Appendix 5.5 (Continued)

Hydrology (Part 2 of 15)

ENTRADA SOUTH

DRAINAGE CONCEPT REPORT

DEVELOPED CONDITION

Program Package Serial Number: 2084
08/17/10 FILE: 201D-A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN A

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
201	1A	284.9	*746.00	284.9	746.00	2	410.	.03000	.00	.00	0.	98	0	A27	.00
201	2A	11.6	39.45	296.5	753.19	4	720.	.02000	6.50	.00	0.	298	5	A31	.10
201	3A	5.3	14.98	301.8	751.11	4	75.	.01000	7.25	.00	0.	298	7	A31	.10
201	4B	15.9	37.63	15.9	37.63	4	260.	.04000	2.00	.00	0.	98	10	A31	.80
201	5B	1.5	3.42	17.4	40.86	4	70.	.02000	2.25	.00	0.	98	8	A27	.91
201	6B	2.2	3.64	19.6	44.36	4	350.	.01000	2.75	.00	0.	98	16	A27	.91

* CONFLUENCE Q'S *
* 201 7A TA 1159 QA 748.42 QAB 789.03 QB 40.60 201 7B TB 1156 QB 44.19 QBA 650.82 QA 606.63 *
* 201 7AB TAB 1159 QAB 789.03 QA 748.42 QB 40.60 *

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	7AB	19.6	44.19	321.4	789.03	4	400.	.01000	7.50	.00	0.	98	0	A27	.00
201	8C	6.6	20.23	6.6	20.23	4	50.	.01000	2.00	.00	0.	298	6	A31	.10
201	9C	1.9	5.83	8.5	26.06	4	170.	.01000	2.25	.00	0.	298	6	A31	.01
201	10C	.5	1.70	9.0	27.31	4	440.	.01000	2.25	.00	0.	298	5	A31	.01
201	11C	2.0	4.75	11.0	30.91	4	5.	.01000	2.25	.00	0.	98	7	A27	.60
201	12C	1.0	2.57	12.0	33.11	4	350.	.03000	2.00	.00	0.	98	6	A27	.60
201	13C	1.7	4.37	13.7	35.87	4	50.	.04000	2.00	.00	0.	98	6	A27	.60
201	14C	1.7	4.03	15.4	39.69	4	370.	.04000	2.00	.00	0.	98	7	A27	.60
201	15C	7.3	20.63	22.7	58.67	4	110.	.04000	2.25	.00	0.	298	7	A31	.10
201	16C	2.8	5.65	25.5	63.72	4	50.	.04000	2.25	.00	0.	98	10	A27	.60
201	17C	.6	1.70	26.1	64.74	4	240.	.05500	2.25	.00	0.	98	5	A27	.60
201	18C	1.3	3.69	27.4	66.70	4	30.	.03000	2.50	.00	0.	98	5	A27	.60
201	19C	1.8	4.62	29.2	70.58	4	340.	.06000	2.25	.00	0.	98	6	A27	.60
201	20C	8.8	24.87	38.0	93.98	4	550.	.01000	3.50	.00	0.	298	7	A31	.10
201	21C	2.0	4.75	40.0	95.90	4	5.	.04000	2.75	.00	0.	98	7	A27	.60
201	22C	3.3	6.33	43.3	102.07	4	290.	.03500	2.75	.00	0.	98	11	A27	.60
201	23C	3.4	9.29	46.7	108.38	4	290.	.01000	3.75	.00	0.	98	7	A31	.60
201	24C	2.7	7.38	49.4	113.39	4	110.	.04000	2.75	.00	0.	98	7	A31	.60
201	25D	.0	.00	.0	.00	4	1.	.01000	.00	.00	0.	98	99	A27	.00
201	26D	4.1	9.55	4.1	9.55	4	20.	.00500	2.00	.00	0.	98	10	A31	.60
201	27D	2.1	5.12	6.2	14.67	4	40.	.02000	2.00	.00	0.	98	9	A31	.60
201	28D	1.8	4.27	8.0	18.93	4	500.	.07000	2.00	.00	0.	98	7	A27	.60
201	29D	2.1	5.39	10.1	23.91	4	5.	.02000	2.00	.00	0.	98	6	A27	.60
201	30D	1.9	5.40	12.0	28.67	4	50.	.03000	2.00	.00	0.	98	5	A27	.60
201	31D	1.1	3.12	13.1	31.40	4	130.	.03000	2.00	.00	0.	98	5	A27	.60
201	32D	1.2	2.73	14.3	34.05	4	70.	.04000	2.00	.00	0.	98	8	A27	.91
201	33D	.8	1.81	15.1	35.78	4	50.	.03000	2.00	.00	0.	98	7	A27	.01
201	34D	1.4	3.61	16.5	39.28	4	50.	.05500	2.00	.00	0.	98	6	A27	.68
201	35D	1.3	3.09	17.8	42.28	4	270.	.05000	2.00	.00	0.	98	7	A27	.60
201	36D	1.4	4.02	19.2	44.94	4	50.	.06000	2.00	.00	0.	98	5	A27	.80
201	37D	.9	1.95	20.1	46.76	4	80.	.06000	2.00	.00	0.	98	9	A27	.91
201	38E	1.8	4.62	1.8	4.62	4	310.	.07000	2.00	.00	0.	98	6	A27	.60
201	39E	1.7	4.37	3.5	8.96	4	160.	.04000	2.00	.00	0.	98	6	A27	.60

Program Package Serial Number: 2084
08/17/10 FILE: 201D-A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN A

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
201	40E	.9	2.04	4.4	10.93	4	5.	.03000	2.00	.00	0.	98	7	A27	.01
201	41E	1.9	4.88	6.3	15.80	4	60.	.03000	2.00	.00	0.	98	6	A27	.60

CONFLUENCE Q'S

201 42D TD 1155 QD 46.76 QDE 61.68 QE 14.92 201 42E TE 1154 QE 15.77 QED 62.26 QD 46.50
201 42DE TDE 1154 QDE 62.26 QD 46.50 QE 15.77

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	42DE	6.3	15.77	26.4	62.26	4	380.	.05500	2.25	.00	0.	98	0	A27	.00
201	43D	8.3	19.67	34.7	81.23	4	40.	.05500	2.50	.00	0.	98	10	A31	.82

CONFLUENCE Q'S

201 44C TC 1157 QC 113.03 QCD 186.52 QD 73.49 201 44D TD 1155 QD 81.18 QDC 186.36 QC 105.18
201 44CD TCD 1156 QCD 190.00 QC 111.02 QD 78.98

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	44CD	34.7	81.18	84.1	190.00	4	550.	.04000	3.50	.00	0.	98	0	A27	.00
201	45C	2.6	5.31	86.7	193.43	4	10.	.03000	3.75	.00	0.	98	10	A27	.72
201	46C	1.7	3.53	88.4	196.74	4	30.	.03000	3.75	.00	0.	98	10	A27	.91
201	47C	1.3	2.46	89.7	199.10	4	120.	.02000	4.00	.00	0.	98	12	A27	.91
201	48C	5.4	14.31	95.1	209.16	4	60.	.02000	4.00	.00	0.	98	7	A31	.10

CONFLUENCE Q'S

201 49A TA 1160 QA 782.12 QAC 956.60 QC 174.48 201 49C TC 1157 QC 209.12 QCA 887.57 QA 678.46
201 49AC TAC 1159 QAC 966.18 QA 773.50 QC 192.68

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	49AC	95.1	209.12	416.5	966.18	4	430.	.01000	8.00	.00	0.	98	0	A27	.00
201	50A	.0	.00	416.5	959.94	4	1.	.01000	8.00	.00	0.	98	99	A27	.00
201	51F	.0	.00	.0	.00	4	1.	.01000	.00	.00	0.	98	99	A31	.00
201	52F	6.8	17.71	6.8	17.71	4	380.	.04000	2.00	.00	0.	98	8	A31	.80

CONFLUENCE Q'S

201 53A TA 1160 QA 959.92 QAF 969.92 QF 10.00 201 53F TF 1155 QF 17.59 QFA 722.09 QA 704.50
201 53AF TAF 1160 QAF 969.92 QA 959.92 QF 10.00

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	53AF	6.8	17.59	423.3	969.92	4	530.	.03000	6.50	.00	0.	98	0	A27	.00
201	54A	3.3	11.22	426.6	962.35	5	30.	.00500	12.00	.00	0.	298	5	A31	.10
201	55A	14.1	34.86	440.7	981.68	5	160.	.00500	12.00	.00	0.	98	9	A31	.80
201	56A	62.1	123.00	502.8	1085.40	5	150.	.00500	12.00	.00	0.	98	0	A27	.00

DEBRIS VOLUME

DPA 8 - 35,000 CY/mi² = 55 CY/Ac

AREA 1A & 2A

1A: UNDEVELOPED OFFSITE AREA= 18.82 AC
2A: ONSITE AREA= 3.5 AC

A_T = 22.32 AC D.V.= 1,228 CY

AREA 8C

8C: OFF-SITE UNDEVELOPED AREA= 6.6 AC.

