

## **APPENDIX B-I**

### **(Supporting Materials for Section I)**

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  - Silver Lake summary table
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  - Dead River Storage Basin summary table
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  - Basin model input file
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  - Silver Lake inflow-outflow and elevation tabulation
  - Dead River Storage Basin summary table
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  - Basin model input file

## **APPENDIX B-I**

### **1. Synthetic Storm Rainfall Distributions**

## Synthetic Storm Rainfall Distributions

NOTE: 25-SQ. MI. STORM = 97% OF POINT 24-HR. STORM      filename SILVERDIST.xls  
 AND = 98% OF POINT 48-HR. STORM

TIME, %	10 TO 50 SQ MI		25-SQUARE-MILE STORM =97% OF POINT PRECIPITATION											
	3RD QUARTILE	% PRECIP	RECURRENCE INTERVAL, YEARS											
%PRECIP TIME (HR.)	TOTAL	INCREM.	1	2	5	10	25	50	100					
0			1.8915	2.3183	2.91	3.3756	4.0449	4.5881	5.1604					
5	1.6667	1.6667	0.0315	0.0386	0.0485	0.0563	0.0674	0.0765	0.0860					
10	2	2.3333	0.0441	0.0541	0.0679	0.0788	0.0944	0.1071	0.1204					
15	3	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
20	4	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
25	5	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
30	6	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
35	7	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
40	8	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
45	9	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
50	10	2.5	0.0473	0.0580	0.0728	0.0844	0.1011	0.1147	0.1290					
55	11	2.5	0.0662	0.0811	0.1019	0.1181	0.1416	0.1606	0.1806					
60	12	3.5	0.1040	0.1275	0.1601	0.1857	0.2225	0.2523	0.2838					
65	13	8.36	0.1581	0.1938	0.2433	0.2822	0.3382	0.3836	0.4314					
70	14	53.47	0.2291	0.2807	0.3524	0.4088	0.4898	0.5556	0.6249					
75	15	62	0.1613	0.1978	0.2482	0.2879	0.3450	0.3914	0.4402					
80	16	70.77	0.1659	0.2033	0.2552	0.2960	0.3547	0.4024	0.4526					
85	17	79.94	0.1735	0.2126	0.2668	0.3095	0.3709	0.4207	0.4732					
90	18	86	0.1146	0.1405	0.1763	0.2046	0.2451	0.2780	0.3127					
95	19	90.05	0.0766	0.0939	0.1179	0.1367	0.1638	0.1858	0.2090					
100	20	92.16	0.0399	0.0489	0.0614	0.0712	0.0853	0.0968	0.1089					
	21	95	0.0537	0.0658	0.0826	0.0959	0.1149	0.1303	0.1466					
	22	97.78	0.0526	0.0644	0.0809	0.0938	0.1124	0.1275	0.1435					
	23	98.86	0.0204	0.0250	0.0314	0.0365	0.0437	0.0496	0.0557					
	24	100	0.0216	0.0264	0.0332	0.0385	0.0461	0.0523	0.0588					
	STORM TOTAL, IN.		1.8915	2.3183	2.9100	3.3756	4.0449	4.5881	5.1604					

## **APPENDIX B-I**

2. HEC-HMS Summary of Results for Synthetic Storms: 2, 5, 10, 25, 50, 100-Year Floods



HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake            Run Name : Run 26

Start of Run : 01Jul00 0000    Basin Model : Clark parameters,  
End of Run : 03Jul00 1200    Met. Model : 2-YR  
Execution Time : 29Aug03 1548    Control Specs : Control 3

Initial loss = 1.11"  
constant = 0.075  
(summer)  
 $T_c = 12$  hr.

Computed Results

Peak Inflow : 494.41 (cfs)    Date/Time of Peak Inflow : 02 Jul 00 0200  
Peak Outflow : 10.0000 (cfs)    Date/Time of Peak Outflow : 30 Jun 00 2400  
Total Inflow : 0.78 (in)    Peak Storage : 31377 (in)  
Total Outflow : 0.04 (in)    Peak Elevation : 1484.4 (in)

HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake            Run Name : Run 28

Start of Run : 01Jul00 0000    Basin Model : Clark parameters,  
End of Run : 03Jul00 1200    Met. Model : 5-YR  
Execution Time : 29Aug03 1549    Control Specs : Control 3

Computed Results

Peak Inflow : 809.02 (cfs)    Date/Time of Peak Inflow : 02 Jul 00 0200  
Peak Outflow : 10.0000 (cfs)    Date/Time of Peak Outflow : 30 Jun 00 2400  
Total Inflow : 1.23 (in)    Peak Storage : 31948 (in)  
Total Outflow : 0.04 (in)    Peak Elevation : 1484.8 (in)

HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake            Run Name : Run 29

Start of Run    : 01Jul00 0000    Basin Model    : Clark parameters,  
End of Run      : 03Jul00 1200    Met. Model    : 10-YR  
Execution Time : 29Aug03 1551    Control Specs : Control 3

Computed Results

Peak Inflow    : 1061.5 (cfs)    Date/Time of Peak Inflow : 02 Jul 00 0200  
Peak Outflow   : 10.0000 (cfs)    Date/Time of Peak Outflow : 30 Jun 00 2400  
Total Inflow   : 1.60 (in)            Peak Storage    : 32421 (in)  
Total Outflow   : 0.04 (in)            Peak Elevation : 1485.1 (in)

HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake                      Run Name : Run 30

Start of Run : 01Jul00 0000    Basin Model : Clark parameters,  
End of Run : 03Jul00 1200    Met. Model : 25-YR  
Execution Time : 29Aug03 1551    Control Specs : Control 3

Computed Results

Peak Inflow : 1420.3 (cfs)    Date/Time of Peak Inflow : 02 Jul 00 0200  
Peak Outflow : 10.0000 (cfs)    Date/Time of Peak Outflow : 30 Jun 00 2400  
Total Inflow : 2.15 (in)    Peak Storage : 33105 (in)  
Total Outflow : 0.04 (in)    Peak Elevation : 1485.6 (in)

HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake                      Run Name : Run 31

Start of Run    : 01Jul00 0000    Basin Model    : Clark parameters,  
End of Run      : 03Jul00 1200    Met. Model    : 50-YR  
Execution Time : 29Aug03 1552    Control Specs : Control 3

Computed Results

Peak Inflow    : 1705.5 (cfs)    Date/Time of Peak Inflow : 02 Jul 00 0200  
Peak Outflow   : 10.0000 (cfs)    Date/Time of Peak Outflow : 30 Jun 00 2400  
Total Inflow   : 2.58 (in)            Peak Storage    : 33655 (in)  
Total Outflow  : 0.04 (in)            Peak Elevation : 1486.0 (in)

HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake            Run Name : Run 32

Start of Run    : 01Jul00 0000    Basin Model    : Clark parameters,  
End of Run      : 03Jul00 1200    Met. Model    : 100-YR  
Execution Time : 29Aug03 1553    Control Specs : Control 3

Computed Results

Peak Inflow    : 2001.3 (cfs)    Date/Time of Peak Inflow : 02 Jul 00 0200  
Peak Outflow   : 52.275 (cfs)    Date/Time of Peak Outflow : 03 Jul 00 1200  
Total Inflow   : 3.04 (in)            Peak Storage    : 34210 (in)  
Total Outflow   : 0.05 (in)            Peak Elevation : 1486.4 (in)

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3. HEC-HMS Model Output and Input for May 9-14 Case with STS Tc's
  - Watershed summary table
  - Silver Lake summary table
  - Silver Lake inflow-outflow and elevation tabulation
  - Dead River Storage Basin summary table
  - Dead River Storage Basin inflow-outflow and elevation table
  - Basin model input file

# HMS \* Summary of Results

Project : silver lake

Run Name : Run 35

Start of Run : 08May03 2200 Basin Model : Clark *calibrated*  
 End of Run : 15May03 1200 Met. Model : DRB MET  
 Execution Time : 03Sep03 1309 Control Specs : Control EXP

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
SILVER LAKE REV	910.05	12 May 03 1300	2762.4	23.600
SILVER LAKE BASIN	10.0000	08 May 03 2200	130.58	23.600
Reach-1	10.000	08 May 03 2400	130.58	23.600
HOIST 12 REV	331.42	12 May 03 1300	981.52	10.800
Junction-3	341.42	12 May 03 1300	1112.1	34.400
Reach-2	341.09	12 May 03 1400	1111.9	34.400
HOIST 1 REV	523.01	12 May 03 1700	1642.2	18.100
Junction-2	853.81	12 May 03 1600	2754.1	52.500
Reach-3	853.39	12 May 03 1600	2753.7	52.500
AAO	15.255	12 May 03 1100	90.995	0.400
Junction-1	866.52	12 May 03 1600	2844.7	52.900
Reach-4	798.02	12 May 03 2400	2816.0	52.900
HOIST 11 REV	161.55	12 May 03 1200	472.08	5.000
HOIST 10 REV	517.74	12 May 03 1500	1593.6	17.000
HOIST 3 REV	185.48	12 May 03 1200	554.04	5.100
Junction-5	1468.1	12 May 03 1900	5435.8	80.000
HOIST 9 REV	181.49	12 May 03 1200	555.99	4.600
HOIST 2 REV	608.69	12 May 03 1500	1861.6	20.500
Junction-6	2213.1	12 May 03 1600	7853.4	105.100
HOIST 4 REV	174.00	12 May 03 1300	529.15	4.700
Junction-7	2373.6	12 May 03 1600	8382.6	109.800
HOIST 8 REV	547.99	12 May 03 1500	1669.1	17.800
HOIST 5 REV	81.762	12 May 03 1200	245.29	2.200
Junction-8	2988.0	12 May 03 1500	10297	129.800
HOIST 7 REV	162.03	12 May 03 1200	485.87	4.500
HOIST 6 REV	79.511	12 May 03 1100	242.16	1.900
Junction-9	3203.7	12 May 03 1500	11025	136.200
Dead River Storage	317.00	08 May 03 2200	4139.3	136.200



HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake            Run Name : Run 35

Start of Run    : 08May03 2200    Basin Model    : Clark *calibrated*  
End of Run      : 15May03 1200    Met. Model     : DRB MET  
Execution Time : 03Sep03 1309    Control Specs : Control EXP

Computed Results

Peak Inflow    : 910.05 (cfs)    Date/Time of Peak Inflow : 12 May 03 1300  
Peak Outflow   : 10.0000 (cfs)    Date/Time of Peak Outflow : 08 May 03 2200  
Total Inflow   : 2.19 (in)            Peak Storage    : 33083 (in)  
Total Outflow   : 0.10 (in)            Peak Elevation : 1485.6 (in)

HMS \* Summary of Results for SILVER LAKE

BASIN

Project : silver lake                      Run Name : Run 35

Start of Run : 08May03 2200    Basin Model : Clark *calibrated*  
 End of Run : 15May03 1200    Met. Model : DRB MET  
 Execution Time : 03Sep03 1309    Control Specs : Control EXP

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
08 May '03	2200	30451	1483.7	24.0000	10.0000
08 May 03	2300	30452	1483.7	24.0475	10.0000
08 May 03	2400	30453	1483.7	24.2736	10.0000
09 May 03	0100	30455	1483.7	24.7236	10.0000
09 May 03	0200	30456	1483.7	25.4157	10.0000
09 May 03	0300	30457	1483.7	26.3679	10.0000
09 May 03	0400	30458	1483.7	27.4995	10.0000
09 May 03	0500	30460	1483.7	28.7342	10.0000
09 May 03	0600	30462	1483.7	29.9825	10.0000
09 May 03	0700	30463	1483.7	31.1521	10.0000
09 May 03	0800	30465	1483.7	32.1719	10.0000
09 May 03	0900	30467	1483.7	32.9706	10.0000
09 May 03	1000	30469	1483.7	33.4925	10.0000
09 May 03	1100	30471	1483.7	33.6870	10.0000
09 May 03	1200	30473	1483.7	33.8402	10.0000
09 May 03	1300	30475	1483.7	34.2794	10.0000
09 May 03	1400	30477	1483.7	34.9062	10.0000
09 May 03	1500	30479	1483.7	35.9602	10.0000
09 May 03	1600	30481	1483.7	37.7933	10.0000
09 May 03	1700	30484	1483.7	40.2743	10.0000
09 May 03	1800	30486	1483.7	43.0986	10.0000
09 May 03	1900	30489	1483.7	45.9690	10.0000
09 May 03	2000	30492	1483.7	48.7313	10.0000
09 May 03	2100	30495	1483.7	51.2474	10.0000
09 May 03	2200	30499	1483.7	53.2595	10.0000
09 May 03	2300	30503	1483.7	54.5174	10.0000
09 May 03	2400	30506	1483.7	54.8743	10.0000
10 May 03	0100	30510	1483.7	54.5684	10.0000
10 May 03	0200	30514	1483.7	53.8001	10.0000
10 May 03	0300	30517	1483.7	52.4309	10.0000
10 May 03	0400	30521	1483.7	50.6915	10.0000
10 May 03	0500	30524	1483.7	48.9695	10.0000
10 May 03	0600	30527	1483.7	47.3586	10.0000
10 May 03	0700	30530	1483.7	45.8516	10.0000
10 May 03	0800	30533	1483.7	44.4418	10.0000
10 May 03	0900	30536	1483.7	43.1230	10.0000
10 May 03	1000	30538	1483.7	41.8892	10.0000
10 May 03	1100	30541	1483.7	40.7351	10.0000
10 May 03	1200	30543	1483.7	39.6554	10.0000
10 May 03	1300	30546	1483.7	38.6454	10.0000

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
10 May 03	1400	30548	1483.7	37.7005	10.0000
10 May 03	1500	30550	1483.7	36.8166	10.0000
10 May 03	1600	30553	1483.8	35.9897	10.0000
10 May 03	1700	30555	1483.8	35.2162	10.0000
10 May 03	1800	30557	1483.8	34.4926	10.0000
10 May 03	1900	30559	1483.8	33.8156	10.0000
10 May 03	2000	30561	1483.8	33.1824	10.0000
10 May 03	2100	30563	1483.8	32.5900	10.0000
10 May 03	2200	30564	1483.8	32.0358	10.0000
10 May 03	2300	30566	1483.8	31.5173	10.0000
10 May 03	2400	30568	1483.8	31.1273	10.0000
11 May 03	0100	30570	1483.8	31.0784	10.0000
11 May 03	0200	30572	1483.8	31.4228	10.0000
11 May 03	0300	30573	1483.8	32.0324	10.0000
11 May 03	0400	30575	1483.8	32.8187	10.0000
11 May 03	0500	30577	1483.8	33.7377	10.0000
11 May 03	0600	30579	1483.8	34.7308	10.0000
11 May 03	0700	30581	1483.8	35.6757	10.0000
11 May 03	0800	30583	1483.8	36.4442	10.0000
11 May 03	0900	30586	1483.8	37.2692	10.0000
11 May 03	1000	30588	1483.8	42.1404	10.0000
11 May 03	1100	30591	1483.8	53.7422	10.0000
11 May 03	1200	30595	1483.8	69.6843	10.0000
11 May 03	1300	30601	1483.8	88.1680	10.0000
11 May 03	1400	30608	1483.8	108.5970	10.0000
11 May 03	1500	30618	1483.8	130.5029	10.0000
11 May 03	1600	30628	1483.8	152.2681	10.0000
11 May 03	1700	30641	1483.8	172.3909	10.0000
11 May 03	1800	30655	1483.8	192.4339	10.0000
11 May 03	1900	30671	1483.8	215.2394	10.0000
11 May 03	2000	30689	1483.9	242.3022	10.0000
11 May 03	2100	30710	1483.9	273.5695	10.0000
11 May 03	2200	30733	1483.9	308.8034	10.0000
11 May 03	2300	30760	1483.9	352.1826	10.0000
11 May 03	2400	30790	1483.9	406.9134	10.0000
12 May 03	0100	30825	1484.0	470.6525	10.0000
12 May 03	0200	30866	1484.0	539.7945	10.0000
12 May 03	0300	30913	1484.0	610.4856	10.0000
12 May 03	0400	30966	1484.1	678.4584	10.0000
12 May 03	0500	31023	1484.1	738.3537	10.0000
12 May 03	0600	31085	1484.2	786.5404	10.0000
12 May 03	0700	31151	1484.2	823.8897	10.0000
12 May 03	0800	31220	1484.3	853.4059	10.0000
12 May 03	0900	31290	1484.3	876.1979	10.0000
12 May 03	1000	31363	1484.4	891.9736	10.0000
12 May 03	1100	31436	1484.4	902.0461	10.0000
12 May 03	1200	31510	1484.5	908.0011	10.0000
12 May 03	1300	31584	1484.5	910.0482	10.0000
12 May 03	1400	31658	1484.6	907.6189	10.0000
12 May 03	1500	31732	1484.6	900.0095	10.0000
12 May 03	1600	31805	1484.7	887.2800	10.0000

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
12 May 03	1700	31877	1484.7	869.3404	10.0000
12 May 03	1800	31947	1484.8	844.4789	10.0000
12 May 03	1900	32015	1484.8	811.7394	10.0000
12 May 03	2000	32079	1484.9	773.0034	10.0000
12 May 03	2100	32141	1484.9	731.7861	10.0000
12 May 03	2200	32199	1485.0	690.0930	10.0000
12 May 03	2300	32253	1485.0	648.4524	10.0000
12 May 03	2400	32304	1485.1	608.2601	10.0000
13 May 03	0100	32352	1485.1	570.5659	10.0000
13 May 03	0200	32397	1485.1	535.2214	10.0000
13 May 03	0300	32439	1485.2	502.2393	10.0000
13 May 03	0400	32478	1485.2	471.3852	10.0000
13 May 03	0500	32515	1485.2	442.4394	10.0000
13 May 03	0600	32550	1485.2	415.4159	10.0000
13 May 03	0700	32582	1485.3	390.1633	10.0000
13 May 03	0800	32613	1485.3	366.5398	10.0000
13 May 03	0900	32641	1485.3	344.4405	10.0000
13 May 03	1000	32668	1485.3	323.7669	10.0000
13 May 03	1100	32693	1485.3	304.4271	10.0000
13 May 03	1200	32717	1485.4	286.3350	10.0000
13 May 03	1300	32739	1485.4	269.4102	10.0000
13 May 03	1400	32760	1485.4	253.5773	10.0000
13 May 03	1500	32779	1485.4	238.7658	10.0000
13 May 03	1600	32798	1485.4	224.9100	10.0000
13 May 03	1700	32815	1485.4	211.9480	10.0000
13 May 03	1800	32831	1485.4	199.8224	10.0000
13 May 03	1900	32846	1485.4	188.4790	10.0000
13 May 03	2000	32861	1485.5	177.8674	10.0000
13 May 03	2100	32874	1485.5	167.9405	10.0000
13 May 03	2200	32887	1485.5	158.6540	10.0000
13 May 03	2300	32899	1485.5	149.9667	10.0000
13 May 03	2400	32910	1485.5	141.8398	10.0000
14 May 03	0100	32921	1485.5	134.2372	10.0000
14 May 03	0200	32930	1485.5	127.1251	10.0000
14 May 03	0300	32940	1485.5	120.4719	10.0000
14 May 03	0400	32949	1485.5	114.2479	10.0000
14 May 03	0500	32957	1485.5	108.4255	10.0000
14 May 03	0600	32965	1485.5	102.9787	10.0000
14 May 03	0700	32973	1485.5	97.8833	10.0000
14 May 03	0800	32980	1485.5	93.1166	10.0000
14 May 03	0900	32986	1485.6	88.6575	10.0000
14 May 03	1000	32993	1485.6	84.4860	10.0000
14 May 03	1100	32999	1485.6	80.5837	10.0000
14 May 03	1200	33004	1485.6	76.9331	10.0000
14 May 03	1300	33010	1485.6	73.5181	10.0000
14 May 03	1400	33015	1485.6	70.2960	10.0000
14 May 03	1500	33020	1485.6	67.2680	10.0000
14 May 03	1600	33024	1485.6	64.4765	10.0000
14 May 03	1700	33029	1485.6	61.8651	10.0000
14 May 03	1800	33033	1485.6	59.4222	10.0000
14 May 03	1900	33037	1485.6	57.1369	10.0000

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
14 May 03	2000	33041	1485.6	54.9991	10.0000
14 May 03	2100	33044	1485.6	52.9991	10.0000
14 May 03	2200	33048	1485.6	51.1282	10.0000
14 May 03	2300	33051	1485.6	49.2958	10.0000
14 May 03	2400	33054	1485.6	46.5706	10.0000
15 May 03	0100	33057	1485.6	45.1144	10.0000
15 May 03	0200	33060	1485.6	43.7522	10.0000
15 May 03	0300	33063	1485.6	42.4779	10.0000
15 May 03	0400	33065	1485.6	41.2857	10.0000
15 May 03	0500	33068	1485.6	40.1705	10.0000
15 May 03	0600	33070	1485.6	39.0999	10.0000
15 May 03	0700	33073	1485.6	37.8183	10.0000
15 May 03	0800	33075	1485.6	36.3285	10.0000
15 May 03	0900	33077	1485.6	34.9349	10.0000
15 May 03	1000	33079	1485.6	33.6311	10.0000
15 May 03	1100	33081	1485.6	32.4115	10.0000
15 May 03	1200	33083	1485.6	31.2705	10.0000

HMS \* Summary of Results for Dead River  
Storage

Project : silver lake            Run Name : Run 35

Start of Run    : 08May03 2200    Basin Model    : Clark *calibrated*  
End of Run      : 15May03 1200    Met. Model    : DRB MET  
Execution Time : 03Sep03 1309    Control Specs : Control EXP

Computed Results

Peak Inflow    : 3203.7 (cfs)    Date/Time of Peak Inflow : 12 May 03 1500  
Peak Outflow   : 317.00 (cfs)    Date/Time of Peak Outflow : 08 May 03 2200  
Total Inflow   : 1.52 (in)        Peak Storage    : 10979 (in)  
Total Outflow   : 0.57 (in)        Peak Elevation : 1344.0 (in)

HMS \* Summary of Results for Dead River  
Storage

Project : silver lake                      Run Name : Run 35

Start of Run : 08May03 2200    Basin Model : Clark *calibrated*  
End of Run : 15May03 1200    Met. Model : DRB MET  
Execution Time : 03Sep03 1309    Control Specs : Control EXP

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
08 May 03	2200	3999	1341.5	153.21	317.00
08 May 03	2300	3986	1341.5	153.46	317.00
08 May 03	2400	3972	1341.5	154.44	317.00
09 May 03	0100	3959	1341.5	156.50	317.00
09 May 03	0200	3946	1341.5	160.38	317.00
09 May 03	0300	3933	1341.5	166.09	317.00
09 May 03	0400	3921	1341.5	171.73	317.00
09 May 03	0500	3909	1341.5	175.58	317.00
09 May 03	0600	3897	1341.5	177.49	317.00
09 May 03	0700	3886	1341.5	178.18	317.00
09 May 03	0800	3874	1341.5	178.68	317.00
09 May 03	0900	3863	1341.5	179.63	317.00
09 May 03	1000	3852	1341.5	181.31	317.00
09 May 03	1100	3840	1341.5	183.52	317.00
09 May 03	1200	3830	1341.5	186.46	317.00
09 May 03	1300	3819	1341.5	189.61	317.00
09 May 03	1400	3808	1341.4	191.96	317.00
09 May 03	1500	3798	1341.4	196.80	317.00
09 May 03	1600	3789	1341.4	203.64	317.00
09 May 03	1700	3780	1341.4	208.43	317.00
09 May 03	1800	3771	1341.4	210.78	317.00
09 May 03	1900	3762	1341.4	210.95	317.00
09 May 03	2000	3753	1341.4	209.50	317.00
09 May 03	2100	3744	1341.4	207.18	317.00
09 May 03	2200	3735	1341.4	204.61	317.00
09 May 03	2300	3725	1341.4	202.03	317.00
09 May 03	2400	3716	1341.4	199.48	317.00
10 May 03	0100	3706	1341.4	196.98	317.00
10 May 03	0200	3696	1341.4	194.78	317.00
10 May 03	0300	3686	1341.4	192.82	317.00
10 May 03	0400	3676	1341.4	190.81	317.00
10 May 03	0500	3665	1341.4	188.73	317.00
10 May 03	0600	3654	1341.4	186.64	317.00
10 May 03	0700	3643	1341.4	184.58	317.00
10 May 03	0800	3632	1341.4	182.60	317.00
10 May 03	0900	3621	1341.4	180.74	317.00
10 May 03	1000	3610	1341.4	178.99	317.00
10 May 03	1100	3598	1341.4	177.36	317.00
10 May 03	1200	3587	1341.4	175.82	317.00
10 May 03	1300	3575	1341.4	174.38	317.00

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
10 May 03	1400	3563	1341.4	173.03	317.00
10 May 03	1500	3551	1341.4	171.76	317.00
10 May 03	1600	3539	1341.3	170.56	317.00
10 May 03	1700	3527	1341.3	169.44	317.00
10 May 03	1800	3515	1341.3	168.40	317.00
10 May 03	1900	3503	1341.3	167.42	317.00
10 May 03	2000	3490	1341.3	166.50	317.00
10 May 03	2100	3478	1341.3	165.64	317.00
10 May 03	2200	3465	1341.3	164.84	317.00
10 May 03	2300	3453	1341.3	164.60	317.00
10 May 03	2400	3440	1341.3	165.85	317.00
11 May 03	0100	3428	1341.3	169.57	317.00
11 May 03	0200	3416	1341.3	174.15	317.00
11 May 03	0300	3404	1341.3	179.44	317.00
11 May 03	0400	3393	1341.3	185.09	317.00
11 May 03	0500	3382	1341.3	190.97	317.00
11 May 03	0600	3372	1341.3	196.94	317.00
11 May 03	0700	3362	1341.3	200.35	317.00
11 May 03	0800	3353	1341.3	203.98	317.00
11 May 03	0900	3345	1341.3	245.42	317.00
11 May 03	1000	3343	1341.3	329.14	317.00
11 May 03	1100	3347	1341.3	406.02	317.00
11 May 03	1200	3356	1341.3	458.13	317.00
11 May 03	1300	3370	1341.3	492.39	317.00
11 May 03	1400	3385	1341.3	518.09	317.00
11 May 03	1500	3403	1341.3	540.45	317.00
11 May 03	1600	3422	1341.3	561.88	317.00
11 May 03	1700	3443	1341.3	582.28	317.00
11 May 03	1800	3466	1341.3	608.02	317.00
11 May 03	1900	3492	1341.3	652.85	317.00
11 May 03	2000	3523	1341.3	729.54	317.00
11 May 03	2100	3562	1341.4	840.34	317.00
11 May 03	2200	3610	1341.4	976.94	317.00
11 May 03	2300	3671	1341.4	1127.99	317.00
11 May 03	2400	3745	1341.4	1286.29	317.00
12 May 03	0100	3832	1341.5	1451.54	317.00
12 May 03	0200	3933	1341.5	1624.51	317.00
12 May 03	0300	4048	1341.5	1802.30	317.00
12 May 03	0400	4178	1341.6	1977.72	317.00
12 May 03	0500	4322	1341.6	2146.88	317.00
12 May 03	0600	4480	1341.7	2311.28	317.00
12 May 03	0700	4652	1341.8	2472.25	317.00
12 May 03	0800	4836	1341.8	2626.75	317.00
12 May 03	0900	5033	1341.9	2768.36	317.00
12 May 03	1000	5241	1342.0	2895.32	317.00
12 May 03	1100	5459	1342.1	3009.56	317.00
12 May 03	1200	5685	1342.1	3106.06	317.00
12 May 03	1300	5918	1342.2	3170.82	317.00
12 May 03	1400	6155	1342.3	3200.93	317.00
12 May 03	1500	6394	1342.4	3203.75	317.00
12 May 03	1600	6632	1342.5	3186.26	317.00



Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
12 May 03	1700	6868	1342.6	3152.73	317.00
12 May 03	1800	7100	1342.6	3105.33	317.00
12 May 03	1900	7328	1342.7	3044.62	317.00
12 May 03	2000	7550	1342.8	2971.07	317.00
12 May 03	2100	7766	1342.9	2885.91	317.00
12 May 03	2200	7974	1342.9	2790.96	317.00
12 May 03	2300	8175	1343.0	2688.34	317.00
12 May 03	2400	8366	1343.1	2580.60	317.00
13 May 03	0100	8549	1343.1	2470.32	317.00
13 May 03	0200	8722	1343.2	2360.12	317.00
13 May 03	0300	8887	1343.3	2252.00	317.00
13 May 03	0400	9042	1343.3	2146.55	317.00
13 May 03	0500	9189	1343.4	2043.97	317.00
13 May 03	0600	9328	1343.4	1944.43	317.00
13 May 03	0700	9458	1343.5	1848.12	317.00
13 May 03	0800	9581	1343.5	1755.18	317.00
13 May 03	0900	9696	1343.6	1665.74	317.00
13 May 03	1000	9804	1343.6	1579.90	317.00
13 May 03	1100	9905	1343.6	1497.74	317.00
13 May 03	1200	9999	1343.7	1419.31	317.00
13 May 03	1300	10087	1343.7	1344.61	317.00
13 May 03	1400	10169	1343.7	1273.62	317.00
13 May 03	1500	10246	1343.7	1206.27	317.00
13 May 03	1600	10316	1343.8	1142.42	317.00
13 May 03	1700	10382	1343.8	1081.87	317.00
13 May 03	1800	10443	1343.8	1024.36	317.00
13 May 03	1900	10499	1343.8	969.85	317.00
13 May 03	2000	10551	1343.9	918.07	317.00
13 May 03	2100	10599	1343.9	868.70	317.00
13 May 03	2200	10642	1343.9	821.35	317.00
13 May 03	2300	10682	1343.9	775.63	317.00
13 May 03	2400	10718	1343.9	733.85	317.00
14 May 03	0100	10751	1343.9	695.49	317.00
14 May 03	0200	10781	1343.9	660.11	317.00
14 May 03	0300	10808	1343.9	627.36	317.00
14 May 03	0400	10832	1343.9	596.96	317.00
14 May 03	0500	10854	1344.0	568.66	317.00
14 May 03	0600	10874	1344.0	542.26	317.00
14 May 03	0700	10892	1344.0	517.61	317.00
14 May 03	0800	10907	1344.0	494.55	317.00
14 May 03	0900	10921	1344.0	472.95	317.00
14 May 03	1000	10933	1344.0	452.70	317.00
14 May 03	1100	10943	1344.0	433.75	317.00
14 May 03	1200	10952	1344.0	415.97	317.00
14 May 03	1300	10960	1344.0	399.32	317.00
14 May 03	1400	10966	1344.0	383.69	317.00
14 May 03	1500	10971	1344.0	369.05	317.00
14 May 03	1600	10975	1344.0	355.34	317.00
14 May 03	1700	10977	1344.0	342.47	317.00
14 May 03	1800	10979	1344.0	329.87	317.00
14 May 03	1900	10979	1344.0	318.25	317.00

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
14 May 03	2000	10979	1344.0	307.56	317.00
14 May 03	2100	10978	1344.0	297.72	317.00
14 May 03	2200	10976	1344.0	288.50	317.00
14 May 03	2300	10973	1344.0	279.20	317.00
14 May 03	2400	10970	1344.0	269.78	317.00
15 May 03	0100	10966	1344.0	262.31	317.00
15 May 03	0200	10961	1344.0	255.30	317.00
15 May 03	0300	10955	1344.0	248.61	317.00
15 May 03	0400	10949	1344.0	242.18	317.00
15 May 03	0500	10943	1344.0	235.93	317.00
15 May 03	0600	10936	1344.0	229.96	317.00
15 May 03	0700	10929	1344.0	224.33	317.00
15 May 03	0800	10921	1344.0	218.95	317.00
15 May 03	0900	10912	1344.0	213.60	317.00
15 May 03	1000	10904	1344.0	208.24	317.00
15 May 03	1100	10894	1344.0	202.90	317.00
15 May 03	1200	10885	1344.0	197.97	317.00

Clark\_~3.bas

Basin: Clark calibrated

Description: Clark parameters with STS tc'c (Silver Lake = 12 hr)

Last Modified Date: 3 September 2003

Last Modified Time: 13:24

Version: 2.1.1

Unit System: English

Default DSS File Name: D:\D\silver\_lake\silver\_lake.dss

End:

Subbasin: SILVER LAKE REV

Canvas X: -2474.854

Canvas Y: 3348.562

Label X: 18

Label Y: -3

Area: 23.6

Downstream: SILVER LAKE BASIN

LossRate: Initial+Constant

Percent Impervious Area: 9.42

Initial Loss: 0.925

Constant Loss Rate: 0.0625

Transform: Clark

Time of Concentration: 12

Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

End:

Subbasin: HOIST 12 REV

Description: HOIST 12 REV CN

Canvas X: -2173.335

Canvas Y: 1878.196

Label X: 16

Label Y: 0

Area: 10.8

Clark\_~3.bas

Downstream: Junction-3

LossRate: Initial+Constant  
Percent Impervious Area: 0  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 8.25  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13

End:

Subbasin: HOIST 2 REV

Description: DRB REV CN  
Canvas X: 861.993  
Canvas Y: 1233.079  
Label X: 16  
Label Y: 0  
Area: 20.5  
Downstream: Junction-6

LossRate: Initial+Constant  
Percent Impervious Area: 0.0  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 14.25  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25

Clark\_~3.bas

Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25

End:

Subbasin: HOIST 3 REV

Description: DRB REV CN  
Canvas X: 337.112  
Canvas Y: 1429.035  
Label X: 16  
Label Y: 0  
Area: 5.1  
Downstream: Junction-5

LossRate: Initial+Constant  
Percent Impervious Area: 12.7  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 2.63  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Subbasin: HOIST 4 REV

Description: DRB REV CN  
Canvas X: 1064.947  
Canvas Y: 988.135

Clark\_~3.bas

Label X: 16  
Label Y: 0  
Area: 4.7  
Downstream: Junction-7

LossRate: Initial+Constant  
Percent Impervious Area: 15.5  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 6  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Subbasin: HOIST 5 REV  
Canvas X: 1372.924  
Canvas Y: 765.441  
Label X: 16  
Label Y: 0  
Area: 2.2  
Downstream: Junction-8

LossRate: Initial+Constant  
Percent Impervious Area: 14.7  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 1.88  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 3

Clark\_~3.bas

Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3

End:

Subbasin: HOIST 6 REV

Description: DRB REV CN  
Canvas X: 1365.878  
Canvas Y: 491.248  
Label X: 23  
Label Y: -4  
Area: 1.9  
Downstream: Junction-9

LossRate: Initial+Constant  
Percent Impervious Area: 26.1  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 1.13  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2

End:

Subbasin: HOIST 7 REV

Description: DRB REV CN

Clark\_~3.bas

Canvas X: 113.162  
Canvas Y: -215.592  
Label X: 16  
Label Y: 0  
Area: 4.5  
Downstream: Junction-9

LossRate: Initial+Constant  
Percent Impervious Area: 12.2  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 4.13  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Subbasin: HOIST 8 REV  
Description: DRB REV CN  
Canvas X: -197.413  
Canvas Y: 27.070  
Label X: 16  
Label Y: 0  
Area: 17.8  
Downstream: Junction-8

LossRate: Initial+Constant  
Percent Impervious Area: 2.1  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 12.38  
Storage Coefficient: 15



Clark\_~3.bas

Baseflow: Monthly Constant

Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22

End:

Subbasin: HOIST 9 REV

Description: DRB REV CN  
Canvas X: -334.736  
Canvas Y: 302.291  
Label X: 16  
Label Y: 0  
Area: 4.6  
Downstream: Junction-6

LossRate: Initial+Constant  
Percent Impervious Area: 21.4  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 4.88  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Clark\_~3.bas

Subbasin: HOIST 10 REV  
Description: DRB REV CN  
Canvas X: -656.663  
Canvas Y: 533.238  
Label X: 16  
Label Y: 0  
Area: 17.0  
Downstream: Junction-5  
  
LossRate: Initial+Constant  
Percent Impervious Area: 2.1  
Initial Loss: 1  
Constant Loss Rate: 0.08  
  
Transform: Clark  
Time of Concentration: 14.25  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21  
Monthly rate: 21

End:

Subbasin: HOIST 11 REV  
Description: REV CN  
Canvas X: -1226.972  
Canvas Y: 817.439  
Label X: 16  
Label Y: 0  
Area: 5.0  
Downstream: Junction-5  
  
LossRate: Initial+Constant  
Percent Impervious Area: 2.5  
Initial Loss: 1  
Constant Loss Rate: 0.08

Clark\_~3.bas

Transform: Clark  
Time of Concentration: 3  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Junction: Junction-1

Canvas X: -609.874  
Canvas Y: 1483.012  
Label X: 16  
Label Y: 3  
Downstream: Reach-4

End:

Junction: Junction-2

Canvas X: -990.006  
Canvas Y: 1880.875  
Label X: 22  
Label Y: -1  
Downstream: Reach-3

End:

Subbasin: HOIST 1 REV

Description: REV CN  
Canvas X: -509.401  
Canvas Y: 2512.571  
Label X: 16  
Label Y: 0  
Area: 18.1  
Downstream: Junction-2

LossRate: Initial+Constant  
Percent Impervious Area: 0.0  
Initial Loss: 1  
Constant Loss Rate: 0.08

Clark\_~3.bas

Transform: Clark  
Time of Concentration: 18  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22

End:

Reservoir: SILVER LAKE BASIN  
Description: RESERVOIR  
Canvas X: -2000.358  
Canvas Y: 2821.719  
Label X: 27  
Label Y: -1  
Downstream: Reach-1

