09/08/99

TIP PROJECT: B-4190

CONTRACT: C202550

CULVERT

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

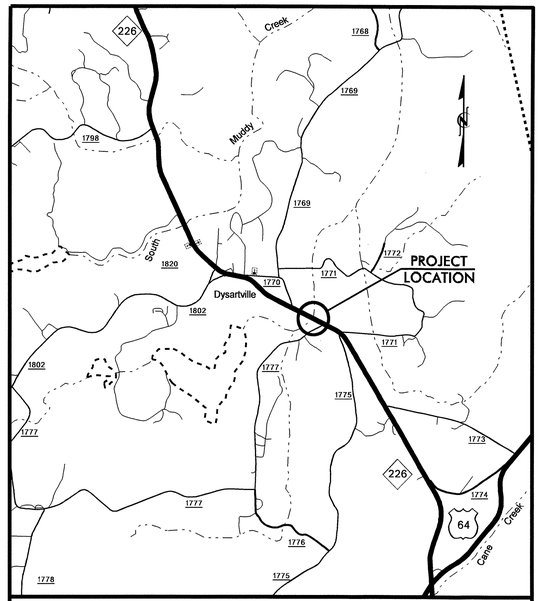
MCDOWELL COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4190		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33537.1.1	BRSTP-0226 (9)	PE
33537.2.1	BRSTP-0226 (9)	R/W, UTILITIES
33537.3.1	BRSTP-0226 (9)	CONST.

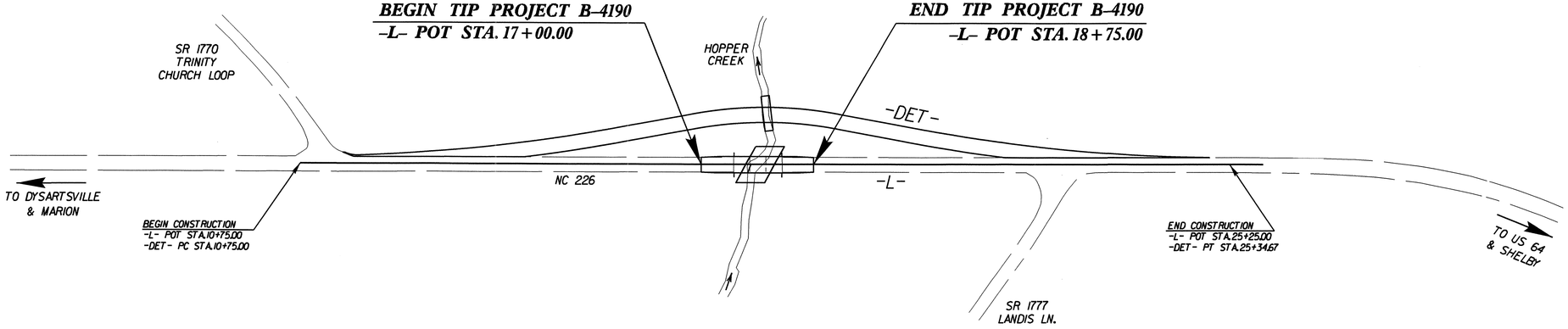
LOCATION: BRIDGE NO. 37 OVER HOPPER CREEK ON NC 226

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND CULVERT



VICINITY MAP

NAD 83
NC GRID



DESIGN DATA

ADT 2010 = 2,520
ADT 2030 = 3,560
DHV = 10 %
D = 60 %
T = 8 % *
V = 60 MPH
* (TTST 3% + DUAL 5%)
FUNCT CLASS = RURAL MAJOR COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4190	=	*0.025 mile*
LENGTH STRUCTURE TIP PROJECT B-4190	=	*0.008 mile*
TOTAL LENGTH TIP PROJECT B-4190	=	*0.033 mile*

PREPARED BY THE OFFICE OF:
DIVISION OF HIGHWAYS

2006 STANDARD SPECIFICATIONS

LETTING DATE:
JUNE 15, 2010

Q.H. NGUYEN, P.E.
PROJECT ENGINEER

MARC G. CHEEK, P.E.
PROJECT DESIGN ENGINEER

STRUCTURE DESIGN UNIT
1000 BIRCH RIDGE DRIVE
RALEIGH, N.C. 27610

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

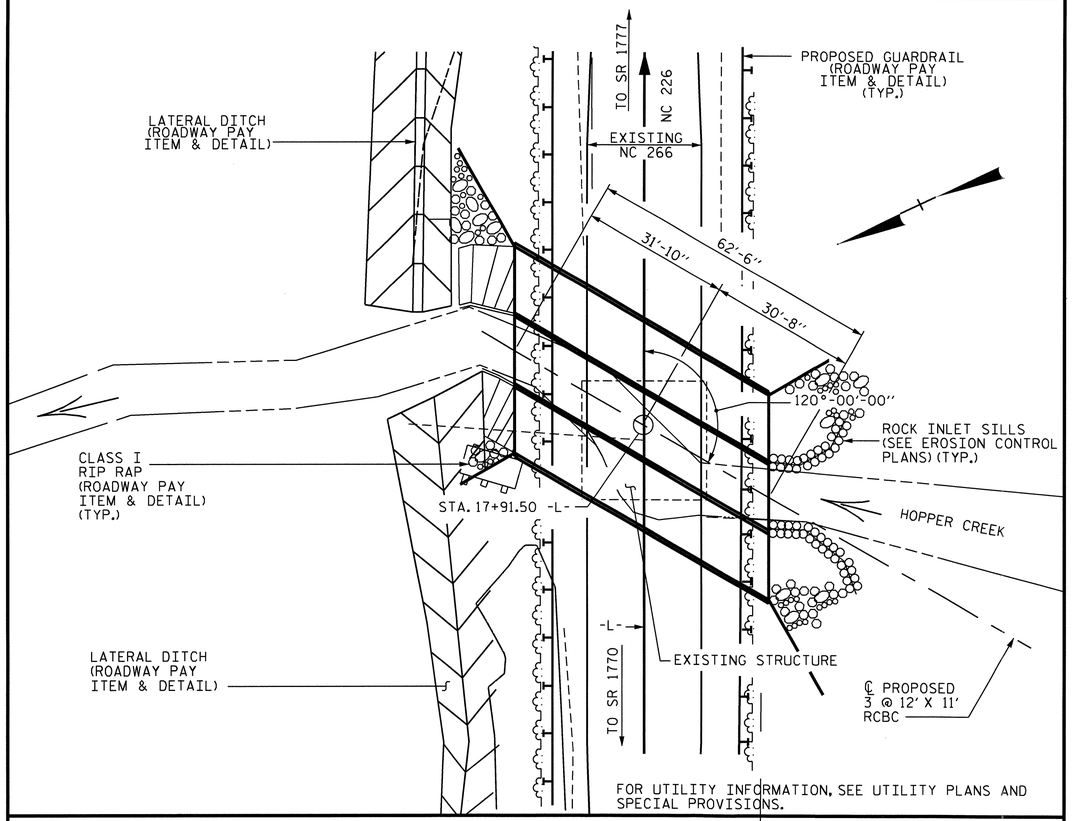
P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR

02-MAR-2010 09:06
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
dahodge

B.M. #1 : CHISELED SQUARE WITH PUNCH HOLE IN WING WALL, STA. 17+50.75 -L-, 15.77 RT., ELEV. 1160.04'



LOCATION SKETCH

F.A. PROJECT NO : BRSTP-0226 (9)

NOTES

ASSUMED LIVE LOAD = HS20 OR ALTERNATE LOADING.

DESIGN FILL_____4.18'

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.

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 SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH 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.

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. PHASE I 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.
1. PHASE II 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.

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 FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

AT THE CONTRACTOR'S OPTION HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACES OF THE EXTERIOR 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.

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

THE EXISTING 3 SPAN STRUCTURE (1 @ 25'-3", 1 @ 25'-0", 1 @ 25'-3") WITH A CLEAR ROADWAY WIDTH OF 24' ON A REINFORCED CONCRETE DECK WITH A 4½" ASPHALT WEARING SURFACE ON 6 LINES OF STEEL I-BEAMS ON A SUBSTRUCTURE CONSISTING OF REINFORCED CONCRETE CAPS AND TIMBER PILES AT THE END BENTS AND BENTS AND LOCATED AT THE SITE OF THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT. FOR REMOVAL OF EXISTING STRUCTURE, SEE SPECIAL PROVISIONS.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT BARRELS. UPON COMPLETION OF THE PROPOSED CULVERT, THE MATERIAL SHALL BE PLACED IN THE BARREL TO A DEPTH OF 1'-0". BED MATERIAL MAY BE SUPPLEMENTED WITH CLASS B RIP RAP IF SUITABLE MATERIAL IS NOT AVAILABLE IN SUFFICIENT QUANTITIES.

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

FOR CURING CONCRETE, SEE SPECIAL PROVISIONS.

FOR TEMPORARY ON-SITE DETOUR, SEE ROADWAY PLANS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 2330 CFS.
FREQUENCY OF DESIGN FLOOD	= 50 YEARS
DESIGN HIGH WATER ELEVATION	= 1156.8
DRAINAGE AREA	= 5.15 SQ. MI.
BASIC DISCHARGE (Q100)	= 2620 CFS.
BASIC HIGH WATER ELEVATION	= 1157.4

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE_____ 3500 CFS.

FREQUENCY OF OVERTOPPING FLOOD_____ 500+ YRS.

OVERTOPPING FLOOD ELEVATION_____ 1160.4

ROADWAY DATA

GRADE POINT ELEV. @ STATION 17+91.50 -L-	= 1160.40
BED ELEV. @ STATION 17+91.50 -L-	= 1145.33
ROADWAY FILL SLOPES	= 2 : 1

TOTAL STRUCTURE QUANTITIES

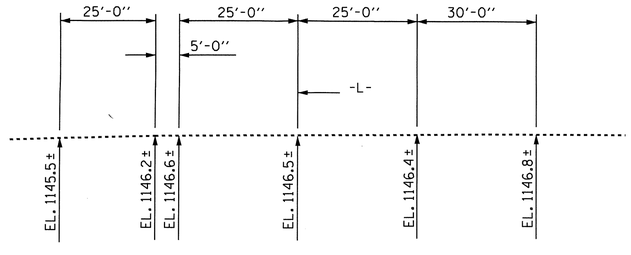
CLASS A CONCRETE

BARREL @	3.784	C.Y./FT.	236.5 C.Y.
WINGS, ETC.			54.3 C.Y.
TOTAL			281.7 C.Y.

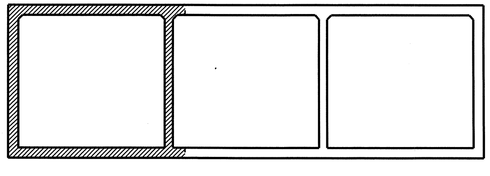
REINFORCING STEEL

BARREL	54135 LBS.
WINGS, ETC.	3094 LBS.
TOTAL	57229 LBS.

CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	170 TONS
REMOVAL OF EXISTING STRUCTURE	LUMP SUM



PROFILE ALONG ℄ CULVERT



CONSTRUCTION PHASING

(LOOKING DOWNSTREAM)

PHASE I CONSTRUCTION

PHASE II CONSTRUCTION

NORTH CAROLINA PROFESSIONAL SEAL 13014 ENGINEER QUANG H. NGUYEN

Quang H. Nguyen 4-14-10

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL B. CHEEK, JR.