D.V. = 363 CY

AREA 15C

A = 7.3 AC. D.V. = 402 CY

AREA 20C

A = 8.8 AC D.V. = 484 CY

Program Package Serial Number: 2084
08/17/10 FILE: 201D-A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 3
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 56A

HYDROGRAPH AT 201 56A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	1.00	100	49.23	200	51.46	300	53.24	400	56.60
500	59.58	600	64.22	700	69.58	800	76.16	900	85.94
1000	109.18	1050	136.11	1100	181.60	1110	206.22	1120	244.23
1130	288.37	1131	293.50	1132	298.61	1133	302.85	1134	308.34
1135	314.01	1136	319.99	1137	326.57	1138	333.70	1139	341.33
1140	349.74	1141	359.24	1142	370.76	1143	383.24	1144	396.76
1145	411.55	1146	427.51	1147	445.54	1148	464.93	1149	490.88
1150	527.43	1151	571.83	1152	627.54	1153	693.48	1154	762.95
1155	831.17	1156	900.43	1157	965.64	1158	1021.03	1159	1062.76
1160	1085.40	1161	1079.84	1162	1044.16	1163	964.29	1164	856.94
1165	747.45	1166	653.07	1167	570.78	1168	502.42	1169	448.84
1170	404.70	1171	368.09	1172	337.58	1173	311.58	1174	290.49
1175	272.79	1176	257.59	1177	244.53	1178	234.56	1179	224.90
1180	215.99	1181	208.92	1182	201.69	1183	196.31	1184	190.34
1185	185.62	1186	181.29	1187	176.24	1188	172.44	1189	167.87
1190	164.54	1191	161.35	1192	158.28	1193	154.40	1194	151.71
1195	149.16	1196	146.69	1197	143.43	1198	141.29	1199	139.12
1200	137.00	1201	134.02	1202	132.26	1203	130.66	1204	129.17
1205	127.75	1206	126.28	1207	123.82	1208	122.34	1209	120.70
1210	119.12	1211	117.79	1212	116.58	1213	115.38	1214	114.13
1215	111.93	1216	110.84	1217	109.75	1218	108.74	1219	107.74
1220	106.64	1221	105.47	1222	104.38	1223	103.46	1224	101.65
1225	100.88	1226	100.15	1227	99.54	1228	98.97	1229	98.34
1230	97.75	1231	97.14	1232	96.45	1233	95.76	1234	95.08
1235	94.41	1236	93.63	1237	91.78	1238	90.90	1239	89.98
1240	89.13	1241	88.44	1242	87.90	1243	87.47	1244	87.09
1245	86.68	1246	86.22	1247	85.74	1248	85.28	1249	84.86
1250	84.44	1251	84.07	1252	83.78	1253	83.53	1254	83.24
1255	81.89	1256	81.53	1257	81.07	1258	80.60	1259	80.21
1260	79.80	1261	79.35	1262	78.98	1263	78.68	1264	78.48
1265	78.32	1266	78.20	1267	78.03	1268	77.73	1269	77.39
1270	77.02	1271	76.59	1272	76.20	1273	75.82	1274	75.44
1275	75.07	1276	74.64	1277	74.26	1278	73.91	1279	73.57
1280	72.32	1281	72.09	1282	71.80	1283	71.51	1284	71.26
1285	71.06	1286	70.92	1287	70.84	1288	70.73	1289	70.54
1290	70.33	1291	70.10	1292	69.82	1293	69.61	1294	69.51
1295	69.44	1296	69.38	1297	69.30	1298	69.17	1299	68.94
1300	68.64	1310	66.42	1320	64.10	1330	62.67	1340	61.16
1350	59.61	1360	57.81	1370	55.79	1380	55.13	1390	54.22
1400	53.68	1420	52.01	1440	50.66	1460	49.23	1500	49.23

TOTAL VOLUME THIS HYDROGRAPH = 182.48(Ac.Ft)

```
7   201    1A   284.9 441158    746.200  4
8  5   0.      1. 100.     28. 200.     30. 300.     31. 400.     33.
8 10 500.     35. 600.     38. 700.     42. 800.     46. 900.     52.
8 151000.     67.1050.     83.1100.    110.1110.    125.1120.    150.
8 201130.    176.1131.    178.1132.    181.1133.    184.1134.    187.
8 251135.    190.1136.    194.1137.    199.1138.    204.1139.    210.
8 301140.    217.1141.    224.1142.    232.1143.    240.1144.    248.
8 351145.    257.1146.    267.1147.    278.1148.    290.1149.    309.
8 401150.    332.1151.    361.1152.    399.1153.    454.1154.    527.
8 451155.    610.1156.    690.1157.    742.1158.    746.1159.    708.
8 501160.    642.1161.    566.1162.    490.1163.    423.1164.    366.
8 551165.    321.1166.    284.1167.    253.1168.    228.1169.    208.
8 601170.    190.1171.    175.1172.    165.1173.    156.1174.    149.
8 651175.    142.1176.    136.1177.    131.1178.    127.1179.    123.
8 701180.    119.1181.    116.1182.    113.1183.    110.1184.    107.
8 751185.    105.1186.    102.1187.    100.1188.     98.1189.     96.
8 801190.     94.1191.     92.1192.     91.1193.     89.1194.     88.
8 851195.     86.1196.     84.1197.     83.1198.     82.1199.     81.
8 901200.     80.1201.     79.1202.     78.1203.     77.1204.     75.
8 951205.     74.1206.     73.1207.     73.1208.     72.1209.     71.
81001210.     70.1211.     69.1212.     69.1213.     68.1214.     67.
81051215.     66.1216.     65.1217.     64.1218.     64.1219.     63.
81101220.     63.1221.     62.1222.     62.1223.     62.1224.     61.
81151225.     61.1226.     60.1227.     60.1228.     59.1229.     59.
81201230.     58.1231.     58.1232.     57.1233.     56.1234.     55.
81251235.     55.1236.     54.1237.     54.1238.     54.1239.     54.
81301240.     53.1241.     53.1242.     52.1243.     52.1244.     52.
81351245.     51.1246.     51.1247.     51.1248.     51.1249.     51.
81401250.     50.1251.     50.1252.     50.1253.     49.1254.     49.
81451255.     49.1256.     48.1257.     48.1258.     48.1259.     48.
81501260.     48.1261.     48.1262.     48.1263.     47.1264.     47.
81551265.     47.1266.     46.1267.     46.1268.     46.1269.     45.
81601270.     45.1271.     45.1272.     44.1273.     44.1274.     44.
81651275.     44.1276.     44.1277.     43.1278.     43.1279.     43.
81701280.     43.1281.     43.1282.     43.1283.     43.1284.     43.
81751285.     42.1286.     42.1287.     42.1288.     42.1289.     42.
81801290.     42.1291.     42.1292.     42.1293.     42.1294.     41.
81851295.     41.1296.     41.1297.     41.1298.     40.1299.     40.
81901300.     40.1310.     39.1320.     38.1330.     37.1340.     36.
81951350.     34.1360.     33.1370.     33.1380.     32.1390.     32.
82001400.     31.1420.     30.1440.     29.1460.     28.1500.     28.
7   201   56A    62.1 421156    123.200  4
8  5   0.      1. 100.      7. 200.      7. 300.      7. 400.      8.
8 10 500.      8. 600.      9. 700.      9. 800.     10. 900.     11.
8 151000.     14.1050.     17.1100.     23.1110.     27.1120.     31.
8 201130.     36.1131.     37.1132.     38.1133.     38.1134.     39.
8 251135.     40.1136.     41.1137.     42.1138.     43.1139.     44.
8 301140.     45.1141.     46.1142.     48.1143.     50.1144.     52.
8 351145.     54.1146.     56.1147.     59.1148.     62.1149.     67.
8 401150.     76.1151.     86.1152.     97.1153.    108.1154.    117.
8 451155.    121.1156.    123.1157.    122.1158.    119.1159.    115.
8 501160.    109.1161.    101.1162.     93.1163.     85.1164.     74.
8 551165.     64.1166.     56.1167.     48.1168.     41.1169.     37.
8 601170.     34.1171.     32.1172.     30.1173.     28.1174.     27.
8 651175.     26.1176.     25.1177.     24.1178.     24.1179.     23.
8 701180.     22.1181.     22.1182.     21.1183.     21.1184.     20.
8 751185.     20.1186.     20.1187.     19.1188.     19.1189.     18.
8 801190.     18.1191.     18.1192.     18.1193.     17.1194.     17.
8 851195.     17.1196.     17.1197.     16.1198.     16.1199.     16.
8 901200.     16.1201.     15.1202.     15.1203.     15.1204.     15.
8 951205.     15.1206.     15.1207.     14.1208.     14.1209.     14.
81001210.     14.1211.     14.1212.     14.1213.     14.1214.     14.
81051215.     13.1216.     13.1217.     13.1218.     13.1219.     13.
81101220.     13.1221.     13.1222.     13.1223.     13.1224.     12.
81151225.     12.1226.     12.1227.     12.1228.     12.1229.     12.
81201230.     12.1231.     12.1232.     12.1233.     12.1234.     12.
81251235.     12.1236.     12.1237.     11.1238.     11.1239.     11.
81301240.     11.1241.     11.1242.     11.1243.     11.1244.     11.
81351245.     11.1246.     11.1247.     11.1248.     11.1249.     11.
81401250.     11.1251.     11.1252.     11.1253.     11.1254.     11.
81451255.     10.1256.     10.1257.     10.1258.     10.1259.     10.
81501260.     10.1261.     10.1262.     10.1263.     10.1264.     10.
81551265.     10.1266.     10.1267.     10.1268.     10.1269.     10.
81601270.     10.1271.     10.1272.     10.1273.     10.1274.     10.
81651275.     10.1276.     10.1277.     10.1278.     10.1279.     10.
81701280.      9.1281.      9.1282.      9.1283.      9.1284.      9.
81751285.      9.1286.      9.1287.      9.1288.      9.1289.      9.
81801290.      9.1291.      9.1292.      9.1293.      9.1294.      9.
81851295.      9.1296.      9.1297.      9.1298.      9.1299.      9.
```

81901300.	9.1310.	9.1320.	8.1330.	8.1340.	8.
81951350.	8.1360.	8.1370.	7.1380.	7.1390.	7.
82001400.	7.1420.	7.1440.	7.1460.	7.1500.	7.

