

09, 08, / 99

TIP PROJECT: R-5705B

CONTRACT: C204745

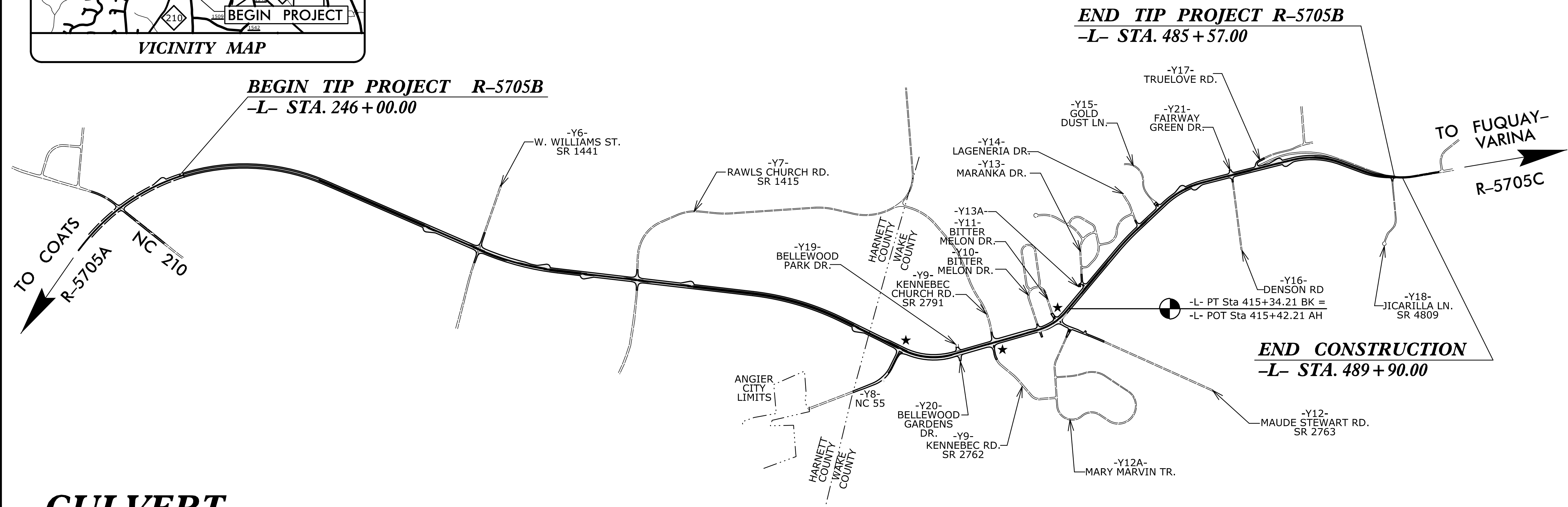
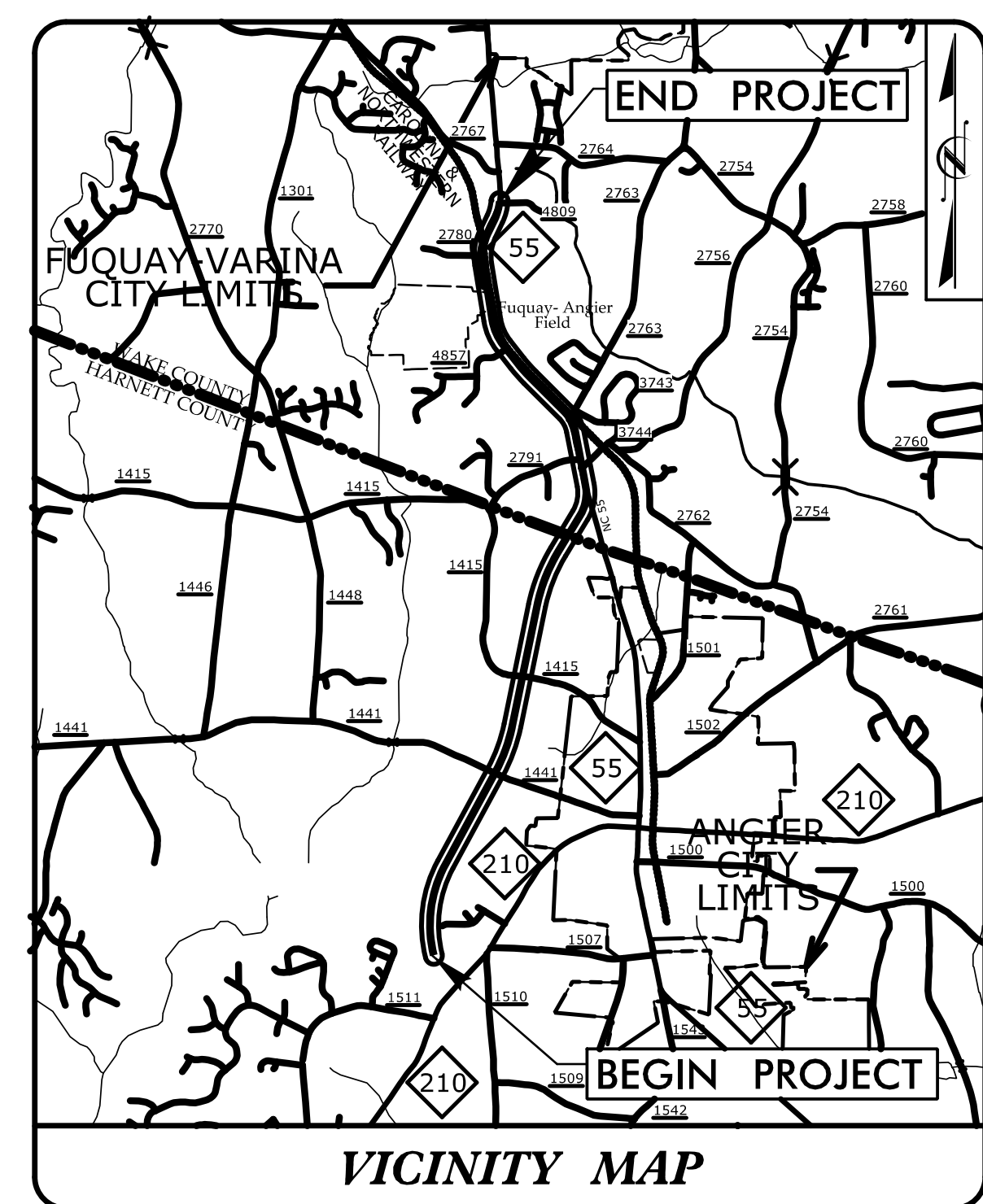
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**HARNETT & WAKE COUNTY**

LOCATION: NC 55 FROM NC 210 TO SR 4809 (JICARILLA LANE)

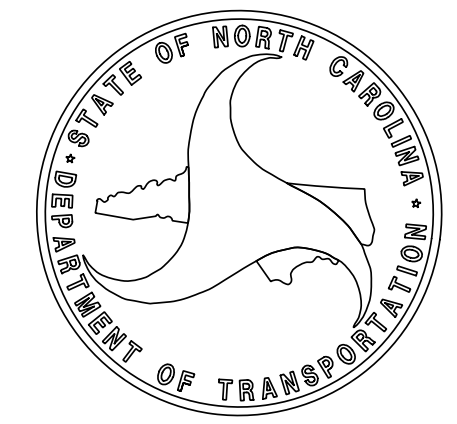
TYPE OF WORK: PAVING, GRADING, DRAINAGE, SIGNALS & CULVERT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5705B		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46377.1.3		PE	
46377.2.2		ROW	
46377.2.6		UTILITIES	
46377.3.2		CONSTRUCTION	



**CULVERT**

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



**DESIGN DATA**

ADT 2022 =	30,200
ADT 2045 =	44,400
K =	9 %
D =	60 %
T =	4 % *
**V =	50 & 60 MPH
* TTST =	1% DUAL 3%
FUNC CLASS =	MINOR ARTERIAL
REGIONAL TIER	

