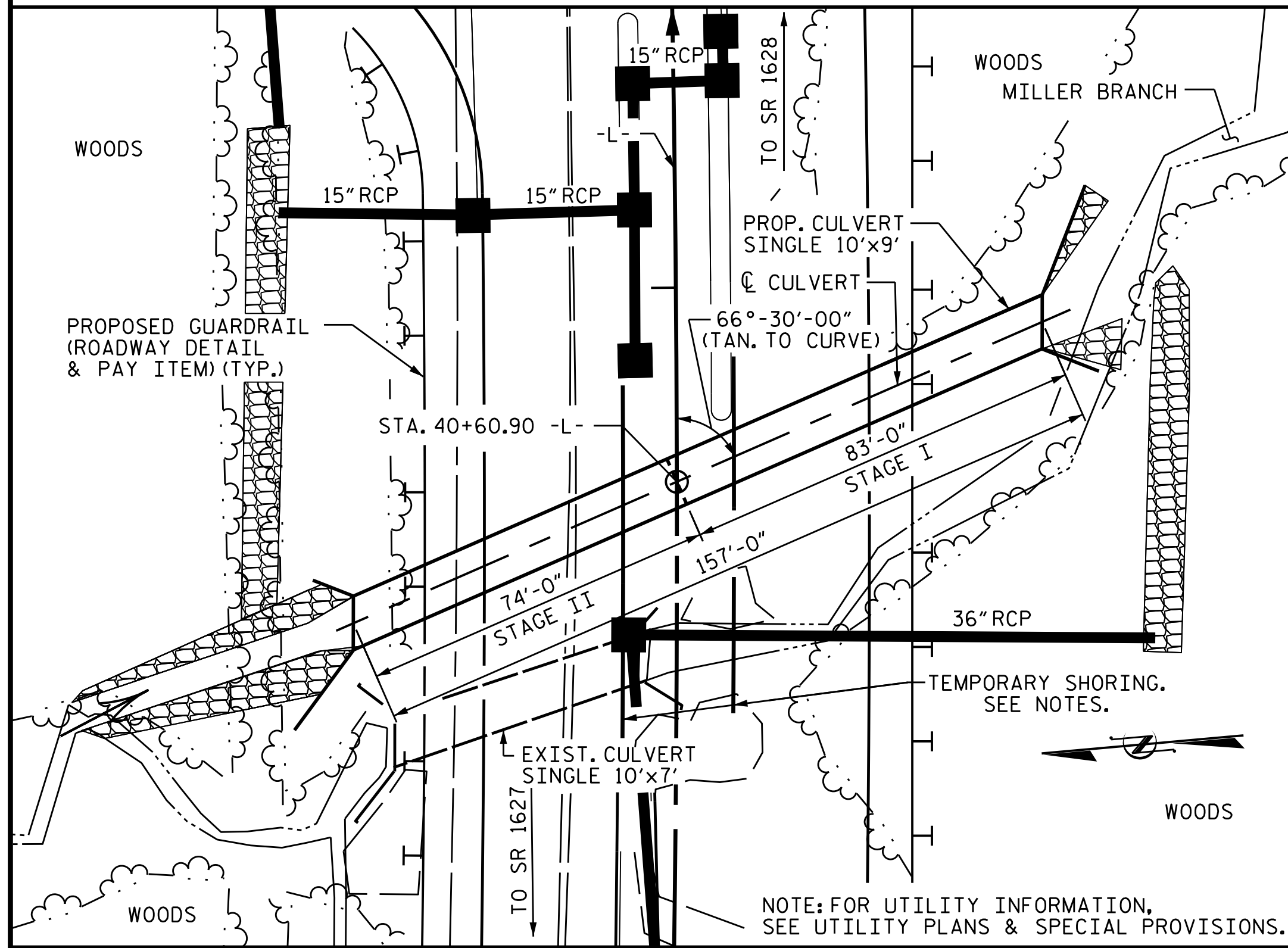


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numbers appear on each page, on the dates appearing  
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shall not be considered a certified document.**

BM #4 (JAS55): STA. 40+21.00 -L-, 7' LEFT, EL.=713.02



LOCATION SKETCH

ROADWAY DATA

GRADE POINT ELEV. @ STA. 40+60.90 -L- = 718.36  
 BED ELEV. @ STA. 40+60.90 -L- = 700.86  
 ROADWAY SLOPES = 2:1

HYDRAULIC DATA

DESIGN DISCHARGE = 800 C.F.S.  
 FREQUENCY OF DESIGN FLOOD = 50 YR.  
 DESIGN HIGH WATER ELEV. = 712.90  
 DRAINAGE AREA = 0.70 SQ. MI.  
 BASE DISCHARGE (Q100) = 900 C.F.S.  
 BASE HIGH WATER ELEV. = 713.70

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 1400 C.F.S.  
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YR.  
 OVERTOPPING FLOOD ELEV. = 719.40

TOTAL STRUCTURE QUANTITIES

REMOVAL OF EXISTING STRUCTURE	LUMP SUM
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
STAGE I	90 TONS
STAGE II	80 TONS
TOTAL	170 TONS
CLASS A CONCRETE	
STAGE I	109.4 C.Y.
STAGE II	99.0 C.Y.
TOTAL	208.4 C.Y.
REINFORCING STEEL	
STAGE I	16,214 LBS.
STAGE II	14,520 LBS.
TOTAL	30,734 LBS.
PLACEMENT OF NATURAL STREAM BED MATERIAL	LUMP SUM

NOTES

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- DESIGN FILL = 10.05 FEET.
- FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- DURING STAGE I & STAGE II CONSTRUCTION, 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, SILLS, BAFFLES, 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.
- TRAFFIC ON EXISTING ROAD SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN SECTIONS AS DIRECTED BY THE ENGINEER.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. 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.
- 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.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- 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.
- NATURAL STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT BETWEEN THE SILLS AND BETWEEN THE BAFFLES. SEE SPECIAL PROVISIONS.
- FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.
- FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

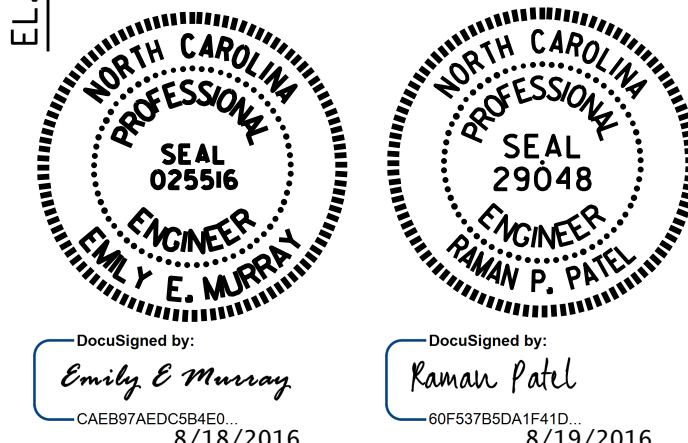
I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-3440  
CABARRUS COUNTY  
 STATION: 40+60.90 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 BARREL STANDARD  
 SINGLE 10 FT. X 9 FT.  
 CONCRETE BOX CULVERT

66°-30'-00" SKEW

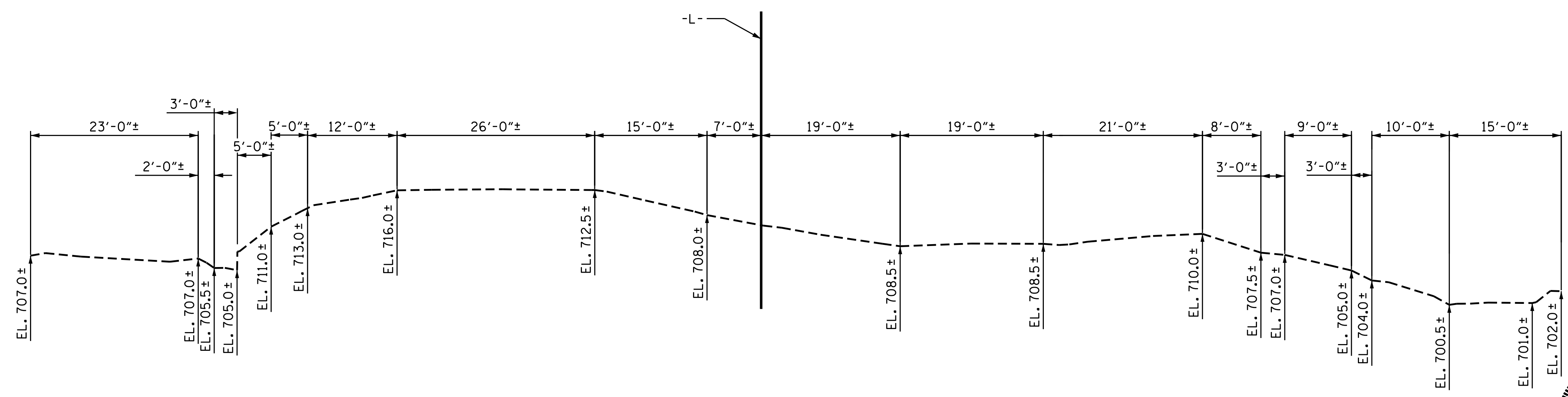


REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-1
1			3			TOTAL SHEETS
2			4			5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STR. #3 STD. NO. CB31A

PROFILE ALONG CULVERT



ASSEMBLED BY : N.D. AIUTO DATE : 2/16/16  
 CHECKED BY : K.D. LAYNE DATE : 2/20/16

**SPECIAL**

DRAWN BY : R.W. WRIGHT DATE : AUG. 1989  
 CHECKED BY : A.R. BISSETTE DATE : AUG. 1989

**STANDARD**

DESIGN ENGINEER OF RECORD:  
R.P. PATEL DATE : 5/3/16

18-AUG-2016 10:22  
 R:\Structures\Plans\fr03\U3440.SD.CU.03.dgn  
 jghawk

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						LIVE-LOAD FACTORS (LL)	MOMENT				SHEAR					
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	1	1.07	--	1.75	1.17	1	TOP SLAB	5.33	1.07	1	TOP SLAB	0.84		
	HL-93 (OPERATING)	N/A		1.39	--	1.35	1.52	1	TOP SLAB	5.33	1.39	1	TOP SLAB	0.84		
	HS-20 (INVENTORY)	36.000	2	1.60	57.67	1.75	1.60	1	BOT CORNER WALL	9.53	1.62	1	TOP SLAB	0.84		
	HS-20 (OPERATING)	36.000		2.08	74.76	1.35	2.08	1	BOT CORNER WALL	9.53	2.11	1	TOP SLAB	0.84		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.27	30.66	1.40	2.27	1	BOT CORNER WALL	9.53	2.94	1	TOP SLAB	0.84		
		SNGARBS2	20.000		2.23	44.61	1.40	2.23	1	BOT CORNER WALL	9.53	2.74	1	TOP SLAB	0.84	
		SNAGRIS2	22.000		2.27	49.96	1.40	2.27	1	BOT CORNER WALL	9.53	2.94	1	TOP SLAB	0.84	
		SNCOTTS3	27.250	3	1.34	36.45	1.40	1.47	1	TOP SLAB	5.33	1.34	1	TOP SLAB	0.84	
		SNAGGRS4	34.925		1.44	50.40	1.40	1.51	1	TOP SLAB	5.33	1.44	1	TOP SLAB	0.84	
		SNS5A	35.550		1.48	52.69	1.40	1.56	1	TOP SLAB	5.33	1.48	1	TOP SLAB	0.84	
		SNS6A	39.950		1.48	59.21	1.40	1.56	1	TOP SLAB	5.33	1.48	1	TOP SLAB	0.84	
		SNS7B	42.000		1.48	62.25	1.40	1.56	1	TOP SLAB	5.33	1.48	1	TOP SLAB	0.84	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.12	69.89	1.40	2.12	1	BOT CORNER WALL	9.53	2.25	1	TOP SLAB	0.84	
		TNT4A	33.075		1.60	52.83	1.40	1.75	1	TOP SLAB	5.33	1.60	1	TOP SLAB	0.84	
		TNT6A	41.600		1.46	60.56	1.40	1.51	1	TOP SLAB	5.33	1.46	1	TOP SLAB	9.82	
		TNT7A	42.000		1.54	64.57	1.40	1.66	1	TOP SLAB	5.33	1.54	1	TOP SLAB	9.82	
		TNT7B	42.000		1.48	62.25	1.40	1.56	1	TOP SLAB	5.33	1.48	1	TOP SLAB	9.82	
		TNAGRIT4	43.000		1.52	65.50	1.40	1.67	1	TOP SLAB	5.33	1.52	1	TOP SLAB	0.84	
TNAGT5A	45.000		1.55	69.84	1.40	1.71	1	TOP SLAB	5.33	1.55	1	TOP SLAB	0.84			
TNAGT5B	45.000		1.60	71.87	1.40	1.75	1	TOP SLAB	5.33	1.60	1	TOP SLAB	0.84			

**LOAD FACTORS**

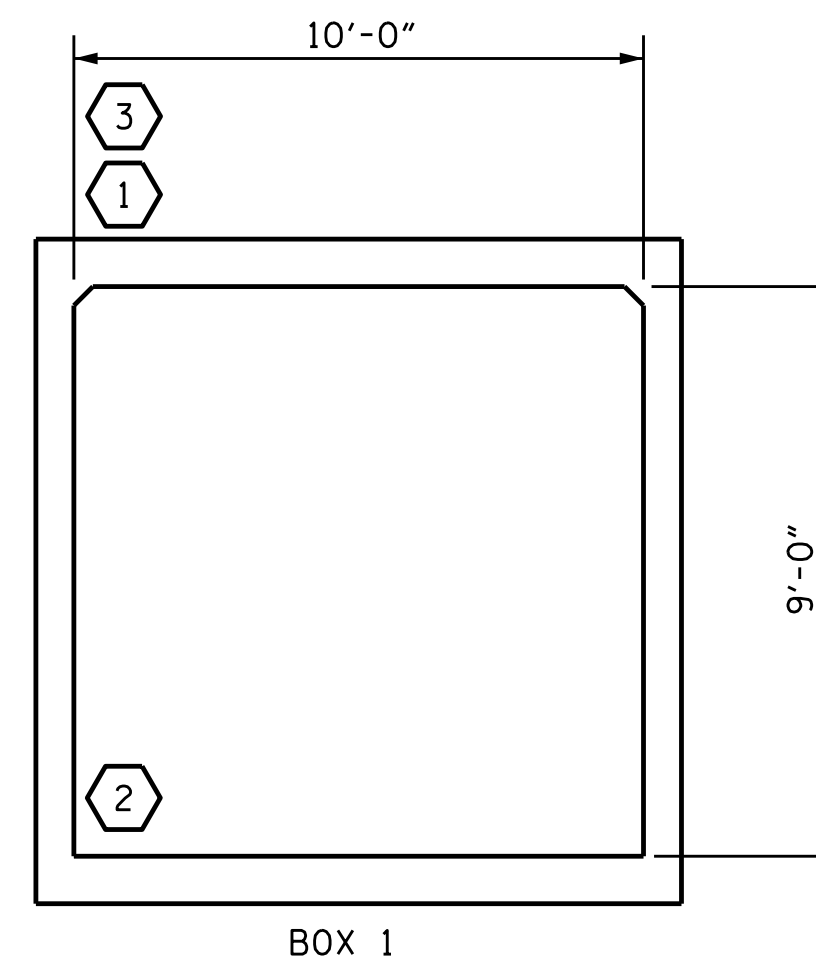
DESIGN LOAD RATING FACTORS

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.

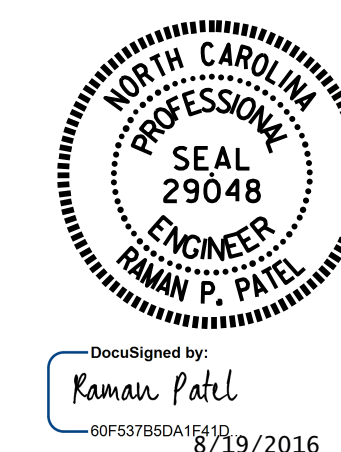
#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. U-3440  
CABARRUS COUNTY  
STATION: 40+60.90 -L-

SHEET 2 OF 5



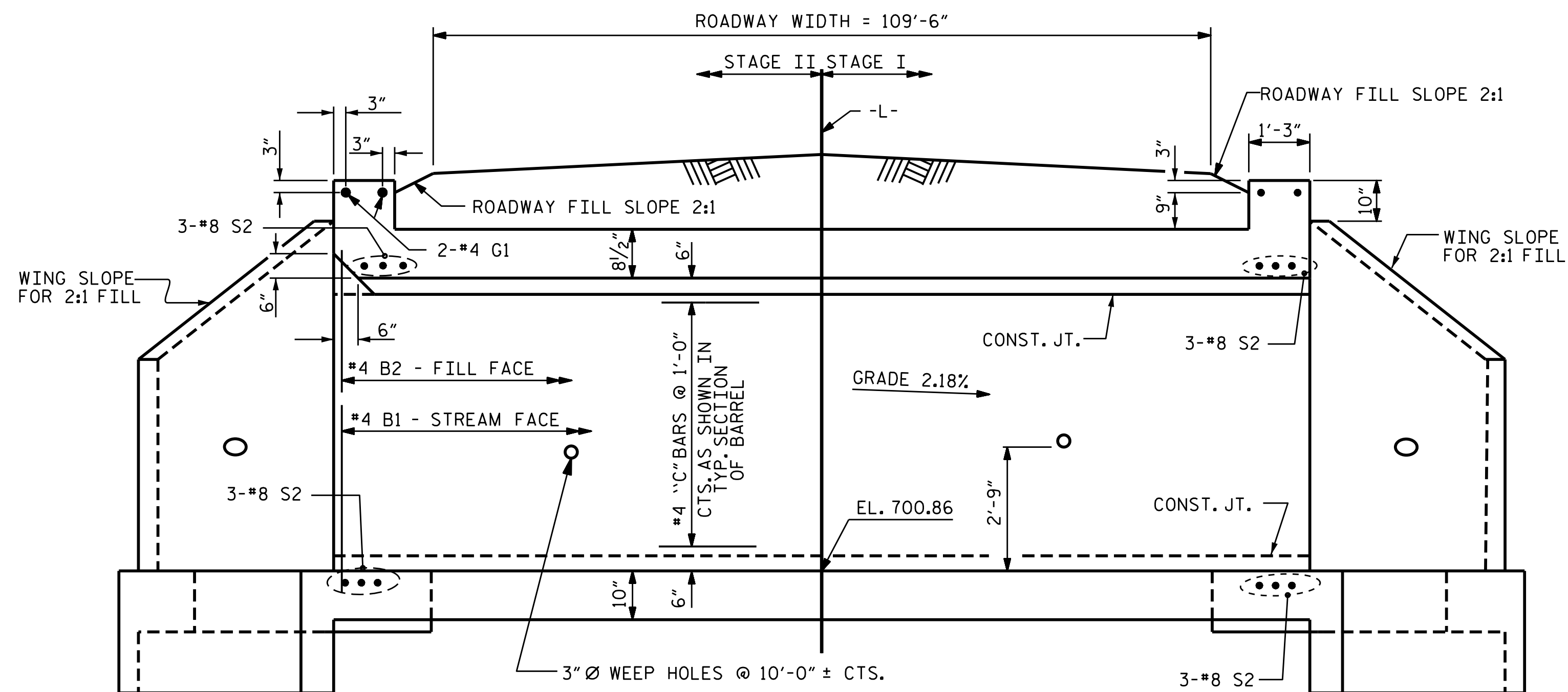
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
LRFR SUMMARY FOR  
REINFORCED CONCRETE  
BOX CULVERTS  
(NON-INTERSTATE TRAFFIC)

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

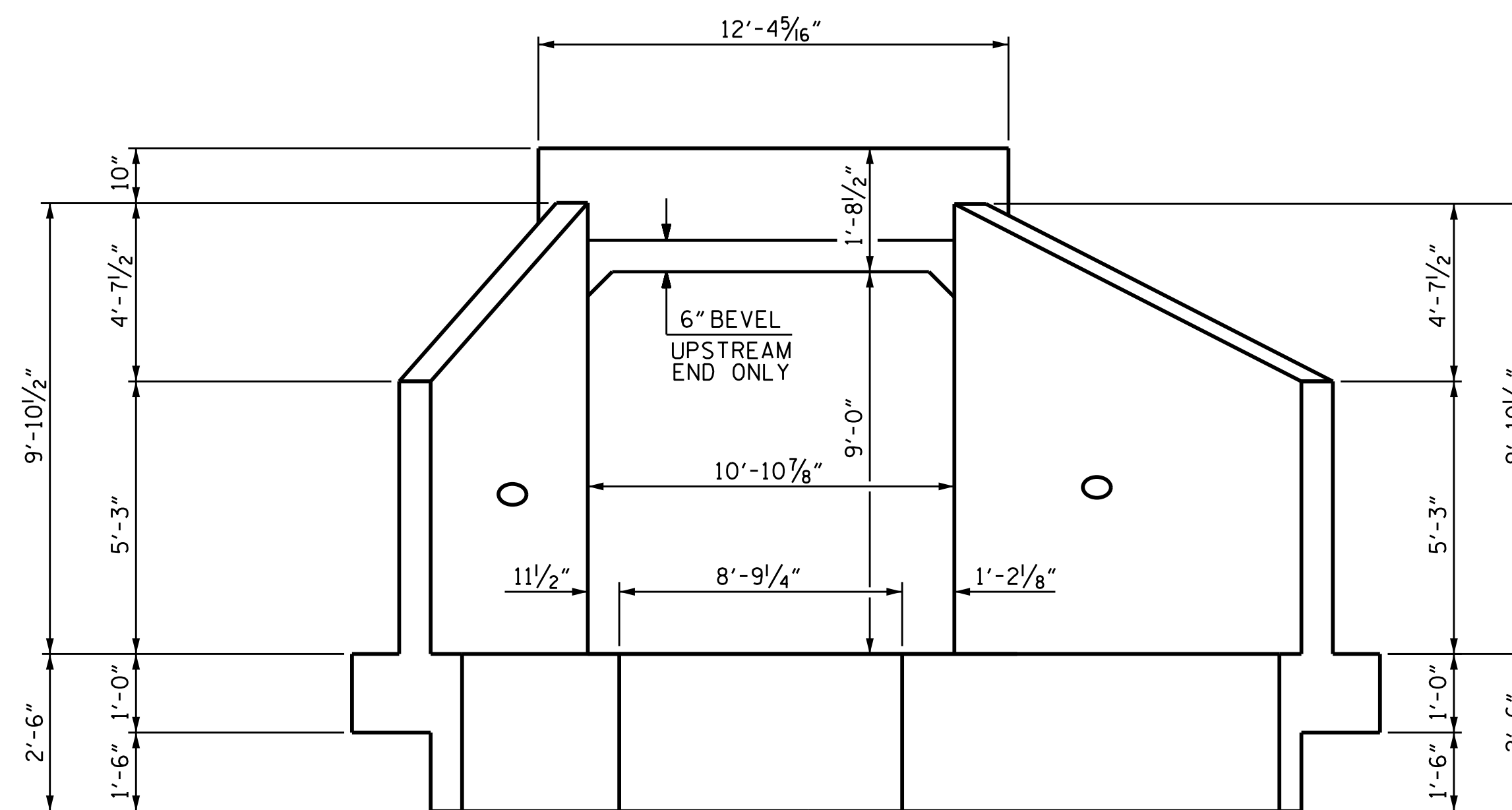
DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

