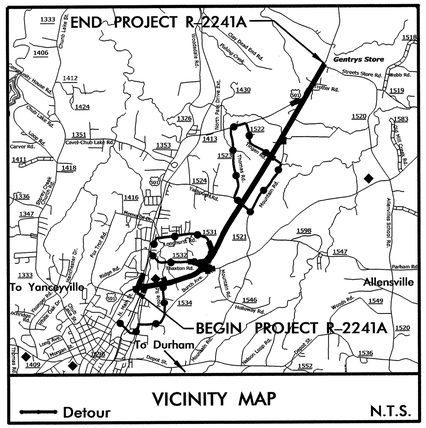
TIP PROJECT: R-2241A

CONTRACT: C202960



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PERSON COUNTY

LOCATION: *US 501 FROM NC 49 IN ROXBORO TO SOUTH OF SR 1602*

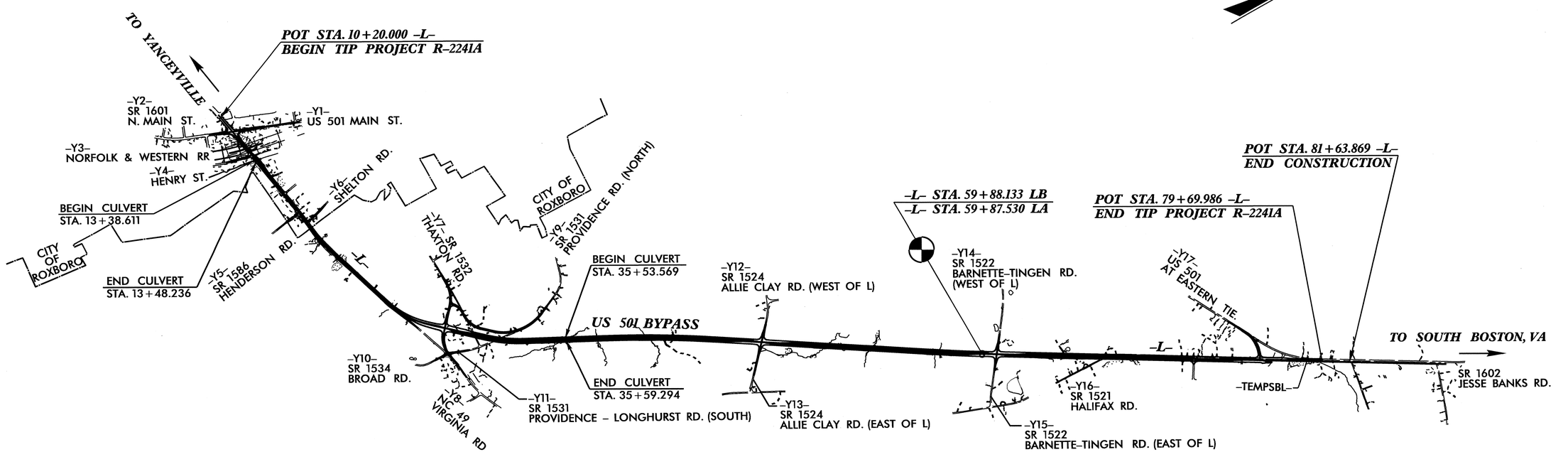
TYPE OF WORK: *GRADING, DRAINAGE, PAVING, CULVERTS, AND SIGNALS*

METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE SHOWN

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2241A		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34406.1.1	MA-STP-501 (1)	PE
34406.2.3	STP-0501 (11)	R/W & UTILITIES
34406.3.2	HHP-0501 (25)	CONST.



CULVERTS

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DESIGN DATA

	5 LANE C&G	4 LANE DIVIDED
ADT 2011 =	10,200	2,900
ADT 2027 =	11,500	4,100
DHV =	9 %	9 %
D =	60 %	55 %
T =	10 %*	21 %*
V =	65 km/h	100 km/h

FUNC. CLASSIFICATION: ARTERIAL

* TTST 5% + DUAL 5%
** TTST 10% + DUAL 11%
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2241A = 6.951 km
(LENGTH BASED ON SOUTHBOUND LANE)

LENGTH STRUCTURES TIP PROJECT R-2241A = 0.015 km

TOTAL LENGTH TIP PROJECT R-2241A = 6.966 km

Prepared In the Office of:
DIVISION OF HIGHWAYS

2006 STANDARD SPECIFICATIONS

LETTING DATE :
APRIL 16, 2013

J. M. BAILEY, P.E.
PROJECT ENGINEER

K. W. ALFORD, P.E.
PROJECT DESIGN ENGINEER

STRUCTURES MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

19-FEB-2013 11:36
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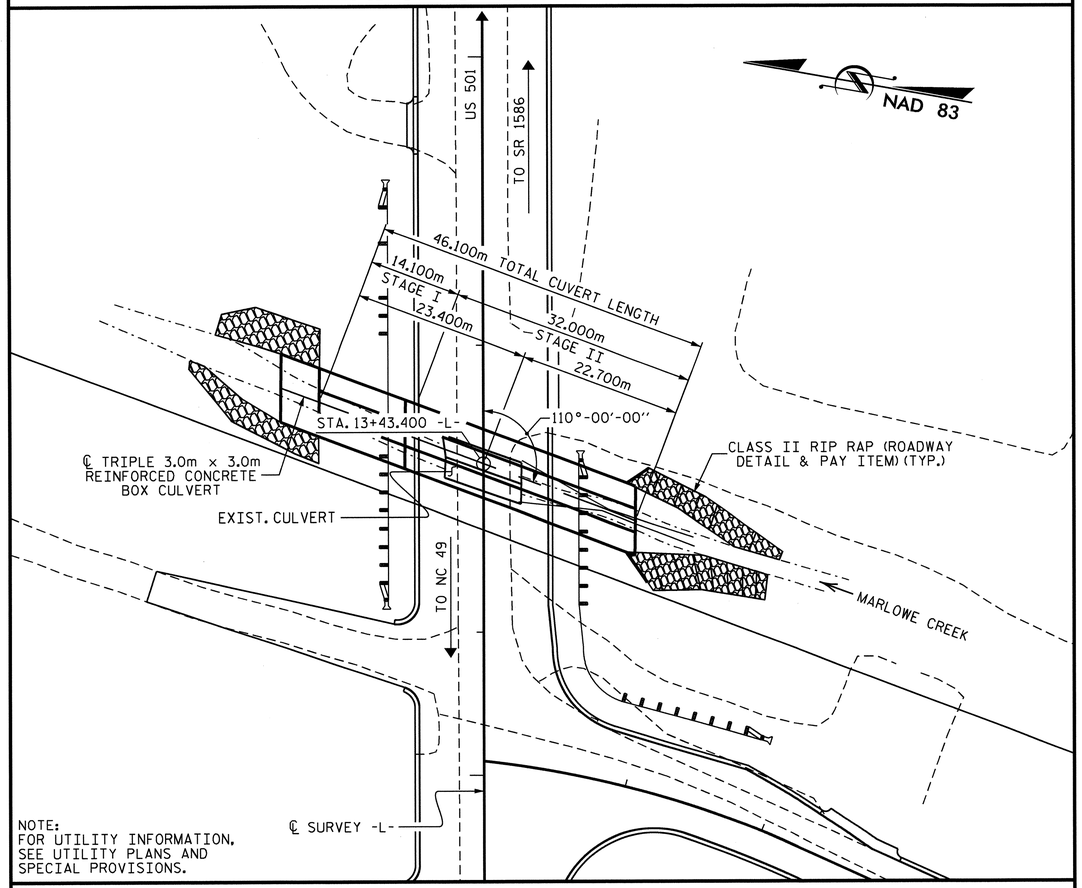
kalford

B.M. #402: NAIL SET IN POWER POLE 23m LT OF -L- 12+73.000, ELEV 180.597



LOCATION SKETCH

TEMPORARY SHORING NOT SHOWN FOR CLARITY. SEE TRAFFIC CONTROL PLANS FOR TEMPORARY SHORING LOCATIONS.

HYDRAULIC DATA

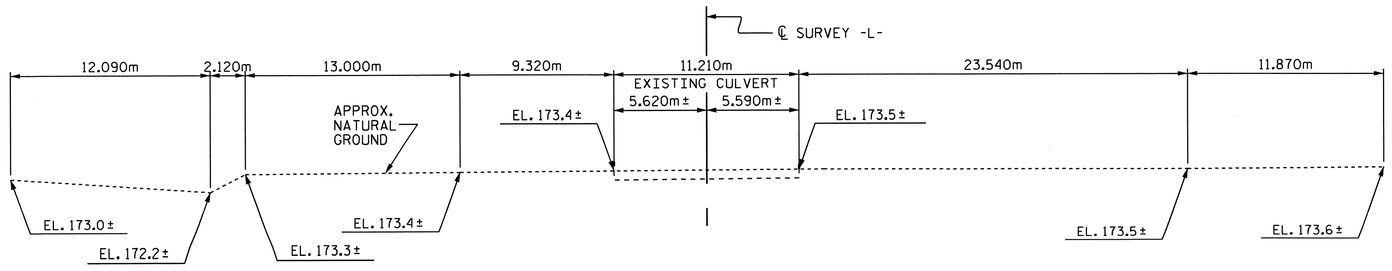
DESIGN DISCHARGE	=	50 m3/s
DESIGN FLOOD FREQUENCY	=	50 YRS
DESIGN HIGH WATER ELEVATION	=	176.82 m
BASE DISCHARGE (Q100)	=	56 m3/s
BASE ELEVATION (Q100)	=	177.01 m
DRAINAGE AREA	=	8.42 sq. Km.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	=	90 m3/s
OVERTOPPING FLOOD FREQUENCY	=	500 YR+
OVERTOPPING FLOOD ELEVATION	=	178.63 m

GRADE DATA

GRADE POINT ELEV. @ STA. 13+43.400 -L-	=	179.62 m
BED ELEV. @ STA. 13+43.400 -L-	=	173.05 m
ROADWAY SLOPE	=	2:1



PROFILE ALONG ℄ CULVERT

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

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kalford

STAGE I QUANTITIES

CLASS A CONCRETE

BARREL @ 8.78 m3/m	123.8 m3
OUTLET WINGS	28.4 m3
TOTAL	152.2 m3

REINFORCING STEEL

BARREL	17,022 kg
OUTLET WINGS	472 kg
TOTAL	17,494 kg

FOUND. CONDITIONING MAT'L.	153 METRIC TONS
CULVERT EXCAVATION	LUMP SUM

STAGE II QUANTITIES

CLASS A CONCRETE

BARREL @ 8.78 m3/m	281.0 m3
INLET WINGS	14.5 m3
TOTAL	295.5 m3

REINFORCING STEEL

BARREL	31,013 kg
INLET WINGS	573 kg
TOTAL	31,586 kg

FOUND. CONDITIONING MAT'L.	240 METRIC TONS
CULVERT EXCAVATION	LUMP SUM

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE

STAGE I	152.2 m3
STAGE II	295.5 m3
TOTAL	447.7 m3

REINFORCING STEEL

STAGE I	17,494 kg
STAGE II	31,586 kg
TOTAL	49,080 kg

FOUNDATION CONDITIONING MAT'L

STAGE I	153 METRIC TONS
STAGE II	240 METRIC TONS
TOTAL	393 METRIC TONS

CULVERT EXCAVATION	LUMP SUM

METRIC

NOTES:

ASSUMED LIVE LOAD ----------MS18 OR ALTERNATE LOADING.

DESIGN FILL---------- 3.670m MAX. FILL. --- 0.750m MIN. FILL.

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

76mm Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERT TO BE POURED IN THE FOLLOWING ORDER:

PART A
1. OUTLET WING APRON AND FLOOR SLAB OF BARREL 1 INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARREL 1 WALLS AND OUTLET WING FULL HEIGHT

PART B
1. OUTLET WING APRON AND FLOOR SLAB OF BARRELS 2 AND 3 INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARRELS 2 AND 3 WALLS AND OUTLET WING FULL HEIGHT FOLLOWED BY THE ROOF SLAB AND HEADWALL.

PART C
1. INLET WING FOOTING AND FLOOR SLAB OF BARREL 1 INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARREL 1 WALLS AND INLET WING FULL HEIGHT

PART D
1. INLET WING FOOTING AND FLOOR SLAB OF BARRELS 2 AND 3 INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARRELS 2 AND 3 WALLS AND INLET WING FULL HEIGHT FOLLOWED BY THE ROOF SLAB AND HEADWALL.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

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 360,000 KG OF REINFORCING STEEL, ONE 760mm SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 360,000 KG OF REINFORCING STEEL, TWO 760mm SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLE OF THE REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

A 900mm STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE INLET WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

FOR CONSTRUCTION SEQUENCE, SEE EROSION CONTROL PLANS.

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING 11.22m LONG DOUBLE 2.7m x 2.4m REINFORCED CONCRETE BOX CULVERT LOCATED AT THE PROPOSED CULVERT SHALL BE REMOVED.

THE CONTRACTOR SHALL REMOVE THE EXISTING CULVERT AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

NO SEPARATE PAYMENT SHALL BE MADE FOR REMOVAL OF EXISTING STRUCTURE. COST FOR REMOVAL OF THE EXISTING STRUCTURE SHALL BE INCLUDED IN THE UNIT BID PRICE FOR CULVERT EXCAVATION.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL OF STAGE II, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 21.0m. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

AT THE CONTRACTOR'S OPTION THE VERTICAL CONSTRUCTION JOINT BETWEEN THE OUTLET WINGS AND THE BARREL MAY BE ELIMINATED AND THE "C" BARS IN THE BARREL MAY BE EXTENDED TO REPLACE THE "D" AND "H" BARS IN THE WINGS AND SLAB.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC. SEE ROADWAY PLANS.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

ALL ELEVATIONS ARE IN METERS.

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

Jesse McArthur Bailey 2/20/2013
NORTH CAROLINA PROFESSIONAL SEAL 022206 ENGINEER JESSE McARTHUR BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 022441 ENGINEER TIMOTHY W. ALFORD

F. A. PROJECT HHP-0501(25)

PROJECT NO. R-2241A
PERSON COUNTY
STATION: 13+43.400 -L-

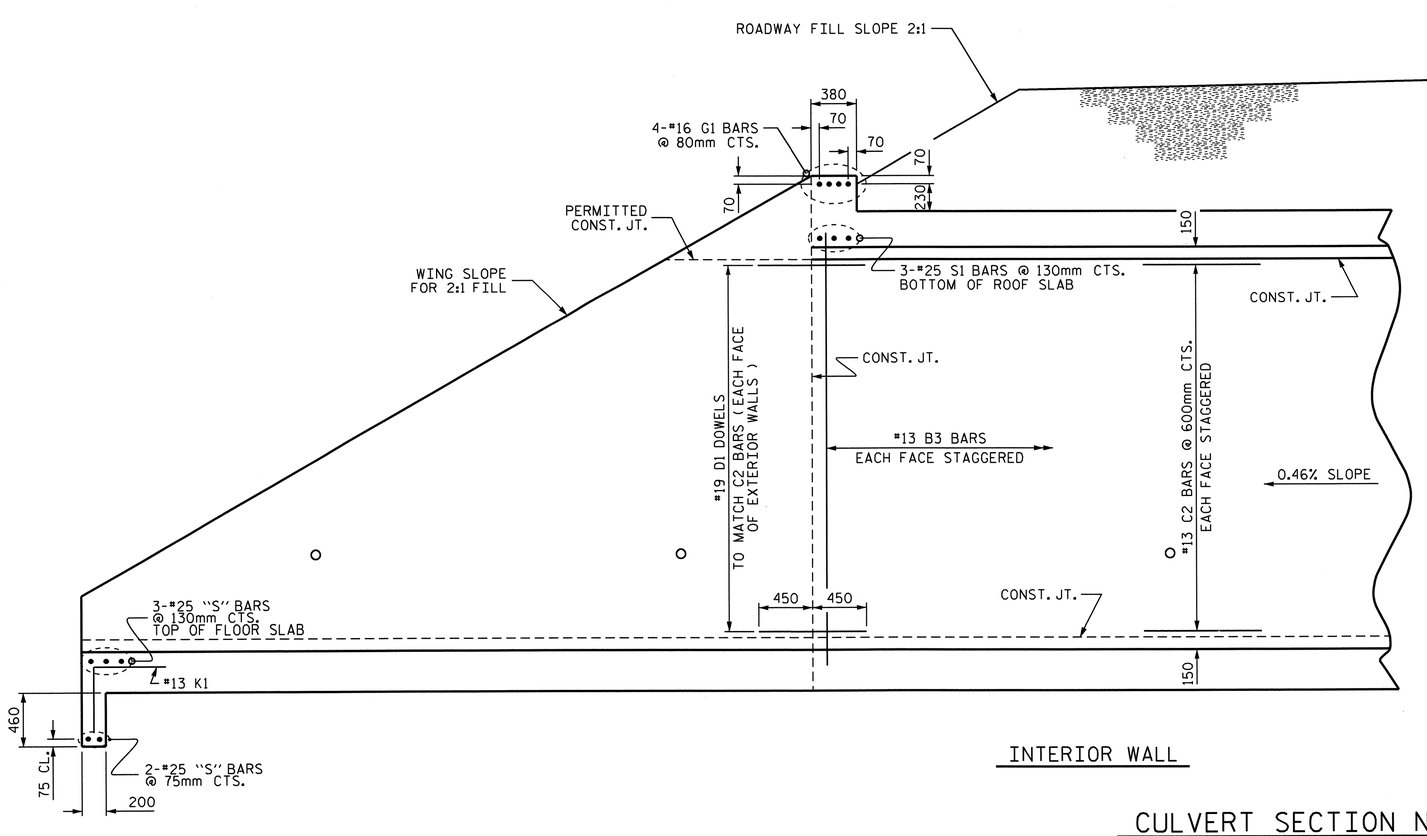
SHEET 1 OF 12 CULVERT NO. 218

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

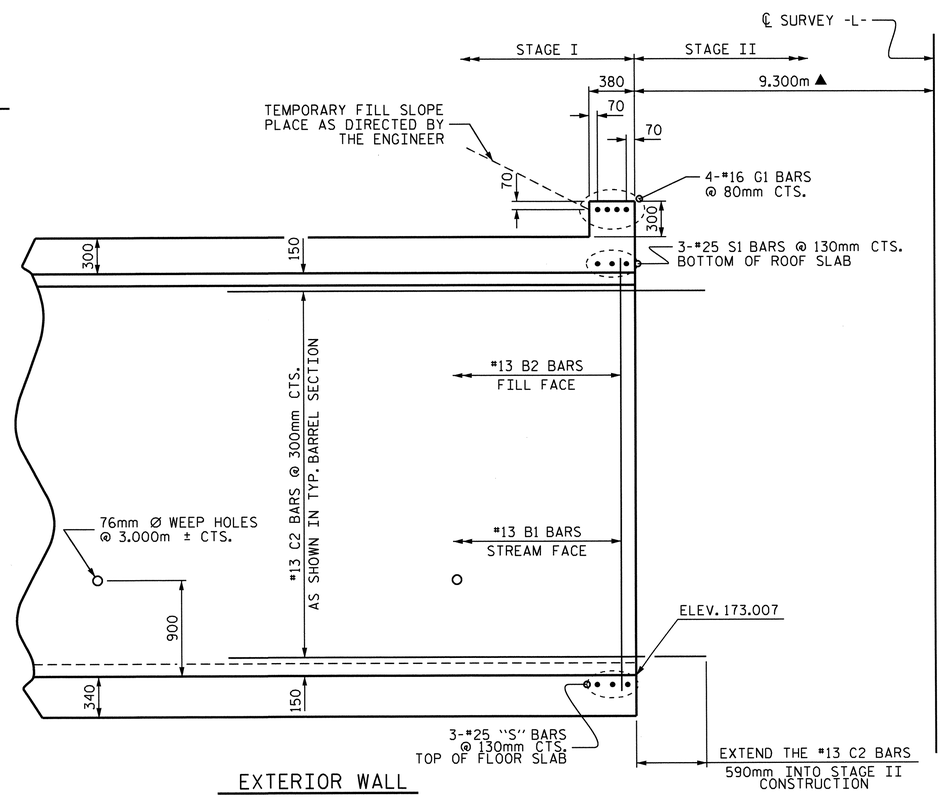
TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-1
1			3			TOTAL SHEETS
2			4			26

STR. #1



INTERIOR WALL



EXTERIOR WALL

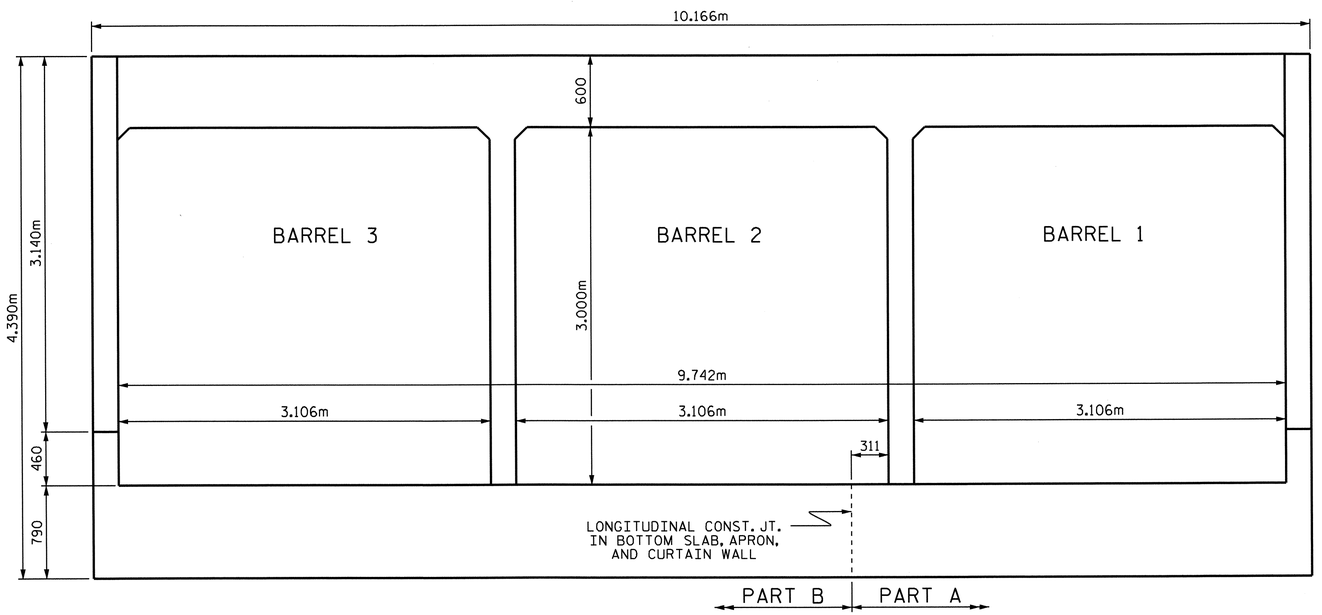
NOTES :
#13 C2 BARS ARE 2 BAR RUN

FOR REINFORCING STEEL IN WING WALLS, SEE SHEET 10 OF 12.

