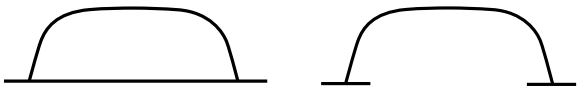
Aluminum Box Culverts

The Solution for Small Bridge Replacement: Aluminum Box Culverts

Contech Aluminum Box Culverts are a practical and cost-efficient solution for small bridge replacement. They have an overall lower installed cost due to material efficiencies when compared with cast-in-place concrete structures. There are no forms to set and remove, no delays due to curing time, large installation crews are unnecessary and no special equipment is typically needed. Cranes may occasionally be required to lift fully assembled structures.

These wide-span, low-rise structures are available in a large range of standard sizes (from 8′-9″ span x 2′-6″ rise to 35′-3″ span x 13′-7″ rise) that permit a minimum cover beginning as low as 1'-5". Information is provided in the following tables for HL-93, HS-20 and HS-25 live loading, since these loads are still widely considered in design.



Full Invert
(see page 72)

Footing Pads
(see page 76)

Typical Metal Foundation Options



Lifting of Aluminum Box Culvert

Efficient Installations for Lower Installed Costs

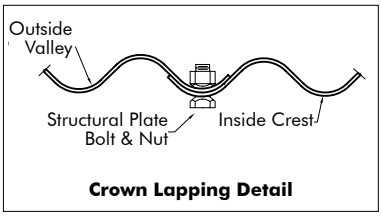
Closing roads for bridge replacement causes extensive traffic detours, so minimizing installation time is critical. Depending on length of structure, Aluminum Box Culverts may be erected in place and are immediately ready to be backfilled. To aid in accelerated bridge construction, Aluminum Box Culverts can be completely assembled nearby while the foundation is being prepared. Light equipment can then be used to pick and set them in place. For more information, contact your local Contech representative.



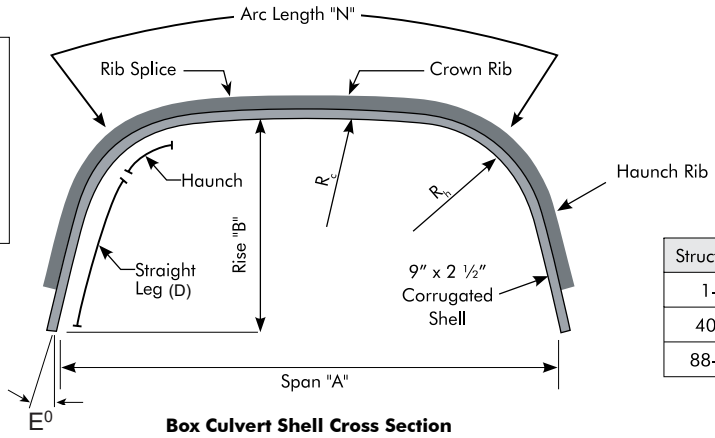
Installation of Ribs



Corrugated Aluminum Box Culvert with Headwall Package

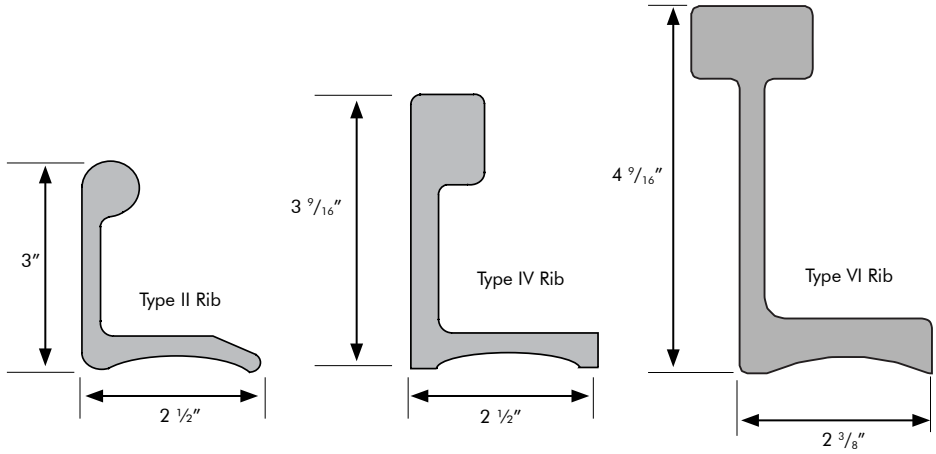


Crown Lapping Detail



Structure #	R_c	R_h
1-39	297.50"	30.250"
40-87	258.75"	37.380"
88-143	310.75"	43.625"

Box Culvert Shell Cross Section



Box Culvert Rib Geometry

Notes:

1. Structure 1 is a one-plate shell. Structures 2-26 are two plate shells. Structures 27-143 are three-plate shells.
2. In Shell Fill Height Tables 48A, 48B, 49A and 49B, the numerical designation for HG/CG indicates thickness or gage of haunch (HG) and crown (CG) plates as follows:
   2=.125"
   3=.150"
   4=.175"
   5=.200"
   6=.225"
   7=.250"
   Example: The HG/CG for 3/6=.150" haunch and .225" crown plate thickness. The HRS/CRS designation indicates the rib spacing on the haunch (HRS) and crown (CRS) plates. Example: 27/9=27" o.c. haunch rib spacing and 9" o.c. crown rib spacing.
3. Allowable cover (minimum and maximum) is measured from the outside valley (inside rise location) of the crown plate to bottom of the flexible pavement or to the top of rigid pavement. Minimum cover is measured at the lowest fill area subjected to possible wheel loads (typically at the roadway shoulder). The roadway surface must be maintained to ensure minimum cover to prevent high-impact loads being imparted to the structure. Maximum cover is measured at the highest fill and/or pavement elevation. Please reference AASHTO 12.9.4.2.
4. Select the structure with the lowest alphabetical sub-designation and cover range that will include the actual minimum and maximum cover. Example: Structure 6 R1 is more economical than 6 R2 if the cover is between 1.7 and 5.0 feet.
5. Shell weight per foot (Wt./Ft.) of shell includes plates, reinforcing ribs, rib splices, bolts, and nuts.
6. Total structure length can be any dimension, but whenever possible, it is recommended to work with a multiple of 4.5' (net plate length). This practice usually results in lower total structure cost. Example: 50' proposed structure ÷ 4.5'=11.1, nearest whole number is 11, therefore use 11 x 4.5'= 49.5' for total structure length. When ordering a structure with headwalls on each end, total structure length must be a multiple of 9 inches (see page 48 plate detail).
7. Shell data in Table 48A and 48B is designed for HL-93 loading. Table 49A is for HS-20 and Table 49B is for HS-25 standard live loadings. Contact your local Contech representative for design information on other loadings.
8. For custom live loads, special rib combinations and spacing are available.
9. The maximum cover for Aluminum Box Culverts with full inverts and footing pads should not exceed 4 feet with a minimum 4,000 psf allowable soil-bearing capacity. Special full invert and footing pad designs or slotted concrete footings can accommodate maximum covers to the limits shown in Tables 48A, 48B, 49A, and 49B.

Box Culvert Shell-Plate and Rib Data (HL-93)

TABLE 48A. SHELL DATA – HL-93 LOADING
PLATE AND RIB COMBINATIONS WITH ALLOWABLE HEIGHT OF COVER

				R1						R2						R3					
Structure Number	Span "A" Ft.-In.	Rise "B" Ft.-In.	Area Sq. Ft.	HG/CG (Gage)	HRS/ CRS (Inches)	HR/ CR (Type)	Cover Hgt. Min. (Feet)	Cover Hgt. Max. (Feet)	Shell Wt./Ft. (Lbs.)	HG/CG (Gage)	HRS/ CRS (Inches)	HR/ CR (Type)	Cover Hgt. Min. (Feet)	Cover Hgt. Max. (Feet)	Shell Wt./Ft. (Lbs.)	HG/CG (Gage)	HRS/ CRS (Inches)	HR/ CR (Type)	Cover Hgt. Min. (Feet)	Cover Hgt. Max. (Feet)	Shell Wt./Ft. (Lbs.)
1	8-9	2-6	18.4	3/3	54/18	II/IV	1.4	5.0	53												
2	9-2	3-3	25.4	2/2	54/18	II/IV	1.4	5.0	53												
3	9-7	4-1	32.6	2/2	54/18	II/IV	1.4	5.0	58												
4	10-0	4-10	40.2	2/2	54/18	II/IV	1.4	5.0	62												
5	10-6	5-7	48.1	2/2	54/18	II/IV	1.4	5.0	66												
6	10-11	6-4	56.4	2/2	54/18	II/IV	1.7	5.0	70	2/2	54/18	II/VI	1.4	5.0	73						
7	11-4	7-2	65.0	2/2	54/18	II/IV	1.9	5.0	74	2/2	54/18	II/VI	1.4	5.0	77						
8	10-2	2-8	23.0	2/2	54/18	II/IV	1.4	5.0	57												
9	10-7	3-5	31.1	2/2	54/18	II/IV	1.4	5.0	62												
10	10-11	4-3	39.5	2/2	54/18	II/IV	1.7	5.0	67	2/2	54/18	II/VI	1.4	5.0	72						
11	11-4	5-0	48.2	2/2	54/18	II/IV	1.9	5.0	71	2/2	54/18	II/VI	1.4	5.0	76						
12	11-8	5-9	57.2	2/2	54/18	II/IV	2.3	5.0	75	2/2	54/18	II/VI	1.4	5.0	80						
13	12-1	6-7	66.4	2/2	54/18	II/IV	2.9	5.0	78	2/2	54/18	II/VI	1.4	5.0	83						
14	12-5	7-4	76.0	2/2	54/18	II/IV	3.2	5.0	82	2/2	54/18	IV/VI	1.4	5.0	90						
15	11-7	2-10	28.1	2/2	54/18	II/IV	2.1	5.0	65	2/2	54/18	II/VI	1.4	5.0	72						
16	11-11	3-7	37.4	2/2	54/18	II/IV	2.6	5.0	70	2/2	54/18	II/VI	1.4	5.0	76						
17	12-3	4-5	46.9	2/2	54/18	II/IV	3.1	5.0	75	2/2	54/18	IV/VI	1.4	5.0	84						
18	12-7	5-2	56.6	2/2	54/18	II/IV	3.4	5.0	78	2/2	54/18	IV/VI	1.4	5.0	87						
19	12-11	6-0	66.6	3/3	54/18	II/IV	2.6	5.0	91	2/2	54/18	IV/VI	1.4	5.0	91						
20	13-3	6-9	76.9	3/3	54/18	II/IV	3.0	5.0	96	2/2	54/18	IV/VI	1.4	5.0	95						
21	13-0	3-0	33.8	3/3	54/18	IV/IV	2.0	5.0	81	2/2	54/18	IV/VI	1.4	5.0	83						
22	13-4	3-10	44.2	3/3	54/18	IV/IV	2.3	5.0	87	2/2	54/18	IV/VI	1.4	5.0	88						
23	13-7	4-7	54.8	3/3	54/18	IV/IV	2.6	5.0	93	2/2	54/18	IV/VI	1.4	5.0	93						
24	13-10	5-5	65.6	3/3	54/18	IV/IV	2.9	5.0	97	2/2	54/18	IV/VI	1.4	5.0	97						
25	14-1	6-2	76.6	3/3	54/18	IV/IV	3.1	5.0	102	3/3	54/18	IV/VI	1.4	5.0	110						
26	14-5	3-3	40.0	3/3	54/18	IV/VI	1.4	5.0	100												
27	14-8	4-1	51.5	3/2	54/18	IV/VI	1.4	5.0	103												
28	14-10	4-10	63.2	4/2	54/18	IV/VI	1.4	5.0	109												
29	15-1	5-8	75.1	3/2	54/18	IV/VI	1.6	5.0	113	2/2	27/18	IV/VI	1.4	5.0	118						
30	15-4	6-5	87.2	3/3	54/18	IV/VI	1.7	5.0	120	3/2	27/18	IV/VI	1.4	5.0	129						
31	15-6	7-3	99.4	4/2	54/18	IV/VI	1.7	5.0	131	3/2	27/18	IV/VI	1.4	5.0	134						
32	15-9	8-0	111.8	3/3	54/18	IV/VI	1.9	5.0	129	3/2	27/18	IV/VI	1.4	5.0	138						
33	15-10	3-6	46.8	2/2	27/18	IV/VI	1.7	5.0	111	3/2	27/18	IV/VI	1.4	5.0	116						
34	16-0	4-3	59.5	2/2	27/18	IV/VI	1.8	5.0	117	4/2	27/18	IV/VI	1.4	5.0	130						
35	16-2	5-1	72.3	2/2	27/18	IV/VI	1.9	5.0	123	3/2	18/18	IV/VI	1.4	5.0	137						
36	16-4	5-11	85.2	2/2	27/18	IV/VI	2.0	5.0	127	3/2	18/18	IV/VI	1.4	5.0	142						
37	16-6	6-8	98.3	2/2	27/18	IV/VI	2.2	5.0	131	3/2	18/18	IV/VI	1.4	5.0	147						
38	16-8	7-6	111.5	2/2	27/18	IV/VI	2.3	5.0	135	3/2	18/18	IV/VI	1.4	5.0	154						
39	16-10	8-3	124.8	2/2	27/18	IV/VI	2.4	5.0	139	3/3	18/18	IV/VI	1.4	5.0	158						
40	17-9	3-10	54.4	2/2	54/18	VI/VI	2.9	5.0	115	2/2	27/18	VI/VI	1.7	5.0	128	2/2	18/18	VI/VI	1.4	5.0	136
41	18-2	4-7	68.3	2/3	54/18	VI/VI	3.0	5.0	124	2/2	27/18	VI/VI	2.0	5.0	135	2/2	18/18	VI/VI	1.4	5.0	145
42	18-7	5-4	82.5	3/3	54/18	VI/VI	3.1	5.0	136	3/2	27/18	VI/VI	2.1	5.0	149	2/2	18/18	VI/VI	1.4	5.0	155
43	19-0	6-1	97.1	2/2	27/18	VI/VI	2.5	5.0	150	2/2	18/18	VI/VI	1.6	5.0	164	2/2	27/9	VI/VI	1.4	5.0	195
44	19-5	6-11	111.9	2/2	27/18	VI/VI	2.7	5.0	154	2/2	18/18	VI/VI	1.8	5.0	168	2/2	27/9	VI/VI	1.4	5.0	199
45	19-10	7-8	127.1	2/2	27/18	VI/VI	3.0	5.0	158	2/2	18/18	VI/VI	1.9	5.0	171	2/2	27/9	VI/VI	1.4	5.0	203
46	20-3	8-5	142.6	3/3	27/18	VI/VI	3.0	4.9	175	2/2	18/18	VI/VI	2.1	5.0	175	3/2	27/9	VI/VI	1.4	5.0	216
47	19-1	4-2	63.3	2/2	27/18	VI/VI	2.5	5.0	137	2/2	18/18	VI/VI	1.6	5.0	145	2/2	27/9	VI/VI	1.4	5.0	188
48	19-5	4-11	78.3	2/2	27/18	VI/VI	2.7	5.0	145	2/2	18/18	VI/VI	1.8	5.0	155	2/2	27/9	VI/VI	1.4	5.0	195
49	19-9	5-8	93.6	2/2	27/18	VI/VI	2.9	5.0	152	2/2	18/18	VI/VI	1.9	5.0	164	2/2	27/9	VI/VI	1.4	5.0	203
50	20-1	6-6	109.2	3/2	27/18	VI/VI	3.0	5.0	167	2/2	18/18	VI/VI	2.0	5.0	173	3/2	27/9	VI/VI	1.4	5.0	218
51	20-6	7-3	125.0	3/2	27/18	VI/VI	3.2	4.9	171	2/2	18/18	VI/VI	2.1	5.0	177	2/2	18/9	VI/VI	1.4	5.0	230
52	20-10	8-1	141.2	2/2	18/18	VI/VI	2.2	5.0	181	2/2	18/9	VI/VI	1.4	5.0	234						
53	21-2	8-10	157.6	2/2	18/18	VI/VI	2.2	5.0	184	2/2	18/9	VI/VI	1.4	5.0	238						
54	20-4	4-6	73.1	2/3	27/18	VI/VI	3.2	5.0	151	2/2	18/18	VI/VI	2.1	5.0	155	2/2	18/9	VI/VI	1.4	5.0	213
55	20-7	5-3	89.2	3/2	27/18	VI/VI	3.3	4.7	160	2/2	18/18	VI/VI	2.1	5.0	164	2/2	18/9	VI/VI	1.4	5.0	223
56	20-11	6-1	105.5	2/2	18/18	VI/VI	2.2	5.0	173	2/2	18/9	VI/VI	1.4	5.0	232						
57	21-3	6-10	122.1	2/2	18/18	VI/VI	2.3	5.0	182	2/2	18/9	VI/VI	1.4	5.0	241						
58	21-6	7-8	139.0	2/2	18/18	VI/VI	2.4	5.0	186	2/2	18/9	VI/VI	1.4	5.0	245						
59	21-10	8-5	156.0	2/2	18/18	VI/VI	2.5	5.0	190	2/2	18/9	VI/VI	1.4	5.0	249						
60	22-1	9-3	173.3	2/2	18/18	VI/VI	2.6	5.0	194	2/2	18/9	VI/VI	1.4	5.0	253						
61	21-7	4-11	83.8	2/2	18/18	VI/VI	2.4	5.0	164	2/3	9/18	VI/VI	2.2	5.0	208	2/2	18/9	VI/VI	1.4	5.0	228
62	21-10	5-8	101.0	2/2	18/18	VI/VI	2.5	5.0	173	2/3	9/18	VI/VI	2.3	5.0	223	2/2	18/9	VI/VI	1.4	5.0	237
63	22-1	6-6	118.4	2/2	18/18	VI/VI	2.6	5.0	182	2/3	9/18	VI/VI	2.3	5.0	237	2/2	18/9	VI/VI	1.4	5.0	247
64	22-3	7-3	135.9	2/2	18/18	VI/VI	2.6	5.0	191	2/3	9/18	VI/VI	2.4	5.0	252	2/2	18/9	VI/VI	1.4	5.0	256
65	22-6	8-1	153.7	2/2	18/18	VI/VI	2.7	5.0	195	2/3	9/18	VI/VI	2.4	5.0	256	2/2	18/9	VI/VI	1.4	5.0	260
66	22-9	8-10	171.6	2/2	18/18	VI/VI	2.8	5.0	199	2/3	9/18	VI/VI	2.5	5.0	260	2/2	18/9	VI/VI	1.4	5.0	264
67	23-0	9-8	189.8	2/2	18/18	VI/VI	2.9	4.8	203	2/3	9/18	VI/VI	2.5	5.0	263	2/2	18/9	VI/VI	1.4	5.0	267
68	22-9	5-4	95.5	2/2	18/18	VI/VI	2.8	5.0	173	2/3	9/18	VI/VI	2.5	5.0	217	2/2	18/9	VI/VI	1.4	5.0	243
69	23-0	6-1	113.7	2/2	18/18	VI/VI	2.8	4.8	182	2/3	9/18	VI/VI	2.5	5.0	232	2/2	18/9	VI/VI	1.4	5.0	252
70	23-2	6-11	132.1	2/2	18/18	VI/VI	3.0	4.6	196	2/3	9/18	VI/VI	2.5	5.0	247	2/2	18/9	VI/VI	1.4	5.0	261
71	23-4	7-8	150.6	2/3	18/18	VI/VI	2.9	4.7	205	2/3	9/18	VI/VI	2.6	5.0	261	2/2	18/9	VI/VI	1.4	5.0	271
72	23-6	8-6	169.3	2/3	18/18	VI/VI	3.0	4.4	209	2/3	9/18	VI/VI	2.6	5.0	265	2/2	18/9	VI/VI	1.4	5.0	275
73	23-8	9-3	188.1	3/3	18/18	VI/VI	3.0	4.5	223	2/3	9/18	VI/VI	2.7	5.0	269	2/2	18/9	VI/VI	1.4	5.0	278
74	23-10	10-1	207.0	3/3	18/18	VI/VI	3.0	4.3	228	2/3	9/18	VI/VI	2.7	5.0	273	2/2	18/9	VI/VI	1.4	5.0	282
75	24-0	5-9	108.2	2/3	9/18	VI/VI	2.7	5.0	227	2/2	18/9	VI/VI	1.4	5.0	258						
76	24-1	6-6	127.5	2/3	9/18	VI/VI	2.7	5.0	242	2/2	18/9	VI/VI	1.4	5.0	267						
77	24-3	7-4	146.8	2/3	9/18	VI/VI	2.8	5.0	256	2/2	18/9	VI/VI	1.4	5.0	276						
78	24-4	8-2	166.2	2/3	9/18	VI/VI	2.8	5.0	271	2/2	18/9	VI/VI	1.4	5.0	285						
79	24-5	8-11	185.7	2/3	9/18	VI/VI	2.8	5.0	275	2/2	18/9	VI/VI	1.4	5.0	289						
80	24-7	9-9	205.3	2/3	9/18	VI/VI	2.8	5.0	279	2/2	18/9	VI/VI	1.4	5.0	293						
81	24-8	10-6	225.0	2/3	9/18	VI/VI	2.9	5.0	283	2/2	18/9	VI/VI	1.4	5.0	297						
82	25-2	6-2	122.0	2/3	9/18	VI/VI	3.0	5.0	236	2/2	18/9	VI/VI	1.4	5.0	273						
83	25-2	7-0	142.2	2/3	9/18	VI/VI	3.0	5.0	251	2/2	18/9	VI/VI	1.4	5.0	282						
84	25-3	7-9	162.4	2/3	9/18	VI/VI	3.0	5.0	266	2/2	18/9	VI/VI	1.4	5.0	291						
85	25-4	8-7	182.6	2/3	9/18	VI/VI	3.0	5.0	280	2/3	18/9	VI/VI	1.4	5.0	306						
86	25-4	9-5	202.9	2/3	9/18	VI/VI	3.0	5.0	284	2/3	18/9	VI/VI	1.4	5.0	310						
87	25-5	10-2	223.3	2/3	9/18	VI/VI	3.0	4.9	288	2/3	18/9	VI/VI	1.4	5.0	313						

