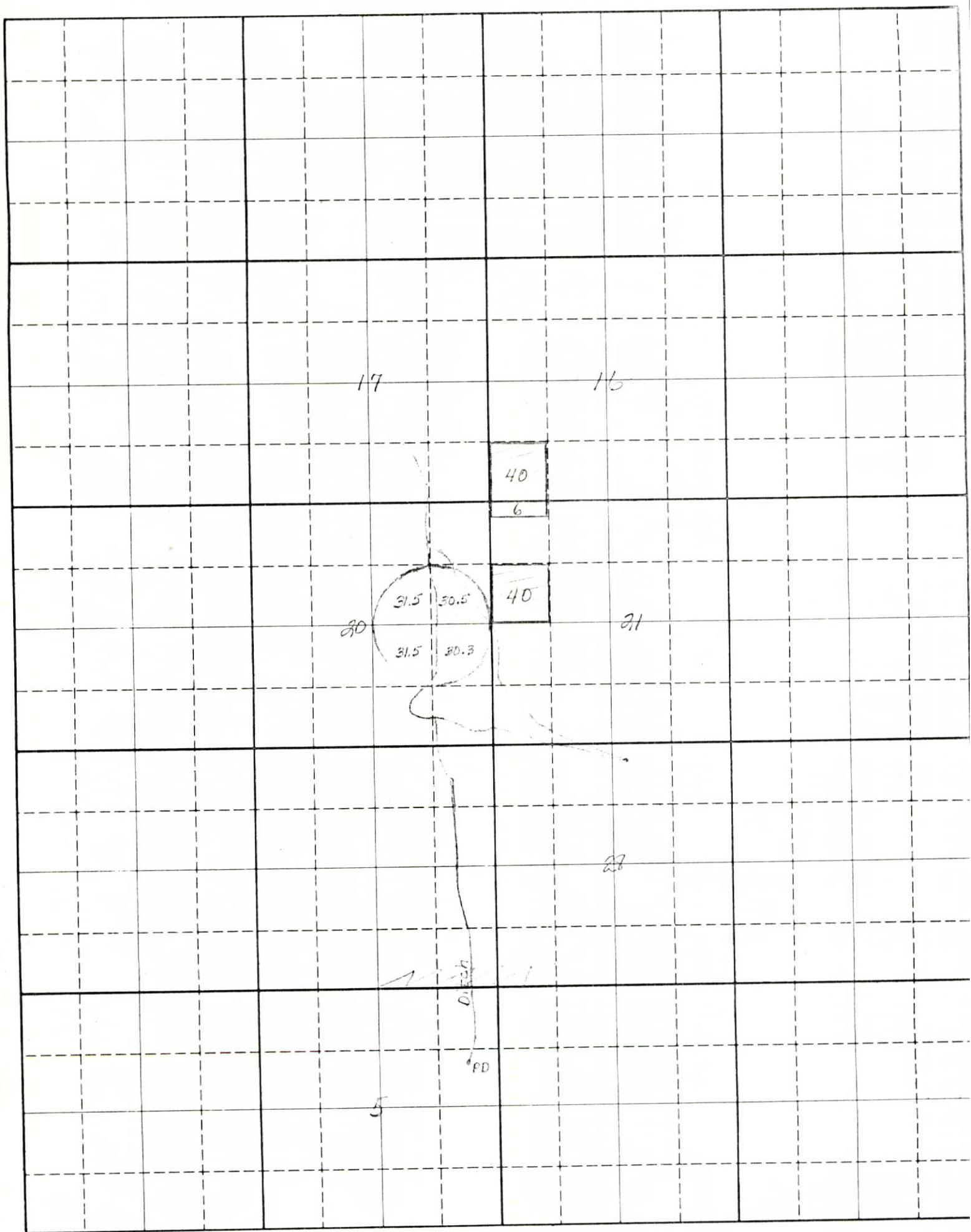


- b. Draw a map indicating the new point(s) of diversion and/or the new land to be irrigated. Show clearly the land involved by section, township and range number.



SCALE: 2 inches equal 1 mile. Draw plan in ink.

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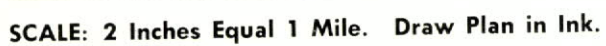


Table 4.—Discharge table for rectangular weirs having complete contractions.**

Head H Ft. or In.	Discharge, Q , in cubic feet per second					Head H Ft. or In.	Discharge, Q , in cubic feet per second				
	Crest length						Crest length				
	1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.	4.0 ft.		1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.	4.0 ft.
0.10	0.105	0.158	0.212	0.319	0.427	0.81	9.34	3.41	4.59	6.95	9.33
0.11	0.121	0.182	0.244	0.367	0.491	0.82	9.67	3.47	4.67	7.08	9.50
0.12	0.137	0.207	0.277	0.418	0.559	0.83	9.99	3.54	4.75	7.21	9.67
0.13	0.155	0.233	0.312	0.470	0.629	0.84	10.3	3.60	4.84	7.33	9.84
0.14	0.172	0.260	0.348	0.524	0.701	0.85	10.6	3.66	4.92	7.46	10.01
0.15	0.191	0.288	0.385	0.581	0.776	0.86	10.9	3.72	5.01	7.59	10.19
0.16	0.210	0.316	0.423	0.638	0.854	0.87	11.2	3.79	5.10	7.72	10.36
0.17	0.229	0.346	0.463	0.698	0.934	0.88	11.5	3.85	5.18	7.85	10.54
0.18	0.249	0.376	0.504	0.760	1.02	0.89	11.8	3.92	5.27	7.99	10.71
0.19	0.270	0.407	0.546	0.823	1.10	0.90	12.1	3.98	5.35	8.12	10.89
0.20	0.291	0.439	0.588	0.887	1.19	0.91	12.4	4.05	5.44	8.25	11.07
0.21	0.312	0.472	0.632	0.954	1.28	0.92	12.7	4.11	5.53	8.38	11.25
0.22	0.335	0.505	0.677	1.02	1.37	0.93	13.0	4.18	5.62	8.52	11.43
0.23	0.358	0.539	0.723	1.09	1.46	0.94	13.3	4.25	5.71	8.65	11.61
0.24	0.380	0.574	0.769	1.16	1.55	0.95	13.6	4.31	5.80	8.79	11.79
0.25	0.404	0.609	0.817	1.23	1.65	0.96	13.9	4.38	5.89	8.93	11.98
0.26	0.428	0.646	0.865	1.31	1.75	0.97	14.2	4.44	5.98	9.06	12.16
0.27	0.452	0.682	0.914	1.38	1.85	0.98	14.5	4.51	6.07	9.20	12.34
0.28	0.477	0.720	0.965	1.46	1.95	0.99	14.8	4.57	6.15	9.34	12.53
0.29	0.502	0.758	1.02	1.53	2.05	1.00	15.1	4.64	6.23	9.48	12.72
0.30	0.527	0.796	1.07	1.61	2.16	1.01	15.4	4.71	6.32	9.62	12.91
0.31	0.553	0.836	1.12	1.69	2.26	1.02	15.7	4.78	6.40	9.76	13.10
0.32	0.578	0.876	1.18	1.77	2.37	1.03	16.0	4.85	6.48	9.90	13.28
0.33	0.603	0.916	1.23	1.86	2.48	1.04	16.3	4.92	6.56	10.04	13.47
0.34	0.629	0.957	1.28	1.94	2.60	1.05	16.6	4.98	6.64	10.18	13.66
0.35	0.654	0.999	1.34	2.02	2.71	1.06	16.9	5.05	6.72	10.32	13.85
0.36	0.680	1.04	1.40	2.11	2.82	1.07	17.2	5.12	6.80	10.46	14.04
0.37	0.706	1.08	1.45	2.20	2.94	1.08	17.5	5.20	6.89	10.61	14.24
0.38	0.732	1.13	1.51	2.29	3.06	1.09	17.8	5.26	6.99	10.75	14.43
0.39	0.758	1.17	1.57	2.37	3.18	1.10	18.1	5.34	7.09	10.90	14.64
0.40	0.784	1.21	1.63	2.46	3.30	1.11	18.4	5.41	7.19	11.04	14.83
0.41	0.809	1.26	1.69	2.55	3.42	1.12	18.7	5.48	7.28	11.19	15.03
0.42	0.835	1.30	1.75	2.63	3.54	1.13	19.0	5.55	7.37	11.34	15.22
0.43	0.861	1.35	1.81	2.74	3.67	1.14	19.3	5.62	7.47	11.48	15.42
0.44	0.888	1.40	1.88	2.83	3.80	1.15	19.6	5.69	7.57	11.64	15.62
0.45	0.915	1.44	1.94	2.93	3.93	1.16	19.9	5.77	7.66	11.79	15.82
0.46	0.942	1.49	2.00	3.03	4.05	1.17	20.2	5.84	7.76	11.94	16.02
0.47	0.969	1.54	2.07	3.12	4.18	1.18	20.5	5.91	7.86	12.09	16.23
0.48	0.996	1.59	2.13	3.22	4.32	1.19	20.8	5.98	7.96	12.24	16.43
0.49	1.02	1.64	2.20	3.32	4.45	1.20	21.1	6.06	8.06	12.39	16.63
0.50	1.05	1.69	2.26	3.42	4.58	1.21	21.4	6.13	8.16	12.54	16.83
0.51	1.11	1.73	2.33	3.52	4.72	1.22	21.7	6.20	8.26	12.69	17.03
0.52	1.15	1.78	2.40	3.62	4.86	1.23	22.0	6.28	8.35	12.85	17.25
0.53	1.18	1.84	2.46	3.73	4.99	1.24	22.3	6.35	8.46	12.99	17.45
0.54	1.21	1.89	2.53	3.83	5.13	1.25	22.6	6.43	8.56	13.14	17.65
0.55	1.25	1.94	2.60	3.94	5.27	1.26	22.9	6.50	8.66	13.29	17.87
0.56	1.28	1.99	2.67	4.04	5.42	1.27	23.2	6.58	8.76	13.45	18.07
0.57	1.31	2.04	2.74	4.15	5.56	1.28	23.5	6.65	8.86	13.61	18.28
0.58	1.35	2.09	2.81	4.26	5.70	1.29	23.8	6.73	8.96	13.77	18.49
0.59	1.38	2.15	2.88	4.36	5.85	1.30	24.1	6.80	9.06	13.93	18.70
0.60	1.42	2.20	2.96	4.47	6.00	1.31	24.4	6.88	9.16	14.09	18.92
0.61	1.45	2.25	3.03	4.59	6.14	1.32	24.7	6.95	9.26	14.24	19.12
0.62	1.49	2.31	3.10	4.69	6.29	1.33	25.0	7.03	9.36	14.40	19.34
0.63	1.52	2.36	3.17	4.81	6.44	1.34	25.3	7.10	9.46	14.56	19.55
0.64	1.56	2.42	3.25	4.92	6.59	1.35	25.6	7.18	9.56	14.72	19.77
0.65	1.60	2.47	3.32	5.03	6.75	1.36	25.9	7.25	9.66	14.88	19.98
0.66	1.63	2.53	3.40	5.15	6.90	1.37	26.2	7.33	9.76	15.04	20.20
0.67	1.67	2.58	3.47	5.26	7.05	1.38	26.5	7.40	9.86	15.20	20.42
0.68	1.71	2.63	3.56	5.38	7.21	1.39	26.8	7.48	9.96	15.36	20.64
0.69	1.74	2.68	3.63	5.49	7.34	1.40	27.1	7.55	10.06	15.53	20.86
0.70	1.78	2.73	3.71	5.61	7.52	1.41	27.4	7.63	10.16	15.69	21.08
0.71	1.82	2.78	3.78	5.73	7.68	1.42	27.7	7.70	10.26	15.85	21.29
0.72	1.86	2.83	3.86	5.85	7.84	1.43	28.0	7.78	10.36	16.01	21.51
0.73	1.90	2.88	3.94	5.97	8.00	1.44	28.3	7.85	10.46	16.17	21.72
0.74	1.93	2.93	4.02	6.09	8.17	1.45	28.6	7.93	10.56	16.33	21.94
0.75	2.01	3.05	4.10	6.21	8.33	1.46	28.9	8.00	10.66	16.49	22.15
0.76	2.05	3.11	4.18	6.33	8.49	1.47	29.2	8.08	10.76	16.65	22.37
0.77	2.09	3.17	4.26	6.45	8.66	1.48	29.5	8.15	10.86	16.81	22.58
0.78	2.13	3.23	4.34	6.58	8.82	1.49	29.8	8.23	10.96	16.97	22.80
0.79	2.17	3.29	4.43	6.70	8.99	1.50	30.1	8.30	11.06	17.13	23.01
0.80	2.21	3.35	4.51	6.83	9.16	1.51	30.4	8.38	11.16	17.29	23.23

**Computed from the formula $Q=3.247LH^{1.48} \left(\frac{0.566L^{1.8}}{1+2L^{1.8}} \right) H^{1.9}$

*Discharges are for heads above $\frac{1}{8}$ L. Special precautions must be taken for complete contractions for these discharges to be accurate.

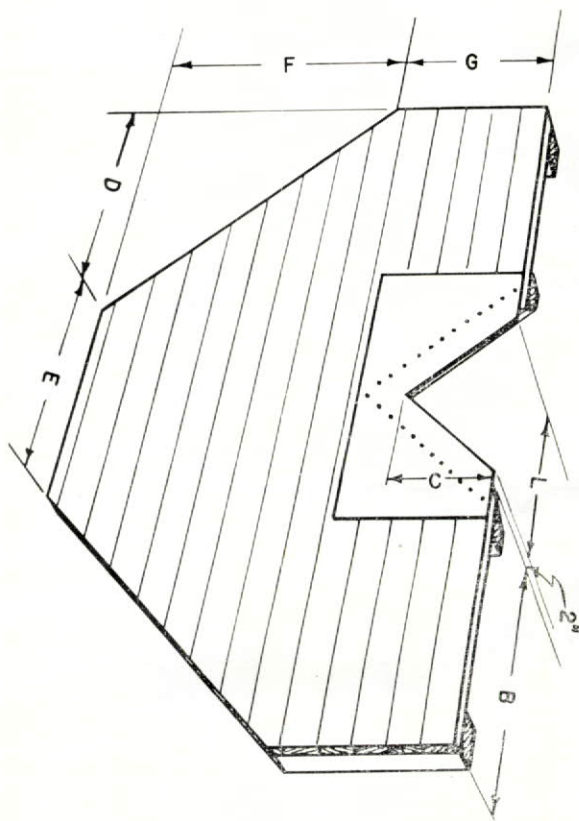


Figure 12.—90° V-notch weir suitable for medium and heavy soils.

Table 6. Symbol dimensions and capacities for weir structure shown in Figure 12.

Length L Ft. In.	Recommended range of measurement in C.F.s.	Symbol dimensions					
		B ft. in.	C ft. in.	D ft. in.	E ft. in.	F ft. in.	G ft. in.
1	.02 to .45	1 8	8	1 5	2 2	1 5	1 3
2	.02 to 1.5	2 10	1	2 8	2 8	2 8	1 6
3	.02 to 4	4 7	1 6	4 6	3 6	4 6	2

* Requires heavier construction than shown in drawing.

The Suppressed Rectangular Weir

When it is desirable to place the measuring device in a flume or box not large enough to give complete end contractions, the suppressed rectangular weir may be used. This structure consists essentially of a uniform width rectangular flume and a vertical weir plate having a horizontal crest. The sides of the flume form the sides of the weir notch. Hence there are no end contractions on a suppressed rectangular weir.

Weir discharges fluctuate with the height of the crest and therefore, the weir crest heights must be used in reading the table of discharges.

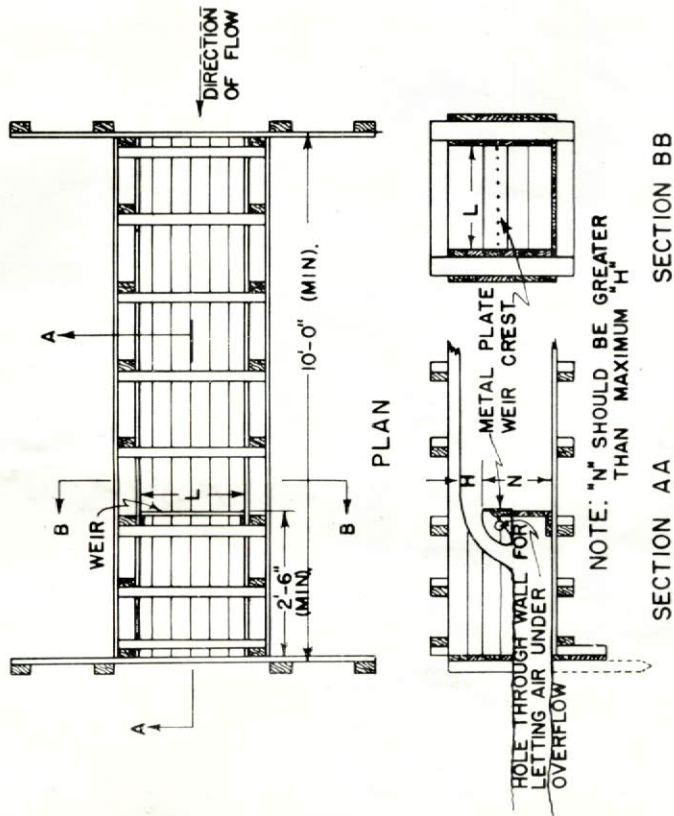


Figure 13.—Suppressed weir structure.

The length of the flume should be at least 10 feet and preferably over 10 times the weir crest length. Holes must be provided immediately below the weir crest to admit air under the sheet of falling water. Openings having an area of 1/2 square inch per foot length of crest are sufficient for heads up to 1.5 feet.*

Table 8* gives the discharges for rectangular suppressed weirs having various crest heights.

*Taken from "Measuring Water for Irrigation," Bulletin 588, University of California, by J. E. Christiansen.

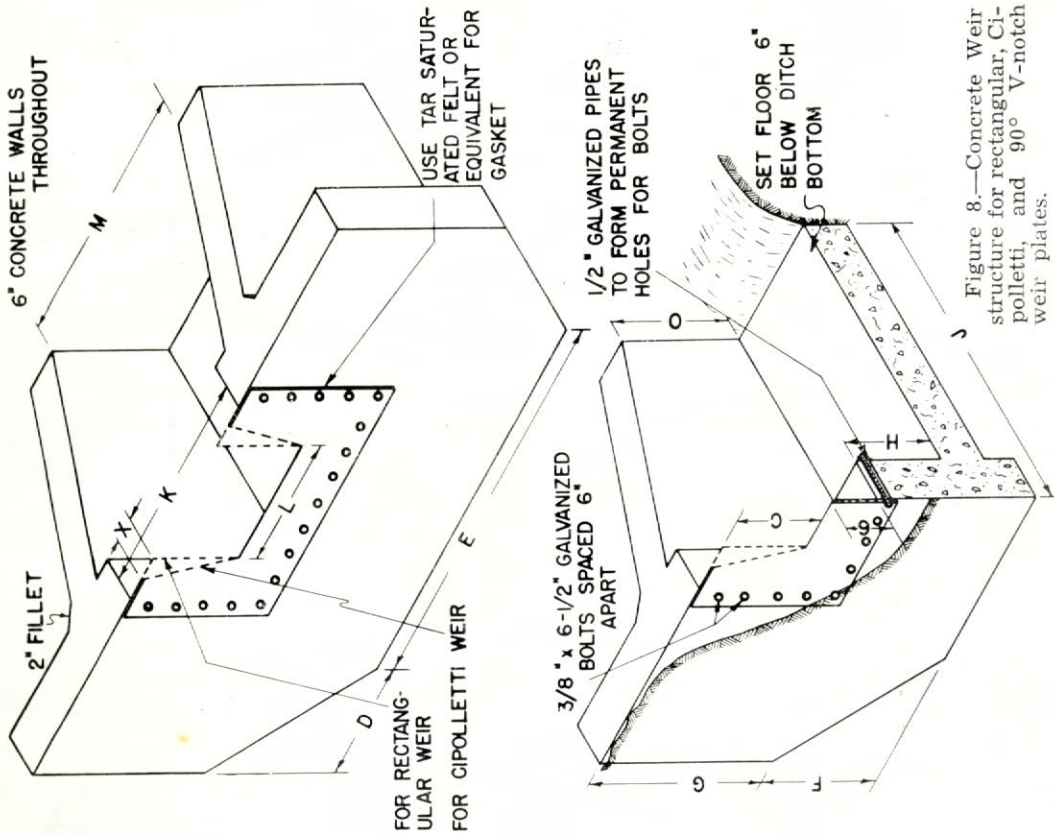


Figure 8.—Concrete Weir structure for rectangular, Cipolletti, and 90° V-notch weir plates.

Table 3.—Symbol dimensions and capacities for weir structure shown in Figure 8.

Crest length L ft.	Recommended range of measurement in C.F.s.		Symbol dimensions																	
			C=H	D	E	F	G	J	K	M	N	O	X							
	Rectangular	Cipolletti	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.							
For Rectangular and Cipolletti Weirs																				
1.0	.2 to .6	.2 to .6	8	0	5	8	0	2	7	3	2	2	6	10	1	4	2			
1.5	.3 to 1.7	.3 to 1.8	1	1	4	4	6	1	4	2	3	6	2	6	3	10	1	4	3	
2.0	.4 to 3.5	.4 to 3.7	1	2	2	5	2	2	4	2	4	3	3	6	1	1	6	3	1/2	
3.0*	.6 to 9.5	.6 to 10.0	1	6	2	6	7	2	6	2	6	4	6	4	5	1	6	2	4	1/2
4.0*	.8 to 19.5	.9 to 20.7	2	3	10	8	4	3	10	5	5	6	6	2	2	6	6	2	6	6
For 90° V-Notch Weirs																				
2.0	.02 to 1.5		1	1	6	5	1	6	2	8	3	6	2	6	3	10	1	4		
3.0*	.02 to 4.0		1	6	2	2	6	2	2	3	4	4	3	6	4	1	1	6		

*Use 6" x 6" No. 12 wire mesh reinforcing or equivalent

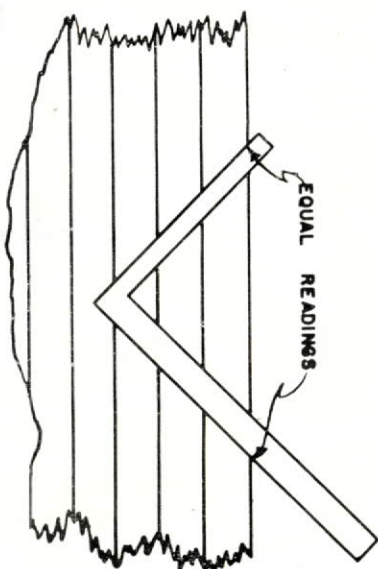


Figure 11.—Method of laying out 90° V-Notch with a steel square.

Table 7. Discharge table for 90° V-notch weirs with complete contractions computed from the formula $Q = 2.49H^{2.48}$

Head H	Discharge Q	Head H	Discharge Q	Head H	Discharge Q
Feet or Inches	Sec.-feet	Feet or Inches	Sec.-feet	Feet or Inches	Sec.-feet
0.10	0.008	5.0	0.445	9.0	1.92
1.1	0.010	5.1	0.468	9.1	1.97
1.2	0.012	5.2	0.491	9.2	2.02
1.3	0.016	5.3	0.515	9.3	2.08
1.4	0.019	5.4	0.539	9.4	2.13
1.5	0.022	5.5	0.564	9.5	2.19
1.6	0.026	5.6	0.590	9.6	2.25
1.7	0.031	5.7	0.617	9.7	2.31
1.8	0.035	5.8	0.644	9.8	2.37
1.9	0.040	5.9	0.672	9.9	2.43
2.0	0.046	6.0	0.700	10.0	2.49
2.1	0.052	6.1	0.730	10.1	2.55
2.2	0.058	6.2	0.760	10.2	2.61
2.3	0.065	6.3	0.790	10.3	2.68
2.4	0.072	6.4	0.822	10.4	2.74
2.5	0.080	6.5	0.854	10.5	2.81
2.6	0.088	6.6	0.887	10.6	2.87
2.7	0.096	6.7	0.921	10.7	2.94
2.8	0.106	6.8	0.955	10.8	3.01
2.9	0.115	6.9	0.991	10.9	3.08
3.0	0.125	7.0	1.03	11.0	3.15
3.1	0.136	7.1	1.06	11.1	3.22
3.2	0.147	7.2	1.10	11.2	3.30
3.3	0.159	7.3	1.14	11.3	3.37
3.4	0.171	7.4	1.18	11.4	3.44
3.5	0.184	7.5	1.22	11.5	3.52
3.6	0.197	7.6	1.26	11.6	3.59
3.7	0.211	7.7	1.30	11.7	3.67
3.8	0.225	7.8	1.34	11.8	3.75
3.9	0.240	7.9	1.39	11.9	3.83
4.0	0.256	8.0	1.43	12.0	3.91
4.1	0.272	8.1	1.48	12.1	3.99
4.2	0.289	8.2	1.52	12.2	4.07
4.3	0.306	8.3	1.57	12.3	4.16
4.4	0.324	8.4	1.61	12.4	4.24
4.5	0.343	8.5	1.66	12.5	4.33
4.6	0.362	8.6	1.71		
4.7	0.382	8.7	1.76		
4.8	0.403	8.8	1.81		
4.9	0.424	8.9	1.86		

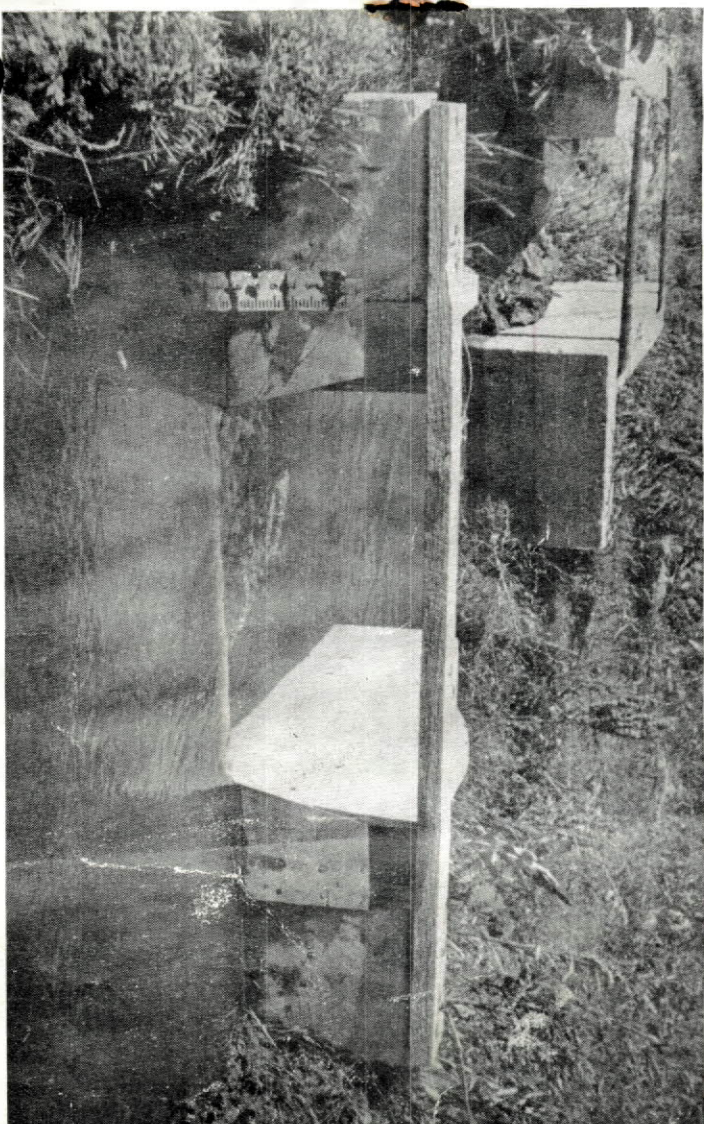


Figure 9.—Concrete structures like this Cipolletti weir near Caldwell, Idaho, are more expensive but longer lived than the ordinary wooden structures.

