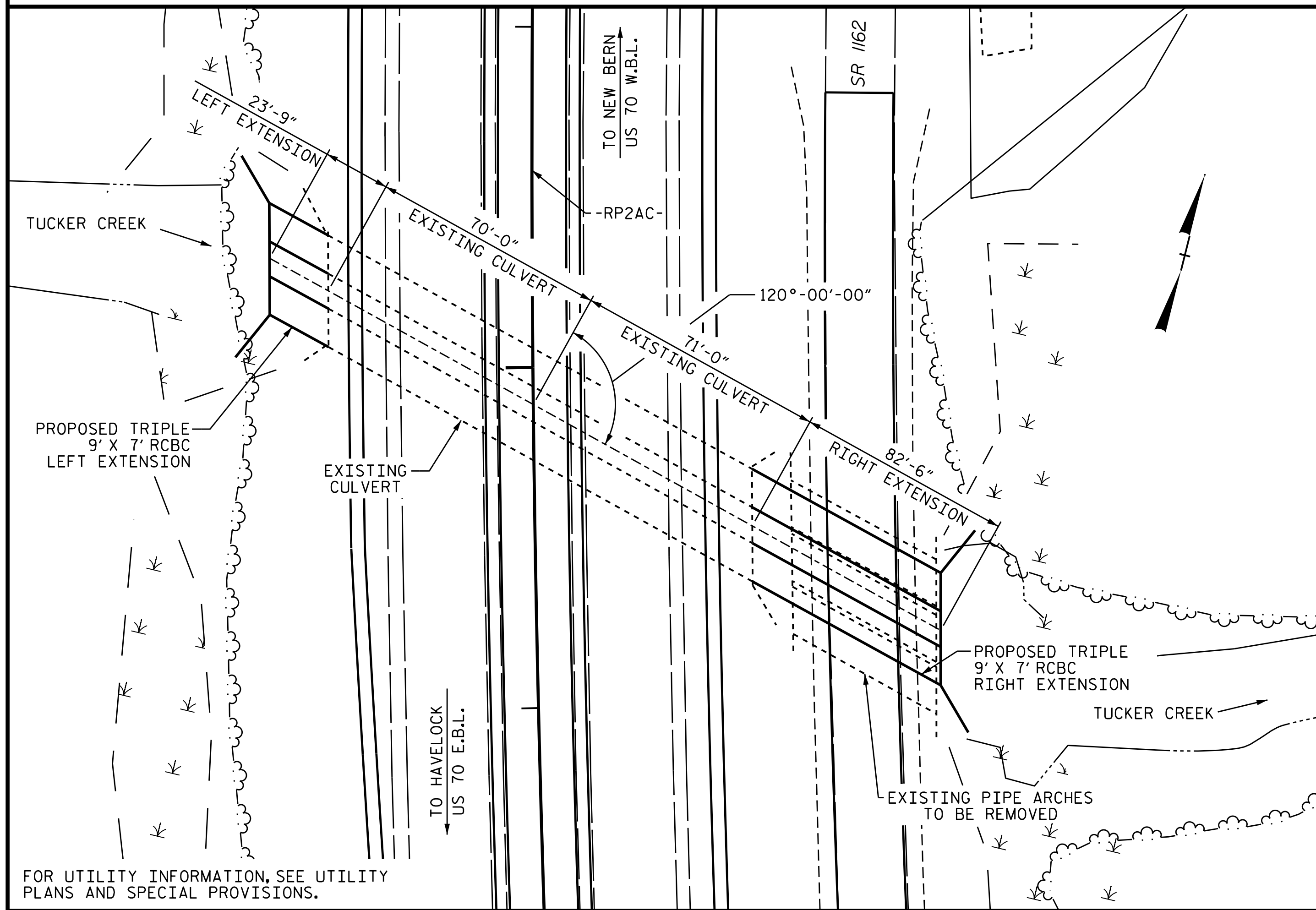


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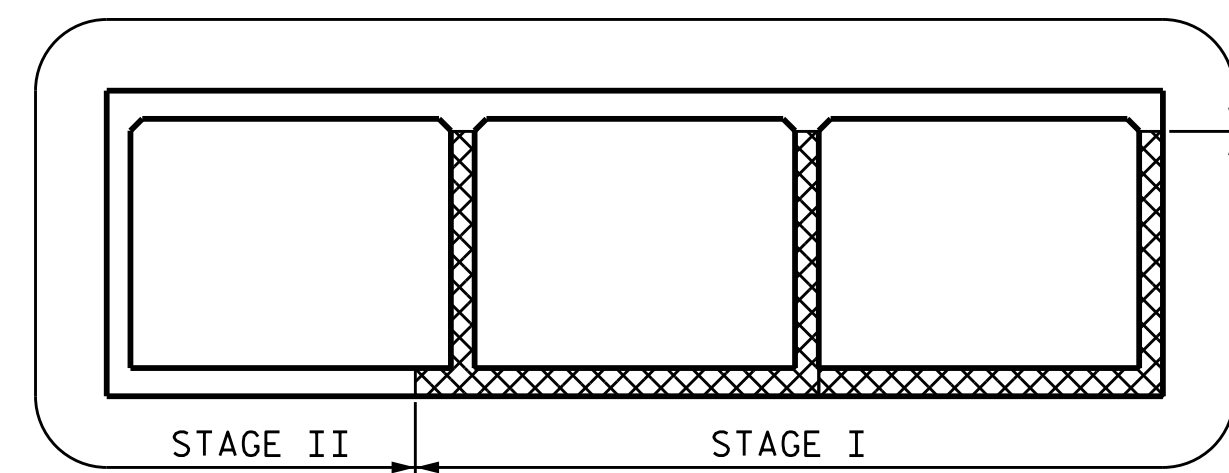
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FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

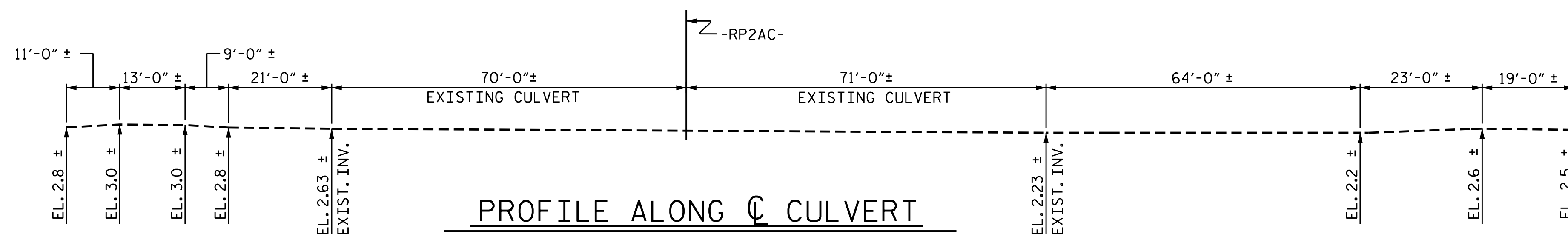
LOCATION SKETCH



CONSTRUCTION SEQUENCE

SECTION IS LOOKING DOWNSTREAM

- STAGE I CONSTRUCTION
- STAGE II CONSTRUCTION



PROFILE ALONG CULVERT

HYDRAULIC DATA

DESIGN DISCHARGE	= 762 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 9.4 FT.
DRAINAGE AREA	= 4.5 SQ. MI.
BASE DISCHARGE (Q100)	= 929 CFS
BASE HIGH WATER ELEVATION	= 10.2 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 2400 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS.
OVERTOPPING FLOOD ELEVATION	= 15.7 FT.*

\* LEFT SHOULDER POINT AT STA. 47+45 -RP2AC-

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"

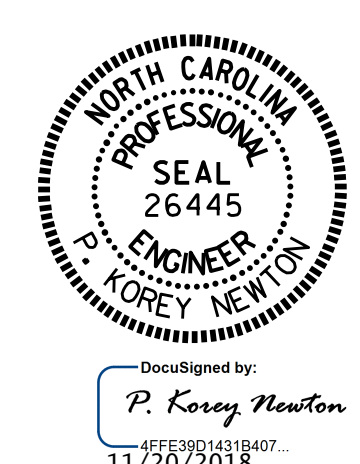
NOTE:  
SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND  $f_y = 60\text{ksi}$ .

NOTES:

- ASSUMED LIVE LOAD ----- HS-93 OR ALTERNATE LOADING.
- DESIGN FILL----- 8.30 FT.
- 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 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.
- 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.
- 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 BAR SIZE USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

PROJECT NO. R-1015  
 CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-

SHEET 1 OF 10 EXTENDS CULVERT NO. 90



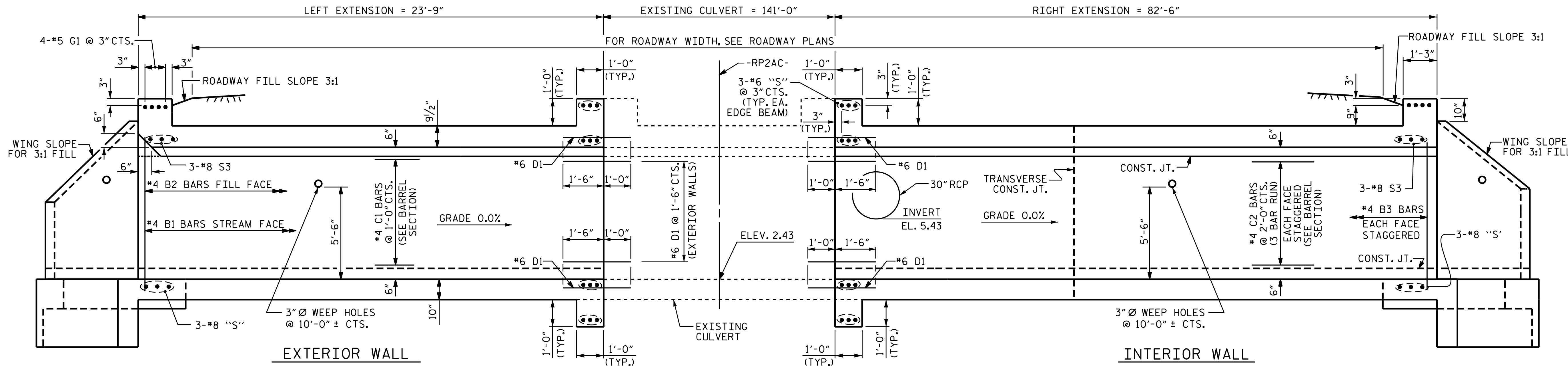
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 9 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 LEFT AND RIGHT  
 EXTENSIONS  
 120° SKEW

ASSEMBLED BY : O.T. NGUYEN	DATE : 10/30/18	<b>SPECIAL</b>
CHECKED BY : P.K. NEWTON	DATE : 10/31/18	
DRAWN BY : J.E. MANGUM	DATE : OCT. 1989	<b>STANDARD</b>
CHECKED BY : A.R. BISSETTE	DATE : AUG. 1989	

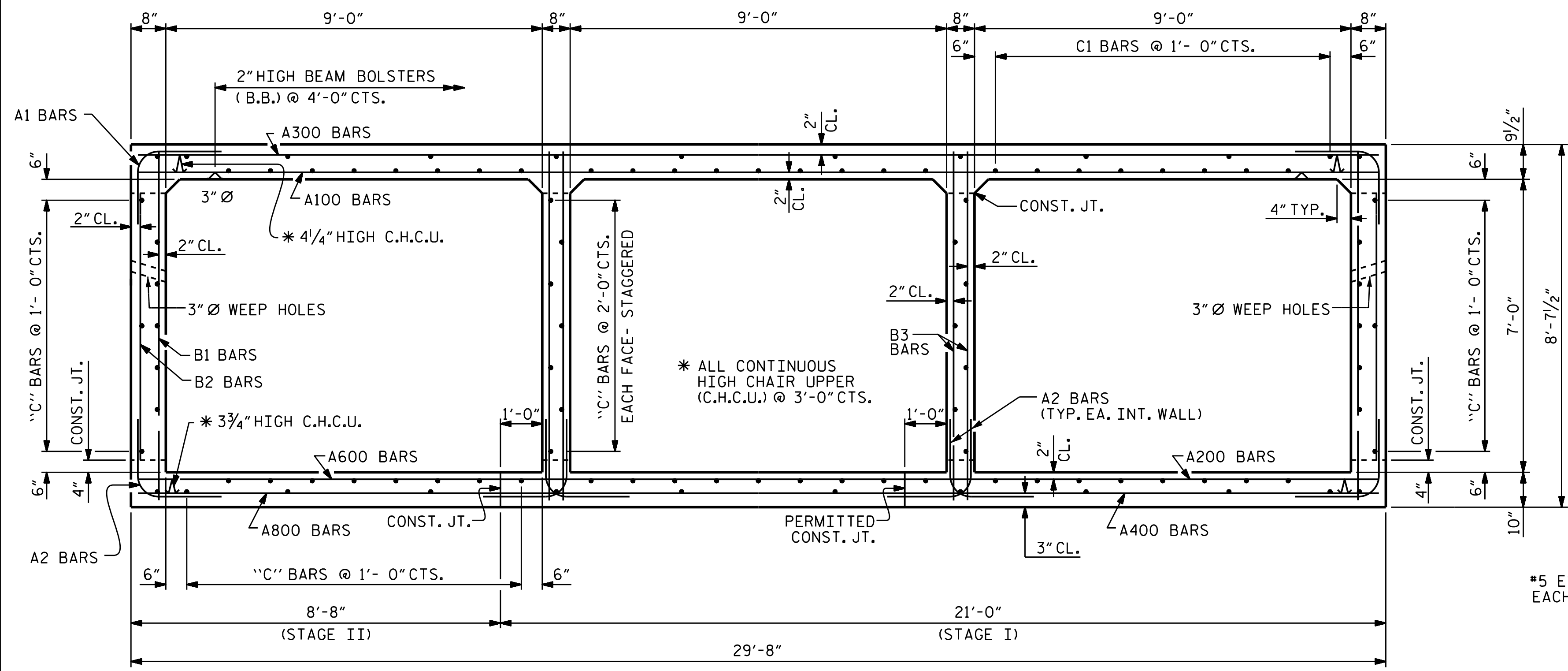
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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



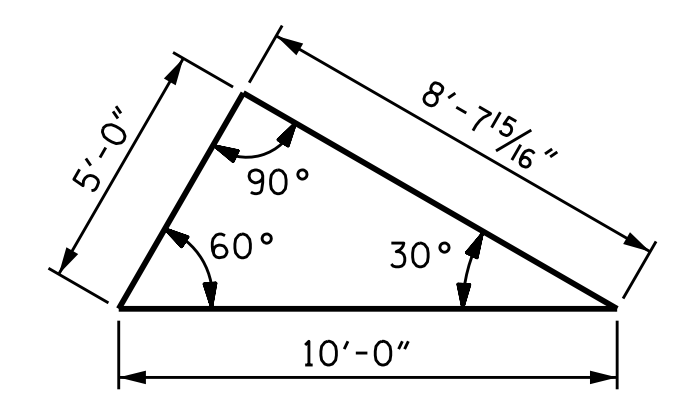


CULVERT SECTION NORMAL TO ROADWAY

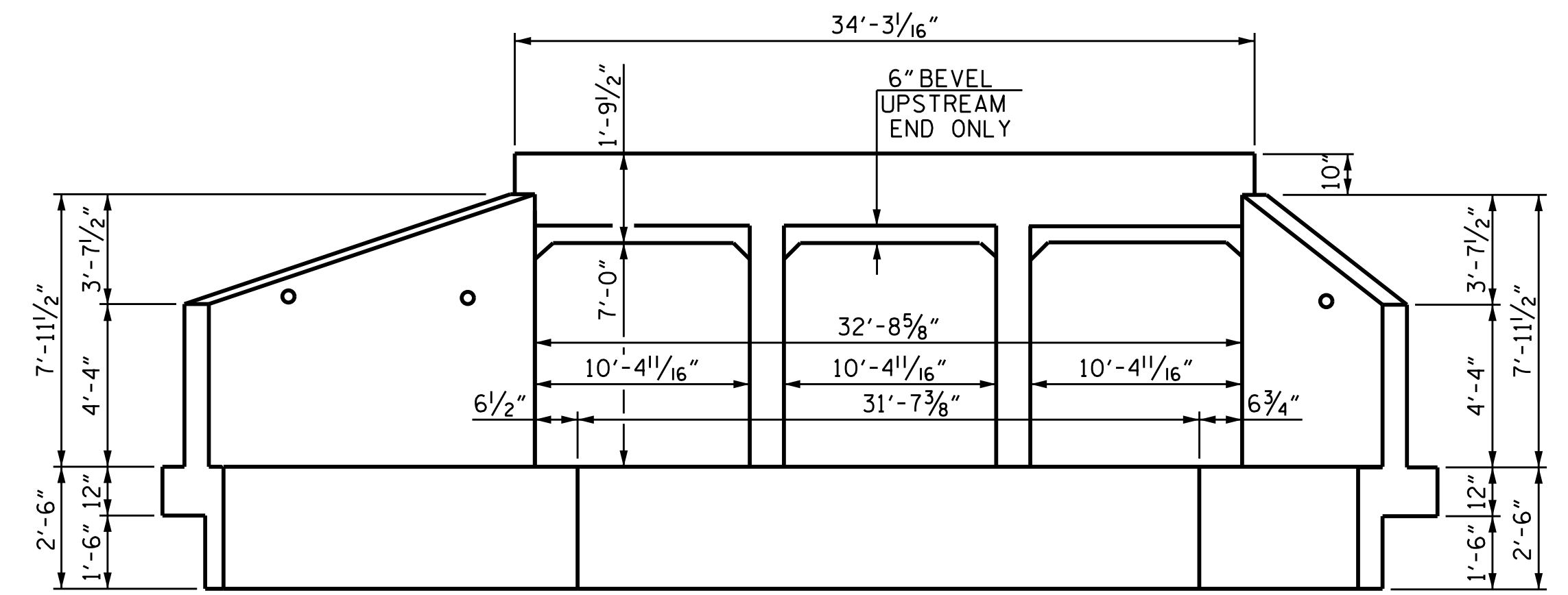


RIGHT ANGLE SECTION OF BARREL

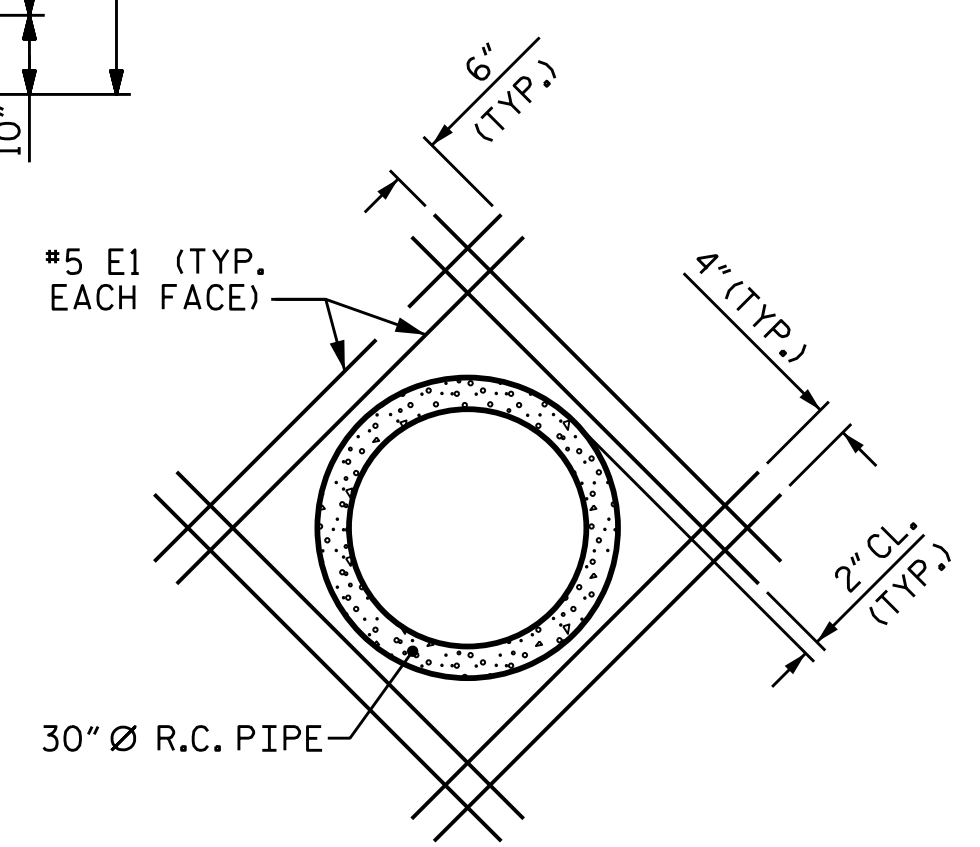
THERE ARE 104 "C" BARS IN SECTION OF BARREL.