**PROJECT LENGTH**

LENGTH ROADWAY PROJECT R-5705B	=	4.537	MILES
TOTAL LENGTH PROJECT	=	4.537	MILES

PLANS PREPARED BY:  
**TGS ENGINEERS**  
 706 HILLSBOROUGH ST  
 SUITE 200  
 RALEIGH, NC 27603

PLANS PREPARED FOR:  
**NICOLE M. HACKLER, PE**  
 NCDOT CONTACT

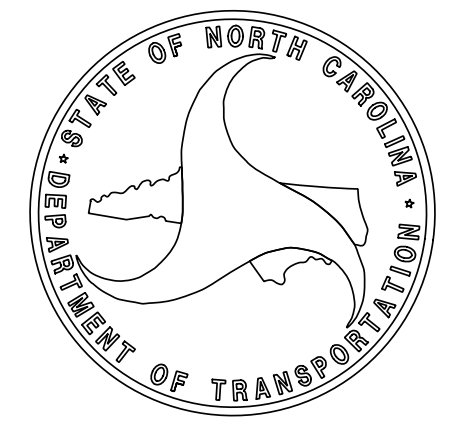
LETTING DATE:  
 OCTOBER 18, 2022

**MARC CHEEK, PE**  
 STRUCTURES DESIGN ENGINEER

STRUCTURES DESIGN ENGINEER

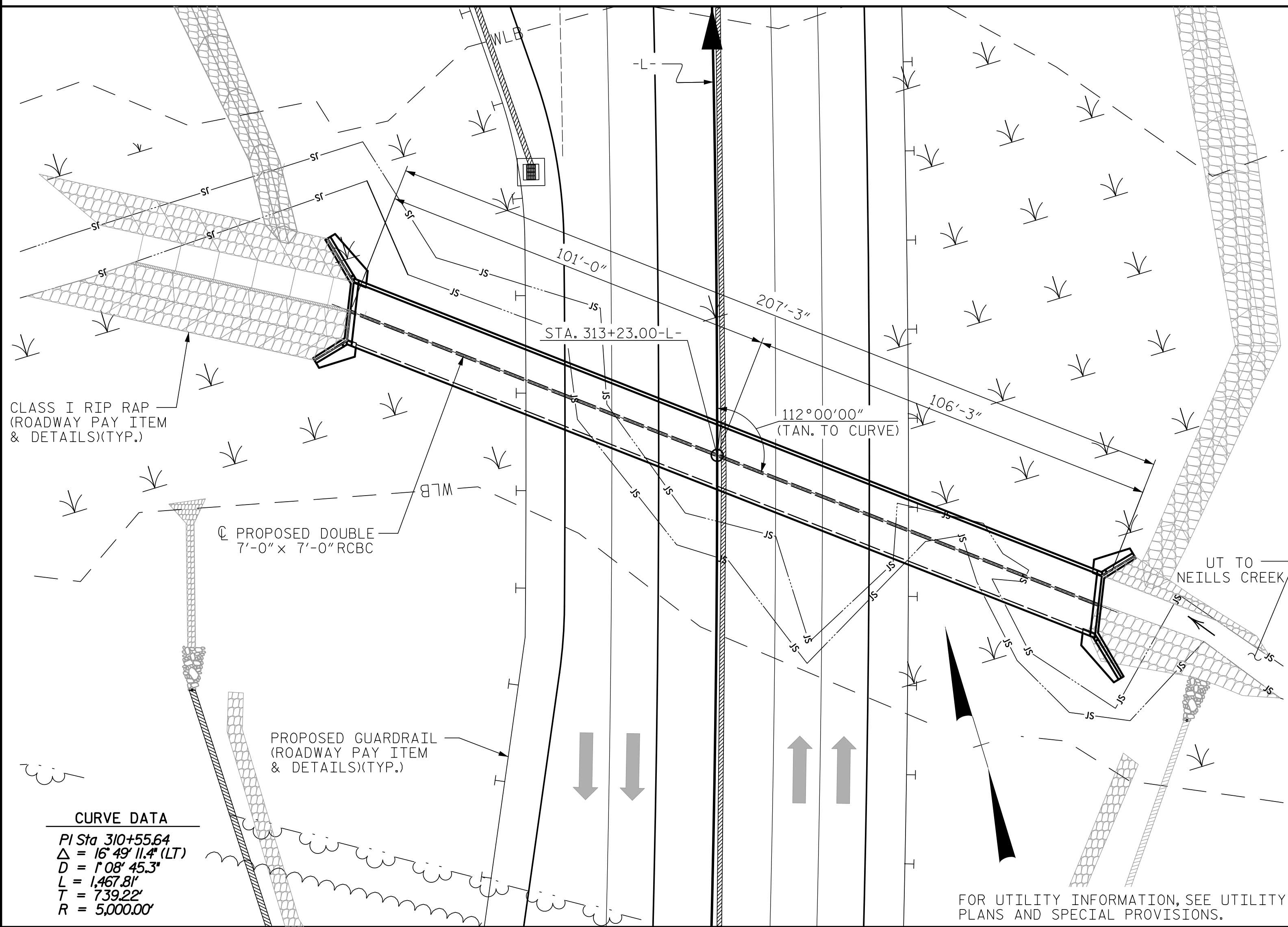


SIGNATURE P.E.  
 6/10/2022 | 11:06 AM EDT



6/10/2022  
\$\$\$\$\$\$\$\$\$DGN\$\$\$\$\$\$\$\$\$  
User:ZSmITH

BENCHMARK #15: BENCH NAIL IN BASE OF 8" BIRCH TREE 98.1' RT. OF STATION 320+85.90-L-; ELEV. 280.73'



LOCATION SKETCH

**CURVE DATA**  
 PI Sta 310+55.64  
 $\Delta = 16^{\circ} 49' 11.4''$  (LT)  
 $D = 108' 45.3''$   
 $L = 1,467.81'$   
 $T = 739.22'$   
 $R = 5,000.00'$

**ROADWAY DATA**

GRADE POINT ELEV. @ STATION 313+23.00 -L- = 270.81  
 BED ELEV. @ STATION 313+23.00 -L- = 240.41  
 ROADWAY SLOPES = 2:1

**HYDRAULIC DATA**

DESIGN DISCHARGE = 330 C.F.S.  
 FREQUENCY OF DESIGN FLOOD = 50 YEARS  
 DESIGN HIGH WATER ELEVATION = 246.4  
 DRAINAGE AREA = 1.03 SQ. MI.  
 BASE DISCHARGE (Q100) = 375 C.F.S.  
 BASE HIGH WATER ELEVATION = 246.9

**OVERTOPPING DATA**

OVERTOPPING DISCHARGE = N/A C.F.S.  
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YEARS  
 OVERTOPPING HIGH WATER ELEVATION = 268.9

**TOTAL STRUCTURE QUANTITIES**

<b>CLASS A CONCRETE</b>	
BARREL @ 2.23 CY/FT	462.2 C.Y.
WINGS, ETC.	21.6 C.Y.
<b>TOTAL</b>	<b>483.8 C.Y.</b>
<b>REINFORCING STEEL</b>	
BARREL	48809 LBS.
WINGS, ETC.	1277 LBS.
<b>TOTAL</b>	<b>50086 LBS.</b>
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MATERIAL	297 TONS
GEOTEXTILE FOR SOIL STABILIZATION	490 SY

**NOTES**

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.
- DESIGN FILL----- 24'
- FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTES SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:  
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.  
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT 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.
- STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURE, SEE SPECIAL PROVISIONS.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
- FOR CULVERT DIVERSION DETAILS, SEE EROSION CONTROL PLANS.
- NO PRECAST CULVERT OPTION WILL BE ALLOWED.
- EXCAVATE A MINIMUM OF 1 FOOT BELOW CULVERT BEARING ELEVATION AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL PER SECTION 414 OF THE STANDARD SPECIFICATIONS.
- UNDERCUT SOFT/LOOSE ALLUVIAL SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL WITH SELECT MATERIAL, CLASS VI MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATIONS.
- INSTALL GEOTEXTILE FOR SOIL STABILIZATION AT THE BOTTOM OF EXCAVATION PRIOR TO PLACING FOUNDATION CONDITIONING MATERIAL. THE GEOTEXTILE SHOULD BE PLACED AT THE BOTTOM OF THE EXCAVATION AND WRAPPED UP THE SIDE WALLS OF THE EXCAVATION. FOR GEOTEXTILE FOR SOIL STABILIZATION, SEE SECTION 270 OF THE STANDARD SPECIFICATIONS.

**REMOVAL OF EXISTING STRUCTURE AT STATION 472+00 -L-**

REMOVAL OF EXISTING STRUCTURE	LUMP SUM
ASBESTOS ASSESSMENT	LUMP SUM

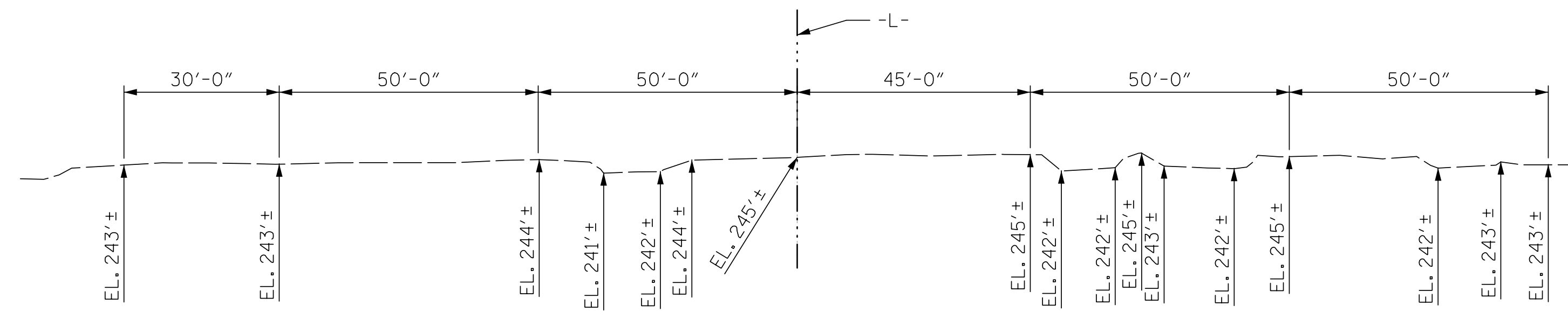
**NOTES:**  
 INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 472+00 -L-."

THE EXISTING 5-SPAN STRUCTURE (2 @ 54'-0", 2 @ 54'-6", 1 @ 53'-6") WITH A CLEAR ROADWAY WIDTH OF 28'-3" AND A 2" ASPHALT WEARING SURFACE AND A SUPERSTRUCTURE CONSISTING OF A REINFORCED CONCRETE DECK ON STEEL I-BEAMS AND A SUBSTRUCTURE CONSISTING OF REINFORCED CONCRETE CAPS ON STEEL PILES AT THE END BENTS AND REINFORCED CONCRETE CAPS ON CONCRETE PILES AT THE BENTS AND LOCATED LEFT OF STATION 472+00 -L- SHALL BE REMOVED. THE EXISTING BRIDGE IS NOT PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT. FOR REMOVAL OF EXISTING STRUCTURE, SEE SPECIAL PROVISIONS.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

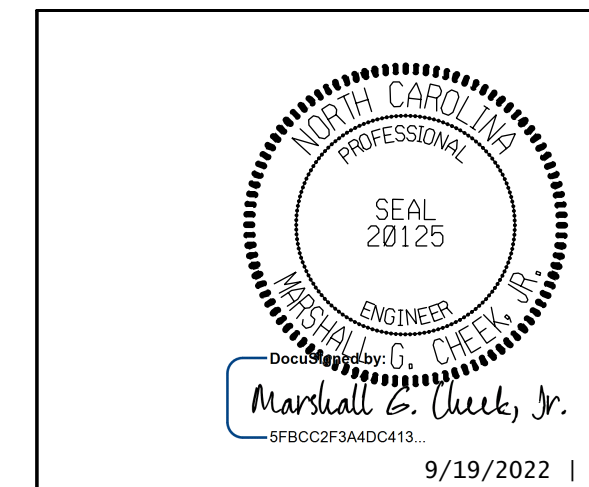
PROJECT NO. R-5705B  
HARNETT COUNTY  
 STATION: 313+23.00 -L-

SHEET 1 OF 5



PROFILE ALONG CULVERT

DRAWN BY : JLA DATE : 1/21  
 CHECKED BY : MGC DATE : 4/21  
 DESIGN ENGINEER OF RECORD : ZCS DATE : 5/22



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 7'-0" x 7'-0" REINFORCED CONCRETE BOX CULVERT**

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					C-1
TOTAL SHEETS					5

## 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 <sub>L</sub> )	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	1.60	--	1.75	1.89	2	TOP SLAB	12.00	1.60	2	TOP SLAB	8.50	-	
	HL-93 (OPERATING)	N/A		2.07	--	1.35	2.46	2	TOP SLAB	12.00	2.07	2	TOP SLAB	8.50	-	
	HS-20 (INVENTORY)	36.000	2	1.66	59.76	1.75	1.97	2	TOP SLAB	12.00	1.66	2	TOP SLAB	8.50	-	
	HS-20 (OPERATING)	36.000		2.16	77.76	1.35	2.56	2	TOP SLAB	12.00	2.16	2	TOP SLAB	8.50	-	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		5.05	68.18	1.40	5.37	2	TOP SLAB	12.00	5.05	1	EXTERIOR WALL	0.42	-	
		SNGARBS2	20,000		4.96	99.20	1.40	5.03	2	TOP SLAB	12.00	4.96	2	TOP SLAB	8.50	-
		SNAGRIS2	22,000		5.05	111.10	1.40	5.37	2	TOP SLAB	12.00	5.05	1	EXTERIOR WALL	0.42	-
		SNCOTTS3	27,250	3	2.00	54.50	1.40	2.37	2	TOP SLAB	12.00	2.00	2	TOP SLAB	8.50	-
		SNAGGRS4	34,925		2.64	92.20	1.40	3.11	2	TOP SLAB	12.00	2.64	2	TOP SLAB	8.50	-
		SNS5A	35,550		2.38	84.61	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
		SNS6A	39,950		2.38	95.08	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
		SNS7B	42,000		2.38	99.96	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		5.05	166.65	1.40	5.37	2	TOP SLAB	12.00	5.05	1	EXTERIOR WALL	0.42	-
		TNT4A	33,075		2.38	78.72	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
		TNT6A	41,600		2.38	99.01	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
		TNT7A	42,000		2.38	99.96	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
		TNT7B	42,000		2.38	99.96	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
		TNAGRIT4	43,000		2.38	102.34	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-
TNAGT5A	45,000		2.38	107.10	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-		
TNAGT5B	45,000		2.38	107.10	1.40	2.82	2	TOP SLAB	12.00	2.38	2	TOP SLAB	8.50	-		