Route: Modified Puls  
Routing Curve: Elevation-Area-Outflow  
Initial Elevation: 1483.67  
Routing Table in DSS: Yes

End:

Reach: Reach-1  
Description: SILVER LAKE BASIN TO SECOND REACH  
Canvas X: -1419.490  
Canvas Y: 2268.845  
From Canvas X: -2000.358  
From Canvas Y: 2821.719  
Label X: 16  
Label Y: 0  
Downstream: Junction-3

Route: Muskingum Cunge 8 Point  
Length: 14000  
Energy Slope: 0.0066  
Left Overbank Mannings n: 0.10

Clark\_~3.bas

Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.10  
Station: 0  
Elevation: 450  
Station: 135  
Elevation: 441  
Station: 226  
Elevation: 427  
Station: 230  
Elevation: 425  
Station: 240  
Elevation: 425  
Station: 244  
Elevation: 427  
Station: 335  
Elevation: 441  
Station: 470  
Elevation: 450

End:

Reach: Reach-2

Description: FROM JUNCTION 1 TO HOIST 1 AND 12 CONNECTION  
Canvas X: -990.006  
Canvas Y: 1880.875  
From Canvas X: -1419.490  
From Canvas Y: 2268.845  
Label X: 16  
Label Y: 0  
Downstream: Junction-2

Route: Muskingum Cunge 8 Point  
Length: 10000  
Energy Slope: 0.0023  
Left Overbank Mannings n: 0.10  
Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.10  
Station: 0  
Elevation: 440  
Station: 225  
Elevation: 425  
Station: 299  
Elevation: 415  
Station: 305  
Elevation: 412  
Station: 325  
Elevation: 412  
Station: 331  
Elevation: 415

Station: 405  
Elevation: 425  
Station: 630  
Elevation: 440

End:

Junction: Junction-3  
Canvas X: -1419.490  
Canvas Y: 2268.845  
Label X: 16  
Label Y: 0  
Downstream: Reach-2

End:

Reach: Reach-3  
Description: HOIST 1 AND 12 TO AAO BRIDGE  
Canvas X: -609.874  
Canvas Y: 1483.012  
From Canvas X: -990.006  
From Canvas Y: 1880.875  
Label X: 15  
Label Y: 2  
Downstream: Junction-1

Route: Muskingum Cunge 8 Point  
Length: 4000  
Energy Slope: 0.0025  
Left Overbank Mannings n: 0.05  
Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.05  
Station: 0  
Elevation: 433  
Station: 55.5  
Elevation: 414.5  
Station: 253  
Elevation: 412  
Station: 298  
Elevation: 408  
Station: 313  
Elevation: 408  
Station: 358  
Elevation: 412  
Station: 555.5  
Elevation: 414.5  
Station: 611  
Elevation: 433

End:

Clark\_~3.bas

Subbasin: AAO

Description: DRAINAGE AREA NEAR ACCESS ROAD; D/S OF SILVER LAKE R  
ESERVOIR ROUTING

Canvas X: -1237.531

Canvas Y: 1191.089

Label X: 16

Label Y: 0

Area: 0.4

Downstream: Junction-1

LossRate: Initial+Constant

Percent Impervious Area: 0.0

Initial Loss: 1

Constant Loss Rate: 0.09

Transform: Clark

Time of Concentration: 2.51

Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

End:

Reach: Reach-4

Description: AAO TO HOIST 11

Canvas X: -158.349

Canvas Y: 1038.823

From Canvas X: -609.874

From Canvas Y: 1483.012

Label X: 14

Label Y: 1

Downstream: Junction-5

Route: Muskingum Cunge 8 Point

Length: 16000

Energy Slope: 0.0003

Left Overbank Mannings n: 0.10

Clark\_~3.bas

Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.10  
Station: 0  
Elevation: 414.5  
Station: 400  
Elevation: 411.5  
Station: 575  
Elevation: 409  
Station: 583  
Elevation: 408  
Station: 617  
Elevation: 408  
Station: 625  
Elevation: 409  
Station: 800  
Elevation: 411.5  
Station: 1200  
Elevation: 414.5

End:

Junction: Junction-5  
Canvas X: -158.349  
Canvas Y: 1038.823  
Label X: 16  
Label Y: 0  
Downstream: Junction-6

End:

Junction: Junction-6  
Canvas X: 153.522  
Canvas Y: 726.952  
Label X: 16  
Label Y: 0  
Downstream: Junction-7

End:

Junction: Junction-7  
Canvas X: 374.564  
Canvas Y: 505.451  
Label X: 16  
Label Y: 0  
Downstream: Junction-8

End:

Junction: Junction-8  
Canvas X: 512.072  
Canvas Y: 344.281  
Label X: 25



Clark\_~3.bas

Label Y: 0

Downstream: Junction-9

End:

Junction: Junction-9

Canvas X: 659.039

Canvas Y: 155.324

Label X: 26

Label Y: -5

Downstream: Dead River Storage

End:

Reservoir: Dead River Storage

Description: Dead River Storage Basin - note: outflow includes 31  
7 cfs thru turbine

Canvas X: 974.782

Canvas Y: -229.453

Label X: 13

Label Y: 0

Route: Modified Puls

Routing Curve: Elevation-Area-Outflow

Initial Elevation: 1341.518

Routing Table in DSS: Yes

End:

## **APPENDIX B-I**

4. HEC-HMS Model Output and Input for May 9-14 Case with Harza Tc's
  - Watershed summary table
  - Silver Lake summary table
  - Silver Lake inflow-outflow and elevation tabulation
  - Dead River Storage Basin summary table
  - Dead River Storage Basin inflow-outflow and elevation table
  - Basin model input file

HMS \* Summary of Results

Project : silver lake

Run Name : Run 35

Start of Run : 08May03 2200

Basin Model : Clark parameters, HARZA Te's

End of Run : 15May03 1200

Met. Model : DRB MET

Execution Time : 03Sep03 1144

Control Specs : Control EXP

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
SILVER LAKE REV	955.51	12 May 03 1000	2764.2	23.600
SILVER LAKE BASIN	10.0000	08 May 03 2200	130.58	23.600
Reach-1	10.000	08 May 03 2400	130.58	23.600
HOIST 12 REV	338.43	12 May 03 1100	981.96	10.800
Junction-3	348.43	12 May 03 1100	1112.5	34.400
Reach-2	348.34	12 May 03 1200	1112.4	34.400
HOIST 1 REV	564.10	12 May 03 1200	1645.4	18.100
Junction-2	912.44	12 May 03 1200	2757.8	52.500
Reach-3	910.18	12 May 03 1200	2757.6	52.500
AAO	15.318	12 May 03 1100	90.998	0.400
Junction-1	925.25	12 May 03 1200	2848.6	52.900
Reach-4	848.85	12 May 03 1800	2822.0	52.900
HOIST 11 REV	162.73	12 May 03 1100	472.13	5.000
HOIST 10 REV	545.46	12 May 03 1200	1595.3	17.000
HOIST 3 REV	186.56	12 May 03 1100	554.10	5.100
Junction-5	1616.8	12 May 03 1300	5443.5	80.000
HOIST 9 REV	183.70	12 May 03 1100	556.07	4.600
HOIST 2 REV	640.88	12 May 03 1200	1863.6	20.500
Junction-6	2426.5	12 May 03 1200	7863.2	105.100
HOIST 4 REV	176.36	12 May 03 1100	529.30	4.700
Junction-7	2602.4	12 May 03 1200	8392.5	109.800
HOIST 8 REV	571.81	12 May 03 1200	1670.5	17.800
HOIST 5 REV	82.227	12 May 03 1100	245.31	2.200
Junction-8	3255.6	12 May 03 1200	10308	129.800
HOIST 7 REV	163.65	12 May 03 1100	485.98	4.500
HOIST 6 REV	79.591	12 May 03 1100	242.18	1.900
Junction-9	3496.7	12 May 03 1200	11036	136.200
Dead River Storage	317.00	08 May 03 2200	4139.3	136.200

HMS \* Summary of Results for SILVER LAKE  
BASIN

Project : silver lake                      Run Name : Run 35

Start of Run    : 08May03 2200    Basin Model    : Clark parameters, *HARZA TCS*  
End of Run      : 15May03 1200    Met. Model    : DRB MET  
Execution Time : 03Sep03 1144    Control Specs : Control EXP

Computed Results

Peak Inflow    : 955.51 (cfs)    Date/Time of Peak Inflow : 12 May 03 1000  
Peak Outflow   : 10.0000 (cfs)    Date/Time of Peak Outflow : 08 May 03 2200  
Total Inflow   : 2.20 (in)            Peak Storage    : 33085 (in)  
Total Outflow   : 0.10 (in)            Peak Elevation : 1485.6 (in)

## HMS \* Summary of Results for SILVER LAKE

## BASIN

Project : silver lake

Run Name : Run 35

Start of Run : 08May03 2200

Basin Model : Clark parameters, HARZA Tc's

End of Run : 15May03 1200

Met. Model : DRB MET

Execution Time : 03Sep03 1144

Control Specs : Control EXP

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
08 May 03	2200	30451	1483.7	24.0000	10.0000
08 May 03	2300	30452	1483.7	24.3446	10.0000
08 May 03	2400	30453	1483.7	25.9535	10.0000
09 May 03	0100	30455	1483.7	28.7308	10.0000
09 May 03	0200	30457	1483.7	31.6068	10.0000
09 May 03	0300	30458	1483.7	33.9368	10.0000
09 May 03	0400	30460	1483.7	35.3963	10.0000
09 May 03	0500	30463	1483.7	35.5671	10.0000
09 May 03	0600	30465	1483.7	34.8825	10.0000
09 May 03	0700	30467	1483.7	34.1804	10.0000
09 May 03	0800	30469	1483.7	33.5236	10.0000
09 May 03	0900	30471	1483.7	32.9092	10.0000
09 May 03	1000	30472	1483.7	32.3344	10.0000
09 May 03	1100	30474	1483.7	31.7967	10.0000
09 May 03	1200	30476	1483.7	33.3614	10.0000
09 May 03	1300	30478	1483.7	38.4089	10.0000
09 May 03	1400	30481	1483.7	43.5962	10.0000
09 May 03	1500	30484	1483.7	47.1178	10.0000
09 May 03	1600	30487	1483.7	52.1520	10.0000
09 May 03	1700	30491	1483.7	58.3365	10.0000
09 May 03	1800	30495	1483.7	60.8783	10.0000
09 May 03	1900	30499	1483.7	59.5900	10.0000
09 May 03	2000	30503	1483.7	57.3555	10.0000
09 May 03	2100	30507	1483.7	55.2036	10.0000
09 May 03	2200	30510	1483.7	53.1904	10.0000
09 May 03	2300	30514	1483.7	51.3072	10.0000
09 May 03	2400	30517	1483.7	49.5454	10.0000
10 May 03	0100	30521	1483.7	47.8973	10.0000
10 May 03	0200	30524	1483.7	46.3556	10.0000
10 May 03	0300	30527	1483.7	44.9133	10.0000
10 May 03	0400	30529	1483.7	43.5640	10.0000
10 May 03	0500	30532	1483.7	42.3018	10.0000
10 May 03	0600	30535	1483.7	41.1211	10.0000
10 May 03	0700	30537	1483.7	40.0165	10.0000
10 May 03	0800	30540	1483.7	38.9832	10.0000
10 May 03	0900	30542	1483.7	38.0165	10.0000
10 May 03	1000	30544	1483.7	37.1122	10.0000
10 May 03	1100	30547	1483.7	36.2663	10.0000
10 May 03	1200	30549	1483.7	35.4749	10.0000
10 May 03	1300	30551	1483.7	34.7346	10.0000

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
10 May 03	1400	30553	1483.8	34.0420	10.0000
10 May 03	1500	30555	1483.8	33.3942	10.0000
10 May 03	1600	30557	1483.8	32.7881	10.0000
10 May 03	1700	30558	1483.8	32.2211	10.0000
10 May 03	1800	30560	1483.8	31.6907	10.0000
10 May 03	1900	30562	1483.8	31.1945	10.0000
10 May 03	2000	30564	1483.8	30.7304	10.0000
10 May 03	2100	30565	1483.8	30.2962	10.0000
10 May 03	2200	30567	1483.8	29.8900	10.0000
10 May 03	2300	30569	1483.8	29.5100	10.0000
10 May 03	2400	30570	1483.8	29.8437	10.0000
11 May 03	0100	30572	1483.8	32.3844	10.0000
11 May 03	0200	30574	1483.8	36.7082	10.0000
11 May 03	0300	30577	1483.8	39.8528	10.0000
11 May 03	0400	30579	1483.8	40.2507	10.0000
11 May 03	0500	30581	1483.8	39.2948	10.0000
11 May 03	0600	30584	1483.8	38.3080	10.0000
11 May 03	0700	30586	1483.8	37.3849	10.0000
11 May 03	0800	30588	1483.8	36.5214	10.0000
11 May 03	0900	30591	1483.8	37.7813	10.0000
11 May 03	1000	30594	1483.8	70.0378	10.0000
11 May 03	1100	30602	1483.8	148.3311	10.0000
11 May 03	1200	30617	1483.8	224.3631	10.0000
11 May 03	1300	30636	1483.8	247.7634	10.0000
11 May 03	1400	30655	1483.8	235.7862	10.0000
11 May 03	1500	30673	1483.8	222.1226	10.0000
11 May 03	1600	30690	1483.9	210.0297	10.0000
11 May 03	1700	30706	1483.9	207.6416	10.0000
11 May 03	1800	30724	1483.9	234.0067	10.0000
11 May 03	1900	30745	1483.9	300.4032	10.0000
11 May 03	2000	30773	1483.9	393.4781	10.0000
11 May 03	2100	30809	1484.0	490.7960	10.0000
11 May 03	2200	30852	1484.0	582.4899	10.0000
11 May 03	2300	30903	1484.0	668.2680	10.0000
11 May 03	2400	30961	1484.1	748.5120	10.0000
12 May 03	0100	31025	1484.1	819.9206	10.0000
12 May 03	0200	31094	1484.2	873.0647	10.0000
12 May 03	0300	31166	1484.2	901.9584	10.0000
12 May 03	0400	31240	1484.3	909.6980	10.0000
12 May 03	0500	31314	1484.3	898.4206	10.0000
12 May 03	0600	31387	1484.4	874.5173	10.0000
12 May 03	0700	31458	1484.4	863.9017	10.0000
12 May 03	0800	31529	1484.5	890.0240	10.0000
12 May 03	0900	31604	1484.5	934.0705	10.0000
12 May 03	1000	31681	1484.6	955.5128	10.0000
12 May 03	1100	31759	1484.7	947.4431	10.0000
12 May 03	1200	31836	1484.7	928.3990	10.0000
12 May 03	1300	31910	1484.8	900.5179	10.0000
12 May 03	1400	31982	1484.8	856.5328	10.0000
12 May 03	1500	32050	1484.9	804.4184	10.0000
12 May 03	1600	32114	1484.9	754.1304	10.0000

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
12 May 03	1700	32173	1485.0	707.0253	10.0000
12 May 03	1800	32229	1485.0	662.9591	10.0000
12 May 03	1900	32281	1485.0	621.7359	10.0000
12 May 03	2000	32330	1485.1	583.1723	10.0000
12 May 03	2100	32376	1485.1	547.0967	10.0000
12 May 03	2200	32419	1485.1	513.2698	10.0000
12 May 03	2300	32459	1485.2	481.7040	10.0000
12 May 03	2400	32497	1485.2	452.1747	10.0000
13 May 03	0100	32532	1485.2	424.4719	10.0000
13 May 03	0200	32566	1485.2	398.6088	10.0000
13 May 03	0300	32597	1485.3	374.4404	10.0000
13 May 03	0400	32626	1485.3	351.8314	10.0000
13 May 03	0500	32653	1485.3	330.6810	10.0000
13 May 03	0600	32679	1485.3	310.8951	10.0000
13 May 03	0700	32703	1485.3	292.3857	10.0000
13 May 03	0800	32726	1485.4	275.0705	10.0000
13 May 03	0900	32747	1485.4	258.8724	10.0000
13 May 03	1000	32767	1485.4	243.7194	10.0000
13 May 03	1100	32786	1485.4	229.5439	10.0000
13 May 03	1200	32803	1485.4	216.2830	10.0000
13 May 03	1300	32820	1485.4	203.8777	10.0000
13 May 03	1400	32835	1485.4	192.2727	10.0000
13 May 03	1500	32850	1485.5	181.4164	10.0000
13 May 03	1600	32864	1485.5	171.2605	10.0000
13 May 03	1700	32877	1485.5	161.7598	10.0000
13 May 03	1800	32889	1485.5	152.8721	10.0000
13 May 03	1900	32900	1485.5	144.5577	10.0000
13 May 03	2000	32911	1485.5	136.7798	10.0000
13 May 03	2100	32921	1485.5	129.5037	10.0000
13 May 03	2200	32931	1485.5	122.6970	10.0000
13 May 03	2300	32940	1485.5	116.3295	10.0000
13 May 03	2400	32948	1485.5	110.3727	10.0000
14 May 03	0100	32957	1485.5	104.8003	10.0000
14 May 03	0200	32964	1485.5	99.5874	10.0000
14 May 03	0300	32971	1485.5	94.7108	10.0000
14 May 03	0400	32978	1485.5	90.1488	10.0000
14 May 03	0500	32985	1485.5	85.8811	10.0000
14 May 03	0600	32991	1485.6	81.8888	10.0000
14 May 03	0700	32996	1485.6	78.1540	10.0000
14 May 03	0800	33002	1485.6	74.6602	10.0000
14 May 03	0900	33007	1485.6	71.3918	10.0000
14 May 03	1000	33012	1485.6	68.3080	10.0000
14 May 03	1100	33017	1485.6	65.4101	10.0000
14 May 03	1200	33021	1485.6	62.7385	10.0000
14 May 03	1300	33026	1485.6	60.2392	10.0000
14 May 03	1400	33030	1485.6	57.9012	10.0000
14 May 03	1500	33033	1485.6	55.7140	10.0000
14 May 03	1600	33037	1485.6	53.6680	10.0000
14 May 03	1700	33041	1485.6	51.7539	10.0000
14 May 03	1800	33044	1485.6	49.9633	10.0000
14 May 03	1900	33047	1485.6	48.2096	10.0000

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
14 May 03	2000	33050	1485.6	45.6014	10.0000
14 May 03	2100	33053	1485.6	44.2078	10.0000
14 May 03	2200	33056	1485.6	42.9041	10.0000
14 May 03	2300	33059	1485.6	41.6844	10.0000
14 May 03	2400	33061	1485.6	40.5435	10.0000
15 May 03	0100	33064	1485.6	39.4762	10.0000
15 May 03	0200	33066	1485.6	38.4515	10.0000
15 May 03	0300	33068	1485.6	37.2250	10.0000
15 May 03	0400	33071	1485.6	35.7992	10.0000
15 May 03	0500	33073	1485.6	34.4653	10.0000
15 May 03	0600	33075	1485.6	33.2176	10.0000
15 May 03	0700	33077	1485.6	32.0503	10.0000
15 May 03	0800	33078	1485.6	30.9583	10.0000
15 May 03	0900	33080	1485.6	29.9368	10.0000
15 May 03	1000	33082	1485.6	28.9812	10.0000
15 May 03	1100	33083	1485.6	28.2265	10.0000
15 May 03	1200	33085	1485.6	27.6596	10.0000



HMS \* Summary of Results for Dead River  
Storage

Project : silver lake            Run Name : Run 35

Start of Run    : 08May03 2200    Basin Model    : Clark parameters, HARZATc's  
End of Run      : 15May03 1200    Met. Model    : DRB MET  
Execution Time : 03Sep03 1144    Control Specs : Control EXP

Computed Results

Peak Inflow    : 3496.7 (cfs)    Date/Time of Peak Inflow : 12 May 03 1200  
Peak Outflow   : 317.00 (cfs)    Date/Time of Peak Outflow : 08 May 03 2200  
Total Inflow   : 1.52 (in)        Peak Storage    : 11040 (in)  
Total Outflow   : 0.57 (in)        Peak Elevation : 1344.0 (in)

HMS \* Summary of Results for Dead River  
Storage

Project : silver lake                      Run Name : Run 35

Start of Run : 08May03 2200    Basin Model : Clark parameters, *Harza To*  
End of Run : 15May03 1200    Met. Model : DRB MET  
Execution Time : 03Sep03 1144    Control Specs : Control EXP

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
08 May 03	2200	3999	1341.5	153.21	317.00
08 May 03	2300	3986	1341.5	153.96	317.00
08 May 03	2400	3972	1341.5	156.32	317.00
09 May 03	0100	3959	1341.5	160.36	317.00
09 May 03	0200	3946	1341.5	167.56	317.00
09 May 03	0300	3934	1341.5	176.49	317.00
09 May 03	0400	3923	1341.5	181.60	317.00
09 May 03	0500	3912	1341.5	182.04	317.00
09 May 03	0600	3901	1341.5	180.76	317.00
09 May 03	0700	3889	1341.5	179.87	317.00
09 May 03	0800	3878	1341.5	180.56	317.00
09 May 03	0900	3867	1341.5	182.29	317.00
09 May 03	1000	3856	1341.5	184.92	317.00
09 May 03	1100	3845	1341.5	187.59	317.00
09 May 03	1200	3835	1341.5	191.66	317.00
09 May 03	1300	3824	1341.5	195.02	317.00
09 May 03	1400	3814	1341.4	195.85	317.00
09 May 03	1500	3805	1341.4	205.96	317.00
09 May 03	1600	3796	1341.4	216.39	317.00
09 May 03	1700	3788	1341.4	216.80	317.00
09 May 03	1800	3779	1341.4	214.68	317.00
09 May 03	1900	3771	1341.4	211.16	317.00
09 May 03	2000	3762	1341.4	207.49	317.00
09 May 03	2100	3753	1341.4	204.00	317.00
09 May 03	2200	3743	1341.4	200.73	317.00
09 May 03	2300	3733	1341.4	197.66	317.00
09 May 03	2400	3723	1341.4	194.79	317.00
10 May 03	0100	3713	1341.4	192.11	317.00
10 May 03	0200	3703	1341.4	190.35	317.00
10 May 03	0300	3692	1341.4	188.85	317.00
10 May 03	0400	3682	1341.4	186.75	317.00
10 May 03	0500	3671	1341.4	184.65	317.00
10 May 03	0600	3660	1341.4	182.63	317.00
10 May 03	0700	3648	1341.4	180.73	317.00
10 May 03	0800	3637	1341.4	178.96	317.00
10 May 03	0900	3626	1341.4	177.30	317.00
10 May 03	1000	3614	1341.4	175.74	317.00
10 May 03	1100	3602	1341.4	174.29	317.00
10 May 03	1200	3590	1341.4	172.93	317.00
10 May 03	1300	3579	1341.4	171.66	317.00

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
10 May 03	1400	3566	1341.4	170.47	317.00
10 May 03	1500	3554	1341.4	169.35	317.00
10 May 03	1600	3542	1341.3	168.31	317.00
10 May 03	1700	3530	1341.3	167.34	317.00
10 May 03	1800	3517	1341.3	166.43	317.00
10 May 03	1900	3505	1341.3	165.57	317.00
10 May 03	2000	3492	1341.3	164.78	317.00
10 May 03	2100	3480	1341.3	164.03	317.00
10 May 03	2200	3467	1341.3	163.33	317.00
10 May 03	2300	3454	1341.3	164.18	317.00
10 May 03	2400	3442	1341.3	168.28	317.00
11 May 03	0100	3430	1341.3	176.55	317.00
11 May 03	0200	3419	1341.3	182.22	317.00
11 May 03	0300	3408	1341.3	188.75	317.00
11 May 03	0400	3397	1341.3	195.02	317.00
11 May 03	0500	3388	1341.3	201.68	317.00
11 May 03	0600	3378	1341.3	208.08	317.00
11 May 03	0700	3369	1341.3	206.59	317.00
11 May 03	0800	3360	1341.3	211.29	317.00
11 May 03	0900	3358	1341.3	359.69	317.00
11 May 03	1000	3370	1341.3	576.11	317.00
11 May 03	1100	3397	1341.3	699.28	317.00
11 May 03	1200	3430	1341.3	751.11	317.00
11 May 03	1300	3466	1341.3	735.97	317.00
11 May 03	1400	3499	1341.3	703.32	317.00
11 May 03	1500	3530	1341.3	676.93	317.00
11 May 03	1600	3559	1341.4	657.88	317.00
11 May 03	1700	3586	1341.4	646.87	317.00
11 May 03	1800	3615	1341.4	668.37	317.00
11 May 03	1900	3647	1341.4	755.10	317.00
11 May 03	2000	3691	1341.4	930.56	317.00
11 May 03	2100	3752	1341.4	1183.82	317.00
11 May 03	2200	3835	1341.5	1472.00	317.00
11 May 03	2300	3943	1341.5	1757.62	317.00
11 May 03	2400	4072	1341.5	2012.52	317.00
12 May 03	0100	4222	1341.6	2236.03	317.00
12 May 03	0200	4389	1341.7	2440.14	317.00
12 May 03	0300	4571	1341.7	2618.83	317.00
12 May 03	0400	4768	1341.8	2760.56	317.00
12 May 03	0500	4974	1341.9	2870.29	317.00
12 May 03	0600	5189	1342.0	2970.54	317.00
12 May 03	0700	5413	1342.0	3075.98	317.00
12 May 03	0800	5645	1342.1	3186.38	317.00
12 May 03	0900	5887	1342.2	3289.40	317.00
12 May 03	1000	6136	1342.3	3375.39	317.00
12 May 03	1100	6392	1342.4	3454.74	317.00
12 May 03	1200	6653	1342.5	3496.71	317.00
12 May 03	1300	6915	1342.6	3465.00	317.00
12 May 03	1400	7171	1342.7	3375.40	317.00
12 May 03	1500	7419	1342.7	3254.40	317.00
12 May 03	1600	7656	1342.8	3124.86	317.00

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
12 May 03	1700	7883	1342.9	2996.50	317.00
12 May 03	1800	8099	1343.0	2869.87	317.00
12 May 03	1900	8305	1343.1	2744.53	317.00
12 May 03	2000	8501	1343.1	2620.42	317.00
12 May 03	2100	8686	1343.2	2497.84	317.00
12 May 03	2200	8861	1343.3	2377.27	317.00
12 May 03	2300	9026	1343.3	2259.22	317.00
12 May 03	2400	9182	1343.4	2144.33	317.00
13 May 03	0100	9329	1343.4	2033.11	317.00
13 May 03	0200	9466	1343.5	1925.97	317.00
13 May 03	0300	9595	1343.5	1823.19	317.00
13 May 03	0400	9715	1343.6	1724.98	317.00
13 May 03	0500	9828	1343.6	1631.44	317.00
13 May 03	0600	9933	1343.6	1542.62	317.00
13 May 03	0700	10030	1343.7	1458.45	317.00
13 May 03	0800	10122	1343.7	1378.87	317.00
13 May 03	0900	10206	1343.7	1303.71	317.00
13 May 03	1000	10285	1343.8	1232.76	317.00
13 May 03	1100	10358	1343.8	1165.82	317.00
13 May 03	1200	10425	1343.8	1102.64	317.00
13 May 03	1300	10488	1343.8	1042.91	317.00
13 May 03	1400	10545	1343.9	986.28	317.00
13 May 03	1500	10598	1343.9	932.35	317.00
13 May 03	1600	10647	1343.9	880.73	317.00
13 May 03	1700	10692	1343.9	830.97	317.00
13 May 03	1800	10732	1343.9	785.44	317.00
13 May 03	1900	10769	1343.9	743.61	317.00
13 May 03	2000	10803	1343.9	705.01	317.00
13 May 03	2100	10834	1343.9	669.29	317.00
13 May 03	2200	10861	1344.0	636.12	317.00
13 May 03	2300	10886	1344.0	605.25	317.00
13 May 03	2400	10909	1344.0	576.47	317.00
14 May 03	0100	10929	1344.0	549.59	317.00
14 May 03	0200	10948	1344.0	524.46	317.00
14 May 03	0300	10964	1344.0	500.95	317.00
14 May 03	0400	10978	1344.0	478.94	317.00
14 May 03	0500	10991	1344.0	458.32	317.00
14 May 03	0600	11001	1344.0	439.00	317.00
14 May 03	0700	11011	1344.0	420.89	317.00
14 May 03	0800	11019	1344.0	403.90	317.00
14 May 03	0900	11025	1344.0	387.95	317.00
14 May 03	1000	11030	1344.0	373.02	317.00
14 May 03	1100	11034	1344.0	359.01	317.00
14 May 03	1200	11037	1344.0	345.89	317.00
14 May 03	1300	11039	1344.0	333.57	317.00
14 May 03	1400	11040	1344.0	322.05	317.00
14 May 03	1500	11040	1344.0	311.27	317.00
14 May 03	1600	11039	1344.0	301.15	317.00
14 May 03	1700	11037	1344.0	290.94	317.00
14 May 03	1800	11035	1344.0	281.76	317.00
14 May 03	1900	11032	1344.0	271.60	317.00

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
14 May 03	2000	11028	1344.0	264.02	317.00
14 May 03	2100	11023	1344.0	256.91	317.00
14 May 03	2200	11018	1344.0	250.24	317.00
14 May 03	2300	11012	1344.0	243.97	317.00
14 May 03	2400	11006	1344.0	238.06	317.00
15 May 03	0100	10999	1344.0	232.50	317.00
15 May 03	0200	10992	1344.0	227.13	317.00
15 May 03	0300	10984	1344.0	221.91	317.00
15 May 03	0400	10976	1344.0	216.47	317.00
15 May 03	0500	10967	1344.0	210.98	317.00
15 May 03	0600	10958	1344.0	205.41	317.00
15 May 03	0700	10949	1344.0	200.25	317.00
15 May 03	0800	10939	1344.0	195.48	317.00
15 May 03	0900	10929	1344.0	191.13	317.00
15 May 03	1000	10918	1344.0	187.15	317.00
15 May 03	1100	10907	1344.0	183.46	317.00
15 May 03	1200	10896	1344.0	180.04	317.00

Clark\_~1.bas

Basin: Clark parameters,

Description: Calibrated model for May 2003 storm, HARZA Tc's

Last Modified Date: 3 September 2003

Last Modified Time: 11:48:19

Version: 2.1.1

Unit System: English

Default DSS File Name: D:\D\silver\_lake\silver\_lake.dss

End:

Subbasin: SILVER LAKE REV

Canvas X: -2474.854

Canvas Y: 3348.562

Label X: 18

Label Y: -3

Area: 23.6

Downstream: SILVER LAKE BASIN

LossRate: Initial+Constant

Percent Impervious Area: 9.42

Initial Loss: 0.925

Constant Loss Rate: 0.0625

Transform: Clark

Time of Concentration: 3.2

Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

Monthly rate: 24

End:

Subbasin: HOIST 12 REV

Description: HOIST 12 REV CN

Canvas X: -2173.335

Canvas Y: 1878.196

Label X: 16

Label Y: 0

Area: 10.8

Clark\_~1.bas

Downstream: Junction-3

LossRate: Initial+Constant  
Percent Impervious Area: 0  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 2.2  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13.31  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13  
Monthly rate: 13

End:

Subbasin: HOIST 2 REV

Description: DRB REV CN  
Canvas X: 861.993  
Canvas Y: 1233.079  
Label X: 16  
Label Y: 0  
Area: 20.5  
Downstream: Junction-6

LossRate: Initial+Constant  
Percent Impervious Area: 0.0  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 3.8  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25

Clark\_~1.bas

Monthly rate: 25  
Monthly rate: 25.26  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25  
Monthly rate: 25

End:

Subbasin: HOIST 3 REV

Description: DRB REV CN  
Canvas X: 337.112  
Canvas Y: 1429.035  
Label X: 16  
Label Y: 0  
Area: 5.1  
Downstream: Junction-5

LossRate: Initial+Constant  
Percent Impervious Area: 12.7  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 0.7  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6.26  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Subbasin: HOIST 4 REV

Description: DRB REV CN  
Canvas X: 1064.947  
Canvas Y: 988.135



Clark\_~1.bas

Label X: 16  
Label Y: 0  
Area: 4.7  
Downstream: Junction-7

LossRate: Initial+Constant  
Percent Impervious Area: 15.5  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 1.6  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 5.79  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Subbasin: HOIST 5 REV  
Canvas X: 1372.924  
Canvas Y: 765.441  
Label X: 16  
Label Y: 0  
Area: 2.2  
Downstream: Junction-8

LossRate: Initial+Constant  
Percent Impervious Area: 14.7  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 0.5  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 3

Clark\_~1.bas

Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 2.71  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3  
Monthly rate: 3

End:

Subbasin: HOIST 6 REV

Description: DRB REV CN  
Canvas X: 1365.878  
Canvas Y: 491.248  
Label X: 23  
Label Y: -4  
Area: 1.9  
Downstream: Junction-9

LossRate: Initial+Constant  
Percent Impervious Area: 26.1  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 0.3  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2.34  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2  
Monthly rate: 2

End:

Subbasin: HOIST 7 REV

Description: DRB REV CN

Clark\_~1.bas

Canvas X: 113.162  
Canvas Y: -215.592  
Label X: 16  
Label Y: 0  
Area: 4.5  
Downstream: Junction-9

LossRate: Initial+Constant  
Percent Impervious Area: 12.2  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 1.1  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 5.54  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Subbasin: HOIST 8 REV  
Description: DRB REV CN  
Canvas X: -197.413  
Canvas Y: 27.070  
Label X: 16  
Label Y: 0  
Area: 17.8  
Downstream: Junction-8

LossRate: Initial+Constant  
Percent Impervious Area: 2.1  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark  
Time of Concentration: 3.3  
Storage Coefficient: 15

Clark\_~1.bas

Baseflow: Monthly Constant

Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 21.93  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22

End:

Subbasin: HOIST 9 REV

Description: DRB REV CN  
Canvas X: -334.736  
Canvas Y: 302.291  
Label X: 16  
Label Y: 0  
Area: 4.6  
Downstream: Junction-6

LossRate: Initial+Constant

Percent Impervious Area: 21.4  
Initial Loss: 1  
Constant Loss Rate: 0.08

Transform: Clark

Time of Concentration: 1.3  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 5.67  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Clark\_~1.bas

Subbasin: HOIST 10 REV

Description: DRB REV CN

Canvas X: -656.663

Canvas Y: 533.238

Label X: 16

Label Y: 0

Area: 17.0

Downstream: Junction-5

LossRate: Initial+Constant

Percent Impervious Area: 2.1

Initial Loss: 1

Constant Loss Rate: 0.08

Transform: Clark

Time of Concentration: 3.8

Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 21

Monthly rate: 21

Monthly rate: 21

Monthly rate: 21

Monthly rate: 20.94

Monthly rate: 21

Monthly rate: 21

Monthly rate: 21

Monthly rate: 21

Monthly rate: 21

Monthly rate: 21

Monthly rate: 21

End:

Subbasin: HOIST 11 REV

Description: REV CN

Canvas X: -1226.972

Canvas Y: 817.439

Label X: 16

Label Y: 0

Area: 5.0

Downstream: Junction-5

LossRate: Initial+Constant

Percent Impervious Area: 2.5

Initial Loss: 1

Constant Loss Rate: 0.08

Clark\_~1.bas

Transform: Clark  
Time of Concentration: 0.8  
Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6.16  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6  
Monthly rate: 6

End:

Junction: Junction-1

Canvas X: -609.874  
Canvas Y: 1483.012  
Label X: 16  
Label Y: 3  
Downstream: Reach-4

End:

Junction: Junction-2

Canvas X: -990.006  
Canvas Y: 1880.875  
Label X: 22  
Label Y: -1  
Downstream: Reach-3

End:

Subbasin: HOIST 1 REV

Description: REV CN  
Canvas X: -509.401  
Canvas Y: 2512.571  
Label X: 16  
Label Y: 0  
Area: 18.1  
Downstream: Junction-2

LossRate: Initial+Constant  
Percent Impervious Area: 0.0  
Initial Loss: 1  
Constant Loss Rate: 0.08

Clark\_-1.bas

Transform: Clark  
Time of Concentration: 4.8  
Storage Coefficient: 15

Baseflow: Monthly Constant  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22.3  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22  
Monthly rate: 22

End:

Reservoir: SILVER LAKE BASIN

Description: RESERVOIR  
Canvas X: -2000.358  
Canvas Y: 2821.719  
Label X: 27  
Label Y: -1  
Downstream: Reach-1

Route: Modified Puls  
Routing Curve: Elevation-Area-Outflow  
Initial Elevation: 1483.67  
Routing Table in DSS: Yes  
Elevation-Area Table: SILVER LAKE BASIN(Clark parameters, br)  
Elevation-Outflow Table: SILVER LAKE BASIN(Clark parameters, br)

End:

Reach: Reach-1

Description: SILVER LAKE BASIN TO SECOND REACH  
Canvas X: -1419.490  
Canvas Y: 2268.845  
From Canvas X: -2000.358  
From Canvas Y: 2821.719  
Label X: 16  
Label Y: 0  
Downstream: Junction-3

Route: Muskingum Cunge 8 Point  
Length: 14000

Clark\_-1.bas

Energy Slope: 0.0066  
Left Overbank Mannings n: 0.10  
Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.10  
Station: 0  
Elevation: 450  
Station: 135  
Elevation: 441  
Station: 226  
Elevation: 427  
Station: 230  
Elevation: 425  
Station: 240  
Elevation: 425  
Station: 244  
Elevation: 427  
Station: 335  
Elevation: 441  
Station: 470  
Elevation: 450

End:

Reach: Reach-2

Description: FROM JUNCTION 1 TO HOIST 1 AND 12 CONNECTION  
Canvas X: -990.006  
Canvas Y: 1880.875  
From Canvas X: -1419.490  
From Canvas Y: 2268.845  
Label X: 16  
Label Y: 0  
Downstream: Junction-2

Route: Muskingum Cunge 8 Point  
Length: 10000  
Energy Slope: 0.0023  
Left Overbank Mannings n: 0.10  
Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.10  
Station: 0  
Elevation: 440  
Station: 225  
Elevation: 425  
Station: 299  
Elevation: 415  
Station: 305  
Elevation: 412  
Station: 325  
Elevation: 412



Clark\_~1.bas

Station: 331  
Elevation: 415  
Station: 405  
Elevation: 425  
Station: 630  
Elevation: 440

End:

Junction: Junction-3  
Canvas X: -1419.490  
Canvas Y: 2268.845  
Label X: 16  
Label Y: 0  
Downstream: Reach-2

End:

Reach: Reach-3  
Description: HOIST 1 AND 12 TO AAO BRIDGE  
Canvas X: -609.874  
Canvas Y: 1483.012  
From Canvas X: -990.006  
From Canvas Y: 1880.875  
Label X: 15  
Label Y: 2  
Downstream: Junction-1

Route: Muskingum Cunge 8 Point  
Length: 4000  
Energy Slope: 0.0025  
Left Overbank Mannings n: 0.05  
Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.05  
Station: 0  
Elevation: 433  
Station: 55.5  
Elevation: 414.5  
Station: 253  
Elevation: 412  
Station: 298  
Elevation: 408  
Station: 313  
Elevation: 408  
Station: 358  
Elevation: 412  
Station: 555.5  
Elevation: 414.5  
Station: 611  
Elevation: 433

Clark\_~1.bas

End:

Subbasin: AAO

Description: DRAINAGE AREA NEAR ACCESS ROAD; D/S OF SILVER LAKE R  
ESERVOIR ROUTING

Canvas X: -1237.531

Canvas Y: 1191.089

Label X: 16

Label Y: 0

Area: 0.4

Downstream: Junction-1

LossRate: Initial+Constant

Percent Impervious Area: 0.0

Initial Loss: 1

Constant Loss Rate: 0.09

Transform: Clark

Time of Concentration: 0.7

Storage Coefficient: 15

Baseflow: Monthly Constant

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

Monthly rate: 5

End:

Reach: Reach-4

Description: AAO TO HOIST 11

Canvas X: -158.349

Canvas Y: 1038.823

From Canvas X: -609.874

From Canvas Y: 1483.012

Label X: 14

Label Y: 1

Downstream: Junction-5

Route: Muskingum Cunge 8 Point

Length: 16000

Clark\_~1.bas

Energy Slope: 0.0003  
Left Overbank Mannings n: 0.10  
Main Channel Mannings n: 0.05  
Right Overbank Mannings n: 0.10  
Station: 0  
Elevation: 414.5  
Station: 400  
Elevation: 411.5  
Station: 575  
Elevation: 409  
Station: 583  
Elevation: 408  
Station: 617  
Elevation: 408  
Station: 625  
Elevation: 409  
Station: 800  
Elevation: 411.5  
Station: 1200  
Elevation: 414.5

End:

Junction: Junction-5  
Canvas X: -158.349  
Canvas Y: 1038.823  
Label X: 16  
Label Y: 0  
Downstream: Junction-6

End:

Junction: Junction-6  
Canvas X: 153.522  
Canvas Y: 726.952  
Label X: 16  
Label Y: 0  
Downstream: Junction-7

End:

Junction: Junction-7  
Canvas X: 374.564  
Canvas Y: 505.451  
Label X: 16  
Label Y: 0  
Downstream: Junction-8

End:

Junction: Junction-8  
Canvas X: 512.072

Clark\_~1.bas

Canvas Y: 344.281  
Label X: 25  
Label Y: 0  
Downstream: Junction-9

End:

Junction: Junction-9  
Canvas X: 659.039  
Canvas Y: 155.324  
Label X: 26  
Label Y: -5  
Downstream: Dead River Storage

End:

Reservoir: Dead River Storage  
Description: Dead River Storage Basin - note: outflow includes 31  
7 cfs thru turbine  
Canvas X: 974.782  
Canvas Y: -229.453  
Label X: 13  
Label Y: 0

Route: Modified Puls  
Routing Curve: Elevation-Area-Outflow  
Initial Elevation: 1341.518  
Routing Table in DSS: Yes  
Elevation-Area Table: Dead River Storage(Clark parameters, br)  
Elevation-Outflow Table: Dead River Storage(Clark parameters, br)

End:

Drb\_met

Precip: DRB MET

Description: ALL SUBWAT, 5/8-13 EVENT

Last Modified Date: 5 August 2003

Last Modified Time: 13:33:06

Version: 2.1.1

Default DSS File Name: D:\D\silver\_lake\silver\_lake.dss

Unit System: English

Enable Evapotranspiration: No

Precipitation Method: Specified Average

End:

Subbasin: SILVER LAKE REV

Gage: Upper

End:

Subbasin: HOIST 12 REV

Gage: Middle

End:

Subbasin: HOIST 2 REV

Gage: Middle

End:

Subbasin: HOIST 3 REV

Gage: Middle

End:

Subbasin: HOIST 4 REV

Gage: Middle

End:

Subbasin: HOIST 5 REV

Gage: Middle

End:

Subbasin: HOIST 6 REV

Gage: Middle

End:

Subbasin: HOIST 7 REV

Gage: Middle

End:

Subbasin: HOIST 8 REV

Gage: Middle

End:

Subbasin: HOIST 9 REV

Drb\_met

Gage: Middle  
End:

Subbasin: HOIST 10 REV  
Gage: Middle  
End:

Subbasin: HOIST 11 REV  
Gage: Middle  
End:

Subbasin: McCLURE REV  
Gage: Middle  
End:

Subbasin: HOIST 1 REV  
Gage: Middle  
End:

Subbasin: AAO  
Gage: Middle  
End:

**APPENDIX B-III**  
**(Supporting Materials for Section III)**

1. HEC-RAS Tabular Output
2. HEC-RAS Model Perspective View
3. HEC-RAS Geometry input file for Channel as Designed
4. HEC-RAS Flow input file
5. Determination of Duration of Outflows above Erosive Velocity
6. Detailed Discussion of Development of Uncontrolled Release of Silver Lake
7. Computed Silver Lake Outflow from Observed Water Levels (Spreadsheet)
8. Synthetic Silver Lake Outflow to Match DRSB Inflow (Spreadsheet)
9. HEC-HMS Hydrograph Output for Case 1
10. HEC-HMS Hydrograph Output for Case 2
11. HEC-RAS Profiles for Analysis of Development of Silver Lake Breach

## **APPENDIX B-III**

### **1. HEC-RAS Tabular Output**



HEC-RAS Plan: Plan 03 River: Channel Reach: 1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2800	1000.00	1478.50	1482.97	1479.48	1482.98	0.000061	0.76	1402.19	386.49	0.06
1	2800	2000.00	1478.50	1483.82	1479.90	1483.84	0.000126	1.23	1740.76	408.47	0.10
1	2800	3000.00	1478.50	1484.50	1480.25	1484.54	0.000181	1.60	2024.46	426.02	0.12
1	2800	4000.00	1478.50	1485.08	1480.56	1485.13	0.000227	1.92	2274.31	442.10	0.13
1	2800	4900.00	1478.50	1485.54	1480.81	1485.61	0.000265	2.17	2484.09	461.21	0.15
1	2800	6000.00	1478.50	1486.06	1481.10	1486.14	0.000305	2.44	2725.97	482.52	0.16
1	2800	7000.00	1478.50	1486.50	1481.35	1486.59	0.000335	2.66	2941.93	502.26	0.17
1	2800	10000.00	1478.50	1487.66	1482.02	1487.80	0.000405	3.21	3557.28	554.66	0.19
1	2800	15000.00	1478.50	1489.29	1483.00	1489.49	0.000475	3.89	4520.92	627.99	0.21
1	2800	19230.00	1478.50	1490.50	1483.69	1490.74	0.000498	4.28	5309.97	660.00	0.22
1	2700	1000.00	1479.50	1482.95		1482.97	0.000209	1.13	927.08	340.92	0.11
1	2700	2000.00	1479.50	1483.78		1483.82	0.000359	1.74	1218.05	360.86	0.16
1	2700	3000.00	1479.50	1484.44		1484.51	0.000462	2.19	1461.79	376.75	0.18
1	2700	4000.00	1479.50	1485.00		1485.09	0.000542	2.56	1676.37	390.21	0.20
1	2700	4900.00	1479.50	1485.45		1485.57	0.000599	2.85	1854.92	401.06	0.21
1	2700	6000.00	1479.50	1485.95		1486.09	0.000659	3.16	2057.55	413.03	0.23
1	2700	7000.00	1479.50	1486.37		1486.54	0.000703	3.42	2236.42	427.17	0.24
1	2700	10000.00	1479.50	1487.51		1487.74	0.000797	4.06	2742.23	465.84	0.26
1	2700	15000.00	1479.50	1489.10		1489.41	0.000881	4.84	3525.12	519.48	0.28
1	2700	19230.00	1479.50	1490.28		1490.66	0.000901	5.31	4164.38	550.00	0.29
1	2500	1000.00	1481.00	1482.81		1482.88	0.001423	2.06	485.95	272.24	0.27
1	2500	2000.00	1481.00	1483.56		1483.69	0.001797	2.90	690.08	275.22	0.32
1	2500	3000.00	1481.00	1484.13		1484.33	0.002045	3.53	849.86	277.53	0.36
1	2500	4000.00	1481.00	1484.63		1484.88	0.002226	4.05	987.76	279.51	0.38
1	2500	4900.00	1481.00	1485.03		1485.34	0.002356	4.46	1099.51	281.11	0.40
1	2500	6000.00	1481.00	1485.46		1485.84	0.002505	4.91	1222.40	282.85	0.42
1	2500	7000.00	1481.00	1485.84		1486.27	0.002601	5.27	1328.89	284.35	0.43
1	2500	10000.00	1481.00	1486.84		1487.43	0.002778	6.18	1635.75	339.30	0.46
1	2500	15000.00	1481.00	1488.27		1489.07	0.002822	7.25	2146.03	360.00	0.48
1	2500	19230.00	1481.00	1489.37		1490.31	0.002778	7.91	2539.25	360.00	0.49
1	2440	1000.00	1481.00	1482.67		1482.77	0.002310	2.48	403.37	245.85	0.34
1	2440	2000.00	1481.00	1483.35		1483.54	0.002924	3.49	572.99	249.27	0.41
1	2440	3000.00	1481.00	1483.88		1484.16	0.003346	4.26	705.01	251.91	0.45

HEC-RAS Plan: Plan 03 River: Channel Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #	Chl
1	2440	4000.00	1481.00	1484.33		1484.70	0.003659	4.88	818.83	254.15	0.48	0.48
1	2440	4900.00	1481.00	1484.69		1485.14	0.003891	5.38	910.71	255.96	0.50	0.50
1	2440	6000.00	1481.00	1485.08		1485.63	0.004175	5.94	1010.10	257.89	0.53	0.53
1	2440	7000.00	1481.00	1485.42		1486.05	0.004353	6.38	1097.27	259.57	0.55	0.55
1	2440	10000.00	1481.00	1486.30		1487.18	0.004808	7.53	1328.73	264.00	0.59	0.59
1	2440	15000.00	1481.00	1487.52		1488.80	0.005246	9.07	1655.90	270.12	0.64	0.64
1	2440	19230.00	1481.00	1488.41		1490.01	0.005534	10.18	1896.62	274.54	0.67	0.67
1	2433	1000.00	1481.00	1482.65		1482.74	0.002425	2.52	397.43	245.72	0.35	0.35
1	2433	2000.00	1481.00	1483.32		1483.52	0.003067	3.54	564.72	249.11	0.41	0.41
1	2433	3000.00	1481.00	1483.84		1484.13	0.003510	4.32	694.78	251.70	0.46	0.46
1	2433	4000.00	1481.00	1484.28		1484.67	0.003838	4.96	806.86	253.92	0.49	0.49
1	2433	4900.00	1481.00	1484.64		1485.10	0.004082	5.46	897.28	255.69	0.51	0.51
1	2433	6000.00	1481.00	1485.04		1485.60	0.004327	6.01	998.96	257.67	0.54	0.54
1	2433	7000.00	1481.00	1485.37		1486.01	0.004511	6.45	1085.17	259.34	0.56	0.56
1	2433	10000.00	1481.00	1486.24		1487.14	0.004984	7.61	1313.88	263.71	0.60	0.60
1	2433	15000.00	1481.00	1487.45		1488.76	0.005447	9.17	1637.05	269.77	0.65	0.65
1	2433	19230.00	1481.00	1488.33		1489.97	0.005751	10.29	1874.28	274.13	0.68	0.68
1	2422	1000.00	1481.00	1482.61	1481.82	1482.72	0.002591	2.57	389.48	245.56	0.36	0.36
1	2422	2000.00	1481.00	1483.28	1482.29	1483.48	0.003267	3.61	553.90	248.89	0.43	0.43
1	2422	3000.00	1481.00	1483.79	1482.69	1484.09	0.003736	4.40	681.57	251.44	0.47	0.47
1	2422	4000.00	1481.00	1484.22	1483.04	1484.62	0.004082	5.05	791.62	253.62	0.50	0.50
1	2422	4900.00	1481.00	1484.57	1483.34	1485.05	0.004342	5.57	880.32	255.36	0.53	0.53
1	2422	6000.00	1481.00	1484.96	1483.67	1485.54	0.004602	6.12	980.04	257.31	0.55	0.55
1	2422	7000.00	1481.00	1485.29	1483.96	1485.96	0.004797	6.57	1064.64	258.95	0.57	0.57
1	2422	10000.00	1481.00	1486.15	1484.74	1487.08	0.005306	7.76	1288.38	263.23	0.62	0.62
1	2422	15000.00	1481.00	1487.33	1485.90	1488.69	0.005823	9.36	1604.23	269.16	0.67	0.67
1	2422	19230.00	1481.00	1488.18	1486.74	1489.90	0.006166	10.51	1834.58	273.41	0.71	0.71
1	2328	1000.00	1481.00	1481.77	1481.76	1482.14	0.024150	4.86	206.29	268.86	0.97	0.97
1	2328	2000.00	1481.00	1482.22	1482.20	1482.80	0.021083	6.15	326.55	271.09	0.98	0.98
1	2328	3000.00	1481.00	1482.58	1482.57	1483.36	0.019738	7.09	425.73	272.91	0.99	0.99
1	2328	4000.00	1481.00	1482.91	1482.90	1483.85	0.018779	7.83	514.54	274.54	1.00	1.00
1	2328	4900.00	1481.00	1483.18	1483.18	1484.26	0.017985	8.38	589.70	275.90	1.00	1.00
1	2328	6000.00	1481.00	1483.50	1483.50	1484.73	0.017153	8.95	676.67	277.47	1.00	1.00

HEC-RAS Plan: Plan 03 River: Channel Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #	Chl
1	2328	7000.00	1481.00	1483.76	1483.76	1485.13	0.016666	9.43	749.83	278.79	1.00	1.00
1	2328	10000.00	1481.00	1484.49	1484.49	1486.21	0.015372	10.60	955.64	282.46	1.00	1.00
1	2328	15000.00	1481.00	1485.57	1485.57	1487.80	0.013964	12.08	1262.30	287.83	1.00	1.00
1	2328	19230.00	1481.00	1486.39	1486.39	1488.99	0.013078	13.06	1501.34	291.96	0.99	0.99
1	2100	1000.00	1476.90	1477.82	1477.66	1478.08	0.013494	4.08	245.86	269.60	0.75	0.75
1	2100	2000.00	1476.90	1478.25	1478.10	1478.72	0.015157	5.57	360.81	271.72	0.85	0.85
1	2100	3000.00	1476.90	1478.58	1478.47	1479.27	0.016169	6.68	452.24	273.40	0.91	0.91
1	2100	4000.00	1476.90	1478.86	1478.80	1479.76	0.017087	7.61	529.50	274.81	0.96	0.96
1	2100	4900.00	1476.90	1479.08	1479.08	1480.16	0.017985	8.38	599.70	275.90	1.00	1.00
1	2100	6000.00	1476.90	1479.33	1479.40	1480.63	0.018794	9.20	658.12	277.14	1.04	1.04
1	2100	7000.00	1476.90	1479.54	1479.66	1481.04	0.019251	9.85	717.61	278.21	1.07	1.07
1	2100	10000.00	1476.90	1480.11	1480.39	1482.16	0.020481	11.56	875.37	281.03	1.14	1.14
1	2100	15000.00	1476.90	1480.92	1481.47	1483.82	0.021512	13.77	1105.32	285.09	1.21	1.21
1	2100	19230.00	1476.90	1481.53	1482.29	1485.09	0.021944	15.28	1279.84	288.14	1.25	1.25
1	1900	1000.00	1473.30	1474.06	1474.06	1474.44	0.025620	4.95	202.65	268.80	1.00	1.00
1	1900	2000.00	1473.30	1474.51	1474.51	1475.10	0.021835	6.22	323.11	271.03	1.00	1.00
1	1900	3000.00	1473.30	1474.87	1474.87	1475.66	0.020178	7.14	422.90	272.86	1.00	1.00
1	1900	4000.00	1473.30	1475.20	1475.20	1476.15	0.018917	7.85	513.40	274.52	1.00	1.00
1	1900	4900.00	1473.30	1475.48	1475.48	1476.56	0.017985	8.38	599.70	275.90	1.00	1.00
1	1900	6000.00	1473.30	1475.79	1475.80	1477.03	0.017165	8.95	676.53	277.47	1.00	1.00
1	1900	7000.00	1473.30	1476.06	1476.06	1477.43	0.016666	9.43	749.83	278.79	1.00	1.00
1	1900	10000.00	1473.30	1476.78	1476.79	1478.51	0.015553	10.64	952.23	282.40	1.00	1.00
1	1900	15000.00	1473.30	1477.78	1477.87	1480.10	0.014869	12.32	1238.14	287.41	1.03	1.03
1	1900	19230.00	1473.30	1478.50	1478.69	1481.30	0.014759	13.55	1446.30	291.01	1.05	1.05
1	1772	1000.00	1471.00	1472.04	1471.75	1472.22	0.008237	3.45	297.75	308.15	0.60	0.60
1	1772	2000.00	1471.00	1472.55	1472.18	1472.85	0.008259	4.52	457.11	317.07	0.64	0.64
1	1772	3000.00	1471.00	1472.96	1472.52	1473.37	0.008174	5.26	590.13	324.33	0.66	0.66
1	1772	4000.00	1471.00	1473.32	1472.82	1473.83	0.008125	5.87	707.70	330.62	0.68	0.68
1	1772	4900.00	1471.00	1473.62	1473.07	1474.21	0.008062	6.33	805.80	335.77	0.69	0.69
1	1772	6000.00	1471.00	1473.94	1473.36	1474.63	0.008038	6.84	916.34	341.48	0.70	0.70
1	1772	7000.00	1471.00	1474.22	1473.60	1474.99	0.007931	7.22	1012.32	343.05	0.71	0.71
1	1772	10000.00	1471.00	1474.96	1474.28	1475.95	0.007821	8.22	1265.77	344.90	0.73	0.73
1	1772	15000.00	1471.00	1474.45	1475.22	1477.47	0.028488	14.32	1091.74	343.63	1.36	1.36

HEC-RAS Plan: Plan 03 River: Channel Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1772	19230.00	1471.00	1474.96	1475.91	1478.63	0.029007	15.82	1264.63	344.89	1.40
1	1600	1000.00	1467.00	1468.47	1468.46	1468.91	0.085444	5.33	191.44	217.23	0.95
1	1600	2000.00	1467.00	1469.02	1469.02	1469.67	0.072545	6.61	318.07	247.98	0.95
1	1600	3000.00	1467.00	1469.43	1469.43	1470.26	0.068401	7.53	422.89	259.34	0.96
1	1600	4000.00	1467.00	1469.79	1469.79	1470.78	0.065300	8.25	518.29	269.27	0.96
1	1600	4900.00	1467.00	1470.09	1470.09	1471.20	0.062661	8.77	600.22	277.51	0.96
1	1600	6000.00	1467.00	1470.44	1470.44	1471.67	0.059323	9.28	698.47	287.08	0.95
1	1600	7000.00	1467.00	1470.71	1470.71	1472.06	0.058408	9.77	777.57	294.56	0.96
1	1600	10000.00	1467.00	1471.49	1471.49	1473.12	0.053619	10.82	1015.31	315.98	0.95
1	1600	15000.00	1467.00	1472.58	1472.58	1474.57	0.048201	12.05	1371.39	330.00	0.94
1	1600	19230.00	1467.00	1473.27	1473.27	1475.65	0.048567	13.17	1599.63	330.00	0.97
1	1400	1000.00	1461.50	1463.54	1462.80	1463.65	0.012285	2.72	373.38	272.13	0.39
1	1400	2000.00	1461.50	1464.36	1463.31	1464.54	0.010748	3.40	619.31	321.82	0.39
1	1400	3000.00	1461.50	1465.03	1463.73	1465.25	0.009698	3.82	848.64	360.00	0.39
1	1400	4000.00	1461.50	1465.54	1464.09	1465.79	0.009598	4.21	1028.99	360.00	0.40
1	1400	4900.00	1461.50	1465.89	1464.38	1466.19	0.010045	4.59	1155.38	360.00	0.41
1	1400	6000.00	1461.50	1466.34	1464.70	1466.69	0.009894	4.91	1320.09	360.00	0.42
1	1400	7000.00	1461.50	1466.73	1465.04	1467.11	0.009766	5.16	1460.27	360.00	0.42
1	1400	10000.00	1461.50	1467.77	1465.67	1468.25	0.009600	5.84	1832.89	360.00	0.43
1	1400	15000.00	1461.50	1469.30	1466.57	1469.94	0.009198	6.70	2385.19	360.00	0.44
1	1400	19230.00	1461.50	1470.47	1467.25	1471.22	0.008923	7.28	2804.91	360.00	0.44
1	1210	1000.00	1456.00	1459.15	1458.83	1459.54	0.044551	4.95	201.42	143.53	0.73
1	1210	2000.00	1456.00	1459.76	1459.58	1460.50	0.054488	6.95	293.41	157.77	0.86
1	1210	3000.00	1456.00	1460.21	1460.17	1461.30	0.062182	8.49	367.99	178.90	0.95
1	1210	4000.00	1456.00	1460.73	1460.73	1461.97	0.056503	9.18	470.41	216.86	0.93
1	1210	4900.00	1456.00	1461.23	1461.23	1462.46	0.047404	9.31	585.00	237.42	0.88
1	1210	6000.00	1456.00	1461.60	1461.60	1462.99	0.047603	9.98	673.50	238.66	0.89
1	1210	7000.00	1456.00	1461.90	1461.90	1463.43	0.047990	10.54	746.17	239.67	0.91
1	1210	10000.00	1456.00	1462.76	1462.76	1464.63	0.046698	11.77	951.41	240.00	0.93
1	1210	15000.00	1456.00	1463.92	1463.92	1466.39	0.046864	13.55	1230.49	240.00	0.96
1	1210	19230.00	1456.00	1464.80	1464.80	1467.72	0.046466	14.75	1442.31	240.00	0.98
1	1100	1000.00	1449.40	1452.19	1452.19	1452.75	0.090502	5.99	167.48	157.67	1.00

HEC-RAS Plan: Plan 03 River: Channel Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1100	2000.00	1449.40	1452.87	1452.87	1453.68	0.070991	7.29	283.59	184.79	0.96
1	1100	3000.00	1449.40	1453.41	1453.41	1454.40	0.062700	8.16	386.40	195.87	0.94
1	1100	4000.00	1449.40	1453.72	1453.83	1455.03	0.070656	9.42	448.51	200.40	1.02
1	1100	4900.00	1449.40	1453.89	1454.20	1455.59	0.084652	10.75	482.72	202.85	1.13
1	1100	6000.00	1449.40	1454.25	1454.60	1456.17	0.082433	11.49	555.79	207.99	1.14
1	1100	7000.00	1449.40	1454.55	1454.95	1456.66	0.080227	12.05	620.25	212.42	1.14
1	1100	10000.00	1449.40	1455.32	1455.85	1457.99	0.078994	13.66	786.64	220.30	1.17
1	1100	15000.00	1449.40	1456.45	1457.11	1459.87	0.074687	15.55	1038.53	225.33	1.18
1	1100	19230.00	1449.40	1457.28	1458.08	1461.30	0.072890	16.90	1226.54	229.00	1.20
1	780	1000.00	1440.00	1442.37	1441.66	1442.57	0.010347	3.56	281.18	167.47	0.48
1	780	2000.00	1440.00	1443.28	1442.33	1443.60	0.010274	4.55	441.42	193.76	0.51
1	780	3000.00	1440.00	1443.92	1442.87	1444.36	0.010457	5.36	576.16	225.87	0.54
1	780	4000.00	1440.00	1444.44	1443.33	1445.00	0.010757	6.04	701.21	252.03	0.56
1	780	4900.00	1440.00	1444.83	1443.71	1445.49	0.011173	6.59	803.87	271.64	0.58
1	780	6000.00	1440.00	1445.25	1444.16	1446.02	0.011602	7.18	921.65	283.56	0.60
1	780	7000.00	1440.00	1445.61	1444.52	1446.46	0.011881	7.65	1022.06	288.47	0.62
1	780	10000.00	1440.00	1446.56	1445.52	1447.66	0.012236	8.76	1304.70	301.88	0.65
1	780	15000.00	1440.00	1448.02	1446.72	1449.40	0.011771	10.00	1759.49	322.28	0.66
1	780	19230.00	1440.00	1449.22	1447.59	1450.75	0.010845	10.64	2155.75	339.06	0.65
1	310	1000.00	1435.00	1437.57	1436.79	1437.78	0.010058	3.67	272.32	151.30	0.48
1	310	2000.00	1435.00	1438.53		1438.87	0.009806	4.70	434.16	196.93	0.51
1	310	3000.00	1435.00	1439.26		1439.70	0.009362	5.40	597.71	248.35	0.52
1	310	4000.00	1435.00	1439.90		1440.41	0.008827	5.88	770.18	292.96	0.52
1	310	4900.00	1435.00	1440.42		1440.96	0.008255	6.17	926.46	304.60	0.51
1	310	6000.00	1435.00	1441.01		1441.59	0.007636	6.43	1108.46	311.10	0.50
1	310	7000.00	1435.00	1441.52		1442.12	0.007162	6.64	1267.98	316.69	0.49
1	310	10000.00	1435.00	1442.92		1443.59	0.006117	7.11	1723.64	332.14	0.47
1	310	15000.00	1435.00	1444.98		1445.73	0.005101	7.71	2430.96	354.80	0.45
1	310	19230.00	1435.00	1446.56		1447.37	0.004579	8.12	3011.87	381.51	0.44
1	10	1000.00	1432.00	1434.53	1433.79	1434.76	0.010001	3.97	266.41	150.52	0.49
1	10	2000.00	1432.00	1435.50	1434.53	1435.89	0.010002	5.16	421.14	162.52	0.52
1	10	3000.00	1432.00	1436.27	1435.15	1436.79	0.010003	6.00	547.84	166.37	0.54
1	10	4000.00	1432.00	1436.94	1435.66	1437.58	0.010001	6.69	659.92	169.70	0.56

HEC-RAS Plan: Plan 03 River: Channel Reach: 1 (Continued)

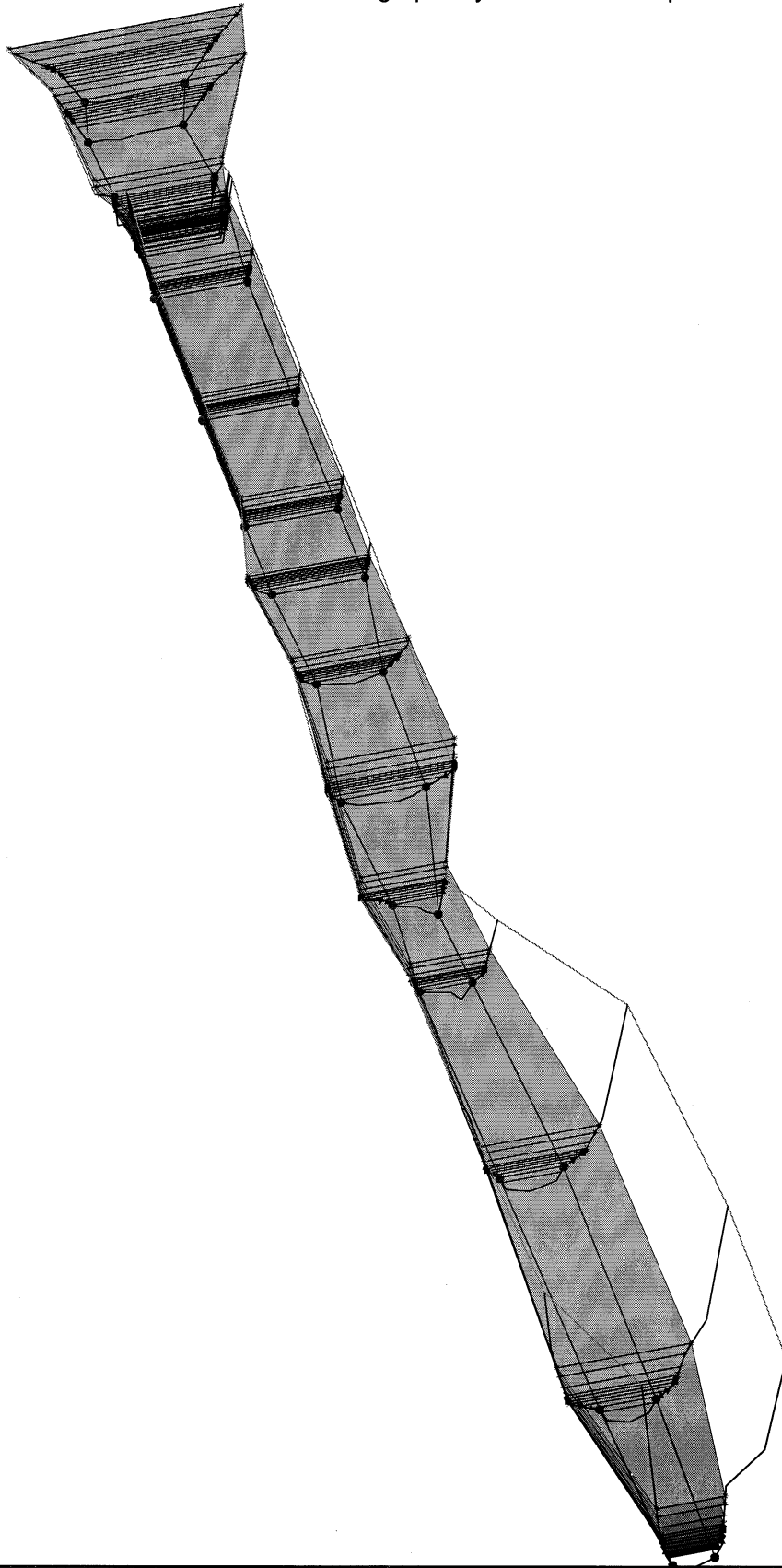
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	10	4900.00	1432.00	1437.48	1436.07	1438.22	0.010010	7.23	752.32	172.40	0.57
1	10	6000.00	1432.00	1438.09	1436.54	1438.95	0.010002	7.80	858.07	175.44	0.58
1	10	7000.00	1432.00	1438.60	1436.92	1439.56	0.010000	8.27	948.55	178.00	0.59
1	10	10000.00	1432.00	1439.97	1438.01	1441.21	0.010004	9.47	1197.20	184.86	0.61
1	10	15000.00	1432.00	1441.89	1439.56	1443.55	0.010011	11.03	1557.46	190.67	0.63
1	10	19230.00	1432.00	1443.31	1440.77	1445.30	0.010003	12.11	1831.46	194.93	0.65

## **APPENDIX B-III**

### **2. HEC-RAS Model Perspective View**



Silver Lake Fuse Plug Spillway Channel After Operation of Fuse Plug



Legend	
[Horizontal line with top half shaded]	WS 1000 cfs
[Horizontal line with top half shaded]	WS 2000 cfs
[Horizontal line with top half shaded]	WS 3000 cfs
[Horizontal line with top half shaded]	WS 4000 cfs
[Horizontal line with top half shaded]	WS 4900 cfs
[Horizontal line with top half shaded]	WS 6000 cfs
[Horizontal line with top half shaded]	WS 7000 cfs
[Horizontal line with top half shaded]	WS 10000 cfs
[Horizontal line with top half shaded]	WS 15000 cfs
[Horizontal line with top half shaded]	WS PMF = 19230 cfs
[Dotted line]	Ground
[Small black dot]	Bank Sta



## **APPENDIX B-III**

### **3. HEC-RAS Geometry input file**

Geom Title=Channel After Operation of Fuse Plug  
Version=Version 3.0.1 Apr 2001  
Viewing Rectangle= 0 , 1 , 1 , 0

River Reach=Channel ,1  
Reach XY= 2  
.4404762 .8854167 .4403292 .2263374  
Rch Text X Y=0.4412202,0.7202381  
Reverse River Text= 0

Type RM Length L Ch R = 1 ,2800 ,100,100,100  
BEGIN DESCRIPTION:

Lake

END DESCRIPTION:

Node Last Edited Time=7/25/03 2:22:50 PM

#Sta/Elev= 7

0	1490	68	1486	160	1479	400	1478.5	444	1479
520	1485	660	1490						

#Mann= 3 , 0 , 0

0	.04	0	160	.04	0	444	.04	0
---	-----	---	-----	-----	---	-----	-----	---

Bank Sta=160,444

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,2700 ,200,200,200  
BEGIN DESCRIPTION:

Station -3+00 - in lake

END DESCRIPTION:

Node Last Edited Time=7/25/03 2:29:35 PM

#Sta/Elev= 9

0	1490	95	1486	175	1480	295	1480	350	1479.5
400	1480	445	1480	520	1487	550	1490		

#Mann= 3 , 0 , 0

0	.04	0	175	.04	0	445	.04	0
---	-----	---	-----	-----	---	-----	-----	---

Bank Sta=175,445

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,2500 ,60,60,60  
BEGIN DESCRIPTION:

upstream of dike

END DESCRIPTION:

Node Last Edited Time=6/11/03 11:23:41 AM

#Sta/Elev= 6

0	1488	20	1486	30	1481	295	1481	305	1486
360	1487								

#Mann= 3 , 0 , 0

0	.04	0	20	.04	0	305	.04	0
---	-----	---	----	-----	---	-----	-----	---

Bank Sta=20,305

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,2440 ,7,7,7  
BEGIN DESCRIPTION:  
upstream crest of dike Section b-b. 20895-C6  
END DESCRIPTION:  
Node Last Edited Time=6/11/03 11:23:56 AM  
#Sta/Elev= 6  
0 1491.5 12.5 1486.5 26.25 1481 263.75 1481 277.5 1486.5  
290 1491.5  
#Mann= 3 , 0 , 0  
0 .04 0 12.5 .04 0 277.5 .04 0  
Bank Sta=12.5,277.5  
XS Rating Curve= 0  
Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,2433 ,11,11,11  
BEGIN DESCRIPTION:  
downstream crest of dike Section b-b. 20895-C6  
END DESCRIPTION:  
Node Last Edited Time=6/11/03 11:24:10 AM  
#Sta/Elev= 6  
0 1491.5 12.5 1486.5 26.25 1481 263.75 1481 277.5 1486.5  
290 1491.5  
#Mann= 3 , 0 , 0  
0 .04 0 12.5 .04 0 277.5 .04 0  
Bank Sta=12.5,277.5  
XS Rating Curve= 0  
Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,2422 ,94,94,94  
BEGIN DESCRIPTION:  
downstream toe of dike Section b-b. 20895-C6  
END DESCRIPTION:  
Node Last Edited Time=6/11/03 11:24:34 AM  
#Sta/Elev= 6  
0 1491.5 12.5 1486.5 26.25 1481 263.75 1481 277.5 1486.5  
290 1491.5  
#Mann= 3 , 0 , 0  
0 .04 0 12.5 .04 0 277.5 .04 0  
Bank Sta=12.5,277.5  
XS Rating Curve= 0  
Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,2328 ,228,228,228  
BEGIN DESCRIPTION:  
start of 1.8% slope, station 0+72  
END DESCRIPTION:  
Node Last Edited Time=6/11/03 11:24:50 AM  
#Sta/Elev= 4  
0 1487 15 1481 280 1481 295 1487  
#Mann= 3 , 0 , 0  
0 .04 0 15 .04 0 280 .04 0  
Bank Sta=15,280

XS Rating Curve= 0  
Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,2100 ,200,200,200

BEGIN DESCRIPTION:

Station 3+00

END DESCRIPTION:

Node Last Edited Time=6/11/03 11:25:10 AM

#Sta/Elev= 4

0 1482.9 15 1476.9 280 1476.9 295 1482.9

#Mann= 3 , 0 , 0

0 .04 0 15 .04 0 280 .04 0

Bank Sta=15,280

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,1900 ,128,128,128

BEGIN DESCRIPTION:

Station 5+00

END DESCRIPTION:

Node Last Edited Time=6/11/03 11:25:30 AM

#Sta/Elev= 4

0 1479.3 15 1473.3 280 1473.3 295 1479.3

#Mann= 3 , 0 , 0

0 .04 0 15 .04 0 280 .04 0

Bank Sta=15,280

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,1772 ,210,172,133

BEGIN DESCRIPTION:

Station 6+28 - Graded Reach 4 upstream, Reach 5 downstream

END DESCRIPTION:

Node Last Edited Time=6/11/03 11:25:59 AM

#Sta/Elev= 5

0 1477 15 1471 280 1471 320 1472 350 1474

#Mann= 3 , 0 , 0

0 .04 0 15 .04 0 280 .04 0

Bank Sta=15,280

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,1600 ,280,200,120

BEGIN DESCRIPTION:

Station 8+00, Reach 6

END DESCRIPTION:

Node Last Edited Time=6/11/03 11:26:25 AM

#Sta/Elev= 6

0 1472 70 1468 150 1467 260 1468 300 1469  
330 1472

#Mann= 3 , 0 , 0

0 .08 0 70 .08 0 260 .08 0

Bank Sta=70,260  
XS Rating Curve= 0  
Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,1400 ,270,190,130

BEGIN DESCRIPTION:

Station 10+00, Reach 7

END DESCRIPTION:

Node Last Edited Time=6/11/03 11:26:41 AM

#Sta/Elev= 7

0	1465	80	1463	115	1462	160	1461.5	270	1462
320	1463	360	1465						

#Mann= 3 , 0 , 0

0	.08	0	80	.08	0	320	.08	0	
---	-----	---	----	-----	---	-----	-----	---	--

Bank Sta=80,320

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,1210 ,110,110,110

BEGIN DESCRIPTION:

Station 11+90, high ground on left

END DESCRIPTION:

Node Last Edited Time=6/11/03 11:26:59 AM

#Sta/Elev= 7

0	1462	20	1456	60	1457	80	1458	150	1459
170	1460	240	1461						

#Mann= 3 , 0 , 0

0	.08	0	20	.08	0	150	.08	0	
---	-----	---	----	-----	---	-----	-----	---	--

Bank Sta=20,150

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,1100 ,270,320,360

BEGIN DESCRIPTION:

Station 13+00

END DESCRIPTION:

Node Last Edited Time=7/25/03 3:08:51 PM

#Sta/Elev= 8

0	1462	40	1453	70	1452	100	1449.4	130	1451
220	1452	230	1453	250	1455				

#Mann= 3 , 0 , 0

0	.08	0	70	.08	0	220	.08	0	
---	-----	---	----	-----	---	-----	-----	---	--

Bank Sta=70,220

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,780 ,400,470,520

BEGIN DESCRIPTION:

Estimated confluence with Dead River

END DESCRIPTION:

Node Last Edited Time=7/25/03 3:48:18 PM

#Sta/Elev= 12

0 1469 70 1450 120 1445 180 1443 200 1441  
275 1440 340 1441 360 1443 400 1445 420 1450  
450 1455 490 1460

#Mann= 3 , 0 , 0

0 .08 0 180 .06 0 360 .08 0

Bank Sta=180,360

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,310 ,280,300,320

BEGIN DESCRIPTION:

Estimated original Dead River

END DESCRIPTION:

Node Last Edited Time=7/25/03 3:22:40 PM

#Sta/Elev= 12

0 1469 60 1450 120 1445 150 1440 200 1438  
220 1436 275 1435 340 1436 360 1438 450 1440  
500 1450 520 1460

#Mann= 3 , 0 , 0

0 .08 0 200 .06 0 360 .08 0

Bank Sta=200,360

XS Rating Curve= 0

Exp/Cntr=.3,.1

Type RM Length L Ch R = 1 ,10 ,0,0,0

BEGIN DESCRIPTION:

Limit of detailed topo mapping

END DESCRIPTION:

Node Last Edited Time=7/25/03 3:52:15 PM

#Sta/Elev= 10

0 1465 60 1450 170 1445 180 1435 200 1433  
260 1432 320 1433 340 1435 360 1440 410 1465

#Mann= 3 , 0 , 0

0 .08 0 200 .06 0 320 .08 0

Bank Sta=200,320

XS Rating Curve= 0

Exp/Cntr=.3,.1

Chan Stop Cuts=-1

**APPENDIX B-III**

4. HEC-RAS Flow input file

Flow Title=Range of flows

Version=Version 3.0.1 Apr 2001

Number of Profiles= 10

Profile Names=1000 cfs,2000 cfs,3000 cfs,4000 cfs,4900 cfs,6000 cfs,7000 cfs,10000 cfs,15000 cfs,PMF = 19230 cfs

River Rch & RM=Channel,1 ,2800  
1000 2000 3000 4000 4900 6000 7000 10000 15000 19230

River Rch & RM=Channel,1 ,2700  
1000 2000 3000 4000 4900 6000 7000 10000 15000 19230

Boundary for River Rch & Prof#=Channel,1 , 1

Up Type= 3

Up Slope=.0001

Dn Type= 3

Dn Slope=.01

Boundary for River Rch & Prof#=Channel,1 , 2

Up Type= 3

Up Slope=.0001

Dn Type= 3

Dn Slope=.01

Boundary for River Rch & Prof#=Channel,1 , 3

Up Type= 3

Up Slope=.0001

Dn Type= 3

Dn Slope=.01

Boundary for River Rch & Prof#=Channel,1 , 4

Up Type= 3

Up Slope=.0001

Dn Type= 3

Dn Slope=.01

Boundary for River Rch & Prof#=Channel,1 , 5

Up Type= 3

Up Slope=.0001

Dn Type= 3

Dn Slope=.01

Boundary for River Rch & Prof#=Channel,1 , 6

Up Type= 3

Up Slope=.0001

Dn Type= 3

Dn Slope=.01

Boundary for River Rch & Prof#=Channel,1 , 7

Up Type= 3

Up Slope=.0001

Dn Type= 3

Dn Slope=.01

DSS Import StartDate=

DSS Import StartTime=

DSS Import EndDate=

DSS Import EndTime=

DSS Import GetInterval= 0

DSS Import Interval=

DSS Import GetPeak= 0

DSS Import FillOption= 0



## **APPENDIX B-III**

### 5. Determination of Duration of Outflows above Erosive Velocity

**DETERMINATION OF DURATION OF OUTFLOWS ABOVE EROSION VELOCITY**

filename fp velocity duration.xls

**COMPUTED SILVER LAKE OUTFLOW FROM HEC-RAS CAPACITY**

**STORAGE CURVE**

	LAKE EL.	AREA	Qout	Delta Vol.	Delta El.	elevation	area, acres
		acres	cfs	acre-ft	ft		
5/14/03 14:00	<b>1485.6</b>	1416.8	0	0	0	1486.00	1,449
5/14/03 14:15	1485.6	1416.8	1250	25.3	0.0185	1484.00	1,288
5/14/03 14:30	1485.581	1415.3	<b>2500</b>	51.2	0.0374 <b>V=6</b>	1482.00	1,228
5/14/03 14:45	1485.544	1412.3	<b>3750</b>	77.0	0.0563 <b>V=7.5</b>	1480.00	1,212
5/14/03 15:00	1485.488	1407.8	4671	96.0	0.0702	1478.00	1,196
5/14/03 15:15	1485.418	1402.1	4539	93.3	0.0682	1476.00	1,072
5/14/03 15:30	1485.35	1396.6	4412	90.7	0.0662	1474.00	1,023
5/14/03 15:45	1485.283	1391.3	4287	88.1	0.0644	1472.00	966
5/14/03 16:00	1485.219	1386.1	4167	85.6	0.0625	1470.00	897
5/14/03 16:15	1485.156	1381.1	4049	83.2	0.0608	1468.00	818
5/14/03 16:30	1485.096	1376.2	3942	80.9	0.0591	1466.00	739
5/14/03 16:45	1485.036	1371.4	3841	78.9	0.0576	1464.00	653
5/14/03 17:00	1484.979	1366.8	3744	76.9	0.0562	1462.00	559
5/14/03 17:15	1484.923	1362.3	3649	74.9	0.0547	1460.00	465
5/14/03 17:30	1484.868	1357.9	<b>3556</b>	73.0	0.0533		
5/14/03 17:45	1484.815	1353.6	<b>3465</b>	71.1	0.0520 <b>V(Sect. 1900) = 7.5 ft/sec</b>		
5/14/03 18:00	1484.763	1349.4	3377	69.3	0.0506		
5/14/03 18:15	1484.712	1345.3	3292	67.5	0.0493		
5/14/03 18:30	1484.663	1341.3	3208	65.8	0.0481		
5/14/03 18:45	1484.615	1337.5	3126	64.1	0.0468		
5/14/03 19:00	1484.568	1333.7	3047	62.5	0.0456	1481	0
5/14/03 19:15	1484.522	1330.0	2974	61.0	0.0445	1482.98	1000
5/14/03 19:30	1484.478	1326.4	2911	59.6	0.0436	1483.84	2000
5/14/03 19:45	1484.434	1322.9	2849	58.4	0.0426	1484.54	3000
5/14/03 20:00	1484.391	1319.5	2788	57.1	0.0417	1485.13	4000
5/14/03 20:15	1484.35	1316.1	2728	55.9	0.0408	1485.61	4900
5/14/03 20:30	1484.309	1312.9	2670	54.7	0.0399	1486.14	6000
5/14/03 20:45	1484.269	1309.6	2613	53.5	0.0391		
5/14/03 21:00	1484.23	1306.5	2557	52.3	0.0382		
5/14/03 21:15	1484.192	1303.4	2502	51.2	0.0374		
5/14/03 21:30	1484.154	1300.4	2449	50.1	0.0366		
5/14/03 21:45	1484.118	1297.5	2396	49.0	0.0358		
5/14/03 22:00	1484.082	1294.6	2345	48.0	0.0350		
5/14/03 22:15	1484.047	1291.8	2295	46.9	0.0343		
5/14/03 22:30	1484.012	1289.0	2246	45.9	0.0336		
5/14/03 22:45	1483.979	1286.3	2198	44.9	0.0329		
5/14/03 23:00	1483.943	1283.4	2147	43.9	0.0322		
5/14/03 23:15	1483.908	1280.6	2097	42.8	0.0315		
5/14/03 23:30	1483.874	1277.9	2049	41.8	0.0308		
5/14/03 23:45	1483.841	1275.2	2001	40.9	0.0301		
5/15/03 0:00	1483.808	1272.6	<b>1955</b>	39.9	0.0294 <b>V(Sect. 1900) = 6.0 ft/sec</b>		

Outflow capacity from HEC-RAS  
(Table III-2)

SUM      SUM  
2472.807 1.823264  
^

Check volume:  $1.8233 \text{ ft}^3 / ((1416.8 + 1272.6) / 2) = 2452 \text{ acre-feet} - \text{OK}$

## **APPENDIX B-III**

### **6. Detailed Discussion of Development of Uncontrolled Release of Silver Lake**

### **III.4 Analysis of Development of Silver Lake Breach**

The purpose of this section is to estimate the rate of release of the Silver Lake contents, and the rate of development of the breach of the saddle. The results provide insight into the erosion mechanisms and the possible shape of the breach as time passed.

There are four different sets of observations from which the rate of outflow from Silver Lake can be calculated. The first and the most directly useful is the recording of the Silver Lake water levels between 18:45 on May 14 and 05:00 on May 15. Fourteen lake levels were recorded at irregular intervals, starting at El. 1483.26 and ending at 1468.70. The second useful observation is the eyewitness report of the water level at County Road AAO Bridge. This was estimated by STS (2003b) to correspond to a flow of 6500 to 7000 cfs at 16:40 on May 14<sup>th</sup>, the early part of the flood. The third is the record of the elevation of Dead River Storage Basin during the inflow from the breach of the Silver Lake saddle. The fourth consists of several photographs taken in the evening of May 14, showing the nature of the outflow at the saddle. The following describes the analyses made to determine the rate of outflow and to estimate the rate of breach development (to the extent possible).

The first step is to compare the volume released from Silver Lake to the volume stored in and discharged from the Dead River Storage Basin in the equivalent times. Silver Lake dropped from El. 1483.26 to El. 1468.7 in 10 hours 15 minutes (between 18:45 on May 14 and 05:00 on May 15). Prior to 18:45 it dropped from the measured high-water mark of 1485.6 to 1483.26, but the time at which this drop started is unknown. The volume released from Silver Lake by 05:00 on the 15<sup>th</sup> is determined from the storage-elevation table to be 18,800 acre-feet. Some additional outflow occurred after this time, as the level of Silver Lake continued to drop to approximately El. 1458 on May 16<sup>th</sup>. The Dead River Storage Basin began to rise from El. 1343.86 at 15:00 on the 14<sup>th</sup> to a peak of 1348.94 at 09:00 on the 15<sup>th</sup>. Allowing for discharge over the spillway and through the turbines, the total inflow to DRSB by 09:00 was 20,480 acre-feet. This indicates that an additional 1680 acre-feet must have flowed out of Silver Lake after 05:00 on the 15<sup>th</sup> and reached DRSB by 09:00. This volume would result in an additional 2.1-foot drop of Silver Lake to el. 1466.7.

The outflow hydrograph from Silver Lake and the inflow hydrograph to DRSB can be calculated directly from the respective reservoir elevation records. Inflow from streams was estimated to be 1 cfs per square mile for both watersheds. Outflow from the Silver Lake low level outlet was estimated to be 10 cfs based on the recorded three-inch gate opening at the start of the breach, dropping to zero by the end of May 15<sup>th</sup>. Outflow from DRSB was limited to the turbine discharge, recorded as 317 cfs, until the spillway began to discharge about 23:00 on May 14. The outflows and inflows in each time interval were calculated from the respective reservoir storage-elevation tables and the DRSB spillway rating table. The resulting outflow and inflow hydrographs are shown in Figure III-10 for Silver Lake and Figure III-11 (the solid line) for the Dead River Storage Basin.

These outflows are sensitive to any imprecision in the reservoir elevation measurements, since 0.01 foot difference in elevation represents a large volume of water in the reservoir. The precision of the Silver Lake water levels is thought to be low because some values were only recorded to the tenth of a foot. These were visual observations of water level on the staff gauge at the dam, most of them made during the nighttime. As a result the outflow shown in Figure III-10 is very irregular. It is conceivable that the outflow could decrease, then increase again due to a sudden increase in the rate of erosion of the channel. But the accuracy of the elevations is probably not sufficient to prove that this happened.

The reasonability of this outflow hydrograph can be checked by using the HEC-HMS flood hydrograph model (Section I.5.4) to route the hydrograph downstream to Dead River Storage Basin, and see whether a good match can be achieved with the computed inflow hydrograph shown in Figure III-11. First some adjustments were made to the reach routing parameters in STS's HEC-HMS model. The channel lengths appear to have been measured to include all the meanders of the channel. This provided good agreement with the observed inflow from the rainfall event prior to the saddle breach. However an extremely large dam-failure flood will travel over the floodplains on a shorter path. The reach lengths were reduced to a more straight-line path and the slopes were increased accordingly. As a result the travel times are shorter and the flood peaks are attenuated less than in the original model.

However the outflow hydrograph of Figure III-10, routed to the Dead River Storage Basin as shown in Figure III-11 (triangles), does not match well with the hydrograph calculated from the Dead River Storage Basin elevations (solid line). The peak inflow is only 84% of the "observed" peak, and two hours earlier. It is possible that inaccuracy in the Silver Lake elevation measurements distorts the outflow hydrograph.

The next step is to back-calculate a synthetic Silver Lake outflow hydrograph that produces a match to the Dead River Storage Basin inflow hydrograph when routed. This was done by trial and error, resulting in the match shown in Figure III-12 (triangles match solid line). This hydrograph cannot be completely synthetic; it must correspond reasonably well with the observed Silver Lake elevations. This was checked by a spreadsheet calculation in which the change in storage due to the assumed outflow results in a specific lake elevation at the end of each one-hour computational interval. The resulting elevations are plotted along with the observed elevations in Figure III-13. The agreement is reasonably good except that the elevations must be approximately one foot higher than the observed elevations between about 19:00 and 22:00 on May 14.

The two outflow hydrographs are compared in Figure III-14. The peaks and volumes are about the same, but the synthetic hydrograph lags behind the "observed" hydrograph by 4 hours at the peak. It cannot be said which hydrograph is closer to the reality; one agrees better with the observed Silver Lake elevations, and the other agrees better with the observed Dead River Storage Basin elevations. Both hydrographs are considered in the following analysis, the synthetic hydrograph designated as Case 1, and the "observed" hydrograph called Case 2.

The next step is to calculate the dimensions of the saddle breach which would have the capacity corresponding to the estimated outflows and lake elevations. This is done by preparing a series of HEC-RAS step-backwater models representing assumed dimensions of the breach at various times. (The HEC-RAS program is discussed in Section III.2.1.) Since the “observed” outflow hydrograph requires an unsteady development of the channel, we will first use the “Synthetic” outflow hydrograph and the corresponding lake elevations shown in Figure III-13 (Case 1).

The HEC-RAS model uses Manning’s N values of 0.03 rather than the 0.04 used for velocity analysis; smaller N’s are considered appropriate for greater depths of flow. The breach is assumed to develop across the full width of the fuse plug section, which the available photographs indicate to have been the case. To achieve the maximum outflow capacity, the breach profiles are assumed to have a control section at the upstream end of the channel which experiences critical flow depth. This control section moves upstream into the lake and decreases in elevation as the erosion progresses. Critical depth will occur in most cases if there is an abrupt drop of the downstream channel by 6 to 10 feet due to head cutting, as indicated by the available photographs. Thus the series of breach channels are configured with original ground elevations at and upstream from the control sections, a 6-foot to 10-foot drop to the next section downstream, and a uniform slope from that point downstream to the Dead River channel at about El. 1446. The series of channel profiles is shown in Figure III-15.

From the HEC-RAS results (summaries are provided in the Appendix), a plot is prepared of breach discharge capacity vs. lake level, Figure III-16. A family of parallel curves for each breach crest elevation is plotted. The breach crest elevation as a function of time is estimated by plotting the breach discharge and corresponding lake level (Figures III-13 and III-14) at hourly intervals. These are shown as dots on Figure III-16. For example, at 8:00 pm (20:00) on May 14, the lake level was estimated to be 1483.02 and the outflow was estimated to be 13,000 cfs. On Figure III-16, this point plots halfway between the curves computed with a critical section elevation of 1480 and 1475. Therefore it is estimated that the critical section crest elevation had to be at El. 1477.5 at this time to have enough capacity to pass 13,000 cfs.

The maximum discharge of 32,000 cfs was estimated to occur at 01:00 on May 15 with a lake elevation of 1474.24. However the HEC-RAS analysis indicates that none of the assumed profiles for the breach channel had sufficient capacity to discharge 32,000 cfs at this elevation. The point in Figure III-16 falls below the capacity curve for the final eroded channel. There are two possibilities: 1) The peak discharge occurred earlier with a higher lake level, as in Case 2; 2) The crest length of the critical section may have been longer than assumed, providing additional capacity. The latter is very likely, since photographs show the breach flow plunging over a horseshoe-shaped crest. The crest may have curved between the ends of the cross section as modeled in HEC-RAS. As long as the downstream channel is steep enough to allow supercritical flow at the crest, the curve would provide extra capacity in the same manner as a semicircular spillway.

The analysis is repeated for Case 2. Figure III-17 shows the elevation-discharge points plotted on the same family of curves from the HEC-RAS analysis. In Case 2 the peak discharge of 30,637 cfs occurs at 9:00 pm (21:00) on May 14, with a lake level of 1480.4 (as recorded at the site). The critical section crest elevation must have been at 1470.5 to provide this capacity. Thus Case 2 is more hydraulically realistic than Case 1 if a curved crest configuration is not considered. Toward 04:00 on May 14, the estimated discharges require a greater capacity than the final eroded channel at El. 1457. Thus the actual conditions may have been somewhere between Case 1 and Case 2.

The results shown on Figures III-16 and III-17 are tabulated below.

**Table III-5**  
**Estimated Elevations of Breach Critical Sections**

Date, time	Lake Level Ft. MSL	Section El. Case 1 Ft. MSL	Section El. Case 2 Ft. MSL
5/14/03 12:00	1485.6	1485.5	1485.5
5/14/03 13:00	1485.6	1481	1481
5/14/03 14:00	1485.54	1481	1481
5/14/03 15:00	1485.25	1480.9	1480.9
5/14/03 16:00	1484.84	1480.8	1480.3
5/14/03 17:00	1484.32	1480.4	1480
5/14/03 18:00	1483.75	1480.1	1479
5/14/03 19:00	1483.04	1479	1477.5
5/14/03 20:00	1481.88	1477.5	1475.2
5/14/03 21:00	1480.4	1475.5	1470.5
5/14/03 22:00	1479	1472.7	1471
5/14/03 23:00	1477.36	1469.5	1468
5/15/03 0:00	1475.68	1463	1466
5/15/03 1:00	1474	<1457	1464
5/15/03 2:00	1472.7	<1457	1464
5/15/03 3:00	1471.32	<1457	1462.5
5/15/03 4:00	1470	<1457	<1457
5/15/03 5:00	1468.7	<1457	<1457
5/15/03 6:00	1467.6	<1457	<1457

A plot of the above estimated breach elevations vs. time is shown in Figure III-18. Both cases show the fuse plug breaching in one hour, between 1 pm and 2 pm. In the next hour the lake level drops slightly and the base of the fuse plug does not erode, but erosion may be occurring downstream. After 3 pm, the critical section begins to erode, the discharge increases, and the lake level begins to drop more rapidly. Case 2 shows the critical section degrading more rapidly at first, and more irregularly. As noted above, the rapid drop of the critical section toward midnight for Case 1 is not realistic. However the

upper portion of the curve could be accurate if the horseshoe- shaped crest developed and provided sufficient capacity to produce the observed drop in the lake level.

Either analysis indicates that in order to produce the observed drop in the level of Silver Lake and the observed inflow to the Dead River Storage Basin, the saddle must have eroded downward from the base elevation of the fuse plug to about El. 1457 between 3 PM on May 14 and about 4am on May 15. The peak outflow, on the order of 30,000 to 32,000 cfs, occurred between 9:00 pm on May 14 and 1:00 am on May 15. In either case the saddle must have eroded downward by 11 feet or more at the time of the peak discharge. After 4 am on the 15<sup>th</sup>, the breach channel was sufficiently flat, less than a 1% slope, that little further erosion occurred and the lake emptied out to about El. 1458 at decreasing rates of discharge. The hydraulic analysis indicates that head cutting and critical control sections must have occurred to provide sufficient hydraulic capacity for the rate of outflow observed.



Figure III-10: Silver Lake Elevation-Outflow with Interpolated Elevations

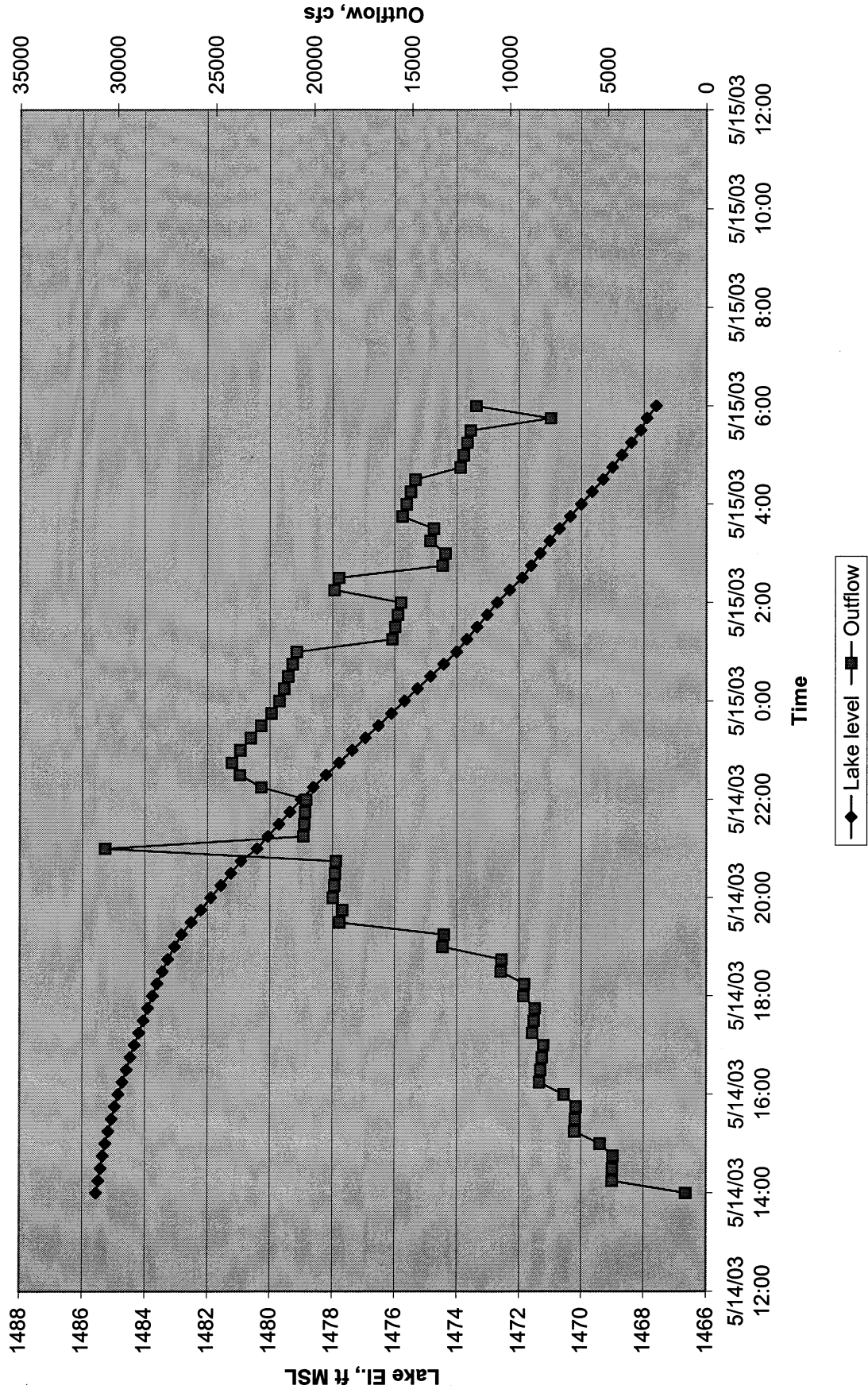


Figure III-11: Silver Lake Outflow from Elevation Routed to DRSB

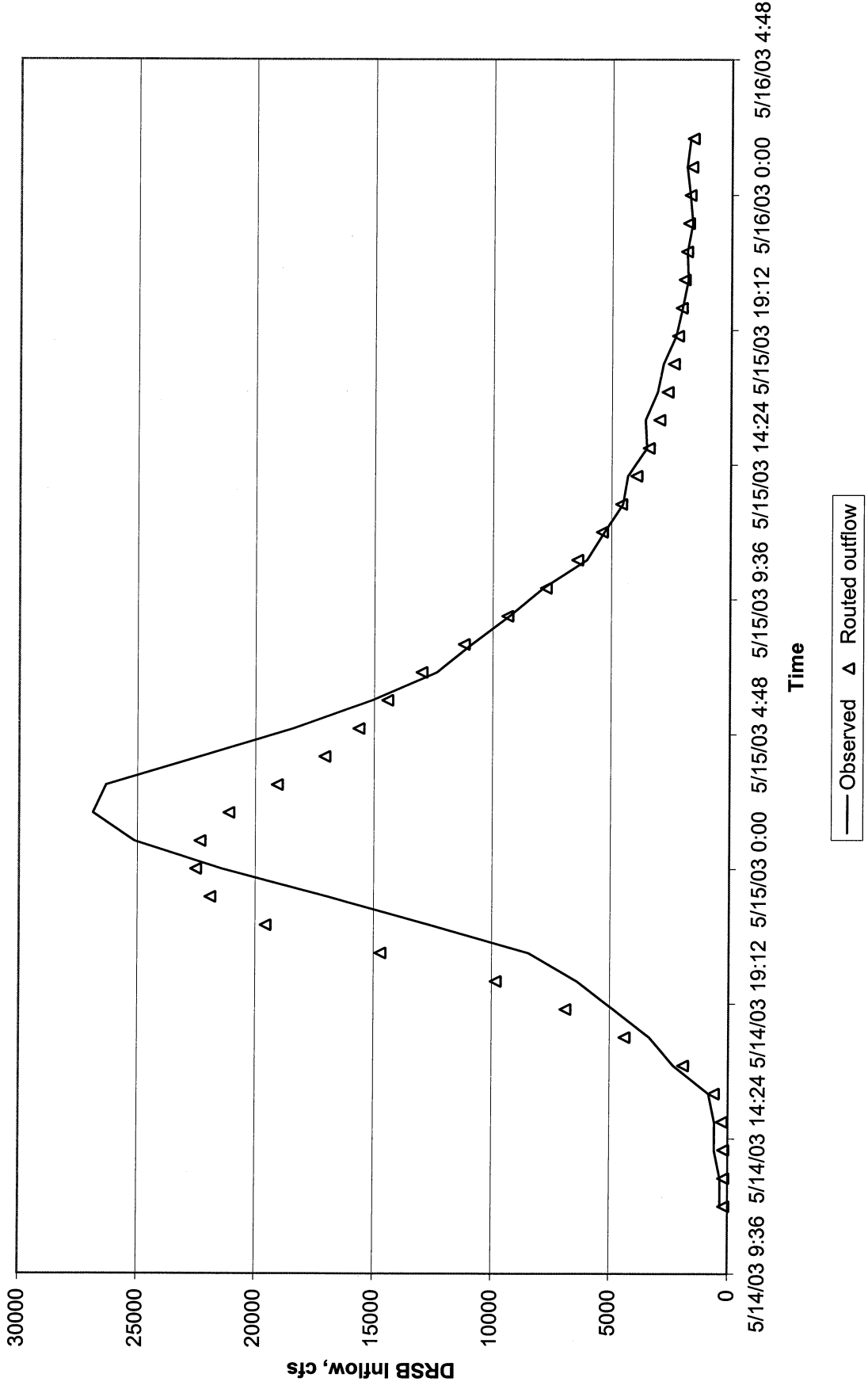


Figure III-12: Silver Lake Outflow (Synthetic), DRSB Inflow (Observed vs. HEC-HMS)

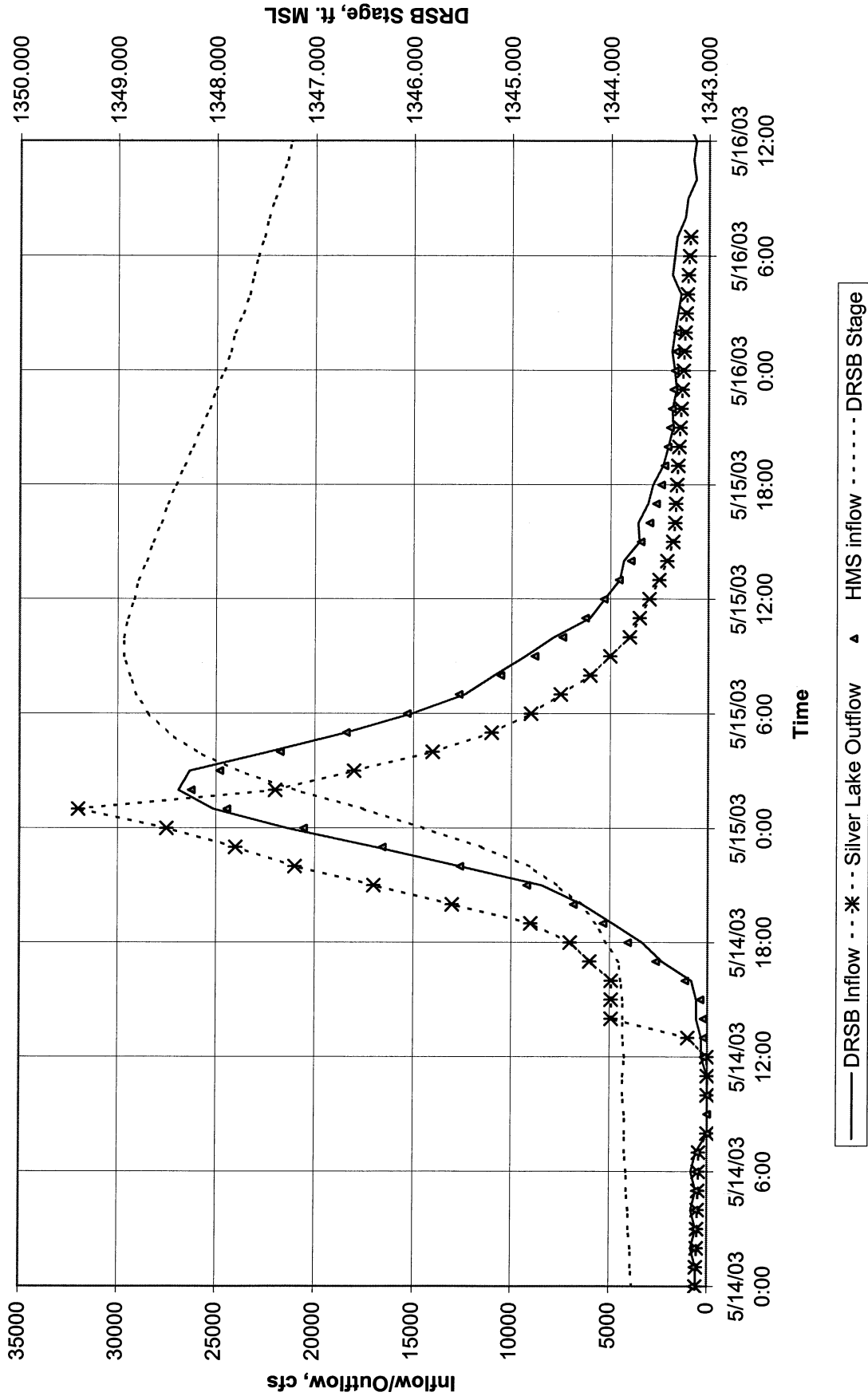


Figure III-13: Silver Lake Elevation to Match Back-Routed Outflow

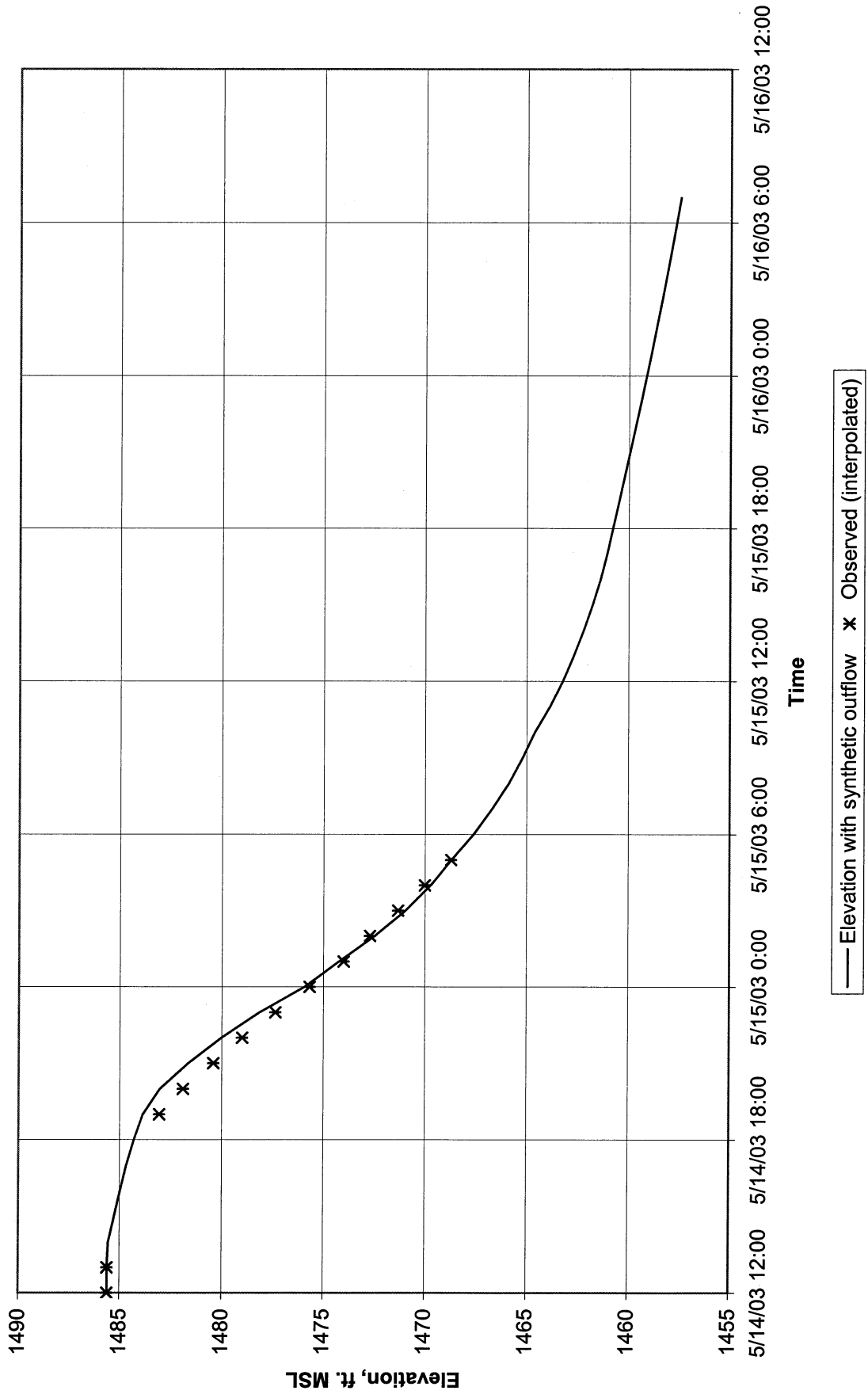
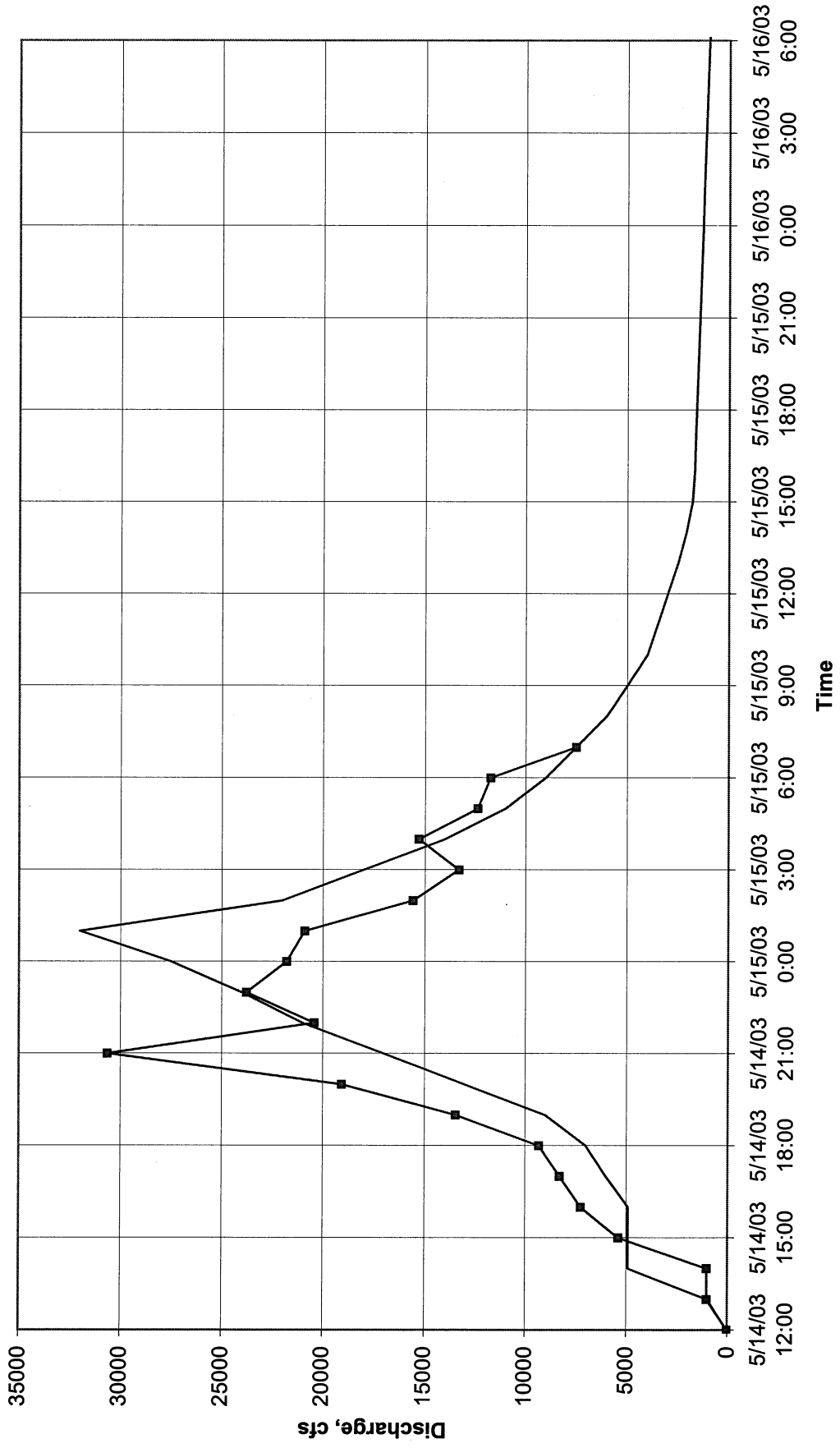