STR. #3      STD. NO. LRFR5

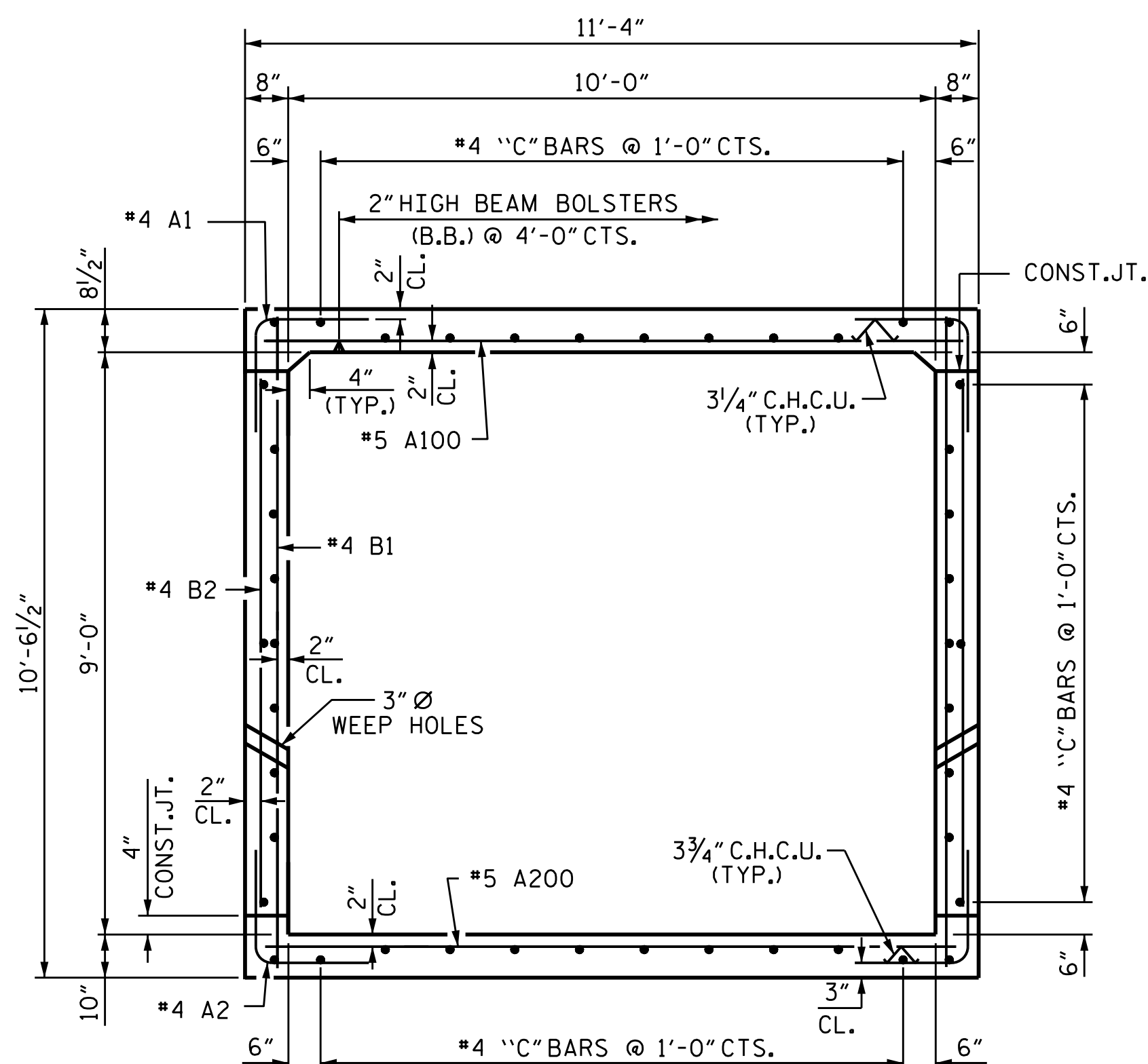
ASSEMBLED BY : N.D'ALUIO	DATE : 2/16/16
CHECKED BY : R.P.PATEL	DATE : 5/3/16
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
DESIGN ENGINEER OF RECORD:	
R. P. PATEL	DATE : 5/25/16



**CULVERT SECTION NORMAL TO ROADWAY**

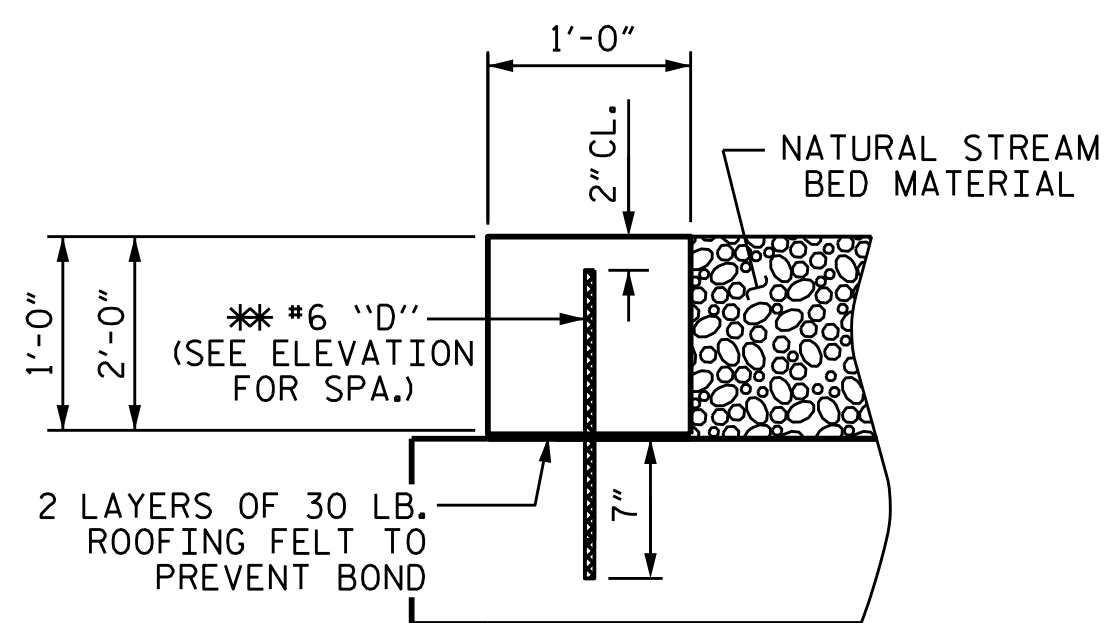


**END ELEVATION NORMAL TO SKEW**



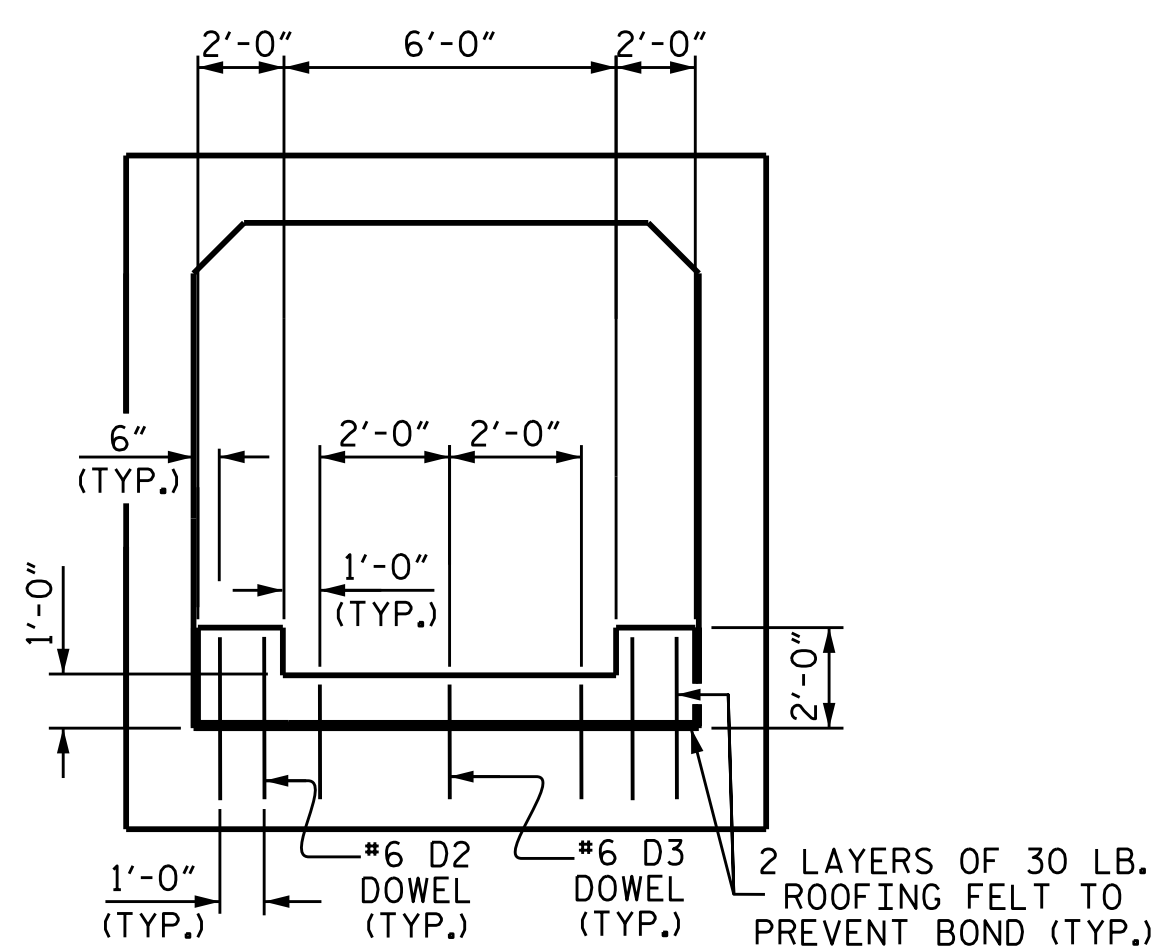
**RIGHT ANGLE SECTION OF BARREL**

THERE ARE 44 C1 BARS IN SECTION OF BARREL.

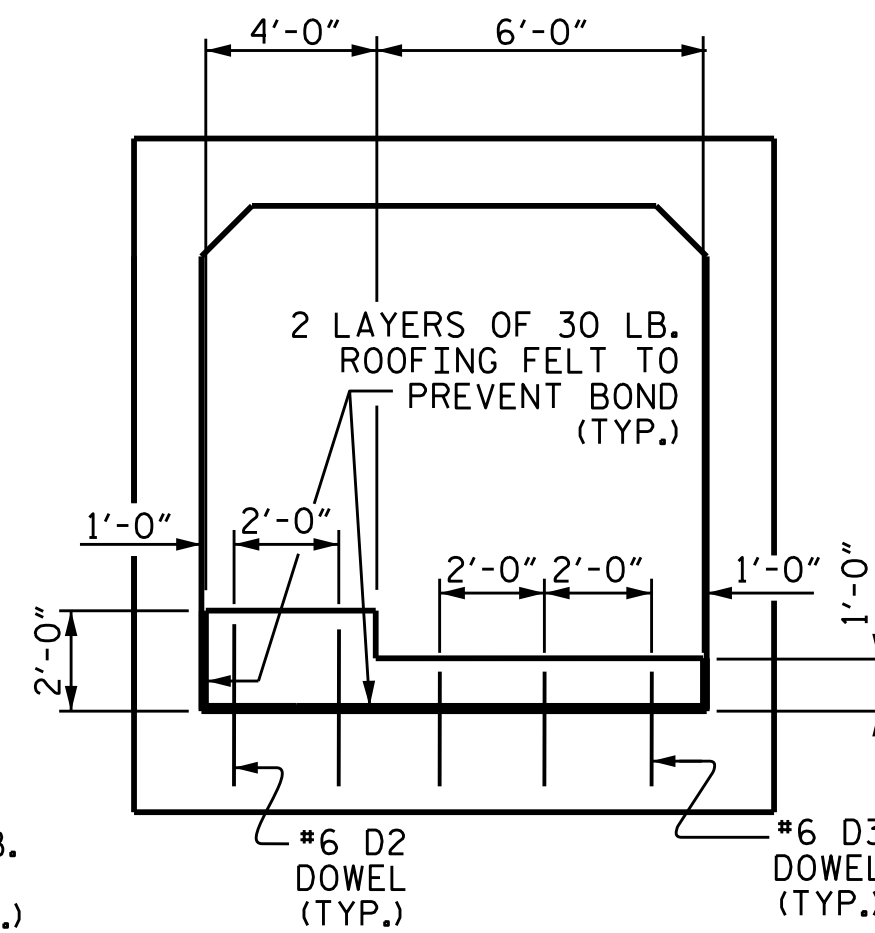


**SECTION THROUGH SILL/BAFFLE**

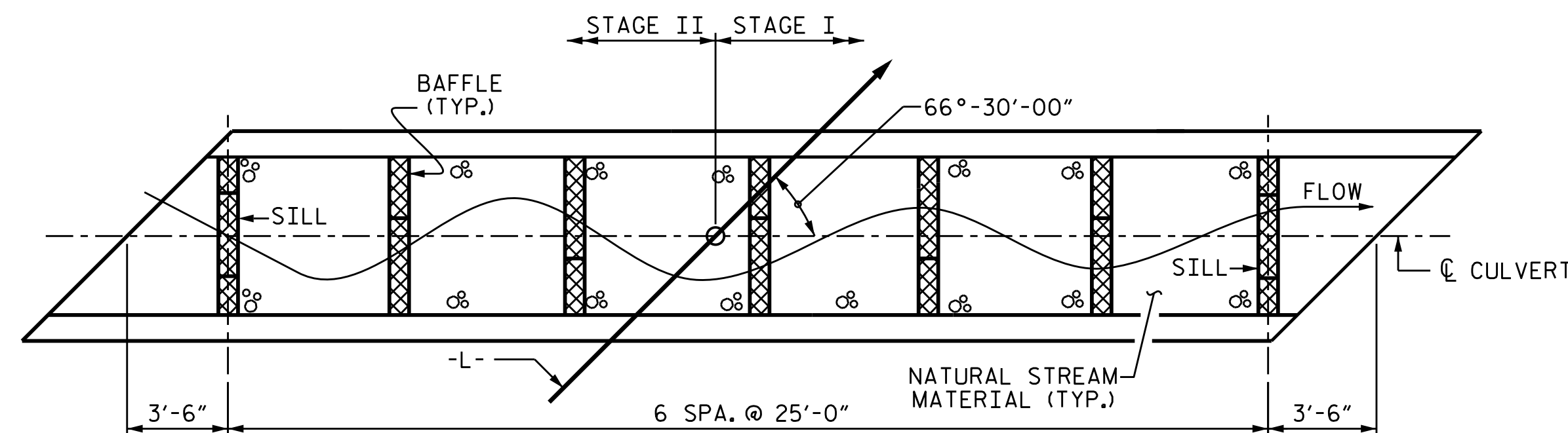
\* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.



**ELEVATION (SILLS)**  
(LOOKING UPSTREAM, DOWNSTREAM SIMILAR)



**ELEVATION (BAFFLES)**  
(ALTERNATE 1'-0" BAFFLE EA. SIDE, SEE PLAN)

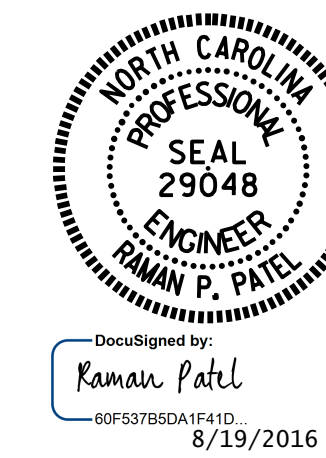


**PLAN**

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-3440  
CABARRUS COUNTY  
 STATION: 40+60.90 -L-

SHEET 3 OF 5



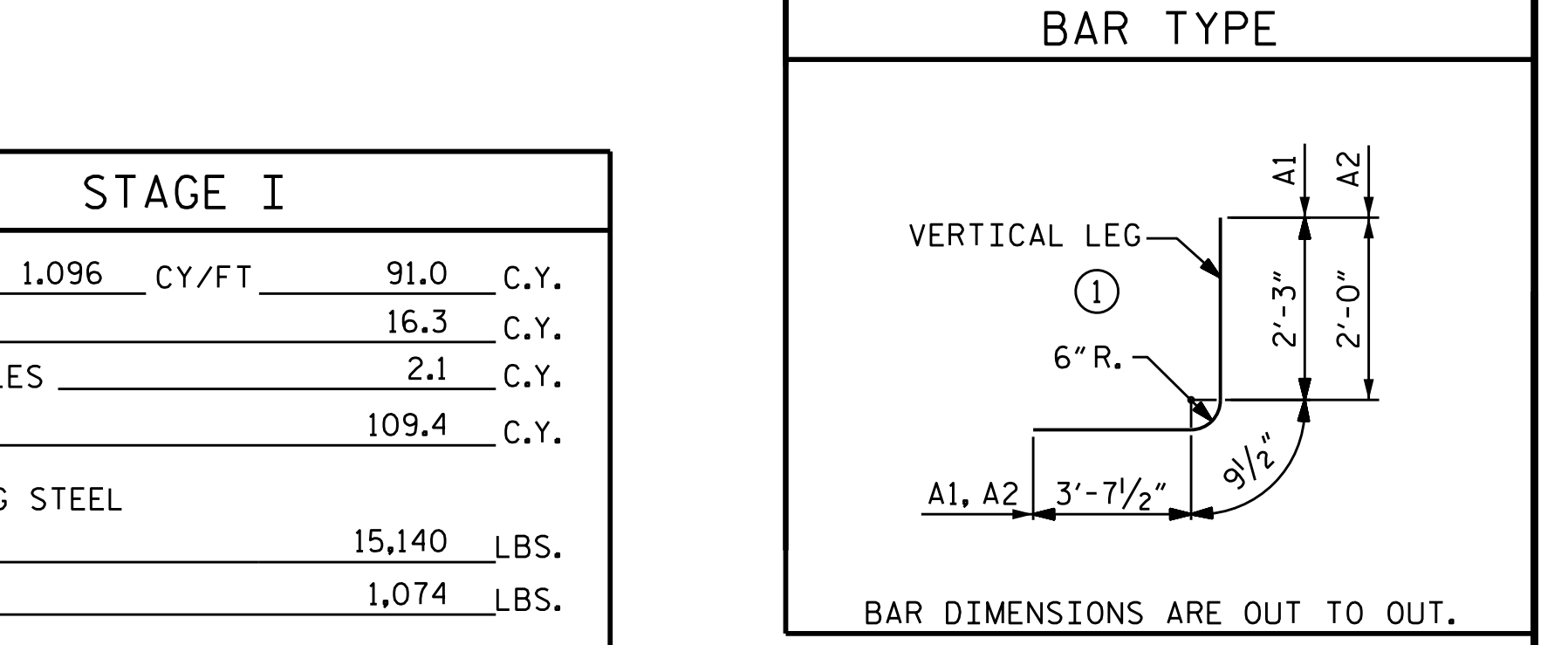
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SINGLE 10 FT. X 9 FT.  
 CONCRETE BOX CULVERT  
 66°-30'-00" SKEW

ASSEMBLED BY : N.D. AIUTO DATE : 2/16/16  
 CHECKED BY : K.D. LAYNE DATE : 4/6/16  
 DESIGN ENGINEER OF RECORD : R.P. PATEL DATE : 5/3/16

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

BILL OF MATERIAL													
STAGE I						STAGE II							
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT		
A1	396	#4	1	6'-8"	1764	A1	354	#4	1	6'-8"	1576		
A2	396	#4	1	6'-5"	1697	A2	354	#4	1	6'-5"	1517		
A100	215	#5	STR.	11'-0"	2467	A100	191	#5	STR.	11'-0"	2191		
A101	3	#5	STR.	8'-4"	26	A101	3	#5	STR.	8'-4"	26		
A102	3	#5	STR.	5'-9"	18	A102	3	#5	STR.	5'-9"	18		
A103	3	#5	STR.	3'-2"	10	A103	3	#5	STR.	3'-2"	10		
A104	1	#5	STR.	2'-4"	2	A104	1	#5	STR.	2'-4"	2		
A200	242	#5	STR.	11'-0"	2776	A200	215	#5	STR.	11'-0"	2467		
A201	3	#5	STR.	8'-8"	27	A201	3	#5	STR.	8'-8"	27		
A202	3	#5	STR.	6'-5"	20	A202	3	#5	STR.	6'-5"	20		
A203	3	#5	STR.	4'-1"	13	A203	3	#5	STR.	4'-1"	13		
A204	2	#5	STR.	2'-7"	5	A204	2	#5	STR.	2'-7"	5		
B1	166	#4	STR.	10'-0"	1109	B1	148	#4	STR.	10'-0"	989		
B2	396	#4	STR.	8'-4"	2204	B2	354	#4	STR.	8'-4"	1971		
C1	176	#4	STR.	23'-3"	2733	C2	132	#4	STR.	26'-9"	2359		
D2	10	#6	STR.	2'-5"	36	D2	8	#6	STR.	2'-5"	29		
D3	12	#6	STR.	1'-5"	26	D3	9	#6	STR.	1'-5"	19		
G1	2	#4	STR.	11'-11"	16	G1	2	#4	STR.	11'-11"	16		
S2	6	#8	STR.	11'-11"	191	S2	6	#8	STR.	11'-11"	191		
REINFORCING STEEL					LBS.	15,140	REINFORCING STEEL					LBS.	13,446



**STAGE I**

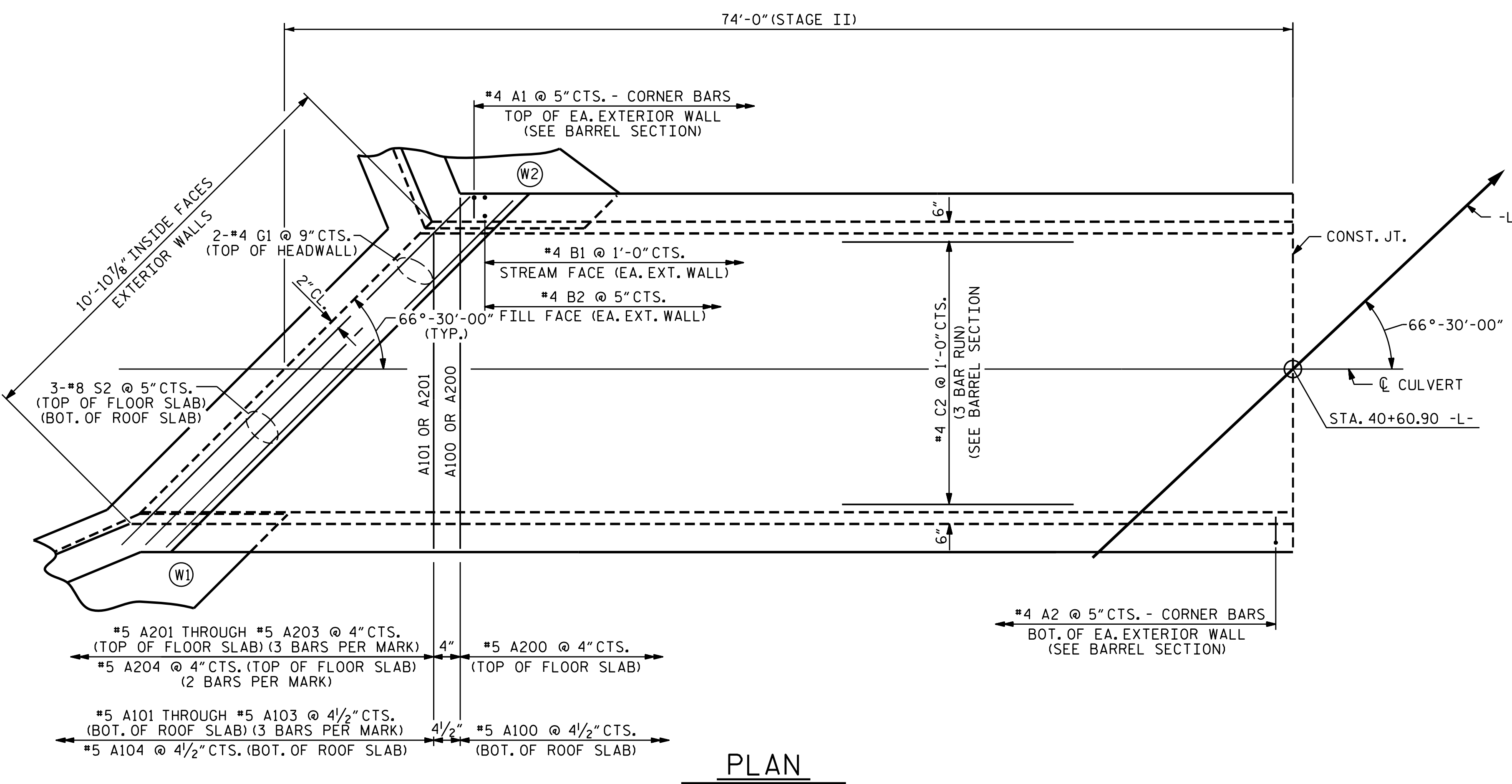
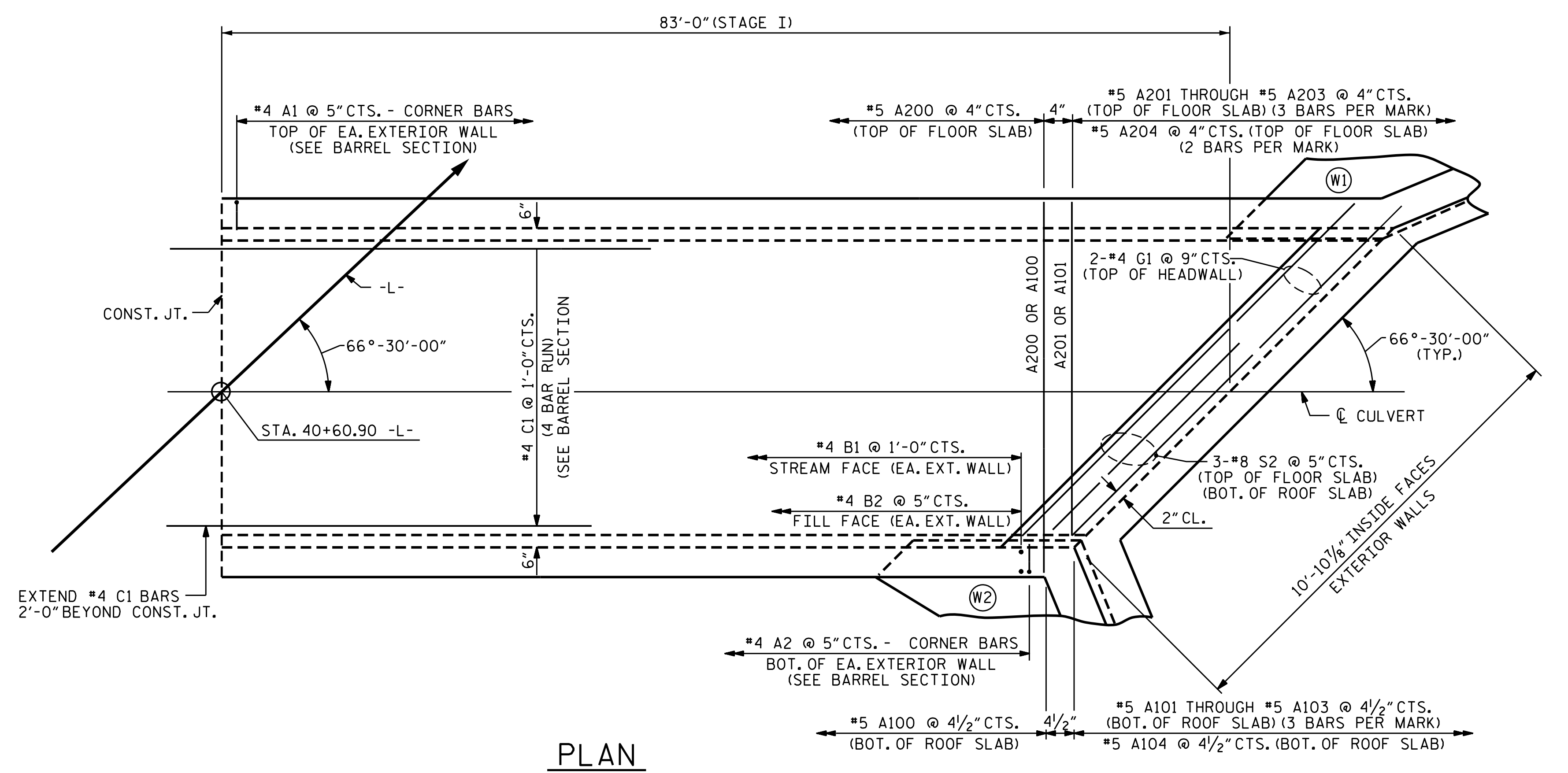
BARREL @	1.096	CY/FT	91.0	C.Y.
WINGS ETC.			16.3	C.Y.
SILLS, BAFFLES			2.1	C.Y.
<b>TOTAL</b>			<b>109.4</b>	<b>C.Y.</b>
REINFORCING STEEL				
BARREL @			15,140	LBS.
WINGS			1,074	LBS.
<b>TOTAL</b>			<b>16,214</b>	<b>LBS.</b>

