Drainage Calculations

for

Las Pilitas Rock Quarry

San Luis Obispo County, California

REGISTERED PROFESSIONAL ENGINEER
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Exp. 12/2010
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August 2009

TARTAGLIA ENGINEERING
CIVIL ENGINEERS
ATASCADERO, CALIFORNIA

INTRODUCTION

Hydraulic Calculations are provided as part of the Mining and Reclamation Plans for the Las Pilitas Rock Quarry. The majority of the analysis focuses on detention pond sizing for each phase of operations. Two (2) year undeveloped release rates are admissible per San Luis Obispo Storm Drainage Standards. Metered flows are attained through the use of orifices placed in vertical risers. The risers are modified (addition of more orifices) to release larger quantities of water as the mining area (area of disturbance) increases. Basins are also enlarged to handle the increased runoff surge in respect to area of disturbance. Runoff is conveyed to the basins via channels cut in rock and overland (also exposed rock) so erosive behavior will not be a concern. Metered basin discharges are released into established, rip-rap lined watercourses to dissipate energy and erosive behavior.

A Hydraulic Summary is provided highlighting key elements of the drainage analysis. Results are presented per phase as mining operations progress. Enclosed in the report appendix are phased drainage maps indentifying watershed areas, hydraulic calculations, basin locations and size, pond performance and points of discharge. Additionally, all research data, San Luis Obispo County Standards and other pertinent information used in this analysis are provided for agency reference.

SITE CHARACTERISTICS

Las Pilitas Rock Quarry Watershed will encompass approximately 40.4 acres of disturbed surface area (access road and mined area) upon its completion of all phases. Existing terrain consists of steep mountainous areas with slopes between 30 and 75% over the majority of the site. Vegetation consists of native grasses and valley oaks near the bottom (southerly) portions of the site with chamise chaparral and other medium shrubbery dominating the northerly steeper areas. Vegetation coverage is considered moderate to dense in its current state. In place topsoil displays slow infiltration properties based on Soil Survey data (USDA – Natural Resources Conservation Service) resulting in a Hydrologic Soil Group of "C".

It should be noted that additional, undisturbed catchments of 4.8 acres will "run-on" and through the mined areas but not be allowed to enter the basins. This "run-on" will be routed along the uppermost bench channels capable of reaching the exterior limits of mining and released into established watercourses. The excavated areas above the bench channels are accounted for as they are included in the "developed" area of the watershed.

METHOD OF ANALYSIS

- The **Rational Method** was used for 2-yr. undeveloped peak flow release rates.
- The **SCS Hydrograph Method** was used to determine 50-yr. developed peak in-flow rates for basin routing and outlet structure performance analysis.

Rational Method

Watershed Area – Determined using AutoCAD polyline areas.

Time of Concentration – Per SLO Co. Std. H-2; extreme relief w/ relatively short travel paths; Use table minimum of 10 minutes (Std. H-4).

Rainfall Intensity – Per SLO Co. Standard H-4.

Runoff Coefficient - Per SLO Co. Standard H-3A.

SCS Hydrograph Method

Watershed Area – Determined using AutoCAD polyline areas.

Time of Concentration – Consistent with above; $T_c = 10$ minutes

Rainfall Intensity – 50 year; 24 hour precipitation total in inches per NOAA Atlas 2 – Precipitation-Frequency Atlas of the Western United States, Vo. XI - California

Runoff Coefficient (Curve Number) - Curve number from Hydrologic Soil Group using Soil Survey and Technical Release 55. (Natural Resources Conservation Service).

Site Hydraulic Summary

--------See Appendix for detailed Calculations and Phased Watershed Maps-------

50 Year Event	Entrance Rd. Pond	Phase 1A	Phase 1B	Phase 2A	Phase 2B	Phase 3A	Phase 3B
Watershed Area (Acres)	0.44	8.78	11.74	7.10	10.70	26.8	31.60
2 yr. Allow. Release Rate (c.f.s.)	**0.40**	**9.10**	**12.17**	**7.36**	**11.10**	**27.80**	**32.80**
50 yr. Peak in-flow (c.f.s.)	1.54	19.40	26.56	17.76	26.67	63.99	76.21
Required Basin Volume (ft^3)	2,839	28,746	46,362	45,115	71,420	164,533	207,991
Actual Basin Volume (ft^3)	6,000	36,500	50,820	54,190	83,800	168,500	218,500
Actual Peak Basin Discharge Rate (c.f.s.)	**0.40**	**9.10**	**11.77**	**6.61**	**10.42**	**27.00**	**33.25**

Conclusion:

Site Drainage Analysis focused on detaining increased storm water runoff by means of Detention Basins. Water conveyance to the basins are via excavated rock channels in the steeper, benched areas while the flatter "base" areas convey water overland in very subtle, broad swales. Waterway substrates are natural, exposed rock and gravels that are highly resistant to erosive conditions. Additionally, the lower base areas will slow velocity and allow any of the smaller fines to settle out further reducing the accumulation of silt in the ponds.

It has been demonstrated that sufficient capacity will exist for a "developed" 50 year storm event in the proposed basins while maintaining a metered, 2 year undeveloped release rate through the use of orifice and riser outlet structures. Runoffs experienced by the existing creeks will actually decrease for larger storm events. The previously undeveloped watershed will now only receive 2-year discharge rates even when a 50 year event occurs. As previously mentioned, all discharge points are into established, natural watercourses with rock rip-rap energy dissipaters placed at the point of outlet to minimize deterioration of the natural creeks and channels.

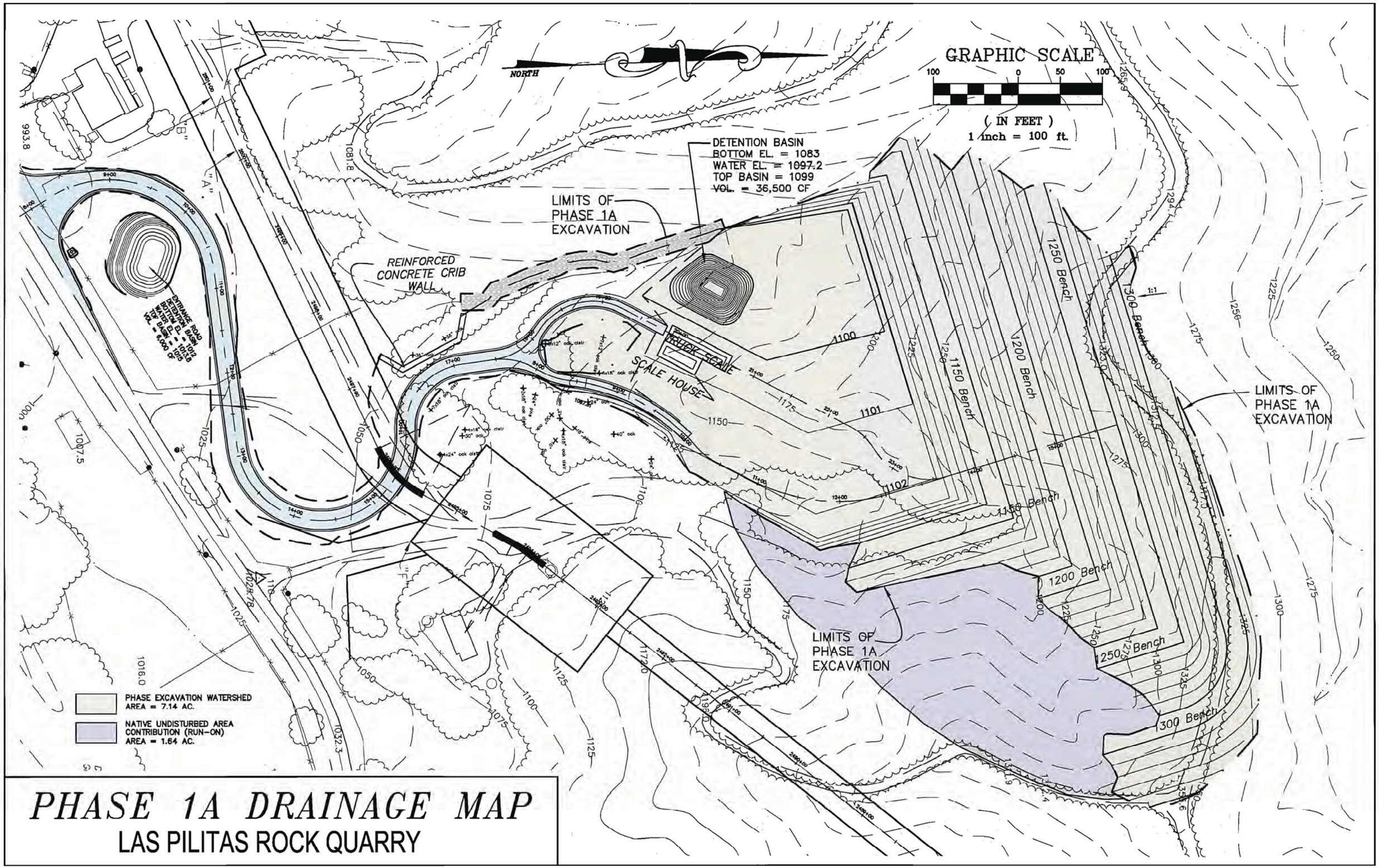
It is anticipated ponds will evolve and remain in service as mining operations expand and ultimately terminate. Once site mitigation and reclamation begin, peak runoffs will decrease resulting in a reduction to detention requirements and may be addressed at that time.