Basin A

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
2A	3.5	0.10	98	410	0.030	6.20	5	3.70	0.86	0.86
3A	5.3	0.10	98	650	0.030	6.20	7	3.16	0.84	0.85
4B	15.9	0.80	98	1200	0.020	6.10	11	2.51	0.82	0.88
5B	1.5	0.91	98	840	0.035	5.36	8	2.56	0.82	0.89
6B	2.2	0.91	98	1980	0.020	5.36	16	1.85	0.78	0.89
8C	6.6	0.10	98	710	0.100	6.20	6	3.40	0.85	0.85
9C	1.9	0.01	98	540	0.030	6.20	6	3.40	0.85	0.86
10C	0.5	0.01	98	150	0.020	6.20	5	3.70	0.86	0.86
11C	2.0	0.60	98	490	0.015	5.44	7	2.77	0.83	0.83
12C	1.0	0.60	98	380	0.015	5.44	6	2.98	0.84	0.88
13C	1.7	0.60	98	400	0.017	5.44	6	2.98	0.84	0.88
14C	1.7	0.60	98	610	0.025	5.44	7	2.77	0.83	0.87
15C	7.3	0.10	98	790	0.080	6.20	7	3.16	0.84	0.84
16C	2.8	0.60	98	1140	0.040	5.44	10	2.34	0.81	0.86
17C	0.6	0.60	98	250	0.020	5.44	5	3.25	0.85	0.88
18C	1.3	0.60	98	400	0.030	5.44	5	3.25	0.85	0.88
19C	1.8	0.60	98	530	0.030	5.44	6	2.98	0.84	0.88
20C	8.8	0.10	98	810	0.080	6.20	7	3.16	0.84	0.85
21C	2.0	0.60	98	590	0.035	5.44	7	2.77	0.83	0.87
22C	3.3	0.60	98	1330	0.035	5.44	11	2.24	0.81	0.86
23C	3.4	0.60	98	710	0.040	6.20	7	3.16	0.84	0.88
24C	2.7	0.60	98	680	0.035	6.20	7	3.16	0.84	0.88
26D	4.1	0.60	98	960	0.015	6.20	10	2.67	0.82	0.87
27D	2.1	0.60	98	640	0.006	6.20	9	2.81	0.83	0.87
28D	1.8	0.60	98	500	0.020	5.44	7	2.77	0.83	0.87

Note: Skipped No. 25D

Basin A Continued

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
29D	2.1	0.60	98	660	0.070	5.44	6	2.98	0.84	0.88
30D	1.9	0.60	98	480	0.070	5.44	5	3.25	0.85	0.88
31D	1.1	0.60	98	270	0.030	5.44	5	3.25	0.85	0.88
32D	1.2	0.91	98	875	0.055	5.44	8	2.60	0.82	0.89
33D	0.8	0.01	98	490	0.013	5.44	7	2.77	0.83	0.83
34D	1.4	0.68	98	460	0.035	5.44	6	2.98	0.84	0.88
35D	1.3	0.60	98	660	0.045	5.44	7	2.77	0.83	0.87
36D	1.4	0.80	98	350	0.020	5.44	5	3.25	0.85	0.89
37D	0.9	0.91	98	1125	0.055	5.44	9	2.46	0.82	0.89
38E	1.8	0.60	98	530	0.050	5.44	6	2.98	0.84	0.88
39E	1.7	0.60	98	550	0.050	5.44	6	2.98	0.84	0.88
40E	0.9	0.01	98	600	0.030	5.44	7	2.77	0.83	0.83
41E	1.9	0.60	98	620	0.055	5.44	6	2.98	0.84	0.88
43D	8.3	0.82	98	1160	0.020	6.10	10	2.63	0.82	0.89
45C	2.6	0.72	98	1300	0.055	5.36	10	2.31	0.81	0.87
46C	1.7	0.91	98	1330	0.055	5.36	10	2.31	0.81	0.89
47C	1.3	0.91	98	1200	0.018	5.36	12	2.12	0.80	0.89
48C	5.4	0.10	98	620	0.020	6.10	7	3.11	0.84	0.85
52F	6.8	0.80	98	840	0.020	6.10	8	2.92	0.83	0.89
54A	3.3	0.10	98	600	0.200	6.10	5	3.64	0.86	0.86
55A	14.1	0.80	98	900	0.020	6.10	9	2.76	0.83	0.89

Note: Skipped No's: 50A, 51F

Program Package Serial Number: 2084
06/16/10 FILE: 930d-b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN B

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
930	1A	28.7	73.00	28.7	73.00	4	480.	.04000	2.50	.00	0.	98	0	A31	.00
930	2A	2.3	7.84	31.0	78.40	4	30.	.03000	2.75	.00	0.	298	5	A31	.01
930	3A	68.3	137.00	99.3	215.29	4	90.	.06000	3.25	.00	0.	98	0	A31	.00
930	4A	2.9	9.51	102.2	221.84	4	410.	.06000	3.50	.00	0.	98	5	A31	.60
930	5B	.0	.00	.0	.00	4	1.	.01000	.00	.00	0.	98	99	A31	.60
930	6B	1.8	5.11	1.8	5.11	4	350.	.05500	2.00	.00	0.	98	5	A27	.60
930	7B	2.5	6.42	4.3	11.25	4	30.	.05500	2.00	.00	0.	98	6	A27	.60
930	8B	1.5	3.56	5.8	14.81	4	640.	.01300	2.00	.00	0.	98	7	A27	.60
930	9B	4.9	11.94	10.7	25.81	4	190.	.02000	2.00	.00	0.	98	9	A31	.60
930	10B	2.0	4.22	12.7	29.70	4	80.	.04000	2.00	.00	0.	98	8	A27	.01

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* CONFLUENCE Q'S *

* 930 11A TA 1155 QA 220.84 QAB 250.19 QB 29.35 930 11B TB 1156 QB 29.68 QBA 249.89 QA 220.21 *

* 930 11AB TAB 1155 QAB 250.19 QA 220.84 QB 29.35 *

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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	11AB	12.7	29.68	114.9	250.19	4	230.	.06000	3.50	.00	0.	98	0	A31	.00
930	12A	.0	.00	114.9	249.93	4	1.	.01000	5.00	.00	0.	98	99	A27	.00
930	13A	1.5	2.86	116.4	252.67	4	220.	.02000	4.25	.00	0.	98	10	A27	.01
930	14A	4.0	8.85	120.4	260.84	4	660.	.01900	4.50	.00	0.	98	11	A31	.60
930	15A	467.6	847.00	588.0	1073.98	5	320.	.01000	11.00	.00	0.	98	0	A31	.00
930	16A	2.5	4.14	590.5	1077.68	5	40.	.01000	11.00	.00	0.	98	16	A27	.91
930	17A	.7	1.70	591.2	1078.01	5	60.	.01000	11.00	.00	0.	98	7	A27	.91
930	18A	.0	.00	591.2	1077.60	5	1.	.01000	11.00	.00	0.	98	99	A27	.80
930	19A	1.6	2.89	592.8	1079.79	5	15.	.02000	10.00	.00	0.	98	11	A27	.01
930	20A	3.3	6.29	596.1	1085.67	5	210.	.01000	11.00	.00	0.	98	16	A31	.91
930	21C	1.5	3.10	1.5	3.10	4	120.	.01000	2.00	.00	0.	298	10	A27	.01
930	22C	1.0	2.84	2.5	5.72	4	390.	.08300	2.00	.00	0.	98	5	A27	.60
930	23C	.8	1.81	3.3	7.42	4	120.	.08300	2.00	.00	0.	98	7	A27	.01
930	24C	1.6	3.89	4.9	11.26	4	260.	.01700	2.00	.00	0.	98	7	A27	.91
930	25C	4.4	10.72	9.3	21.69	4	250.	.02000	2.00	.00	0.	98	9	A31	.60