See Notes page 63

Box Culvert Shell-Plate and Rib Data (HL-93)

TABLE 48B. SHELL DATA – HL-93 LOADING
PLATE AND RIB COMBINATIONS WITH ALLOWABLE HEIGHT OF COVER

				R1						R2					
							Cover Hgt.		Shell				Cover Hgt.		Shell
Structure	Span "A"	Rise "B"	Area	HG/CG	HRS/CRS	HR/CR	Min.	Max.	Wt./Ft.	HG/CG	HRS/CRS	HR/CR	Min.	Max.	Wt./Ft.
Number	Ft.-In.	Ft.-In.	Sq. Ft.	(Gage)	(Inches)	(Type)	(Feet)		(Lbs.)	(Gage)	(Inches)	(Type)	(Feet)		(Lbs.)
88	26-7	5-5	111.6	3/3	9/18	VI/VI	4.0	5.0	244	3/4	9/9	VI/VI	1.4	5.0	323
89	27-0	6-3	132.4	3/3	9/18	VI/VI	4.0	5.0	259	3/4	9/9	VI/VI	1.4	5.0	338
90	27-5	7-0	153.4	3/3	9/18	VI/VI	4.0	5.0	275	3/4	9/9	VI/VI	1.4	5.0	353
91	27-10	7-9	174.8	3/3	9/18	VI/VI	4.0	5.0	290	3/4	9/9	VI/VI	1.4	5.0	369
92	28-3	8-7	196.5	3/3	9/18	VI/VI	4.0	5.0	294	3/4	9/9	VI/VI	1.4	5.0	373
93	28-8	9-4	218.6	3/3	9/18	VI/VI	4.0	5.0	299	3/5	9/9	VI/VI	1.4	5.0	384
94	29-2	10-1	241.0	3/3	9/18	VI/VI	4.0	5.0	303	3/5	9/9	VI/VI	1.4	5.0	388
95	27-10	5-10	125.4	3/3	9/18	VI/VI	4.0	5.0	259	3/4	9/9	VI/VI	1.4	5.0	338
96	28-3	6-8	147.3	3/3	9/18	VI/VI	4.0	5.0	275	3/4	9/9	VI/VI	1.4	5.0	353
97	28-7	7-5	169.4	3/3	9/18	VI/VI	4.0	5.0	290	3/5	9/9	VI/VI	1.4	5.0	375
98	29-0	8-3	191.8	3/3	9/18	VI/VI	4.0	5.0	305	3/5	9/9	VI/VI	1.4	5.0	390
99	29-4	9-0	214.6	3/3	9/18	VI/VI	4.0	5.0	310	3/5	9/9	VI/VI	1.4	5.0	394
100	29-8	9-9	237.6	3/3	9/18	VI/VI	4.0	5.0	314	3/5	9/9	VI/VI	1.4	5.0	399
101	30-1	10-7	260.9	3/3	9/18	VI/VI	4.0	5.0	319	3/5	9/9	VI/VI	1.4	5.0	403
102	29-1	6-4	140.2	3/3	9/18	VI/VI	4.0	5.0	275	3/5	9/9	VI/VI	1.4	5.0	361
103	29-5	7-1	163.2	3/3	9/18	VI/VI	4.0	5.0	290	3/5	9/9	VI/VI	1.4	5.0	376
104	29-8	7-11	186.4	3/3	9/18	VI/VI	4.0	5.0	305	3/5	9/9	VI/VI	1.4	5.0	391
105	30-0	8-8	209.8	3/3	9/18	VI/VI	4.0	5.0	320	3/5	9/9	VI/VI	1.4	5.0	407
106	30-4	9-5	233.6	3/3	9/18	VI/VI	4.0	5.0	325	3/5	9/9	VI/VI	1.4	5.0	411
107	30-8	10-3	257.5	3/3	9/18	VI/VI	4.0	5.0	330	3/5	9/9	VI/VI	1.4	5.0	416
108	31-0	11-0	281.8	3/3	9/18	VI/VI	4.0	5.0	334	3/5	9/9	VI/VI	1.4	5.0	420
109	30-3	6-9	156.1	3/3	9/18	VI/VI	4.0	5.0	285	3/5	9/9	VI/VI	1.4	5.0	376
110	30-6	7-7	180.1	3/3	9/18	VI/VI	4.0	5.0	300	3/5	9/9	VI/VI	1.4	5.0	391
111	30-10	8-4	204.4	3/3	9/18	VI/VI	4.0	5.0	315	3/5	9/9	VI/VI	1.4	5.0	407
112	31-1	9-2	228.8	3/3	9/18	VI/VI	4.0	5.0	330	3/5	9/9	VI/VI	1.4	5.0	422
113	31-4	9-11	253.5	3/3	9/18	VI/VI	4.0	5.0	335	3/5	9/9	VI/VI	1.4	5.0	426
114	31-8	10-9	278.4	3/3	9/18	VI/VI	4.0	5.0	339	3/5	9/9	VI/VI	1.4	5.0	431
115	31-11	11-6	303.5	3/3	9/18	VI/VI	4.0	5.0	344	3/5	9/9	VI/VI	1.4	5.0	435
116	31-5	7-3	173.1	3/3	9/18	VI/VI	4.0	5.0	294	3/5	9/9	VI/VI	1.4	5.0	391
117	31-8	8-0	198.2	3/3	9/18	VI/VI	4.0	5.0	310	3/5	9/9	VI/VI	1.4	5.0	407
118	31-10	8-10	223.4	3/3	9/18	VI/VI	4.0	5.0	325	3/5	9/9	VI/VI	1.4	5.0	422
119	32-1	9-8	248.8	3/3	9/18	VI/VI	4.0	5.0	340	3/5	9/9	VI/VI	1.4	5.0	437
120	32-3	10-5	274.4	3/3	9/18	VI/VI	4.0	5.0	345	3/4	9/9	VI/VI	1.4	5.0	435
121	32-7	11-3	300.1	3/3	9/18	VI/VI	4.0	5.0	349	3/4	9/9	VI/VI	1.4	5.0	440
122	32-8	12-0	326.1	3/3	9/18	VI/VI	4.0	5.0	354	3/4	9/9	VI/VI	1.4	5.0	444
123	32-7	7-9	191.3	3/3	9/18	VI/VI	4.0	5.0	304	3/4	9/9	VI/VI	1.4	5.0	401
124	32-9	8-6	217.3	3/3	9/18	VI/VI	4.0	5.0	320	3/4	9/9	VI/VI	1.4	5.0	416
125	32-11	9-4	243.4	3/3	9/18	VI/VI	4.0	5.0	335	3/4	9/9	VI/VI	1.4	5.0	431
126	33-1	10-2	269.7	3/3	9/18	VI/VI	4.0	5.0	350	3/4	9/9	VI/VI	1.4	5.0	447
127	33-3	10-11	296.4	3/3	9/18	VI/VI	4.0	5.0	355	3/4	9/9	VI/VI	1.4	5.0	451
128	33-5	11-9	322.8	3/3	9/18	VI/VI	4.0	5.0	359	3/4	9/9	VI/VI	1.4	5.0	456
129	33-8	12-6	349.5	3/3	9/18	VI/VI	4.0	5.0	364	3/4	9/9	VI/VI	1.4	5.0	460
130	33-8	8-3	210.5	3/3	9/18	VI/VI	4.0	5.0	314	3/4	9/9	VI/VI	1.4	5.0	416
131	33-9	9-1	237.5	3/3	9/18	VI/VI	4.0	5.0	330	3/4	9/9	VI/VI	1.4	5.0	431
132	33-11	9-10	264.5	3/3	9/18	VI/VI	4.0	5.0	345	3/4	9/9	VI/VI	1.4	5.0	447
133	34-0	10-8	291.7	3/3	9/18	VI/VI	4.0	5.0	360	3/4	9/9	VI/VI	1.4	5.0	462
134	34-2	11-5	319.0	3/3	9/18	VI/VI	4.0	5.0	365	3/4	9/9	VI/VI	1.4	5.0	466
135	34-3	12-3	346.4	3/3	9/18	VI/VI	4.0	5.0	369	3/4	9/9	VI/VI	1.4	5.0	471
136	34-5	13-1	373.8	3/3	9/18	VI/VI	4.0	5.0	374	3/4	9/9	VI/VI	1.4	5.0	475
137	34-9	8-9	230.9	3/3	9/18	VI/VI	4.0	5.0	324	3/3	9/9	VI/VI	1.4	5.0	424
138	34-10	9-7	258.1	3/3	9/18	VI/VI	4.0	5.0	339	3/3	9/9	VI/VI	1.4	5.0	439
139	34-11	10-4	286.7	3/3	9/18	VI/VI	4.0	5.0	355	3/3	9/9	VI/VI	1.4	5.0	455
140	35-0	11-2	314.6	3/3	9/18	VI/VI	4.0	5.0	370	3/3	9/9	VI/VI	1.4	5.0	470
141	35-1	12-0	342.7	3/3	9/18	VI/VI	4.0	5.0	375	3/3	9/9	VI/VI	1.4	5.0	474
142	35-2	12-9	370.8	3/3	9/18	VI/VI	4.0	5.0	379	3/3	9/9	VI/VI	1.4	5.0	479
143	35-3	13-7	399.0	3/3	9/18	VI/VI	4.0	5.0	384	3/3	9/9	VI/VI	1.4	5.0	483

See Notes page 63



Fully Assembled Aluminum Box Culvert Being Set in Place

Box Culvert Shell-Plate and Rib Data (H-20, HS-20)