Appendix inclusions

Phased Drainage Maps

Basin Sizing, Storm Drain Peak Flows
& Performance

Soil Survey Data
&
San Luis Obispo County Standards



PHASE 1A DRAINAGE MAP

LAS PILITAS ROCK QUARRY

TARTAGLIA ENGINEERING
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P.O. Box 1930
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(805) 466-5660
FAX (805) 466-5471

JOB 08-23
SHEET NO. _____ OF _____
CALCULATED BY SAK DATE 8/7/09
CHECKED BY _____ DATE _____
SCALE QUARRY POND SIZING

– PHASE 1A – ALLOWABLE 2YR UNDEVELOPED RELEASE RATE

– POND SIZING WILL BE BASED ON "DETENTION" CRITERIA. THAT IS, POND MAY RELEASE 2 YR "UNDEVELOPED" DISCHARGE & BE SIZED FOR 50 YR "DEVELOPED" IN FLOW.

– USING RATIONAL METHOD & SLO COUNTY STANDARDS.

⊙ WATERSHED AREA

total undeveloped WATERSHED AREA = 8.78 Ac.

⊙ TIME OF CONCENTRATION

– STEEP RUGGED TERRAIN, RELATIVELY SHORT PATH OF TRAVEL (L = ~720') USE CHART MIN. T_c = 10 min.

⊙ INTENSITY (Per Co Std's H-1 & H-4)

· 18 to 21" ANNUAL RAINFALL
· 10 min. T_c
∴ i_2 = 1.7 in/hr

⊙ RUNOFF COEFFICIENT "C" (PER COUNTY STD. H-3A)

RELIEF:	SLOPES > 30% STEEP, RUGGED	= 0.31
SOIL INFILT:	"High" (SLOW to TAKE UP WATER)	= 0.10
VEG COVER:	"NORMAL to HIGH" (CLOSER to High)	= 0.09
SURF STORAGE:	"Extreme"	= 0.11
	total "C"	= 0.61

⊙ ALLOWABLE RELEASE RATE

$Q = CiA \Rightarrow (.61)(1.7)(8.78) =$ 9.10 cfs

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JOB 08-23
SHEET NO. ____ OF ____
CALCULATED BY SAK DATE 4/9/09
CHECKED BY ____ DATE ____
SCALE QUARRY POND SIZING (per PHASE)

— PHASE 1A, 50-YR. 'DEVELOPED' —

ALL 50 YR "DEVELOPED" RUN-OFF Qty's WILL BE DETERMINED USING "SCS Hydrograph" ANALYSIS. Hydrograph WILL BE ROUTED THROUGH TRIAL BASINS UNTIL AN ACCEPTABLE VOLUME/DISCHARGE CORRELATION IS FOUND — TYPICAL ALL DEVELOPED CASES —

⊙ WATERSHED AREAS:

- PHASE EXCAVATION AREA = 7.14 Ac.
- NATIVE UNDISTURBED AREA = 1.64 Ac.

⊙ Soil Hydrologic Group & Curve Number derivation

∴ Hydrologic Soil Group "C" per Soil Survey (See Attached)

- NATIVE, UNDIST. RUNON (FAIR) CN = 57 A = 1.64 Ac.
- EXCAVATED BENCHS CN = 91 A = 7.14 Ac.

$$\text{Weighted CN} = \frac{57(1.64) + 91(7.14)}{8.78} = 84.6 \Rightarrow \underline{\text{SAY } 85}$$

⊙ Watershed slope

$\Delta H = 1300' - 1100' = 200'$

Longest distance "L" = ~770'

$S = 200/770 = 26\%$

⊙ SCS method using min. T_c = 10 min.: Type I STORM DISTRIBUTION

(SEE ATTACHED Hydrograph & POND CALCULATIONS)

Hydrograph Report

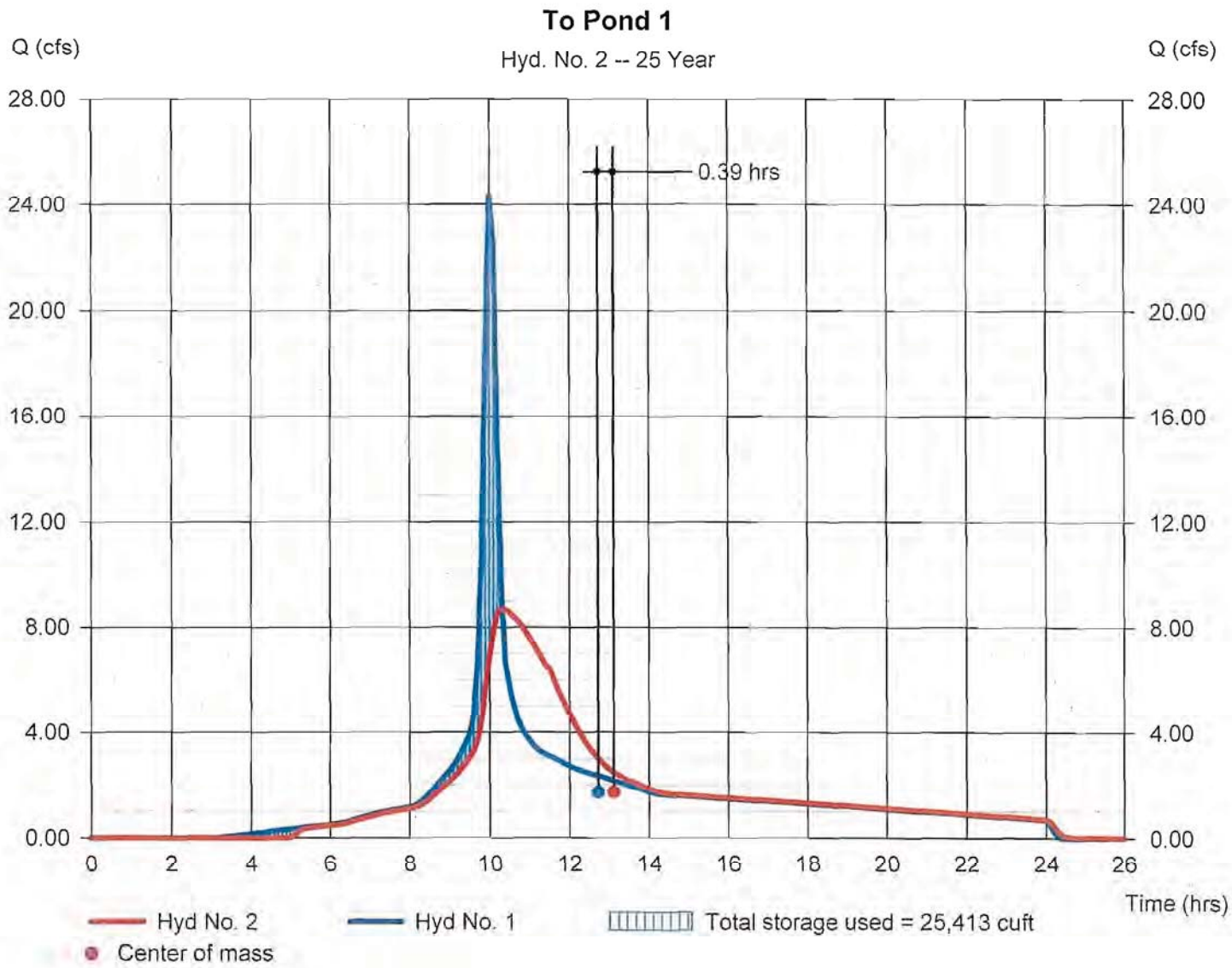
Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Hyd. No. 2

To Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 8.688 cfs
Storm frequency	= 25 yrs	Time to peak	= 618 min
Time interval	= 6 min	Hyd. volume	= 141,641 cuft
Inflow hyd. No.	= 1 - Phase 1A Pond	Max. Elevation	= 1096.41 ft
Reservoir name	= Pond Phase 1A	Max. Storage	= 25,413 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Hyd. No. 2

To Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 8.688 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.30 hrs
Time interval	= 6 min	Hyd. volume	= 155,882 cuft
Inflow hyd. No.	= 1 - Phase 1A Pond	Reservoir name	= Pond Phase 1A
Max. Elevation	= 1096.41 ft	Max. Storage	= 25,413 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
6.00	0.484	1085.88	0.477	0.434	-----	0.036	-----	-----	-----	-----	-----	0.470
6.30	0.555	1085.91	0.542	0.492	-----	0.040	-----	-----	-----	-----	-----	0.532
6.60	0.668	1085.96	0.657	0.590	-----	0.047	-----	-----	-----	-----	-----	0.638
6.90	0.795	1086.01	0.782	0.700	-----	0.056	-----	-----	-----	-----	-----	0.756
7.20	0.923	1086.07	0.903	0.813	-----	0.066	-----	-----	-----	-----	-----	0.879
7.50	1.014	1086.12	0.995	0.901	-----	0.074	-----	-----	-----	-----	-----	0.976
7.80	1.098	1086.17	1.067	0.974	-----	0.084	-----	-----	-----	-----	-----	1.058
8.10	1.194	1086.22	1.146	1.049	-----	0.094	-----	-----	-----	-----	-----	1.143
8.40	1.533	1086.37	1.370	1.228	-----	0.119	-----	-----	-----	-----	-----	1.347
8.70	2.022	1086.69	1.759	1.553	-----	0.174	-----	-----	-----	-----	-----	1.727
9.00	2.537	1087.10	2.161	1.888	-----	0.261	-----	-----	-----	-----	-----	2.149
9.30	3.255	1087.60	2.656	2.233	-----	0.384	-----	-----	-----	-----	-----	2.617
9.60	4.626	1088.39	3.327	2.676	-----	0.617	-----	-----	-----	-----	-----	3.292
9.90	17.59	1091.49	5.750	3.863	-----	1.855	-----	-----	-----	-----	-----	5.718
10.20	15.41	1096.08	8.514	4.847	-----	3.667	-----	-----	-----	-----	-----	8.514
10.50	5.874	1096.15	8.555	4.860	-----	3.695	-----	-----	-----	-----	-----	8.555
10.80	4.155	1095.27	8.031	4.697	-----	3.335	-----	-----	-----	-----	-----	8.031
11.10	3.518	1094.13	7.346	4.470	-----	2.875	-----	-----	-----	-----	-----	7.346
11.40	3.179	1092.58	6.563	4.189	-----	2.366	-----	-----	-----	-----	-----	6.555
11.70	2.960	1091.47	5.730	3.857	-----	1.847	-----	-----	-----	-----	-----	5.704
12.00	2.737	1090.22	4.735	3.427	-----	1.296	-----	-----	-----	-----	-----	4.723
12.30	2.548	1089.15	3.914	3.008	-----	0.876	-----	-----	-----	-----	-----	3.884
12.60	2.406	1088.31	3.263	2.637	-----	0.590	-----	-----	-----	-----	-----	3.227
12.90	2.265	1087.73	2.753	2.314	-----	0.421	-----	-----	-----	-----	-----	2.735
13.20	2.122	1087.36	2.415	2.077	-----	0.324	-----	-----	-----	-----	-----	2.402
13.50	1.978	1087.13	2.185	1.909	-----	0.267	-----	-----	-----	-----	-----	2.177
13.80	1.833	1086.93	2.005	1.760	-----	0.224	-----	-----	-----	-----	-----	1.984
14.10	1.690	1086.76	1.819	1.617	-----	0.188	-----	-----	-----	-----	-----	1.805
14.40	1.626	1086.65	1.710	1.515	-----	0.167	-----	-----	-----	-----	-----	1.682
14.70	1.598	1086.60	1.648	1.468	-----	0.158	-----	-----	-----	-----	-----	1.626
15.00	1.571	1086.57	1.613	1.438	-----	0.153	-----	-----	-----	-----	-----	1.591
15.30	1.543	1086.54	1.584	1.413	-----	0.148	-----	-----	-----	-----	-----	1.562
15.60	1.515	1086.52	1.555	1.389	-----	0.144	-----	-----	-----	-----	-----	1.533
15.90	1.487	1086.49	1.527	1.365	-----	0.140	-----	-----	-----	-----	-----	1.505
16.20	1.458	1086.47	1.501	1.340	-----	0.136	-----	-----	-----	-----	-----	1.476
16.50	1.430	1086.45	1.475	1.315	-----	0.132	-----	-----	-----	-----	-----	1.447
16.80	1.401	1086.42	1.449	1.291	-----	0.128	-----	-----	-----	-----	-----	1.419
17.10	1.372	1086.40	1.423	1.266	-----	0.124	-----	-----	-----	-----	-----	1.390
17.40	1.343	1086.38	1.386	1.240	-----	0.121	-----	-----	-----	-----	-----	1.360
17.70	1.314	1086.36	1.351	1.214	-----	0.118	-----	-----	-----	-----	-----	1.331

Continues on next page...

To Pond 1

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
18.00	1.285	1086.33	1.315	1.188	-----	0.114	-----	-----	-----	-----	-----	1.302
18.30	1.256	1086.31	1.279	1.162	-----	0.111	-----	-----	-----	-----	-----	1.273
18.60	1.226	1086.29	1.245	1.135	-----	0.107	-----	-----	-----	-----	-----	1.242
18.90	1.197	1086.27	1.215	1.109	-----	0.103	-----	-----	-----	-----	-----	1.212
19.20	1.167	1086.25	1.185	1.083	-----	0.099	-----	-----	-----	-----	-----	1.182
19.50	1.138	1086.23	1.155	1.057	-----	0.095	-----	-----	-----	-----	-----	1.153
19.80	1.108	1086.21	1.126	1.031	-----	0.092	-----	-----	-----	-----	-----	1.123
20.10	1.078	1086.19	1.097	1.005	-----	0.088	-----	-----	-----	-----	-----	1.093
20.40	1.048	1086.17	1.071	0.978	-----	0.084	-----	-----	-----	-----	-----	1.063
20.70	1.018	1086.15	1.045	0.952	-----	0.081	-----	-----	-----	-----	-----	1.033
21.00	0.988	1086.14	1.019	0.925	-----	0.077	-----	-----	-----	-----	-----	1.003
21.30	0.958	1086.12	0.992	0.899	-----	0.074	-----	-----	-----	-----	-----	0.973
21.60	0.928	1086.10	0.965	0.871	-----	0.071	-----	-----	-----	-----	-----	0.941
21.90	0.898	1086.08	0.933	0.841	-----	0.068	-----	-----	-----	-----	-----	0.909
22.20	0.867	1086.07	0.903	0.813	-----	0.066	-----	-----	-----	-----	-----	0.878
22.50	0.837	1086.05	0.873	0.785	-----	0.063	-----	-----	-----	-----	-----	0.848
22.80	0.807	1086.04	0.843	0.757	-----	0.061	-----	-----	-----	-----	-----	0.818
23.10	0.776	1086.03	0.813	0.729	-----	0.058	-----	-----	-----	-----	-----	0.787
23.40	0.746	1086.01	0.783	0.701	-----	0.056	-----	-----	-----	-----	-----	0.757
23.70	0.716	1086.00	0.751	0.671	-----	0.053	-----	-----	-----	-----	-----	0.725
24.00	0.685	1085.98	0.717	0.642	-----	0.051	-----	-----	-----	-----	-----	0.693

...End

Hydrograph Report

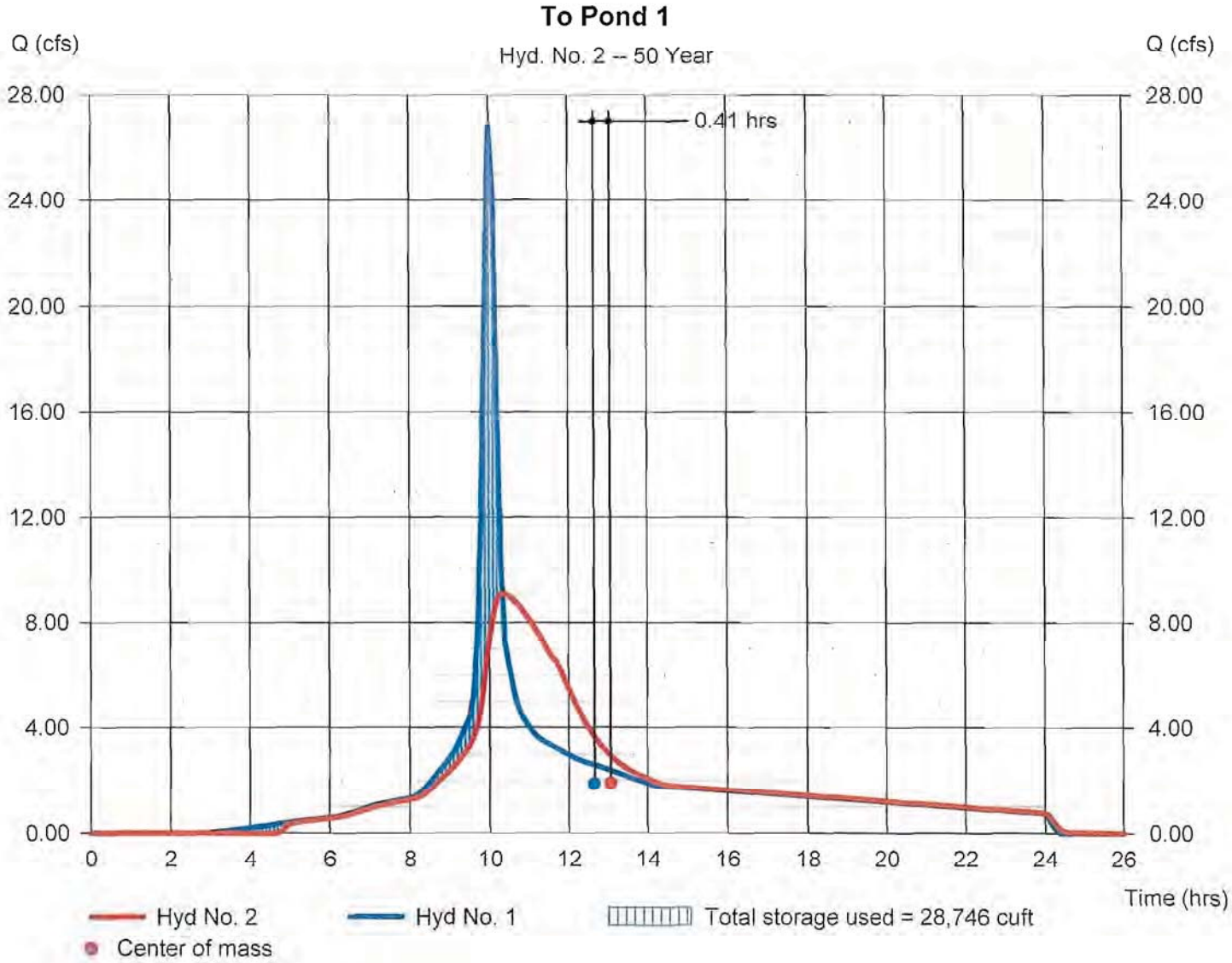
Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Hyd. No. 2

To Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 9.097 cfs
Storm frequency	= 50 yrs	Time to peak	= 618 min
Time interval	= 6 min	Hyd. volume	= 155,882 cuft
Inflow hyd. No.	= 1 - Phase 1A Pond	Max. Elevation	= 1097.12 ft
Reservoir name	= Pond Phase 1A	Max. Storage	= 28,746 cuft

Storage Indication method used.