▲ MEASURED ALONG ℄ CULVERT

CULVERT SECTION NORMAL TO ROADWAY

(STAGE I)



OUTLET END ELEVATION

NORMAL TO SKEW (LOOKING UPSTREAM)

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 2 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS
2			4			26

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/18/11

15-AUG-2012 08:13
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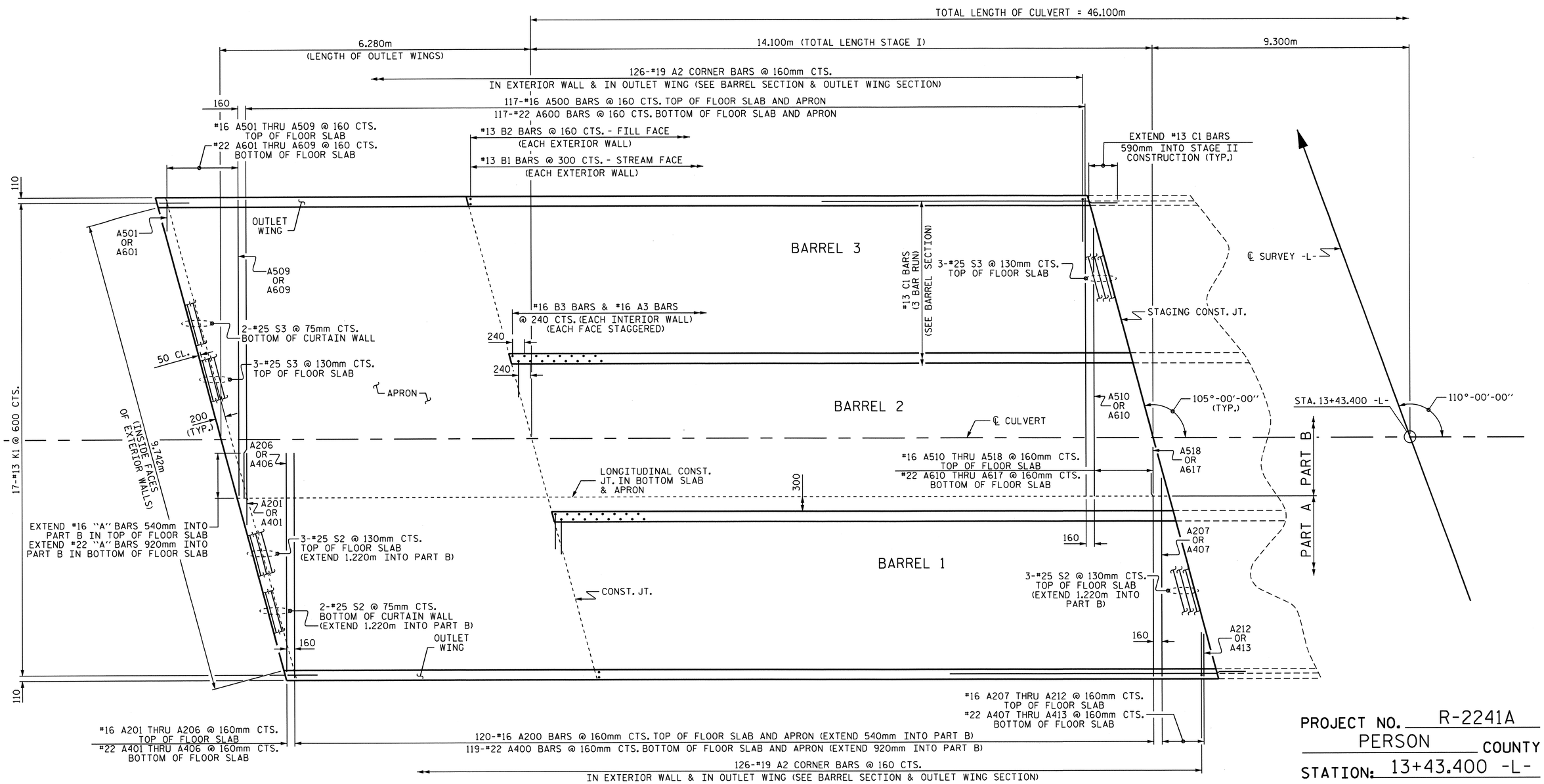
STR. #1



PLAN OF FLOOR SLAB - STAGE I

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 3 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			26

NORTH CAROLINA PROFESSIONAL SEAL 025447 ENGINEER KRISTY W. ALFORD

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/26/11

19-FEB-2013 11:34
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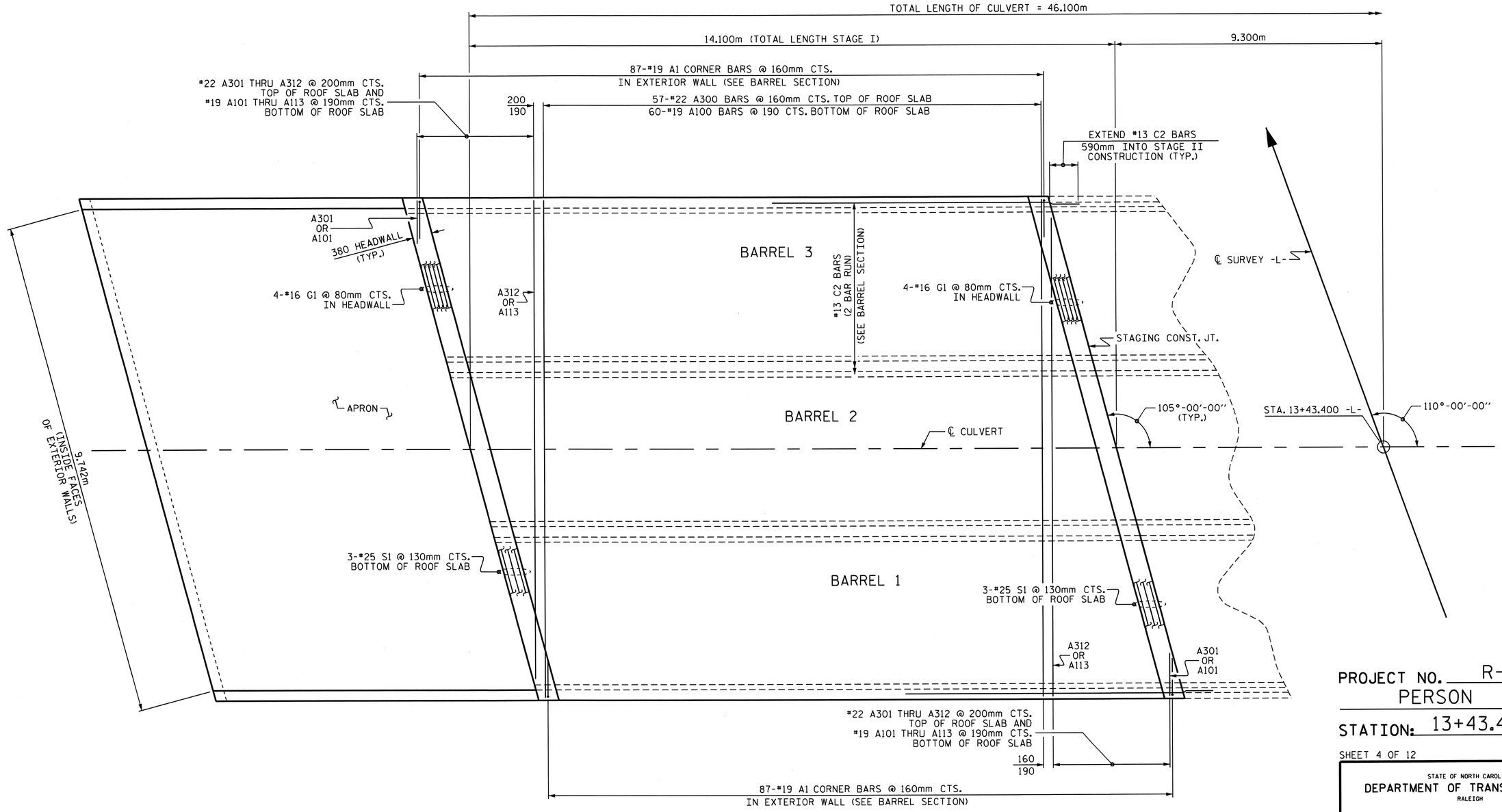
kalford

STR. #1



PLAN OF ROOF SLAB - STAGE I

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 4 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			26

STR. #1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029441 CHRISTY W. ALFORD

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

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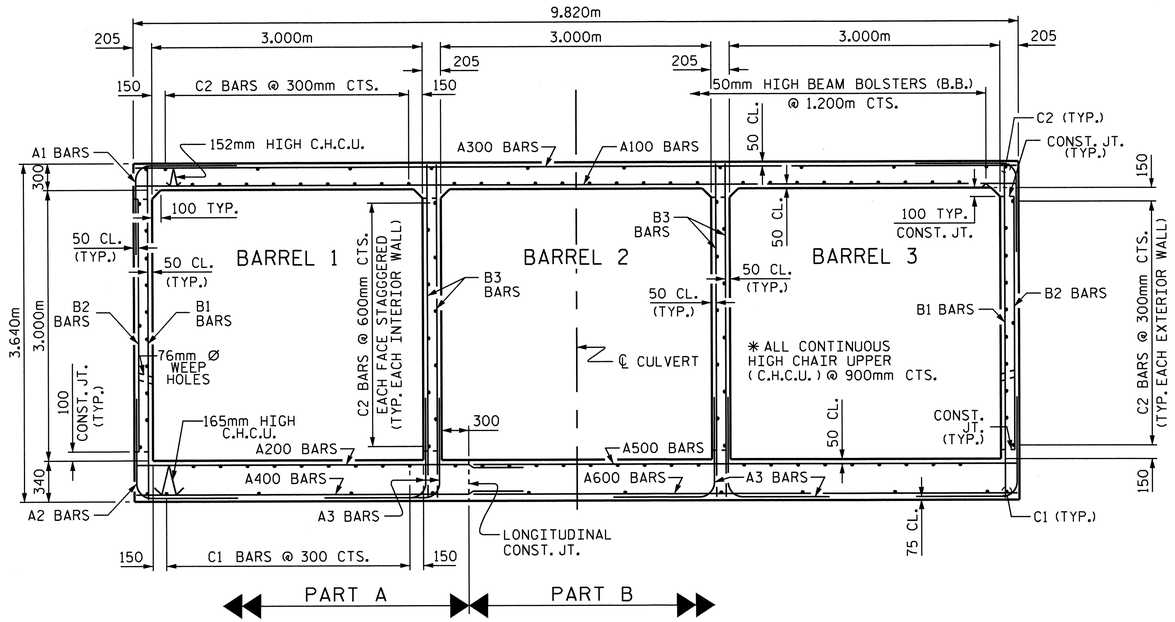
REINFORCING STEEL BAR SCHEDULE FOR BARREL (STAGE I)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	174	#19	1	1780	692	A211	1	#16	STR	1400	2	A413	1	#22	STR	800	2	A608	1	#22	STR	5080	15
A2	252	#19	1	1800	1014	A212	1	#16	STR	800	1							A609	1	#22	STR	5660	17
A3	232	#16	1	1640	591							A500	117	#16	STR	6060	1100	A610	1	#22	STR	5560	17
						A300	57	#22	STR	9680	1678	A501	1	#16	STR	900	1	A611	1	#22	STR	4960	15
A100	60	#19	STR	9680	1298	A301	2	#22	STR	1100	7	A502	1	#16	STR	1480	2	A612	1	#22	STR	4380	13
A101	2	#19	STR	800	4	A302	2	#22	STR	1840	11	A503	1	#16	STR	2080	3	A613	1	#22	STR	3780	11
A102	2	#19	STR	1520	7	A303	2	#22	STR	2580	16	A504	1	#16	STR	2680	4	A614	1	#22	STR	3180	10
A103	2	#19	STR	2220	10	A304	2	#22	STR	3320	20	A505	1	#16	STR	3280	5	A615	1	#22	STR	2580	8
A104	2	#19	STR	2940	13	A305	2	#22	STR	4080	25	A506	1	#16	STR	3880	6	A616	1	#22	STR	1980	6
A105	2	#19	STR	3640	16	A306	2	#22	STR	4820	29	A507	1	#16	STR	4480	7	A617	1	#22	STR	1400	4
A106	2	#19	STR	4360	19	A307	2	#22	STR	5560	34	A508	1	#16	STR	5080	8						
A107	2	#19	STR	5060	23	A308	2	#22	STR	6320	38	A509	1	#16	STR	5660	9	B1	94	#13	STR	3480	325
A108	2	#19	STR	5780	26	A309	2	#22	STR	7060	43	A510	1	#16	STR	5600	9	B2	174	#13	STR	2800	484
A109	2	#19	STR	6480	29	A310	2	#22	STR	7800	47	A511	1	#16	STR	5000	8	B3	232	#16	STR	3480	1253
A110	2	#19	STR	7200	32	A311	2	#22	STR	8560	52	A512	1	#16	STR	4400	7						
A111	2	#19	STR	7900	35	A312	2	#22	STR	9300	57	A513	1	#16	STR	3800	6	C1	120	#13	STR	7380	880
A112	2	#19	STR	8600	38							A514	1	#16	STR	3200	5	C2	164	#13	STR	7620	1242
A113	2	#19	STR	9320	42	A400	119	#22	STR	4580	1658	A515	1	#16	STR	2600	4						
						A401	1	#22	STR	1240	4	A516	1	#16	STR	2000	3	D1	22	#19	STR	900	44
A200	120	#16	STR	4200	782	A402	1	#22	STR	1840	6	A517	1	#16	STR	1420	2						
A201	1	#16	STR	840	1	A403	1	#22	STR	2440	7	A518	1	#16	STR	820	1	G1	8	#16	STR	10060	125
A202	1	#16	STR	1440	2	A404	1	#22	STR	3040	9												
A203	1	#16	STR	2040	3	A405	1	#22	STR	3620	11	A600	117	#22	STR	6060	2157	K1	17	#13	2	1020	17
A204	1	#16	STR	2640	4	A406	1	#22	STR	4220	13	A601	1	#22	STR	900	3						
A205	1	#16	STR	3240	5	A407	1	#22	STR	4380	13	A602	1	#22	STR	1480	5	S1	6	#25	STR	10060	240
A206	1	#16	STR	3820	6	A408	1	#22	STR	3780	11	A603	1	#22	STR	2080	6	S2	8	#25	STR	5020	160
A207	1	#16	STR	3800	6	A409	1	#22	STR	3180	10	A604	1	#22	STR	2680	8	S3	8	#25	STR	6260	199
A208	1	#16	STR	3200	5	A410	1	#22	STR	2580	8	A605	1	#22	STR	3280	10						
A209	1	#16	STR	2600	4	A411	1	#22	STR	1980	6	A606	1	#22	STR	3880	12						
A210	1	#16	STR	2000	3	A412	1	#22	STR	1380	4	A607	1	#22	STR	4480	14	REINFORCING STEEL = 17,022 KG					



RIGHT ANGLE SECTION OF BARREL

(STAGE I)

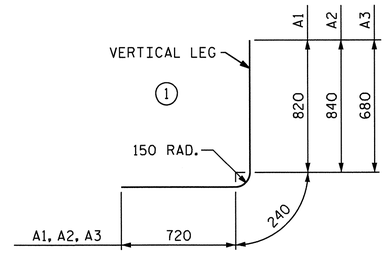
LOOKING DOWNSTREAM

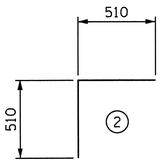
THERE ARE 122 "C" BARS IN SECTION OF BARREL.

NOTES: C1 BARS ARE 3 BAR RUNS
C2 BARS ARE 2 BAR RUNS

NOTE:

DIMENSIONS FOR OUTLET WINGS LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON SHEET 10 OF 12.





BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
A200 & A500	16	540
A400 & A600	22	920
B1	13	540
B3	16	540
C1 & C2	13	590
S2 & S3	25	1220

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 5 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			26

STR. #1

NORTH CAROLINA PROFESSIONAL SEAL 026441 ENGINEER TRISTY W. ALFORD

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

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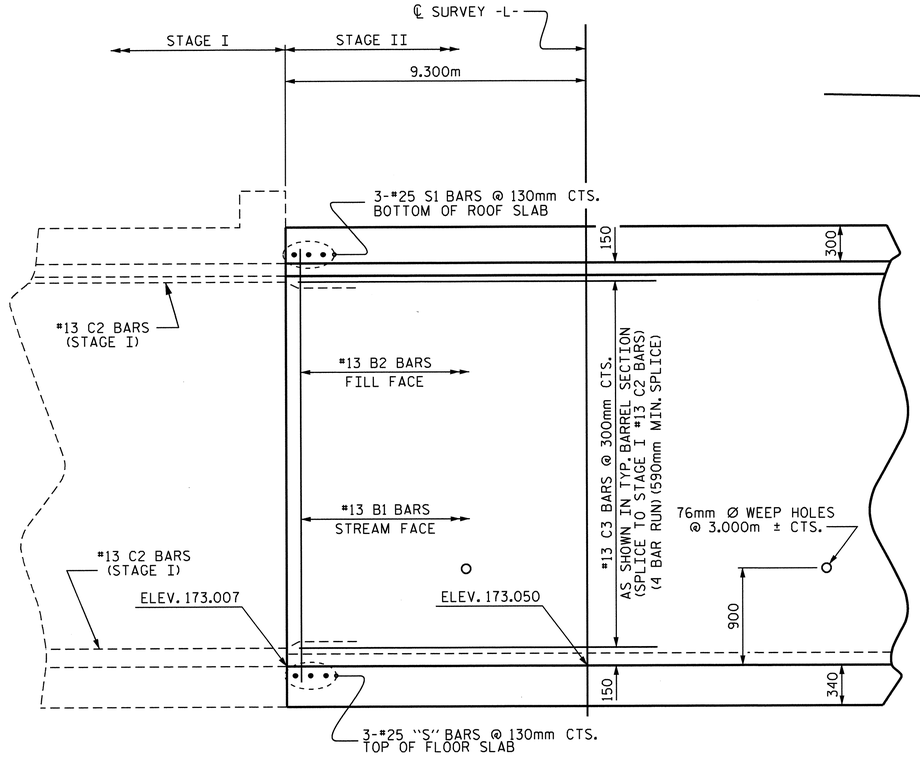
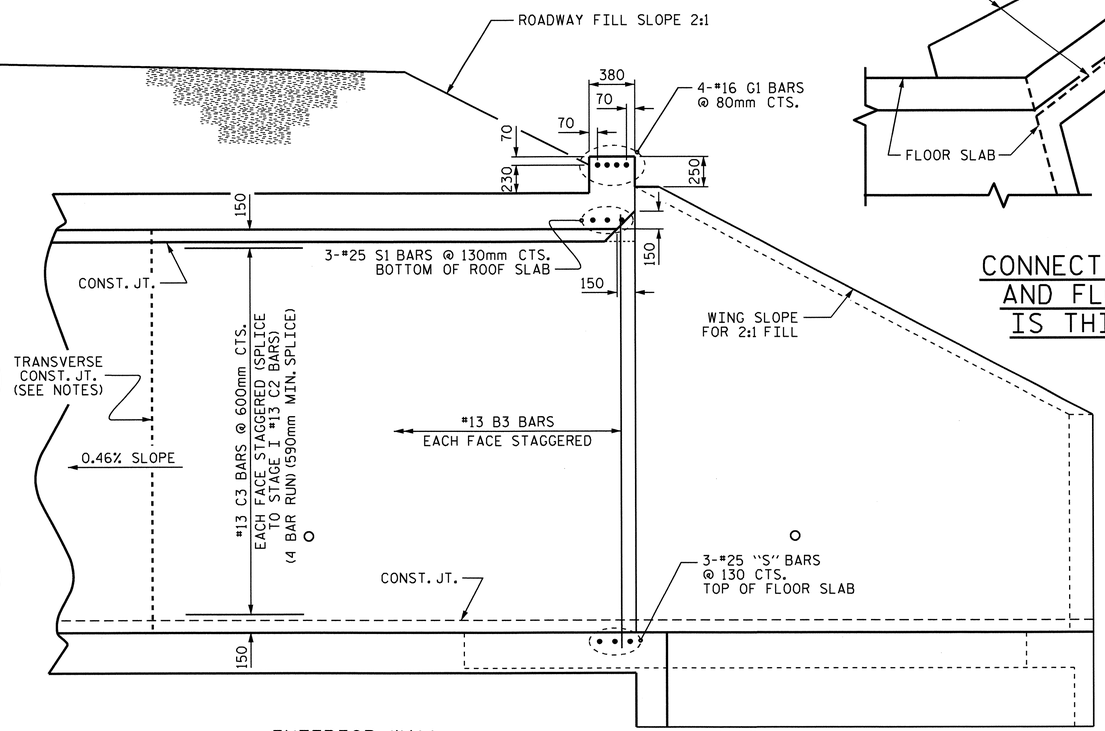
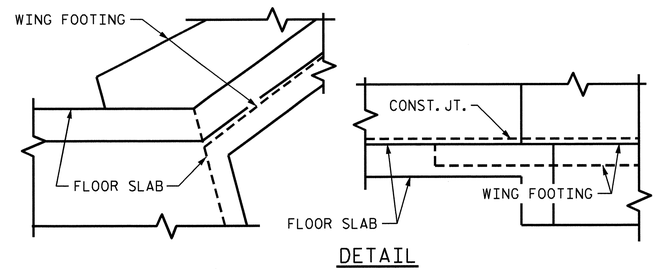
kalford