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* CONFLUENCE Q'S *

* 930 26A TA 1160 QA 1083.08 QAC 1097.01 QC 13.93 930 26C TC 1155 QC 21.57 QCA 840.08 QA 818.51 *

* 930 26AC TAC 1160 QAC 1097.01 QA 1083.08 QC 13.93 *

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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	26AC	9.3	21.57	605.4	1097.01	4	250.	.02000	7.50	.00	0.	98	0	A31	.00
930	27A	.0	.00	605.4	1094.16	5	1.	.01000	11.00	.00	0.	98	99	A27	.00
930	28A	.0	.00	605.4	1094.16	5	1.	.01000	11.00	.00	0.	98	99	A27	.00
930	29A	2.2	7.28	607.6	1095.70	5	340.	.02500	9.00	.00	0.	98	5	A31	.80
930	30D	2.8	6.53	2.8	6.53	4	140.	.02000	2.00	.00	0.	98	9	A31	.01
930	31D	5.4	11.45	8.2	17.98	4	40.	.02000	2.00	.00	0.	98	12	A31	.60
930	32D	6.3	13.36	14.5	31.31	4	670.	.09000	2.00	.00	0.	98	12	A31	.60

Program Package Serial Number: 2084
06/16/10 FILE: 930d-b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN B

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	33D	2.8	8.10	17.3	38.51	4	90.	.03000	2.00	.00	0.	98	6	A30	.80

* CONFLUENCE Q'S *

* 930 34A TA 1161 QA 1095.55 QAD 1123.10 QD 27.55 930 34D TD 1155 QD 38.34 QDA 838.11 QA 799.77 *

* 930 34AD TAD 1161 QAD 1123.10 QA 1095.55 QD 27.55 *

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	34AD	17.3	38.34	624.9	1123.10	4	660.	.06000	6.25	.00	0.	98	0	A31	.00
930	35E	2.6	6.77	2.6	6.77	4	350.	.04000	2.00	.00	0.	98	8	A31	.80
930	36E	2.9	7.55	5.5	14.22	4	510.	.01000	2.00	.00	0.	98	8	A31	.80
930	37E	2.1	3.79	7.6	17.71	4	270.	.01400	2.00	.00	0.	98	11	A27	.01
930	38E	3.7	8.86	11.3	25.92	4	370.	.01000	2.25	.00	0.	98	9	A30	.80
930	39E	1.7	3.69	13.0	28.26	4	10.	.01000	2.25	.00	0.	98	7	A26	.01
930	40E	3.2	6.58	16.2	34.63	4	30.	.02000	2.25	.00	0.	98	12	A30	.65
930	41E	2.0	4.17	18.2	38.73	4	890.	.02000	2.25	.00	0.	98	12	A30	.80
930	42E	11.4	23.78	29.6	60.64	4	60.	.02500	2.50	.00	0.	98	12	A30	.80
930	43E	2.1	3.66	31.7	63.99	4	40.	.20000	2.00	.00	0.	98	11	A26	.10

* CONFLUENCE Q'S *

* 930 44A TA 1161 QA 1121.03 QAE 1178.36 QE 57.32 930 44E TE 1158 QE 63.99 QEA 1086.90 QA 1022.91 *

* 930 44AE TAE 1161 QAE 1178.36 QA 1121.03 QE 57.32 *

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	44AE	31.7	63.99	656.6	1178.36	5	10.	.01000	11.00	.00	0.	98	0	A31	.00
930	45A	66.6	119.00	723.2	1285.30	5	200.	.01000	12.00	.00	0.	98	0	A31	.00
930	46A	2.2	4.02	725.4	1287.07	5	5.	.01000	12.00	.00	0.	98	11	A25	.91
930	47A	1.7	3.11	727.1	1289.14	5	590.	.01000	12.00	.00	0.	98	11	A25	.91
930	48A	14.5	35.59	741.6	1294.72	5	900.	.08000	8.00	.00	0.	98	8	A29	.91
930	49F	26.0	52.57	26.0	52.57	2	1220.	.05000	.00	.00	0.	298	12	A29	.01
930	50F	24.4	49.33	50.4	97.95	2	620.	.02000	.00	.00	0.	298	12	A29	.01
930	51F	26.2	58.46	76.6	148.51	4	70.	.02000	3.50	.00	0.	298	10	A29	.01

* CONFLUENCE Q'S *

* 930 52A TA 1162 QA 1293.89 QAF 1412.26 QF 118.37 930 52F TF 1158 QF 148.40 QFA 1286.21 QA 1137.81 *

* 930 52AF TAF 1162 QAF 1412.26 QA 1293.89 QF 118.37 *

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	52AF	76.6	148.40	818.2	1412.26	4	3500.	.03500	7.50	.00	0.	98	0	A29	.00
930	53A	109.5	164.00	927.7	1532.94	4	450.	.03000	7.75	.00	0.	20	0	A29	.00
930	54A	8.7	9.91	936.4	1533.31	4	140.	.03000	7.75	.00	0.	20	14	A29	.01

BULKING CALCULATION

SAMPLE CALCULATION

Q_{BB} - Q BURNED BULKED

Q_B - Q BURNED

DPA 8 - BULKING FACTOR = 1.36

$Q_{BB} = Q_B \times$ BULKING FACTOR

AREA 49F

$Q_B = 52.57$ cfs $Q_{BB} = 71.50$ cfs Add 18.93 cfs to All Downstream

AREA 50F

$Q_B = 49.33$ cfs $Q_{BB} = 67.09$ cfs Add 17.76 cfs to All Downstream

DEBRIS Volume

DPA 8 - 35,000 CY/mi² = 55 CY/AC

AREA 51F

A_{Total} = 76.6AC

D.V. = 4,213 CY

Program Package Serial Number: 2084
06/16/10 FILE: 930d-b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 3
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 54A
HYDROGRAPH AT 930 54A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.60	100	51.76	200	52.20	300	56.09	400	59.47
500	62.12	600	65.29	700	72.00	800	78.34	900	88.23
1000	110.83	1050	151.00	1100	230.28	1110	260.24	1120	312.57
1130	384.08	1131	391.92	1132	399.53	1133	407.42	1134	415.47
1135	423.76	1136	432.95	1137	442.32	1138	451.51	1139	461.78
1140	472.46	1141	483.97	1142	497.51	1143	511.65	1144	526.09
1145	541.57	1146	559.42	1147	579.34	1148	600.67	1149	627.04
1150	659.63	1151	697.49	1152	742.75	1153	798.83	1154	863.10
1155	935.86	1156	1019.02	1157	1108.96	1158	1200.53	1159	1288.80
1160	1368.00	1161	1435.96	1162	1486.30	1163	1518.12	1164	1533.31
1165	1531.72	1166	1508.38	1167	1464.42	1168	1402.30	1169	1323.58
1170	1234.90	1171	1142.09	1172	1049.33	1173	960.16	1174	877.30
1175	801.96	1176	734.70	1177	675.14	1178	622.26	1179	573.77
1180	529.51	1181	490.10	1182	455.79	1183	424.91	1184	398.09
1185	374.06	1186	352.58	1187	332.75	1188	315.49	1189	300.21
1190	286.28	1191	273.54	1192	262.48	1193	252.68	1194	243.03
1195	234.68	1196	227.24	1197	220.50	1198	214.07	1199	207.91
1200	202.01	1201	196.35	1202	190.94	1203	185.73	1204	180.78
1205	176.06	1206	171.97	1207	167.98	1208	163.68	1209	159.59
1210	156.27	1211	152.78	1212	149.63	1213	147.05	1214	144.46
1215	141.44	1216	138.48	1217	136.08	1218	133.80	1219	131.11
1220	128.45	1221	126.30	1222	124.28	1223	122.35	1224	120.09
1225	117.88	1226	116.26	1227	114.77	1228	113.32	1229	111.89
1230	110.46	1231	109.11	1232	107.43	1233	105.80	1234	104.72
1235	103.77	1236	102.85	1237	101.95	1238	101.04	1239	100.13
1240	99.24	1241	98.39	1242	97.57	1243	96.82	1244	95.69
1245	94.53	1246	93.88	1247	93.35	1248	92.84	1249	92.37
1250	91.92	1251	91.49	1252	91.06	1253	90.61	1254	90.13
1255	89.61	1256	89.08	1257	88.58	1258	88.15	1259	87.77
1260	87.41	1261	87.07	1262	86.71	1263	86.35	1264	85.96
1265	85.14	1266	84.21	1267	83.69	1268	83.28	1269	82.86
1270	82.48	1271	82.13	1272	81.80	1273	81.50	1274	81.19
1275	80.90	1276	80.62	1277	80.34	1278	80.07	1279	79.80
1280	79.53	1281	79.27	1282	79.02	1283	78.78	1284	78.53
1285	78.26	1286	77.96	1287	77.66	1288	77.37	1289	77.07
1290	76.76	1291	76.43	1292	76.09	1293	75.76	1294	75.47
1295	75.22	1296	75.00	1297	74.79	1298	74.58	1299	73.95
1300	73.21	1310	70.55	1320	68.32	1330	66.57	1340	65.13
1350	63.83	1360	62.09	1370	60.98	1380	59.93	1390	58.65
1400	57.36	1420	54.41	1440	52.78	1460	51.74	1500	51.67