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Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
5.70	0.520	1085.90	0.513	0.467	-----	0.038	-----	-----	-----	-----	-----	0.505
6.00	0.571	1085.92	0.570	0.516	-----	0.042	-----	-----	-----	-----	-----	0.558
6.30	0.651	1085.95	0.643	0.579	-----	0.047	-----	-----	-----	-----	-----	0.625
6.60	0.778	1086.00	0.769	0.687	-----	0.055	-----	-----	-----	-----	-----	0.742
6.90	0.920	1086.06	0.893	0.804	-----	0.065	-----	-----	-----	-----	-----	0.869
7.20	1.062	1086.14	1.019	0.925	-----	0.077	-----	-----	-----	-----	-----	1.002
7.50	1.161	1086.20	1.116	1.023	-----	0.090	-----	-----	-----	-----	-----	1.113
7.80	1.252	1086.27	1.208	1.103	-----	0.102	-----	-----	-----	-----	-----	1.205
8.10	1.355	1086.33	1.307	1.182	-----	0.114	-----	-----	-----	-----	-----	1.295
8.40	1.734	1086.50	1.536	1.373	-----	0.141	-----	-----	-----	-----	-----	1.514
8.70	2.278	1086.88	1.939	1.717	-----	0.213	-----	-----	-----	-----	-----	1.930
9.00	2.845	1087.32	2.386	2.050	-----	0.314	-----	-----	-----	-----	-----	2.364
9.30	3.635	1087.92	2.900	2.426	-----	0.474	-----	-----	-----	-----	-----	2.900
9.60	5.143	1088.77	3.625	2.849	-----	0.745	-----	-----	-----	-----	-----	3.594
9.90	19.40	1092.03	6.147	4.032	-----	2.109	-----	-----	-----	-----	-----	6.141
10.20	16.89	1096.74	8.897	4.963	-----	3.934	-----	-----	-----	-----	-----	8.897
10.50	6.416	1096.90	8.994	4.991	-----	4.003	-----	-----	-----	-----	-----	8.994
10.80	4.533	1096.10	8.528	4.852	-----	3.676	-----	-----	-----	-----	-----	8.528
11.10	3.836	1095.05	7.901	4.655	-----	3.247	-----	-----	-----	-----	-----	7.901
11.40	3.464	1093.85	7.173	4.411	-----	2.762	-----	-----	-----	-----	-----	7.173
11.70	3.224	1092.56	6.554	4.185	-----	2.359	-----	-----	-----	-----	-----	6.544
12.00	2.980	1091.24	5.527	3.781	-----	1.740	-----	-----	-----	-----	-----	5.520
12.30	2.773	1090.05	4.607	3.363	-----	1.225	-----	-----	-----	-----	-----	4.588
12.60	2.618	1089.06	3.843	2.970	-----	0.843	-----	-----	-----	-----	-----	3.813
12.90	2.463	1088.29	3.247	2.627	-----	0.584	-----	-----	-----	-----	-----	3.210
13.20	2.307	1087.75	2.769	2.328	-----	0.427	-----	-----	-----	-----	-----	2.755
13.50	2.150	1087.39	2.437	2.099	-----	0.333	-----	-----	-----	-----	-----	2.432
13.80	1.992	1087.15	2.206	1.928	-----	0.273	-----	-----	-----	-----	-----	2.200
14.10	1.837	1086.95	2.027	1.773	-----	0.227	-----	-----	-----	-----	-----	2.000
14.40	1.767	1086.79	1.844	1.646	-----	0.195	-----	-----	-----	-----	-----	1.841
14.70	1.736	1086.73	1.795	1.589	-----	0.182	-----	-----	-----	-----	-----	1.771
15.00	1.706	1086.69	1.763	1.556	-----	0.175	-----	-----	-----	-----	-----	1.731
15.30	1.676	1086.66	1.727	1.528	-----	0.170	-----	-----	-----	-----	-----	1.697
15.60	1.645	1086.63	1.692	1.502	-----	0.164	-----	-----	-----	-----	-----	1.666
15.90	1.614	1086.61	1.659	1.476	-----	0.159	-----	-----	-----	-----	-----	1.635
16.20	1.583	1086.58	1.626	1.449	-----	0.155	-----	-----	-----	-----	-----	1.604
16.50	1.552	1086.55	1.595	1.422	-----	0.150	-----	-----	-----	-----	-----	1.572
16.80	1.520	1086.52	1.563	1.396	-----	0.145	-----	-----	-----	-----	-----	1.541
17.10	1.489	1086.50	1.532	1.369	-----	0.140	-----	-----	-----	-----	-----	1.510
17.40	1.457	1086.47	1.502	1.341	-----	0.136	-----	-----	-----	-----	-----	1.477

Continues on next page...

To Pond 1

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
17.70	1.426	1086.45	1.473	1.314	-----	0.132	-----	-----	-----	-----	-----	1.445
18.00	1.394	1086.42	1.444	1.286	-----	0.127	-----	-----	-----	-----	-----	1.414
18.30	1.362	1086.39	1.412	1.258	-----	0.123	-----	-----	-----	-----	-----	1.381
18.60	1.330	1086.37	1.372	1.229	-----	0.120	-----	-----	-----	-----	-----	1.349
18.90	1.298	1086.35	1.333	1.201	-----	0.116	-----	-----	-----	-----	-----	1.317
19.20	1.266	1086.32	1.294	1.172	-----	0.112	-----	-----	-----	-----	-----	1.285
19.50	1.234	1086.30	1.255	1.143	-----	0.109	-----	-----	-----	-----	-----	1.252
19.80	1.201	1086.27	1.221	1.114	-----	0.104	-----	-----	-----	-----	-----	1.218
20.10	1.169	1086.25	1.188	1.086	-----	0.100	-----	-----	-----	-----	-----	1.185
20.40	1.136	1086.23	1.156	1.057	-----	0.096	-----	-----	-----	-----	-----	1.153
20.70	1.104	1086.21	1.123	1.029	-----	0.091	-----	-----	-----	-----	-----	1.120
21.00	1.071	1086.19	1.092	1.000	-----	0.087	-----	-----	-----	-----	-----	1.087
21.30	1.038	1086.17	1.064	0.971	-----	0.083	-----	-----	-----	-----	-----	1.054
21.60	1.006	1086.15	1.035	0.942	-----	0.080	-----	-----	-----	-----	-----	1.021
21.90	0.973	1086.13	1.006	0.913	-----	0.076	-----	-----	-----	-----	-----	0.989
22.20	0.940	1086.11	0.978	0.884	-----	0.072	-----	-----	-----	-----	-----	0.956
22.50	0.907	1086.09	0.943	0.851	-----	0.069	-----	-----	-----	-----	-----	0.920
22.80	0.874	1086.07	0.910	0.820	-----	0.066	-----	-----	-----	-----	-----	0.886
23.10	0.841	1086.06	0.878	0.790	-----	0.064	-----	-----	-----	-----	-----	0.853
23.40	0.808	1086.04	0.846	0.760	-----	0.061	-----	-----	-----	-----	-----	0.820
23.70	0.775	1086.03	0.813	0.729	-----	0.058	-----	-----	-----	-----	-----	0.787
24.00	0.742	1086.01	0.781	0.699	-----	0.056	-----	-----	-----	-----	-----	0.754

...End

Pond No. 1 - Pond Phase 1A

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1083.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1083.00	228	0	0
1.00	1084.00	370	296	296
2.00	1085.00	536	450	747
3.00	1086.00	725	628	1,375
4.00	1087.00	945	832	2,207
5.00	1088.00	1,188	1,064	3,271
6.00	1089.00	1,455	1,319	4,590
7.00	1090.00	1,748	1,599	6,189
8.00	1091.00	2,066	1,905	8,094
9.00	1092.00	2,408	2,235	10,329
10.00	1093.00	2,819	2,611	12,939
11.00	1094.00	3,305	3,058	15,998
12.00	1095.00	3,823	3,561	19,558
13.00	1096.00	4,376	4,096	23,654
14.00	1097.00	4,961	4,665	28,319
15.00	1098.00	5,580	5,267	33,586
16.00	1099.00	6,233	5,903	39,489
17.00	1100.00	6,500	6,365	45,854

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	8.00	0.00	4.00
Span (in)	= 18.00	8.00	0.00	4.00
No. Barrels	= 1	1	1	6
Invert El. (ft)	= 1085.00	1085.50	0.00	1085.50
Length (ft)	= 100.00	2.00	0.00	11.00
Slope (%)	= 1.50	1.00	0.00	n/a
N-Value	= .024	.024	.024	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.75	0.00	0.00	0.00
Crest El. (ft)	= 1098.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1083.00	0.00	0.00	---	0.00	0.00	---	---	---	---	---	0.00
1.00	296	1084.00	0.00	0.00	---	0.00	0.00	---	---	---	---	---	0.00
2.00	747	1085.00	0.00	0.00	---	0.00	0.00	---	---	---	---	---	0.00
3.00	1,375	1086.00	0.76 ic	0.68 ic	---	0.05	0.00	---	---	---	---	---	0.73
4.00	2,207	1087.00	2.10 ic	1.82 ic	---	0.24	0.00	---	---	---	---	---	2.05
5.00	3,271	1088.00	2.97 ic	2.47 ic	---	0.50	0.00	---	---	---	---	---	2.97
6.00	4,590	1089.00	3.80 ic	2.95 ic	---	0.82	0.00	---	---	---	---	---	3.77
7.00	6,189	1090.00	4.57 ic	3.35 ic	---	1.21	0.00	---	---	---	---	---	4.55
8.00	8,094	1091.00	5.37 ic	3.70 ic	---	1.63	0.00	---	---	---	---	---	5.33
9.00	10,329	1092.00	6.12 ic	4.02 ic	---	2.10	0.00	---	---	---	---	---	6.12
10.00	12,939	1093.00	6.65 oc	4.22 ic	---	2.43	0.00	---	---	---	---	---	6.65
11.00	15,998	1094.00	7.27 oc	4.44 ic	---	2.82	0.00	---	---	---	---	---	7.27
12.00	19,558	1095.00	7.87 oc	4.65 ic	---	3.23	0.00	---	---	---	---	---	7.87
13.00	23,654	1096.00	8.47 oc	4.83 ic	---	3.63	0.00	---	---	---	---	---	8.47
14.00	28,319	1097.00	9.05 oc	5.01 ic	---	4.04	0.00	---	---	---	---	---	9.05
15.00	33,586	1098.00	9.63 oc	5.17 ic	---	4.45	0.00	---	---	---	---	---	9.63
16.00	39,489	1099.00	14.22 oc	4.22 ic	---	2.42	7.58 ic	---	---	---	---	---	14.22
17.00	45,854	1100.00	16.20 oc	3.76 ic	---	1.71	10.72 ic	---	---	---	---	---	16.20