SKEW TRIANGLE



END ELEVATION NORMAL TO SKEW

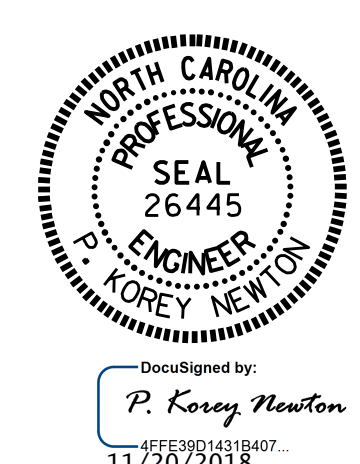


DETAIL OF REINFORCING AROUND 30" Ø PIPE

FOR PIPE THRU EXTERIOR WALL, FIELD CUT AND BEND "B" AND "C" BARS AS NEEDED TO CLEAR PIPE

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-

SHEET 2 OF 10



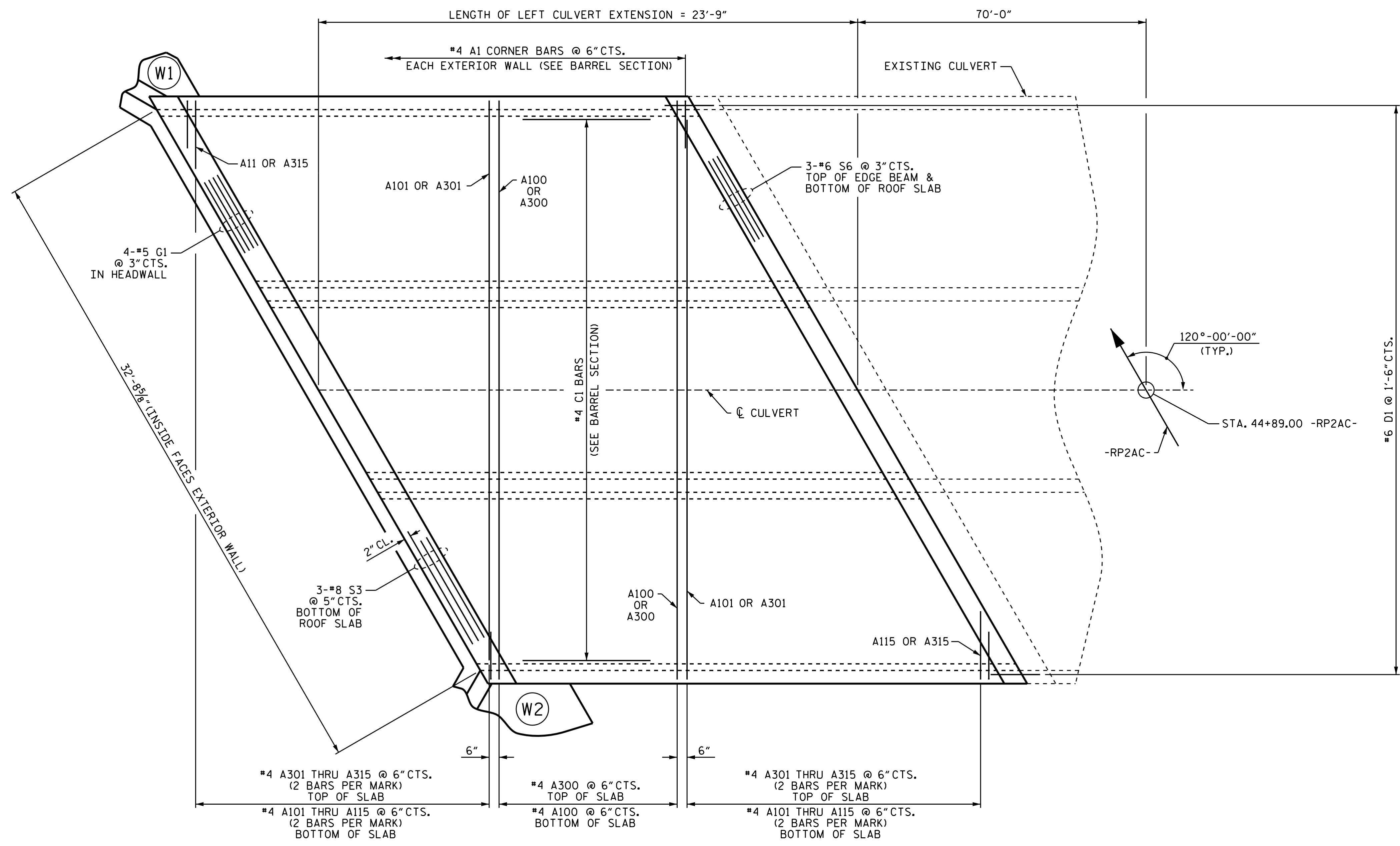
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 9 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 LEFT AND RIGHT  
 EXTENSIONS  
 120° SKEW

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

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.  
 REDRAWN BY JEM 10-30 CHECKED BY ARC

ASSEMBLED BY : Q.T. NGUYEN DATE : 10/30/18  
 CHECKED BY : P.K. NEWTON DATE : 10/31/18  
 DRAWN BY : C.F. HOLMES DATE : 11-71  
 CHECKED BY : JOEL JOHNSON DATE : 12-71

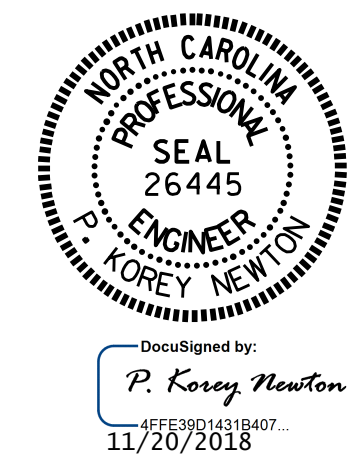
**SPECIAL**  
**STANDARD**



PLAN OF ROOF SLAB

PROJECT NO.     R-1015      
    CRAVEN     COUNTY  
STATION: 44+89.00-RP2AC-

SHEET 3 OF 10



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
TRIPLE 9 FT. X 7 FT.  
CONCRETE BOX CULVERT  
120° SKEW  
(LEFT EXTENSION)

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.  
 REDRAWN BY JEM 10-30 CHECKED BY ARC

ASSEMBLED BY : <u>O.T. NGUYEN</u>	DATE : <u>10/30/18</u>
CHECKED BY : <u>P.K. NEWTON</u>	DATE : <u>10/31/18</u>
DRAWN BY : <u>C.F. HOLMES</u>	DATE : <u>11-71</u>
CHECKED BY : <u>JOEL JOHNSON</u>	DATE : <u>12-71</u>

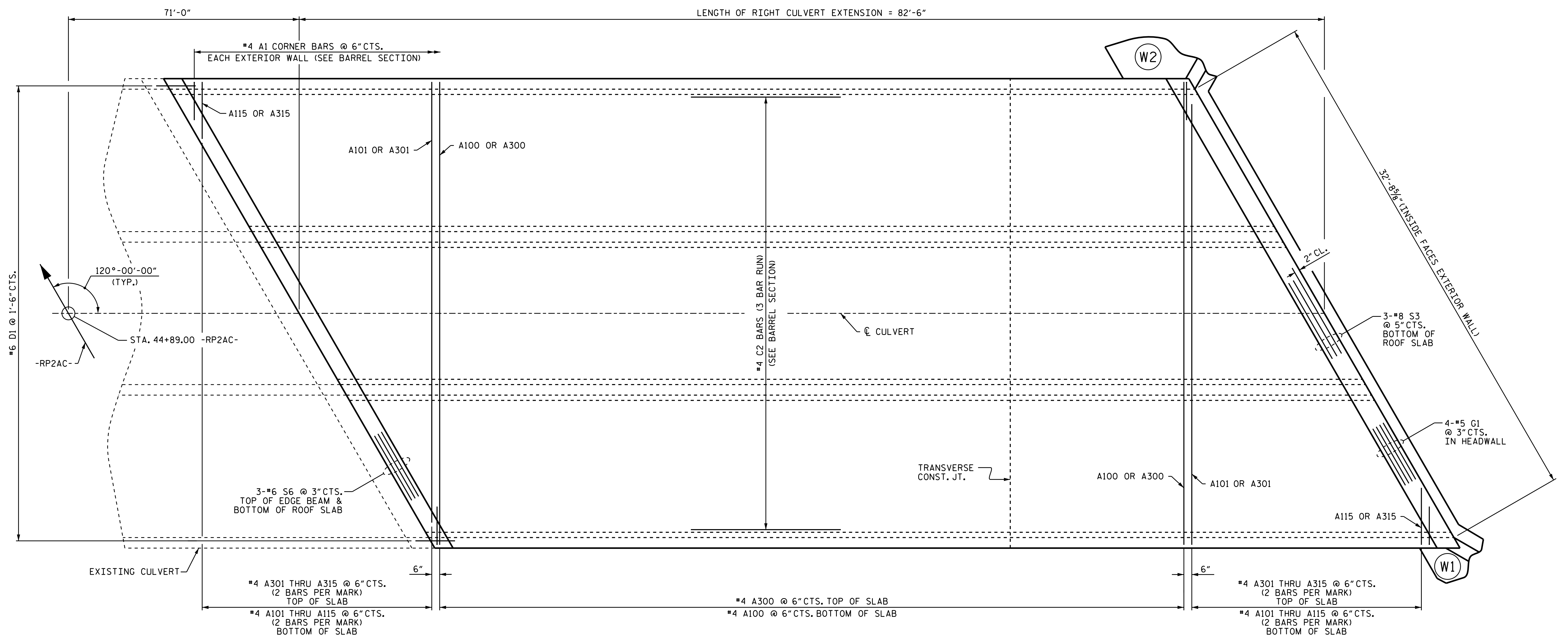
**SPECIAL**  
**STANDARD**

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



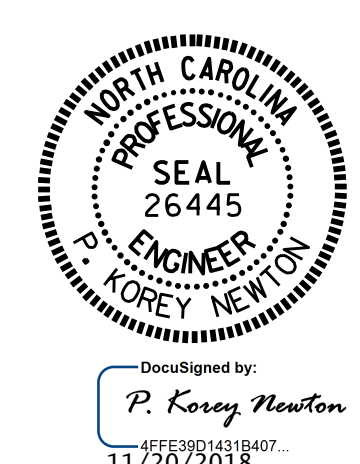




PLAN OF ROOF SLAB

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-

SHEET 5 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 9 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 120° SKEW  
 (RIGHT EXTENSION)

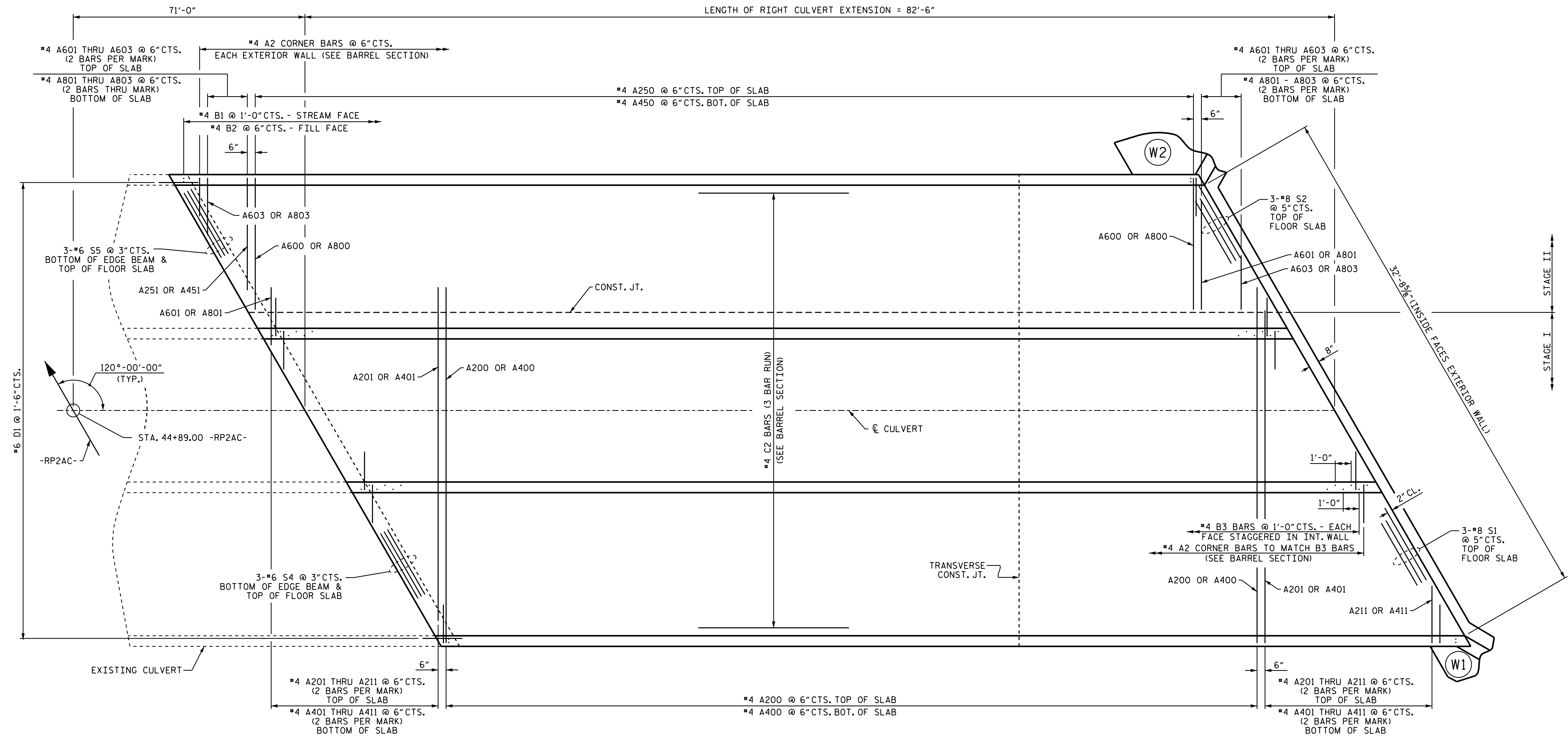
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.  
 REDRAWN BY JEM 10-30 CHECKED BY ARC

ASSEMBLED BY: O.T. NGUYEN DATE: 10/30/18  
 CHECKED BY: P.K. NEWTON DATE: 11/1/18  
 DRAWN BY: C.F. HOLMES DATE: 11-71  
 CHECKED BY: JOEL JOHNSON DATE: 12-71

**SPECIAL**  
**STANDARD**

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

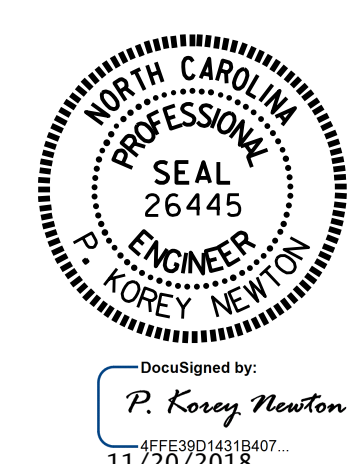
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5	
1			3			TOTAL SHEETS	
2			4			10	



PLAN OF FLOOR SLAB

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-

SHEET 6 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 9 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 120° SKEW  
 (RIGHT EXTENSION)

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.  
 REDRAWN BY JEM 10-30 CHECKED BY ARC

ASSEMBLED BY : O.T. NGUYEN DATE : 10/30/18  
 CHECKED BY : P.K. NEWTON DATE : 11/2/18  
 DRAWN BY : C.F. HOLMES DATE : 11-71  
 CHECKED BY : JOEL JOHNSON DATE : 12-71

**SPECIAL**  
**STANDARD**

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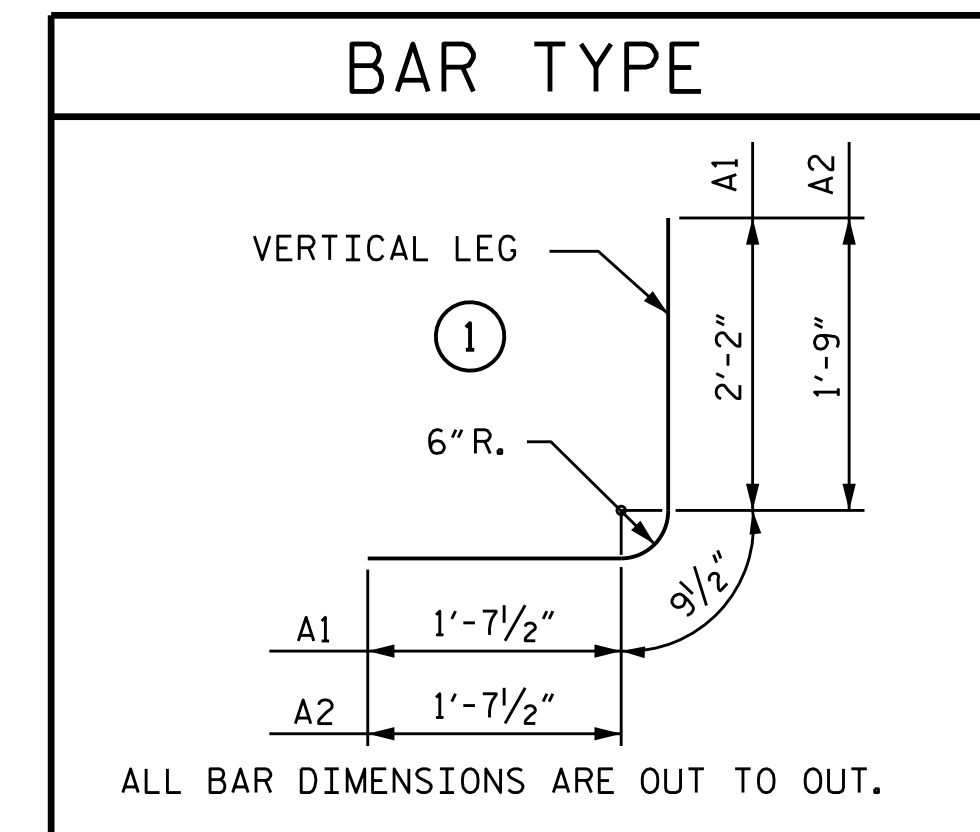
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.  
 C1-6  
 TOTAL SHEETS  
 10



BILL OF MATERIAL LEFT EXTENSION											
STAGE I						STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	48	#4	1	4'-7"	147	A1	48	#4	1	4'-7"	147
A2	144	#4	1	4'-2"	401	A2	48	#4	1	4'-2"	134
A200	22	#4	STR.	22'-3"	327	A100	14	#4	STR.	29'-3"	274
A201	4	#4	STR.	20'-6"	55	A101	4	#4	STR.	27'-5"	73
A202	4	#4	STR.	18'-9"	50	A102	4	#4	STR.	25'-8"	69
A203	4	#4	STR.	17'-0"	45	A103	4	#4	STR.	23'-11"	64
A204	4	#4	STR.	15'-3"	41	A104	4	#4	STR.	22'-2"	59
A205	4	#4	STR.	13'-6"	36	A105	4	#4	STR.	20'-6"	55
A206	4	#4	STR.	11'-10"	32	A106	4	#4	STR.	18'-9"	50
A207	4	#4	STR.	10'-1"	27	A107	4	#4	STR.	17'-0"	45
A208	4	#4	STR.	8'-4"	22	A108	4	#4	STR.	15'-3"	41
A209	4	#4	STR.	6'-7"	18	A109	4	#4	STR.	13'-6"	36
A210	4	#4	STR.	4'-11"	13	A110	4	#4	STR.	11'-10"	32
A211	4	#4	STR.	3'-2"	8	A111	4	#4	STR.	10'-1"	27
A400	22	#4	STR.	22'-3"	327	A112	4	#4	STR.	8'-4"	22
A401	4	#4	STR.	20'-6"	55	A113	4	#4	STR.	6'-7"	18
A402	4	#4	STR.	18'-9"	50	A114	4	#4	STR.	4'-11"	13
A403	4	#4	STR.	17'-0"	45	A115	4	#4	STR.	3'-2"	8
A404	4	#4	STR.	15'-3"	41	A300	14	#4	STR.	29'-3"	274
A405	4	#4	STR.	13'-6"	36	A301	4	#4	STR.	27'-5"	73
A406	4	#4	STR.	11'-10"	32	A302	4	#4	STR.	25'-8"	69
A407	4	#4	STR.	10'-1"	27	A303	4	#4	STR.	23'-11"	64
A408	4	#4	STR.	8'-4"	22	A304	4	#4	STR.	22'-2"	59
A409	4	#4	STR.	6'-7"	18	A305	4	#4	STR.	20'-6"	55
A410	4	#4	STR.	4'-11"	13	A306	4	#4	STR.	18'-9"	50
A411	4	#4	STR.	3'-2"	8	A307	4	#4	STR.	17'-0"	45
B1	24	#4	STR.	8'-1"	130	A308	4	#4	STR.	15'-3"	41
B2	48	#4	STR.	6'-4"	203	A309	4	#4	STR.	13'-6"	36
B3	96	#4	STR.	8'-1"	518	A310	4	#4	STR.	11'-10"	32
C1	48	#4	STR.	23'-4"	748	A311	4	#4	STR.	10'-1"	27
D1	19	#6	STR.	2'-6"	71	A312	4	#4	STR.	8'-4"	22
S1	3	#8	STR.	28'-1"	225	A313	4	#4	STR.	6'-7"	18
S4	6	#6	STR.	26'-4"	237	A314	4	#4	STR.	4'-11"	13
						A315	4	#4	STR.	3'-2"	8
						A800	38	#4	STR.	8'-5"	214
						A801	4	#4	STR.	6'-7"	18
						A802	4	#4	STR.	4'-11"	13
						A803	4	#4	STR.	3'-2"	8
						B1	24	#4	STR.	8'-1"	130
						B2	48	#4	STR.	6'-4"	203
						C1	56	#4	STR.	23'-4"	873
						D1	31	#6	STR.	2'-6"	116
						G1	4	#5	STR.	33'-9"	141
						S2	3	#8	STR.	9'-9"	78
						S3	3	#8	STR.	33'-9"	270
						S5	6	#6	STR.	9'-9"	88
						S6	6	#6	STR.	33'-9"	304
REINFORCING STEEL = LBS. 4028						REINFORCING STEEL = LBS. 4762					

BILL OF MATERIAL RIGHT EXTENSION											
STAGE I						STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	165	#4	1	4'-7"	505	A1	165	#4	1	4'-7"	505
A2	495	#4	1	4'-2"	1378	A2	165	#4	1	4'-2"	459
A200	139	#4	STR.	22'-3"	2066	A100	131	#4	STR.	29'-3"	2560
A201	4	#4	STR.	20'-6"	55	A101	4	#4	STR.	27'-5"	73
A202	4	#4	STR.	18'-9"	50	A102	4	#4	STR.	25'-8"	69
A203	4	#4	STR.	17'-0"	45	A103	4	#4	STR.	23'-11"	64
A204	4	#4	STR.	15'-3"	41	A104	4	#4	STR.	22'-2"	59
A205	4	#4	STR.	13'-6"	36	A105	4	#4	STR.	20'-6"	55
A206	4	#4	STR.	11'-10"	32	A106	4	#4	STR.	18'-9"	50
A207	4	#4	STR.	10'-1"	27	A107	4	#4	STR.	17'-0"	45
A208	4	#4	STR.	8'-4"	22	A108	4	#4	STR.	15'-3"	41
A209	4	#4	STR.	6'-7"	18	A109	4	#4	STR.	13'-6"	36
A210	4	#4	STR.	4'-11"	13	A110	4	#4	STR.	11'-10"	32
A211	4	#4	STR.	3'-2"	8	A111	4	#4	STR.	10'-1"	27
A400	139	#4	STR.	22'-3"	2066	A112	4	#4	STR.	8'-4"	22
A401	4	#4	STR.	20'-6"	55	A113	4	#4	STR.	6'-7"	18
A402	4	#4	STR.	18'-9"	50	A114	4	#4	STR.	4'-11"	13
A403	4	#4	STR.	17'-0"	45	A115	4	#4	STR.	3'-2"	8
A404	4	#4	STR.	15'-3"	41	A300	131	#4	STR.	29'-3"	2560
A405	4	#4	STR.	13'-6"	36	A301	4	#4	STR.	27'-5"	73
A406	4	#4	STR.	11'-10"	32	A302	4	#4	STR.	25'-8"	69
A407	4	#4	STR.	10'-1"	27	A303	4	#4	STR.	23'-11"	64
A408	4	#4	STR.	8'-4"	22	A304	4	#4	STR.	22'-2"	59
A409	4	#4	STR.	6'-7"	18	A305	4	#4	STR.	20'-6"	55
A410	4	#4	STR.	4'-11"	13	A306	4	#4	STR.	18'-9"	50
A411	4	#4	STR.	3'-2"	8	A307	4	#4	STR.	17'-0"	45
B1	83	#4	STR.	8'-1"	448	A308	4	#4	STR.	15'-3"	41
B2	165	#4	STR.	6'-4"	698	A309	4	#4	STR.	13'-6"	36
B3	332	#4	STR.	8'-1"	1793	A310	4	#4	STR.	11'-10"	32
C2	144	#4	STR.	28'-10"	2774	A311	4	#4	STR.	10'-1"	27
D1	19	#6	STR.	2'-6"	71	A312	4	#4	STR.	8'-4"	22
S1	3	#8	STR.	28'-1"	225	A313	4	#4	STR.	6'-7"	18
S4	6	#6	STR.	26'-4"	237	A314	4	#4	STR.	4'-11"	13
						A315	4	#4	STR.	3'-2"	8
						A600	155	#4	STR.	8'-5"	871
						A601	4	#4	STR.	6'-7"	18
						A602	4	#4	STR.	4'-11"	13
						A603	4	#4	STR.	3'-2"	8
						A800	165	#4	STR.	8'-5"	871
						A801	4	#4	STR.	6'-7"	18
						A802	4	#4	STR.	4'-11"	13
						A803	4	#4	STR.	3'-2"	8
						B1	83	#4	STR.	8'-1"	448
						B2	163	#4	STR.	6'-4"	698
						C2	168	#4	STR.	28'-10"	3236
						D1	31	#6	STR.	2'-6"	116
						E1	8	#5	STR.	5'-2"	43
						G1	4	#5	STR.	33'-9"	141
						S2	3	#8	STR.	9'-9"	78
						S3	3	#8	STR.	33'-9"	270
						S5	6	#6	STR.	9'-9"	88
						S6	6	#6	STR.	33'-9"	304
REINFORCING STEEL = LBS. 12955						REINFORCING STEEL = LBS. 14550					



BAR	SIZE	SPLICE LENGTH
"A"	#4	1'-5"
"B"	#4	1'-5"
C2	#4	1'-11"
"S"	#6	2'-3"
"S"	#8	4'-0"

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE BARREL @ 2.489 CU.YDS./FT.	
LEFT EXTENSION	
STAGE I	27.1 C.Y.
STAGE II	32.0 C.Y.
WINGS, ETC.	17.8 C.Y.
TOTAL	76.9 C.Y.
RIGHT EXTENSION	
STAGE I	94.2 C.Y.
STAGE II	111.1 C.Y.
WINGS, ETC.	17.8 C.Y.
TOTAL	223.1 C.Y.
TOTAL CONCRETE	300.0 C.Y.
REINFORCING STEEL BARREL	
LEFT EXTENSION	
STAGE I	4028 LBS.
STAGE II	4762 LBS.
WINGS, ETC.	960 LBS.
TOTAL	9750 LBS.
RIGHT EXTENSION	
STAGE I	12955 LBS.
STAGE II	14550 LBS.
WINGS, ETC.	960 LBS.
TOTAL	28465 LBS.
TOTAL CONCRETE	38215 LBS.
FOUNDATION CONDITIONING MATERIAL	
LEFT EXTENSION	56 TONS
RIGHT EXTENSION	196 TONS
TOTAL	252 TONS
CULVERT EXCAVATION	LUMP SUM

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-  
 SHEET 7 OF 10



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

DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 9 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 LEFT AND RIGHT  
 EXTENSIONS  
 120° SKEW