TOTAL VOLUME THIS HYDROGRAPH = 219.90(Ac.Ft)

```
7   930    1A    28.7 411155    73.200  4
8  5   0.      0. 100.      2. 200.      2. 300.      2. 400.      3.
8 10 500.      3. 600.      3. 700.      3. 800.      4. 900.      4.
8 151000.     5.1050.      7.1100.      9.1110.     12.1120.     14.
8 201130.    16.1131.     17.1132.     17.1133.     17.1134.     18.
8 251135.    19.1136.     19.1137.     20.1138.     20.1139.     21.
8 301140.    22.1141.     23.1142.     23.1143.     24.1144.     25.
8 351145.    27.1146.     28.1147.     30.1148.     32.1149.     36.
8 401150.    41.1151.     49.1152.     58.1153.     68.1154.     73.
8 451155.    73.1156.     69.1157.     61.1158.     51.1159.     42.
8 501160.    35.1161.     29.1162.     24.1163.     20.1164.     18.
8 551165.    16.1166.     15.1167.     14.1168.     14.1169.     13.
8 601170.    12.1171.     12.1172.     11.1173.     11.1174.     10.
8 651175.    10.1176.     10.1177.     10.1178.      9.1179.      9.
8 701180.     9.1181.      9.1182.      8.1183.      8.1184.      8.
8 751185.     8.1186.      8.1187.      8.1188.      7.1189.      7.
8 801190.     7.1191.      7.1192.      7.1193.      7.1194.      7.
8 851195.     6.1196.      6.1197.      6.1198.      6.1199.      6.
8 901200.     6.1201.      6.1202.      6.1203.      6.1204.      6.
8 951205.     6.1206.      6.1207.      5.1208.      5.1209.      5.
81001210.     5.1211.      5.1212.      5.1213.      5.1214.      5.
81051215.     5.1216.      5.1217.      5.1218.      5.1219.      5.
81101220.     5.1221.      5.1222.      5.1223.      5.1224.      5.
81151225.     4.1226.      4.1227.      4.1228.      4.1229.      4.
81201230.     4.1231.      4.1232.      4.1233.      4.1234.      4.
81251235.     4.1236.      4.1237.      4.1238.      4.1239.      4.
81301240.     4.1241.      4.1242.      4.1243.      4.1244.      4.
81351245.     4.1246.      4.1247.      4.1248.      4.1249.      4.
81401250.     4.1251.      4.1252.      4.1253.      4.1254.      4.
81451255.     4.1256.      4.1257.      4.1258.      4.1259.      4.
81501260.     4.1261.      4.1262.      4.1263.      4.1264.      4.
81551265.     4.1266.      4.1267.      4.1268.      4.1269.      4.
81601270.     4.1271.      4.1272.      3.1273.      4.1274.      3.
81651275.     3.1276.      3.1277.      3.1278.      3.1279.      3.
81701280.     3.1281.      3.1282.      3.1283.      3.1284.      3.
81751285.     3.1286.      3.1287.      3.1288.      3.1289.      3.
81801290.     3.1291.      3.1292.      3.1293.      3.1294.      3.
81851295.     3.1296.      3.1297.      3.1298.      3.1299.      3.
81901300.     3.1310.      3.1320.      3.1330.      3.1340.      3.
81951350.     3.1360.      3.1370.      3.1380.      2.1390.      2.
82001400.     2.1420.      2.1440.      2.1460.      2.1500.      2.
7   930    3A    68.3 411155   137.200  4
8  5   0.      1. 100.      3. 200.      3. 300.      4. 400.      4.
8 10 500.      4. 600.      4. 700.      5. 800.      5. 900.      6.
8 151000.     7.1050.     12.1100.     18.1110.     23.1120.     29.
8 201130.    34.1131.     35.1132.     36.1133.     37.1134.     38.
8 251135.    39.1136.     40.1137.     41.1138.     42.1139.     44.
8 301140.    45.1141.     47.1142.     49.1143.     52.1144.     54.
8 351145.    57.1146.     60.1147.     64.1148.     67.1149.     76.
8 401150.    89.1151.    103.1152.    116.1153.    130.1154.    136.
8 451155.   137.1156.    136.1157.    134.1158.    131.1159.    127.
8 501160.   123.1161.    116.1162.    105.1163.     90.1164.     75.
8 551165.    61.1166.     48.1167.     38.1168.     34.1169.     31.
8 601170.    28.1171.     26.1172.     25.1173.     23.1174.     22.
8 651175.    21.1176.     20.1177.     19.1178.     18.1179.     18.
8 701180.    17.1181.     16.1182.     16.1183.     15.1184.     15.
8 751185.    14.1186.     14.1187.     13.1188.     13.1189.     13.
8 801190.    12.1191.     12.1192.     12.1193.     11.1194.     11.
8 851195.    11.1196.     10.1197.     10.1198.     10.1199.     10.
8 901200.     9.1201.      9.1202.      9.1203.      9.1204.      8.
8 951205.     8.1206.      8.1207.      8.1208.      8.1209.      7.
81001210.     7.1211.      7.1212.      7.1213.      7.1214.      7.
81051215.     7.1216.      7.1217.      7.1218.      7.1219.      7.
81101220.     7.1221.      7.1222.      7.1223.      7.1224.      7.
81151225.     6.1226.      6.1227.      6.1228.      6.1229.      6.
81201230.     6.1231.      6.1232.      6.1233.      6.1234.      6.
81251235.     6.1236.      6.1237.      6.1238.      6.1239.      6.
81301240.     6.1241.      6.1242.      6.1243.      6.1244.      6.
81351245.     6.1246.      6.1247.      6.1248.      6.1249.      6.
81401250.     6.1251.      6.1252.      5.1253.      5.1254.      5.
81451255.     5.1256.      5.1257.      5.1258.      5.1259.      5.
81501260.     5.1261.      5.1262.      5.1263.      5.1264.      5.
81551265.     5.1266.      5.1267.      5.1268.      5.1269.      5.
81601270.     5.1271.      5.1272.      5.1273.      5.1274.      5.
81651275.     5.1276.      5.1277.      5.1278.      5.1279.      5.
81701280.     5.1281.      5.1282.      5.1283.      5.1284.      5.
81751285.     5.1286.      5.1287.      5.1288.      5.1289.      5.
81801290.     5.1291.      5.1292.      5.1293.      5.1294.      5.
81851295.     5.1296.      5.1297.      5.1298.      4.1299.      4.
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81901300.      4.1310.      4.1320.      4.1330.      4.1340.      4.
81951350.      4.1360.      4.1370.      4.1380.      4.1390.      4.
82001400.      3.1420.      3.1440.      3.1460.      2.1500.      2.
7   930   15A   467.6 471161    847.200  4
8  5   0.       0. 100.     23. 200.     23. 300.     25. 400.     26.
8 10 500.      27. 600.     29. 700.     32. 800.     35. 900.     40.
8 151000.     49.1050.     72.1100.    115.1110.    134.1120.    166.
8 201130.    205.1131.    209.1132.    213.1133.    218.1134.    222.
8 251135.    227.1136.    232.1137.    238.1138.    243.1139.    249.
8 301140.    256.1141.    264.1142.    272.1143.    281.1144.    291.
8 351145.    302.1146.    315.1147.    328.1148.    343.1149.    364.
8 401150.    392.1151.    426.1152.    468.1153.    518.1154.    573.
8 451155.    632.1156.    691.1157.    747.1158.    793.1159.    827.
8 501160.    845.1161.    847.1162.    834.1163.    806.1164.    765.
8 551165.    715.1166.    663.1167.    610.1168.    558.1169.    510.