### 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	--

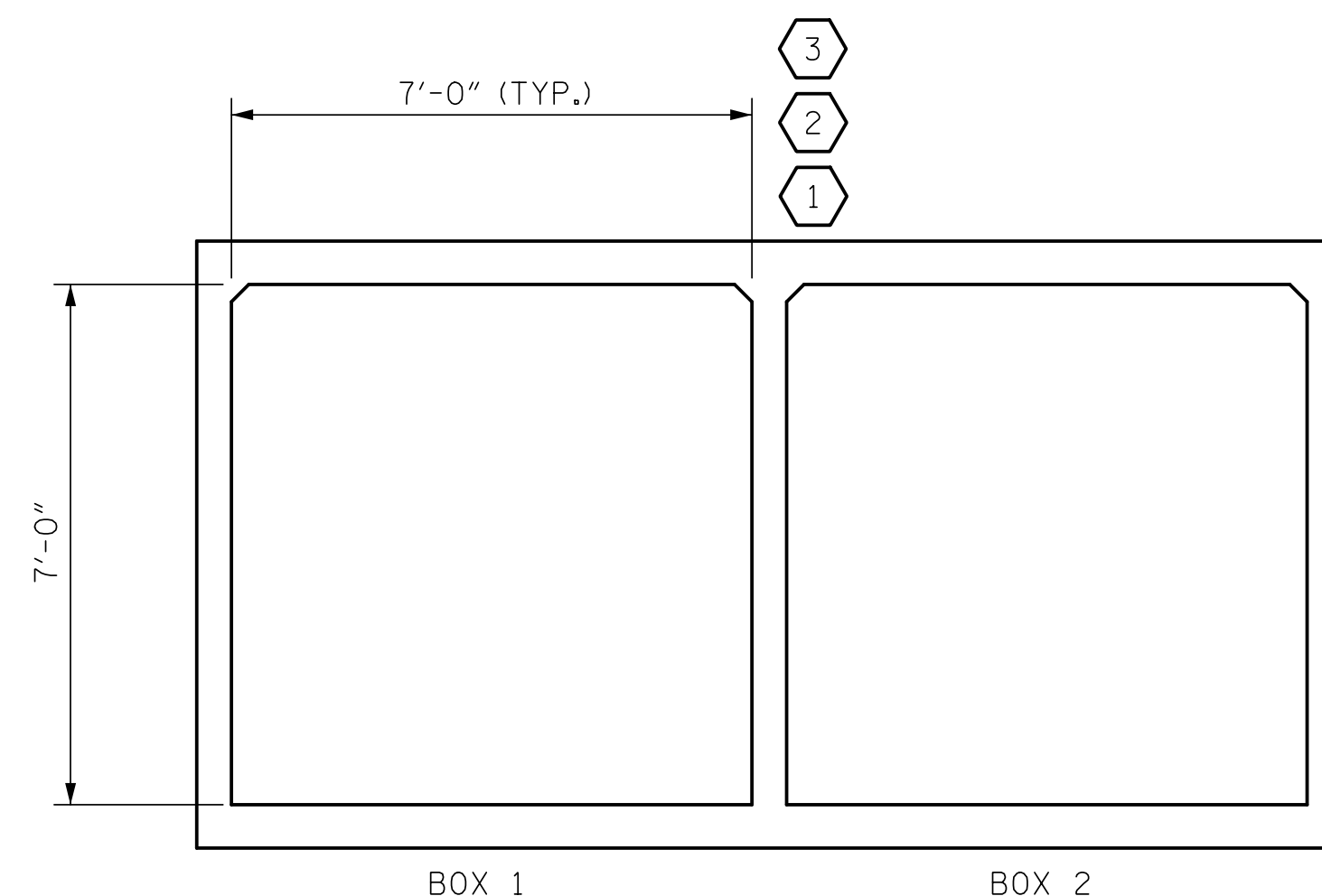
### NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

### COMMENTS:

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

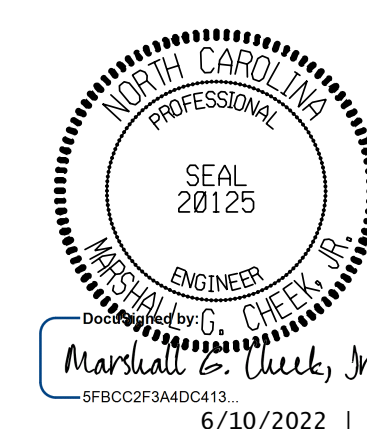
#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. R-5705B  
HARNETT COUNTY  
 STATION: 313+23.00 -L-

SHEET 2 OF 5



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UNLESS ALL SIGNATURES COMPLETED

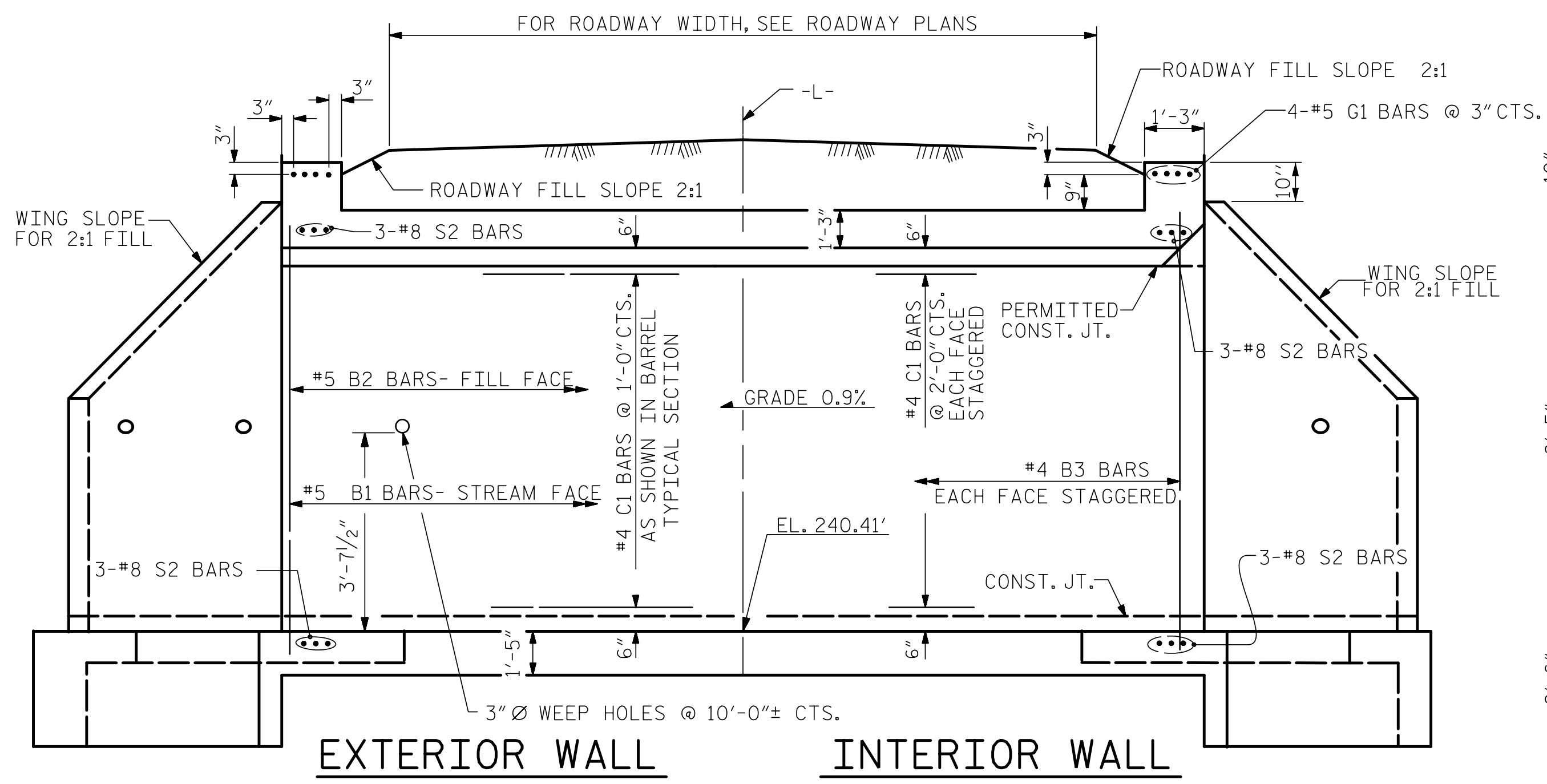
**TGS ENGINEERS**  
 706 HILLSBOROUGH STREET  
 SUITE 200  
 RALEIGH, NC 27603  
 PH (919) 773-8887  
 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

