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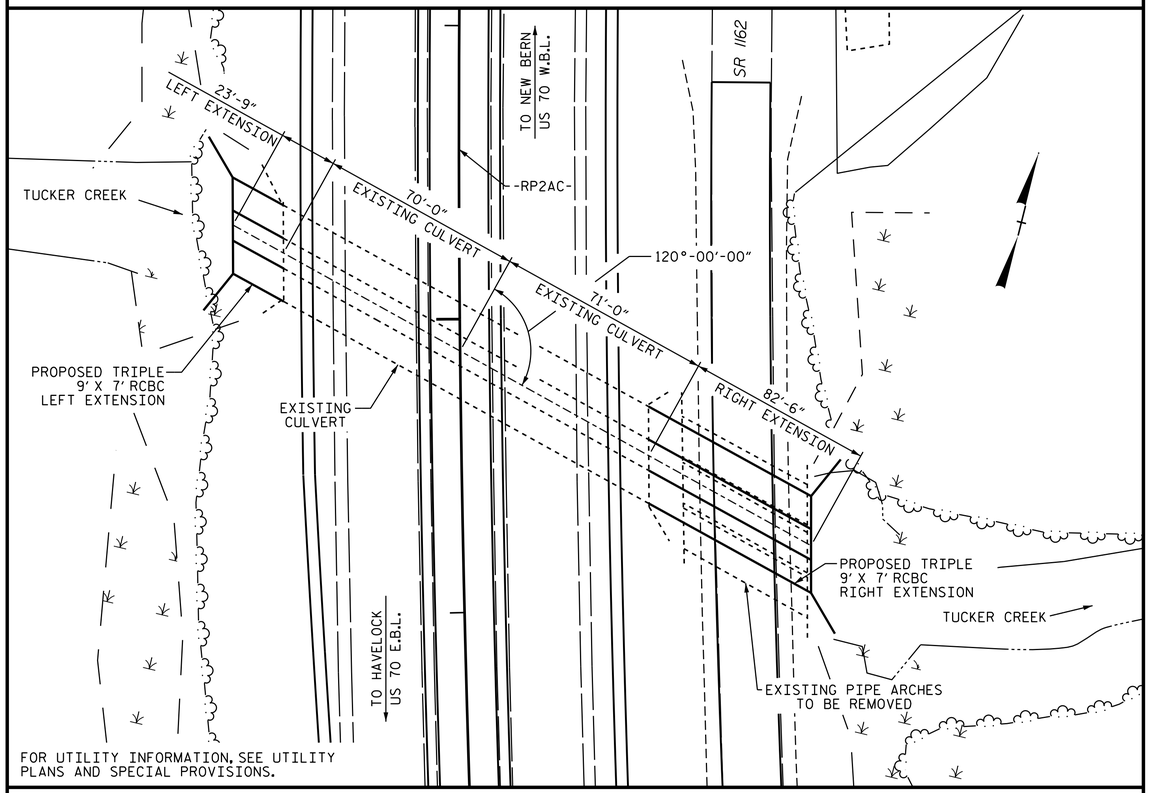
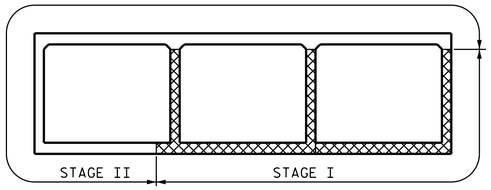
BM#27: RR SPIKE IN PP #57827, STA. 42+58.00 -RP2AC-, 361' RT, EL. 14.12

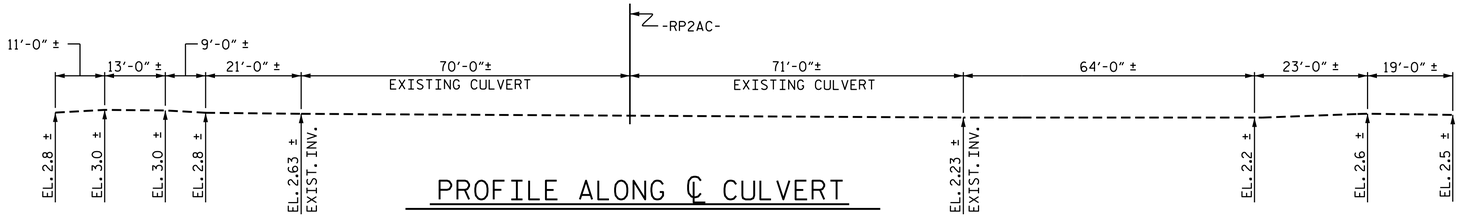


LOCATION SKETCH



CONSTRUCTION SEQUENCE

SECTION IS LOOKING DOWNSTREAM
STAGE I CONSTRUTION
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 = 60ksi.

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

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

ADDED 10-1-90

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

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NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON

DocuSigned by: P. Korey Newton 4FFE39D1431B407... 11/20/2018

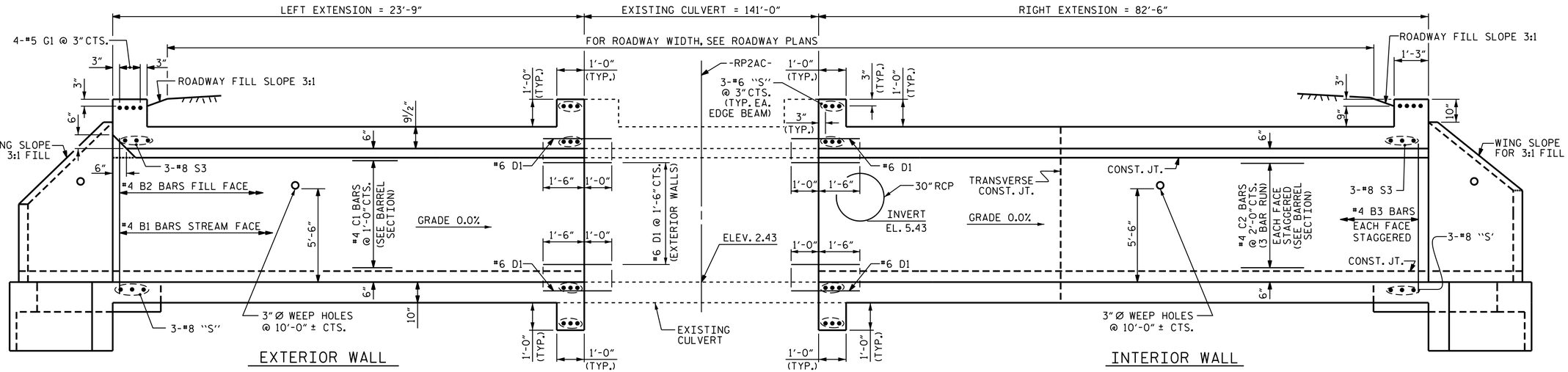
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

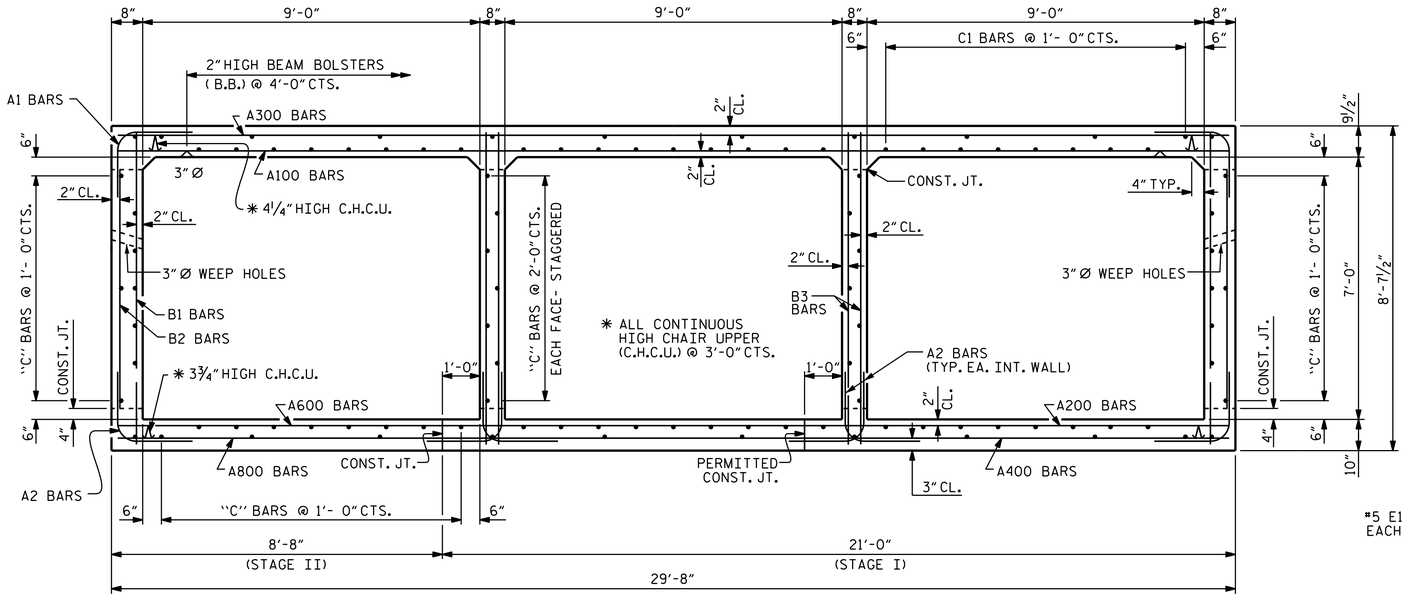
TRIPLE 9 FT. X 7 FT. CONCRETE BOX CULVERT LEFT AND RIGHT EXTENSIONS 120° SKEW

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

CUL 1

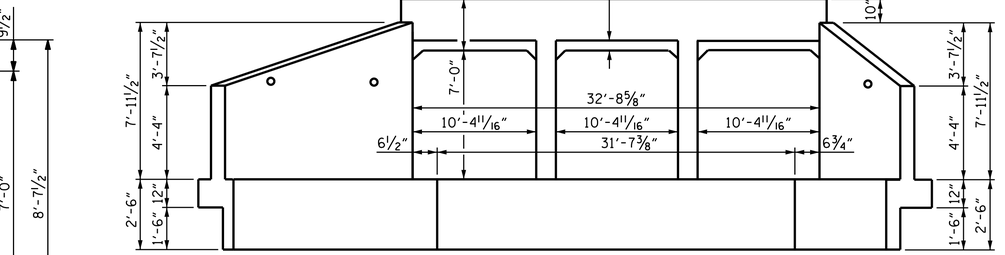


CULVERT SECTION NORMAL TO ROADWAY

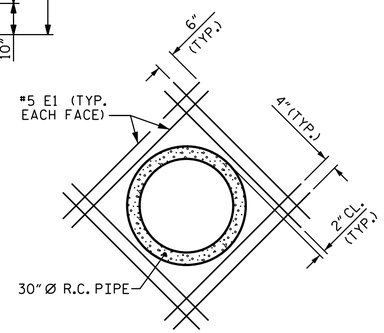


RIGHT ANGLE SECTION OF BARREL

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

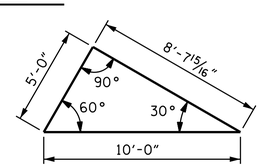


END ELEVATION NORMAL TO SKEW



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



SKEW TRIANGLE

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 10-90 CHECKED BY ARC

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

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NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER KOREY NEWTON
DocuSigned by: P. Korey Newton
11/20/2018

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

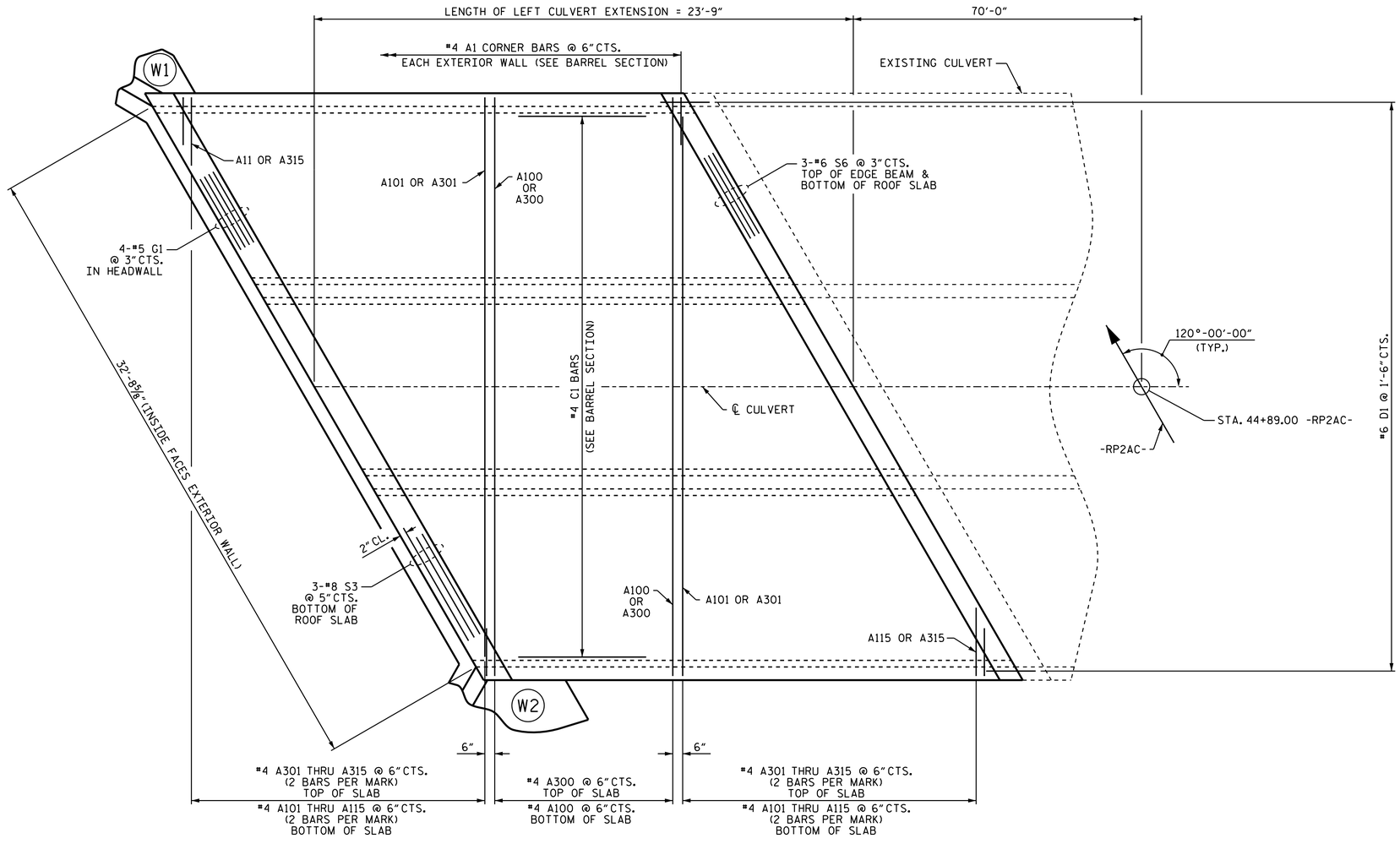
SHEET 2 OF 10

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
2			4			10

CUL 1



PLAN OF ROOF SLAB

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REVISED 8-28-92 BY E.L.R. CHECKED BY C.R.P.
REDRAWN BY JEM 10-90 CHECKED BY ARC