The Cipolletti Weir

The Cipolletti weir differs from the rectangular in that its sides slope outwardly 1 to 4 (1 inch horizontally to 4 inches vertically). It is the most common weir in general use in Idaho, although it is no more accurate nor convenient than the rectangular weir. It is named after Cesare Cipolletti, the Italian engineer who first proposed its use.

Discharges over Cipolletti weirs with complete contractions are given in Table 5.

The 90° Triangular, or V-Notch Weir

The 90° V-Notch weir has no crest length as the sloping sides come together to form the crest. Each side has an angle of 45° with the vertical or horizontal, making a total notch angle of 90°.

The advantage of the V-notch over other weirs is its ability to measure small flows accurately. Considering the recommendation that the minimum head to be measured over a weir is 2", this is readily evident by checking the weir discharge tables.

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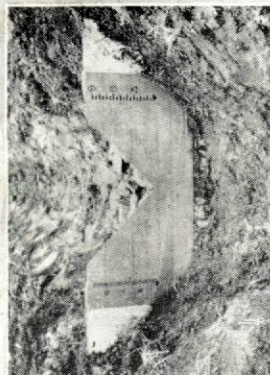
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Table 5. Discharge table for Cipolletti weirs with complete contractions.**

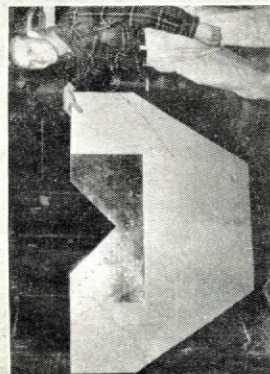
Head H Ft. or In.	Discharge, Q, in cubic feet per second				Head H Ft. or In.				Discharge, Q, in cubic feet per second			
	1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.	1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.	1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.
0.10	0.107	0.160	0.214	0.321	0.429	0.81	9%	2.61*	3.77*	4.95*	7.31	9.69
0.11	0.123	0.185	0.246	0.370	0.494	0.82	9 1/2	2.66*	3.84*	5.04*	7.45	9.87
0.12	0.140	0.210	0.280	0.421	0.562	0.83	10	2.71*	3.92*	5.14*	7.59	10.05
0.13	0.158	0.237	0.316	0.474	0.632	0.84	10 1/2	2.77*	3.99*	5.23*	7.73	10.23
0.14	0.177	0.264	0.352	0.528	0.706	0.85	11	2.82*	4.07*	5.33*	7.87	10.42
0.15	0.195	0.293	0.390	0.586	0.782	0.86	11 1/2	2.87*	4.14*	5.43*	8.01	10.60
0.16	0.216	0.322	0.430	0.644	0.860	0.87	12	2.93*	4.22*	5.52*	8.15	10.79
0.17	0.237	0.353	0.470	0.705	0.941	0.88	12 1/2	2.98*	4.29*	5.62*	8.30	10.98
0.18	0.258	0.384	0.512	0.768	1.024	0.89	13	3.04*	4.37*	5.72*	8.44	11.17
0.19	0.280	0.417	0.555	0.832	1.110	0.90	13 1/2	3.09*	4.45*	5.82*	8.59	11.36
0.20	0.302	0.450	0.599	0.898	1.20	0.91	14	3.15*	4.53*	5.92*	8.73	11.55
0.21	0.324	0.484	0.644	0.966	1.29	0.92	14 1/2	3.20*	4.60*	6.02*	8.88	11.74
0.22	0.349	0.519	0.691	1.04	1.38	0.93	15	3.26*	4.68*	6.13*	9.03	11.94
0.23	0.374	0.555	0.739	1.11	1.47	0.94	15 1/2	3.32*	4.76*	6.23*	9.17	12.13
0.24	0.397	0.591	0.786	1.18	1.57	0.95	16	3.37*	4.84*	6.33*	9.32	12.33
0.25	0.423	0.628	0.836	1.25	1.67	0.96	16 1/2	3.43*	4.92*	6.44*	9.48	12.53
0.26	0.449	0.667	0.886	1.33	1.77	0.97	17	3.49*	5.00*	6.55*	9.62	12.72
0.27	0.475	0.705	0.937	1.40	1.87	0.98	17 1/2	3.55*	5.09*	6.64*	9.78	12.92
0.28	0.502	0.745	0.990	1.48	1.97	0.99	18	3.61*	5.17*	6.75*	9.93	13.12
0.29	0.529	0.785	1.04	1.56	2.08	1.00	18 1/2	3.67*	5.25*	6.86*	10.08	13.32
0.30	0.557	0.827	1.10	1.64	2.19	1.01	19	3.73*	5.33*	6.96*	10.24	13.53
0.31	0.586	0.869	1.15	1.73	2.30	1.02	19 1/2	3.79*	5.42*	7.07*	10.40	13.73
0.32	0.615	0.911	1.21	1.81	2.41	1.03	20	3.85*	5.50*	7.18*	10.55	13.94
0.33	0.644	0.954	1.27	1.89	2.52	1.04	20 1/2	3.91*	5.59*	7.29*	10.71	14.15
0.34	0.675	1.00	1.32	1.98	2.64	1.05	21	3.97*	5.67*	7.40*	10.87	14.35
0.35	0.705	1.04	1.38	2.07	2.75	1.06	21 1/2	4.03*	5.76*	7.51*	11.03	14.56
0.36	0.735	1.09	1.44	2.16	2.87	1.07	22	4.09*	5.84*	7.62*	11.18	14.76
0.37	0.767	1.13	1.50	2.25	2.99	1.08	22 1/2	4.15*	5.93*	7.73*	11.35	14.98
0.38	0.799	1.18	1.57	2.34	3.11	1.09	23	4.21*	6.02*	7.84*	11.51	15.19
0.39	0.832	1.23	1.63	2.43	3.24	1.10	23 1/2	4.27*	6.11*	7.96*	11.68	15.41
0.40	0.866	1.28	1.69	2.53	3.36	1.11	24	4.33*	6.20*	8.07*	11.84	15.62
0.41	0.899	1.32	1.76	2.62	3.49	1.12	24 1/2	4.39*	6.29*	8.18*	12.00	15.84
0.42	0.932	1.37	1.82	2.72	3.61	1.13	25	4.45*	6.37*	8.29*	12.16	16.04
0.43	0.967	1.42	1.89	2.81	3.74	1.14	25 1/2	4.51*	6.46*	8.41*	12.33	16.26
0.44	1.00	1.47	1.95	2.91	3.87	1.15	26	4.57*	6.55*	8.53*	12.50	16.48
0.45	1.04	1.53	2.02	3.01	4.01	1.16	26 1/2	4.63*	6.63*	8.65*	12.67	16.70
0.46	1.07	1.58	2.09	3.11	4.14	1.17	27	4.69*	6.72*	8.76*	12.84	16.93
0.47	1.11	1.63	2.16	3.21	4.28	1.18	27 1/2	4.75*	6.83*	8.88*	13.01	17.15
0.48	1.15	1.68	2.23	3.32	4.41	1.19	28	4.81*	6.93*	9.00*	13.18	17.37
0.49	1.18	1.74	2.30	3.42	4.55	1.20	28 1/2	4.87*	7.03*	9.12*	13.35	17.59
0.50	1.22	1.79	2.37	3.53	4.69	1.21	29	4.93*	7.11*	9.24*	13.52	17.81
0.51	1.26	1.85	2.44	3.64	4.83	1.22	29 1/2	4.99*	7.20*	9.36*	13.69	18.03
0.52	1.30	1.90	2.51	3.74	4.97	1.23	30	5.05*	7.30*	9.48*	13.87	18.27
0.53	1.34	1.96	2.59	3.85	5.12	1.24	30 1/2	5.11*	7.40*	9.60*	14.04	18.49
0.54	1.38	2.02	2.66	3.96	5.26	1.25	31	5.17*	7.49*	9.72*	14.21	18.71
0.55	1.42	2.07	2.74	4.07	5.41	1.26	31 1/2	5.23*	7.59*	9.84*	14.39	18.95
0.56	1.46	2.13	2.81	4.18	5.56	1.27	32	5.29*	7.69*	9.96*	14.56	19.17
0.57	1.50	2.19	2.89	4.30	5.71	1.28	32 1/2	5.35*	7.79*	10.08*	14.74	19.41
0.58	1.54	2.25	2.97	4.41	5.86	1.29	33	5.41*	7.89*	10.20*	14.92	19.65
0.59	1.58	2.31	3.05	4.53	6.01	1.30	33 1/2	5.47*	7.99*	10.32*	15.11	19.88
0.60	1.62	2.37	3.13	4.64	6.17	1.31	34	5.53*	8.09*	10.44*	15.29	20.12
0.61	1.67	2.43	3.20	4.76	6.32	1.32	34 1/2	5.59*	8.19*	10.56*	15.46	20.34
0.62	1.71	2.49	3.28	4.88	6.47	1.33	35	5.65*	8.29*	10.68*	15.64	20.58
0.63	1.75	2.55	3.37	5.00	6.63	1.34	35 1/2	5.71*	8.39*	10.80*	15.82	20.82
0.64	1.80	2.62	3.45	5.12	6.79	1.35	36	5.77*	8.49*	10.92*	16.01	21.06
0.65	1.84	2.68	3.53	5.24	6.95	1.36	36 1/2	5.83*	8.59*	11.04*	16.19	21.29
0.66	1.89	2.75	3.61	5.36	7.11	1.37	37	5.89*	8.69*	11.16*	16.37	21.53
0.67	1.93	2.81	3.70	5.48	7.28	1.38	37 1/2	5.95*	8.79*	11.28*	16.55	21.78
0.68	1.98	2.87	3.79	5.61	7.44	1.39	38	6.01*	8.89*	11.40*	16.73	22.02
0.69	2.03	2.94	3.87	5.73	7.61	1.40	38 1/2	6.07*	8.99*	11.52*	16.91	22.27
0.70	2.07	3.01	3.95	5.86	7.77	1.41	39	6.13*	9.09*	11.64*	17.09	22.51
0.71	2.12	3.07	4.04	5.99	7.94	1.42	39 1/2	6.19*	9.19*	11.76*	17.27	22.75
0.72	2.16	3.14	4.13	6.12	8.11	1.43	40	6.25*	9.29*	11.88*	17.45	23.00
0.73	2.21	3.21	4.22	6.24	8.28	1.44	40 1/2	6.31*	9.39*	12.00*	17.63	23.26
0.74	2.26	3.28	4.31	6.38	8.45	1.45	41	6.37*	9.49*	12.12*	17.81	23.50
0.75	2.31	3.35	4.40	6.51	8.62	1.46	41 1/2	6.43*	9.59*	12.24*	18.00	23.75
0.76	2.36	3.42	4.49	6.64	8.80	1.47	42	6.49*	9.69*	12.36*	18.18	24.00
0.77	2.41	3.49	4.58	6.77	8.97	1.48	42 1/2	6.55*	9.79*	12.48*	18.36	24.26
0.78	2.46	3.56	4.67	6.90	9.15	1.49	43	6.61*	9.89*	12.60*	18.54	24.50
0.79	2.51	3.63	4.76	7.04	9.33	1.50	43 1/2	6.67*	9.99*	12.72*	18.72	24.75
0.80	2.56	3.70	4.85	7.18	9.51							

**Computed with the formula $Q = 3.247LH^{1.48} \left(\frac{0.566L}{1 + 2L} \right)^{1.8} \left(\frac{H}{1 + 0.609H^2} \right)^{2.5}$

Discharges are for heads above 1/8 ft. Special precautions must be taken for complete contractions for these discharges to be accurate.



Looking downstream on installed 90° V notch weir. Note end and bottom contractions and weir scales painted on weir plate



Upstream face of 90° V notch weir prior to installation



90° V notch weir being used to measure a pump discharge



Looking upstream on installed 90° V notch weir. Note the gravel and rock protecting apron.

Figure 10.—This 90° V-notch weir structure is simple and easy to build and is satisfactory for heavy and medium textured soils. The V-notch is especially adapted to the accurate measurement of small flows.

The sides of the 90° V-notch weir may be determined readily with a carpenter's square as shown in Figure 11. The notch can be marked out by placing the point of the angle of the square at the point as selected for the bottom of the notch, and adjusting the square so that the same figures on both arms are at the edge of the board or metal plate. If the notch is then set with the upper edge level, the sides of the notch will have the same slope as required.

Table 7 gives the discharges over 90° triangular or V-notch weirs.

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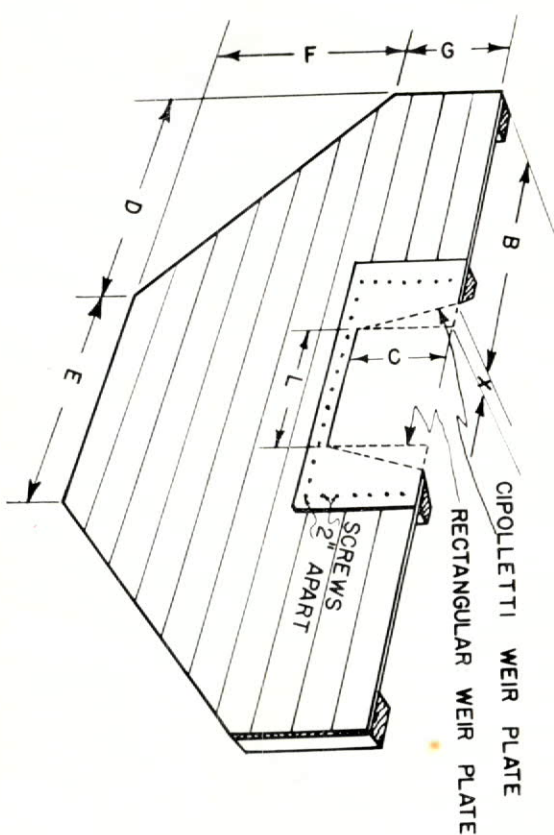


Figure 7.—Bulkhead for rectangular or Cipolletti weirs . . . suitable for medium and heavy soils.

Table 2.—Symbol dimensions and capacities for weir bulkhead shown in Figure 7.

Crest length L	Recommended range of measurement in C.f.s. Cipolletti	Symbol dimensions													
		B		C		D		E		F		G		X	
		ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
1.0	.2 to .6	.2 to .6	1 10	8	1 6	2	2 8	1 6	10	2					
1.5	.3 to 1.7	.3 to 1.8	2 2½	1	2 3	2 8	2 3	1 1	3½	3					
2.0	.4 to 3.5	.4 to 3.7	3 2	1 2	2 11	3 2	2 11	1 1	4½	4					
3.0*	.6 to 9.5	.6 to 10.0	4 4	1 6	4 2	4 8	4 2	1 4	4½	6					
4.0*	.8 to 19.5	.9 to 20.7	6 2	2	5 6	6 4	5 6	1 10	6						

• Requires heavier construction than shown in drawing

The Rectangular Weir

The rectangular weir, as its name suggests, is a weir whose crest is horizontal and whose sides are perpendicular. It is the oldest form of measuring weir and is the most easily farm-made.

Table 4 gives the discharges over rectangular weirs with complete contractions.

FARM WATER MEASUREMENT

Head H Feet or Inches	Discharge, Q , in cubic feet per second per foot of weir crest							
	0.5 foot	0.75 foot	1.0 foot	1.5 feet	2.0 feet	3.0 feet	4.0 feet	
0.10	0.111	0.110	0.109	0.109	0.108	0.108	0.108	
0.11	0.127	0.126	0.126	0.125	0.125	0.125	0.124	
0.12	0.145	0.144	0.143	0.142	0.142	0.141	0.141	
0.13	0.163	0.162	0.161	0.160	0.159	0.159	0.159	
0.14	0.182	0.180	0.179	0.178	0.178	0.177	0.177	
0.15	0.202	0.200	0.200	0.200	0.200	0.200	0.200	
0.16	0.223	0.220	0.219	0.219	0.218	0.218	0.218	
0.17	0.244	0.241	0.239	0.238	0.237	0.237	0.237	
0.18	0.266	0.263	0.262	0.261	0.260	0.260	0.260	
0.19	0.289	0.285	0.283	0.282	0.281	0.281	0.281	
0.20	0.312	0.307	0.305	0.304	0.303	0.303	0.303	
0.21	0.336	0.331	0.328	0.327	0.326	0.326	0.326	
0.22	0.361	0.355	0.352	0.351	0.350	0.350	0.350	
0.23	0.387	0.380	0.376	0.375	0.374	0.374	0.374	
0.24	0.413	0.406	0.402	0.401	0.400	0.400	0.400	
0.25	0.440	0.431	0.427	0.426	0.425	0.425	0.425	
0.26	0.467	0.457	0.453	0.452	0.451	0.451	0.451	
0.27	0.495	0.485	0.480	0.479	0.478	0.478	0.478	
0.28	0.524	0.513	0.508	0.507	0.506	0.506	0.506	
0.29	0.554	0.541	0.535	0.534	0.533	0.533	0.533	
0.30	0.583	0.569	0.562	0.561	0.560	0.560	0.560	
0.31	0.614	0.599	0.591	0.589	0.588	0.588	0.588	
0.32	0.645	0.629	0.620	0.618	0.617	0.617	0.617	
0.33	0.677	0.659	0.650	0.647	0.646	0.646	0.646	
0.34	0.709	0.690	0.681	0.678	0.677	0.677	0.677	
0.35	0.742	0.722	0.711	0.707	0.706	0.706	0.706	
0.36	0.775	0.754	0.743	0.731	0.725	0.725	0.725	
0.37	0.810	0.787	0.774	0.762	0.757	0.757	0.757	
0.38	0.844	0.819	0.807	0.793	0.788	0.788	0.788	
0.39	0.881	0.853	0.840	0.826	0.819	0.813	0.813	
0.40	0.916	0.888	0.873	0.858	0.851	0.844	0.844	
0.41	0.952	0.923	0.907	0.890	0.883	0.876	0.876	
0.42	0.990	0.958	0.942	0.924	0.917	0.908	0.908	
0.43	1.03	0.994	0.976	0.958	0.950	0.941	0.941	
0.44	1.07	1.03	1.01	0.993	0.983	0.974	0.974	
0.45	1.10	1.07	1.05	1.03	1.02	1.01	1.01	
0.46	1.14	1.10	1.08	1.06	1.05	1.04	1.04	
0.47	1.18	1.14	1.12	1.10	1.09	1.08	1.08	
0.48	1.22	1.18	1.16	1.13	1.12	1.11	1.11	
0.49	1.27	1.22	1.19	1.17	1.16	1.15	1.15	
0.50	1.31	1.26	1.23	1.21	1.20	1.19	1.18	
0.51	1.35	1.30	1.27	1.24	1.23	1.22	1.21	
0.52	1.39	1.34	1.31	1.28	1.27	1.25	1.25	
0.53	1.44	1.38	1.35	1.32	1.30	1.29	1.28	
0.54	1.48	1.42	1.39	1.36	1.34	1.33	1.32	
0.55	1.52	1.46	1.43	1.40	1.38	1.36	1.36	
0.56	1.57	1.50	1.47	1.44	1.42	1.40	1.39	
0.57	1.61	1.54	1.51	1.48	1.46	1.44	1.44	
0.58	1.66	1.59	1.55	1.52	1.49	1.46	1.46	
0.59	1.71	1.63	1.60	1.56	1.54	1.52	1.52	
0.60	1.76	1.68	1.64	1.60	1.58	1.56	1.56	
0.61	1.80	1.72	1.68	1.64	1.62	1.59	1.59	
0.62	1.85	1.77	1.72	1.68	1.66	1.63	1.63	
0.63	1.90	1.81	1.77	1.72	1.70	1.67	1.67	
0.64	1.95	1.86	1.81	1.76	1.74	1.72	1.71	
0.65	2.00	1.90	1.86	1.81	1.78	1.76	1.75	
0.66	2.05	1.95	1.90	1.85	1.82	1.80	1.79	
0.67	2.10	2.00	1.95	1.90	1.87	1.84	1.83	
0.68	2.15	2.05	1.99	1.94	1.91	1.88	1.87	
0.69	2.21	2.09	2.04	1.98	1.95	1.93	1.91	
0.70	2.26	2.14	2.08	2.03	2.00	1.97	1.95	
0.71	2.31	2.19	2.13	2.07	2.04	2.01	2.00	
0.72	2.37	2.24	2.18	2.12	2.08	2.05	2.04	
0.73	2.42	2.29	2.23	2.16	2.13	2.10	2.10	
0.74	2.48	2.34	2.28	2.21	2.18	2.14	2.14	
0.75	2.53	2.39	2.32	2.25	2.22	2.18	2.18	
0.76	2.59	2.45	2.37	2.30	2.27	2.23	2.23	
0.77	2.65	2.50	2.43	2.35	2.31	2.27	2.27	
0.78	2.70	2.55	2.48	2.40	2.36	2.32	2.32	
0.79	2.76	2.60	2.52	2.45	2.41	2.37	2.37	
0.80	2.82	2.66	2.58	2.49	2.45	2.41	2.41	
0.81	2.88	2.71	2.63	2.54	2.50	2.46	2.46	
0.82	2.94	2.76	2.68	2.59	2.55	2.51	2.51	
0.83	3.00	2.82	2.73	2.64	2.60	2.55	2.55	
0.84	3.06	2.87	2.78	2.69	2.64	2.60	2.60	

(Continued on page 22)

Table 8. Flow over rectangular suppressed weir.* (Continued)

Head H Feet or Inches	Discharge, Q, in cubic feet per second per foot of weir crest						
	Weir Height						
	0.5 foot	0.75 foot	1.0 foot	1.5 foot	2.0 foot	3.0 foot	4.0 foot
0.55	10 $\frac{1}{2}$	3.12	2.83	2.74	2.69	2.65	2.62
0.56	10 $\frac{1}{4}$	3.18	2.89	2.79	2.74	2.69	2.67
0.57	10 $\frac{1}{8}$	3.25	3.04	2.94	2.80	2.74	2.72
0.58	10 $\frac{1}{4}$	3.31	3.10	2.90	2.84	2.79	2.76
0.59	10 $\frac{1}{2}$	3.37	3.16	2.95	2.89	2.84	2.81

*Computed from the simplified form of Rehbock's formula $Q = \frac{2}{3}mL\sqrt{2gh^3/2}$, where $m = 0.605 + \frac{0.0028}{h} + 0.08 \frac{h}{P}$ and P = height of weir crest above bottom of channel approach.

The Submerged Orifice

The submerged orifice is a regularly shaped opening in a bulkhead through which the water flows, the level of the water surface both upstream and downstream from the bulkhead being above the top of the hole. The orifice should be rectangular and have sharp edges and complete contractions the same as a weir.

The head (denoted by h for the submerged orifice) causing the flow is obtained by subtracting the reading of the downstream water surface from the reading of the upstream water surface. The downstream gauge and the upstream gauge must be set on the same level. Measurements should not be made on flows giving an effective head of less than 2 inches.

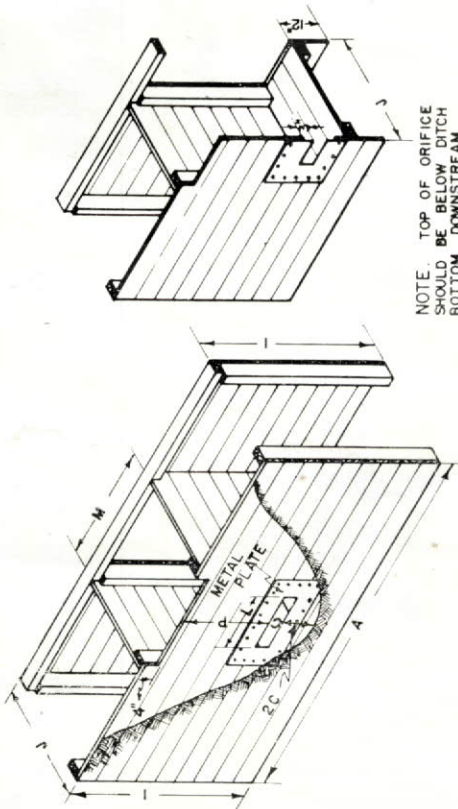


Figure 14.—Submerged orifice structure.