8 601170.    465.1171.    421.1172.    381.1173.    343.1174.    308.
8 651175.    278.1176.    252.1177.    230.1178.    212.1179.    196.
8 701180.    183.1181.    171.1182.    161.1183.    152.1184.    144.
8 751185.    137.1186.    131.1187.    125.1188.    120.1189.    116.
8 801190.    112.1191.    108.1192.    104.1193.    101.1194.     98.
8 851195.     94.1196.     92.1197.     89.1198.     86.1199.     84.
8 901200.     81.1201.     79.1202.     77.1203.     75.1204.     73.
8 951205.     71.1206.     69.1207.     68.1208.     66.1209.     65.
81001210.     63.1211.     62.1212.     61.1213.     59.1214.     58.
81051215.     57.1216.     56.1217.     55.1218.     54.1219.     53.
81101220.     52.1221.     51.1222.     50.1223.     49.1224.     49.
81151225.     48.1226.     48.1227.     47.1228.     47.1229.     46.
81201230.     46.1231.     46.1232.     45.1233.     45.1234.     44.
81251235.     44.1236.     44.1237.     43.1238.     43.1239.     43.
81301240.     43.1241.     42.1242.     42.1243.     42.1244.     41.
81351245.     41.1246.     41.1247.     41.1248.     40.1249.     40.
81401250.     40.1251.     40.1252.     40.1253.     39.1254.     39.
81451255.     39.1256.     39.1257.     39.1258.     38.1259.     38.
81501260.     38.1261.     38.1262.     38.1263.     37.1264.     37.
81551265.     37.1266.     37.1267.     37.1268.     36.1269.     36.
81601270.     36.1271.     36.1272.     36.1273.     36.1274.     35.
81651275.     35.1276.     35.1277.     35.1278.     35.1279.     35.
81701280.     35.1281.     34.1282.     34.1283.     34.1284.     34.
81751285.     34.1286.     34.1287.     34.1288.     33.1289.     33.
81801290.     33.1291.     33.1292.     33.1293.     33.1294.     33.
81851295.     33.1296.     32.1297.     32.1298.     32.1299.     32.
81901300.     32.1310.     31.1320.     30.1330.     29.1340.     28.
81951350.     28.1360.     27.1370.     26.1380.     26.1390.     25.
82001400.     25.1420.     24.1440.     23.1460.     23.1500.     23.
7   930   45A    66.6 431157    119.200  4
8  5   0.       0. 100.      3. 200.      3. 300.      4. 400.      4.
8 10 500.       4. 600.      4. 700.      5. 800.      5. 900.      6.
8 151000.      7.1050.     10.1100.     16.1110.     20.1120.     25.
8 201130.     30.1131.     31.1132.     31.1133.     32.1134.     33.
8 251135.     34.1136.     35.1137.     35.1138.     36.1139.     38.
8 301140.     39.1141.     40.1142.     41.1143.     43.1144.     45.
8 351145.     47.1146.     49.1147.     52.1148.     55.1149.     59.
8 401150.     67.1151.     76.1152.     88.1153.    100.1154.    110.
8 451155.    116.1156.    119.1157.    119.1158.    118.1159.    116.
8 501160.    111.1161.    107.1162.    101.1163.     93.1164.     85.
8 551165.     77.1166.     69.1167.     60.1168.     51.1169.     43.
8 601170.     37.1171.     31.1172.     28.1173.     25.1174.     24.
8 651175.     22.1176.     21.1177.     20.1178.     19.1179.     18.
8 701180.     17.1181.     16.1182.     16.1183.     15.1184.     15.
8 751185.     14.1186.     14.1187.     13.1188.     13.1189.     12.
8 801190.     12.1191.     12.1192.     11.1193.     11.1194.     11.
8 851195.     10.1196.     10.1197.     10.1198.      9.1199.      9.
8 901200.      9.1201.      9.1202.      8.1203.      8.1204.      8.
8 951205.      8.1206.      8.1207.      8.1208.      7.1209.      7.
81001210.      7.1211.      7.1212.      7.1213.      7.1214.      7.
81051215.      7.1216.      7.1217.      7.1218.      7.1219.      7.
81101220.      7.1221.      7.1222.      7.1223.      7.1224.      6.
81151225.      6.1226.      6.1227.      6.1228.      6.1229.      6.
81201230.      6.1231.      6.1232.      6.1233.      6.1234.      6.
81251235.      6.1236.      6.1237.      6.1238.      6.1239.      6.
81301240.      6.1241.      6.1242.      6.1243.      6.1244.      6.
81351245.      6.1246.      6.1247.      6.1248.      6.1249.      5.
81401250.      5.1251.      5.1252.      5.1253.      5.1254.      5.
81451255.      5.1256.      5.1257.      5.1258.      5.1259.      5.
81501260.      5.1261.      5.1262.      5.1263.      5.1264.      5.
81551265.      5.1266.      5.1267.      5.1268.      5.1269.      5.
81601270.      5.1271.      5.1272.      5.1273.      5.1274.      5.
81651275.      5.1276.      5.1277.      5.1278.      5.1279.      5.
81701280.      5.1281.      5.1282.      5.1283.      5.1284.      5.
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81751285.      5.1286.      5.1287.      5.1288.      5.1289.      5.
81801290.      5.1291.      5.1292.      5.1293.      5.1294.      5.
81851295.      5.1296.      5.1297.      4.1298.      4.1299.      4.
81901300.      4.1310.      4.1320.      4.1330.      4.1340.      4.
81951350.      4.1360.      4.1370.      4.1380.      4.1390.      4.
82001400.      3.1420.      3.1440.      3.1460.      3.1500.      3.
7   930   53A   109.5 461160    164.200  4
8  5   0.       0. 100.      5. 200.      5. 300.      5. 400.      5.
8 10 500.       6. 600.      6. 700.      7. 800.      7. 900.      8.
8 151000.      12.1050.     17.1100.     25.1110.     30.1120.     36.
8 201130.      45.1131.     46.1132.     47.1133.     48.1134.     49.
8 251135.      50.1136.     52.1137.     53.1138.     54.1139.     56.
8 301140.      57.1141.     59.1142.     62.1143.     64.1144.     66.
8 351145.      68.1146.     72.1147.     75.1148.     78.1149.     85.
8 401150.      95.1151.    104.1152.    115.1153.    128.1154.    137.
8 451155.     144.1156.    152.1157.    158.1158.    162.1159.    164.
8 501160.     164.1161.    164.1162.    158.1163.    150.1164.    143.
8 551165.     134.1166.    124.1167.    117.1168.    111.1169.    104.
8 601170.      97.1171.     89.1172.     81.1173.     73.1174.     66.
8 651175.      59.1176.     53.1177.     48.1178.     45.1179.     41.
8 701180.      38.1181.     36.1182.     34.1183.     32.1184.     30.
8 751185.      29.1186.     27.1187.     26.1188.     25.1189.     24.
8 801190.      23.1191.     22.1192.     22.1193.     21.1194.     20.
8 851195.      20.1196.     19.1197.     19.1198.     18.1199.     18.
8 901200.      17.1201.     17.1202.     16.1203.     16.1204.     15.
8 951205.      15.1206.     15.1207.     15.1208.     14.1209.     14.
81001210.      14.1211.     13.1212.     13.1213.     13.1214.     13.
81051215.      12.1216.     12.1217.     12.1218.     12.1219.     11.
81101220.      11.1221.     11.1222.     11.1223.     11.1224.     10.
