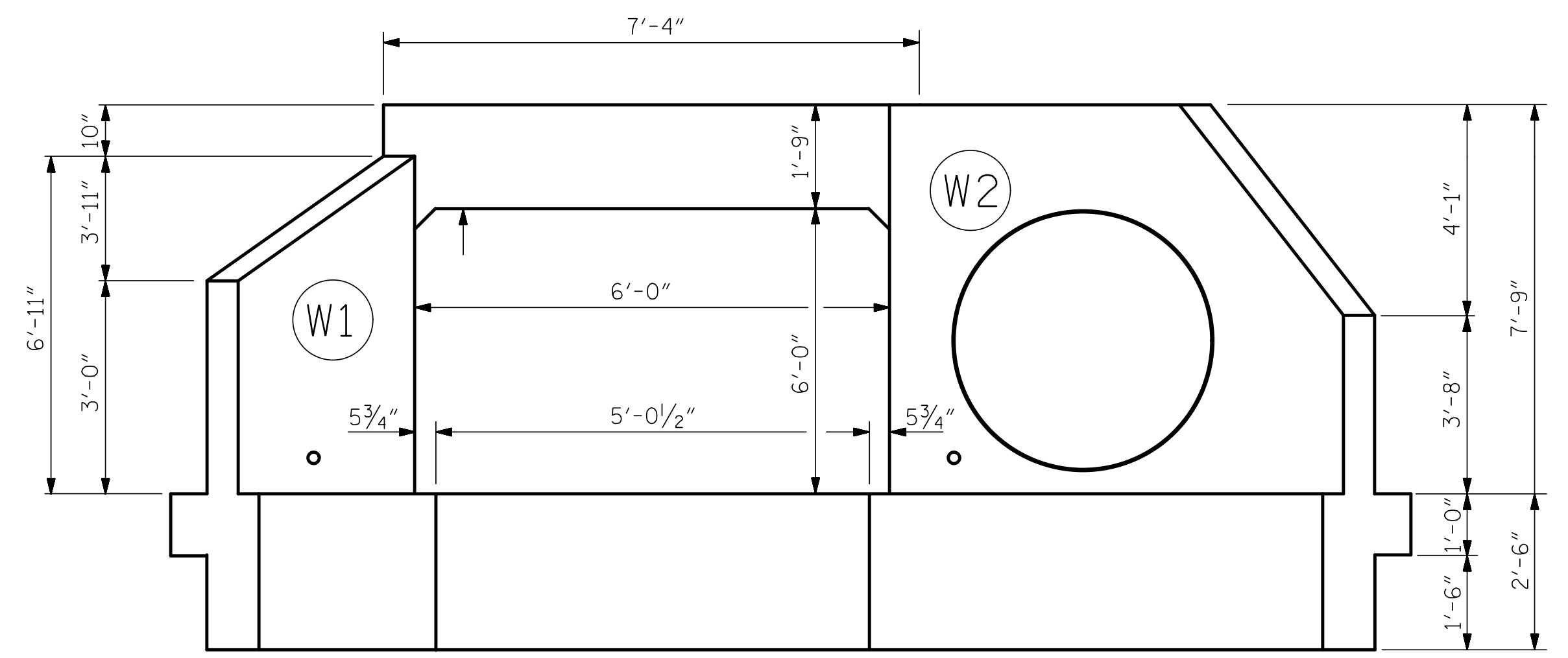
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS
2			4			7

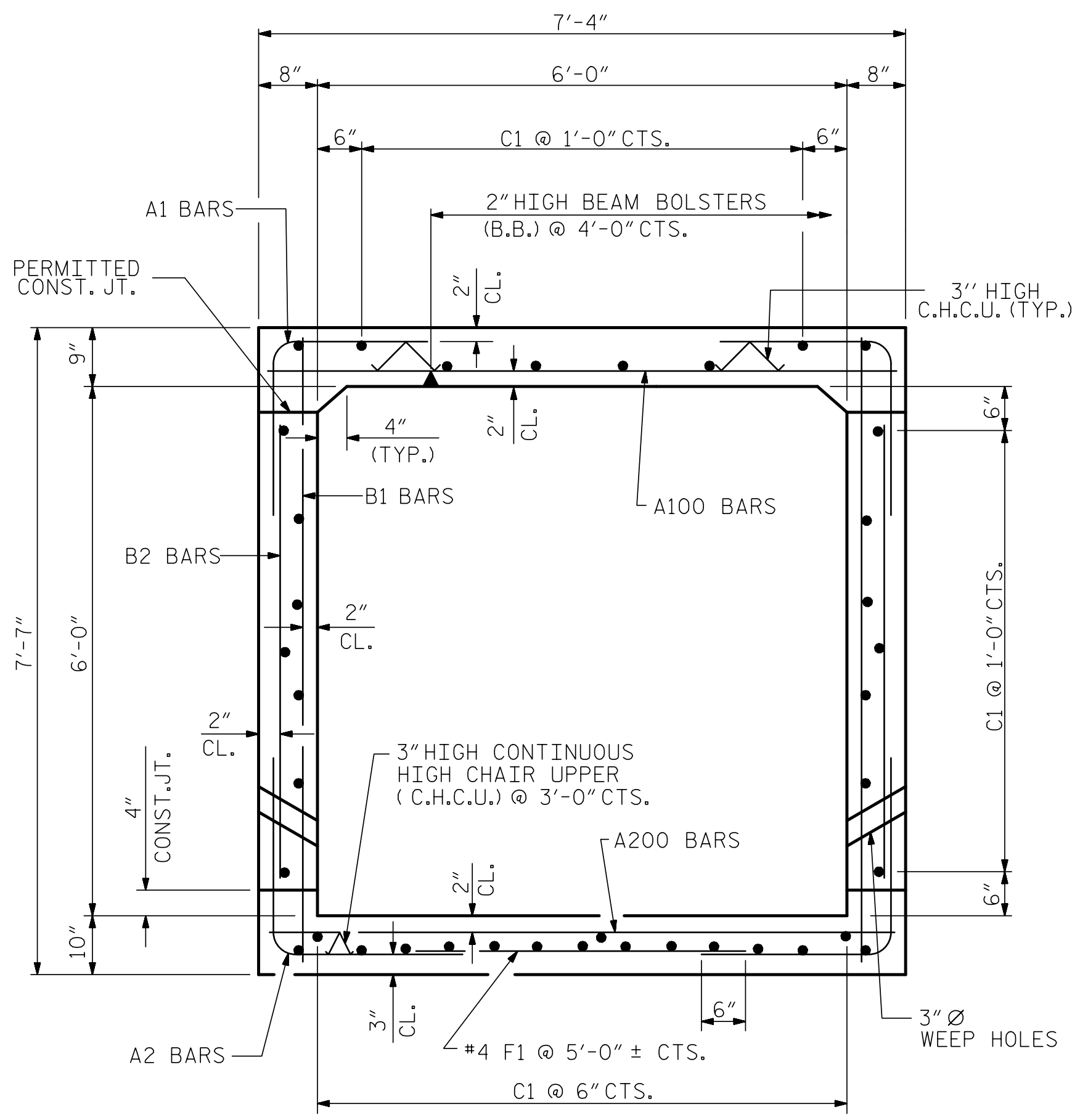
ASSEMBLED BY : ZCS	DATE : 05/21
CHECKED BY : MGC	DATE : 09/21
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC