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

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

SHEET 3 OF 10

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON
DocuSigned by: P. Korey Newton
11/20/2018

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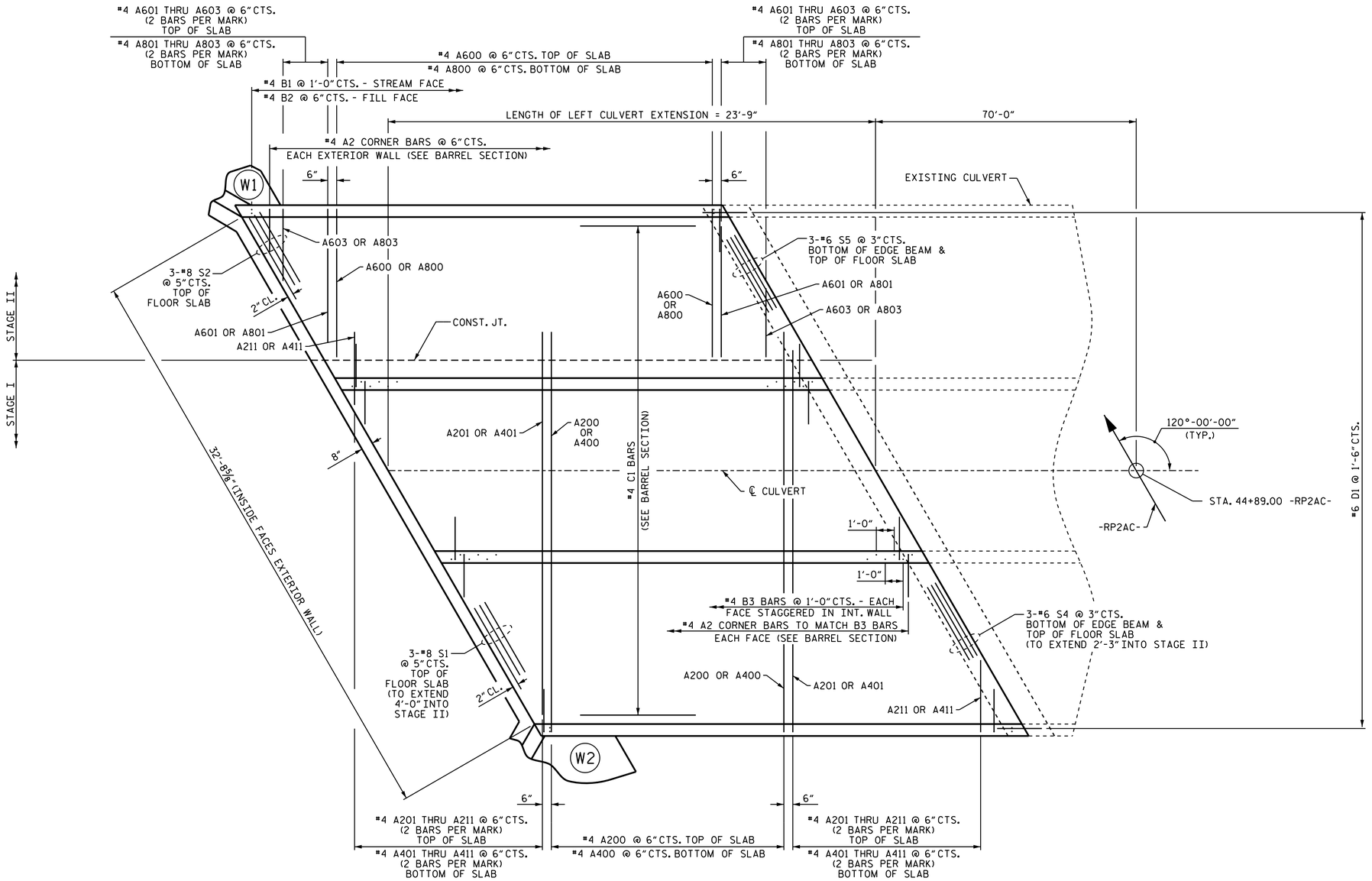
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 9 FT. X 7 FT. CONCRETE BOX CULVERT 120° SKEW (LEFT EXTENSION)

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

CUL 1



PLAN OF FLOOR SLAB

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REVISED 8-28-92 BY E.J.R. CHECKED BY G.R.P.
REDRAWN BY JEM 10-90 CHECKED BY ARC

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

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

SHEET 4 OF 10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 9 FT. X 7 FT. CONCRETE BOX CULVERT 120° SKEW (LEFT EXTENSION)

NORTH CAROLINA PROFESSIONAL SEAL 26445 P. ENGINEER KOREY NEWTON

DocuSigned by: P. Korey Newton 4FEE39D1441B407...
11/20/2018

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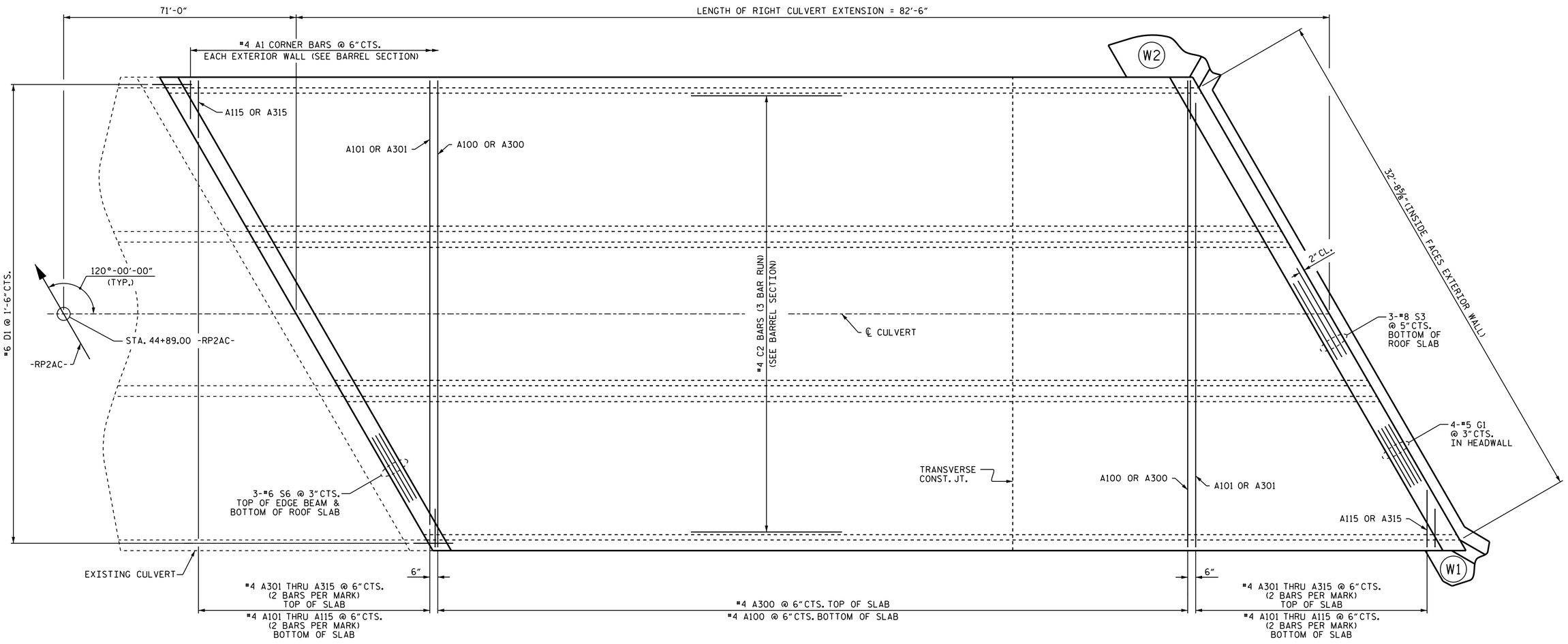
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-4
1			3			TOTAL SHEETS
2			4			10

CUL 1



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)

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON

DocuSigned by: P. Korey Newton 11/20/2018

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

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

CUL 1

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REVISED 8-28-92 BY E.L.R. CHECKED BY C.R.P.
REDRAWN BY JEM 10-90 CHECKED BY ARC

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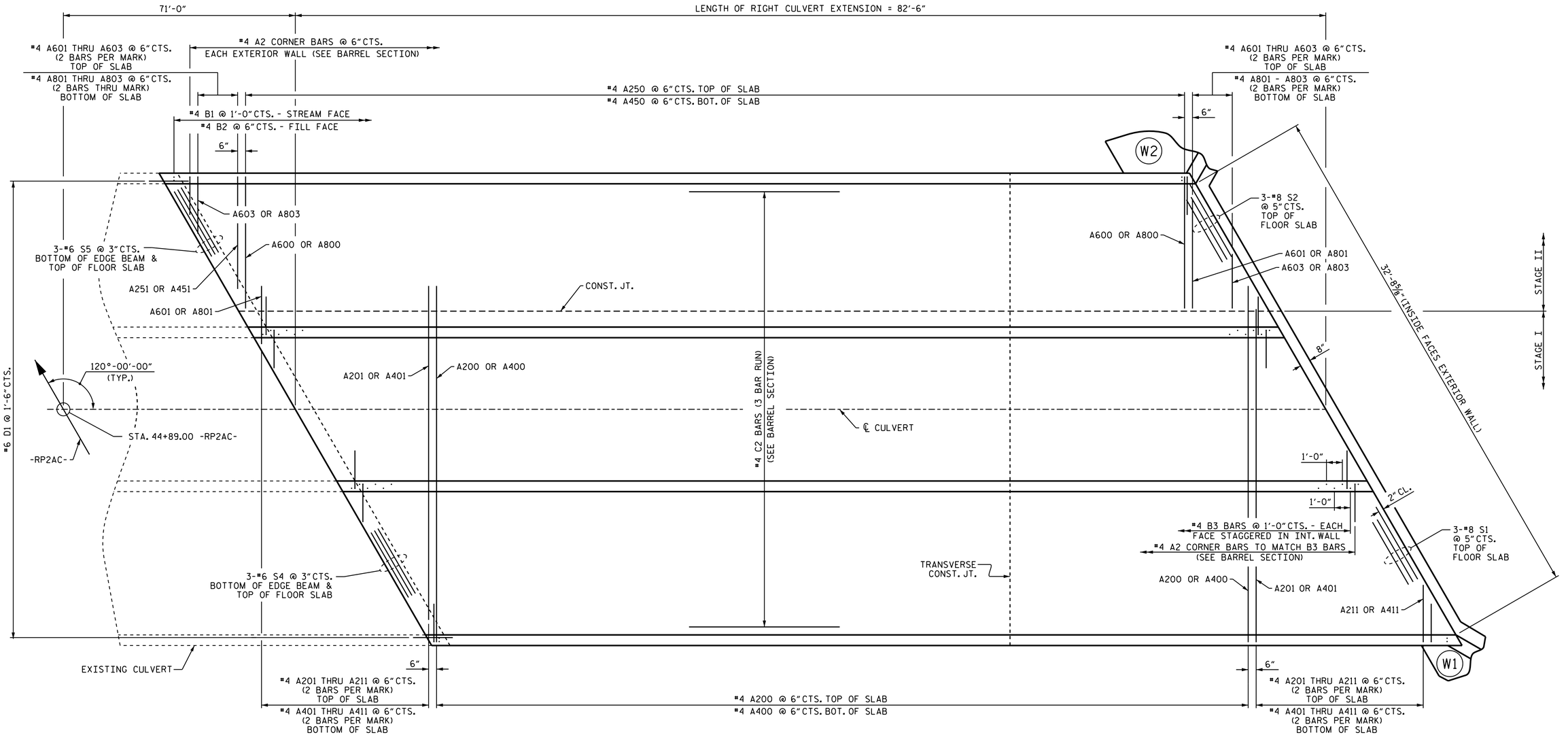

PLAN OF FLOOR SLAB

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+89.00-RP2AC-

SHEET 6 OF 10

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REVISED 8-28-92 BY E.J.R. CHECKED BY G.R.P.
REDRAWN BY JEM 10-90 CHECKED BY ARC

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

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NORTH CAROLINA PROFESSIONAL SEAL 26445 P.E. ENGINEER KOREY NEWTON

DocuSigned by: P. Korey Newton 4FEE39D14518407...
11/20/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 9 FT. X 7 FT. CONCRETE BOX CULVERT 120° SKEW (RIGHT EXTENSION)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-6
1			3			TOTAL SHEETS
2			4			10