**STAGE II**

CLASS A CONCRETE				
BARREL @	1.096	CY/FT	81.1	C.Y.
WINGS ETC.			16.3	C.Y.
SILLS, BAFFLES			1.6	C.Y.
<b>TOTAL</b>			<b>99.0</b>	<b>C.Y.</b>
REINFORCING STEEL				
BARREL @			13,446	LBS.
WINGS			1,074	LBS.
<b>TOTAL</b>			<b>14,520</b>	<b>LBS.</b>

**SPLICE LENGTH CHART**

BAR	SIZE	SPLICE LENGTH
B1	#4	1'-9"
C1	#4	1'-11"
C2	#4	1'-11"



ASSEMBLED BY : N.D. AIUTO DATE : 2/16/16  
 CHECKED BY : K.D. LAYNE DATE : 4/6/16  
 DESIGN ENGINEER OF RECORD : R.P. PATEL DATE : 5/3/16

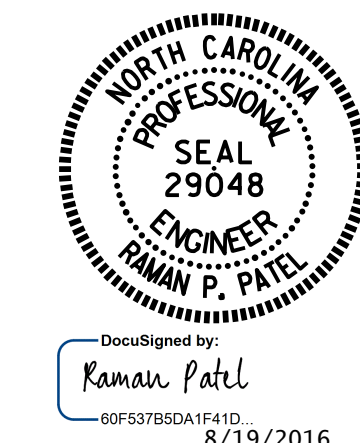
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DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

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

STR. #3 STD. NO. CB22

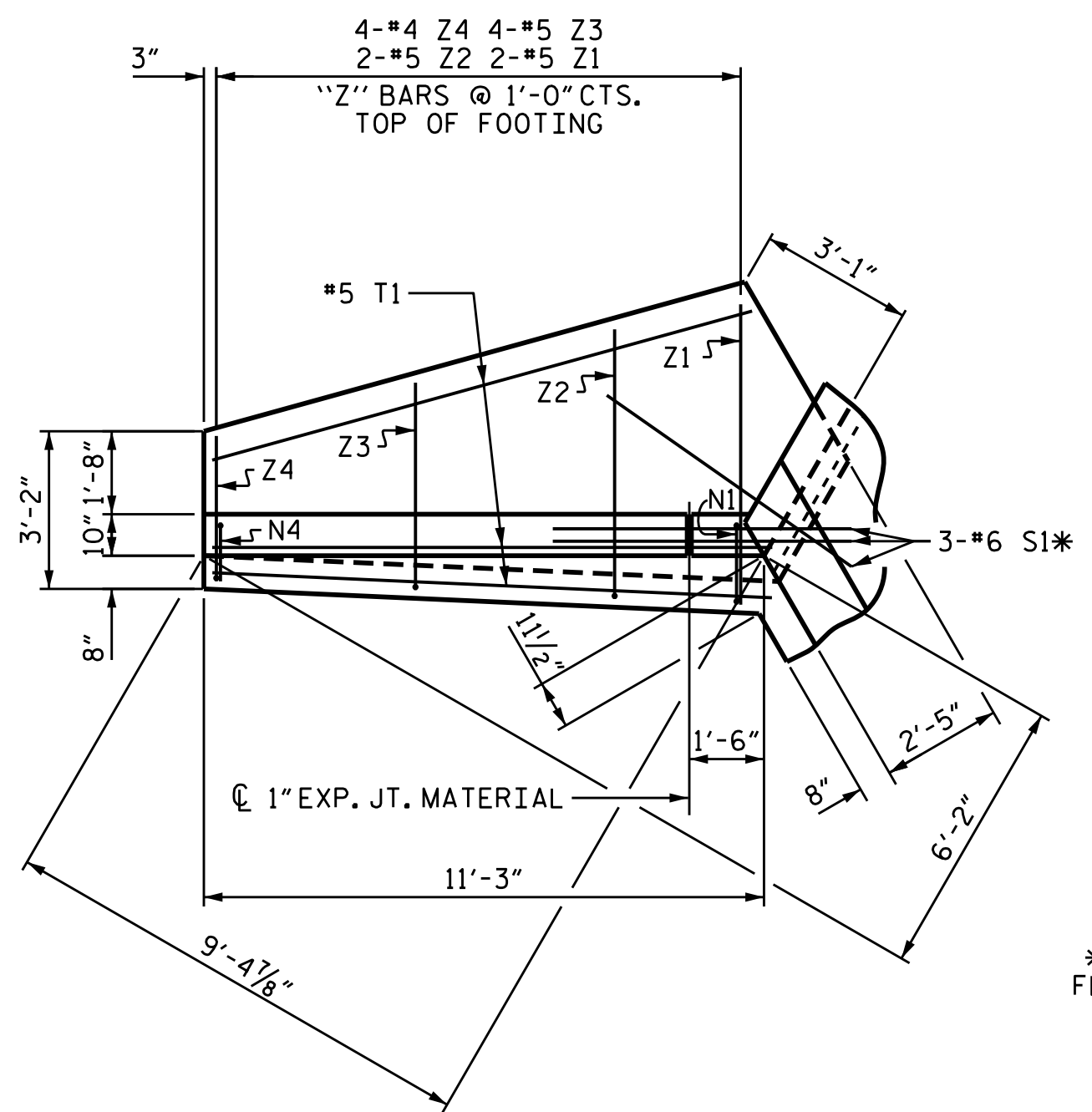
PROJECT NO. U-3440  
 CABARRUS COUNTY  
 STATION: 40+60.90 -L-  
 SHEET 4 OF 5



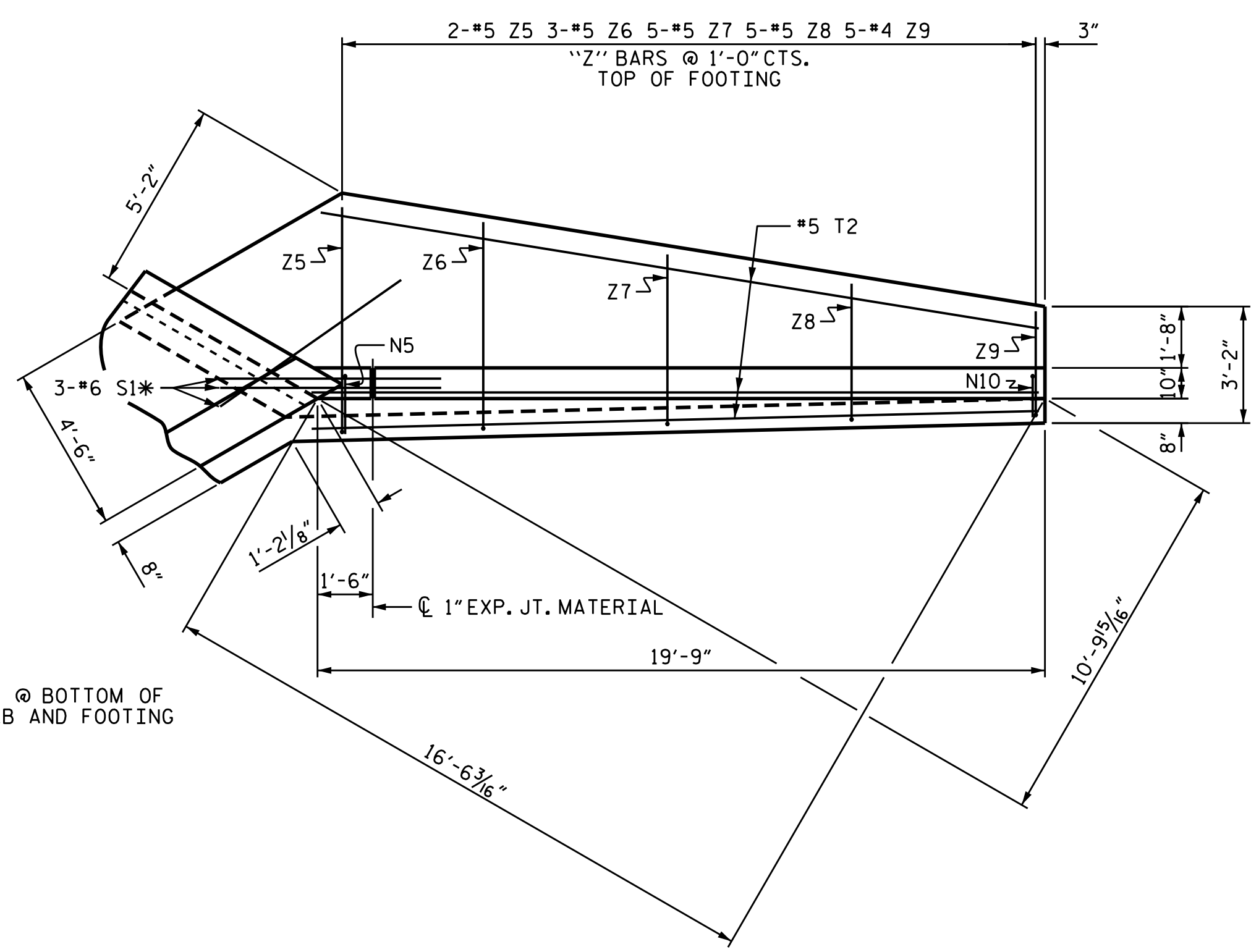
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SINGLE 10 FT. X 9 FT.  
 CONCRETE BOX CULVERT**

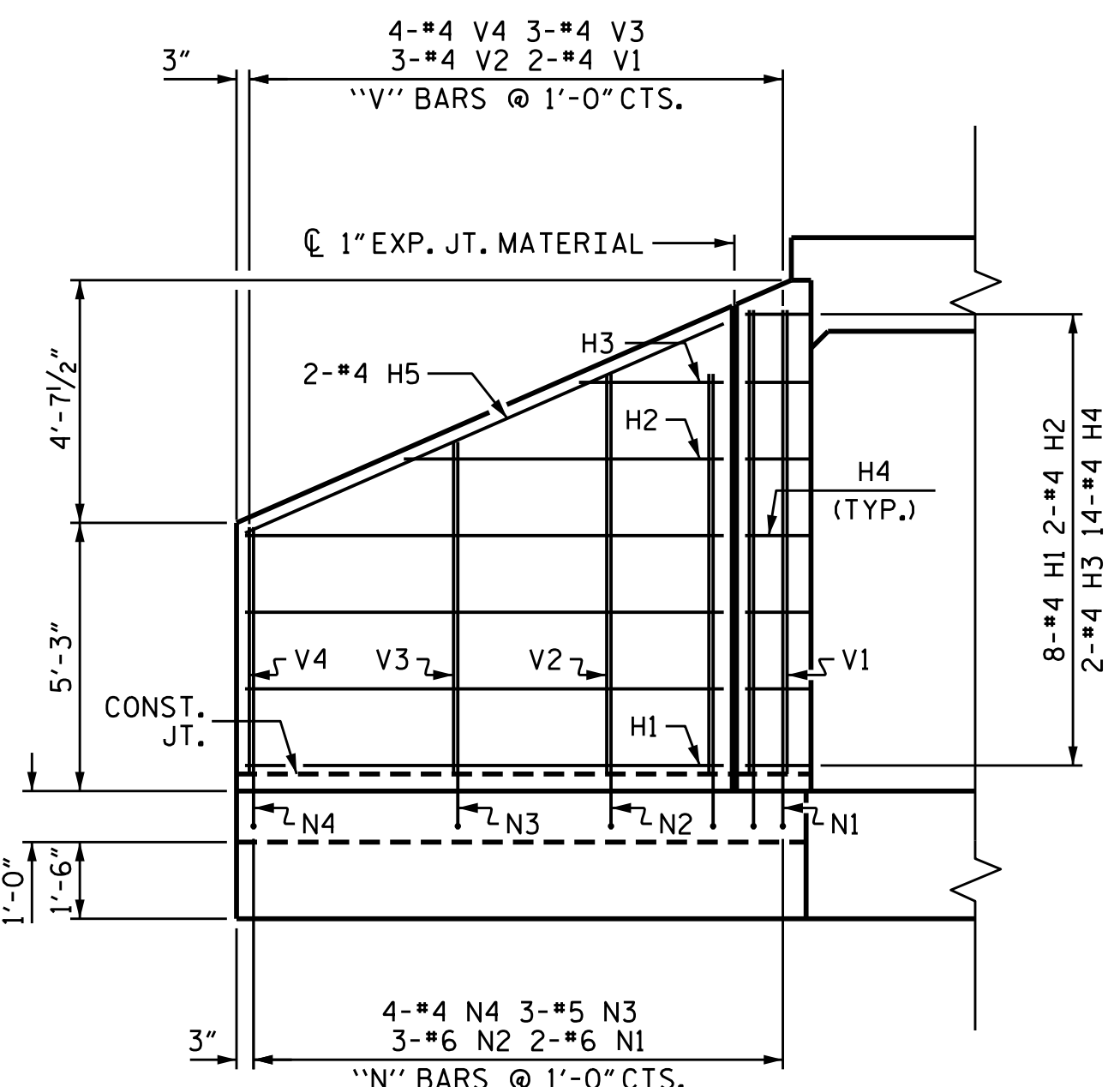
**66°-30'-00" SKEW**



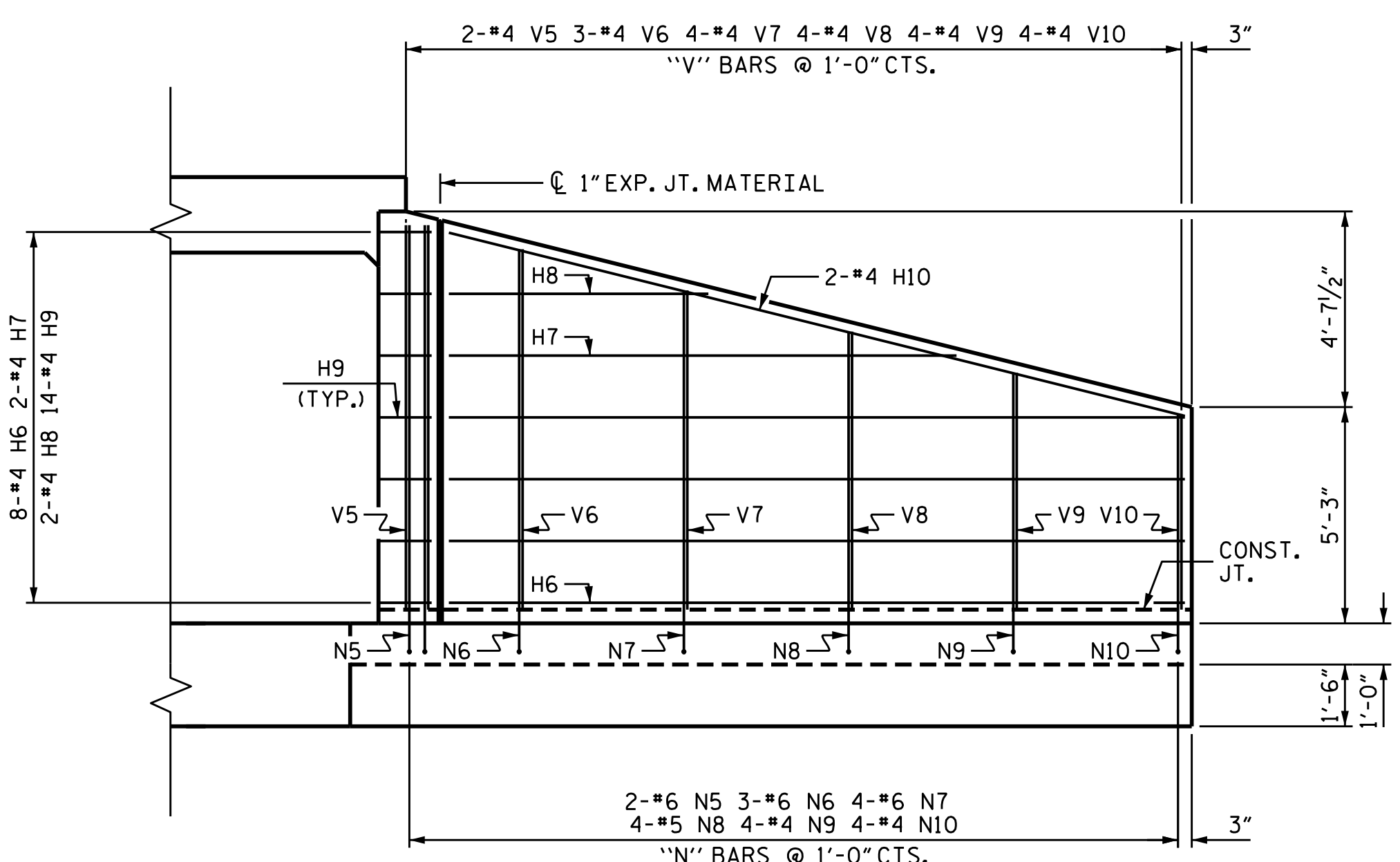
PLAN W2



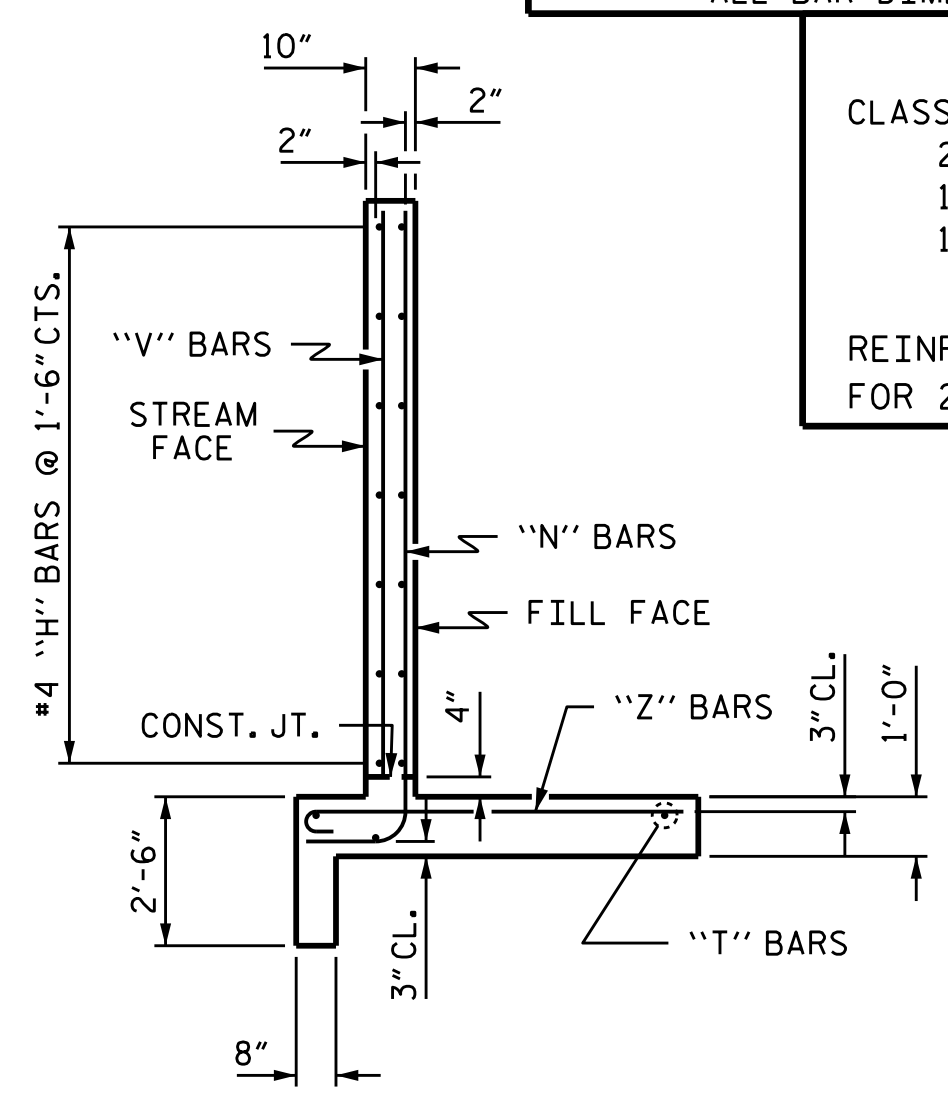
PLAN W1



ELEVATION W2

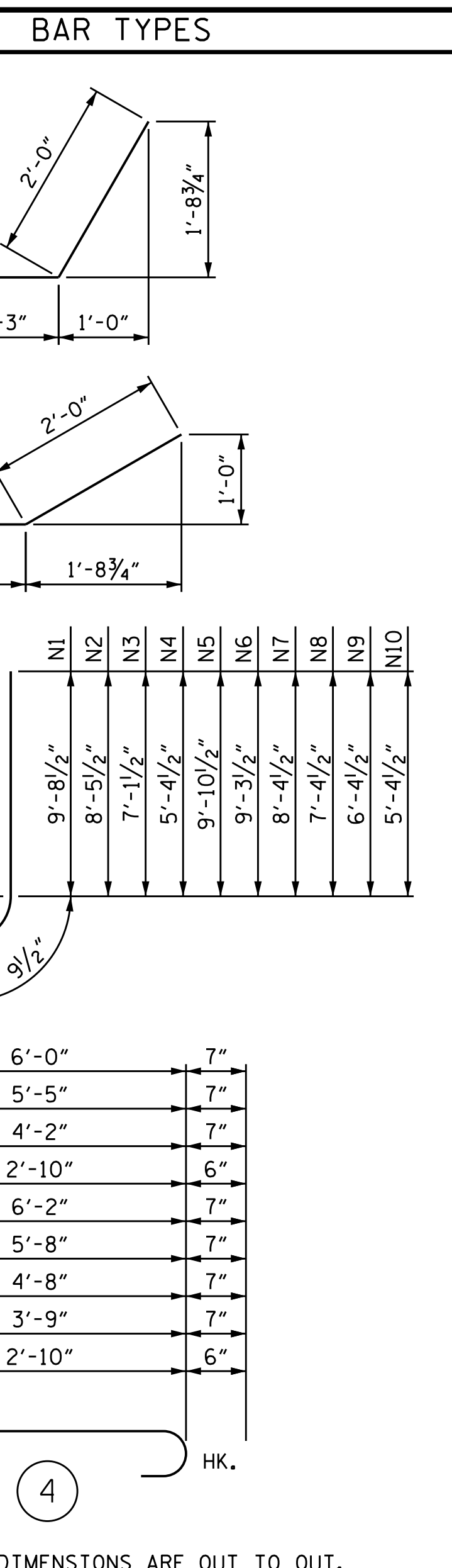


ELEVATION W1



TYPICAL WING SECTION

STAGE I		STAGE II	
CLASS A CONCRETE	15.1 C.Y.	CLASS A CONCRETE	15.1 C.Y.
2 WINGS		2 WINGS	
1 HEADWALL	0.6 C.Y.	1 HEADWALL	0.6 C.Y.
1 END CURTAIN WALL	0.6 C.Y.	1 END CURTAIN WALL	0.6 C.Y.
TOTAL	16.3 C.Y.	TOTAL	16.3 C.Y.
REINFORCING STEEL FOR 2 WINGS	1074 LBS.	REINFORCING STEEL FOR 2 WINGS	1074 LBS.



BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-4"	50
H2	2	#4	STR	6'-3"	8
H3	2	#4	STR	2'-10"	4
H4	14	#4	1	3'-3"	30
H5	2	#4	STR	10'-2"	14
H6	8	#4	STR	17'-10"	95
H7	2	#4	STR	12'-4"	16
H8	2	#4	STR	6'-3"	8
H9	14	#4	2	3'-3"	30
H10	2	#4	STR	18'-5"	25
N1	2	#6	3	11'-2"	34
N2	3	#6	3	9'-11"	45
N3	3	#5	3	8'-7"	27
N4	4	#4	3	6'-10"	18
N5	2	#6	3	11'-4"	34
N6	3	#6	3	10'-9"	48
N7	4	#6	3	9'-10"	59
N8	4	#5	3	8'-10"	37
N9	4	#4	3	7'-10"	21
N10	4	#4	3	6'-10"	18
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	11'-3"	35
T2	3	#5	STR	19'-9"	62
V1	2	#4	STR	9'-1"	12
V2	3	#4	STR	7'-10"	16
V3	3	#4	STR	6'-6"	13
V4	4	#4	STR	4'-10"	13
V5	2	#4	STR	9'-4"	12
V6	3	#4	STR	8'-9"	18
V7	4	#4	STR	7'-9"	21
V8	4	#4	STR	6'-9"	18
V9	4	#4	STR	5'-9"	15
V10	4	#4	STR	4'-9"	13
Z1	2	#5	4	6'-7"	14
Z2	2	#5	4	6'-0"	13
Z3	4	#5	4	4'-9"	20
Z4	4	#4	4	3'-4"	9
Z5	2	#5	4	6'-9"	14
Z6	3	#5	4	6'-3"	20
Z7	5	#5	4	5'-3"	27
Z8	5	#5	4	4'-4"	23
Z9	5	#4	4	3'-4"	11
REINFORCING STEEL FOR 2 WINGS				1074 LBS.	

ASSEMBLED BY : N.D'AIUTO DATE : 2/16/16  
 CHECKED BY : K.D. LAYNE DATE : 4/16/16  
 DRAWN BY : CCJ 12/99  
 CHECKED BY : RWW 03/00

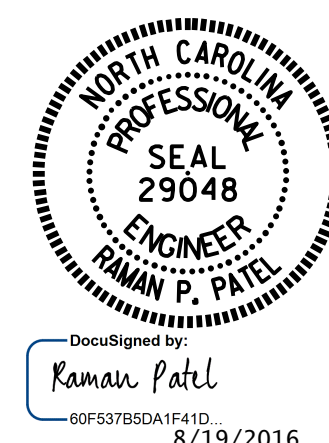
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 jshawk

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

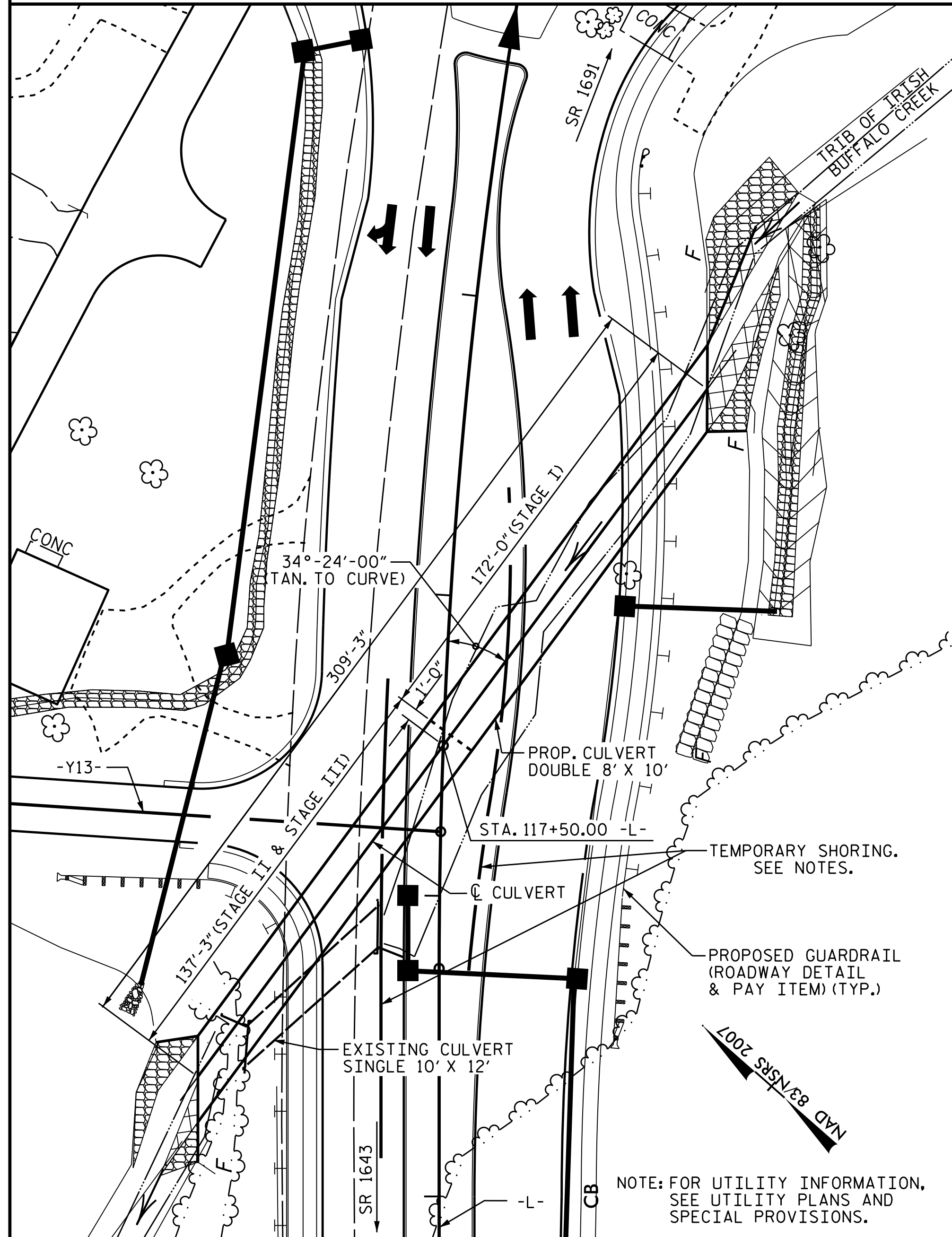
TOTAL SHEETS 5

PROJECT NO. U-3440  
 CABARRUS COUNTY  
 STATION: 40+60.90 -L-  
 SHEET 5 OF 5  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD WINGS FOR CONCRETE BOX CULVERT  
 H = 9'-0" SLOPE = 2:1  
 66°-30'-00" SKEW



STR. #3 STD. NO. CW6009

BM# 16 21' LT. OF STA. 116+97.2 EL. 703.19



LOCATION SKETCH

**ROADWAY DATA**

GRADE POINT EL. @ STA. 117+50.00 -L- = 708.80  
 BED ELEVATION @ STA. 117+50.00 -L- = 688.20  
 ROADWAY SLOPES = 2:1

**HYDRAULIC DATA**

DESIGN DISCHARGE = 850 CFS  
 FREQUENCY OF DESIGN FLOOD = 50 Yrs.  
 DESIGN HIGH WATER ELEVATION = 700.10  
 DRAINAGE AREA = 0.53 Sq.Mi.  
 BASE DISCHARGE (Q100) = 950 CFS  
 BASE HIGH WATER ELEVATION = 700.75

**OVERTOPPING FLOOD DATA**

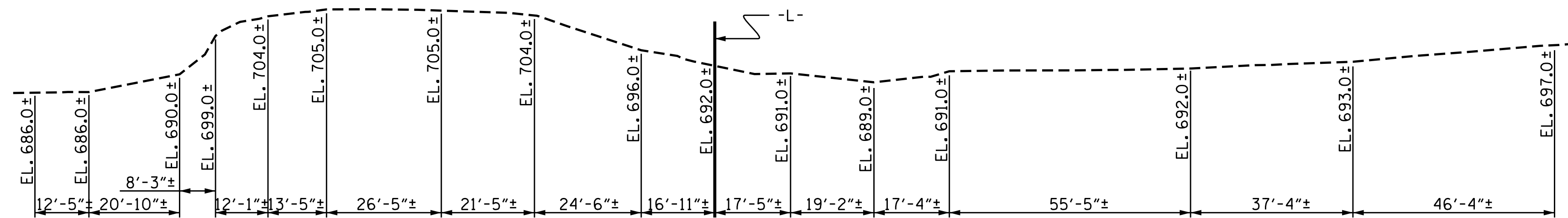
OVERTOPPING DISCHARGE = 2600 CFS  
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YRS.  
 OVERTOPPING FLOOD ELEVATION = 709.10

TOTAL STRUCTURE QUANTITIES	
REMOVAL OF EXISTING STRUCTURE	LUMP SUM
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	
STAGE I	268 TONS
STAGE II	116 TONS
STAGE III	99 TONS
TOTAL	483 TONS
CLASS A CONCRETE	
STAGE I	377.1 C.Y.
STAGE II	129.1 C.Y.
STAGE III	217.1 C.Y.
TOTAL	723.3 C.Y.
REINFORCING STEEL	
STAGE I	42,991 LBS.
STAGE II	15,693 LBS.
STAGE III	20,402 LBS.
TOTAL	79,086 LBS.
PLACEMENT OF NATURAL STREAM BED MATERIAL	LUMP SUM

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

**NOTES**

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- DESIGN FILL = 12.00 FEET.
- FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE 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, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS IN STAGE I.
  2. THE REMAINING PORTIONS OF STAGE I WALLS, SILLS, BAFFLES, AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALL.
  3. WING FOOTING, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS IN STAGE II.
  4. THE REMAINING PORTIONS OF STAGE II WALLS, SILL, BAFFLES, AND WING FULL HEIGHT.
  5. WING FOOTING, CURTAIN WALL, AND FLOOR SLAB INCLUDING 4" OF VERTICAL WALL IN STAGE III.
  6. THE REMAINING PORTION OF STAGE III WALL, SILL, AND WING FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALL.
- 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.
- TRAFFIC ON EXISTING ROAD SHALL BE MAINTAINED. IN ORDER TO MAINTAIN TRAFFIC THE CULVERT SHALL BE CONSTRUCTED IN SECTIONS AS DIRECTED BY THE ENGINEER.
- 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 WILL 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.
- 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.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- NATURAL STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT BETWEEN THE SILLS AND BETWEEN THE BAFFLES. SEE SPECIAL PROVISIONS.
- FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.
- FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.



PROFILE ALONG C CULVERT

PROJECT NO. U-3440  
CABARRUS COUNTY  
 STATION: 117+50.00 -L-

SHEET 1 OF 8 BRIDGE #405



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

DOUBLE 8 FT. X 10 FT.  
 CONCRETE BOX CULVERT

34°-24'-00" SKEW / 45° HEADWALL

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY: KEITH D. LAYNE DATE: 5/06/16  
 CHECKED BY: J. D. HAWK DATE: 5/20/16  
 DESIGN ENGINEER OF RECORD: R. P. PATEL DATE: 6/3/16

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

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 (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	1.39	--	1.75	1.39	1	BOT. CORNER WALL	10.66	1.85	1	EXTERIOR WALL	9.93		
	HL-93 (OPERATING)	N/A		1.80	--	1.35	1.80	1	BOT. CORNER WALL	10.66	2.40	1	EXTERIOR WALL	9.93		
	HS-20 (INVENTORY)	36.000	②	1.43	51.650	1.75	1.43	1	BOT. CORNER WALL	10.66	1.85	1	EXTERIOR WALL	9.93		
	HS-20 (OPERATING)	36.000		1.86	66.950	1.35	1.86	1	BOT. CORNER WALL	10.66	2.40	1	EXTERIOR WALL	9.93		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.83	24.640	1.40	1.83	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		SNGARBS2	20.000		1.82	36.500	1.40	1.82	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		SNAGRIS2	22.000		1.83	40.150	1.40	1.83	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		SNCOTTS3	27.250	③	1.73	47.060	1.40	1.73	1	BOT. CORNER WALL	10.66	2.31	1	EXTERIOR WALL	9.93	
		SNAGGRS4	34.925		1.77	61.990	1.40	1.77	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		SNS5A	35.550		1.77	62.880	1.40	1.77	1	BOT. CORNER WALL	10.66	2.31	1	EXTERIOR WALL	9.93	
		SNS6A	39.950		1.80	71.870	1.40	1.80	1	BOT. CORNER WALL	10.66	2.31	1	EXTERIOR WALL	9.93	
		SNS7B	42.000		1.80	75.560	1.40	1.80	1	BOT. CORNER WALL	10.66	2.31	1	EXTERIOR WALL	9.93	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.84	60.720	1.40	1.84	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		TNT4A	33.075		1.80	59.410	1.40	1.80	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		TNT6A	41.600		1.76	73.160	1.40	1.76	1	BOT. CORNER WALL	10.66	2.31	1	EXTERIOR WALL	9.93	
		TNT7A	42.000		1.76	73.710	1.40	1.76	1	BOT. CORNER WALL	10.66	2.31	1	EXTERIOR WALL	9.93	
		TNT7B	42.000		1.78	74.700	1.40	1.78	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		TNAGRIT4	43.000		1.80	77.450	1.40	1.80	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		TNAGT5A	45.000		1.80	81.060	1.40	1.80	1	BOT. CORNER WALL	10.66	2.32	1	EXTERIOR WALL	9.93	
		TNAGT5B	45.000		1.87	84.200	1.40	1.87	1	BOT. CORNER WALL	10.66	2.31	1	EXTERIOR WALL	9.93	

**LOAD FACTORS**

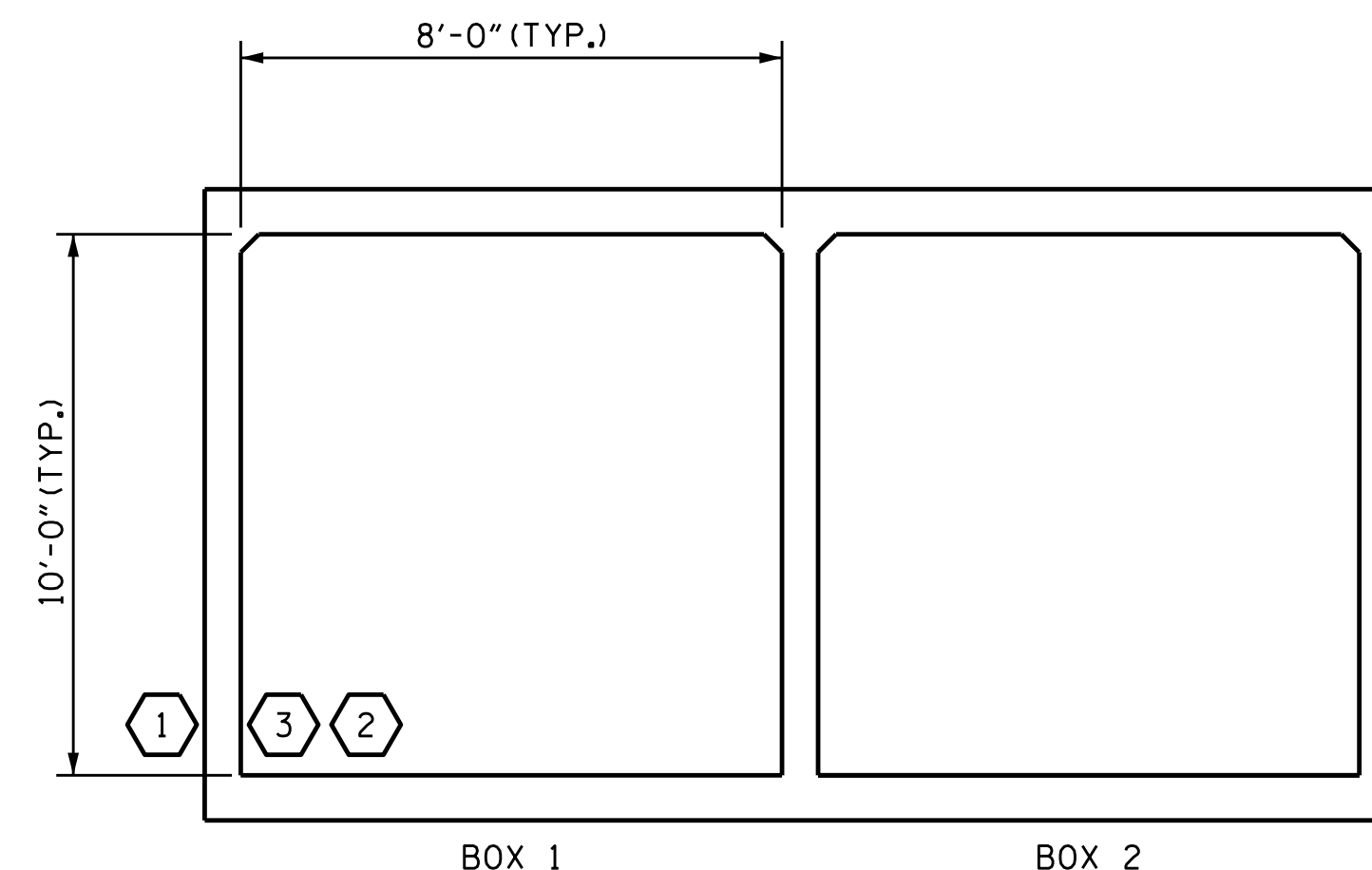
DESIGN LOAD RATING FACTORS

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.

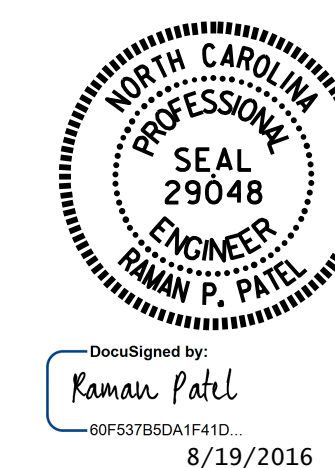
①	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. U-3440  
CABARRUS COUNTY  
STATION: 117+50.00 -L-

SHEET 2 OF 8



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
LRFR SUMMARY FOR  
REINFORCED CONCRETE  
BOX CULVERTS  
(NON-INTERSTATE TRAFFIC)

ASSEMBLED BY : R. P. PATEL	DATE : 5/23/16
CHECKED BY : H. P. KIM	DATE : 5/23/16
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11

DESIGN ENGINEER OF RECORD:  
R. P. PATEL DATE : 6/3/16

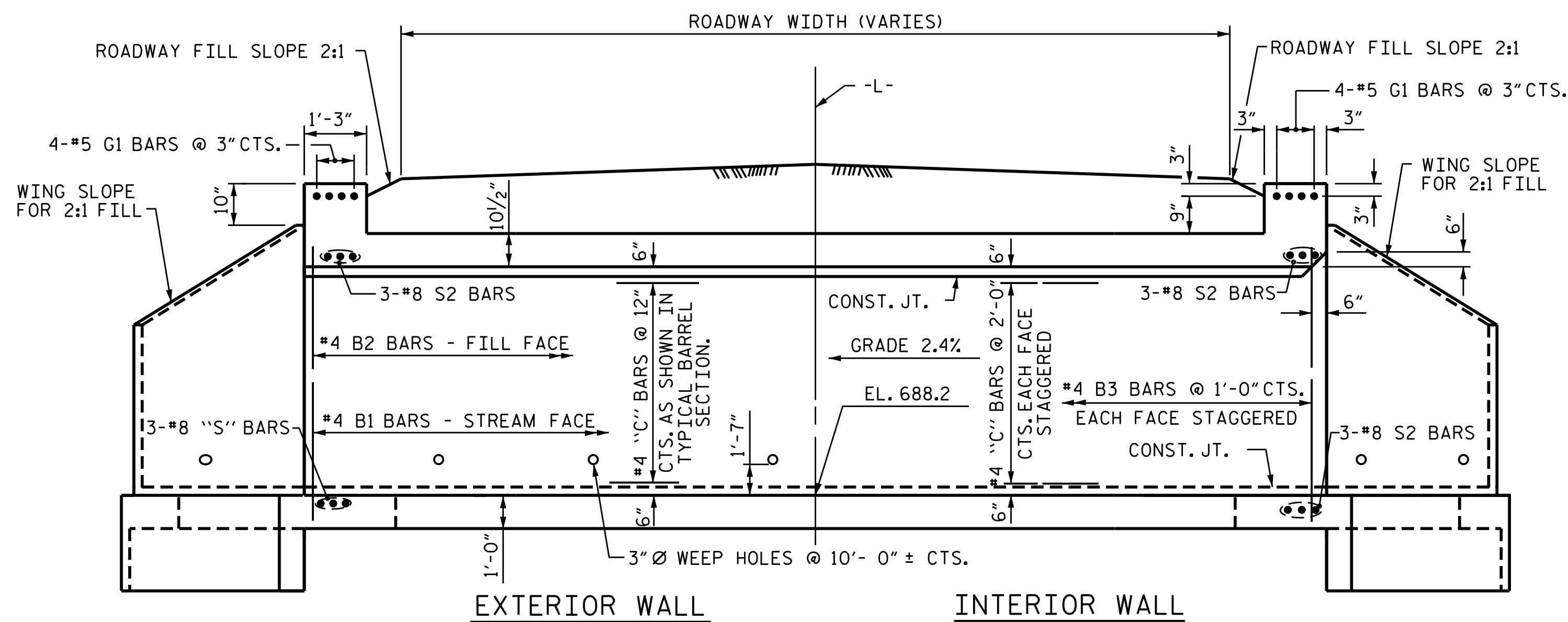
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jdhawk

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SIGNATURES COMPLETED

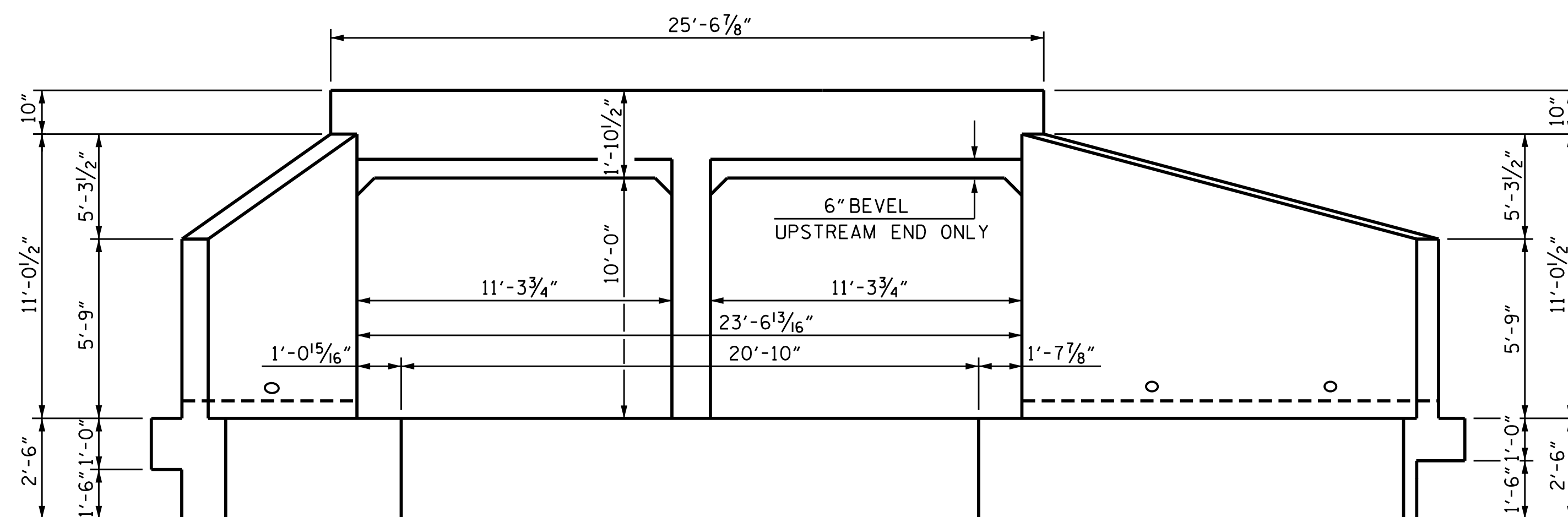
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			8