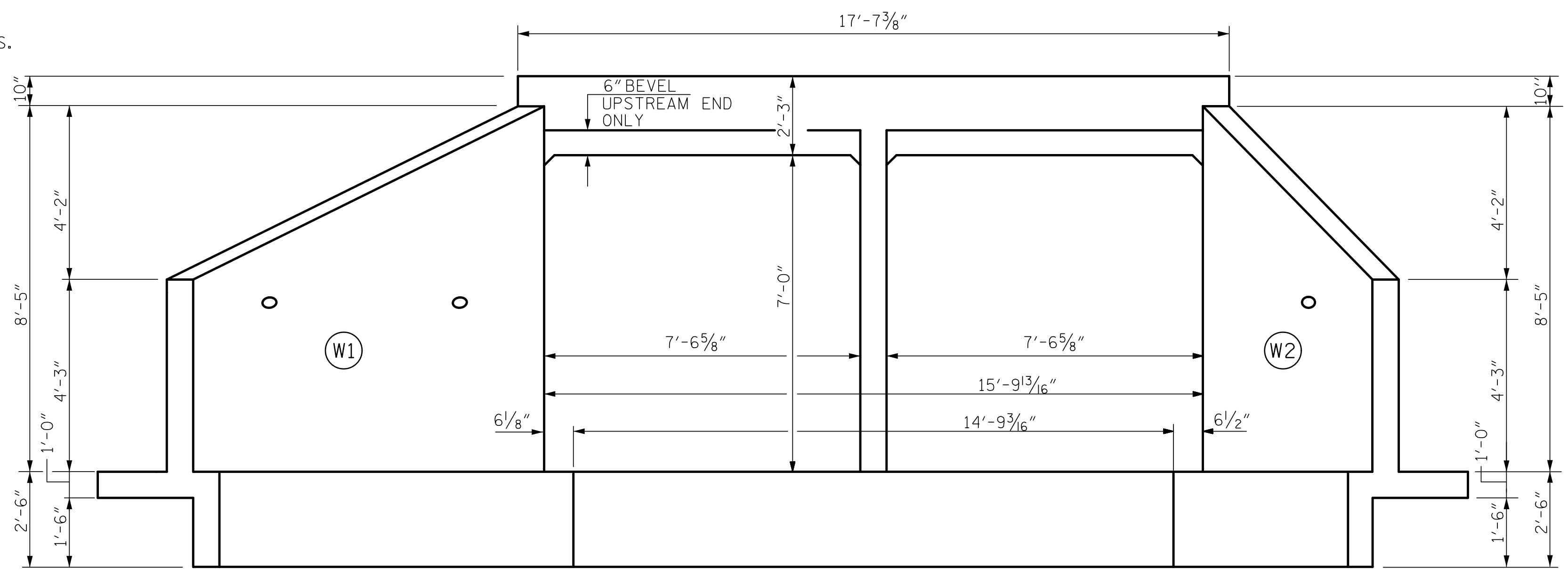
STANDARD  
 LRFR SUMMARY FOR  
 REINFORCED CONCRETE  
 BOX CULVERTS  
 (NON-INTERSTATE TRAFFIC)

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

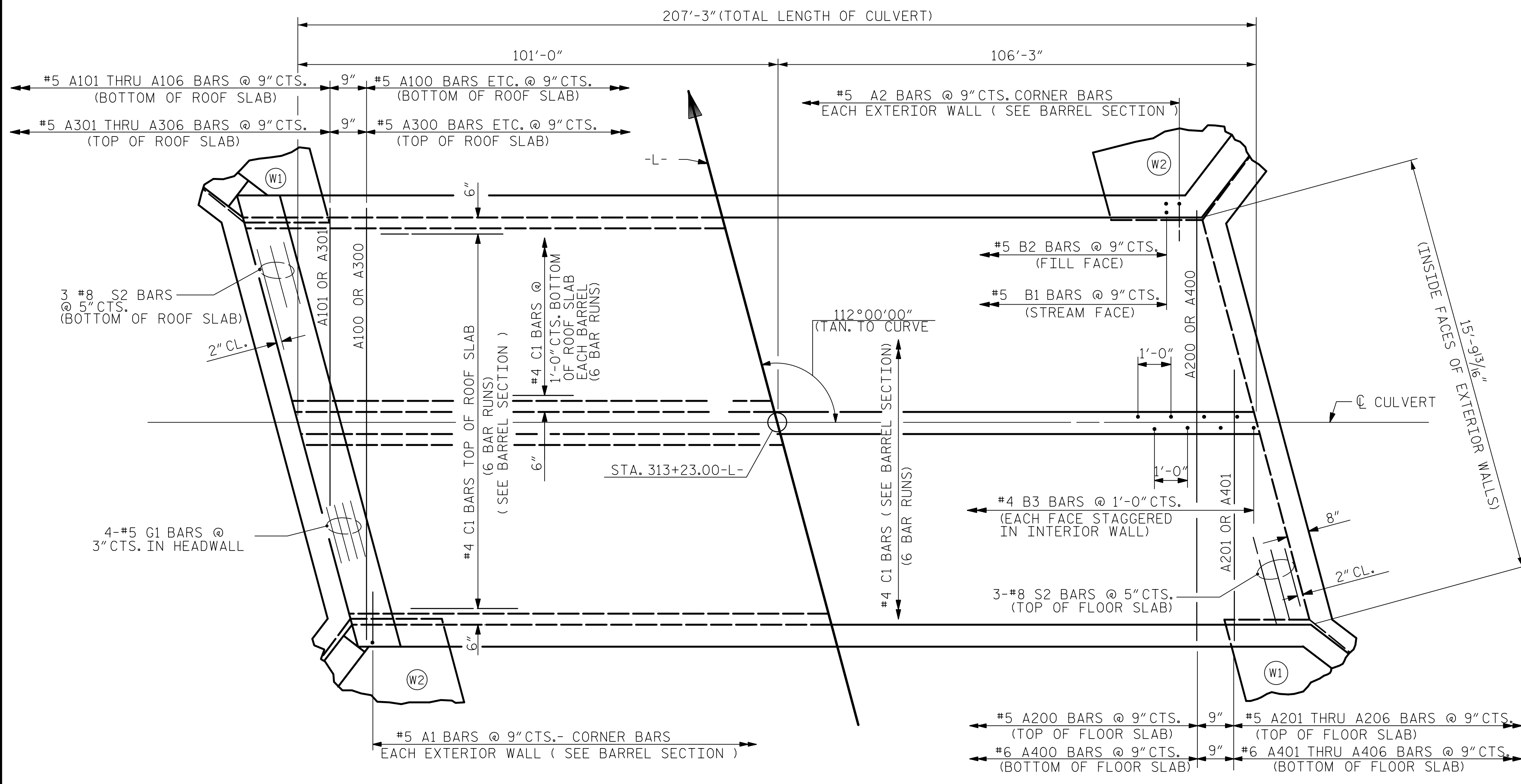
ASSEMBLED BY : ZCS	DATE : 12/20
CHECKED BY : MGC	DATE : 4/21
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC



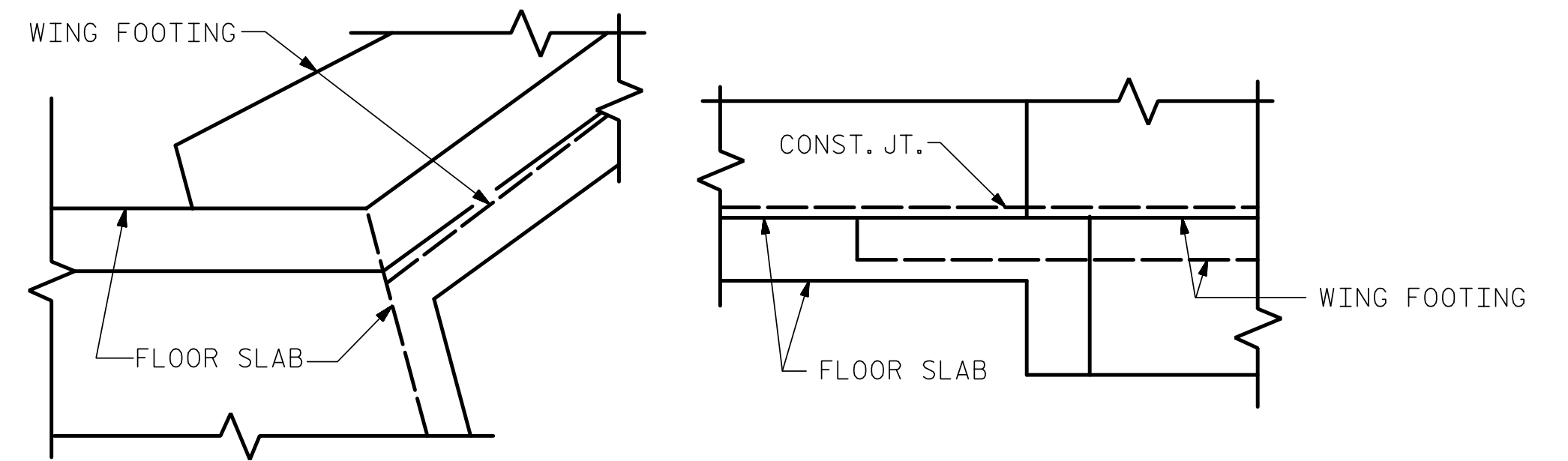
EXTERIOR WALL INTERIOR WALL  
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW



PART PLAN - ROOF SLAB PART PLAN - FLOOR SLAB



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

PROJECT NO. R-5705B  
HARNETT COUNTY  
STATION: 313+23.00 -L-  
SHEET 3 OF 5

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

DOUBLE 7'-0" X 7'-0" REINFORCED CONCRETE BOX CULVERT

6/10/2022 | 11:06 AM EDT

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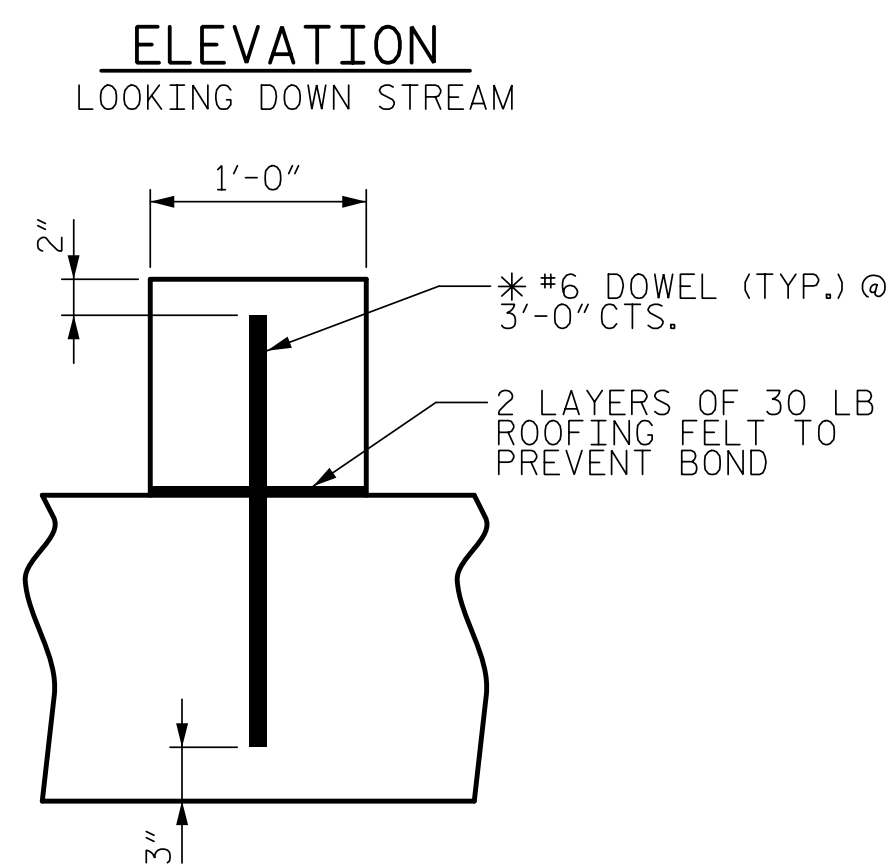
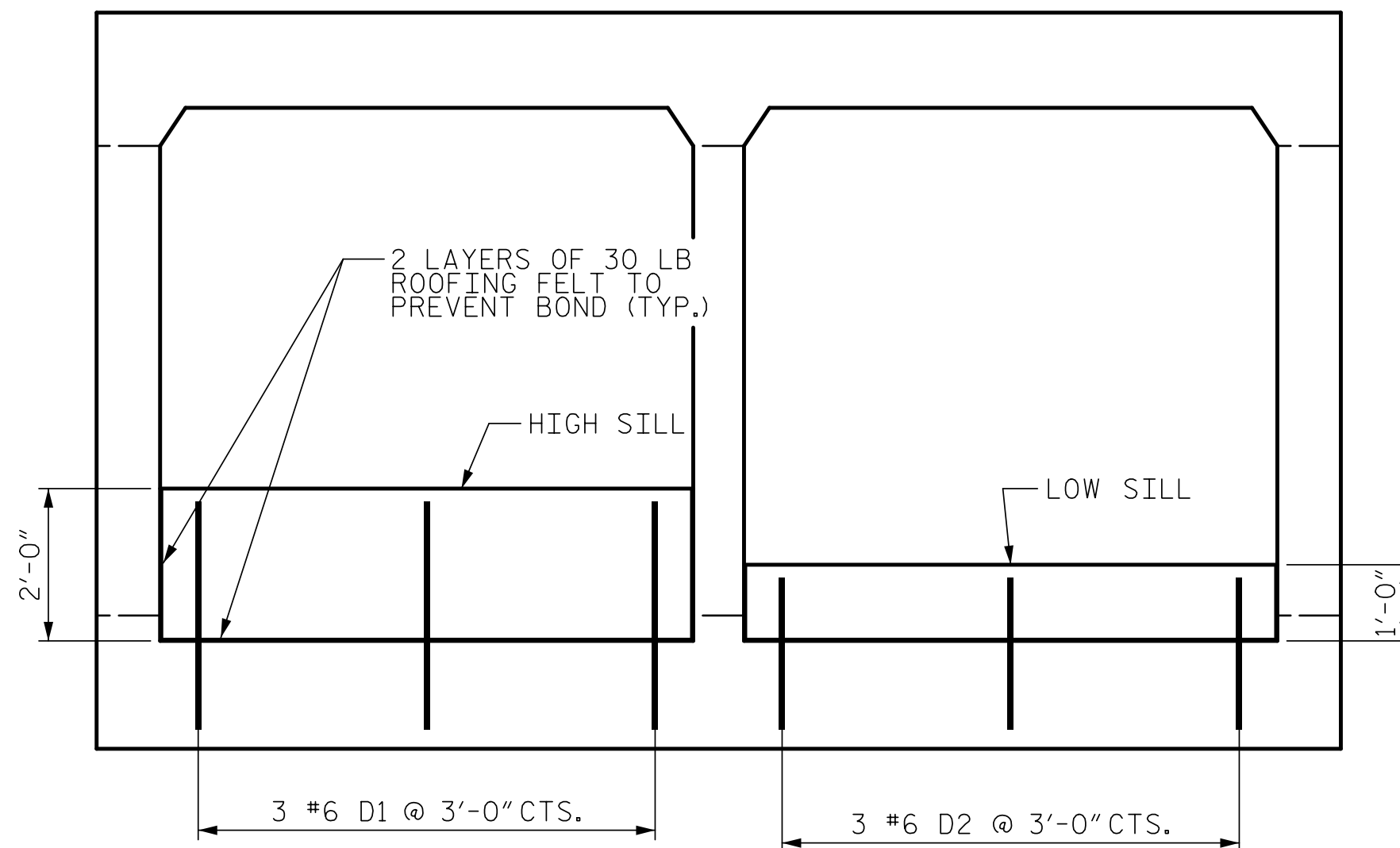
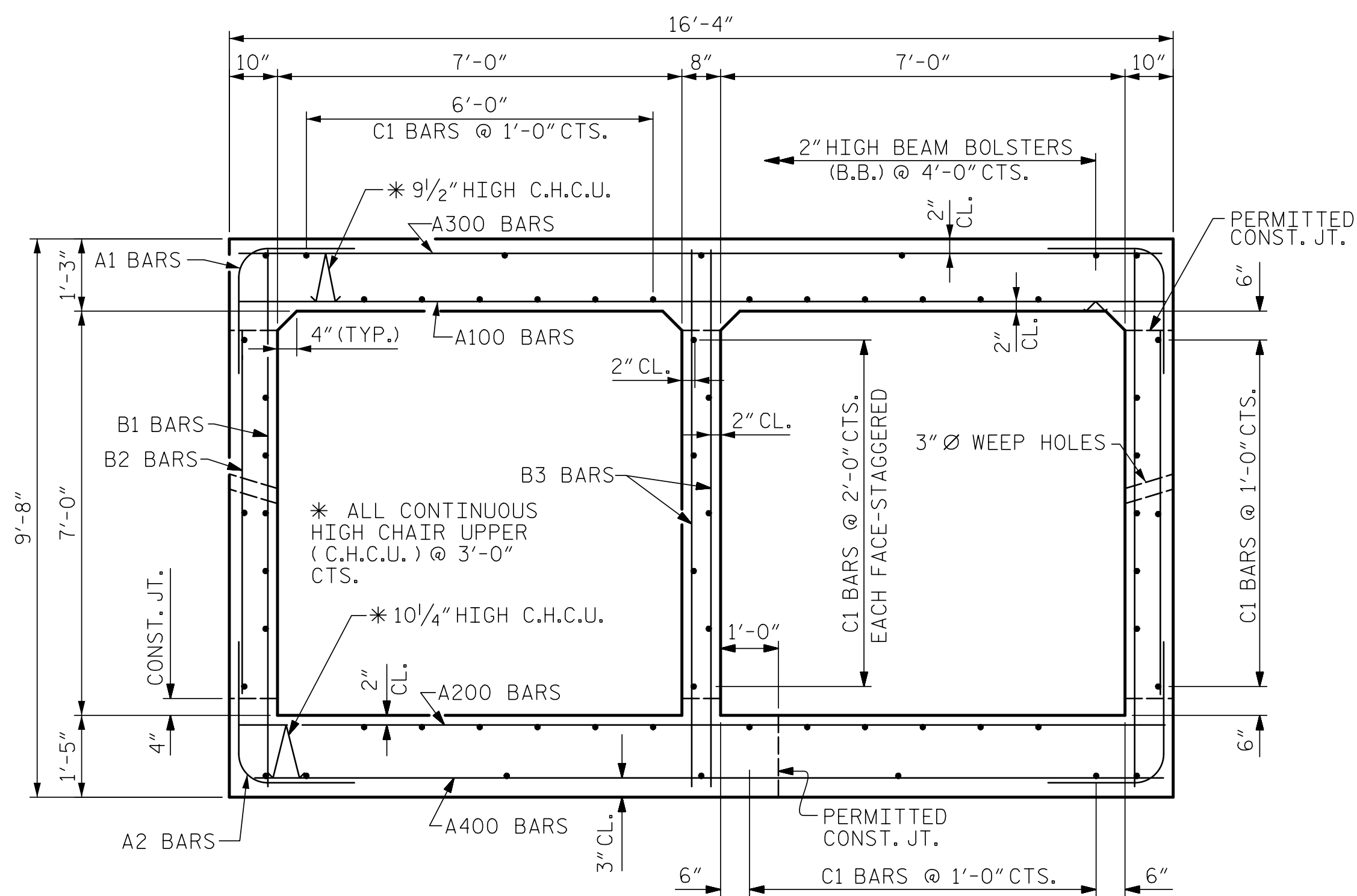
TGS ENGINEERS  
804-C N. LAFAYETTE ST  
SHELBY, NC 28150  
PH (704) 476-0003  
CORP. LICENSE NO.: C-0275

REVISIONS

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

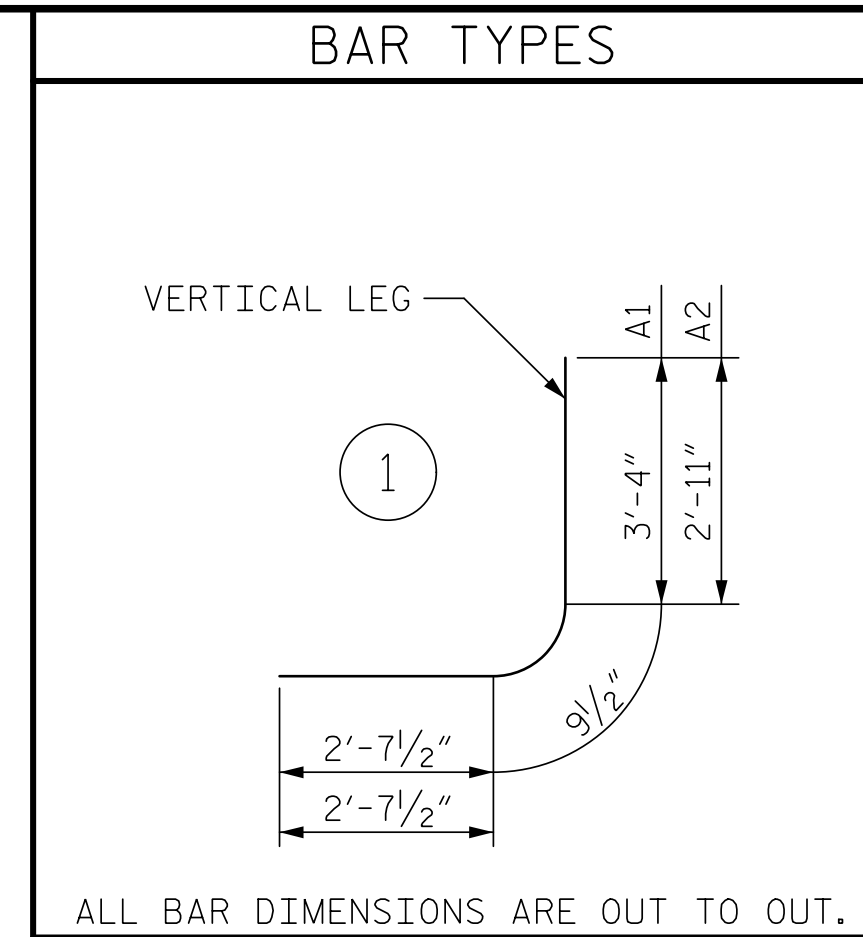
SHEET NO. C-3  
TOTAL SHEETS 5

DRAWN BY : JLA DATE : 1/21  
CHECKED BY : MGC DATE : 4/21  
DESIGN ENGINEER : ZCS DATE : 5/22



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

CULVERT SILL DETAILS



BAR TYPES		BAR SCHEDULE				
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	546	#5	1	6'-9"	3844	
A2	546	#5	1	6'-4"	3607	
A100	268	#5	STR	16'-0"	4456	
A101	2	#5	STR	14'-2"	30	
A102	2	#5	STR	12'-4"	26	
A103	2	#5	STR	10'-5"	22	
A104	2	#5	STR	8'-8"	18	
A105	2	#5	STR	6'-9"	14	
A106	2	#5	STR	4'-10"	10	
A200	268	#5	STR	16'-0"	4456	
A201	2	#5	STR	14'-2"	30	
A202	2	#5	STR	12'-4"	26	
A203	2	#5	STR	10'-5"	22	
A204	2	#5	STR	8'-8"	18	
A205	2	#5	STR	6'-9"	14	
A206	2	#5	STR	4'-10"	10	
A300	268	#5	STR	16'-0"	4456	
A301	2	#5	STR	14'-2"	30	
A302	2	#5	STR	12'-4"	26	
A303	2	#5	STR	10'-5"	22	
A304	2	#5	STR	8'-8"	18	
A305	2	#5	STR	6'-9"	14	
A306	2	#5	STR	4'-10"	10	
A400	268	#6	STR	16'-0"	6417	
A401	2	#6	STR	14'-2"	43	
A402	2	#6	STR	12'-4"	37	
A403	2	#6	STR	10'-5"	31	
A404	2	#6	STR	8'-8"	26	
A405	2	#6	STR	6'-9"	20	
A406	2	#6	STR	4'-10"	15	
B1	546	#5	STR	9'-2"	5220	
B2	546	#5	STR	6'-6"	3702	
B3	414	#4	STR	9'-2"	2535	
C1	366	#4	STR	36'-2"	8842	
D1	6	#6	STR	3'-0"	27	
D2	6	#6	STR	2'-0"	18	
G1	8	#5	STR	17'-3"	144	
S2	12	#8	STR	17'-3"	553	
REINFORCING STEEL					48809LBS	