EXTERIOR WALL



INTERIOR WALL

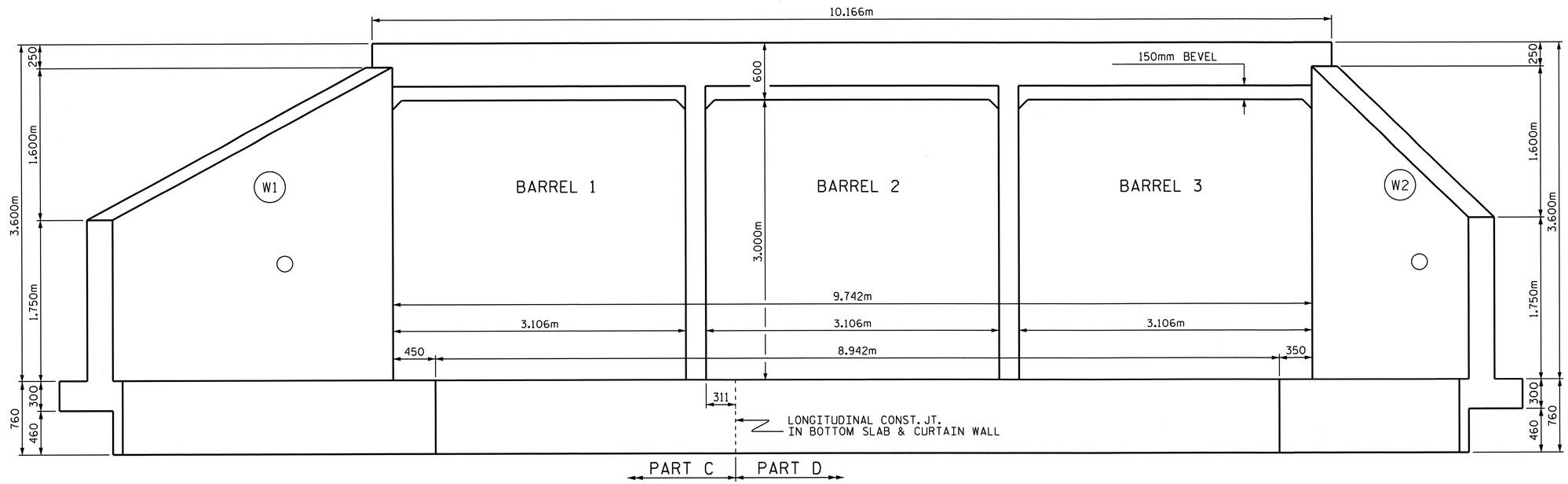


DETAIL

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

CULVERT SECTION NORMAL TO ROADWAY

(STAGE II)



INLET END ELEVATION

NORMAL TO SKEW (LOOKING DOWNSTREAM)

NORTH CAROLINA PROFESSIONAL SEAL 025441 ENGINEER KRISTY W. ALFORD

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 6 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE II)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6
1			3			TOTAL SHEETS
2			4			26

STR. #1

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

19-FEB-2013 11:33
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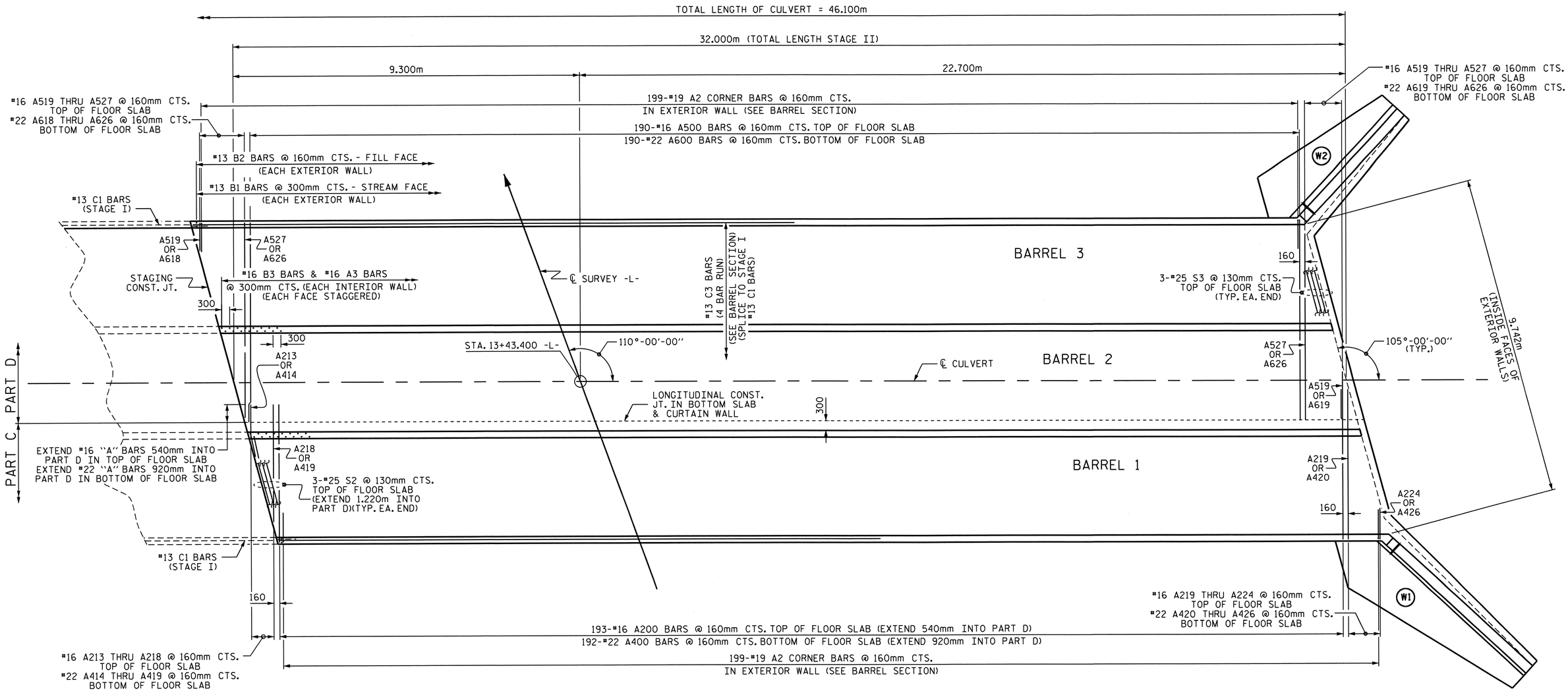
kalford



PLAN OF FLOOR SLAB - STAGE II

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 7 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE II)

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-7
1			3			TOTAL SHEETS
2			4			26

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

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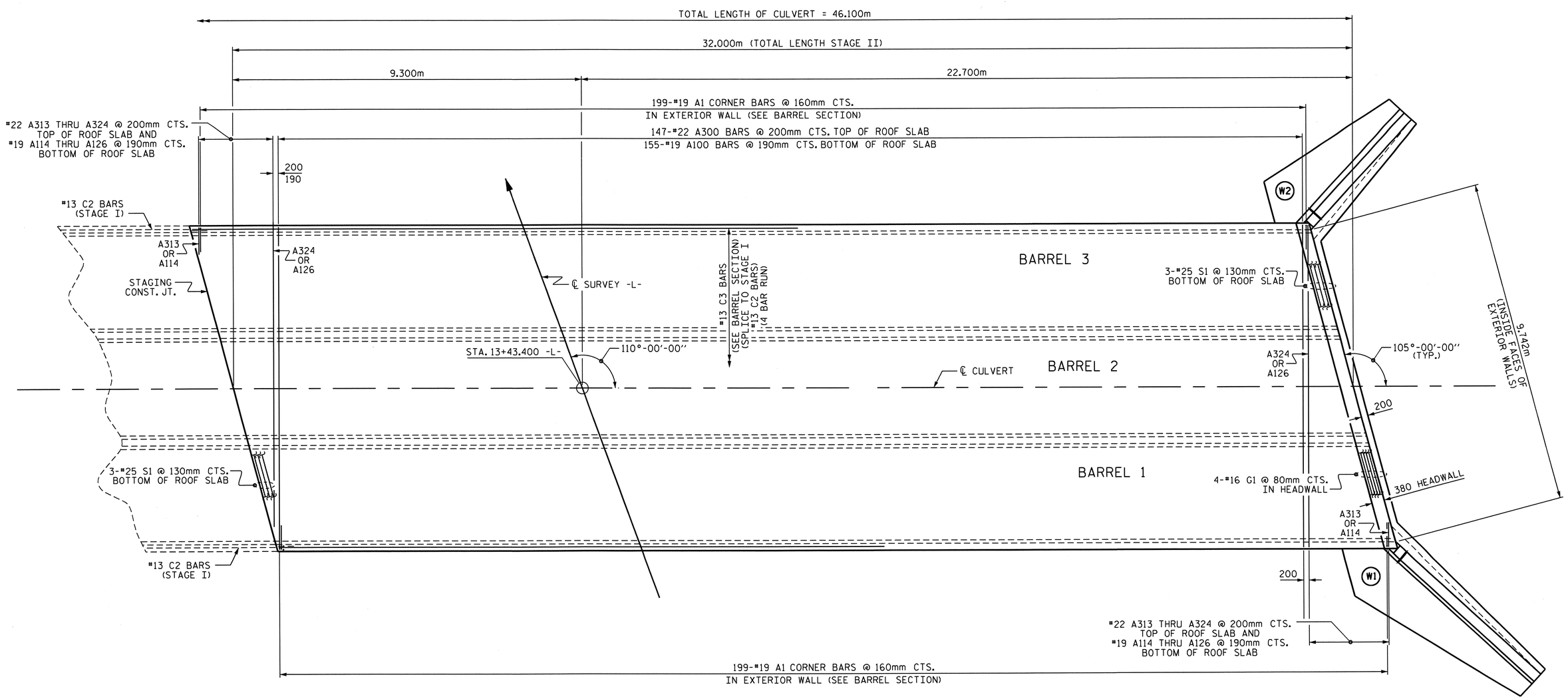
kalford

STR. #1



PLAN OF ROOF SLAB - STAGE II

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 8 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE II)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-8
1			3			TOTAL SHEETS
2			4			26

STR. #1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029441 CHRISTY W. ALFORD

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

15-AUG-2012 08:16
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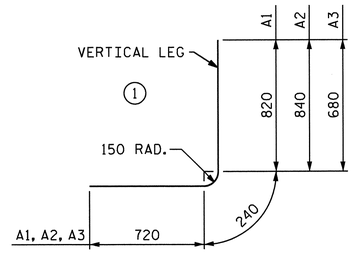
aoutlaw

REINFORCING STEEL BAR SCHEDULE FOR BARREL (STAGE II)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	398	#19	1	1780	1583	A217	1	#16	STR	3120	5	A414	1	#22	STR	1280	4	A600	190	#22	STR	6060	3503
A2	398	#19	1	1800	1601	A218	1	#16	STR	3640	6	A415	1	#22	STR	1880	6	A618	1	#22	STR	760	2
A3	424	#16	1	1640	1079	A219	1	#16	STR	3660	6	A416	1	#22	STR	2480	8	A619	2	#22	STR	1320	8
						A220	1	#16	STR	3060	5	A417	1	#22	STR	3080	9	A620	2	#22	STR	1920	12
A100	155	#19	STR	9680	3353	A221	1	#16	STR	2460	4	A418	1	#22	STR	3660	11	A621	2	#22	STR	2520	15
A114	2	#19	STR	560	3	A222	1	#16	STR	1860	3	A419	1	#22	STR	4260	13	A622	2	#22	STR	3120	19
A115	2	#19	STR	1260	6	A223	1	#16	STR	1260	2	A420	1	#22	STR	4100	12	A623	2	#22	STR	3720	23
A116	2	#19	STR	1980	9	A224	1	#16	STR	660	1	A421	1	#22	STR	3520	11	A624	2	#22	STR	4320	26
A117	2	#19	STR	2680	12							A422	1	#22	STR	2920	9	A625	2	#22	STR	4920	30
A118	2	#19	STR	3400	15	A300	147	#22	STR	9680	4329	A423	1	#22	STR	2320	7	A626	2	#22	STR	5520	34
A119	2	#19	STR	4100	18	A313	2	#22	STR	900	5	A424	1	#22	STR	1720	5						
A120	2	#19	STR	4800	21	A314	2	#22	STR	1640	10	A425	1	#22	STR	1120	3	B1	214	#13	STR	3480	740
A121	2	#19	STR	5520	25	A315	2	#22	STR	2400	15	A426	1	#22	STR	520	2	B2	398	#13	STR	2800	1108
A122	2	#19	STR	6220	28	A316	2	#22	STR	3140	19							B3	424	#16	STR	3480	2290
A123	2	#19	STR	6940	31	A317	2	#22	STR	3880	24	A500	190	#16	STR	6060	1787						
A124	2	#19	STR	7640	34	A318	2	#22	STR	4640	28	A519	2	#16	STR	740	2	C3	488	#13	STR	8440	4094
A125	2	#19	STR	8360	37	A319	2	#22	STR	5380	33	A520	2	#16	STR	1340	4						
A126	2	#19	STR	9060	40	A320	2	#22	STR	6120	37	A521	2	#16	STR	1940	6	G1	4	#16	STR	10060	62
						A321	2	#22	STR	6880	42	A522	2	#16	STR	2520	8						
A200	193	#16	STR	4200	1258	A322	2	#22	STR	7620	46	A523	2	#16	STR	3120	10	S1	6	#25	STR	10060	240
A213	1	#16	STR	720	1	A323	2	#22	STR	8360	51	A524	2	#16	STR	3720	12	S2	6	#25	STR	5020	120
A214	1	#16	STR	1320	2	A324	2	#22	STR	9120	55	A525	2	#16	STR	4320	13	S3	6	#25	STR	6260	149
A215	1	#16	STR	1920	3							A526	2	#16	STR	4920	15						
A216	1	#16	STR	2520	4	A400	192	#22	STR	4580	2675	A527	2	#16	STR	5520	17	REINFORCING STEEL = 31,013 KG					

NOTE:

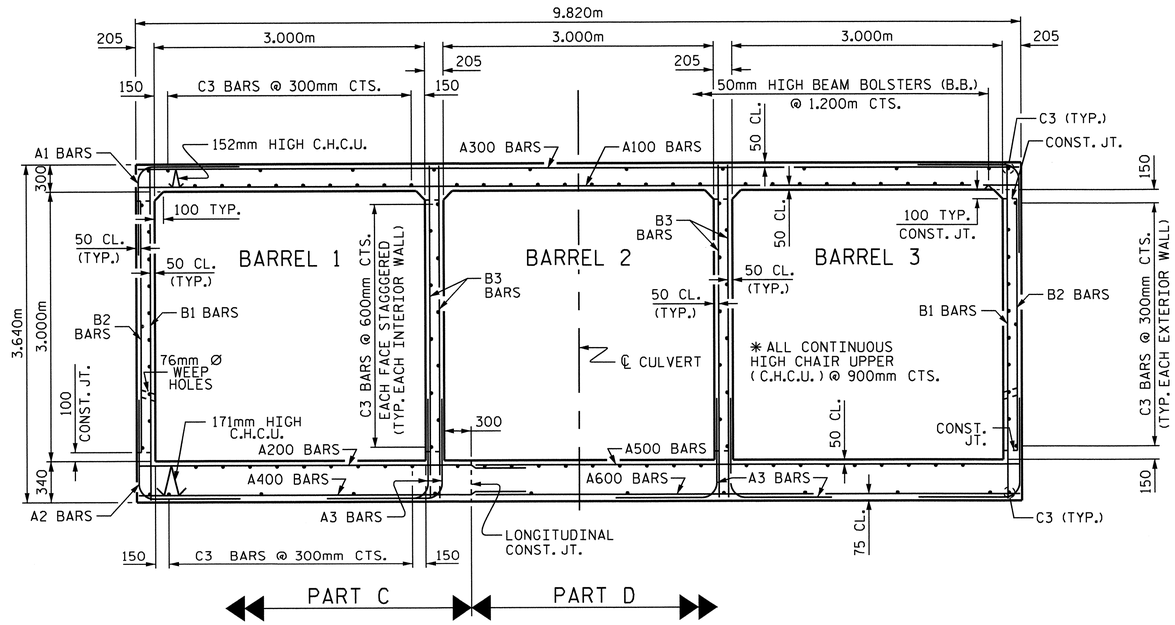
DIMENSIONS FOR INLET WINGS LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON SHEET 11 OF 12.



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
A200 & A500	16	540
A400 & A600	22	920
B1	13	540
B3	16	540
C3	13	590
S2 & S3	25	1220



RIGHT ANGLE SECTION OF BARREL

(STAGE II)

LOOKING DOWNSTREAM

THERE ARE 122 "C" BARS IN SECTION OF BARREL.

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 9 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 3.0m X 3.0m CONCRETE BOX CULVERT 110° SKEW (STAGE II)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-9
1			3			TOTAL SHEETS
2			4			26

STR. #1

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

19-FEB-2013 11:33
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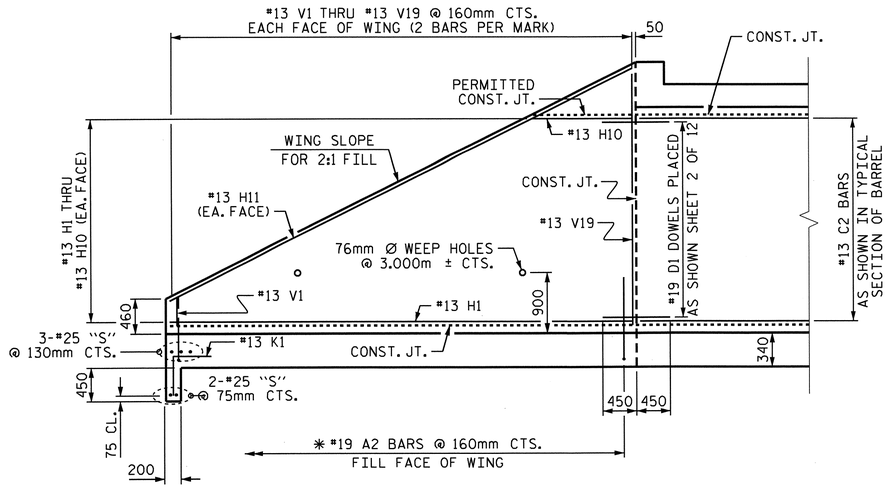
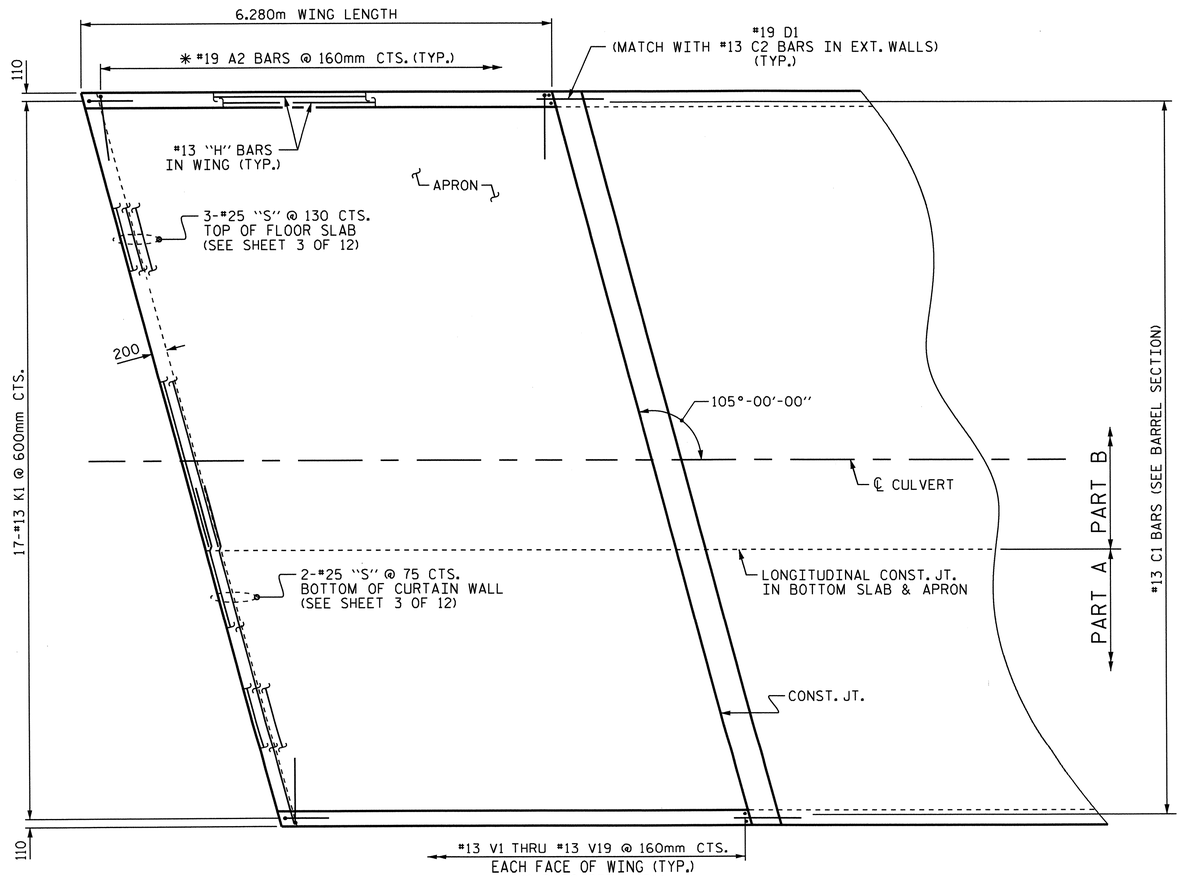
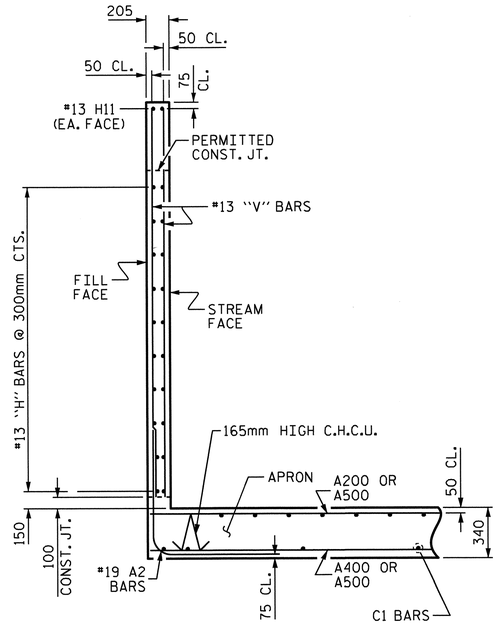
Kalford