4-14-10

PROJECT NO. B-4190

McDOWELL COUNTY

STATION: 17+91.50 -L-

SHEET 1 OF 7 REPLACES BRIDGE #37

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 11 FT. CONCRETE BOX CULVERT 120° SKEW

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

DRAWN BY : M. POOLE DATE : 11/09

CHECKED BY : W.D. CRUTCHER DATE : 12/09

14-APR-2010 07:12
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STR. #1

22-FEB-2010 08:32
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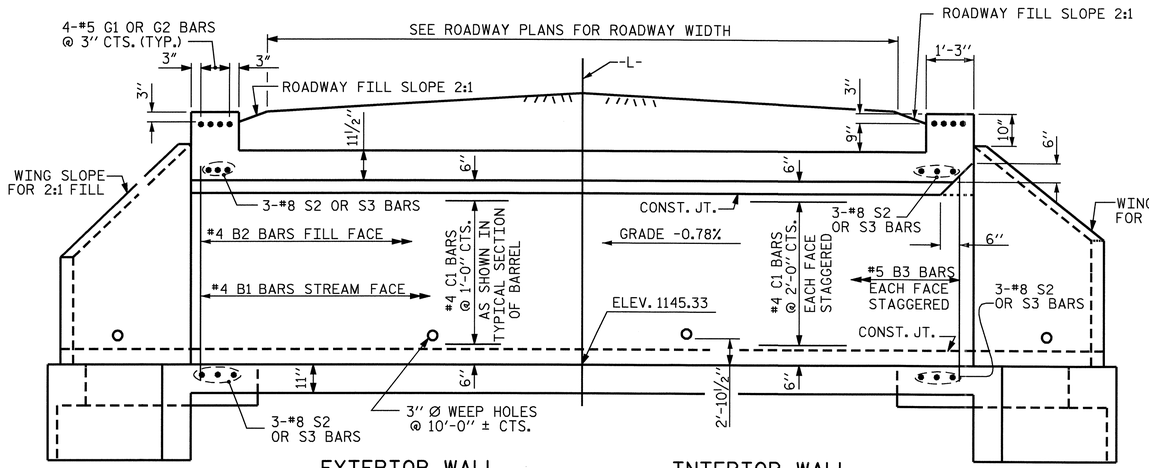
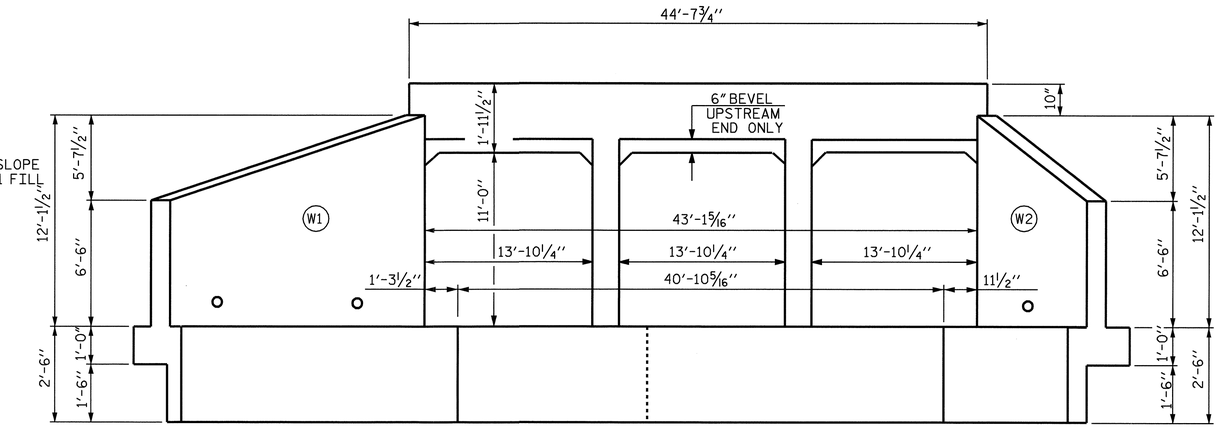
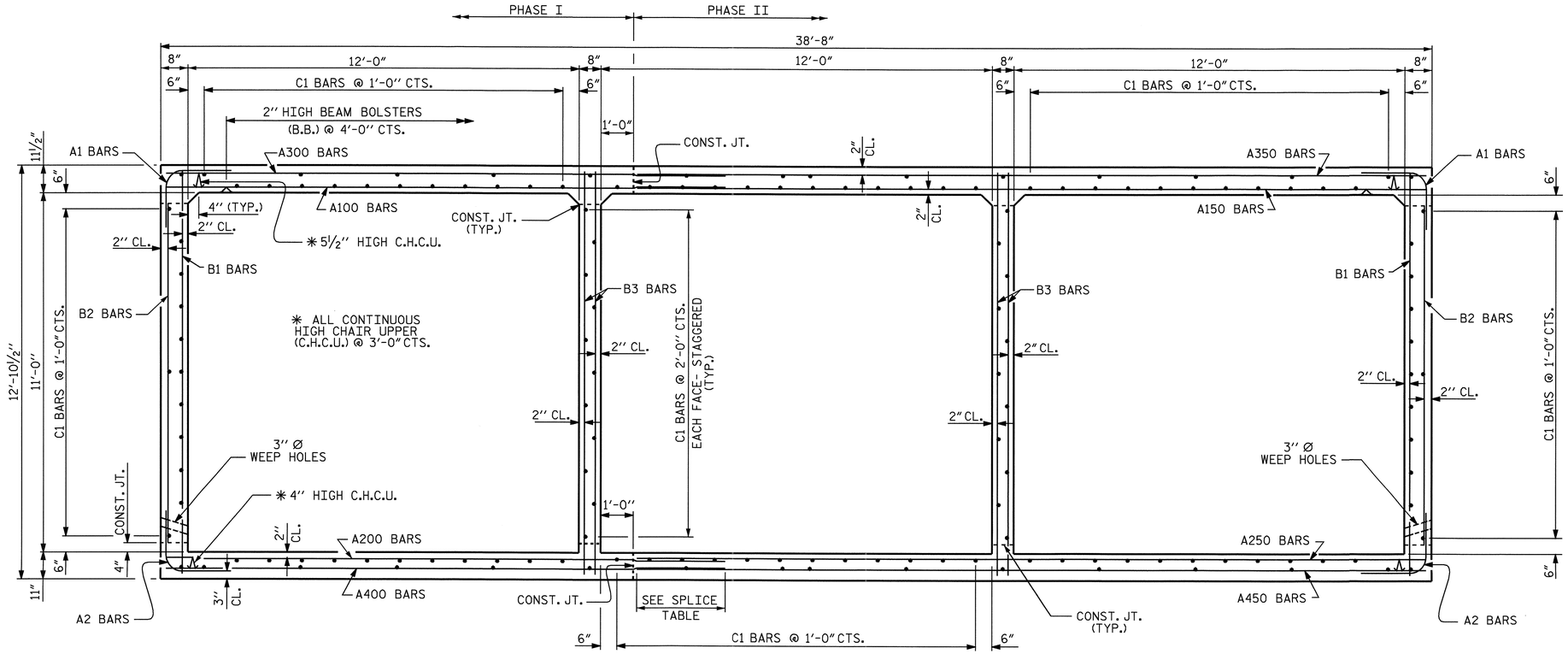
mpoole



CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW



RIGHT ANGLE SECTION OF BARREL

THERE ARE 144 "C" BARS IN SECTION OF BARREL.
(LOOKING DOWNSTREAM)

ASSEMBLED BY : M. POOLE DATE : 11/09
CHECKED BY : W.D. CRUTCHER DATE : 12/09

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. PEELE, JR.
4-14-10

PROJECT NO. B-4190
McDOWELL COUNTY
STATION: 17+91.50 -L-

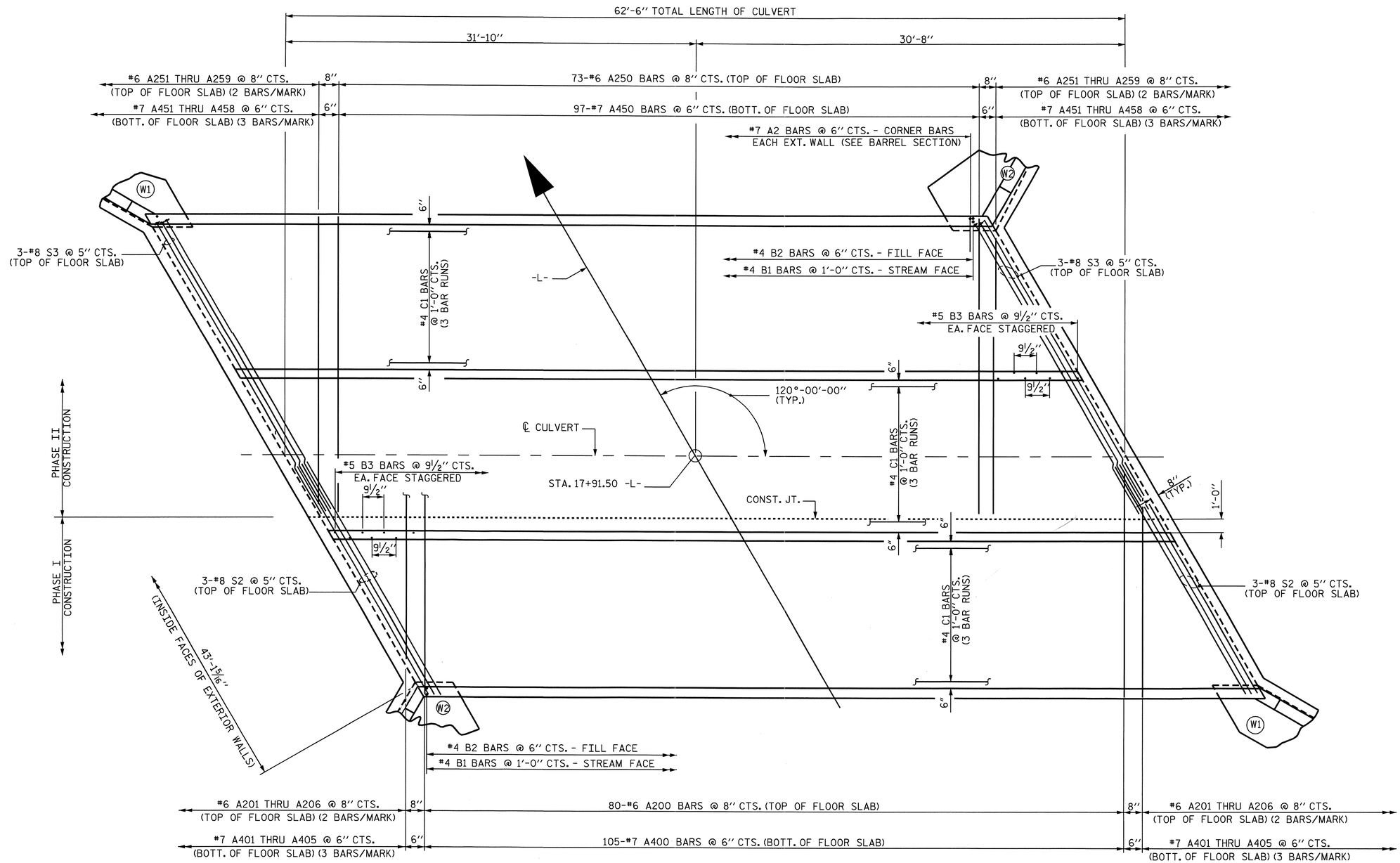
SHEET 2 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 11 FT. CONCRETE BOX CULVERT 120° SKEW

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

STR. #1



PLAN - FLOOR SLAB

PROJECT NO. B-4190

McDOWELL COUNTY

STATION: 17+91.50 -L-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 11 FT. CONCRETE BOX CULVERT 120° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. FLICK, JR.
4-14-10