Table 9.—Symbol dimensions and capacities for submerged orifice structure shown in Figure 14.

Size of orifice		Recommended range of measurement in C.F.s.	Symbol dimensions							
L Ft.	C In.	Area in sq. ft.	A Ft.	B In.	I Ft.	J In.	M Ft.	N In.	P Ft.	Q In.
1	3	.25	8	4	4	4	3	3	2	6
1	4	.33	9	8	4	4	3	3	2	6
2	3	.50	9	10	4	4	3	3	2	6
1	6	.50	10	10	4	4	3	3	2	6
2	3	.75	11	3	4	4	3	3	2	6
1	6	.75	11	6	5	1	3	3	2	6
1	6	.50	11	6	5	1	3	3	2	6
3	6	1.00	12	6	5	1	3	3	2	6
1	4	1.00	12	6	5	1	3	3	2	6
2	9	1.50	12	6	5	1	3	3	2	6
2	8	2.00	16	6	5	1	3	3	2	6

* Requires heavier construction than shown in drawing.

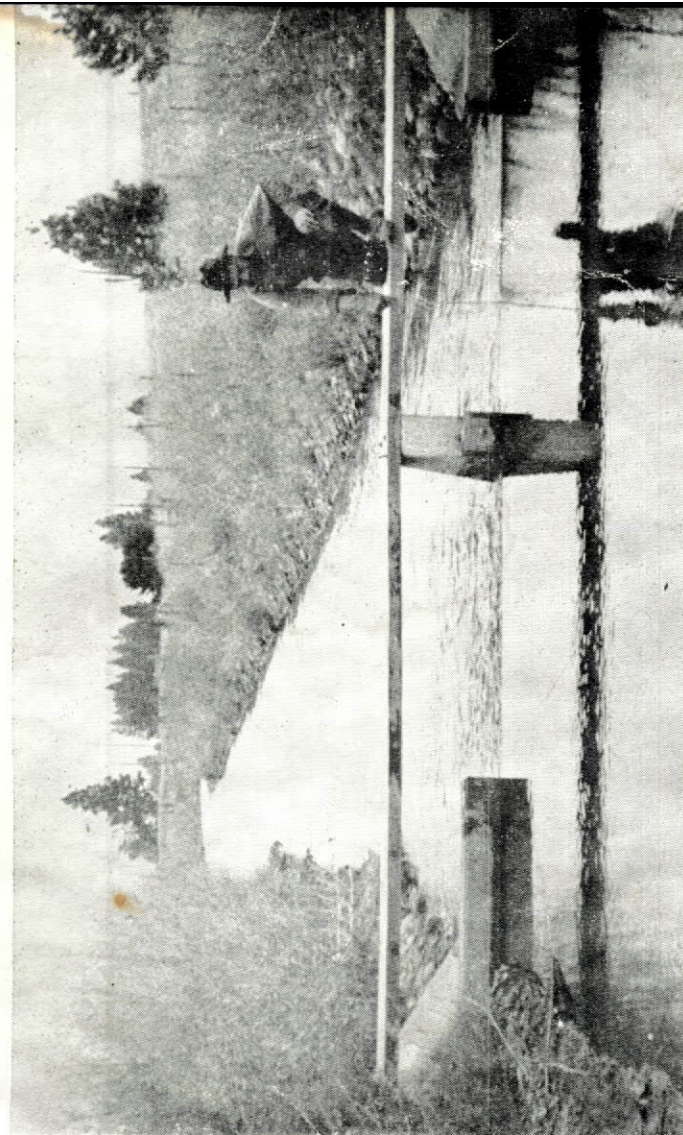


Figure 6.—The operator is measuring the water over a double rectangular weir by the "pile-up" method. This method is not recommended due to the difficulty in getting an accurate head reading. Rather, the head should be measured in still water away from the weir notch.

Advantages of Weirs

Weirs are simple, cheap, and reliable. They require only one reading of the head to determine the discharge. They are not clogged easily by moss and floating trash.

Disadvantages of Weirs

Weirs require an excess fall in the stream equal to the head of the largest stream to be measured.

Silt accumulates in the weir pond making its cleaning necessary for accurate measurement.

The Parshall Measuring Flume

The Parshall flume combines many of the advantages of the weir and submerged orifice. There is no need for a pond above the flume as the velocity of approach has little effect on the accuracy of the measurement. It uses a small amount of head as it can have a high degree of submergence without the necessity of reading

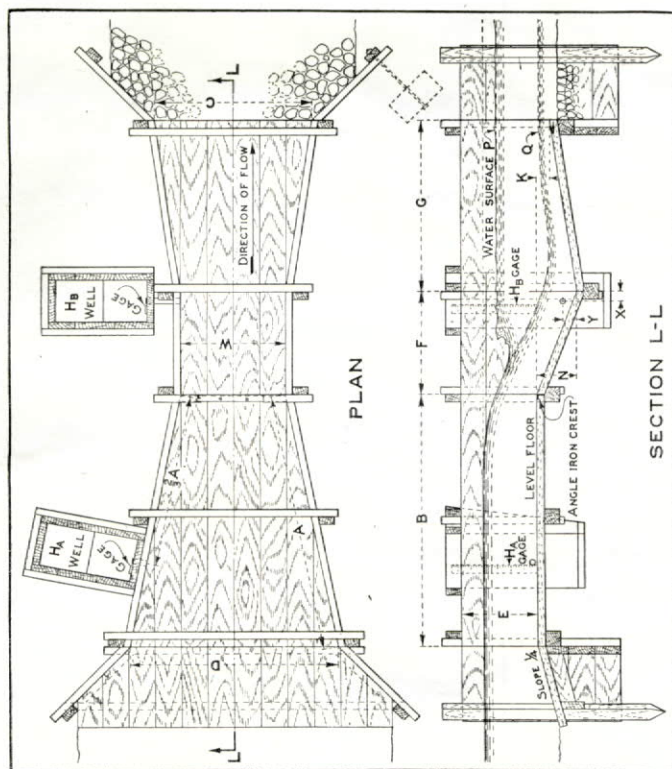


Figure 15.—Parshall measuring flume.

Table 11. Symbol dimensions and capacities of Parshall measuring flume.
(Letters refer to Figure 15.)

Free-flow capacity		SYMBOL DIMENSION															
Maxi-	Mini-	W	A	2/3A	B	C	D	E	F	G	K	N	X	Y			
mm	mm	Sec. ft.	Sec. ft.	Feet	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft.	In.	In.	In.	In.			
1.2	0.03	0.25	1 6%	1 ¼	1 6	7	10 ½	1 3	1 ½	1	1	2 ¼	1	1 ½			
2.9	.05	.50	2 17 ½	1 4 ½	2	1 3 ½	1 3 ½	1 6	1	2	3	4 ½	2	3			
5.7	.1	.75	2 10%	1 11 ½	2 10	1 3	1 10%	2 1	1	1 ½	3	4 ½	2	3			
16	.4	1	4 6	3 4	4 4 ½	2	2 9 ½	3	2	3	3	9	2	3			
33	.7	2	5 3	4	4 10 ½	3	3 11 ½	3	2	3	3	9	2	3			
50	1.0	3	5 6	3 8	5 4 ¾	4	5 17 ½	3	2	3	3	9	2	3			
88	1.3	4	6	4	5 10 ½	5	6 4 ¾	3	2	3	3	9	2	3			

two heads or making corrections in the free-flow formula. It does not readily clog with floating trash and it keeps itself clean of sand and silt. It requires but one reading of head (H_A) for determining the discharge except in case of extreme submergence.

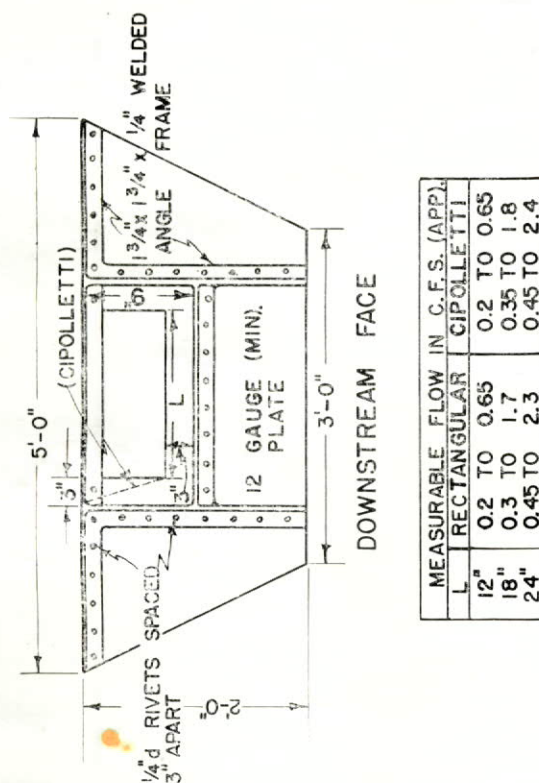


Figure 4. —Portable weir bulkhead for rectangular or Cipolletti notches.

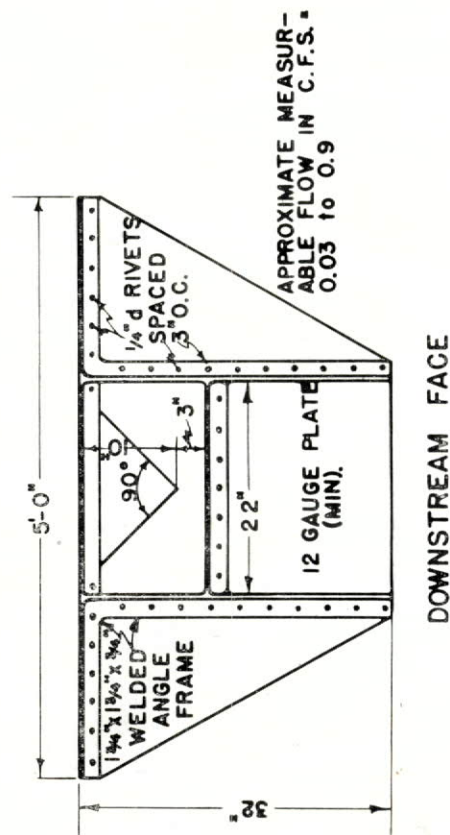


Figure 5.—Portable 90° V-notch weir.

Table 12. Free flow discharge through Parshall measuring flume.* (Cont'd.)

Head H A Inches	Discharge, Q , for throat widths, W , of—									
	0.25 foot	0.50 foot	0.75 foot	1.00 foot	2.00 foot	3.00 foot	4.00 foot	5.00 foot	6.00 foot	7.00 foot
Feet	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
9.94	.81	1.48	2.22	2.90	5.77	9.63	11.5	11.7	11.9	12.1
9.88	.82	1.50	2.27	2.96	5.88	9.79	11.7	11.9	12.1	12.3
9.82	.83	1.53	2.31	3.02	6.00	9.96	11.9	12.1	12.3	12.5
9.76	.84	1.56	2.35	3.07	6.11	10.13	12.2	12.4	12.6	12.8
9.70	.85	1.59	2.39	3.12	6.22	10.30	12.4	12.6	12.8	13.0
9.64	.86	1.62	2.44	3.18	6.33	10.48	12.6	12.8	13.0	13.2
9.58	.87	1.65	2.48	3.24	6.44	10.65	12.8	13.0	13.2	13.4
9.52	.88	1.68	2.52	3.29	6.56	10.82	13.1	13.3	13.5	13.7
9.46	.89	1.71	2.57	3.35	6.68	11.00	13.3	13.5	13.7	13.9
9.40	.90	1.74	2.61	3.41	6.80	11.18	13.6	13.8	14.0	14.2
9.34	.91	1.77	2.66	3.46	6.92	11.36	13.8	14.0	14.2	14.4
9.28	.92	1.81	2.70	3.52	7.03	11.54	14.0	14.2	14.4	14.6
9.22	.93	1.84	2.75	3.58	7.15	11.72	14.3	14.5	14.7	14.9
9.16	.94	1.87	2.79	3.64	7.27	11.90	14.5	14.7	14.9	15.1
9.10	.95	1.90	2.84	3.70	7.39	12.08	14.8	15.0	15.2	15.4
9.04	.96	1.93	2.88	3.76	7.51	12.26	15.0	15.2	15.4	15.6
8.98	.97	1.97	2.93	3.82	7.63	12.44	15.2	15.4	15.6	15.8
8.92	.98	2.00	2.98	3.88	7.75	12.62	15.5	15.7	15.9	16.1
8.86	.99	2.03	3.02	3.94	7.88	12.80	15.7	15.9	16.1	16.3
8.80	1.00	2.06	3.07	4.00	8.00	12.98	16.0	16.2	16.4	16.6
8.74	1.01	2.09	3.12	4.06	8.12	13.16	16.2	16.4	16.6	16.8
8.68	1.02	2.12	3.17	4.12	8.25	13.34	16.5	16.7	16.9	17.1
8.62	1.03	2.15	3.21	4.18	8.38	13.52	16.8	17.0	17.2	17.4
8.56	1.04	2.19	3.26	4.25	8.50	13.70	17.0	17.2	17.4	17.6
8.50	1.05	2.22	3.31	4.31	8.63	13.88	17.3	17.5	17.7	17.9
8.44	1.06	2.26	3.36	4.37	8.76	14.06	17.5	17.7	17.9	18.1
8.38	1.07	2.29	3.40	4.43	8.88	14.24	17.8	18.0	18.2	18.4
8.32	1.08	2.32	3.45	4.50	9.01	14.42	18.1	18.3	18.5	18.7
8.26	1.09	2.36	3.50	4.56	9.14	14.60	18.3	18.5	18.7	18.9
8.20	1.10	2.40	3.55	4.62	9.27	14.78	18.6	18.8	19.0	19.2
8.14	1.11	2.43	3.60	4.68	9.40	14.96	18.9	19.1	19.3	19.5
8.08	1.12	2.46	3.65	4.75	9.54	15.14	19.1	19.3	19.5	19.7
8.02	1.13	2.50	3.70	4.82	9.67	15.32	19.4	19.6	19.8	20.0
7.96	1.14	2.53	3.75	4.88	9.80	15.50	19.7	19.9	20.1	20.3
7.90	1.15	2.57	3.80	4.94	9.94	15.68	19.9	20.1	20.3	20.5
7.84	1.16	2.60	3.85	5.01	10.1	15.86	20.2	20.4	20.6	20.8
7.78	1.17	2.64	3.90	5.08	10.2	16.04	20.5	20.7	20.9	21.1
7.72	1.18	2.68	3.95	5.15	10.3	16.22	20.8	21.0	21.2	21.4
7.66	1.19	2.71	4.01	5.21	10.5	16.40	21.0	21.2	21.4	21.6
7.60	1.20	2.75	4.06	5.28	10.6	16.58	21.3	21.5	21.7	21.9
7.54	1.21	2.78	4.11	5.34	10.8	16.76	21.6	21.8	22.0	22.2
7.48	1.22	2.82	4.16	5.41	10.9	16.94	21.9	22.1	22.3	22.5
7.42	1.23	2.86	4.22	5.48	11.0	17.12	22.2	22.4	22.6	22.8
7.36	1.24	2.89	4.27	5.55	11.2	17.30	22.5	22.7	22.9	23.1
7.30	1.25	2.93	4.32	5.62	11.3	17.48	22.8	23.0	23.2	23.4
7.24	1.26	2.97	4.37	5.69	11.4	17.66	23.1	23.3	23.5	23.7
7.18	1.27	3.00	4.43	5.76	11.7	17.84	23.4	23.6	23.8	24.0
7.12	1.28	3.04	4.48	5.82	11.9	18.02	23.7	23.9	24.1	24.3
7.06	1.29	3.08	4.53	5.89	12.0	18.20	24.0	24.2	24.4	24.6
7.00	1.30	3.12	4.59	5.96	12.2	18.38	24.3	24.5	24.7	24.9
6.94	1.31	3.16	4.64	6.03	12.3	18.56	24.6	24.8	25.0	25.2
6.88	1.32	3.20	4.69	6.10	12.4	18.74	24.9	25.1	25.3	25.5
6.82	1.33	3.24	4.75	6.18	12.6	18.92	25.2	25.4	25.6	25.8
6.76	1.34	3.28	4.80	6.25	12.7	19.10	25.5	25.7	25.9	26.1
6.70	1.35	3.32	4.86	6.32	12.9	19.28	25.8	26.0	26.2	26.4
6.64	1.36	3.36	4.92	6.39	13.0	19.46	26.1	26.3	26.5	26.7
6.58	1.37	3.40	4.97	6.46	13.2	19.64	26.4	26.6	26.8	27.0
6.52	1.38	3.44	5.03	6.53	13.3	19.82	26.7	26.9	27.1	27.3
6.46	1.39	3.48	5.08	6.60	13.5	20.00	27.0	27.2	27.4	27.6

*Letters H A and W refer to Figure 15.

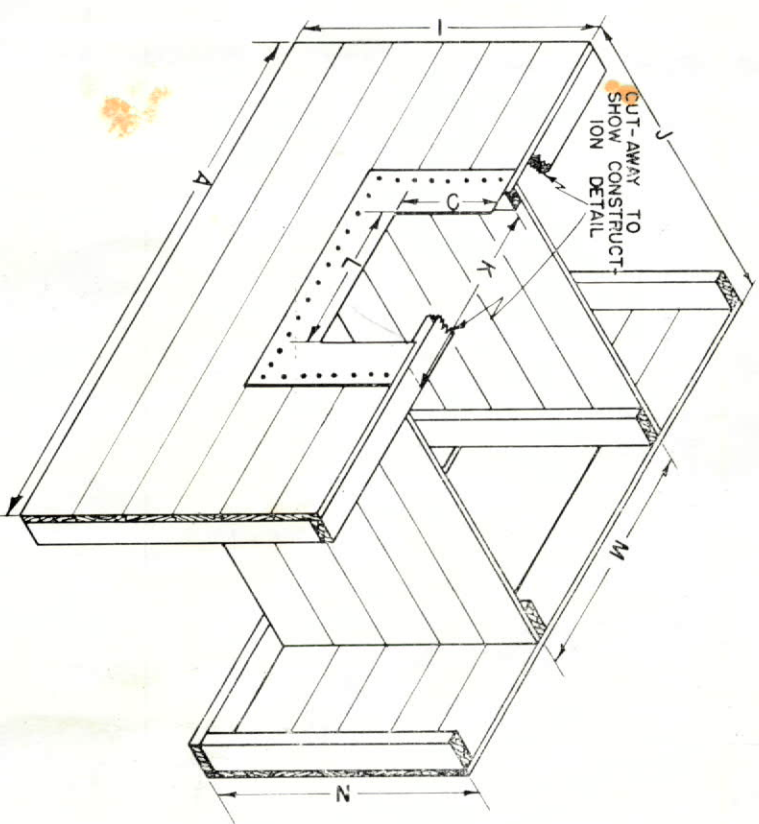


Figure 3.—Structure for rectangular, Cipolletti, and 90° V-notch weir plates . . . suitable for light soils.

Table 1. Symbol dimensions and capacities for weir bulkhead shown in Figure 3.

Crest length L ft.	Recommended range of measurement in C.F.s.		Symbol dimensions									
	Rectangular	Cipolletti	C	A	I	J	K	M	N			
			ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
1	.2 to .6	.2 to .6	8	5	2	4	2	6	1	6	1	9
1.5	.3 to 1.7	.3 to 1.8	1	6	3	3	3	2	2	6	2	5
2	.4 to 3.5	.4 to 3.7	1	2	8	3	6	3	2	6	3	2
3	.6 to 9.5	.6 to 10.0	1	6	11	4	6	3	6	3	6	3
4	.8 to 19.5	.9 to 20.7	2	14	5	8	4	4	4	6	5	6
For 90° V-notch Weirs												
2	.02 to 1.5	.02 to 1.5	7	6	3	8	2	6	2	2	2	5
3	.02 to 4.0	.02 to 4.0	9	6	5	3	3	3	3	3	3	4

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Setting and Size of Parshall Measuring Flume*

Successful operation of the Parshall flume depends upon setting the crest at the correct elevation with reference to the bed of the channel. Free-flow conditions are desirable so that computations for submergence of flow need not be made. The smallest practical size of flume should be selected as a matter of economy, but as the size of the flume decreases the loss of head increases.

The dimensions as given in Table 11 which correspond to the same letter in Figure 15, must be followed accurately. The crest must be straight and level and the floor of the converging section must be level in both directions.

Measurement of head should be made in a stilling well with the zero of the gauge level with the crest of the flume. The connection from the flume to the stilling well should take out of the flume at a point exactly two thirds of the length of the converging section back from the crest and about $1\frac{1}{2}$ inches above the floor line.

Combined Regulating and Measuring Devices

There are several manufactured devices which combine regulating and measuring facilities into one structure. These devices have been calibrated so that they accurately measure the water as regulated if they are installed and operated as directed. A special table is necessary for each size and type of device.

You cannot easily make these devices on the farm. They are ordinarily installed and operated by the canal company and are not treated in this bulletin.

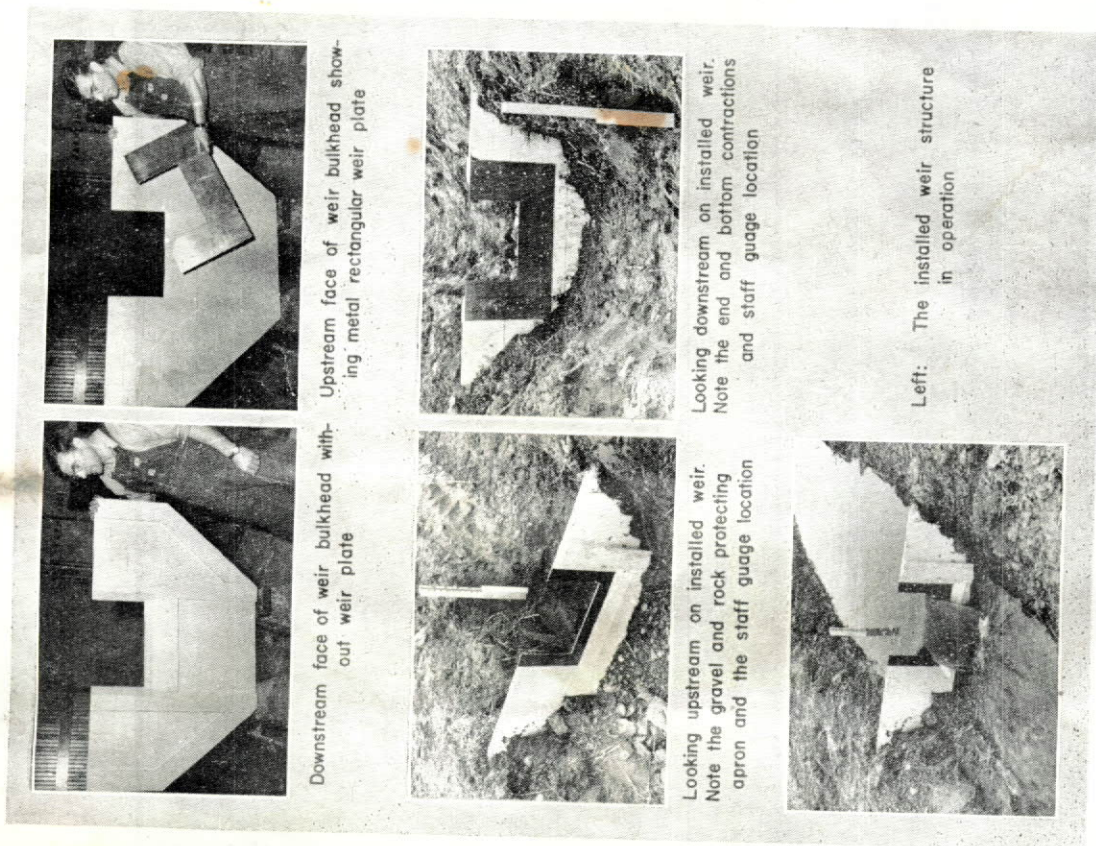


Figure 2.—This type of weir structure is easy to make, install, and operate and is adapted to use in heavy and medium textured soils.