81151225.      10.1226.     10.1227.     10.1228.     10.1229.     10.
81201230.      10.1231.     10.1232.      9.1233.      9.1234.      9.
81251235.       9.1236.      9.1237.      9.1238.      9.1239.      9.
81301240.       9.1241.      9.1242.      9.1243.      9.1244.      8.
81351245.       8.1246.      8.1247.      8.1248.      8.1249.      8.
81401250.       8.1251.      8.1252.      8.1253.      8.1254.      8.
81451255.       8.1256.      8.1257.      8.1258.      8.1259.      8.
81501260.       8.1261.      8.1262.      8.1263.      8.1264.      8.
81551265.       7.1266.      7.1267.      7.1268.      7.1269.      7.
81601270.       7.1271.      7.1272.      7.1273.      7.1274.      7.
81651275.       7.1276.      7.1277.      7.1278.      7.1279.      7.
81701280.       7.1281.      7.1282.      7.1283.      7.1284.      7.
81751285.       7.1286.      7.1287.      7.1288.      7.1289.      7.
81801290.       7.1291.      7.1292.      7.1293.      7.1294.      7.
81851295.       7.1296.      7.1297.      7.1298.      7.1299.      6.
81901300.       6.1310.      6.1320.      6.1330.      6.1340.      6.
81951350.       6.1360.      5.1370.      5.1380.      5.1390.      5.
82001400.       5.1420.      5.1440.      5.1460.      5.1500.      5.
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Basin B

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
2A	2.3	0.01	98	340	0.300	6.20	5	3.70	0.86	0.86
4A	2.9	0.60	98	450	0.030	6.20	5	3.70	0.86	0.88
6B	1.8	0.60	98	390	0.040	5.44	5	3.25	0.85	0.88
7B	2.5	0.60	98	570	0.040	5.44	6	2.98	0.84	0.88
8B	1.5	0.60	98	640	0.040	5.44	7	2.77	0.83	0.87
9B	4.9	0.60	98	910	0.020	6.20	9	2.81	0.83	0.87
10B	2.0	0.01	98	680	0.025	5.44	8	2.60	0.82	0.82
13A	1.5	0.01	98	890	0.025	5.44	10	2.34	0.81	0.81
14A	4.0	0.60	98	1150	0.018	6.20	11	2.55	0.82	0.87
16A	2.5	0.91	98	2100	0.019	5.44	16	1.88	0.78	0.89
17A	0.7	0.91	98	520	0.018	5.36	7	2.73	0.83	0.89
19A	1.6	0.01	98	890	0.015	5.36	11	2.21	0.81	0.81
20A	3.3	0.91	98	2100	0.019	5.44	16	1.88	0.78	0.89
21C	1.5	0.01	98	840	0.015	5.44	10	2.34	0.81	0.81
22C	1.0	0.60	98	410	0.060	5.44	5	3.25	0.85	0.88
23C	0.8	0.01	98	650	0.070	5.36	7	2.73	0.83	0.83
24C	1.6	0.91	98	810	0.075	5.36	7	2.73	0.83	0.89

Skipped Basin No's: 5B, 12A, 18A, 27A, 28A

Basin B Continued

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
25C	4.4	0.60	98	830	0.018	6.10	9	2.76	0.83	0.87
29A	2.2	0.80	98	360	0.020	6.10	5	3.64	0.86	0.89
30D	2.8	0.01	98	890	0.020	6.10	9	2.76	0.83	0.83
31D	5.4	0.60	98	1290	0.020	6.10	12	2.41	0.81	0.86
32D	6.3	0.60	98	1340	0.020	6.10	12	2.41	0.81	0.86
33D	2.8	0.80	98	460	0.020	6.00	6	3.29	0.85	0.89
35E	2.6	0.80	98	730	0.015	6.10	8	2.92	0.83	0.89
36E	2.9	0.80	98	730	0.015	6.10	8	2.92	0.83	0.89
37E	2.1	0.01	98	850	0.014	5.36	11	2.21	0.81	0.81
38E	3.7	0.80	98	860	0.015	6.00	9	2.72	0.83	0.89
39E	1.7	0.01	98	530	0.030	5.27	7	2.68	0.83	0.83
40E	3.2	0.65	98	1510	0.025	6.00	12	2.37	0.81	0.87
41E	2.0	0.80	98	1530	0.025	6.00	12	2.37	0.81	0.88
42E	11.4	0.80	98	1370	0.020	6.00	12	2.37	0.81	0.88
43E	2.1	0.10	98	1200	0.040	5.27	11	2.17	0.81	0.82
46A	2.2	0.91	98	990	0.015	5.09	11	2.10	0.80	0.89
47A	1.7	0.91	98	1000	0.015	5.09	11	2.10	0.80	0.89
48A	14.5	0.91	98	780	0.020	5.80	8	2.77	0.83	0.89
49F	26.0	0.01	98	1900	0.100	5.80	12	2.29	0.81	0.81
50F	24.4	0.01	98	1820	0.090	5.80	12	2.29	0.81	0.81
51F	26.2	0.01	98	1550	0.100	5.80	10	2.50	0.82	0.82
54A	8.7	0.01	20	1000	0.020	5.80	14	2.13	0.53	0.53

Program Package Serial Number: 2084
08/17/10 FILE: 201D-C INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN C

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
201	1A	10.4	26.17	10.4	26.17	4	210.	.05000	2.00	.00	0.	98	8	A30	.80
201	2A	1.3	2.99	11.7	29.16	4	60.	.05000	2.00	.00	0.	98	7	A26	.70
201	3A	2.0	3.90	13.7	33.03	4	10.	.02000	2.00	.00	0.	98	9	A26	.20
201	4A	1.5	3.09	15.2	36.10	4	50.	.02000	2.25	.00	0.	98	9	A26	.75
201	5A	1.1	2.49	16.3	38.53	4	10.	.02000	2.25	.00	0.	98	7	A26	.50
201	6A	2.9	5.08	19.2	43.60	4	70.	.02000	2.25	.00	0.	98	13	A26	.90
201	7A	3.3	6.22	22.5	49.67	4	740.	.05000	2.00	.00	0.	98	11	A26	.80
201	8A	.0	.00	22.5	49.33	4	1.	.03000	2.25	.00	0.	98	99	A26	.00
201	9A	.0	.00	22.5	49.33	4	1.	.03000	2.25	.00	0.	98	99	A26	.00
201	10A	3.2	6.25	25.7	55.32	4	300.	.05000	2.25	.00	0.	98	9	A26	.20
201	11A	1.5	3.00	27.2	58.03	4	30.	.05000	2.25	.00	0.	98	10	A26	.90
201	12B	.9	2.49	.9	2.49	4	10.	.03000	2.00	.00	0.	98	5	A26	.80

CONFLUENCE Q'S

201 13A TA 1156 QA 58.00 QAB 59.54 QB 1.54 201 13B TB 1153 QB 2.47 QBA 50.89 QA 48.41
201 13AB TAB 1156 QAB 59.54 QA 58.00 QB 1.54

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	13AB	.9	2.47	28.1	59.54	4	60.	.02000	2.50	.00	0.	98	0	A26	.00
201	14A	1.6	2.98	29.7	62.29	4	20.	.02000	2.50	.00	0.	98	10	A26	.20
201	15A	3.2	6.40	32.9	68.32	4	10.	.02000	2.75	.00	0.	98	10	A26	.90

Program Package Serial Number: 2084
08/17/10 FILE: 201D-C INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 15A
HYDROGRAPH AT 201 15A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.60	100	3.55	200	3.67	300	3.81	400	3.96
500	4.15	600	4.39	700	4.69	800	5.10	900	5.69
1000	6.81	1050	8.57	1100	11.17	1110	13.40	1120	15.78
1130	18.30	1131	18.61	1132	18.92	1133	19.25	1134	19.61
1135	19.97	1136	20.40	1137	20.91	1138	21.48	1139	22.18
1140	22.92	1141	23.75	1142	24.58	1143	25.42	1144	26.30
1145	27.46	1146	28.73	1147	30.15	1148	31.74	1149	34.88
1150	39.34	1151	45.01	1152	51.91	1153	59.05	1154	64.16
1155	67.17	1156	68.32	1157	67.85	1158	65.30	1159	60.10
1160	53.26	1161	45.91	1162	38.29	1163	31.43	1164	26.53
1165	23.07	1166	20.45	1167	18.63	1168	17.11	1169	15.98
1170	15.08	1171	14.36	1172	13.76	1173	13.25	1174	12.77
1175	12.36	1176	11.99	1177	11.64	1178	11.30	1179	11.05
1180	10.77	1181	10.51	1182	10.26	1183	10.00	1184	9.82
1185	9.64	1186	9.41	1187	9.22	1188	9.04	1189	8.92
1190	8.82	1191	8.66	1192	8.50	1193	8.38	1194	8.24
1195	8.14	1196	8.03	1197	7.94	1198	7.82	1199	7.68
1200	7.58	1201	7.54	1202	7.44	1203	7.32	1204	7.24
1205	7.12	1206	7.05	1207	6.96	1208	6.92	1209	6.85
1210	6.80	1211	6.75	1212	6.71	1213	6.67	1214	6.59
1215	6.55	1216	6.50	1217	6.43	1218	6.35	1219	6.29
1220	6.24	1221	6.20	1222	6.14	1223	6.10	1224	6.07
1225	6.01	1226	5.97	1227	5.98	1228	5.93	1229	5.90
1230	5.85	1231	5.81	1232	5.78	1233	5.76	1234	5.72
1235	5.72	1236	5.68	1237	5.65	1238	5.64	1239	5.60
1240	5.59	1241	5.54	1242	5.49	1243	5.46	1244	5.44
1245	5.40	1246	5.41	1247	5.38	1248	5.36	1249	5.36
1250	5.32	1251	5.32	1252	5.30	1253	5.25	1254	5.23
1255	5.22	1256	5.18	1257	5.16	1258	5.14	1259	5.11
1260	5.09	1261	5.05	1262	5.04	1263	5.02	1264	5.01
1265	4.99	1266	4.98	1267	4.96	1268	4.95	1269	4.93
