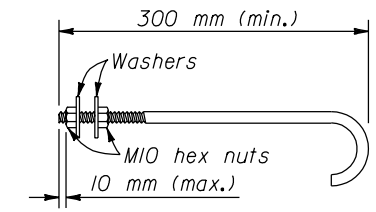


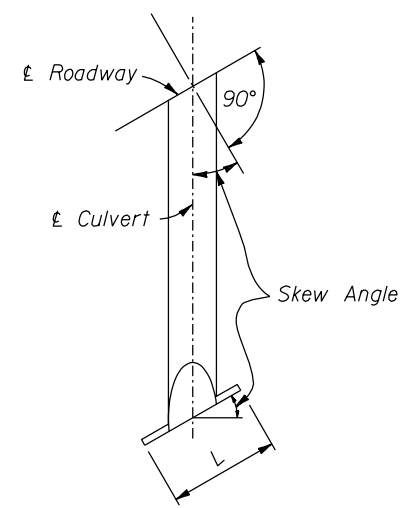
HEADWALL FOR DOUBLE PIPE CULVERT

DIMENSIONS, REINFORCING STEEL AND CONCRETE TABLE OF QUANTITIES

D mm	H m	SQUARE HEADWALL					15° SKEW					30° SKEW					45° SKEW				
		A m	B m	L m	CONC. m ³	STEEL kg	A m	B m	L m	CONC. m ³	STEEL kg	A m	B m	L m	CONC. m ³	STEEL kg	A m	B m	L m	CONC. m ³	STEEL kg
1200	1.500	1.2	1.8	4.2	1.55	71	1.3	1.9	4.5	1.60	73	1.4	2.1	4.9	1.79	82	1.7	2.6	6.0	2.19	100
1350	1.575	1.4	2.1	4.9	1.86	84	1.5	2.1	5.1	1.95	87	1.6	2.4	5.6	2.18	97	2.0	3.0	7.0	2.67	119
1500	1.650	1.6	2.3	5.5	2.19	99	1.7	2.4	5.8	2.27	102	1.9	2.6	6.4	2.53	114	2.3	3.2	7.8	3.10	140
1650	1.725	1.8	2.5	6.1	2.52	114	1.9	2.6	6.4	2.60	118	2.1	2.9	7.1	2.90	131	2.6	3.5	8.7	3.56	161
1800	1.800	2.0	2.7	6.7	2.85	130	2.1	2.8	7.0	2.95	135	2.3	3.2	7.8	3.30	150	2.8	3.9	9.5	4.04	184
1950	1.875	2.2	3.0	7.7	3.44	147	2.2	3.1	7.5	3.56	152	2.5	3.4	8.4	3.97	170	3.1	4.2	10.4	4.86	208
2100	1.950	2.4	3.2	8.0	3.64	164	2.4	3.4	8.2	3.77	170	2.7	3.6	9.0	4.21	190	3.4	4.5	11.3	5.15	232
2250	2.025	2.6	3.4	8.6	4.03	183	2.6	3.6	8.8	4.17	189	3.0	3.9	9.9	4.66	211	3.6	4.9	12.1	5.70	258
2400	2.100	2.7	3.6	9.0	4.31	202	2.8	3.7	9.3	4.46	209	3.2	4.2	10.6	4.98	233	3.9	5.2	13.0	6.10	285
2550	2.175	2.9	3.8	9.6	4.73	220	3.0	4.0	10.0	4.90	227	3.4	4.4	11.2	5.47	254	4.2	5.4	13.8	6.69	310
2700	2.250	3.1	4.0	10.2	5.17	238	3.2	4.1	10.5	5.35	247	3.6	4.6	11.8	5.97	275	4.4	5.6	14.4	7.31	337
2850	2.325	3.3	4.1	10.7	5.55	257	3.4	4.3	11.1	5.75	266	3.8	4.7	12.3	6.41	297	4.7	5.9	15.3	7.85	363
3000	2.400	3.5	4.3	11.3	6.02	277	3.6	4.4	11.6	6.23	286	4.0	4.9	12.9	6.95	320	5.0	6.0	16.0	8.63	391
3150	2.475	3.7	4.4	11.8	6.42	297	3.8	4.6	12.2	6.65	307	4.3	5.1	13.7	7.42	343	5.2	6.2	16.6	9.08	419
3300	2.550	3.9	4.6	12.4	6.92	318	4.0	4.7	12.7	7.16	329	4.5	5.3	14.3	7.99	367	5.5	6.5	17.5	9.79	449
3450	2.625	4.1	4.7	12.9	7.35	339	4.2	4.9	13.3	7.60	351	4.7	5.4	14.8	8.49	392	5.8	6.7	18.3	10.39	480
3600	2.700	4.3	4.9	13.5	7.88	362	4.4	5.0	13.8	8.16	374	4.9	5.6	15.4	9.10	418	6.1	6.8	19.0	11.15	511
3750	2.775	4.5	5.0	14.0	8.34	384	4.6	5.2	14.4	8.64	398	5.1	5.8	16.0	9.64	444	6.3	7.1	19.7	11.80	543
3900	2.850	4.6	5.2	14.4	8.73	408	4.8	5.3	14.9	9.04	422	5.4	6.0	16.8	10.08	471	6.6	7.3	20.5	12.34	577
4050	2.925	4.8	5.3	14.9	9.21	432	5.0	5.5	15.5	9.53	447	5.6	6.2	17.4	10.64	499	6.9	7.5	21.3	13.03	611
4200	3.000	5.0	5.5	15.5	9.80	456	5.2	5.6	16.0	10.14	472	5.8	6.3	17.9	11.31	527	7.1	7.8	22.0	13.85	645
4350	3.075	5.2	5.6	16.0	10.30	482	5.4	5.8	16.6	10.66	499	6.0	6.5	18.5	11.90	556	7.4	8.0	22.8	14.60	681
4500	3.150	5.4	5.8	16.6	10.91	508	5.6	6.0	17.2	11.29	525	6.2	6.7	19.1	12.60	586	7.7	8.2	23.6	15.43	722