OUTLET WING SECTION NORMAL TO ROADWAY



PLAN - OUTLET WINGS



TYPICAL WING SECTION

BILL OF MATERIAL

OUTLET WINGS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	4	#13	STR	6180	25
H2	4	#13	STR	6140	24
H3	4	#13	STR	5540	22
H4	4	#13	STR	4940	20
H5	4	#13	STR	4340	17
H6	4	#13	STR	3740	15
H7	4	#13	STR	3140	12
H8	4	#13	STR	2540	10
H9	4	#13	STR	1940	8
H10	4	#13	STR	1340	5
H11	4	#13	STR	6900	27
V1	8	#13	STR	460	4
V2	8	#13	STR	620	5
V3	8	#13	STR	780	6
V4	8	#13	STR	940	7
V5	8	#13	STR	1100	9
V6	8	#13	STR	1260	10
V7	8	#13	STR	1420	11
V8	8	#13	STR	1580	13
V9	8	#13	STR	1740	14
V10	8	#13	STR	1900	15
V11	8	#13	STR	2060	16
V12	8	#13	STR	2220	18
V13	8	#13	STR	2380	19
V14	8	#13	STR	2540	20
V15	8	#13	STR	2700	21
V16	8	#13	STR	2860	23
V17	8	#13	STR	3020	24
V18	8	#13	STR	3180	25
V19	8	#13	STR	3340	27

REINFORCING STEEL FOR 2 OUTLET WINGS	=	472 KG
CLASS A CONCRETE		
2 OUTLET WINGS	=	5.0 m³
1 HEADWALL	=	1.2 m³
1 END CURTAIN WALL AND OUTLET WING APRON	=	22.2 m³
TOTAL	=	28.4 m³

NOTE:

* THE VERTICAL LEG OF THE A2 BARS SHALL BE CUT OFF AS NECESSARY AT THE ENDS OF THE WINGS TO MATCH HEIGHT OF "V" BARS.

REINFORCING STEEL IN THE APRON AND END CURTAIN WALL ARE INCLUDED IN THE BILL OF MATERIAL FOR THE BARREL.

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 10 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

OUTLET WINGS FOR CONCRETE BOX CULVERT

H = 3.000m SLOPE = 2:1

105° SKEW (STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-10
1			3			TOTAL SHEETS
2			4			26

STR. #1

NORTH CAROLINA PROFESSIONAL SEAL 029411 ENGINEER KRISTY W. ALFORD

DRAWN BY : M. K. TOM DATE : 3/25/11
CHECKED BY : T. M. GARRISON DATE : 4/27/11

15-AUG-2012 08:23
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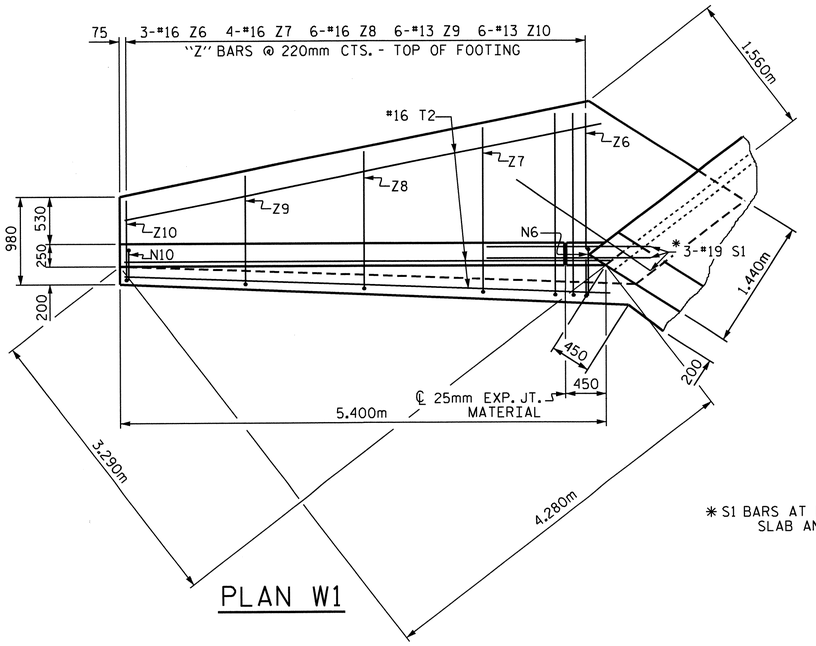
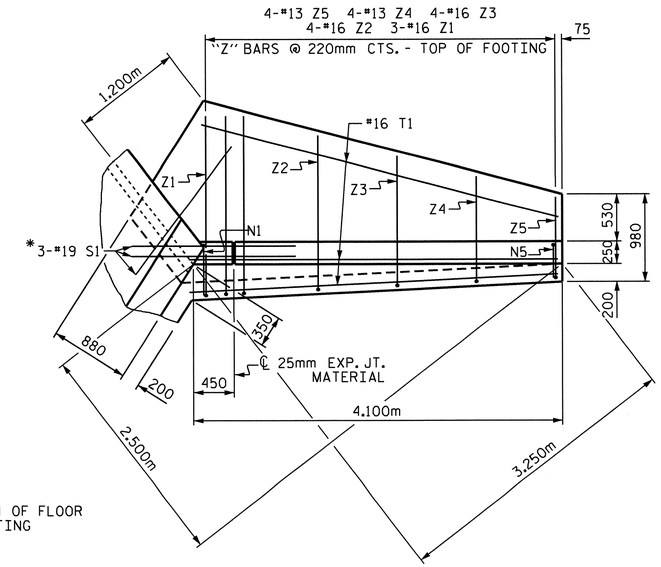
aoutlaw

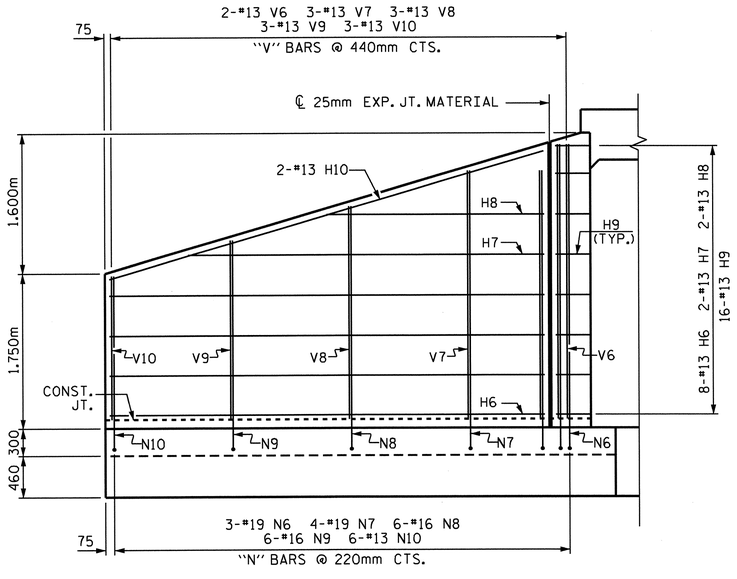


PLAN W1

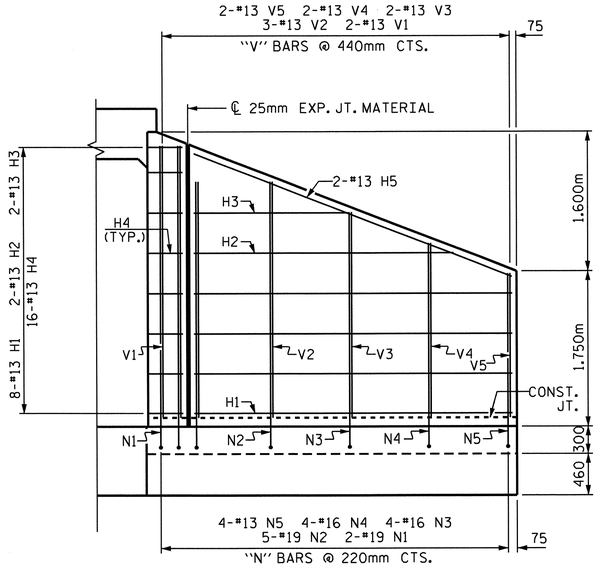


PLAN W2

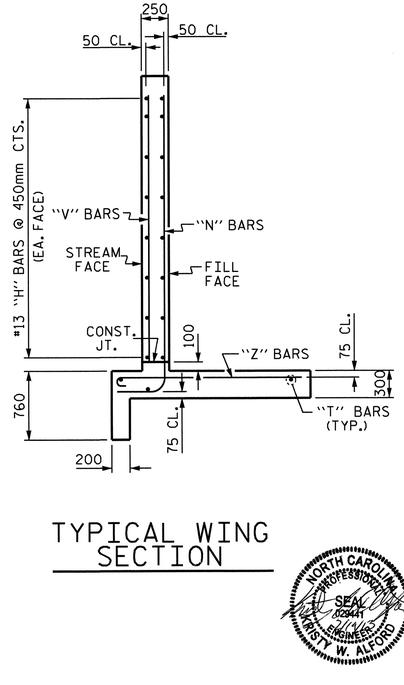
* S1 BARS AT BOTTOM OF FLOOR SLAB AND FOOTING



ELEVATION W1



ELEVATION W2

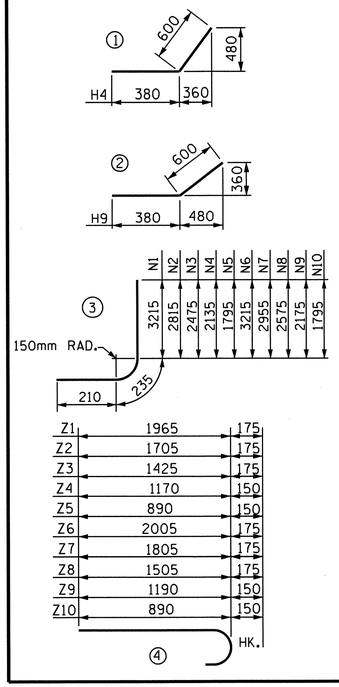


TYPICAL WING SECTION

FOR WING ORIENTATION, SEE BARREL STANDARD SHEET.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#13	STR	3540	28
H2	2	#13	STR	2940	6
H3	2	#13	STR	1780	4
H4	16	#13	1	980	16
H5	2	#13	STR	3780	8
H6	8	#13	STR	4840	38
H7	2	#13	STR	4080	8
H8	2	#13	STR	2540	5
H9	16	#13	2	980	16
H10	2	#13	STR	5040	10
N1	2	#19	3	3660	16
N2	5	#19	3	3260	36
N3	4	#16	3	2920	18
N4	4	#16	3	2580	16
N5	4	#13	3	2240	9
N6	3	#19	3	3660	25
N7	4	#19	3	3400	30
N8	6	#16	3	3020	28
N9	6	#16	3	2620	24
N10	6	#13	3	2240	13
S1	6	#19	STR	1800	24
T1	3	#16	STR	4100	19
T2	3	#16	STR	5400	25
V1	2	#13	STR	3040	6
V2	3	#13	STR	2640	8
V3	2	#13	STR	2300	5
V4	2	#13	STR	1960	4
V5	2	#13	STR	1620	3
V6	2	#13	STR	3080	6
V7	3	#13	STR	2780	8
V8	3	#13	STR	2400	7
V9	3	#13	STR	2000	6
V10	3	#13	STR	1620	5
Z1	3	#16	4	2140	10
Z2	4	#16	4	1880	12
Z3	4	#16	4	1600	10
Z4	4	#13	4	1320	5
Z5	4	#13	4	1040	4
Z6	3	#16	4	2180	10
Z7	4	#16	4	1980	12
Z8	6	#16	4	1680	16
Z9	6	#13	4	1340	8
Z10	6	#13	4	1040	6

REINFORCING STEEL FOR 2 OUTLET WINGS	= 573 KG
CLASS A CONCRETE	
2 INLET WINGS	= 11.9 m3
1 HEADWALL	= 1.2 m3
1 END CURTAIN	= 1.4 m3
TOTAL	= 14.5 m3

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 13+43.400 -L-

SHEET 11 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INLET WINGS FOR CONCRETE BOX CULVERT

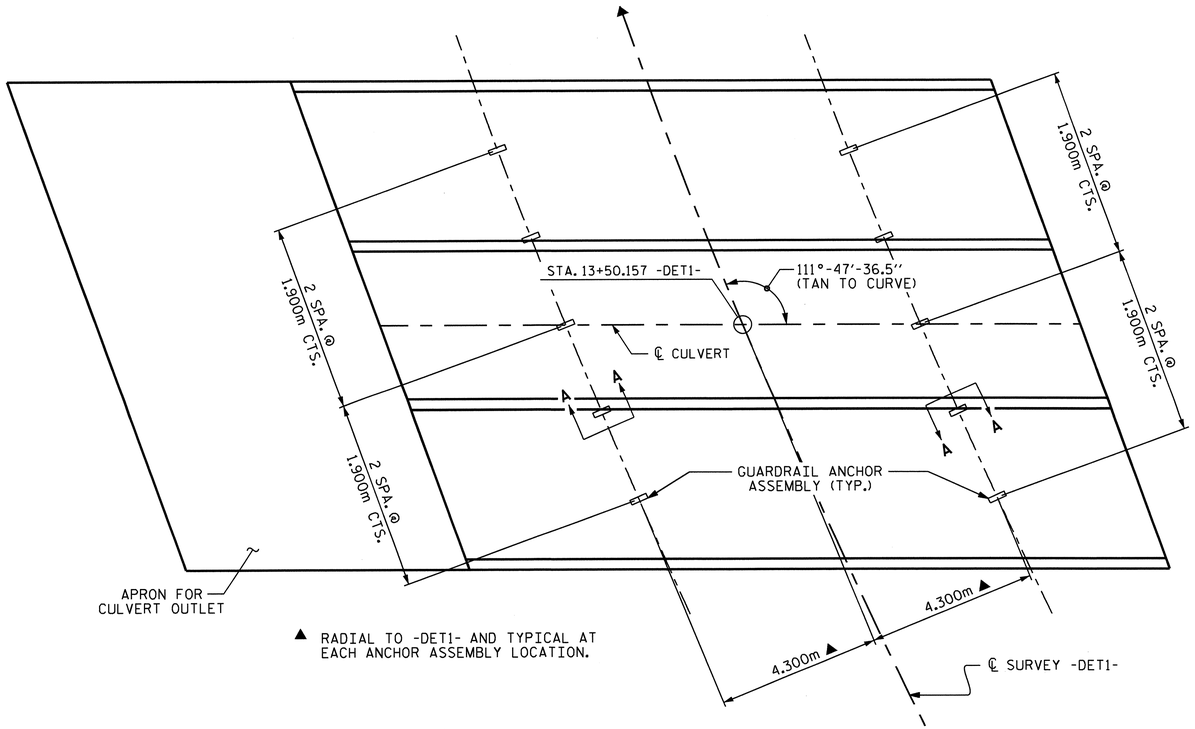
H = 3.000m SLOPE = 2:1

105° SKEW (STAGE II)

ASSEMBLED BY : M. K. TOM	DATE : 3/25/11
CHECKED BY : T. M. GARRISON	DATE : 4/27/11
DRAWN BY : JLR 6/97	
CHECKED BY : VAP 6/97	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-11
1			3			TOTAL SHEETS
2			4			26

STD. NO. CW7530 STR. #1



PLAN

SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.
(STAGE I)

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 64mm.

B. 4 - 25.40mm DIA. X 57mm BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 25.40mm DIA. X 57mm GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 689 MPa. AS AN OPTION, A 11mm Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 620 MPa. IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

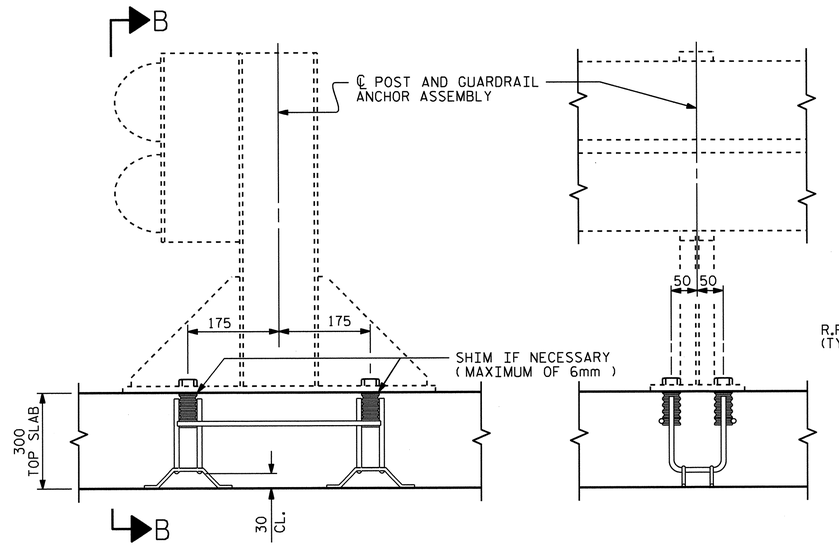
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

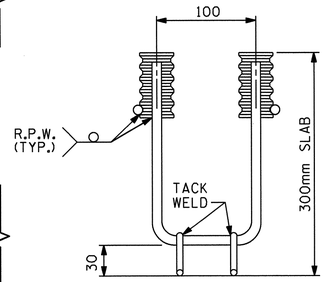
SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 25.40mm Ø BOLT IS 97.0 kN. SEE STANDARD SPECIFICATIONS.

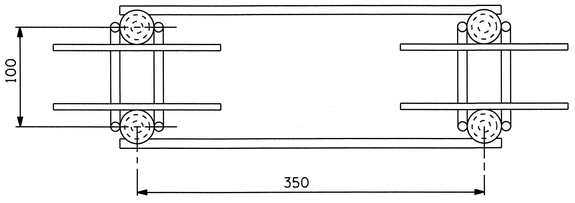


SECTION A-A

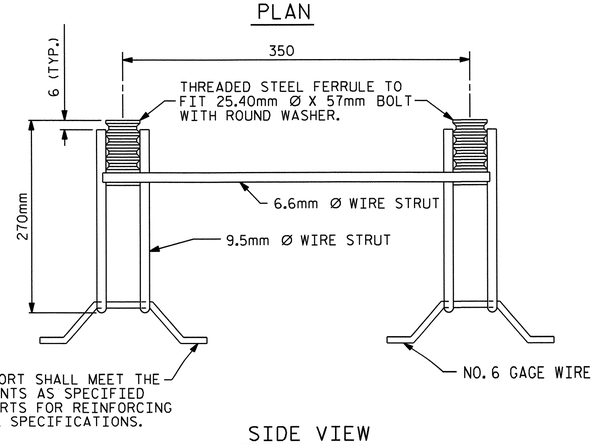
SECTION B-B



ELEVATION



PLAN



SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

ASSEMBLED BY : M. K. TOM	DATE : 3/25/11
CHECKED BY : T. M. GARRISON	DATE : 4/27/11
DRAWN BY : FCJ 6/88	REV. 7/10/01 LES/RDR
CHECKED BY : ARB 6/88	REV. 5/7/03 RWW/JTE
	REV. 5/1/06R KMM/GM

PROJECT NO. R-2241A
PERSON COUNTY
STATION: 13+43.400 -L-

SHEET 12 OF 12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-12
1			3			TOTAL SHEETS
2			4			26

STR. #1

STD. NO. GRA1SM

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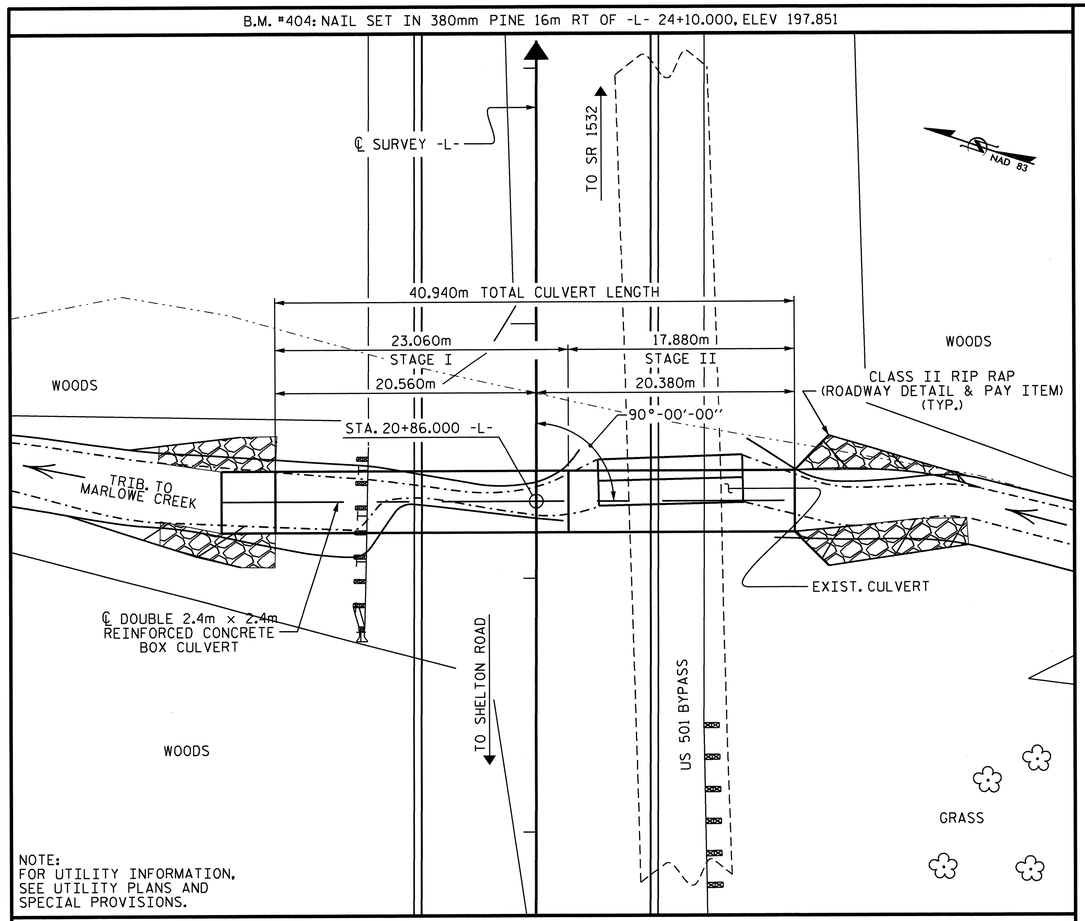


LOCATION SKETCH

TEMPORARY SHORING NOT SHOWN FOR CLARITY. SEE TRAFFIC CONTROL PLANS FOR TEMPORARY SHORING LOCATIONS.