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

DRAWN BY : M. POOLE DATE : 11/09
CHECKED BY : W.D. CRUTCHER DATE : 12/09

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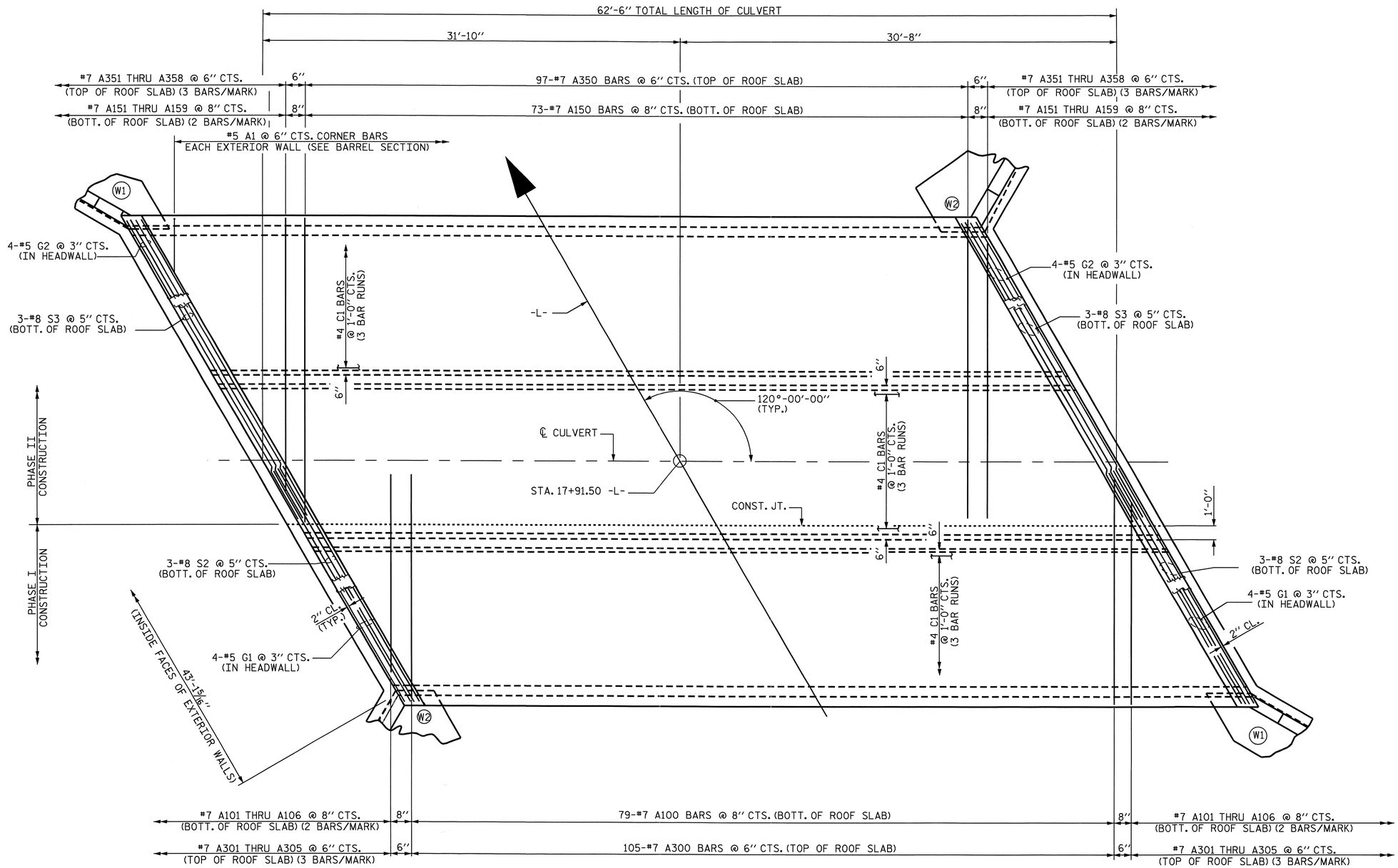
mpoole



PLAN - ROOF SLAB

PROJECT NO. B-4190

McDOWELL COUNTY

STATION: 17+91.50 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 11 FT. CONCRETE BOX CULVERT 120° SKEW

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

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
4-14-10

DRAWN BY : M. POOLE DATE : 11/09
CHECKED BY : W.D. CRUTCHER DATE : 12/09

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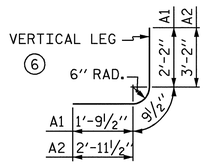
SPLICE LENGTH CHART

BAR	SIZE	SPLICE LENGTH
A100	7	3′-1″
A200	6	2′-4″
A300	7	3′-1″
A400	7	3′-1″
B1	4	1′-9″
B3	5	1′-9′
C1	4	1′-11″
″G″	5	2′-6″
″S″	8	4′-11″

BAR TYPE

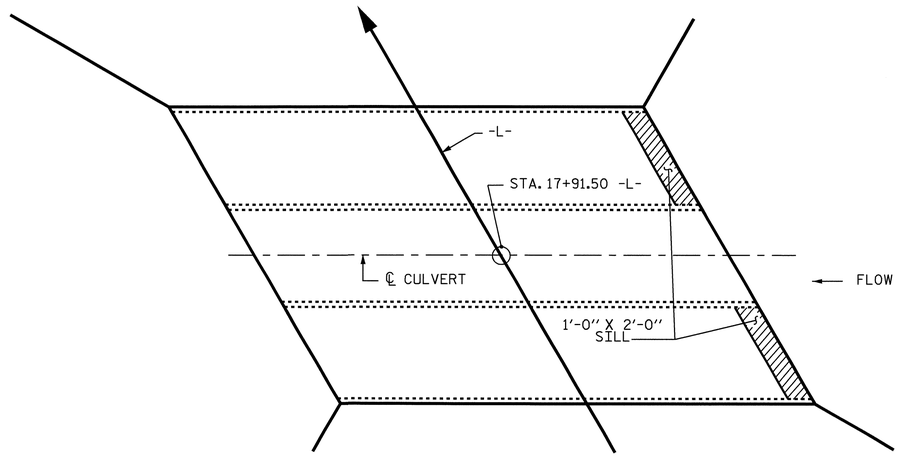


BAR DIMENSIONS ARE OUT TO OUT

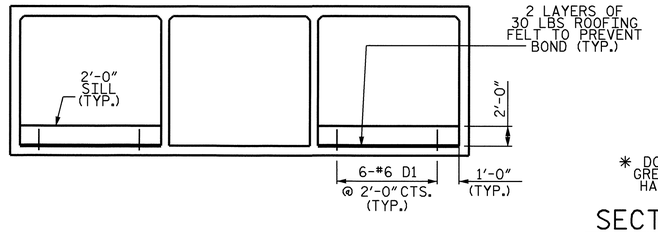
BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	250	5	6	4′-9″	1239
A2	250	7	6	6′-11″	3534
A100	79	7	STR	17′-3″	2785
A101	4	7	STR	15′-3″	125
A102	4	7	STR	12′-10″	105
A103	4	7	STR	10′-6″	86
A104	4	7	STR	8′-2″	67
A105	4	7	STR	5′-6″	45
A106	4	7	STR	3′-8″	30
A150	73	7	STR	24′-2″	3606
A151	4	7	STR	22′-3″	182
A152	4	7	STR	19′-10″	162
A153	4	7	STR	17′-7″	144
A154	4	7	STR	15′-3″	125
A155	4	7	STR	13′-0″	106
A156	4	7	STR	10′-8″	87
A157	4	7	STR	8′-4″	68
A158	4	7	STR	6′-0″	49
A159	4	7	STR	3′-8″	30
A200	80	6	STR	16′-6″	1983
A201	4	6	STR	14′-3″	86
A202	4	6	STR	12′-0″	72
A203	4	6	STR	9′-8″	58
A204	4	6	STR	7′-4″	44
A205	4	6	STR	5′-1″	31
A206	4	6	STR	2′-9″	17
A250	73	6	STR	24′-2″	2650
A251	4	6	STR	22′-3″	134
A252	4	6	STR	19′-10″	119
A253	4	6	STR	17′-7″	106
A254	4	6	STR	15′-3″	92
A255	4	6	STR	13′-0″	78
A256	4	6	STR	10′-8″	64
A257	4	6	STR	8′-4″	50
A258	4	6	STR	6′-0″	36
A259	4	6	STR	3′-8″	22