CUL 1

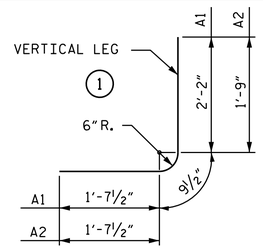
BILL OF MATERIAL
LEFT EXTENSION

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
						A112	4	#4	STR.	8'-4"	22
A400	22	#4	STR.	22'-3"	327	A113	4	#4	STR.	6'-7"	18
A401	4	#4	STR.	20'-6"	55	A114	4	#4	STR.	4'-11"	13
A402	4	#4	STR.	18'-9"	50	A115	4	#4	STR.	3'-2"	8
A403	4	#4	STR.	17'-0"	45						
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
						A308	4	#4	STR.	15'-3"	41
B1	24	#4	STR.	8'-1"	130	A309	4	#4	STR.	13'-6"	36
B2	48	#4	STR.	6'-4"	203	A310	4	#4	STR.	11'-10"	32
B3	96	#4	STR.	8'-1"	518	A311	4	#4	STR.	10'-1"	27
						A312	4	#4	STR.	8'-4"	22
C1	48	#4	STR.	23'-4"	748	A313	4	#4	STR.	6'-7"	18
						A314	4	#4	STR.	4'-11"	13
D1	19	#6	STR.	2'-6"	71	A315	4	#4	STR.	3'-2"	8
S1	3	#8	STR.	28'-1"	225	A600	38	#4	STR.	8'-5"	214
S4	6	#6	STR.	26'-4"	237	A601	4	#4	STR.	6'-7"	18
						A602	4	#4	STR.	4'-11"	13
						A603	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
						A112	4	#4	STR.	8'-4"	22
A400	139	#4	STR.	22'-3"	2066	A113	4	#4	STR.	6'-7"	18
A401	4	#4	STR.	20'-6"	55	A114	4	#4	STR.	4'-11"	13
A402	4	#4	STR.	18'-9"	50	A115	4	#4	STR.	3'-2"	8
A403	4	#4	STR.	17'-0"	45						
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
						A308	4	#4	STR.	15'-3"	41
B1	83	#4	STR.	8'-1"	448	A309	4	#4	STR.	13'-6"	36
B2	165	#4	STR.	6'-4"	698	A310	4	#4	STR.	11'-10"	32
B3	332	#4	STR.	8'-1"	1793	A311	4	#4	STR.	10'-1"	27
						A312	4	#4	STR.	8'-4"	22
C2	144	#4	STR.	28'-10"	2774	A313	4	#4	STR.	6'-7"	18
						A314	4	#4	STR.	4'-11"	13
D1	19	#6	STR.	2'-6"	71	A315	4	#4	STR.	3'-2"	8
S1	3	#8	STR.	28'-1"	225	A600	155	#4	STR.	8'-5"	871
S4	6	#6	STR.	26'-4"	237	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 TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTH CHART

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

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON
DocuSigned by: P. Korey Newton
11/20/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-7
1			3			TOTAL SHEETS
2			4			10

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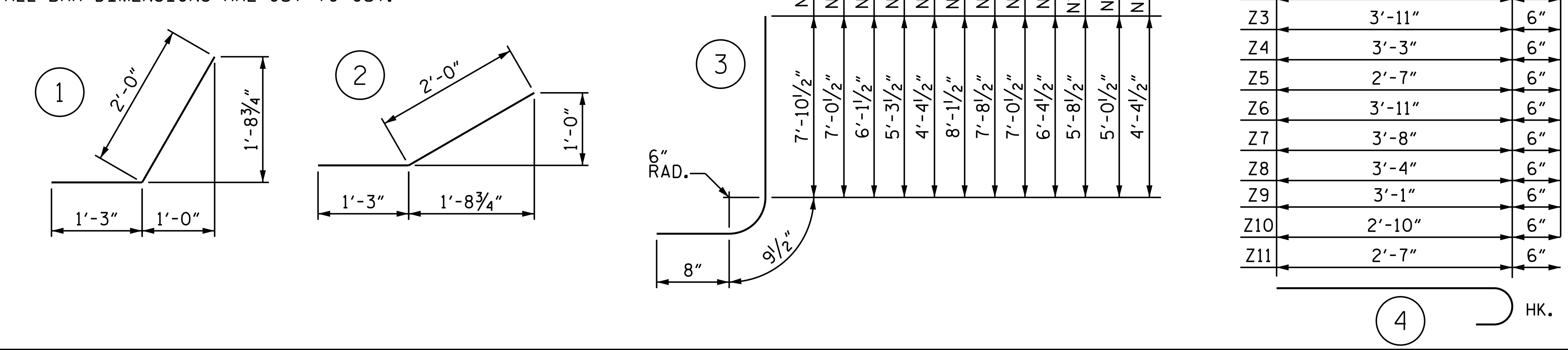
pknewton

CUL 1

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



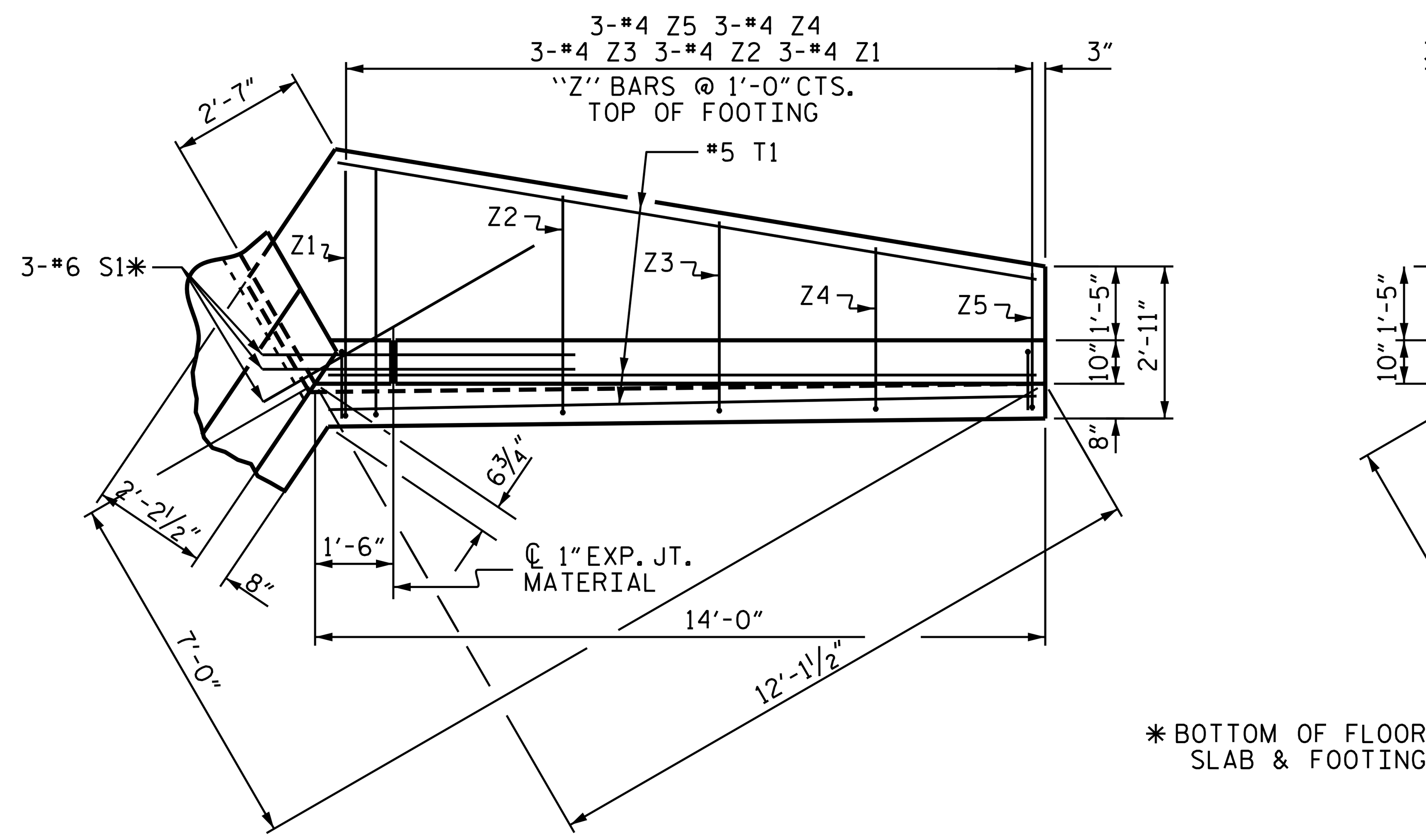
Z1	5'-3"	6"
Z2	4'-7"	6"
Z3	3'-11"	6"
Z4	3'-3"	6"
Z5	2'-7"	6"
Z6	3'-11"	6"
Z7	3'-8"	6"
Z8	3'-4"	6"
Z9	3'-1"	6"
Z10	2'-10"	6"
Z11	2'-7"	6"

STAGE I BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	12'-1"	48
H2	2	#4	STR	9'-1"	12
H3	2	#4	STR	3-4	4
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	12'-7"	17
N1	3	#5	3	9'-4"	29
N2	3	#5	3	8'-6"	27
N3	3	#4	3	7'-7"	15
N4	3	#4	3	6'-9"	14
N5	3	#4	3	5'-10"	12
S1	3	#6	STR	6'-0"	27
T1	3	#5	STR	14'-0"	44
V1	3	#4	STR	7'-0"	14
V2	3	#4	STR	6'-3"	13
V3	3	#4	STR	5'-6"	11
V4	3	#4	STR	4'-8"	9
V5	3	#4	STR	3'-9"	8
Z1	3	#4	4	5'-9"	12
Z2	3	#4	4	5'-1"	10
Z3	3	#4	4	4'-5"	9
Z4	3	#4	4	3'-9"	8
Z5	3	#4	4	3'-1"	6
REINFORCING STEEL FOR 1 WING					375 LBS
CLASS A CONCRETE					
1 WING					5.7 CY
1 END CURTAIN WALL					0.8 CY
TOTAL					6.5 CY

STAGE II BILL OF MATERIAL

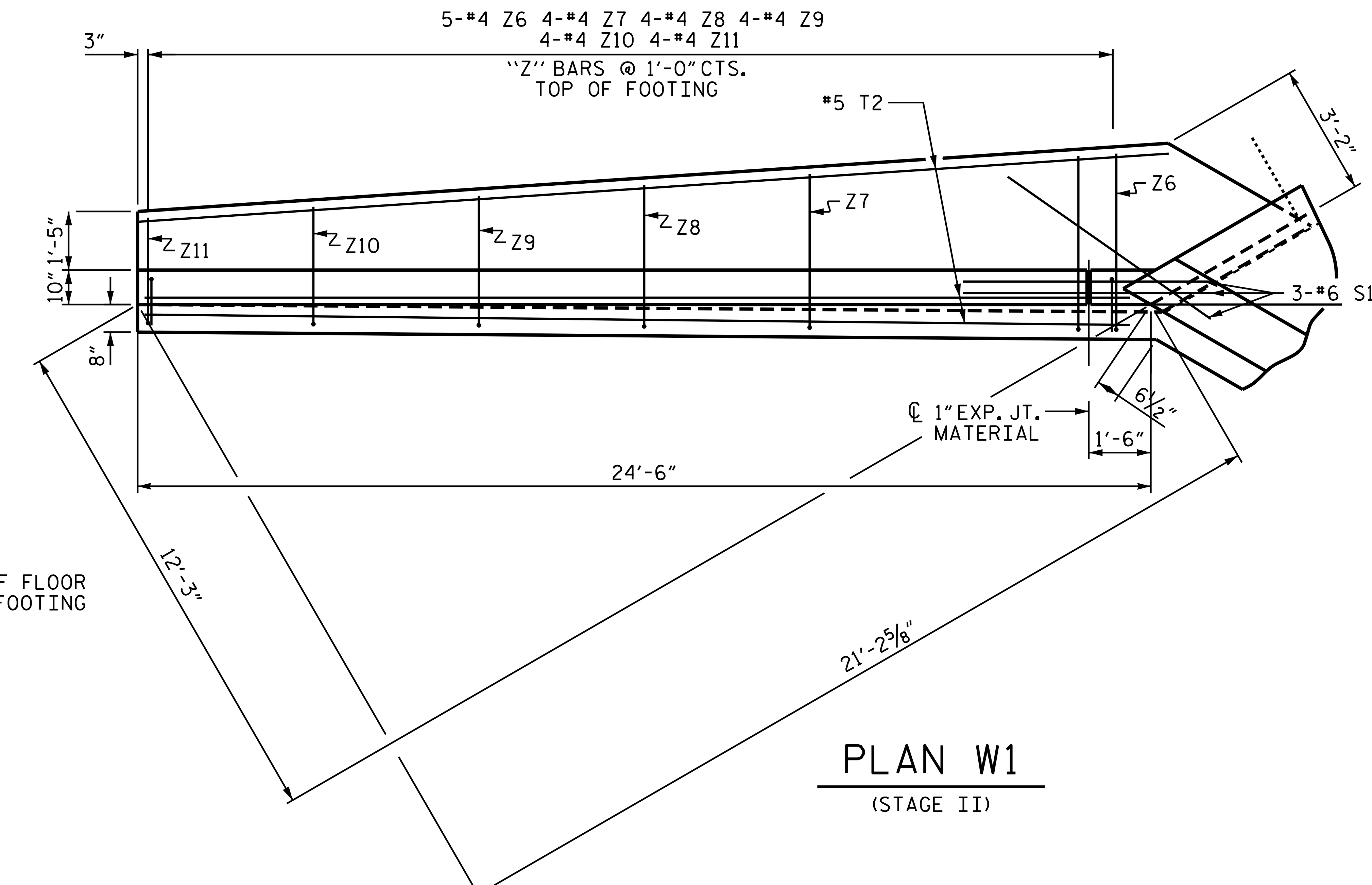
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	6	#4	STR	22'-7"	91
H7	2	#4	STR	17'-3"	23
H8	2	#4	STR	7'-5"	10
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	22'-10"	31
N6	2	#5	3	9'-7"	20
N7	3	#5	3	9'-2"	29
N8	4	#4	3	8'-6"	23
N9	4	#4	3	7'-10"	21
N10	4	#4	3	7'-2"	19
N11	4	#4	3	6'-6"	17
N12	4	#4	3	5'-10"	16
S1	3	#6	STR	6'-0"	27
T2	3	#5	STR	24'-6"	77
V6	2	#4	STR	7'-5"	10
V7	3	#4	STR	6'-10"	14
V8	4	#4	STR	6'-3"	17
V9	4	#4	STR	5'-9"	15
V10	4	#4	STR	5'-1"	14
V11	4	#4	STR	4'-5"	12
V12	4	#4	STR	3'-9"	10
Z6	5	#4	4	4'-3"	15
Z7	4	#4	4	4'-2"	11
Z8	4	#4	4	3'-10"	10
Z9	4	#4	4	3'-7"	10
Z10	4	#4	4	3'-4"	9
Z11	4	#4	4	3'-1"	8
REINFORCING STEEL FOR 1 WING					585 LBS
CLASS A CONCRETE					
1 WING					9.4 CY
1 HEADWALL					1.6 CY
1 END CURTAIN WALL					0.3 CY
TOTAL					11.3 CY