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*Complete instructions for setting, size, construction, and operation of Parshall measuring flume are given in USDA Farmers' Bulletin No. 1683, "Measuring Water in Irrigation Channels," by R. L. Parshall.

original in file
74-0249

Transfer No. 2510

Application No (74-0404) &

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

AMENDED

APPLICATION FOR TRANSFER OF WATER RIGHT

To Change the Point of Diversion and/or the Place of Use

APPROVED

Name of applicant James Stoddard Phone 756-2404

Post office address Route #1, Box 120, Salmon, ID 83467

A. DESCRIPTION OF RIGHT AS RECORDED

1. Right evidenced by: Proposed finding of water right
- a. Decree to Stoddard, James F. &/or Jean L.
(Name)
in case of State of Idaho vs Adams, Mary, etc. defendants
et al.
dated Nov. 1, 1971 in 7th Judicial Dist. county of Lemhi
(Name of court)
- b. License No. _____ issued by the Idaho Department of Water Resources
- c. Claim No. _____ on file with the Idaho Department of Water Resources
2. If applicant is not the original holder of this right, explain how it was acquired and attach a copy of the deed or other evidence of ownership of the land to which the right is appurtenant

3. Source of water Lemhi River tributary to Salmon River

74-04044. Date of priority 6/1/1914

5. Water is used for the following purposes:
- | | | | | | | | |
|--------|------------------|-----|-------------------|---------------|----------------|----|---------------|
| amount | <u>10.30 cfs</u> | for | <u>irrigation</u> | purposes from | <u>April 1</u> | to | <u>Nov. 1</u> |
| amount | _____ | for | _____ | purposes from | _____ | to | _____ |
| amount | _____ | for | _____ | purposes from | _____ | to | _____ |
- (month/day – both dates inclusive)

6. Total amount of water under right: a. 10.30 cubic feet per second
b. &/or
acre feet per annum

7. Location of original point of diversion is SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Section 5
Township 18N Range 24E, B.M., in Lemhi County
Additional points of diversion, if any _____

8. Lands irrigated or place of use:

[illegible]

Total number of acres to be irrigated	209.8
---------------------------------------	-------

B. DESCRIPTION OF PORTION OF RIGHT FOR WHICH THE CHANGE IS REQUESTED (If the entire right is requested changed, omit part B)

1. Amount of water: a. _____ cubic feet per second
&/or
b. _____ acre feet per annum
2. Point of diversion _____ 1/4 _____ 1/4, Section _____ Township _____
Range _____, B.M., _____ County
Additional points _____

3. Place of use:

TWP.	RANGE	SEC.	NE 1/4				NW 1/4				SW 1/4				SE 1/4				TOTALS
			NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	

C. DESCRIPTION OF RIGHT OR PORTION THEREOF, AFTER THE REQUESTED CHANGE

1. Change in point of diversion NO CHANGE
- a. Amount of water to be diverted _____ c.f.s. &/or _____ acre feet
- b. Point(s) of diversion _____ 1/4 _____ 1/4, Section _____ Township _____
Range _____, B.M., _____ County
Additional points _____

c. Description of diverting works Headgate, ditches, pumps & sprinkler system

d. Describe the reasons for applying for a change in the point(s) of diversion _____

2. Change in place of use

- a. Describe the lands or place of use to which the right will be transferred:

TWP.	RANGE	SEC.	NE 1/4				NW 1/4				SW 1/4				SE 1/4				TOTALS
			NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	
24N	24E	20			31.5	30.5									30.3	31.5			123.8
		21						6	40										46.0
		16											40						40.0

Total number of acres to be irrigated 209.8

A. DESCRIPTION OF RIGHT AS RECORDED

1. Right evidenced by:

- a. Decree to Stoddard, James F. &/or Jean L.
(Name)
in case of State of Idaho vs Adams, Mary etc. defendant
dated November 1, 1971 in U.S. District Court et al.
7th Judicial Dist. county of Lemhi
(Name of court)
- b. License No. _____ issued by the Idaho Department of Water Resources
- c. Claim No. _____ on file with the Idaho Department of Water Resources

2. If applicant is not the original holder of this right, explain how it was acquired and attach a copy of the deed or other evidence of ownership of the land to which the right is appurtenant _____

3. Source of water Agency Creek tributary to Lemhi River

4. Date of priority 11/27/1919

5. Water is used for the following purposes:

74-0249 amount 3.80 cfs for irrigation purposes from 4/1 to 11/1
amount _____ for _____ purposes from _____ to _____
amount _____ for _____ purposes from _____ to _____
(month/day - both dates inclusive)

6. Total amount of water under right: a. 3.80 cubic feet per second
&/or
b. _____ acre feet per annum

7. Location of original point of diversion is NW $\frac{1}{4}$ of NE $\frac{1}{4}$ of Section 28
Township 19N Range 24E, B.M., in Lemhi County
Additional points of diversion, if any _____

8. Lands irrigated or place of use:

TWP.	RANGE	SEC.	NE $\frac{1}{4}$				NW $\frac{1}{4}$				SW $\frac{1}{4}$				SE $\frac{1}{4}$				TOTALS
			NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	
19	24E	17			23.2											17.7	26.2	2.6	69.7
		20	7	37.4	35.8	8.5				1.8	5.3				5.5	38.8			140.1

APPROVED

3. Remarks _____

I hereby assert that no one will be injured by such change and the change does not constitute an enlargement in use of the original right. The information contained in this application is true to the best of my knowledge.

Subscribed and sworn to before me this 22 day of April, 19 81.

James O. Stoddard
(Signature of applicant)

Blaine Cook
(Notary public)

My commission expires 4/10/1983

ACTION OF THE DIRECTOR, DEPARTMENT OF WATER RESOURCES

This is to certify that I have examined Application for Transfer of Water Rights No. 74-0249 and 74-0404 and said application is hereby APPROVED, subject to the following limitations and conditions:

1. A measuring device and lockable controlling works of a type acceptable to the Department shall be permanently installed and maintained as part of the diverting works.
2. Use of water under this transfer is subject to control by the watermaster of State Water District No. 74M, Agency Creek, and to the control of the Lemhi River watermaster.
3. Right 74-0249 is supplemental to Right 74-0404 and may only be diverted when right 74-0404 cannot be diverted due to its relative priority when considered together with other rights diverted from the Lemhi River, and shall be limited to the use of one inch of water per acre.

Witness my hand this 20th day of June, 19 83.

J. Glen Saxton
Chief, Operations Bureau

J.S.

FOR DEPARTMENT USE ONLY

Received by kw Date 4/27/81 Protest filed by _____
Prelim. check by EMC Fee 4-29-81.20. amendment
Receipted by kw Date 5/6/81 #17022
Published in Recorder, Herald Copies of protest forwarded by _____
Pub. dates 5/14 & 5/21/81 Hearing held by _____ Date _____
Watermaster recommendation requested on _____ Recommended for approval denial
_____ rec'd. _____ by EMC. J. Glen

RECEIVED
MAY 14 1981

PROPOSED FINDING OF WATER RIGHTS - LEMHI RIVER DRAINAGE

Source: Lemhi River, Div. L-32

Pt. of Div.: SE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 5, T18N, R24E

IDENT. NO.	NAME AND ADDRESS	PRIORITY	PURPOSE	PERIOD OF USE		MAXIMUM RATE OF DIVERSION (cfs)	PLACE OF USE and LANDS IRRIGATED		BASIS OF RIGHT and REMARKS
				From	To				
74-0403	ADAMS, Ralston W. and/or Rachel Box 52 Tendoy, Idaho	4 -1 -1911	Irrigation	4/1	11/1	1.50	Sec. 20		Decree
							SW $\frac{1}{4}$ SE $\frac{1}{4}$,	29.6	
							SE $\frac{1}{4}$ SE $\frac{1}{4}$,	18.0	
							Sec. 21		
							Lot 7,	1.1	
							Sec. 28		
							Lot 1,	3.5	
							Sec. 29		
							NE $\frac{1}{4}$ NE $\frac{1}{4}$,	31.6	
							NW $\frac{1}{4}$ NE $\frac{1}{4}$,	33.5	
							T19N, R24E		
								117.3	
74-0404	STODDARD, James F. and/or Jean L. Route 1 Salmon, Idaho	6 -1 -1914	Irrigation	4/1	11/1	10.30	Sec. 17		Decree
							SW $\frac{1}{4}$ NE $\frac{1}{4}$,	23.2	
							NW $\frac{1}{4}$ SE $\frac{1}{4}$,	17.7	
							SW $\frac{1}{4}$ SE $\frac{1}{4}$,	26.2	
							SE $\frac{1}{4}$ SE $\frac{1}{4}$,	2.6	
							Sec. 20		
							NE $\frac{1}{4}$ NE $\frac{1}{4}$,	7.0	
							NW $\frac{1}{4}$ NE $\frac{1}{4}$,	37.4	
							SW $\frac{1}{4}$ NE $\frac{1}{4}$,	35.8	
							SE $\frac{1}{4}$ NE $\frac{1}{4}$,	8.5	
							SE $\frac{1}{4}$ NW $\frac{1}{4}$,	1.8	
							NE $\frac{1}{4}$ SW $\frac{1}{4}$,	5.3	
							NE $\frac{1}{4}$ SE $\frac{1}{4}$,	5.5	
							NW $\frac{1}{4}$ SE $\frac{1}{4}$,	38.8	
							T19N, R24E		
								209.8	
74-1111	JONES, Ivan L. and/or Doris Box 28 Tendoy, Idaho	6 -1 -1914	Irrigation	4/1	11/1	0.59	Sec. 29		Beneficial Use
							SW $\frac{1}{4}$ NE $\frac{1}{4}$,	16.0	
							SE $\frac{1}{4}$ NE $\frac{1}{4}$,	7.0	
							T19N, R24E		
								23.0	

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Withdrawn

Identification No. T 2006

Transfer No. _____

STATE OF IDAHO
DEPARTMENT OF RECLAMATION

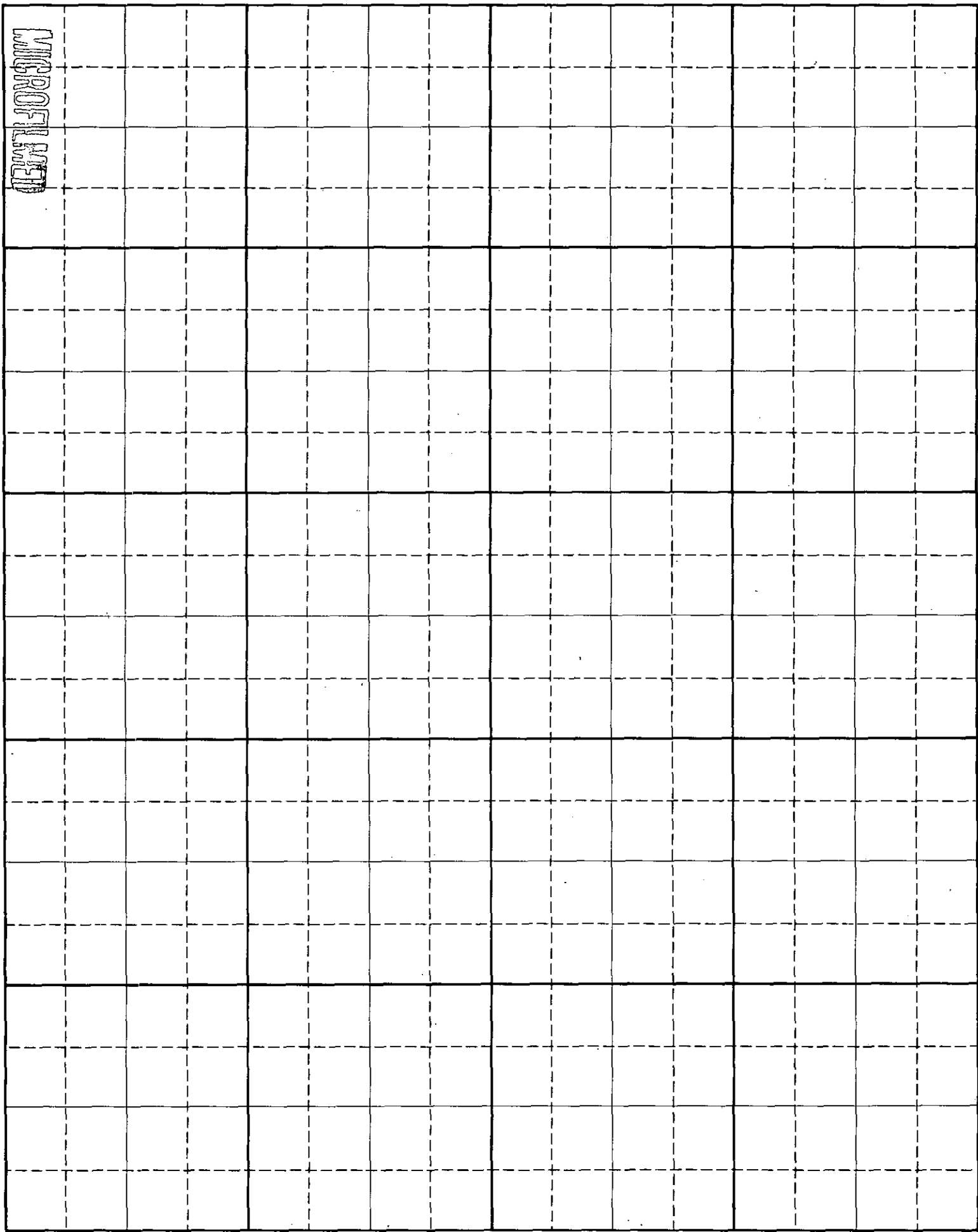
APPLICATION FOR TRANSFER OF WATER RIGHT
To Change the Point of Diversion and/or the Place of Use

1. Name of Right Holder James F &/or Jean L. Stoddard
Post office address Rt 1, Box 120, Salmon, Idaho 83467
2. Right obtained by:
a. Decree to Joseph L & Fred B. Patter in Case of Margaret Mahaffey et al
(Name)
vs. Fred B. Patter et al, Dated Aug 15, 1925 in Sixth District
(Name of Court)
Court, County of Lemhi
- b. License No. _____ issued by the State of Idaho, Department of Reclamation.
3. Source of water Lemhi River tributary to Salmon River
(Name of stream or source)
4. Date of Priority June 1914 (From finding of fact)
5. Amount of water a. _____ c.f.s. and/or dec. 515/700 IS of canal cap.
b. _____ acre feet/annum Present 10.3 CFS
6. Water is used for Irrigation from April 1 to Nov. 1
(Month, Day) (Month, Day)
7. Present Original location of point of diversion is SE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 5,
Township 18N, Range 24E, B.M., in Lemhi County;
Additional points of diversion, if any Original location of point of
diversion not listed in decree.
8. Lands presently irrigated or place of use:

TWP.	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
Decreed Place of Use:																			
Not listed in decree																			
Present Place of Use.																			
19N	24E	17			23										18	30	3		74
				8											77	26	26		545
		15	38	36	38				2	10				40	40			219	
		20	7	374	358	25				10	58			55	388			1401	

Total number of acres presently irrigated 293
194.6

MICROFILMED



SCALE: 2 Inches Equal 1 Mile. Draw Plan in Ink.

9. If applicant was not the original holder of this right explain how it was acquired: Land purchased from Fred B. Pattee owner of decreed right

10. CHANGE IN POINT OF DIVERSION No Change

- a. Quantity to be diverted at new point: _____ c.f.s. and/or _____ acre feet
- b. New point of diversion: _____ 1/4 _____ 1/4, Section _____, Township _____, Range _____, B.M.
- c. Description of method of diversion and conveyance from new points of diversion: _____
- d. Is water to be conveyed to the lands previously irrigated? Yes _____ No _____
If not, the place of use should be changed below.
- e. Describe the reasons for applying for a change in the point of diversion: _____
- f. Do you intend to make the transfer permanent? _____
- g. Do you intend to abandon completely the old point of diversion? _____
- h. Indicate on the above plat the new point of diversion and lands to be irrigated.

11. CHANGE IN PLACE OF USE

- a. Describe the new lands on which you wish to use your right.

TWP.	RANGE	SEC.	NE 1/4				NW 1/4				SW 1/4				SE 1/4				TOTALS
			NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	
19N	24E	17			8										40	35	27	40	150
19N	24E	20	40	37	36	40									38	39			230
19N	24E	21						40	40										80
								↑	↑										
								4	5										
								dot	dot										

RECORDED

Total number of acres to be irrigated 460

RECORDED

b. Do you intend to make the transfer permanent? yes

c. Are you completely abandoning the lands previously irrigated by this right? If not, explain your plans:

No a proposed pump location on the existing Lemhi River ditch will be in NE 1/4 NE 1/4 Sec 20 Twp 19 N Rge 24 E and will sprinkle the land.

d. Describe any other water rights that you claim for the new ground upon which you wish to transfer this right:

Plan to also transfer some Agency Creek water to this land also

e. Indicate on the above plat the new land to be irrigated and the point of diversion.

I hereby assert that no one will be injured by such transfer and that the change will be made at my own risk. The information contained in this application is true to the best of my knowledge.

(signature of applicant)

Subscribed and sworn to before me this _____ day of _____, 19____

(notary public)

My commission expires _____.

**ACTION OF STATE RECLAMATION ENGINEER
AND CERTIFICATE OF TRANSFER**

This is to certify that I have examined Application for Transfer of Water Rights No. _____,
and said application is hereby _____.

1. Approval of said application is subject to the following limitations and conditions:

2. Denial of said application is for the following reasons: _____

Witness my hand this _____ day of _____, 19____.

State Reclamation Engineer

FOR DEPARTMENT USE ONLY

Received by _____ Date _____

Protest filed by: _____ Date _____

Prelim. check by _____ Date _____

Fee received by _____ Date _____ Fee \$ _____

Approved for publication by _____

Published in _____ Dates _____

Hearing held _____

Watermaster Recommendation sent _____

3000
Identification No. _____
Transfer No. 74-0404 (part)

STATE OF IDAHO
DEPARTMENT OF RECLAMATION

APPLICATION FOR TRANSFER OF WATER RIGHT
To Change the Point of Diversion and/or the Place of Use

1. Name of Right Holder James F. &/or Jean L. Stoddard
Post office address Rt. 1, Box 120, Salmon, Idaho 83467
(74-0404 Dept. files)
2. Right obtained by:
a. Decree to Joseph L. & Fred B. Pattee in Case of Margaret Mahaffey
(Name)
vs. Fred B. Pattee, Dated Aug. 15, 1925 in 6th Judicial District
(Name of Court)
Court. County of Lemhi
b. License No. N.A. issued by the State of Idaho, Department of Reclamation.
3. Source of water Lemhi R. tributary to Salmon River
(Name of stream or source)
4. Date of Priority June 1914 (from finding of fact)
5. Amount of water a. 215 miners inches c.f.s. and/or
b. _____ acre feet/annum
6. Water is used for Irrigation from 1 Apr. to 1 Nov.
(Month, Day) (Month, Day)
7. Original location of point of diversion is SE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 5,
Township 18 N, Range 24 E, B.M., in Lemhi County;
Additional points of diversion, if any _____

8. Lands presently irrigated or place of use:

TWP.	RANGE	SEC.	NE $\frac{1}{4}$				NW $\frac{1}{4}$				SW $\frac{1}{4}$				SE $\frac{1}{4}$				TOTALS
			NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	
19 N	24 E	17	✓	✓	8	✓				✓	✓				✓	17.7	26.2	2.6	54.5 ✓
		20	7	37.4	35.8	8.5				1.8	5.3				5.5	38.8			140.1 ✓

Total number of acres presently irrigated 194.6

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R 24 E

17

17 16

16

T

17

20

17

20

16

21

X

21

19

N

X

X

BLM

20

20 21

21

N

SCALE: 2 Inches Equal 1 Mile. Draw Plan in Ink.

9. If applicant was not the original holder of this right explain how it was acquired: When
land was purchased.

10. CHANGE IN POINT OF DIVERSION No Change.

- a. Quantity to be diverted at new point: _____ c.f.s. and/or _____ acre feet
- b. New point of diversion: _____ 1/4 _____ 1/4, Section _____, Township _____
_____, Range _____, B.M.
- c. Description of method of diversion and conveyance from new points of diversion: _____
- d. Is water to be conveyed to the lands previously irrigated? Yes _____ No _____
If not, the place of use should be changed below.
- e. Describe the reasons for applying for a change in the point of diversion: _____
- f. Do you intend to make the transfer permanent? _____
- g. Do you intend to abandon completely the old point of diversion? _____
- h. Indicate on the above plat the new point of diversion and lands to be irrigated.

11. CHANGE IN PLACE OF USE

- a. Describe the new lands on which you wish to use your right.

TWP.	RANGE	SEC.	NE 1/4				NW 1/4				SW 1/4				SE 1/4				TOTALS
			NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	NE 1/4	NW 1/4	SW 1/4	SE 1/4	
19N	24E	16																	
		17			8														
19N	24E	20	40	37	36	40													
		21					40	40	40	40	40								

lot 4
40 ← Mahaffey

40 35 27 40 150

38 39 230

BLM

lot 4
lot 5
lot 3 (BLM)

Total number of acres to be irrigated 620

MICROFILMED

- b. Do you intend to make the transfer permanent? Yes
- c. Are you completely abandoning the lands previously irrigated by this right? If not, explain your plans:
No. A proposed pump location on the existing Lemhi River ditch will be in NE⁴ NE⁴ - Sec. 20, T19N, R. 24E + will sprinkle the land.
- d. Describe any other water rights that you claim for the new ground upon which you wish to transfer this right: Plan to also transfer some Agency Creek water to this land also.
- e. Indicate on the above plat the new land to be irrigated and the point of diversion.

I hereby assert that no one will be injured by such transfer and that the change will be made at my own risk. The information contained in this application is true to the best of my knowledge.

James B. Stoddard
(signature of applicant)

Subscribed and sworn to before me this 21st day of September, 1973
Ellis Cook
(notary public)

My commission expires 4/10/1975

**ACTION OF STATE RECLAMATION ENGINEER
AND CERTIFICATE OF TRANSFER**

This is to certify that I have examined Application for Transfer of Water Rights No. _____,
and said application is hereby _____.

1. Approval of said application is subject to the following limitations and conditions:

2. Denial of said application is for the following reasons: _____

Witness my hand this _____ day of _____, 19____.

State Reclamation Engineer

Rec'd #12428 **DEPARTMENT USE ONLY**

Received by mt ef Date 9-27-73
9-25-73
Prelim. check by mt Date 26 Sept 73
Fee received by ef Date 9/26/73 Fee \$ 30.00
Approved for publication by _____
Published in Second Herald Dates Oct. 11 + 18, 1973
Hearing held _____
Watermaster Recommendation sent WD 74-M. Anna (Jaw) - mt 10/3/73

Protest filed by: _____ Date _____
Application
Withdrawn
12-16-1980

INTER-DEPARTMENT MEMO — 1

FROM Kay Walker

DATE 4/12/1983

TO File 74-0404

SUBJECT Transfer No. 2510

See Water Right File No. 74-0249 for all correspondence regarding the above referenced transfer.

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SIGNATURE

Table 9-10.--Discharge values for rectangular weir with complete contractions

Head, H'		Discharge, Q, for crest length, L, of--							
		1 foot	1.5 feet	2 feet	3 feet	4 feet	6 feet	8 feet	10 feet
Feet	Inches	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet
0.10	1 1/8	0.11	0.16	0.22	0.33	0.44	0.62	0.84	1.05
0.11	1 1/8	.13	.18	.25	.37	.50	.78	.97	1.21
0.12	1 1/8	.14	.20	.28	.42	.57	.83	1.10	1.38
0.13	1 1/8	.15	.22	.32	.47	.64	.93	1.24	1.56
0.14	1 1/8	.17	.25	.36	.53	.71	1.04	1.39	1.74
0.15	1 1/8	.19	.28	.39	.58	.79	1.15	1.54	1.98
0.16	1 1/8	.21	.31	.43	.64	.86	1.27	1.70	2.12
0.17	2 1/8	.23	.34	.47	.70	.95	1.39	1.86	2.33
0.18	2 1/8	.25	.37	.51	.76	1.03	1.52	2.08	2.53
0.19	2 1/8	.27	.40	.55	.83	1.11	1.64	2.20	2.76
0.20	2 1/8	.29	.44	.59	.89	1.19	1.76	2.37	2.97
0.21	2 1/8	.31	.47	.63	.95	1.28	1.91	2.55	3.18
0.22	2 1/8	.34	.50	.68	1.02	1.37	2.05	2.73	3.42
0.23	2 1/8	.36	.54	.72	1.09	1.46	2.19	2.92	3.68
0.24	2 1/8	.38	.57	.77	1.16	1.55	2.33	3.11	3.90
0.25	3	.40	.61	.82	1.23	1.65	2.48	3.31	4.14
0.26	3	.43	.65	.86	1.31	1.75	2.63	3.51	4.39
0.27	3	.45	.68	.91	1.38	1.85	2.78	3.71	4.65
0.28	3	.48	.72	.96	1.46	1.95	2.93	3.92	4.91
0.29	3	.50	.76	1.02	1.53	2.05	3.09	4.13	5.17
0.30	3 1/8	.53	.80	1.07	1.61	2.16	3.25	4.34	5.44
0.31	3 1/8	.55	.84	1.12	1.69	2.26	3.41	4.56	5.71
0.32	3 1/8	.58	.88	1.18	1.77	2.37	3.58	4.78	5.99
0.33	3 1/8	.61	.92	1.23	1.86	2.48	3.75	5.01	6.27
0.34	4 1/8	.63	.98	1.28	1.94	2.60	3.92	5.24	6.56
0.35	4 1/8	.66	1.00	1.34	2.02	2.71	4.09	5.47	6.85
0.36	4 1/8	.69	1.04	1.40	2.11	2.83	4.26	5.70	7.14
0.37	4 1/8	.72	1.06	1.45	2.20	2.94	4.44	5.94	7.44
0.38	4 1/8	.74	1.13	1.51	2.28	3.06	4.62	6.18	7.74
0.39	4 1/8	.77	1.17	1.57	2.37	3.18	4.80	6.43	8.05
0.40	4 1/8	.80	1.21	1.63	2.46	3.30	4.99	6.67	8.36
0.41	4 1/8	.83	1.26	1.69	2.55	3.42	5.17	6.92	8.67
0.42	5 1/8	.86	1.30	1.75	2.65	3.54	5.36	7.18	8.99
0.43	5 1/8	.89	1.35	1.81	2.74	3.67	5.55	7.43	9.31
0.44	5 1/8	.92	1.40	1.88	2.83	3.80	5.75	7.69	9.63
0.45	5 1/8	.96	1.44	1.94	2.93	3.93	5.94	7.95	9.96
0.46	5 1/8	.99	1.49	2.00	3.03	4.05	6.14	8.22	10.3
0.47	5 1/8	1.02	1.54	2.07	3.12	4.18	6.34	8.48	10.6
0.48	5 1/8	1.05	1.59	2.13	3.22	4.32	6.54	8.75	11.0
0.49	5 1/8	1.08	1.64	2.20	3.32	4.45	6.74	9.03	11.3
0.50	6	1.11	1.68	2.26	3.42	4.59	6.95	9.30	11.7
0.51	6 1/8	1.15	1.73	2.33	3.53	4.72	7.15	9.58	12.0
0.52	6 1/8	1.18	1.78	2.40	3.62	4.86	7.36	9.86	12.4
0.53	6 1/8	1.21	1.84	2.46	3.73	4.99	7.57	10.1	12.7
0.54	6 1/8	1.25	1.89	2.53	3.83	5.13	7.79	10.4	13.1
0.55	6 1/8	1.28	1.94	2.60	3.94	5.27	8.00	10.7	13.4
0.56	6 1/8	1.31	1.99	2.67	4.04	5.42	8.22	11.0	13.8
0.57	6 1/8	1.35	2.04	2.74	4.15	5.56	8.43	11.3	14.2
0.58	6 1/8	1.38	2.09	2.81	4.26	5.70	8.65	11.6	14.6
0.59	7 1/8	1.42	2.15	2.88	4.36	5.85	8.88	11.9	14.9
0.60	7 1/8	1.45	2.20	2.93	4.47	6.00	9.10	12.2	15.3
0.61	7 1/8	1.49	2.25	3.03	4.59	6.14	9.33	12.5	15.7
0.62	7 1/8	1.52	2.31	3.10	4.69	6.29	9.55	12.8	16.1
0.63	7 1/8	1.56	2.36	3.17	4.81	6.44	9.78	13.1	16.4
0.64	7 1/8	1.60	2.42	3.25	4.92	6.59	10.0	13.4	16.8

See note at end of table.