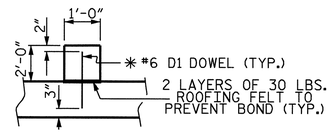
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A300	105	7	STR	17′-3″	3702
A301	6	7	STR	14′-9″	181
A302	6	7	STR	12′-2″	149
A303	6	7	STR	9′-7″	118
A304	6	7	STR	6′-11″	85
A305	6	7	STR	4′-4″	53
A350	97	7	STR	24′-2″	4791
A351	6	7	STR	22′-0″	270
A352	6	7	STR	19′-4″	237
A353	6	7	STR	16′-9″	205
A354	6	7	STR	14′-2″	174
A355	6	7	STR	11′-7″	142
A356	6	7	STR	9′-0″	110
A357	6	7	STR	6′-4″	78
A358	6	7	STR	3′-9″	46
A400	105	7	STR	17′-3″	3702
A401	6	7	STR	14′-9″	181
A402	6	7	STR	12′-2″	149
A403	6	7	STR	9′-7″	118
A404	6	7	STR	6′-11″	85
A405	6	7	STR	4′-4″	53
A450	97	7	STR	24′-2″	4791
A451	6	7	STR	22′-0″	270
A452	6	7	STR	19′-4″	237
A453	6	7	STR	16′-9″	205
A454	6	7	STR	14′-2″	174
A455	6	7	STR	11′-7″	142
A456	6	7	STR	9′-0″	110
A457	6	7	STR	6′-4″	78
A458	6	7	STR	3′-9″	46
B1	126	4	STR	12′-4″	1038
B2	250	4	STR	10′-4″	1726
B3	316	5	STR	12′-4″	4065
C1	432	4	STR	22′-2″	6397
D1	12	6	STR	2′-6″	45
G1	8	5	STR	18′-11″	158
G2	8	5	STR	27′-9″	232
S2	12	8	STR	21′-6″	689
S3	12	8	STR	27′-9″	889
REINFORCING STEEL				54135	LBS.



PLAN OF SILL LOCATION



ELEVATION



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

SECTION THRU 2′-0″ SILL

PROJECT NO. B-4190

McDOWELL COUNTY

STATION: 17+91.50 -L-

SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TRIPLE 12 FT. X 11 FT. CONCRETE BOX CULVERT

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL GLOVER CREEK, JR.
4-14-10

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

SHEET NO. C-5
TOTAL SHEETS 7

ASSEMBLED BY : M. POOLE DATE : 11/09
CHECKED BY : W.D. CRUTCHER DATE : 12/09

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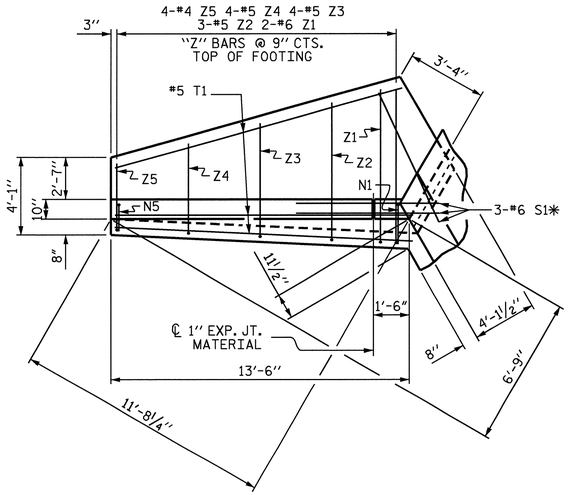
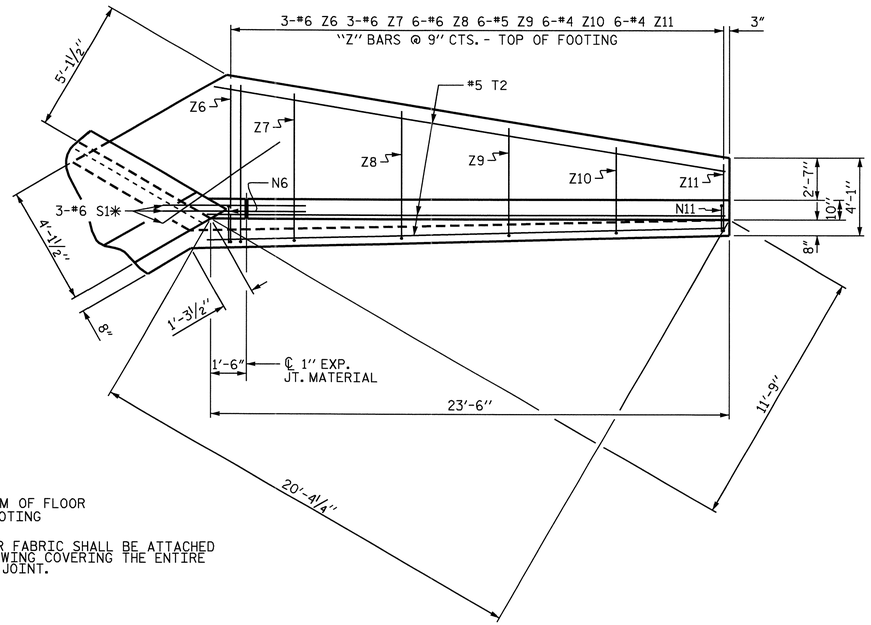
mpoole