PLAN W2

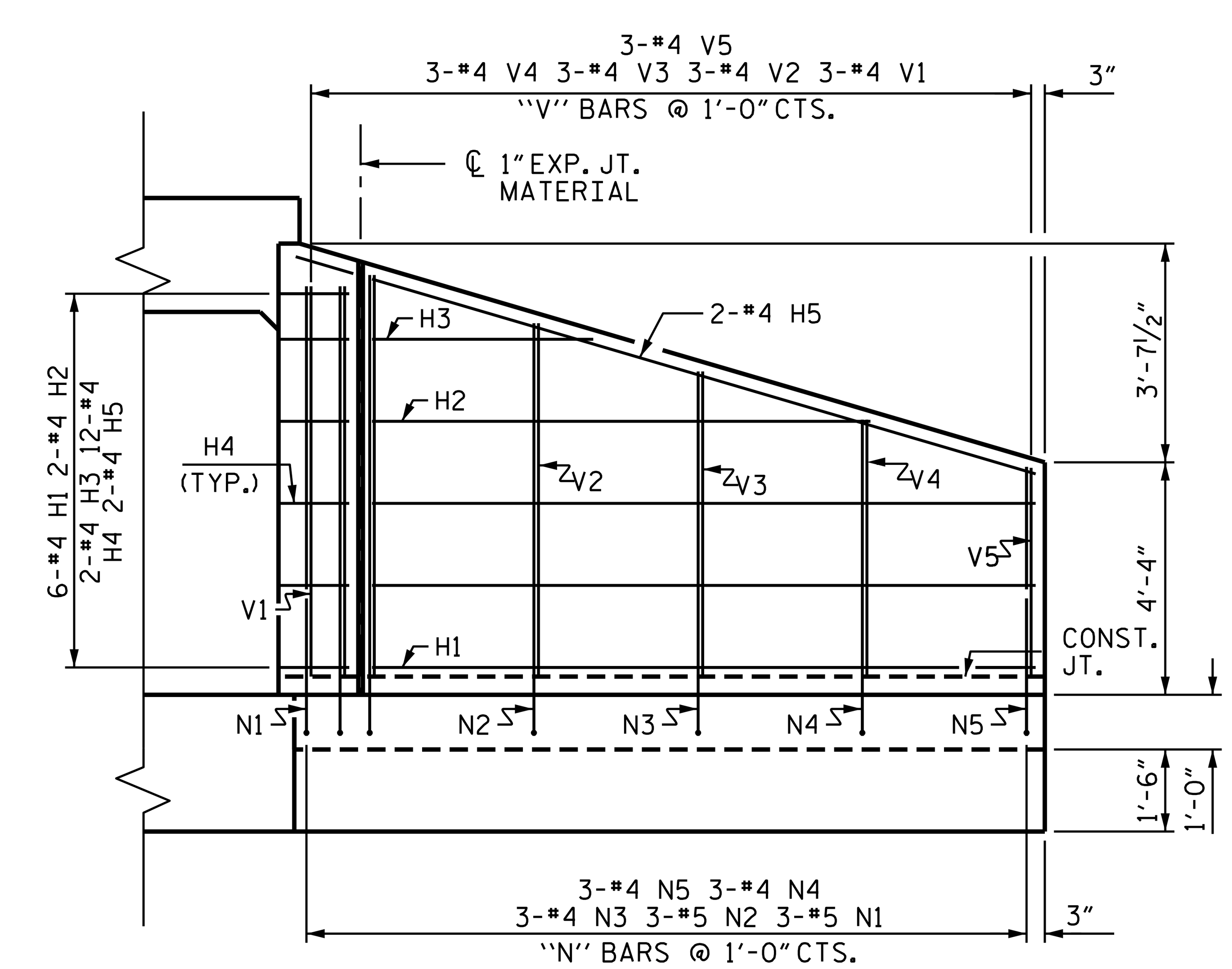
(STAGE I)

* BOTTOM OF FLOOR SLAB & FOOTING



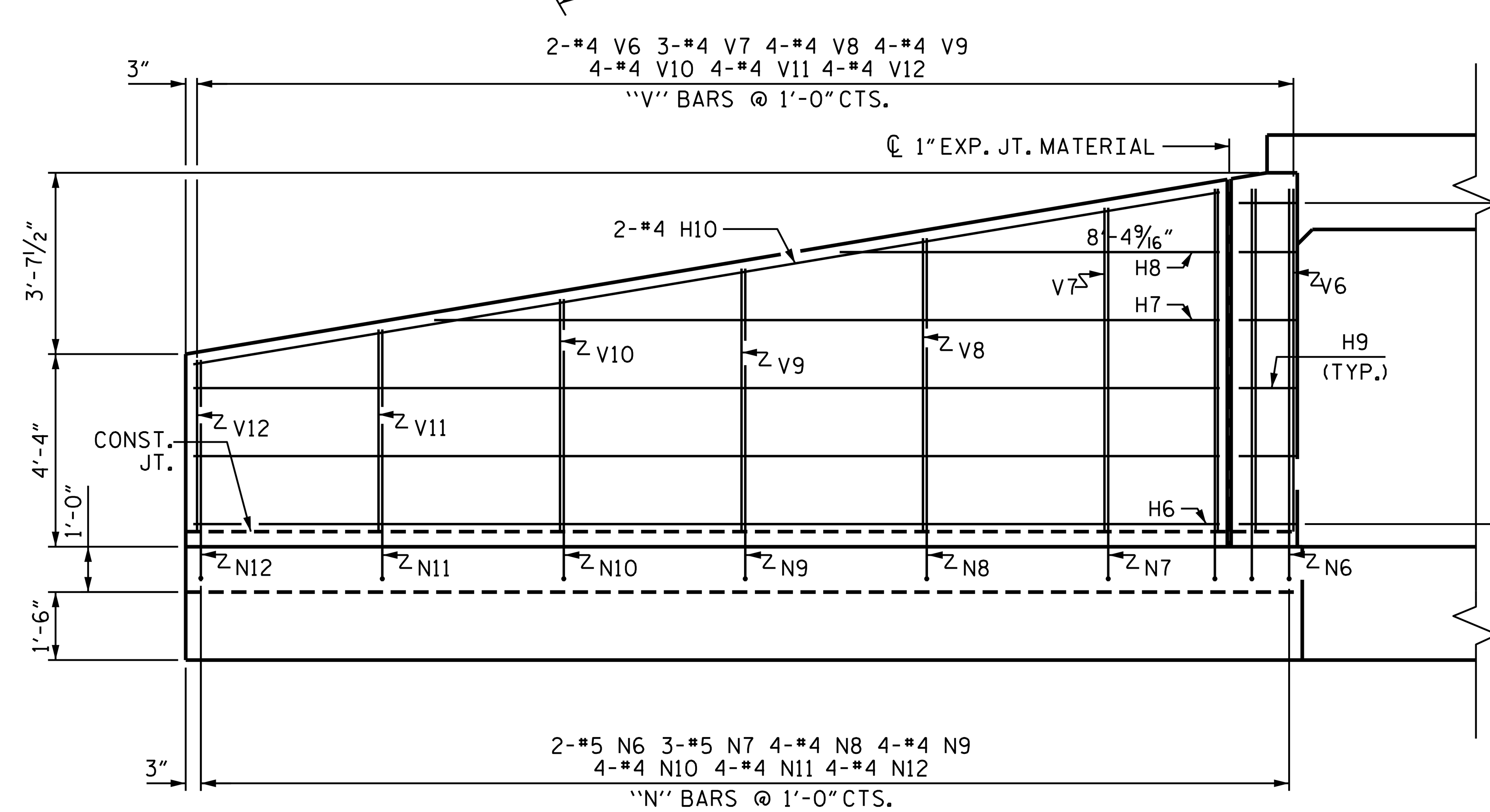
PLAN W1

(STAGE II)



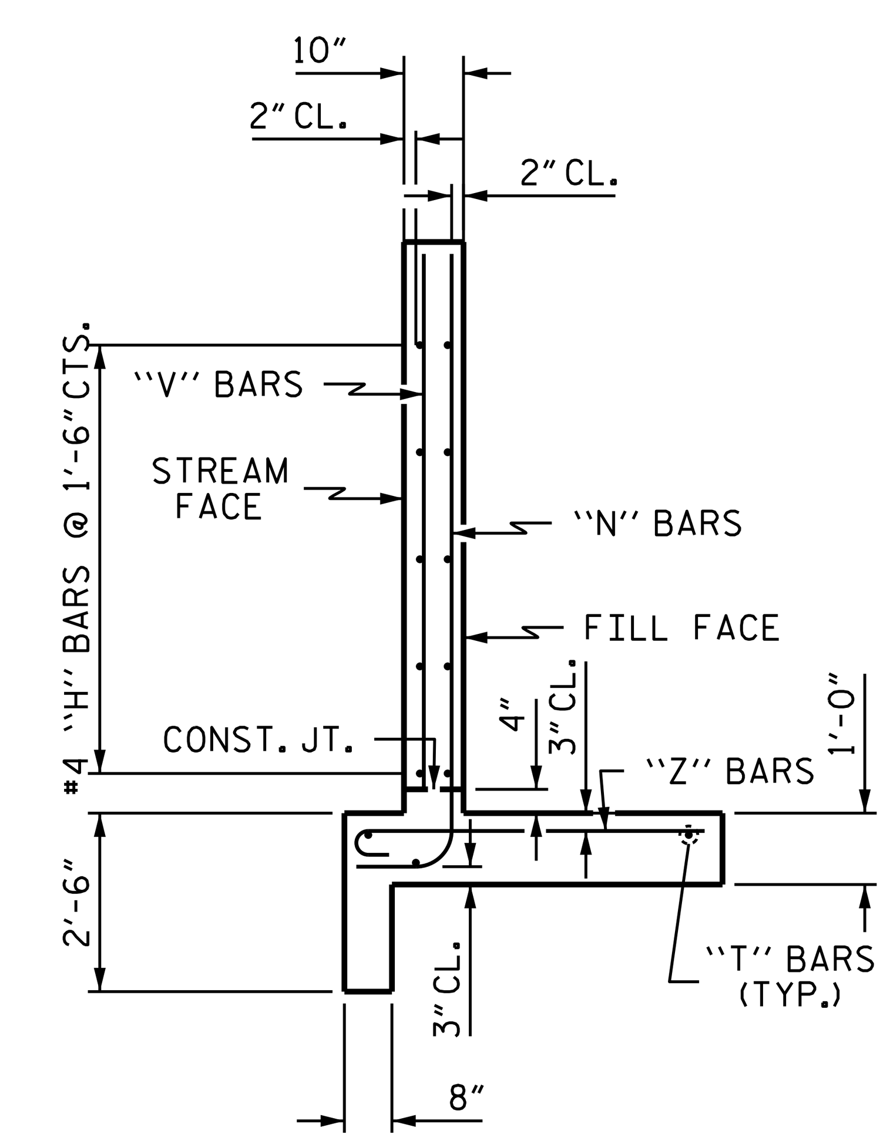
ELEVATION W2

(STAGE I)



ELEVATION W1

(STAGE II)



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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

REVISIONS

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

SHEET NO. C1-8

TOTAL SHEETS 10

CUL 1

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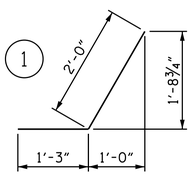
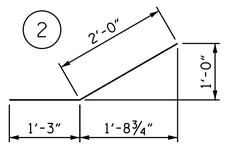
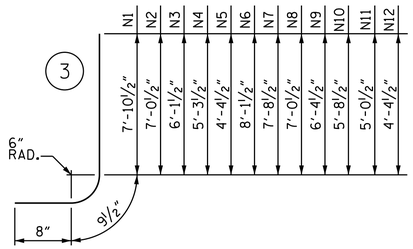
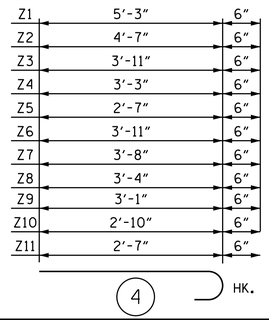
BAR TYPES

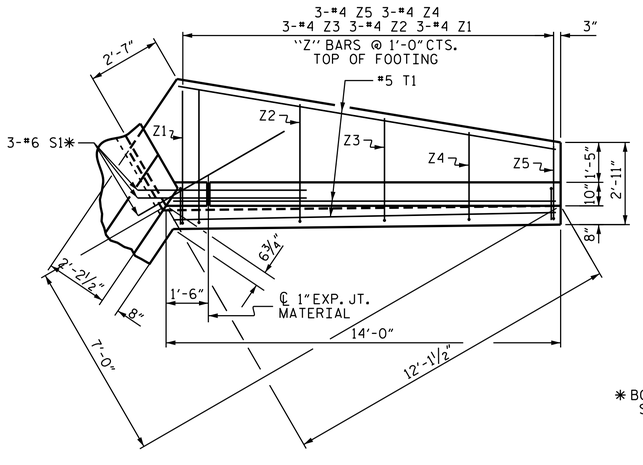
ALL BAR DIMENSIONS ARE OUT TO OUT.