TABLE 49A. SHELL DATA – H-20, HS-20 LOADING
PLATE AND RIB COMBINATIONS WITH ALLOWABLE HEIGHT OF COVER

				A6						B6					
							Cover Hgt.		Shell				Cover Hgt.		Shell
Structure	Span "A"	Rise "B"	Area	HG/CG	HRS/CRS	HR/CR	Min.	Max.	Wt./Ft.	HG/CG	HRS/CRS	HR/CR	Min.	Max.	Wt./Ft.
Number	Ft.-In.	Ft.-In.	Sq. Ft.	(Gage)	(Inches)	(Type)	(Feet)		(Lbs.)	(Gage)	(Inches)	(Type)	(Feet)		(Lbs.)
1	8-9	2-6	18.4	3/3	54/18	II/IV	1.4	5.0	53						
2	9-2	3-3	25.4	2/2	54/18	II/IV	1.4	5.0	53						
3	9-7	4-1	32.6	2/2	54/18	II/IV	1.4	5.0	58						
4	10-0	4-10	40.2	2/2	54/18	II/IV	1.6	5.0	62	3/3	54/18	II/IV	1.4	5.0	69
5	10-6	5-7	48.1	2/2	54/18	II/IV	1.8	5.0	66	3/3	54/18	II/IV	1.4	5.0	74
6	10-11	6-4	56.4	2/2	54/18	II/IV	2.1	5.0	70	3/3	27/18	II/IV	1.4	5.0	87
7	11-4	7-2	65.0	2/2	54/18	II/IV	2.3	5.0	74	2/2	54/9	II/IV	1.4	5.0	83
8	10-2	2-8	23.0	2/2	54/18	II/IV	1.7	5.0	57	3/3	54/18	II/IV	1.4	5.0	63
9	10-7	3-5	31.1	2/2	54/18	II/IV	1.9	5.0	62	3/3	54/18	II/IV	1.4	5.0	68
10	10-11	4-3	39.5	2/2	54/18	II/IV	2.1	5.0	67	3/3	54/18	II/IV	1.4	5.0	74
11	11-4	5-0	48.2	2/2	54/18	II/IV	2.3	5.0	71	3/3	54/18	IV/IV	1.4	5.0	81
12	11-8	5-9	57.2	2/2	54/18	II/IV	2.4	5.0	75	2/2	54/18	IV/VI	1.4	5.0	82
13	12-1	6-7	66.4	2/2	54/18	II/IV	2.7	5.0	78	2/2	54/18	IV/VI	1.4	5.0	86
14	12-5	7-4	76.0	2/2	54/18	II/IV	2.8	5.0	82	2/2	54/18	IV/VI	1.4	5.0	90
15	11-7	2-10	28.1	2/2	54/18	II/IV	2.4	5.0	65	2/2	54/18	IV/VI	1.4	5.0	73
16	11-11	3-7	37.4	2/2	54/18	II/IV	2.6	5.0	70	2/2	54/18	IV/VI	1.4	5.0	79
17	12-3	4-5	46.9	2/2	54/18	II/IV	2.7	5.0	75	2/2	54/18	IV/VI	1.4	5.0	84
18	12-7	5-2	56.6	2/2	54/18	II/IV	2.9	5.0	78	2/2	54/18	IV/VI	1.4	5.0	87
19	12-11	6-0	66.6	2/2	54/18	II/IV	3.2	5.0	82	2/2	54/18	IV/VI	1.4	5.0	91
20	13-3	6-9	76.9	3/3	54/18	II/IV	2.6	5.0	96	2/2	54/18	IV/VI	1.4	5.0	95
21	13-0	3-0	33.8	3/3	54/18	II/IV	2.5	5.0	79	2/2	54/18	IV/VI	1.4	5.0	83
22	13-4	3-10	44.2	3/3	54/18	II/IV	2.7	5.0	85	2/2	54/18	IV/VI	1.4	5.0	88
23	13-7	4-7	54.8	3/3	54/18	II/IV	2.8	5.0	90	2/2	54/18	IV/VI	1.4	5.0	93
24	13-10	5-5	65.6	3/3	54/18	II/IV	3.2	5.0	95	2/2	54/18	IV/VI	1.4	5.0	97
25	14-1	6-2	76.6	3/3	54/18	II/IV	3.1	5.0	99	2/2	54/18	IV/VI	1.4	5.0	101
26	14-5	3-3	40.0	2/2	54/18	IV/VI	1.6	5.0	92	3/3	54/18	IV/VI	1.4	5.0	100
27	14-8	4-1	51.5	2/2	54/18	IV/VI	1.9	5.0	97	3/2	54/18	IV/VI	1.4	5.0	103
28	14-10	4-10	63.2	2/2	54/18	IV/VI	2.1	5.0	102	3/2	54/18	IV/VI	1.4	5.0	108
29	15-1	5-8	75.1	2/2	54/18	IV/VI	2.3	5.0	106	3/3	54/18	IV/VI	1.4	5.0	116
30	15-4	6-5	87.2	2/2	54/18	IV/VI	2.5	5.0	110	3/5	54/18	IV/VI	1.4	5.0	126
31	15-6	7-3	99.4	3/2	54/18	IV/VI	1.7	5.0	122	3/6	54/18	IV/VI	1.4	5.0	134
32	15-9	8-0	111.8	3/2	54/18	IV/VI	1.8	5.0	126	3/6	27/18	IV/VI	1.4	5.0	150
33	15-10	3-6	46.8	3/2	54/18	IV/VI	1.8	5.0	107	3/2	27/18	IV/VI	1.4	5.0	116
34	16-0	4-3	59.5	3/2	54/18	IV/VI	1.9	5.0	113	3/2	27/18	IV/VI	1.4	5.0	123
35	16-2	5-1	72.3	3/2	54/18	IV/VI	1.9	5.0	118	3/2	27/18	IV/VI	1.4	5.0	130
36	16-4	5-11	85.2	3/2	54/18	IV/VI	2.0	5.0	123	3/2	27/18	IV/VI	1.4	5.0	135
37	16-6	6-8	98.3	3/3	54/18	IV/VI	2.1	5.0	130	3/3	27/18	IV/VI	1.4	5.0	142
38	16-8	7-6	111.5	3/3	54/18	IV/VI	2.2	5.0	135	3/4	27/18	IV/VI	1.4	5.0	150
39	16-10	8-3	124.8	3/3	54/18	IV/VI	2.4	4.9	139	3/5	27/18	IV/VI	1.4	5.0	157
40	17-9	3-10	54.4	2/2	54/18	VI/VI	2.2	5.0	115	2/2	27/18	VI/VI	1.4	5.0	128
41	18-2	4-7	68.3	2/2	54/18	VI/VI	2.3	5.0	120	2/2	27/18	VI/VI	1.4	5.0	135
42	18-7	5-4	82.5	2/2	54/18	VI/VI	2.5	5.0	126	2/2	27/18	VI/VI	1.4	5.0	143
43	19-0	6-1	97.1	2/2	54/18	VI/VI	2.7	5.0	131	3/3	27/18	VI/VI	1.4	5.0	161
44	19-5	6-11	111.9	2/2	54/18	VI/VI	2.9	5.0	135	2/2	18/18	VI/VI	1.4	5.0	168
45	19-10	7-8	127.1	2/2	27/18	VI/VI	2.0	5.0	139	2/2	18/18	VI/VI	1.4	5.0	171
46	20-3	8-5	142.6	2/2	27/18	VI/VI	2.1	5.0	161	2/2	18/18	VI/VI	1.4	5.0	175
47	19-1	4-2	63.3	2/2	54/18	VI/VI	2.7	5.0	124	2/2	18/18	VI/VI	1.4	5.0	145
48	19-5	4-11	78.3	2/2	54/18	VI/VI	2.9	5.0	130	2/2	18/18	VI/VI	1.4	5.0	155
49	19-9	5-8	93.6	2/2	27/18	VI/VI	1.9	5.0	152	2/2	18/18	VI/VI	1.4	5.0	164
50	20-1	6-6	109.2	2/2	27/18	VI/VI	2.1	5.0	159	2/2	18/18	VI/VI	1.4	5.0	173
51	20-6	7-3	125.0	2/2	27/18	VI/VI	2.2	5.0	163	2/2	18/18	VI/VI	1.4	5.0	177
52	20-10	8-1	141.2	2/2	27/18	VI/VI	2.3	5.0	167	2/3	18/18	VI/VI	1.4	5.0	185
53	21-2	8-10	157.6	2/2	27/18	VI/VI	2.4	5.0	171	2/3	18/18	VI/VI	1.4	5.0	189
54	20-4	4-6	73.1	2/2	27/18	VI/VI	2.1	5.0	146	2/2	18/18	VI/VI	1.4	5.0	155
55	20-7	5-3	89.2	2/2	27/18	VI/VI	2.2	5.0	154	2/2	18/18	VI/VI	1.4	5.0	164
56	20-11	6-1	105.5	2/2	27/18	VI/VI	2.3	5.0	161	2/3	18/18	VI/VI	1.4	5.0	178
57	21-3	6-10	122.1	2/2	27/18	VI/VI	2.4	5.0	169	2/3	18/18	VI/VI	1.4	5.0	187
58	21-6	7-8	139.0	2/2	27/18	VI/VI	2.5	5.0	172	2/4	18/18	VI/VI	1.4	5.0	196
59	21-10	8-5	156.0	3/2	27/18	VI/VI	2.5	5.0	185	3/5	18/18	VI/VI	1.4	5.0	214
60	22-1	9-3	173.3	3/2	27/18	VI/VI	2.5	4.9	190	3/5	18/18	VI/VI	1.4	5.0	218
61	21-7	4-11	83.8	2/2	27/18	VI/VI	2.5	5.0	156	3/4	18/18	VI/VI	1.4	5.0	180
62	21-10	5-8	101.0	2/2	27/18	VI/VI	2.6	4.9	163	3/5	18/18	VI/VI	1.4	5.0	195
63	22-1	6-6	118.4	2/2	27/18	VI/VI	2.7	4.7	171	3/5	18/18	VI/VI	1.4	5.0	205
64	22-3	7-3	135.9	2/2	27/18	VI/VI	2.7	4.5	178	3/5	18/18	VI/VI	1.4	5.0	215
65	22-6	8-1	153.7	2/2	27/18	VI/VI	2.8	4.3	182	3/6	18/18	VI/VI	1.4	5.0	224
66	22-9	8-10	171.6	3/3	27/18	VI/VI	2.7	4.5	200	3/6	18/18	VI/VI	1.4	5.0	229
67	23-0	9-8	189.8	3/3	27/18	VI/VI	2.7	4.3	205	3/6	18/18	VI/VI	1.4	5.0	233
68	22-9	5-4	95.5	3/2	27/18	VI/VI	2.8	4.3	172	3/6	18/18	VI/VI	1.4	5.0	200
69	23-0	6-1	113.7	3/2	27/18	VI/VI	2.8	4.1	180	3/6	18/18	VI/VI	1.4	5.0	210
70	23-2	6-11	132.1	3/3	27/18	VI/VI	2.8	4.1	193	2/2	18/9	VI/VI	1.4	5.0	261
71	23-4	7-8	150.6	3/3	27/18	VI/VI	2.9	4.0	201	2/2	18/9	VI/VI	1.4	5.0	271
72	23-6	8-6	169.3	3/3	27/18	VI/VI	2.9	3.9	206	2/2	18/9	VI/VI	1.4	5.0	275
73	23-8	9-3	188.1	2/2	18/18	VI/VI	1.9	5.0	208	2/2	18/9	VI/VI	1.4	5.0	278
74	23-10	10-1	207.0	2/2	18/18	VI/VI	1.9	5.0	212	2/2	18/9	VI/VI	1.4	5.0	282
75	24-0	5-9	108.2	2/2	18/18	VI/VI	1.9	5.0	182	2/2	18/9	VI/VI	1.4	5.0	258
76	24-1	6-6	127.5	2/2	18/18	VI/VI	1.9	5.0	191	2/2	18/9	VI/VI	1.4	5.0	267
77	24-3	7-4	146.8	2/2	18/18	VI/VI	1.9	5.0	201	2/2	18/9	VI/VI	1.4	5.0	276
78	24-4	8-2	166.2	2/2	18/18	VI/VI	1.9	5.0	210	2/2	18/9	VI/VI	1.4	5.0	285
79	24-5	8-11	185.7	2/2	18/18	VI/VI	2.0	5.0	214	2/2	18/9	VI/VI	1.4	5.0	289
80	24-7	9-9	205.3	2/2	18/18	VI/VI	2.0	5.0	218	2/2	18/9	VI/VI	1.4	5.0	293
81	24-8	10-6	225.0	2/2	18/18	VI/VI	2.0	5.0	221	2/2	18/9	VI/VI	1.4	5.0	297
82	25-2	6-2	122.0	2/2	18/18	VI/VI	2.0	4.7	191	2/2	18/9	VI/VI	1.4	5.0	273
83	25-2	7-0	142.2	2/2	18/18	VI/VI	2.0	4.7	201	2/2	18/9	VI/VI	1.4	5.0	282
84	25-3	7-9	162.4	2/2	18/18	VI/VI	2.1	4.7	210	2/2	18/9	VI/VI	1.4	5.0	291
85	25-4	8-7	182.6	2/2	18/18	VI/VI	2.1	4.6	219	2/2	18/9	VI/VI	1.4	5.0	300
86	25-4	9-5	202.9	2/2	18/18	VI/VI	2.1	4.6	223	2/2	18/9	VI/VI	1.4	5.0	304
87	25-5	10-2	223.3	2/2	18/18	VI/VI	2.1	4.6	227	2/2	18/9	VI/VI	1.4	5.0	308

See Notes page 63

Box Culvert Shell-Plate and Rib Data (H-25, HS-25)