STR. #4 STD. NO. LRFR5

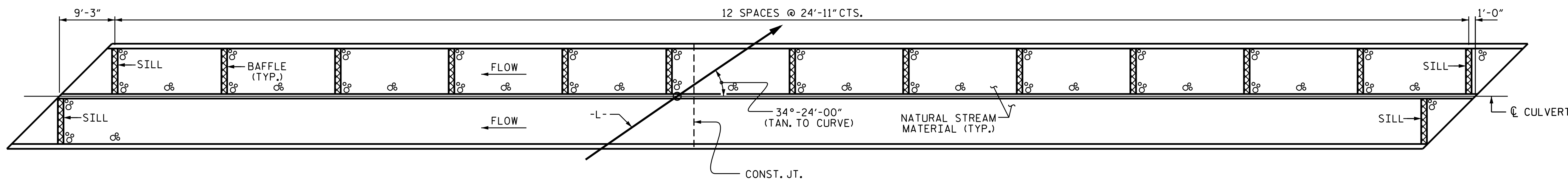




CULVERT SECTION NORMAL TO ROADWAY

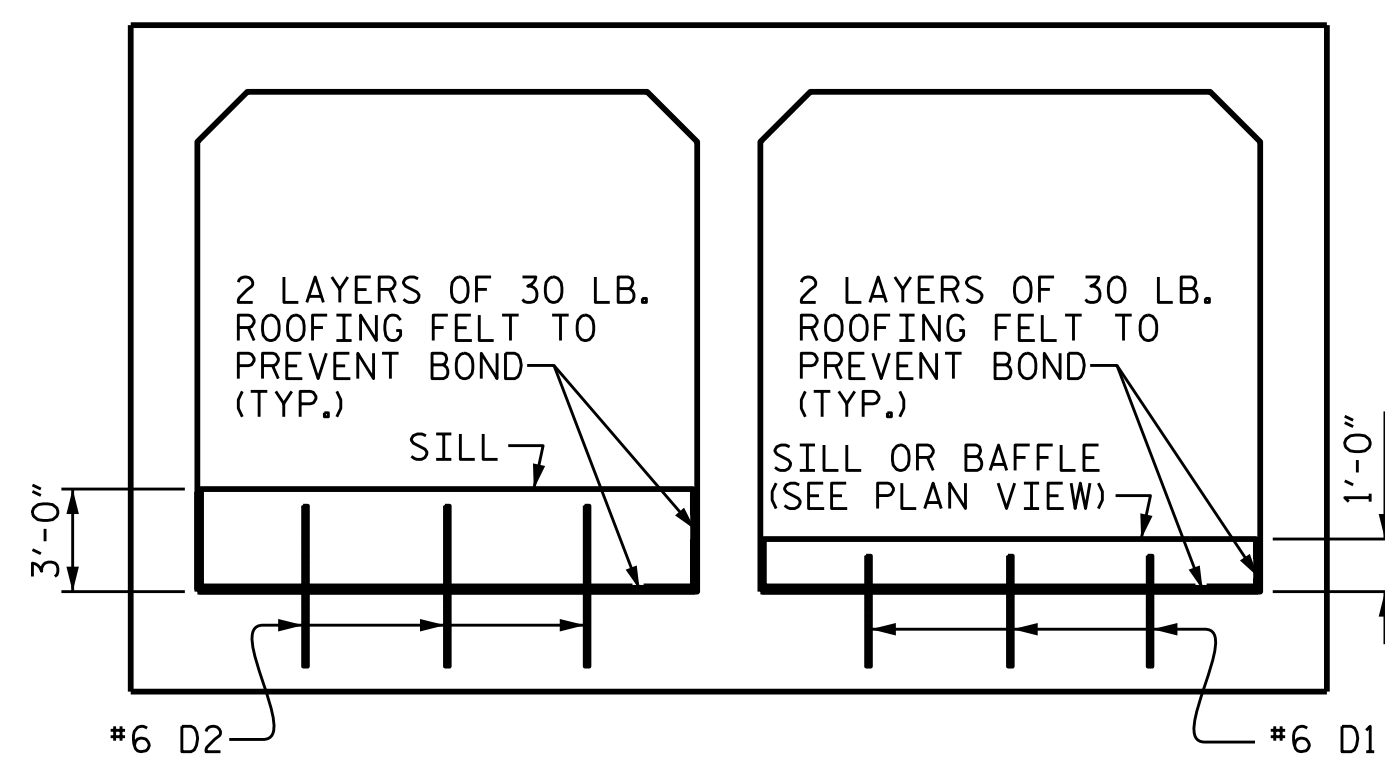


END ELEVATION NORMAL TO SKEW  
(LOOKING DOWNSTREAM)

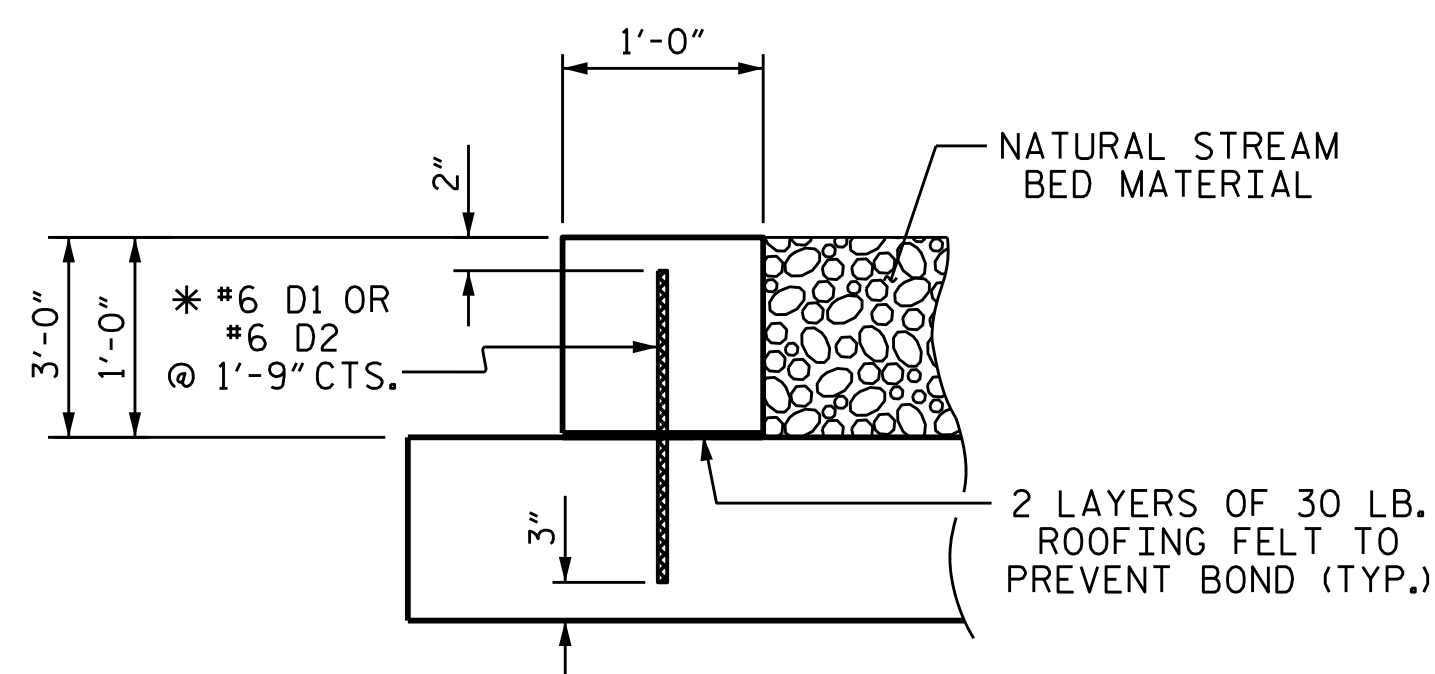


PLAN

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



ELEVATION



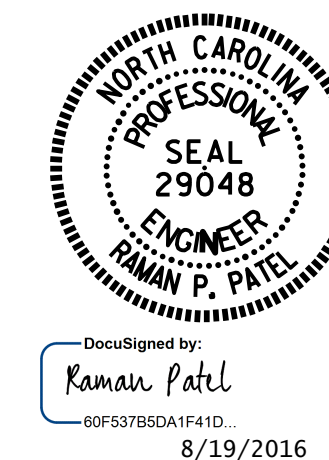
SECTION THROUGH SILL/BAFFLE  
\* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

CULVERT SILL/BAFFLE DETAILS  
(LOOKING DOWNSTREAM)

PROJECT NO. U-3440  
CABARRUS COUNTY  
STATION: 117+50.00 -L-

SHEET 3 OF 8

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
DOUBLE 8 FT. X 10 FT.  
CONCRETE BOX CULVERT  
34°-24'-00" SKEW/45° HEADWALL

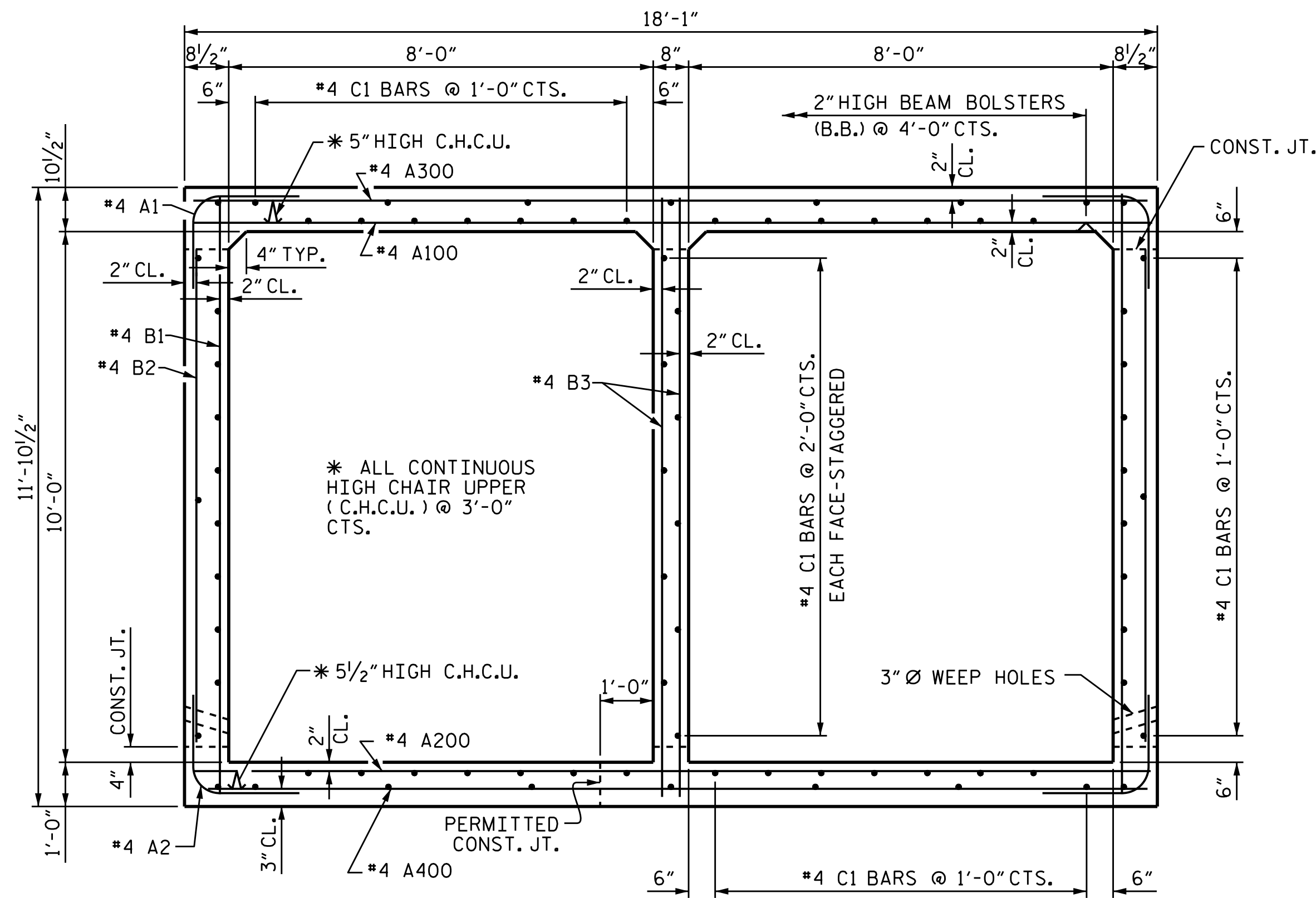


DocuSigned by:  
Raman Patel  
00F537B5DA1F41D  
8/19/2016

DRAWN BY: KEITH D. LAYNE DATE: 5/06/16  
CHECKED BY: J. D. HAWK DATE: 5/20/16  
DESIGN ENGINEER OF RECORD: R. P. PATEL DATE: 6/3/16

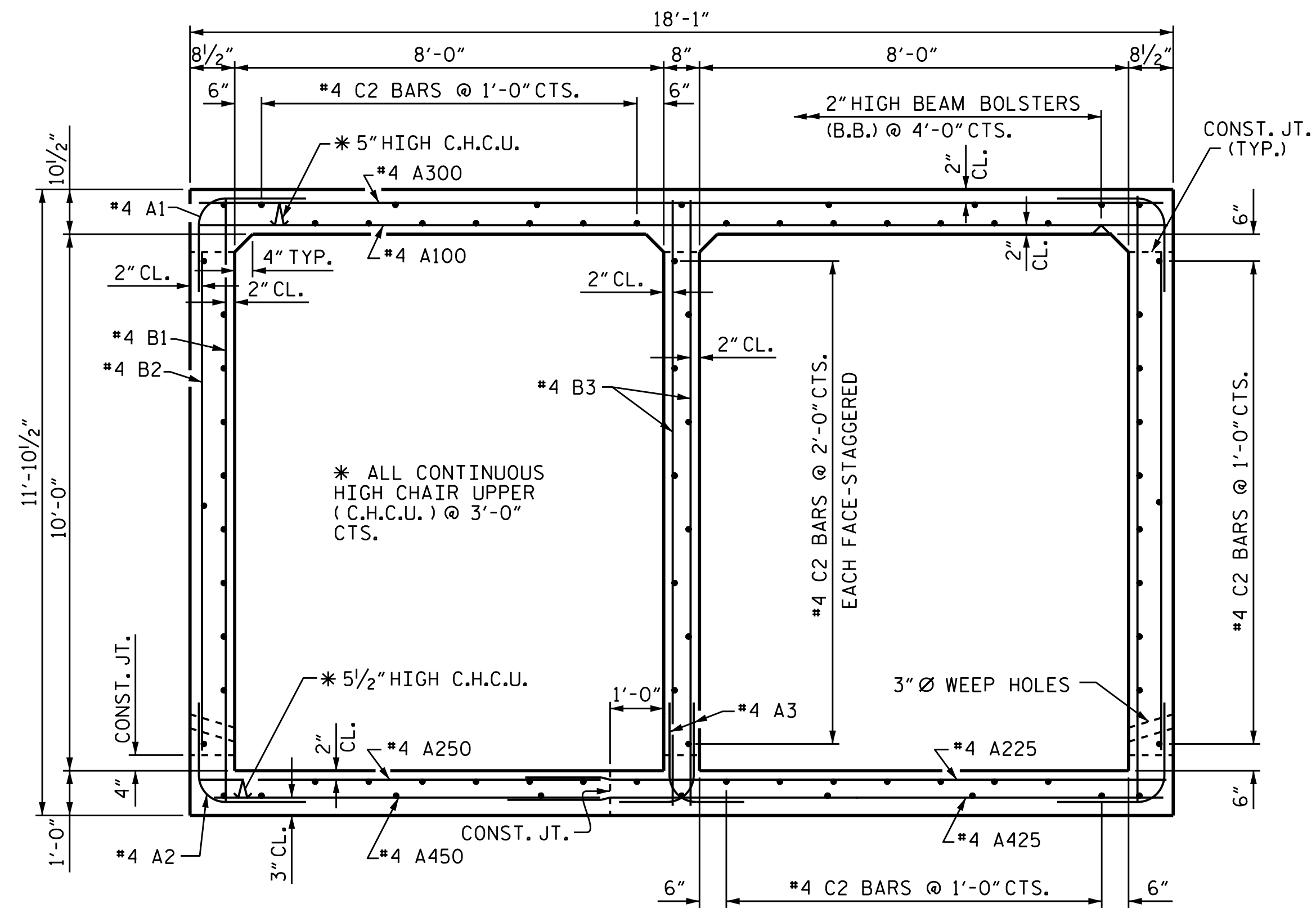
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SIGNATURES COMPLETED

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



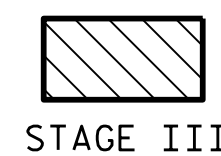
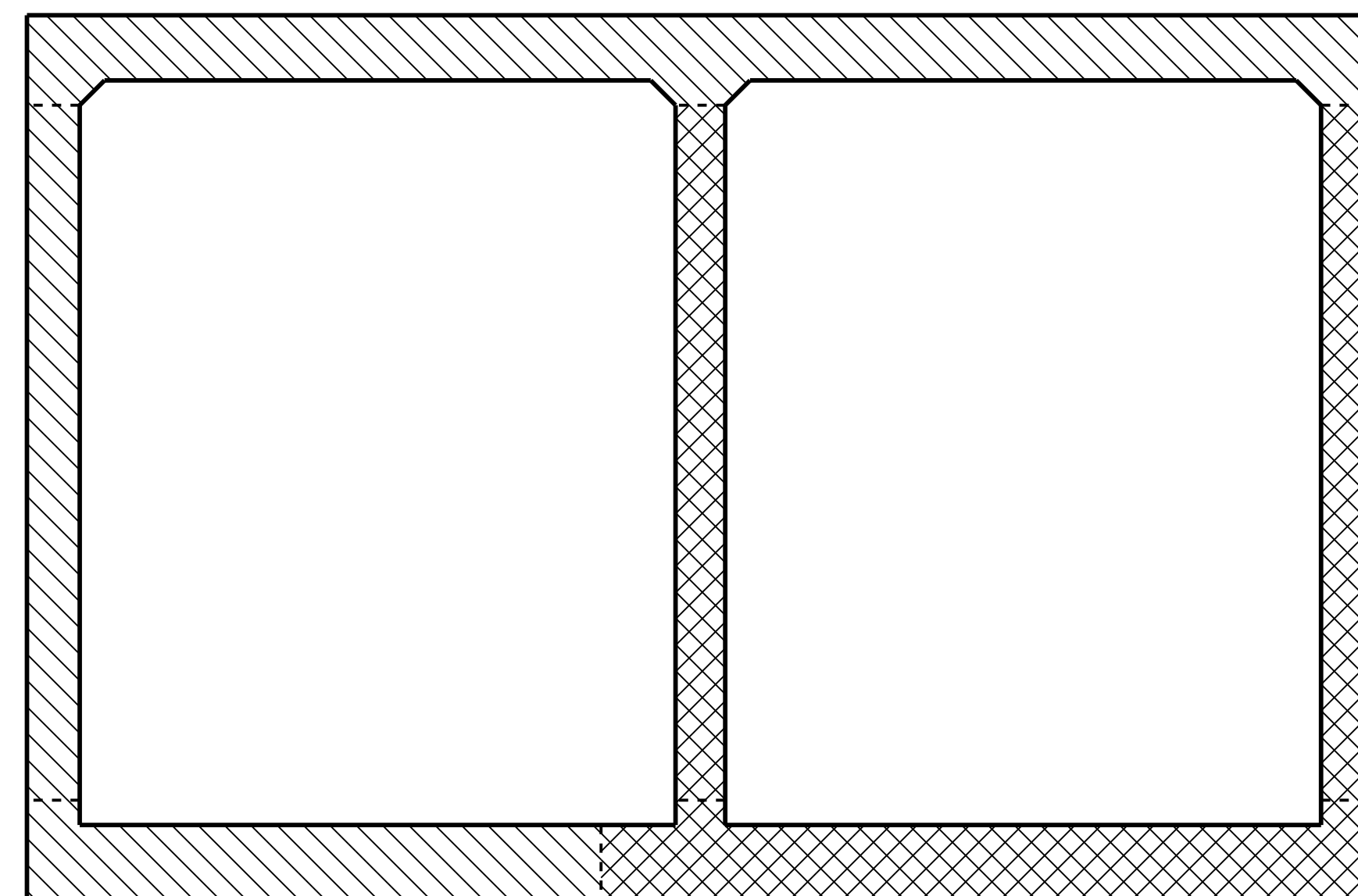
RIGHT ANGLE SECTION OF BARREL (STAGE I)

THERE ARE 78 C1 BARS IN SECTION OF BARREL.  
(LOOKING DOWNSTREAM)

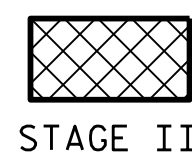


RIGHT ANGLE SECTION OF BARREL (STAGE II & III)

THERE ARE 78 C2 BARS IN SECTION OF BARREL.  
(LOOKING DOWNSTREAM)



STAGE III



STAGE II

CONSTRUCTION SEQUENCE

(LOOKING DOWNSTREAM)