Figure III-14: Silver Lake Outflow Hydrographs Compared



— Synthetic Outflow to match DRSB Inflow —■— Outflow from observed elevations



Figure III-16: Silver Lake Stage-Discharge vs. Breach Critical Section El., Case 1

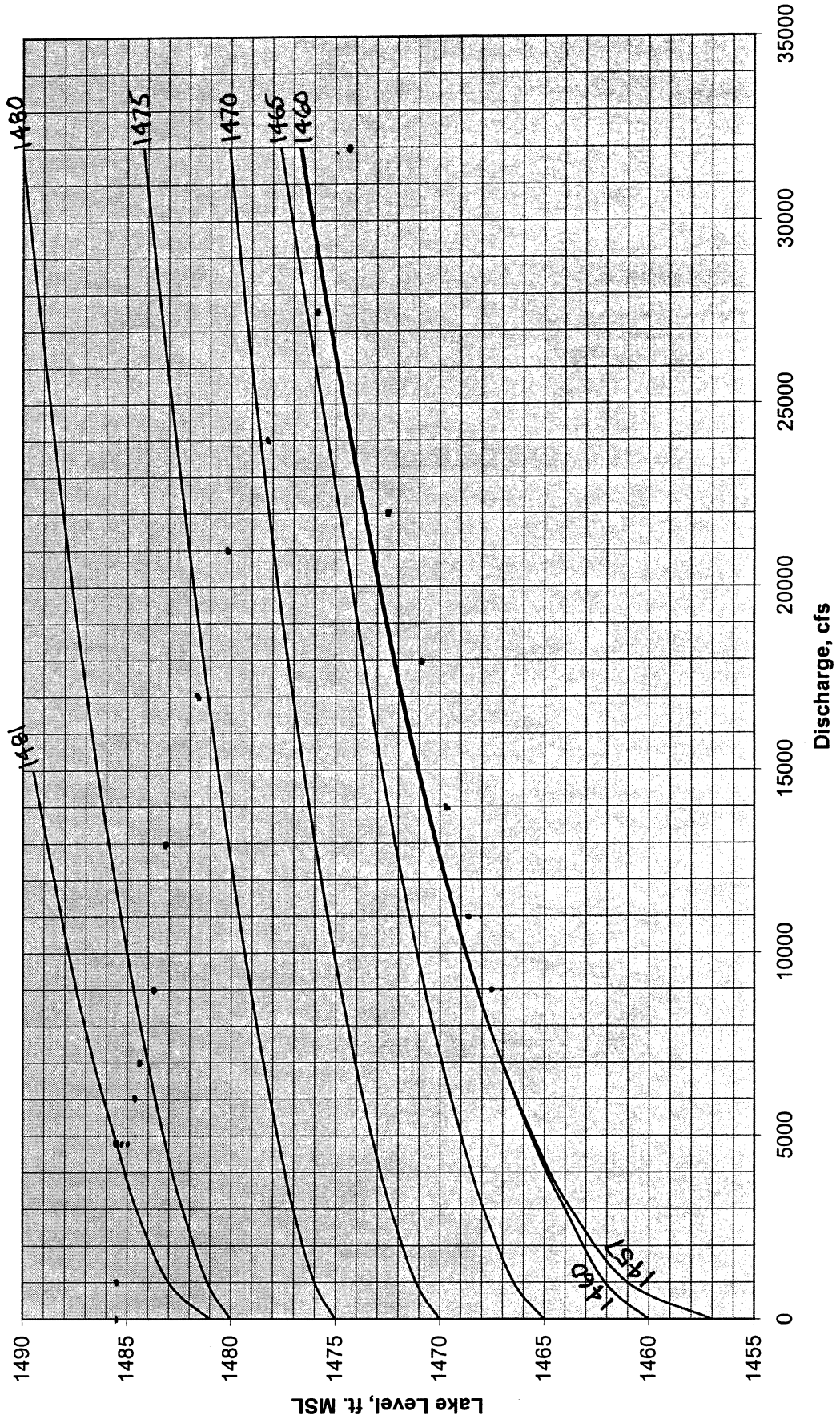




Figure III-17: Silver Lake Stage-Discharge vs. Breach Critical Section El., Case 2

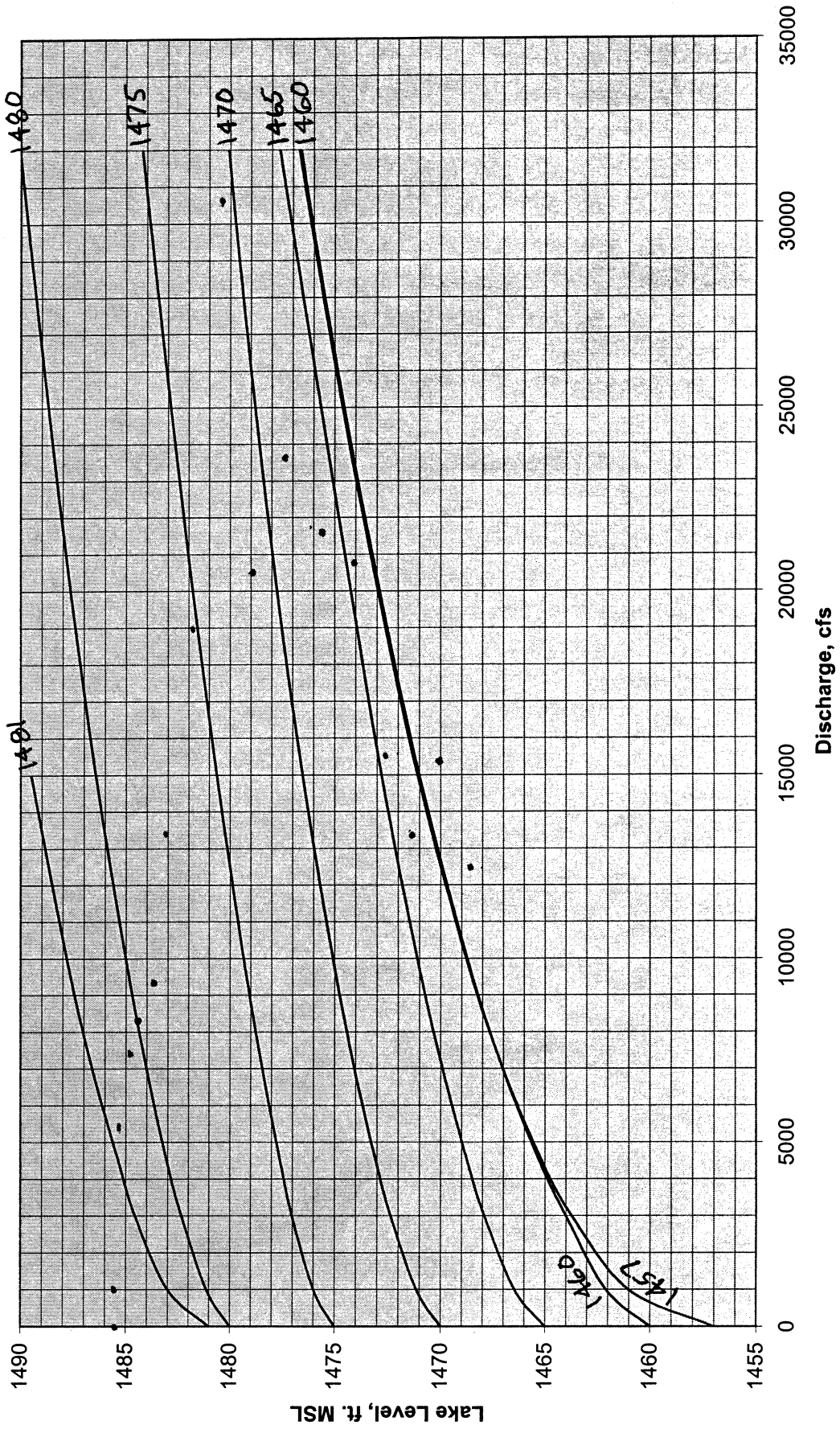
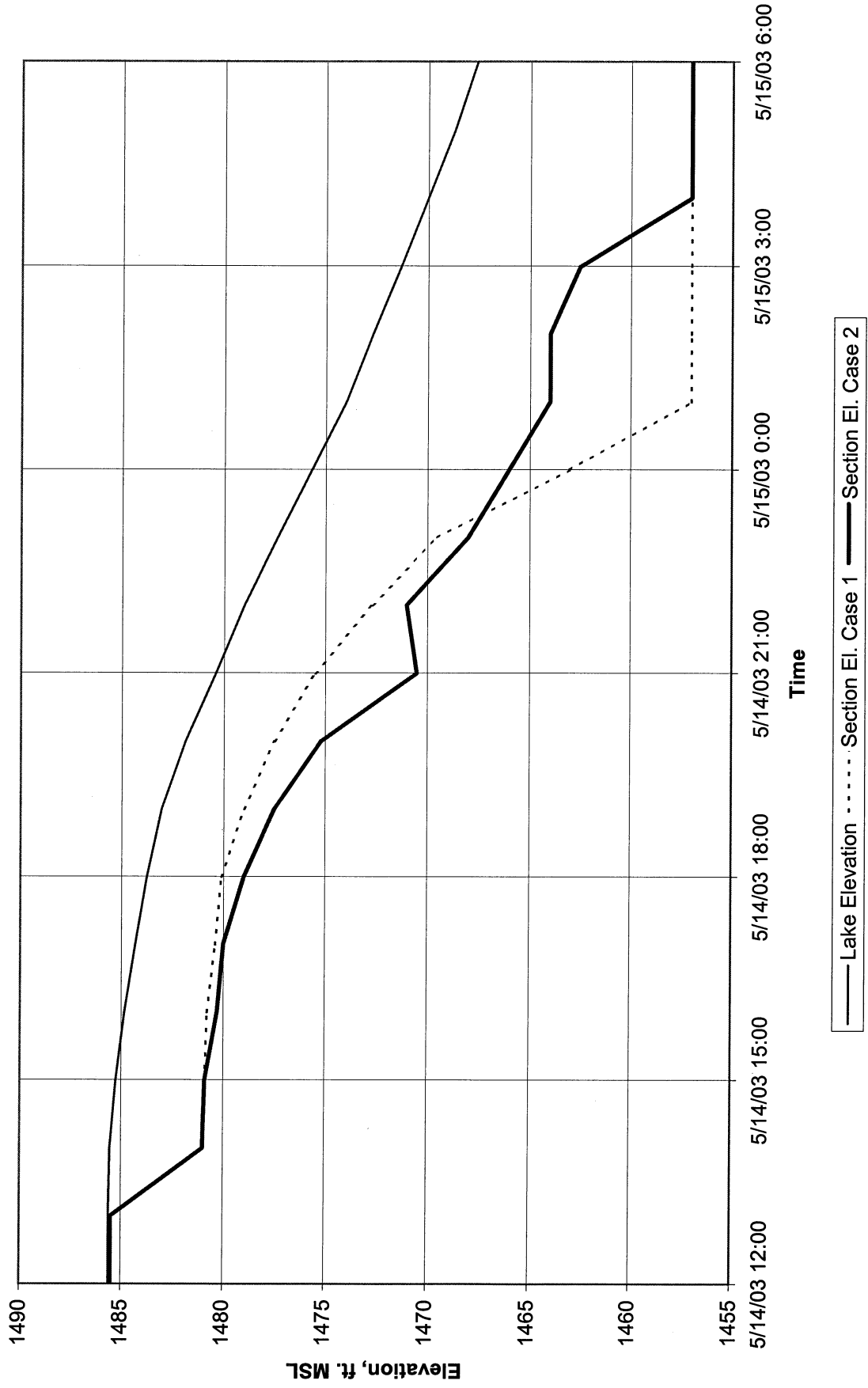




Figure III-18: Estimated Elevation of Breach Critical Section



## **APPENDIX B-III**

### **7. Computed Silver Lake Outflow from Observed Water Levels (Spreadsheet)**

**COMPUTED SILVER LAKE OUTFLOW FROM OBSERVED WATER LEVELS**

See Chart 4

	delta h	AREA	DELTA V	Qout	cum. Vol.	elevation	area, acres
5/14/03 13:00	1485.6	0.015	1416.8	0.0	0	0.0	
5/14/03 13:15	1485.585	0.015	1415.6	21.2	1028	21.2	
5/14/03 13:30	1485.57	0.015	1414.4	21.2	1027	42.5	
5/14/03 13:45	1485.555	0.015	1413.2	21.2	1026	63.7	
5/14/03 14:00	<b>1485.54</b>	0.07	1412.0	21.2	1026	84.9	1486 1449
5/14/03 14:15	1485.47	0.07	1406.3	98.6	4774	183.5	1484 1288
5/14/03 14:30	1485.4	0.07	1400.7	98.2	4755	281.7	1482 1228
5/14/03 14:45	1485.33	0.08	1395.1	97.9	4736	379.6	1480 1212
5/14/03 15:00	1485.25	0.1	1388.6	111.3	5389	490.9	1478 1196
5/14/03 15:15	1485.15	0.1	1380.6	138.5	6701	629.4	1476 1072
5/14/03 15:30	1485.05	0.1	1372.5	137.7	6663	767.1	1474 1023
5/14/03 15:45	1484.95	0.11	1364.5	136.8	6624	903.9	1472 966
5/14/03 16:00	1484.84	0.13	1355.6	149.6	7241	1053.5	1470 897
5/14/03 16:15	1484.71	0.13	1345.2	175.6	8497	1229.1	1468 818
5/14/03 16:30	1484.58	0.13	1334.7	174.2	8431	1403.3	1466 739
5/14/03 16:45	1484.45	0.13	1324.2	172.8	8365	1576.1	1464 653
5/14/03 17:00	1484.32	0.14	1313.8	171.5	8299	1747.6	1462 559
5/14/03 17:15	1484.18	0.14	1302.5	183.1	8864	1930.7	1460 465
5/14/03 17:30	1484.04	0.14	1291.2	181.6	8787	2112.3	
5/14/03 17:45	1483.9	0.15	1285.0	180.3	8728	2292.6	
5/14/03 18:00	1483.75	0.15	1280.5	192.4	9313	2485.0	
5/14/03 18:15	1483.6	0.17	1276.0	191.7	9280	2676.7	
5/14/03 18:30	1483.43	0.17	1270.9	216.5	10478	2893.2	
5/14/03 18:45	<b>1483.26</b>	0.22	1265.8	215.6	10436	3108.8	
5/14/03 19:00	1483.04	0.22	1259.2	277.8	13443	3386.6	
5/14/03 19:15	<b>1482.82</b>	0.31	1252.6	276.3	13373	3662.9	
5/14/03 19:30	1482.51	0.31	1243.3	386.9	18724	4049.8	
5/14/03 19:45	1482.2	0.32	1234.0	384.0	18585	4433.7	
5/14/03 20:00	1481.88	0.32	1227.0	393.8	19058	4827.5	
5/14/03 20:15	1481.56	0.32	1224.5	392.2	18985	5219.8	
5/14/03 20:30	1481.24	0.32	1221.9	391.4	18945	5611.2	
5/14/03 20:45	<b>1480.92</b>	0.52	1219.4	390.6	18905	6001.8	
5/14/03 21:00	<b>1480.4</b>	0.35	1215.2	633.0	30637	6634.8	
5/14/03 21:15	1480.05	0.35	1212.4	424.8	20562	7059.6	
5/14/03 21:30	1479.7	0.35	1209.6	423.8	20514	7483.4	
5/14/03 21:45	1479.35	0.35	1206.8	422.9	20467	7906.3	
5/14/03 22:00	<b>1479</b>	0.39	1204.0	421.9	20419	8328.2	
5/14/03 22:15	1478.61	0.41	1200.9	469.0	22697	8797.2	
5/14/03 22:30	<b>1478.2</b>	0.42	1197.6	491.7	23798	9288.8	
5/14/03 22:45	1477.78	0.42	1182.4	499.8	24190	9788.6	
5/14/03 23:00	1477.36	0.42	1156.3	491.1	23770	10279.8	
5/14/03 23:15	1476.94	0.42	1130.3	480.2	23241	10759.9	
5/14/03 23:30	1476.52	0.42	1104.2	469.2	22712	11229.2	
5/14/03 23:45	1476.1	0.42	1078.2	458.3	22182	11687.5	
5/15/03 0:00	1475.68	0.42	1064.2	449.9	21775	12137.4	
5/15/03 0:15	1475.26	0.42	1053.9	444.8	21528	12582.2	
5/15/03 0:30	1474.84	0.42	1043.6	440.5	21318	13022.7	
5/15/03 0:45	1474.42	0.42	1033.3	436.1	21109	13458.8	
5/15/03 1:00	<b>1474</b>	0.325	1023.0	431.8	20900	13890.6	
5/15/03 1:15	1473.675	0.325	1013.7	331.0	16019	14221.6	

5/15/03 1:30	1473.35	0.325	1004.5	328.0	15873	14549.5
5/15/03 1:45	1473.025	0.325	995.2	324.9	15728	14874.5
5/15/03 2:00	<b>1472.7</b>	0.4	986.0	321.9	15582	15196.4
5/15/03 2:15	1472.3	0.4	974.5	392.1	18978	15588.5
5/15/03 2:30	<b>1471.9</b>	0.29	962.6	387.4	18751	15976.0
5/15/03 2:45	1471.61	0.29	952.5	277.7	13440	16253.6
5/15/03 3:00	<b>1471.32</b>	0.31	942.5	274.8	13300	16528.4
5/15/03 3:15	1471.01	0.31	931.8	290.5	14062	16819.0
5/15/03 3:30	<b>1470.7</b>	0.35	921.2	287.2	13901	17106.2
5/15/03 3:45	1470.35	0.35	909.1	320.3	15502	17426.5
5/15/03 4:00	<b>1470</b>	0.35	897.0	316.1	15297	17742.5
5/15/03 4:15	1469.65	0.35	883.2	311.5	15078	18054.1
5/15/03 4:30	<b>1469.3</b>	0.3	869.3	306.7	14844	18360.7
5/15/03 4:45	1469	0.3	857.5	259.0	12537	18619.8
5/15/03 5:00	<b>1468.7</b>	0.3	845.7	255.5	12365	18875.2
5/15/03 5:15	1468.4	0.3	833.8	251.9	12193	19127.2
5/15/03 5:30	1468.1	0.2	821.9	248.4	12021	19375.5
5/15/03 5:45	1467.9	0.3	814.1	163.6	7918	19539.1
5/15/03 6:00	1467.6	0.3	802.2	242.4	11734	19781.6

bold observed, non-bold interpolated

19717.89

## **APPENDIX B-III**

8. Synthetic Silver Lake Outflow to Match DRSB Inflow (Spreadsheet)

Filename BACKBREACH2.xls

SYNTHETIC SILVER LAKE OUTFLOW TO MATCH DRSB INFLOW  
 ELEVATION CALCULATED FROM OUTFLOW

	VVV	delta h	AREA	DELTA V acre-ft	Qout	running	See Chart 1, Sheet 1(2)		Observed
						total out (ac-ft)	elevation	area, acres	
							1486.00	1,449	
5/14/03 12:00	<b>1485.6</b>	0.0014	1416.8	2.0	24	2.0	1484.00	1,288	
5/14/03 13:00	<b>1485.599</b>	0.0583	1416.7	82.6	1000	84.6	1482.00	1,228	
5/14/03 14:00	<b>1485.54</b>	0.2868	1412.0	405.0	4900	489.6	1480.00	1,212	
5/14/03 15:00	<b>1485.253</b>	0.2916	1388.9	405.0	4900	894.6	1478.00	1,196	
5/14/03 16:00	<b>1484.962</b>	0.2966	1365.4	405.0	4900	1299.5	1476.00	1,072	
5/14/03 17:00	<b>1484.665</b>	0.3696	1341.6	495.9	6000	1795.4	1474.00	1,023	<b>Observed</b>
5/14/03 18:00	<b>1484.296</b>	0.4410	1311.8	578.5	7000	2373.9	1472.00	966	
5/14/03 19:00	<b>1483.855</b>	0.8370	1283.6	1074.4	9000	3448.3	1470.00	897	1483.04
5/14/03 20:00	<b>1483.018</b>	1.3790	1258.5	1735.5	13000	5183.8	1468.00	818	1481.88
5/14/03 21:00	<b>1481.639</b>	1.6190	1225.1	1983.5	17000	7167.3	1466	739	<b>1480.4</b>
5/14/03 22:00	<b>1480.02</b>	1.8749	1212.2	2272.7	21000	9440.0	1464.00	653	<b>1479</b>
5/14/03 23:00	<b>1478.145</b>	2.2091	1197.2	2644.6	24000	12084.6	1462	559	1477.36
5/15/03 0:00	<b>1475.936</b>	1.6986	1070.4	1818.2	27500	13902.8	1460	465	1475.68
5/15/03 1:00	<b>1474.237</b>	1.7673	1028.8	1818.2	32000	15721.0	1458	423	<b>1474</b>
5/15/03 2:00	<b>1472.47</b>	1.5189	979.4	1487.6	22000	17208.6	1456	381	<b>1472.7</b>
5/15/03 3:00	<b>1470.951</b>	1.2444	929.8	1157.0	18000	18365.6			<b>1471.32</b>
5/15/03 4:00	<b>1469.707</b>	1.0267	885.4	909.1	14000	19274.7			<b>1470</b>
5/15/03 5:00	<b>1468.68</b>	1.0760	844.9	909.1	11000	20183.8	18800(target)		<b>1468.7</b>
5/15/03 6:00	<b>1467.604</b>	0.9270	802.3	743.8	9000	20927.6			
5/15/03 7:00	<b>1466.677</b>	0.8095	765.7	619.8	7500	21547.5			
5/15/03 8:00	<b>1465.867</b>	0.6762	733.3	495.9	6000	22043.3			
5/15/03 9:00	<b>1465.191</b>	0.5868	704.2	413.2	5000	22456.5			
5/15/03 10:00	<b>1464.604</b>	0.7303	679.0	495.9	4000	22952.4			
5/15/03 11:00	<b>1463.874</b>	0.6386	647.1	413.2	3500	23365.6			
5/15/03 12:00	<b>1463.235</b>	0.5357	617.1	330.6	3000	23696.2			
5/15/03 13:00	<b>1462.7</b>	0.4887	591.9	289.3	2500	23985.5			
5/15/03 14:00	<b>1462.211</b>	0.4358	568.9	247.9	2100	24233.4			
5/15/03 15:00	<b>1461.775</b>	0.3767	548.4	206.6	1800	24440.0			
5/15/03 16:00	<b>1461.398</b>	0.3270	530.7	173.6	1700	24613.6			
5/15/03 17:00	<b>1461.071</b>	0.2887	515.4	148.8	1650	24762.3			
5/15/03 18:00	<b>1460.783</b>	0.2800	501.8	140.5	1600	24902.8			
5/15/03 19:00	<b>1460.503</b>	0.2791	488.6	136.4	1550	25039.2			
5/15/03 20:00	<b>1460.224</b>	0.2781	475.5	132.2	1500	25171.4			
5/15/03 21:00	<b>1459.946</b>	0.2762	463.9	128.1	1450	25299.5			
5/15/03 22:00	<b>1459.669</b>	0.2706	458.1	124.0	1400	25423.5			
5/15/03 23:00	<b>1459.399</b>	0.2649	452.4	119.8	1350	25543.3			
5/16/03 0:00	<b>1459.134</b>	0.2590	446.8	115.7	1300	25659.0			
5/16/03 1:00	<b>1458.875</b>	0.2528	441.4	111.6	1250	25770.6			
5/16/03 2:00	<b>1458.622</b>	0.2464	436.1	107.4	1200	25878.0			
5/16/03 3:00	<b>1458.376</b>	0.2397	430.9	103.3	1150	25981.3			
5/16/03 4:00	<b>1458.136</b>	0.2329	425.9	99.2	1100	26080.5			
5/16/03 5:00	<b>1457.903</b>	0.2258	421.0	95.0	1050	26175.6			
5/16/03 6:00	<b>1457.677</b>	0.2184	416.2	90.9	1000	26266.5			
5/16/03 7:00	<b>1457.459</b>	0.2108	411.6	86.8	950	26353.2			

## **APPENDIX B-III**

### **9. HEC-HMS Hydrograph Output for Case 1**

HMS \* Summary of Results for Source-1

Project : silverbreach

Run Name : Run 5

9/10/03 PSA

Start of Run : 14May03 1200 Basin Model : Clark parameters, br

End of Run : 16May03 0200 Met. Model : Met 5

Execution Time : 10Sep03 1107 Control Specs : Control 3

↙ Synthetic breach outflow

Date	Time	Discharge (cfs)	Obs. Q (cfs)	Residual (cfs)
14 May 03	1200	24	24	0
14 May 03	1300	1000	1000	0
14 May 03	1400	4900	4900	0
14 May 03	1500	4900	4900	0
14 May 03	1600	4900	4900	0
14 May 03	1700	6000	6000	0
14 May 03	1800	7000	7000	0
14 May 03	1900	9000	9000	0
14 May 03	2000	13000	13000	0
14 May 03	2100	17000	17000	0
14 May 03	2200	21000	21000	0
14 May 03	2300	24000	24000	0
14 May 03	2400	27500	27500	0
15 May 03	0100	32000	32000	0
15 May 03	0200	22000	22000	0
15 May 03	0300	18000	18000	0
15 May 03	0400	14000	14000	0
15 May 03	0500	11000	11000	0
15 May 03	0600	9000	9000	0
15 May 03	0700	7500	7500	0
15 May 03	0800	6000	6000	0
15 May 03	0900	5000	5000	0
15 May 03	1000	4000	4000	0
15 May 03	1100	3500	3500	0
15 May 03	1200	3000	3000	0
15 May 03	1300	2500	2500	0
15 May 03	1400	2100	2100	0
15 May 03	1500	1800	1800	0
15 May 03	1600	1700	1700	0
15 May 03	1700	1650	1650	0
15 May 03	1800	1600	1600	0
15 May 03	1900	1550	1550	0
15 May 03	2000	1500	1500	0
15 May 03	2100	1450	1450	0
15 May 03	2200	1400	1400	0
15 May 03	2300	1350	1350	0
15 May 03	2400	1300	1300	0
16 May 03	0100	1250	1250	0
16 May 03	0200	1200	1200	0



HMS \* Summary of Results for Dead River  
Storage

Project : silverbreach

Run Name : Run 5

9/10/03 DS H

Start of Run : 14May03 1200 Basin Model : Clark parameters, br  
End of Run : 16May03 0200 Met. Model : Met 5  
Execution Time : 10Sep03 1107 Control Specs : Control 3

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
14 May 03	1200	10464	1343.9	190.9	317.0
14 May 03	1300	10454	1343.9	190.9	317.0
14 May 03	1400	10444	1343.9	201.8	317.0
14 May 03	1500	10441	1343.9	368.1	317.0
14 May 03	1600	10477	1343.9	1134.6	317.0
14 May 03	1700	10607	1343.9	2626.9	317.0
14 May 03	1800	10857	1344.0	4058.1	317.0
14 May 03	1900	11218	1344.1	5320.4	317.0
14 May 03	2000	11694	1344.3	6829.9	317.0
14 May 03	2100	12330	1344.5	9201.1	317.0
14 May 03	2200	13205	1344.8	12596.9	317.0
14 May 03	2300	14383	1345.2	16564.7	317.0
14 May 03	2400	15889	1345.7	20557.1	362.1
15 May 03	0100	17693	1346.2	24445.9	1003.1
15 May 03	0200	19661	1346.9	26241.9	2049.0
15 May 03	0300	21546	1347.4	24807.1	3369.6
15 May 03	0400	23142	1347.9	21752.4	4570.9
15 May 03	0500	24379	1348.3	18401.8	5666.9
15 May 03	0600	25269	1348.6	15307.7	6481.7
15 May 03	0700	25867	1348.7	12664.9	7022.9
15 May 03	0800	26232	1348.9	10547.3	7353.4
15 May 03	0900	26418	1348.9	8827.1	7521.7
15 May 03	1000	26466	1348.9	7414.0	7564.9
15 May 03	1100	26408	1348.9	6256.7	7512.3
15 May 03	1200	26270	1348.9	5313.7	7387.7
15 May 03	1300	26075	1348.8	4560.3	7211.0
15 May 03	1400	25840	1348.7	3950.3	6997.8
15 May 03	1500	25577	1348.7	3439.0	6759.6
15 May 03	1600	25295	1348.6	3008.3	6504.6
15 May 03	1700	25002	1348.5	2659.4	6239.4
15 May 03	1800	24707	1348.4	2402.2	5968.4
15 May 03	1900	24416	1348.3	2231.8	5701.6
15 May 03	2000	24134	1348.2	2087.0	5442.8
15 May 03	2100	23862	1348.1	1969.5	5193.3
15 May 03	2200	23602	1348.1	1875.1	4954.3
15 May 03	2300	23354	1348.0	1796.9	4729.9
15 May 03	2400	23116	1347.9	1730.3	4550.9
16 May 03	0100	22887	1347.9	1670.8	4378.9
16 May 03	0200	22668	1347.8	1615.8	4213.9

# HMS \* Summary of Results

Project : silverbreach

Run Name : Run 5

Start of Run : 14May03 1200 Basin Model : Clark parameters, br  
 End of Run : 16May03 0200 Met. Model : Met 5  
 Execution Time : 10Sep03 1107 Control Specs : Control 3

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
SILVER LAKE REV	24.000	14 May 03 1200	75.372	23.600
SILVER LAKE BASIN	24.000	14 May 03 1200	75.372	23.600
Source-1	32000	15 May 03 0100	24542	23.600
Junction-4	32024	15 May 03 0100	24618	47.200
Reach-1	30381	15 May 03 0100	24566	47.200
HOIST 12 REV	13.000	14 May 03 1200	40.826	10.800
Junction-3	30394	15 May 03 0100	24607	58.000
Reach-2	28701	15 May 03 0100	24556	58.000
HOIST 1 REV	22.300	14 May 03 1200	70.033	18.100
Junction-2	28723	15 May 03 0100	24627	76.100
Reach-3	28427	15 May 03 0100	24623	76.100
AAO	5.0000	14 May 03 1200	15.702	0.400
Junction-1	28432	15 May 03 0100	24639	76.500
Reach-4	26139	15 May 03 0200	24134	76.500
HOIST 11 REV	6.1600	14 May 03 1200	19.345	5.000
HOIST 10 REV	20.940	14 May 03 1200	65.762	17.000
HOIST 3 REV	6.2800	14 May 03 1200	19.722	5.100
Junction-5	26173	15 May 03 0200	24238	103.600
HOIST 9 REV	5.6700	14 May 03 1200	17.807	4.600
HOIST 2 REV	25.260	14 May 03 1200	79.329	20.500
Junction-6	26204	15 May 03 0200	24336	128.700
HOIST 4 REV	5.7900	14 May 03 1200	18.183	4.700
Junction-7	26209	15 May 03 0200	24354	133.400
HOIST 8 REV	21.930	14 May 03 1200	68.871	17.800
HOIST 5 REV	2.7100	14 May 03 1200	8.5107	2.200
Junction-8	26234	15 May 03 0200	24431	153.400
HOIST 7 REV	5.5400	14 May 03 1200	17.398	4.500
HOIST 6 REV	2.3400	14 May 03 1200	7.3488	1.900
Junction-9	26242	15 May 03 0200	24456	159.800
Dead River Storage	7564.9	15 May 03 1000	12252	159.800

## **APPENDIX B-III**

### 10. HEC-HMS Hydrograph Output for Case 2

HMS \* Summary of Results for Junction-4

Project : silverbreach

Run Name : Run 5

*Silver Lake Outflow  
from elevation*

Start of Run : 14May03 1200 Basin Model : Clark parameters, br

End of Run : 16May03 0200 Met. Model : Met 5

Execution Time : 10Sep03 1307 Control Specs : Control 3

Date	Time	from SILVER LAKE BASIN	Inflow (cfs) from Source-1	Outflow (cfs)
14 May 03	1200	24	10	34
14 May 03	1300	24	1028	1052
14 May 03	1400	24	1026	1050
14 May 03	1500	24	5389	5413
14 May 03	1600	24	7241	7265
14 May 03	1700	24	8299	8323
14 May 03	1800	24	9313	9337
14 May 03	1900	24	13443	13467
14 May 03	2000	24	19058	19082
14 May 03	2100	24	30637	30661
14 May 03	2200	24	20419	20443
14 May 03	2300	24	23770	23794
14 May 03	2400	24	21775	21799
15 May 03	0100	24	20900	20924
15 May 03	0200	24	15582	15606
15 May 03	0300	24	13300	13324
15 May 03	0400	24	15297	15321
15 May 03	0500	24	12365	12389
15 May 03	0600	24	11734	11758
15 May 03	0700	24	7500	7524
15 May 03	0800	24	6000	6024
15 May 03	0900	24	5000	5024
15 May 03	1000	24	4000	4024
15 May 03	1100	24	3500	3524
15 May 03	1200	24	3000	3024
15 May 03	1300	24	2500	2524
15 May 03	1400	24	2100	2124
15 May 03	1500	24	1800	1824
15 May 03	1600	24	1700	1724
15 May 03	1700	24	1650	1674
15 May 03	1800	24	1600	1624
15 May 03	1900	24	1550	1574
15 May 03	2000	24	1500	1524
15 May 03	2100	24	1450	1474
15 May 03	2200	24	1400	1424
15 May 03	2300	24	1350	1374
15 May 03	2400	24	1300	1324
16 May 03	0100	24	1250	1274
16 May 03	0200	24	1200	1224