HYDRAULIC DATA

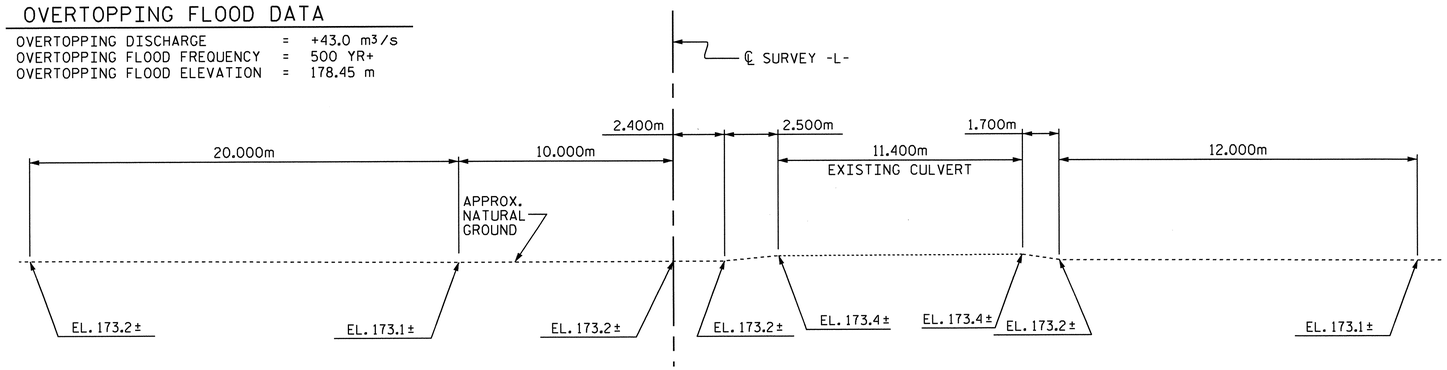
DESIGN DISCHARGE	=	24.3 m³/s
DESIGN FLOOD FREQUENCY	=	50 YRS
DESIGN HIGH WATER ELEVATION	=	175.59 m
BASE DISCHARGE (Q100)	=	28.0 m³/s
BASE ELEVATION (Q100)	=	175.90 m
DRAINAGE AREA	=	3.34 sq. Km.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	=	+43.0 m³/s
OVERTOPPING FLOOD FREQUENCY	=	500 YR+
OVERTOPPING FLOOD ELEVATION	=	178.45 m

GRADE DATA

GRADE POINT ELEV. @ STA. 20+86.00 -L-	=	178.70
BED ELEV. @ STA. 20+86.00 -L-	=	172.75
ROADWAY SLOPE	=	2:1



PROFILE ALONG ℄ CULVERT

STAGE I QUANTITIES

CLASS A CONCRETE	
BARREL @ 4.79 m³/m	110.5 m³
OUTLET WINGS	14.6 m³
TOTAL	125.1 m³
REINFORCING STEEL	
BARREL	9,512 kg
OUTLET WINGS	351 kg
TOTAL	9863 kg
FOUND. CONDITIONING MAT'L.	127 METRIC TONS
CULVERT EXCAVATION	LUMP SUM

STAGE II QUANTITIES

CLASS A CONCRETE	
BARREL @ 4.79 m³/m	85.6 m³
INLET WINGS	9.3 m³
TOTAL	94.9 m³
REINFORCING STEEL	
BARREL	6,817 kg
INLET WINGS	327 kg
TOTAL	7,144 kg
FOUND. CONDITIONING MAT'L.	81 METRIC TONS
CULVERT EXCAVATION	LUMP SUM

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
STAGE I	125.1 m³
STAGE II	94.9 m³
TOTAL	220.0 m³
REINFORCING STEEL	
STAGE I	9,863 kg
STAGE II	7,144 kg
TOTAL	17,007 kg
FOUNDATION CONDITIONING MAT'L	
STAGE I	127 METRIC TONS
STAGE II	81 METRIC TONS
TOTAL	208 METRIC TONS
CULVERT EXCAVATION	LUMP SUM

STAGE I CULVERT NOTES:

ASSUMED LIVE LOAD ---------- MS18 OR ALTERNATE LOADING.

DESIGN FILL ---------- 3.600m MAX. FILL --- 3.270m MIN. FILL

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

76mm Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERT TO BE POURED IN THE FOLLOWING ORDER:

PART A
1. OUTLET WING APRON AND FLOOR SLAB OF BARREL 1, INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARREL 1 WALLS AND OUTLET WING FULL HEIGHT.

PART B
1. OUTLET WING APRON AND FLOOR SLAB OF BARREL 2, INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARREL 2 WALLS AND OUTLET WING FULL HEIGHT, FOLLOWED BY THE ROOF SLAB AND HEADWALL.

PART C
1. INLET WING FOOTING AND FLOOR SLAB OF BARREL 2, INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARREL 2 WALLS AND INLET WING FULL HEIGHT.

PART D
1. INLET WING FOOTING AND FLOOR SLAB OF BARREL 1, INCLUDING 100mm OF VERTICAL WALLS.
2. THE REMAINING PORTION OF BARREL 1 WALLS AND INLET WING FULL HEIGHT, FOLLOWED BY THE ROOF SLAB AND HEADWALL.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR OUTLET WINGS LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON SHEET 10 OF 11.

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 360,000 KG OF REINFORCING STEEL, ONE 760mm SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 360,000 KG OF REINFORCING STEEL, TWO 760mm SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

FOR CONSTRUCTION SEQUENCE, SEE EROSION CONTROL PLANS.

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING 11.400m LONG DOUBLE 1.8m x 1.8m REINFORCED CONCRETE BOX CULVERT LOCATED AT THE PROPOSED CULVERT SHALL BE REMOVED.

THE CONTRACTOR SHALL REMOVE THE EXISTING CULVERT AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

NO SEPARATE PAYMENT SHALL BE MADE FOR REMOVAL OF EXISTING STRUCTURE. COST FOR REMOVAL OF THE EXISTING STRUCTURE SHALL BE INCLUDED IN THE UNIT BID PRICE FOR CULVERT EXCAVATION.

AT THE CONTRACTOR'S OPTION THE VERTICAL CONSTRUCTION JOINT BETWEEN THE OUTLET WINGS AND THE BARREL MAY BE ELIMINATED AND THE "C" BARS IN THE BARREL MAY BE EXTENDED TO REPLACE THE "D" AND "H" BARS IN THE WINGS AND SLAB.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 21.0m. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

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

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENACE OF TRAFFIC, SEE ROADWAY PLANS.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

ALL ELEVATIONS ARE IN METERS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

NORTH CAROLINA PROFESSIONAL SEAL 022606 ENGINEER JOHN McARTHUR BAILEY
2/20/13

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 1 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW

METRIC

NORTH CAROLINA PROFESSIONAL SEAL 025441 ENGINEER TIMOTHY W. ALFORD
2/20/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-13
1			3			TOTAL SHEETS
2			4			26

DRAWN BY : M. K. TOM DATE : 11/10
CHECKED BY : T. M. GARRISON DATE : 2/11

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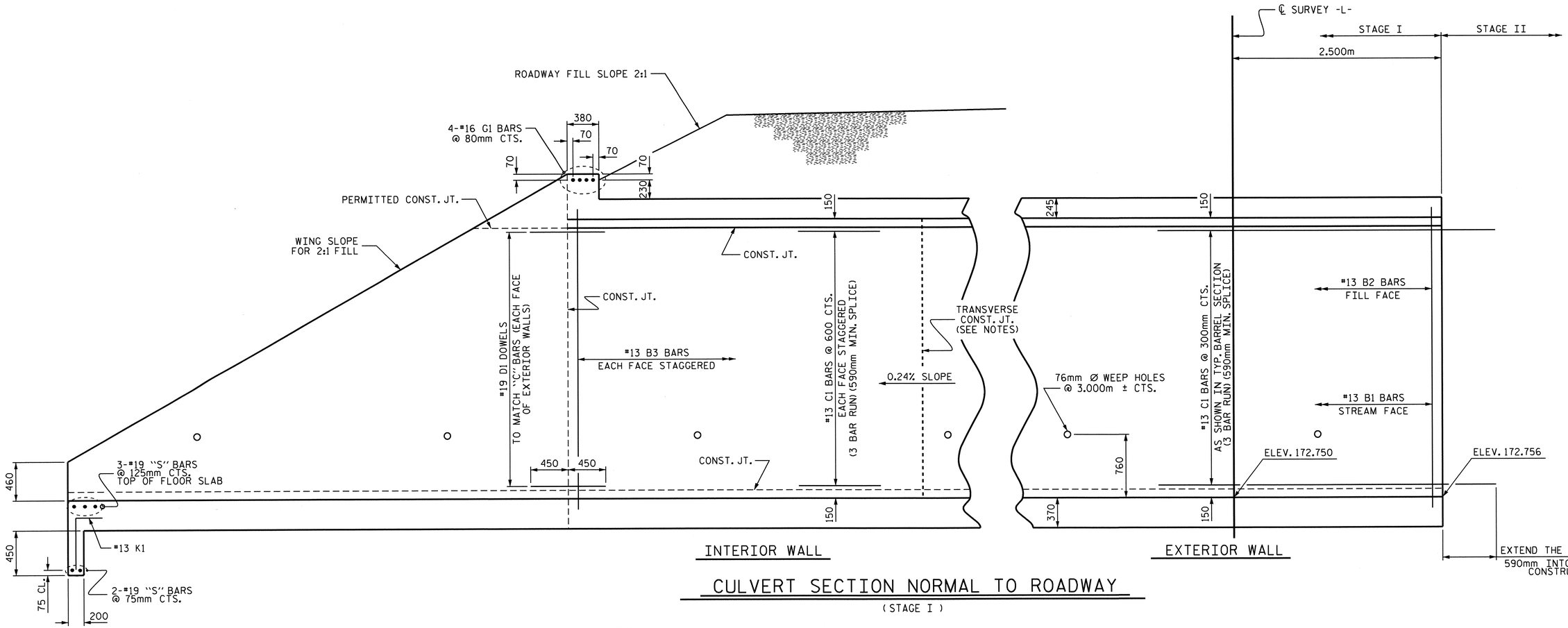
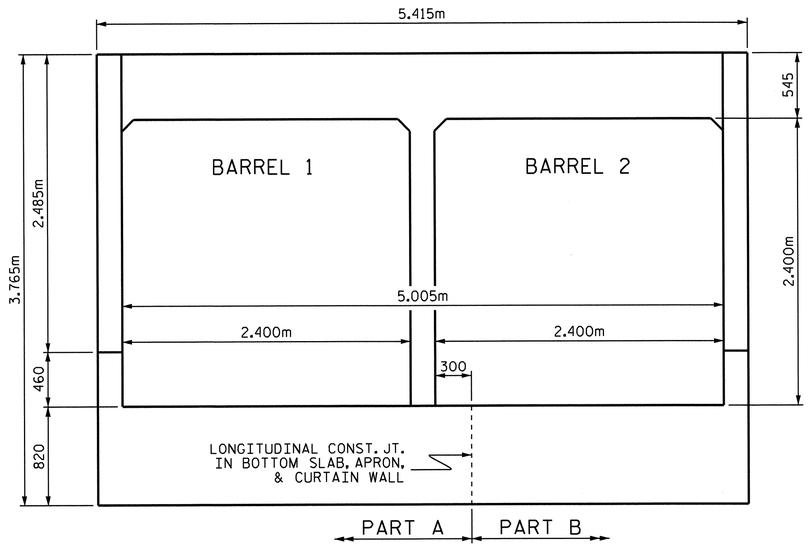


INTERIOR WALL

EXTERIOR WALL

CULVERT SECTION NORMAL TO ROADWAY

(STAGE I)



OUTLET END ELEVATION

NORMAL TO SKEW (LOOKING UPSTREAM)

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 2 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE I)

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-14
1			3			TOTAL SHEETS
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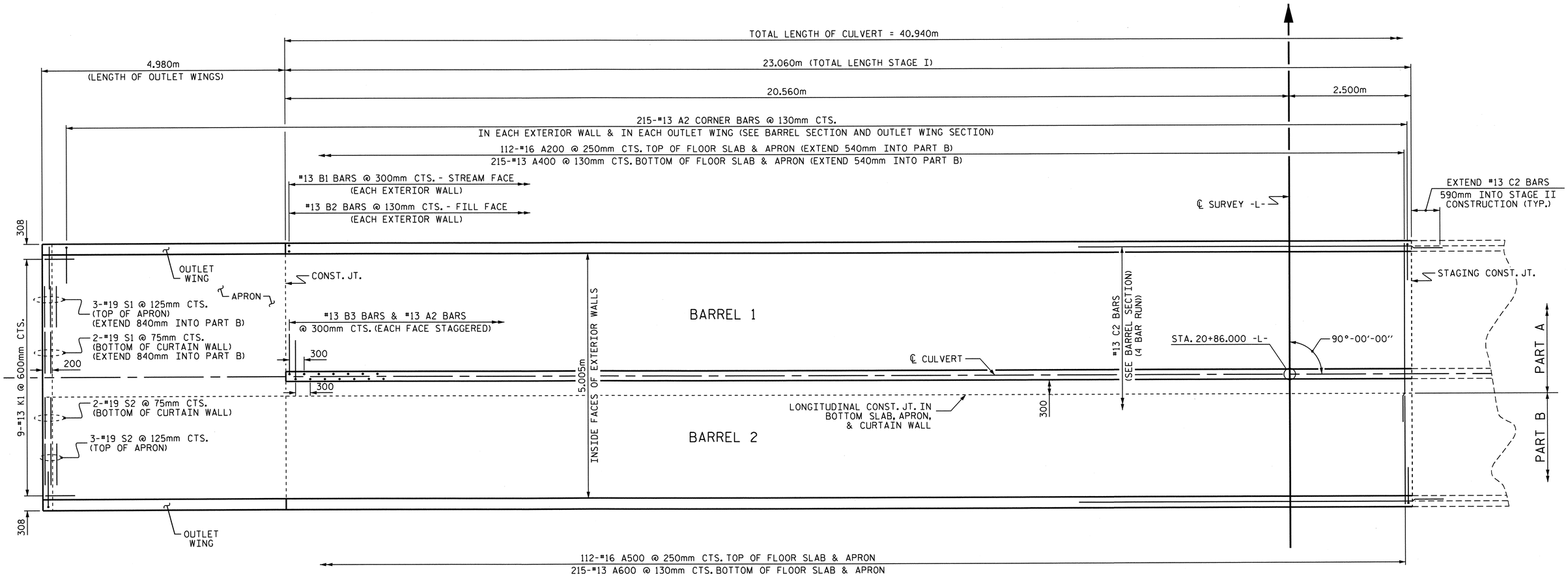

PLAN OF FLOOR SLAB - STAGE I

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 3 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE I)

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-15
1			3			TOTAL SHEETS
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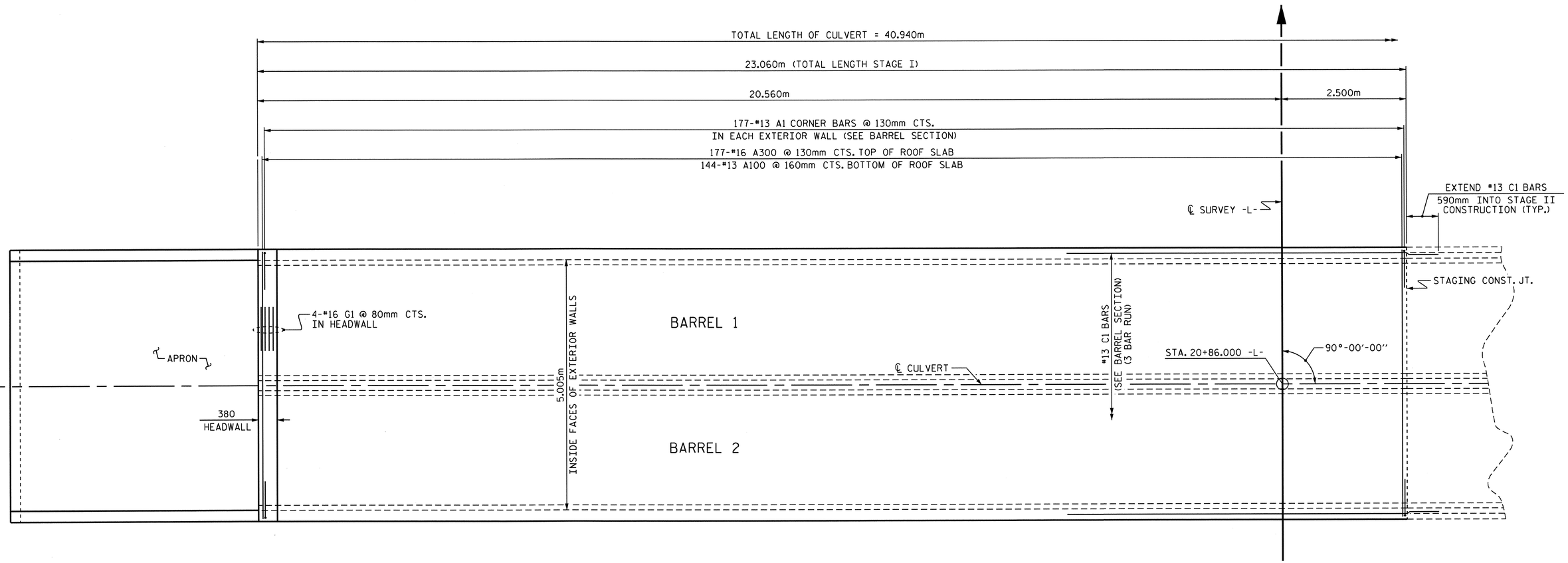

PLAN OF ROOF SLAB - STAGE I

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 4 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE I)

NORTH CAROLINA PROFESSIONAL SEAL 025441 ENGINEER KRISTY W. ALFORD

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-16
1			3			TOTAL SHEETS
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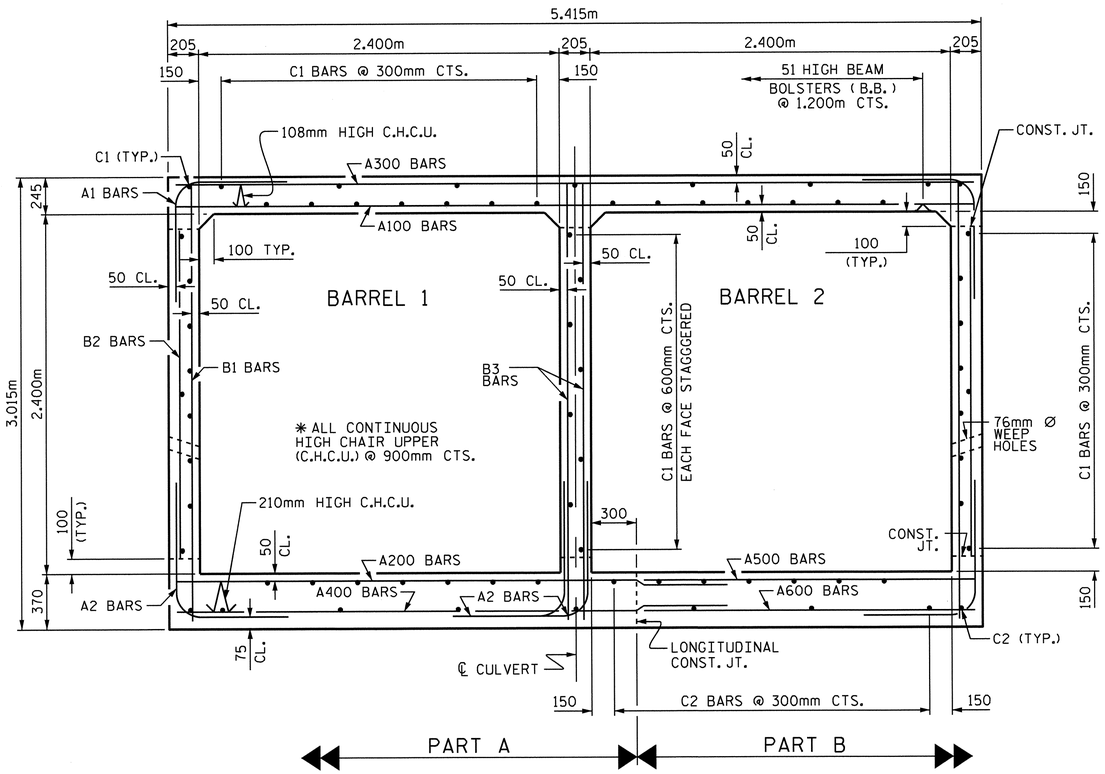


RIGHT ANGLE SECTION OF BARREL

(STAGE I)

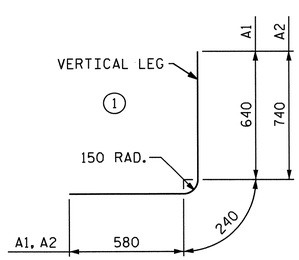
LOOKING UPSTREAM

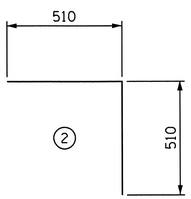
THERE ARE 72 "C" BARS IN SECTION OF BARREL.