PROJECT NO. U-3440  
CABARRUS COUNTY  
STATION: 117+50.00 -L-

SHEET 4 OF 8



DocuSigned by:  
Raman Patel  
00F537B5DA1F41D  
8/19/2016

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

DOUBLE 8 FT. X 10 FT.  
CONCRETE BOX CULVERT

34°-24'-00" SKEW/45° HEADWALL

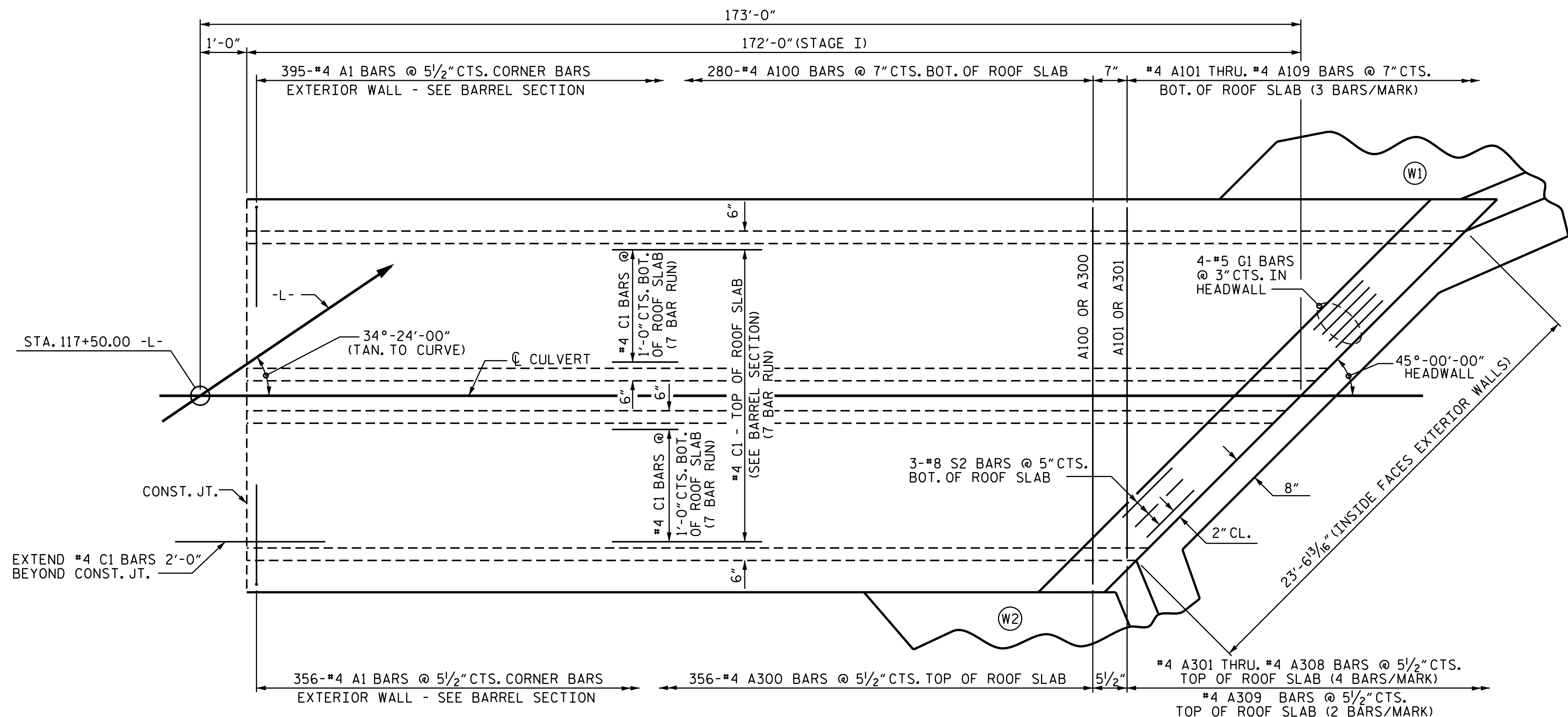
REVISIONS

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

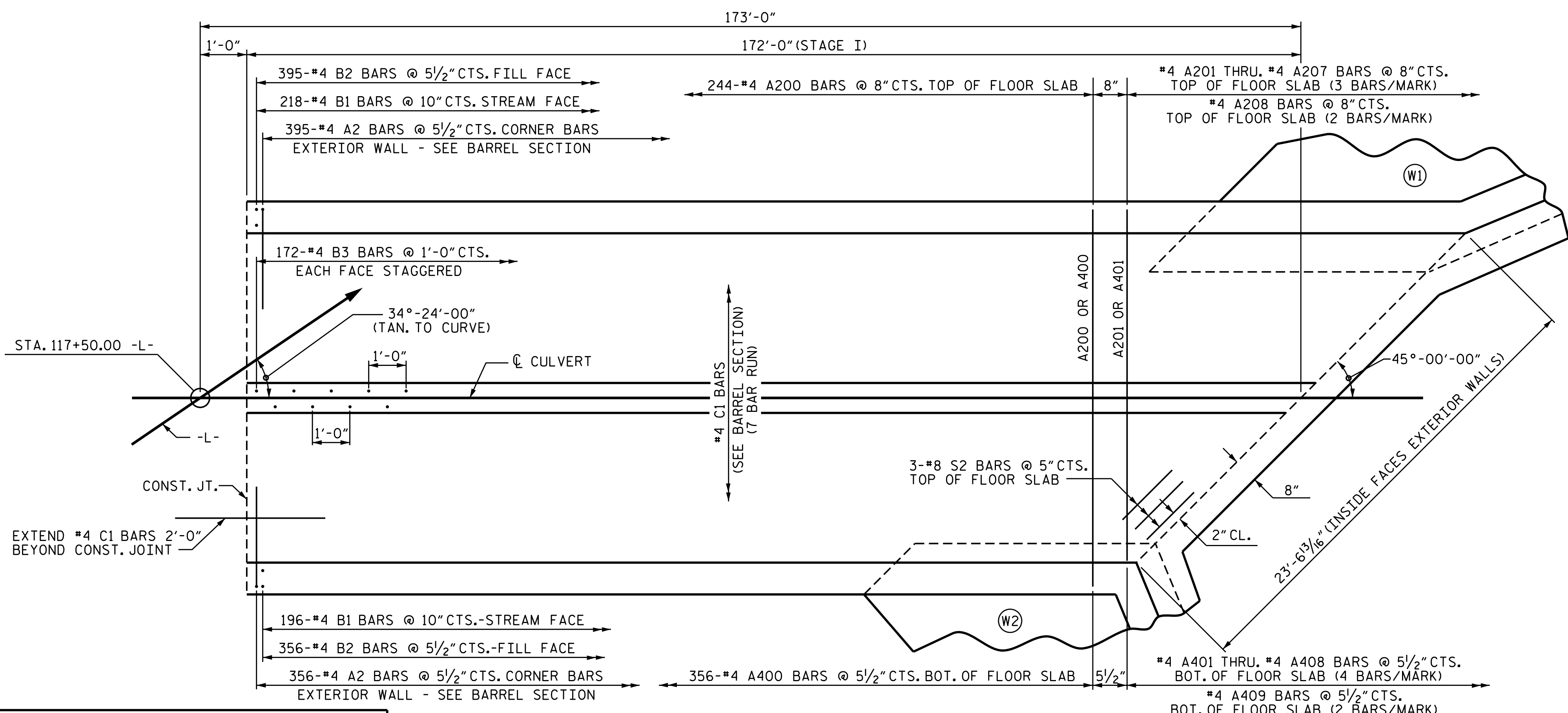
SHEET NO.  
C2-4  
TOTAL SHEETS  
8

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

DRAWN BY: KEITH D. LAYNE DATE: 5/06/16  
CHECKED BY: J. D. HAWK DATE: 5/20/16  
DESIGN ENGINEER OF RECORD: R. P. PATEL DATE: 6/3/16



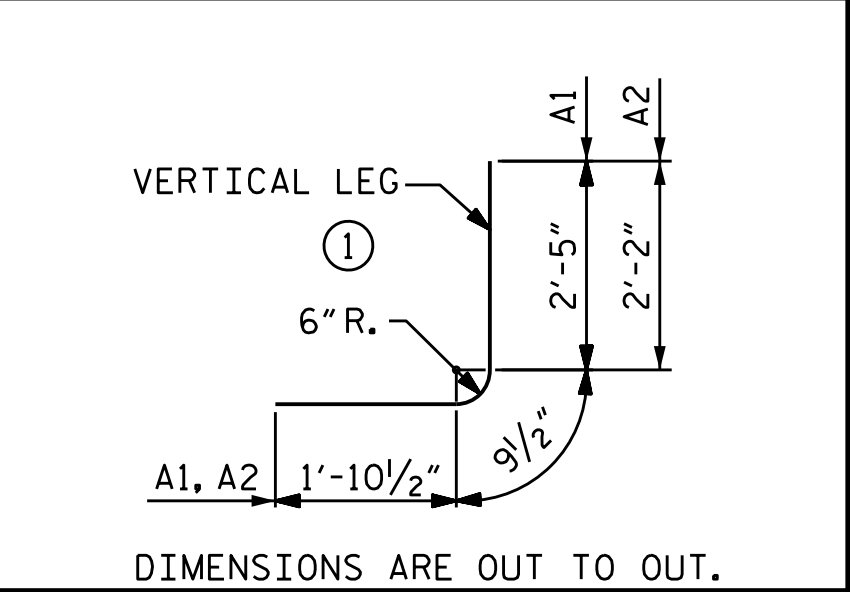
PLAN - ROOF SLAB (STAGE I)



PLAN - FLOOR SLAB (STAGE I)

BILL OF MATERIAL STAGE I										
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	751	#4	1	5'-1"	2550	A305	4	#4 STR.	8'-7"	23
A2	751	#4	1	4'-10"	2425	A306	4	#4 STR.	6'-9"	18
						A307	4	#4 STR.	4'-11"	13
A100	280	#4	STR.	17'-8"	3304	A308	4	#4 STR.	3'-1"	8
A101	3	#4	STR.	15'-11"	32	A309	2	#4 STR.	2'-2"	3
A102	3	#4	STR.	14'-2"	28					
A103	3	#4	STR.	12'-5"	25	A400	356	#4 STR.	17'-8"	4201
A104	3	#4	STR.	10'-8"	21	A401	4	#4 STR.	15'-10"	43
A105	3	#4	STR.	8'-11"	18	A402	4	#4 STR.	14'-1"	38
A106	3	#4	STR.	7'-3"	15	A403	4	#4 STR.	12'-3"	33
A107	3	#4	STR.	5'-6"	11	A404	4	#4 STR.	10'-5"	28
A108	3	#4	STR.	3'-9"	8	A405	4	#4 STR.	8'-7"	23
A109	3	#4	STR.	2'-0"	4	A406	4	#4 STR.	6'-9"	18
						A407	4	#4 STR.	4'-11"	13
A200	244	#4	STR.	17'-8"	2880	A408	4	#4 STR.	3'-1"	8
A201	3	#4	STR.	15'-8"	31	A409	2	#4 STR.	2'-2"	3
A202	3	#4	STR.	13'-8"	27					
A203	3	#4	STR.	11'-8"	23	B1	414	#4 STR.	11'-4"	3134
A204	3	#4	STR.	9'-8"	19	B2	751	#4 STR.	9'-4"	4682
A205	3	#4	STR.	7'-8"	15	B3	344	#4 STR.	11'-4"	2604
A206	3	#4	STR.	5'-8"	11					
A207	3	#4	STR.	3'-8"	7	C1	546	#4 STR.	27'-9"	10121
A208	2	#4	STR.	2'-4"	3					
A300	356	#4	STR.	17'-8"	4201	D1	21	#6 STR.	1'-7"	50
A301	4	#4	STR.	15'-10"	43	D2	3	#6 STR.	3'-7"	16
A302	4	#4	STR.	14'-1"	38	G1	4	#5 STR.	25'-1"	105
A303	4	#4	STR.	12'-3"	33					
A304	4	#4	STR.	10'-5"	28	S2	6	#8 STR.	25'-1"	402
									REINFORCING STEEL	LBS. 41,387

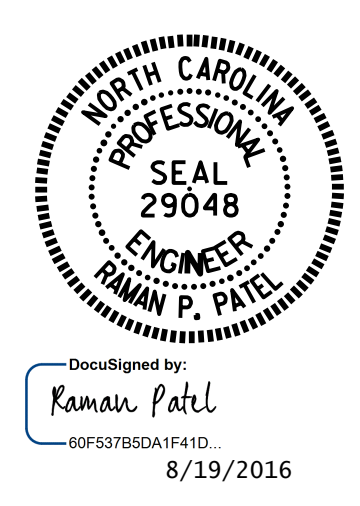
STAGE I		BAR TYPE	
CLASS A CONCRETE			
BARREL @	2.036	CY/FT	350.2
WINGS, ETC.		C.Y.	23.9
2 SILLS, 6 BAFFLES		C.Y.	3.0
TOTAL		C.Y.	377.1
REINFORCING STEEL			
BARREL		LBS.	41,387
WINGS, ETC.		LBS.	1,604
TOTAL		LBS.	42,991



SPlice LENGTH		
BAR	SIZE	LENGTH
A200	#4	1'-5"
A400	#4	1'-9"
B1	#4	1'-5"
B3	#4	1'-5"
C1	#4	1'-11"

PROJECT NO. U-3440  
 CABARRUS COUNTY  
 STATION: 117+50.00 -L-

SHEET 5 OF 8

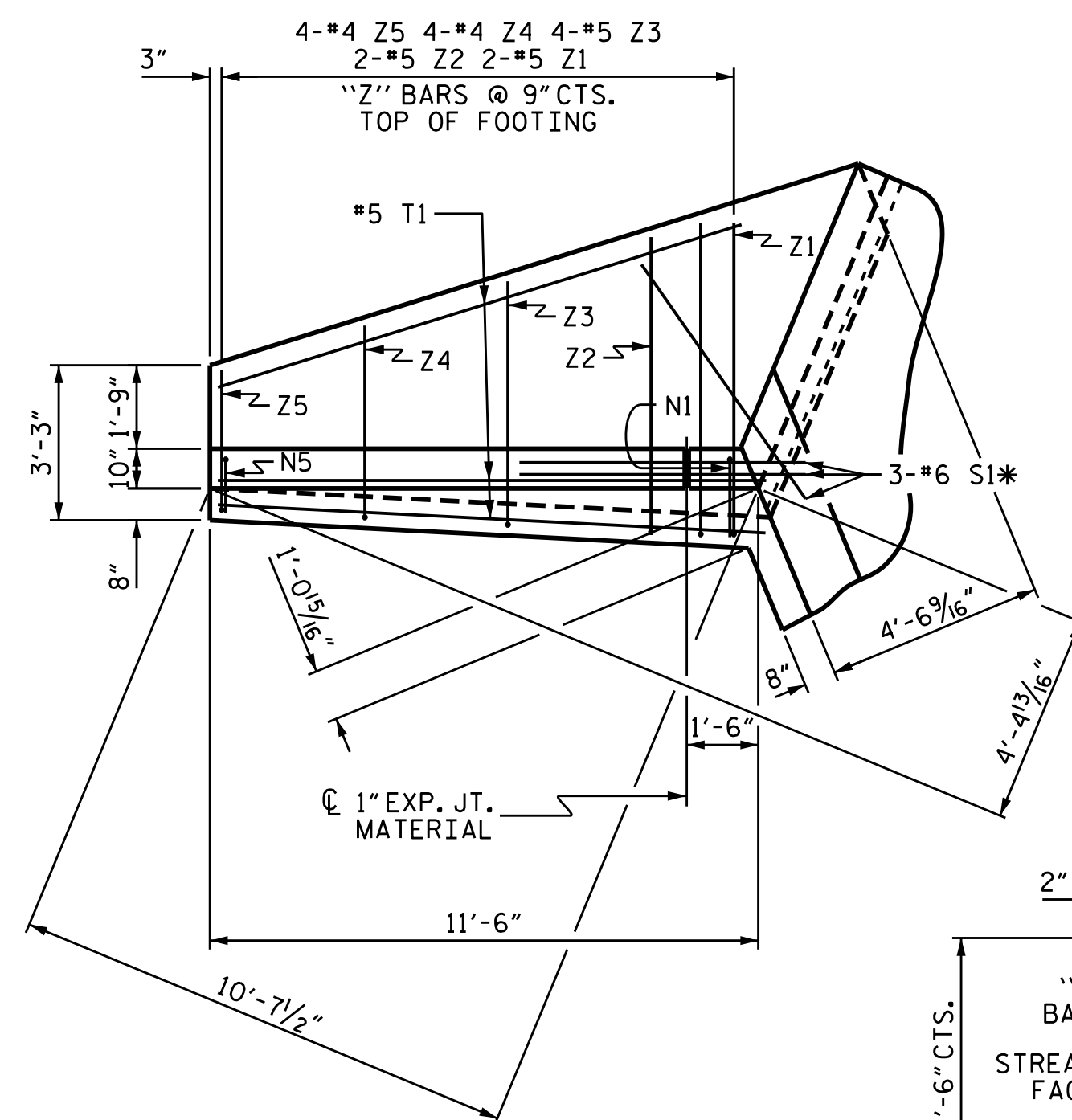


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE 8 FT. X 10 FT.  
 CONCRETE BOX CULVERT  
 STAGE I  
 34°-24'-00" SKEW / 45° HEADWALL

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-5	
1			3			TOTAL SHEETS	
2			4			8	

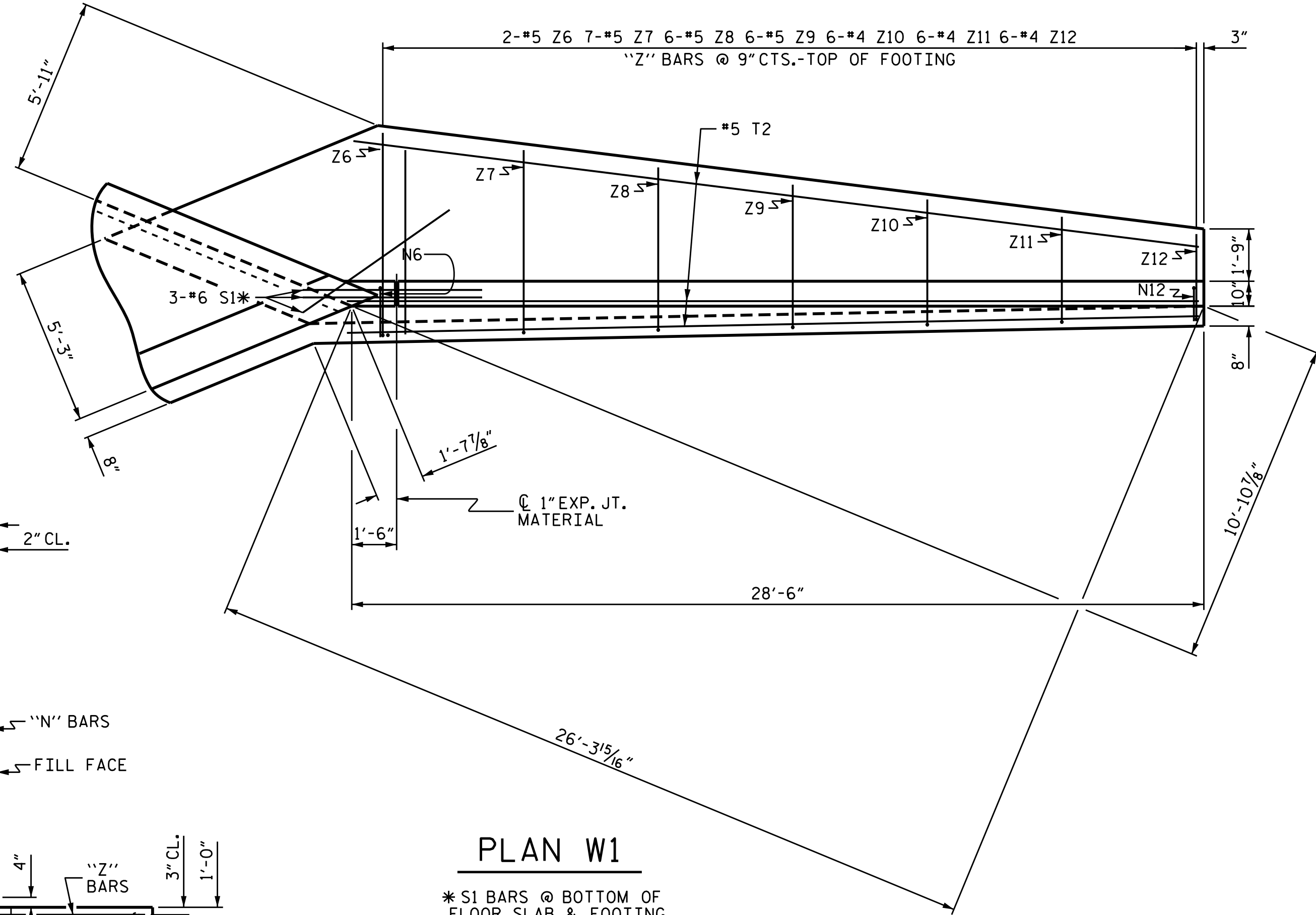
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY: KEITH D. LAYNE DATE: 5/06/16  
 CHECKED BY: J.D. HAWK DATE: 5/20/16  
 DESIGN ENGINEER OF RECORD: R. P. PATEL DATE: 6/3/16