MIO HOOK BOLT DETAILS



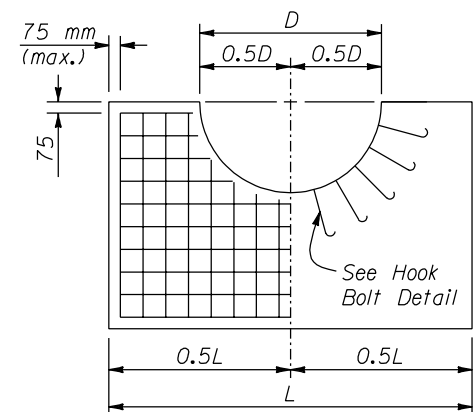
TYPICAL HALF PLAN

- NOTE:**
- Dimensions not labeled are in millimeters.
 - Concrete conforms to Section 601. Pour concrete monolithically. Chamfer all exposed edges 20 mm and finish all exposed surfaces with a Class 1 ordinary finish.
 - Clearance for reinforcing steel is 50 mm unless otherwise noted.
 - Headwall dimension "H" may be reduced in solid rock provided the wall is keyed into the rock at least 300 mm. Excavate and backfill according to Section 209.
 - Set hook bolts on nominal 450 mm centers around pipe perimeter at center of headwall. Hook bolts conform to ASTM A307. Galvanize according to ASTM A153.
 - For installations with more than two pipe culverts, increase the dimension "L" and all quantities shown for double pipe installation by adding a length equal to dimension "B" and the incremental change in quantities for each additional pipe culvert.
 - For skews other than those shown, multiply quantities and dimensions "A", "B" & "L" for square headwalls by secant of the skew angle.
 - Final quantities will be determined by using the tables on this standard.
 - Do not order materials until the length, skew angle, and slope bevel in the field have been approved.