Table 9-10.--Discharge values for rectangular weirs with complete contractions--continued

Head, H ¹		Discharge, Q, for crest length, L, of--							
		1 foot	1.5 feet	2 feet	3 feet	4 feet	6 feet	8 feet	10 feet
Feet	Inches	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet	Second-feet
0.65	7 7/8	1.63	2.47	3.32	5.03	6.75	10.2	13.7	17.2
0.66	7 7/8	1.67	2.53	3.40	5.15	6.90	10.5	14.0	17.6
0.67	8 1/8	1.71	2.59	3.47	5.28	7.05	10.7	14.4	18.0
0.68	8 1/8	1.74	2.64	3.56	5.38	7.21	10.9	14.7	18.4
0.69	8 1/8	1.78	2.70	3.63	5.49	7.36	11.2	15.0	18.8
0.70	8 1/8	1.82	2.76	3.71	5.61	7.52	11.4	15.3	19.2
0.71	8 1/8	1.85	2.81	3.78	5.73	7.68	11.7	15.7	19.6
0.72	8 1/8	1.90	2.87	3.86	5.85	7.84	11.9	16.0	20.1
0.73	8 1/8	1.93	2.93	3.94	5.97	8.00	12.2	16.3	20.5
0.74	8 1/8	1.97	2.99	4.02	6.09	8.17	12.4	16.6	20.9
0.75	9	2.01	3.05	4.10	6.21	8.33	12.7	17.0	21.3
0.76	9 1/8	2.05	3.11	4.18	6.33	8.49	12.9	17.3	21.7
0.77	9 1/8	2.09	3.17	4.26	6.45	8.66	13.2	17.7	22.2
0.78	9 1/8	2.13	3.23	4.34	6.58	8.82	13.4	18.0	22.6
0.79	9 1/8	2.17	3.29	4.42	6.70	8.99	13.7	18.3	23.0
0.80	9 1/8	2.21	3.35	4.51	6.83	9.16	13.9	18.7	23.4
0.81	9 1/8	2.25	3.41	4.59	6.95	9.33	14.2	19.0	23.9
0.82	9 1/8	2.29	3.47	4.67	7.08	9.50	14.4	19.4	24.3
0.83	9 1/8	2.33	3.54	4.75	7.21	9.67	14.7	19.7	24.8
0.84	10 1/8	2.37	3.60	4.84	7.33	9.84	15.0	20.1	25.2
0.85	10 1/8	2.41	3.66	4.92	7.46	10.0	15.2	20.4	25.7
0.86	10 1/8	2.46	3.72	5.01	7.59	10.2	15.5	20.8	26.1
0.87	10 1/8	2.50	3.79	5.10	7.72	10.4	15.7	21.1	26.6
0.88	10 1/8	2.54	3.85	5.18	7.85	10.5	16.0	21.5	27.0
0.89	10 1/8	2.58	3.92	5.27	7.99	10.7	16.3	21.9	27.5
0.90	10 1/8	2.62	3.98	5.35	8.12	10.9	16.5	22.2	27.9
0.91	10 1/8	2.67	4.05	5.44	8.25	11.1	16.8	22.6	28.4
0.92	11 1/8	2.71	4.11	5.53	8.38	11.2	17.1	23.0	28.8
0.93	11 1/8	2.75	4.18	5.62	8.52	11.4	17.4	23.3	29.3
0.94	11 1/8	2.79	4.24	5.71	8.65	11.6	17.6	23.7	29.8
0.95	11 1/8	2.84	4.31	5.80	8.79	11.8	17.9	24.1	30.2
0.96	11 1/8	2.88	4.37	5.89	8.93	12.0	18.2	24.5	30.7
0.97	11 1/8	2.93	4.44	5.98	9.06	12.2	18.5	24.8	31.2
0.98	11 1/8	2.97	4.51	6.07	9.20	12.3	18.8	25.2	31.7
0.99	11 1/8	3.01	4.57	6.15	9.34	12.5	19.0	25.6	32.2
1.00	12	3.06	4.64	6.25	9.48	12.7	19.3	26.0	32.6
1.01	12 1/8	-----	4.71	6.34	9.62	12.9	19.6	26.4	33.1
1.02	12 1/8	-----	4.78	6.43	9.76	13.1	19.9	26.7	33.6
1.03	12 1/8	-----	4.85	6.52	9.90	13.3	20.2	27.1	34.1
1.04	12 1/8	-----	4.92	6.62	10.0	13.5	20.5	27.5	34.6
1.05	12 1/8	-----	4.98	6.71	10.2	13.7	20.7	27.9	35.1
1.06	12 1/8	-----	5.05	6.80	10.3	13.8	21.0	28.3	35.6
1.07	12 1/8	-----	5.12	6.90	10.5	14.0	21.3	28.7	36.1
1.08	12 1/8	-----	5.20	6.99	10.6	14.2	21.6	29.1	36.6
1.09	13 1/8	-----	5.26	7.09	10.8	14.4	21.9	29.5	37.1
1.10	13 1/8	-----	5.34	7.19	10.9	14.6	22.2	29.9	37.6
1.11	13 1/8	-----	5.41	7.28	11.0	14.8	22.5	30.3	38.1
1.12	13 1/8	-----	5.48	7.38	11.2	15.0	22.8	30.7	38.6
1.13	13 1/8	-----	5.55	7.47	11.3	15.2	23.1	31.1	39.1
1.14	13 1/8	-----	5.62	7.57	11.5	15.4	23.4	31.5	39.6
1.15	13 1/8	-----	5.69	7.66	11.6	15.6	23.7	31.9	40.1
1.16	13 1/8	-----	5.77	7.76	11.8	15.8	24.0	32.3	40.6
1.17	14 1/8	-----	5.84	7.86	11.9	16.0	24.3	32.7	41.2
1.18	14 1/8	-----	5.91	7.96	12.1	16.2	24.6	33.1	41.7
1.19	14 1/8	-----	5.98	8.06	12.2	16.4	24.9	33.6	42.2

See note at end of table.

1. amount of water received this season

2. the way they divide the water out
Jones Weir & head gate

3. Water master ordered to measure
water 2 times a week since July
15. How many times does his record
show of measuring & what were
the measurements

4. Butch changed his water
3 times in past week who divided
it & how much water was
measured.

5. What right does water master
have of denying me any of my
water rights without an order
from the court?

Frank pay your assessment.

Wm. J. Jones

RECORDED

180
110
240
225.00
1128
75
300
9
20.25
120.10
5
4
809.0
168
1800.0

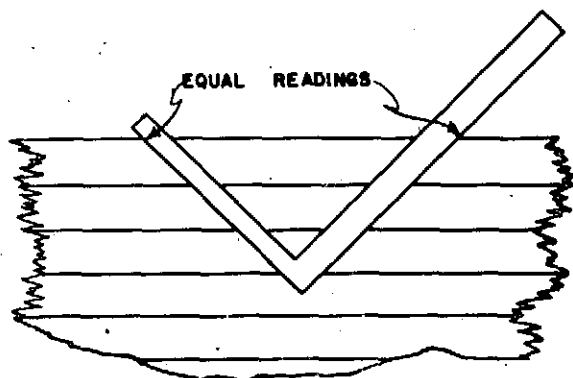


Figure 11.—Method of laying out 90° V-Notch with a steel square.

Table 7. Discharge table for 90° V-notch weirs with complete contractions computed from the formula $Q = 2.49H^{2.48}$

Head H	Discharge Q	Head H	Discharge Q	Head H	Discharge Q
Feet or Inches	Sec.-feet	Feet or Inches	Sec.-feet	Feet or Inches	Sec.-feet
.10	1 $\frac{1}{16}$	.50	6	.90	10 $\frac{1}{16}$
.11	1 $\frac{1}{8}$	.51	6 $\frac{1}{8}$	.91	10 $\frac{1}{8}$
.12	1 $\frac{1}{4}$	.52	6 $\frac{1}{4}$	.92	11 $\frac{1}{16}$
.13	1 $\frac{3}{8}$	.53	6 $\frac{3}{8}$	.93	11 $\frac{1}{8}$
.14	1 $\frac{1}{2}$	.54	6 $\frac{1}{2}$	.94	11 $\frac{1}{4}$
.15	1 $\frac{5}{8}$	.55	6 $\frac{5}{8}$	.95	11 $\frac{3}{8}$
.16	1 $\frac{3}{4}$	.56	6 $\frac{3}{4}$	.96	11 $\frac{1}{2}$
.17	2 $\frac{1}{16}$	.57	6 $\frac{7}{8}$	.97	11 $\frac{3}{4}$
.18	2 $\frac{1}{8}$	.58	6 $\frac{7}{8}$	.98	11 $\frac{7}{8}$
.19	2 $\frac{1}{4}$	.59	7 $\frac{1}{16}$	.99	11 $\frac{9}{8}$
.20	2 $\frac{1}{2}$	.60	7 $\frac{1}{8}$	1.00	12
.21	2 $\frac{3}{8}$	.61	7 $\frac{1}{4}$	1.01	12 $\frac{1}{16}$
.22	2 $\frac{1}{2}$	.62	7 $\frac{1}{2}$	1.02	12 $\frac{1}{8}$
.23	2 $\frac{3}{4}$	.63	7 $\frac{3}{8}$	1.03	12 $\frac{1}{4}$
.24	2 $\frac{3}{4}$	.64	7 $\frac{1}{2}$	1.04	12 $\frac{1}{2}$
.25	3	.65	6 $\frac{1}{2}$	1.05	12 $\frac{3}{4}$
.26	3 $\frac{1}{8}$	.66	7 $\frac{1}{8}$	1.06	12 $\frac{3}{8}$
.27	3 $\frac{1}{4}$	.67	7 $\frac{1}{4}$	1.07	12 $\frac{7}{8}$
.28	3 $\frac{3}{8}$	.68	8 $\frac{1}{16}$	1.08	12 $\frac{1}{2}$
.29	3 $\frac{1}{2}$	.69	8 $\frac{1}{4}$	1.09	13 $\frac{1}{16}$
.30	3 $\frac{3}{4}$	.70	8 $\frac{1}{2}$	1.10	13 $\frac{1}{8}$
.31	3 $\frac{3}{4}$	.71	8 $\frac{3}{8}$	1.11	13 $\frac{1}{4}$
.32	3 $\frac{7}{8}$	.72	8 $\frac{3}{4}$	1.12	13 $\frac{3}{8}$
.33	3 $\frac{7}{8}$	.73	8 $\frac{7}{8}$	1.13	13 $\frac{1}{2}$
.34	4 $\frac{1}{16}$	.74	8 $\frac{3}{4}$	1.14	13 $\frac{3}{4}$
.35	4 $\frac{1}{8}$	.75	9	1.15	13 $\frac{7}{8}$
.36	4 $\frac{1}{4}$	.76	9 $\frac{1}{8}$	1.16	13 $\frac{7}{8}$
.37	4 $\frac{1}{2}$	.77	9 $\frac{1}{4}$	1.17	14 $\frac{1}{16}$
.38	4 $\frac{3}{8}$	.78	9 $\frac{1}{2}$	1.18	14 $\frac{1}{8}$
.39	4 $\frac{3}{4}$	.79	9 $\frac{3}{4}$	1.19	14 $\frac{1}{4}$
.40	4 $\frac{3}{4}$	.80	9 $\frac{3}{4}$	1.20	14 $\frac{1}{2}$
.41	4 $\frac{7}{8}$	.81	9 $\frac{7}{8}$	1.21	14 $\frac{3}{8}$
.42	5 $\frac{1}{16}$	.82	9 $\frac{7}{8}$	1.22	14 $\frac{3}{4}$
.43	5 $\frac{1}{8}$	.83	9 $\frac{7}{8}$	1.23	14 $\frac{3}{4}$
.44	5 $\frac{1}{4}$	.84	10 $\frac{1}{16}$	1.24	14 $\frac{3}{4}$
.45	5 $\frac{1}{2}$	.85	10 $\frac{1}{8}$	1.25	15
.46	5 $\frac{1}{2}$	.86	10 $\frac{1}{4}$		
.47	5 $\frac{3}{8}$	.87	10 $\frac{1}{4}$		
.48	5 $\frac{3}{4}$	.88	10 $\frac{1}{2}$		
.49	5 $\frac{3}{4}$	.89	10 $\frac{1}{2}$		

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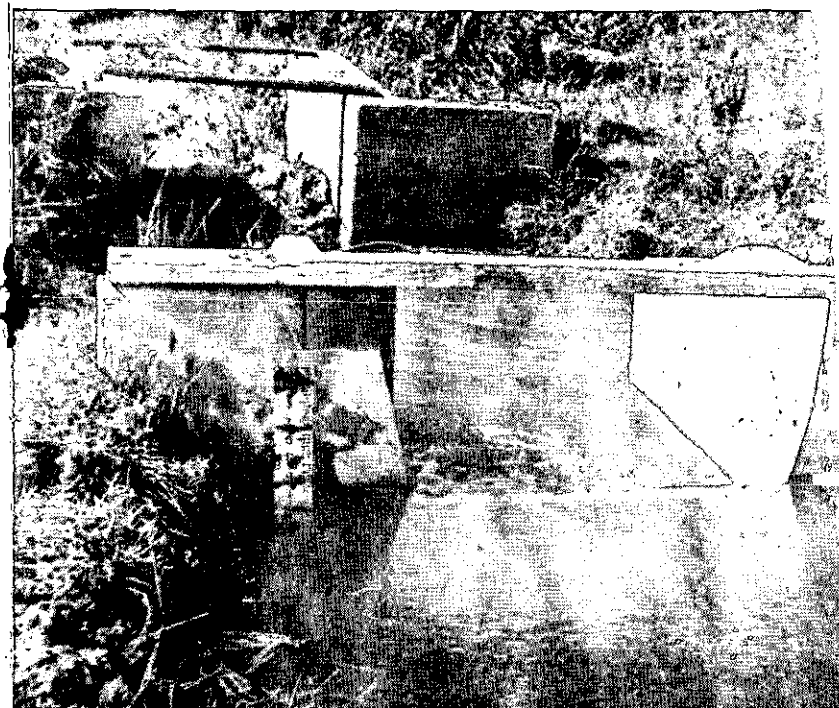


Figure 9.—Concrete structures like this Cipolletti weir near Cal more expensive but longer lived than the ordinary wooden structure.

The Cipolletti Weir

The Cipolletti weir differs from the rectangular in the slope outwardly 1 to 4 (1 inch horizontally to 4 inches vertically). It is the most common weir in general use in Idaho, although no more accurate nor convenient than the rectangular named after Cesare Cipolletti, the Italian engineer who proposed its use.

Discharges over Cipolletti weirs with complete contractions are given in Table 5.

The 90° Triangular, or V-Notch Weir

The 90° V-Notch weir has no crest length as the slopes come together to form the crest. Each side has an angle with the vertical or horizontal, making a total notch angle of 90°.

The advantage of the V-notch over other weirs is its ability to measure small flows accurately. Considering the recommendation that the minimum head to be measured over a weir is 2" readily evident by checking the weir discharge tables.

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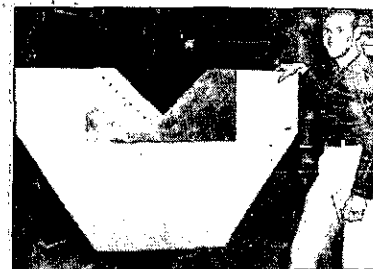
with complete contractions.**

H In.	Discharge, Q, in cubic feet per second				
	Crest length				
	1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.	4.0 ft.
9 3/4	2.61*	3.77*	4.95*	7.31	9.69
9 1/2	2.66*	3.84*	5.04*	7.45	9.87
9 1/4	2.71*	3.92*	5.14*	7.59	10.05
10 3/4	2.77*	3.99*	5.23*	7.73	10.23
10 1/2	2.82*	4.07*	5.33*	7.87	10.42
10 1/4	2.87*	4.14*	5.43*	8.01	10.60
10 3/8	2.93*	4.22*	5.52*	8.15	10.79
10 1/8	2.98*	4.29*	5.62*	8.30	10.98
10 1/4	3.04*	4.37*	5.72*	8.44	11.17
10 3/8	3.09*	4.45*	5.82*	8.59	11.36
10 1/8	3.15*	4.53*	5.92*	8.73	11.55
11 3/4	3.20*	4.60*	6.02*	8.88	11.74
11 1/2	3.26*	4.68*	6.13*	9.03	11.94
11 1/4	3.32*	4.76*	6.23*	9.17	12.13
11 3/8	3.37*	4.84*	6.33*	9.32	12.33
11 1/8	3.43*	4.92*	6.44*	9.48	12.53
11 3/4	3.49*	5.00*	6.55*	9.62	12.72
11 1/4	3.55*	5.09*	6.64*	9.78	12.92
11 3/8	3.61*	5.17*	6.75*	9.93	13.12
12 3/4	3.67*	5.25*	6.86*	10.08	13.32
12 1/2	.....	5.33*	6.96*	10.24*	13.53
12 1/4	.....	5.42*	7.07*	10.40*	13.73
12 3/8	.....	5.50*	7.18*	10.55*	13.94
12 1/8	.....	5.59*	7.29*	10.71*	14.15
12 3/4	.....	5.67*	7.40*	10.87*	14.35
12 1/4	.....	5.76*	7.51*	11.03*	14.56
12 3/8	.....	5.84*	7.62*	11.18*	14.76
12 1/8	.....	5.93*	7.73*	11.35*	14.98
13 3/4	.....	6.02*	7.84*	11.51*	15.19
13 1/2	.....	6.11*	7.96*	11.68*	15.41
13 1/4	.....	6.20*	8.07*	11.84*	15.62
13 3/8	.....	6.29*	8.18*	12.00*	15.84
13 1/8	.....	6.37*	8.29*	12.16*	16.04
13 3/4	.....	6.46*	8.41*	12.33*	16.26
13 1/4	.....	6.56*	8.53*	12.50*	16.48
13 3/8	.....	6.65*	8.65*	12.67*	16.70
13 1/8	.....	6.74*	8.76*	12.84*	16.93
14 3/4	.....	6.83*	8.88*	13.01*	17.15
14 1/2	.....	6.93*	9.00*	13.18*	17.37
14 1/4	.....	7.02*	9.12*	13.35*	17.59
14 3/8	.....	7.11*	9.24*	13.52*	17.81
14 1/8	.....	7.20*	9.36*	13.69*	18.03
14 3/4	.....	7.30*	9.48*	13.87*	18.27
14 1/4	.....	7.40*	9.60*	14.04*	18.49
14 3/8	.....	7.49*	9.72*	14.21*	18.71
15 3/4	.....	.....	.....	14.39*	18.95
15 1/2	.....	.....	.....	14.56*	19.17
15 1/4	.....	.....	.....	14.74*	19.41
15 3/8	.....	.....	.....	14.92*	19.65
15 1/8	.....	.....	.....	15.11*	19.88
15 3/4	.....	.....	.....	15.29*	20.12
15 1/4	.....	.....	.....	15.46*	20.34
15 3/8	.....	.....	.....	15.64*	20.58
15 1/8	.....	.....	.....	15.82*	20.82*
16 3/4	.....	.....	.....	16.01*	21.06*
16 1/2	.....	.....	.....	16.19*	21.29*
16 1/4	.....	.....	.....	16.37*	21.53*
16 3/8	.....	.....	.....	16.57*	21.78*
16 1/8	.....	.....	.....	16.75*	22.02*
16 3/4	.....	.....	.....	16.94*	22.27*
16 1/4	.....	.....	.....	17.13*	22.51*
16 3/8	.....	.....	.....	17.31*	22.75*
16 1/8	.....	.....	.....	17.51*	23.01*
17 3/4	.....	.....	.....	17.70*	23.26*
17 1/2	.....	.....	.....	17.89*	23.50*
17 1/4	.....	.....	.....	18.08*	23.75*
17 3/8	.....	.....	.....	18.28*	24.01*
17 1/8	.....	.....	.....	18.47*	24.26*
17 3/4	.....	.....	.....	18.66*	24.50*
17 1/4	.....	.....	.....	18.85*	24.75*

$$3.247LH^{1.48} \left\{ \begin{array}{l} 0.566L^{1.8} \\ 1 + 2L^{1.8} \end{array} \right\} H^{1.9+0.609H^{2.5}}$$

Special precautions must be taken for complete contractions for these

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Upstream face of 90° V notch weir prior to installation



Looking downstream on installed 90° V notch weir. Note end and bottom contractions and weir scales painted on weir plate



Looking upstream on installed 90° V notch weir. Note the gravel and rock protecting apron.



90° V notch weir being used to measure a pump discharge

Figure 10.—This 90° V-notch weir structure is simple and easy to build and is satisfactory for heavy and medium textured soils. The V-notch is especially adapted to the accurate measurement of small flows.

The sides of the 90° V-notch weir may be determined readily with a carpenter's square as shown in Figure 11. The notch can be marked out by placing the point of the angle of the square at the point as selected for the bottom of the notch, and adjusting the square so that the same figures on both arms are at the edge of the board or metal plate. If the notch is then set with the upper edge level, the sides of the notch will have the same slope as required.

Table 7 gives the discharges over 90° triangular or V-notch weirs.

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Table 4.—Discharge table for rectangular weirs having complete contractions.**

Head H ft. or in.	Discharge, Q, in cubic feet per second				Head H ft. or in.	Discharge, Q, in cubic feet per second			
	1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.	4.0 ft.	1.0 ft.	1.5 ft.	2.0 ft.	3.0 ft.
0.10	0.105	0.158	0.212	0.319	0.427	0.81	9%	2.25	3.47
0.11	0.121	0.182	0.244	0.367	0.491	0.82	9%	2.29	3.47
0.12	0.137	0.207	0.277	0.418	0.559	0.83	9%	2.33	3.54
0.13	0.153	0.233	0.312	0.470	0.629	0.84	10%	2.37	3.60
0.14	0.170	0.260	0.348	0.524	0.701	0.85	10%	2.41	3.66
0.15	0.187	0.288	0.385	0.581	0.776	0.86	10%	2.46	3.72
0.16	0.205	0.316	0.423	0.638	0.854	0.87	10%	2.50	3.79
0.17	0.223	0.346	0.463	0.698	0.934	0.88	10%	2.54	3.85
0.18	0.242	0.376	0.504	0.760	1.02	0.89	10%	2.58	3.92
0.19	0.262	0.407	0.546	0.823	1.10	0.90	10%	2.62	3.98
0.20	0.282	0.439	0.588	0.887	1.19	0.91	10%	2.67	4.05
0.21	0.302	0.472	0.632	0.954	1.28	0.92	11%	2.71	4.11
0.22	0.323	0.505	0.677	1.02	1.37	0.93	11%	2.75	4.18
0.23	0.345	0.539	0.723	1.09	1.46	0.94	11%	2.79	4.24
0.24	0.368	0.574	0.769	1.16	1.55	0.95	11%	2.84	4.31
0.25	0.392	0.609	0.817	1.23	1.65	0.96	11%	2.88	4.37
0.26	0.417	0.646	0.865	1.31	1.75	0.98	11%	2.93	4.44
0.27	0.442	0.682	0.914	1.38	1.85	0.98	11%	2.97	4.51
0.28	0.468	0.720	0.965	1.46	1.95	0.99	11%	3.01	4.57
0.29	0.495	0.758	1.02	1.53	2.05	1.00	12%	3.06	4.64
0.30	0.522	0.796	1.07	1.61	2.16	1.01	12%	3.11	4.71
0.31	0.550	0.838	1.12	1.69	2.26	1.02	12%	3.16	4.78
0.32	0.578	0.876	1.18	1.77	2.37	1.03	12%	3.21	4.85
0.33	0.607	0.916	1.23	1.86	2.48	1.04	12%	3.26	4.92
0.34	0.636	0.957	1.28	1.94	2.60	1.05	12%	3.31	4.98
0.35	0.666	1.000	1.34	2.02	2.71	1.06	12%	3.36	5.05
0.36	0.696	1.044	1.40	2.11	2.82	1.07	12%	3.41	5.12
0.37	0.727	1.089	1.45	2.20	2.94	1.08	12%	3.46	5.20
0.38	0.758	1.135	1.51	2.28	3.06	1.09	13%	3.51	5.26
0.39	0.790	1.182	1.57	2.37	3.18	1.10	13%	3.56	5.34
0.40	0.822	1.231	1.63	2.46	3.30	1.11	13%	3.61	5.41
0.41	0.855	1.280	1.69	2.55	3.42	1.12	13%	3.66	5.48
0.42	0.888	1.330	1.75	2.65	3.54	1.13	13%	3.71	5.55
0.43	0.922	1.381	1.81	2.74	3.67	1.14	13%	3.76	5.62
0.44	0.956	1.434	1.88	2.83	3.80	1.15	13%	3.81	5.69
0.45	0.990	1.488	1.94	2.93	3.93	1.16	14%	3.86	5.77
0.46	1.025	1.544	2.00	3.03	4.05	1.17	14%	3.91	5.84
0.47	1.060	1.601	2.07	3.12	4.18	1.18	14%	3.96	5.91
0.48	1.096	1.659	2.13	3.22	4.32	1.19	14%	4.01	5.98
0.49	1.132	1.718	2.20	3.32	4.45	1.20	14%	4.06	6.06
0.50	1.169	1.778	2.26	3.42	4.58	1.21	14%	4.11	6.13
0.51	1.207	1.839	2.33	3.52	4.72	1.22	14%	4.16	6.20
0.52	1.245	1.901	2.40	3.62	4.86	1.23	14%	4.21	6.28
0.53	1.284	1.964	2.46	3.73	4.99	1.24	14%	4.26	6.35
0.54	1.323	2.028	2.53	3.83	5.13	1.25	15%	4.31	6.43
0.55	1.363	2.093	2.60	3.94	5.27	1.26	15%	4.36	6.50
0.56	1.403	2.159	2.67	4.04	5.42	1.27	15%	4.41	6.57
0.57	1.444	2.226	2.74	4.15	5.56	1.28	15%	4.46	6.65
0.58	1.485	2.294	2.81	4.26	5.70	1.29	15%	4.51	6.72
0.59	1.527	2.363	2.88	4.36	5.85	1.30	15%	4.56	6.80
0.60	1.569	2.433	2.96	4.47	6.00	1.31	15%	4.61	6.87
0.61	1.612	2.504	3.03	4.59	6.14	1.32	15%	4.66	6.95
0.62	1.655	2.576	3.10	4.69	6.29	1.33	15%	4.71	7.02
0.63	1.699	2.649	3.17	4.81	6.44	1.34	16%	4.76	7.10
0.64	1.743	2.723	3.25	4.92	6.59	1.35	16%	4.81	7.17
0.65	1.788	2.798	3.32	5.03	6.75	1.36	16%	4.86	7.25
0.66	1.833	2.874	3.40	5.15	6.90	1.37	16%	4.91	7.32
0.67	1.879	2.951	3.47	5.26	7.05	1.38	16%	4.96	7.40
0.68	1.925	3.028	3.56	5.38	7.21	1.39	16%	5.01	7.48
0.69	1.971	3.106	3.64	5.49	7.36	1.40	16%	5.06	7.56
0.70	2.018	3.185	3.71	5.61	7.52	1.41	16%	5.11	7.64
0.71	2.065	3.265	3.78	5.73	7.68	1.42	17%	5.16	7.72
0.72	2.113	3.346	3.86	5.85	7.84	1.43	17%	5.21	7.80
0.73	2.161	3.428	3.94	5.97	8.00	1.44	17%	5.26	7.88
0.74	2.210	3.511	4.02	6.09	8.17	1.45	17%	5.31	7.96
0.75	2.259	3.595	4.10	6.21	8.33	1.46	17%	5.36	8.04
0.76	2.309	3.680	4.18	6.33	8.49	1.47	17%	5.41	8.12
0.77	2.359	3.766	4.26	6.45	8.65	1.48	17%	5.46	8.20
0.78	2.410	3.853	4.34	6.57	8.82	1.49	17%	5.51	8.28
0.79	2.461	3.941	4.42	6.69	8.99	1.50	18%	5.56	8.36
0.80	2.513	4.030	4.50	6.81	9.16	1.51	18%	5.61	8.44

*Computed from the formula $Q=3.247LH^{1.48}-\frac{0.566L^{1.8}}{H^{1.9}}$

**Discharges are for heads above 1/2 L. Special precautions must be taken for complete contractions for these discharges to be accurate.