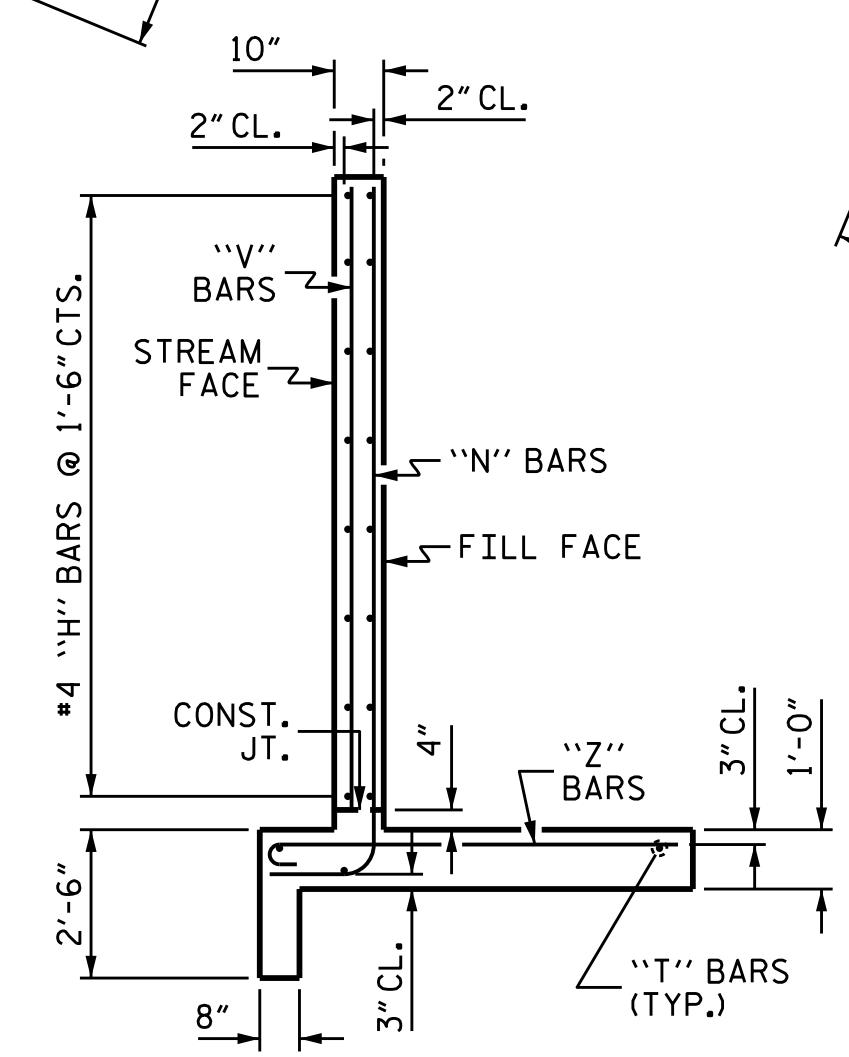
PLAN W2

\* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

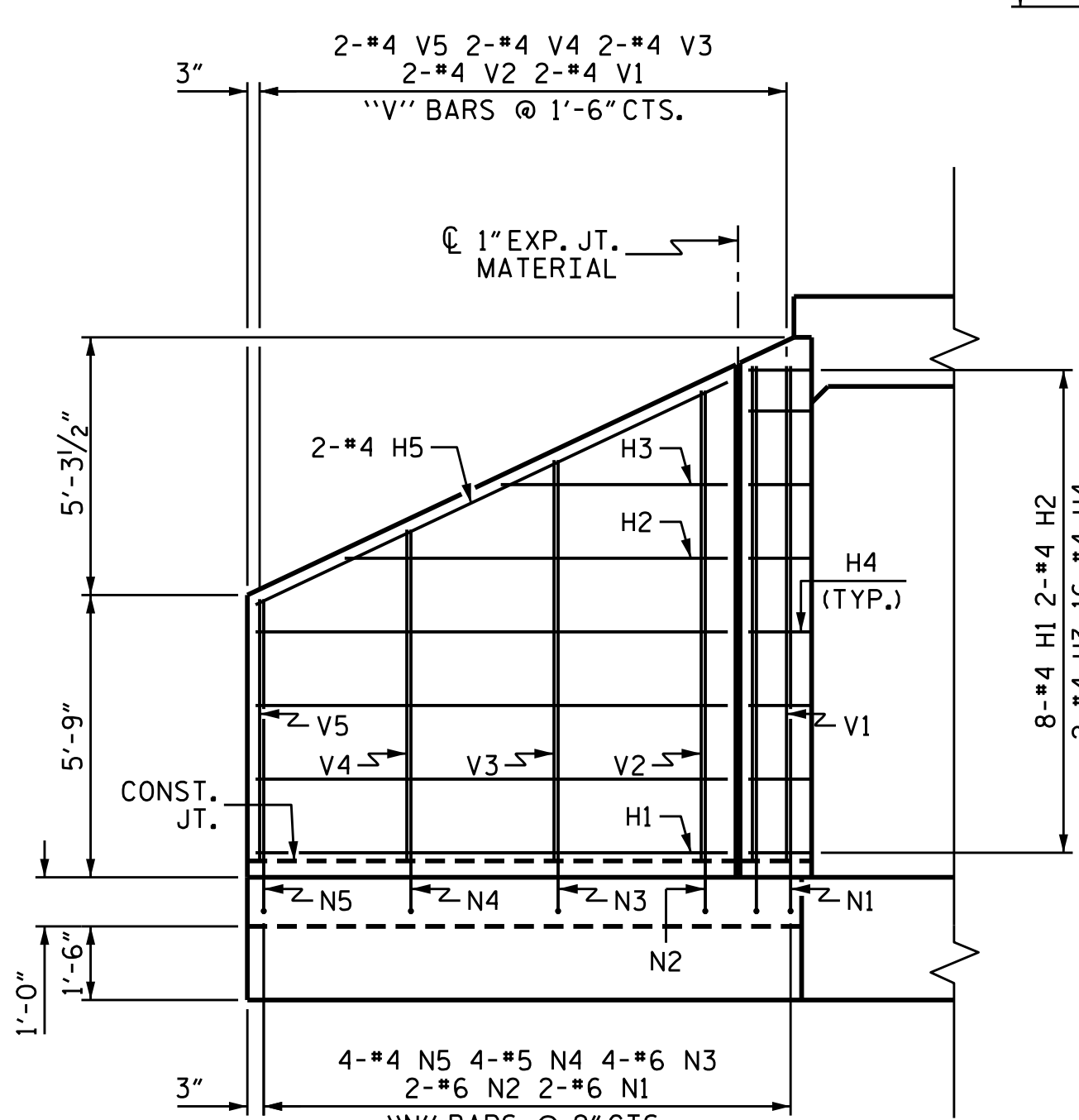


PLAN W1

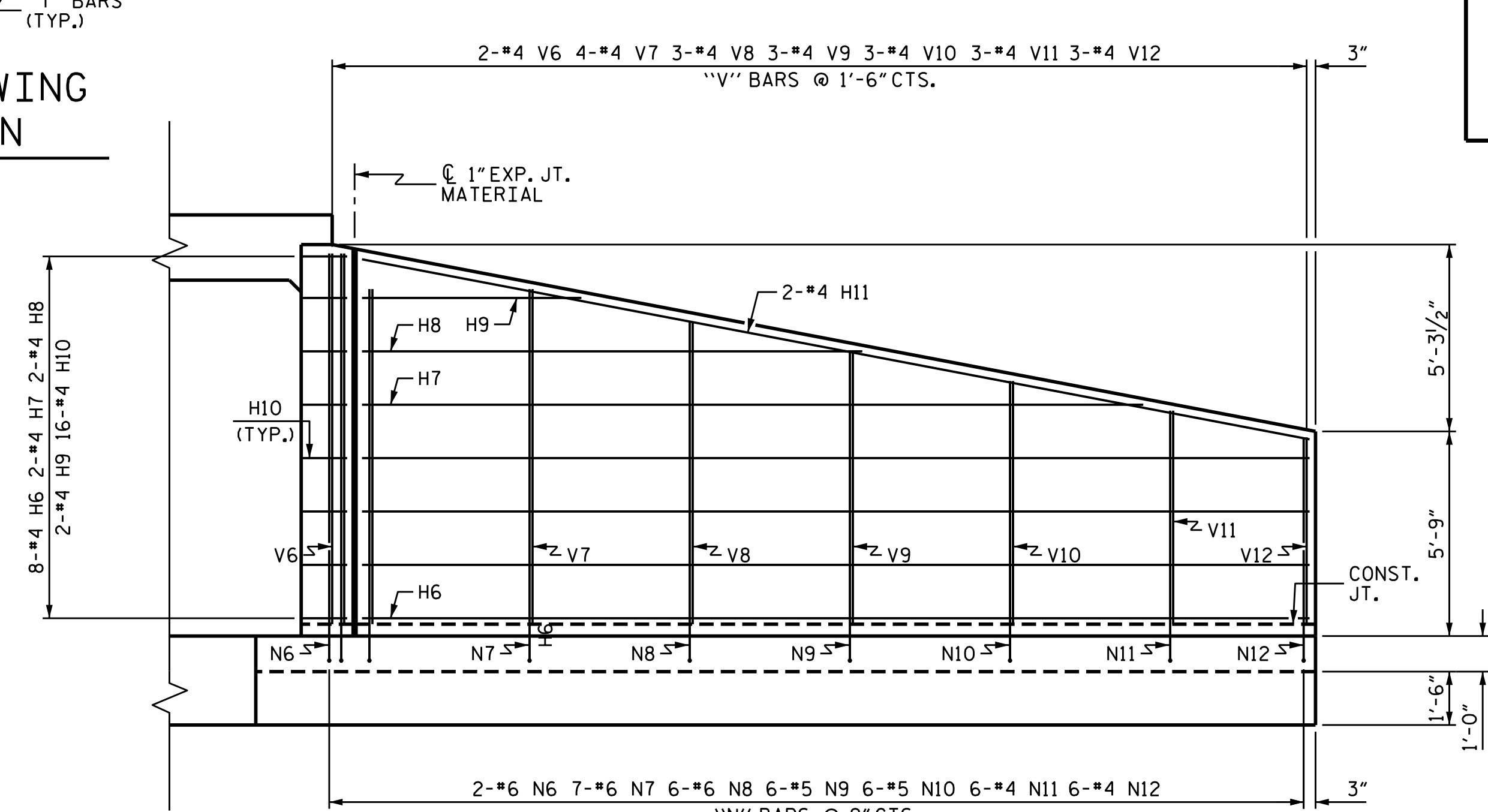
\* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING



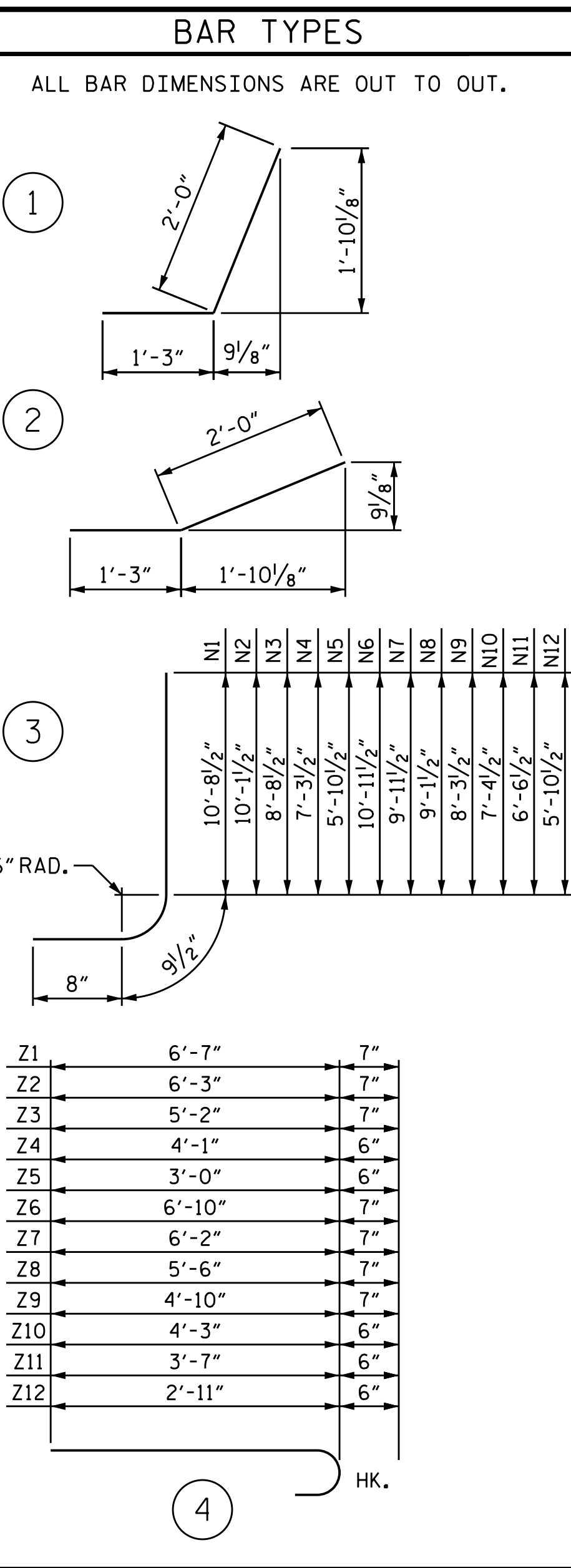
TYPICAL WING SECTION



ELEVATION W2



ELEVATION W1



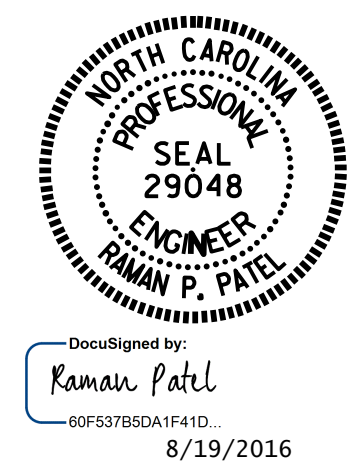
BILL OF MATERIAL STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-7"	51
H2	2	#4	STR	7'-9"	10
H3	2	#4	STR	4'-7"	6
H4	16	#4	1	3'-3"	35
H5	2	#4	STR	10'-7"	14
H6	8	#4	STR	26'-7"	142
H7	2	#4	STR	21'-11"	29
H8	2	#4	STR	14'-0"	19
H9	2	#4	STR	6'-2"	8
H10	16	#4	2	3'-3"	35
H11	2	#4	STR	27'-11"	37
N1	2	#6	3	12'-2"	37
N2	2	#6	3	11'-7"	35
N3	4	#6	3	10'-2"	61
N4	4	#5	3	8'-9"	37
N5	4	#4	3	7'-4"	20
N6	2	#6	3	12'-5"	37
N7	7	#6	3	11'-5"	120
N8	6	#6	3	10'-7"	95
N9	6	#5	3	9'-9"	61
N10	6	#5	3	8'-10"	55
N11	6	#4	3	8'-0"	32
N12	6	#4	3	7'-4"	29
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	11'-6"	36
T2	3	#5	STR	28'-6"	89
V1	2	#4	STR	10'-1"	13
V2	2	#4	STR	9'-7"	13
V3	2	#4	STR	8'-2"	11
V4	2	#4	STR	6'-9"	9
V5	2	#4	STR	5'-4"	7
V6	2	#4	STR	10'-5"	14
V7	4	#4	STR	9'-5"	25
V8	3	#4	STR	8'-6"	17
V9	3	#4	STR	7'-8"	15
V10	3	#4	STR	6'-10"	14
V11	3	#4	STR	6'-0"	12
V12	3	#4	STR	5'-3"	11
Z1	2	#5	4	7'-2"	15
Z2	2	#5	4	6'-10"	14
Z3	4	#5	4	5'-9"	24
Z4	4	#4	4	4'-7"	12
Z5	4	#4	4	3'-6"	9
Z6	2	#5	4	7'-5"	15
Z7	7	#5	4	6'-9"	49
Z8	6	#5	4	6'-1"	38
Z9	6	#5	4	5'-5"	34
Z10	6	#4	4	4'-9"	19
Z11	6	#4	4	4'-1"	16
Z12	6	#4	4	3'-5"	14

REINFORCING STEEL FOR 2 WINGS	1604 LBS.
CLASS A CONCRETE	
2 WINGS	21.4 C.Y.
1 HEADWALL	1.2 C.Y.
1 END CURTAIN WALL	1.3 C.Y.
<b>TOTAL</b>	<b>23.9 C.Y.</b>

PROJECT NO. U-3440  
 CABARRUS COUNTY  
 STATION: 117+50.00 -L-

SHEET 6 OF 8

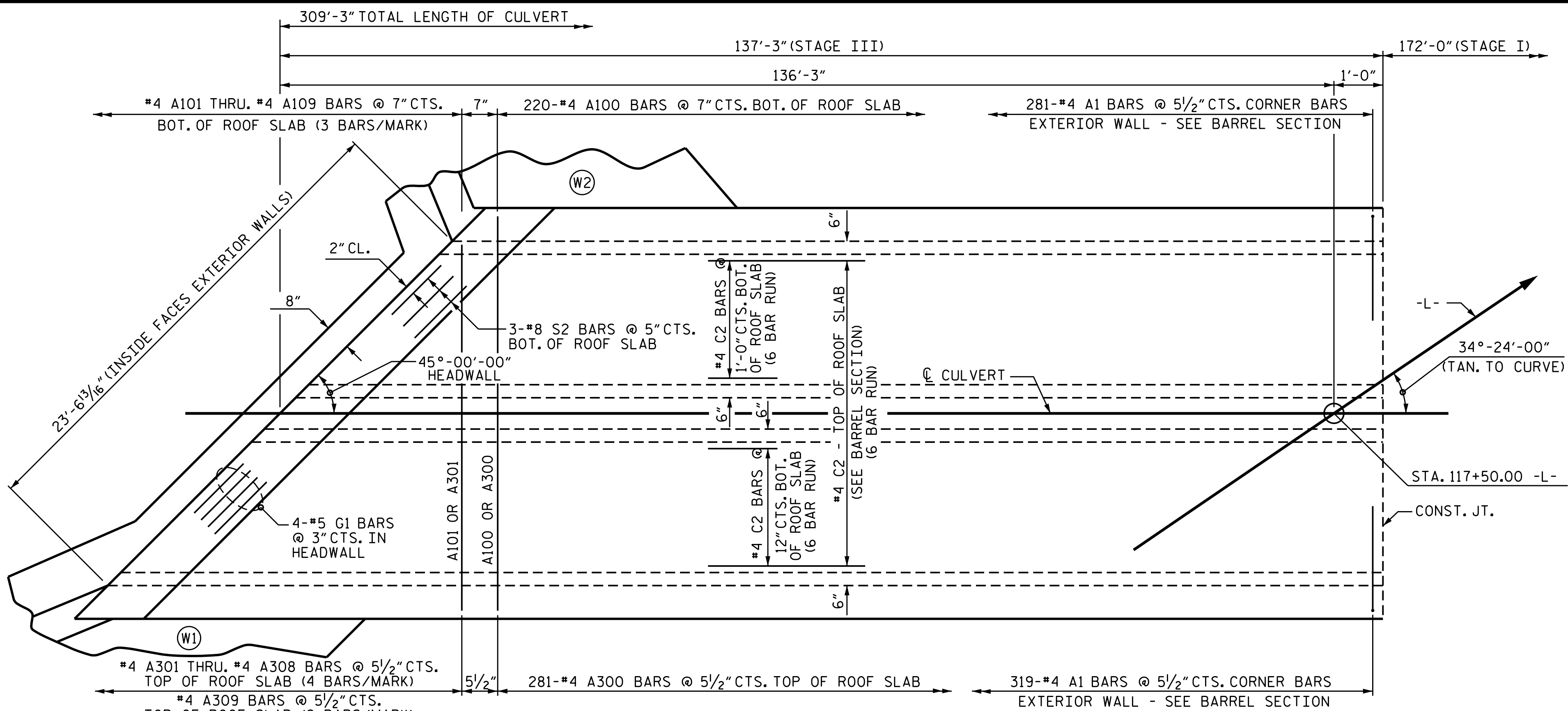
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD WINGS FOR CONCRETE BOX CULVERT**  
 H = 10'-0" SLOPE = 2:1  
 45° SKEW



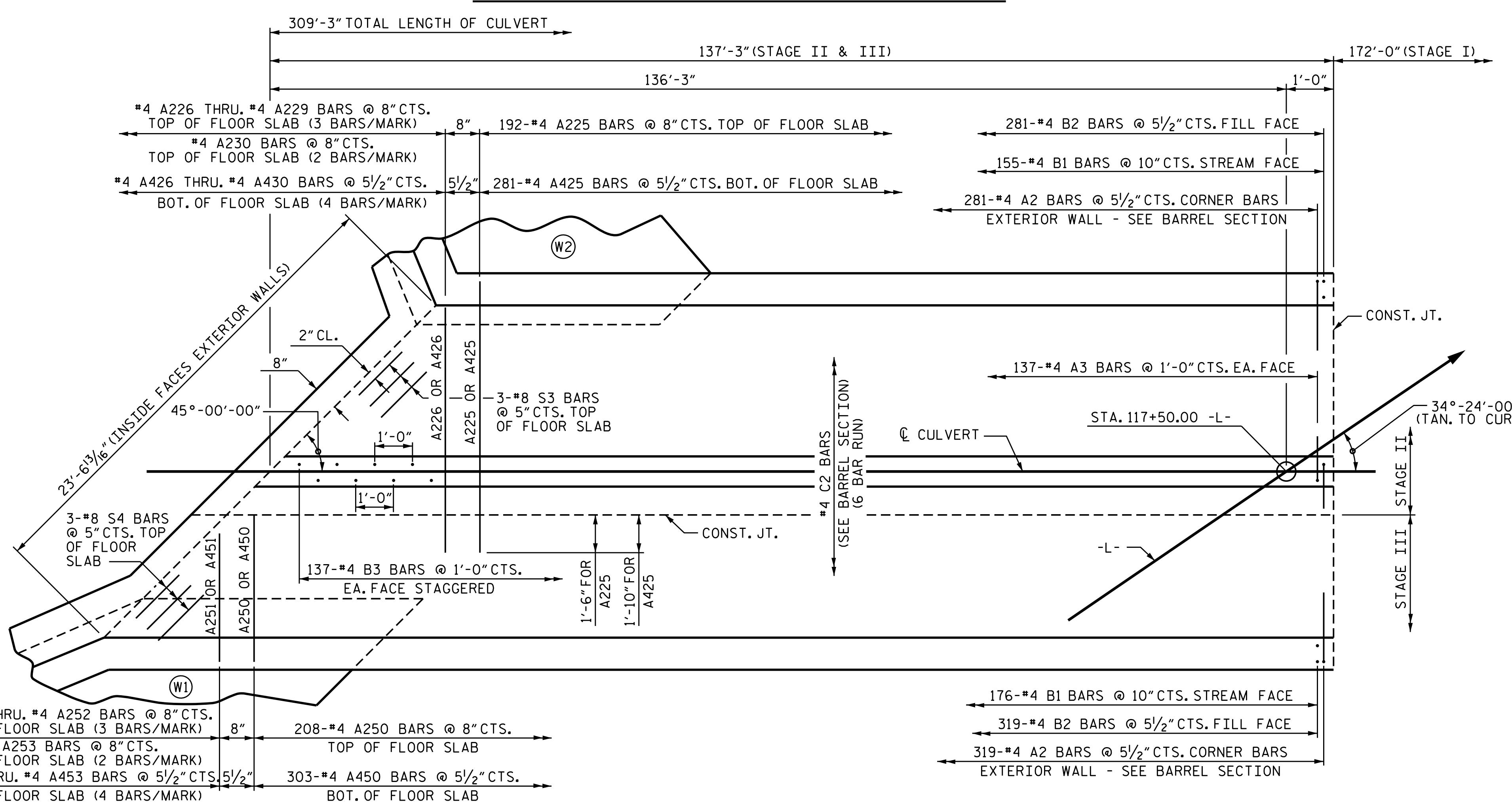
ASSEMBLED BY : KEITH D. LAYNE DATE : 5/06/16  
 CHECKED BY : J. D. HAWK DATE : 5/20/16  
 DRAWN BY : CCJ 01/00  
 CHECKED BY : RWW 03/00

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



PLAN - ROOF SLAB (STAGE III)



PLAN - FLOOR SLAB (STAGE II & III)

BILL OF MATERIAL STAGE II

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	281	#4	1 5'-1"	954
A2	281	#4	1 4'-10"	907
A3	274	#4	1 3'-10"	702
A225	192	#4	STR. 11'-9"	1507
A226	3	#4	STR. 9'-9"	20
A227	3	#4	STR. 7'-9"	16
A228	3	#4	STR. 5'-9"	12
A229	3	#4	STR. 3'-9"	8
A230	2	#4	STR. 2'-5"	3
A425	281	#4	STR. 12'-1"	2268
A426	4	#4	STR. 10'-3"	27
A427	4	#4	STR. 8'-5"	22
A428	4	#4	STR. 6'-7"	18
A429	4	#4	STR. 4'-9"	13
A430	4	#4	STR. 2'-11"	8
B1	155	#4	STR. 11'-4"	1173
B2	281	#4	STR. 9'-4"	1752
B3	274	#4	STR. 11'-4"	2074
C2	204	#4	STR. 25'-10"	3520
D1	18	#6	STR. 1'-7"	43
S3	3	#8	STR. 18'-9"	150
A100	220	#4	STR. 17'-8"	2596
A101	3	#4	STR. 15'-11"	32
A102	3	#4	STR. 14'-2"	28
A103	3	#4	STR. 12'-5"	25
A104	3	#4	STR. 10'-8"	21
A105	3	#4	STR. 8'-11"	18
A106	3	#4	STR. 7'-3"	15
A107	3	#4	STR. 5'-6"	11
A108	3	#4	STR. 3'-9"	8
A109	3	#4	STR. 2'-0"	4
A250	208	#4	STR. 7'-6"	1042
A251	3	#4	STR. 5'-9"	12
A252	3	#4	STR. 3'-9"	8
A253	2	#4	STR. 2'-5"	3
A300	281	#4	STR. 17'-8"	3316
A301	4	#4	STR. 15'-11"	43
A302	4	#4	STR. 14'-1"	38
A303	4	#4	STR. 12'-3"	33
A304	4	#4	STR. 10'-5"	28
A305	4	#4	STR. 8'-7"	23
A306	4	#4	STR. 6'-9"	18
A307	4	#4	STR. 4'-11"	13
A308	4	#4	STR. 3'-1"	8
A309	2	#4	STR. 2'-2"	3

REINFORCING STEEL LBS. 15,197

BILL OF MATERIAL STAGE III

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
A450	303	#4	STR. 7'-6"	1518
A451	4	#4	STR. 5'-10"	16
A452	4	#4	STR. 4'-0"	11
A453	4	#4	STR. 2'-1"	6
B1	176	#4	STR. 11'-4"	1332
B2	319	#4	STR. 9'-4"	1989
C2	264	#4	STR. 25'-10"	4556
D2	3	#6	STR. 3'-7"	16
G1	4	#5	STR. 25'-1"	105
S2	3	#8	STR. 25'-1"	201
S4	3	#8	STR. 10'-8"	85

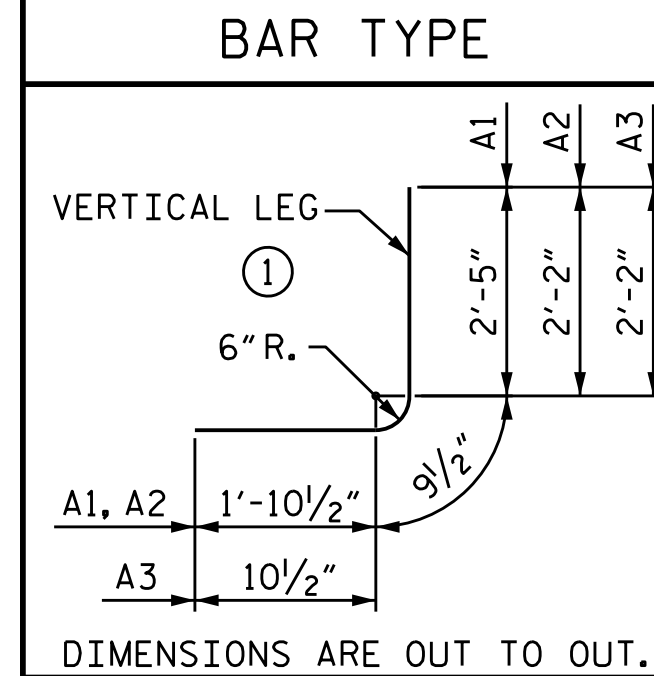
REINFORCING STEEL LBS. 19,294

STAGE II

CLASS A CONCRETE	
BARREL @ 0.877 CY/FT	120.4 C.Y.
WINGS, ETC.	6.9 C.Y.
1 SILL, 5 BAFFLES	1.8 C.Y.
TOTAL	129.1 C.Y.
REINFORCING STEEL	
BARREL	15,197 LBS.
WINGS, ETC.	496 LBS.
TOTAL	15,693 LBS.

STAGE III

CLASS A CONCRETE	
BARREL @ 1.159 CY/FT	199.3 C.Y.
WINGS, ETC.	16.9 C.Y.
1 SILL	0.9 C.Y.
TOTAL	217.1 C.Y.
REINFORCING STEEL	
BARREL	19,294 LBS.
WINGS, ETC.	1,108 LBS.
TOTAL	20,402 LBS.