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

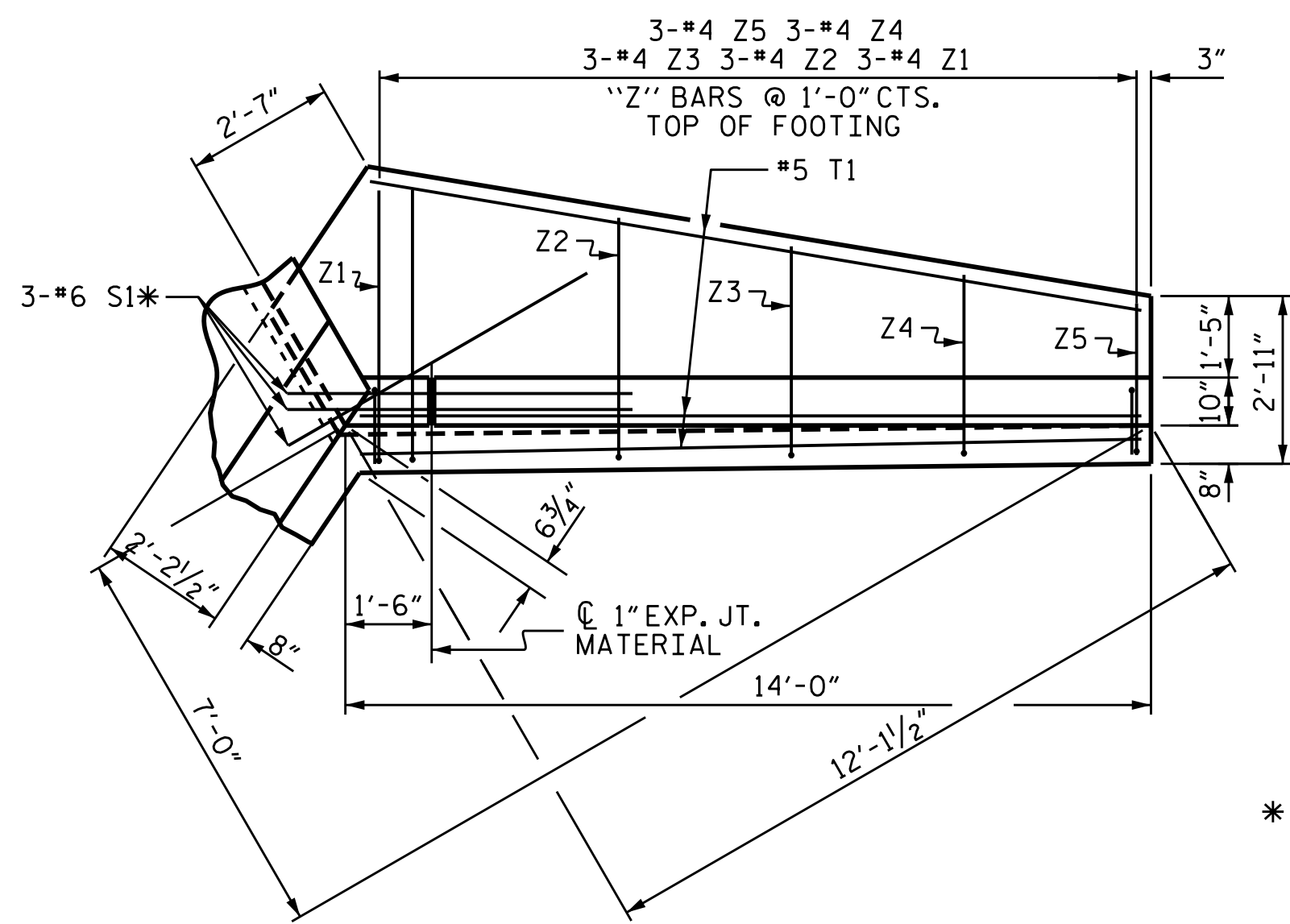
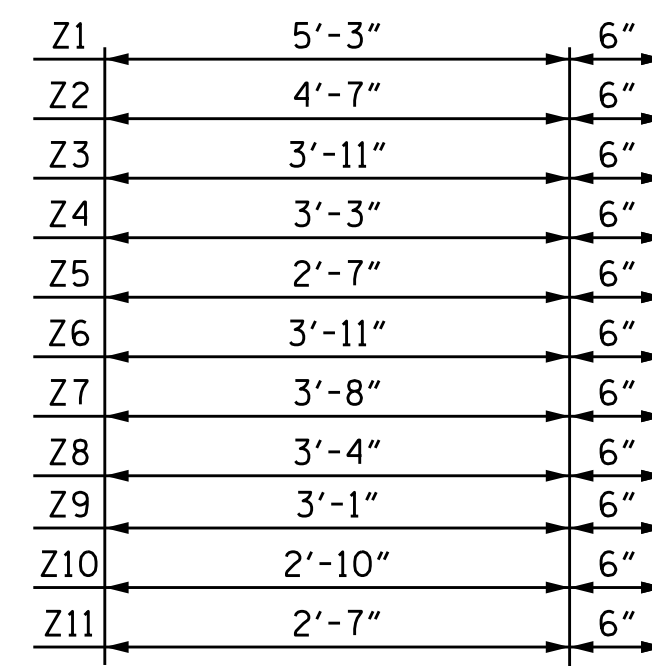
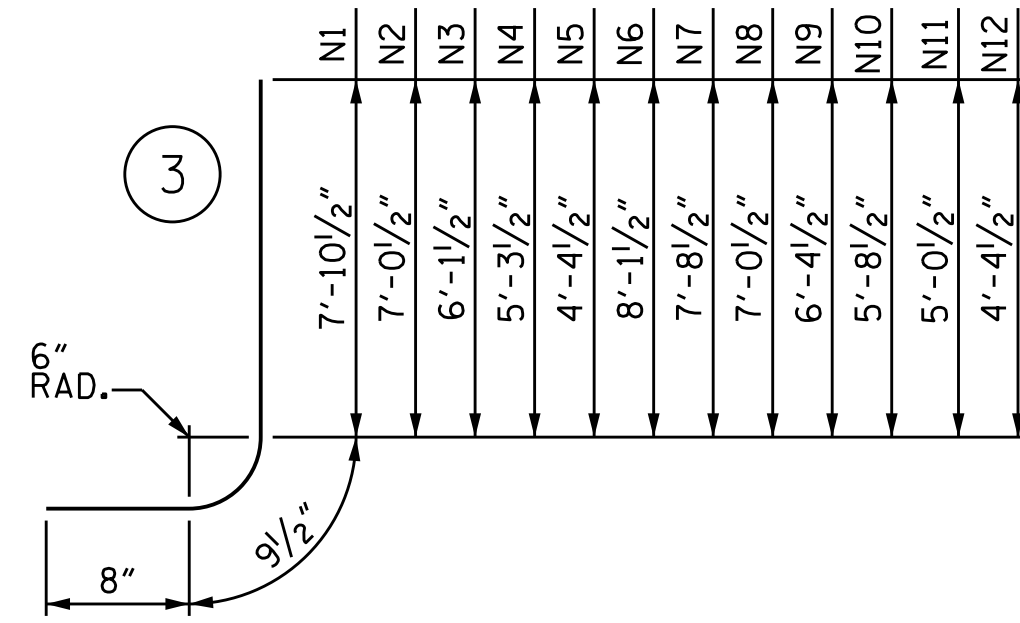
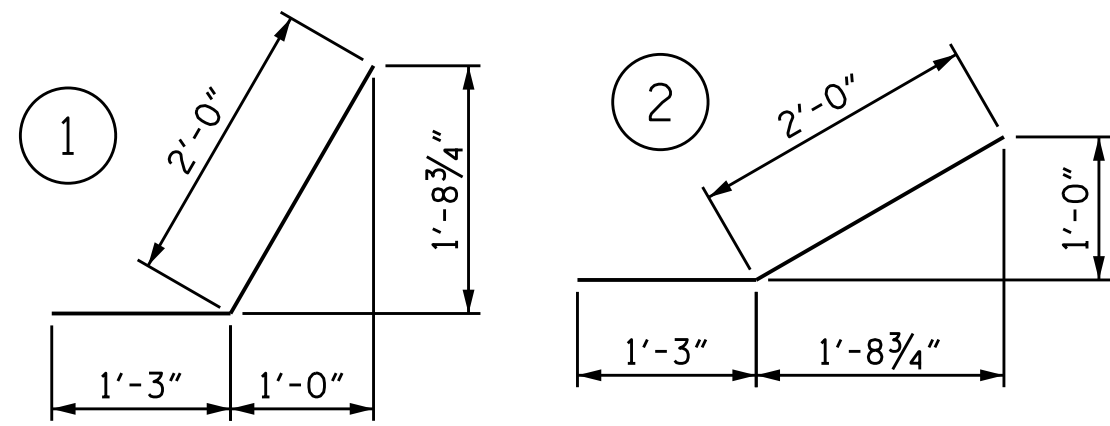
TOTAL SHEETS 10

DRAWN BY : O.T. NGUYEN DATE : 10/30/18  
 CHECKED BY : P.K. NEWTON DATE : 11/5/18  
 DESIGN ENGINEER OF RECORD: P.K. NEWTON DATE : 11/6/18

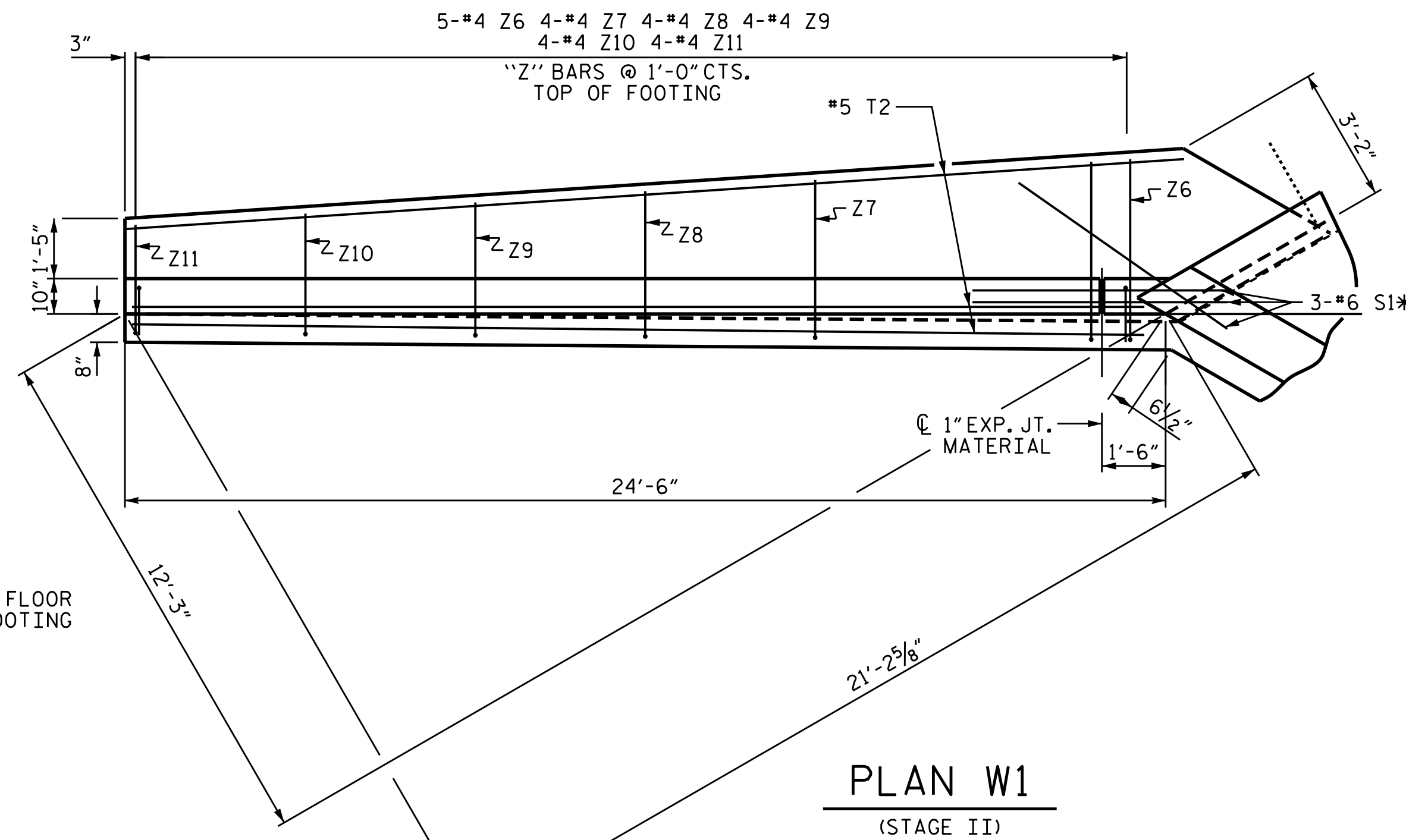


**BAR TYPES**

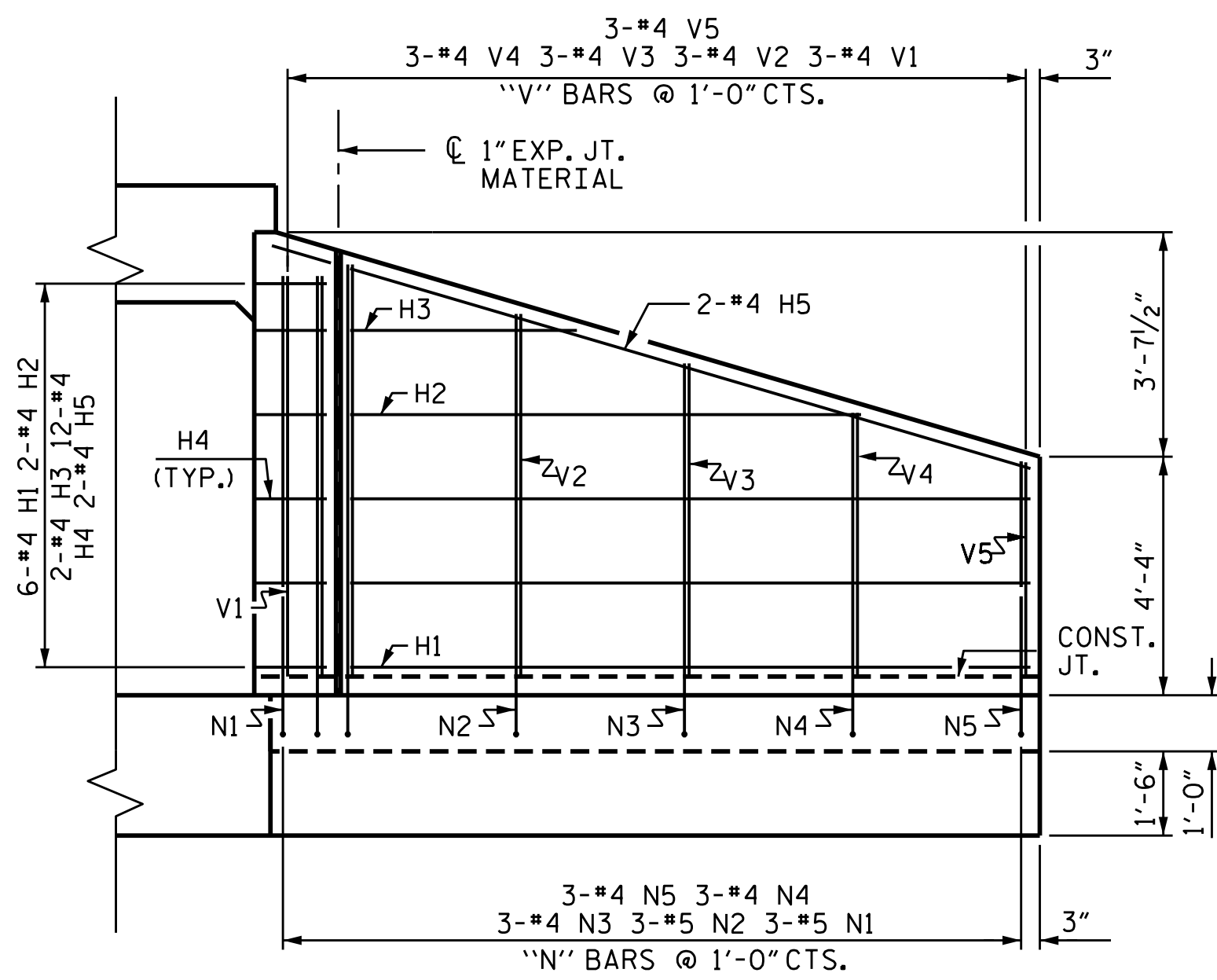
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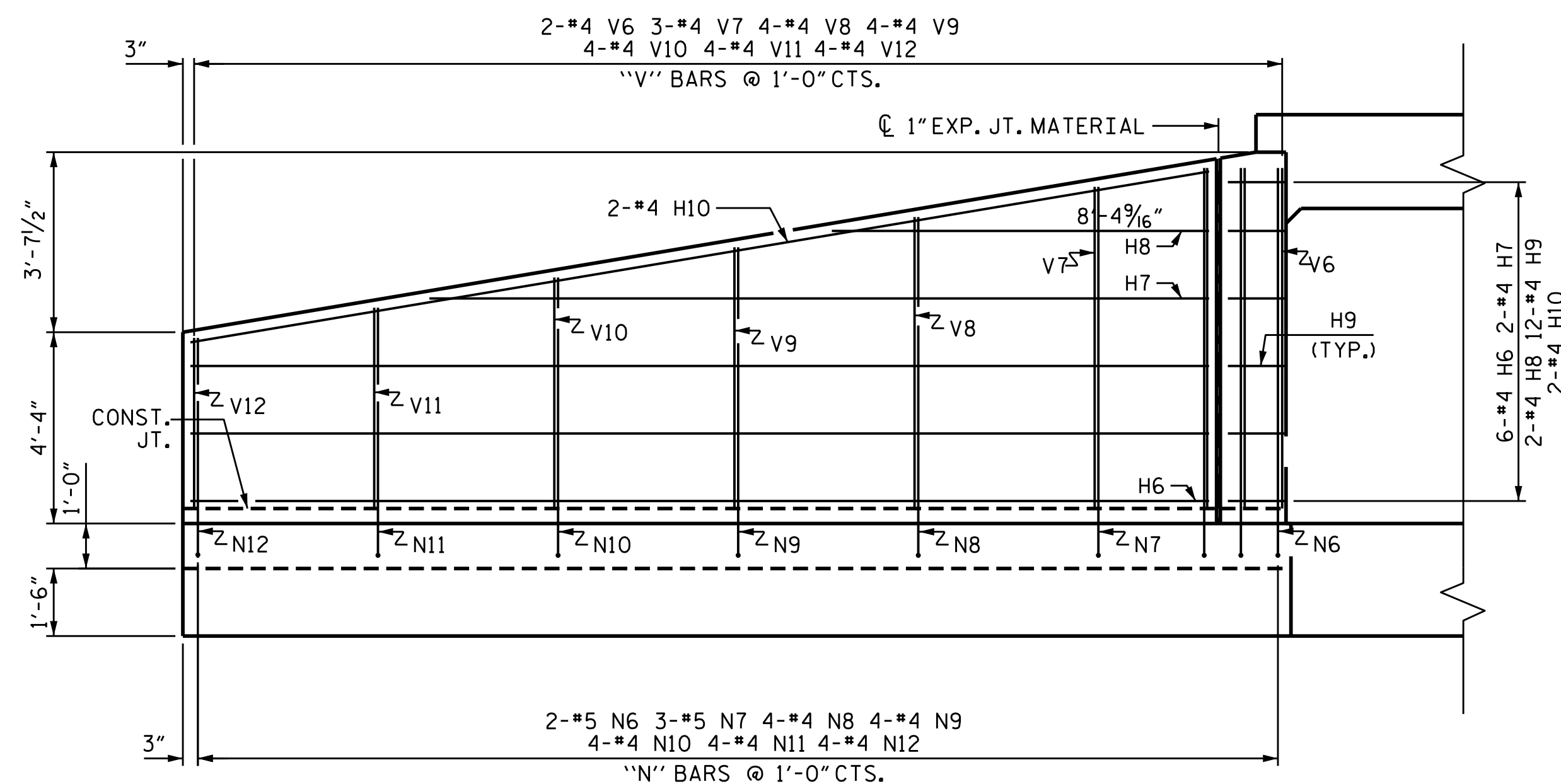
**PLAN W2**  
(STAGE I)



**PLAN W1**  
(STAGE II)

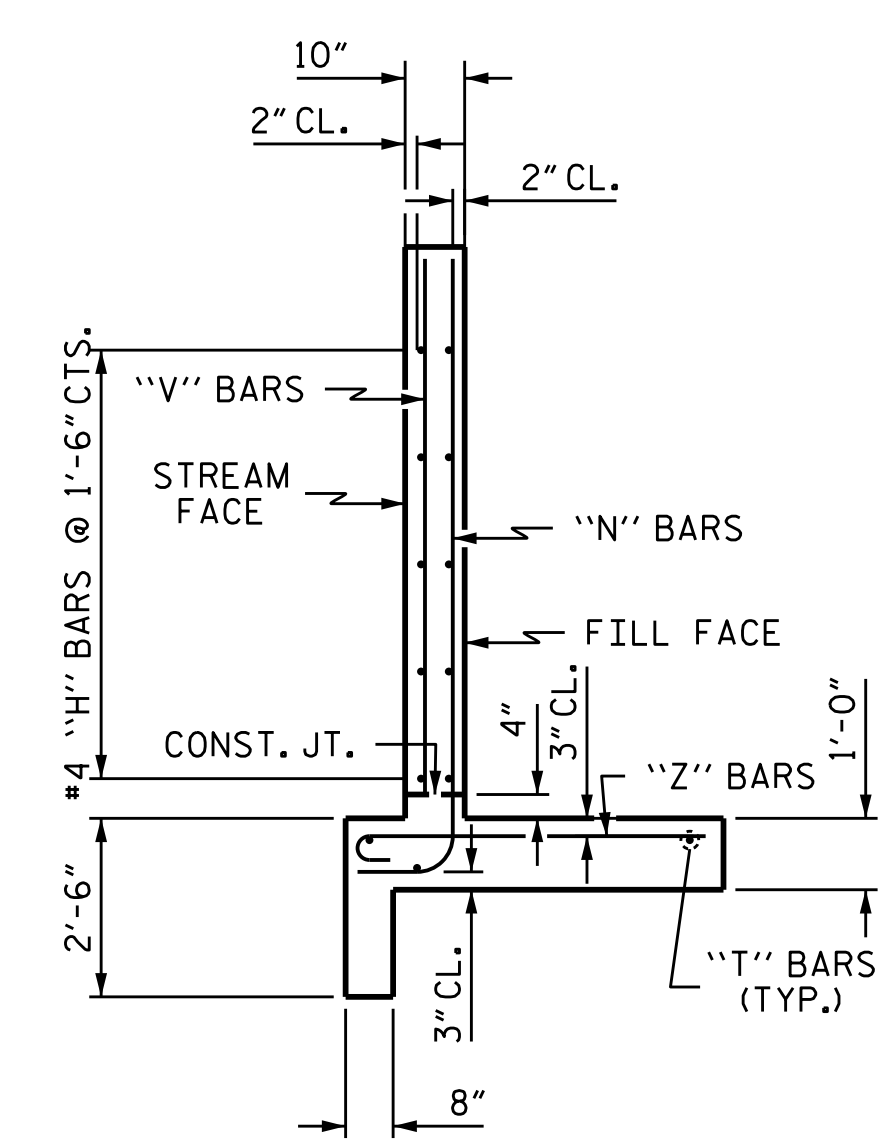


**ELEVATION W2**  
(STAGE I)



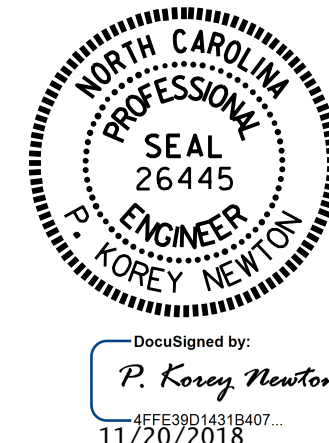
**ELEVATION W1**  
(STAGE II)