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When it is desirable to place the measuring device in a flume or box not large enough to give complete end contractions, the suppressed rectangular weir may be used. This structure consists essentially of a uniform width rectangular flume and a vertical weir plate having a horizontal crest. The sides of the flume form the sides of the weir notch. Hence there are no end contractions on a suppressed rectangular weir.

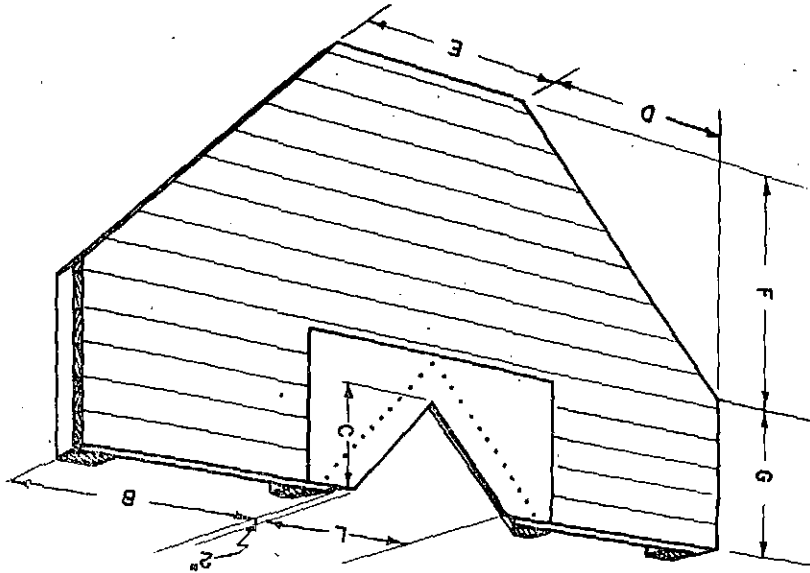
The Suppressed Rectangular Weir

* Requires heavier construction than shown in drawing.

Length L	Recommended range of measurement in C.F.s.	Symbol dimensions
1	0.02 to 0.45	A
2	0.02 to 1.5	B
3	0.02 to 4	C

Table 6. Symbol dimensions and capacities for weir structure shown in Figure 12.

Figure 12.—90° V-notch weir suitable for medium and heavy soils.



Weir discharges fluctuate with the height of the crest and therefore, the weir crest heights must be used in reading the table of discharges.

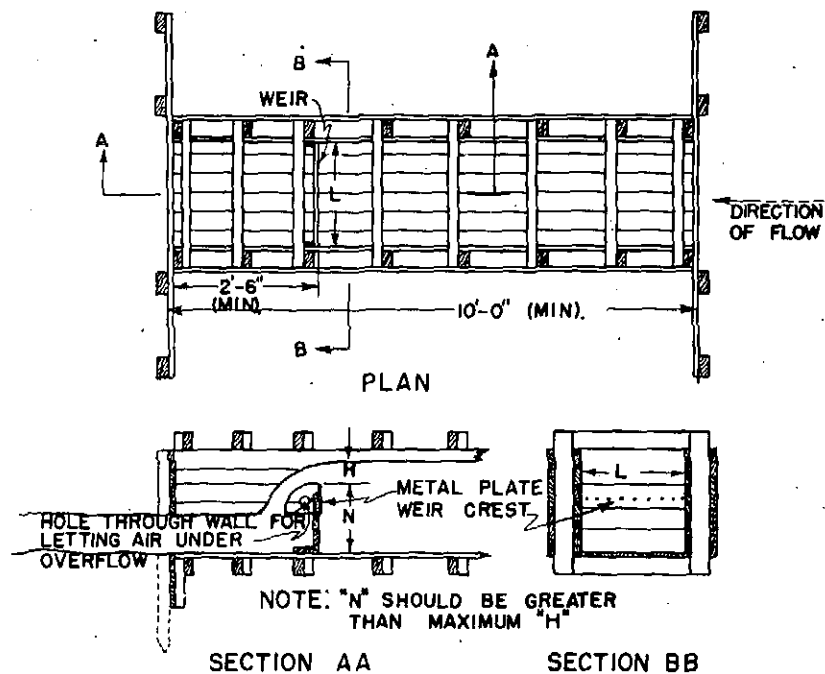


Figure 13.—Suppressed weir structure.

The length of the flume should be at least 10 feet and preferably over 10 times the weir crest length. Holes must be provided immediately below the weir crest to admit air under the sheet of falling water. Openings having an area of $\frac{1}{2}$ square inch per foot length of crest are sufficient for heads up to 1.5 feet.*

Table 8* gives the discharges for rectangular suppressed weirs having various crest heights.

*Taken from "Measuring Water for Irrigation," Bulletin 588, University of California, by J. E. Christiansen.

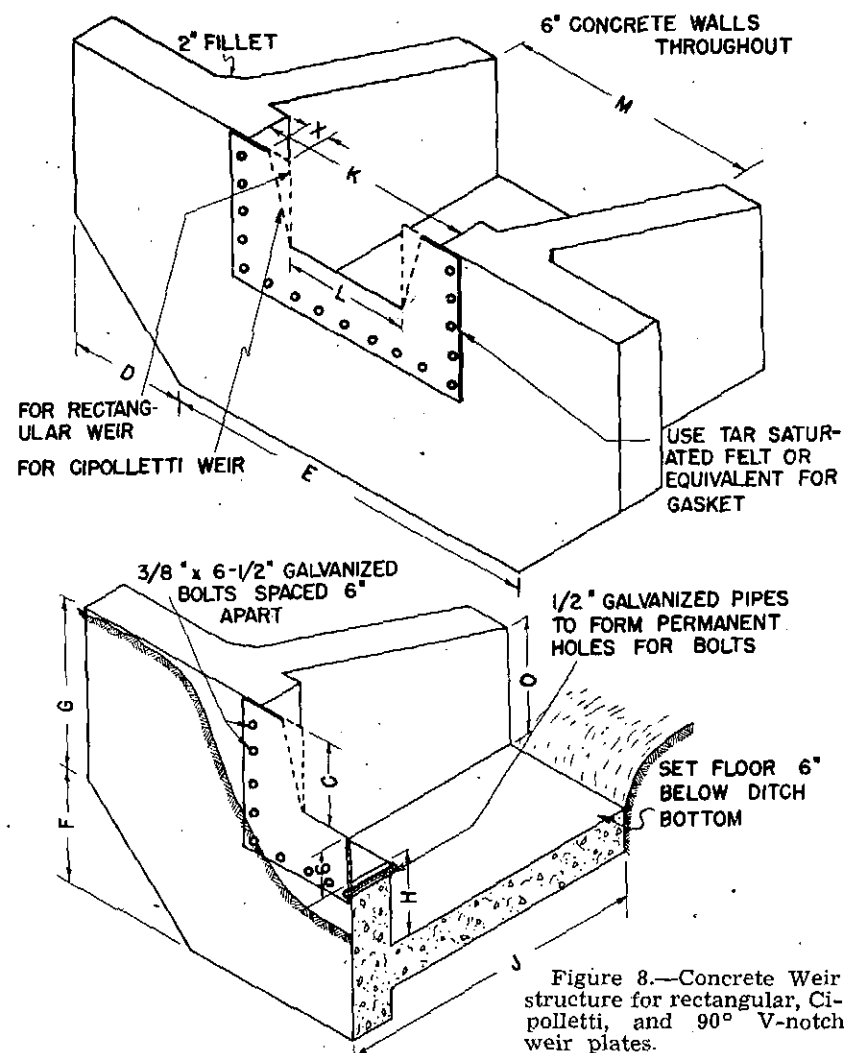


Figure 8.—Concrete Weir structure for rectangular, Cipolletti, and 90° V-notch weir plates.

Table 3.—Symbol dimensions and capacities for weir structure shown in Figure 8.

Crest length L ft.	Recommended range of measurement in C.f.s.		Symbol dimensions										
			C=H	D	E	F	G	J	K	M	N	O	X
	Rectangular	Cipolletti	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
For Rectangular and Cipolletti Weirs													
1.0	.2 to .6	.2 to .6	9	0	5 8	0	2 7 3	2	2 6	10	1 4 2		
1.5	.3 to 1.7	.3 to 1.8	1	1 4	4 6	1 4	2	3 6	2 6 3	10	1 4 3		
2.0	.4 to 3.5	.4 to 3.7	1	2 2	5	2	2	4	3	3 6 1	1 6 3 1/2		
3.0°	.6 to 9.5	.6 to 10.0	1 6	2 6 7	2 6	2 6	4 6	4 4 5	1 6	2	4 1/2		
4.0°	.8 to 19.5	.9 to 20.7	2	3 10	8 4	3 10	2 10	5	5 6 6	2	2 6 6		
For 90° V-Notch Weirs													
2.0	.02 to 1.5		1	1 6 5	1 6	2 8	3 6	2 6 3		10	1 4		
3.0°	.02 to 4.0		1 6	2 2 6 2	2 2	3 4 4		3 6 4		1	1 6		

*Use 6" x 6" No. 12 wire mesh reinforcing or equivalent.

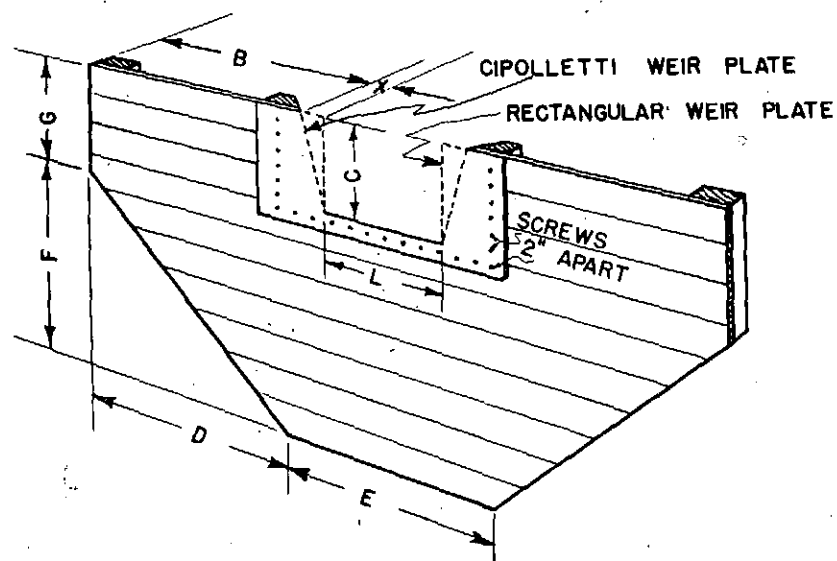


Figure 7.—Bulkhead for rectangular or Cipolletti weirs . . . suitable for medium and heavy soils.

Table 2.—Symbol dimensions and capacities for weir bulkhead shown in Figure 7.

Crest length L ft.	Recommended range of measurement in C.f.s.		Symbol dimensions						
			B	C	D	E	F	G	X
	Rectangular	Cipolletti	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	in.
1.0	.2 to .6	.2 to .6	1 10	8	1 6	2	1 6	10	2
1.5	.3 to 1.7	.3 to 1.8	2 7	1	2 3	2 8	2 3	1 1	3
2.0	.4 to 3.5	.4 to 3.7	3 2½	1 2	2 11	3 2	2 11	1 1	3½
3.0*	.6 to 9.5	.6 to 10.0	4 7½	1 6	4 2	4 8	4 2	1 4	4½
4.0*	.8 to 19.5	.9 to 20.7	6 2	2	5 6	6 4	5 6	1 10	6

*Requires heavier construction than shown in drawing.

The Rectangular Weir

The rectangular weir, as its name suggests, is a weir whose crest is horizontal and whose sides are perpendicular. It is the oldest form of measuring weir and is the most easily farm-made.

Table 4 gives the discharges over rectangular weirs with complete contractions

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Table 8. Flow over rectangular suppressed weir.*

Head H Feet or Inches	Discharge, Q, in cubic feet per second per foot of weir crest						
	Weir Height						
	0.5 foot	0.75 foot	1.0 foot	1.5 feet	2.0 feet	3.0 feet	4.0 feet
0.10	1.11	0.110	0.109	0.109	0.108	0.108	0.108
0.11	1.12	0.127	0.126	0.125	0.125	0.125	0.124
0.12	1.13	0.145	0.144	0.143	0.142	0.141	0.141
0.13	1.14	0.163	0.162	0.161	0.160	0.159	0.159
0.14	1.15	0.182	0.180	0.179	0.178	0.177	0.177
0.15	1.16	0.202	0.200	0.199	0.197	0.196	0.196
0.16	1.17	0.223	0.220	0.219	0.217	0.216	0.215
0.17	1.18	0.244	0.241	0.239	0.238	0.237	0.235
0.18	1.19	0.266	0.263	0.261	0.259	0.257	0.256
0.19	1.20	0.289	0.285	0.283	0.280	0.279	0.277
0.20	1.21	0.312	0.307	0.305	0.302	0.300	0.299
0.21	1.22	0.336	0.331	0.328	0.325	0.324	0.322
0.22	1.23	0.361	0.355	0.352	0.349	0.347	0.344
0.23	1.24	0.387	0.380	0.376	0.372	0.370	0.368
0.24	1.25	0.413	0.406	0.401	0.397	0.395	0.392
0.25	1.26	0.440	0.431	0.427	0.422	0.420	0.416
0.26	1.27	0.467	0.458	0.452	0.447	0.445	0.442
0.27	1.28	0.495	0.485	0.479	0.473	0.471	0.467
0.28	1.29	0.524	0.513	0.508	0.500	0.498	0.493
0.29	1.30	0.554	0.541	0.535	0.527	0.524	0.520
0.30	1.31	0.583	0.569	0.562	0.555	0.552	0.548
0.31	1.32	0.614	0.599	0.591	0.583	0.580	0.574
0.32	1.33	0.645	0.629	0.620	0.612	0.608	0.602
0.33	1.34	0.677	0.659	0.650	0.641	0.637	0.631
0.34	1.35	0.709	0.690	0.681	0.670	0.666	0.660
0.35	1.36	0.742	0.722	0.711	0.701	0.696	0.688
0.36	1.37	0.775	0.754	0.743	0.731	0.725	0.717
0.37	1.38	0.810	0.787	0.774	0.762	0.757	0.748
0.38	1.39	0.844	0.819	0.807	0.793	0.788	0.778
0.39	1.40	0.881	0.853	0.840	0.826	0.819	0.809
0.40	1.41	0.916	0.888	0.873	0.858	0.851	0.840
0.41	1.42	0.952	0.922	0.907	0.890	0.883	0.872
0.42	1.43	0.990	0.958	0.942	0.924	0.917	0.904
0.43	1.44	1.03	0.994	0.976	0.958	0.950	0.937
0.44	1.45	1.07	1.03	1.01	0.993	0.983	0.969
0.45	1.46	1.10	1.07	1.05	1.03	1.02	1.00
0.46	1.47	1.14	1.10	1.08	1.06	1.05	1.04
0.47	1.48	1.18	1.14	1.12	1.10	1.09	1.07
0.48	1.49	1.22	1.18	1.16	1.13	1.12	1.10
0.49	1.50	1.27	1.22	1.19	1.17	1.16	1.14
0.50	1.51	1.31	1.26	1.23	1.21	1.20	1.18
0.51	1.52	1.35	1.30	1.27	1.24	1.23	1.21
0.52	1.53	1.39	1.34	1.31	1.28	1.27	1.25
0.53	1.54	1.44	1.39	1.35	1.32	1.30	1.28
0.54	1.55	1.48	1.42	1.39	1.36	1.34	1.32
0.55	1.56	1.52	1.46	1.43	1.40	1.38	1.36
0.56	1.57	1.57	1.50	1.47	1.44	1.42	1.40
0.57	1.58	1.61	1.54	1.51	1.48	1.46	1.44
0.58	1.59	1.66	1.59	1.55	1.52	1.50	1.48
0.59	1.60	1.71	1.63	1.60	1.56	1.54	1.52
0.60	1.61	1.76	1.68	1.64	1.60	1.58	1.55
0.61	1.62	1.80	1.72	1.68	1.64	1.62	1.59
0.62	1.63	1.85	1.77	1.72	1.68	1.66	1.62
0.63	1.64	1.90	1.81	1.77	1.72	1.70	1.67
0.64	1.65	1.95	1.86	1.81	1.76	1.74	1.71
0.65	1.66	2.00	1.90	1.86	1.81	1.78	1.75
0.66	1.67	2.05	1.95	1.90	1.85	1.82	1.79
0.67	1.68	2.10	2.00	1.95	1.90	1.87	1.83
0.68	1.69	2.15	2.05	1.99	1.94	1.91	1.87
0.69	1.70	2.21	2.09	2.04	1.98	1.95	1.91
0.70	1.71	2.26	2.14	2.08	2.03	2.00	1.97
0.71	1.72	2.31	2.19	2.13	2.07	2.04	2.01
0.72	1.73	2.37	2.24	2.18	2.12	2.08	2.05
0.73	1.74	2.42	2.29	2.23	2.16	2.13	2.10
0.74	1.75	2.48	2.34	2.28	2.21	2.18	2.14
0.75	1.76	2.53	2.39	2.32	2.25	2.22	2.18
0.76	1.77	2.59	2.45	2.37	2.30	2.27	2.23
0.77	1.78	2.65	2.50	2.43	2.35	2.31	2.27
0.78	1.79	2.70	2.55	2.48	2.40	2.36	2.32
0.79	1.80	2.76	2.60	2.52	2.45	2.41	2.37
0.80	1.81	2.82	2.66	2.58	2.49	2.45	2.41
0.81	1.82	2.88	2.71	2.63	2.54	2.50	2.46
0.82	1.83	2.94	2.76	2.68	2.59	2.55	2.51
0.83	1.84	3.00	2.82	2.73	2.64	2.60	2.55
0.84	1.85	3.06	2.87	2.78	2.69	2.64	2.58

(Continued on page 22)

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Table 8. Flow over rectangular suppressed weir.* (Continued)

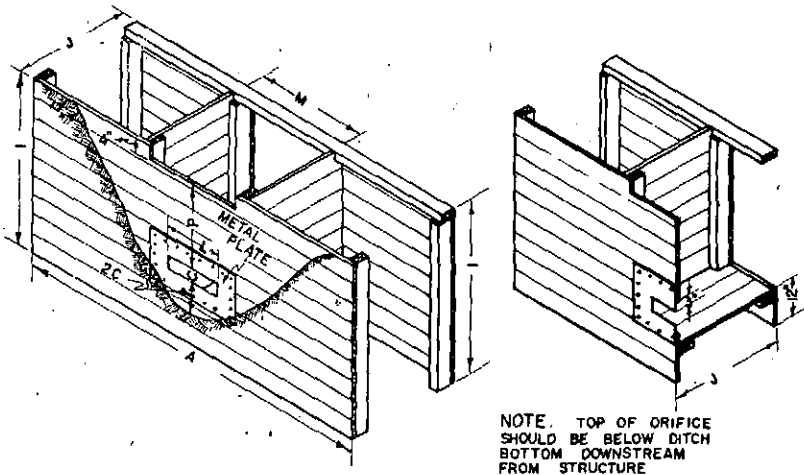
Head H		Discharge, Q, in cubic feet per second per foot of weir crest						
Feet or Inches		Weir Height						
		0.5 foot	0.75 foot	1.0 foot	1.5 foot	2.0 foot	3.0 foot	4.0 foot
0.85	10 1/4	3.12	2.93	2.84	2.74	2.69	2.65	2.62
0.86	10 1/2	3.13	2.99	2.89	2.79	2.74	2.69	2.67
0.87	10 3/4	3.25	3.04	2.94	2.84	2.80	2.74	2.72
0.88	10 7/8	3.31	3.10	3.00	2.90	2.84	2.79	2.76
0.89	11	3.37	3.16	3.05	2.95	2.89	2.84	2.81

*Computed from the simplified form of Rehbock's formula $Q=2/3mL\sqrt{2gh^{3/2}}$, where $m = 0.605 + \frac{0.0028}{h} + 0.08 \frac{h}{P}$ and P = height of weir crest above bottom of channel approach.

The Submerged Orifice

The submerged orifice is a regularly shaped opening in a bulkhead through which the water flows, the level of the water surface both upstream and downstream from the bulkhead being above the top of the hole. The orifice should be rectangular and have sharp edges and complete contractions the same as a weir.

The head (denoted by h for the submerged orifice) causing the flow is obtained by subtracting the reading of the downstream water surface from the reading of the upstream water surface. The downstream gauge and the upstream gauge must be set on the same level. Measurements should not be made on flows giving an effective head of less than 2 inches.



LOOKING DOWNSTREAM

Figure 14.—Submerged orifice structure.

Table 9.—Symbol dimensions and capacities for submerged orifice structure shown in Figure 14.

Size of orifice				Recommended range of measurement in C.f.s.	Symbol dimensions					
L	G	A	P		A	I	J	M	P	
Ft.	In.	sq. ft.			Ft.	In.	Ft.	In.	Ft.	In.
1	3	.25		.4 to 1.0	8	4	4	3	2	6
1	4	.33		.5 to 1.4	9	8	4	3	3	6
2	3	.50		.8 to 2.1	9	10	4	3	3	6
	4	.33		.5 to 1.4	9		4	4	2	6
1	6	.50		.8 to 2.1	10		4	7	3	6
2	3	.75		1.0 to 3.2	11	3	4	10	3	6
1	6	.50		.8 to 2.1	10	6	5	1	3	6
1	6	.75		1.0 to 3.2	11	6	5	4	3	6
	6	1.00		1.5 to 4.3	12		5	4	3	6
3	6	1.50		2.3 to 6.5	14		5	10	4	6
1	4	1.00		1.5 to 4.3	12	6	5	11	3	6
2	9	1.50		2.3 to 6.5	14	6	6	7	3	6
2	8	2.00		3.0 to 8.7	18		7		4	6

* Requires heavier construction than shown in drawing.