SPLICE LENGTH

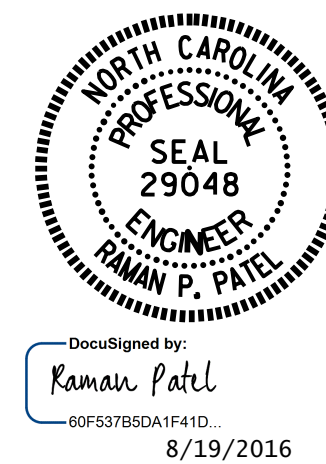
BAR	SIZE	LENGTH
A225	#4	1'-5"
A425	#4	1'-9"
B1	#4	1'-5"
B3	#4	1'-5"
C2	#4	1'-11"
S3	#8	4'-0"

PROJECT NO. U-3440  
 CABARRUS COUNTY  
 STATION: 117+50.00 -L-

SHEET 7 OF 8

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

DOUBLE 8 FT. X 10 FT.  
 CONCRETE BOX CULVERT  
 STAGE II & III  
 34°-24'-00" SKEW/45° HEADWALL

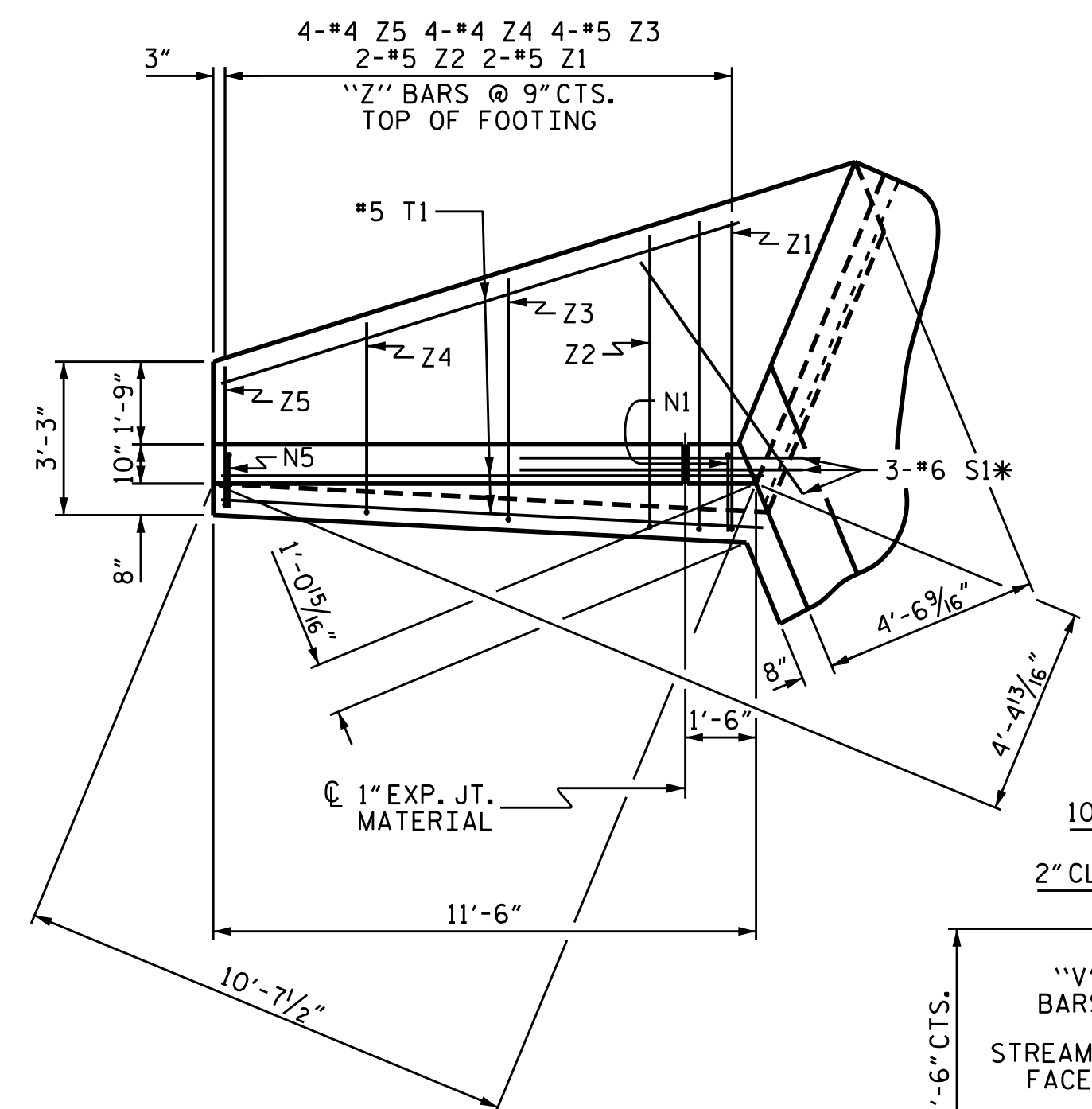


DRAWN BY: KEITH D. LAYNE DATE: 5/06/16  
 CHECKED BY: J.D. HAWK DATE: 5/20/16  
 DESIGN ENGINEER OF RECORD: R. P. PATEL DATE: 6/3/16

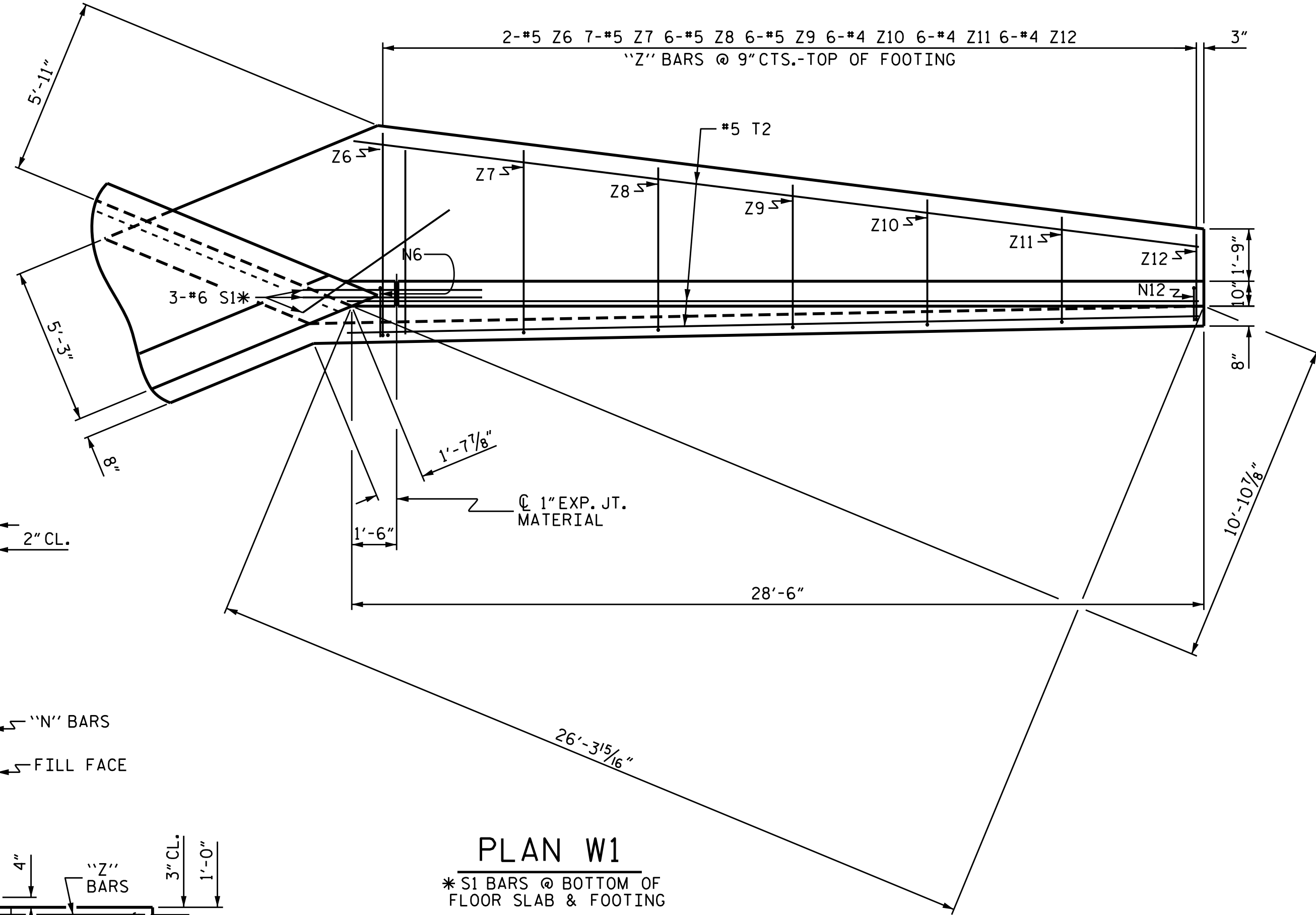
DOCUMENT NOT CONSIDERED  
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NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

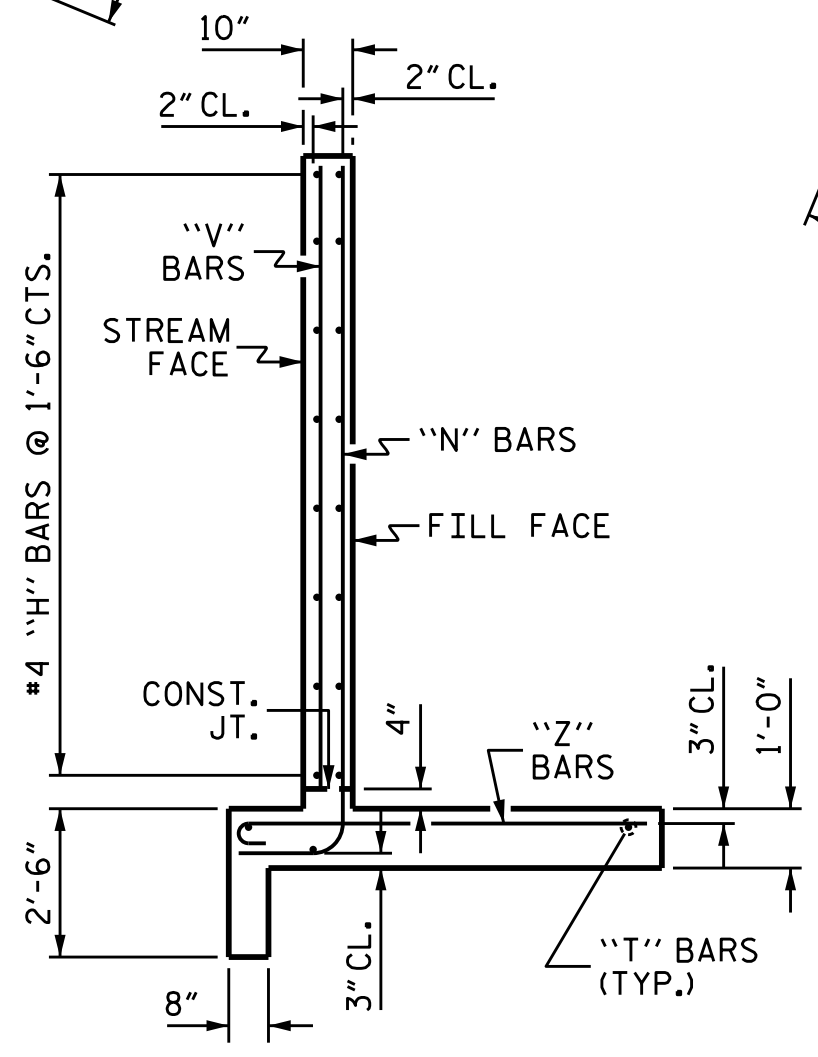
SHEET NO. C2-7  
 TOTAL SHEETS 8



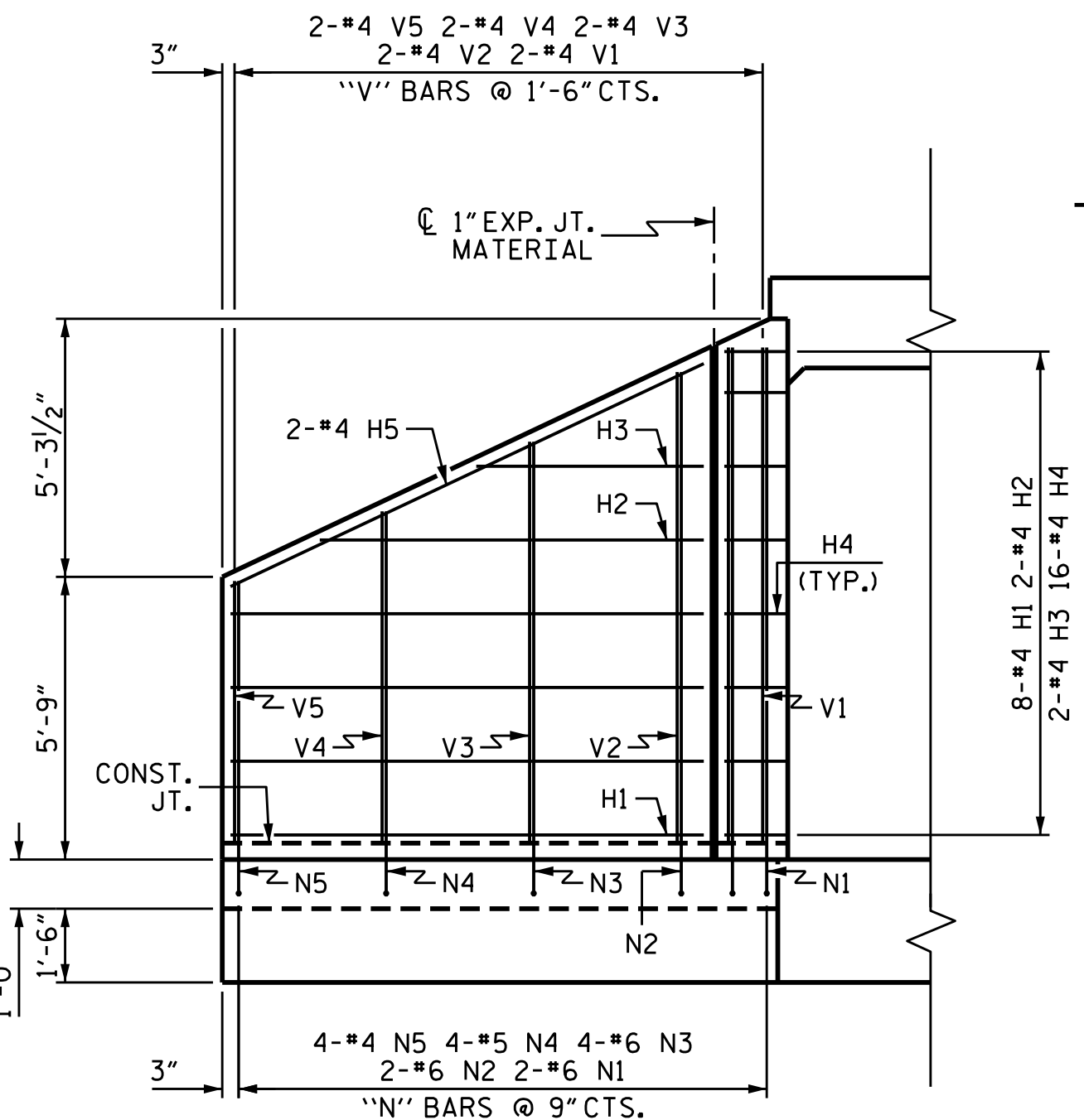
**PLAN W2**  
\* SI BARS @ BOTTOM OF FLOOR SLAB & FOOTING



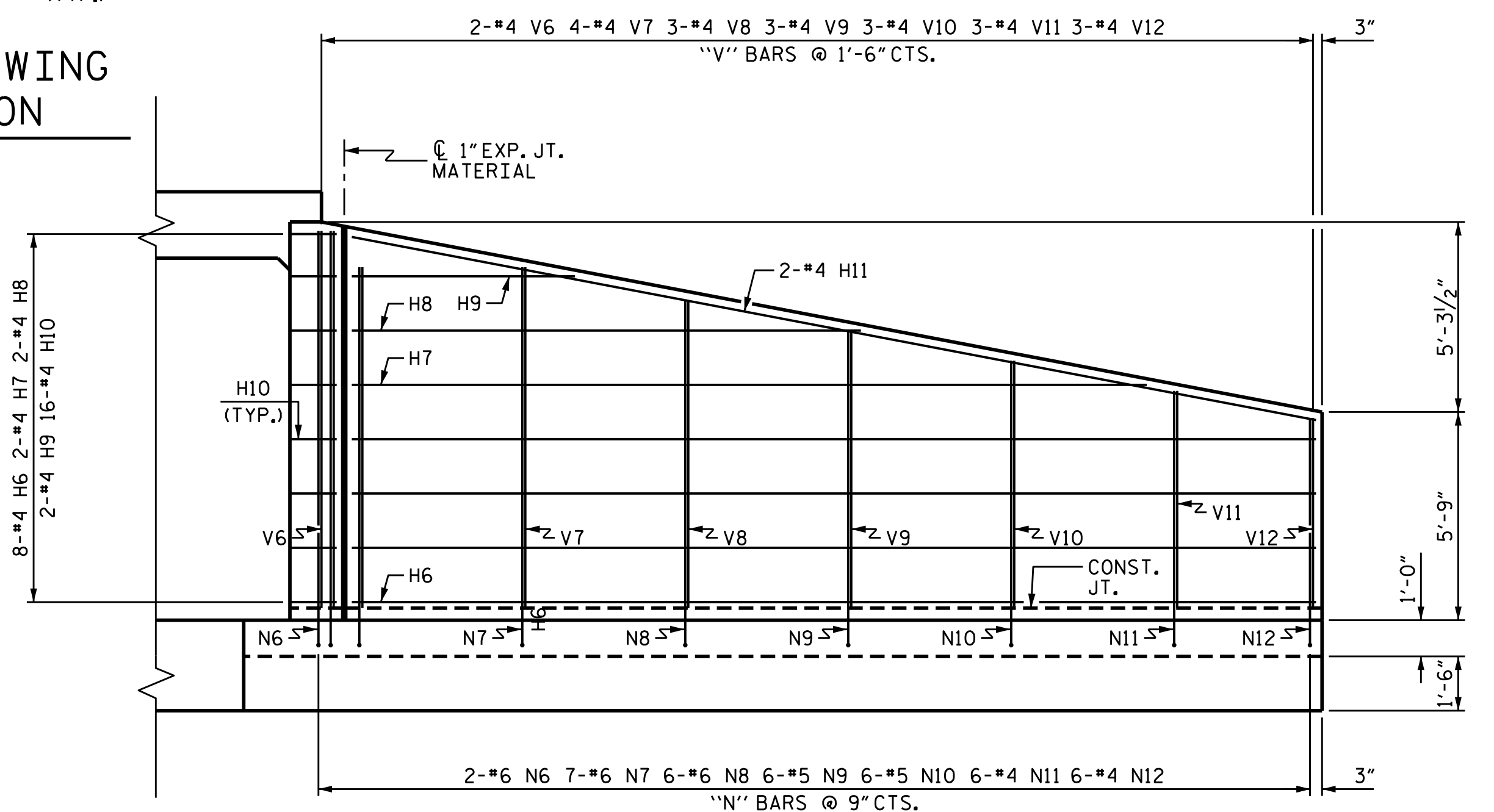
**PLAN W1**  
\* SI BARS @ BOTTOM OF FLOOR SLAB & FOOTING



**TYPICAL WING SECTION**



**ELEVATION W2**

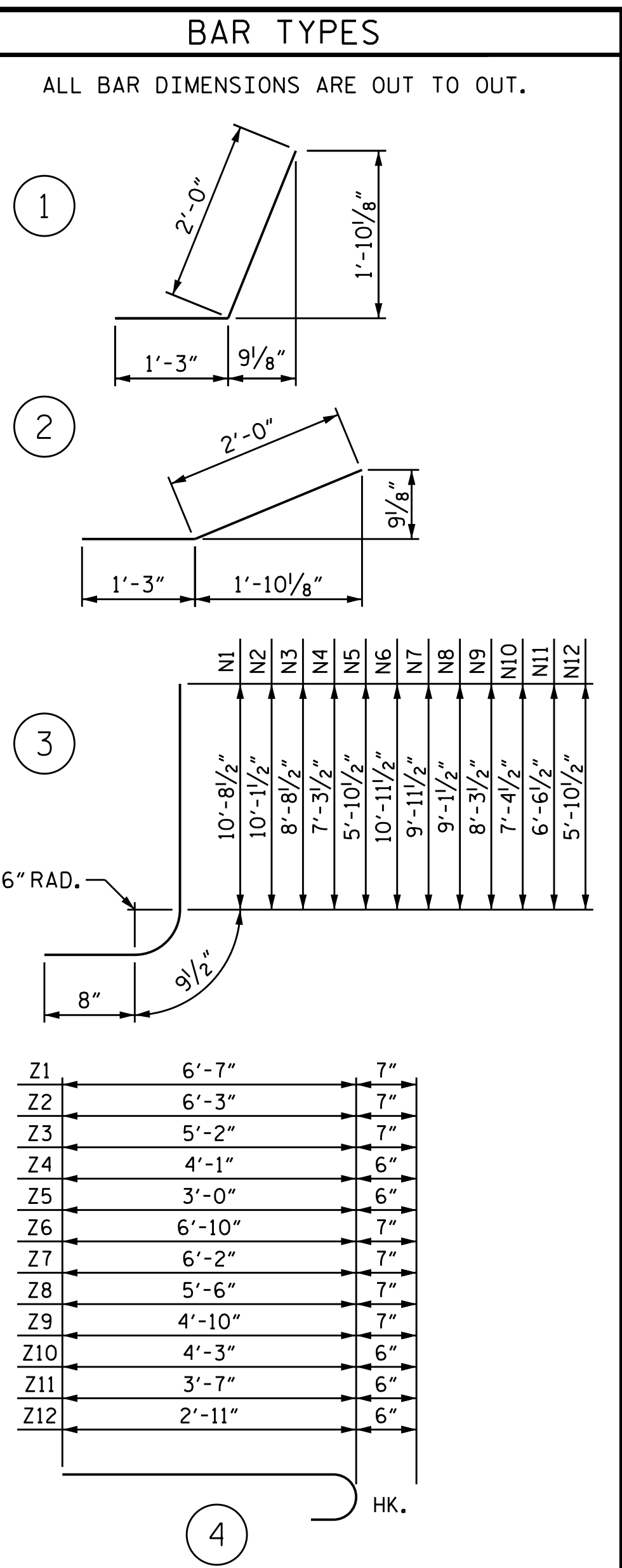


**ELEVATION W1**

BILL OF MATERIAL STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-7"	51
H2	2	#4	STR	7'-9"	10
H3	2	#4	STR	4'-7"	6
H4	16	#4	1	3'-3"	35
H5	2	#4	STR	10'-7"	14
N1	2	#6	3	12'-2"	37
N2	2	#6	3	11'-7"	35
N3	4	#6	3	10'-2"	61
N4	4	#5	3	8'-9"	37
N5	4	#4	3	7'-4"	20
S1	3	#6	STR	6'-0"	27
T1	3	#5	STR	11'-6"	36
V1	2	#4	STR	10'-1"	13
V2	2	#4	STR	9'-7"	13
V3	2	#4	STR	8'-2"	11
V4	2	#4	STR	6'-9"	9
V5	2	#4	STR	5'-4"	7
Z1	2	#5	4	7'-2"	15
Z2	2	#5	4	6'-10"	14
Z3	4	#5	4	5'-9"	24
Z4	4	#4	4	4'-7"	12
Z5	4	#4	4	3'-6"	9
REINFORCING STEEL					496 LBS.
CLASS A CONCRETE					
WING W2					6.2 C.Y.
PARTIAL CURTAIN WALL					0.7 C.Y.
TOTAL					6.9 C.Y.

BILL OF MATERIAL STAGE III					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	8	#4	STR	26'-7"	142
H7	2	#4	STR	21'-11"	29
H8	2	#4	STR	14'-0"	19
H9	2	#4	STR	6'-2"	8
H10	16	#4	2	3'-3"	35
H11	2	#4	STR	27'-11"	37
N6	2	#6	3	12'-5"	37
N7	7	#6	3	11'-5"	120
N8	6	#6	3	10'-7"	95
N9	6	#5	3	9'-9"	61
N10	6	#5	3	8'-10"	55
N11	6	#4	3	8'-0"	32
N12	6	#4	3	7'-4"	29
S1	3	#6	STR	6'-0"	27
T2	3	#5	STR	28'-6"	89
V6	2	#4	STR	10'-5"	14
V7	4	#4	STR	9'-5"	25
V8	3	#4	STR	8'-6"	17
V9	3	#4	STR	7'-8"	15
V10	3	#4	STR	6'-10"	14
V11	3	#4	STR	6'-0"	12
V12	3	#4	STR	5'-3"	11
Z6	2	#5	4	7'-5"	15
Z7	7	#5	4	6'-9"	49
Z8	6	#5	4	6'-1"	38
Z9	6	#5	4	5'-5"	34
Z10	6	#4	4	4'-9"	19
Z11	6	#4	4	4'-1"	16
Z12	6	#4	4	3'-5"	14
REINFORCING STEEL					1108 LBS.
CLASS A CONCRETE					
WING W1					15.2 C.Y.
1 HEADWALL					1.2 C.Y.
PARTIAL CURTAIN WALL					0.5 C.Y.
TOTAL					16.9 C.Y.

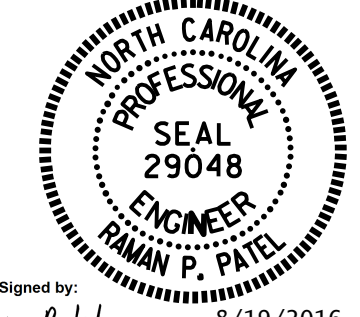


PROJECT NO. U-3440  
CABARRUS COUNTY  
 STATION: 117+50.00 -L-

SHEET 8 OF 8

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**STANDARD WINGS FOR CONCRETE BOX CULVERT**  
 H = 10'-0" SLOPE = 2:1  
 45° SKEW



ASSEMBLED BY : KEITH D. LAYNE DATE : 5/06/16  
 CHECKED BY : J. D. HAWK DATE : 5/20/16  
 DRAWN BY : CCJ 01/00  
 CHECKED BY : RWW 03/00

DocuSigned by:  
 Raman Patel 8/19/2016  
 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

TOTAL SHEETS 8

## STANDARD NOTES

### DESIGN DATA:

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

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "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 1-1/2" 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 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.  
WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16" INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.  
METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. 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

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