TABLE 49B. SHELL DATA – H-25, HS-25 LOADING
PLATE AND RIB COMBINATIONS WITH ALLOWABLE HEIGHT OF COVER

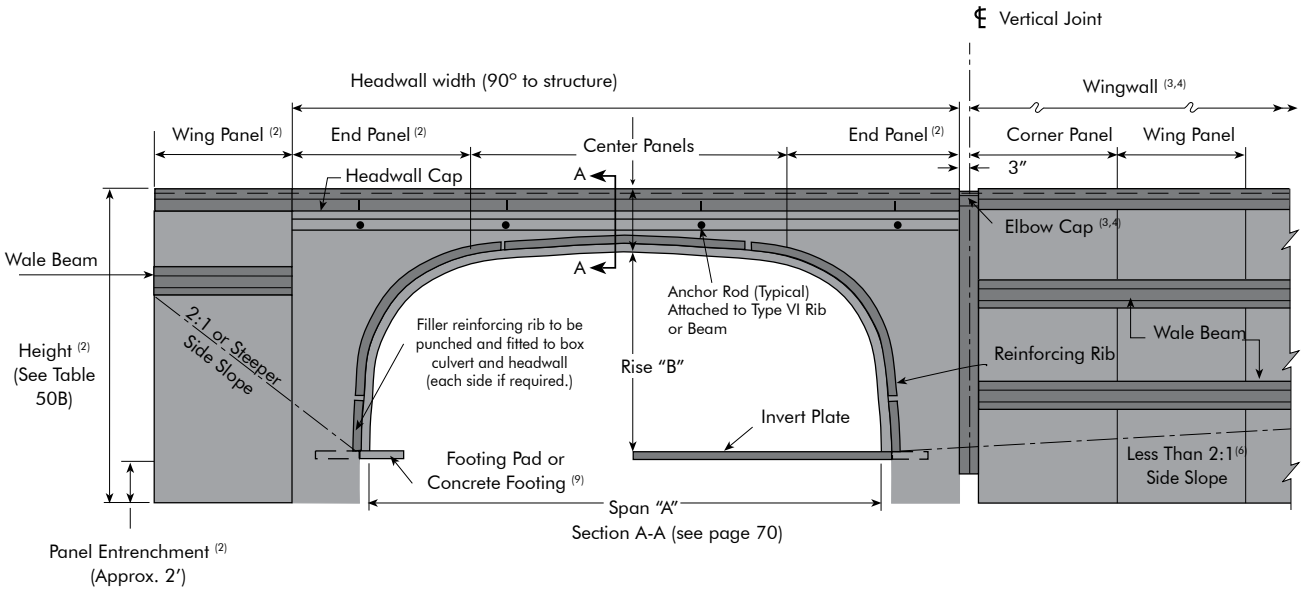
				D6						E6					
							Cover Hgt.		Shell				Cover Hgt.		Shell
Structure	Span "A"	Rise "B"	Area	HG/CG	HRS/CRS	HR/CR	Min.	Max.	Wt./Ft.	HG/CG	HRS/CRS	HR/CR	Min.	Max.	Wt./Ft.
Number	Ft.-In.	Ft.-In.	Sq. Ft.	(Gage)	(Inches)	(Type)	(Feet)		(Lbs.)	(Gage)	(Inches)	(Type)	(Feet)		(Lbs.)
1	8-9	2-6	18.4	3/3	54/18	II/IV	1.4	5.0	53						
2	9-2	3-3	25.4	2/2	54/18	II/IV	1.9	5.0	53	3/3	54/18	II/IV	1.4	5.0	59
3	9-7	4-1	32.6	2/2	54/18	II/IV	2.1	5.0	58	3/3	54/18	IV/IV	1.4	5.0	67
4	10-0	4-10	40.2	2/2	54/18	II/IV	2.3	5.0	62	3/3	54/18	IV/IV	1.4	5.0	71
5	10-6	5-7	48.1	2/2	54/18	II/IV	2.6	5.0	66	2/2	54/18	IV/VI	1.4	5.0	71
6	10-11	6-4	56.4	2/2	54/18	II/IV	2.8	5.0	70	2/2	54/18	IV/VI	1.4	5.0	75
7	11-4	7-2	65.0	2/2	54/18	II/IV	3.0	5.0	74	2/2	54/18	IV/VI	1.4	5.0	79
8	10-2	2-8	23.0	2/2	54/18	II/IV	2.4	5.0	57	2/2	54/18	IV/VI	1.4	5.0	64
9	10-7	3-5	31.1	2/2	54/18	II/IV	2.6	5.0	62	2/2	54/18	IV/VI	1.4	5.0	69
10	10-11	4-3	39.5	2/2	54/18	II/IV	2.8	5.0	67	2/2	54/18	IV/VI	1.4	5.0	74
11	11-4	5-0	48.2	2/2	54/18	II/IV	3.0	5.0	71	2/2	54/18	IV/VI	1.4	5.0	78
12	11-8	5-9	57.2	2/2	54/18	II/IV	3.2	5.0	75	2/2	54/18	IV/VI	1.4	5.0	82
13	12-1	6-7	66.4	3/3	54/18	II/IV	2.8	5.0	87	2/2	54/18	IV/VI	1.4	5.0	86
14	12-5	7-4	76.0	2/2	27/18	II/IV	3.1	5.0	92	3/3	54/18	IV/VI	1.4	5.0	95
15	11-7	2-10	28.1	2/2	54/18	II/IV	3.2	5.0	65	2/2	54/18	IV/VI	1.4	5.0	73
16	11-11	3-7	37.4	2/2	54/18	IV/IV	2.9	5.0	72	2/2	54/18	IV/VI	1.4	5.0	79
17	12-3	4-5	46.9	2/2	54/18	IV/IV	3.1	5.0	77	2/2	54/18	IV/VI	1.4	5.0	84
18	12-7	5-2	56.6	2/2	54/18	IV/IV	3.4	5.0	81	3/3	54/18	IV/VI	1.4	5.0	96
19	12-11	6-0	66.6	3/3	54/18	IV/IV	2.8	5.0	93	3/3	54/18	IV/VI	1.4	5.0	100
20	13-3	6-9	76.9	3/3	54/18	IV/IV	3.0	5.0	98	2/2	27/18	IV/VI	1.4	5.0	107
21	13-0	3-0	33.8	3/3	54/18	IV/IV	2.9	5.0	81	2/2	27/18	IV/VI	1.4	5.0	92
22	13-4	3-10	44.2	3/3	54/18	IV/IV	3.0	5.0	87	2/2	27/18	IV/VI	1.4	5.0	98
23	13-7	4-7	54.8	3/3	54/18	IV/IV	3.2	5.0	93	3/3	27/18	IV/VI	1.4	5.0	113
24	13-10	5-5	65.6	3/3	54/18	IV/IV	3.5	5.0	97	3/3	27/18	IV/VI	1.4	5.0	118
25	14-1	6-2	76.6	2/2	54/18	IV/VI	2.8	5.0	101	3/3	27/18	IV/VI	1.4	5.0	122
26	14-5	3-3	40.0	2/2	54/18	IV/VI	3.1	5.0	92	4/4	27/18	IV/VI	1.4	5.0	117
27	14-8	4-1	51.5	3/2	54/18	IV/VI	2.2	5.0	103	4/4	27/18	IV/VI	1.4	5.0	125
28	14-10	4-10	63.2	3/2	54/18	IV/VI	2.3	5.0	108	3/3	18/18	IV/VI	1.4	5.0	130
29	15-1	5-8	75.1	3/2	54/18	IV/VI	2.5	5.0	113	3/3	18/18	IV/VI	1.4	5.0	135
30	15-4	6-5	87.2	3/3	54/18	IV/VI	2.6	5.0	120	4/4	18/18	IV/VI	1.4	5.0	150
31	15-6	7-3	99.4	3/3	54/18	IV/VI	2.7	5.0	125	4/4	18/18	IV/VI	1.4	5.0	156
32	15-9	8-0	111.8	3/3	54/18	IV/VI	2.9	5.0	129	4/4	18/18	IV/VI	1.4	5.0	161
33	15-10	3-6	46.8	2/2	27/18	IV/VI	2.3	5.0	111	2/2	27/9	IV/VI	1.4	5.0	151
34	16-0	4-3	59.5	2/2	27/18	IV/VI	2.4	5.0	117	2/2	27/9	IV/VI	1.4	5.0	157
35	16-2	5-1	72.3	2/2	27/18	IV/VI	2.4	5.0	123	3/3	27/9	IV/VI	1.4	5.0	173
36	16-4	5-11	85.2	2/2	27/18	IV/VI	2.5	5.0	127	3/3	27/9	IV/VI	1.4	5.0	177
37	16-6	6-8	98.3	2/2	27/18	IV/VI	2.6	5.0	131	3/3	27/9	IV/VI	1.4	5.0	182
38	16-8	7-6	111.5	2/2	27/18	IV/VI	2.6	5.0	135	3/3	27/9	IV/VI	1.4	5.0	186
39	16-10	8-3	124.8	2/2	27/18	IV/VI	2.7	5.0	139	3/3	27/9	IV/VI	1.4	5.0	191
40	17-9	3-10	54.4	2/2	27/18	VI/VI	2.1	5.0	128	2/3	18/18	VI/VI	1.4	5.0	140
41	18-2	4-7	68.3	2/2	27/18	VI/VI	2.3	5.0	135	2/5	18/18	VI/VI	1.4	5.0	156
42	18-7	5-4	82.5	2/2	27/18	VI/VI	2.4	5.0	143	2/2	18/9	VI/VI	1.4	5.0	202
43	19-0	6-1	97.1	2/2	18/18	VI/VI	1.8	5.0	164	2/2	18/9	VI/VI	1.4	5.0	212
44	19-5	6-11	111.9	2/2	18/18	VI/VI	1.9	5.0	168	2/2	18/9	VI/VI	1.4	5.0	215
45	19-10	7-8	127.1	2/2	18/18	VI/VI	2.0	5.0	171	2/2	18/9	VI/VI	1.4	5.0	219
46	20-3	8-5	142.6	2/2	18/18	VI/VI	2.1	5.0	175	2/2	18/9	VI/VI	1.4	5.0	223
47	19-1	4-2	63.3	2/2	18/18	VI/VI	1.8	5.0	145	2/2	18/9	VI/VI	1.4	5.0	199
48	19-5	4-11	78.3	2/2	18/18	VI/VI	1.9	5.0	155	2/2	18/9	VI/VI	1.4	5.0	208
49	19-9	5-8	93.6	2/2	18/18	VI/VI	2.0	5.0	164	2/2	18/9	VI/VI	1.4	5.0	217
50	20-1	6-6	109.2	2/2	18/18	VI/VI	2.1	5.0	173	2/2	18/9	VI/VI	1.4	5.0	226
51	20-6	7-3	125.0	2/2	18/18	VI/VI	2.1	5.0	177	2/2	18/9	VI/VI	1.4	5.0	230
52	20-10	8-1	141.2	2/2	18/18	VI/VI	2.2	5.0	181	2/2	18/9	VI/VI	1.4	5.0	234
53	21-2	8-10	157.6	2/2	18/18	VI/VI	2.2	5.0	184	2/2	18/9	VI/VI	1.4	5.0	238
54	20-4	4-6	73.1	2/2	18/18	VI/VI	2.1	5.0	155	2/2	18/9	VI/VI	1.4	5.0	213
55	20-7	5-3	89.2	2/2	18/18	VI/VI	2.2	5.0	164	2/2	18/9	VI/VI	1.4	5.0	223
56	20-11	6-1	105.5	2/2	18/18	VI/VI	2.2	5.0	173	2/2	18/9	VI/VI	1.4	5.0	232
57	21-3	6-10	122.1	2/2	18/18	VI/VI	2.3	5.0	182	2/2	18/9	VI/VI	1.4	5.0	241
58	21-6	7-8	139.0	2/2	18/18	VI/VI	2.3	5.0	186	2/2	18/9	VI/VI	1.4	5.0	245
59	21-10	8-5	156.0	2/2	18/18	VI/VI	2.4	5.0	190	2/2	18/9	VI/VI	1.4	5.0	249
60	22-1	9-3	173.3	2/2	18/18	VI/VI	2.5	5.0	194	2/2	18/9	VI/VI	1.4	5.0	253
61	21-7	4-11	83.8	2/2	18/18	VI/VI	2.3	5.0	164	2/2	18/9	VI/VI	1.4	5.0	228
62	21-10	5-8	101.0	2/2	18/18	VI/VI	2.4	5.0	173	2/2	18/9	VI/VI	1.4	5.0	237
63	22-1	6-6	118.4	2/2	18/18	VI/VI	2.5	5.0	182	2/2	18/9	VI/VI	1.4	5.0	247
64	22-3	7-3	135.9	2/2	18/18	VI/VI	2.5	5.0	191	2/2	18/9	VI/VI	1.4	5.0	256
65	22-6	8-1	153.7	3/5	18/18	VI/VI	2.2	5.0	219	2/2	18/9	VI/VI	1.4	5.0	260
66	22-9	8-10	171.6	3/5	18/18	VI/VI	2.3	5.0	224	2/2	18/9	VI/VI	1.4	5.0	264
67	23-0	9-8	189.8	3/5	18/18	VI/VI	2.4	5.0	228	2/2	18/9	VI/VI	1.4	5.0	267
68	22-9	5-4	95.5	3/6	18/18	VI/VI	2.3	5.0	200	2/2	18/9	VI/VI	1.4	5.0	243
69	23-0	6-1	113.7	3/6	18/18	VI/VI	2.4	5.0	210	2/2	18/9	VI/VI	1.4	5.0	252
70	23-2	6-11	132.1	3/6	18/18	VI/VI	2.4	5.0	220	2/2	18/9	VI/VI	1.4	5.0	261
71	23-4	7-8	150.6	3/6	18/18	VI/VI	2.4	5.0	230	2/2	18/9	VI/VI	1.4	5.0	271
72	23-6	8-6	169.3	3/6	18/18	VI/VI	2.5	5.0	234	2/2	18/9	VI/VI	1.4	5.0	275
73	23-8	9-3	188.1	3/6	18/18	VI/VI	2.5	5.0	239	2/2	18/9	VI/VI	1.4	5.0	278
74	23-10	10-1	207.0	3/6	18/18	VI/VI	2.5	5.0	243	2/2	18/9	VI/VI	1.4	5.0	282
75	24-0	5-9	108.2	3/6	18/18	VI/VI	2.6	5.0	212	2/2	18/9	VI/VI	1.4	5.0	258
76	24-1	6-6	127.5	3/6	18/18	VI/VI	2.6	5.0	222	2/2	18/9	VI/VI	1.4	5.0	267
77	24-3	7-4	146.8	3/6	18/18	VI/VI	2.6	5.0	232	2/2	18/9	VI/VI	1.4	5.0	276
78	24-4	8-2	166.2	3/6	18/18	VI/VI	2.7	4.9	242	2/2	18/9	VI/VI	1.4	5.0	285
79	24-5	8-11	185.7	3/6	18/18	VI/VI	2.7	4.8	246	2/2	18/9	VI/VI	1.4	5.0	289
80	24-7	9-9	205.3	3/6	18/18	VI/VI	2.7	4.7	251	2/2	18/9	VI/VI	1.4	5.0	293
81	24-8	10-6	225.0	3/6	18/18	VI/VI	2.7	4.6	255	2/2	18/9	VI/VI	1.4	5.0	297
82	25-2	6-2	122.0	3/5	18/18	VI/VI	2.7	3.9	216	2/3	18/9	VI/VI	1.4	5.0	278
83	25-2	7-0	142.2	3/5	18/18	VI/VI	2.9	3.9	226	2/3	18/9	VI/VI	1.4	5.0	287
84	25-3	7-9	162.4	3/5	18/18	VI/VI	3.0	3.9	236	2/3	18/9	VI/VI	1.4	5.0	297
85	25-4	8-7	182.6	3/5	18/18	VI/VI	3.0	3.8	246	2/3	18/9	VI/VI	1.4	5.0	306
86	25-4	9-5	202.9	3/5	18/18	VI/VI	3.0	3.8	250	2/3	18/9	VI/VI	1.4	5.0	310
87	25-5	10-2	223.3	3/5	18/18	VI/VI	3.0	3.8	255	2/3	18/9	VI/VI	1.4	5.0	313