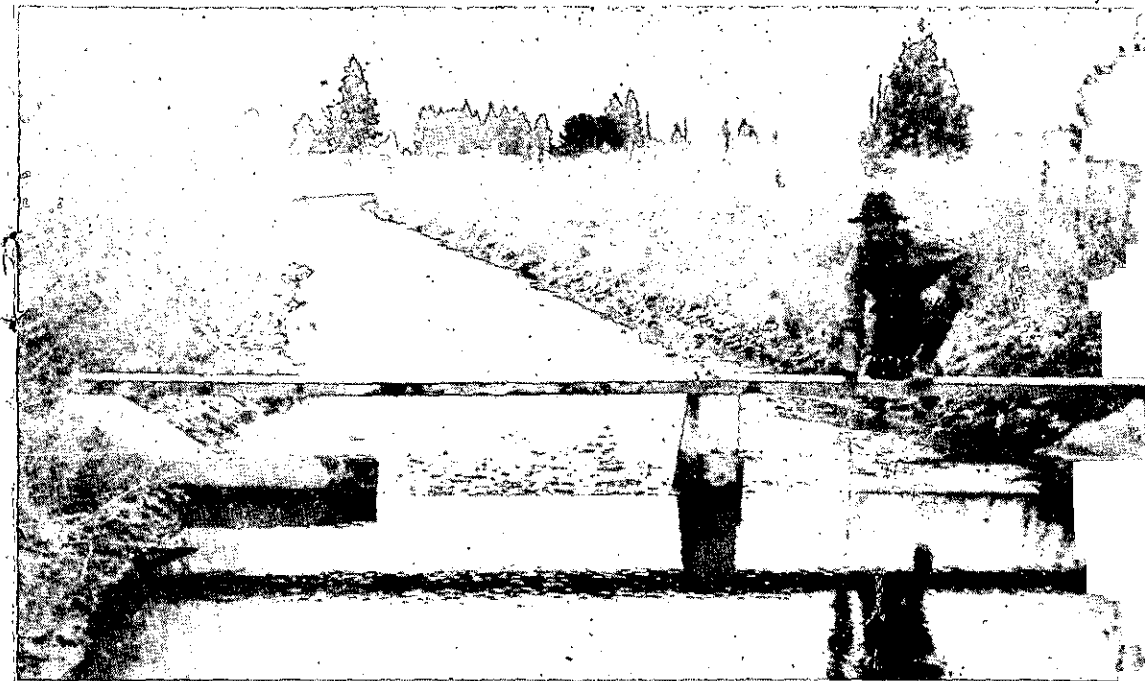


Figure 6.—The operator is measuring the water over a double rectangular weir by the "pile-up" method. This method is not recommended due to the difficulty in getting an accurate head reading. Rather, the head should be measured in still water away from the weir notch.

Advantages of Weirs

Weirs are simple, cheap, and reliable. They require only one reading of the head to determine the discharge. They are not clogged easily by moss and floating trash.

Disadvantages of Weirs

Weirs require an excess fall in the stream equal to the head of the largest stream to be measured.

Silt accumulates in the weir pond making its cleaning necessary for accurate measurement.

If the scale is to be mounted on the weir bulkhead, it should be fastened to a board slightly longer than the scale and the board fastened to the bulkhead. This will facilitate setting the gauge and removal if desired.

Weir gauges must be set accurately and checked occasionally.

If a permanent scale is not wanted at the weir, a stake may be driven in the weir pond with its top at the elevation of the weir crest, or a block may be nailed to the bulkhead with its top at the elevation of the weir crest and the reading of the head may be made with a pocket rule or scale.

Operation of Weirs

Having made and set the weir and gauge there is little difficulty in determining the discharge. If a gauge is installed, read the gauge at the water surface, look in the correct table under "Head" for that reading, and carry over to the right to the column headed by the length of crest of the weir you are using, and the discharge in cubic feet per second will be found. If the discharge is desired in Idaho miner's inches, multiply by 50. Fifty Idaho miner's inches equal 1 cubic foot per second (c.f.s.).

Be sure to have the right table and the right weir crest length.

Be sure to find the head (H) in the same units in which the measurement of the head was made. Commercial weir scales commonly are made in feet and decimals and most rules are in inches and fractions. Heads in all tables are given both in feet and decimals and in inches and fractions.

Example: The head on an 18-inch (1.5') crest length Cipolletti weir is read at $3\frac{3}{4}$ inches. What is the discharge in miner's inches (Idaho)?

Refer to table 5, the discharge table for Cipolletti weirs. Under "In." of the column headed "Head H" find $3\frac{3}{4}$. Reading opposite this head from the column headed "1.5 feet" is the figure .869. This is the discharge in cubic feet per second. To convert to miner's inches (Idaho) multiply c.f.s. by 50. $50 \times .869 = 43.5$ inches flowing over the weir.

Table 10. Discharge table for submerged orifices.*

Effective Head H		Discharge in cubic feet per second						
		Cross-sectional area, A, of orifice						
In feet	In inches	0.25 sq. ft.	0.333 sq. ft.	0.50 sq. ft.	0.75 sq. ft.	1.00 sq. ft.	1.50 sq. ft.	2.00 sq. ft.
0.01	$\frac{1}{16}$	0.122	0.163	0.245	0.367	0.489	0.73	0.98
0.02	$\frac{1}{8}$	0.173	0.230	0.346	0.518	0.691	1.04	1.38
0.03	$\frac{3}{16}$	0.212	0.282	0.424	0.635	0.847	1.27	1.69
0.04	$\frac{1}{4}$	0.245	0.326	0.489	0.734	0.978	1.47	1.96
0.05	$\frac{5}{16}$	0.273	0.364	0.546	0.820	1.09	1.64	2.19
0.06	$\frac{3}{8}$	0.300	0.399	0.599	0.899	1.20	1.80	2.40
0.07	$\frac{7}{16}$	0.324	0.431	0.647	0.971	1.29	1.94	2.59
0.08	$\frac{1}{2}$	0.346	0.461	0.691	1.04	1.38	2.07	2.77
0.09	$\frac{9}{16}$	0.367	0.489	0.734	1.10	1.47	2.20	2.94
0.10	$\frac{5}{8}$	0.387	0.518	0.773	1.16	1.56	2.32	3.09
0.11	$\frac{11}{16}$	0.406	0.540	0.811	1.22	1.62	2.43	3.24
0.12	$\frac{3}{4}$	0.424	0.564	0.847	1.27	1.69	2.54	3.39
0.13	$\frac{13}{16}$	0.441	0.587	0.882	1.32	1.76	2.65	3.53
0.14	$1\frac{1}{16}$	0.458	0.609	0.915	1.37	1.83	2.75	3.66
0.15	$\frac{15}{16}$	0.474	0.631	0.947	1.42	1.90	2.84	3.79
0.16	$1\frac{1}{8}$	0.489	0.651	0.978	1.47	1.96	2.93	3.91
0.17	$1\frac{3}{8}$	0.504	0.671	1.01	1.51	2.02	3.02	4.03
0.18	$1\frac{1}{2}$	0.519	0.691	1.04	1.56	2.08	3.11	4.15
0.19	$1\frac{5}{8}$	0.533	0.710	1.07	1.60	2.13	3.20	4.26
0.20	$1\frac{3}{4}$	0.547	0.729	1.09	1.64	2.19	3.28	4.38
0.21	$1\frac{7}{8}$	0.561	0.746	1.12	1.68	2.24	3.36	4.48
0.22	$2\frac{1}{16}$	0.574	0.765	1.15	1.72	2.30	3.46	4.59
0.23	$\frac{23}{16}$	0.587	0.781	1.17	1.76	2.35	3.52	4.69
0.24	$2\frac{1}{8}$	0.600	0.798	1.20	1.80	2.40	3.60	4.79
0.25	$\frac{5}{4}$	0.612	0.815	1.22	1.83	2.45	3.67	4.89
0.26	$2\frac{3}{8}$	0.624	0.831	1.25	1.87	2.49	3.74	4.99
0.27	$\frac{27}{16}$	0.636	0.846	1.27	1.91	2.54	3.81	5.08
0.28	$2\frac{1}{2}$	0.646	0.862	1.29	1.94	2.59	3.88	5.18
0.29	$\frac{29}{16}$	0.659	0.878	1.32	1.98	2.64	3.96	5.28
0.30	$2\frac{5}{8}$	0.670	0.892	1.34	2.01	2.68	4.02	5.36
0.31	$\frac{31}{16}$	0.681	0.908	1.36	2.05	2.73	4.09	5.45
0.32	$2\frac{3}{4}$	0.692	0.920	1.38	2.07	2.76	4.15	5.53
0.33	$\frac{33}{16}$	0.703	0.936	1.41	2.11	2.81	4.22	5.62
0.34	$2\frac{7}{8}$	0.713	0.950	1.43	2.14	2.85	4.28	5.70
0.35	$\frac{7}{4}$	0.724	0.963	1.45	2.17	2.89	4.34	5.78
0.36	$\frac{36}{16}$	0.734	0.976	1.47	2.20	2.93	4.40	5.87
0.37	$2\frac{9}{8}$	0.745	0.991	1.49	2.23	2.98	4.46	5.95
0.38	$\frac{38}{16}$	0.754	1.00	1.51	2.26	3.02	4.52	6.03
0.39	$\frac{39}{16}$	0.764	1.02	1.53	2.29	3.05	4.58	6.11
0.40	$2\frac{1}{2}$	0.774	1.03	1.55	2.32	3.09	4.64	6.19
0.41	$\frac{41}{16}$	0.783	1.04	1.57	2.35	3.13	4.70	6.27
0.42	$\frac{42}{16}$	0.792	1.06	1.59	2.38	3.17	4.75	6.34
0.43	$2\frac{5}{8}$	0.802	1.07	1.60	2.41	3.21	4.81	6.42
0.44	$\frac{44}{16}$	0.811	1.08	1.62	2.43	3.24	4.87	6.49
0.45	$\frac{45}{16}$	0.820	1.09	1.64	2.46	3.28	4.92	6.56
0.46	$\frac{46}{16}$	0.829	1.10	1.66	2.49	3.32	4.98	6.64
0.47	$\frac{47}{16}$	0.839	1.12	1.68	2.52	3.36	5.04	6.71
0.48	$\frac{48}{16}$	0.847	1.13	1.70	2.54	3.39	5.08	6.78
0.49	$\frac{49}{16}$	0.856	1.14	1.71	2.57	3.42	5.14	6.85
0.50	$\frac{5}{2}$	0.865	1.15	1.73	2.59	3.46	5.19	6.92
0.51	$\frac{51}{16}$	0.873	1.16	1.75	2.62	3.49	5.24	6.99
0.52	$\frac{52}{16}$	0.882	1.17	1.76	2.65	3.53	5.29	7.05
0.53	$\frac{53}{16}$	0.890	1.19	1.78	2.67	3.56	5.34	7.12
0.54	$\frac{54}{16}$	0.898	1.20	1.80	2.70	3.59	5.39	7.19
0.55	$\frac{55}{16}$	0.907	1.21	1.81	2.72	3.63	5.44	7.25
0.56	$\frac{56}{16}$	0.915	1.22	1.83	2.75	3.66	5.49	7.32
0.57	$\frac{57}{16}$	0.923	1.23	1.85	2.77	3.69	5.54	7.38
0.58	$\frac{58}{16}$	0.931	1.24	1.86	2.79	3.73	5.59	7.45
0.59	$\frac{59}{16}$	0.939	1.25	1.88	2.82	3.76	5.64	7.51
0.60	$\frac{60}{16}$	0.947	1.26	1.90	2.84	3.79	5.68	7.58
0.61	$\frac{61}{16}$	0.955	1.27	1.91	2.87	3.82	5.73	7.64
0.62	$\frac{62}{16}$	0.963	1.28	1.93	2.89	3.85	5.78	7.70
0.63	$\frac{63}{16}$	0.971	1.29	1.94	2.91	3.88	5.82	7.76
0.64	$\frac{64}{16}$	0.978	1.30	1.96	2.93	3.91	5.87	7.82
0.65	$\frac{65}{16}$	0.986	1.31	1.97	2.96	3.94	5.92	7.89
0.66	$\frac{66}{16}$	0.993	1.32	1.99	2.98	3.97	5.96	7.95
0.67	$\frac{67}{16}$	1.00	1.33	2.00	3.00	4.00	6.01	8.01
0.68	$\frac{68}{16}$	1.01	1.34	2.02	3.02	4.03	6.05	8.06
0.69	$\frac{69}{16}$	1.02	1.35	2.03	3.05	4.06	6.10	8.13
0.70	$\frac{70}{16}$	1.02	1.36	2.05	3.07	4.09	6.14	8.18
0.71	$\frac{71}{16}$	1.03	1.37	2.06	3.09	4.12	6.19	8.25
0.72	$\frac{72}{16}$	1.04	1.38	2.08	3.11	4.15	6.23	8.30
0.73	$\frac{73}{16}$	1.05	1.39	2.09	3.14	4.18	6.27	8.36
0.74	$\frac{74}{16}$	1.05	1.40	2.10	3.16	4.21	6.31	8.42
0.75	$\frac{75}{16}$	1.06	1.41	2.12	3.18	4.24	6.36	8.48
0.76	$\frac{76}{16}$	1.07	1.42	2.13	3.20	4.26	6.40	8.53
0.77	$\frac{77}{16}$	1.07	1.43	2.15	3.22	4.29	6.43	8.58
0.78	$\frac{78}{16}$	1.08	1.44	2.16	3.24	4.32	6.48	8.64
0.79	$\frac{79}{16}$	1.09	1.45	2.17	3.26	4.35	6.52	8.70
0.80	$\frac{80}{16}$	1.09	1.46	2.19	3.28	4.38	6.56	8.75

*Computed from the formulae $Q = 0.61 A \sqrt{2gh}$.

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The Parshall Measuring Flume

The Parshall flume combines many of the advantages of the weir and submerged orifice. There is no need for a pond above the flume as the velocity of approach has little effect on the accuracy of the measurement. It uses a small amount of head as it can have a high degree of submergence without the necessity of reading

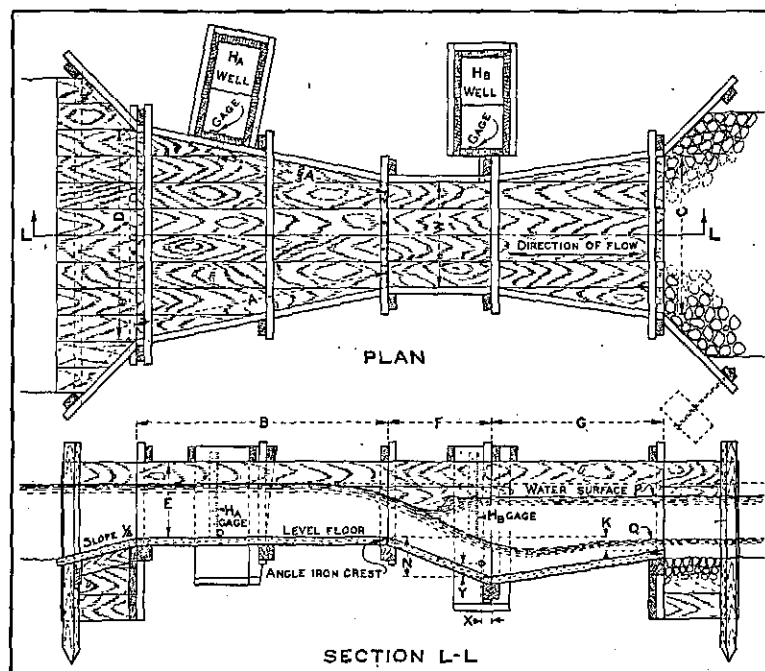
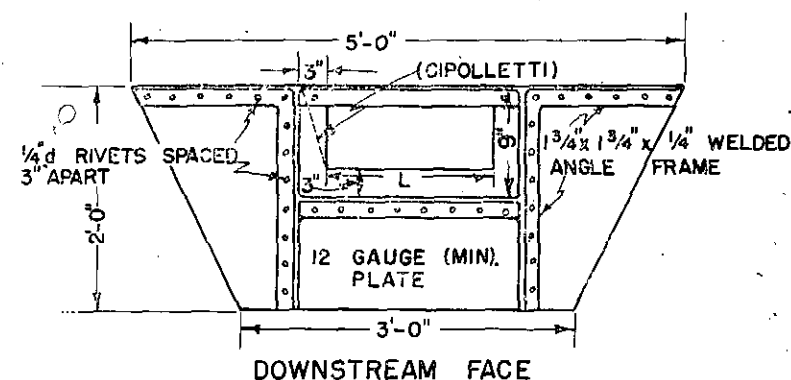


Figure 15.—Parshall measuring flume.

Table 11. Symbol dimensions and capacities of Parshall measuring flume. (Letters refer to Figure 15.)

Free-flow capacity		SYMBOL DIMENSION													
Maximum	Minimum	W	A	2/3A	B	C	D	E	F	G	K	N	X	Y	
Sec. ft.	Sec. ft.	Feet	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft.	Ft.	In.	In.	In.	In.	
1.2	0.03	0.25	1 6%	1 ¼	1 6	7	10 ¼	1 3	½	1	1	2 ¼	1	1 ½	
2.9	.05	.50	2 ⅞	1 4 ½	2	1 3 ½	1 3 ½	1 6	1	2	3	4 ½	2	3	
5.7	.1	.75	2 10%	1 11 ½	2 10	1 3	1 10%	2	1	1 ½	3	4 ½	2	3	
16	.4	1	4 6	3	4 4%	2	2 9 ¼	3	2	3	3	9	2	3	
33	.7	2	5	3 4	4 10%	3	3 11 ½	3	2	3	3	9	2	3	
50	1.0	3	5 6	3 8	5 4%	4	5 1 ½	3	2	3	3	9	2	3	
68	1.3	4	6	4	5 10%	5	6 4%	3	2	3	3	9	2	3	

two heads or making corrections in the free-flow formula. It does not readily clog with floating trash and it keeps itself clean of sand and silt. It requires but one reading of head (H_A) for determining the discharge except in case of extreme submergence.



MEASURABLE FLOW IN C.F.S. (APP.)		
L	RECTANGULAR	CIPOLLETTI
12"	0.2 TO 0.65	0.2 TO 0.65
18"	0.3 TO 1.7	0.35 TO 1.8
24"	0.45 TO 2.3	0.45 TO 2.4

Figure 4.—Portable weir bulkhead for rectangular or Cipolletti notches.

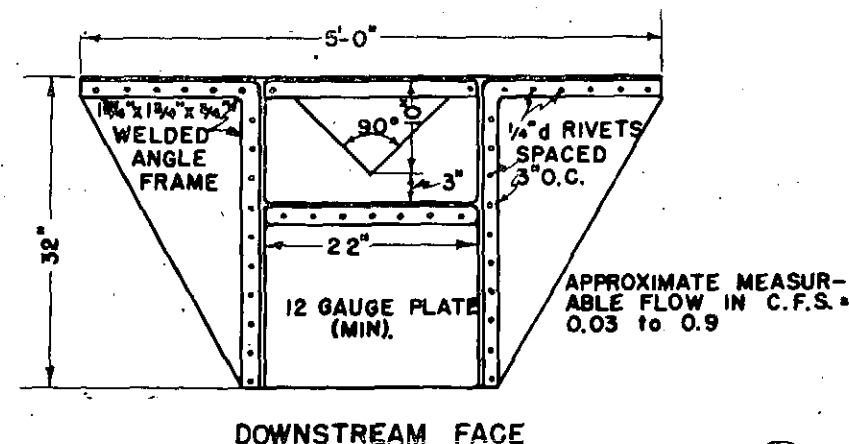


Figure 5.—Portable 90° V-notch weir.

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Very often a weir set in a deep ditch will back the water up far enough to form a suitable weir-pond without further excavation. If the pond is not large enough to cause complete contractions on the weir, it may be enlarged evenly for a distance and then tapered gradually to the ditch section.

When the soil is light and will not hold a simple weir wall or bulkhead, a box is built with wings and cutoff walls as shown in Figure 3.

Portable weirs are usually small and commonly are made of sheet metal suitably reinforced. They may have the weir scales fastened to the bulkhead and, if there is a scale on each side of the notch, the weir can be leveled from the water surface.

Free-flow conditions can be obtained by setting the weir at an elevation that will give free fall and then building up the banks above the weir; or, if there is excess grade below the weir location, the weir may be set low and the ditch below deepened to obtain the same effect.

Weir Scales or Gauges

The weir scale consists of a strip of wood or metal graduated in inches and fractions, feet and decimals, or directly in units of flow or discharge per minute. A scale graduated directly in units of flow will fit all weirs of the same design and size when operated under standard conditions but will not fit another weir of a different design, or of a different crest length.

The scale or gauge may be set in the weir pond as stated under "standard conditions" or may be set in a stilling well or box at the side of the pond. The stilling well is connected to the weir pond by a small pipe set below the water level. The function of the stilling well is to present a water surface at the same elevation as the water surface of the weir pond completely without turbulence or surges. The connecting pipe must be small in comparison to the area of the well or it will transmit surges. The pipe must be kept freely open or the well will not give a reliable reading.

The practice of reading the head by holding a rule on the crest and allowing the velocity of the water to "pile up" on the rule is not recommended although, with a rule of the right proportion and operated by an expert, it gives very close results. If the rule is not of the proper width or leans from the vertical, the reading will not be correct. Gauges are not read directly on the crest of the weir for the reason that the surface of the water has a decided curve downward as it approaches the weir.

Table 12. Free flow discharge through Parshall measuring flume.*

Head H _A Inches	Feet	Discharge, Q, for throat widths, W, of—						
		0.25 foot Sec.-ft.	0.50 foot Sec.-ft.	0.75 foot Sec.-ft.	1.00 foot Sec.-ft.	2.00 feet Sec.-ft.	3.00 feet Sec.-ft.	4.00 feet Sec.-ft.
1 1/8	0.10	0.028	0.05	0.09				
1 1/8	.11	.033	.06	.10				
1 1/8	.12	.037	.07	.12				
1 1/8	.13	.042	.08	.14				
1 1/8	.14	.047	.09	.15				
1 1/8	.15	.053	.10	.17				
1 1/8	.16	.058	.11	.19				
2 1/8	.17	.064	.12	.20				
2 1/8	.18	.070	.14	.22				
2 1/8	.19	.076	.15	.24				
2 1/8	.20	.082	.16	.26	0.35	0.66	0.97	1.26
2 1/8	.21	.089	.18	.28	.37	.71	1.04	1.36
2 1/8	.22	.095	.19	.30	.40	.77	1.12	1.47
2 1/8	.23	.102	.20	.32	.43	.82	1.20	1.58
2 1/8	.24	.109	.22	.35	.46	.88	1.28	1.68
3	.25	.117	.23	.37	.49	.93	1.37	1.80
3 1/8	.26	.124	.25	.39	.51	.99	1.46	1.91
3 1/8	.27	.131	.26	.41	.54	1.05	1.55	2.03
3 1/8	.28	.138	.28	.44	.58	1.11	1.64	2.15
3 1/8	.29	.146	.29	.46	.61	1.18	1.73	2.27
3 1/8	.30	.154	.31	.49	.64	1.24	1.82	2.39
3 1/8	.31	.162	.32	.51	.68	1.30	1.92	2.52
3 1/8	.32	.170	.34	.54	.71	1.37	2.02	2.65
3 1/8	.33	.179	.36	.56	.74	1.44	2.12	2.78
4 1/8	.34	.187	.38	.59	.77	1.50	2.22	2.92
4 1/8	.35	.196	.39	.62	.80	1.57	2.32	3.06
4 1/8	.36	.205	.41	.64	.84	1.64	2.42	3.19
4 1/8	.37	.213	.43	.67	.88	1.72	2.53	3.34
4 1/8	.38	.222	.45	.70	.92	1.79	2.64	3.48
4 1/8	.39	.231	.47	.73	.95	1.86	2.75	3.62
4 1/8	.40	.241	.48	.76	.99	1.93	2.86	3.77
4 1/8	.41	.250	.50	.78	1.03	2.01	2.97	3.92
5 1/8	.42	.260	.52	.81	1.07	2.09	3.08	4.07
5 1/8	.43	.269	.54	.84	1.11	2.16	3.20	4.22
5 1/8	.44	.279	.56	.87	1.15	2.24	3.32	4.38
5 1/8	.45	.289	.58	.90	1.19	2.32	3.44	4.54
5 1/8	.46	.299	.61	.94	1.23	2.40	3.56	4.70
5 1/8	.47	.309	.63	.97	1.27	2.48	3.68	4.86
5 1/8	.48	.319	.65	1.00	1.31	2.57	3.80	5.03
5 1/8	.49	.329	.67	1.03	1.35	2.65	3.92	5.20
6	.50	.339	.69	1.06	1.39	2.73	4.05	5.36
6 1/8	.51	.350	.71	1.10	1.44	2.82	4.18	5.53
6 1/8	.52	.361	.73	1.13	1.48	2.90	4.31	5.70
6 1/8	.53	.371	.76	1.16	1.52	2.99	4.44	5.88
6 1/8	.54	.382	.78	1.20	1.57	3.08	4.57	6.05
6 1/8	.55	.393	.80	1.23	1.62	3.17	4.70	6.23
6 1/8	.56	.404	.82	1.26	1.66	3.26	4.84	6.41
6 1/8	.57	.415	.85	1.30	1.70	3.35	4.98	6.59
6 1/8	.58	.427	.87	1.33	1.75	3.44	5.11	6.77
7 1/8	.59	.438	.89	1.37	1.80	3.53	5.25	6.96
7 1/8	.60	.450	.92	1.40	1.84	3.62	5.39	7.15
7 1/8	.61	.462	.94	1.44	1.88	3.72	5.53	7.34
7 1/8	.62	.474	.97	1.48	1.93	3.81	5.68	7.53
7 1/8	.63	.485	.99	1.51	1.98	3.91	5.82	7.72
7 1/8	.64	.497	1.02	1.55	2.03	4.01	5.97	7.91
7 1/8	.65	.509	1.04	1.59	2.08	4.11	6.12	8.11
7 1/8	.66	.522	1.07	1.63	2.13	4.20	6.26	8.31
8 1/8	.67	.534	1.10	1.66	2.18	4.30	6.41	8.51
8 1/8	.68	.546	1.12	1.70	2.23	4.40	6.56	8.71
8 1/8	.69	.558	1.15	1.74	2.28	4.50	6.71	8.91
8 1/8	.70	.571	1.17	1.78	2.33	4.60	6.86	9.11
8 1/8	.71	.584	1.20	1.82	2.38	4.70	7.02	9.32
8 1/8	.72	.597	1.23	1.86	2.43	4.81	7.17	9.53
8 1/8	.73	.610	1.26	1.90	2.48	4.91	7.33	9.74
8 1/8	.74	.623	1.28	1.94	2.53	5.02	7.49	9.95
9	.75	.....	1.31	1.98	2.58	5.12	7.65	10.2
9 1/8	.76	.....	1.34	2.02	2.63	5.23	7.81	10.4
9 1/8	.77	.....	1.36	2.06	2.68	5.34	7.97	10.6
9 1/8	.78	.....	1.39	2.10	2.74	5.44	8.13	10.8
9 1/8	.79		1.42	2.14	2.80	5.55	8.30	11.0
9 1/8	.80		1.45	2.18	2.85	5.66	8.48	11.2

(Continued on page 26)

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Table 12. Free flow discharge through Parshall measuring flume.* (Cont'd.)