REINFORCING STEEL BAR SCHEDULE FOR BARREL (STAGE I)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	354	#13	1	1460	514
A2	584	#13	1	1560	906
A100	144	#13	STR	5260	712
A200	112	#16	STR	3580	622
A300	177	#16	STR	5260	1445
A400	215	#13	STR	3580	765
A500	112	#16	STR	2220	386
A600	215	#13	STR	2220	474
B1	154	#13	STR	2840	435
B2	354	#13	STR	2180	767
B3	154	#13	STR	2840	435
C1	147	#13	STR	8280	1210
C2	92	#13	STR	7600	695
D1	18	#19	STR	900	36
G1	4	#16	STR	5300	33
K1	9	#13	2	1020	9
S1	5	#19	STR	3880	43
S2	5	#19	STR	2220	25
REINFORCING STEEL				= 9,512 KG	

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
A200 & A500	16	540
A400 & A600	13	540
B1 & B3	13	540
C1 & C2	13	590
S1 & S2	19	840





BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 5 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-17
1			3			TOTAL SHEETS
2			4			26

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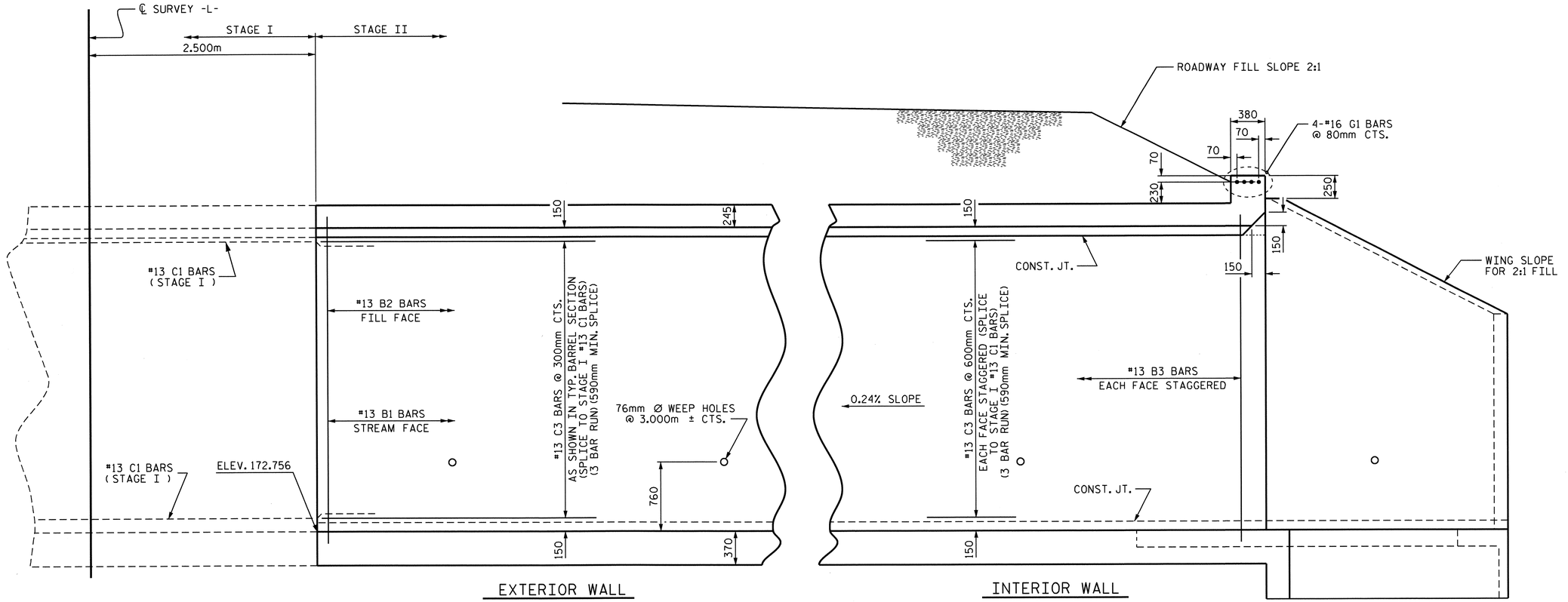
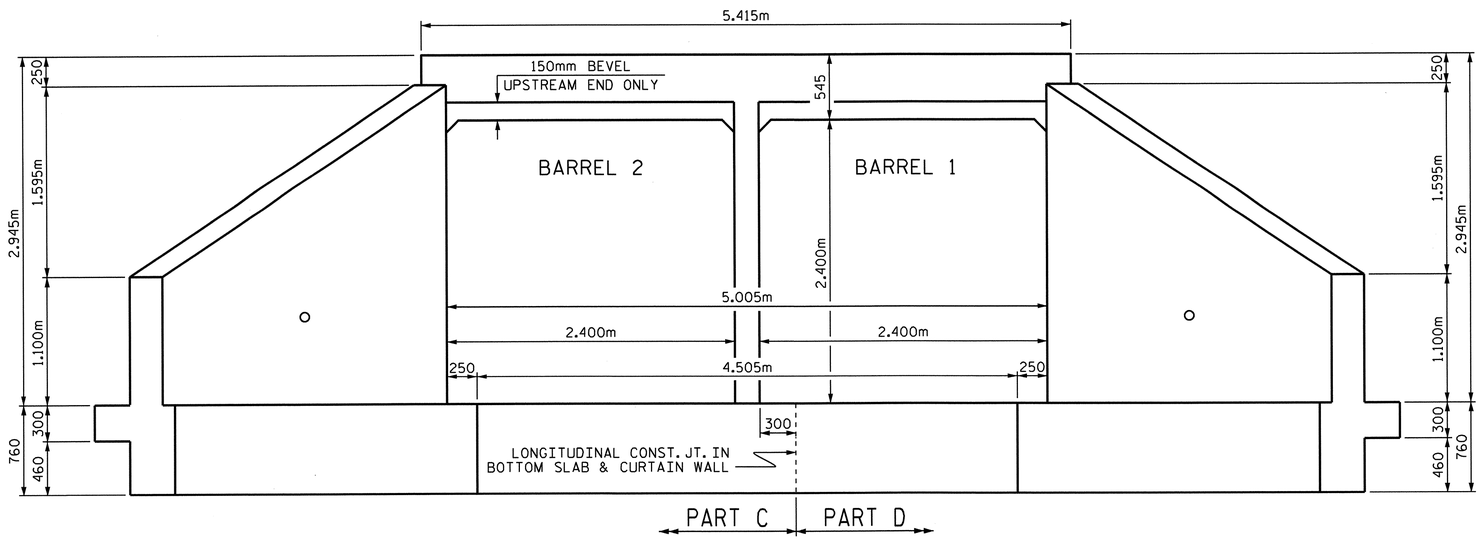


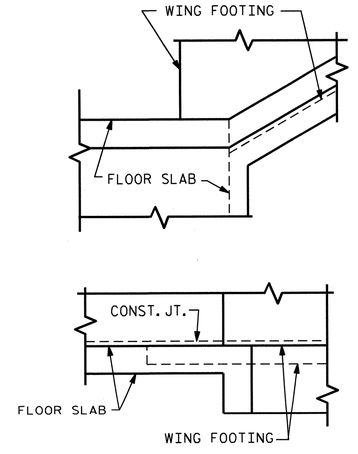
CULVERT SECTION NORMAL TO ROADWAY

(STAGE II)



INLET END ELEVATION

NORMAL TO SKEW



DETAIL

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

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 6 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE II)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-18
1			3			TOTAL SHEETS
2			4			26

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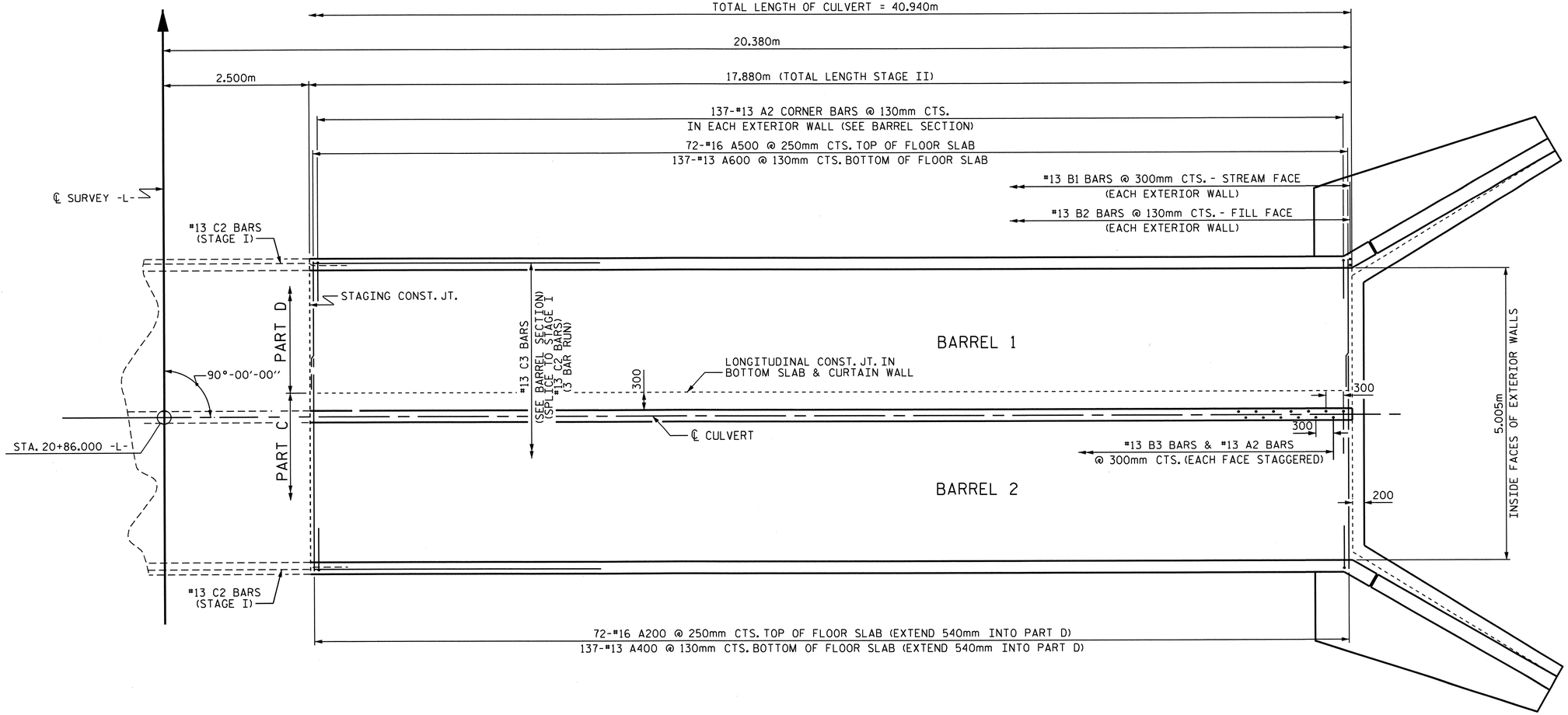

PLAN OF FLOOR SLAB - STAGE II

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 7 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE II)

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-19
1			3			TOTAL SHEETS
2			4			26

STR. #2

DRAWN BY : M. K. TOM DATE : 2/11
CHECKED BY : T. M. GARRISON DATE : 3/11

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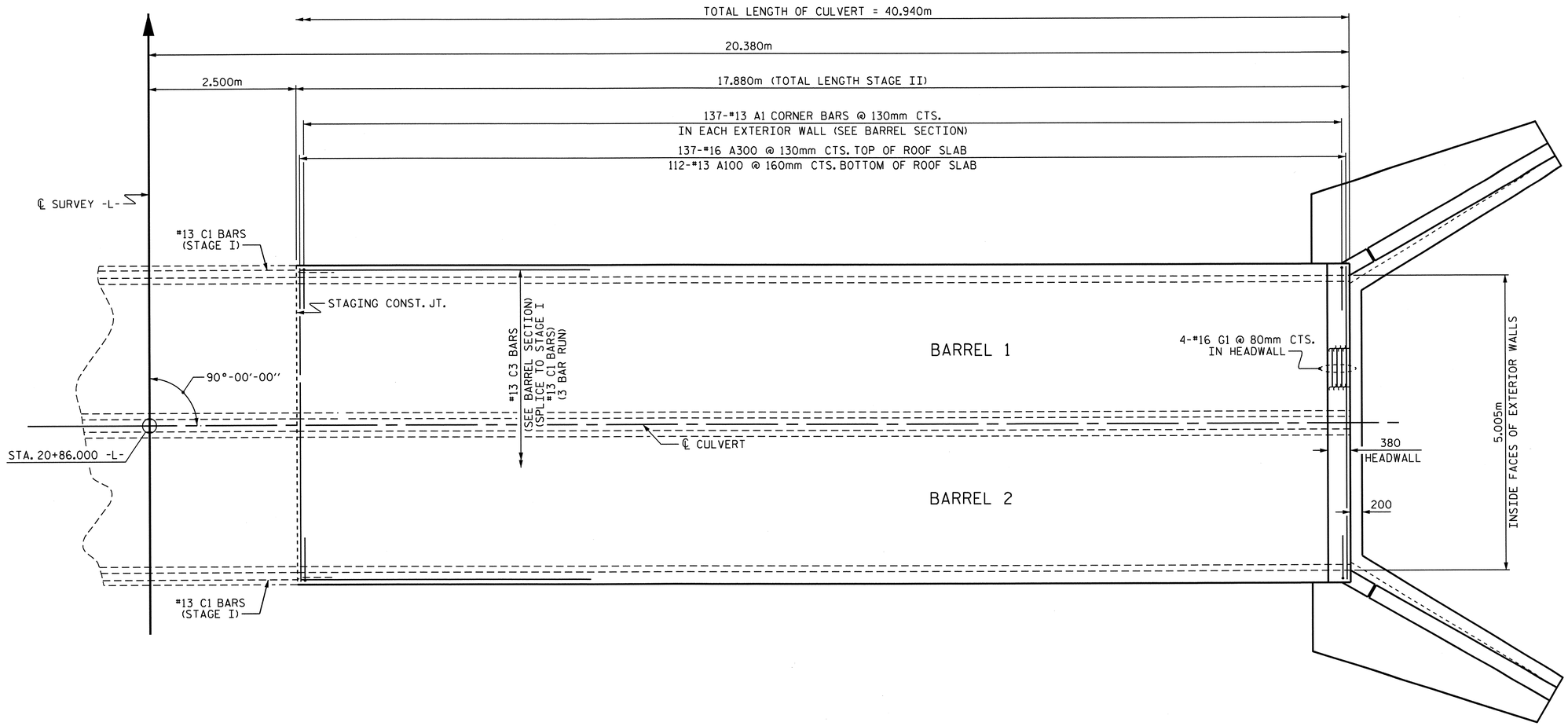

PLAN OF ROOF SLAB - STAGE II

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 8 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE II)

NORTH CAROLINA PROFESSIONAL SEAL 029431 ENGINEER HARRY W. ALFORD

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-20
1			3			TOTAL SHEETS
2			4			26

DRAWN BY : M. K. TOM DATE : 2/11
CHECKED BY : T. M. GARRISON DATE : 3/11

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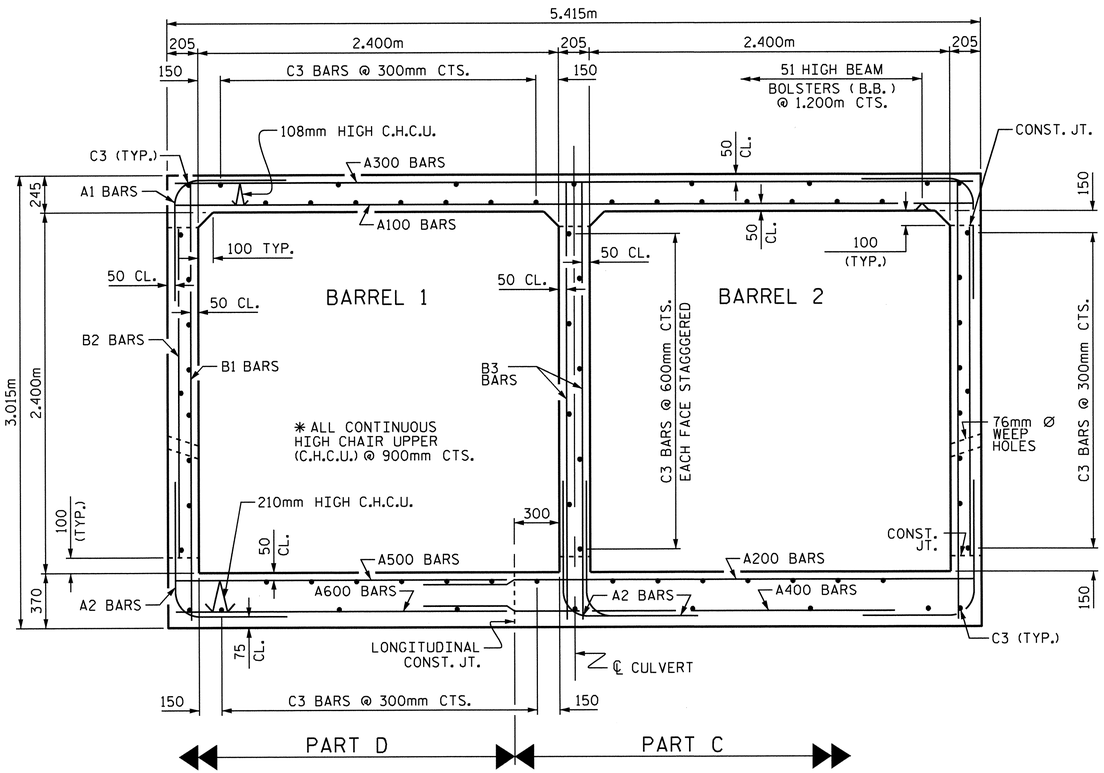


RIGHT ANGLE SECTION OF BARREL

(STAGE II)

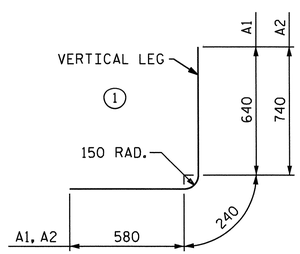
LOOKING UPSTREAM

THERE ARE 72 "C" BARS IN SECTION OF BARREL.