CULVERT EXTENSION SECTION NORMAL TO ROADWAY

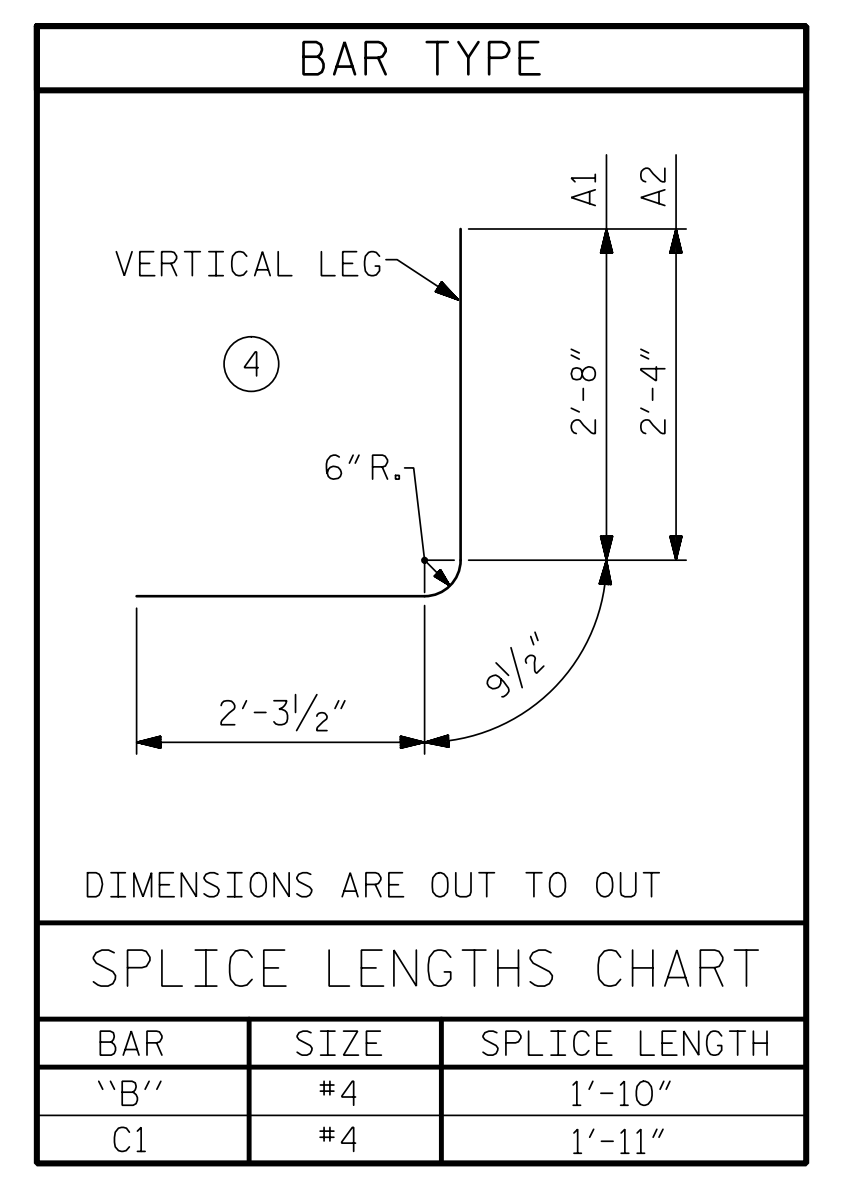


OUTLET END ELEVATION



RIGHT ANGLE SECTION OF BARREL
THERE ARE 38 "C" BARS IN SECTION OF BARREL

BAR SCHEDULE						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	130	#5	4	5'-9"	780	
A2	130	#5	4	5'-5"	734	
A100	78	#6	STR	6'-11"	810	
A101	2	#6	STR	5'-6"	17	
A102	3	#6	STR	2'-6"	11	
A200	78	#6	STR	6'-11"	810	
A201	2	#6	STR	5'-6"	17	
A202	3	#6	STR	2'-6"	11	
F1	13	#4	STR	2'-6"	22	
B1	121	#4	STR	7'-2"	579	
B2	130	#4	STR	5'-4"	463	
C1	76	#4	STR	31'-11"	1620	
D1	18	#6	STR	2'-6"	68	
G1	2	#4	STR	6'-11"	9	
S2	6	#8	STR	7'-2"	115	
REINFORCING STEEL					6,066 LBS	



PROJECT NO. A-0009CC
GRAHAM COUNTY
 STATION: 66+85.00 -Y2-

SHEET 3 OF 7

7/13/2022

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TGS ENGINEERS
 706 HILLSBOROUGH STREET
 SUITE 200
 RALEIGH, NC 27603
 PH (919) 773-8887
 CORP. LICENSE NO.: C-0275

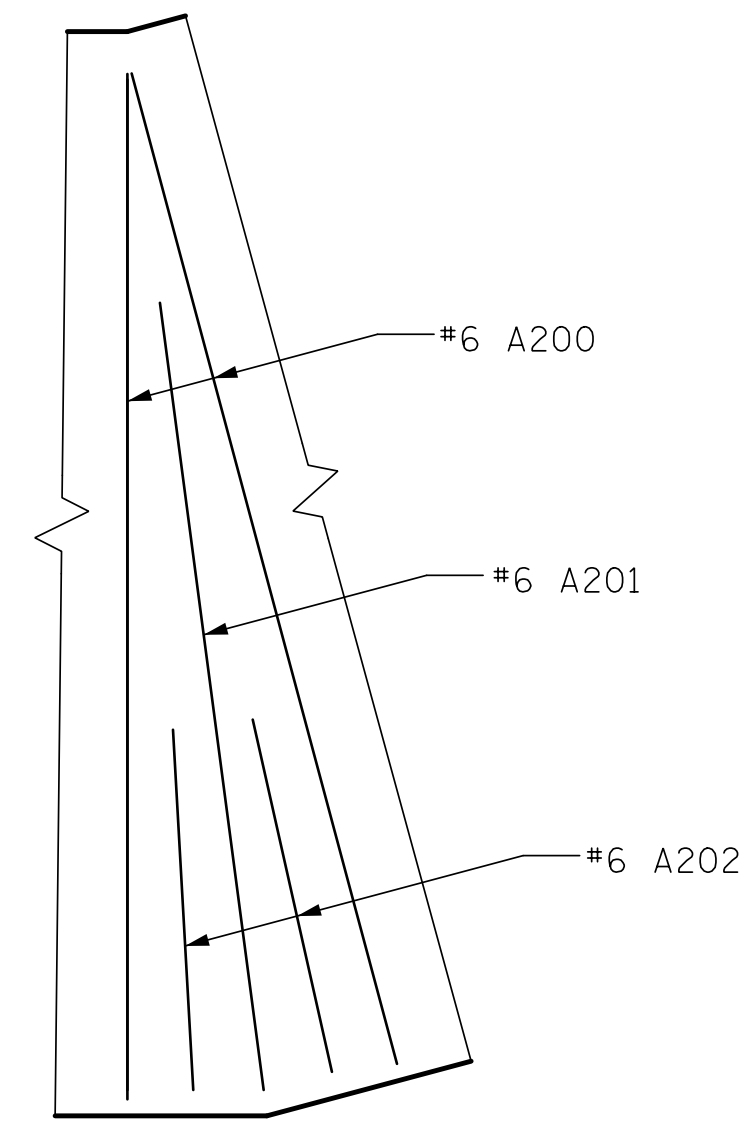
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SINGLE 6 FT. X 6 FT. CONCRETE BOX CULVERT EXTENSION
63°-54'-03" SKEW