TARTAGLIA ENGINEERING
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JOB 08-23
SHEET NO. _____ OF _____
CALCULATED BY SAK DATE 8/7/09
CHECKED BY _____ DATE _____
SCALE _____

— ENTRANCE ROAD AREA — "2 YR ALLOWABLE" RELEASE RATE

AREA = 0.44 ACRES

○ TIME OF CONCENTRATION (CHART MIN.)

T_c = 10 min.

○ INTENSITY (AS PREVIOUSLY DETERMINED)

i_2 @ 10 MIN. T_c = 1.7 in/hr

○ RUNOFF COEFFICIENT (C)

RELIEF = 0.24 ; SOIL INFILT = 0.10 ; VEG. COVER = 0.09
SURF STORAGE = 0.11
TOTAL = 0.24 + .10 + .09 + .11 = 0.54

∴ 2 YR ALLOWABLE = Q = CiA ⇒ (.54)(1.7)(.38) = 0.35 cfs

— 50 YR "DEVELOPED" HYDROGRAPH PARAMETERS —

CURVE NUMBER (CN) ⇒ IMPERVIOUS PAVED AREA'S
CN = 98

SLOPE & PATH OF TRAVEL

L = 845'
ΔH = 1100 - 1015 = 85'

∴ 85/845 = 10%

Hydrograph Report

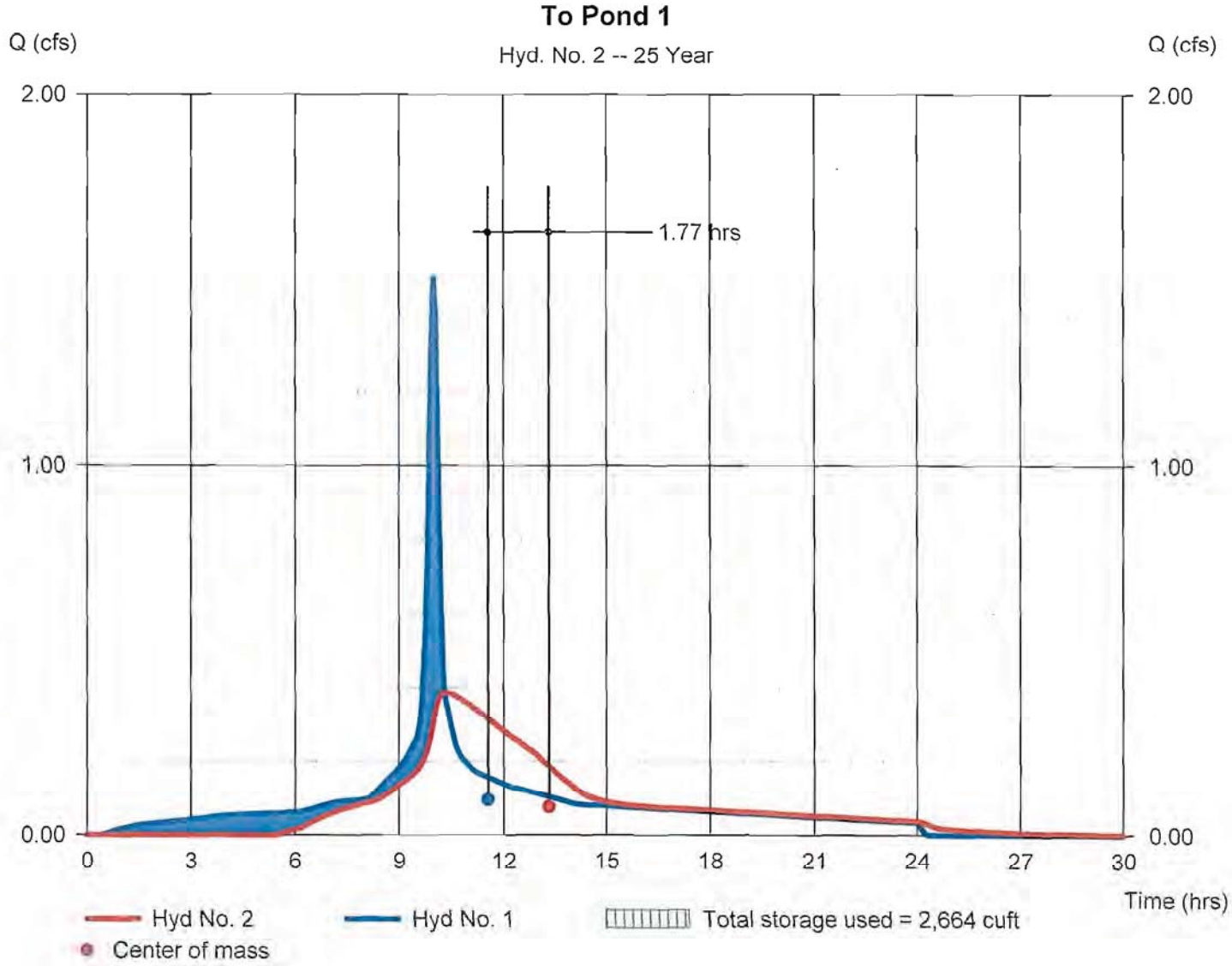
Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Hyd. No. 2

To Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 0.385 cfs
Storm frequency	= 25 yrs	Time to peak	= 621 min
Time interval	= 3 min	Hyd. volume	= 7,940 cuft
Inflow hyd. No.	= 1 - Pond for Entrance Rd	Max. Elevation	= 1019.65 ft
Reservoir name	= Roadway Pond	Max. Storage	= 2,664 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Hyd. No. 2

To Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 0.385 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.35 hrs
Time interval	= 3 min	Hyd. volume	= 8,629 cuft
Inflow hyd. No.	= 1 - Pond for Entrance Rd	Reservoir name	= Roadway Pond
Max. Elevation	= 1019.65 ft	Max. Storage	= 2,664 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
6.30	0.065	1018.61	0.025	0.024	-----	-----	-----	-----	-----	-----	-----	0.024
6.45	0.069	1018.62	0.033	0.032	-----	-----	-----	-----	-----	-----	-----	0.032
6.60	0.073	1018.64	0.040	0.039	-----	-----	-----	-----	-----	-----	-----	0.039
6.75	0.077	1018.65	0.047	0.046	-----	-----	-----	-----	-----	-----	-----	0.046
6.90	0.081	1018.66	0.053	0.052	-----	-----	-----	-----	-----	-----	-----	0.052
7.05	0.085	1018.67	0.058	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
7.20	0.088	1018.68	0.064	0.063	-----	-----	-----	-----	-----	-----	-----	0.063
7.35	0.090	1018.69	0.068	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
7.50	0.091	1018.70	0.072	0.072	-----	-----	-----	-----	-----	-----	-----	0.072
7.65	0.092	1018.71	0.077	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
7.80	0.094	1018.71	0.080	0.080	-----	-----	-----	-----	-----	-----	-----	0.080
7.95	0.095	1018.72	0.084	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
8.10	0.097	1018.72	0.087	0.086	-----	-----	-----	-----	-----	-----	-----	0.086
8.25	0.107	1018.73	0.090	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
8.40	0.121	1018.74	0.096	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
8.55	0.137	1018.75	0.103	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
8.70	0.152	1018.76	0.113	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
8.85	0.166	1018.78	0.124	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
9.00	0.181	1018.79	0.135	0.135	-----	-----	-----	-----	-----	-----	-----	0.135
9.15	0.197	1018.81	0.146	0.145	-----	-----	-----	-----	-----	-----	-----	0.145
9.30	0.222	1018.84	0.157	0.156	-----	-----	-----	-----	-----	-----	-----	0.156
9.45	0.249	1018.87	0.171	0.169	-----	-----	-----	-----	-----	-----	-----	0.169
9.60	0.299	1018.90	0.189	0.185	-----	-----	-----	-----	-----	-----	-----	0.185
9.75	0.518	1018.98	0.216	0.212	-----	-----	-----	-----	-----	-----	-----	0.212
9.90	1.136	1019.13	0.261	0.260	-----	-----	-----	-----	-----	-----	-----	0.260
10.05	1.427	1019.43	0.341	0.338	-----	-----	-----	-----	-----	-----	-----	0.338
10.20	0.685	1019.62	0.389	0.380	-----	-----	-----	-----	-----	-----	-----	0.380
10.35	0.363	1019.65 <<	0.393	0.385	-----	-----	-----	-----	-----	-----	-----	0.385 <<
10.50	0.297	1019.63	0.391	0.382	-----	-----	-----	-----	-----	-----	-----	0.382
10.65	0.240	1019.60	0.386	0.376	-----	-----	-----	-----	-----	-----	-----	0.376
10.80	0.211	1019.56	0.373	0.367	-----	-----	-----	-----	-----	-----	-----	0.367
10.95	0.194	1019.52	0.359	0.358	-----	-----	-----	-----	-----	-----	-----	0.358
11.10	0.179	1019.47	0.349	0.348	-----	-----	-----	-----	-----	-----	-----	0.348
11.25	0.168	1019.43	0.341	0.337	-----	-----	-----	-----	-----	-----	-----	0.337
11.40	0.162	1019.38	0.330	0.326	-----	-----	-----	-----	-----	-----	-----	0.326
11.55	0.156	1019.34	0.317	0.315	-----	-----	-----	-----	-----	-----	-----	0.315
11.70	0.150	1019.29	0.305	0.305	-----	-----	-----	-----	-----	-----	-----	0.305
11.85	0.144	1019.25	0.294	0.294	-----	-----	-----	-----	-----	-----	-----	0.294
12.00	0.138	1019.21	0.283	0.283	-----	-----	-----	-----	-----	-----	-----	0.283
12.15	0.133	1019.17	0.272	0.272	-----	-----	-----	-----	-----	-----	-----	0.272

Continues on next page...