REINFORCING STEEL BAR SCHEDULE FOR BARREL (STAGE II)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	274	#13	1	1460	398
A2	394	#13	1	1560	611
A100	112	#13	STR	5260	586
A200	72	#16	STR	3580	400
A300	137	#16	STR	5260	1118
A400	137	#13	STR	3580	488
A500	72	#16	STR	2220	248
A600	137	#13	STR	2220	302
B1	120	#13	STR	2840	339
B2	274	#13	STR	2180	594
B3	120	#13	STR	2840	339
C3	216	#13	STR	6340	1361
G1	4	#16	STR	5300	33
REINFORCING STEEL				=	6,817 KG

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
A200 & A500	16	540
A400 & A600	13	540
B1 & B3	13	540
C3	13	590



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 9 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 2.4m X 2.4m CONCRETE BOX CULVERT 90° SKEW (STAGE II)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-21
1			3			TOTAL SHEETS
2			4			26

STR. #2

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

DRAWN BY : M. K. TOM DATE : 2/11
CHECKED BY : T. M. GARRISON DATE : 3/11

19-FEB-2013 11:27
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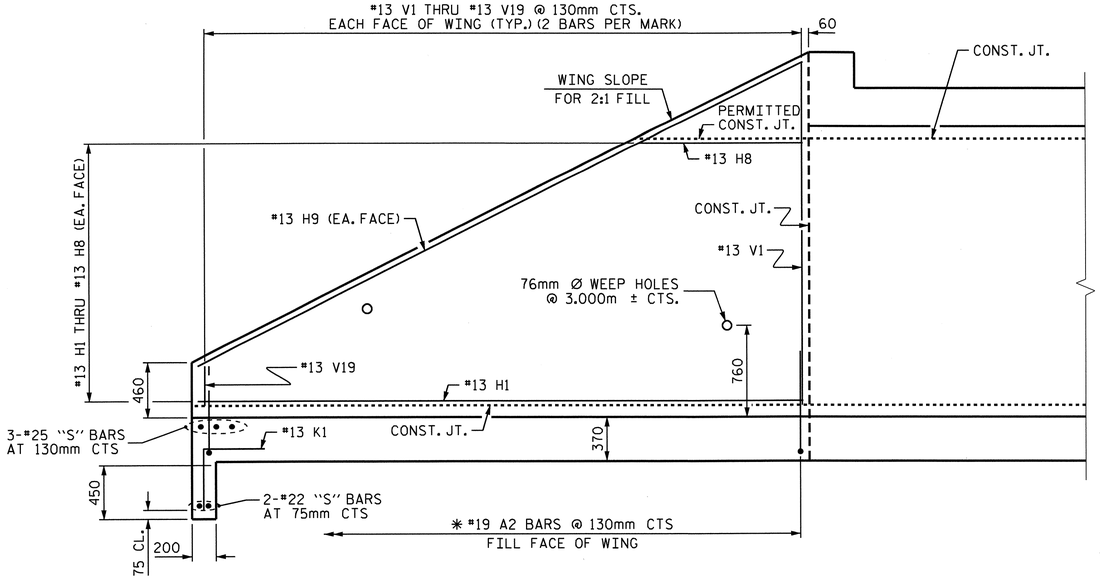
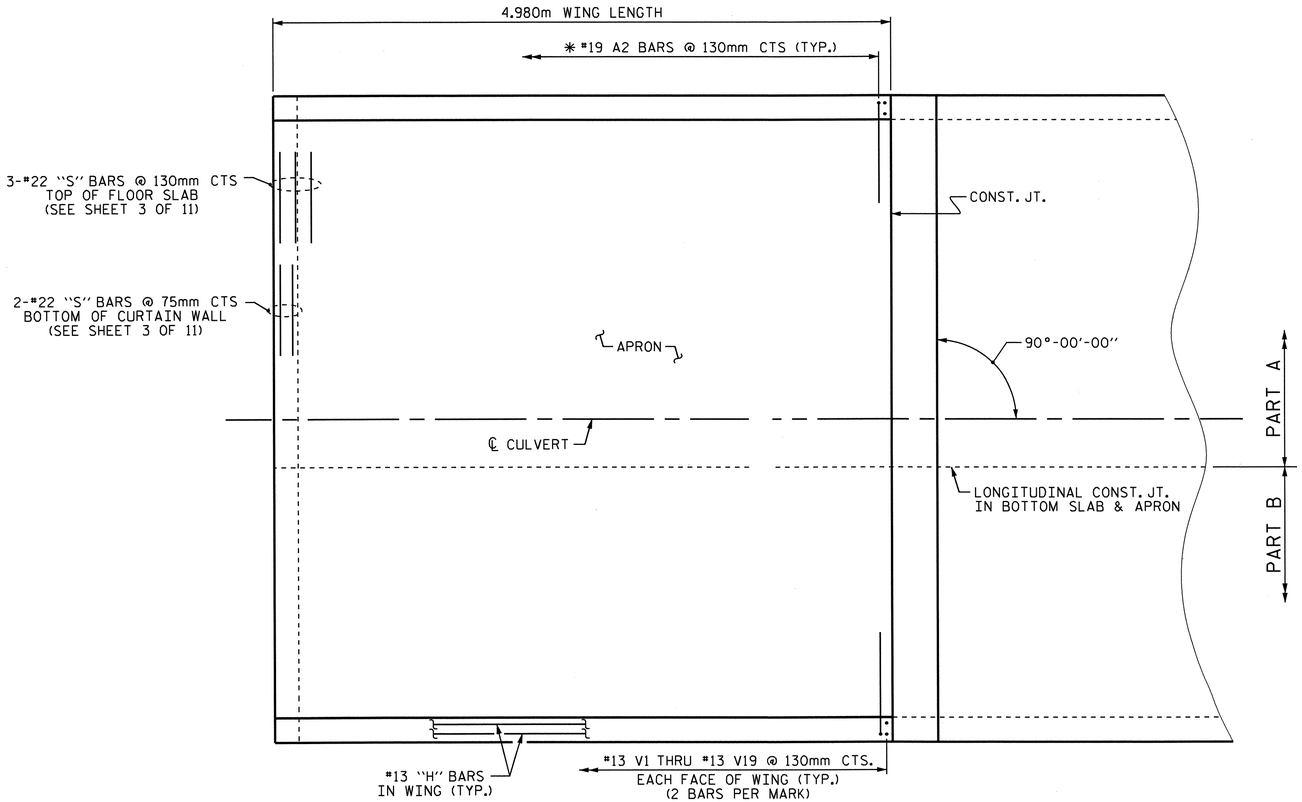
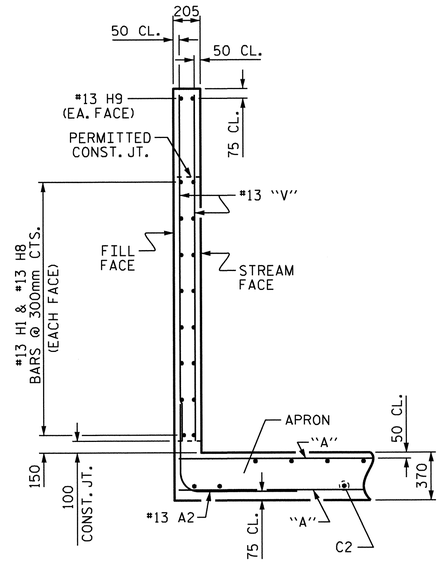
kalford



OUTLET WING SECTION NORMAL TO ROADWAY



PLAN - OUTLET WINGS



TYPICAL WING SECTION

BILL OF MATERIAL
OUTLET WINGS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	4	#13	STR	4880	19
H2	4	#13	STR	4780	19
H3	4	#13	STR	4180	17
H4	4	#13	STR	3560	14
H5	4	#13	STR	2960	12
H6	4	#13	STR	2360	9
H7	4	#13	STR	1760	7
H8	4	#13	STR	1160	5
H9	4	#13	STR	5440	22
V1	8	#13	STR	2660	21
V2	8	#13	STR	2520	20
V3	8	#13	STR	2400	19
V4	8	#13	STR	2260	18
V5	8	#13	STR	2140	17
V6	8	#13	STR	2000	16
V7	8	#13	STR	1880	15
V8	8	#13	STR	1740	14
V9	8	#13	STR	1620	13
V10	8	#13	STR	1480	12
V11	8	#13	STR	1360	11
V12	8	#13	STR	1220	10
V13	8	#13	STR	1100	9
V14	8	#13	STR	960	8
V15	8	#13	STR	840	7
V16	8	#13	STR	700	6
V17	8	#13	STR	580	5
V18	8	#13	STR	440	3
V19	8	#13	STR	320	3

REINFORCING STEEL FOR 2 OUTLET WINGS	=	351 kg
CLASS A CONCRETE		
2 OUTLET WINGS	=	3.3 m3
1 HEADWALL	=	0.6 m3
1 END CURTAIN WALL AND OUTLET WING APRON	=	10.7 m3
TOTAL	=	14.6 m3

NOTE:

* THE VERTICAL LEG OF THE A2 BARS SHALL BE CUT OFF AS NECESSARY AT THE ENDS OF THE WINGS TO MATCH HEIGHT OF "V" BARS.

REINFORCING STEEL IN THE APRON AND END CURTAIN WALL ARE INCLUDED IN THE BILL OF MATERIAL FOR THE BARREL.

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 10 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

OUTLET WINGS FOR CONCRETE BOX CULVERT

H = 2.400m SLOPE = 2:1

90° SKEW (STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-22
1			3			TOTAL SHEETS
2			4			26

STR. #2

DRAWN BY : M. K. TOM DATE : 2/11
CHECKED BY : T. M. GARRISON DATE : 3/11

15-AUG-2012 08:31
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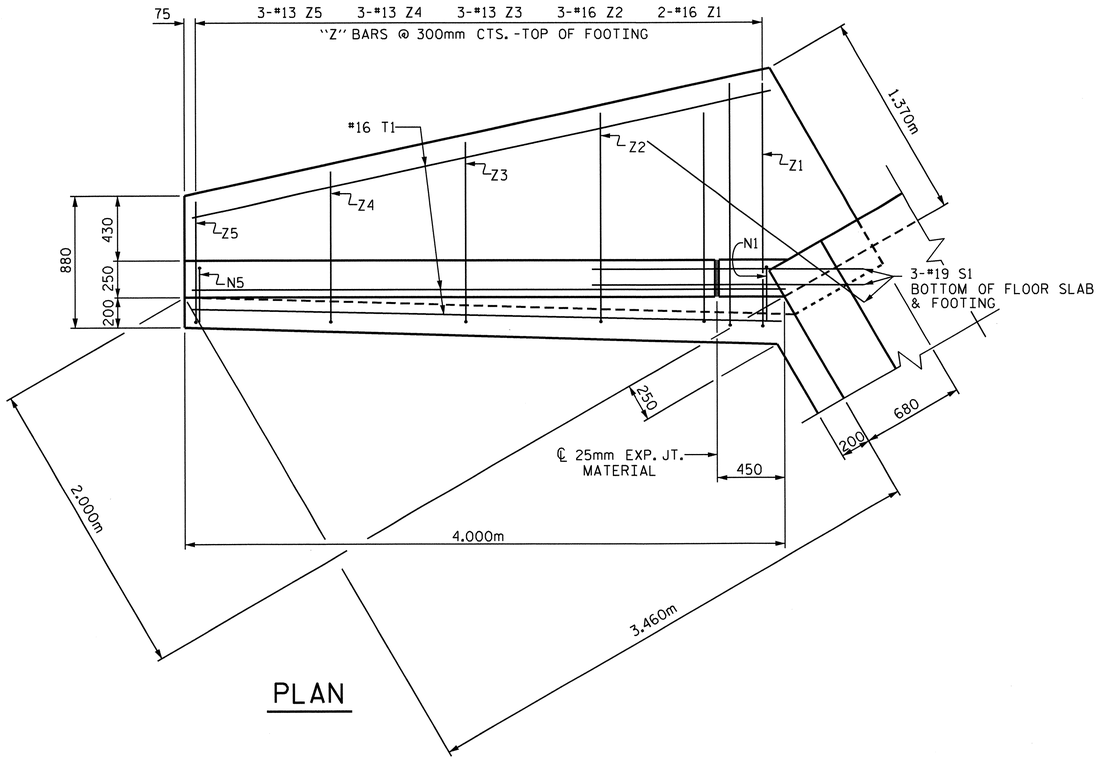
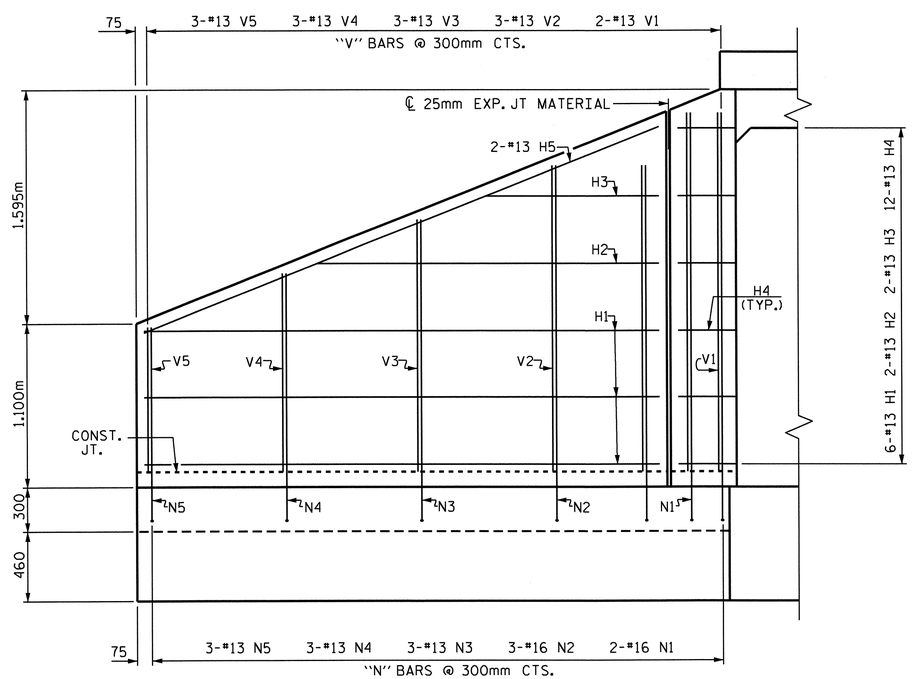
doutlaw



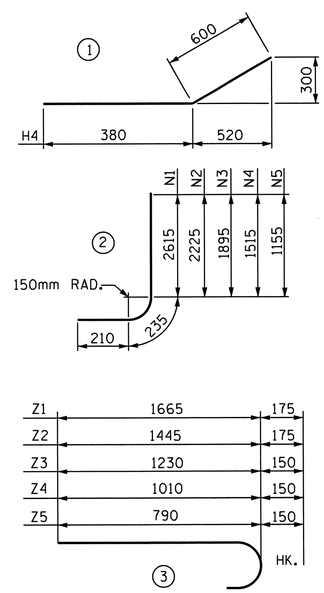
PLAN



ELEVATION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

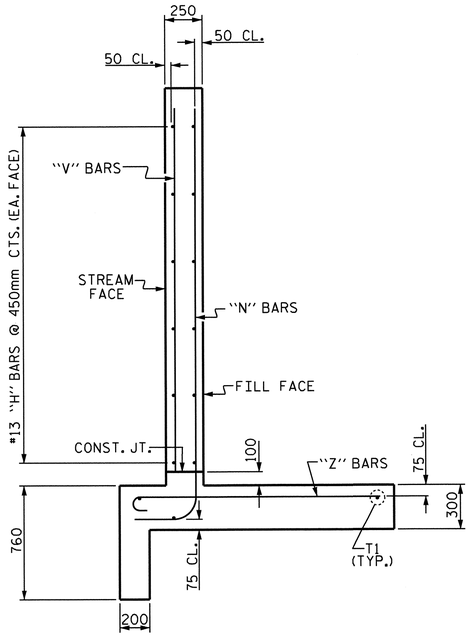
INLET WINGS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#13	STR	3440	41
H2	4	#13	STR	2380	9
H3	4	#13	STR	1280	5
H4	24	#13	1	980	23
H5	4	#13	STR	3700	15
N1	4	#16	2	3060	19
N2	6	#16	2	2700	25
N3	6	#13	2	2340	14
N4	6	#13	2	1960	12
N5	6	#13	2	1600	10
S1	6	#19	STR	1800	24
T1	6	#16	STR	4000	37
V1	4	#13	STR	2440	10
V2	6	#13	STR	2080	12
V3	6	#13	STR	1720	10
V4	6	#13	STR	1340	8
V5	6	#13	STR	980	6
Z1	4	#16	3	1840	11
Z2	6	#16	3	1620	15
Z3	6	#13	3	1380	8
Z4	6	#13	3	1160	7
Z5	6	#13	3	940	6

REINFORCING STEEL FOR 2 INLET WINGS = 327 kg

CLASS A CONCRETE

2 INLET WINGS	=	8.0 m3
1 HEADWALL	=	0.6 m3
1 END CURTAIN WALL	=	0.7 m3
TOTAL	=	9.3 m3



TYPICAL WING SECTION

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 20+86.000 -L-

SHEET 11 OF 11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INLET WINGS FOR CONCRETE BOX CULVERT

H = 2.400m SLOPE = 2:1
90° SKEW (STAGE II)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-23
1			3			TOTAL SHEETS
2			4			26

STR. #2

NORTH CAROLINA PROFESSIONAL SEAL 12441 ENGINEER TIMOTHY W. ALFORD

DRAWN BY : M. K. TOM DATE : 2/11
CHECKED BY : T. M. GARRISON DATE : 3/11

15-AUG-2012 08:31
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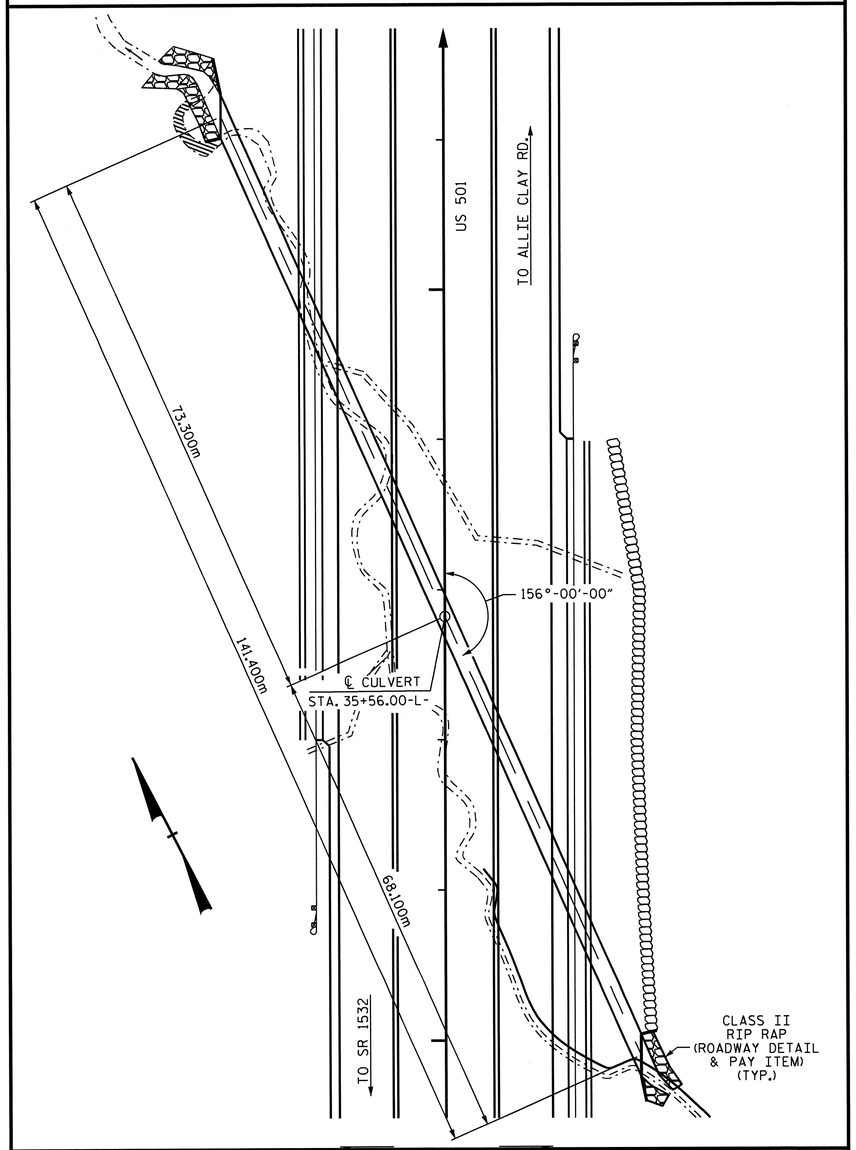
aoutlaw

F.A. PROJECT HHP-0501(25)

BM #408: SPIKE SET IN 510mm OAK 4m RT OF STA. 38+50.000 -L-, ELEV. 204.273



LOCATION SKETCH

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 2.36 m^3/m	333.7	m^3
WINGS ETC.	14.8	m^3
TOTAL	348.5	m^3
REINFORCING STEEL		
BARREL	34160	kg
WINGS ETC.	521	kg
TOTAL	34681	kg
CULVERT EXCAVATION ---------- LUMP SUM		
FOUNDATION COND. MAT'L ---- 415 METRIC TONS		

HYDRAULIC DATA

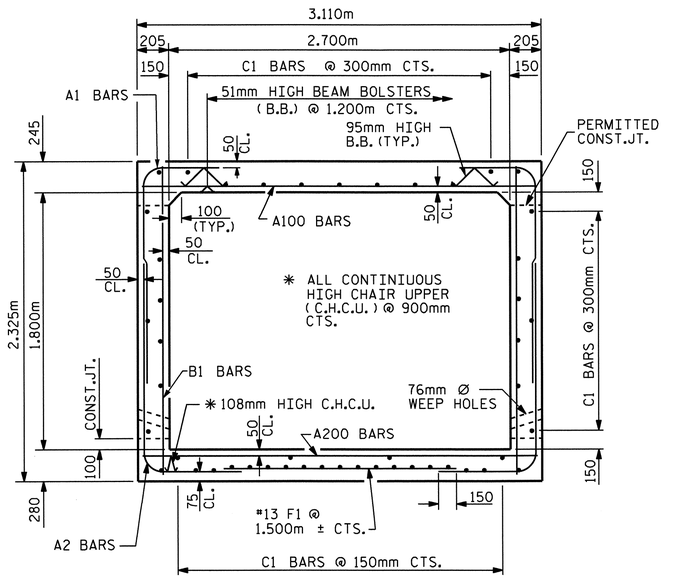
DESIGN DISCHARGE	= 7.5	m^3/s
DESIGN FREQUENCY	= 50	YRS.
DESIGN HW ELEVATION	= 195.210	m
BASE DISCHARGE (Q100)	= 8.7	m^3/s
BASE HW ELEVATION	= 195.330	
DRAINAGE AREA	= 41.3	Ha

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 13.3+	m^3/s
OVERTOPPING FREQUENCY	= 500	YRS.
OVERTOPPING ELEVATION	= 198.500	m

GRADE DATA

GRADE POINT ELEVATION @ STA. 35+56.00 -L-	= 199.270 m
BED ELEVATION @ STA. 35+56.00 -L-	= 192.020 m
ROADWAY SLOPE	= 2:1



RIGHT ANGLE SECTION OF BARREL

THERE ARE 48 "C" BARS IN SECTION OF BARREL

NOTES:

ASSUMED LIVE LOAD ---------- MS18 OR ALTERNATE LOADING.