HMS \* Summary of Results for Dead River

Storage

Project : silverbreach

Run Name : Run 5

*Inflow with outflow  
from Silver Lake elevation*

Start of Run : 14May03 1200 Basin Model : Clark parameters, br

End of Run : 16May03 0200 Met. Model : Met 5

Execution Time : 10Sep03 1307 Control Specs : Control 3

Date	Time	Reservoir Storage (ac-ft)	Reservoir Elevation (ft)	Inflow (cfs)	Outflow (cfs)
14 May 03	1200	10464	1343.9	176.9	317.0
14 May 03	1300	10453	1343.9	176.9	317.0
14 May 03	1400	10442	1343.9	186.8	317.0
14 May 03	1500	10434	1343.8	254.5	317.0
14 May 03	1600	10443	1343.9	593.0	317.0
14 May 03	1700	10519	1343.9	1899.4	317.0
14 May 03	1800	10752	1344.0	4368.1	317.0
14 May 03	1900	11191	1344.1	6875.2	317.0
14 May 03	2000	11855	1344.3	9830.1	317.0
14 May 03	2100	12842	1344.7	14710.2	317.0
14 May 03	2200	14232	1345.1	19557.5	317.0
14 May 03	2300	15917	1345.7	21899.6	368.4
14 May 03	2400	17696	1346.2	22515.2	1004.8
15 May 03	0100	19428	1346.8	22325.8	1925.0
15 May 03	0200	21020	1347.3	21110.2	2973.3
15 May 03	0300	22392	1347.7	19068.5	4006.0
15 May 03	0400	23518	1348.0	17069.0	4877.4
15 May 03	0500	24432	1348.3	15642.4	5716.0
15 May 03	0600	25175	1348.5	14437.7	6395.7
15 May 03	0700	25758	1348.7	12989.8	6923.5
15 May 03	0800	26170	1348.8	11211.7	7296.9
15 May 03	0900	26408	1348.9	9368.1	7512.7
15 May 03	1000	26491	1348.9	7743.4	7587.9
15 May 03	1100	26451	1348.9	6423.1	7551.5
15 May 03	1200	26320	1348.9	5388.7	7432.9
15 May 03	1300	26125	1348.8	4586.2	7256.5
15 May 03	1400	25888	1348.7	3955.3	7041.2
15 May 03	1500	25621	1348.7	3437.5	6800.0
15 May 03	1600	25336	1348.6	3003.3	6541.8
15 May 03	1700	25040	1348.5	2655.9	6274.0
15 May 03	1800	24742	1348.4	2402.2	6000.4
15 May 03	1900	24449	1348.3	2231.1	5731.3
15 May 03	2000	24164	1348.2	2086.1	5470.2
15 May 03	2100	23890	1348.2	1968.4	5218.7
15 May 03	2200	23627	1348.1	1873.5	4977.7
15 May 03	2300	23377	1348.0	1795.8	4748.1
15 May 03	2400	23138	1347.9	1729.1	4567.6
16 May 03	0100	22908	1347.9	1669.7	4394.5
16 May 03	0200	22687	1347.8	1614.7	4228.5

## **APPENDIX B-III**

### **11. HEC-RAS Profiles for Analysis of Development of Silver Lake Breach**



Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	4700	1000.00	1457.00	1481.12	1458.22	1481.12	0.000000	0.09	17177.21	1150.00	0.00
1	4700	3000.00	1457.00	1482.32	1459.40	1482.32	0.000000	0.25	18549.71	1150.00	0.01
1	4700	4500.00	1457.00	1483.03	1460.05	1483.03	0.000001	0.36	19363.64	1150.00	0.01
1	4700	7000.00	1457.00	1483.99	1460.93	1483.99	0.000002	0.53	20472.65	1150.00	0.02
1	4700	10000.00	1457.00	1485.00	1461.82	1485.00	0.000003	0.71	21632.05	1150.00	0.02
1	4700	15000.00	1457.00	1486.42	1463.04	1486.43	0.000005	0.99	23264.40	1150.00	0.03
1	4700	20000.00	1457.00	1487.62	1464.07	1487.63	0.000007	1.25	24645.61	1150.00	0.04
1	4700	25000.00	1457.00	1488.66	1464.91	1488.68	0.000010	1.49	25842.07	1150.00	0.05
1	4700	30000.00	1457.00	1489.63	1465.65	1489.66	0.000013	1.71	26956.98	1150.00	0.05
1	4700	32000.00	1457.00	1489.99	1465.95	1490.02	0.000014	1.79	27375.73	1150.00	0.06
1	4300	1000.00	1460.00	1481.12		1481.12	0.000000	0.14	10073.18	818.79	0.01
1	4300	3000.00	1460.00	1482.31		1482.31	0.000001	0.40	11064.44	849.74	0.02
1	4300	4500.00	1460.00	1483.01		1483.02	0.000002	0.57	11670.23	873.99	0.02
1	4300	7000.00	1460.00	1483.98		1483.99	0.000005	0.84	12532.32	907.39	0.03
1	4300	10000.00	1460.00	1484.98		1485.00	0.000008	1.12	13447.45	919.80	0.04
1	4300	15000.00	1460.00	1486.39		1486.42	0.000014	1.54	14744.12	920.00	0.05
1	4300	20000.00	1460.00	1487.58		1487.62	0.000020	1.92	15839.20	920.00	0.07
1	4300	25000.00	1460.00	1488.61		1488.67	0.000026	2.27	16785.71	920.00	0.08
1	4300	30000.00	1460.00	1489.57		1489.64	0.000032	2.59	17666.85	920.00	0.09
1	4300	32000.00	1460.00	1489.93		1490.01	0.000035	2.71	17997.48	920.00	0.09
1	4100	1000.00	1465.00	1481.12		1481.12	0.000000	0.20	6945.02	688.54	0.01
1	4100	3000.00	1465.00	1482.31		1482.31	0.000003	0.53	7779.44	714.97	0.02
1	4100	4500.00	1465.00	1483.00		1483.01	0.000005	0.76	8281.65	724.05	0.03
1	4100	7000.00	1465.00	1483.98		1483.99	0.000010	1.10	8991.15	736.68	0.04
1	4100	10000.00	1465.00	1484.97		1485.00	0.000017	1.47	9730.39	749.61	0.06
1	4100	15000.00	1465.00	1486.37		1486.42	0.000028	1.99	10779.95	750.00	0.08
1	4100	20000.00	1465.00	1487.55		1487.62	0.000040	2.46	11664.62	750.00	0.09
1	4100	25000.00	1465.00	1488.57		1488.66	0.000052	2.89	12427.53	750.00	0.11
1	4100	30000.00	1465.00	1489.51		1489.64	0.000064	3.29	13137.06	750.00	0.12
1	4100	32000.00	1465.00	1489.87		1490.00	0.000069	3.44	13403.02	750.00	0.12
1	3900	1000.00	1470.00	1481.12		1481.12	0.000001	0.22	5289.76	664.08	0.01
1	3900	3000.00	1470.00	1482.30		1482.31	0.000005	0.59	6098.67	696.50	0.03
1	3900	4500.00	1470.00	1482.99		1483.00	0.000010	0.83	6582.63	699.97	0.04

HEC-RAS Plan: Plan 20 River: Breach Reach: 1



HEC-RAS Plan: Plan 20 River: Breach Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3900	7000.00	1470.00	1483.97		1483.99	0.000018	1.17	7267.46	704.84	0.06
1	3900	10000.00	1470.00	1484.96		1484.99	0.000028	1.54	7968.21	709.79	0.07
1	3900	15000.00	1470.00	1486.35		1486.41	0.000045	2.07	8956.94	710.00	0.09
1	3900	20000.00	1470.00	1487.52		1487.61	0.000061	2.53	9789.40	710.00	0.11
1	3900	25000.00	1470.00	1488.53		1488.65	0.000076	2.96	10506.42	710.00	0.12
1	3900	30000.00	1470.00	1489.47		1489.62	0.000091	3.34	11173.09	710.00	0.14
1	3900	32000.00	1470.00	1489.82		1489.98	0.000097	3.49	11422.87	710.00	0.14
1	3700	1000.00	1475.00	1481.11		1481.12	0.000008	0.45	2722.24	456.79	0.03
1	3700	3000.00	1475.00	1482.29		1482.30	0.000039	1.13	3258.09	458.10	0.07
1	3700	4500.00	1475.00	1482.97		1483.00	0.000064	1.55	3570.26	458.85	0.10
1	3700	7000.00	1475.00	1483.92		1483.98	0.000106	2.15	4007.83	459.91	0.13
1	3700	10000.00	1475.00	1484.88		1484.97	0.000154	2.77	4461.66	486.41	0.16
1	3700	15000.00	1475.00	1486.22		1486.38	0.000223	3.63	5204.00	560.00	0.19
1	3700	20000.00	1475.00	1487.34		1487.57	0.000284	4.37	5831.20	560.00	0.22
1	3700	25000.00	1475.00	1488.30		1488.60	0.000341	5.04	6366.52	560.00	0.25
1	3700	30000.00	1475.00	1489.18		1489.56	0.000392	5.64	6862.47	560.00	0.27
1	3700	32000.00	1475.00	1489.51		1489.92	0.000411	5.87	7047.52	560.00	0.27
1	3500	1000.00	1480.00	1480.72	1480.72	1481.08	0.014644	4.81	212.10	304.20	1.00
1	3500	3000.00	1480.00	1481.49	1481.49	1482.21	0.011423	6.87	455.22	330.80	1.00
1	3500	4500.00	1480.00	1481.94	1481.94	1482.87	0.010389	7.82	609.48	348.58	0.99
1	3500	7000.00	1480.00	1482.59	1482.59	1483.79	0.009358	8.98	843.74	373.98	0.99
1	3500	10000.00	1480.00	1483.26	1483.26	1484.74	0.008609	10.02	1103.17	400.23	0.98
1	3500	15000.00	1480.00	1484.22	1484.22	1486.08	0.007881	11.35	1503.33	437.64	0.98
1	3500	20000.00	1480.00	1485.16	1485.16	1487.22	0.006846	12.07	1931.13	468.59	0.94
1	3500	25000.00	1480.00	1485.84	1485.84	1488.21	0.006791	13.03	2249.78	469.72	0.96
1	3500	30000.00	1480.00	1486.45	1486.45	1489.13	0.006765	13.91	2543.82	494.67	0.97
1	3500	32000.00	1480.00	1486.72	1486.72	1489.48	0.006625	14.15	2678.15	509.38	0.97
1	3300	1000.00	1469.40	1469.72	1470.24	1472.68	0.364416	13.80	72.46	230.90	4.34
1	3300	3000.00	1469.40	1470.09	1471.11	1475.54	0.246487	18.73	160.17	240.48	4.04
1	3300	4500.00	1469.40	1470.34	1471.63	1476.83	0.192902	20.45	220.10	240.88	3.77
1	3300	7000.00	1469.40	1470.73	1472.39	1478.40	0.142015	22.22	315.05	241.49	3.43
1	3300	10000.00	1469.40	1471.18	1473.18	1479.83	0.108562	23.60	423.78	242.20	3.14
1	3300	15000.00	1469.40	1471.90	1474.34	1481.66	0.078107	25.07	598.41	243.33	2.82

HEC-RAS Plan: Plan 20 River: Breach Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3300	20000.00	1469.40	1472.58	1475.37	1483.27	0.062575	26.24	762.19	244.38	2.62
1	3300	25000.00	1469.40	1473.27	1476.32	1484.43	0.050370	26.80	932.67	245.47	2.42
1	3300	30000.00	1469.40	1473.95	1477.20	1485.49	0.042143	27.25	1100.75	246.54	2.27
1	3300	32000.00	1469.40	1474.22	1477.57	1485.92	0.039725	27.45	1165.93	246.96	2.23
1	3200	1000.00	1468.00	1468.89	1468.89	1469.30	0.013908	5.17	193.54	232.12	1.00
1	3200	3000.00	1468.00	1469.68	1469.78	1470.64	0.013533	7.88	380.53	236.40	1.10
1	3200	4500.00	1468.00	1470.03	1470.31	1471.49	0.015887	9.72	463.16	237.78	1.22
1	3200	7000.00	1468.00	1470.51	1471.07	1472.79	0.018491	12.11	577.96	255.33	1.37
1	3200	10000.00	1468.00	1471.01	1471.89	1474.22	0.020503	14.38	695.35	273.02	1.48
1	3200	15000.00	1468.00	1471.74	1473.05	1476.36	0.022064	17.24	869.99	274.49	1.59
1	3200	20000.00	1468.00	1472.39	1474.13	1478.29	0.022773	19.48	1026.67	275.81	1.66
1	3200	25000.00	1468.00	1473.06	1475.10	1479.95	0.022125	21.06	1186.94	277.16	1.67
1	3200	30000.00	1468.00	1473.72	1476.00	1481.45	0.021226	22.32	1344.01	278.47	1.67
1	3200	32000.00	1468.00	1473.97	1476.36	1482.02	0.020871	22.77	1405.49	278.98	1.66
1	3100	1000.00	1466.60	1467.46	1467.42	1467.82	0.012087	4.84	206.58	245.66	0.93
1	3100	3000.00	1466.60	1468.10	1468.28	1469.15	0.016382	8.21	365.51	248.66	1.19
1	3100	4500.00	1466.60	1468.57	1468.80	1469.93	0.014813	9.35	484.50	259.84	1.18
1	3100	7000.00	1466.60	1469.19	1469.56	1471.06	0.014311	11.00	649.09	274.55	1.21
1	3100	10000.00	1466.60	1469.75	1470.35	1472.27	0.014952	12.80	807.72	288.01	1.28
1	3100	15000.00	1466.60	1470.43	1471.42	1474.14	0.017193	15.59	1007.45	294.76	1.41
1	3100	20000.00	1466.60	1470.98	1472.37	1475.90	0.019325	18.03	1168.92	295.80	1.53
1	3100	25000.00	1466.60	1471.48	1473.26	1477.56	0.020871	20.09	1316.48	296.74	1.61
1	3100	30000.00	1466.60	1471.95	1474.06	1479.13	0.021956	21.87	1455.86	297.64	1.68
1	3100	32000.00	1466.60	1472.13	1474.38	1479.74	0.022317	22.52	1509.34	297.98	1.70
1	2800	1000.00	1462.40	1463.48	1463.48	1463.94	0.013773	5.47	182.78	199.70	1.01
1	2800	3000.00	1462.40	1464.47	1464.47	1465.42	0.010849	7.83	383.04	203.79	1.01
1	2800	4500.00	1462.40	1465.07	1465.07	1466.30	0.009884	8.91	505.10	206.25	1.00
1	2800	7000.00	1462.40	1465.87	1465.91	1467.55	0.009429	10.41	672.61	209.58	1.02
1	2800	10000.00	1462.40	1466.80	1466.80	1468.86	0.008432	11.51	868.51	213.40	1.01
1	2800	15000.00	1462.40	1468.09	1468.09	1470.74	0.007772	13.07	1147.69	218.73	1.01
1	2800	20000.00	1462.40	1469.23	1469.23	1472.40	0.007346	14.28	1400.41	223.45	1.01
1	2800	25000.00	1462.40	1470.28	1470.28	1473.90	0.007036	15.28	1635.68	227.76	1.01
1	2800	30000.00	1462.40	1471.24	1471.25	1475.29	0.006800	16.15	1857.78	231.75	1.01

HEC-RAS Plan: Plan 20 River: Breach Reach: 1 (Continued)

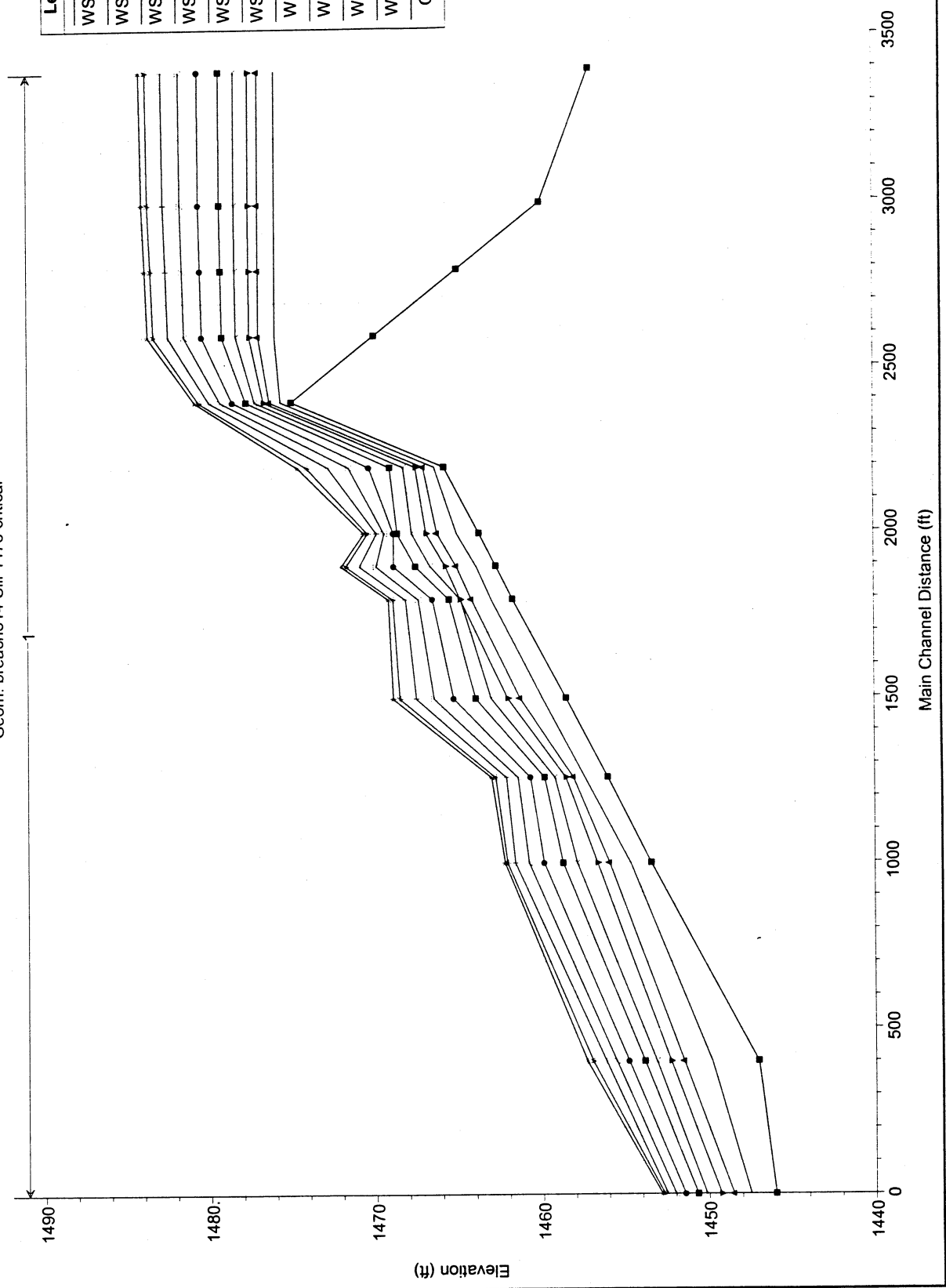
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2800	32000.00	1462.40	1471.61	1471.62	1475.82	0.006719	16.46	1943.66	233.27	1.01
1	2560	1000.00	1459.00	1459.78	1459.83	1460.25	0.017277	5.49	182.00	234.39	1.10
1	2560	3000.00	1459.00	1460.39	1460.72	1461.71	0.023064	9.24	324.62	237.77	1.39
1	2560	4500.00	1459.00	1460.72	1461.25	1462.65	0.025215	11.13	404.45	239.64	1.51
1	2560	7000.00	1459.00	1461.24	1462.02	1463.96	0.025325	13.23	529.26	242.53	1.58
1	2560	10000.00	1459.00	1461.74	1462.81	1465.40	0.026252	15.34	651.74	245.34	1.66
1	2560	15000.00	1459.00	1462.52	1463.97	1467.42	0.025534	17.76	844.54	249.70	1.70
1	2560	20000.00	1459.00	1463.23	1465.00	1469.18	0.024602	19.57	1021.75	253.64	1.72
1	2560	25000.00	1459.00	1463.88	1465.91	1470.75	0.023718	21.04	1188.24	257.29	1.73
1	2560	30000.00	1459.00	1464.49	1466.77	1472.20	0.022933	22.28	1346.64	260.71	1.73
1	2560	32000.00	1459.00	1464.73	1467.09	1472.74	0.022635	22.72	1408.34	262.03	1.73
1	2300	1000.00	1455.50	1456.29	1456.29	1456.67	0.014441	5.00	199.90	259.29	1.00
1	2300	3000.00	1455.50	1457.12	1457.12	1457.91	0.011423	7.13	420.98	269.18	1.00
1	2300	4500.00	1455.50	1457.62	1457.62	1458.64	0.010511	8.10	555.34	275.03	1.00
1	2300	7000.00	1455.50	1458.30	1458.33	1459.67	0.009888	9.38	746.04	283.11	1.02
1	2300	10000.00	1455.50	1458.89	1459.06	1460.74	0.010582	10.94	914.42	290.06	1.09
1	2300	15000.00	1455.50	1459.63	1460.13	1462.35	0.012120	13.23	1133.43	298.86	1.20
1	2300	20000.00	1455.50	1460.22	1461.03	1463.83	0.013556	15.24	1312.23	304.33	1.29
1	2300	25000.00	1455.50	1460.73	1461.88	1465.24	0.014804	17.05	1466.25	306.82	1.37
1	2300	30000.00	1455.50	1461.19	1462.66	1466.59	0.015841	18.66	1607.98	309.10	1.44
1	2300	32000.00	1455.50	1461.36	1462.93	1467.12	0.016227	19.26	1661.40	309.95	1.47
1	1600	1000.00	1447.00	1449.79	1449.03	1450.10	0.003394	4.48	223.02	114.79	0.57
1	1600	3000.00	1447.00	1451.48	1450.72	1452.12	0.004615	6.43	468.47	179.10	0.70
1	1600	4500.00	1447.00	1452.26	1451.56	1453.09	0.005031	7.29	621.75	210.57	0.74
1	1600	7000.00	1447.00	1453.12	1452.63	1454.28	0.006015	8.65	817.21	244.90	0.83
1	1600	10000.00	1447.00	1453.84	1453.59	1455.41	0.007189	10.07	1004.44	273.78	0.92
1	1600	15000.00	1447.00	1454.85	1454.85	1456.97	0.008270	11.70	1299.56	313.95	1.01
1	1600	20000.00	1447.00	1455.76	1455.76	1458.28	0.007748	12.78	1592.22	326.06	1.00
1	1600	25000.00	1447.00	1456.56	1456.56	1459.48	0.007362	13.75	1857.39	332.50	1.00
1	1600	30000.00	1447.00	1457.33	1457.33	1460.60	0.007016	14.57	2113.81	338.62	1.00
1	1600	32000.00	1447.00	1457.62	1457.62	1461.03	0.006918	14.89	2211.53	340.92	1.00
1	1200	1000.00	1446.00	1447.48	1447.39	1447.90	0.010018	5.16	193.74	181.81	0.88

HEC-RAS Plan: Plan 20 River: Breach Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1200	3000.00	1446.00	1448.52	1448.47	1449.42	0.010000	7.64	392.55	203.90	0.97
1	1200	4500.00	1446.00	1449.27	1449.22	1450.28	0.010017	8.06	558.15	267.94	0.98
1	1200	7000.00	1446.00	1450.14	1450.11	1451.15	0.010019	8.07	867.16	416.09	0.99
1	1200	10000.00	1446.00	1450.67	1450.67	1451.98	0.009590	9.18	1089.50	417.52	1.00
1	1200	15000.00	1446.00	1451.35	1451.49	1453.21	0.010033	10.93	1373.14	419.33	1.06
1	1200	20000.00	1446.00	1451.73	1452.21	1454.38	0.012398	13.06	1532.99	420.35	1.20
1	1200	25000.00	1446.00	1452.16	1452.88	1455.48	0.013457	14.62	1711.95	421.49	1.28
1	1200	30000.00	1446.00	1452.55	1453.48	1456.52	0.014246	15.99	1879.54	422.56	1.33
1	1200	32000.00	1446.00	1452.71	1453.74	1456.93	0.014442	16.47	1946.62	422.98	1.35

Silverbreach  
Geom: breach514 Sill 1475 critical

Legend
WS 32000
WS 30000
WS 25000
WS 20000
WS 15000
WS 10000
WS 7000
WS 4500
WS 3000
WS 1000
Ground



HEC-RAS Plan:

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	4700	1000.00	1457.00	1475.99	1458.22	1475.99	0.000000	0.14	11277.70	1150.00	0.01
1	4700	3000.00	1457.00	1477.00	1459.40	1477.01	0.000001	0.37	12439.07	1150.00	0.02
1	4700	4500.00	1457.00	1477.58	1460.05	1477.59	0.000002	0.53	13104.34	1150.00	0.02
1	4700	7000.00	1457.00	1478.44	1460.93	1478.44	0.000005	0.77	14088.13	1150.00	0.03
1	4700	10000.00	1457.00	1479.33	1461.82	1479.34	0.000008	1.02	15117.68	1150.00	0.04
1	4700	15000.00	1457.00	1480.62	1463.04	1480.64	0.000013	1.40	16597.99	1150.00	0.05
1	4700	20000.00	1457.00	1481.77	1464.07	1481.80	0.000019	1.72	17915.61	1150.00	0.06
1	4700	25000.00	1457.00	1482.81	1464.91	1482.85	0.000025	2.02	19113.76	1150.00	0.07
1	4700	30000.00	1457.00	1483.78	1465.65	1483.83	0.000030	2.29	20227.54	1150.00	0.08
1	4700	32000.00	1457.00	1484.15	1465.95	1484.21	0.000032	2.39	20654.16	1150.00	0.08
1	4300	1000.00	1460.00	1475.99		1475.99	0.000001	0.22	6177.23	696.02	0.01
1	4300	3000.00	1460.00	1477.00		1477.00	0.000004	0.60	6890.73	723.87	0.03
1	4300	4500.00	1460.00	1477.57		1477.58	0.000007	0.85	7310.74	737.12	0.04
1	4300	7000.00	1460.00	1478.42		1478.43	0.000015	1.24	7941.24	756.54	0.05
1	4300	10000.00	1460.00	1479.30		1479.33	0.000024	1.65	8616.28	776.79	0.07
1	4300	15000.00	1460.00	1480.57		1480.63	0.000041	2.25	9622.65	806.04	0.09
1	4300	20000.00	1460.00	1481.69		1481.78	0.000058	2.77	10540.03	831.80	0.11
1	4300	25000.00	1460.00	1482.70		1482.83	0.000074	3.24	11399.21	863.23	0.12
1	4300	30000.00	1460.00	1483.64		1483.80	0.000090	3.67	12227.48	895.72	0.14
1	4300	32000.00	1460.00	1484.00		1484.18	0.000096	3.83	12552.49	908.05	0.14
1	4100	1000.00	1465.00	1475.99		1475.99	0.000002	0.32	3791.70	535.61	0.02
1	4100	3000.00	1465.00	1476.98		1476.99	0.000012	0.87	4337.62	566.32	0.05
1	4100	4500.00	1465.00	1477.55		1477.57	0.000022	1.23	4667.21	584.09	0.06
1	4100	7000.00	1465.00	1478.38		1478.42	0.000042	1.76	5161.16	609.74	0.09
1	4100	10000.00	1465.00	1479.24		1479.31	0.000067	2.31	5697.23	636.41	0.11
1	4100	15000.00	1465.00	1480.48		1480.60	0.000107	3.11	6508.83	672.19	0.14
1	4100	20000.00	1465.00	1481.57		1481.75	0.000145	3.78	7255.70	699.95	0.17
1	4100	25000.00	1465.00	1482.56		1482.80	0.000179	4.37	7958.15	718.22	0.19
1	4100	30000.00	1465.00	1483.47		1483.77	0.000209	4.89	8620.61	730.11	0.20
1	4100	32000.00	1465.00	1483.82		1484.14	0.000220	5.09	8877.46	734.67	0.21
1	3900	1000.00	1470.00	1475.98	1470.72	1475.99	0.000010	0.48	2155.55	531.92	0.04
1	3900	3000.00	1470.00	1476.96	1471.49	1476.98	0.000051	1.21	2707.50	598.34	0.08
1	3900	4500.00	1470.00	1477.52	1471.94	1477.56	0.000085	1.64	3045.43	605.17	0.11

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chml (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3900	7000.00	1470.00	1478.33	1472.58	1478.40	0.000137	2.24	3535.44	611.61	0.14
1	3900	10000.00	1470.00	1479.17	1473.25	1479.28	0.000190	2.84	4051.17	618.32	0.17
1	3900	15000.00	1470.00	1480.38	1474.21	1480.57	0.000263	3.65	4806.99	638.13	0.21
1	3900	20000.00	1470.00	1481.44	1475.07	1481.70	0.000319	4.31	5505.51	675.36	0.23
1	3900	25000.00	1470.00	1482.41	1475.88	1482.74	0.000362	4.86	6173.86	697.04	0.25
1	3900	30000.00	1470.00	1483.31	1476.56	1483.70	0.000397	5.34	6802.73	701.54	0.26
1	3900	32000.00	1470.00	1483.65	1476.81	1484.07	0.000408	5.52	7045.38	703.26	0.27
1	3700	1000.00	1475.00	1475.64	1475.64	1475.95	0.017787	4.89	247.44	419.27	1.08
1	3700	3000.00	1475.00	1476.31	1476.31	1476.89	0.013464	6.85	544.61	455.73	1.06
1	3700	4500.00	1475.00	1476.67	1476.67	1477.44	0.012847	7.86	709.59	455.93	1.07
1	3700	7000.00	1475.00	1477.19	1477.19	1478.22	0.012141	9.15	946.64	456.22	1.09
1	3700	10000.00	1475.00	1477.74	1477.74	1479.05	0.011508	10.33	1196.50	456.52	1.10
1	3700	15000.00	1475.00	1478.54	1478.54	1480.26	0.010743	11.83	1564.42	456.97	1.11
1	3700	20000.00	1475.00	1479.26	1479.26	1481.34	0.010205	13.02	1893.29	457.37	1.11
1	3700	25000.00	1475.00	1479.92	1479.92	1482.33	0.009809	14.03	2195.07	457.73	1.12
1	3700	30000.00	1475.00	1480.55	1480.55	1483.25	0.009392	14.86	2485.45	458.09	1.11
1	3700	32000.00	1475.00	1480.79	1480.79	1483.61	0.009286	15.19	2594.06	458.22	1.12
1	3500	1000.00	1465.80	1466.39	1466.93	1468.47	0.113221	11.58	86.36	148.81	2.68
1	3500	3000.00	1465.80	1467.05	1468.12	1471.07	0.083082	16.09	186.51	155.27	2.59
1	3500	4500.00	1465.80	1467.52	1468.81	1472.15	0.063846	17.27	260.62	159.88	2.38
1	3500	7000.00	1465.80	1468.25	1469.80	1473.53	0.046840	18.43	379.72	167.03	2.15
1	3500	10000.00	1465.80	1469.06	1470.77	1474.83	0.036046	19.27	518.82	175.00	1.97
1	3500	15000.00	1465.80	1470.32	1472.17	1476.61	0.026190	20.13	745.26	184.67	1.77
1	3500	20000.00	1465.80	1471.53	1473.42	1478.12	0.019701	20.60	970.88	186.51	1.59
1	3500	25000.00	1465.80	1472.77	1474.57	1479.47	0.015359	20.77	1203.84	188.39	1.45
1	3500	30000.00	1465.80	1474.07	1475.66	1480.73	0.012199	20.71	1448.70	190.34	1.32
1	3500	32000.00	1465.80	1474.62	1476.08	1481.20	0.011097	20.60	1553.63	191.17	1.27
1	3300	1000.00	1463.70	1465.05	1464.86	1465.42	0.007745	4.87	205.43	173.98	0.79
1	3300	3000.00	1463.70	1466.22	1465.99	1466.97	0.007510	6.96	430.90	208.31	0.85
1	3300	4500.00	1463.70	1466.87	1466.60	1467.84	0.007132	7.90	569.32	218.45	0.86
1	3300	7000.00	1463.70	1467.74	1467.44	1469.05	0.006820	9.18	762.91	225.76	0.88
1	3300	10000.00	1463.70	1468.62	1468.30	1470.29	0.006618	10.36	965.08	232.07	0.90
1	3300	15000.00	1463.70	1468.85	1469.54	1472.22	0.012589	14.73	1018.02	233.70	1.24

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3300	20000.00	1463.70	1469.42	1470.62	1474.10	0.015212	17.37	1151.62	237.74	1.39
1	3300	25000.00	1463.70	1469.87	1471.59	1475.98	0.017926	19.83	1260.75	241.00	1.53
1	3300	30000.00	1463.70	1470.40	1472.49	1477.66	0.018979	21.63	1387.14	242.49	1.59
1	3300	32000.00	1463.70	1470.63	1472.83	1478.25	0.018932	22.16	1444.37	242.84	1.60
1	3200	1000.00	1462.70	1463.88	1463.88	1464.42	0.012877	5.89	169.75	157.43	1.00
1	3200	3000.00	1462.70	1465.07	1465.07	1466.07	0.010385	8.02	373.97	185.12	0.99
1	3200	4500.00	1462.70	1465.74	1465.74	1466.99	0.009741	8.96	502.36	200.58	1.00
1	3200	7000.00	1462.70	1466.63	1466.63	1468.24	0.009008	10.18	687.63	213.24	1.00
1	3200	10000.00	1462.70	1467.54	1467.54	1469.52	0.008423	11.30	885.13	222.74	1.00
1	3200	15000.00	1462.70	1468.83	1468.83	1471.33	0.007853	12.69	1181.79	236.31	1.00
1	3200	20000.00	1462.70	1469.89	1469.89	1472.91	0.007461	13.93	1435.43	239.00	1.00
1	3200	25000.00	1462.70	1470.89	1470.89	1474.35	0.007072	14.94	1673.69	271.14	1.00
1	3200	30000.00	1462.70	1471.72	1471.80	1475.70	0.007058	16.01	1873.92	276.56	1.01
1	3200	32000.00	1462.70	1472.00	1472.12	1476.22	0.007154	16.48	1941.98	277.09	1.02
1	3100	1000.00	1461.70	1462.98	1462.76	1463.31	0.007011	4.64	215.60	182.13	0.75
1	3100	3000.00	1461.70	1464.17	1463.85	1464.87	0.006580	6.70	447.60	207.40	0.80
1	3100	4500.00	1461.70	1464.85	1464.47	1465.74	0.006328	7.58	593.41	221.81	0.82
1	3100	7000.00	1461.70	1464.84	1465.33	1467.02	0.015487	11.84	591.17	221.60	1.28
1	3100	10000.00	1461.70	1465.52	1466.18	1468.31	0.015388	13.41	745.71	230.47	1.31
1	3100	15000.00	1461.70	1466.51	1467.41	1470.16	0.014871	15.32	979.03	240.87	1.34
1	3100	20000.00	1461.70	1467.37	1468.45	1471.76	0.014310	16.82	1189.06	246.34	1.35
1	3100	25000.00	1461.70	1468.15	1469.44	1473.23	0.013676	18.09	1382.09	250.52	1.35
1	3100	30000.00	1461.70	1468.89	1470.39	1474.59	0.013126	19.17	1573.21	268.09	1.34
1	3100	32000.00	1461.70	1469.17	1470.73	1475.11	0.012952	19.57	1649.12	274.75	1.34
1	2800	1000.00	1458.50	1459.91	1459.91	1460.54	0.012471	6.33	157.99	128.43	1.01
1	2800	3000.00	1458.50	1461.27	1461.27	1462.39	0.010304	8.48	353.97	160.51	1.01
1	2800	4500.00	1458.50	1462.02	1462.02	1463.38	0.009620	9.36	480.76	178.21	1.00
1	2800	7000.00	1458.50	1463.02	1463.02	1464.71	0.009045	10.43	670.84	201.47	1.01
1	2800	10000.00	1458.50	1463.94	1463.94	1466.05	0.008326	11.65	858.72	205.07	1.00
1	2800	15000.00	1458.50	1465.26	1465.28	1467.99	0.007756	13.26	1131.36	210.19	1.01
1	2800	20000.00	1458.50	1466.43	1466.45	1469.69	0.007324	14.48	1381.27	214.78	1.01
1	2800	25000.00	1458.50	1467.50	1467.52	1471.23	0.007022	15.50	1613.20	218.94	1.01
1	2800	30000.00	1458.50	1468.50	1468.52	1472.66	0.006788	16.37	1832.40	222.81	1.01



HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2800	32000.00	1458.50	1468.89	1468.89	1473.20	0.006674	16.66	1920.37	224.35	1.00
1	2560	1000.00	1456.00	1457.39	1457.19	1457.75	0.007535	4.85	206.10	171.72	0.78
1	2560	3000.00	1456.00	1458.09	1458.32	1459.36	0.015666	9.03	332.09	188.34	1.20
1	2560	4500.00	1456.00	1458.55	1458.97	1460.32	0.017162	10.67	421.69	199.32	1.29
1	2560	7000.00	1456.00	1459.21	1459.86	1461.65	0.018119	12.55	557.55	214.90	1.37
1	2560	10000.00	1456.00	1459.83	1460.70	1463.03	0.019297	14.36	696.19	229.71	1.45
1	2560	15000.00	1456.00	1460.68	1461.93	1465.03	0.019616	16.73	896.73	238.02	1.52
1	2560	20000.00	1456.00	1461.43	1462.99	1466.79	0.019464	18.57	1077.09	242.71	1.55
1	2560	25000.00	1456.00	1462.12	1463.95	1468.37	0.019188	20.06	1245.97	247.02	1.57
1	2560	30000.00	1456.00	1462.77	1464.84	1469.83	0.018877	21.33	1406.48	251.05	1.59
1	2560	32000.00	1456.00	1463.02	1465.19	1470.38	0.018728	21.78	1469.35	252.61	1.59
1	2300	1000.00	1453.40	1454.65	1454.65	1455.24	0.012636	6.14	162.86	140.33	1.00
1	2300	3000.00	1453.40	1455.92	1455.92	1457.04	0.010234	8.46	354.58	161.00	1.00
1	2300	4500.00	1453.40	1456.65	1456.65	1458.04	0.009518	9.46	475.58	172.78	1.01
1	2300	7000.00	1453.40	1457.88	1457.88	1459.32	0.009242	9.64	725.97	250.88	1.00
1	2300	10000.00	1453.40	1458.72	1458.72	1460.44	0.008760	10.52	950.75	276.96	1.00
1	2300	15000.00	1453.40	1459.87	1459.87	1461.99	0.008165	11.69	1283.42	302.63	1.00
1	2300	20000.00	1453.40	1460.79	1460.79	1463.32	0.007709	12.78	1565.38	309.00	1.00
1	2300	25000.00	1453.40	1461.62	1461.62	1464.54	0.007368	13.71	1823.41	312.62	1.00
1	2300	30000.00	1453.40	1462.09	1462.39	1465.69	0.008248	15.21	1972.16	314.68	1.07
1	2300	32000.00	1453.40	1462.23	1462.67	1466.14	0.008742	15.87	2016.26	315.29	1.11
1	1600	1000.00	1447.00	1449.79	1449.03	1450.10	0.003394	4.48	223.02	114.79	0.57
1	1600	3000.00	1447.00	1451.48	1450.72	1452.12	0.004615	6.43	468.47	179.10	0.70
1	1600	4500.00	1447.00	1452.26	1451.56	1453.09	0.005031	7.29	621.75	210.57	0.74
1	1600	7000.00	1447.00	1453.12	1452.63	1454.28	0.006015	8.65	817.21	244.90	0.83
1	1600	10000.00	1447.00	1453.84	1453.59	1455.41	0.007191	10.07	1004.37	273.77	0.92
1	1600	15000.00	1447.00	1454.80	1454.85	1456.97	0.008555	11.85	1282.75	311.80	1.02
1	1600	20000.00	1447.00	1455.53	1455.76	1458.30	0.009028	13.38	1519.14	324.26	1.08
1	1600	25000.00	1447.00	1456.16	1456.56	1459.53	0.009348	14.78	1724.54	329.29	1.12
1	1600	30000.00	1447.00	1456.95	1457.33	1460.64	0.008529	15.46	1988.09	335.63	1.09
1	1600	32000.00	1447.00	1457.30	1457.62	1461.06	0.008082	15.60	2105.67	338.42	1.07
1	1200	1000.00	1446.00	1447.48	1447.39	1447.90	0.010018	5.16	193.74	181.81	0.88

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1200	3000.00	1446.00	1448.52	1448.46	1449.42	0.010000	7.64	392.55	203.90	0.97
1	1200	4500.00	1446.00	1449.27	1449.22	1450.28	0.010017	8.06	558.15	267.94	0.98
1	1200	7000.00	1446.00	1450.14	1450.12	1451.15	0.010019	8.07	867.16	416.09	0.99
1	1200	10000.00	1446.00	1450.67	1450.67	1451.98	0.009587	9.18	1089.61	417.52	1.00
1	1200	15000.00	1446.00	1451.42	1451.49	1453.20	0.009364	10.71	1402.12	419.52	1.03
1	1200	20000.00	1446.00	1451.99	1452.21	1454.30	0.009876	12.19	1642.37	421.05	1.09
1	1200	25000.00	1446.00	1452.48	1452.88	1455.33	0.010465	13.55	1847.72	422.35	1.14
1	1200	30000.00	1446.00	1452.67	1453.48	1456.44	0.013087	15.59	1928.61	422.87	1.28
1	1200	32000.00	1446.00	1452.80	1453.74	1456.86	0.013563	16.16	1984.12	423.22	1.31



HEC-RAS Plan:

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	4700	1000.00	1457.00	1471.14	1458.22	1471.14	0.000001	0.21	6176.74	898.85	0.01
1	4700	3000.00	1457.00	1472.34	1459.40	1472.34	0.000004	0.56	7304.49	977.00	0.03
1	4700	4500.00	1457.00	1473.04	1460.05	1473.05	0.000007	0.77	8006.14	1022.62	0.04
1	4700	7000.00	1457.00	1474.04	1460.94	1474.05	0.000013	1.09	9060.86	1087.60	0.05
1	4700	10000.00	1457.00	1475.06	1461.83	1475.08	0.000020	1.40	10198.73	1150.00	0.06
1	4700	15000.00	1457.00	1476.49	1463.04	1476.52	0.000030	1.81	11844.14	1150.00	0.08
1	4700	20000.00	1457.00	1477.70	1464.06	1477.75	0.000039	2.16	13242.89	1150.00	0.09
1	4700	25000.00	1457.00	1478.73	1464.89	1478.80	0.000048	2.47	14429.11	1150.00	0.10
1	4700	30000.00	1457.00	1479.65	1465.62	1479.73	0.000056	2.76	15476.49	1150.00	0.11
1	4700	32000.00	1457.00	1479.98	1465.92	1480.07	0.000059	2.86	15866.19	1150.00	0.11
1	4300	1000.00	1460.00	1471.13		1471.13	0.000003	0.36	3226.56	507.15	0.02
1	4300	3000.00	1460.00	1472.32		1472.33	0.000015	0.93	3859.57	556.79	0.05
1	4300	4500.00	1460.00	1473.02		1473.04	0.000027	1.29	4258.29	585.90	0.07
1	4300	7000.00	1460.00	1474.00		1474.04	0.000047	1.80	4852.64	626.79	0.09
1	4300	10000.00	1460.00	1474.99		1475.06	0.000070	2.32	5494.00	668.11	0.11
1	4300	15000.00	1460.00	1476.38		1476.50	0.000104	3.03	6448.64	706.75	0.14
1	4300	20000.00	1460.00	1477.55		1477.72	0.000135	3.62	7297.51	736.71	0.16
1	4300	25000.00	1460.00	1478.54		1478.75	0.000163	4.15	8037.75	759.47	0.18
1	4300	30000.00	1460.00	1479.41		1479.67	0.000191	4.63	8706.14	779.44	0.19
1	4300	32000.00	1460.00	1479.73		1480.01	0.000201	4.81	8958.42	786.85	0.20
1	4100	1000.00	1465.00	1471.12	1465.94	1471.13	0.000017	0.64	1662.70	349.14	0.05
1	4100	3000.00	1465.00	1472.29	1466.90	1472.32	0.000078	1.58	2088.47	383.15	0.11
1	4100	4500.00	1465.00	1472.96	1467.42	1473.03	0.000127	2.13	2352.31	402.79	0.14
1	4100	7000.00	1465.00	1473.90	1468.17	1474.02	0.000201	2.90	2750.82	449.20	0.18
1	4100	10000.00	1465.00	1474.83	1468.94	1475.02	0.000277	3.65	3194.74	496.60	0.21
1	4100	15000.00	1465.00	1476.14	1470.05	1476.44	0.000377	4.64	3876.09	540.47	0.25
1	4100	20000.00	1465.00	1477.25	1471.05	1477.65	0.000456	5.45	4490.75	574.64	0.28
1	4100	25000.00	1465.00	1478.16	1471.97	1478.67	0.000530	6.18	5031.03	603.09	0.31
1	4100	30000.00	1465.00	1478.96	1472.79	1479.58	0.000600	6.85	5521.84	627.81	0.33
1	4100	32000.00	1465.00	1479.26		1479.91	0.000626	7.10	5707.80	636.92	0.34
1	3900	1000.00	1470.00	1470.73	1470.73	1471.08	0.014760	4.78	209.40	296.09	1.00
1	3900	3000.00	1470.00	1471.49	1471.49	1472.21	0.011789	6.78	442.27	312.02	1.00
1	3900	4500.00	1470.00	1471.94	1471.94	1472.86	0.010904	7.70	584.34	321.36	1.01

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3900	7000.00	1470.00	1472.58	1472.58	1473.79	0.009961	8.80	795.62	334.75	1.01
1	3900	10000.00	1470.00	1473.25	1473.25	1474.73	0.009285	9.78	1023.02	348.59	1.01
1	3900	15000.00	1470.00	1474.21	1474.21	1476.08	0.008592	10.98	1365.62	368.47	1.01
1	3900	20000.00	1470.00	1475.09	1475.09	1477.24	0.007816	11.77	1706.48	471.03	0.99
1	3900	25000.00	1470.00	1475.90	1475.90	1478.23	0.006837	12.31	2109.64	526.02	0.95
1	3900	30000.00	1470.00	1476.60	1476.60	1479.11	0.006305	12.86	2493.23	573.47	0.93
1	3900	32000.00	1470.00	1476.86	1476.86	1479.43	0.006133	13.05	2646.36	591.35	0.93
1	3700	1000.00	1462.00	1462.58	1463.10	1464.58	0.110969	11.34	88.18	154.60	2.65
1	3700	3000.00	1462.00	1463.24	1464.26	1467.01	0.077490	15.58	192.50	159.88	2.50
1	3700	4500.00	1462.00	1463.69	1464.94	1468.17	0.062058	16.99	264.82	163.43	2.35
1	3700	7000.00	1462.00	1464.39	1465.92	1469.64	0.046943	18.39	380.54	168.97	2.16
1	3700	10000.00	1462.00	1465.17	1466.92	1471.01	0.036582	19.40	515.60	175.20	1.99
1	3700	15000.00	1462.00	1466.41	1468.38	1472.82	0.026793	20.31	738.37	185.04	1.79
1	3700	20000.00	1462.00	1472.41	1469.61	1474.01	0.002352	10.15	1971.12	223.54	0.60
1	3700	25000.00	1462.00	1473.93	1470.72	1475.73	0.002265	10.79	2317.43	232.45	0.60
1	3700	30000.00	1462.00	1475.37	1471.75	1477.34	0.002145	11.27	2705.51	385.93	0.60
1	3700	32000.00	1462.00	1475.95	1472.14	1477.94	0.002047	11.36	2947.66	444.94	0.59
1	3500	1000.00	1461.00	1462.37	1462.26	1462.88	0.009371	5.72	174.77	133.75	0.88
1	3500	3000.00	1461.00	1463.67	1463.57	1464.77	0.008718	8.41	356.85	144.98	0.94
1	3500	4500.00	1461.00	1464.41	1464.33	1465.86	0.008511	9.65	466.55	151.35	0.97
1	3500	7000.00	1461.00	1465.47	1465.41	1467.38	0.008130	11.09	631.46	160.44	0.98
1	3500	10000.00	1461.00	1466.52	1466.52	1468.93	0.007870	12.45	803.18	166.85	1.00
1	3500	15000.00	1461.00	1468.07	1468.07	1471.13	0.007319	14.04	1068.19	174.58	1.00
1	3500	20000.00	1461.00	1469.42	1469.42	1473.05	0.006991	15.28	1308.77	181.32	1.00
1	3500	25000.00	1461.00	1470.62	1470.62	1474.77	0.006737	16.36	1528.53	185.13	1.00
1	3500	30000.00	1461.00	1471.69	1471.69	1476.37	0.006570	17.36	1727.79	186.75	1.01
1	3500	32000.00	1461.00	1472.11	1472.11	1476.98	0.006493	17.72	1806.37	187.38	1.01
1	3300	1000.00	1459.00	1460.57		1461.10	0.008390	5.80	172.43	119.05	0.85
1	3300	3000.00	1459.00	1462.05	1462.05	1463.12	0.007731	8.30	361.49	136.92	0.90
1	3300	4500.00	1459.00	1462.91	1462.91	1464.26	0.007298	9.31	483.10	147.27	0.91
1	3300	7000.00	1459.00	1464.04	1464.04	1465.80	0.007261	10.63	658.66	164.02	0.93
1	3300	10000.00	1459.00	1465.21	1465.01	1467.29	0.007223	11.58	863.52	188.28	0.95
1	3300	15000.00	1459.00	1465.99	1466.59	1469.37	0.010517	14.75	1017.23	204.61	1.17

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3300	20000.00	1459.00	1466.83	1467.79	1471.18	0.011929	16.74	1194.52	217.79	1.26
1	3300	25000.00	1459.00	1467.54	1468.84	1472.85	0.012839	18.48	1352.92	224.35	1.33
1	3300	30000.00	1459.00	1468.20	1469.83	1474.40	0.013468	19.98	1501.22	229.02	1.38
1	3300	32000.00	1459.00	1468.44	1470.16	1474.99	0.013690	20.54	1558.05	230.79	1.39
1	3200	1000.00	1458.00	1459.78	1459.57	1460.29	0.007745	5.73	174.57	115.71	0.82
1	3200	3000.00	1458.00	1461.54	1461.07	1462.38	0.005846	7.35	408.40	150.82	0.79
1	3200	4500.00	1458.00	1462.61	1461.88	1463.54	0.004837	7.74	581.55	172.27	0.74
1	3200	7000.00	1458.00	1463.93	1462.98	1465.07	0.004175	8.55	818.73	186.21	0.72
1	3200	10000.00	1458.00	1465.15	1464.01	1466.55	0.004017	9.49	1053.56	198.26	0.73
1	3200	15000.00	1458.00	1466.66	1465.46	1468.54	0.004247	11.00	1363.47	213.54	0.77
1	3200	20000.00	1458.00	1467.93	1466.76	1470.23	0.004413	12.17	1642.91	226.85	0.80
1	3200	25000.00	1458.00	1469.11	1467.93	1471.75	0.004397	13.02	1919.54	238.22	0.81
1	3200	30000.00	1458.00	1470.22	1468.94	1473.15	0.004177	13.74	2183.47	247.04	0.80
1	3200	32000.00	1458.00	1470.64	1469.30	1473.69	0.004106	14.01	2284.79	262.31	0.80
1	3100	1000.00	1457.00	1459.08	1458.77	1459.58	0.006594	5.68	176.11	104.74	0.77
1	3100	3000.00	1457.00	1461.02	1460.38	1461.83	0.005096	7.22	415.49	141.91	0.74
1	3100	4500.00	1457.00	1462.19	1462.19	1463.08	0.004240	7.56	595.45	165.39	0.70
1	3100	7000.00	1457.00	1463.57	1463.57	1464.64	0.003981	8.29	844.57	194.74	0.70
1	3100	10000.00	1457.00	1464.86	1464.86	1466.11	0.003863	8.99	1112.57	222.02	0.71
1	3100	15000.00	1457.00	1466.47	1466.47	1468.05	0.003696	10.09	1486.83	240.47	0.71
1	3100	20000.00	1457.00	1467.84	1467.84	1469.71	0.003477	10.97	1822.44	246.77	0.71
1	3100	25000.00	1457.00	1469.09	1469.09	1471.22	0.003271	11.73	2143.85	272.82	0.70
1	3100	30000.00	1457.00	1470.27	1470.27	1472.62	0.003077	12.31	2483.33	295.09	0.70
1	3100	32000.00	1457.00	1470.74	1470.74	1473.15	0.003000	12.51	2620.02	295.95	0.69
1	2800	1000.00	1455.00	1456.80	1456.80	1457.42	0.007823	6.28	159.25	91.65	0.84
1	2800	3000.00	1455.00	1458.43	1458.29	1459.85	0.008179	9.59	312.78	97.64	0.94
1	2800	4500.00	1455.00	1459.43	1459.43	1461.20	0.008936	10.67	421.64	119.83	1.00
1	2800	7000.00	1455.00	1460.85	1460.85	1462.86	0.008510	11.38	615.19	153.16	1.00
1	2800	10000.00	1455.00	1462.11	1462.11	1464.38	0.008205	12.10	826.73	182.75	1.00
1	2800	15000.00	1455.00	1463.61	1463.61	1466.38	0.007822	13.36	1122.69	205.94	1.01
1	2800	20000.00	1455.00	1464.80	1464.80	1468.10	0.007390	14.59	1370.52	210.41	1.01
1	2800	25000.00	1455.00	1465.88	1465.88	1469.67	0.007081	15.62	1600.94	214.49	1.01
1	2800	30000.00	1455.00	1466.89	1466.89	1471.11	0.006842	16.49	1818.85	218.27	1.01

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2800	32000.00	1455.00	1467.27	1467.27	1471.66	0.006760	16.81	1903.24	219.72	1.01
1	2560	1000.00	1453.00	1455.45	1454.97	1455.87	0.005021	5.18	192.90	107.25	0.68
1	2560	3000.00	1453.00	1457.04	1456.67	1457.90	0.006809	7.45	402.84	163.46	0.84
1	2560	4500.00	1453.00	1457.85	1457.47	1458.92	0.006603	8.30	542.35	182.61	0.85
1	2560	7000.00	1453.00	1458.04	1458.50	1460.32	0.013304	12.09	578.90	187.30	1.21
1	2560	10000.00	1453.00	1458.79	1459.51	1461.75	0.014519	13.81	724.36	204.92	1.29
1	2560	15000.00	1453.00	1459.82	1460.81	1463.70	0.015520	15.83	947.75	229.35	1.37
1	2560	20000.00	1453.00	1460.61	1461.91	1465.43	0.015865	17.62	1135.36	237.59	1.42
1	2560	25000.00	1453.00	1461.32	1462.90	1467.03	0.016039	19.17	1303.90	241.98	1.46
1	2560	30000.00	1453.00	1461.98	1463.81	1468.48	0.015990	20.46	1466.57	246.15	1.48
1	2560	32000.00	1453.00	1462.23	1464.16	1469.04	0.015994	20.94	1528.48	247.71	1.49
1	2300	1000.00	1451.50	1453.24	1453.24	1453.91	0.012119	6.57	152.20	114.95	1.01
1	2300	3000.00	1451.50	1454.83	1454.68	1455.91	0.008429	8.37	358.52	143.16	0.93
1	2300	4500.00	1451.50	1455.65	1455.49	1457.00	0.007992	9.34	481.69	156.51	0.94
1	2300	7000.00	1451.50	1456.77	1456.60	1458.48	0.007546	10.48	667.96	174.78	0.94
1	2300	10000.00	1451.50	1458.21	1458.01	1459.82	0.007412	10.17	982.99	265.52	0.93
1	2300	15000.00	1451.50	1459.52	1459.20	1461.44	0.006679	11.12	1348.95	294.73	0.92
1	2300	20000.00	1451.50	1460.32	1460.20	1462.77	0.007209	12.56	1592.92	306.97	0.97
1	2300	25000.00	1451.50	1461.04	1461.04	1463.99	0.007418	13.79	1813.54	310.09	1.00
1	2300	30000.00	1451.50	1461.82	1461.82	1465.12	0.007126	14.58	2057.51	313.50	1.00
1	2300	32000.00	1451.50	1462.11	1462.11	1465.55	0.007053	14.89	2149.19	314.77	1.00
1	1600	1000.00	1447.00	1449.79	1449.03	1450.10	0.003394	4.48	223.02	114.79	0.57
1	1600	3000.00	1447.00	1451.48	1450.72	1452.12	0.004615	6.43	468.47	179.10	0.70
1	1600	4500.00	1447.00	1452.26	1451.56	1453.09	0.005031	7.29	621.75	210.57	0.74
1	1600	7000.00	1447.00	1453.12	1452.63	1454.28	0.006019	8.65	816.98	244.86	0.83
1	1600	10000.00	1447.00	1453.84	1453.59	1455.41	0.007191	10.07	1004.37	273.77	0.92
1	1600	15000.00	1447.00	1454.85	1454.85	1456.97	0.008270	11.70	1299.56	313.95	1.01
1	1600	20000.00	1447.00	1455.76	1455.76	1458.28	0.007748	12.78	1592.22	326.06	1.00
1	1600	25000.00	1447.00	1456.51	1456.56	1459.48	0.007586	13.88	1840.11	332.09	1.02
1	1600	30000.00	1447.00	1457.11	1457.33	1460.62	0.007840	15.07	2041.29	336.90	1.05
1	1600	32000.00	1447.00	1457.35	1457.62	1461.05	0.007896	15.49	2121.17	338.79	1.06
1	1200	1000.00	1446.00	1447.48	1447.39	1447.90	0.010018	5.16	193.74	181.81	0.88

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1200	3000.00	1446.00	1448.52	1448.47	1449.42	0.010000	7.64	392.55	203.90	0.97
1	1200	4500.00	1446.00	1449.27	1449.22	1450.28	0.010017	8.06	558.15	267.94	0.98
1	1200	7000.00	1446.00	1450.14	1450.11	1451.15	0.010001	8.07	867.62	416.09	0.98
1	1200	10000.00	1446.00	1450.67	1450.67	1451.98	0.009587	9.18	1089.61	417.52	1.00
1	1200	15000.00	1446.00	1451.35	1451.49	1453.21	0.010032	10.93	1373.19	419.33	1.06
1	1200	20000.00	1446.00	1451.73	1452.21	1454.38	0.012398	13.06	1532.99	420.35	1.20
1	1200	25000.00	1446.00	1452.18	1452.88	1455.47	0.013229	14.55	1720.85	421.55	1.27
1	1200	30000.00	1446.00	1452.62	1453.48	1456.47	0.013537	15.75	1908.89	422.74	1.30
1	1200	32000.00	1446.00	1452.79	1453.74	1456.87	0.013682	16.21	1978.85	423.19	1.32





HEC-RAS Plan:

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	4700	1000.00	1457.00	1466.45	1458.22	1466.45	0.000005	0.41	2778.27	537.32	0.03
1	4700	3000.00	1457.00	1467.89	1459.40	1467.90	0.000023	0.99	3636.83	654.06	0.06
1	4700	4500.00	1457.00	1468.71	1460.05	1468.73	0.000036	1.33	4198.95	720.32	0.08
1	4700	7000.00	1457.00	1469.86	1460.93	1469.90	0.000056	1.79	5082.39	813.62	0.10
1	4700	10000.00	1457.00	1471.03	1461.82	1471.10	0.000076	2.24	6085.46	892.22	0.11
1	4700	15000.00	1457.00	1472.68	1463.04	1472.78	0.000101	2.81	7640.76	999.12	0.14
1	4700	20000.00	1457.00	1474.09	1464.07	1474.22	0.000119	3.26	9116.97	1090.94	0.15
1	4700	25000.00	1457.00	1475.50	1464.91	1475.65	0.000126	3.56	10711.96	1150.00	0.16
1	4700	30000.00	1457.00	1476.91	1465.65	1477.07	0.000124	3.74	12330.70	1150.00	0.16
1	4700	32000.00	1457.00	1477.46	1465.95	1477.62	0.000123	3.80	12958.34	1150.00	0.16
1	4300	1000.00	1460.00	1466.44	1461.35	1466.45	0.000031	0.78	1310.19	313.79	0.06
1	4300	3000.00	1460.00	1467.83	1462.61	1467.88	0.000116	1.79	1785.55	366.71	0.13
1	4300	4500.00	1460.00	1468.61	1463.30	1468.70	0.000173	2.36	2083.79	399.66	0.16
1	4300	7000.00	1460.00	1469.70	1464.22	1469.85	0.000248	3.12	2545.08	447.06	0.19
1	4300	10000.00	1460.00	1470.81		1471.02	0.000316	3.84	3065.53	493.72	0.22
1	4300	15000.00	1460.00	1472.37		1472.69	0.000394	4.76	3885.51	558.73	0.26
1	4300	20000.00	1460.00	1473.70		1474.11	0.000448	5.48	4665.63	614.21	0.28
1	4300	25000.00	1460.00	1475.05		1475.53	0.000463	5.98	5536.07	670.01	0.29
1	4300	30000.00	1460.00	1476.43		1476.95	0.000449	6.29	6487.16	708.26	0.29
1	4300	32000.00	1460.00	1476.97		1477.50	0.000442	6.39	6872.01	723.16	0.29
1	4100	1000.00	1465.00	1465.94	1465.94	1466.38	0.014006	5.33	187.49	215.68	1.01
1	4100	3000.00	1465.00	1466.90	1466.90	1467.73	0.011243	7.31	410.25	249.00	1.00
1	4100	4500.00	1465.00	1467.42	1467.42	1468.49	0.010286	8.32	542.61	261.36	1.00
1	4100	7000.00	1465.00	1468.16	1468.16	1469.58	0.009167	9.56	743.21	277.19	0.99
1	4100	10000.00	1465.00	1468.94	1468.94	1470.69	0.008367	10.68	964.86	293.69	0.99
1	4100	15000.00	1465.00	1470.05	1470.05	1472.29	0.007609	12.11	1305.03	317.76	0.98
1	4100	20000.00	1465.00	1471.53		1473.72	0.005321	12.08	1807.35	361.05	0.86
1	4100	25000.00	1465.00	1473.23		1475.19	0.003547	11.54	2464.62	415.78	0.73
1	4100	30000.00	1465.00	1474.87		1476.65	0.002572	11.15	3210.04	498.16	0.64
1	4100	32000.00	1465.00	1475.50		1477.21	0.002291	10.99	3535.01	520.54	0.61
1	3900	1000.00	1459.00	1459.82	1460.27	1461.34	0.054495	9.90	101.00	127.28	1.96
1	3900	3000.00	1459.00	1463.20	1461.59	1463.61	0.001907	5.15	582.27	157.43	0.47
1	3900	4500.00	1459.00	1464.54	1462.36	1465.03	0.001635	5.62	801.29	169.38	0.46

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3900	7000.00	1459.00	1466.30	1463.45	1466.92	0.001463	6.30	1111.21	181.49	0.45
1	3900	10000.00	1459.00	1467.98	1464.56	1468.73	0.001640	6.95	1438.53	220.74	0.48
1	3900	15000.00	1459.00	1470.06	1466.12	1470.95	0.001877	7.59	1975.27	294.08	0.52
1	3900	20000.00	1459.00	1471.82		1472.80	0.001698	7.93	2522.95	326.56	0.50
1	3900	25000.00	1459.00	1473.43		1474.46	0.001547	8.14	3071.51	356.13	0.49
1	3900	30000.00	1459.00	1475.01		1476.06	0.001381	8.20	3658.11	465.75	0.47
1	3900	32000.00	1459.00	1475.63		1476.68	0.001268	8.20	3961.37	508.10	0.45
1	3700	1000.00	1458.00	1460.35	1459.37	1460.54	0.001932	3.54	282.69	136.04	0.43
1	3700	3000.00	1458.00	1462.98		1463.27	0.001230	4.37	686.25	170.85	0.38
1	3700	4500.00	1458.00	1464.36		1464.72	0.001131	4.81	935.16	189.15	0.38
1	3700	7000.00	1458.00	1466.17		1466.62	0.001024	5.41	1292.86	202.65	0.38
1	3700	10000.00	1458.00	1467.84		1468.42	0.001000	6.11	1637.92	209.83	0.39
1	3700	15000.00	1458.00	1469.83		1470.65	0.001105	7.27	2063.56	218.35	0.42
1	3700	20000.00	1458.00	1471.44		1472.50	0.001207	8.26	2421.26	225.27	0.44
1	3700	25000.00	1458.00	1472.86		1474.15	0.001290	9.11	2745.56	231.36	0.47
1	3700	30000.00	1458.00	1474.26		1475.74	0.001324	9.76	3073.90	237.36	0.48
1	3700	32000.00	1458.00	1474.82		1476.37	0.001327	9.98	3206.98	239.76	0.48
1	3500	1000.00	1457.00	1460.01		1460.21	0.001421	3.60	277.77	102.83	0.39
1	3500	3000.00	1457.00	1462.54		1462.98	0.001534	5.36	560.09	120.37	0.44
1	3500	4500.00	1457.00	1463.81		1464.42	0.001651	6.25	719.56	129.23	0.47
1	3500	7000.00	1457.00	1465.45		1466.31	0.001834	7.44	940.85	140.60	0.51
1	3500	10000.00	1457.00	1466.92		1468.08	0.002136	8.65	1155.72	153.95	0.56
1	3500	15000.00	1457.00	1468.43		1470.21	0.002876	10.71	1400.60	168.83	0.66
1	3500	20000.00	1457.00	1469.47		1471.96	0.003696	12.65	1581.64	179.04	0.75
1	3500	25000.00	1457.00	1470.22		1473.51	0.004581	14.56	1717.35	184.53	0.84
1	3500	30000.00	1457.00	1470.87		1475.01	0.005315	16.32	1838.61	185.52	0.91
1	3500	32000.00	1457.00	1471.13	1470.68	1475.60	0.005574	16.96	1886.69	185.91	0.94
1	3300	1000.00	1456.00	1458.83	1458.61	1459.59	0.007956	7.00	142.79	70.99	0.87
1	3300	3000.00	1456.00	1460.67	1460.67	1462.25	0.009256	10.09	297.33	95.58	1.01
1	3300	4500.00	1456.00	1461.75	1461.75	1463.65	0.008588	11.05	407.18	107.84	1.00
1	3300	7000.00	1456.00	1463.18	1463.18	1465.50	0.008031	12.21	573.07	124.09	1.00
1	3300	10000.00	1456.00	1464.79	1464.79	1467.21	0.007875	12.49	800.72	165.56	1.00
1	3300	15000.00	1456.00	1466.55	1466.55	1469.24	0.007655	13.16	1140.23	213.51	1.00

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3300	20000.00	1456.00	1467.80	1467.75	1470.90	0.007163	14.12	1416.50	226.22	0.99
1	3300	25000.00	1456.00	1468.89	1468.84	1472.39	0.006832	15.00	1666.82	233.99	0.99
1	3300	30000.00	1456.00	1469.80	1469.80	1473.74	0.006832	15.94	1881.52	240.45	1.00
1	3300	32000.00	1456.00	1470.17	1470.17	1474.26	0.006729	16.23	1971.16	242.15	1.00
1	3200	1000.00	1455.50	1457.74	1457.74	1458.65	0.010761	7.65	130.66	71.48	1.00
1	3200	3000.00	1455.50	1459.73	1459.76	1461.33	0.009295	10.14	295.92	94.93	1.01
1	3200	4500.00	1455.50	1460.69	1460.82	1462.73	0.009505	11.47	392.28	106.24	1.05
1	3200	7000.00	1455.50	1461.98	1462.26	1464.60	0.009528	12.98	539.33	121.49	1.09
1	3200	10000.00	1455.50	1463.46	1463.77	1466.33	0.009001	13.60	735.32	147.62	1.07
1	3200	15000.00	1455.50	1465.62	1465.63	1468.46	0.007666	13.54	1107.90	197.72	1.01
1	3200	20000.00	1455.50	1466.99	1466.99	1470.18	0.007173	14.33	1395.78	217.05	1.00
1	3200	25000.00	1455.50	1468.12	1468.12	1471.70	0.006937	15.17	1648.00	228.92	1.00
1	3200	30000.00	1455.50	1469.08	1469.12	1473.07	0.006916	16.03	1871.16	238.19	1.01
1	3200	32000.00	1455.50	1469.52	1469.46	1473.59	0.006591	16.19	1976.51	238.63	0.99
1	3100	1000.00	1455.00	1457.09	1456.82	1457.66	0.007013	6.06	164.98	93.04	0.80
1	3100	3000.00	1455.00	1459.42	1458.55	1460.22	0.004183	7.17	418.63	124.39	0.69
1	3100	4500.00	1455.00	1460.80	1459.50	1461.67	0.003362	7.46	602.86	142.90	0.64
1	3100	7000.00	1455.00	1462.68	1460.79	1463.62	0.002824	7.78	899.85	175.88	0.61
1	3100	10000.00	1455.00	1464.19	1462.05	1465.29	0.002844	8.41	1189.13	207.86	0.62
1	3100	15000.00	1455.00	1466.01	1463.82	1467.38	0.002839	9.39	1597.10	235.63	0.64
1	3100	20000.00	1455.00	1467.48	1465.18	1469.11	0.002762	10.25	1951.92	246.44	0.64
1	3100	25000.00	1455.00	1468.78	1466.30	1470.65	0.002633	10.99	2280.93	265.47	0.64
1	3100	30000.00	1455.00	1470.00	1467.25	1472.09	0.002524	11.62	2622.89	294.58	0.64
1	3100	32000.00	1455.00	1470.47	1467.47	1472.64	0.002479	11.83	2762.33	295.46	0.63
1	2800	1000.00	1453.00	1455.81		1456.22	0.003300	5.17	193.33	77.85	0.58
1	2800	3000.00	1453.00	1457.69	1456.95	1458.82	0.004947	8.54	351.33	89.84	0.76
1	2800	4500.00	1453.00	1458.52	1458.08	1460.24	0.006255	10.50	428.38	95.53	0.87
1	2800	7000.00	1453.00	1459.86	1459.86	1462.14	0.008209	12.14	576.72	127.04	1.00
1	2800	10000.00	1453.00	1461.37	1461.37	1463.82	0.007952	12.56	796.41	162.87	1.00
1	2800	15000.00	1453.00	1463.12	1463.12	1465.92	0.007722	13.43	1116.56	201.84	1.01
1	2800	20000.00	1453.00	1464.33	1464.33	1467.67	0.007288	14.66	1364.34	206.57	1.01
1	2800	25000.00	1453.00	1465.43	1465.43	1469.25	0.006980	15.68	1594.88	210.88	1.00
1	2800	30000.00	1453.00	1466.46	1466.46	1470.71	0.006751	16.55	1812.27	214.86	1.00

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #	Chl
1	2800	32000.00	1453.00	1466.85	1466.85	1471.27	0.006673	16.87	1896.37	216.38	1.00	
1	2560	1000.00	1452.00	1454.04	1454.04	1454.85	0.011256	7.22	138.47	85.71	1.00	
1	2560	3000.00	1452.00	1455.82	1455.82	1457.20	0.009487	9.40	319.18	116.92	1.00	
1	2560	4500.00	1452.00	1456.88	1456.88	1458.35	0.009277	9.76	461.19	157.17	1.00	
1	2560	7000.00	1452.00	1457.69	1458.01	1459.81	0.011175	11.69	599.02	178.89	1.13	
1	2560	10000.00	1452.00	1458.36	1459.05	1461.32	0.013570	13.80	724.57	194.84	1.26	
1	2560	15000.00	1452.00	1459.45	1460.44	1463.32	0.014631	15.79	950.00	220.62	1.34	
1	2560	20000.00	1452.00	1460.28	1461.54	1465.05	0.015417	17.52	1141.24	235.50	1.40	
1	2560	25000.00	1452.00	1460.99	1462.54	1466.65	0.015635	19.09	1309.60	239.92	1.44	
1	2560	30000.00	1452.00	1461.65	1463.46	1468.12	0.015698	20.41	1469.86	244.06	1.47	
1	2560	32000.00	1452.00	1461.90	1463.81	1468.69	0.015747	20.91	1530.59	245.61	1.48	
1	2300	1000.00	1450.00	1452.27		1452.74	0.005645	5.52	181.14	99.97	0.72	
1	2300	3000.00	1450.00	1454.21	1453.54	1455.05	0.004953	7.34	408.78	133.19	0.74	
1	2300	4500.00	1450.00	1455.13	1454.44	1456.22	0.005139	8.36	538.29	148.15	0.77	
1	2300	7000.00	1450.00	1456.34	1455.65	1457.77	0.005361	9.61	728.36	167.70	0.81	
1	2300	10000.00	1450.00	1457.85	1456.82	1459.33	0.005913	9.76	1025.08	248.60	0.85	
1	2300	15000.00	1450.00	1459.29	1458.66	1461.03	0.005538	10.58	1417.57	289.65	0.84	
1	2300	20000.00	1450.00	1460.19	1459.73	1462.37	0.005940	11.85	1687.41	306.39	0.89	
1	2300	25000.00	1450.00	1460.91	1460.59	1463.57	0.006243	13.10	1909.02	309.53	0.93	
1	2300	30000.00	1450.00	1461.54	1461.37	1464.69	0.006588	14.26	2103.75	312.26	0.97	
1	2300	32000.00	1450.00	1461.78	1461.65	1465.13	0.006704	14.69	2178.51	313.30	0.98	
1	1600	1000.00	1447.00	1449.79	1449.03	1450.10	0.003394	4.48	223.02	114.79	0.57	
1	1600	3000.00	1447.00	1451.48	1450.72	1452.12	0.004615	6.43	468.47	179.10	0.70	
1	1600	4500.00	1447.00	1452.26	1451.56	1453.09	0.005031	7.29	621.75	210.57	0.74	
1	1600	7000.00	1447.00	1453.12	1452.63	1454.28	0.006019	8.65	816.98	244.86	0.83	
1	1600	10000.00	1447.00	1453.84	1453.59	1455.41	0.007191	10.07	1004.37	273.77	0.92	
1	1600	15000.00	1447.00	1454.85	1454.85	1456.97	0.008270	11.70	1299.56	313.95	1.01	
1	1600	20000.00	1447.00	1455.76	1455.76	1458.28	0.007748	12.78	1592.22	326.06	1.00	
1	1600	25000.00	1447.00	1456.56	1456.56	1459.48	0.007362	13.75	1857.39	332.50	1.00	
1	1600	30000.00	1447.00	1457.33	1457.33	1460.60	0.007016	14.57	2113.81	338.62	1.00	
1	1600	32000.00	1447.00	1457.62	1457.62	1461.03	0.006918	14.89	2211.53	340.92	1.00	
1	1200	1000.00	1446.00	1447.48	1447.39	1447.90	0.010018	5.16	193.74	181.81	0.88	