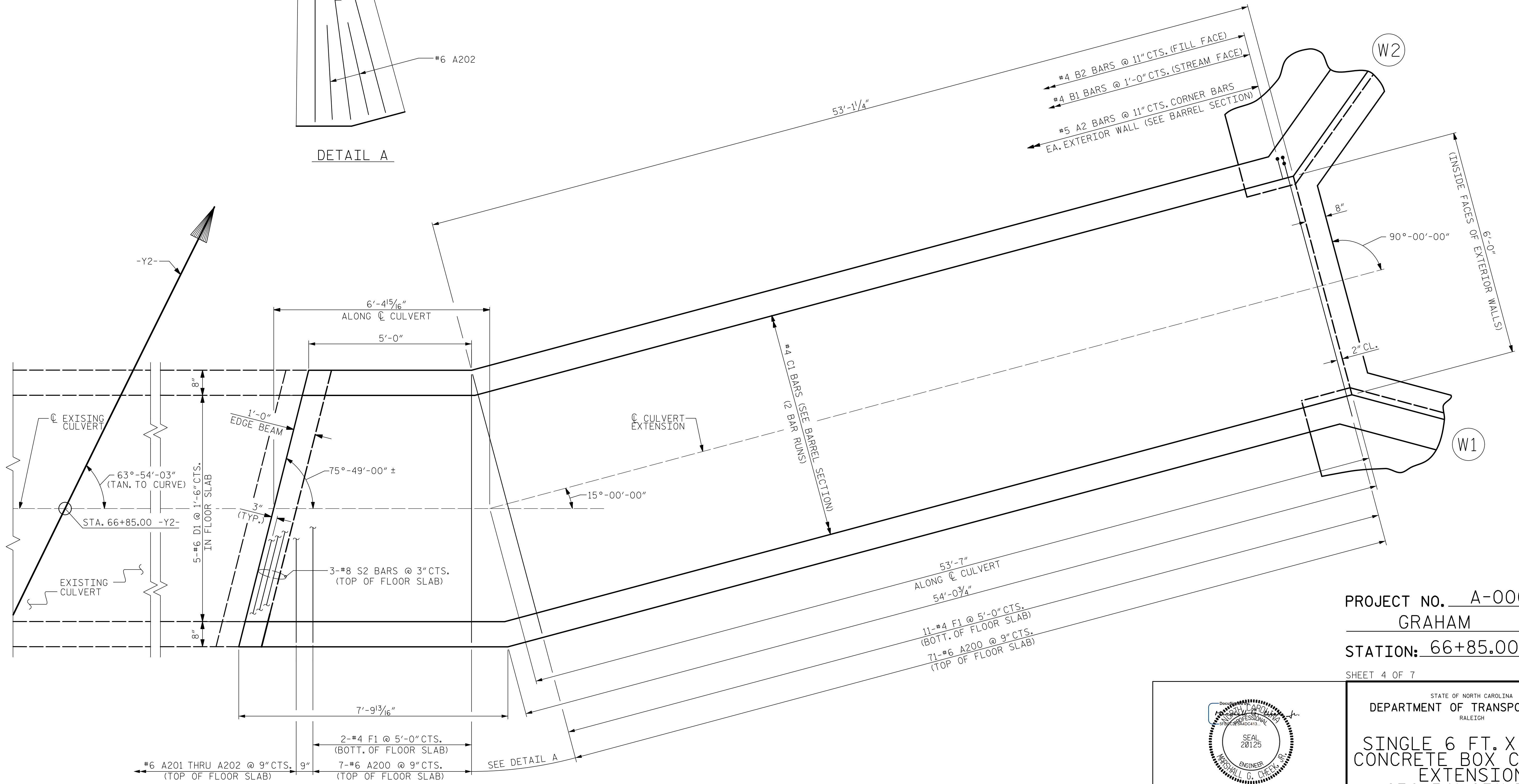
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-3
1			3			TOTAL SHEETS
2			4			7