To Pond 1

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
12.30	0.128	1019.14	0.262	0.262	-----	-----	-----	-----	-----	-----	-----	0.262
12.45	0.125	1019.10	0.252	0.252	-----	-----	-----	-----	-----	-----	-----	0.252
12.60	0.121	1019.07	0.242	0.241	-----	-----	-----	-----	-----	-----	-----	0.241
12.75	0.117	1019.04	0.234	0.231	-----	-----	-----	-----	-----	-----	-----	0.231
12.90	0.113	1019.01	0.225	0.222	-----	-----	-----	-----	-----	-----	-----	0.222
13.05	0.110	1018.97	0.212	0.209	-----	-----	-----	-----	-----	-----	-----	0.209
13.20	0.106	1018.93	0.199	0.196	-----	-----	-----	-----	-----	-----	-----	0.196
13.35	0.102	1018.90	0.187	0.184	-----	-----	-----	-----	-----	-----	-----	0.184
13.50	0.098	1018.87	0.172	0.170	-----	-----	-----	-----	-----	-----	-----	0.170
13.65	0.095	1018.84	0.160	0.158	-----	-----	-----	-----	-----	-----	-----	0.158
13.80	0.091	1018.82	0.148	0.147	-----	-----	-----	-----	-----	-----	-----	0.147
13.95	0.087	1018.80	0.137	0.137	-----	-----	-----	-----	-----	-----	-----	0.137
14.10	0.084	1018.78	0.125	0.125	-----	-----	-----	-----	-----	-----	-----	0.125
14.25	0.082	1018.76	0.115	0.115	-----	-----	-----	-----	-----	-----	-----	0.115
14.40	0.081	1018.75	0.108	0.107	-----	-----	-----	-----	-----	-----	-----	0.107
14.55	0.080	1018.74	0.101	0.101	-----	-----	-----	-----	-----	-----	-----	0.101
14.70	0.079	1018.74	0.096	0.096	-----	-----	-----	-----	-----	-----	-----	0.096
14.85	0.079	1018.73	0.092	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
15.00	0.078	1018.73	0.089	0.089	-----	-----	-----	-----	-----	-----	-----	0.089
15.15	0.077	1018.72	0.086	0.086	-----	-----	-----	-----	-----	-----	-----	0.086
15.30	0.076	1018.72	0.084	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
15.45	0.076	1018.72	0.082	0.082	-----	-----	-----	-----	-----	-----	-----	0.082
15.60	0.075	1018.71	0.081	0.081	-----	-----	-----	-----	-----	-----	-----	0.081
15.75	0.074	1018.71	0.079	0.079	-----	-----	-----	-----	-----	-----	-----	0.079
15.90	0.073	1018.71	0.078	0.078	-----	-----	-----	-----	-----	-----	-----	0.078
16.05	0.073	1018.71	0.077	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
16.20	0.072	1018.71	0.076	0.076	-----	-----	-----	-----	-----	-----	-----	0.076
16.35	0.071	1018.70	0.075	0.075	-----	-----	-----	-----	-----	-----	-----	0.075
16.50	0.070	1018.70	0.074	0.074	-----	-----	-----	-----	-----	-----	-----	0.074
16.65	0.070	1018.70	0.073	0.073	-----	-----	-----	-----	-----	-----	-----	0.073
16.80	0.069	1018.70	0.072	0.072	-----	-----	-----	-----	-----	-----	-----	0.072
16.95	0.068	1018.70	0.072	0.071	-----	-----	-----	-----	-----	-----	-----	0.071
17.10	0.067	1018.70	0.071	0.071	-----	-----	-----	-----	-----	-----	-----	0.071
17.25	0.067	1018.70	0.070	0.070	-----	-----	-----	-----	-----	-----	-----	0.070
17.40	0.066	1018.70	0.070	0.069	-----	-----	-----	-----	-----	-----	-----	0.069
17.55	0.065	1018.69	0.069	0.069	-----	-----	-----	-----	-----	-----	-----	0.069
17.70	0.064	1018.69	0.068	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
17.85	0.064	1018.69	0.067	0.067	-----	-----	-----	-----	-----	-----	-----	0.067
18.00	0.063	1018.69	0.067	0.067	-----	-----	-----	-----	-----	-----	-----	0.067
18.15	0.062	1018.69	0.066	0.066	-----	-----	-----	-----	-----	-----	-----	0.066
18.30	0.061	1018.69	0.065	0.065	-----	-----	-----	-----	-----	-----	-----	0.065
18.45	0.061	1018.69	0.065	0.064	-----	-----	-----	-----	-----	-----	-----	0.064
18.60	0.060	1018.68	0.064	0.064	-----	-----	-----	-----	-----	-----	-----	0.064
18.75	0.059	1018.68	0.063	0.063	-----	-----	-----	-----	-----	-----	-----	0.063
18.90	0.059	1018.68	0.062	0.062	-----	-----	-----	-----	-----	-----	-----	0.062
19.05	0.058	1018.68	0.062	0.061	-----	-----	-----	-----	-----	-----	-----	0.061
19.20	0.057	1018.68	0.061	0.061	-----	-----	-----	-----	-----	-----	-----	0.061
19.35	0.056	1018.68	0.060	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
19.50	0.056	1018.68	0.060	0.059	-----	-----	-----	-----	-----	-----	-----	0.059
19.65	0.055	1018.67	0.059	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
19.80	0.054	1018.67	0.058	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
19.95	0.053	1018.67	0.057	0.057	-----	-----	-----	-----	-----	-----	-----	0.057
20.10	0.053	1018.67	0.057	0.056	-----	-----	-----	-----	-----	-----	-----	0.056
20.25	0.052	1018.67	0.056	0.055	-----	-----	-----	-----	-----	-----	-----	0.055

Continues on next page...

To Pond 1

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
20.40	0.051	1018.67	0.055	0.055	-----	-----	-----	-----	-----	-----	-----	0.055
20.55	0.050	1018.67	0.054	0.054	-----	-----	-----	-----	-----	-----	-----	0.054
20.70	0.050	1018.66	0.054	0.053	-----	-----	-----	-----	-----	-----	-----	0.053
20.85	0.049	1018.66	0.053	0.052	-----	-----	-----	-----	-----	-----	-----	0.052
21.00	0.048	1018.66	0.052	0.052	-----	-----	-----	-----	-----	-----	-----	0.052
21.15	0.047	1018.66	0.052	0.051	-----	-----	-----	-----	-----	-----	-----	0.051
21.30	0.047	1018.66	0.051	0.050	-----	-----	-----	-----	-----	-----	-----	0.050
21.45	0.046	1018.66	0.050	0.049	-----	-----	-----	-----	-----	-----	-----	0.049
21.60	0.045	1018.66	0.049	0.049	-----	-----	-----	-----	-----	-----	-----	0.049
21.75	0.044	1018.65	0.049	0.048	-----	-----	-----	-----	-----	-----	-----	0.048
21.90	0.044	1018.65	0.048	0.047	-----	-----	-----	-----	-----	-----	-----	0.047
22.05	0.043	1018.65	0.047	0.046	-----	-----	-----	-----	-----	-----	-----	0.046
22.20	0.042	1018.65	0.046	0.046	-----	-----	-----	-----	-----	-----	-----	0.046
22.35	0.041	1018.65	0.046	0.045	-----	-----	-----	-----	-----	-----	-----	0.045
22.50	0.041	1018.65	0.045	0.044	-----	-----	-----	-----	-----	-----	-----	0.044
22.65	0.040	1018.65	0.044	0.043	-----	-----	-----	-----	-----	-----	-----	0.043
22.80	0.039	1018.64	0.043	0.043	-----	-----	-----	-----	-----	-----	-----	0.043
22.95	0.038	1018.64	0.043	0.042	-----	-----	-----	-----	-----	-----	-----	0.042
23.10	0.038	1018.64	0.042	0.041	-----	-----	-----	-----	-----	-----	-----	0.041
23.25	0.037	1018.64	0.041	0.041	-----	-----	-----	-----	-----	-----	-----	0.040
23.40	0.036	1018.64	0.041	0.040	-----	-----	-----	-----	-----	-----	-----	0.040
23.55	0.035	1018.64	0.040	0.039	-----	-----	-----	-----	-----	-----	-----	0.039
23.70	0.035	1018.64	0.039	0.038	-----	-----	-----	-----	-----	-----	-----	0.038
23.85	0.034	1018.63	0.038	0.038	-----	-----	-----	-----	-----	-----	-----	0.038
24.00	0.033	1018.63	0.038	0.037	-----	-----	-----	-----	-----	-----	-----	0.037
24.15	0.016	1018.63	0.036	0.035	-----	-----	-----	-----	-----	-----	-----	0.035
24.30	0.002	1018.62	0.031	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
24.45	0.000	1018.61	0.025	0.024	-----	-----	-----	-----	-----	-----	-----	0.024
24.60	0.000	1018.60	0.021	0.020	-----	-----	-----	-----	-----	-----	-----	0.020