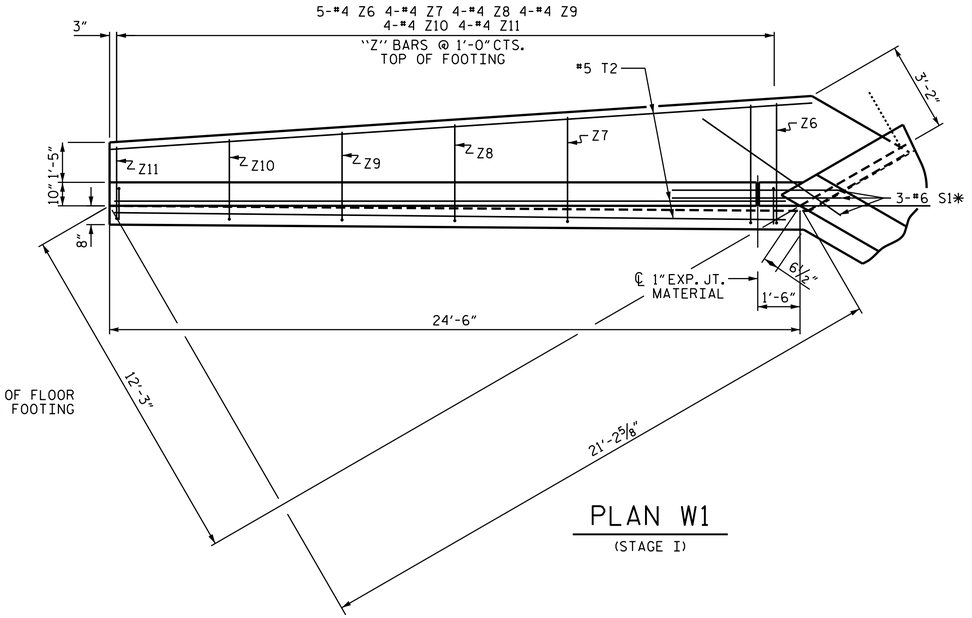






PLAN W2

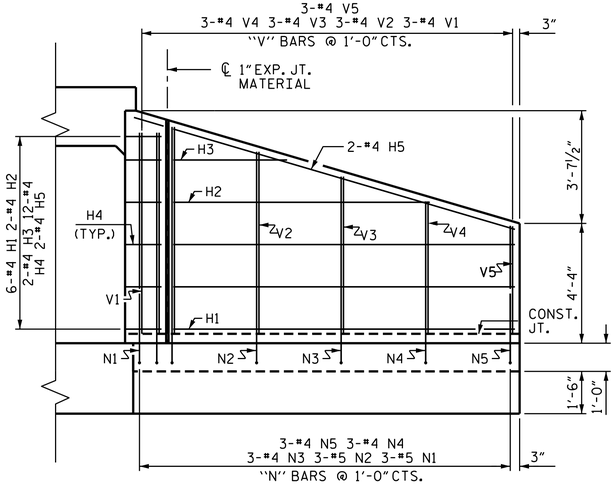
(STAGE II)



* BOTTOM OF FLOOR SLAB & FOOTING

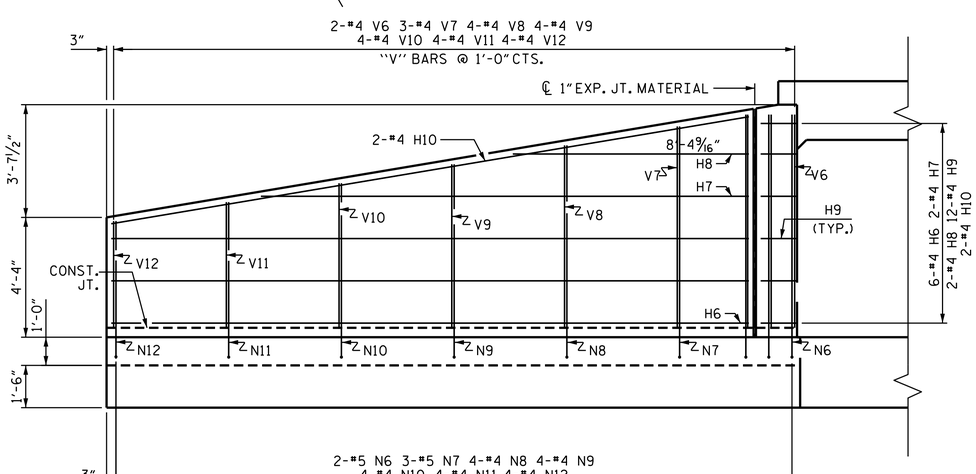
PLAN W1

(STAGE I)



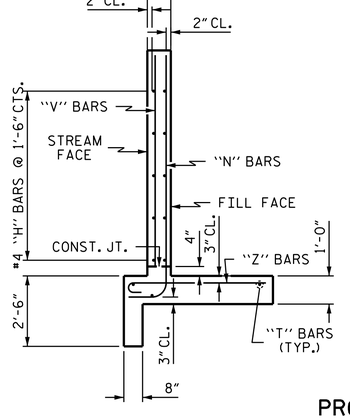
ELEVATION W2

(STAGE II)



ELEVATION W1

(STAGE I)



TYPICAL WING SECTION

STAGE II
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	12'-1"	48
H2	2	#4	STR	9'-1"	12
H3	2	#4	STR	3-4	4
H4	12	#4	1	3'-3"	26
H5	2	#4	STR	12'-7"	17
N1	3	#5	3	9'-4"	29
N2	3	#5	3	8'-6"	27
N3	3	#4	3	7'-7"	15
N4	3	#4	3	6'-9"	14
N5	3	#4	3	5'-10"	12
S1	3	#6	STR	6'-0"	27
T1	3	#5	STR	14'-0"	44
V1	3	#4	STR	7'-0"	14
V2	3	#4	STR	6'-3"	13
V3	3	#4	STR	5'-6"	11
V4	3	#4	STR	4'-8"	9
V5	3	#4	STR	3'-9"	8
Z1	3	#4	4	5'-9"	12
Z2	3	#4	4	5'-1"	10
Z3	3	#4	4	4'-5"	9
Z4	3	#4	4	3'-9"	8
Z5	3	#4	4	3'-1"	6

REINFORCING STEEL
FOR 1 WING 375 LBS

CLASS A CONCRETE
1 WING 5.7 CY
1 HEADWALL 1.6 CY
1 END CURTAIN WALL 0.3 CY
TOTAL 7.6 CY

STAGE I
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	6	#4	STR	22'-7"	91
H7	2	#4	STR	17'-3"	23
H8	2	#4	STR	7'-5"	10
H9	12	#4	2	3'-3"	26
H10	2	#4	STR	22'-10"	31
N6	2	#5	3	9'-7"	20
N7	3	#5	3	9'-2"	29
N8	4	#4	3	8'-6"	23
N9	4	#4	3	7'-10"	21
N10	4	#4	3	7'-2"	19
N11	4	#4	3	6'-6"	17
N12	4	#4	3	5'-10"	16
S1	3	#6	STR	6'-0"	27
T2	3	#5	STR	24'-6"	77
V6	2	#4	STR	7'-5"	10
V7	3	#4	STR	6'-10"	14
V8	4	#4	STR	6'-3"	17
V9	4	#4	STR	5'-9"	15
V10	4	#4	STR	5'-1"	14
V11	4	#4	STR	4'-5"	12
V12	4	#4	STR	3'-9"	10
Z6	5	#4	4	4'-3"	15
Z7	4	#4	4	4'-2"	11
Z8	4	#4	4	3'-10"	10
Z9	4	#4	4	3'-7"	10
Z10	4	#4	4	3'-4"	9
Z11	4	#4	4	3'-1"	8

REINFORCING STEEL
FOR 1 WING 585 LBS

CLASS A CONCRETE
1 WING 9.4 CY
1 END CURTAIN WALL 0.8 CY
TOTAL 10.2 CY

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

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER KOREY NEWTON

DocuSigned by: P. Korey Newton
11/20/2018

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

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CUL 1

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
							LIVE-LOAD FACTORS (γ_{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	1.25	--	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.

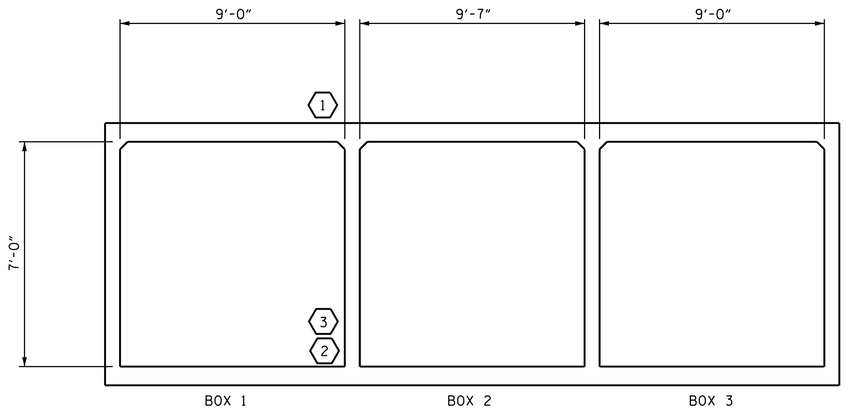
(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+89.00-RP2AC-

SHEET 10 OF 10

NORTH CAROLINA PROFESSIONAL SEAL 26445 P. ENGINEER KOREY NEWTON

DocuSigned by: P. Korey Newton 11/20/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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
2			4			10

CUL 1

STD. NO. LRFR5

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

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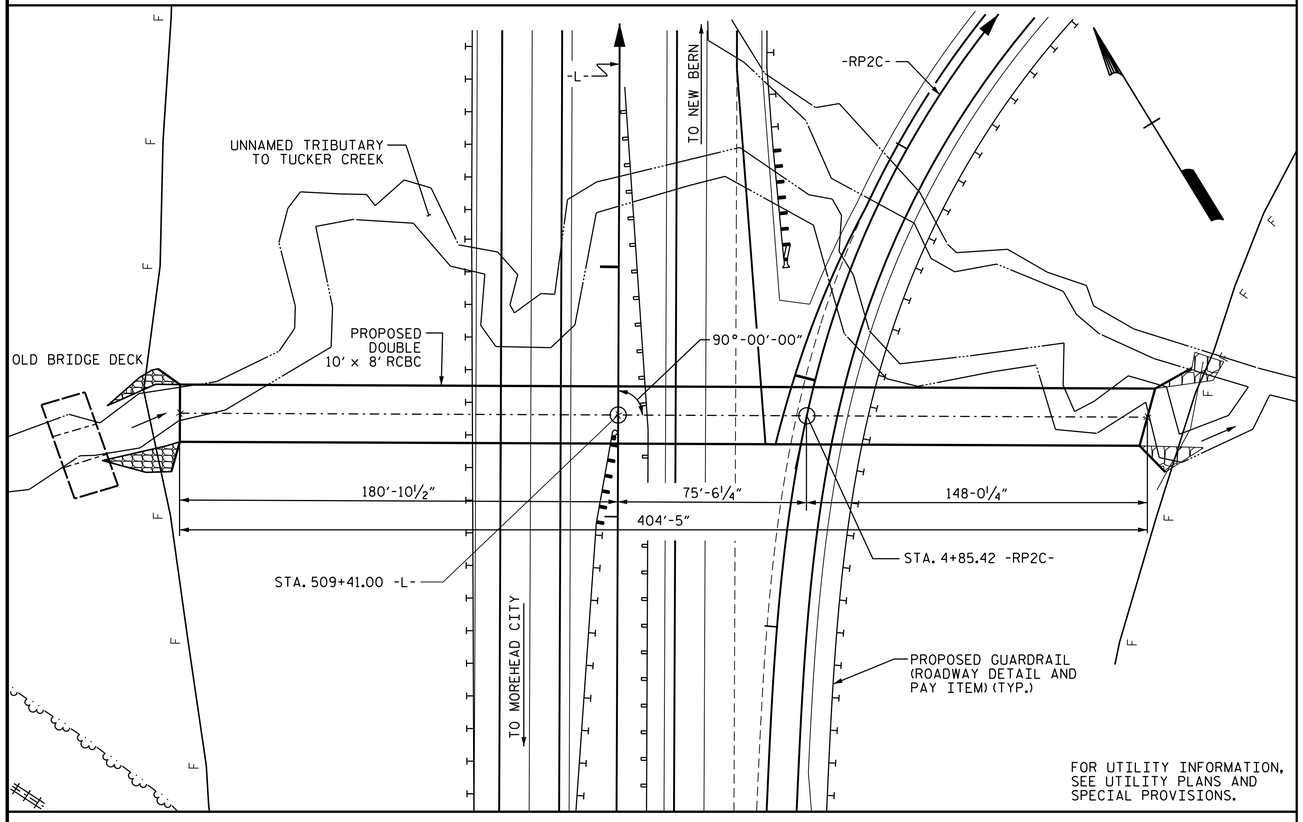
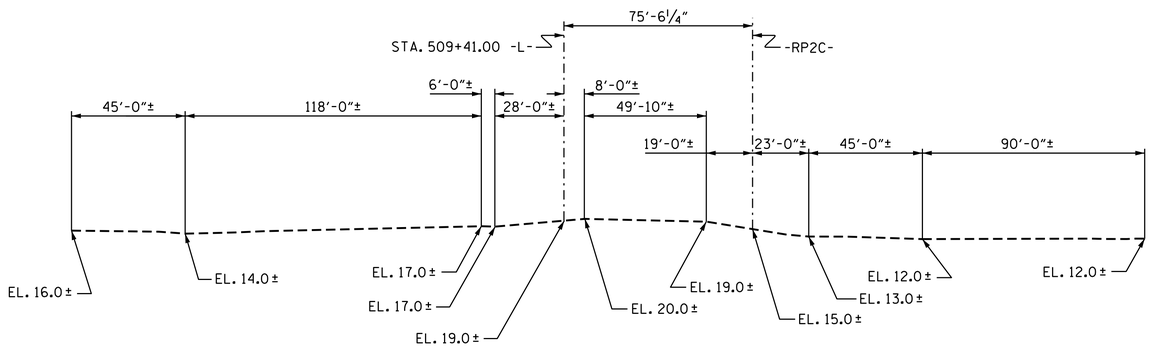
BM#26: RR SPIKE IN 8" OAK TREE, STA. 520+57 -L-, 308' LT, EL. 26.38



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

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 (0100)	= 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.

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 = 60ksi.