STR. #1

DRAWN BY : ZCS DATE : 05/21
 CHECKED BY : MGC DATE : 09/21
 DESIGN ENGINEER OF RECORD: ZCS DATE : 6/22

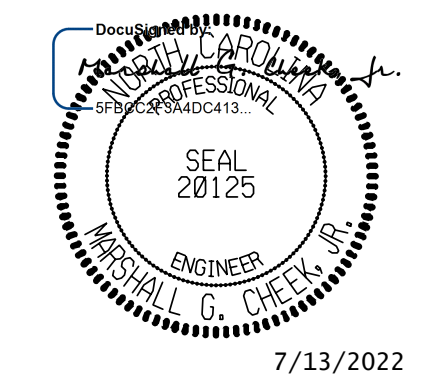


DETAIL A



PROJECT NO. A-0009CC
GRAHAM COUNTY
 STATION: 66+85.00 -Y2-

SHEET 4 OF 7



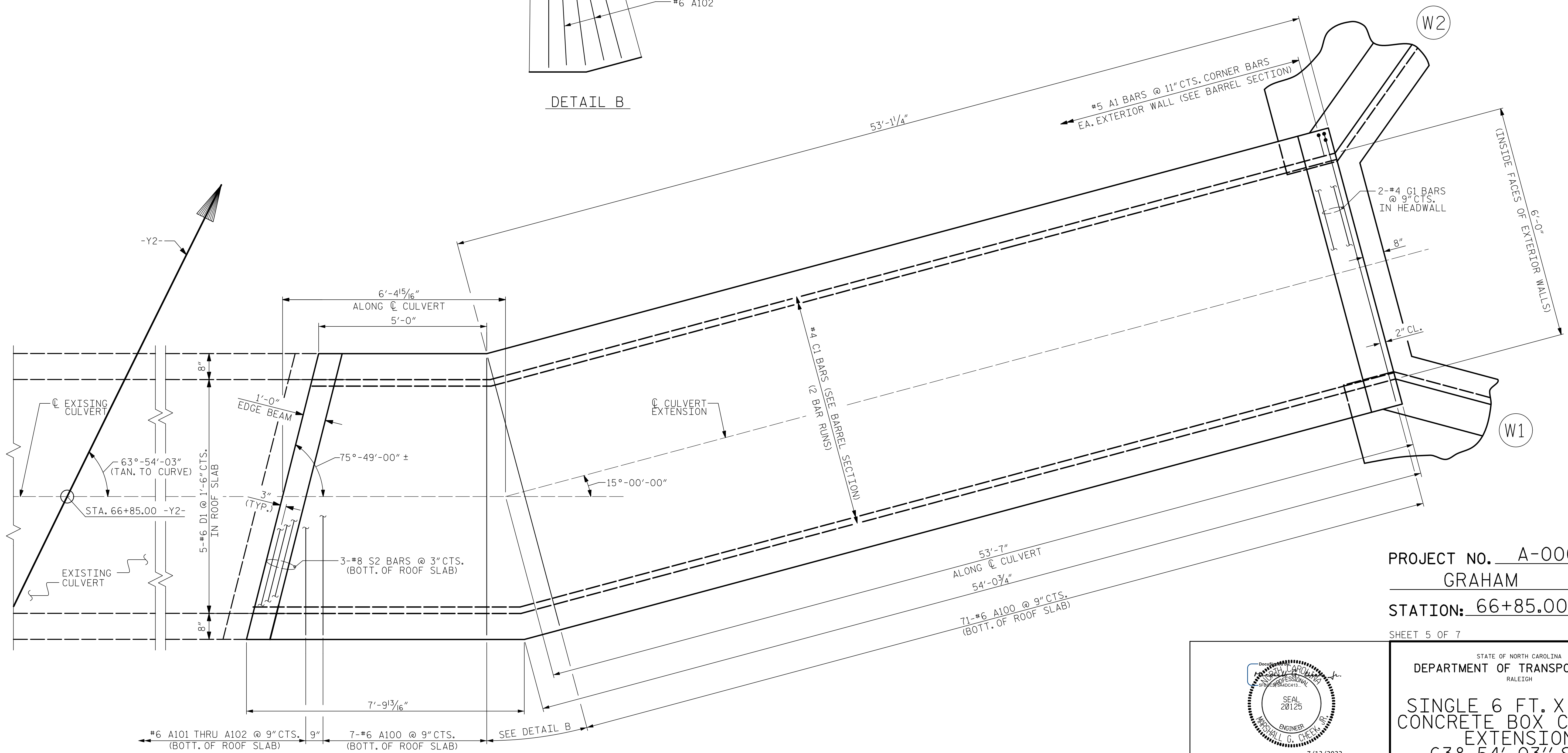
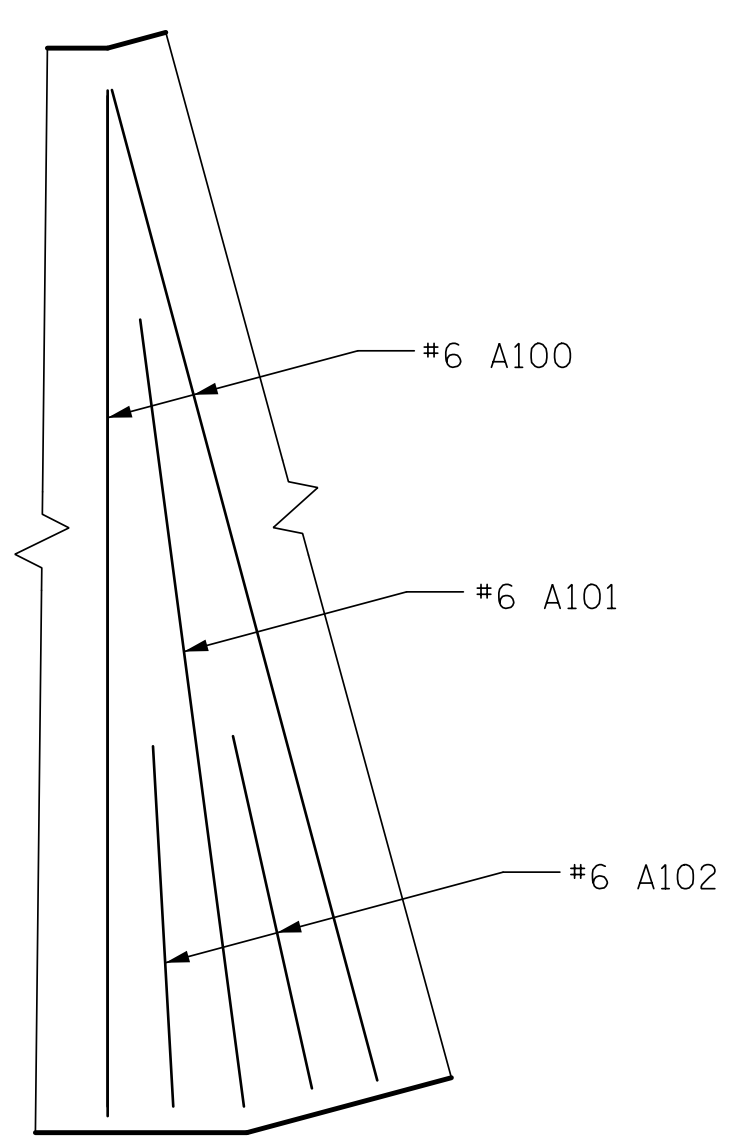
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 6 FT. X 6 FT.
 CONCRETE BOX CULVERT
 EXTENSION
 63°-54'-03" SKEW

PLAN OF FLOOR SLAB

NOTE: #4 C1 BARS SHALL BE FIELD BENT AS NECESSARY.
 FOR S1 BARS IN FLOOR SLAB & WING FOOTINGS, SEE WING SHEET.
 FOR D1 DOWELS IN INTERIOR WALLS, SEE SHEET 3 OF 7.

DRAWN BY :	ZCS	DATE :	05/21
CHECKED BY :	MGC	DATE :	09/21
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	06/22

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED					
TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. C1-4 TOTAL SHEETS 7

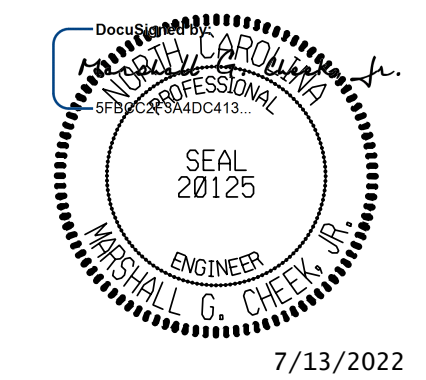


PLAN OF ROOF SLAB

NOTE: #4 C1 BARS SHALL BE FIELD BENT AS NECESSARY.