...End

Hydrograph Report

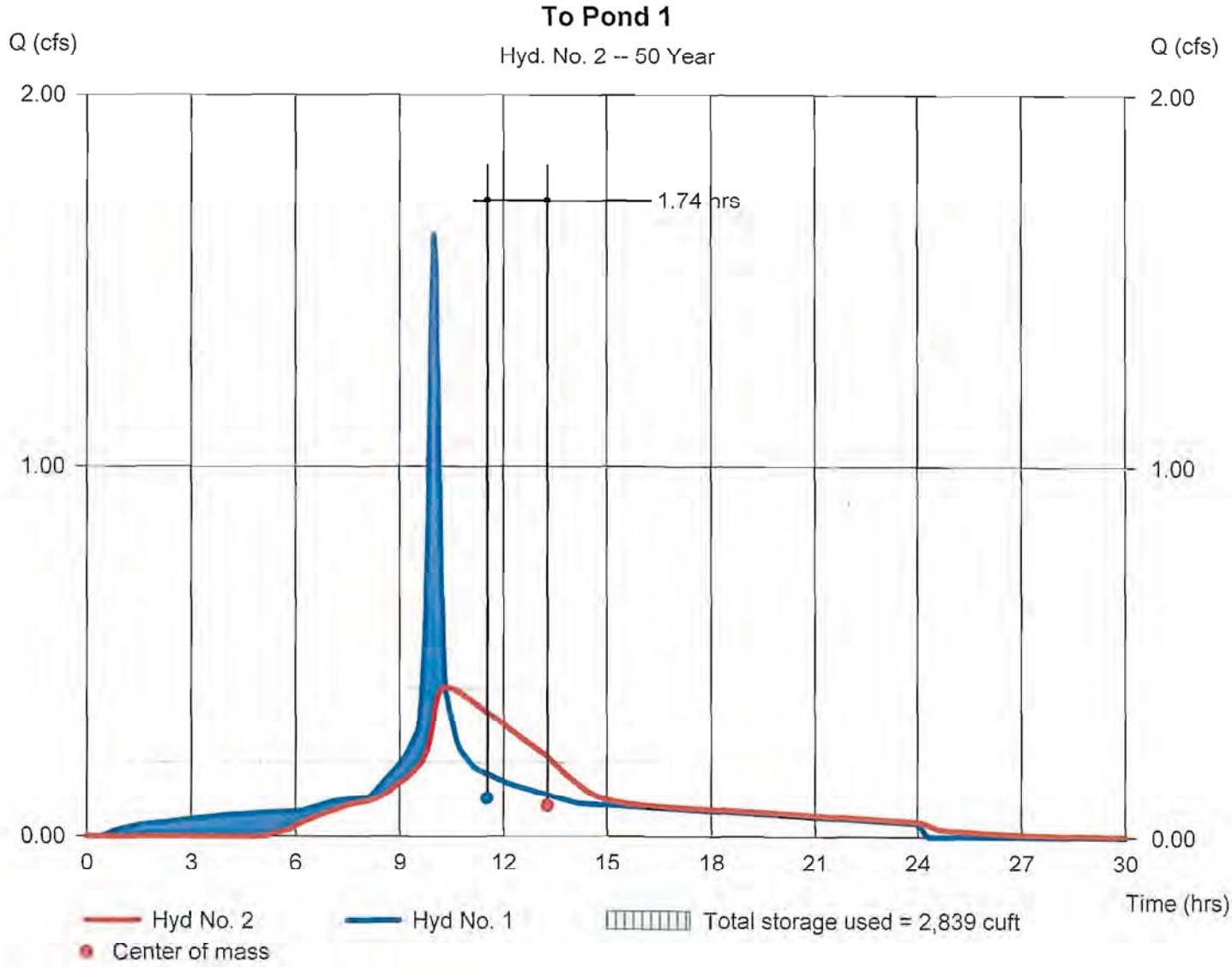
Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Hyd. No. 2

To Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 0.404 cfs
Storm frequency	= 50 yrs	Time to peak	= 621 min
Time interval	= 3 min	Hyd. volume	= 8,629 cuft
Inflow hyd. No.	= 1 - Pond for Entrance Rd	Max. Elevation	= 1019.74 ft
Reservoir name	= Roadway Pond	Max. Storage	= 2,839 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Hyd. No. 2

To Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 0.404 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.35 hrs
Time interval	= 3 min	Hyd. volume	= 8,629 cuft
Inflow hyd. No.	= 1 - Pond for Entrance Rd	Reservoir name	= Roadway Pond
Max. Elevation	= 1019.74 ft	Max. Storage	= 2,839 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print Interval = 3)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
6.00	0.065	1018.62	0.029	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
6.15	0.067	1018.63	0.036	0.035	-----	-----	-----	-----	-----	-----	-----	0.035
6.30	0.070	1018.64	0.042	0.041	-----	-----	-----	-----	-----	-----	-----	0.041
6.45	0.074	1018.65	0.047	0.047	-----	-----	-----	-----	-----	-----	-----	0.047
6.60	0.079	1018.66	0.053	0.052	-----	-----	-----	-----	-----	-----	-----	0.052
6.75	0.083	1018.67	0.058	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
6.90	0.088	1018.68	0.063	0.063	-----	-----	-----	-----	-----	-----	-----	0.063
7.05	0.092	1018.69	0.068	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
7.20	0.095	1018.70	0.073	0.073	-----	-----	-----	-----	-----	-----	-----	0.073
7.35	0.097	1018.71	0.078	0.078	-----	-----	-----	-----	-----	-----	-----	0.078
7.50	0.098	1018.72	0.083	0.083	-----	-----	-----	-----	-----	-----	-----	0.083
7.65	0.100	1018.72	0.087	0.086	-----	-----	-----	-----	-----	-----	-----	0.086
7.80	0.101	1018.73	0.090	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
7.95	0.102	1018.73	0.093	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
8.10	0.105	1018.73	0.095	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
8.25	0.115	1018.74	0.098	0.098	-----	-----	-----	-----	-----	-----	-----	0.098
8.40	0.131	1018.75	0.104	0.104	-----	-----	-----	-----	-----	-----	-----	0.104
8.55	0.148	1018.76	0.112	0.112	-----	-----	-----	-----	-----	-----	-----	0.112
8.70	0.164	1018.78	0.122	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
8.85	0.179	1018.79	0.134	0.134	-----	-----	-----	-----	-----	-----	-----	0.134
9.00	0.195	1018.81	0.145	0.144	-----	-----	-----	-----	-----	-----	-----	0.144
9.15	0.213	1018.83	0.155	0.154	-----	-----	-----	-----	-----	-----	-----	0.154
9.30	0.239	1018.86	0.168	0.166	-----	-----	-----	-----	-----	-----	-----	0.166
9.45	0.269	1018.89	0.183	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
9.60	0.323	1018.93	0.199	0.195	-----	-----	-----	-----	-----	-----	-----	0.195
9.75	0.558	1019.01	0.226	0.223	-----	-----	-----	-----	-----	-----	-----	0.223
9.90	1.225	1019.17	0.272	0.272	-----	-----	-----	-----	-----	-----	-----	0.272
10.05	1.538	1019.50	0.353	0.353	-----	-----	-----	-----	-----	-----	-----	0.353
10.20	0.739	1019.70	0.403	0.397	-----	-----	-----	-----	-----	-----	-----	0.397
10.35	0.391	1019.74 <<	0.409	0.404	-----	-----	-----	-----	-----	-----	-----	0.404 <<
10.50	0.320	1019.72	0.407	0.401	-----	-----	-----	-----	-----	-----	-----	0.401
10.65	0.258	1019.69	0.401	0.395	-----	-----	-----	-----	-----	-----	-----	0.395
10.80	0.227	1019.65	0.394	0.386	-----	-----	-----	-----	-----	-----	-----	0.386
10.95	0.209	1019.61	0.387	0.377	-----	-----	-----	-----	-----	-----	-----	0.377
11.10	0.192	1019.56	0.373	0.367	-----	-----	-----	-----	-----	-----	-----	0.367
11.25	0.181	1019.51	0.358	0.357	-----	-----	-----	-----	-----	-----	-----	0.357
11.40	0.174	1019.47	0.348	0.346	-----	-----	-----	-----	-----	-----	-----	0.346
11.55	0.168	1019.42	0.339	0.335	-----	-----	-----	-----	-----	-----	-----	0.335
11.70	0.162	1019.37	0.328	0.324	-----	-----	-----	-----	-----	-----	-----	0.325
11.85	0.155	1019.33	0.315	0.314	-----	-----	-----	-----	-----	-----	-----	0.314