See Notes page 63

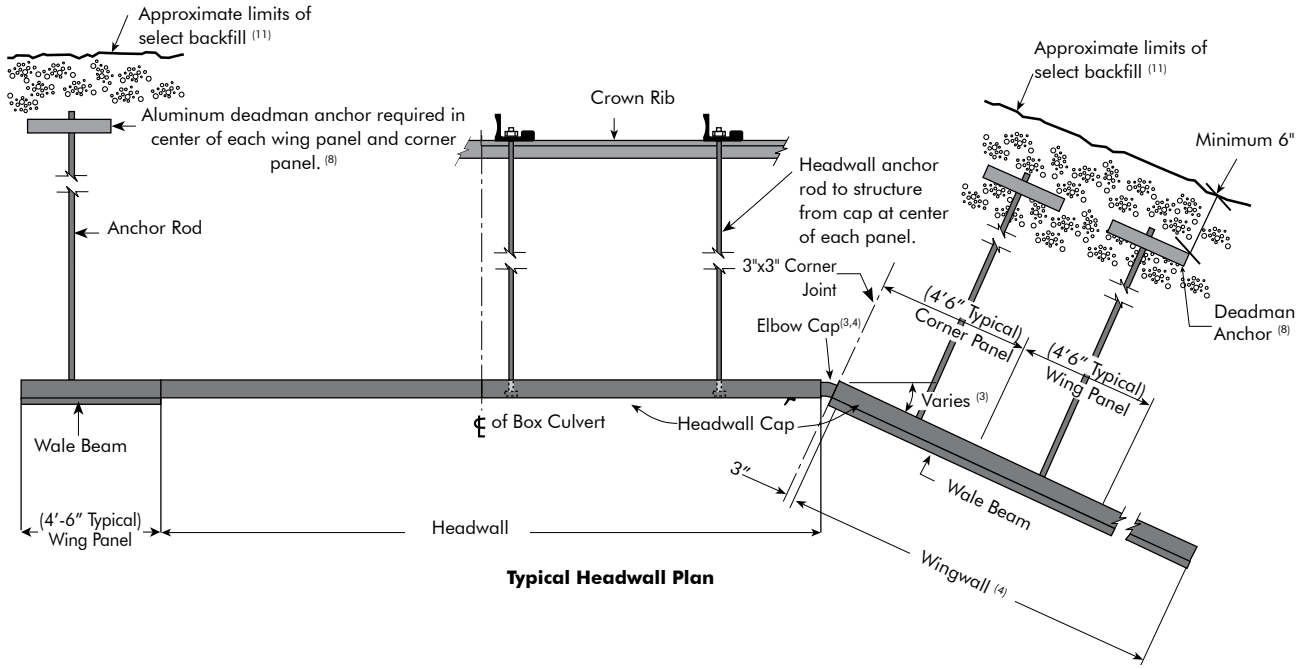
TABLE 49C. ALBC STRUCTURE AREA, PLATE AND RIB MAKE-UP

Box #	Inside Dimensions		Total (N)	Crown			Haunch		Straight Leg Length D (N)	Side Angle E (deg.)
	Span (Ft.-In.)	Rise (Ft.-In.)		Arc Length (N)	Plate (N)	Rib Lengths Long/ Short (N)	Plate (N)	Rib Length (N)		
1	8-9	2-6	14		NA		14	5.5	.5	
2	9-2	3-3	16				8	6.5	1.5	
3	9-7	4-1	18				9	7.5	2.5	
4	10-0	4-10	20	5		5/3	10	7.5	3.5	15.40
5	10-6	5-7	22				11	7.5	4.5	
6	10-11	6-4	24				12	7.5	5.5	
7	11-4	7-2	26				13	7.5	6.5	
8	10-2	2-8	16				8	6.5	.5	
9	10-7	3-5	18				9	7.5	1.5	
10	10-11	4-3	20				10	8.5	2.5	
11	11-4	5-0	22	7		7/3	11	8.5	3.5	13.55
12	11-8	5-9	24				12	8.5	4.5	
13	12-1	6-7	26				13	8.5	5.5	
14	12-5	7-4	28				14	8.5	6.5	
15	11-7	2-10	18		TWO PLATE SHELL		9	6.5	.5	
16	11-11	3-7	20				10	7.5	1.5	
17	12-3	4-5	22	9		9/5	11	8.5	2.5	11.70
18	12-7	5-2	24				12	8.5	3.5	
19	12-11	6-0	26				13	8.5	4.5	
20	13-3	6-9	28				14	8.5	5.5	
21	13-0	3-0	20				10	6.5	.5	
22	13-4	3-10	22				11	7.5	1.5	
23	13-7	4-7	24	11		11/7	12	8.5	2.5	9.87
24	13-10	5-5	26				13	8.5	3.5	
25	14-1	6-2	28				14	8.5	4.5	
26	14-5	3-3	22				11	6.5	.5	
27	14-8	4-1	24				8	7.5	1.5	
28	14-10	4-10	26				9	8.5	2.5	
29	15-1	5-8	28	13	8	13/9	10	8.5	3.5	8.02
30	15-4	6-5	30				11	8.5	4.5	
31	15-6	7-3	32				12	8.5	5.5	
32	15-9	8-0	34				13	8.5	6.5	
33	15-10	3-6	24				8	6.5	.5	
34	16-0	4-3	26				9	7.5	1.5	
35	16-2	5-1	28				10	8.5	2.5	
36	16-4	5-11	30	15	8	15/11	11	8.5	3.5	6.17
37	16-6	6-8	32				12	8.5	4.5	
38	16-8	7-6	34				13	8.5	5.5	
39	16-10	8-3	36				14	8.5	6.5	
40	17-9	3-10	26				8	6.5	.5	
41	18-2	4-7	28				9	7.5	1.5	
42	18-7	5-4	30				10	8.5	2.5	
43	19-0	6-1	32	17	10	17/13	11	9.5	3.5	14.90
44	19-5	6-11	34				12	9.5	4.5	
45	19-10	7-8	36				13	9.5	5.5	
46	20-3	8-5	38				14	9.5	6.5	
47	19-1	4-2	28				8	6.5	.5	
48	19-5	4-11	30				9	7.5	1.5	
49	19-9	5-8	32				10	8.5	2.5	
50	20-1	6-6	34	19	12	19/15	11	9.5	3.5	12.78
51	20-6	7-3	36				12	9.5	4.5	
52	20-10	8-1	38				13	9.5	5.5	
53	21-2	8-10	40				14	9.5	6.5	
54	20-4	4-6	30				8	6.5	.5	
55	20-7	5-3	32				9	7.5	1.5	
56	20-11	6-1	34				10	8.5	2.5	
57	21-3	6-10	36	21	14	21/17	11	9.5	3.5	10.67
58	21-6	7-8	38				12	9.5	4.5	
59	21-10	8-5	40				13	9.5	5.5	
60	22-1	9-3	42				14	9.5	6.5	
61	21-7	4-11	32				9	6.5	.5	
62	21-10	5-8	34				10	7.5	1.5	
63	22-1	6-6	36				11	8.5	2.5	
64	22-3	7-3	38	23	14	23/19	12	9.5	3.5	8.53
65	22-6	8-1	40				13	9.5	4.5	
66	22-9	8-10	42				14	9.5	5.5	
67	23-0	9-8	44				15	9.5	6.5	
68	22-9	5-4	34				10	6.5	.5	
69	23-0	6-1	36				11	7.5	1.5	
70	23-2	6-11	38				12	8.5	2.5	
71	23-4	7-8	40	25	14	25/21	13	9.5	3.5	6.42
72	23-6	8-6	42				14	9.5	4.5	
73	23-8	9-3	44				15	9.5	5.5	
74	23-10	10-1	46				16	9.5	6.5	
75	24-0	5-9	36				10	6.5	.5	
76	24-1	6-6	38				11	7.5	1.5	
77	24-3	7-4	40				12	8.5	2.5	
78	24-4	8-2	42	27	16	27/23	13	9.5	3.5	4.30
79	24-5	8-11	44				14	9.5	4.5	
80	24-7	9-9	46				15	9.5	5.5	
81	24-8	10-6	48				16	9.5	6.5	
82	25-2	6-2	38				11	6.5	.5	
83	25-2	7-0	40				12	7.5	1.5	
84	25-3	7-9	42				13	8.5	2.5	
85	25-4	8-7	44	29	16	29/25	14	9.5	3.5	2.18
86	25-4	9-5	46				15	9.5	4.5	
87	25-5	10-2	48				16	9.5	5.5	
88	26-7	5-5	38				11	6.5	.5	
89	27-0	6-3	40				12	7.5	1.5	
90	27-5	7-0	42				13	8.5	2.5	
91	27-10	7-9	44	29	16	29/25	14	9.5	3.5	15.22
92	28-3	8-7	46				15	9.5	4.5	
93	28-8	9-4	48				16	9.5	5.5	
94	29-2	10-1	50				17	9.5	6.5	
95	27-10	5-10	40				12	7.5	.5	
96	28-3	6-8	42				13	8.5	1.5	
97	28-7	7-5	44				14	9.5	2.5	
98	29-0	8-3	46	31	16	31/25	15	10.5	3.5	13.45
99	29-4	9-0	48				16	10.5	4.5	
100	29-8	9-9	50				17	10.5	5.5	
101	30-1	10-7	52				18	10.5	6.5	
102	29-1	6-4	42				12	8.5	.5	
103	29-5	7-1	44				13	9.5	1.5	
104	29-8	7-11	46				14	10.5	2.5	
105	30-0	8-8	48	33	18	33/25	15	11.5	3.5	11.68
106	30-4	9-5	50				16	11.5	4.5	
107	30-8	10-3	52				17	11.5	5.5	
108	31-0	11-0	54				18	11.5	6.5	
109	30-3	6-9	44				13	8.5	.5	
110	30-6	7-7	46				14	9.5	1.5	
111	30-10	8-4	48				15	10.5	2.5	
112	31-1	9-2	50	35	18	35/27	16	11.5	3.5	9.92
113	31-4	9-11	52				17	11.5	4.5	
114	31-8	10-9	54				18	11.5	5.5	
115	31-11	11-6	56				19	11.5	6.5	
116	31-5	7-3	46				14	8.5	.5	
117	31-8	8-0	48				15	9.5	1.5	
118	31-10	8-10	50				16	10.5	2.5	
119	32-1	9-8	52	37	18	37/29	17	11.5	3.5	8.15
120	32-3	10-5	54				18	11.5	4.5	
121	32-7	11-3	56				19	11.5	5.5	
122	32-8	12-0	58				20	11.5	6.5	
123	32-7	7-9	48				14	8.5	.5	
124	32-9	8-6	50				15	9.5	1.5	
125	32-11	9-4	52				16	10.5	2.5	
126	33-1	10-2	54	39	20	39/31	17	11.5	3.5	6.37
127	33-3	10-11	56				18	11.5	4.5	
128	33-5	11-9	58				19	11.5	5.5	
129	33-8	12-6	60				20	11.5	6.5	
130	33-8	8-3	50				15	8.5	.5	
131	33-9	9-1	52				16	9.5	1.5	
132	33-11	9-10	54				17	10.5	2.5	
133	34-0	10-8	56	41	20	41/33	18	11.5	3.5	4.62
134	34-2	11-5	58				19	11.5	4.5	
135	34-3	12-3	60				20	11.5	5.5	
136	34-5	13-1	62				21	11.5	6.5	
137	34-9	8-9	52				16	8.5	.5	
138	34-10	9-7	54				17	9.5	1.5	
139	34-11	10-4	56				18	10.5	2.5	
140	35-0	11-2	58	43	20	43/35	19	11.5	3.5	2.85
141	35-1	12-0	60				20	11.5	4.5	
142	35-2	12-9	62				21	11.5	5.5	
143	35-3	13-7	64				22	11.5	6.5	

Notes: Box #1 is a one plate shell.
See page 63 for "D" and "E" designations.



ALBC Headwall and Wingwall Details



Typical Headwall Plan

Notes:

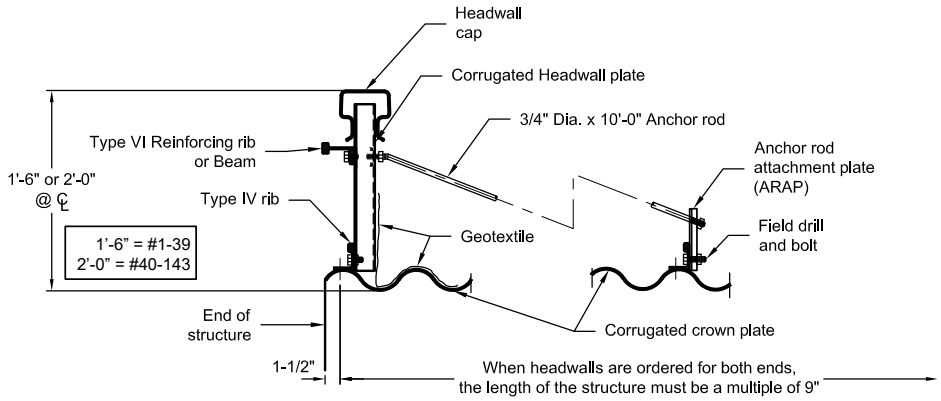
1. All panels are fabricated from aluminum structural plate as specified in ASTM B746.
2. Height of headwall listed in Table 50B permits approximately 24" entrenchment depth below the invert. All wingwall and headwall end panels must be trenched into existing ground.
3. Horizontal rotation on the wingwall should not exceed 90°.
4. The top of a headwall and its wingwall are always horizontal, unless beveled wingwalls are required.
5. Standard headwalls shown are for vertical orientation only.
6. If side slope is flatter than 2:1, a double tieback assembly is required for each deadman.
7. Standard headwalls are shown. HL-93, HS-20 and HS-25 wheel loads must be kept a minimum distance of 36" from the wall face. Special headwall packages can be fabricated to meet other loading requirements.
8. For details on single and dual deadman anchors, refer to next page.
9. Structures on concrete footings with headwalls require field modification of the headwall plates to fit around the footings.
10. Aluminum headwalls may be used only on square-ended structures. Structure length must be an increment of 9 inches, if these headwalls are utilized at both ends.
11. If an aluminum headwall and/or wingwall system is specified, the select granular structural backfill shall extend past the deadman anchor system a minimum of 6". Contact your Contech representative if stiff material or rock is encountered where the wingalls and deadman are to be installed.

TABLE 50A. HEADWALL AND WINGWALL DETAILS

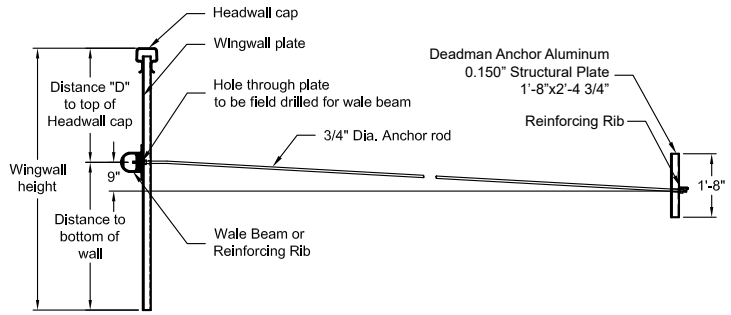
Wall Height (Ft.-In.)	Headwall		Wingwalls						0.150" thick Deadman Size	3/4" Dia. Rod Length Min. (Ft.-In.)
			Single Anchor		Dual Anchor		Triple Anchors			
	Center Panel Thickness	End Panel Thickness	Panel Thickness	"D" Wale Beam - Distance from top of HW Cap (Ft.-In.)	Panel Thickness	"D" Wale Beam - Distance see detail (Ft.-In.)	Panel Thickness	"D" Wale Beam - Distance from top of HW Cap (Ft.-In.)		
6-2 to 8-6	0.125"	0.150"	0.125"	3-0	N/A	N/A	N/A	N/A	1'8" x 2' 4 3/4"	12-6
9-4 to 11-9	0.125"	0.150"	0.150"	3-6	0.125"	3-0	N/A	N/A	1'8" x 2' 4 3/4"	12-6
12-7 to 14-2	0.125"	0.150"	N/A	N/A	0.150"	3-8	N/A	N/A	1'8" x 2' 4 3/4"	12-6
14-11	0.175"	0.175"	N/A	N/A	N/A	N/A	0.175"	3-6, 8-0, 12-9	3'2" x 2' 5 1/2"	20-0
15-9	0.175"	0.175"	N/A	N/A	N/A	N/A	0.175"	3-6, 8-0, 12-9	3'2" x 2' 5 1/2"	20-0
16-7	0.200"	0.200"	N/A	N/A	N/A	N/A	0.200"	3-9, 8-9, 13-8	3'2" x 2' 5 1/2"	20-0
17-4	0.200"	0.200"	N/A	N/A	N/A	N/A	0.200"	3-9, 8-9, 13-8	3'2" x 2' 5 1/2"	20-0
18-2	0.200"	0.200"	N/A	N/A	N/A	N/A	0.225"	3-9, 8-9, 13-8	3'2" x 2' 5 1/2"	20-0

Notes:
1. Any wall heights greater than 18'-2": Inquire
2. HW = Headwall, WW = Wingwall

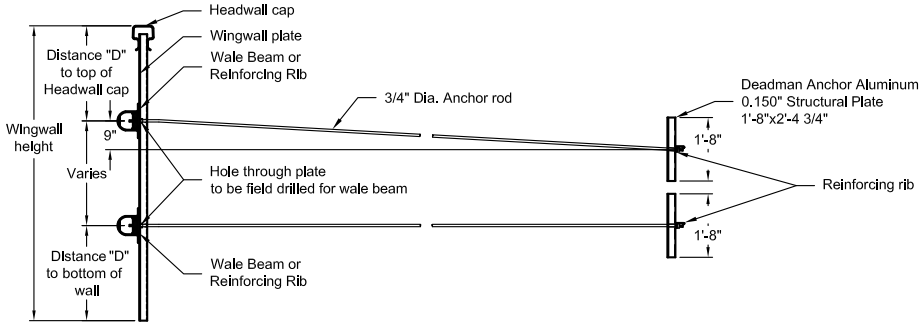
HEADWALL ATTACHMENT TO CROWN



WINGWALL SINGLE ANCHOR DESIGN



WINGWALL DUAL ANCHOR DESIGN



Note: Triple anchor design required wall heights greater than 14'-2". See table above for additional options.