DESIGN FILL---------- 5.590m

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

76mm 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 100mm 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 21.0m. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 360,000 KG OF REINFORCING STEEL, ONE 760mm SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 360,000 KG OF REINFORCING STEEL, TWO 760mm SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

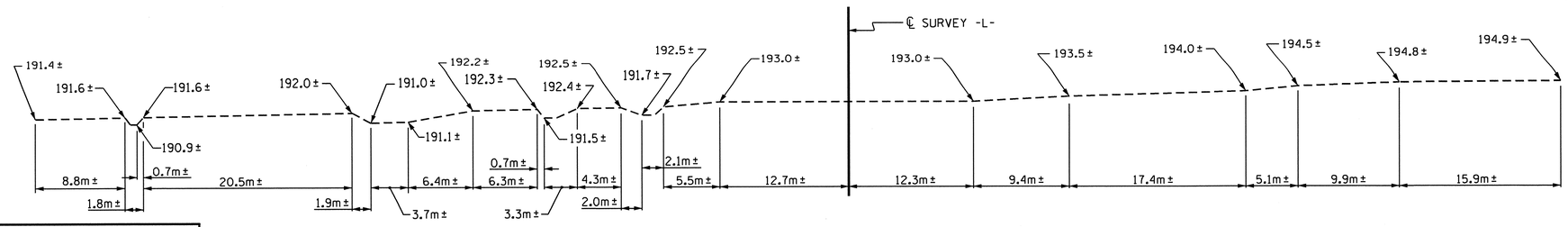
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

ALL ELEVATIONS ARE IN METERS.

FOR STREAM DIVERSION DETAILS AND PAY ITEMS, SEE EROSION CONTROL PLANS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

METRIC



PROFILE ALONG ℄ CULVERT

NORTH CAROLINA PROFESSIONAL SEAL 032205 ENGINEER JESSE McARTHUR BAILEY

2/20/13

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 35+56.000 -L-

SHEET 1 OF 3 CULVERT NO. 217

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD SINGLE 2.7m X 1.8m CONCRETE BOX CULVERT 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-24
1			3			TOTAL SHEETS
2			4			26

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTI W. ALFORD

ASSEMBLED BY : M. E. GILES/AVR	DATE : 11/10
CHECKED BY : T. M. GARRISON	DATE : 12/10
DRAWN BY : EEM	6/97
CHECKED BY : ARB	7/97

19-FEB-2013 11:25
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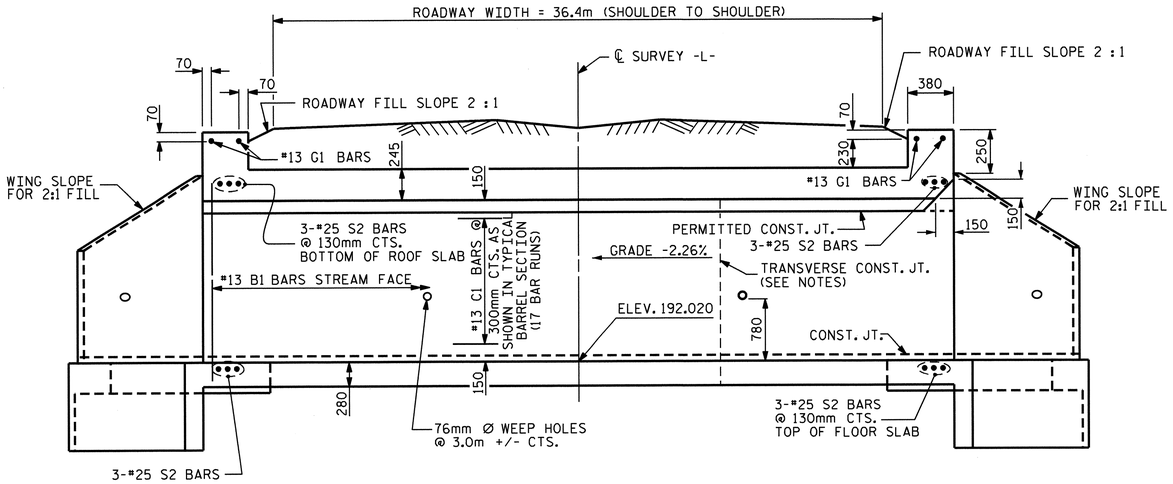
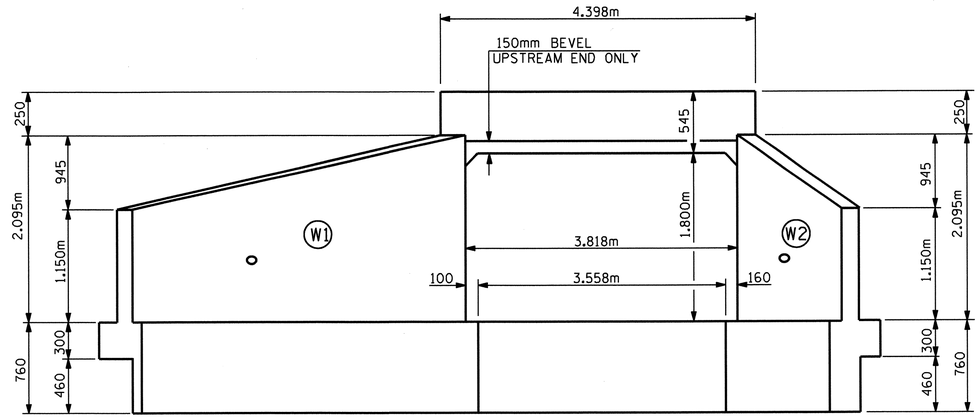
Kalford

STD. No. CBII35SM

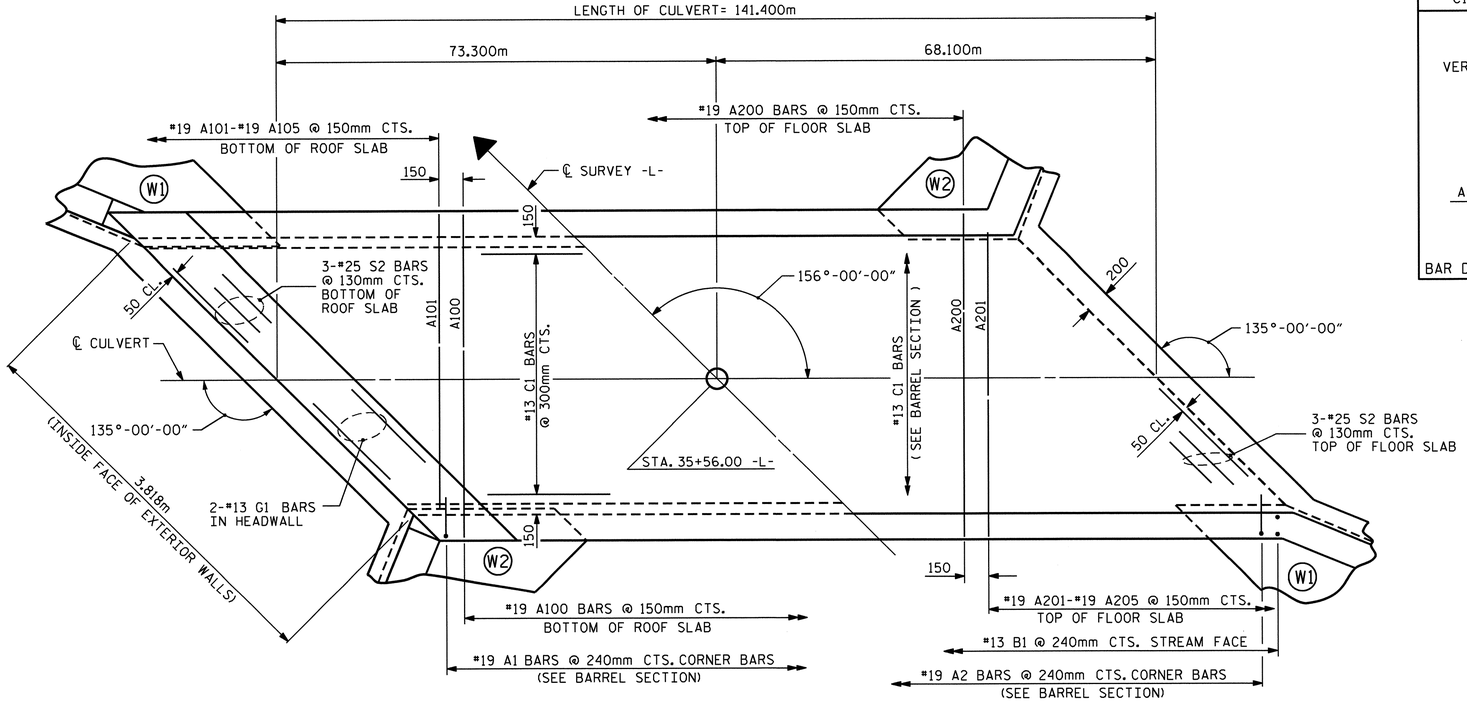
STR. #3



CULVERT SECTION NORMAL TO ROADWAY



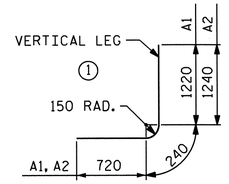
END ELEVATION NORMAL TO SKEW



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

SPLICE LENGTH CHART		
BAR	SIZE	SPLICE LENGTH
B1	13	540
C1	13	590



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

REINFORCING STEEL BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	922	19	STR	2980	6141
A101	6	19	STR	2520	34
A102	6	19	STR	2060	28
A103	6	19	STR	1600	21
A104	6	19	STR	1160	16
A105	6	19	STR	720	10
A200	922	19	STR	2980	6141
A201	6	19	STR	2520	34
A202	6	19	STR	2060	28
A203	6	19	STR	1600	21
A204	6	19	STR	1160	16
A205	6	19	STR	720	10
A1	1180	19	1	2180	5749
A2	1180	19	1	2200	5802
B1	1180	13	STR	2160	2534
C1	816	13	STR	8860	7186
G1	4	13	STR	4240	17
S2	12	25	STR	4240	202
F1	92	13	STR	1860	170
REINFORCING STEEL					34160 KG

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 35+56.000 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD SINGLE 2.7m X 1.8m CONCRETE BOX CULVERT 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-25
1			3			TOTAL SHEETS
2			4			26

NORTH CAROLINA PROFESSIONAL SEAL 029441 ENGINEER KRISTY W. ALFORD

ASSEMBLED BY : M. E. GILES/AVR	DATE : 11/10
CHECKED BY : T.M. GARRISON	DATE : 12/10
DRAWN BY : EEM 6/97	
CHECKED BY : ARB 7/97	

19-FEB-2013 11:25
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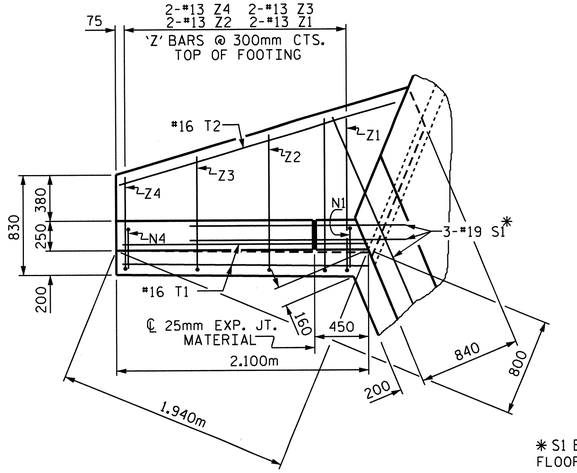
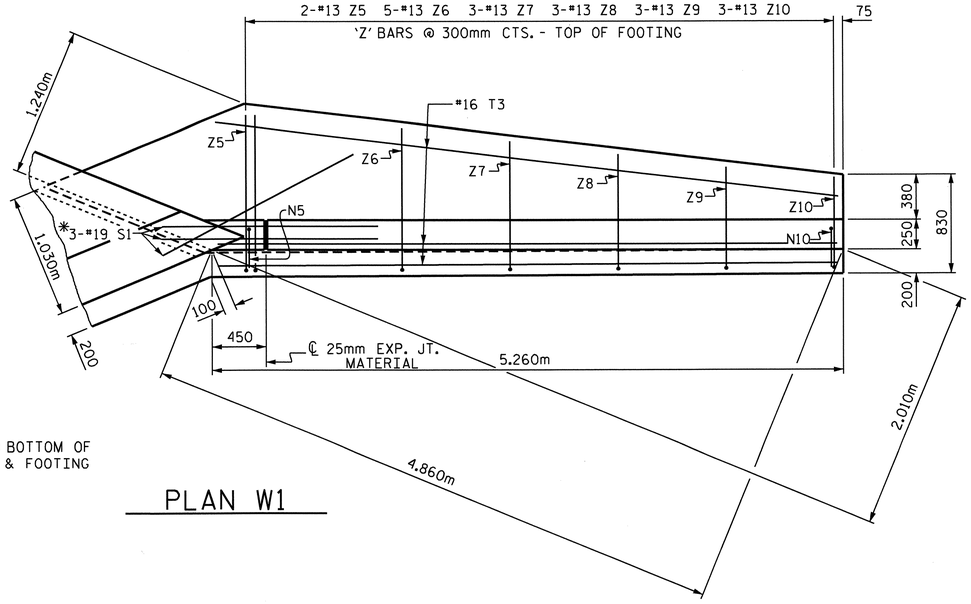
kalford

STD. No. CBII35SM

STR. #3

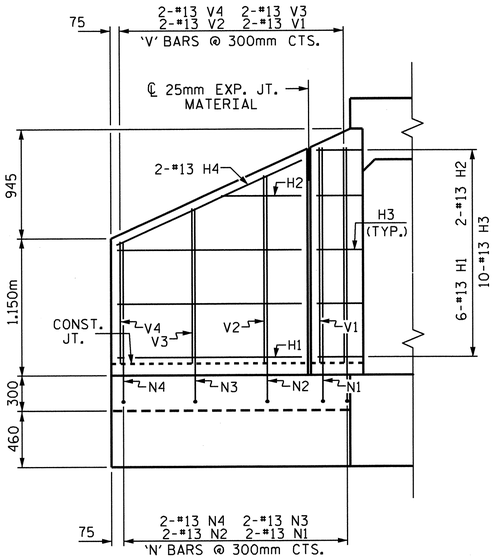


PLAN W2

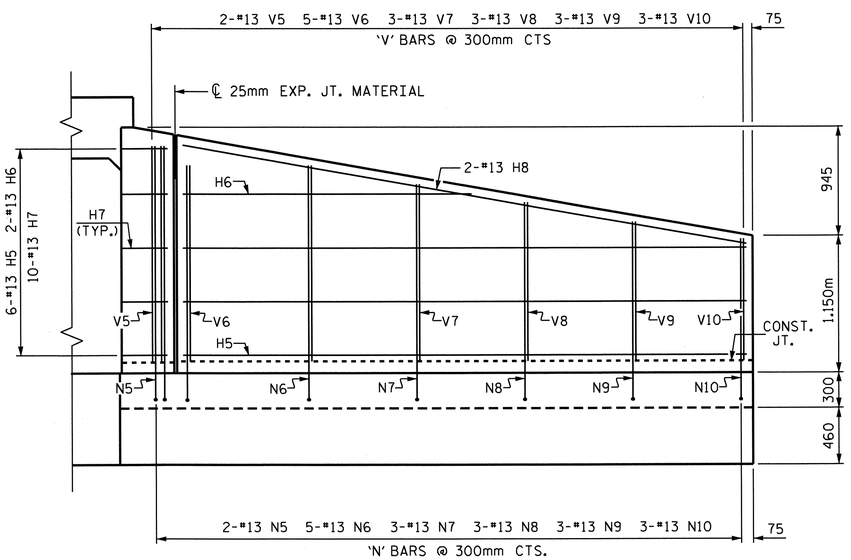


PLAN W1

✱S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING



ELEVATION W2

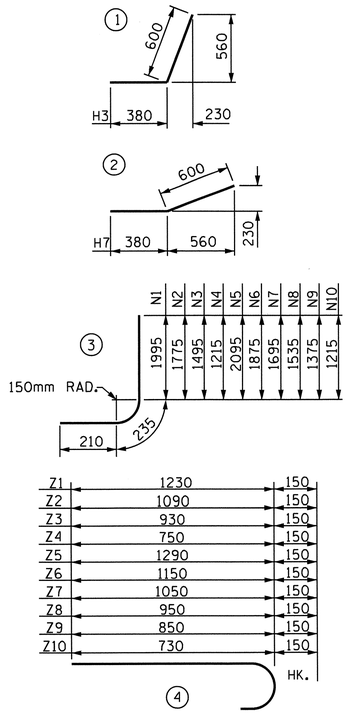


ELEVATION W1

FOR WING ORIENTATION, SEE BARREL STANDARD SHEET.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



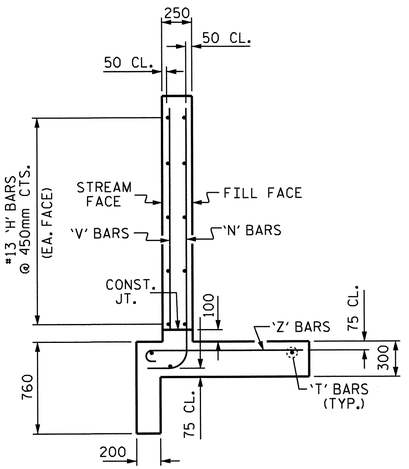
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	13	STR	1540	18
H2	4	13	STR	720	3
H3	20	13	1	980	19
H4	4	13	STR	1680	7
H5	12	13	STR	4700	56
H6	4	13	STR	2760	11
H7	20	13	2	980	19
H8	4	13	STR	4760	19
N1	4	13	3	2440	10
N2	4	13	3	2220	9
N3	4	13	3	1940	8
N4	4	13	3	1660	7
N5	4	13	3	2540	10
N6	10	13	3	2320	23
N7	6	13	3	2140	13
N8	6	13	3	1980	12
N9	6	13	3	1820	11
N10	6	13	3	1660	10
S1	12	19	STR	1800	48
T1	4	16	STR	2100	13
T2	2	16	STR	2400	7
T3	6	16	STR	5260	49
V1	4	13	STR	1820	7
V2	4	13	STR	1600	6
V3	4	13	STR	1320	5
V4	4	13	STR	1040	4
V5	4	13	STR	1920	8
V6	10	13	STR	1700	17
V7	6	13	STR	1520	9
V8	6	13	STR	1360	8
V9	6	13	STR	1200	7
V10	6	13	STR	1040	6
Z1	4	13	4	1380	5
Z2	4	13	4	1240	5
Z3	4	13	4	1080	4
Z4	4	13	4	900	4
Z5	4	13	4	1440	6
Z6	10	13	4	1300	13
Z7	6	13	4	1200	7
Z8	6	13	4	1100	7
Z9	6	13	4	1000	6
Z10	6	13	4	880	5

REINFORCING STEEL FOR 4 WING WALLS 521 kg

CLASS A CONCRETE

4	WINGS	12.7 m^3
2	HEADWALLS	1.0 m^3
2	END CURTAIN WALLS	1.1 m^3
	TOTAL	14.8 m^3



TYPICAL WING SECTION

PROJECT NO. R-2241A

PERSON COUNTY

STATION: 35+56.000 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT H=1.800m SLOPE=2:1 135° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 022441 ENGINEER KRISTY W. ALFORD

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-26
1			3			TOTAL SHEETS
2			4			26

STR. #3 STD. NO. CW4518

ASSEMBLED BY : M. E. GILES/AVR	DATE : 11/10
CHECKED BY : T. M. GARRISON	DATE : 12/10
DRAWN BY : JLR 7/97	
CHECKED BY : VAP 7/97	

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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 250	140 MPa
- AASHTO M270 GRADE 345W	190 MPa
- AASHTO M270 GRADE 345	190 MPa
REINFORCING STEEL IN TENSION	
GRADE 420	165 MPa
CONCRETE IN COMPRESSION	8.3 MPa
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR	
UNTREATED - EXTREME FIBER STRESS	12 MPa
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	2.6 MPa
EQUIVALENT FLUID PRESSURE OF EARTH	480 kg/m^3 (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 2006 "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; CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP; AND CLASS S SHALL BE USED FOR UNDERWATER FOOTING SEALS.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 19mm WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 38mm RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 6mm 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 6mm 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 300mm 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 22.23mm Ø SHEAR STUDS FOR THE 19.05mm Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -22.23mm Ø STUDS FOR 4 - 19.05mm Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 22.23mm Ø STUDS ALONG THE BEAM AS SHOWN FOR 19.05mm Ø STUDS BASED ON THE RATIO OF 3 - 22.23mm Ø STUDS FOR 4 - 19.05mm Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 610mm.

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 8mm IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 50mm 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.

PLACEMENT OF BEAM OR GIRDER MEMBERS ON TRUCKS FOR HAULING SHALL BE DONE IN COMPLIANCE WITH LIMITS SHOWN ON SKETCHES PROVIDED TO THE MATERIALS AND TEST UNIT APPROVED BY THE STRUCTURE DESIGN UNIT DATED MAY 8, 1991. THESE SKETCHES PRIMARILY LIMIT THE UNSUPPORTED CANTILEVER LENGTH OF MEMBERS. WHEN THE CONTRACTOR WISHES TO PLACE MEMBERS ON TRUCKS NOT IN ACCORDANCE WITH THESE LIMITS, TO SHIP BY RAIL, TO ATTACH SHIPPING RESTRAINTS TO THE MEMBERS OR TO INVERT MEMBERS, HE SHALL SUBMIT A SKETCH FOR APPROVAL PRIOR TO SHIPPING. SEE ALSO ARTICLE 1072-1 1.

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 2mm 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.

REV. 5/16/97 EEM/RGW REV. 5/7/03 RWW (./) JTE
REV. 8/16/99 RWW (./) LES REV. 5/1/06 TLA (./) GM

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JANUARY, 1990

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