PROJECT NO. A-0009CC
GRAHAM COUNTY
 STATION: 66+85.00 -Y2-

SHEET 5 OF 7



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

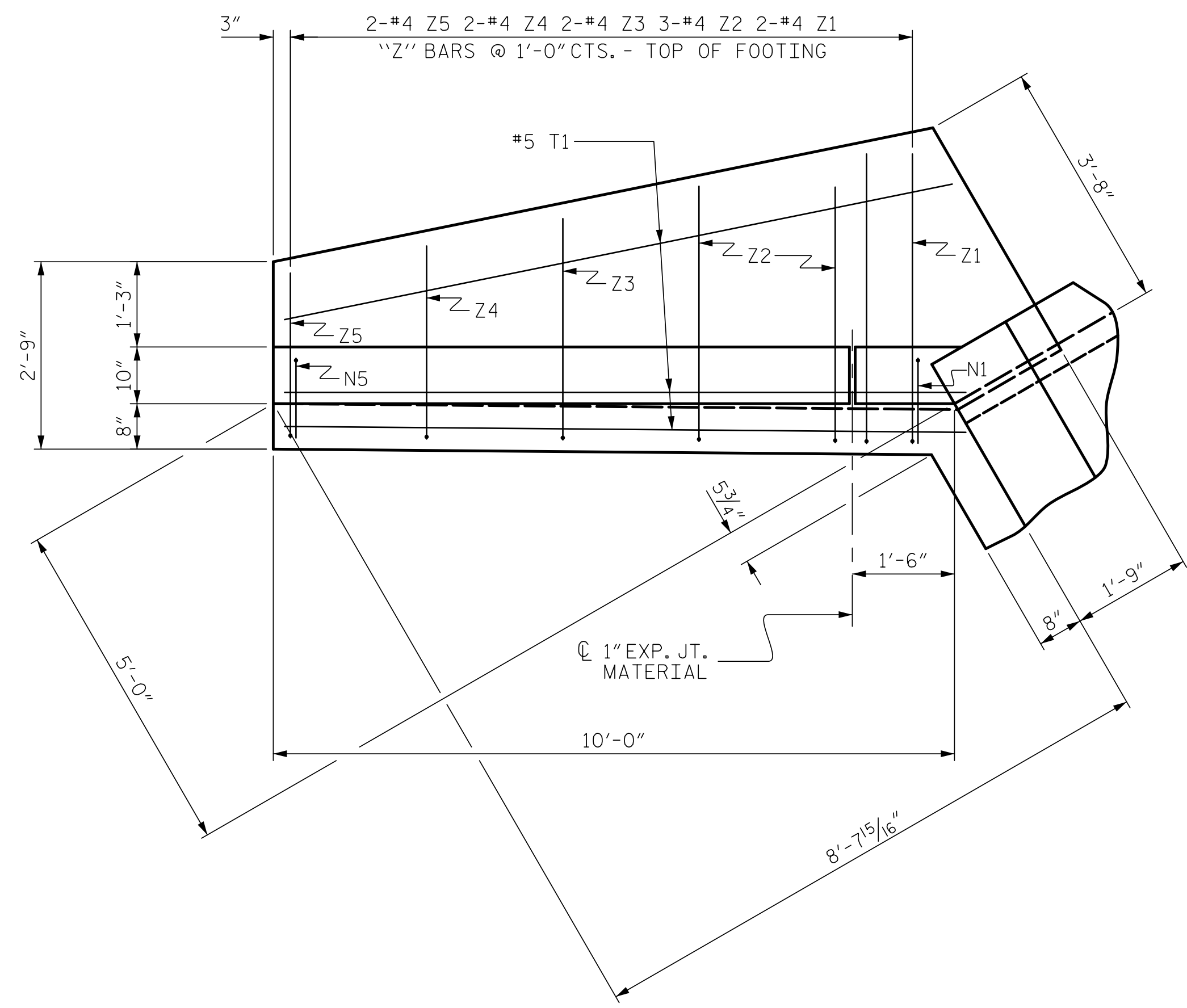
SINGLE 6 FT. X 6 FT. CONCRETE BOX CULVERT EXTENSION
63°-54'-03" SKEW

DRAWN BY :	ZCS	DATE :	05/21
CHECKED BY :	MGC	DATE :	09/21
DESIGN ENGINEER OF RECORD:	ZCS	DATE :	06/22

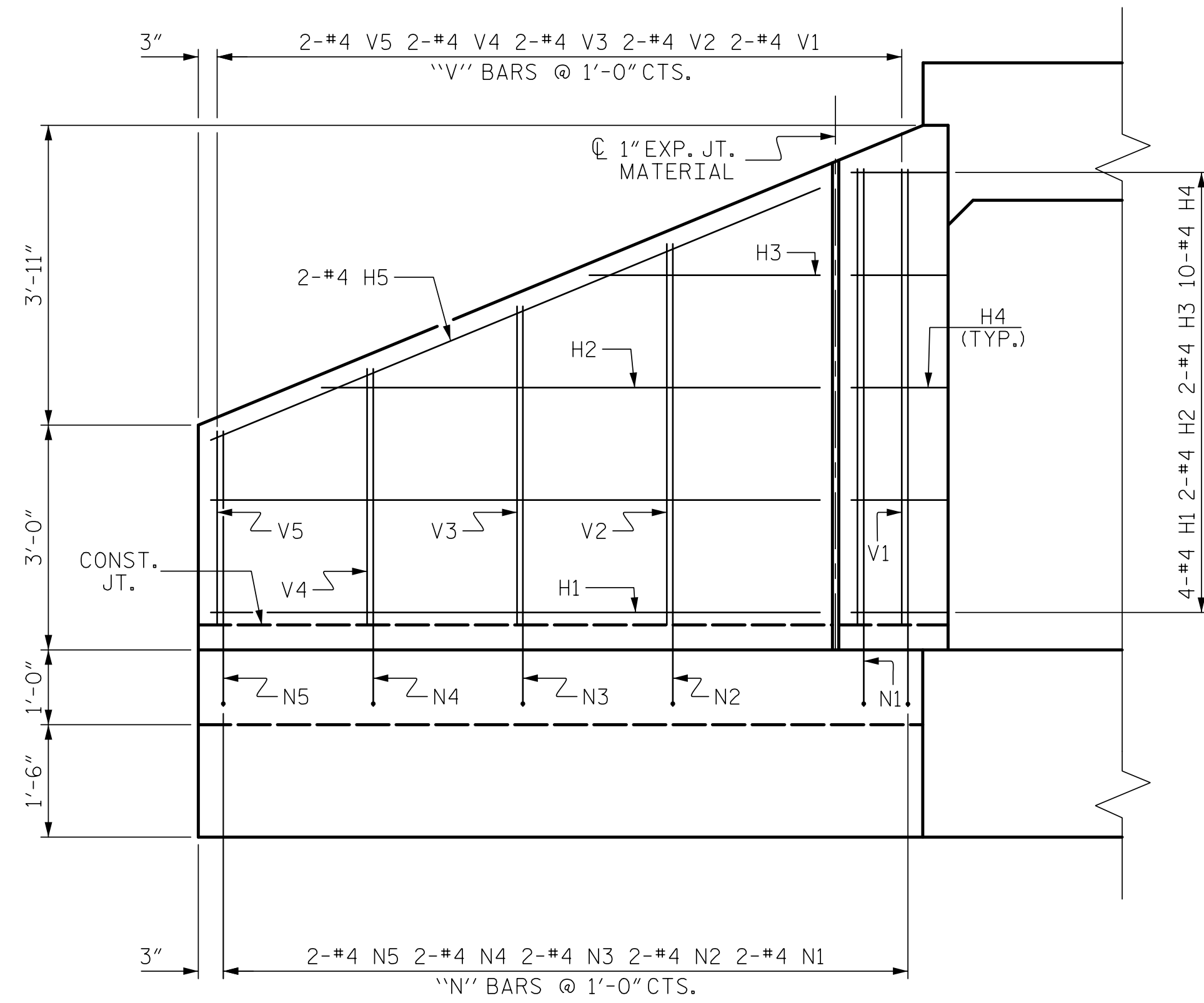
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 SUITE 200
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 CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			5
2			4			7