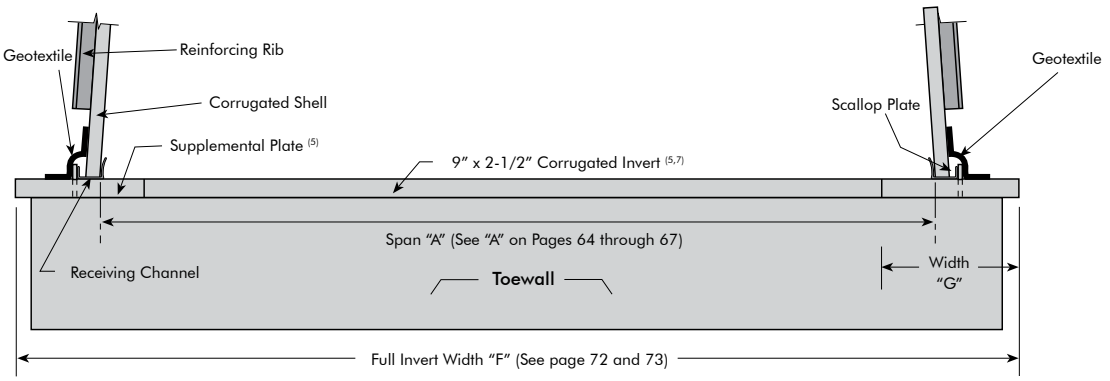
Headwall Dimensions for HL-93, H-20, HS-20, H-25, HS-25 Loading

TABLE 50B. HEADWALL

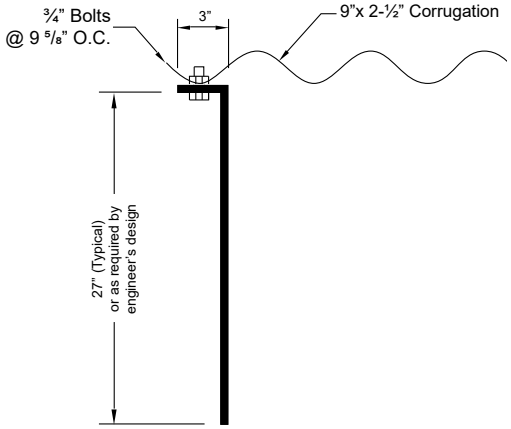
No.	Width (Ft.-In.)	Height (Ft.-In.)	No. of Anchor Rods
1	13-6	6-2	3
2	13-6	6-11	3
3	13-6	7-9	3
4	13-6	8-6	3
5	13-6	9-4	3
6	13-6	10-2	3
7	13-6	10-11	3
8	15-0	6-2	3
9	15-0	6-11	3
10	15-0	7-9	3
11	15-0	8-6	3
12	15-0	9-4	3
13	15-0	10-2	3
14	15-0	10-11	3
15	16-6	6-11	4
16	16-6	7-9	4
17	16-6	8-6	4
18	16-6	9-4	4
19	16-6	10-2	4
20	16-6	10-11	4
21	18-0	6-11	4
22	18-0	7-9	4
23	18-0	8-6	4
24	18-0	9-4	4
25	18-0	10-2	4
26	19-6	6-11	4
27	19-6	7-9	4
28	19-6	8-6	4
29	19-6	9-4	4
30	19-6	10-2	4
31	19-6	10-11	4
32	19-6	11-9	4
33	21-0	6-11	5
34	21-0	7-9	5
35	21-0	8-6	5
36	21-0	9-4	5
37	21-0	10-2	5
38	21-0	10-11	5
39	21-0	11-9	5
40	22-6	7-9	5
41	22-6	8-6	5
42	22-6	9-4	5
43	22-6	10-2	5
44	22-6	10-11	5
45	22-6	11-9	5
46	22-6	12-7	5
47	24-0	8-6	5
48	24-0	9-4	5
49	24-0	10-2	5
50	24-0	10-11	5
51	24-0	11-9	5
52	24-0	12-7	5
53	24-0	13-4	5
54	25-6	8-6	6
55	25-6	9-4	6
56	25-6	10-2	6
57	25-6	10-11	6
58	25-6	11-9	6
59	25-6	12-7	6
60	25-6	13-4	6
61	27-0	9-4	6
62	27-0	10-2	6
63	27-0	10-11	6
64	27-0	11-9	6
65	27-0	12-7	6
66	27-0	13-4	6
67	27-0	14-2	6
68	28-6	9-4	6
69	28-6	10-2	6
70	28-6	10-11	6
71	28-6	11-9	6
72	28-6	12-7	6
73	28-6	13-4	6
74	28-6	14-2	6
75	30-0	10-2	7
76	30-0	10-11	7
77	30-0	11-9	7
78	30-0	12-7	7
79	30-0	13-4	7
80	30-0	14-2	7
81	30-0	14-11	7
82	31-6	10-2	7
83	31-6	10-11	7
84	31-6	11-9	7
85	31-6	12-7	7
86	31-6	13-4	7
87	31-6	14-2	7
88	33-0	9-4	7
89	33-0	10-11	7
90	33-0	10-11	7
91	33-0	11-9	7
92	33-0	12-7	7
93	33-0	13-4	7
94	33-0	14-2	7
95	34-6	10-2	8
96	34-6	10-11	8
97	34-6	11-9	8
98	34-6	12-7	8
99	34-6	13-4	8
100	34-6	14-2	8
101	34-6	14-11	8
102	36-0	10-11	8
103	36-0	11-9	8
104	36-0	12-7	8
105	36-0	13-4	8
106	36-0	13-4	8
107	36-0	14-2	8
108	36-0	14-11	8
109	37-6	10-11	8
110	37-6	11-9	8
111	37-6	12-7	8
112	37-6	13-4	8
113	37-6	14-2	8
114	37-6	14-11	8
115	37-6	15-9	8
116	37-6	11-9	8
117	37-6	12-7	8
118	37-6	13-4	8
119	37-6	14-2	8
120	37-6	14-11	8
121	37-6	15-9	8
122	37-6	16-7	8
123	37-6	11-9	8
124	37-6	12-7	8
125	37-6	13-4	8
126	37-6	14-2	8
127	37-6	14-11	8
128	37-6	15-9	8
129	37-6	16-7	8
130	40-6	12-7	9
131	40-6	13-4	9
132	40-6	14-2	9
133	40-6	14-11	9
134	40-6	15-9	9
135	40-6	16-7	9
136	40-6	17-4	9
137	42-0	13-4	9
138	42-0	14-2	9
139	42-0	14-11	9
140	42-0	15-9	9
141	42-0	16-7	9
142	42-0	17-4	9
143	42-0	18-2	9



Aluminum Box Culvert with Full Aluminum Headwall Package



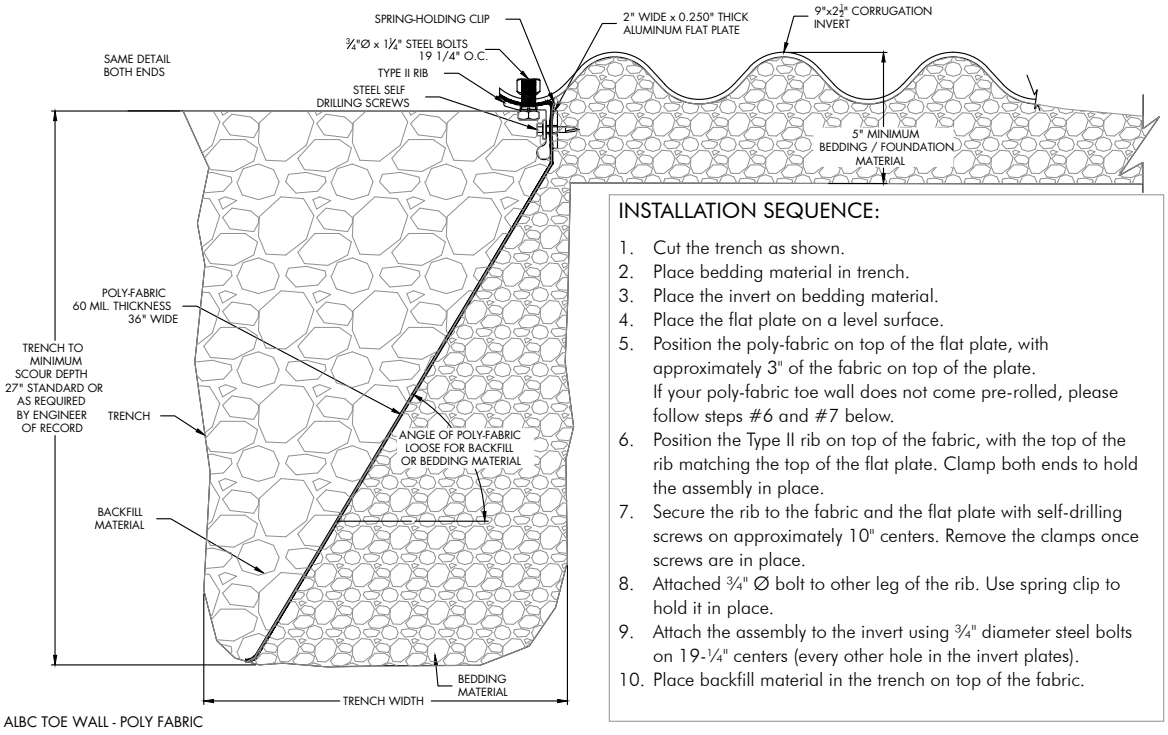
Aluminum Full Invert Option



Aluminum Bent Sheet Toewall Detail

Notes:

1. N=9.625" or 9 $^{5}/_{8}$". Use N as a conversion factor. For example, for Structure No. 1, Width "F" is 13 x N, or 125.13".
2. Minimum allowable (unfactored) soil-bearing pressure is 4,000 psf for structures and details shown in this catalog. This applies specifically for width "G" below the receiving channel. Other conditions can be accommodated. Contact a Contech Representative for more information.
3. The maximum cover for Aluminum Box Culverts with full inverts and footing pads should not exceed 4 feet. Special full invert and footing pad designs or slotted concrete footings can accommodate maximum covers to the limits shown in Tables 48A-48B and 49A-49B.
4. Weight per foot of full invert includes receiving channels, scallop plates, nuts, bolts, and all plates.
5. Full invert plates thickness are as shown. When reactions to the invert require additional thickness, supplemental plates of the thickness and width listed in Table 51 are furnished to bolt between the full invert and the receiving channel.
6. Invert widths 21N and greater are two-pieces.
7. Invert plates must not be overlapped on adjacent structures unless appropriate design modifications are incorporated.
8. Bent sheet toewalls are supplied for structures having a full corrugated aluminum invert.



INSTALLATION SEQUENCE:

1. Cut the trench as shown.
2. Place bedding material in trench.
3. Place the invert on bedding material.
4. Place the flat plate on a level surface.
5. Position the poly-fabric on top of the flat plate, with approximately 3" of the fabric on top of the plate. If your poly-fabric toe wall does not come pre-rolled, please follow steps #6 and #7 below.
6. Position the Type II rib on top of the fabric, with the top of the rib matching the top of the flat plate. Clamp both ends to hold the assembly in place.
7. Secure the rib to the fabric and the flat plate with self-drilling screws on approximately 10" centers. Remove the clamps once screws are in place.
8. Attached ¾" Ø bolt to other leg of the rib. Use spring clip to hold it in place.
9. Attach the assembly to the invert using ¾" diameter steel bolts on 19-¼" centers (every other hole in the invert plates).
10. Place backfill material in the trench on top of the fabric.

Poly-Fabric Toewall Detail

Full Invert Details

TABLE 51A
FULL INVERT DETAILS (H-20, HS-20)

Structure No.	Width "F" (N)	Supplemental Plate Thickness (Inches)	Width "G" (N)	Weight/Ft. (Lbs.)	Bolts/Ft. (Each)
1	13			25.9	5.8
2	14			27.3	6.0
3	14			27.3	6.0
4	15			28.8	6.2
5	16			30.2	6.4
6	16			30.2	6.4
7	17			31.7	6.7
8	15			28.8	6.2
9	16			30.2	6.4
10	16			30.2	6.4
11	17			31.7	6.7
12	17			31.7	6.7
13	18			33.1	6.9
14	18			33.1	6.9
15	17			31.7	6.7
16	17			31.7	6.7
17	18			33.1	6.9
18	18			33.1	6.9
19	19			34.6	7.1
20	19			34.6	7.1
21	19			34.6	7.1
22	19			34.6	7.1
23	19			34.6	7.1
24	20			36.0	7.3
25	20			36.0	7.3
26	20	.100	2	41.3	7.3
27	21	.100	2	46.4	12.9
28	21	.100	2	46.4	12.9
29	21	.100	2	46.4	12.9
30	22	.100	2	47.8	13.1
31	22	.100	2	47.8	13.1
32	22	.100	2	47.8	13.1
33	22	.100	2	47.8	13.1
34	22	.100	2	47.8	13.1
35	23	.100	2	49.3	13.3
36	23	.100	2	49.3	13.3
37	23	.100	2	49.3	13.3
38	23	.100	2	49.3	13.3
39	24	.100	2	50.7	13.6
40	26	.100	3	56.3	14.0
41	26	.100	3	56.3	14.0
42	27	.100	3	57.7	14.2
43	27	.100	3	57.7	14.2
44	28	.100	3	59.2	14.4
45	28	.100	3	59.2	14.4
46	29	.100	3	60.6	14.7
47	27	.100	3	57.7	14.2
48	28	.100	3	59.2	14.4
49	28	.100	3	59.2	14.4
50	29	.100	3	60.6	14.7
51	29	.100	3	60.6	14.7
52	29	.125	3	62.6	14.7
53	30	.125	3	64.0	14.9
54	29	.125	3	62.6	14.7
55	29	.125	3	62.6	14.7
56	30	.125	3	64.0	14.9
57	30	.125	3	64.0	14.9
58	30	.125	3	64.0	14.9
59	31	.125	3	65.5	15.1
60	31	.125	3	65.5	15.1
61	30	.125	3	64.0	14.9
62	31	.125	3	65.5	15.1
63	31	.150	3	67.5	15.1
64	31	.150	3	67.5	15.1
65	32	.150	3	68.9	15.3
66	32	.150	3	68.9	15.3
67	32	.150	3	68.9	15.3
68	32	.150	3	68.9	15.3
69	32	.150	3	68.9	15.3
70	32	.150	3	68.9	15.3
71	33	.150	3	70.4	15.6
72	33	.150	3	70.4	15.6
73	33	.150	3	70.4	15.6
74	33	.150	3	70.4	15.6
75	33	.175	3	72.4	15.6
76	34	.175	3	73.8	15.8
77	34	.175	3	73.8	15.8
78	34	.175	3	73.8	15.8
79	34	.175	3	73.8	15.8
80	34	.175	3	73.8	15.8
81	34	.175	3	73.8	15.8
82	35	.200	3.5	79.9	16.0
83	35	.200	3.5	79.9	16.0
84	35	.200	3.5	79.9	16.0
85	36	.200	3.5	81.4	16.2
86	36	.200	3.5	81.4	16.2
87	36	.200	3.5	81.4	16.2