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1200	3000.00	1446.00	1448.52	1448.47	1449.42	0.010000	7.64	392.55	203.90	0.97
1	1200	4500.00	1446.00	1449.27	1449.22	1450.28	0.010017	8.06	558.15	267.94	0.98
1	1200	7000.00	1446.00	1450.14	1450.11	1451.15	0.010001	8.07	867.62	416.09	0.98
1	1200	10000.00	1446.00	1450.67	1450.67	1451.98	0.009587	9.18	1089.61	417.52	1.00
1	1200	15000.00	1446.00	1451.35	1451.49	1453.21	0.010032	10.93	1373.19	419.33	1.06
1	1200	20000.00	1446.00	1451.73	1452.21	1454.38	0.012398	13.06	1532.99	420.35	1.20
1	1200	25000.00	1446.00	1452.16	1452.88	1455.48	0.013457	14.62	1711.95	421.49	1.28
1	1200	30000.00	1446.00	1452.55	1453.48	1456.52	0.014246	15.99	1879.54	422.56	1.33
1	1200	32000.00	1446.00	1452.71	1453.74	1456.93	0.014442	16.47	1946.62	422.98	1.35

# Silverbreach

Geom: breach515 Sill 1460 critical

Legend	
—●—	WS 32000
—○—	WS 30000
—□—	WS 25000
—△—	WS 20000
—◇—	WS 15000
—■—	WS 10000
—▲—	WS 7000
—▼—	WS 4500
—◆—	WS 3000
—◆—	WS 1000
—■—	Ground



HEC-RAS Plan:

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	4700	1000.00	1457.00	1462.06	1458.22	1462.08	0.000068	1.00	1029.59	298.88	0.09
1	4700	3000.00	1457.00	1463.94	1459.40	1464.00	0.000174	1.93	1663.60	376.34	0.15
1	4700	4500.00	1457.00	1465.19	1460.05	1465.27	0.000195	2.26	2166.13	435.37	0.16
1	4700	7000.00	1457.00	1466.91	1460.93	1467.02	0.000192	2.66	3035.95	574.85	0.17
1	4700	10000.00	1457.00	1468.60	1461.82	1468.73	0.000187	3.00	4120.82	711.48	0.17
1	4700	15000.00	1457.00	1470.84	1463.04	1471.00	0.000183	3.43	5914.48	879.68	0.18
1	4700	20000.00	1457.00	1472.69	1464.07	1472.87	0.000179	3.75	7653.57	999.96	0.18
1	4700	25000.00	1457.00	1474.34	1464.91	1474.54	0.000174	3.98	9392.42	1107.23	0.18
1	4700	30000.00	1457.00	1475.84	1465.65	1476.05	0.000165	4.13	11104.61	1150.00	0.18
1	4700	32000.00	1457.00	1476.41	1465.95	1476.61	0.000161	4.18	11757.66	1150.00	0.18
1	4300	1000.00	1460.00	1461.35	1461.35	1461.93	0.012741	6.11	163.69	142.95	1.01
1	4300	3000.00	1460.00	1463.06	1463.06	1463.73	0.005859	6.59	454.91	197.48	0.77
1	4300	4500.00	1460.00	1464.50	1464.50	1465.02	0.002997	5.83	771.43	243.27	0.58
1	4300	7000.00	1460.00	1466.32	1466.32	1466.81	0.001620	5.61	1274.66	309.47	0.45
1	4300	10000.00	1460.00	1468.03	1468.03	1468.54	0.001161	5.78	1857.17	374.18	0.40
1	4300	15000.00	1460.00	1470.26	1470.26	1470.82	0.000894	6.19	2798.89	470.66	0.37
1	4300	20000.00	1460.00	1472.09	1472.09	1472.70	0.000775	6.55	3730.82	547.05	0.36
1	4300	25000.00	1460.00	1473.73	1473.73	1474.37	0.000694	6.84	4682.67	615.37	0.35
1	4300	30000.00	1460.00	1475.21	1475.21	1475.88	0.000635	7.06	5645.13	674.50	0.34
1	4300	32000.00	1460.00	1475.78	1475.78	1476.46	0.000613	7.13	6032.21	690.22	0.33
1	4100	1000.00	1457.00	1460.31	1458.71	1460.51	0.001231	3.62	275.99	90.01	0.36
1	4100	3000.00	1457.00	1462.47	1462.47	1463.08	0.002002	6.25	479.87	98.53	0.50
1	4100	4500.00	1457.00	1463.55	1463.55	1464.45	0.002386	7.65	593.74	122.67	0.56
1	4100	7000.00	1457.00	1464.96	1464.96	1466.31	0.002772	9.40	807.39	179.80	0.62
1	4100	10000.00	1457.00	1466.29	1466.29	1468.06	0.003055	10.92	1077.94	226.53	0.67
1	4100	15000.00	1457.00	1468.24	1468.24	1470.36	0.003064	12.36	1574.67	277.85	0.69
1	4100	20000.00	1457.00	1470.00	1470.00	1472.27	0.002867	13.10	2098.89	315.73	0.68
1	4100	25000.00	1457.00	1471.61	1471.61	1473.96	0.002690	13.64	2643.54	362.97	0.67
1	4100	30000.00	1457.00	1473.16	1473.16	1475.49	0.002451	13.87	3244.71	412.25	0.65
1	4100	32000.00	1457.00	1473.75	1473.75	1476.08	0.002350	13.95	3495.53	441.91	0.64
1	3700	1000.00	1457.00	1459.85	1459.85	1460.00	0.001183	3.09	323.99	132.23	0.35
1	3700	3000.00	1457.00	1461.96	1461.96	1462.31	0.001479	4.74	632.33	159.80	0.42
1	3700	4500.00	1457.00	1463.09	1463.09	1463.55	0.001575	5.49	819.80	174.44	0.45



HEC-RAS Plan: (Continued)

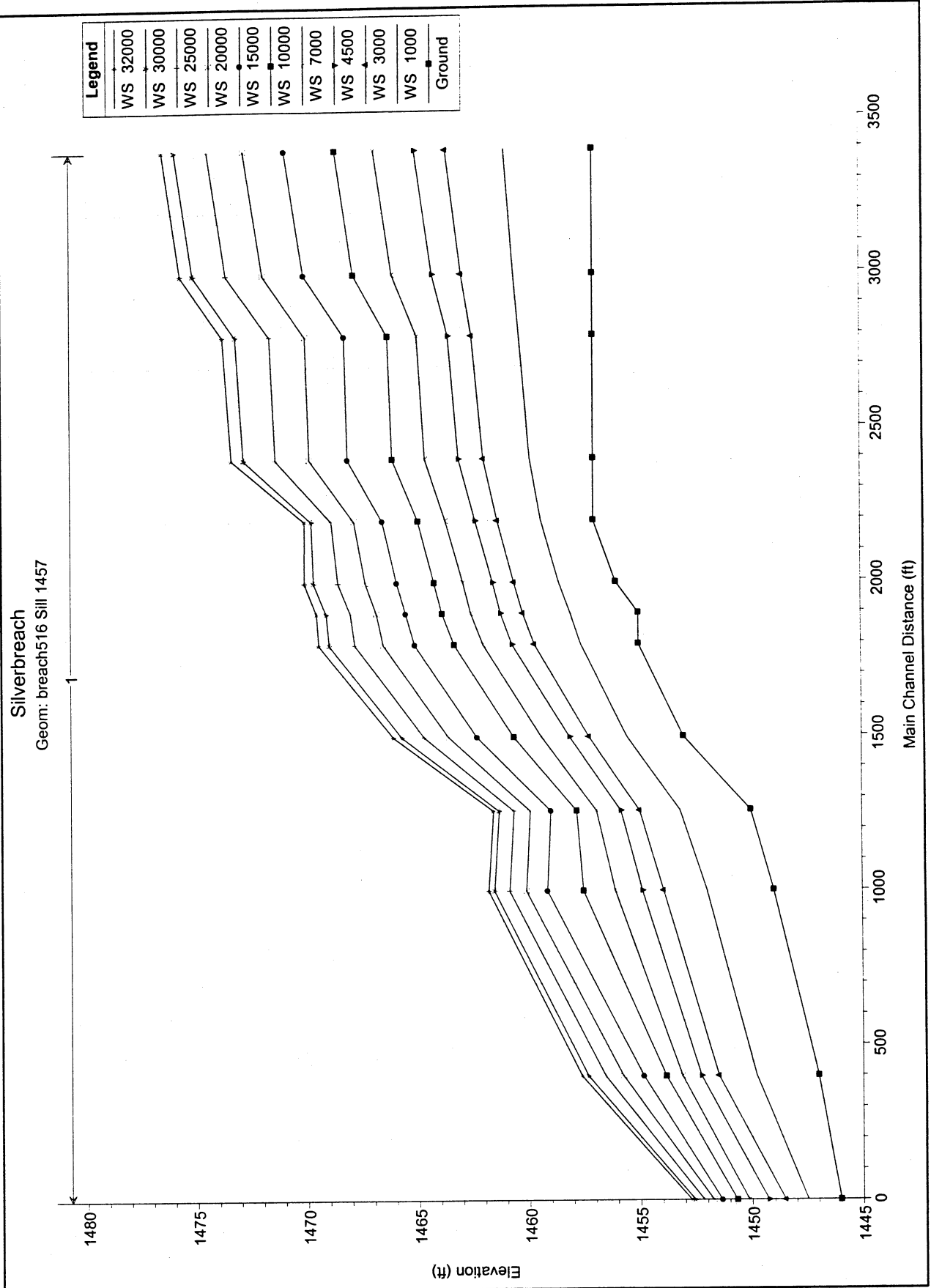
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3700	7000.00	1457.00	1464.62		1465.25	0.001640	6.35	1103.19	194.50	0.47
1	3700	10000.00	1457.00	1466.10		1466.89	0.001618	7.14	1400.07	203.97	0.48
1	3700	15000.00	1457.00	1468.12		1469.17	0.001613	8.24	1819.62	212.25	0.50
1	3700	20000.00	1457.00	1469.83		1471.13	0.001625	9.14	2189.35	219.29	0.51
1	3700	25000.00	1457.00	1471.36		1472.88	0.001636	9.88	2529.44	225.57	0.52
1	3700	30000.00	1457.00	1472.80		1474.51	0.001628	10.49	2858.68	231.49	0.53
1	3700	32000.00	1457.00	1473.35		1475.13	0.001623	10.71	2986.81	233.76	0.53
1	3500	1000.00	1457.00	1459.36		1459.64	0.002884	4.20	238.28	119.70	0.52
1	3500	3000.00	1457.00	1461.33		1461.90	0.002743	6.04	496.29	138.42	0.56
1	3500	4500.00	1457.00	1462.34		1463.11	0.002826	7.04	639.41	144.91	0.59
1	3500	7000.00	1457.00	1463.70		1464.77	0.002965	8.32	841.67	153.62	0.63
1	3500	10000.00	1457.00	1464.94		1466.38	0.003227	9.63	1038.02	161.62	0.67
1	3500	15000.00	1457.00	1466.56		1468.61	0.003608	11.48	1306.26	169.04	0.73
1	3500	20000.00	1457.00	1467.83		1470.51	0.004031	13.12	1524.19	174.74	0.78
1	3500	25000.00	1457.00	1468.86		1472.19	0.004496	14.65	1706.10	179.36	0.84
1	3500	30000.00	1457.00	1469.75		1473.76	0.004947	16.06	1867.86	183.38	0.89
1	3500	32000.00	1457.00	1470.05	1469.34	1474.35	0.005156	16.64	1923.46	184.58	0.91
1	3300	1000.00	1456.00	1458.57		1458.94	0.004207	4.84	206.49	111.28	0.63
1	3300	3000.00	1456.00	1460.60		1461.27	0.003503	6.57	456.70	135.50	0.63
1	3300	4500.00	1456.00	1461.57		1462.46	0.003684	7.59	592.94	147.02	0.67
1	3300	7000.00	1456.00	1462.90		1464.09	0.003820	8.73	801.47	165.27	0.70
1	3300	10000.00	1456.00	1464.22		1465.68	0.003893	9.70	1031.13	184.25	0.72
1	3300	15000.00	1456.00	1465.92		1467.79	0.004063	10.99	1365.37	208.82	0.76
1	3300	20000.00	1456.00	1467.33		1469.56	0.004033	11.97	1671.45	222.85	0.77
1	3300	25000.00	1456.00	1468.56		1471.11	0.003988	12.82	1949.76	231.60	0.78
1	3300	30000.00	1456.00	1469.65		1472.52	0.003980	13.59	2207.91	239.43	0.79
1	3300	32000.00	1456.00	1470.07		1473.06	0.003964	13.86	2308.88	242.01	0.79
1	3200	1000.00	1455.00	1458.06	1457.49	1458.49	0.004668	5.27	189.81	97.44	0.67
1	3200	3000.00	1455.00	1460.20	1459.27	1460.89	0.003987	6.69	448.66	142.94	0.67
1	3200	4500.00	1455.00	1461.20	1460.17	1462.08	0.003833	7.53	597.82	154.15	0.67
1	3200	7000.00	1455.00	1462.56	1461.34	1463.70	0.003742	8.58	816.29	169.22	0.69
1	3200	10000.00	1455.00	1463.87	1462.46	1465.28	0.003724	9.54	1048.48	183.90	0.70
1	3200	15000.00	1455.00	1465.52	1464.09	1467.39	0.003955	10.98	1366.52	202.28	0.74

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #	Chl
1	3200	20000.00	1455.00	1466.83	1465.44	1469.14	0.004183	12.18	1642.30	216.38	0.78	0.78
1	3200	25000.00	1455.00	1468.00	1466.66	1470.68	0.004323	13.14	1902.11	228.57	0.80	0.80
1	3200	30000.00	1455.00	1469.10	1467.73	1472.10	0.004352	13.90	2158.17	239.09	0.82	0.82
1	3200	32000.00	1455.00	1469.53	1468.14	1472.64	0.004249	14.14	2263.01	239.50	0.81	0.81
1	3100	1000.00	1455.00	1457.58		1458.03	0.004266	5.38	186.00	86.14	0.64	0.64
1	3100	3000.00	1455.00	1459.68		1460.46	0.004582	7.09	423.42	136.80	0.71	0.71
1	3100	4500.00	1455.00	1460.69		1461.67	0.004314	7.93	567.80	148.03	0.71	0.71
1	3100	7000.00	1455.00	1462.01		1463.28	0.004259	9.07	771.90	162.65	0.73	0.73
1	3100	10000.00	1455.00	1463.33		1464.87	0.004449	9.96	1004.50	190.12	0.76	0.76
1	3100	15000.00	1455.00	1465.12		1466.96	0.004400	10.88	1378.16	226.22	0.78	0.78
1	3100	20000.00	1455.00	1466.54		1468.66	0.004161	11.69	1710.93	241.17	0.77	0.77
1	3100	25000.00	1455.00	1467.81		1470.18	0.003867	12.36	2022.00	246.74	0.76	0.76
1	3100	30000.00	1455.00	1468.96		1471.58	0.003631	13.00	2318.06	269.85	0.75	0.75
1	3100	32000.00	1455.00	1469.43		1472.13	0.003522	13.19	2447.10	281.01	0.74	0.74
1	2800	1000.00	1453.00	1455.53	1455.39	1456.21	0.009066	6.61	151.24	90.70	0.90	0.90
1	2800	3000.00	1453.00	1457.24	1457.16	1458.55	0.008742	9.21	325.76	114.89	0.96	0.96
1	2800	4500.00	1453.00	1458.11	1458.11	1459.80	0.008921	10.42	432.06	128.35	1.00	1.00
1	2800	7000.00	1453.00	1459.37	1459.37	1461.44	0.008497	11.57	605.06	147.66	1.01	1.01
1	2800	10000.00	1453.00	1460.63	1460.63	1463.03	0.007966	12.45	803.43	167.08	1.00	1.00
1	2800	15000.00	1453.00	1462.29	1462.29	1465.16	0.007544	13.59	1103.80	192.80	1.00	1.00
1	2800	20000.00	1453.00	1463.58	1463.58	1466.93	0.007269	14.67	1362.89	205.85	1.01	1.01
1	2800	25000.00	1453.00	1464.69	1464.69	1468.51	0.006961	15.69	1593.01	210.01	1.00	1.00
1	2800	30000.00	1453.00	1465.71	1465.71	1469.98	0.006750	16.59	1808.42	213.83	1.01	1.01
1	2800	32000.00	1453.00	1466.09	1466.09	1470.54	0.006678	16.92	1891.71	215.29	1.01	1.01
1	2560	1000.00	1450.00	1453.16	1453.02	1453.99	0.009260	7.29	137.19	72.16	0.93	0.93
1	2560	3000.00	1450.00	1454.98	1454.98	1456.35	0.009578	9.38	319.99	118.38	1.00	1.00
1	2560	4500.00	1450.00	1455.81	1455.89	1457.57	0.009639	10.62	423.73	130.60	1.04	1.04
1	2560	7000.00	1450.00	1456.91	1457.23	1459.16	0.010596	12.02	582.22	159.96	1.11	1.11
1	2560	10000.00	1450.00	1457.81	1458.38	1460.68	0.011793	13.60	735.14	181.67	1.19	1.19
1	2560	15000.00	1450.00	1458.98	1459.92	1462.74	0.013039	15.57	963.48	209.40	1.28	1.28
1	2560	20000.00	1450.00	1459.91	1461.03	1464.45	0.013944	17.12	1168.45	231.49	1.34	1.34
1	2560	25000.00	1450.00	1460.64	1462.03	1466.03	0.014266	18.63	1341.60	237.75	1.38	1.38
1	2560	30000.00	1450.00	1461.31	1462.96	1467.50	0.014439	19.97	1502.36	241.94	1.41	1.41

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2560	32000.00	1450.00	1461.57	1463.32	1468.06	0.014465	20.44	1565.27	243.56	1.42
1	2300	1000.00	1449.00	1451.97		1452.32	0.004021	4.76	210.27	112.61	0.61
1	2300	3000.00	1449.00	1453.92	1452.93	1454.61	0.003692	6.67	449.78	135.53	0.65
1	2300	4500.00	1449.00	1454.87	1453.84	1455.79	0.003951	7.70	584.60	149.33	0.69
1	2300	7000.00	1449.00	1456.09	1455.06	1457.35	0.004297	9.00	777.71	167.13	0.74
1	2300	10000.00	1449.00	1457.52	1456.24	1458.95	0.004876	9.61	1040.77	223.03	0.78
1	2300	15000.00	1449.00	1459.14	1458.27	1460.76	0.004855	10.19	1471.39	287.70	0.79
1	2300	20000.00	1449.00	1460.10	1459.36	1462.11	0.005212	11.38	1757.27	307.07	0.84
1	2300	25000.00	1449.00	1460.86	1460.26	1463.31	0.005455	12.56	1990.54	310.16	0.87
1	2300	30000.00	1449.00	1461.54	1461.04	1464.42	0.005665	13.61	2204.36	312.96	0.90
1	2300	32000.00	1449.00	1461.80	1461.34	1464.85	0.005738	14.00	2286.03	314.03	0.91
1	1600	1000.00	1447.00	1449.79	1449.03	1450.10	0.003394	4.48	223.02	114.79	0.57
1	1600	3000.00	1447.00	1451.48	1450.72	1452.12	0.004615	6.43	468.47	179.10	0.70
1	1600	4500.00	1447.00	1452.26	1451.56	1453.09	0.005032	7.29	621.73	210.57	0.74
1	1600	7000.00	1447.00	1453.12	1452.63	1454.28	0.006019	8.65	816.98	244.86	0.83
1	1600	10000.00	1447.00	1453.84	1453.59	1455.41	0.007191	10.07	1004.37	273.77	0.92
1	1600	15000.00	1447.00	1454.85	1454.85	1456.97	0.008270	11.70	1299.56	313.95	1.01
1	1600	20000.00	1447.00	1455.76	1455.76	1458.28	0.007748	12.78	1592.22	326.06	1.00
1	1600	25000.00	1447.00	1456.56	1456.56	1459.48	0.007362	13.75	1857.39	332.50	1.00
1	1600	30000.00	1447.00	1457.33	1457.33	1460.60	0.007016	14.57	2113.81	338.62	1.00
1	1600	32000.00	1447.00	1457.62	1457.62	1461.03	0.006918	14.89	2211.53	340.92	1.00
1	1200	1000.00	1446.00	1447.48	1447.39	1447.90	0.010018	5.16	193.74	181.81	0.88
1	1200	3000.00	1446.00	1448.52	1448.47	1449.42	0.010000	7.64	392.55	203.90	0.97
1	1200	4500.00	1446.00	1449.27	1449.22	1450.28	0.010016	8.06	558.18	267.96	0.98
1	1200	7000.00	1446.00	1450.14	1450.11	1451.15	0.010001	8.07	867.62	416.09	0.98
1	1200	10000.00	1446.00	1450.67	1450.67	1451.98	0.009587	9.18	1089.61	417.52	1.00
1	1200	15000.00	1446.00	1451.35	1451.49	1453.21	0.010032	10.93	1373.19	419.33	1.06
1	1200	20000.00	1446.00	1451.73	1452.21	1454.38	0.012398	13.06	1532.99	420.35	1.20
1	1200	25000.00	1446.00	1452.16	1452.88	1455.48	0.013457	14.62	1711.95	421.49	1.28
1	1200	30000.00	1446.00	1452.55	1453.48	1456.52	0.014246	15.99	1879.54	422.56	1.33
1	1200	32000.00	1446.00	1452.71	1453.74	1456.93	0.014442	16.47	1946.62	422.98	1.35



HEC-RAS Plan:

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #	Chl
1	4700	1000.00	1457.00	1460.98	1458.28	1461.01	0.000197	1.45	699.55	249.07	0.15	0.15
1	4700	3000.00	1457.00	1463.65	1459.49	1463.71	0.000225	2.11	1515.32	362.46	0.17	0.17
1	4700	4500.00	1457.00	1465.05	1460.15	1465.14	0.000226	2.37	2067.68	424.35	0.18	0.18
1	4700	7000.00	1457.00	1466.90	1461.05	1467.01	0.000203	2.70	2990.69	574.11	0.17	0.17
1	4700	10000.00	1457.00	1468.65	1461.95	1468.78	0.000191	3.02	4116.36	715.51	0.17	0.17
1	4700	15000.00	1457.00	1470.92	1463.17	1471.08	0.000184	3.43	5946.53	884.99	0.18	0.18
1	4700	20000.00	1457.00	1472.78	1464.20	1472.95	0.000179	3.74	7698.52	1005.46	0.18	0.18
1	4700	25000.00	1457.00	1474.43	1465.01	1474.62	0.000173	3.97	9445.50	1112.68	0.18	0.18
1	4700	30000.00	1457.00	1475.92	1465.77	1476.12	0.000164	4.12	11157.68	1150.00	0.18	0.18
1	4700	32000.00	1457.00	1476.49	1466.07	1476.69	0.000161	4.16	11805.96	1150.00	0.18	0.18
1	4300	1000.00	1457.00	1460.56		1460.82	0.001614	4.04	252.17	102.75	0.42	0.42
1	4300	3000.00	1457.00	1462.93		1463.47	0.001805	6.09	593.14	185.04	0.48	0.48
1	4300	4500.00	1457.00	1464.27		1464.89	0.001695	6.75	870.68	231.34	0.48	0.48
1	4300	7000.00	1457.00	1466.09		1466.78	0.001516	7.36	1352.99	299.07	0.47	0.47
1	4300	10000.00	1457.00	1467.83		1468.55	0.001383	7.83	1930.61	366.31	0.46	0.46
1	4300	15000.00	1457.00	1470.06		1470.86	0.001225	8.53	2857.12	462.68	0.45	0.45
1	4300	20000.00	1457.00	1471.92		1472.74	0.001103	8.97	3785.37	539.92	0.44	0.44
1	4300	25000.00	1457.00	1473.58		1474.42	0.001005	9.28	4738.46	609.12	0.43	0.43
1	4300	30000.00	1457.00	1475.08		1475.93	0.000927	9.51	5705.01	670.89	0.42	0.42
1	4300	32000.00	1457.00	1475.66		1476.50	0.000889	9.54	6098.43	686.95	0.41	0.41
1	4100	1000.00	1457.00	1460.32		1460.52	0.001212	3.61	277.37	90.07	0.36	0.36
1	4100	3000.00	1457.00	1462.48		1463.08	0.001986	6.23	481.16	98.58	0.50	0.50
1	4100	4500.00	1457.00	1463.56		1464.46	0.002370	7.63	595.20	123.15	0.56	0.56
1	4100	7000.00	1457.00	1464.97		1466.31	0.002757	9.38	809.28	180.22	0.62	0.62
1	4100	10000.00	1457.00	1466.30		1468.06	0.003041	10.90	1080.21	226.88	0.67	0.67
1	4100	15000.00	1457.00	1468.24		1470.37	0.003054	12.34	1577.04	278.03	0.69	0.69
1	4100	20000.00	1457.00	1470.01		1472.27	0.002861	13.09	2100.94	315.92	0.68	0.68
1	4100	25000.00	1457.00	1471.61		1473.96	0.002686	13.63	2645.23	363.11	0.67	0.67
1	4100	30000.00	1457.00	1473.17		1475.50	0.002448	13.86	3246.22	412.44	0.65	0.65
1	4100	32000.00	1457.00	1473.75		1476.08	0.002348	13.95	3496.93	442.07	0.64	0.64
1	3700	1000.00	1457.00	1459.86		1460.01	0.001237	3.13	319.71	132.30	0.35	0.35
1	3700	3000.00	1457.00	1461.96		1462.32	0.001518	4.78	627.31	159.80	0.43	0.43
1	3700	4500.00	1457.00	1463.08		1463.56	0.001609	5.52	814.50	174.42	0.45	0.45

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #	Chl
1	3700	7000.00	1457.00	1464.62		1465.25	0.001667	6.38	1097.62	194.46	0.47	0.47
1	3700	10000.00	1457.00	1466.10		1466.90	0.001640	7.17	1394.30	203.96	0.48	0.48
1	3700	15000.00	1457.00	1468.11		1469.18	0.001630	8.27	1813.64	212.23	0.50	0.50
1	3700	20000.00	1457.00	1469.83		1471.13	0.001639	9.16	2183.15	219.27	0.51	0.51
1	3700	25000.00	1457.00	1471.35		1472.88	0.001649	9.91	2523.09	225.55	0.52	0.52
1	3700	30000.00	1457.00	1472.80		1474.51	0.001639	10.52	2852.27	231.47	0.53	0.53
1	3700	32000.00	1457.00	1473.35		1475.14	0.001634	10.74	2980.38	233.73	0.53	0.53
1	3500	1000.00	1457.00	1459.36		1459.64	0.002884	4.20	238.28	119.70	0.52	0.52
1	3500	3000.00	1457.00	1461.33		1461.90	0.002743	6.04	496.29	138.42	0.56	0.56
1	3500	4500.00	1457.00	1462.34		1463.11	0.002826	7.04	639.41	144.91	0.59	0.59
1	3500	7000.00	1457.00	1463.70		1464.77	0.002965	8.32	841.67	153.62	0.63	0.63
1	3500	10000.00	1457.00	1464.94		1466.38	0.003227	9.63	1038.02	161.62	0.67	0.67
1	3500	15000.00	1457.00	1466.56		1468.61	0.003608	11.48	1306.26	169.04	0.73	0.73
1	3500	20000.00	1457.00	1467.83		1470.51	0.004031	13.12	1524.19	174.74	0.78	0.78
1	3500	25000.00	1457.00	1468.86		1472.19	0.004496	14.65	1706.10	179.36	0.84	0.84
1	3500	30000.00	1457.00	1469.75		1473.76	0.004947	16.06	1867.86	183.38	0.89	0.89
1	3500	32000.00	1457.00	1470.05	1469.34	1474.35	0.005156	16.64	1923.46	184.58	0.91	0.91
1	3300	1000.00	1456.00	1458.57		1458.94	0.004207	4.84	206.49	111.28	0.63	0.63
1	3300	3000.00	1456.00	1460.60		1461.27	0.003503	6.57	456.70	135.50	0.63	0.63
1	3300	4500.00	1456.00	1461.57		1462.46	0.003684	7.59	592.94	147.02	0.67	0.67
1	3300	7000.00	1456.00	1462.90		1464.09	0.003820	8.73	801.47	165.27	0.70	0.70
1	3300	10000.00	1456.00	1464.22		1465.68	0.003893	9.70	1031.13	184.25	0.72	0.72
1	3300	15000.00	1456.00	1465.92		1467.79	0.004063	10.99	1365.37	208.82	0.76	0.76
1	3300	20000.00	1456.00	1467.33		1469.56	0.004033	11.97	1671.45	222.85	0.77	0.77
1	3300	25000.00	1456.00	1468.56		1471.11	0.003988	12.82	1949.76	231.60	0.78	0.78
1	3300	30000.00	1456.00	1469.65		1472.52	0.003980	13.59	2207.91	239.43	0.79	0.79
1	3300	32000.00	1456.00	1470.07		1473.06	0.003964	13.86	2308.88	242.01	0.79	0.79
1	3200	1000.00	1455.00	1458.06	1457.49	1458.49	0.004668	5.27	189.81	97.44	0.67	0.67
1	3200	3000.00	1455.00	1460.20	1459.27	1460.89	0.003987	6.69	448.66	142.94	0.67	0.67
1	3200	4500.00	1455.00	1461.20	1460.17	1462.08	0.003833	7.53	597.82	154.15	0.67	0.67
1	3200	7000.00	1455.00	1462.56	1461.34	1463.70	0.003742	8.58	816.29	169.22	0.69	0.69
1	3200	10000.00	1455.00	1463.87	1462.46	1465.28	0.003724	9.54	1048.48	183.90	0.70	0.70
1	3200	15000.00	1455.00	1465.52	1464.09	1467.39	0.003955	10.98	1366.52	202.28	0.74	0.74

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	3200	2000.00	1455.00	1466.83	1465.44	1469.14	0.004183	12.18	1642.30	216.38	0.78
1	3200	2500.00	1455.00	1468.00	1466.66	1470.68	0.004323	13.14	1902.11	228.57	0.80
1	3200	3000.00	1455.00	1469.10	1467.73	1472.10	0.004352	13.90	2158.17	239.09	0.82
1	3200	3200.00	1455.00	1469.53	1468.14	1472.64	0.004249	14.14	2263.01	239.50	0.81
1	3100	1000.00	1455.00	1457.58		1458.03	0.004266	5.38	186.00	86.14	0.64
1	3100	3000.00	1455.00	1459.68		1460.46	0.004582	7.09	423.42	136.80	0.71
1	3100	4500.00	1455.00	1460.69		1461.67	0.004314	7.93	567.80	148.03	0.71
1	3100	7000.00	1455.00	1462.01		1463.28	0.004259	9.07	771.90	162.65	0.73
1	3100	10000.00	1455.00	1463.33		1464.87	0.004449	9.96	1004.50	190.12	0.76
1	3100	15000.00	1455.00	1465.12		1466.96	0.004400	10.88	1378.16	226.22	0.78
1	3100	20000.00	1455.00	1466.54		1468.66	0.004161	11.69	1710.93	241.17	0.77
1	3100	25000.00	1455.00	1467.81		1470.18	0.003867	12.36	2022.00	246.74	0.76
1	3100	30000.00	1455.00	1468.96		1471.58	0.003631	13.00	2318.06	269.85	0.75
1	3100	32000.00	1455.00	1469.43		1472.13	0.003522	13.19	2447.10	281.01	0.74
1	2800	1000.00	1453.00	1455.53	1455.39	1456.21	0.009066	6.61	151.24	90.70	0.90
1	2800	3000.00	1453.00	1457.24	1457.16	1458.55	0.008742	9.21	325.76	114.89	0.96
1	2800	4500.00	1453.00	1458.11	1458.11	1459.80	0.008921	10.42	432.06	128.35	1.00
1	2800	7000.00	1453.00	1459.37	1459.37	1461.44	0.008497	11.57	605.06	147.66	1.01
1	2800	10000.00	1453.00	1460.63	1460.63	1463.03	0.007966	12.45	803.43	167.08	1.00
1	2800	15000.00	1453.00	1462.29	1462.29	1465.16	0.007544	13.59	1103.80	192.80	1.00
1	2800	20000.00	1453.00	1463.58	1463.58	1466.93	0.007269	14.67	1362.89	205.85	1.01
1	2800	25000.00	1453.00	1464.69	1464.69	1468.51	0.006961	15.69	1593.01	210.01	1.00
1	2800	30000.00	1453.00	1465.71	1465.71	1469.98	0.006750	16.59	1808.42	213.83	1.01
1	2800	32000.00	1453.00	1466.09	1466.09	1470.54	0.006678	16.92	1891.71	215.29	1.01
1	2560	1000.00	1450.00	1453.16	1453.02	1453.99	0.009260	7.29	137.19	72.16	0.93
1	2560	3000.00	1450.00	1454.98	1454.98	1456.35	0.009578	9.38	319.99	118.38	1.00
1	2560	4500.00	1450.00	1455.81	1455.89	1457.57	0.009639	10.62	423.73	130.60	1.04
1	2560	7000.00	1450.00	1456.91	1457.23	1459.16	0.010596	12.02	582.22	159.96	1.11
1	2560	10000.00	1450.00	1457.81	1458.37	1460.68	0.011794	13.60	735.12	181.67	1.19
1	2560	15000.00	1450.00	1458.98	1459.92	1462.74	0.013039	15.57	963.48	209.40	1.28
1	2560	20000.00	1450.00	1459.90	1461.03	1464.46	0.013964	17.13	1167.83	231.42	1.34
1	2560	25000.00	1450.00	1460.64	1462.03	1466.03	0.014262	18.63	1341.71	237.76	1.38
1	2560	30000.00	1450.00	1461.31	1462.96	1467.50	0.014435	19.97	1502.51	241.95	1.41

HEC-RAS Plan: (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2560	32000.00	1450.00	1461.57	1463.32	1468.06	0.014461	20.44	1565.42	243.57	1.42
1	2300	1000.00	1449.00	1451.97		1452.32	0.004021	4.76	210.27	112.61	0.61
1	2300	3000.00	1449.00	1453.92	1452.93	1454.61	0.003692	6.67	449.78	135.53	0.65
1	2300	4500.00	1449.00	1454.87	1453.84	1455.79	0.003951	7.70	584.60	149.33	0.69
1	2300	7000.00	1449.00	1456.09	1455.06	1457.35	0.004297	9.00	777.71	167.13	0.74
1	2300	10000.00	1449.00	1457.52	1456.24	1458.95	0.004876	9.61	1040.77	223.03	0.78
1	2300	15000.00	1449.00	1459.14	1458.27	1460.76	0.004855	10.19	1471.39	287.70	0.79
1	2300	20000.00	1449.00	1460.10	1459.36	1462.11	0.005212	11.38	1757.27	307.07	0.84
1	2300	25000.00	1449.00	1460.86	1460.26	1463.31	0.005455	12.56	1990.54	310.16	0.87
1	2300	30000.00	1449.00	1461.54	1461.04	1464.42	0.005665	13.61	2204.36	312.96	0.90
1	2300	32000.00	1449.00	1461.80	1461.34	1464.85	0.005738	14.00	2286.03	314.03	0.91
1	1600	1000.00	1447.00	1449.79	1449.03	1450.10	0.003394	4.48	223.02	114.79	0.57
1	1600	3000.00	1447.00	1451.48	1450.72	1452.12	0.004615	6.43	468.47	179.10	0.70
1	1600	4500.00	1447.00	1452.26	1451.56	1453.09	0.005032	7.29	621.73	210.57	0.74
1	1600	7000.00	1447.00	1453.12	1452.63	1454.28	0.006019	8.65	816.98	244.86	0.83
1	1600	10000.00	1447.00	1453.84	1453.59	1455.41	0.007191	10.07	1004.37	273.77	0.92
1	1600	15000.00	1447.00	1454.85	1454.85	1456.97	0.008270	11.70	1299.56	313.95	1.01
1	1600	20000.00	1447.00	1455.76	1455.76	1458.28	0.007748	12.78	1592.22	326.06	1.00
1	1600	25000.00	1447.00	1456.56	1456.56	1459.48	0.007362	13.75	1857.39	332.50	1.00
1	1600	30000.00	1447.00	1457.33	1457.33	1460.60	0.007016	14.57	2113.81	338.62	1.00
1	1600	32000.00	1447.00	1457.62	1457.62	1461.03	0.006918	14.89	2211.53	340.92	1.00
1	1200	1000.00	1446.00	1447.48	1447.39	1447.90	0.010018	5.16	193.74	181.81	0.88
1	1200	3000.00	1446.00	1448.52	1448.46	1449.42	0.010000	7.64	392.55	203.90	0.97
1	1200	4500.00	1446.00	1449.27	1449.22	1450.28	0.010016	8.06	558.18	267.96	0.98
1	1200	7000.00	1446.00	1450.14	1450.11	1451.15	0.010001	8.07	867.62	416.09	0.98
1	1200	10000.00	1446.00	1450.67	1450.67	1451.98	0.009587	9.18	1089.61	417.52	1.00
1	1200	15000.00	1446.00	1451.35	1451.49	1453.21	0.010032	10.93	1373.19	419.33	1.06
1	1200	20000.00	1446.00	1451.73	1452.21	1454.38	0.012398	13.06	1532.99	420.35	1.20
1	1200	25000.00	1446.00	1452.16	1452.88	1455.48	0.013457	14.62	1711.95	421.49	1.28
1	1200	30000.00	1446.00	1452.55	1453.48	1456.52	0.014246	15.99	1879.54	422.56	1.33
1	1200	32000.00	1446.00	1452.71	1453.74	1456.93	0.014442	16.47	1946.62	422.98	1.35