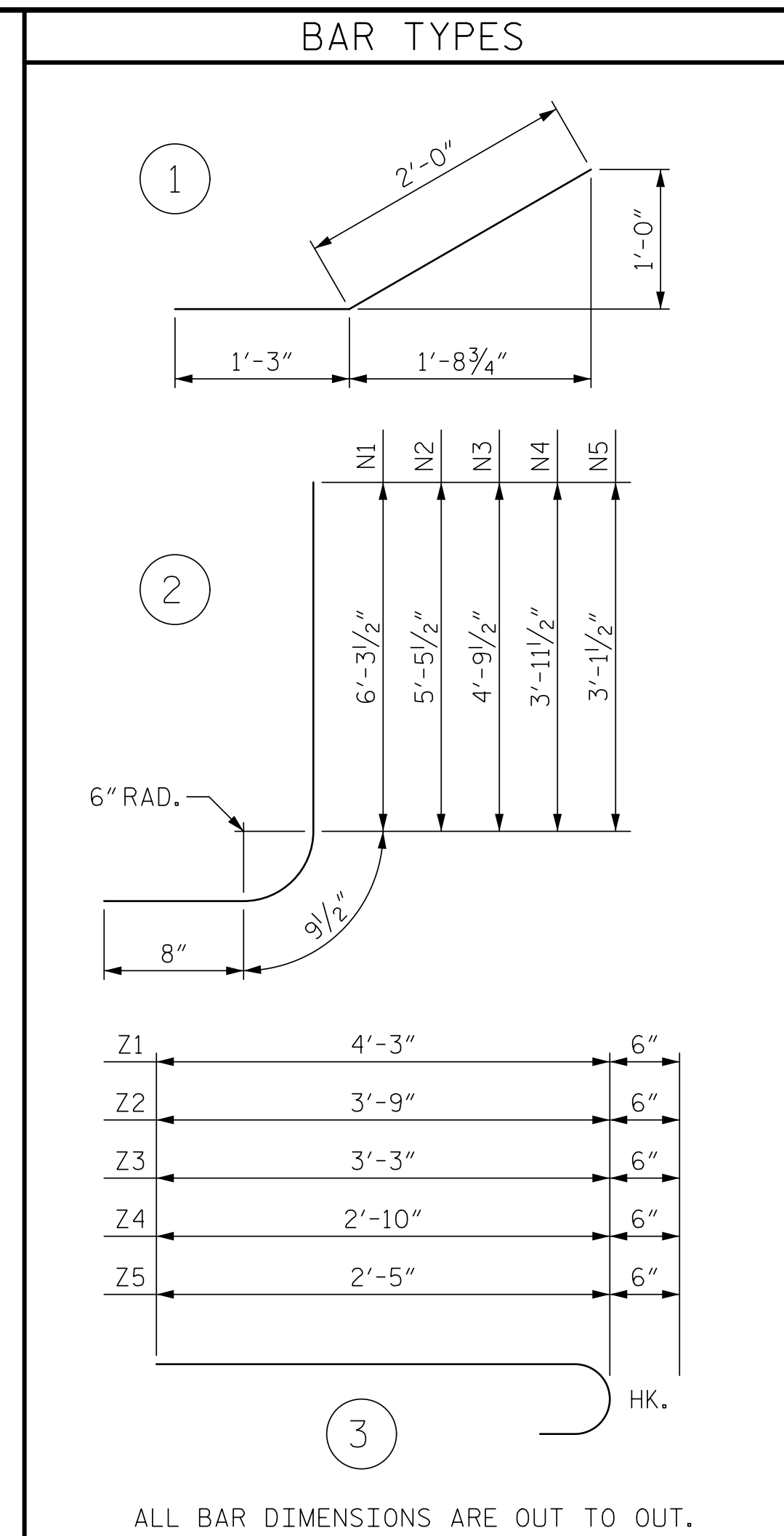
PLAN



ELEVATION

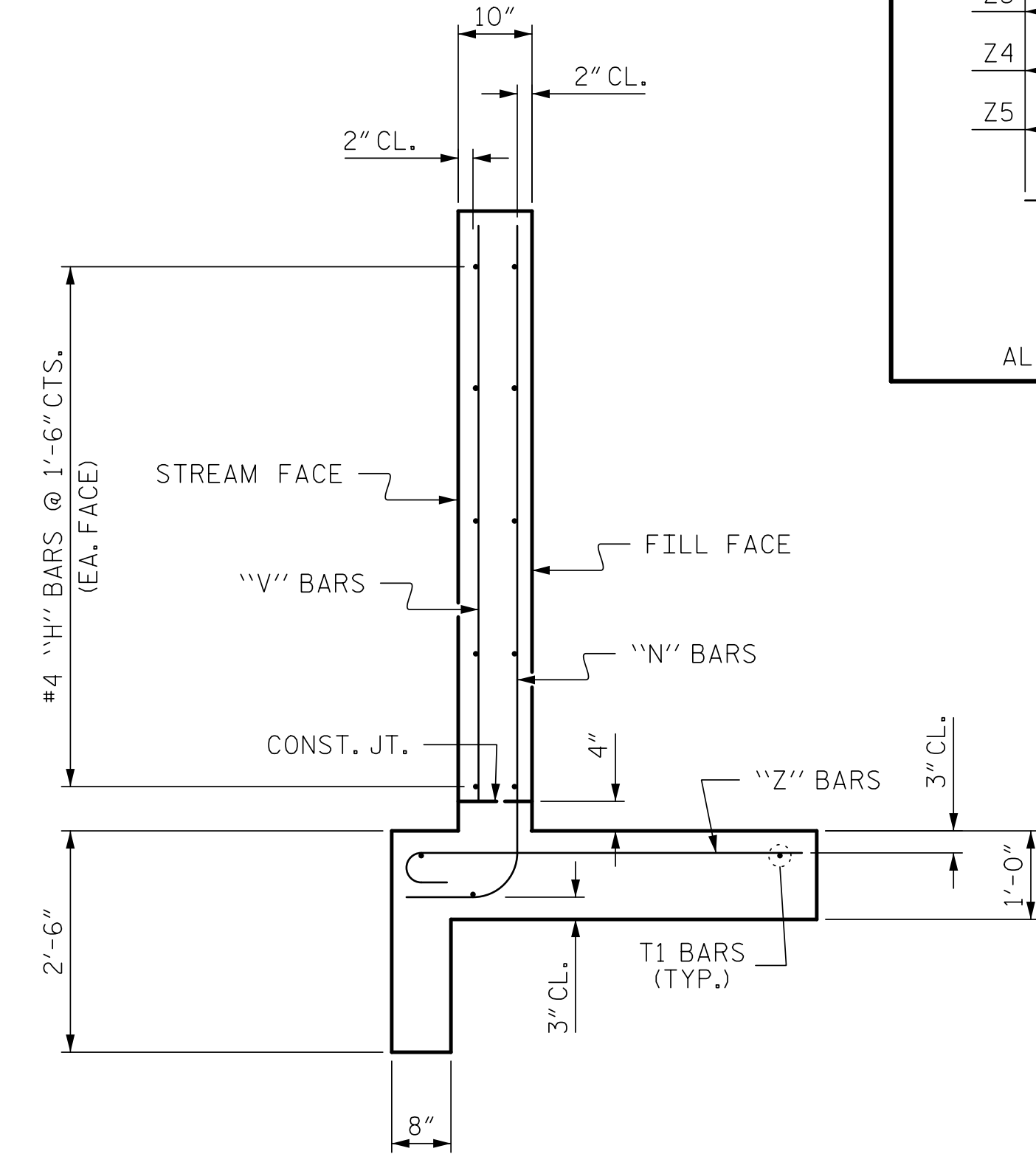
ASSEMBLED BY :	ZCS	DATE :	05/21
CHECKED BY :	MGC	DATE :	09/21
DRAWN BY :	CCJ 10/99	REV. 6/19	MAA/THC
CHECKED BY :	RWW 03/00		

6/14/2022 X:\NCDOT\A-0009\Structures\A-0009CC\STR. #1 66+85.00 -Y2-\FinalPlans\VDGNS\414.011.A-0009CC.SMU.CU06.dgn User:z2sm1h



BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	4	#4	STR	8'-1"	22
H2	2	#4	STR	6'-8"	9
H3	2	#4	STR	2'-11"	4
H4	10	#4	1	3'-3"	22
H5	2	#4	STR	8'-9"	12
N1	2	#4	2	7'-9"	10
N2	2	#4	2	6'-11"	9
N3	2	#4	2	6'-3"	8
N4	2	#4	2	5'-5"	7
N5	2	#4	2	4'-7"	6
T1	3	#5	STR	10'-0"	31
V1	2	#4	STR	5'-7"	7
V2	2	#4	STR	4'-10"	6
V3	2	#4	STR	4'-1"	5
V4	2	#4	STR	3'-3"	4
V5	2	#4	STR	2'-6"	3
Z1	2	#4	3	4'-9"	6
Z2	3	#4	3	4'-3"	9
Z3	2	#4	3	3'-9"	5
Z4	2	#4	3	3'-4"	4
Z5	2	#4	3	2'-11"	4

REINFORCING STEEL FOR WING W1	193	LBS
CLASS A CONCRETE		
WING W1	3.5	CY
1 HEADWALL	0.3	CY
END CURTAIN WALL	0.3	CY
TOTAL	4.1	CY



W1 WING SECTION

NOTE:
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.
G1 BARS IN HEADWALL ARE INCLUDED WITH THE BARREL REINFORCING STEEL.