STAGE I						STAGE II							
BILL OF MATERIAL						BILL OF MATERIAL							
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT		
H1	6	#4	STR	12'-1"	48	H6	6	#4	STR	22'-7"	91		
H2	2	#4	STR	9'-1"	12	H7	2	#4	STR	17'-3"	23		
H3	2	#4	STR	3'-4"	4	H8	2	#4	STR	7'-5"	10		
H4	12	#4	1	3'-3"	26	H9	12	#4	2	3'-3"	26		
H5	2	#4	STR	12'-7"	17	H10	2	#4	STR	22'-10"	31		
N1	3	#5	3	9'-4"	29	N6	2	#5	3	9'-7"	20		
N2	3	#5	3	8'-6"	27	N7	3	#5	3	9'-2"	29		
N3	3	#4	3	7'-7"	15	N8	4	#4	3	8'-6"	23		
N4	3	#4	3	6'-9"	14	N9	4	#4	3	7'-10"	21		
N5	3	#4	3	5'-10"	12	N10	4	#4	3	7'-2"	19		
						N11	4	#4	3	6'-6"	17		
S1	3	#6	STR	6'-0"	27	N12	4	#4	3	5'-10"	16		
T1	3	#5	STR	14'-0"	44	S1	3	#6	STR	6'-0"	27		
V1	3	#4	STR	7'-0"	14	T2	3	#5	STR	24'-6"	77		
V2	3	#4	STR	6'-3"	13	V6	2	#4	STR	7'-5"	10		
V3	3	#4	STR	5'-6"	11	V7	3	#4	STR	6'-10"	14		
V4	3	#4	STR	4'-8"	9	V8	4	#4	STR	6'-3"	17		
V5	3	#4	STR	3'-9"	8	V9	4	#4	STR	5'-9"	15		
Z1	3	#4	4	5'-9"	12	V10	4	#4	STR	5'-1"	14		
Z2	3	#4	4	5'-1"	10	V11	4	#4	STR	4'-5"	12		
Z3	3	#4	4	4'-5"	9	V12	4	#4	STR	3'-9"	10		
Z4	3	#4	4	3'-9"	8	Z6	5	#4	4	4'-3"	15		
Z5	3	#4	4	3'-1"	6	Z7	4	#4	4	4'-2"	11		
REINFORCING STEEL FOR 1 WING						375	LBS	Z8	4	#4	4	3'-10"	10
CLASS A CONCRETE						5.7	CY	Z9	4	#4	4	3'-7"	10
1 WING						0.8	CY	Z10	4	#4	4	3'-4"	9
1 END CURTAIN WALL						6.5	CY	Z11	4	#4	4	3'-1"	8
REINFORCING STEEL FOR 1 WING						585	LBS	CLASS A CONCRETE				9.4	CY
1 WING						1.6	CY	1 WING				1.6	CY
1 HEADWALL						0.3	CY	1 HEADWALL				0.3	CY
1 END CURTAIN WALL						11.3	CY	1 END CURTAIN WALL				11.3	CY



**TYPICAL WING SECTION**

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-  
 SHEET 8 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**INLET WINGS**  
**CONCRETE BOX CULVERT**  
 H = 7'-0" SLOPE = 3:1  
 120° SKEW

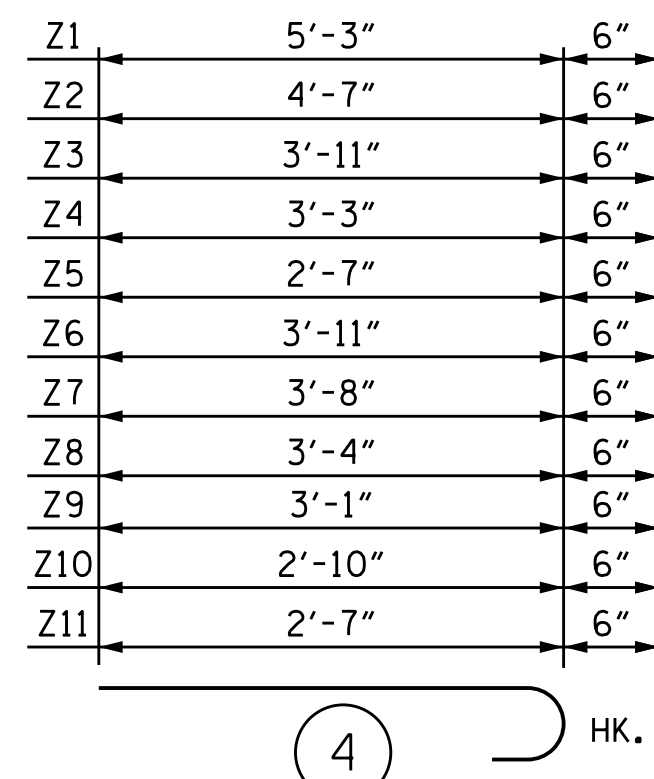
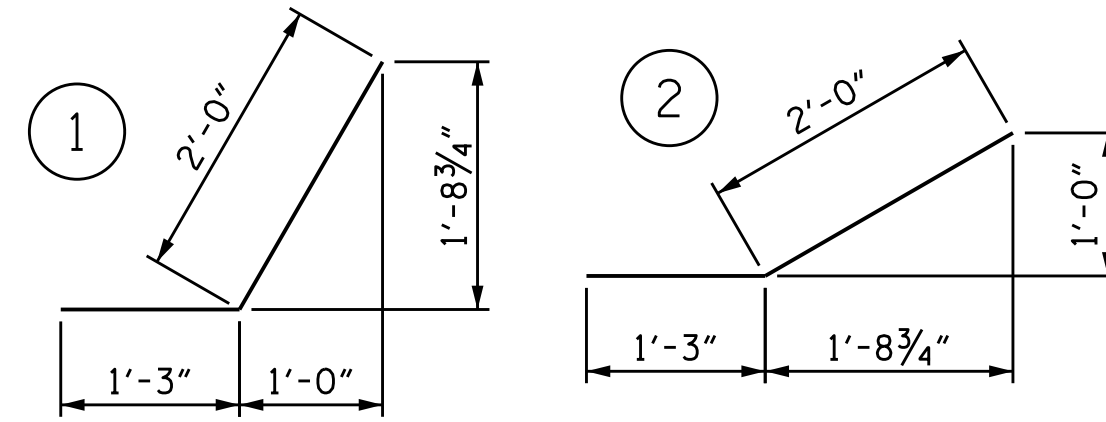
ASSEMBLED BY : P. D. BRYANT DATE : 10/29/18  
 CHECKED BY : K. W. ALFORD DATE : 10/30/18  
 DRAWN BY : CCJ 11/99  
 CHECKED BY : RWW 03/00

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

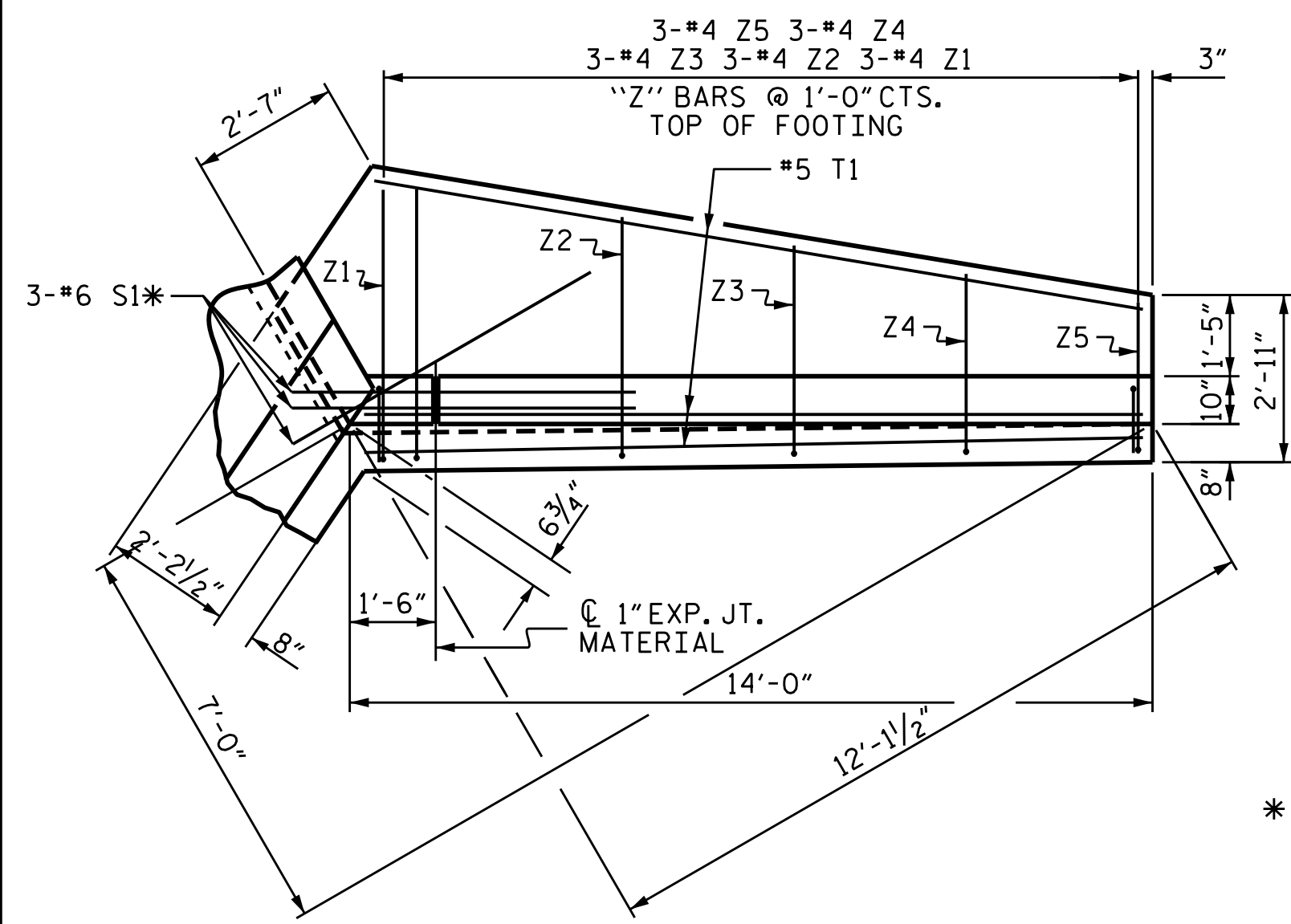
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-8
1			3			TOTAL SHEETS 10
2			4			

**BAR TYPES**

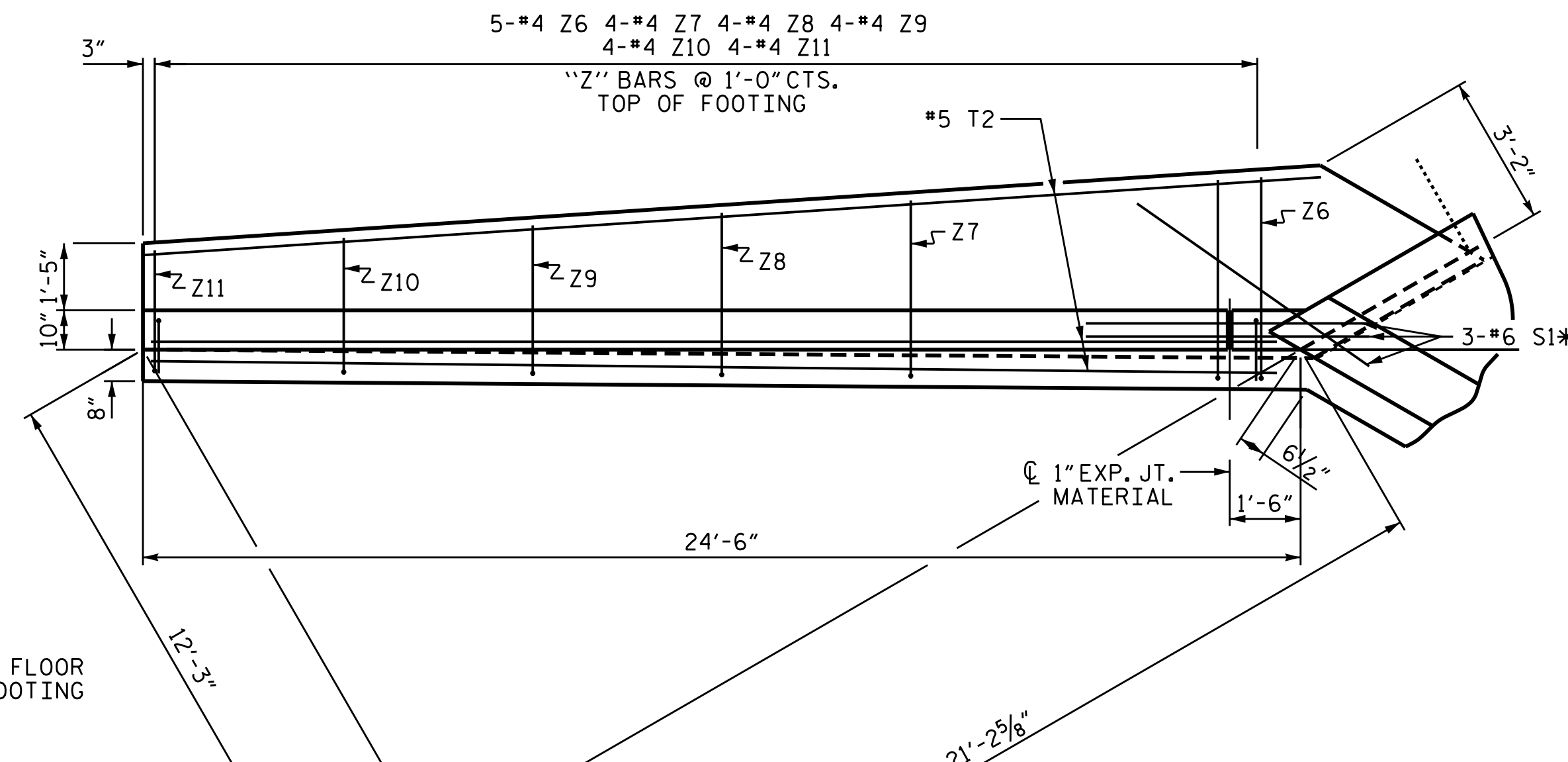
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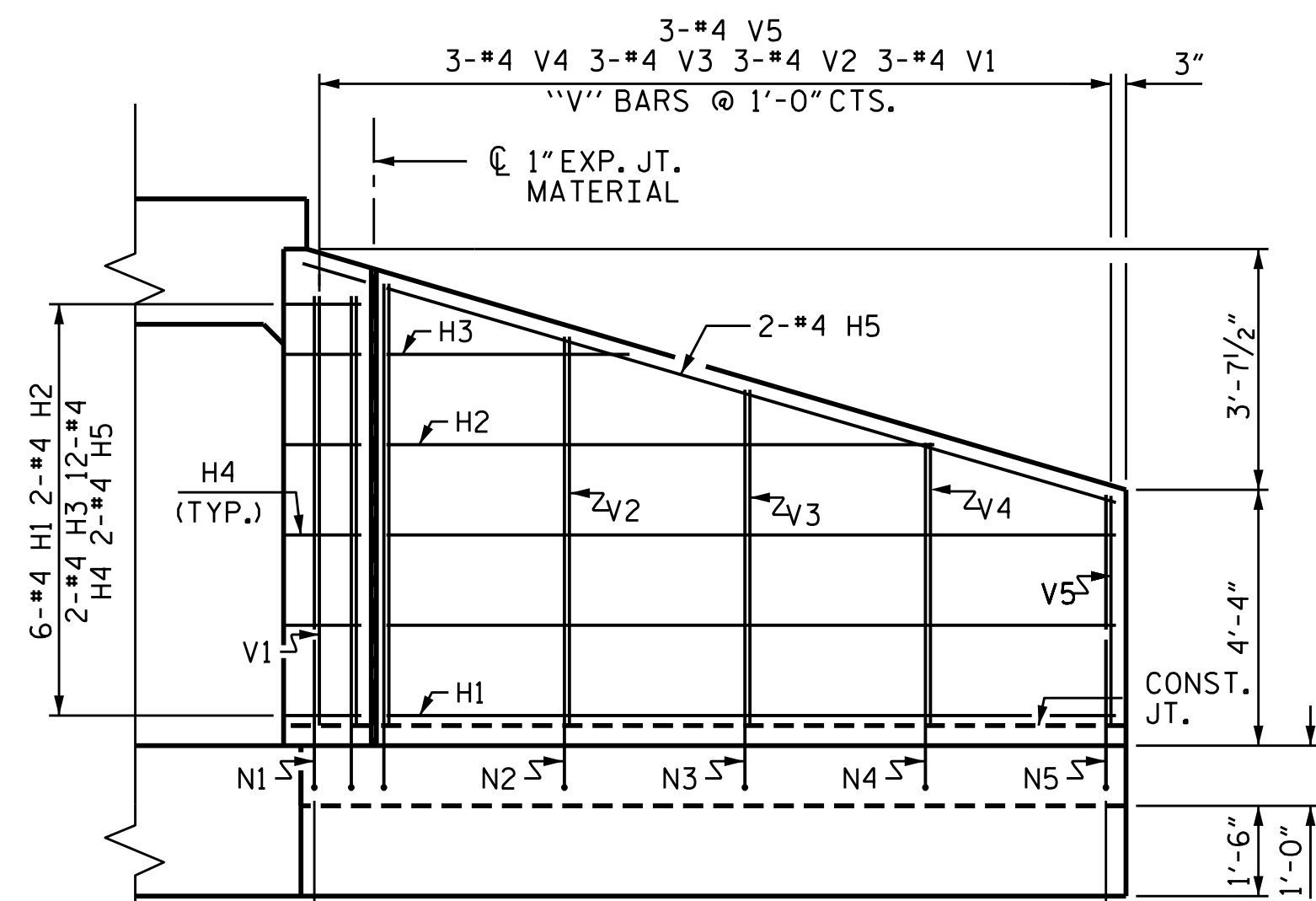
STAGE II						STAGE I									
BILL OF MATERIAL						BILL OF MATERIAL									
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT				
H1	6	#4	STR	12'-1"	48	H6	6	#4	STR	22'-7"	91				
H2	2	#4	STR	9'-1"	12	H7	2	#4	STR	17'-3"	23				
H3	2	#4	STR	3'-4	4	H8	2	#4	STR	7'-5"	10				
H4	12	#4	1	3'-3"	26	H9	12	#4	2	3'-3"	26				
H5	2	#4	STR	12'-7"	17	H10	2	#4	STR	22'-10"	31				
N1	3	#5	3	9'-4"	29	N6	2	#5	3	9'-7"	20				
N2	3	#5	3	8'-6"	27	N7	3	#5	3	9'-2"	29				
N3	3	#4	3	7'-7"	15	N8	4	#4	3	8'-6"	23				
N4	3	#4	3	6'-9"	14	N9	4	#4	3	7'-10"	21				
N5	3	#4	3	5'-10"	12	N10	4	#4	3	7'-2"	19				
						N11	4	#4	3	6'-6"	17				
S1	3	#6	STR	6'-0"	27	N12	4	#4	3	5'-10"	16				
T1	3	#5	STR	14'-0"	44	S1	3	#6	STR	6'-0"	27				
V1	3	#4	STR	7'-0"	14	T2	3	#5	STR	24'-6"	77				
V2	3	#4	STR	6'-3"	13	V6	2	#4	STR	7'-5"	10				
V3	3	#4	STR	5'-6"	11	V7	3	#4	STR	6'-10"	14				
V4	3	#4	STR	4'-8"	9	V8	4	#4	STR	6'-3"	17				
V5	3	#4	STR	3'-9"	8	V9	4	#4	STR	5'-9"	15				
Z1	3	#4	4	5'-9"	12	V10	4	#4	STR	5'-1"	14				
Z2	3	#4	4	5'-1"	10	V11	4	#4	STR	4'-5"	12				
Z3	3	#4	4	4'-5"	9	V12	4	#4	STR	3'-9"	10				
Z4	3	#4	4	3'-9"	8	Z6	5	#4	4	4'-3"	15				
Z5	3	#4	4	3'-1"	6	Z7	4	#4	4	4'-2"	11				
REINFORCING STEEL FOR 1 WING						375	LBS	Z8	4	#4	4	3'-10"	10		
CLASS A CONCRETE								Z9	4	#4	4	3'-7"	10		
1 WING						5.7	CY	Z10	4	#4	4	3'-4"	9		
1 HEADWALL						1.6	CY	Z11	4	#4	4	3'-1"	8		
1 END CURTAIN WALL						0.3	CY	REINFORCING STEEL FOR 1 WING						585	LBS
TOTAL						7.6	CY	CLASS A CONCRETE							
								1 WING						9.4	CY
								1 END CURTAIN WALL						0.8	CY
								TOTAL						10.2	CY



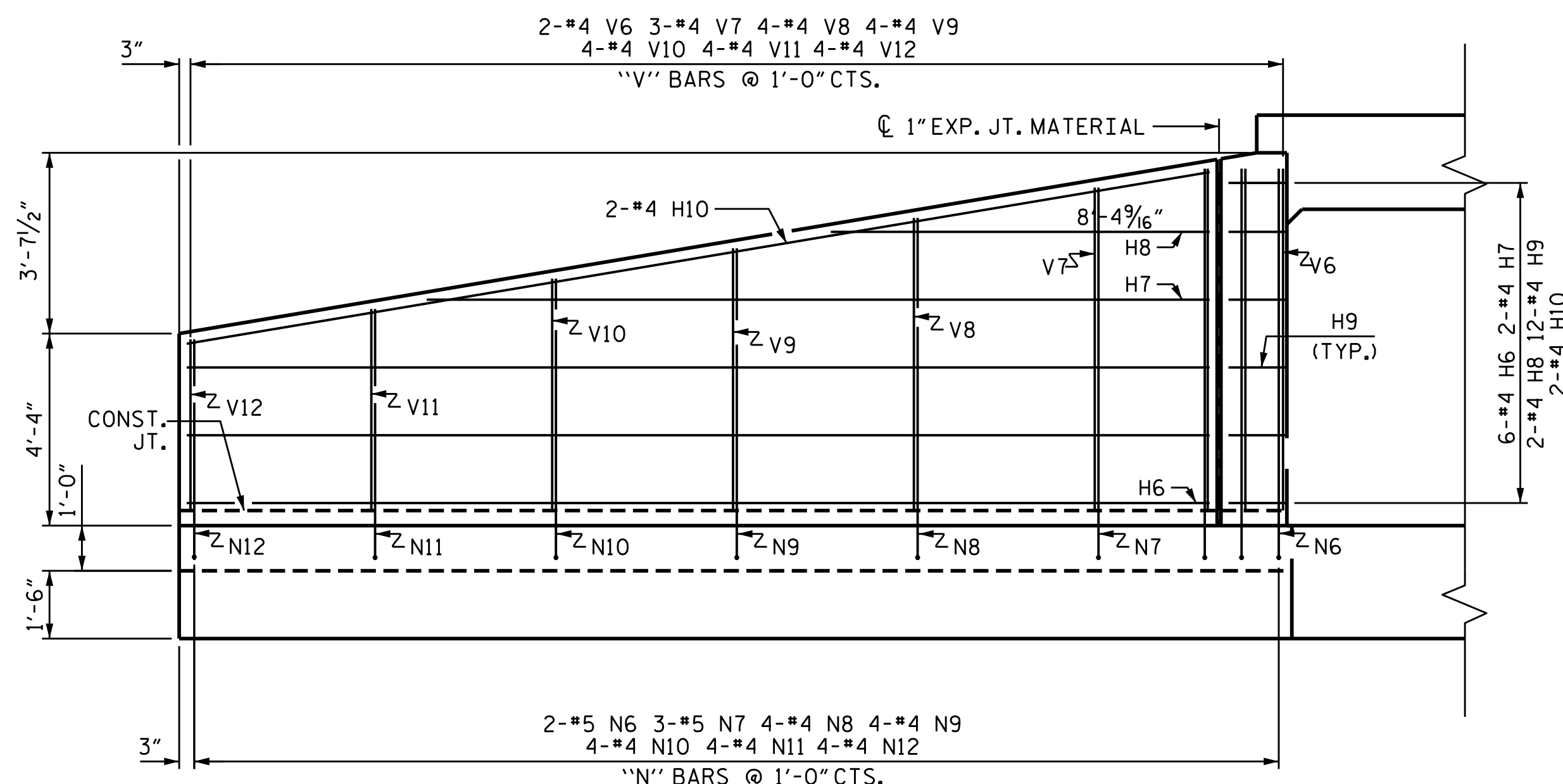
**PLAN W2**  
(STAGE II)