NOTES:  
 NATIVE MATERIAL EXCAVATED FROM THE EXISTING STREAMBED OR FLOODPLAIN SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT AS SHOWN IN "PLAN OF FLOOR SILL LAYOUT". ONLY MATERIAL EXCAVATED FROM THE EXISTING STREAMBED MAY BE USED IN THE LOW FLOW BARREL. CLASS B RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL USED IN THE HIGH FLOW BARREL. IF RIP RAP IS USED IN THE HIGH FLOW BARREL, NATIVE MATERIAL SHOULD BE PLACED ON TOP OF THE RIP RAP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

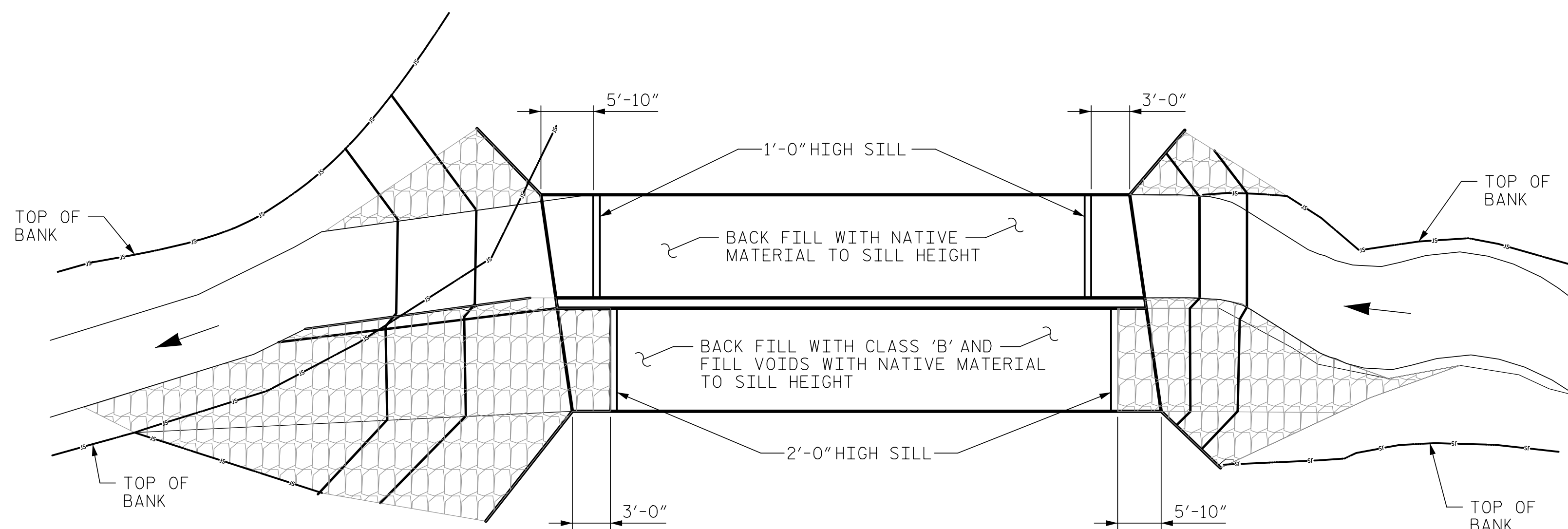
THE ENTIRE COST OF WORK REQUIRED TO PLACE EXCAVATED MATERIAL OR SUPPLEMENTAL MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

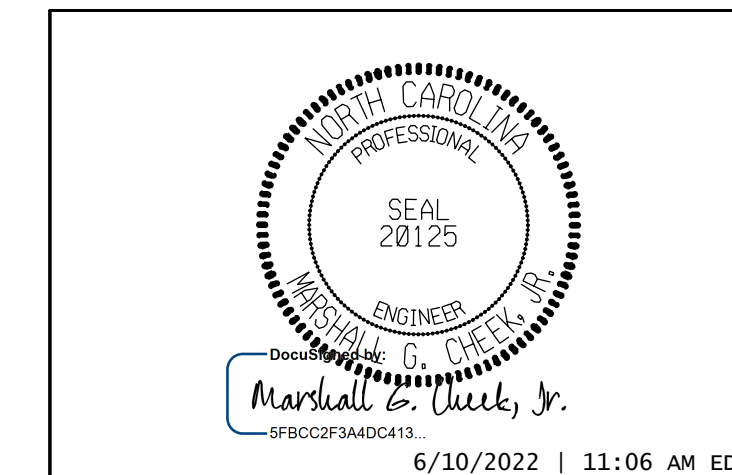
SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
B1	#5	2'-4"
B3	#4	1'-10"
C1	#4	1'-11"
S2	#8	3'-8"

PROJECT NO. R-5705B  
 HARNETT COUNTY  
 STATION: 313+23.00 -L-

SHEET 4 OF 5



DRAWN BY : JLA DATE : 1/21  
 CHECKED BY : MGC DATE : 4/21  
 DESIGN ENGINEER : ZCS DATE : 5/22



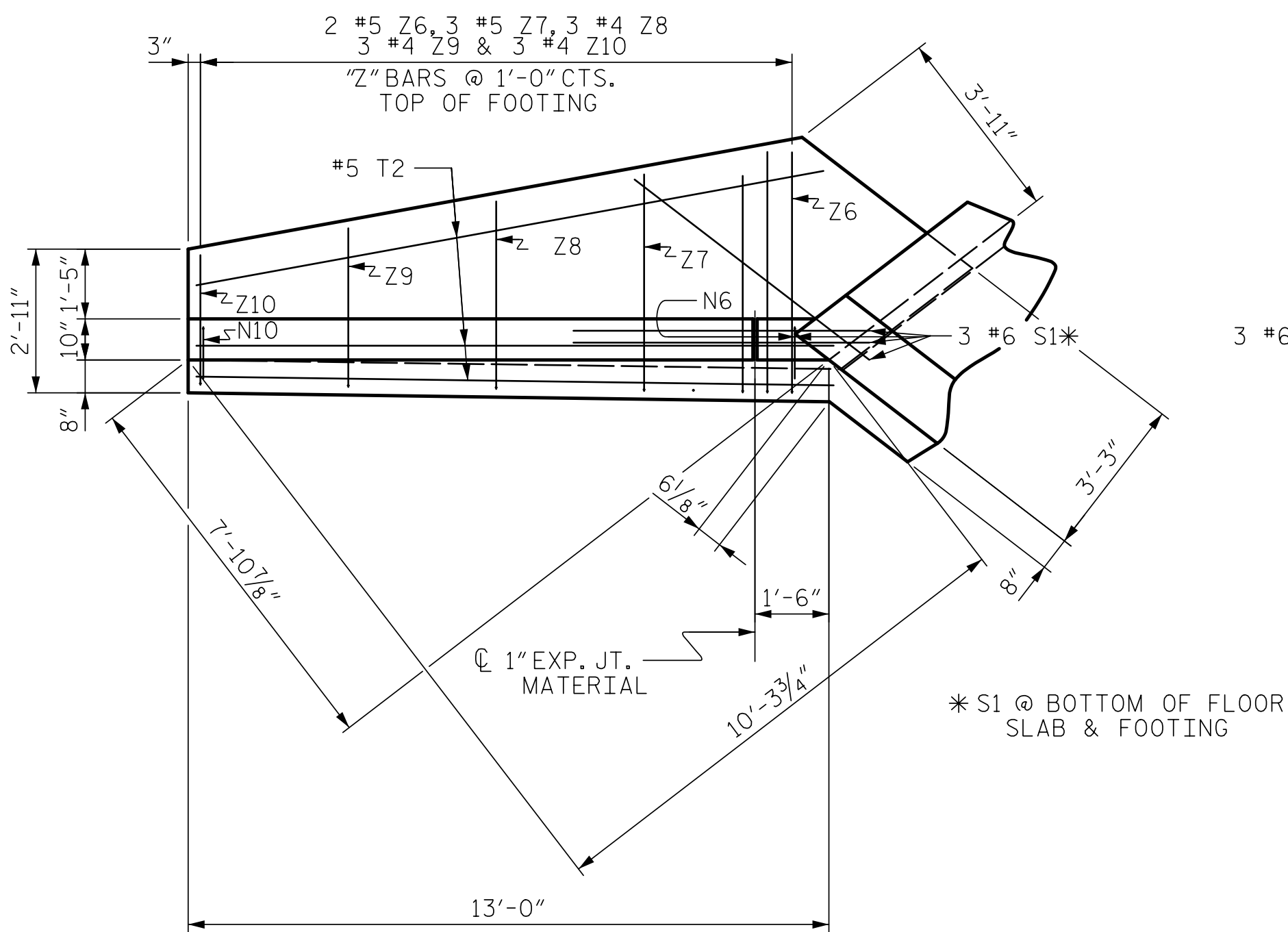
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