Head H _A		Discharge, Q, for throat widths, W, of—						
		0.25 foot	0.50 foot	0.75 foot	1.00 foot	2.00 feet	3.00 feet	4.00 feet
Inches	Feet	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
9 3/4	.81	.....	1.48	2.22	2.90	5.77	9.63	11.5
9 1/2	.82	.....	1.50	2.27	2.96	5.88	8.79	11.7
9 1/4	.83	.....	1.53	2.31	3.02	6.00	8.96	11.9
9	.84	.....	1.56	2.35	3.07	6.11	9.13	12.2
10 3/4	.85	.....	1.59	2.39	3.12	6.22	9.30	12.4
10 1/2	.86	.....	1.62	2.44	3.18	6.33	9.48	12.6
10 1/4	.87	.....	1.65	2.46	3.24	6.44	9.65	12.8
10	.88	.....	1.68	2.52	3.29	6.56	9.82	13.1
10 3/4	.89	.....	1.71	2.57	3.35	6.68	10.0	13.3
10 1/2	.90	.....	1.74	2.61	3.41	6.80	10.2	13.6
10 1/4	.91	.....	1.77	2.66	3.46	6.92	10.4	13.8
11 3/4	.92	.....	1.81	2.70	3.52	7.03	10.5	14.0
11 1/2	.93	.....	1.84	2.75	3.58	7.15	10.7	14.3
11 1/4	.94	.....	1.87	2.79	3.64	7.27	10.9	14.5
11	.95	.....	1.90	2.84	3.70	7.39	11.1	14.8
11 3/4	.96	.....	1.93	2.88	3.76	7.51	11.3	15.0
11 1/2	.97	.....	1.97	2.93	3.82	7.63	11.4	15.2
11 1/4	.98	.....	2.00	2.98	3.88	7.75	11.6	15.5
11	.99	.....	2.03	3.02	3.94	7.88	11.8	15.8
12	1.00	.....	2.08	3.07	4.00	8.00	12.0	16.0
12 3/4	1.01	.....	2.09	3.12	4.06	8.12	12.2	16.2
12 1/2	1.02	.....	2.12	3.17	4.12	8.25	12.4	16.5
12 1/4	1.03	.....	2.16	3.21	4.18	8.38	12.6	16.8
12	1.04	.....	2.19	3.26	4.25	8.50	12.8	17.0
12 3/4	1.05	.....	2.22	3.31	4.31	8.63	13.0	17.3
12 1/2	1.06	.....	2.26	3.36	4.37	8.76	13.2	17.5
12 1/4	1.07	.....	2.29	3.40	4.43	8.88	13.3	17.8
12	1.08	.....	2.32	3.45	4.50	9.01	13.5	18.1
12 3/4	1.09	.....	2.36	3.50	4.56	9.14	13.7	18.3
12 1/2	1.10	.....	2.40	3.55	4.62	9.27	13.9	18.6
12 1/4	1.11	.....	2.43	3.60	4.68	9.40	14.1	18.9
12	1.12	.....	2.46	3.65	4.75	9.54	14.3	19.1
12 3/4	1.13	.....	2.50	3.70	4.82	9.67	14.5	19.4
12 1/2	1.14	.....	2.53	3.75	4.88	9.80	14.7	19.7
12 1/4	1.15	.....	2.57	3.80	4.94	9.94	14.9	19.9
12	1.16	.....	2.60	3.85	5.01	10.1	15.1	20.2
12 3/4	1.17	.....	2.64	3.90	5.08	10.2	15.3	20.5
12 1/2	1.18	.....	2.68	3.95	5.15	10.3	15.6	20.8
12 1/4	1.19	.....	2.71	4.01	5.21	10.5	15.8	21.0
12	1.20	.....	2.75	4.06	5.28	10.6	16.0	21.3
12 3/4	1.21	.....	2.78	4.11	5.34	10.8	16.2	21.6
12 1/2	1.22	.....	2.82	4.16	5.41	10.9	16.4	21.9
12 1/4	1.23	.....	2.86	4.22	5.48	11.0	16.6	22.2
12	1.24	.....	2.89	4.27	5.55	11.2	16.8	22.5
12 3/4	1.25	.....	.....	4.32	5.62	11.3	17.0	22.8
12 1/2	1.26	.....	.....	4.37	5.69	11.4	17.2	23.0
12 1/4	1.27	.....	.....	4.43	5.76	11.6	17.4	23.3
12	1.28	.....	.....	4.48	5.82	11.7	17.7	23.6
12 3/4	1.29	.....	.....	4.53	5.89	11.9	17.9	23.9
12 1/2	1.30	.....	.....	4.59	5.96	12.0	18.1	24.2
12 1/4	1.31	.....	.....	4.64	6.03	12.2	18.3	24.5
12	1.32	.....	.....	4.69	6.10	12.3	18.5	24.8
12 3/4	1.33	.....	.....	4.75	6.18	12.4	18.8	25.1
12 1/2	1.34	.....	.....	4.80	6.25	12.6	19.0	25.4
12 1/4	1.35	.....	.....	4.86	6.32	12.7	19.2	25.7
12	1.36	.....	.....	4.92	6.39	12.9	19.4	26.0
12 3/4	1.37	.....	.....	4.97	6.46	13.0	19.6	26.3
12 1/2	1.38	.....	.....	5.03	6.53	13.2	19.9	26.6
12 1/4	1.39	.....	.....	5.08	6.60	13.3	20.1	26.9

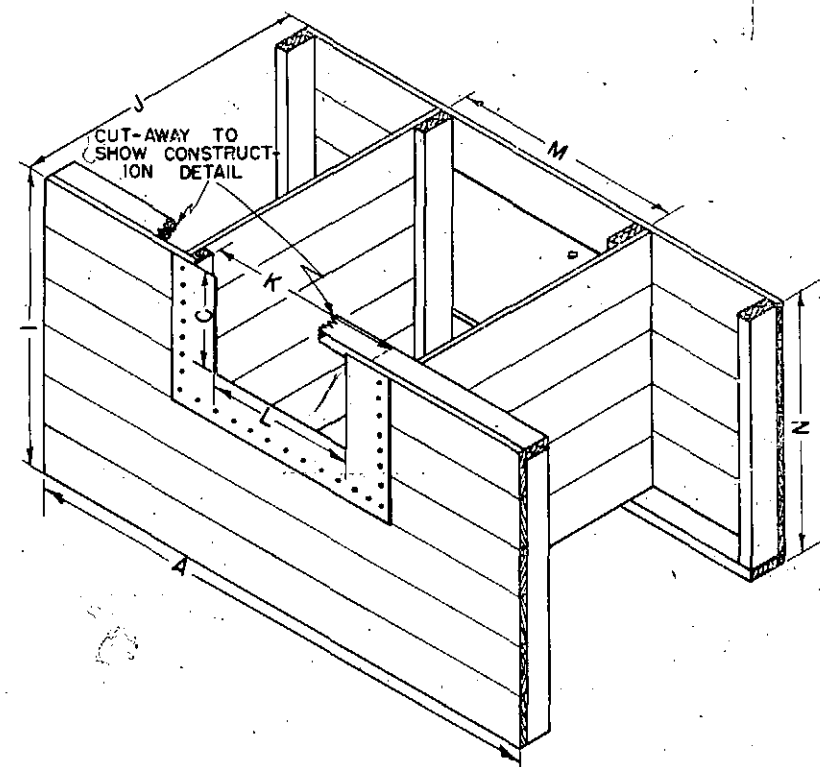
*Letters H_A and W refer to Figure 15.

Figure 3.—Structure for rectangular, Cipolletti, and 90° V-notch weir plates . . . suitable for light soils.

Table 1. Symbol dimensions and capacities for weir bulkhead shown in Figure 3.

Crest length L ft.	Recommended range of measurement in C.f.s.		Symbol dimensions							
			C	A	I	J	K	M	N	
	Rectangular	Cipolletti	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	
For Rectangular and Cipolletti Weirs										
1	.2 to .6	.2 to .6	8	5	2 4	2 6	1 6	1 10	1 9	
1.5	.3 to 1.7	.3 to 1.8	1	6 6	3	3	2	2 6	2 5	
2	.4 to 3.5	.4 to 3.7	1 2	8	3 6	3	2 6	3	2 9	
3	.6 to 9.5	.6 to 10.0	1 6	11	4 6	3 6	3 6	4 6	3 6	
4	.8 to 19.5	.9 to 20.7	2	14	5 8	4	4 6	5 6	4 6	
For 90 V-notch Weirs										
2	.02 to 1.5	.02 to 1.5	7	3 8	2 6	2 2	2 6	2 5		
3	.02 to 4.0	.02 to 4.0	9	6	5	3	3 6	3 4		

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Setting and Size of Parshall Measuring Flume*

Successful operation of the Parshall flume depends upon setting the crest at the correct elevation with reference to the bed of the channel. Free-flow conditions are desirable so that computations for submergence of flow need not be made. The smallest practical size of flume should be selected as a matter of economy, but as the size of the flume decreases the loss of head increases.

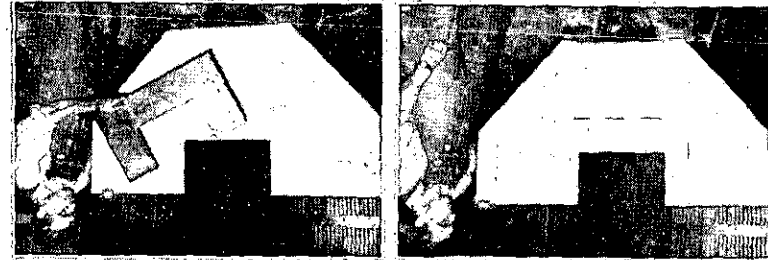
The dimensions as given in Table 11 which correspond to the same letter in Figure 1b, must be followed accurately. The crest must be straight and level and the floor of the converging section must be level in both directions.

Measurement of head should be made in a stilling well with the zero of the gauge level with the crest of the flume. The connection from the flume to the stilling well should take out of the flume at a point exactly two thirds of the length of the converging section back from the crest and about 1 1/2 inches above the floor line.

Combined Regulating and Measuring Devices

There are several manufactured devices which combine regulating and measuring facilities into one structure. These devices have been calibrated so that they accurately measure the water as regulated if they are installed and operated as directed. A special table is necessary for each size and type of device.

You cannot easily make these devices on the farm. They are ordinarily installed and operated by the canal company and are not treated in this bulletin.



Upstream face of weir bulkhead showing metal rectangular weir plate



Downstream face of weir bulkhead with out weir plate

Looking upstream on installed weir. Note the gravel and rock protecting apron and the staff gauge location and staff gauge location



Left: The installed weir structure in operation

Figure 2.—This type of weir structure is easy to make, install, and operate and is adapted to use in heavy and medium textured soils.

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*Complete instructions for setting, size, construction, and operation of Parshall measuring flume are given in USDA Farmers' Bulletin No. 1683, "Measuring Water in Irrigation Channels," by R. L. Parshall.

Appendix I

Equivalents

- 1 cubic foot = 7.48 gallons or approximately 7.5 gallons.
- 1 cubic foot of water weighs about 62.4 pounds.
- 1 cubic foot per second (c.f.s.) = 448.8 gallons per minute or approximately 450 gallons per minute = 50 miner's inches (Idaho).
- 1 cubic foot per second flowing 24 hours = 1.9835 acre-feet or approximately 2 acre-feet.
- 1 cubic foot per second flowing 12 hours = .9917 acre-feet or approximately 1 acre-foot.
- 1 cubic foot per second flowing 1 hour = .9917 acre-inches or approximately 1 acre-inch.

The table of equivalents may be used to determine the depth of water applied to a field when the time and flow are known.

Example: A flow of 60 miner's inches (Idaho) has been running on a 20-acre field for 48 hours. How much water has been applied if it is evenly distributed:

(a) From the table of equivalents, 1 cubic foot per second equals 50 miner's inches; therefore, 60 inches will equal

$$50 \times 1 \text{ cfs or } 1.2 \text{ c.f.s.}$$

(b) From the table of equivalents, 1 cubic foot per second flowing 1 hour equals 1 acre inch; 1.2 c.f.s. flowing for 1 hour will equal 1.2×1 acre inches = 1.2 acre inches per hour.

(c) 1.2 acre inches per hour $\times$ 48 hours equals 57.6 acre inches in 48 hours.

(d) As the field is 20 acres in size and the 57.6 acre inches are uniformly distributed over it, there will be a uniform application of $57.6 \div 20$ inches, or, 2.88 (about $2\frac{7}{8}$ inches) inches depth applied.

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a wooden bulkhead, the weir notch should be beveled on the downstream side to an angle of 45 degrees so that the water flowing over the weir will not touch the bulkhead or weir notch except at the upstream edge and will have an air pocket under the sheet of falling water. When the edges of the weir notch are made of metal strips nailed to the wall, the wooden notch is beveled or is cut enough larger to obtain the same effect. As wooden weir notches are likely to crack and warp, metal strips are always desirable.

The weir crest must be level and accurate as to length ($\frac{1}{8}$ inch error in the length of a 12-inch weir will change the discharge approximately 1 percent.)

The level of the water downstream from the weir must not be higher than the weir crest at the maximum flow to be measured, or there will be no air pocket under the crest of falling water and free-flow conditions will not result. (All discharge tables in this bulletin are for free-flow conditions although the Parshall measuring flume may be partly submerged without altering the free-flow formula.)

The depth of the water flowing over the crest of the weir should not be less than 2 inches (.17 ft.) for accurate measurement, nor more than one-third the crest width. For heads greater than one-third the crest width special precaution must be taken to insure complete contractions.

The weir gauge must be set away from the weir notch. It may be set on the weir wall far enough from the side of the notch to be in practically still water. A better place to set the gauge is 3 or 4 feet upstream from the notch and as near the side of the weir pond as possible and yet be in the water at all discharges. The zero of the gauge should be set with a good level at the exact elevation of the weir crest. (Do not set the gauge by filling the pond with water to the point where it starts to flow over the weir crest. Such a setting will not be correct. The water surface raises somewhat above the weir crest before it begins to pour over.)

Construction and Setting of Weirs

Weirs may be constructed of wood, metal, or concrete and may be either portable or permanent. The simplest type of weir installation is a notch cut in a plain wooden bulkhead set across the stream where there is ample fall. When the soil is of a nature that will hold the bulkhead, the installation may be made as shown in Figures 2 and 10.

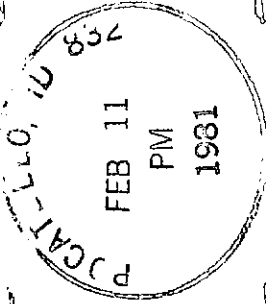
MICROFILMED

DEPARTMENT OF WATER RESOURCES

EASTERN DISTRICT OFFICE

133 SHCUP AVE.

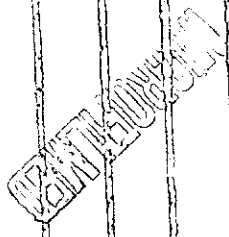
IDAHO FALLS, IDAHO 83401



11

P.M.

1.11



Dept of Water Resources

State of Idaho

James Goodland
Route 11, Box 120
Salmon, ID 83467

Boise Idaho 83720

Water Review Board in Stock matter

RECEIVED

MAR 22 1981 3-10-81

UNITED STATES DEPARTMENT OF THE INTERIOR

Water Resources Board

Check in all of my water records
I can find for you.

Thank you

P.S.

Please send Mr. Henderson & family
copies as I don't have access to a
copy machine.

Thank you

RECEIVED

This table & book was given to me by a S. C. S. office manager back in the late sixties, say around 1967 or 8. I couldn't find any tables around that showed the measurement for an 8' Resting-indur weir so I took the height of the water or measurement down to him and he marked it in the book and gave me the book. Also the other papers page no.

9-35 - 9-36 - 9-37 is a chart the County agent gave. How Haggland (manager for Pine Cr. Ranches) sometime in the seventies probably 1976 or 7. showing the size of our weir but showing one measurement he made of 11.6 in on page 9-35

MICROFILMED

18

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

Complete items 1-2, and
Add your address in the "RETURN TO" space on
reverse.

1. The following service is requested (check one.)

☐ Show to whom and date delivered. 1991.....

☐ Show to whom, date and address of delivery.

☐ RESTRICTED DELIVERY

Department of Water Resources

☐ RESTRICTED DELIVERY ☐ District Office

Show to whom, date, and address of delivery. \$ _____

(CONSULT POSTMASTER FOR FEES)

2 ARTICLE ADDRESSED TO:

Kent W. Foster.
P.O. Box 219
Black Falls, Idaho

3. ARTICLE DESCRIPTION:

REGISTERED NO. | CERTIFIED NO. | INSURED NO.

1279

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐ Addressee ☐ Authorized agent

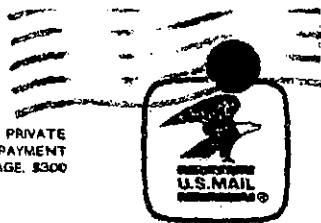
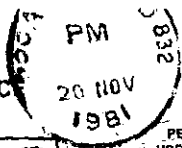
4. DATE OF DELIVERY

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

UNDERK'S
INITIALS

UNITED STATES POSTAL SERVICE
OFFICIAL BUSINESS



SENDER INSTRUCTIONS

Print your name, address, and ZIP Code in the space below.

- Complete items 1, 2, and 3 on the reverse.
- Attach to front of article if space permits, otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.

PENALTY FOR PRIVATE
USE TO AVOID PAYMENT
OF POSTAGE, \$300

RECEIVED

NOV 30 1981

Department of Water Resources

RETURN



Dept. of Water Resources

(Name of Sender)

Eastern Dist. Office.

150 Shoop Ave

(Street or P.O. Box)

Shelo Falls, Minn.

(City, State, and ZIP Code)

WATER RIGHT NUMBER 74-0404

OWNER LAST NAME - STODDARD

FIRST NAME - JAMES F.

ORIG OWNER -

OWNER LAST NAME - STODDARD

FIRST NAME - JEAN L.

ORIG OWNER -

ADDRESS LINE 1 - RT. 1

ADDRESS LINE 2 -

ADDRESS LINE 3 -

CITY - SALMON

STATE - ID ZIP CODE - 83467

SOURCE - LEMHI RIVER

TRIBUTARY OF -

STAGE - DECREE

STATUS -

PRIORITY - 06-01-1914 COUNTY - LEMHI

TOTAL DIV. RATE - 10.3000 -CFS

TOTAL DIV. VOLUME -

.00 AFA TRER/AMEND -

WATER DIST. -

DLE/CAREY ACT -

RIGHT BASIS - B

DIVERSION POINT - SENE 05 18N 24E LOT REDIV -

FROM - 04-01 TO - 11-01 USE - IRRIGATION

USE DIV. RATE - 10.3000 CFS USE DIV. VOLUME - .00 AFA

USE - IRRIGATION

PLACE OF USE - TWN 19N RNG 24E SEC 20

TRACT NENE LOT

AC 07 TRACT

NWNE LOT

AC 37

TRACT SWNE LOT

AC 36 TRACT

SENE LOT

AC 08

TRACT SENW LOT

AC 02 TRACT

NESW LOT

AC 05

TRACT NESE LOT

AC 06 TRACT

NWSE LOT

AC 39

USE - IRRIGATION

PLACE OF USE - TWN 19N RNG 24E SEC 17

TRACT SWNE LOT

AC 23 TRACT

NWSE LOT

AC 18

TRACT SWSE LOT

AC 26 TRACT

SESE LOT

AC 03

DECREE NAME -

DATE -

TOTAL ACRES

210

REMARKS - AC. IRR.=209.8.

DIV. L-32.

NON IRRIG USE -

OTHER RIGHTS FOR SAME USE -

PROOF DUE -

PERMIT/DENIED -

PROTESTED -

HEARING -

OLD NO. -

PROOF MADE - FLD EXAM - COND. OF APPROVAL -

DIVERSION MEANS -



STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
EASTERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

525-7161
150 Shoup
Idaho Falls, ID 83401

December 17, 1980

James F. Stoddard
Route #1, Box 120
Salmon, ID 83467

RE: Applications for Transfer of Water Right Nos. 74-0247, 74-0249 & 74-0404

Dear Mr. Stoddard:

This office acknowledges receipt of your withdrawal of the above referenced applications for transfer. We will take no further action in the processing of these applications and they will be voided from our records.

If you have any questions concerning this matter, please feel free to contact our office.

Respectfully submitted,

ERNEST CARLSEN
Sr. Resource Analyst

EC:kw

MICROFILMED

In the matter of applications
for transfer #74-0247,
#74-0249 & #74-0404
in the name of James
Stoddard, filed 9-25-1973)

Withdrawal

Finding it less complicated and more economical to
file two new applications for transfer on rights #74-0247,
74-0248, 74-0249 & 74-0404, I hereby withdraw the
three previous applications for transfer listed above.

Signed this 15th day of December, 1980.

James B. Stoddard

MICROFILMED

1515 Lincoln Road

March 7, 1974

Re: Application for Transfer of Water Right No. 74-0247, 74-0249 & 74-0404

Mr. James F. Stoddard
Route #1
Salmon, Idaho 83467

Dear Mr. Stoddard:

As you are aware, we holding the above referenced applications awaiting additional information as requested in previous letters. It was my understanding from conversations with you during January of this year at the Lemhi River Adjudication Hearings, that you wished to withhold further action on these application until the Lemhi River Adjudication was complete.

If this is what you wish to do, the Department will be happy to continue delaying the processing of the applications. However, if you do wish immediate action on the application, please provide re-executed documents as requested in the letter of November 2, 1973.

If you have any questions concerning this matter, please contact this office.

Very truly yours,

NORMAN C. YOUNG
District Engineer

mb

1515 Lincoln Road

November 9, 1973

James F. Stoddard
Route #1 Box 120
Salmon, ID 83467

Dear Mr. Stoddard:

Pursuant to your letter which was received in this office under the above date, enclosed please find several applications for transfer of water right.

If we can be of further assistance, please contact us.

Very truly yours,

NORMAN C. YOUNG
District Engineer

NCY:mb

Enclosures

RECEIVED
NOV 14 1973
FBI - SALT LAKE CITY

State of Ida
Water Administration
Idaho Falls, Idaho

Mr. Young,

Please send new forms as these you have
filled out are not pursuant to our conversation
of the other day.

Thank you
Frank Stoddard
R#1 Box 120
Salmon Ida.

RECEIVED

NOV 9 1973

Department of Water Administration
Eastern District Office

MICROFILMED

1515 Lincoln Road

November 2, 1973

Re: Applications for Transfer of Water Right No. 74-0247, 74-0249 & 74-0404

Mr. & Mrs. James F. Stoddard
Route #1 Box 120
Salmon, Idaho 83467

Dear Mr. & Mrs. Stoddard:

I have re-executed the transfer forms pursuant to our discussion in Salmon last week. Review them, and if they meet with your approval, both husband and wife should sign the three transfers. Also, the three transfers should again be notarized.

You should also include a copy of the deed showing ownership of the land the water is being transferred from and a copy of the easement allowing access to the new point of diversion in Section 25.

Upon your re-submitting, the Department will re-evaluate, and advertise the transfers pending final action.

Should you require further assistance in this matter, please do not hesitate to contact this office.

Very truly yours,

NORMAN C. YOUNG
District Engineer

NCY:mb

Enclosures: 3 transfers

NOTICE OF PROPOSED CHANGE OF WATER RIGHT

NO. 74-0404

Notice is hereby given that James F. &/or Jean L. Stoddard of Route 1 Box 120, Salmon, Idaho have applied to the Department of Water Administration for a change of the place of use of the waters of Lemhi River tributary to Salmon River. The right sought to be changed is evidenced by decree to Joseph L. & Fred B. Pattee in case of Margaret Mahaffey -vs- Fred B. Pattee, dated August 15, 1925 in 6th Judicial District Court, Lemhi County and is recorded as follows:

Amount: 215 miners inches Priority: June, 1914

Decreed Point of Diversion: SE $\frac{1}{4}$ NE $\frac{1}{4}$, Sec. 5, T. 18N, R. 24E, B.M.

The water is used for irrigation purposes within the SW $\frac{1}{4}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 17; NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$, Sec. 20, T. 19N, R. 24E, B.M.

TO BE CHANGED AS FOLLOWS

The water will be used within the SE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 16; SW $\frac{1}{4}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 17; NE $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$, Sec. 20; NW $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 21, T. 19N, R. 24E, B.M.

Any protest against approval of the above proposed change of water right must be filed with the Idaho Dept. of Water Administration, 1515 Lincoln Road, Idaho Falls, Idaho 83401, on or before October 29, 1973.

R. KEITH HIGGINSON

Director

Published in the Recorder-Herald, Salmon, Idaho, on October 11 and October 18, 1973.

RECORDED

NCY
9/28/73

NOTES ON TRANSFER 74-0404 (STODDARD) (LEMMI RIVER)

- (1) IS THE PRIORITY DATE CLAIMED CORRECT?
- (2) DECREE DOES NOT GIVE P.D., P.U., OR ACREAGE.
- (3) Acreage listed in item 8 agrees well with Saxton's map.
- (4) P.D. AGREES WITH SAXTON'S MAPS.
- (5) DIFFICULT TO BE CERTAIN BUT IT APPEARS THAT DECREE EXCEEDS THE RATE BEING TRANSFERRED. WHAT HAPPENS TO THE REMAINDER?
- (6) APPEARS ONLY 7.1 ACRES TO BE DROPPED WHILE 932.5 NEW ACRES WILL BE ADDED.
- (7) ACQUISITION OF BLM PROPERTY (?)
- (8) DECREE rate / acre = ?
~~PRESENT~~ rate / acre = $4.3 \text{ cts} / 194.6 = 0.022 \text{ cts/acre}$
TRANS rate / acre = $4.3 \text{ cts} / 620 = 0.007 \text{ cts/acre}$

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RECORDED
INDEXED
OCT 11 1973