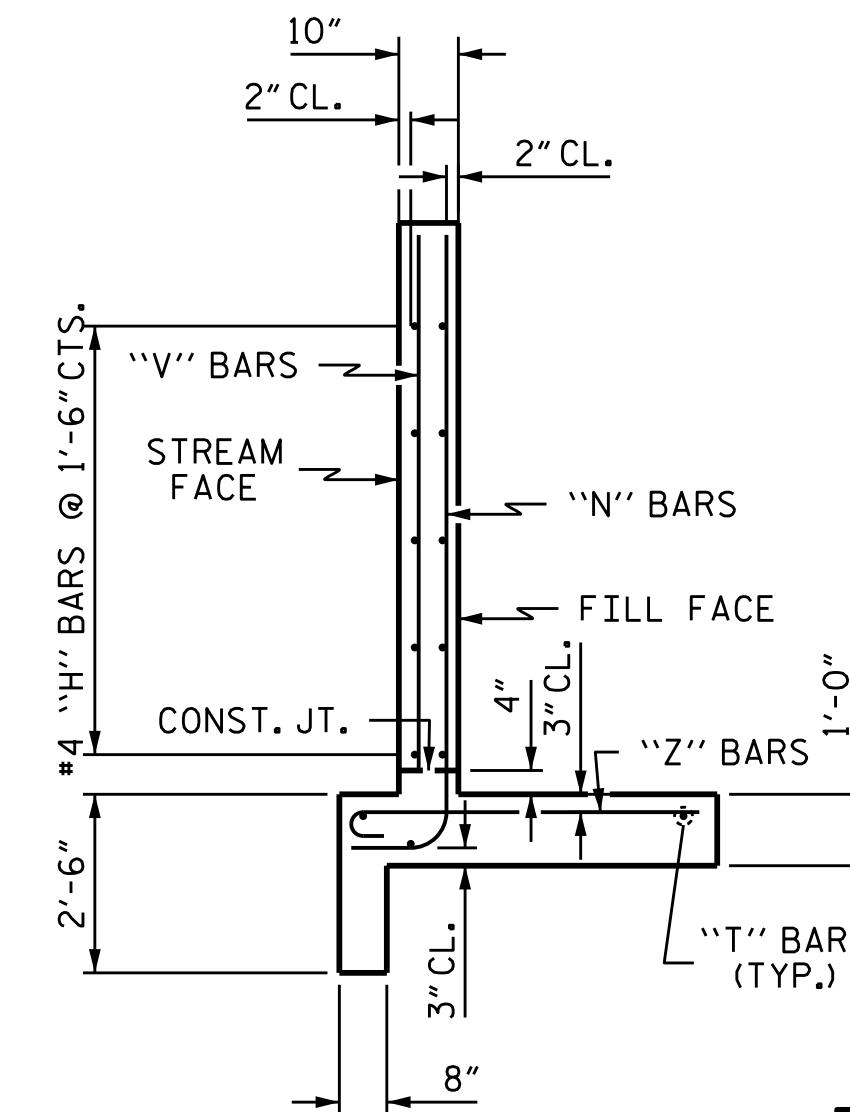
**PLAN W1**  
(STAGE I)



**ELEVATION W2**  
(STAGE II)

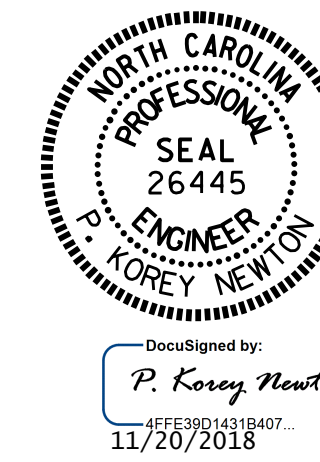


**ELEVATION W1**  
(STAGE I)



**TYPICAL WING SECTION**

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-  
 SHEET 9 OF 10



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**OUTLET WINGS**  
**CONCRETE BOX CULVERT**  
 H = 7'-0" SLOPE = 3:1  
 120° SKEW

ASSEMBLED BY : P. D. BRYANT DATE : 10/29/18  
 CHECKED BY : K. W. ALFORD DATE : 10/30/18  
 DRAWN BY : CCJ 11/99  
 CHECKED BY : RWW 03/00

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 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-9
1			3			TOTAL SHEETS
2			4			10



## 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 (VLL)	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	1.25	--	1.75	1.49	1	TOP SLAB	4.35	1.25	1	TOP SLAB	8.76		
	HL-93 (OPERATING)	N/A		1.62	--	1.35	1.93	1	TOP SLAB	4.35	1.62	1	TOP SLAB	8.76		
	HS-20 (INVENTORY)	36.000	②	1.61	57.93	1.75	2.14	1	TOP SLAB	4.35	1.61	1	BOTTOM SLAB	8.73		
	HS-20 (OPERATING)	36.000		2.09	75.10	1.35	2.77	1	TOP SLAB	4.35	2.09	1	BOTTOM SLAB	8.73		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.22	43.51	1.40	3.88	1	TOP SLAB	4.35	3.22	1	TOP SLAB	8.76	
		SNGARBS2	20.000		2.94	58.72	1.40	3.63	1	TOP SLAB	4.35	2.94	1	TOP SLAB	8.76	
		SNAGRIS2	22.000		2.92	64.16	1.40	3.88	1	TOP SLAB	4.35	2.92	1	BOTTOM SLAB	8.73	
		SNCOTTS3	27.250		1.55	42.34	1.40	1.86	1	TOP SLAB	4.35	1.55	1	TOP SLAB	8.76	
		SNAGGRS4	34.925		1.74	60.85	1.40	2.08	1	TOP SLAB	4.35	1.74	1	TOP SLAB	8.76	
		SNS5A	35.550		1.60	56.89	1.40	2.09	1	TOP SLAB	4.35	1.60	1	TOP SLAB	8.76	
		SNS6A	39.950		1.60	63.93	1.40	2.09	1	TOP SLAB	4.35	1.60	1	TOP SLAB	8.76	
	SNS7B	42.000		1.56	65.38	1.40	2.14	1	TOP SLAB	4.35	1.56	1	TOP SLAB	8.76		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.93	63.56	1.40	3.74	1	TOP SLAB	4.35	1.93	1	BOTTOM SLAB	8.73	
		TNT4A	33.075		1.85	61.13	1.40	2.21	1	TOP SLAB	4.35	1.85	1	TOP SLAB	8.76	
		TNT6A	41.600		1.67	69.60	1.40	2.09	1	TOP SLAB	4.35	1.67	1	TOP SLAB	8.76	
		TNT7A	42.000		1.68	70.73	1.40	2.27	1	TOP SLAB	4.35	1.68	1	BOTTOM SLAB	8.73	
		TNT7B	42.000		1.73	72.62	1.40	2.12	1	TOP SLAB	4.35	1.73	1	TOP SLAB	8.76	
		TNAGRIT4	43.000		1.59	68.34	1.40	2.11	1	TOP SLAB	4.35	1.59	1	BOTTOM SLAB	8.73	
TNAGT5A		45.000		1.62	72.70	1.40	2.16	1	TOP SLAB	4.35	1.62	1	BOTTOM SLAB	8.73		
TNAGT5B	45.000		③	1.53	68.85	1.40	2.21	1	TOP SLAB	4.35	1.53	1	BOTTOM SLAB	8.73		

### LOAD FACTORS:

#### DESIGN LOAD RATING FACTORS

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

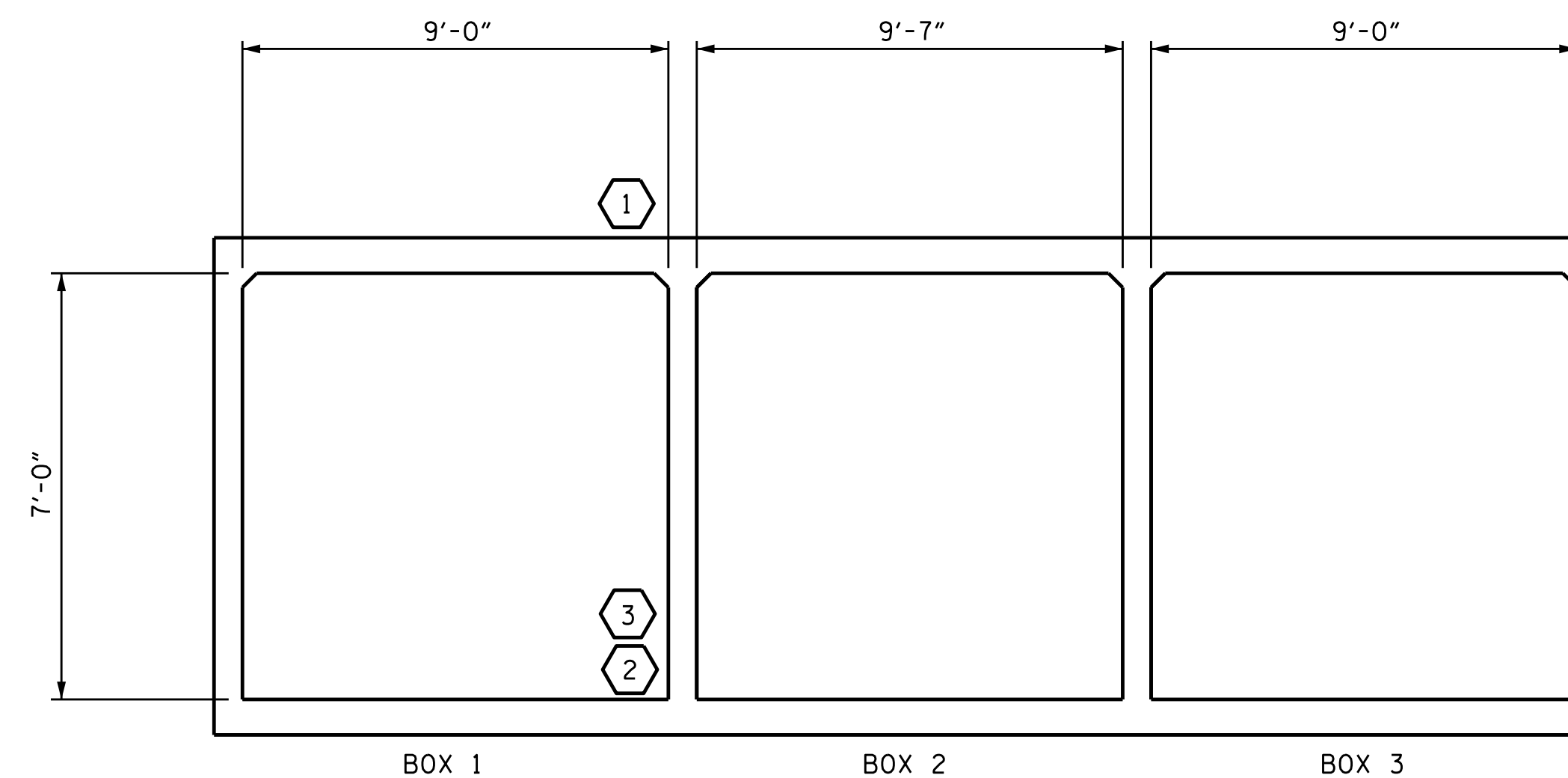
### NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

### COMMENTS:

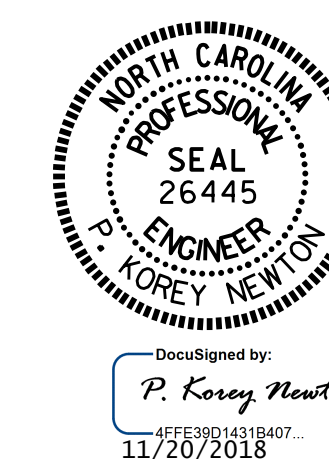
- 1.
- 2.
- 3.
- 4.

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



PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 44+89.00-RP2AC-

SHEET 10 OF 10



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

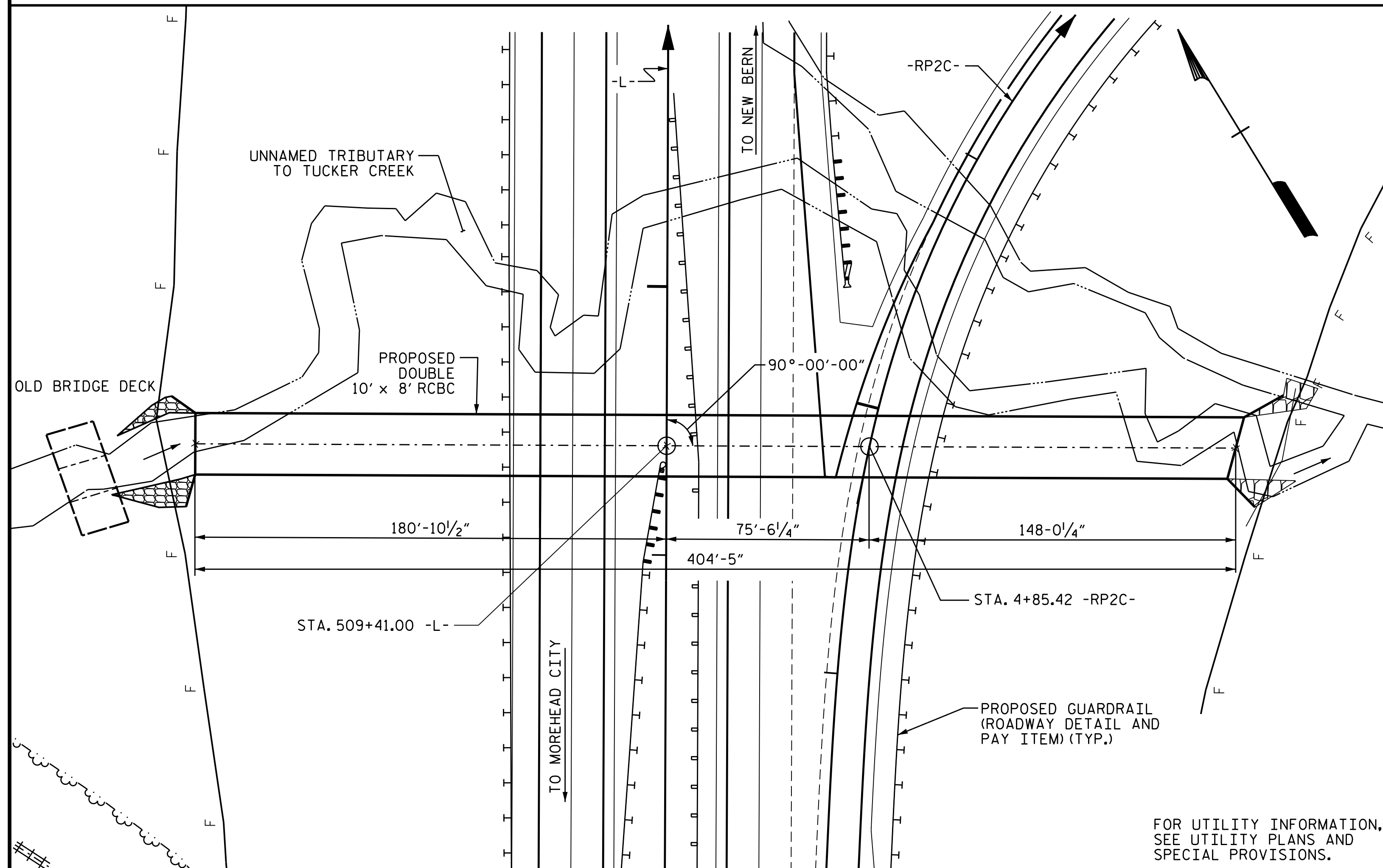
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-10
1			3			TOTAL SHEETS 10
2			4			

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

ASSEMBLED BY : O. T. NGUYEN	DATE : 10/30/18
CHECKED BY : P.K. NEWTON	DATE : 11/5/18
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC

BM#26: RR SPIKE IN 8" OAK TREE, STA. 520+57 -L-, 308' LT, EL. 26.38

F.A. PROJECT NO. NHF-70(49)



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE = 340 CFS  
 FREQUENCY OF DESIGN FLOOD = 50 YRS.  
 DESIGN HIGH WATER ELEVATION = 14.8 FT.  
 DRAINAGE AREA = 1.15 SQ. MI.  
 BASE DISCHARGE (Q100) = 410 CFS  
 BASE HIGH WATER ELEVATION = 15.4 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = N/A \*  
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YRS.  
 OVERTOPPING FLOOD ELEVATION = N/A \*  
 \* OVERTOPPING EXCEEDS 500 YR. EVENT, LOCATED AT INSIDE SHOULDER POINT @ STA. 497+80.00 -L-

GRADE DATA -L-

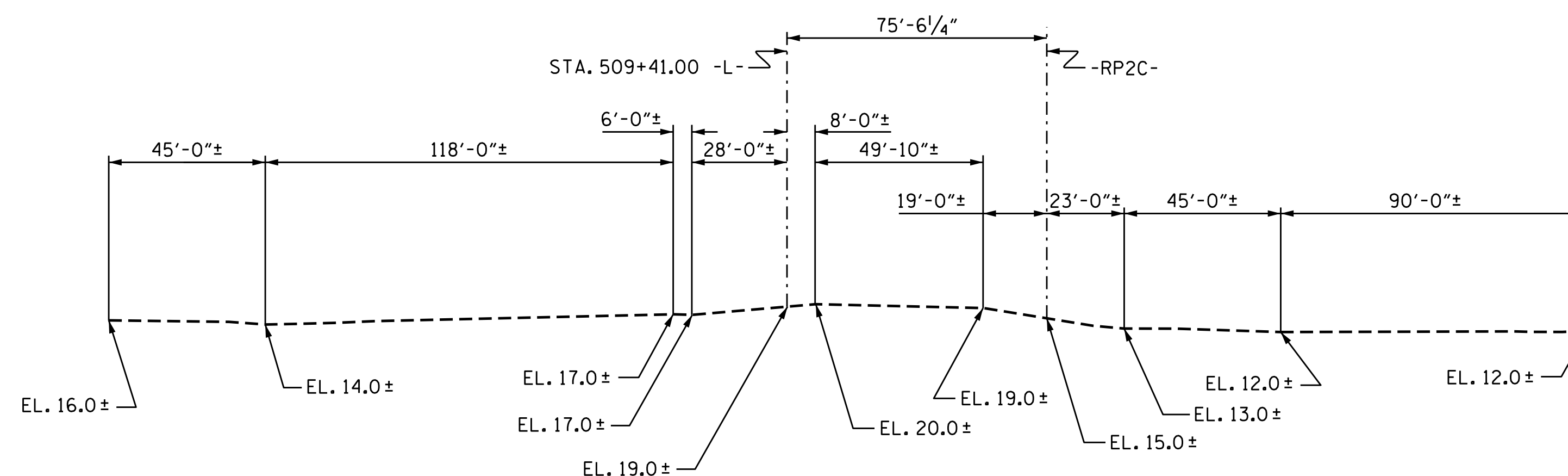
GRADE POINT EL. @ STA. 509+41.00 -L- = 60.01'  
 BED ELEVATION @ STA. 509+41.00 -L- = 7.6'  
 ROADWAY SLOPES = 3 : 1

TOTAL STRUCTURE QUANTITIES

CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	773 TONS
CLASS A CONCRETE	
BARREL @ 4.947 CY/FT	2000.7 C.Y.
INLET WING ETC.	22.3 C.Y.
OUTLET WING ETC.	23.4 C.Y.
TOTAL	2046.4 C.Y.
REINFORCING STEEL	
BARREL	165268 LBS.
WINGS ETC.	3329 LBS.
TOTAL	168597 LBS.

NOTES

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.
- DESIGN FILL ----- 44.69 FT.
- 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 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.
- 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 BAR SIZE USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- THE CULVERT SHALL BE BACKFILLED TO A DEPTH OF 2 FEET WITH NATIVE MATERIAL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- DETAILED DRAWINGS FOR FALSEWORK AND FORMS FOR THIS CULVERT SHALL BE SUBMITTED, SEE SHEET SN.
- NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.



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 fy = 60ksi.



PROJECT NO. R-1015  
 CRAVEN COUNTY  
 STATION: 509+41.00 -L-

SHEET 1 OF 8 CULVERT #298

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

DOUBLE 10 FT. X 8 FT.  
 CONCRETE BOX CULVERT  
 90° SKEW

REVISIONS

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

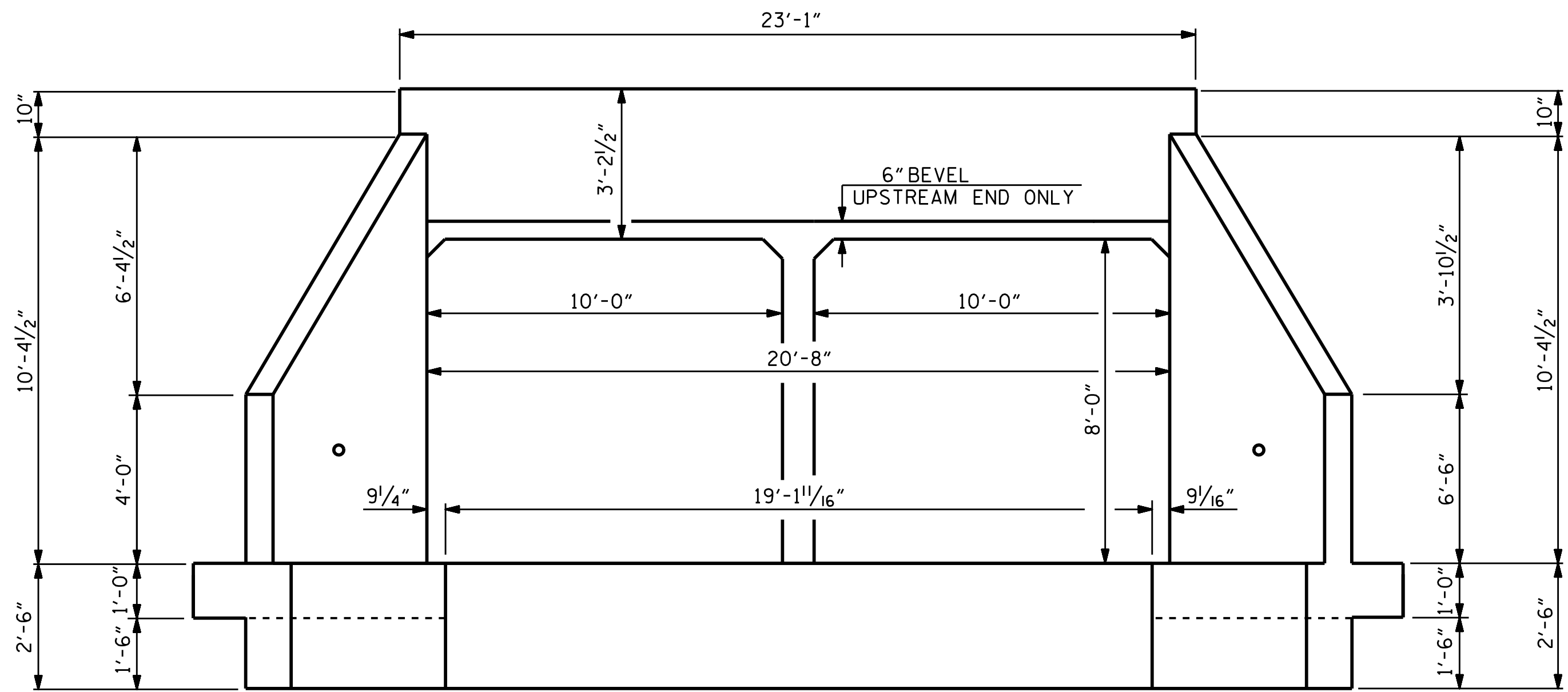
ASSEMBLED BY : B.N.B / O.T.N. DATE : 9/27/18  
 CHECKED BY : P.K. NEWTON DATE : 10/22/18  
 DRAWN BY : R.W. WRIGHT DATE : JULY, 1990  
 CHECKED BY : D.A. GLADDEN DATE : JULY, 1990