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

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.

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

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON

DocuSigned by: P. Korey Newton 11/20/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. C2-1

TOTAL SHEETS 8

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

ADDED NOV. 1, 1990

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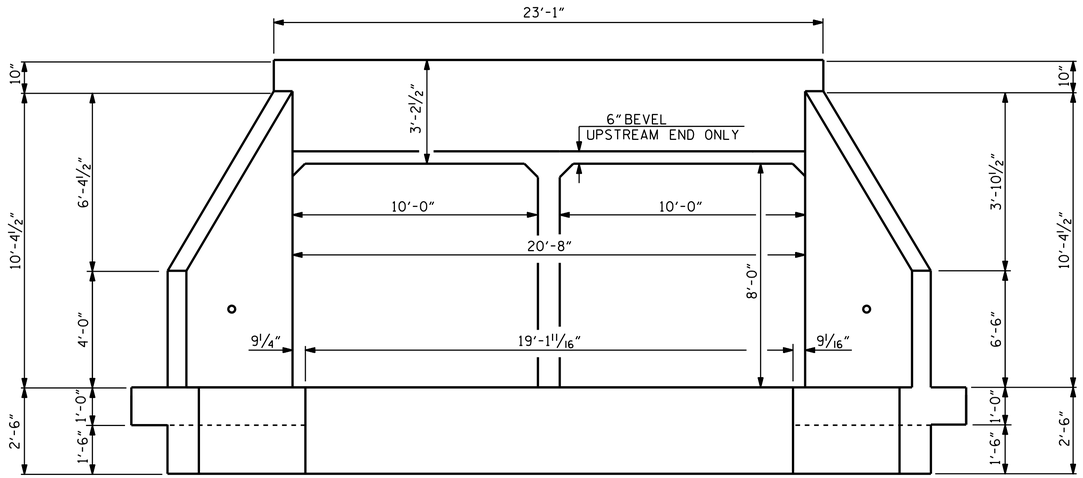
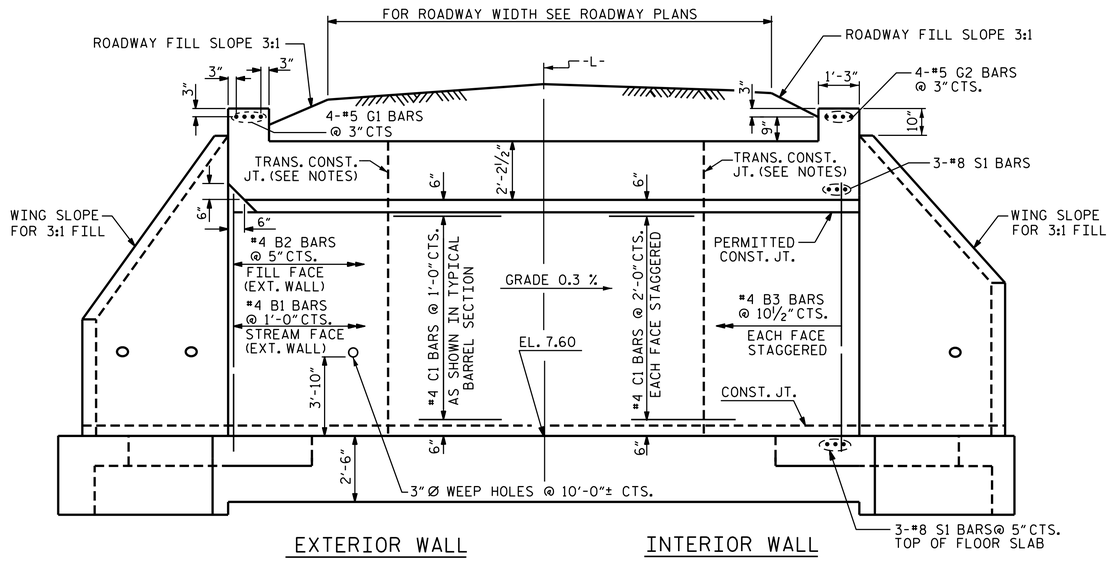
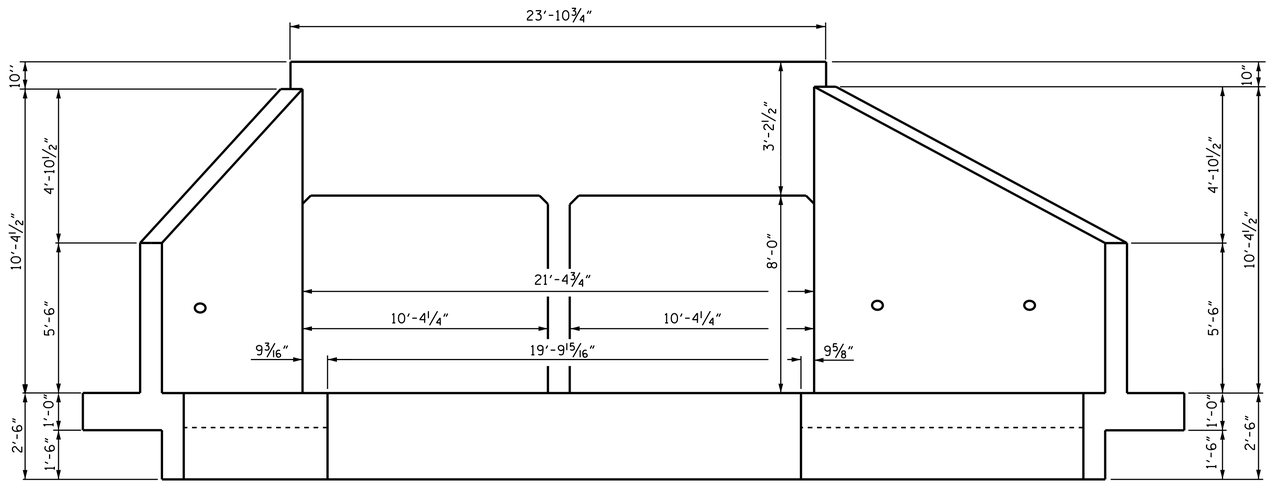
CUL 2



END ELEVATION (AT INLET)



CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW (AT OUTLET)

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	SPECIAL
CHECKED BY : P. K. NEWTON	DATE : 10/22/18	
DRAWN BY : RALPH D. UNDERWOOD	DATE : MAY 1971	STANDARD
CHECKED BY : JOEL A. JOHNSON	DATE : JULY 1971	

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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

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON
DocuSigned by: P. Korey Newton
11/20/2018

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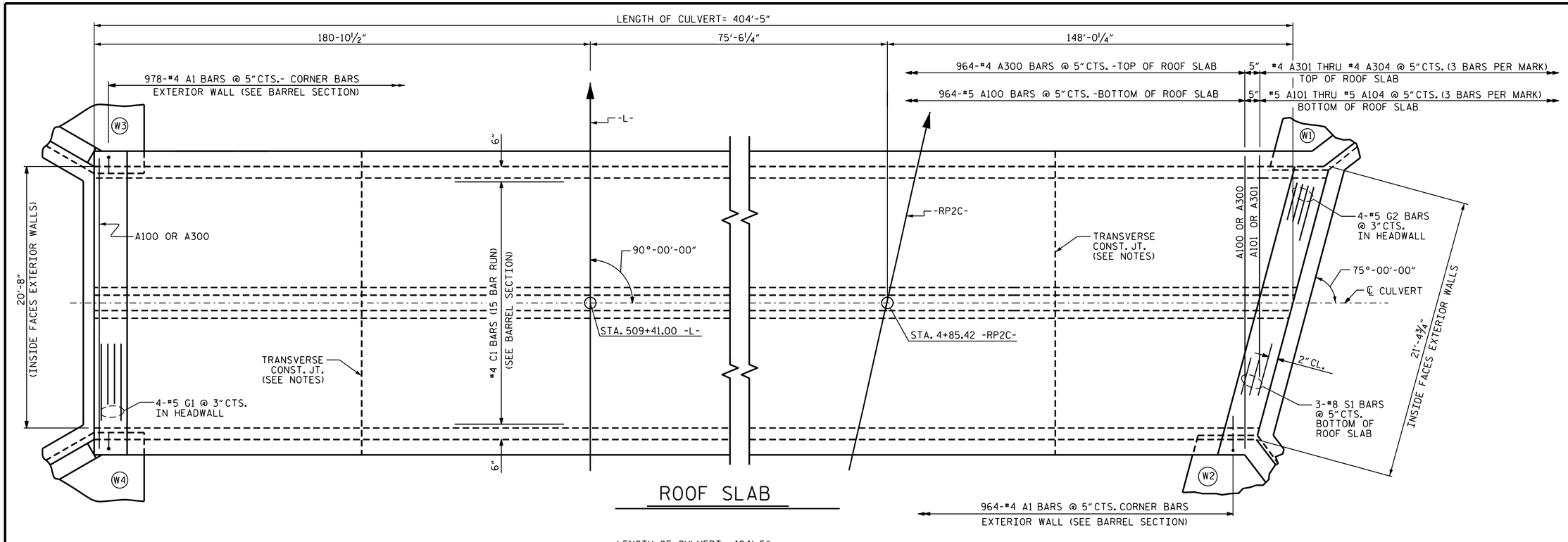
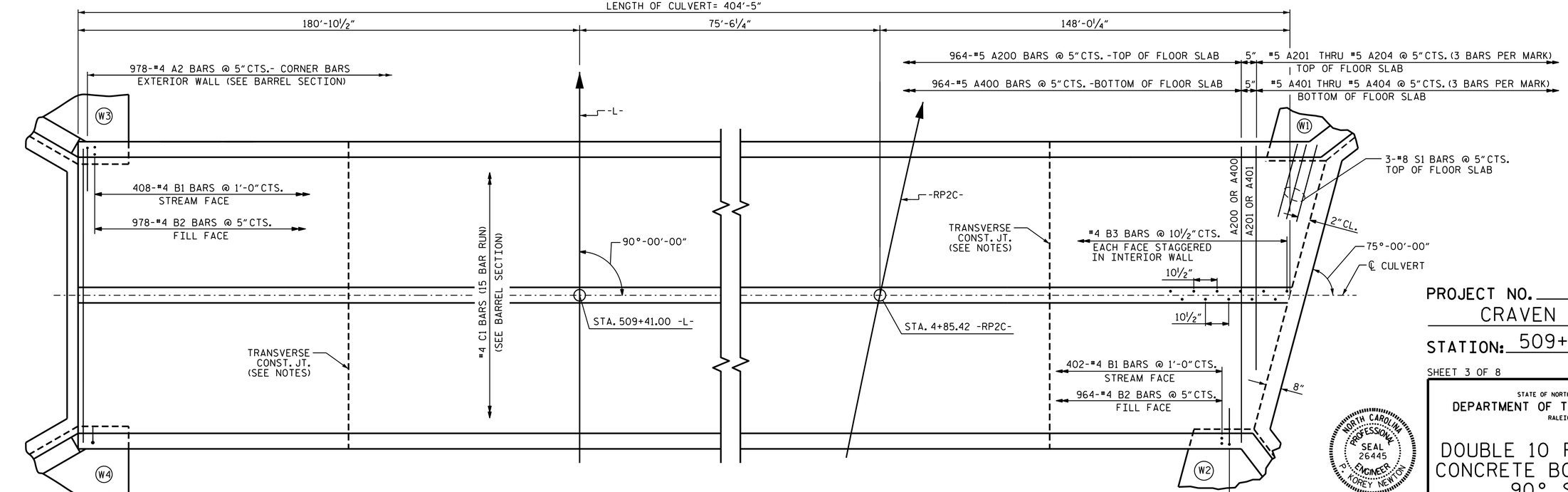
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS
2			4			8

CUL 2



ROOF SLAB



FLOOR SLAB

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

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

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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

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON
DocuSigned by: P. Korey Newton 4FFE39D1431B407...
11/20/2018

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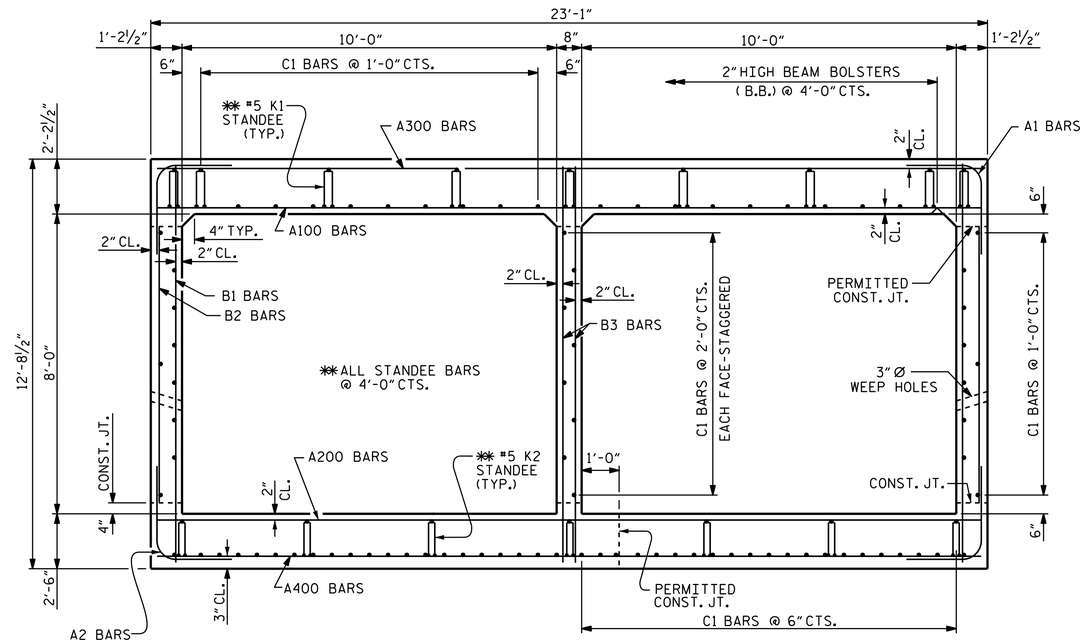
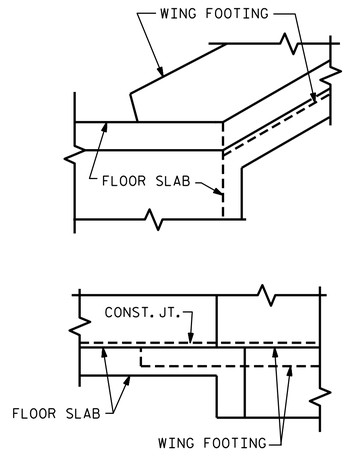
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-3
1			3			TOTAL SHEETS
2			4			8

CUL 2



RIGHT ANGLE SECTION OF BARREL

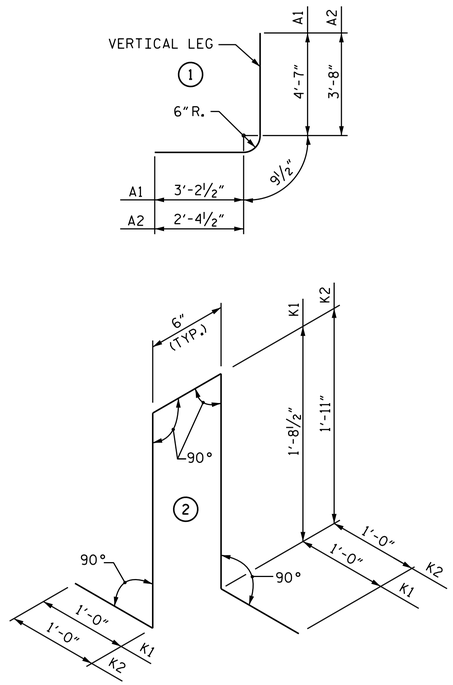
THERE ARE 102 "C" BARS IN SECTION OF BARREL.