TABLE 51B
FULL INVERT DETAILS (HL-93, H-25, HS-25)

Structure No.	Width "F" (N)	Supplemental Plate Thickness (Inches)	Width "G" (N)	Weight/Ft. (Lbs.)	Bolts/Ft. (Each)
1	13			25.9	5.8
2	14			27.3	6.0
3	14			27.3	6.0
4	15			28.8	6.2
5	16			30.2	6.4
6	16			30.2	6.4
7	17			31.7	6.7
8	15			28.8	6.2
9	16			30.2	6.4
10	16			30.2	6.4
11	17			31.7	6.7
12	17			31.7	6.7
13	18	.100	2	38.4	6.9
14	18	.100	2	38.4	6.9
15	17	.100	2	37.0	6.7
16	17	.100	2	37.0	6.7
17	18	.100	2	38.4	6.9
18	18	.100	2	38.4	6.9
19	19	.100	2	39.9	7.1
20	19	.100	2	39.9	7.1
21	19	.100	2	39.9	7.1
22	19	.100	2	39.9	7.1
23	19	.100	2	39.9	7.1
24	20	.100	2	41.3	7.3
25	20	.100	2	41.3	7.3
26	20	.100	2.5	42.6	7.3
27	21	.100	2	46.4	12.9
28	21	.100	2	46.4	12.9
29	21	.100	2	46.4	12.9
30	22	.100	2	47.8	13.1
31	22	.100	2	47.8	13.1
32	22	.100	2	47.8	13.1
33	22	.100	2.5	49.1	13.1
34	22	.100	2.5	49.1	13.1
35	23	.100	2.5	50.6	13.3
36	23	.100	2.5	50.6	13.3
37	23	.100	2.5	50.6	13.3
38	23	.100	2.5	50.6	13.3
39	24	.100	3	53.4	13.6
40	26	.150	3	60.2	14.0
41	26	.150	3	60.2	14.0
42	27	.150	3	61.7	14.2
43	27	.150	3	61.7	14.2
44	28	.150	3	63.1	14.4
45	28	.150	3	63.1	14.4
46	29	.150	3	64.6	14.7
47	27	.150	3	61.7	14.2
48	28	.150	3	63.1	14.4
49	28	.150	3	63.1	14.4
50	29	.150	3	64.6	14.7
51	29	.150	3	64.6	14.7
52	29	.150	3	64.6	14.7
53	30	.175	3	68.0	14.9
54	29	.175	3	66.6	14.7
55	29	.175	3	66.6	14.7
56	30	.175	3	68.0	14.9
57	30	.175	3	68.0	14.9
58	30	.175	3	68.0	14.9
59	31	.175	3	69.5	15.1
60	31	.175	3	69.5	15.1
61	30	.175	3	68.0	14.9
62	31	.175	3	69.5	15.1
63	31	.175	3	69.5	15.1
64	31	.175	3	69.5	15.1
65	32	.175	3	70.9	15.3
66	32	.175	3	70.9	15.3
67	32	.175	3	70.9	15.3
68	32	.225	3	74.9	15.3
69	32	.225	3	74.9	15.3
70	32	.225	3	74.9	15.3
71	33	.225	3	76.4	15.6
72	33	.225	3	76.4	15.6
73	33	.225	3	76.4	15.6
74	33	.225	3	76.4	15.6
75	33	.225	3.5	79.3	15.6
76	34	.225	3.5	80.8	15.8
77	34	.225	3.5	80.8	15.8
78	34	.225	3.5	80.8	15.8
79	34	.225	3.5	80.8	15.8
80	34	.225	3.5	80.8	15.8
81	34	.225	3.5	80.8	15.8
82	35	.250	3.5	84.6	16.0
83	35	.250	3.5	84.6	16.0
84	35	.250	3.5	84.6	16.0
85	36	.250	3.5	86.0	16.2
86	36	.250	3.5	86.0	16.2
87	36	.250	3.5	86.0	16.2

Note:
1. For structures 1-87, invert plates are 0.100" thick.

TABLE 51C. FULL INVERT DETAILS (HL-93, H-25, HS-25)							
Structure No.	**Invert Plate Thickness (Inches)**	**Invert Width (N)**	**Supplemental Plate Thickness (Inches)**	**Supplemental Plate Quantity**	**Supplemental Plate Width (N)**	**Weight (Lbs.-Ft.)**	**Bolts/Ft.**
88	0.125	37	0.175	2	4	114.0	16.4
89	0.125	38	0.175	2	4	115.8	16.7
90	0.125	38	0.175	2	4	115.8	16.7
91	0.125	39	0.175	2	4	117.6	16.9
92	0.125	40	0.175	2	4	119.3	17.1
93	0.125	40	0.175	2	4	119.3	17.1
94	0.125	40	0.175	2	4	119.3	17.1
95	0.125	39	0.175	2	4	117.6	16.9
96	0.125	39	0.175	2	4	117.6	16.9
97	0.125	40	0.175	2	4	119.3	17.1
98	0.125	40	0.200	2	4	124.6	17.1
99	0.125	41	0.200	2	4	126.4	17.3
100	0.125	41	0.225	2	4	131.7	17.3
101	0.125	42	0.250	2	6	165.4	17.6
102	0.125	40	0.250	2	6	161.8	17.1
103	0.125	41	0.250	2	6	163.6	17.3
104	0.125	41	0.250	2	6	163.6	17.3
105	0.125	42	0.250	2	6	165.4	17.6
106	0.125	44	0.250	2	6	168.9	18.0
107	0.125	45	0.250	2	6	170.7	18.2
108	0.125	45	0.250	2	6	170.7	18.2
109	0.125	44	0.250	2	6	168.9	18.0
110	0.125	44	0.250	2	6	168.9	18.0
111	0.125	45	0.250	2	6	170.7	18.2
112	0.125	45	0.250	2	6	170.7	18.2
113	0.125	45	0.250	2	6	170.7	18.2
114	0.125	46	0.250	2	6	172.5	18.4
115	0.125	46	0.250	2	6	172.5	18.4
116	0.125	45	0.250	2	6	170.7	18.2
117	0.125	46	0.250	2	6	172.5	18.4
118	0.125	46	0.250	2	6	172.5	18.4
119	0.125	46	0.250	2	6	172.5	18.4
120	0.125	47	0.250	2	6	174.3	18.7
121	0.125	47	0.250	2	6	174.3	18.7
122	0.125	47	0.250	3	6	214.1	18.7
123	0.125	47	0.250	3	6	214.1	18.7
124	0.125	47	0.250	3	6	214.1	18.7
125	0.125	47	0.250	3	6	214.1	18.7
126	0.125	48	0.250	3	6	215.9	18.9
127	0.125	48	0.250	3	6	215.9	18.9
128	0.125	48	0.250	3	6	215.9	18.9
129	0.125	48	0.250	3	6	215.9	18.9
130	0.125	48	0.250	3	6	215.9	18.9
131	0.125	48	0.250	3	6	215.9	18.9
132	0.125	49	0.250	3	6	217.6	19.1
133	0.125	49	0.250	3	6	217.6	19.1
134	0.125	49	0.250	3	6	217.6	19.1
135	0.125	49	0.250	3	6	217.6	19.1
136	0.125	49	0.250	3	6	217.6	19.1
137	0.125	49	0.250	3	6	217.6	19.1
138	0.125	50	0.250	3	6	219.4	19.3
139	0.125	50	0.250	3	6	219.4	19.3
140	0.125	50	0.250	3	6	219.4	19.3
141	0.125	50	0.250	3	6	219.4	19.3
142	0.125	50	0.250	3	6	219.4	19.3
143	0.125	50	0.250	3	6	219.4	19.3



Assembly of ALBC Shell onto Full Invert

TABLE 52A. FOOTING PAD DETAILS

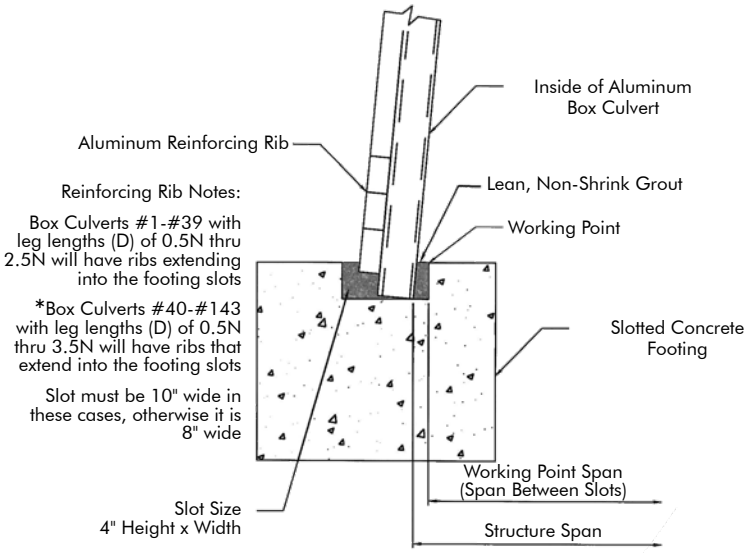
Structure No.	H-20, HS-20 Loading				HL-93, H-25, HS-25 Loading			
	Plate Thickness (Inches)	Width "G" (N)	Weight (Lbs.-Ft.)	Bolts-Ft.	Plate Thickness (Inches)	Width "G" (N)	Weight (Lbs.-Ft.)	Bolts-Ft.
1	0.100	2	12.4	3.3	0.100	2	12.4	3.3
2	0.100	2	12.4	3.3	0.100	2	12.4	3.3
3	0.100	2	12.4	3.3	0.100	2	12.4	3.3
4	0.100	2	17.0	4.2	0.100	2	17.0	4.2
5	0.100	2	17.0	4.2	0.100	2	17.0	4.2
6	0.100	2	17.0	4.2	0.100	2	17.0	4.2
7	0.100	2	17.0	4.2	0.100	2	17.0	4.2
8	0.100	2	12.4	3.3	0.100	2	12.4	3.3
9	0.100	2	12.4	3.3	0.100	2	12.4	3.3
10	0.100	2	12.4	3.3	0.100	2	12.4	3.3
11	0.100	2	17.0	4.2	0.100	2	17.0	4.2
12	0.100	2	17.0	4.2	0.100	2	17.0	4.2
13	0.100	2	17.0	4.2	0.125	2	18.6	4.2
14	0.100	2	17.0	4.2	0.125	2	18.6	4.2
15	0.100	2	12.4	3.3	0.125	2	14.0	3.3
16	0.100	2	12.4	3.3	0.125	2	14.0	3.3
17	0.100	2	12.4	3.3	0.125	2	14.0	3.3
18	0.100	2	17.0	4.2	0.125	2	18.6	4.2
19	0.100	2	17.0	4.2	0.125	2	18.6	4.2
20	0.100	2	17.0	4.2	0.125	2	18.6	4.2
21	0.100	2	12.4	3.3	0.125	2	14.0	3.3
22	0.100	2	12.4	3.3	0.125	2	14.0	3.3
23	0.100	2	12.4	3.3	0.125	2	14.0	3.3
24	0.100	2	17.0	4.2	0.125	2	18.6	4.2
25	0.100	2	17.0	4.2	0.125	2	18.6	4.2
26	0.125	2	14.0	3.3	0.150	2.5	17.7	3.3
27	0.125	2	14.0	3.3	0.150	2.5	17.7	3.3
28	0.125	2	14.0	3.3	0.150	2	15.7	3.3
29	0.125	2	18.6	4.2	0.150	2	20.3	4.2
30	0.125	2	18.6	4.2	0.150	2	20.3	4.2
31	0.125	2	18.6	4.2	0.150	2	20.3	4.2
32	0.125	2	18.6	4.2	0.150	2	20.3	4.2
33	0.125	2	14.0	3.3	0.175	2.5	19.6	3.4
34	0.125	2	14.0	3.3	0.175	2.5	19.6	3.4
35	0.125	2	14.0	3.3	0.175	2.5	19.6	3.4
36	0.125	2	18.6	4.2	0.175	2.5	24.2	4.3
37	0.125	2	18.6	4.2	0.175	2.5	24.2	4.3
38	0.125	2	18.6	4.2	0.175	2.5	24.2	4.3
39	0.125	2	18.6	4.2	0.200	3	28.8	4.4
40	0.200	3	24.4	3.6	0.250	3	29.1	3.6
41	0.200	3	24.4	3.6	0.250	3	29.1	3.6
42	0.200	3	24.4	3.6	0.250	3	29.1	3.6
43	0.200	3	29.0	4.4	0.250	3	33.7	4.4
44	0.200	3	29.0	4.4	0.250	3	33.7	4.4
45	0.200	3	29.0	4.4	0.250	3	33.7	4.4
46	0.200	3	29.0	4.4	0.250	3	33.7	4.4
47	0.200	3	24.4	3.6	0.250	3	29.1	3.6
48	0.200	3	24.4	3.6	0.250	3	29.1	3.6
49	0.200	3	24.4	3.6	0.250	3	29.1	3.6
50	0.200	3	29.0	4.4	0.250	3	33.7	4.4
51	0.200	3	29.0	4.4	0.250	3	33.7	4.4
52	0.225	3	31.3	4.4	0.250	3	33.7	4.4
53	0.225	3	31.3	4.4	0.275	3	36.0	4.4
54	0.225	3	26.7	3.6	0.275	3	31.4	3.6
55	0.225	3	26.7	3.6	0.275	3	31.4	3.6
56	0.225	3	26.7	3.6	0.275	3	31.4	3.6
57	0.225	3	31.3	4.4	0.275	3	36.0	4.4
58	0.225	3	31.3	4.4	0.275	3	36.0	4.4
59	0.225	3	31.3	4.4	0.275	3	36.0	4.4
60	0.225	3	31.3	4.4	0.275	3	36.0	4.4
61	0.225	3	26.7	3.6	0.275	3	31.4	3.6
62	0.225	3	26.7	3.6	0.275	3	31.4	3.6
63	0.250	3	29.1	3.6	0.275	3	31.4	3.6
64	0.250	3	33.7	4.4	0.275	3	36.0	4.4
65	0.250	3	33.7	4.4	0.275	3	36.0	4.4
66	0.250	3	33.7	4.4	0.275	3	36.0	4.4
67	0.250	3	33.7	4.4	0.275	3	36.0	4.4
68	0.250	3	29.1	3.6	0.300	3.5	37.7	3.7
69	0.250	3	29.1	3.6	0.300	3.5	37.7	3.7
70	0.250	3	29.1	3.6	0.300	3.5	37.7	3.7
71	0.250	3	33.7	4.4	0.300	3.5	42.3	4.6
72	0.250	3	33.7	4.4	0.300	3.5	42.3	4.6
73	0.250	3	33.7	4.4	0.300	3.5	42.3	4.6
74	0.250	3	33.7	4.4	0.300	3.5	42.3	4.6
75	0.275	3	31.4	3.6	0.325	3.5	43.0	3.7
76	0.275	3	31.4	3.6	0.325	3.5	43.0	3.7
77	0.275	3	31.4	3.6	0.325	3.5	43.0	3.7
78	0.275	3	36.0	4.4	0.325	3.5	47.6	4.6
79	0.275	3	36.0	4.4	0.300	3.5	43.7	4.6
80	0.275	3	36.0	4.4	0.300	3.5	43.7	4.6
81	0.275	3	36.0	4.4	0.300	3.5	43.7	4.6
82	0.300	3.5	37.8	3.7	0.350	3.5	44.5	3.7
83	0.300	3.5	37.8	3.7	0.350	3.5	44.5	3.7
84	0.300	3.5	37.8	3.7	0.350	3.5	44.5	3.7
85	0.300	3.5	42.4	4.6	0.350	3.5	49.1	4.6
86	0.300	3.5	42.4	4.6	0.350	3.5	49.1	4.6
87	0.300	3.5	42.4	4.6	0.350	3.5	49.1	4.6