SPECIAL  
 STANDARD

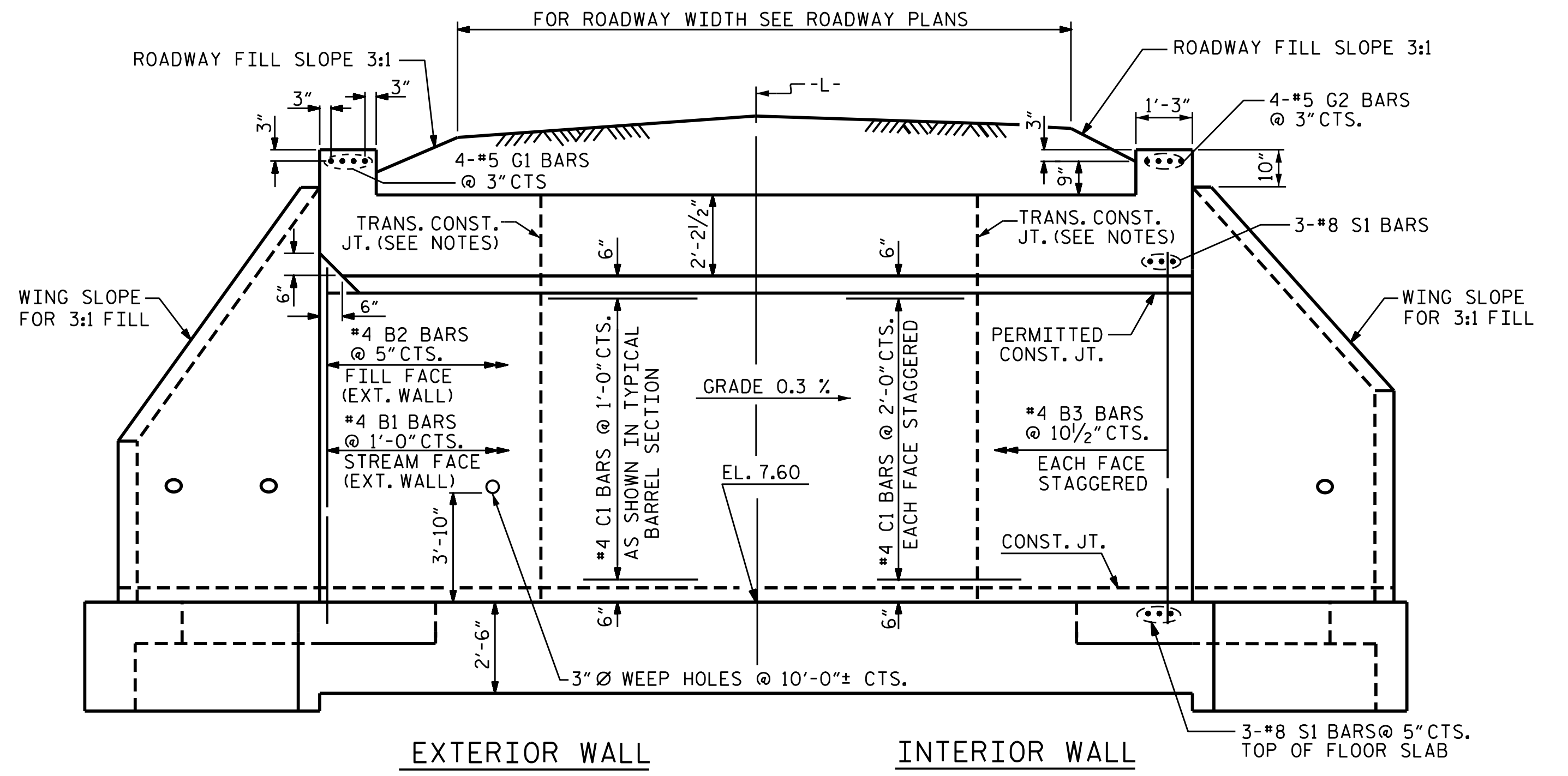
SHEET NO. C2-1  
 TOTAL SHEETS 8

ADDED NOV. 1, 1990

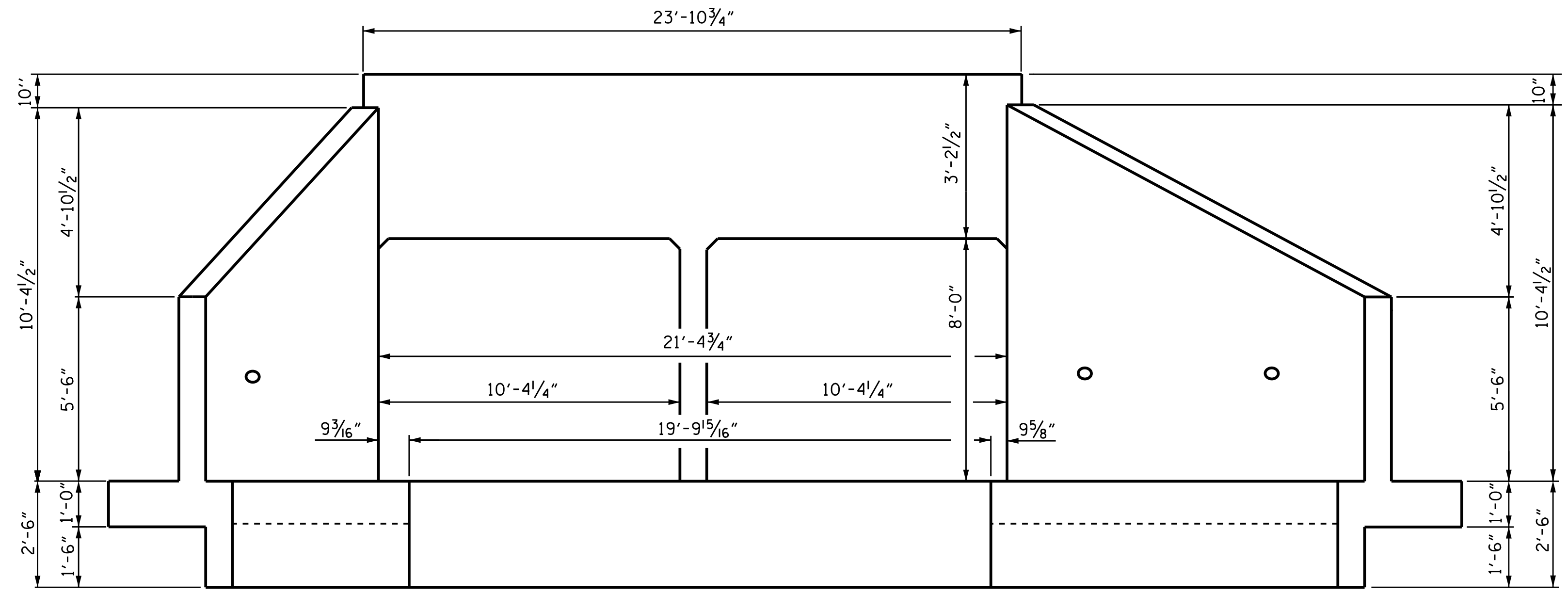




END ELEVATION (AT INLET)



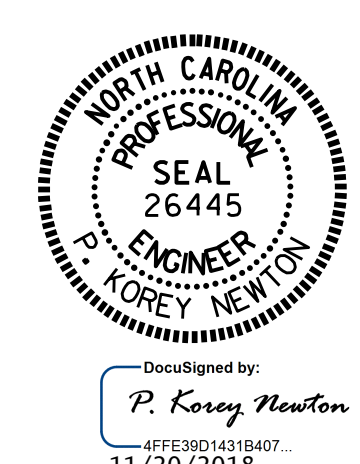
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW (AT OUTLET)

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 509+41.00 -L-

SHEET 2 OF 8



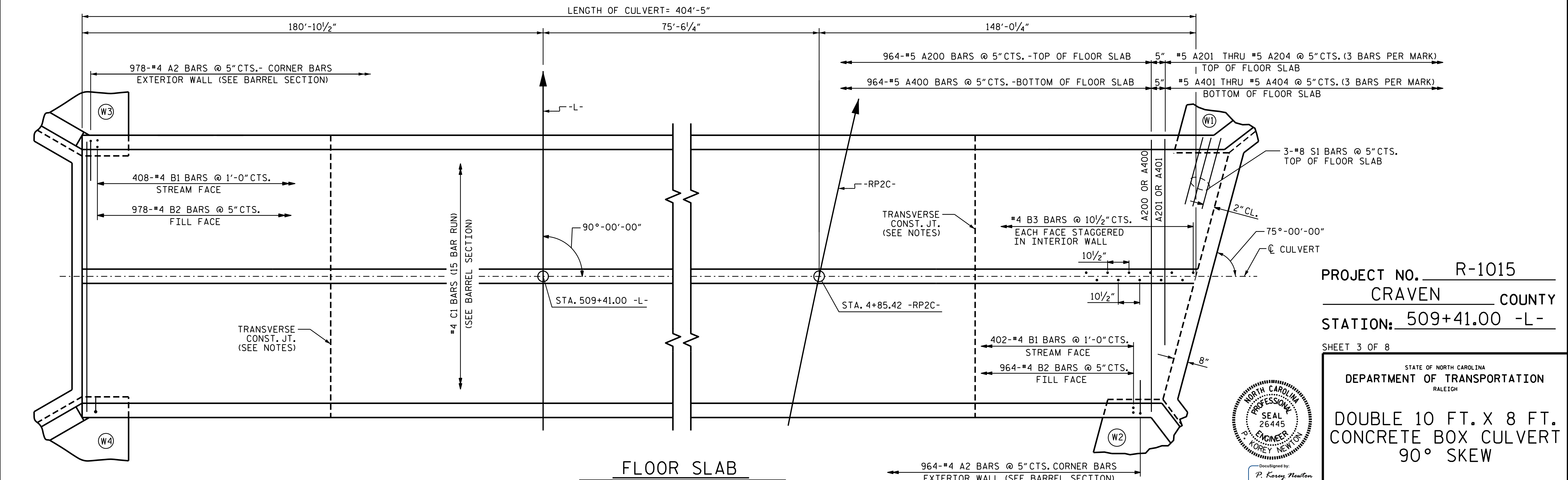
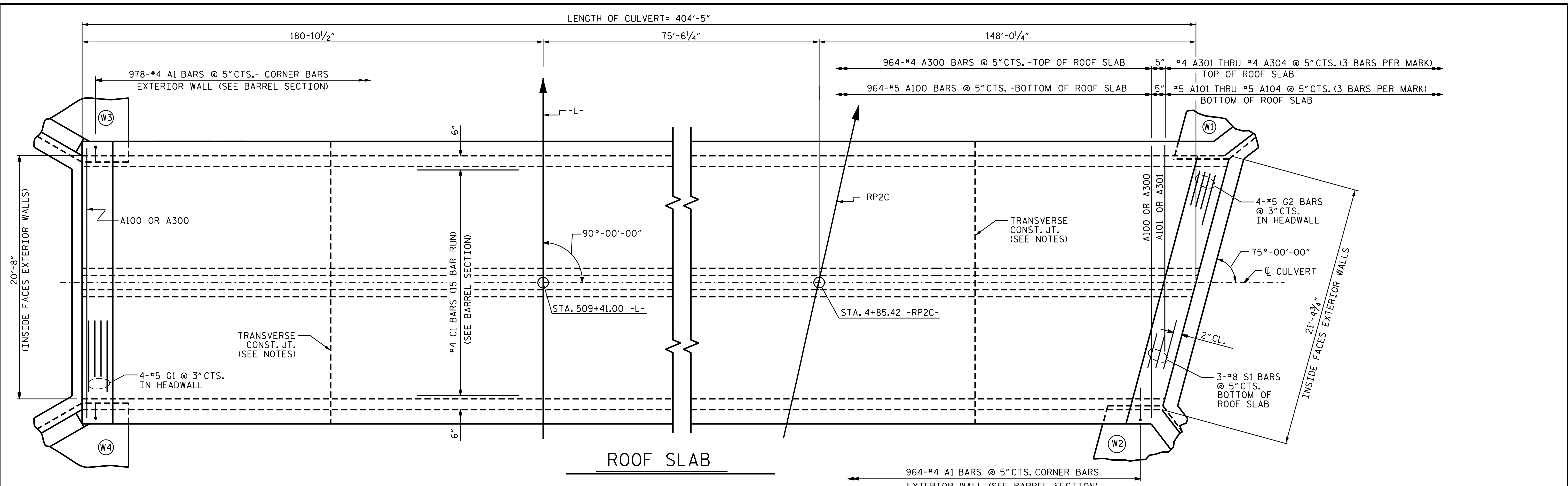
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE 10 FT. X 8 FT.  
 CONCRETE BOX CULVERT  
 90° SKEW

REVISED 11-19-99 BY M.M. CHECKED BY R.H.W.  
 RE-DRAWN NOV. 1990 BY TSS CHECKED BY ARB

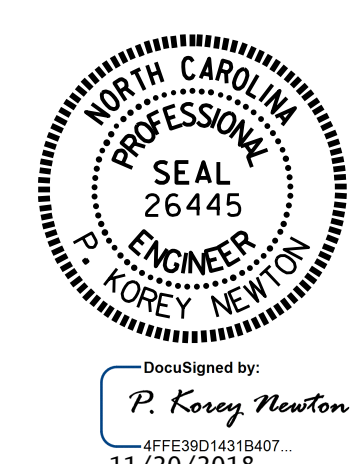
ASSEMBLED BY : <u>B.N.B. / Q.T.N.</u>	DATE : <u>9/27/18</u>	<b>SPECIAL</b>
CHECKED BY : <u>P.K. NEWTON</u>	DATE : <u>10/22/18</u>	
DRAWN BY : <u>RALPH D. UNDERWOOD</u>	DATE : <u>MAY 1971</u>	<b>STANDARD</b>
CHECKED BY : <u>JOEL A. JOHNSON</u>	DATE : <u>JULY 1971</u>	

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

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



PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 509+41.00 -L-  
 SHEET 3 OF 8



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 10 FT. X 8 FT.  
 CONCRETE BOX CULVERT  
 90° SKEW**

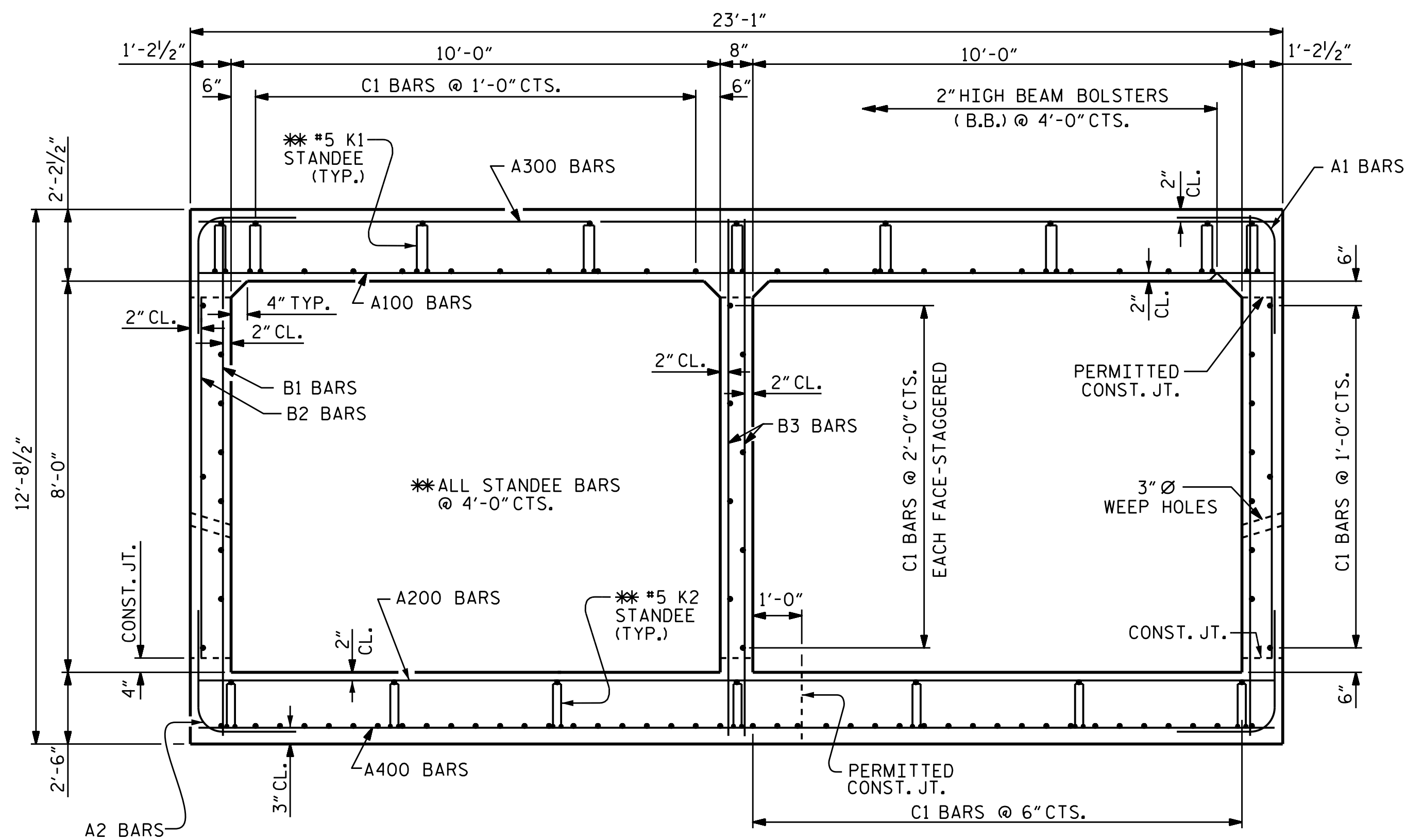
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REDRAWN NOV. 1990 BY TSS CHECKED BY ARB

ASSEMBLED BY : B.N.B. / O.T.N.	DATE : 9/27/18	<b>SPECIAL</b>
CHECKED BY : P. K. NEWTON	DATE : 10/22/18	
DRAWN BY : RALPH D. UNDERWOOD	DATE : MAY 1971	<b>STANDARD</b>
CHECKED BY : JOEL A. JOHNSON	DATE : JULY 1971	

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

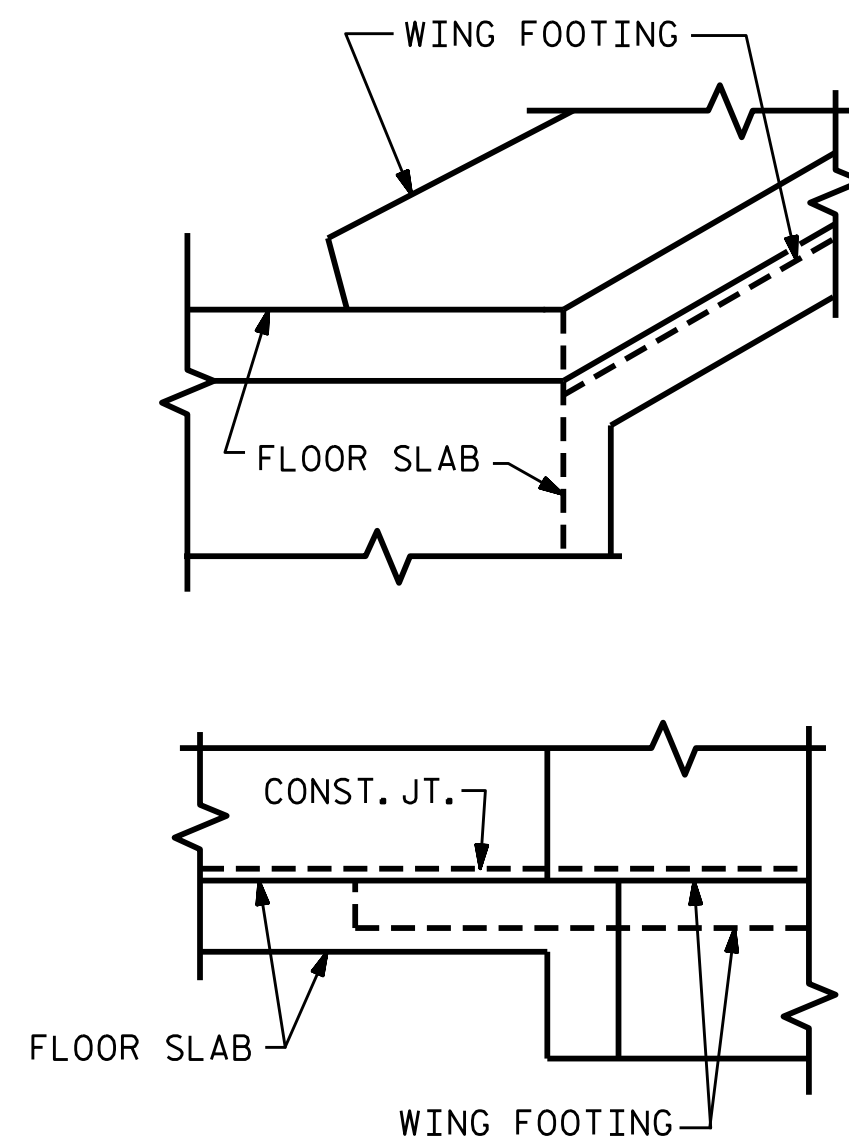
REVISIONS				SHEET NO.
NO.	BY:	DATE:		C2-3
1				TOTAL SHEETS 8
2				
3				
4				





**RIGHT ANGLE SECTION OF BARREL**

THERE ARE 102 "C" BARS IN SECTION OF BARREL.