DETAIL

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

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

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

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"

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
CHECKED BY : P. K. NEWTON DATE : 10/22/18
DRAWN BY : RALPH D. UNDERWOOD DATE : MAY 1971
CHECKED BY : JOEL A. JOHNSON DATE : JULY 1971

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NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON

DocuSigned by:
P. Korey Newton
11/20/2018

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

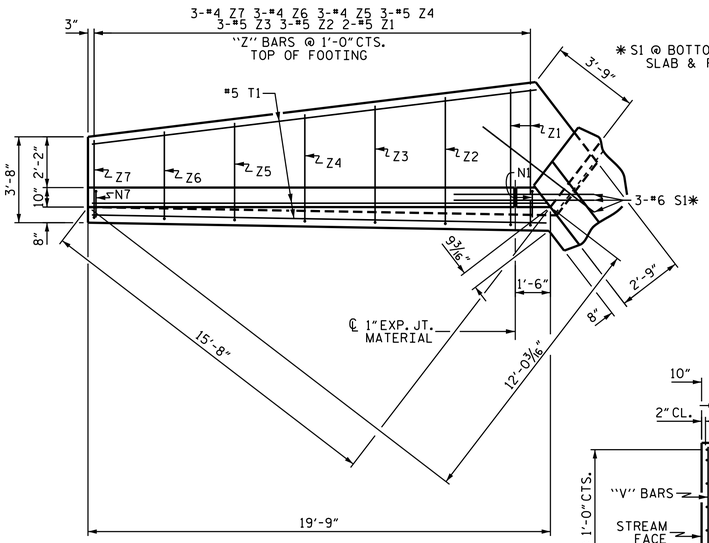
SHEET 4 OF 8

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

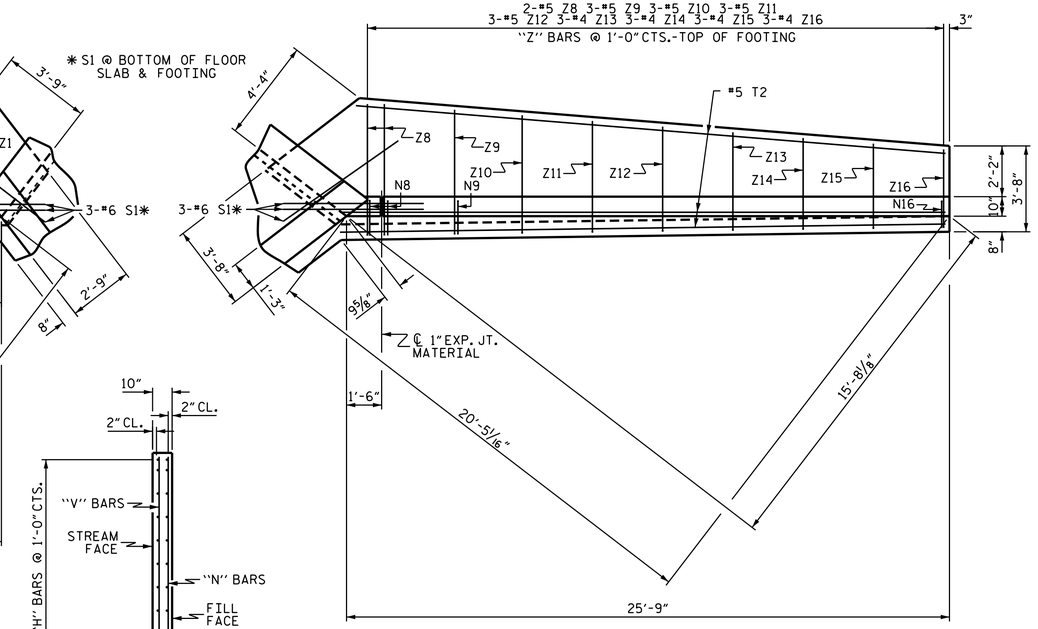
DOUBLE 10 FT. X 8 FT. CONCRETE BOX CULVERT 90° SKEW

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

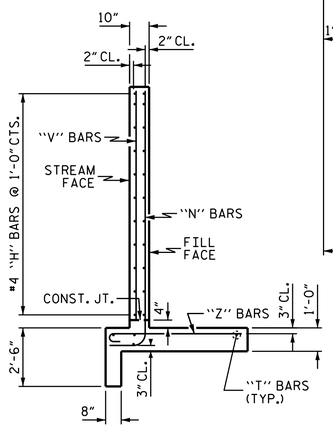
CUL 2



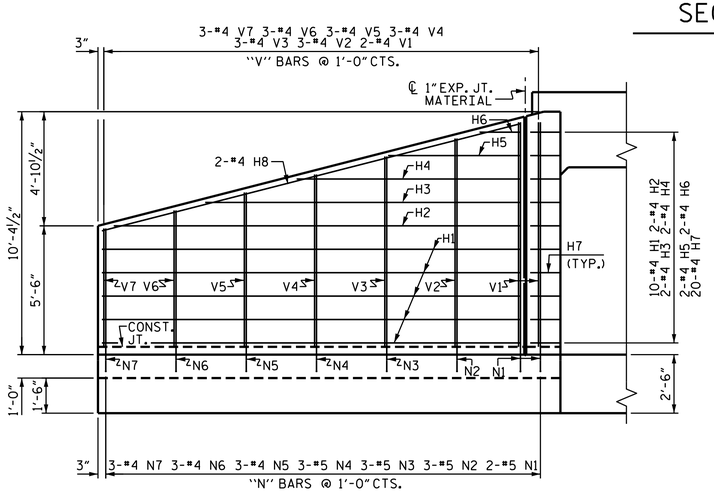
PLAN W2



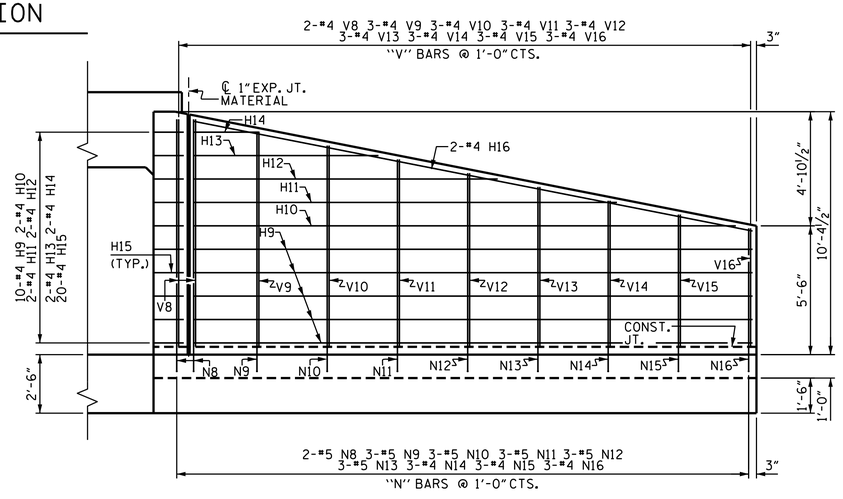
PLAN W1



TYPICAL WING SECTION



ELEVATION W2



ELEVATION W1

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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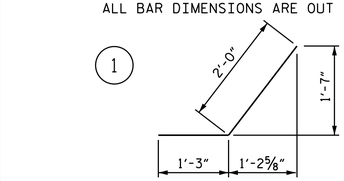
BILL OF MATERIAL

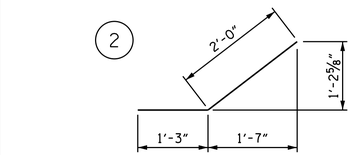
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	10	#4	STR	17'-10"	119
H2	2	#4	STR	17'-4"	23
H3	2	#4	STR	13'-4"	18
H4	2	#4	STR	9'-5"	13
H5	2	#4	STR	5'-5"	7
H6	2	#4	STR	1'-5"	2
H7	20	#4	1	3'-3"	43
H8	2	#4	STR	18'-5"	25
H9	10	#4	STR	23'-10"	159
H10	2	#4	STR	23'-2"	31
H11	2	#4	STR	17'-11"	24
H12	2	#4	STR	12'-9"	17
H13	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

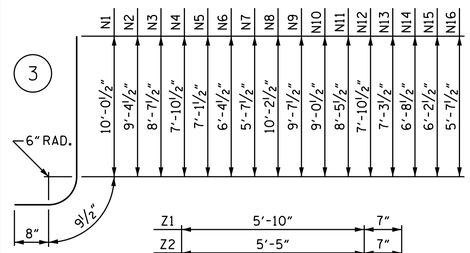
REINFORCING STEEL		
FOR 2 WINGS	1985	LBS
CLASS A CONCRETE		
2 WINGS	21.1	CY
1 HEADWALLS	1.1	CY
1 END CURTAIN WALLS	1.2	CY
TOTAL	23.4	CY

BAR TYPES

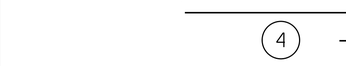
ALL BAR DIMENSIONS ARE OUT TO OUT.







Z1	5'-10"	7"
Z2	5'-5"	7"
Z3	5'-0"	7"
Z4	4'-7"	7"
Z5	4'-2"	6"
Z6	3'-9"	6"
Z7	3'-4"	6"
Z8	5'-7"	7"
Z9	5'-3"	7"
Z10	5'-0"	7"
Z11	4'-9"	7"
Z12	4'-5"	7"
Z13	4'-2"	6"
Z14	3'-11"	6"
Z15	3'-7"	6"
Z16	3'-4"	6"



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)

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON

DocuSigned by: P. Korey Newton 4FFE39D14318407...
11/20/2018

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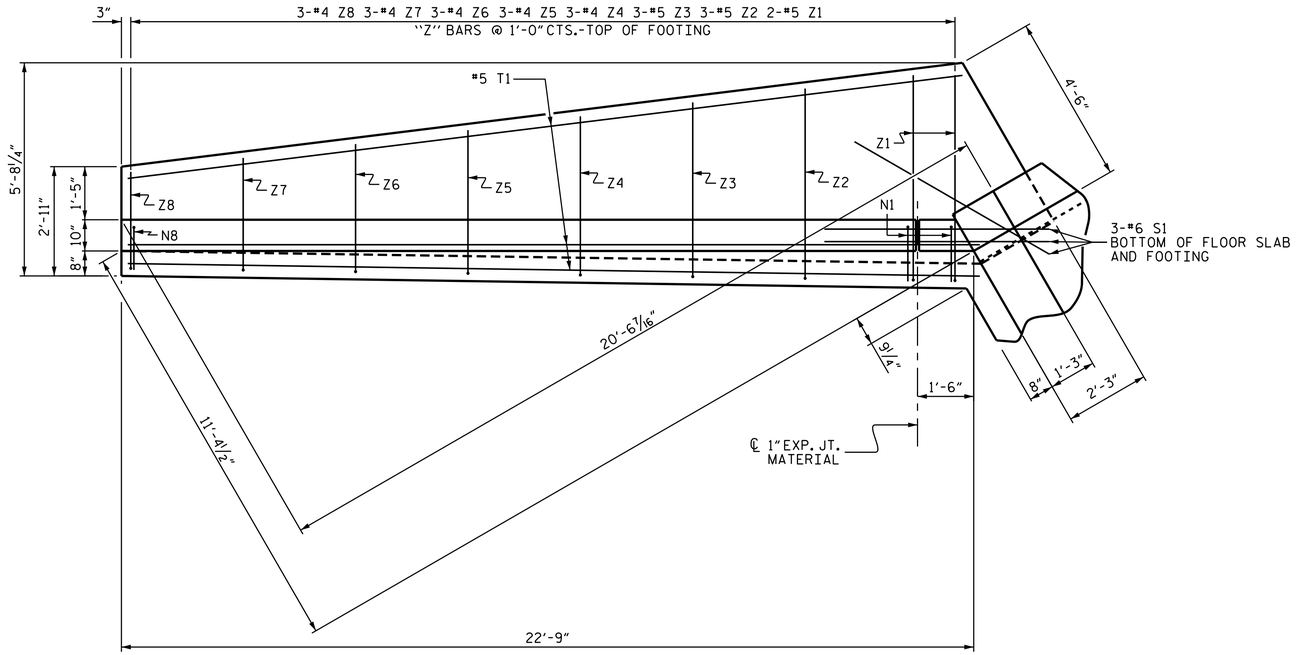
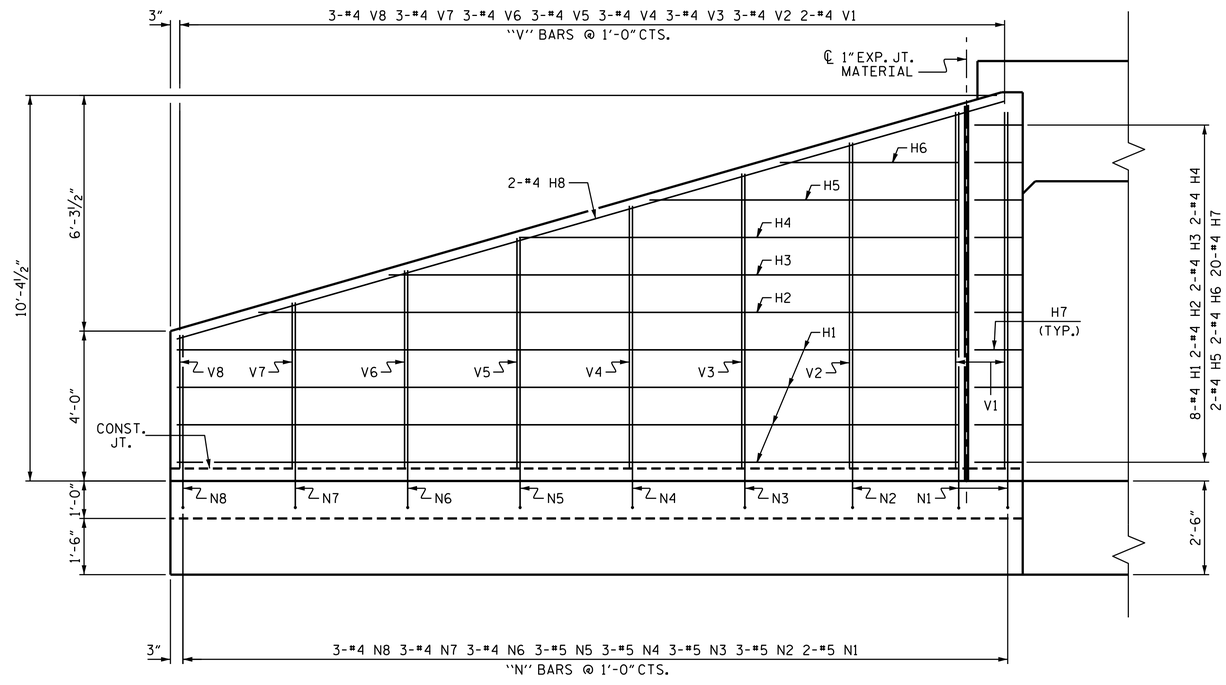
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-5
1			3			TOTAL SHEETS
2			4			8