TABLE 52B. FOOTING PAD DETAILS (HL-93)

Structure No.	HL-93 Loading					
	Total Thickness (Inches)	Quantity	Plate Thickness (Inches)	Width "G" (N)	Weight (Lbs.-Ft.)	Bolts-Ft.
88	0.500	2	0.250	4	65.6	3.8
89	0.500	2	0.250	4	65.6	3.8
90	0.500	2	0.250	4	65.6	3.8
91	0.500	2	0.250	4	70.2	4.7
92	0.500	2	0.250	4	70.2	4.7
93	0.500	2	0.250	4	70.2	4.7
94	0.500	2	0.250	4	70.2	4.7
95	0.500	2	0.250	4	65.6	3.8
96	0.500	2	0.250	4	65.6	3.8
97	0.500	2	0.250	4	65.6	3.8
98	0.500	2	0.250	4	70.2	4.7
99	0.550	2	0.275	4	76.2	4.7
100	0.550	2	0.275	4	76.2	4.7
101	0.600	3	0.200	6	115.8	5.1
102	0.600	3	0.200	6	111.2	4.2
103	0.600	3	0.200	6	111.2	4.2
104	0.600	3	0.200	6	111.2	4.2
105	0.600	3	0.200	6	115.8	5.1
106	0.600	3	0.200	6	115.8	5.1
107	0.600	3	0.200	6	115.8	5.1
108	0.600	3	0.200	6	115.8	5.1
109	0.600	3	0.200	6	111.2	4.2
110	0.600	3	0.200	6	111.2	4.2
111	0.600	3	0.200	6	111.2	4.2
112	0.600	3	0.200	6	115.8	5.1
113	0.600	3	0.200	6	115.8	5.1
114	0.600	3	0.200	6	115.8	5.1
115	0.600	3	0.200	6	115.8	5.1
116	0.675	3	0.225	6	122.6	4.2
117	0.675	3	0.225	6	122.6	4.2
118	0.675	3	0.225	6	122.6	4.2
119	0.675	3	0.225	6	127.2	5.1
120	0.675	3	0.225	6	127.2	5.1
121	0.675	3	0.225	6	127.2	5.1
122	0.900	4	0.225	6	167.5	5.1
123	0.900	4	0.225	6	162.9	4.2
124	0.900	4	0.225	6	162.9	4.2
125	0.900	4	0.225	6	162.9	4.2
126	0.900	4	0.225	6	167.5	5.1
127	0.900	4	0.225	6	167.5	5.1
128	0.900	4	0.225	6	167.5	5.1
129	0.900	4	0.225	6	167.5	5.1
130	0.900	4	0.225	6	162.9	4.2
131	0.900	4	0.225	6	162.9	4.2
132	0.900	4	0.225	6	162.9	4.2
133	0.900	4	0.225	6	167.5	5.1
134	0.900	4	0.225	6	167.5	5.1
135	0.900	4	0.225	6	167.5	5.1
136	0.900	4	0.225	6	167.5	5.1
137	0.900	4	0.225	6	162.9	4.2
138	0.900	4	0.225	6	162.9	4.2
139	0.900	4	0.225	6	162.9	4.2
140	0.900	4	0.225	6	167.5	5.1
141	0.900	4	0.225	6	167.5	5.1
142	0.900	4	0.225	6	167.5	5.1
143	0.900	4	0.225	6	167.5	5.1

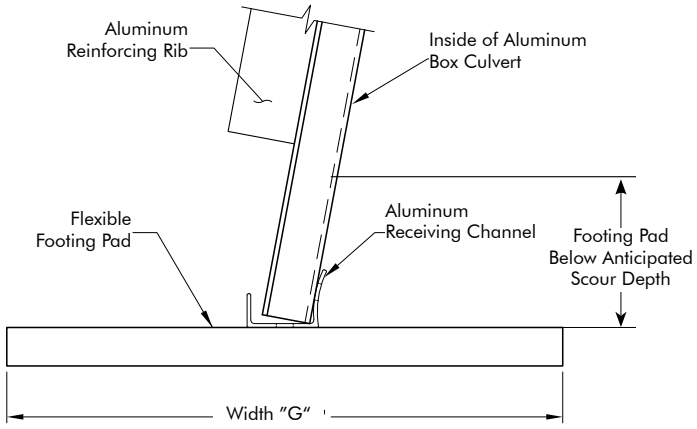
Notes:

1. N=9.625". Use N as a conversion factor. For example, for Structure No. 1, Width "G" is 2 x N, or 19.25".
2. Minimum allowable (unfactored) soil-bearing pressure is 4,000 psf for structures and details shown in this catalog. This applies specifically for width "G" below the footing pad. Other conditions can be accommodated. Contact a Contech representative for more information.
3. The maximum cover for Aluminum Box Culverts with full inverts and footing pads should not exceed 4 feet. Special full invert and footing pad designs or slotted concrete footings can accommodate maximum covers to the limits shown in Tables 48A-48B and 49A-49B.
4. Weight per foot of footing pads includes receiving channels, nuts, bolts, and plates.
5. When the thickness listed is greater than .250", the footing pads will be two or more pieces equaling the composite thickness required.
6. Footing pads must not be overlapped on adjacent structures unless appropriate design modifications are incorporated.



Aluminum Box Culvert Slotted Concrete Footing Option

*See note above. For D dimension see page 68.



Aluminum Footing Pad Option

(see page 75)

Certain shapes will have a longitudinal stiffener between the bottom of the haunch rib and the top of the footing pad plates.

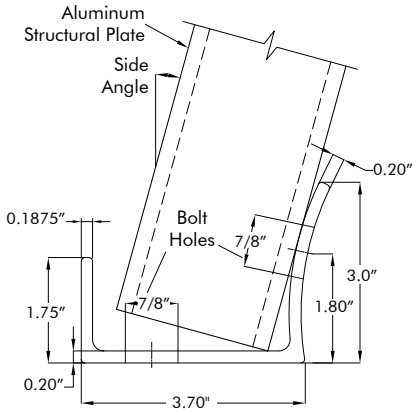
Scour Considerations

In most cases, using a full aluminum invert with toe plate extensions at the inlet and outlet ends will eliminate the potential for scour through the structure. If it is desirable to span the stream crossing, scour should be investigated. The most efficient counter measure, as listed below, should be chosen based on site specific conditions. The selected alternative should be designed by the registered professional engineer for the project.

These counter measures include:

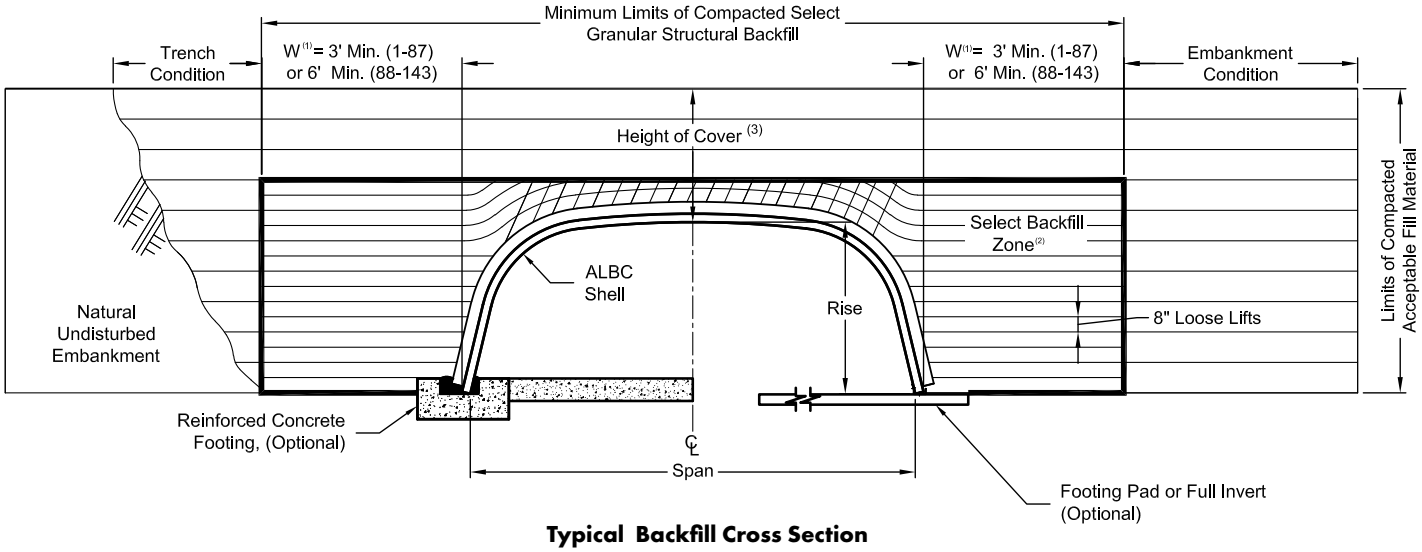
- Rip rap protection
- Concrete paving
- Lower footings below anticipated scour depth
- Bearing foundation on competent rock
- Undercut erodible soils and replace with non-erodible material
- Construction of guide banks including sheet piling
- Implementation of hard armor interlocking blocks where vegetation cannot be established, such as ArmorFlex® or A-Jacks®

Please contact your Contech representative for more details and design information.

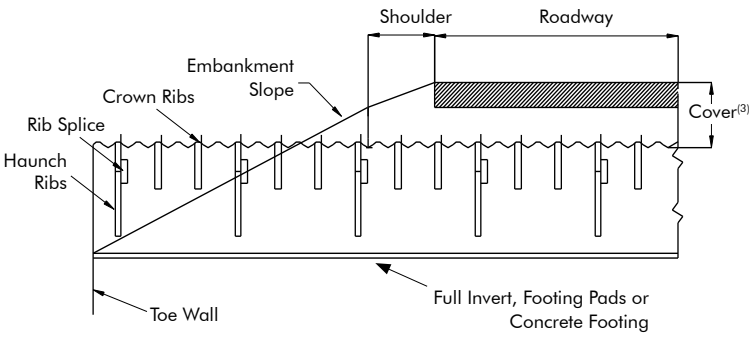


Aluminum Receiving Channel

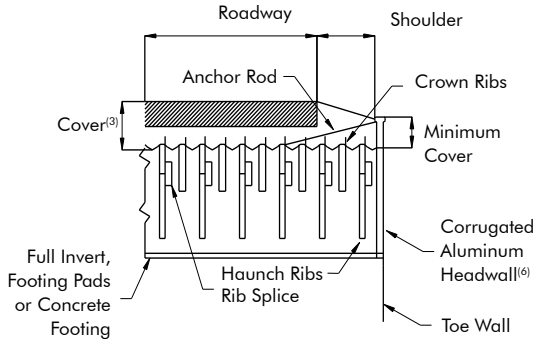
Weight is equal to 2 lbs per foot per side.



Typical Backfill Cross Section



End Treatment With Projecting End Structure



End Treatment With Headwall

Typical End Treatments

Notes:

1. If the select backfill width (W) is less than the required width, a concrete grout material may be required as backfill.
2. Select backfill zone to be well graded granular backfill material, per AASHTO M 145, placed in 6" to 8" lifts symmetrically, with no side-to-side differential exceeding 24-inches, on each side compacted to a minimum 90% density per AASHTO T-180. For structure numbers 1 through 87, the material must be classified as A-1, A-2-4, A-2-5, or A-3. For structure numbers 88 through 143, the material must be classified as A-1, A-2-4, or A-2-5 for cover heights 2.0' and greater, and it must be an A-1 only if the cover height is less than 2.0'. D4 dozer or smaller to operate near and above structure during backfilling to finish grade. Refer to AASHTO Sec. 26 installation specification.
3. Fill in these zones, must be placed in 8" maximum loose lifts and compacted to a minimum 90% density per AASHTO T-180.
4. The addition of temporary soil cover for heavy construction loads is not feasible or permissible for Aluminum Box Culvert structures. By design, these structures are limited in the range of permissible fill heights and live loads.
5. When using a full invert or footing pads, the foundation shall have a minimum of 4,000 psf bearing capacity and include a 6" well graded granular bed. Lower bearing capacities can be accommodated through special design or the use of concrete footings.
6. Standard aluminum headwalls shown are for vertical orientation only.
7. The type and extent of end treatment on the box culvert should be chosen and designed to prevent the loss of backfill due to high flow conditions.
8. Bolt torque requirements - plate lap must be well aligned in a tangent fashion using proper techniques and adequate bolt torque to seat the corrugation. The recommended installation bolt torque for Aluminum Box Culverts is 100-150 ft-lbs.
9. For assembly information, see the manufacturer's detailed assembly drawings and instructions.

Aluminum Box Culvert Project Specification

Scope

This specification covers the manufacture and installation of the aluminum box culvert structure detailed in the plans.

Material

The aluminum box culvert shall consist of plates, ribs, and appurtenant items as shown on the plans and shall conform to the requirements of ASTM B864 and AASHTO M 219. Plate thicknesses, rib spacings, end treatment, and type of invert and foundation shall be as indicated on the plans.

Bolts with suitable nuts shall conform to the requirements of ASTM A307 or ASTM A449 and shall be galvanized in accordance with ASTM A153.

Assembly

The box culvert shall be assembled in accordance with the shop drawings provided by the manufacturer and per the manufacturer's recommendations. Bolts shall be tightened using an applied torque between 100-150 ft-lbs.

Installation

The box culvert shall be installed in accordance with the plans and specifications, the manufacturer's recommendations and the AASHTO Standard Specification for Highway Bridges, Section 26 (Division II).

Bedding

The bedding should be constructed to a uniform line and grade using material outlined in the backfill section. The foundation must be capable of providing a bearing capacity of at least two tons per square foot.

Please reference the project specifications, drawing submittals and Contech's Assembly and Installation Guide for more information.

Backfill

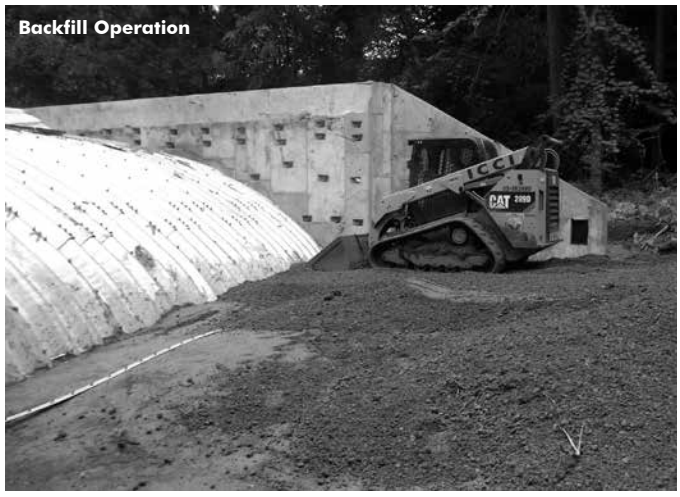
Select backfill zone to be well graded granular backfill material, per AASHTO M 145, placed in 6" to 8" lifts symmetrically, with no side-to-side differential exceeding 24-inches, on each side compacted to a minimum 90% density per AASHTO T-180. For structure numbers 1 through 87, the material must be classified as A-1, A-2-4, A-2-5, or A-3. For structure numbers 88 through 143, the material must be classified as A-1, A-2-4, or A-2-5 for cover heights 2.0' and greater, and it must be an A-1 only if the cover height is less than 2.0'. D4 dozer or smaller to operate near and above structure during backfilling to finish grade. Refer to AASHTO Sec. 26 installation specification.

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Assembly



Lifting



Backfill Operation