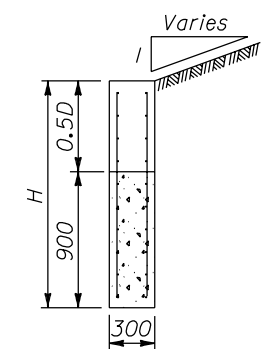
HEADWALL FOR SINGLE PIPE CULVERT

DIMENSIONS, REINFORCING STEEL AND CONCRETE TABLE OF QUANTITIES

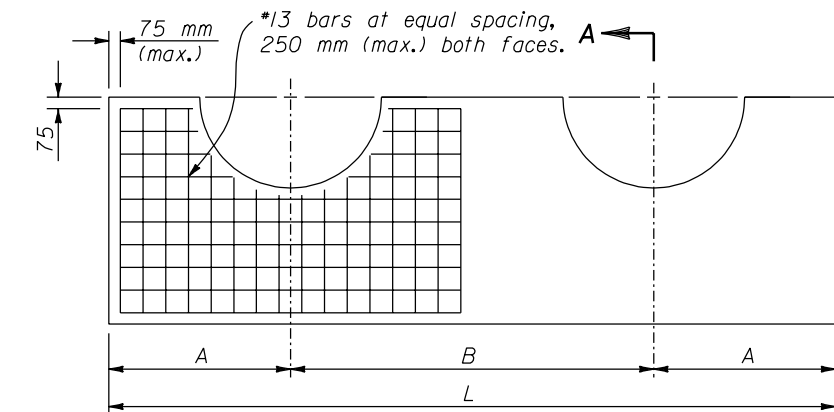
D mm	H m	SQUARE HEADWALL			15° SKEW			30° SKEW			45° SKEW		
		L m	CONC. m ³	STEEL kg	L m	CONC. m ³	STEEL kg	L m	CONC. m ³	STEEL kg	L m	CONC. m ³	STEEL kg
1200	1.500	2.4	0.91	41	2.5	0.94	43	2.8	1.05	48	3.4	1.28	58
1350	1.575	2.8	1.11	50	3.0	1.15	52	3.3	1.28	58	4.0	1.57	71
1500	1.650	3.2	1.32	59	3.3	1.37	61	3.7	1.52	69	4.6	1.86	84
1650	1.725	3.6	1.54	69	3.7	1.60	72	4.1	1.78	80	5.1	2.18	98
1800	1.800	4.0	1.78	80	4.1	1.84	83	4.6	2.05	92	5.6	2.51	113
1950	1.875	4.3	1.97	91	4.5	2.04	94	5.0	2.28	105	6.2	2.79	129
2100	1.950	4.7	2.23	102	4.9	2.31	106	5.5	2.58	118	6.7	3.15	145
2250	2.025	5.1	2.47	115	5.3	2.56	119	5.9	2.86	133	7.2	3.50	162
2400	2.100	5.5	2.79	127	5.7	2.88	132	6.3	3.22	147	7.8	3.94	180
2550	2.175	5.9	3.08	141	6.1	3.19	146	6.8	3.56	163	8.3	4.36	199
2700	2.250	6.2	3.33	155	6.5	3.44	162	7.2	3.84	181	8.8	4.70	222
2850	2.325	6.6	3.75	169	6.9	3.88	175	7.7	4.33	195	9.4	5.30	239
3000	2.400	7.0	3.98	185	7.3	4.12	191	8.1	4.60	213	9.9	5.63	261
3150	2.475	7.4	4.38	200	7.7	4.53	207	8.5	5.06	231	10.4	6.19	283
3300	2.550	7.8	4.68	216	8.1	4.85	224	9.0	5.41	250	11.0	6.62	306
3450	2.625	8.2	5.05	233	8.5	5.23	241	9.4	5.84	269	11.5	7.14	330
3600	2.700	8.5	5.36	250	8.8	5.55	259	9.9	6.19	289	12.1	7.58	354
3750	2.775	8.9	5.75	268	9.2	5.95	277	10.3	6.64	310	12.6	8.13	379
3900	2.850	9.3	6.16	287	9.6	6.38	297	10.7	7.12	331	13.2	8.71	405
4050	2.925	9.7	6.58	306	10.0	6.81	316	11.2	7.60	353	13.7	9.31	432
4200	3.000	10.1	7.01	326	10.4	7.26	337	11.6	8.10	376	14.2	9.92	461
4350	3.075	10.4	7.37	346	10.8	7.62	358	12.0	8.51	399	14.8	10.42	489
4500	3.150	10.8	7.82	366	11.2	8.10	379	12.5	9.03	423	15.3	11.06	518



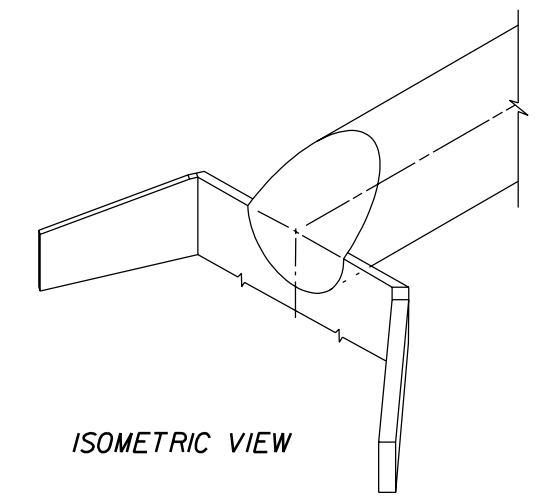
SINGLE PIPE CULVERT



SECTION A-A



DOUBLE PIPE CULVERT HEADWALLS



ISOMETRIC VIEW

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD

CONCRETE HEADWALLS

STANDARD APPROVED FOR USE 3/1996
REVISED: 5/1997

STANDARD
M601-1

NO SCALE