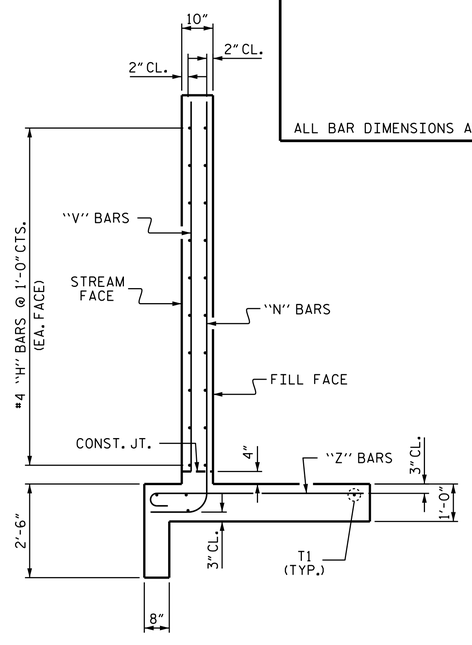
CUL 2



PLAN W3

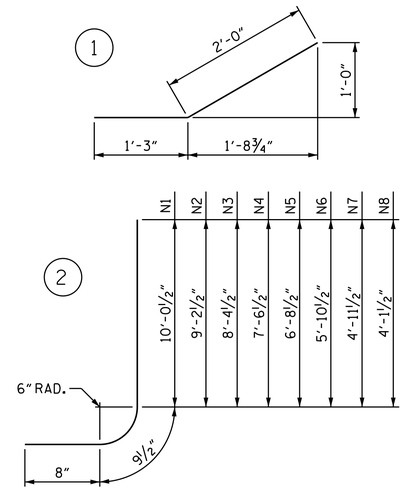


ELEVATION W3



TYPICAL WING SECTION

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

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'-4"	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

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)

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON

DocuSigned by: P. Korey Newton 4FFE39D1431B407...
11/20/2018

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1			3			TOTAL SHEETS
2			4			8

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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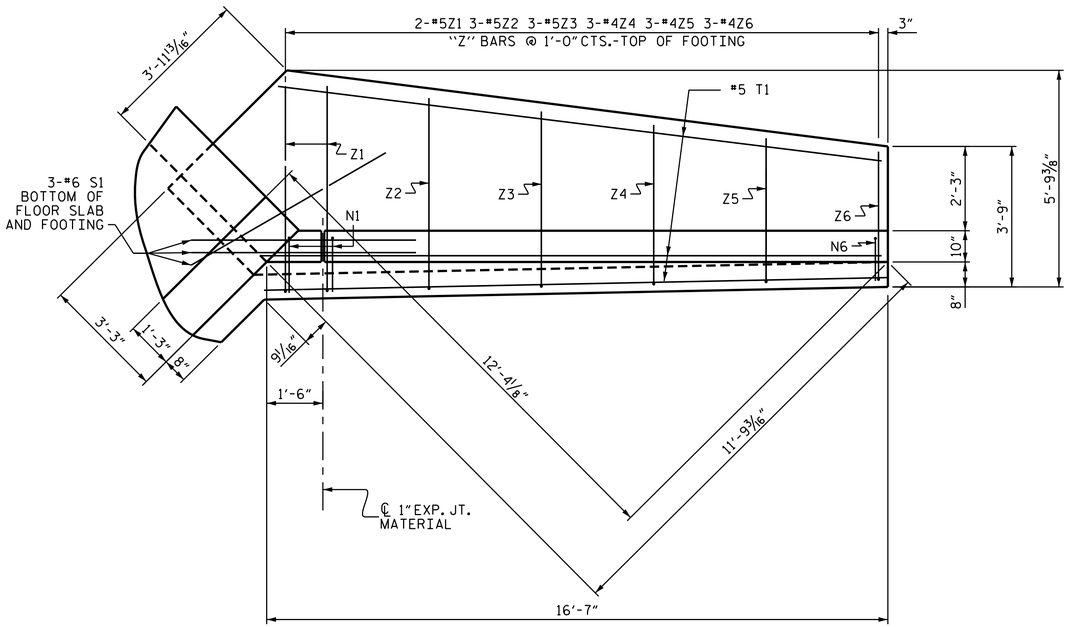
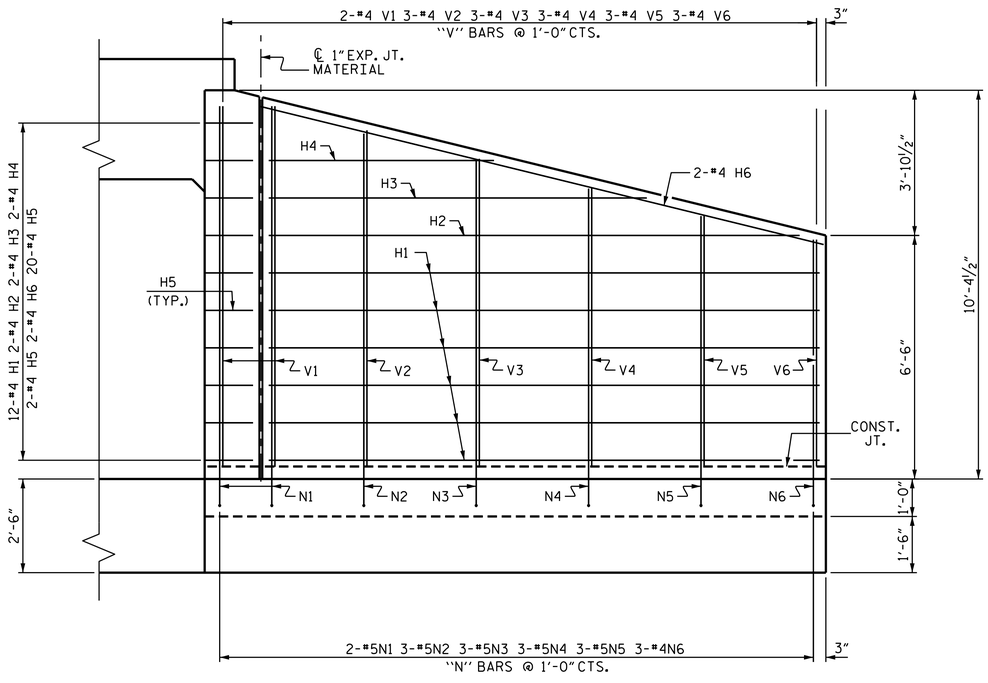
CUL 2

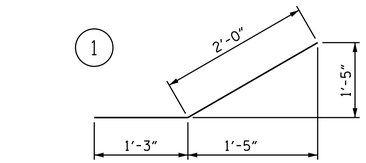


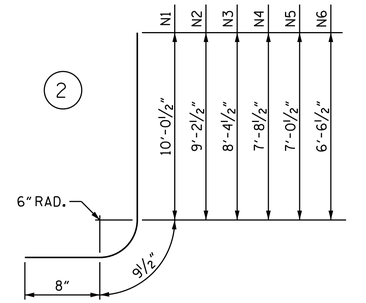
PLAN W4

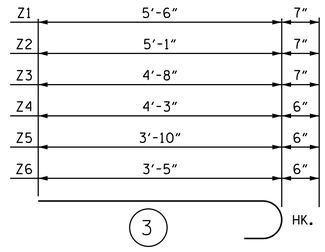


ELEVATION W4

BAR TYPES







ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR ONE WING (INLET END)

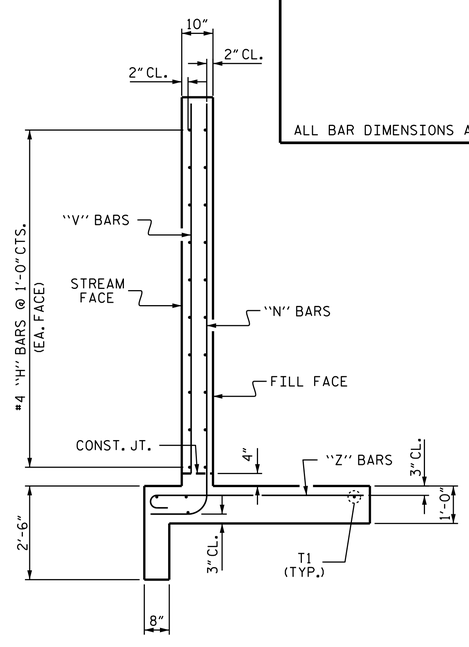
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	14'-9"	118
H2	2	#4	STR	14'-2"	19
H3	2	#4	STR	10'-1"	13
H4	2	#4	STR	6'-0"	8
H5	20	#4	1	3'-3"	43
H6	2	#4	STR	15'-0"	20
N1	2	#5	2	11'-6"	24
N2	3	#5	2	10'-8"	33
N3	3	#5	2	9'-10"	31
N4	3	#5	2	9'-2"	29
N5	3	#5	2	8'-6"	27
N6	3	#4	2	8'-0"	16
S1	3	#6	STR	6'-0"	27
T1	3	#5	STR	16'-7"	52
V1	2	#4	STR	9'-7"	13
V2	3	#4	STR	8'-11"	18
V3	3	#4	STR	8'-2"	16
V4	3	#4	STR	7'-6"	15
V5	3	#4	STR	6'-9"	14
V6	3	#4	STR	6'-0"	12
Z1	2	#5	3	6'-1"	13
Z2	3	#5	3	5'-8"	18
Z3	3	#5	3	5'-3"	16
Z4	3	#4	3	4'-9"	10
Z5	3	#4	3	4'-4"	9
Z6	3	#4	3	3'-11"	8

REINFORCING STEEL FOR 1 WING 622 LBS

CLASS A CONCRETE 1 WING 10.2 CY

TOTAL 10.2 CY

SEE SHEET 6 OF 8 FOR HEADWALL AND END CURTAIN WALL QTYS.



TYPICAL WING SECTION

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 509+41.00 -L-

SHEET 7 OF 8

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WING W4

H = 8'-0" SLOPE = 3:1
90° SKEW (INLET END)

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER P. KOREY NEWTON

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1			3			TOTAL SHEETS
2			4			8

DRAWN BY :	P. D. BRYANT	DATE : 10/18
CHECKED BY :	K. W. ALFORD	DATE : 10/18
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CUL 2

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
							LIVE-LOAD FACTORS (γ_{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	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.

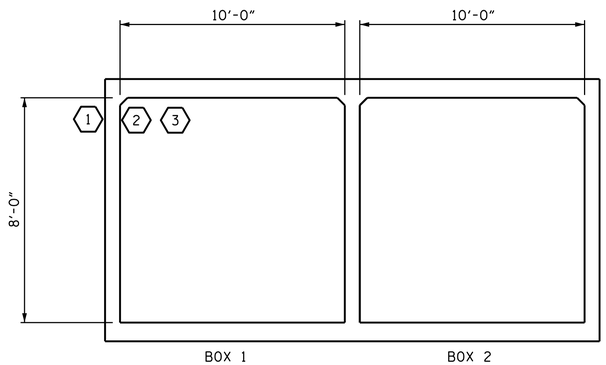
⬡ CONTROLLING LOAD RATING

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)

NORTH CAROLINA PROFESSIONAL SEAL 26445 P.E. ENGINEER K. NEWTON

DocuSigned by: P. Korey Newton 4FFE39D1451B407... 11/20/2018

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			8

CUL 2

STD. NO. LRFR5

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

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (c) RGW REV. 5-7-03 RWW (c) JTE REV. 10-1-11 MAA (c) GM
REV. 8-16-99 RWW (c) LES REV. 5-1-06 TLA (c) GM REV. 12-17 MAA (c) THC