**DETAIL**

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

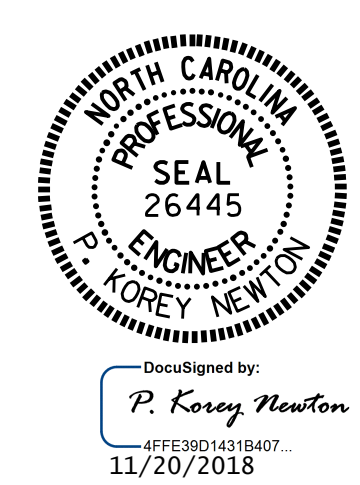
BAR TYPE				BILL OF MATERIAL			
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT		
A1	1942	#4	1	8'-7"	11135		
A2	1942	#4	1	6'-10"	8865		
A100	964	#5	STR	22'-8"	22790		
A101	3	#5	STR	17'-7"	55		
A102	3	#5	STR	12'-11"	40		
A103	3	#5	STR	8'-3"	26		
A104	3	#5	STR	3'-7"	11		
A200	964	#5	STR	22'-8"	22790		
A201	3	#5	STR	17'-7"	55		
A202	3	#5	STR	12'-11"	40		
A203	3	#5	STR	8'-3"	26		
A204	3	#5	STR	3'-7"	11		
A300	964	#4	STR	22'-8"	14596		
A301	3	#4	STR	17'-7"	35		
A302	3	#4	STR	12'-11"	26		
A303	3	#4	STR	8'-3"	17		
A304	3	#4	STR	3'-7"	7		
A400	964	#5	STR	22'-8"	22790		
A401	3	#5	STR	17'-7"	55		
A402	3	#5	STR	12'-11"	40		
A403	3	#5	STR	8'-3"	26		
A404	3	#5	STR	3'-7"	11		
B1	810	#4	STR	12'-2"	6583		
B2	1942	#4	STR	7'-4"	9513		
B3	926	#4	STR	12'-2"	7526		
C1	1530	#4	STR	29'-2"	29810		
G1	4	#5	STR	22'-9"	95		
G2	4	#5	STR	23'-6"	98		
K1	612	#5	2	5'-11"	3777		
K2	612	#5	2	6'-4"	4043		
S1	6	#8	STR	23'-6"	376		
REINFORCING STEEL =					LBS.	165268	

ALL BAR DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
A200	#5	3'-0"
A400	#5	2'-2"
B1, B3	#4	1'-5"
C1	#4	1'-11"
S1	#8	4'-0"

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 509+41.00 -L-

SHEET 4 OF 8



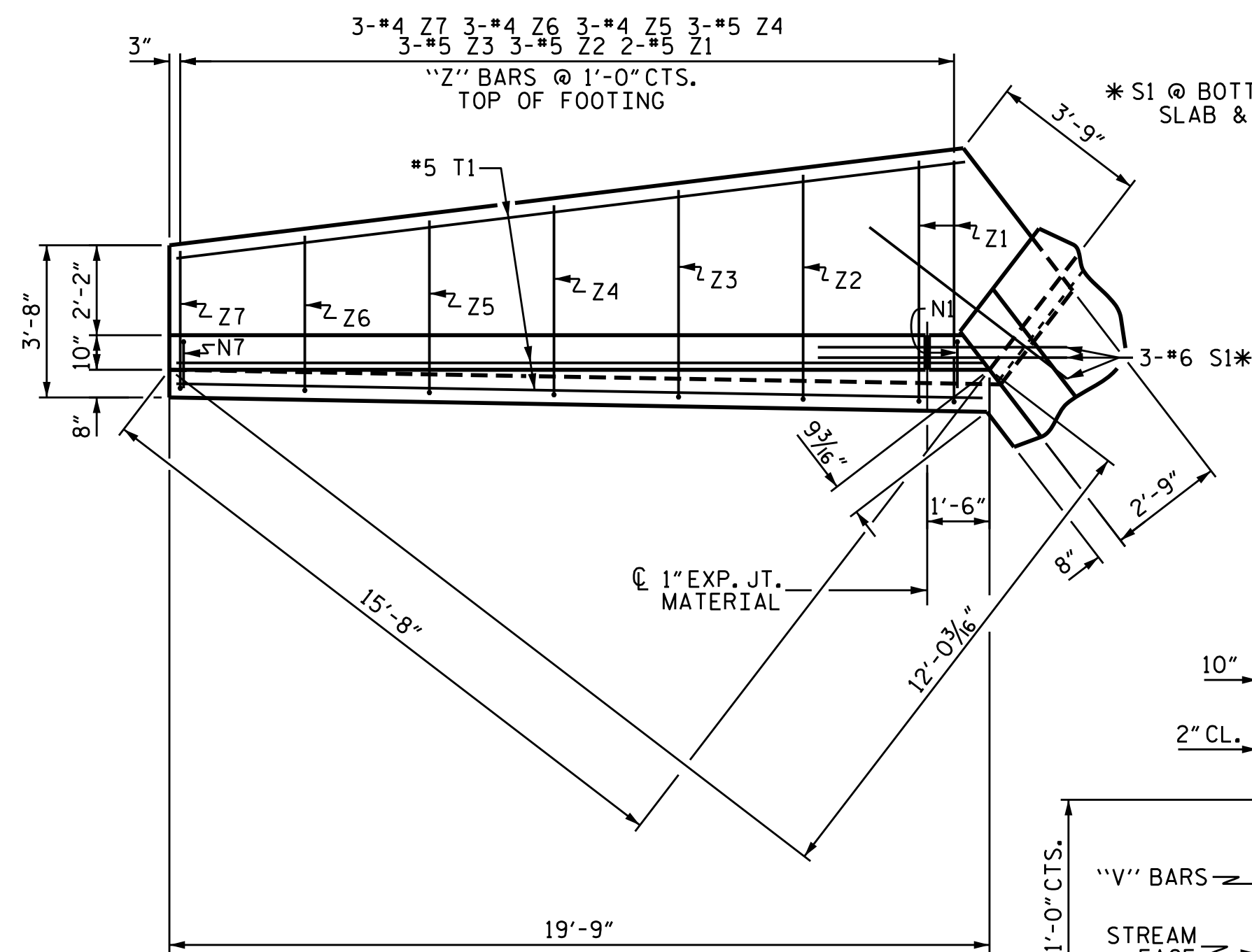
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 10 FT. X 8 FT. CONCRETE BOX CULVERT  
 90° SKEW**

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

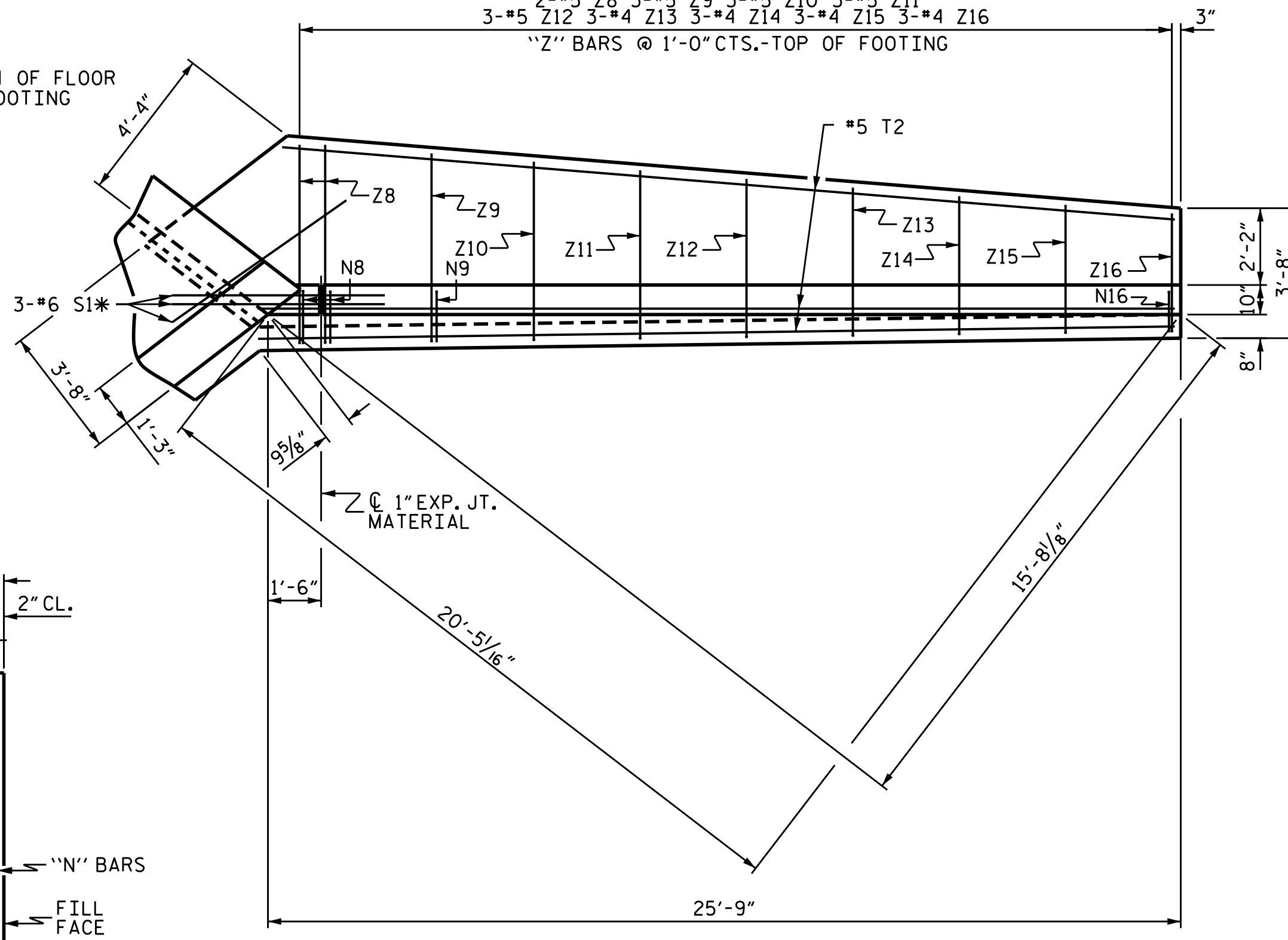
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-4
1			3			TOTAL SHEETS
2			4			8

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REDRAWN NOV. 1990 BY TSS CHECKED BY ARB

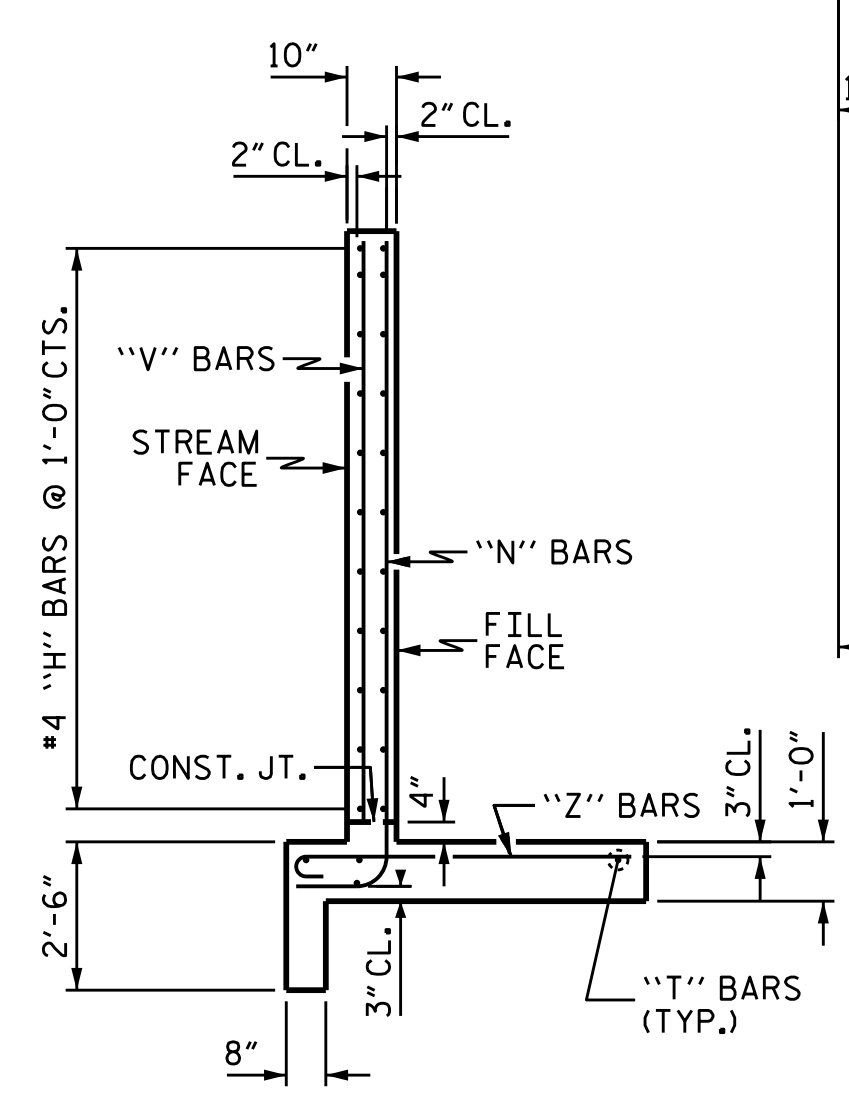
ASSEMBLED BY : <u>B.N.B. / O.T.N.</u>	DATE : <u>9/27/18</u>	<b>SPECIAL</b>
CHECKED BY : <u>P. K. NEWTON</u>	DATE : <u>10/22/18</u>	
DRAWN BY : <u>RALPH D. UNDERWOOD</u>	DATE : <u>MAY 1971</u>	<b>STANDARD</b>
CHECKED BY : <u>JOEL A. JOHNSON</u>	DATE : <u>JULY 1971</u>	



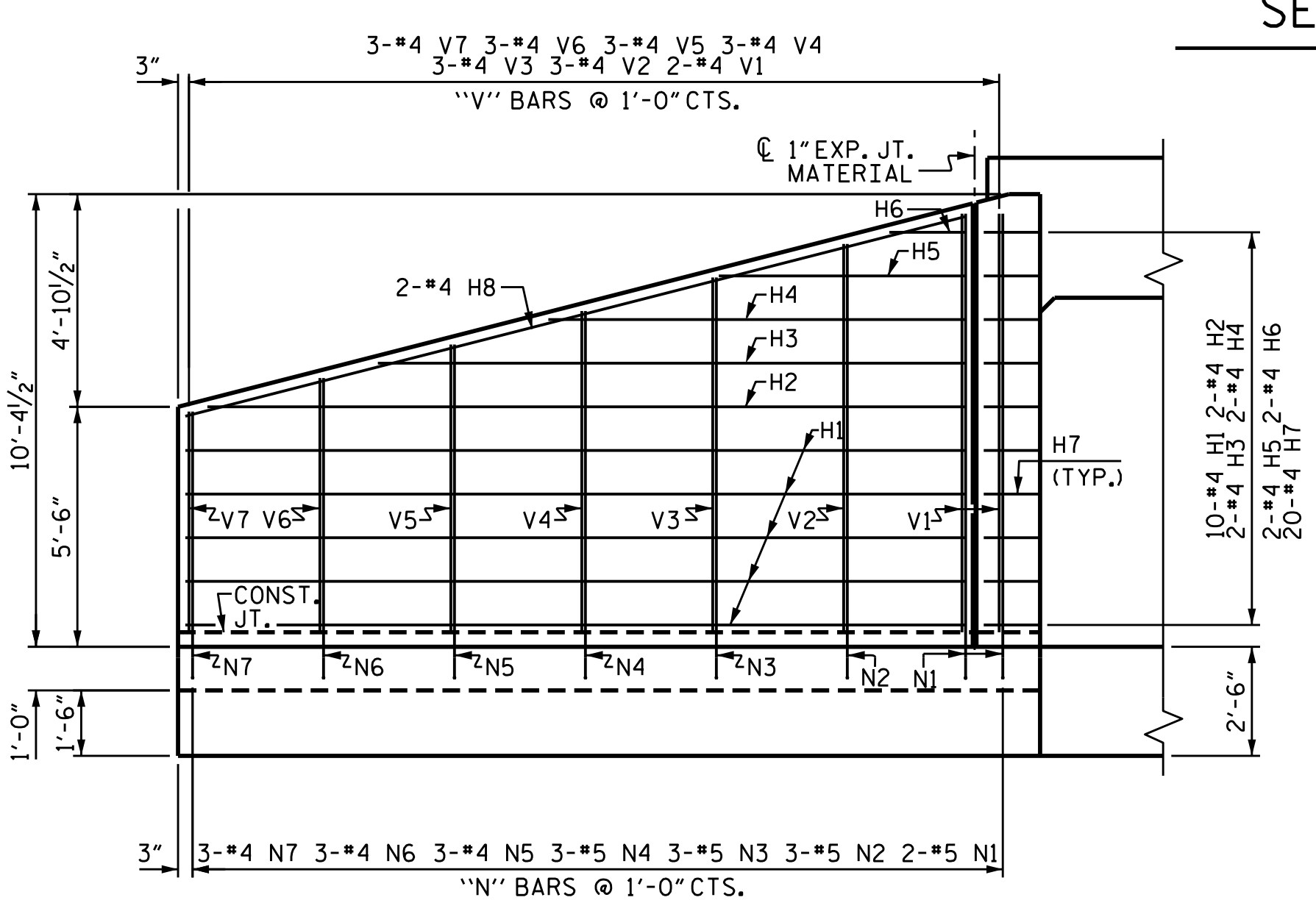
PLAN W2



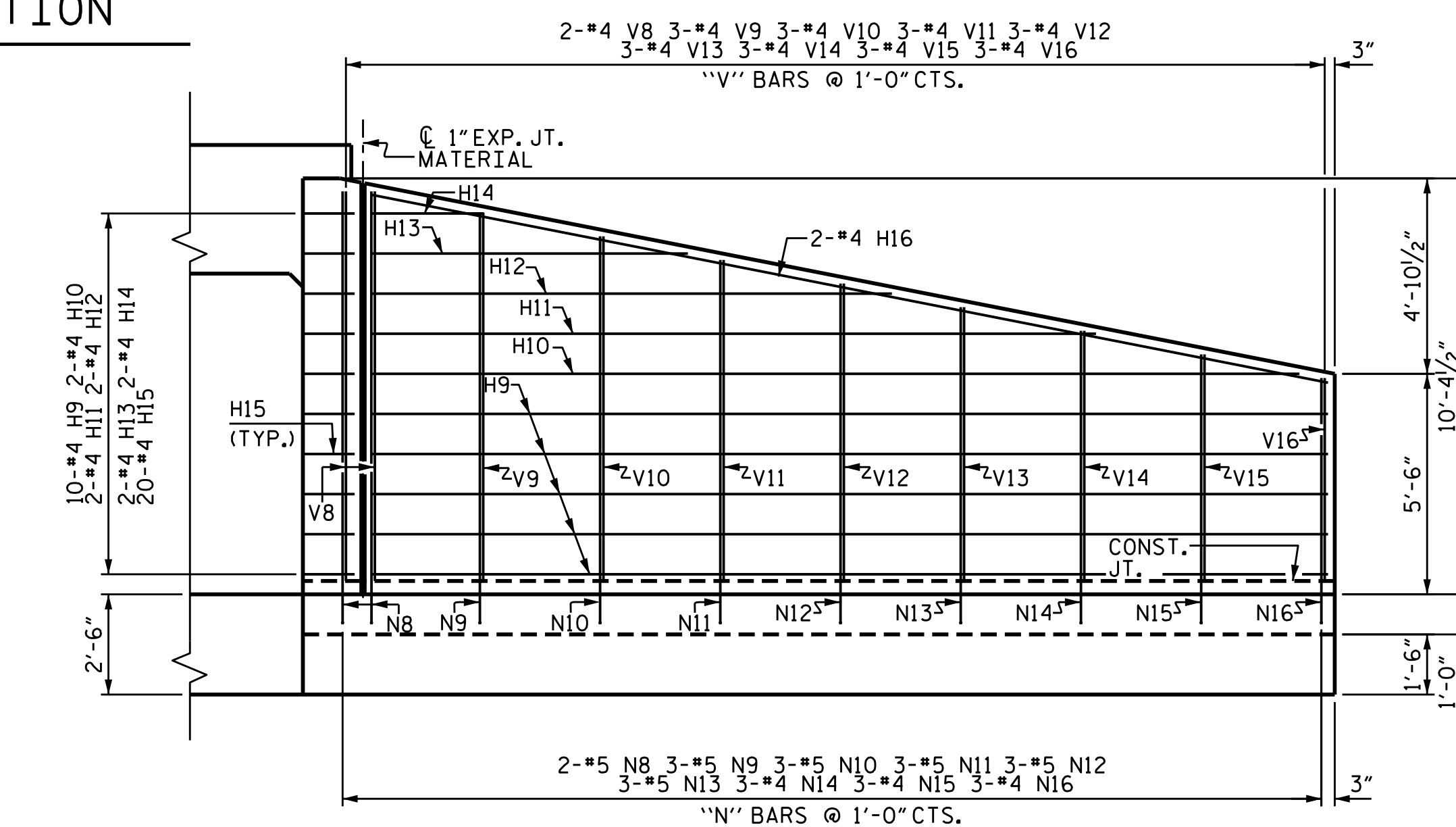
PLAN W1



TYPICAL WING SECTION



ELEVATION W2



ELEVATION W1

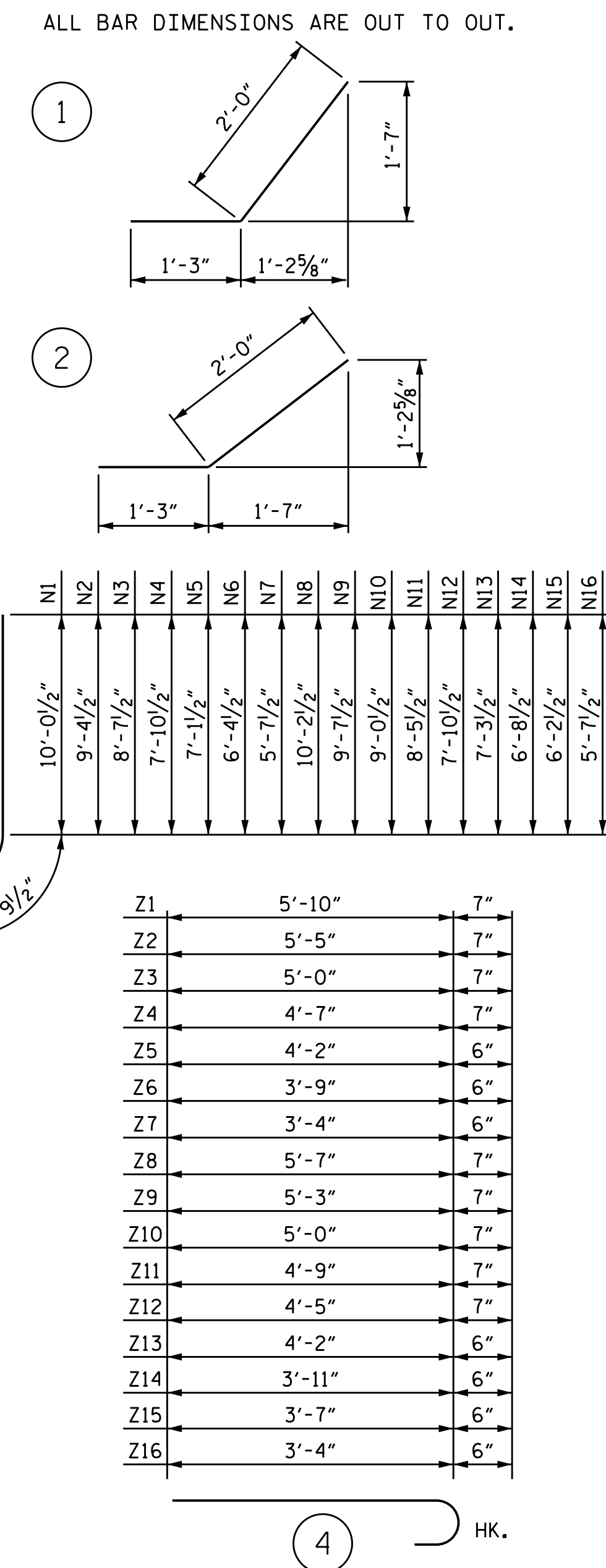
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	10	#4	STR	17'-10"	119
H2	2	#4	STR	17'-4"	23
H3	2	#4	STR	13'-4"	18
H4	2	#4	STR	9'-5"	13
H5	2	#4	STR	5'-5"	7
H6	2	#4	STR	1'-5"	2
H7	20	#4	1	3'-3"	43
H8	2	#4	STR	18'-5"	25
H9	10	#4	STR	23'-10"	159
H10	2	#4	STR	23'-2"	31
H11	2	#4	STR	17'-11"	24
H12	2	#4	STR	12'-9"	17
H13	2	#4	STR	7'-7"	10
H14	2	#4	STR	2'-5"	3
H15	20	#4	2	3'-3"	43
H16	2	#4	STR	24'-3"	32
N1	2	#5	3	11'-6"	24
N2	3	#5	3	10'-10"	34
N3	3	#5	3	10'-1"	32
N4	3	#5	3	9'-4"	29
N5	3	#4	3	8'-7"	17
N6	3	#4	3	7'-10"	16
N7	3	#4	3	7'-1"	14
N8	2	#5	3	11'-8"	24
N9	3	#5	3	11'-1"	35
N10	3	#5	3	10'-6"	33
N11	3	#5	3	9'-11"	31
N12	3	#5	3	9'-4"	29
N13	3	#5	3	8'-9"	27
N14	3	#4	3	8'-2"	16
N15	3	#4	3	7'-8"	15
N16	3	#4	3	7'-1"	14
S1	6	#6	STR	6'-0"	54
T1	3	#5	STR	19'-9"	62
T2	3	#5	STR	25'-9"	81
V1	2	#4	STR	9'-6"	13
V2	3	#4	STR	8'-10"	18
V3	3	#4	STR	8'-1"	16
V4	3	#4	STR	7'-3"	15
V5	3	#4	STR	6'-6"	13
V6	3	#4	STR	5'-9"	12
V7	3	#4	STR	5'-0"	10
V8	2	#4	STR	9'-7"	13
V9	3	#4	STR	9'-1"	18
V10	3	#4	STR	8'-6"	17
V11	3	#4	STR	7'-11"	16
V12	3	#4	STR	7'-4"	15
V13	3	#4	STR	6'-9"	14
V14	3	#4	STR	6'-2"	12
V15	3	#4	STR	5'-7"	11
V16	3	#4	STR	5'-0"	10
Z1	2	#5	4	6'-5"	13
Z2	3	#5	4	6'-0"	19
Z3	3	#5	4	5'-7"	17
Z4	3	#5	4	5'-2"	16
Z5	3	#4	4	4'-8"	9
Z6	3	#4	4	4'-3"	9
Z7	3	#4	4	3'-10"	8
Z8	2	#5	4	6'-2"	13
Z9	3	#5	4	5'-10"	18
Z10	3	#5	4	5'-7"	17
Z11	3	#5	4	5'-4"	17
Z12	3	#5	4	5'-0"	16
Z13	3	#4	4	4'-8"	9
Z14	3	#4	4	4'-5"	9
Z15	3	#4	4	4'-1"	8
Z16	3	#4	4	3'-10"	8

REINFORCING STEEL FOR 2 WINGS 1985 LBS

CLASS A CONCRETE	21.1	CY
2 WINGS		
1 HEADWALLS	1.1	CY
1 END CURTAIN WALLS	1.2	CY
TOTAL	23.4	CY

BAR TYPES



PROJECT NO. R-1015  
 CRAVEN COUNTY  
 STATION: 509+41.00 -L-

SHEET 5 OF 8

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 WINGS W1 & W2  
 H = 8'-0" SLOPE = 3:1  
 75° SKEW (OUTLET END)

