

Table 2.3
Elevation Storage Discharge - John Street Gravity Pond Option 2
John Street Feasibility Design Analysis Report

Contour Elevation NAVD 1988	Depth	Contour Area	Incremental Volume	Incremental Volume	Cumulative Volume	1st Row of Ports Discharge	2nd Row of Ports Discharge	3rd Row of Ports Discharge	4th Row of Ports Discharge	Principal Spillway Grate Discharge	Principal Spillway Outfall Pipe Discharge	Total Principal Spillway / Outfall Pipe Discharge	Emergency Spillway Discharge	Total Discharge Rating Curve	Comment
		Orifice Diameter (inches)				6" x 8"	6	6	0	6'-8" x 6'-8"	15				
		Number of Openings				3	6	6	0	1	1				
(ft)		(sq ft)	(cu ft)	(ac-ft)	(ac-ft)	(cfs)	(cfs)	(cfs)		(cfs)		(cfs)	(cfs)	(cfs)	
(d)						(a)	(a)	(a)	(a)	(a)	(a,b)	(e)	(c)		
4947.40	0.00	28181	0	0.0000	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Principal Spillway Invert/Pond Invert/1st row of ports
4948.03	0.63	29387	18134	0.4163	0.42	3.8	0.0	0.0	0.0	0.0	2.3	2.3	0.0	2.3	2nd row of ports
4948.40	1.00	30660	11109	0.2550	0.67	4.7	3.4	0.0	0.0	0.0	4.5	4.5	0.0	4.5	
4948.65	1.25	31521	7773	0.1784	0.85	5.3	4.4	0.0	0.0	0.0	4.6	4.6	0.0	4.6	
4949.00	1.60	32725	11243	0.2581	1.11	6.0	5.5	0.0	0.0	0.0	5.7	5.7	0.0	5.7	3rd row of ports
4950.00	2.60	35866	34296	0.7873	1.90	7.6	7.8	5.6	0.0	0.0	8.2	8.2	0.0	8.2	
4950.57	3.2	39071	21357	0.4903	2.39	8.4	8.9	7.0	0.0	0.0	9.3	9.3	0.0	9.3	Top of Principal Spillway Grate
4951.00	3.6	40054	17012	0.3905	2.78	9.0	9.6	7.9	0.0	138.1	10.0	10.0	0.0	10.0	
4952.00	4.6	42339	41196	0.9457	3.72	10.2	11.1	9.7	0.0	251.9	11.6	11.6	0.0	11.6	
4953.00	5.6	45679	44009	1.0103	4.73	11.2	12.4	11.2	0.0	328.4	13.0	13.0	0.0	13.0	
4954.00	6.6	49091	47385	1.0878	5.82	12.2	13.6	12.5	0.0	390.1	14.2	14.2	0.0	14.2	
4955.00	7.6	52569	50830	1.1669	6.99	13.1	14.7	13.7	0.0	443.4	15.3	15.3	0.0	15.3	
4956.00	8.6	56090	54330	1.2472	8.23	13.9	15.7	14.8	0.0	490.8	16.4	16.4	0.0	16.4	Emergency Spillway
4956.20	8.8	56755	11285	0.2591	8.49	14.0	15.9	15.0	0.0	499.8	16.6	16.6	18.6	35.2	
4956.40	9.0	57421	11418	0.2621	8.76	14.2	16.1	15.2	0.0	508.6	16.8	16.8	52.6	69.4	
4956.60	9.2	58086	11551	0.2652	9.02	14.4	16.3	15.4	0.0	517.3	17.0	17.0	96.7	113.7	
4956.80	9.4	58752	11684	0.2682	9.29	14.5	16.5	15.6	0.0	525.8	17.2	17.2	148.8	166.0	
4957.00	9.6	59417	11817	0.2713	9.56	14.7	16.7	15.8	0.0	534.1	17.4	17.4	208.0	225.4	Top of Pond (artificial)

NOTES:

(a) Orifice equation and coefficient were obtained from Equation 4-10 and Table 4-3 from "Handbook of Hydraulics" Sixth Edition, by Brater & King, 1976.

$$Q = Ca\sqrt{2gh}$$

C = 0.590 g=32.2 ft/sec^2, a=area (sq ft) h=head (ft)

Weir equation and "C" coefficients were obtained from Equation 5-10 and Table 5-3 from "Handbook of Hydraulics" Sixth Edition, by Brater & King, 1976.

$$a = \pi D^2 / 4$$

(full area formula of a circle)

	k	Material	"n"	Slope (ft/ft)
(b) Manning's Equation Parameters	1.486	Concrete	0.013	0.005
Manning's Equation (equation 19.12(b)) and "k" value (page 19-4) were obtained from from "PE Civil Reference Manual" 16th edition, by Michael R. Lindeburg P.E, 2019				
Flow depth increments, wetted perimeter and flow area of pipe were computed using Bentley FlowMaster.				

(c)Emergency Spillway flows were computed based on the following data used in the weir equation
Q = CLH^ 1.5 C = discharge coefficient, L = spillway length perp. to flow (ft), H = head (ft)

Emergency Spillway C =	2.60	L =	80	Emergency Spillway Elevation =	4956.00
------------------------	------	-----	----	--------------------------------	---------

Length assumed along top of pond embankment and elevations extended above emergency spillway to allow for rating curve to function if flow spills over top of emergency spillway.

(d) Data Source : Contours generated from DEMs provided by MRCOG 2018.

(e) The combined discharge of the reverse incline ports and the grate (A), will govern the discharge until the principal spillway outfall pipe becomes fully submerged. When the sum of (A)s is greater than outfall pipe capacity then outfall pipe capacity governs the discharge.

grey box means must input data

