Figure 1

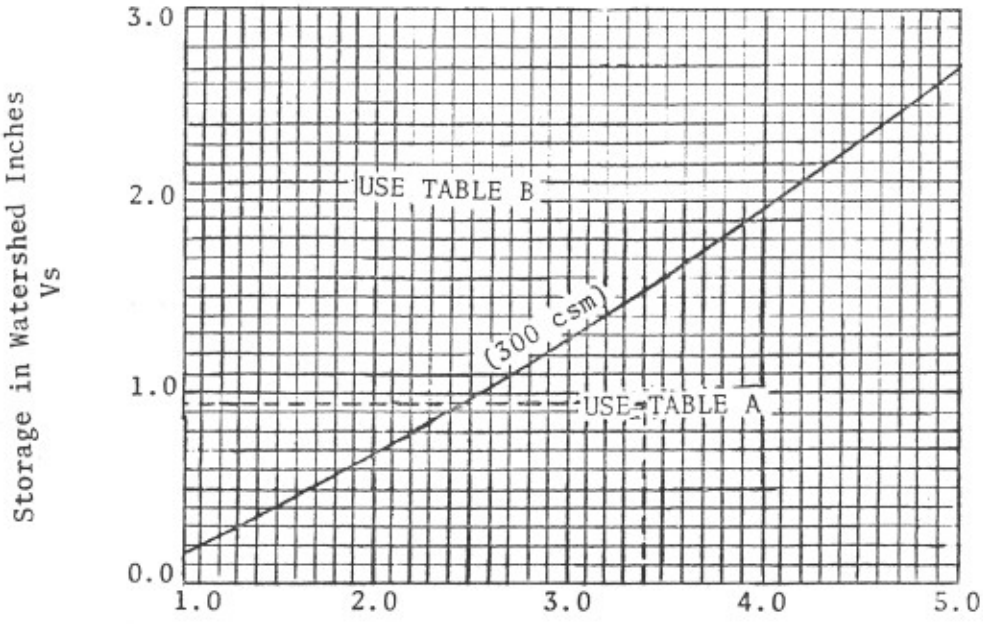

Figure 1 and Tables A and B can be used to determine the capacity of principal spillways considering temporary storage. Figure 1 is a plot of Vs versus Vr to determine which Table to use. Table A is for pipe flow structures with a discharge over 0.47 $ft^3/s/acre$ (300 csm) and Table B is for pipe flow structures with a discharge under 0.47 $ft^3/s/acre$.

Description of Terms:

Vs = Volume of temporary storage, acre-feet or in.
Vr = Volume of runoff, acre-feet or in.
Qo = Required principal spillway discharge, ft^3/s (Table A) and $ft^3/s/acre$ (Table B)
Qi = Peak flow from design storm, ft^3/s

Exhibit 11-4 Estimate of principal spillway discharge allowing for temporary storage.

Table A

Vs/Vr	0.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	1.00	.99	.98	.96	.95	.94	.92	.91	.90	.88
0.1	.87	.85	.84	.82	.81	.79	.78	.76	.75	.74
0.2	.70	.67	.64	.61	.58	.56	.54	.52	.50	.48
0.3	.47	.45	.44	.42	.41	.40	.39	.38	.37	.36
0.4	.35	.32	.30	.28	.26	.24	.23	.21	.20	.19
0.5	.18	.17	.16	.15	.14	.13	.12	.12	.11	.11
0.6	.10	.10	.09	.09	.08	.08	.07	.07	.07	.07
0.7	.06	.06	.06	.06	.05	.05	.05	.05	.04	.04
0.8	.04	.04	.04	.04	.04	.03	.03	.03	.03	.03

Table A: Values of Qo/Qi for pipe flow structures with a discharge over 0.47 $ft^3/s/acre$ (300 csm).

Example #1:

Given: Vs = 5.9 acre-feet or 0.94 in.
Vr = 21.1 acre-feet or 3.4 in.
Qi = 360 ft^3/s
D.A. = 75 acres

Find: Qo

Solution: Find the point for Vs of 0.94 in. and Vr of 3.4 in. in figure 1. Since the point is below the line, use Table A.

$$\frac{Vs}{Vr} = \frac{0.94}{3.4} = 0.28 \text{ (Vs and Vr must be in same units)}$$

$$\frac{Qo}{Qi} = 0.50 \text{ (From Table A)}$$

$$Qo = 0.50 \times Qi = 0.50 \times 360 \text{ ft}^3/s = 180 \text{ ft}^3/s$$

Exhibit 11-4 (cont.)

Table B

VALUES OF Qo IN $ft^3/s/acre$

STORAGE IN WATERSHED INCHES

Vr \ Vs	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4
1.0	.89	.39	.19	.10	.06																	
1.2		.62	.33	.20	.12	.08	.05	.04														
1.4			.57	.31	.21	.14	.09	.07	.05													
1.6				.57	.33	.23	.16	.11	.08	.06												
1.8					.59	.37	.25	.19	.13	.09	.06											
2.0						.64	.42	.27	.21	.14	.09	.06										
2.2							.62	.45	.32	.23	.13	.08	.05									
2.4								.65	.49	.34	.20	.12	.08	.05								
2.6										.49	.28	.17	.11	.08	.05							
2.8										.69	.41	.25	.16	.11	.08	.05						
3.0											.55	.34	.22	.15	.11	.08	.05					
3.2												.49	.31	.20	.14	.10	.08	.05				
3.4												.66	.44	.28	.19	.14	.10	.08	.05			
3.6													.56	.39	.26	.19	.14	.10	.08	.05		
3.8														.49	.34	.23	.16	.13	.10	.08	.05	
4.0														.65	.45	.31	.22	.17	.13	.09	.07	.05
4.2															.55	.41	.28	.20	.16	.12	.09	.07
4.4																.49	.36	.25	.21	.14	.12	.09
4.6																.62	.45	.33	.27	.19	.15	.12
4.8																	.55	.43	.33	.23	.19	.14
5.0																		.49	.39	.31	.23	.18

RUNOFF IN WATERSHED INCHES

DISCHARGE VALUES TO THE LEFT OF LINE ARE TO BE USED FOR INTERPOLATION ONLY.

HOWEVER, INTERPOLATED VALUES SHOULD NOT EXCEED .47 $ft^3/s/acre$

Table B is for pipe flow structures with a discharge under 0.47 $ft^3/s/acre$ (300 csm).

Example #2:

Given: Vs = 34 acre-feet or 1.6 in.
Vr = 3.2 in.
Qi = 420 ft^3/s
D.A. = 256 acres (drainage area)

Find: Qo

Solution: Use Table B (determined from Figure 1)
Qo = 0.31 $ft^3/s/acre$ (from Table B)
= 0.31 $ft^3/s/acre$ X 256 acres = 79 ft^3/s

Exhibit 11-4 (cont.)

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