DOUBLE 7'-0" x 7'-0"  
 REINFORCED CONCRETE  
 BOX CULVERT

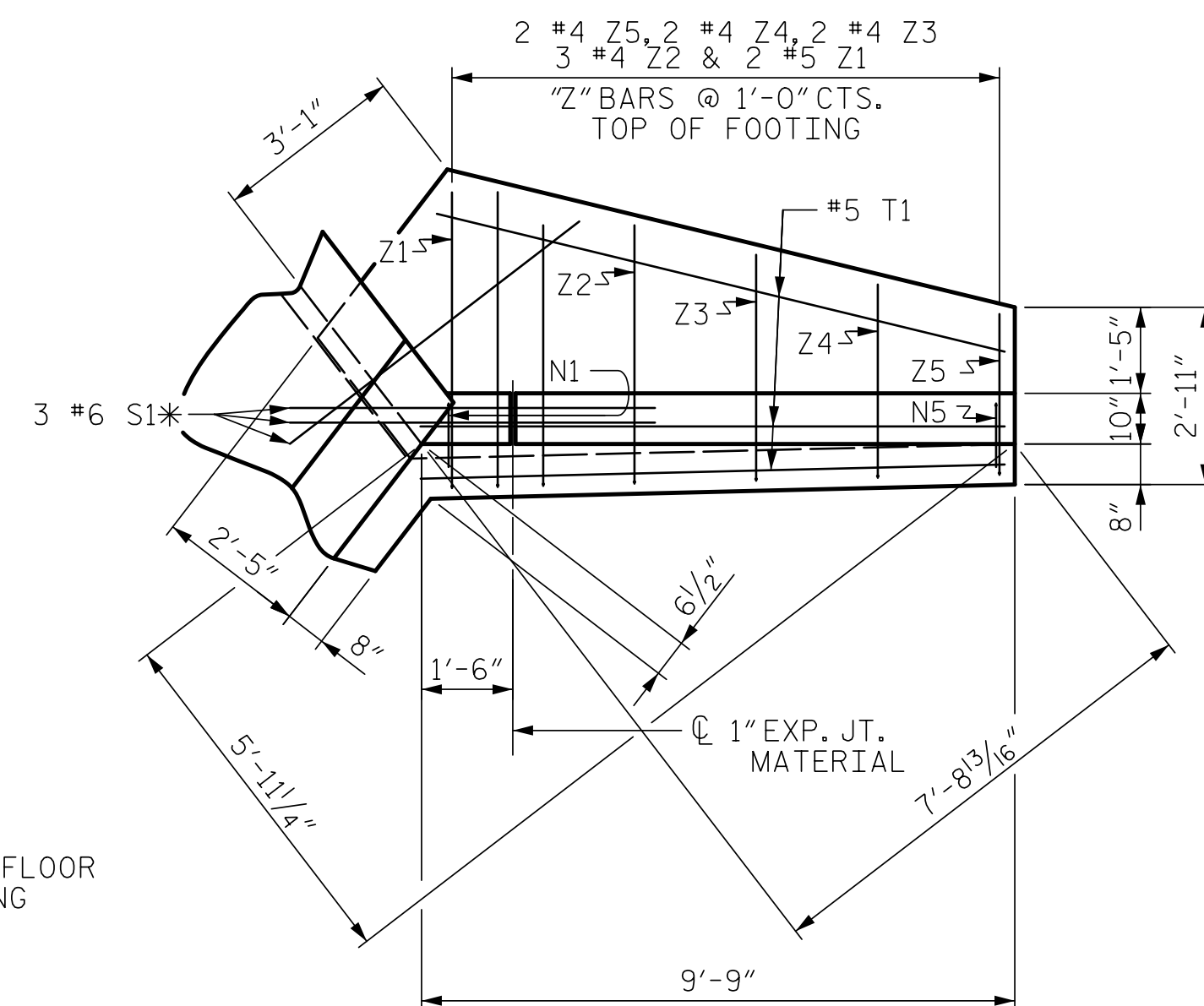
DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS  
 804-C N. LAFAYETTE ST  
 SHELBY, NC 28150  
 PH (704) 476-0003  
 CORP. LICENSE NO.: C-0275

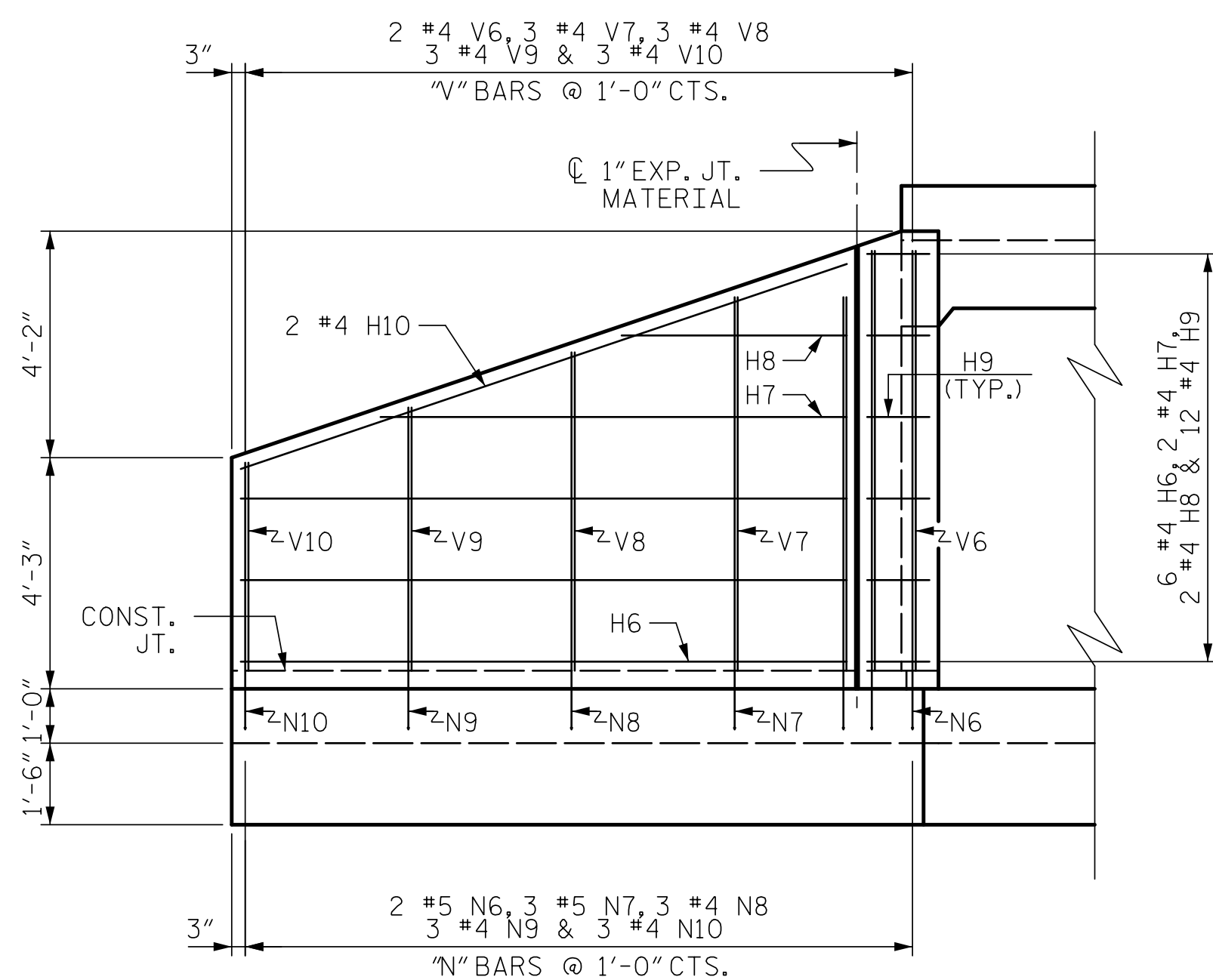
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			5