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To Pond 1

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
12.00	0.149	1019.29	0.303	0.303	-----	-----	-----	-----	-----	-----	-----	0.303
12.15	0.143	1019.25	0.292	0.292	-----	-----	-----	-----	-----	-----	-----	0.292
12.30	0.138	1019.21	0.281	0.281	-----	-----	-----	-----	-----	-----	-----	0.281
12.45	0.134	1019.17	0.271	0.271	-----	-----	-----	-----	-----	-----	-----	0.271
12.60	0.130	1019.13	0.260	0.260	-----	-----	-----	-----	-----	-----	-----	0.260
12.75	0.126	1019.10	0.251	0.250	-----	-----	-----	-----	-----	-----	-----	0.250
12.90	0.122	1019.07	0.242	0.240	-----	-----	-----	-----	-----	-----	-----	0.240
13.05	0.118	1019.03	0.233	0.231	-----	-----	-----	-----	-----	-----	-----	0.231
13.20	0.114	1019.00	0.225	0.221	-----	-----	-----	-----	-----	-----	-----	0.221
13.35	0.110	1018.97	0.211	0.208	-----	-----	-----	-----	-----	-----	-----	0.208
13.50	0.106	1018.93	0.199	0.195	-----	-----	-----	-----	-----	-----	-----	0.195
13.65	0.102	1018.90	0.186	0.183	-----	-----	-----	-----	-----	-----	-----	0.183
13.80	0.098	1018.87	0.172	0.169	-----	-----	-----	-----	-----	-----	-----	0.169
13.95	0.094	1018.84	0.159	0.157	-----	-----	-----	-----	-----	-----	-----	0.157
14.10	0.090	1018.82	0.147	0.147	-----	-----	-----	-----	-----	-----	-----	0.147
14.25	0.088	1018.80	0.136	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
14.40	0.087	1018.78	0.125	0.125	-----	-----	-----	-----	-----	-----	-----	0.125
14.55	0.086	1018.77	0.116	0.116	-----	-----	-----	-----	-----	-----	-----	0.116
14.70	0.085	1018.76	0.109	0.109	-----	-----	-----	-----	-----	-----	-----	0.109
14.85	0.085	1018.75	0.104	0.104	-----	-----	-----	-----	-----	-----	-----	0.104
15.00	0.084	1018.74	0.099	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
15.15	0.083	1018.74	0.096	0.096	-----	-----	-----	-----	-----	-----	-----	0.096
15.30	0.082	1018.73	0.093	0.093	-----	-----	-----	-----	-----	-----	-----	0.093
15.45	0.081	1018.73	0.090	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
15.60	0.081	1018.72	0.088	0.088	-----	-----	-----	-----	-----	-----	-----	0.088
15.75	0.080	1018.72	0.086	0.086	-----	-----	-----	-----	-----	-----	-----	0.086
15.90	0.079	1018.72	0.085	0.085	-----	-----	-----	-----	-----	-----	-----	0.085
16.05	0.078	1018.72	0.083	0.083	-----	-----	-----	-----	-----	-----	-----	0.083
16.20	0.077	1018.72	0.082	0.082	-----	-----	-----	-----	-----	-----	-----	0.082
16.35	0.077	1018.71	0.081	0.081	-----	-----	-----	-----	-----	-----	-----	0.081
16.50	0.076	1018.71	0.080	0.080	-----	-----	-----	-----	-----	-----	-----	0.080
16.65	0.075	1018.71	0.079	0.079	-----	-----	-----	-----	-----	-----	-----	0.079
16.80	0.074	1018.71	0.078	0.078	-----	-----	-----	-----	-----	-----	-----	0.078
16.95	0.073	1018.71	0.077	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
17.10	0.073	1018.71	0.076	0.076	-----	-----	-----	-----	-----	-----	-----	0.076
17.25	0.072	1018.70	0.075	0.075	-----	-----	-----	-----	-----	-----	-----	0.075
17.40	0.071	1018.70	0.074	0.074	-----	-----	-----	-----	-----	-----	-----	0.074
17.55	0.070	1018.70	0.074	0.073	-----	-----	-----	-----	-----	-----	-----	0.073
17.70	0.069	1018.70	0.073	0.073	-----	-----	-----	-----	-----	-----	-----	0.073
17.85	0.069	1018.70	0.072	0.072	-----	-----	-----	-----	-----	-----	-----	0.072
18.00	0.068	1018.70	0.071	0.071	-----	-----	-----	-----	-----	-----	-----	0.071
18.15	0.067	1018.70	0.071	0.070	-----	-----	-----	-----	-----	-----	-----	0.070
18.30	0.066	1018.70	0.070	0.070	-----	-----	-----	-----	-----	-----	-----	0.070
18.45	0.065	1018.69	0.069	0.069	-----	-----	-----	-----	-----	-----	-----	0.069
18.60	0.065	1018.69	0.069	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
18.75	0.064	1018.69	0.068	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
18.90	0.063	1018.69	0.067	0.067	-----	-----	-----	-----	-----	-----	-----	0.067
19.05	0.062	1018.69	0.066	0.066	-----	-----	-----	-----	-----	-----	-----	0.066
19.20	0.061	1018.69	0.065	0.065	-----	-----	-----	-----	-----	-----	-----	0.065
19.35	0.061	1018.69	0.065	0.064	-----	-----	-----	-----	-----	-----	-----	0.064
19.50	0.060	1018.68	0.064	0.064	-----	-----	-----	-----	-----	-----	-----	0.064
19.65	0.059	1018.68	0.063	0.063	-----	-----	-----	-----	-----	-----	-----	0.063
19.80	0.058	1018.68	0.062	0.062	-----	-----	-----	-----	-----	-----	-----	0.062
19.95	0.057	1018.68	0.062	0.061	-----	-----	-----	-----	-----	-----	-----	0.061

Continues on next page...

To Pond 1

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
20.10	0.057	1018.68	0.061	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
20.25	0.056	1018.68	0.060	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
20.40	0.055	1018.68	0.059	0.059	-----	-----	-----	-----	-----	-----	-----	0.059
20.55	0.054	1018.67	0.058	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
20.70	0.053	1018.67	0.058	0.057	-----	-----	-----	-----	-----	-----	-----	0.057
20.85	0.053	1018.67	0.057	0.056	-----	-----	-----	-----	-----	-----	-----	0.056
21.00	0.052	1018.67	0.056	0.056	-----	-----	-----	-----	-----	-----	-----	0.056
21.15	0.051	1018.67	0.055	0.055	-----	-----	-----	-----	-----	-----	-----	0.055
21.30	0.050	1018.67	0.055	0.054	-----	-----	-----	-----	-----	-----	-----	0.054
21.45	0.049	1018.66	0.054	0.053	-----	-----	-----	-----	-----	-----	-----	0.053
21.60	0.049	1018.66	0.053	0.052	-----	-----	-----	-----	-----	-----	-----	0.052
21.75	0.048	1018.66	0.052	0.052	-----	-----	-----	-----	-----	-----	-----	0.052
21.90	0.047	1018.66	0.051	0.051	-----	-----	-----	-----	-----	-----	-----	0.051
22.05	0.046	1018.66	0.051	0.050	-----	-----	-----	-----	-----	-----	-----	0.050
22.20	0.045	1018.66	0.050	0.049	-----	-----	-----	-----	-----	-----	-----	0.049
22.35	0.045	1018.66	0.049	0.048	-----	-----	-----	-----	-----	-----	-----	0.048
22.50	0.044	1018.65	0.048	0.048	-----	-----	-----	-----	-----	-----	-----	0.048
22.65	0.043	1018.65	0.047	0.047	-----	-----	-----	-----	-----	-----	-----	0.047
22.80	0.042	1018.65	0.047	0.046	-----	-----	-----	-----	-----	-----	-----	0.046
22.95	0.041	1018.65	0.046	0.045	-----	-----	-----	-----	-----	-----	-----	0.045
23.10	0.041	1018.65	0.045	0.044	-----	-----	-----	-----	-----	-----	-----	0.044
23.25	0.040	1018.65	0.044	0.044	-----	-----	-----	-----	-----	-----	-----	0.044
23.40	0.039	1018.64	0.044	0.043	-----	-----	-----	-----	-----	-----	-----	0.043
23.55	0.038	1018.64	0.043	0.042	-----	-----	-----	-----	-----	-----	-----	0.042
23.70	0.037	1018.64	0.042	0.041	-----	-----	-----	-----	-----	-----	-----	0.041
23.85	0.036	1018.64	0.041	0.040	-----	-----	-----	-----	-----	-----	-----	0.040
24.00	0.036	1018.64	0.040	0.040	-----	-----	-----	-----	-----	-----	-----	0.040
24.15	0.018	1018.63	0.038	0.038	-----	-----	-----	-----	-----	-----	-----	0.037
24.30	0.002	1018.62	0.033	0.032	-----	-----	-----	-----	-----	-----	-----	0.032
24.45	0.000	1018.61	0.027	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
24.60	0.000	1018.60	0.022	0.021	-----	-----	-----	-----	-----	-----	-----	0.021

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 7, 2009

Pond No. 1 - Roadway Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1018.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1018.00	1,110	0	0
1.00	1019.00	1,667	1,379	1,379
2.00	1020.00	2,325	1,987	3,366
3.00	1021.00	3,084	2,695	6,061

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	4.00	0.00	0.00
Span (in)	= 12.00	4.00	0.00	0.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 1018.50	1018.50	0.00	0.00
Length (ft)	= 30.00	2.00	0.00	0.00
Slope (%)	= 2.00	1.00	0.00	n/a
N-Value	= .024	.024	.024	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	0.00	0.00	0.00
Crest El. (ft)	= 1020.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1018.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.00
1.00	1,379	1019.00	0.22 ic	0.22 ic	---	---	0.00	---	---	---	---	---	0.22
2.00	3,366	1020.00	0.46 ic	0.45 ic	---	---	0.00	---	---	---	---	---	0.45
3.00	6,061	1021.00	3.03 oc	0.42 ic	---	---	2.34 ic	---	---	---	---	---	2.77