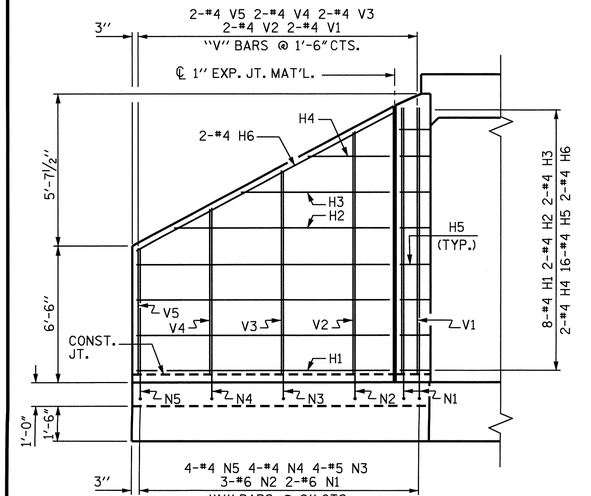


* S1 BARS @ BOTTOM OF FLOOR SLAB AND FOOTING

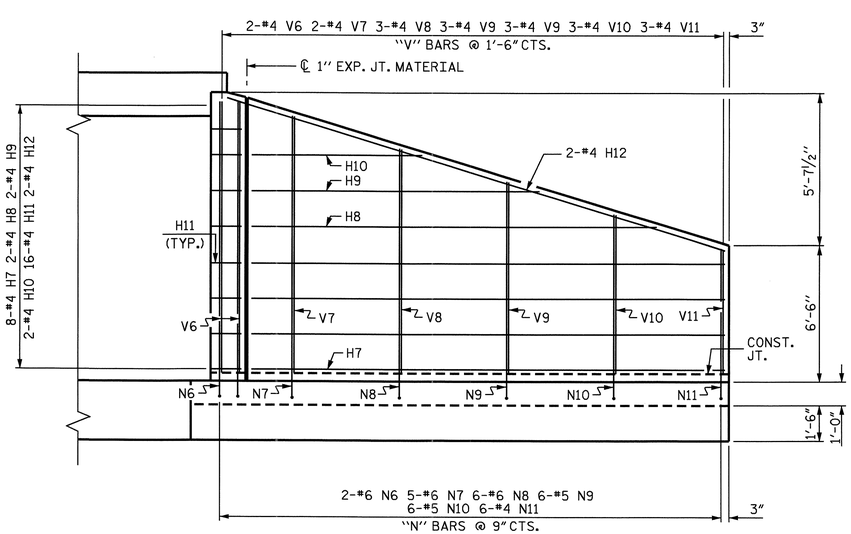
A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

PLAN W2

PLAN W1



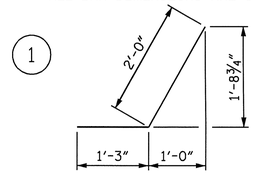
ELEVATION W2

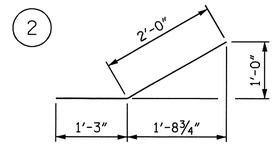


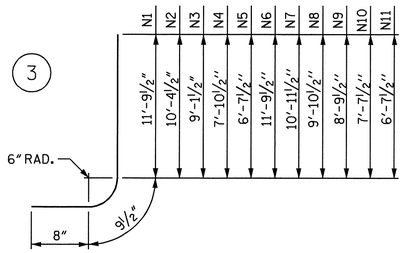
ELEVATION W1

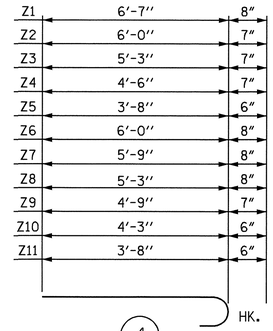
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.









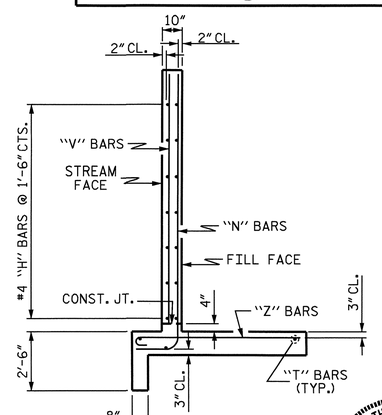
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	16	#4	STR	11'-7"	124
H2	4	#4	STR	11'-4"	30
H3	4	#4	STR	7'-10"	21
H4	4	#4	STR	4'-4"	12
H5	32	#4	1	3'-3"	69
H6	4	#4	STR	12'-7"	34
H7	16	#4	STR	21'-7"	231
H8	4	#4	STR	20'-11"	56
H9	4	#4	STR	14'-6"	39
H10	4	#4	STR	8'-2"	22
H11	32	#4	2	3'-3"	69
H12	4	#4	STR	22'-1"	59
N1	4	#6	3	13'-3"	80
N2	6	#6	3	11'-6"	107
N3	8	#5	3	10'-7"	88
N4	8	#4	3	9'-4"	50
N5	8	#4	3	8'-1"	43
N6	4	#6	3	13'-3"	80
N7	10	#6	3	12'-5"	186
N8	12	#6	3	11'-4"	204
N9	12	#5	3	10'-3"	128
N10	12	#5	3	9'-1"	114
N11	12	#4	3	8'-1"	65
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	12'-11"	81
T2	6	#5	STR	22'-1"	138
V1	4	#4	STR	11'-2"	30
V2	4	#4	STR	9'-11"	26
V3	4	#4	STR	8'-7"	23
V4	4	#4	STR	7'-4"	20
V5	4	#4	STR	6'-1"	16
V6	4	#4	STR	11'-3"	30
V7	4	#4	STR	10'-6"	28
V8	6	#4	STR	9'-4"	37
V9	6	#4	STR	8'-2"	33
V10	6	#4	STR	7'-1"	28
V11	6	#4	STR	6'-0"	24
Z1	4	#6	4	7'-3"	44
Z2	6	#5	4	6'-7"	41
Z3	8	#5	4	5'-10"	49
Z4	8	#5	4	5'-1"	42
Z5	8	#4	4	4'-2"	22
Z6	6	#6	4	6'-8"	60
Z7	6	#6	4	6'-5"	58
Z8	12	#6	4	5'-11"	107
Z9	12	#5	4	5'-4"	67
Z10	12	#4	4	4'-9"	38
Z11	12	#4	4	4'-2"	33

REINFORCING STEEL FOR 4 WINGS 3094 LBS.