PROJECT NO. A-0009CC
GRAHAM COUNTY
 STATION: 66+85.00 -Y2-
 SHEET 6 OF 7

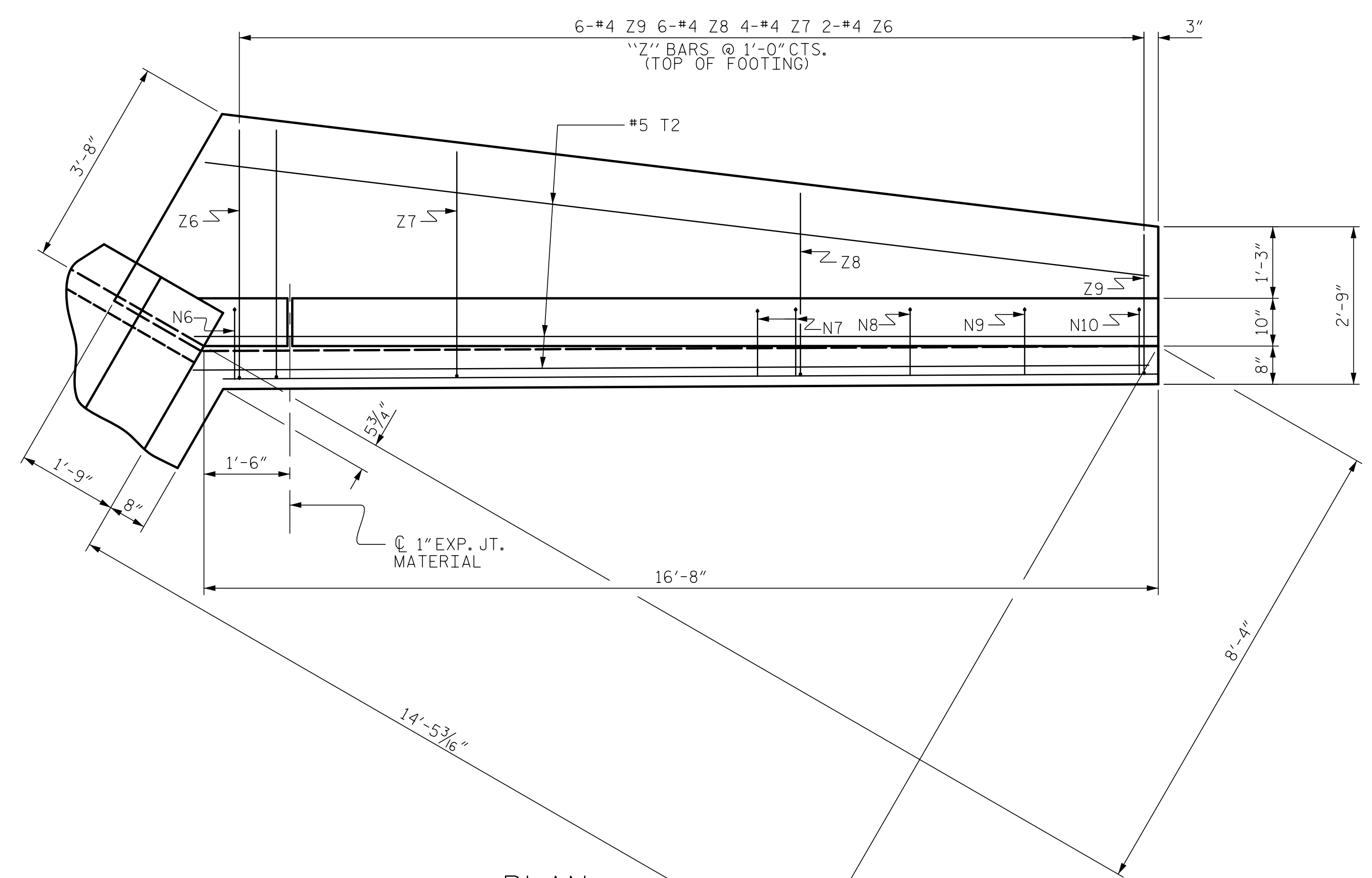
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SEAL
 20125
 ENGINEER
 MARSHALL G. CHECK, JR.
 7/13/2022

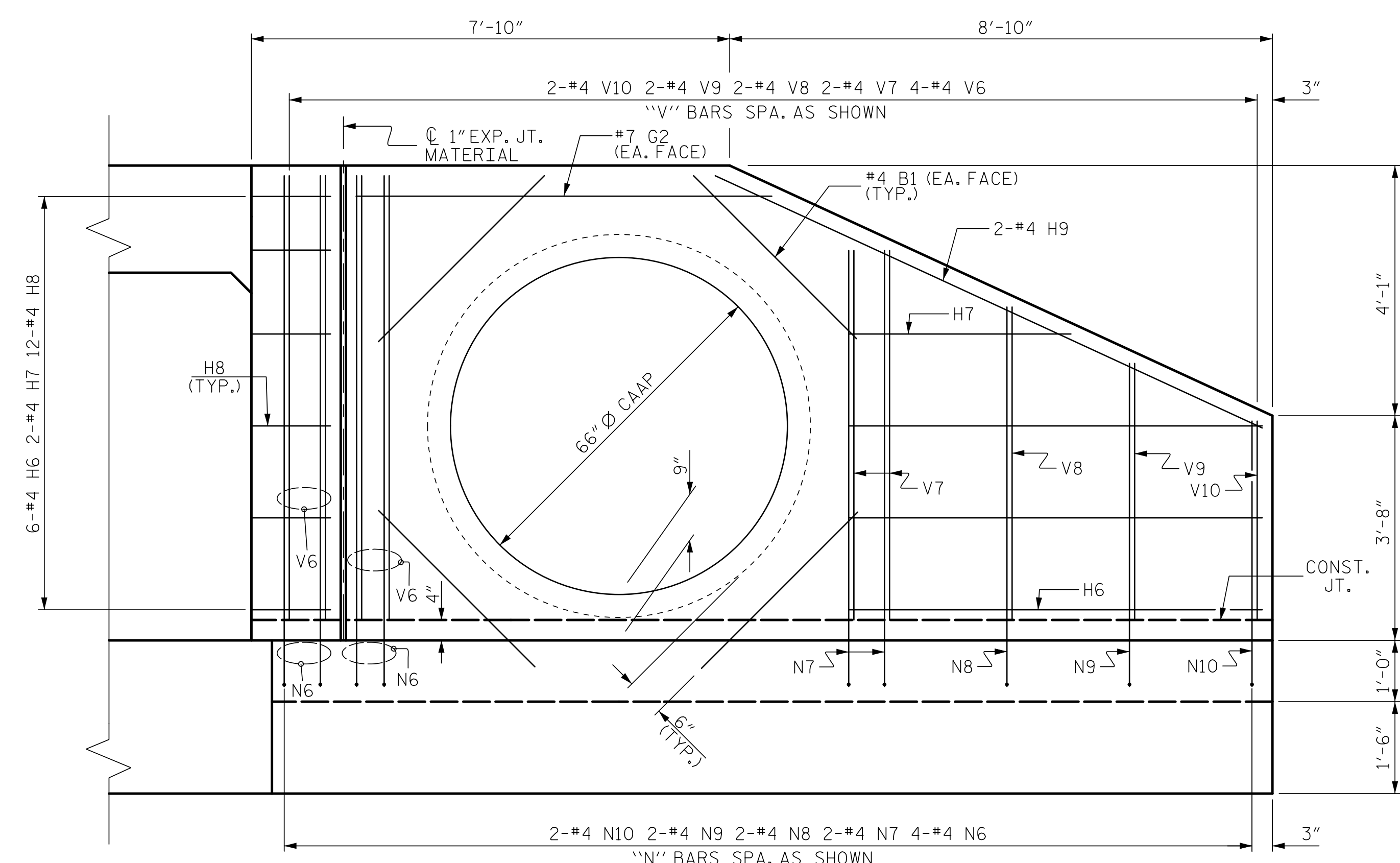
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 RALEIGH, NC 27603
 PH (919) 773-8887
 CORP. LICENSE NO.: C-0275