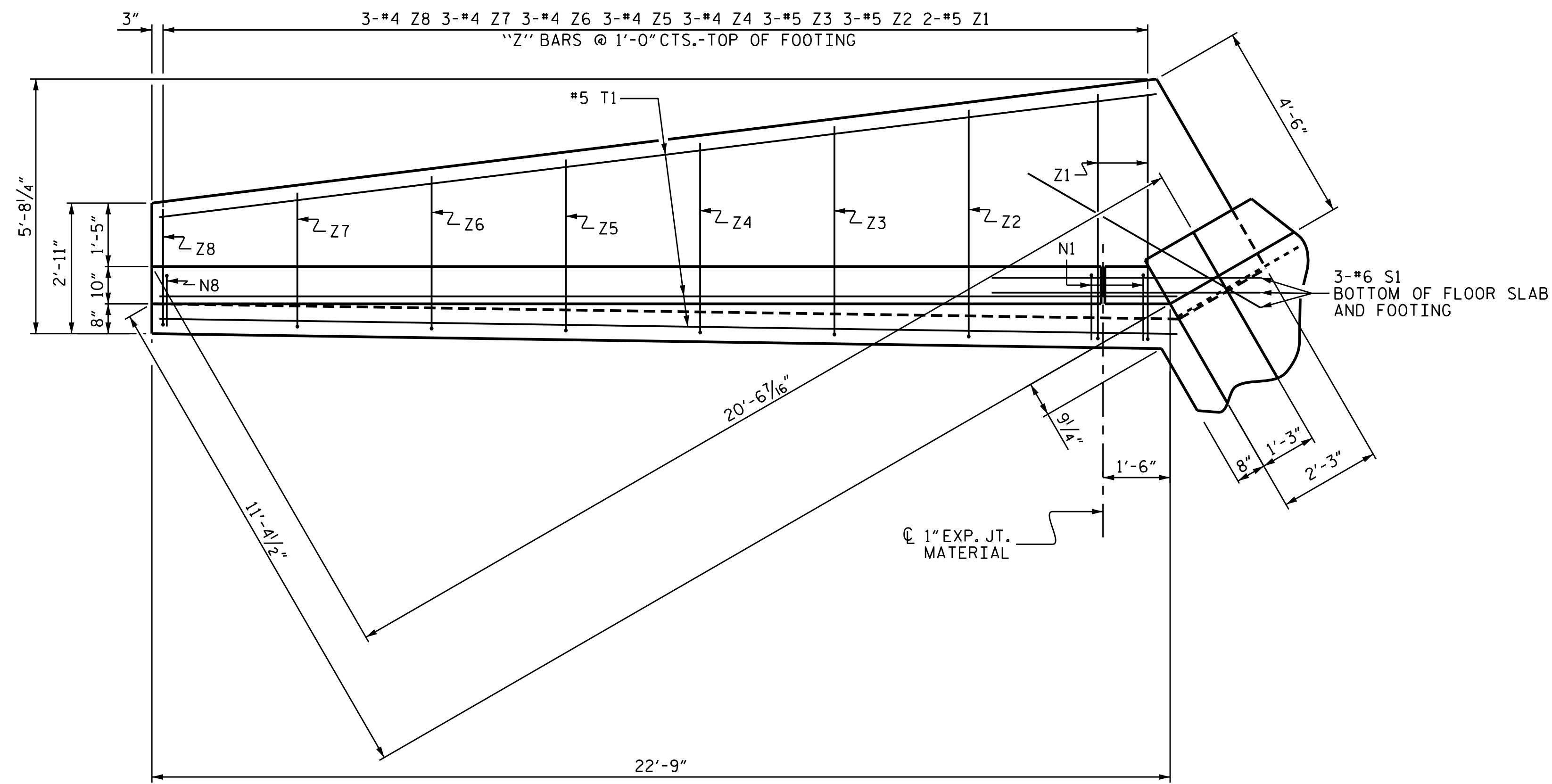
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

DRAWN BY: P.D. BRYANT DATE: 10/18  
 CHECKED BY: K.W. ALFORD DATE: 10/18  
 DESIGN ENGINEER OF RECORD: P.D. BRYANT DATE: 10/18

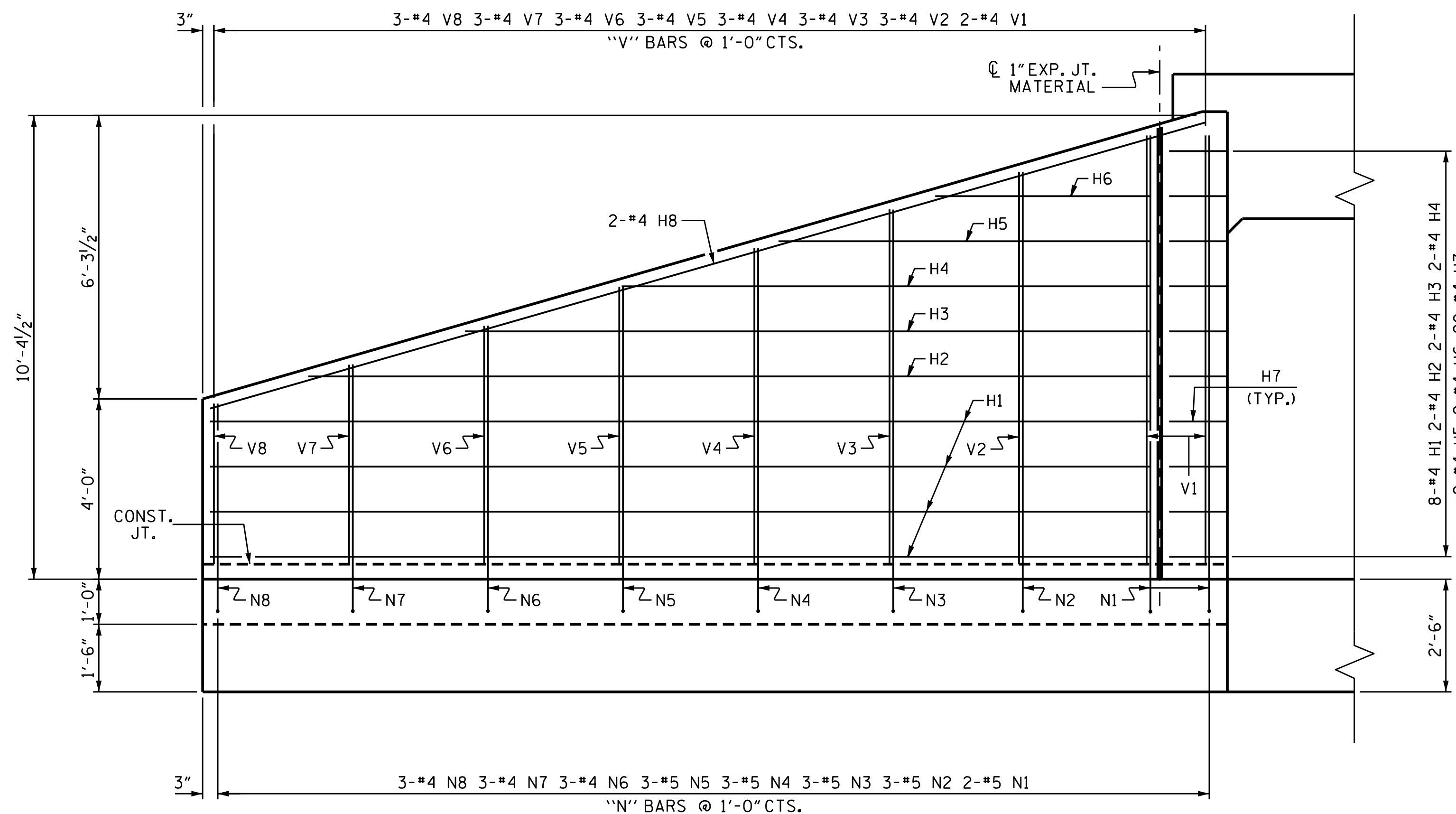
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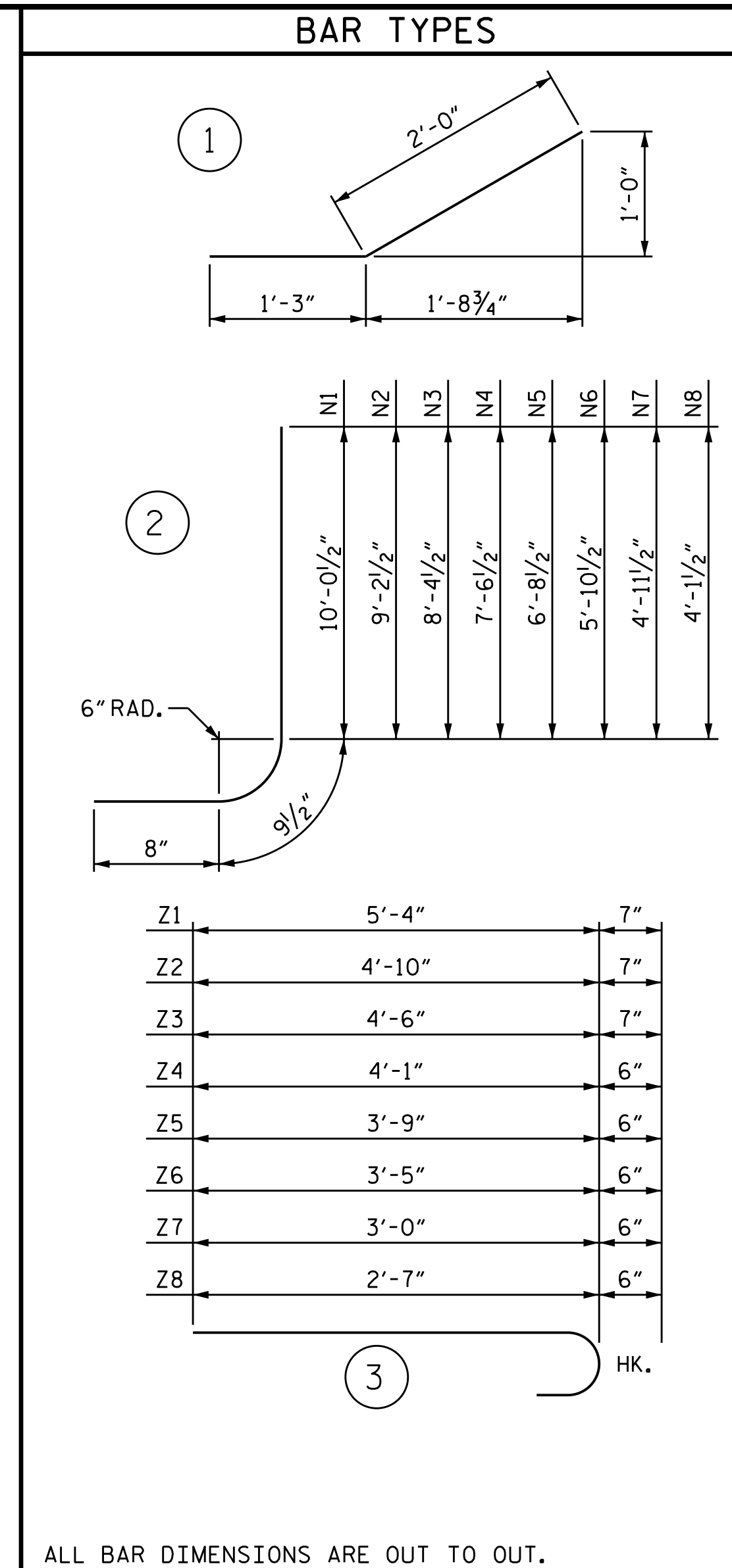




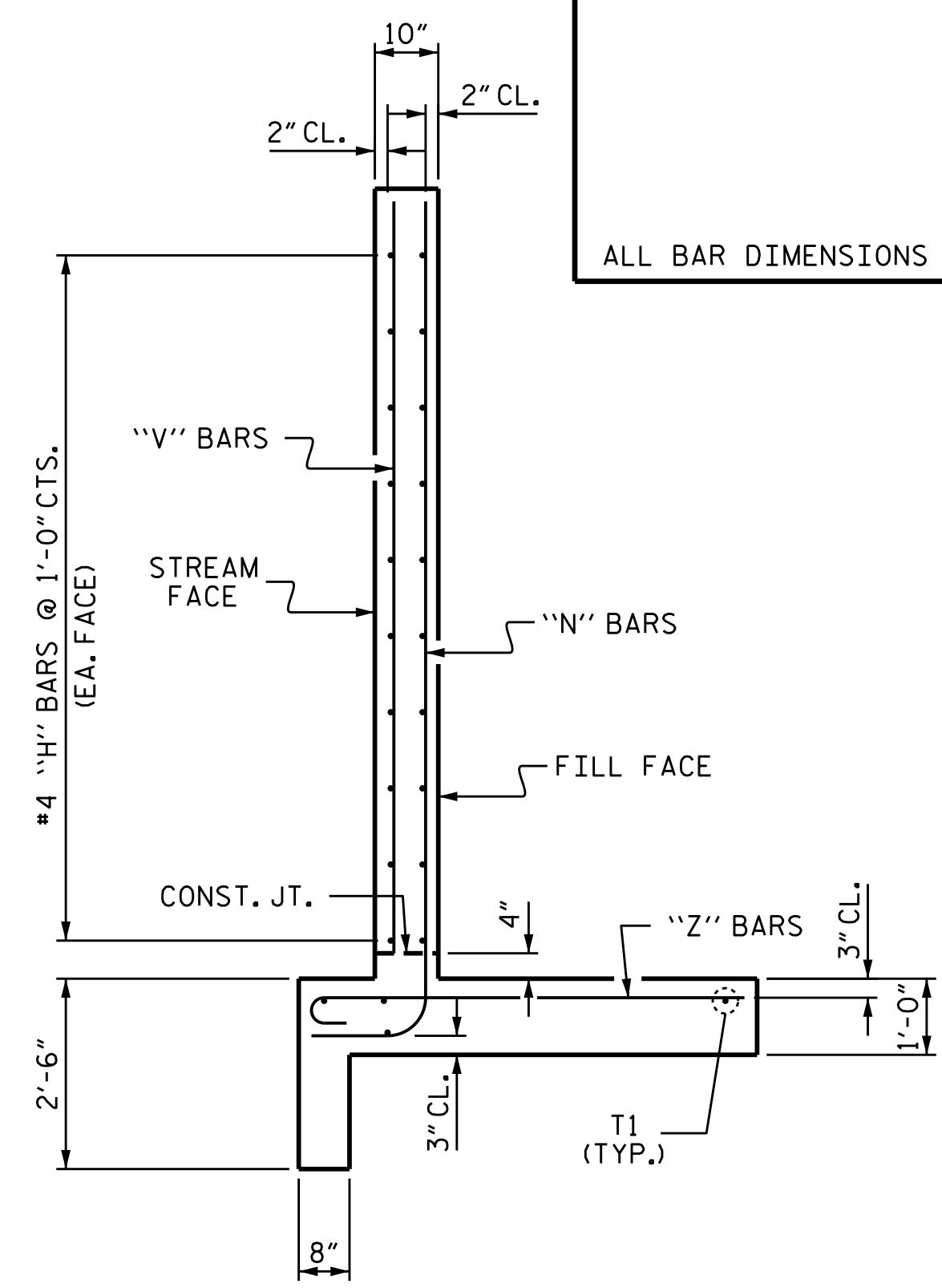
PLAN W3



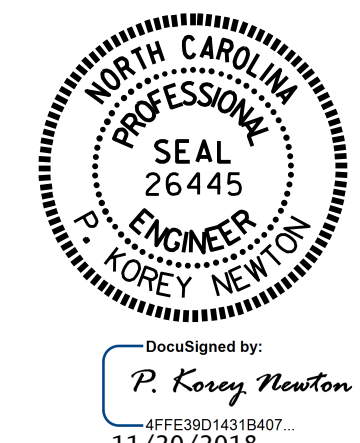
ELEVATION W3



BILL OF MATERIAL FOR ONE WING (INLET END)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	20'-10"	111
H2	2	#4	STR	18'-8"	25
H3	2	#4	STR	15'-1"	20
H4	2	#4	STR	11'-7"	15
H5	2	#4	STR	8'-1"	11
H6	2	#4	STR	4'-6"	6
H7	20	#4	1	3'-3"	43
H8	2	#4	STR	21'-8"	29
N1	2	#5	2	11'-6"	24
N2	3	#5	2	10'-8"	33
N3	3	#5	2	9'-10"	31
N4	3	#5	2	9'-0"	28
N5	3	#5	2	8'-2"	26
N6	3	#4	2	7'-1"	15
N7	3	#4	2	6'-5"	13
N8	3	#4	2	5'-7"	11
S1	3	#6	STR	6'-0"	27
T1	3	#5	STR	22'-9"	71
V1	2	#4	STR	9'-5"	13
V2	3	#4	STR	8'-7"	17
V3	3	#4	STR	7'-9"	16
V4	3	#4	STR	6'-11"	14
V5	3	#4	STR	6'-1"	12
V6	3	#4	STR	5'-3"	11
V7	3	#4	STR	4'-5"	9
V8	3	#4	STR	3'-6"	7
Z1	2	#5	3	5'-11"	12
Z2	3	#5	3	5'-5"	17
Z3	3	#5	3	5'-1"	16
Z4	3	#4	3	4'-3"	9
Z5	3	#4	3	4'-4"	9
Z6	3	#4	3	3'-11"	8
Z7	3	#4	3	3'-6"	7
Z8	3	#4	3	3'-1"	6
REINFORCING STEEL FOR 1 WING				722 LBS	
CLASS A CONCRETE					
1 WING				9.8	CY
1 HEADWALL				1.1	CY
1 END CURTAIN WALL				1.2	CY
TOTAL				12.1	CY



TYPICAL WING SECTION



PROJECT NO. R-1015  
 CRAVEN COUNTY  
 STATION: 509+41.00 -L-

SHEET 6 OF 8

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 WING W3  
 H = 8'-0" SLOPE = 3:1  
 90° SKEW (INLET END)

DRAWN BY : P. D. BRYANT DATE : 10/18  
 CHECKED BY : K. W. ALFORD DATE : 10/18  
 DESIGN ENGINEER OF RECORD : P. D. BRYANT DATE : 10/18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-6
1			3			TOTAL SHEETS
2			4			8





## 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 (VLL)	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	5.03	--	1.75	11.29	1	EXTERIOR WALL	5.44	5.03	1	EXTERIOR WALL	2.02		
	HL-93 (OPERATING)	N/A		6.52	--	1.35	14.63	1	EXTERIOR WALL	5.44	6.52	1	EXTERIOR WALL	2.02		
	HS-20 (INVENTORY)	36.000	2	5.03	181.18	1.75	11.29	1	EXTERIOR WALL	5.44	5.03	1	EXTERIOR WALL	2.02		
	HS-20 (OPERATING)	36.000		6.52	234.87	1.35	14.63	1	EXTERIOR WALL	5.44	6.52	1	EXTERIOR WALL	2.02		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	3	6.29	84.93	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		SNGARBS2	20.000		6.29	125.82	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		SNAGRIS2	22.000		6.29	138.40	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		SNCOTTS3	27.250		6.29	171.43	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		SNAGGRS4	34.925		6.29	219.72	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		SNS5A	35.550		6.29	223.65	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		SNS6A	39.950		6.29	251.33	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		SNS7B	42.000		6.29	264.22	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		6.29	207.61	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		TNT4A	33.075		6.29	208.08	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		TNT6A	41.600		6.29	261.71	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		TNT7A	42.000		6.29	264.22	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		TNT7B	42.000		6.29	264.22	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
		TNAGRIT4	43.000		6.29	270.52	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02	
	TNAGT5A	45.000		6.29	283.10	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02		
	TNAGT5B	45.000		6.29	283.10	1.40	14.09	1	EXTERIOR WALL	5.44	6.29	1	EXTERIOR WALL	2.02		

### 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	--

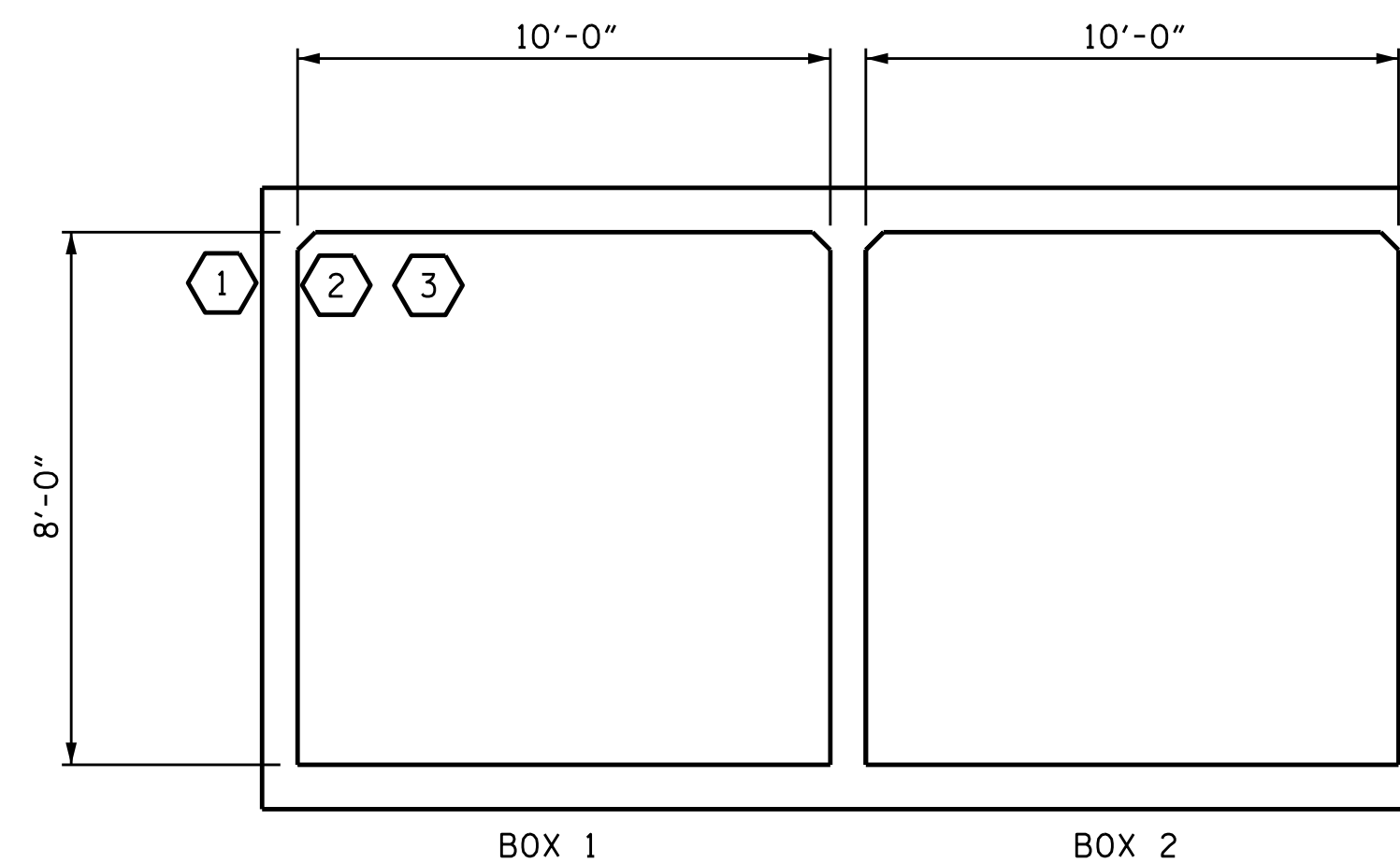
### NOTE:

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	

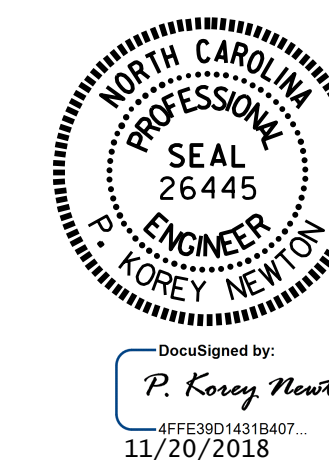


### LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. R-1015  
CRAVEN COUNTY  
 STATION: 509+41.00 -L-

SHEET 8 OF 8



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

ASSEMBLED BY : O.T. NGUYEN	DATE : 10/23/18
CHECKED BY : P. K. NEWTON	DATE : 10/26/18
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM
REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

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

## 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 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  $\frac{5}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY  $\frac{1}{16}$ " 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. FINISHES 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