CLASS A CONCRETE

4 WINGS	45.2 C.Y
2 HEADWALLS	4.1 C.Y.
2 END CURTAIN WALLS	5.0 C.Y.
TOTAL	54.3 C.Y.



TYPICAL WING SECTION

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.
4-14-10

PROJECT NO. B-4190
McDOWELL COUNTY
STATION: 17+91.50 -L-

SHEET 6 OF 7

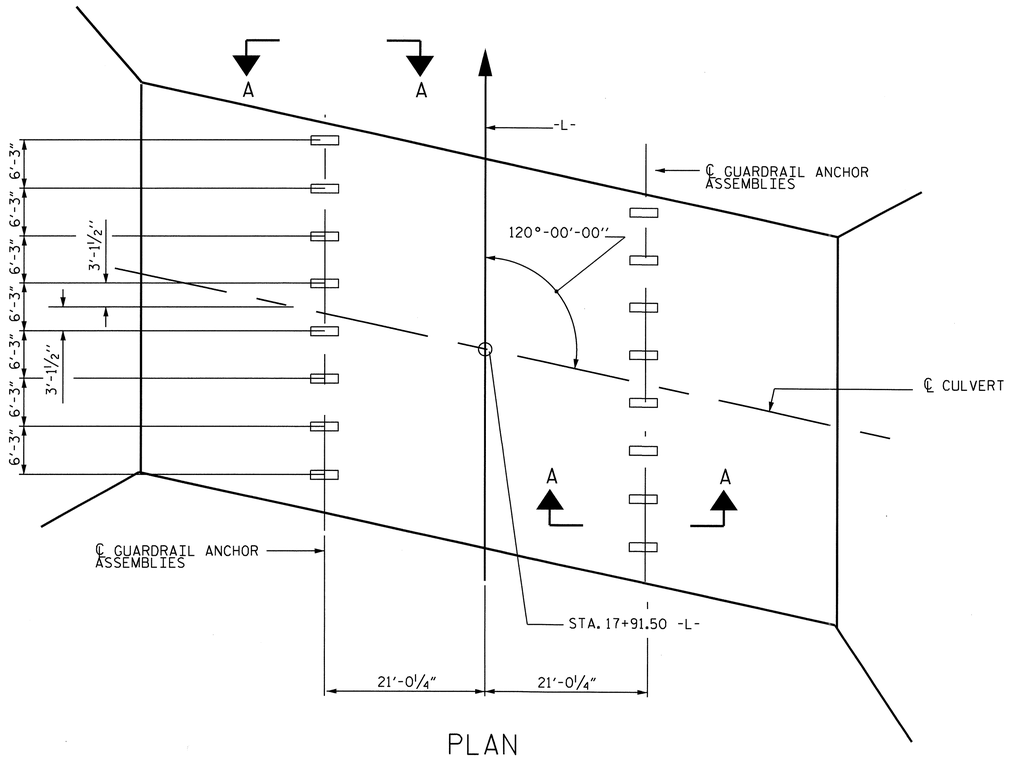
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

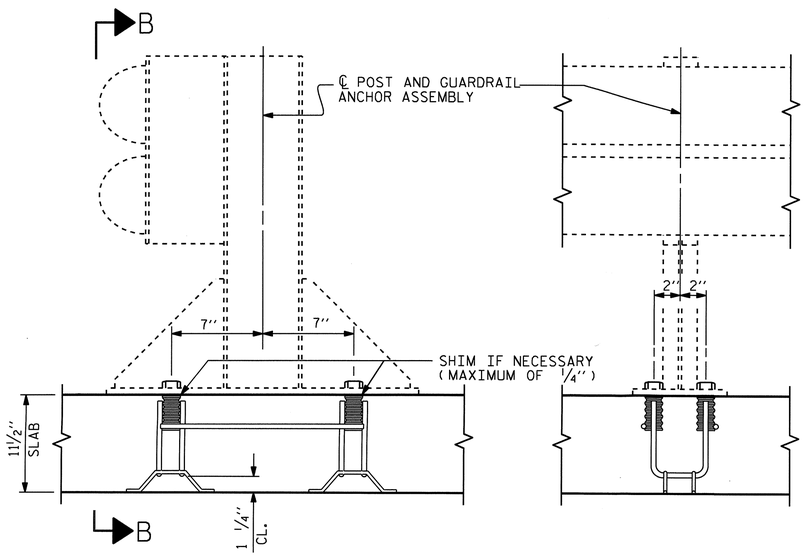
H = 11'-0" SLOPE = 2:1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6
1			3			TOTAL SHEETS
2			4			7

ASSEMBLED BY : M. POOLE DATE : 12/09
CHECKED BY : W.D. CRUTCHER DATE : 12/09



PLAN

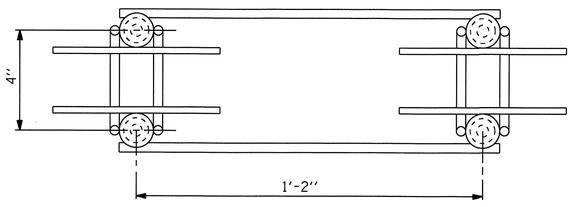


SECTION A-A

SECTION B-B

ELEVATION

SIDE VIEW



PLAN

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 2½".

B. 4 - 1" Ø X 2 ¼" 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 1" Ø X 2¼" 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 100,000 P.S.I. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI 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 1"Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE SPECIAL PROVISIONS.

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

ASSEMBLED BY :	M. POOLE	DATE :	02/10
CHECKED BY :	M. G. CHEEK	DATE :	02/10
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

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PROJECT NO. B-4190
McDOWELL COUNTY
STATION: 17+91.50 -L-

SHEET 7 OF 7

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-7
1			3			TOTAL SHEETS
2			4			7

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR. 4-14-10

STD. NO. GRA1

STR. #1

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 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; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

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

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. 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 (W) RGW REV. 5-7-03 RWW (W) JTE
REV. 8-16-99 RWW (W) LES REV. 5-1-06 TLA (W) GM

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