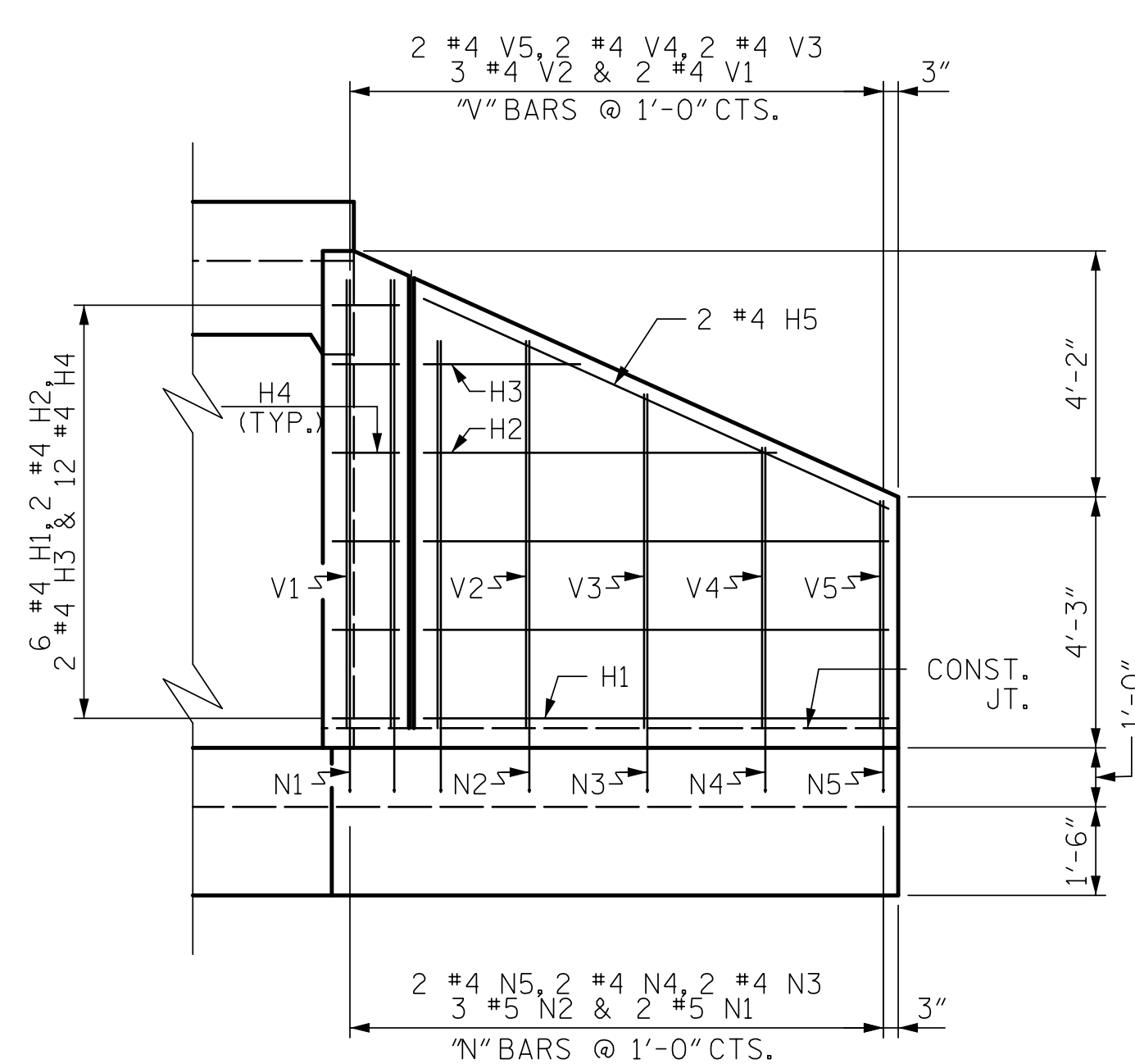
PLAN W1



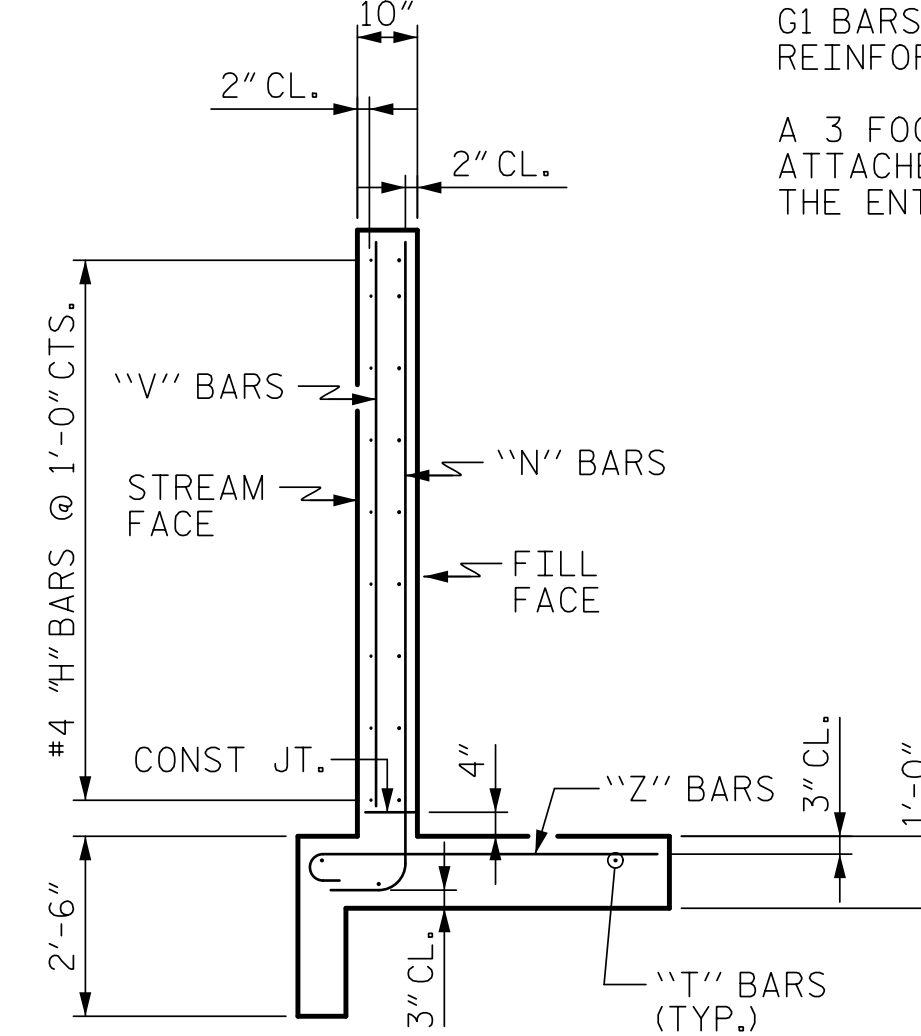
PLAN W2



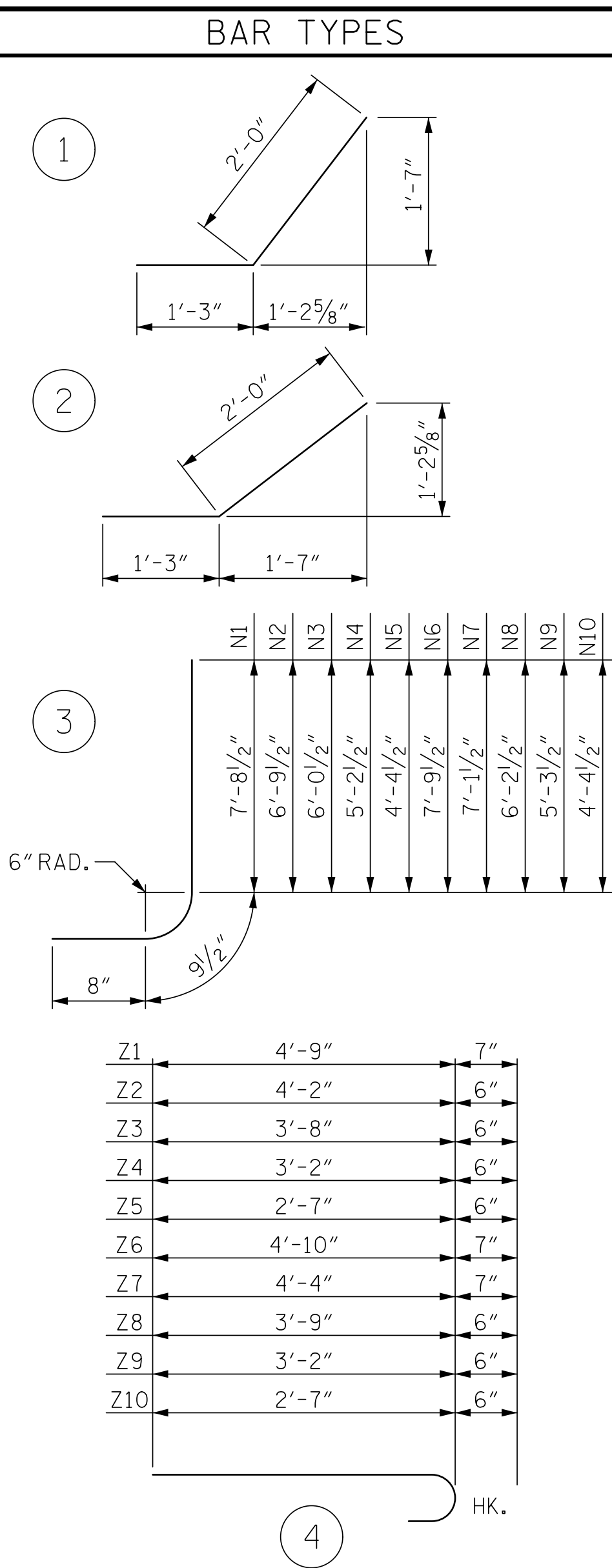
ELEVATION W1



ELEVATION W2



TYPICAL WING SECTION



ALL BAR DIMENSIONS ARE OUT TO OUT.

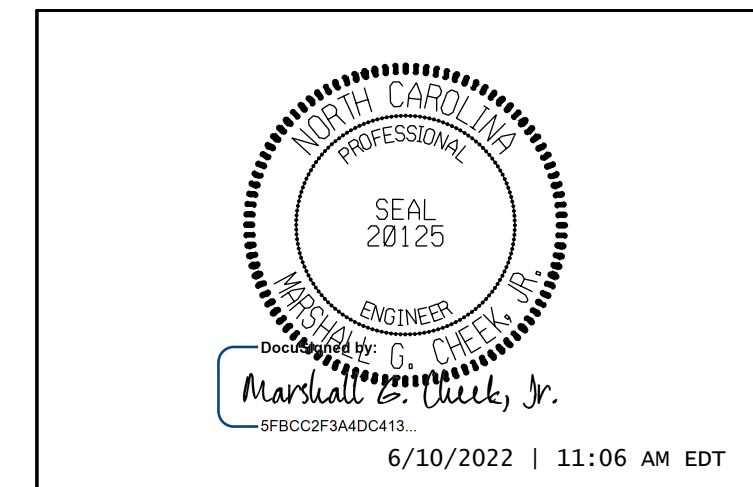
BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	7'-10"	63
H2	4	#4	STR	5'-8"	15
H3	4	#4	STR	2'-0"	5
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	8'-5"	22
H6	12	#4	STR	11'-1"	89
H7	4	#4	STR	8'-2"	22
H8	4	#4	STR	3'-3"	9
H9	24	#4	2	3'-3"	52
H10	4	#4	STR	11'-7"	31
N1	4	#5	3	9'-2"	38
N2	6	#5	3	8'-3"	52
N3	4	#4	3	7'-6"	20
N4	4	#4	3	6'-8"	18
N5	4	#4	3	5'-10"	16
N6	4	#5	3	9'-3"	39
N7	6	#5	3	8'-7"	54
N8	6	#4	3	7'-8"	31
N9	6	#4	3	6'-9"	27
N10	6	#4	3	5'-10"	23
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	9'-9"	61
T2	6	#5	STR	13'-0"	81
V1	4	#4	STR	7'-1"	19
V2	6	#4	STR	6'-3"	25
V3	4	#4	STR	5'-5"	14
V4	4	#4	STR	4'-7"	12
V5	4	#4	STR	3'-10"	10
V6	4	#4	STR	7'-3"	19
V7	6	#4	STR	6'-6"	26
V8	6	#4	STR	5'-7"	22
V9	6	#4	STR	4'-8"	19
V10	6	#4	STR	3'-10"	15
Z1	4	#5	4	5'-4"	22
Z2	6	#4	4	4'-8"	19
Z3	4	#4	4	4'-2"	11
Z4	4	#4	4	3'-8"	10
Z5	4	#4	4	3'-1"	8
Z6	4	#5	4	5'-5"	23
Z7	6	#5	4	4'-11"	31
Z8	6	#4	4	4'-3"	17
Z9	6	#4	4	3'-8"	15
Z10	6	#4	4	3'-1"	12

REINFORCING STEEL	1277 LBS
FOR 4 WINGS	
CLASS A CONCRETE	
4 WINGS	18.2 CY
2 HEADWALLS	1.6 CY
2 END CURTAIN WALLS	1.8 CY
TOTAL	21.6 CY

NOTES

G1 BARS IN HEADWALL ARE INCLUDED WITH BARREL REINFORCING STEEL.  
 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.

ASSEMBLED BY :	JLA	DATE :	1/21
CHECKED BY :	MGC	DATE :	4/21
DRAWN BY :	CCJ	REV.	6/19
CHECKED BY :	RWW	DATE :	03/00



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED  
 TGS ENGINEERS  
 804-C N. LAFAYETTE ST  
 SHELBY, NC 28150  
 PH (704) 476-0003  
 CORP. LICENSE NO.: C-0275

PROJECT NO. R-5705B  
 HARNETT COUNTY  
 STATION: 313+23.00 -L-

SHEET 5 OF 5  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD WINGS  
 FOR  
 CONCRETE BOX CULVERT  
 H = 7'-0" SLOPE = 2:1

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

STD. NO. CW10507

## 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  $\frac{3}{4}$ " 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  $\frac{7}{8}$ "  $\emptyset$  SHEAR STUDS FOR THE  $\frac{3}{4}$ "  $\emptyset$  STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{7}{8}$ "  $\emptyset$  STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ "  $\emptyset$  STUDS BASED ON THE RATIO OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  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  $\frac{3}{16}$ " 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  $\frac{1}{16}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

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

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

### SPECIAL NOTES:

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



# ENGLISH

JANUARY, 1990

STD. NO. SN