STANDARD WING W1 FOR CONCRETE BOX CULVERT H = 6'-0" SLOPE = 2:1 90° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. C1-6					TOTAL SHEETS 7

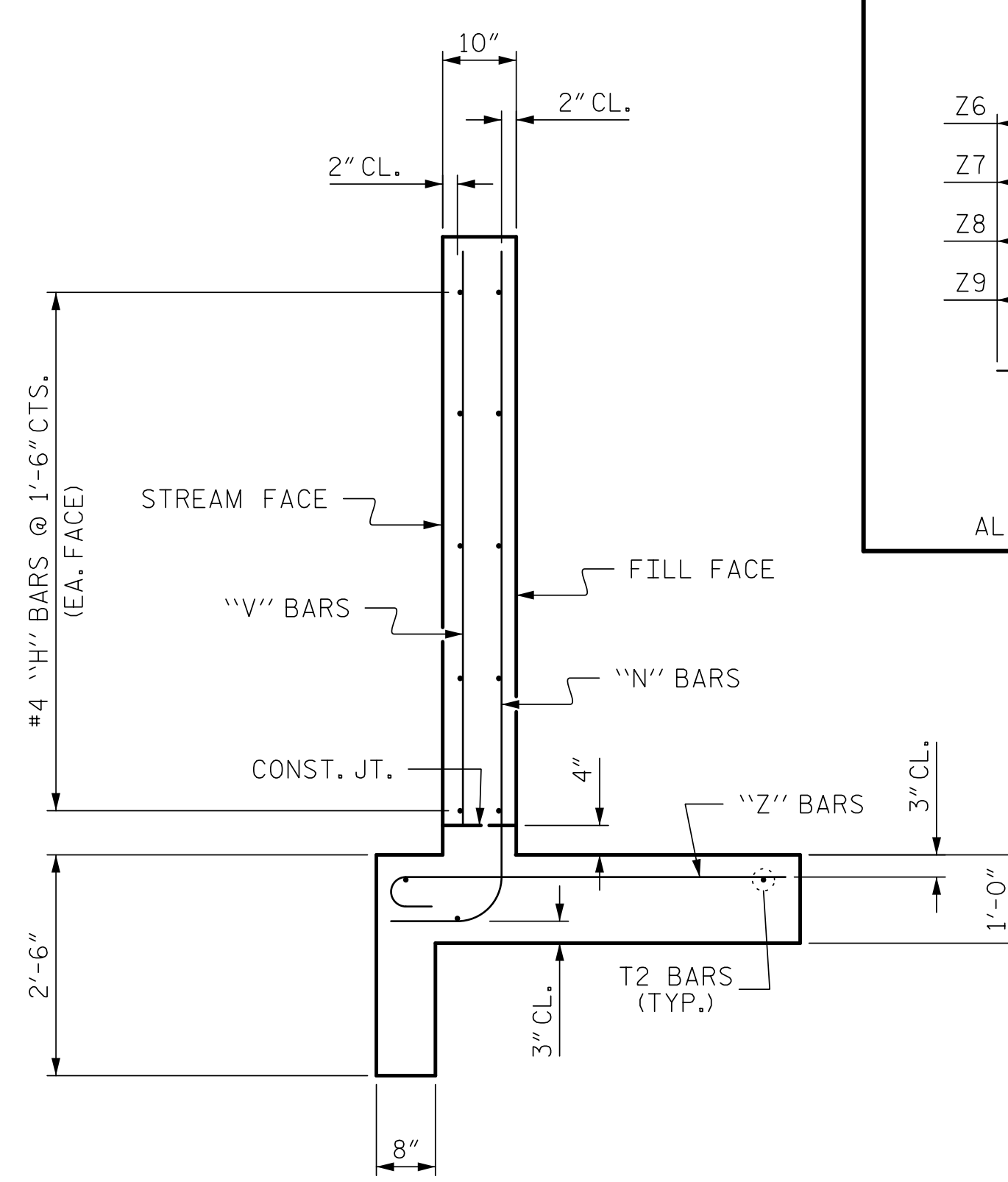


PLAN
66" Ø CAAP NOT SHOWN FOR CLARITY.



ELEVATION

DRAWN BY : ZCS DATE : 05/21
 CHECKED BY : MGC DATE : 09/21
 DESIGN ENGINEER OF RECORD: ZCS DATE : 06/22



W2 WING SECTION

BAR TYPES

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	6	#4	STR	6'-9"	27
H7	2	#4	STR	3'-8"	5
H8	12	#4	1	3'-3"	26
H9	2	#4	STR	9'-9"	13
N6	4	#4	2	9'-3"	25
N7	2	#4	2	8'-0"	11
N8	2	#4	2	7'-1"	9
N9	2	#4	2	6'-2"	8
N10	2	#4	2	5'-3"	7
T2	3	#5	STR	16'-8"	52
V6	4	#4	STR	7'-3"	19
V7	2	#4	STR	6'-0"	8
V8	2	#4	STR	5'-1"	7
V9	2	#4	STR	4'-2"	6
V10	2	#4	STR	3'-3"	4
Z6	2	#4	3	4'-10"	6
Z7	4	#4	3	4'-5"	12
Z8	6	#4	3	3'-8"	15
Z9	6	#4	3	2'-11"	12
G2	2	#7	STR	6'-10"	28
B1	8	#4	STR	3'-9"	20

REINFORCING STEEL FOR WING W2 320 LBS
 CLASS A CONCRETE WING W2 6.5 CY

NOTE:
 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.

ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. A-0009CC
GRAHAM COUNTY
 STATION: 66+85.00 -Y2-
 SHEET 7 OF 7

7/13/2022

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**WING W2
 W/66" CAAP
 FOR
 CONCRETE BOX CULVERT**

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

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 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 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 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" 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 3/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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



ENGLISH

JANUARY, 1990

STD. NO. SN