1270	4.92	1271	4.91	1272	4.90	1273	4.89	1274	4.89
1275	4.89	1276	4.87	1277	4.86	1278	4.84	1279	4.81
1280	4.80	1281	4.76	1282	4.75	1283	4.73	1284	4.71
1285	4.69	1286	4.68	1287	4.68	1288	4.67	1289	4.64
1290	4.62	1291	4.62	1292	4.61	1293	4.58	1294	4.58
1295	4.59	1296	4.58	1297	4.56	1298	4.55	1299	4.54
1300	4.53	1310	4.41	1320	4.32	1330	4.19	1340	4.13
1350	4.05	1360	3.95	1370	3.88	1380	3.85	1390	3.81
1400	3.75	1420	3.64	1440	3.56	1460	3.25	1500	3.25

TOTAL VOLUME THIS HYDROGRAPH = 11.77(Ac.Ft)

Basin C

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	10.4	0.80	98	760	0.020	6.0	8	2.87	0.83	0.89
2A	1.3	0.82	98	720	0.055	5.27	7	2.68	0.83	0.89
3A	2.0	0.01	98	590	0.012	5.27	9	2.39	0.81	0.81
4A	1.5	0.91	98	1060	0.060	5.27	9	2.39	0.81	0.89
5A	1.1	0.64	98	720	0.050	5.27	7	2.68	0.83	0.87
6A	2.9	0.91	98	1240	0.012	5.27	13	2.01	0.80	0.89
7A	3.3	0.78	98	900	0.012	5.27	11	2.17	0.81	0.88
10A	3.2	0.01	98	1140	0.080	5.27	10	2.27	0.81	0.81
11A	1.5	0.91	98	1170	0.040	5.27	10	2.27	0.81	0.89
12C	0.9	0.78	98	400	0.040	5.27	5	3.14	0.84	0.89
14A	1.6	0.01	98	980	0.040	5.27	10	2.27	0.81	0.81
15A	3.2	0.91	98	1140	0.040	5.27	10	2.27	0.81	0.89

Skipped: 8A and 9A

Program Package Serial Number: 2084
05/04/10 FILE: 201D-D INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN D

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
201	1A	3.1	5.35	3.1	5.35	4	20.	.03000	2.00	.00	0.	98	11	A26	.01
201	2A	.0	.00	3.1	5.35	4	1.	.01000	2.00	.00	0.	98	99	A26	.00
201	3A	.6	1.32	3.7	6.67	4	70.	.03000	2.00	.00	0.	98	8	A26	.91
201	4A	1.3	2.99	5.0	9.65	4	30.	.03000	2.00	.00	0.	98	7	A26	.73
201	5A	2.1	3.57	7.1	13.21	4	80.	.01500	2.00	.00	0.	98	14	A26	.91
201	6A	1.9	3.23	9.0	16.40	4	580.	.03500	2.00	.00	0.	98	14	A26	.91
201	7A	10.7	26.45	19.7	42.15	4	150.	.05000	2.00	.00	0.	98	9	A31	.80
201	8A	1.0	2.17	20.7	44.15	4	610.	.04500	2.00	.00	0.	98	7	A26	.01
201	9A	1.7	3.69	22.4	47.07	4	140.	.04500	2.00	.00	0.	98	7	A26	.01
201	10A	30.2	59.34	52.6	105.92	4	30.	.04000	2.75	.00	0.	98	14	A30	.91
201	11A	2.3	4.20	54.9	110.08	4	40.	.03000	3.00	.00	0.	98	12	A26	.91
201	12A	3.2	5.99	58.1	115.93	4	60.	.01300	3.50	.00	0.	98	11	A26	.73
201	13A	1.1	2.80	59.2	118.26	4	230.	.01300	3.50	.00	0.	98	7	A30	.01
201	14A	1.8	4.25	61.0	121.01	4	100.	.02000	3.25	.00	0.	98	6	A26	.01
201	15A	1.1	3.06	62.1	122.70	4	240.	.03000	3.00	.00	0.	98	5	A26	.91

Program Package Serial Number: 2084
05/04/10 FILE: 201D-D INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 15A
HYDROGRAPH AT 201 15A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.60	100	6.71	200	6.95	300	7.26	400	7.61
500	8.04	600	8.57	700	9.25	800	10.14	900	11.49
1000	13.96	1050	17.50	1100	22.66	1110	26.63	1120	31.34
1130	36.22	1131	36.90	1132	37.55	1133	38.28	1134	39.12
1135	39.96	1136	40.75	1137	41.63	1138	42.70	1139	43.88
1140	45.04	1141	46.42	1142	48.09	1143	49.87	1144	51.65
1145	53.75	1146	56.38	1147	59.21	1148	62.03	1149	67.24
1150	75.93	1151	86.30	1152	97.15	1153	108.31	1154	116.80
1155	121.34	1156	122.70	1157	121.79	1158	119.01	1159	114.70
1160	108.53	1161	101.03	1162	93.26	1163	84.62	1164	74.37
1165	64.38	1166	55.69	1167	47.67	1168	41.01	1169	36.68
1170	33.85	1171	31.52	1172	29.71	1173	28.28	1174	27.08
1175	26.02	1176	25.13	1177	24.37	1178	23.60	1179	22.91
1180	22.32	1181	21.77	1182	21.25	1183	20.78	1184	20.32
1185	19.89	1186	19.55	1187	19.17	1188	18.79	1189	18.48
1190	18.15	1191	17.79	1192	17.51	1193	17.29	1194	17.06
1195	16.84	1196	16.59	1197	16.35	1198	16.14	1199	15.95
1200	15.68	1201	15.44	1202	15.22	1203	15.03	1204	14.90
1205	14.76	1206	14.58	1207	14.44	1208	14.33	1209	14.19
1210	14.07	1211	13.93	1212	13.78	1213	13.64	1214	13.53
1215	13.43	1216	13.32	1217	13.19	1218	13.07	1219	12.97
1220	12.86	1221	12.74	1222	12.64	1223	12.52	1224	12.40
1225	12.34	1226	12.27	1227	12.17	1228	12.06	1229	11.97
1230	11.91	1231	11.88	1232	11.82	1233	11.75	1234	11.67
1235	11.63	1236	11.53	1237	11.46	1238	11.35	1239	11.23
1240	11.15	1241	11.11	1242	11.08	1243	11.06	1244	11.01
1245	10.90	1246	10.82	1247	10.79	1248	10.76	1249	10.70
1250	10.65	1251	10.63	1252	10.62	1253	10.60	1254	10.56
1255	10.48	1256	10.40	1257	10.32	1258	10.26	1259	10.25
1260	10.22	1261	10.16	1262	10.11	1263	10.08	1264	10.03
1265	9.95	1266	9.92	1267	9.90	1268	9.86	1269	9.82
1270	9.78	1271	9.76	1272	9.73	1273	9.69	1274	9.66
1275	9.61	1276	9.55	1277	9.53	1278	9.51	1279	9.50
1280	9.49	1281	9.46	1282	9.39	1283	9.33	1284	9.30
1285	9.29	1286	9.26	1287	9.20	1288	9.16	1289	9.14
1290	9.13	1291	9.12	1292	9.11	1293	9.08	1294	9.04
1295	8.99	1296	8.95	1297	8.93	1298	8.92	1299	8.86
1300	8.82	1310	8.62	1320	8.44	1330	8.18	1340	7.95
1350	7.84	1360	7.66	1370	7.44	1380	7.35	1390	7.29
1400	7.15	1420	6.87	1440	6.71	1460	6.60	1500	6.60

TOTAL VOLUME THIS HYDROGRAPH = 23.32(Ac.Ft)

Basin D

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	3.1	0.01	98	880	0.012	5.27	11	2.17	0.81	0.81
3A	0.6	0.91	98	780	0.050	5.27	8	2.52	0.82	0.89
4A	1.3	0.73	98	710	0.050	5.27	7	2.68	0.83	0.88
5A	2.1	0.91	98	1330	0.012	5.27	14	1.94	0.79	0.89
6A	1.9	0.91	98	1410	0.012	5.27	14	1.94	0.79	0.89
7A	10.7	0.80	98	860	0.020	6.10	9	2.76	0.83	0.89
8A	1.0	0.01	98	600	0.050	5.27	7	2.68	0.83	0.83
9A	1.7	0.01	98	580	0.050	5.27	7	2.68	0.83	0.83
10A	30.2	0.91	98	2000	0.030	5.90	14	2.17	0.81	0.89
11A	2.3	0.91	98	1420	0.043	5.27	12	2.08	0.80	0.89
12A	3.2	0.73	98	1380	0.043	5.27	11	2.17	0.81	0.88
13A	1.1	0.01	98	560	0.015	5.90	7	3.01	0.84	0.84
14A	1.8	0.01	98	460	0.050	5.27	6	2.89	0.83	0.83
15A	1.1	0.91	98	360	0.025	5.27	5	3.14	0.84	0.89

Note: Skipped No's: 2A, 7A

Program Package Serial Number: 2084
01/07/10 FILE: 201D-E INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN E

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM RAIN ZONE	DAY 4 PCT IMPV
201	1A	23.1	52.57	23.1	52.57	2	680.	.08000	.00	.00	0.	298	11	A31	.01
201	2A	6.9	21.18	30.0	70.32	2	900.	.03500	.00	.00	0.	298	6	A31	.01
201	3A	11.5	30.53	41.5	94.18	4	280.	.02000	3.00	.00	0.	298	8	A31	.01
201	4A	2.5	8.52	44.0	96.91	4	270.	.02000	3.00	.00	0.	298	5	A31	.01
201	5A	2.9	7.61	46.9	102.90	4	40.	.02000	3.25	.00	0.	98	8	A31	.91

BULKING CALCULATION

SAMPLE CALCULATION

Q_{BB} - Q BURNED BULKED

Q_B - Q BURNED

DPA 8 - BULKING FACTOR = 1.36

$Q_{BB} = Q_B \times$ BULKING FACTOR

AREA 1A

$Q_B = 52.57$ cfs $Q_{BB} = 71.50$ cfs Add 18.93 cfs to All Downstream

AREA 2A

$Q_B = 21.18$ cfs $Q_{BB} = 28.80$ cfs Add 7.62 cfs to All Downstream

DEBRIS VOLUME

DPA 8 - 35,000 CY/sq mi = 55 CY/Ac

AREA 1A, 2A & 3A

1A: OFFSITE AREA = 23.1 AC
2A: OFFSITE AREA = 6.9 AC
3A: ONSITE AREA = 11.5 AC
A_T = 41.5 AC

D.V. = 2283 CY

AREA 4A

A_T = 2.5 AC $A_{UNDEVELOPED}$ = 1.8 AC D.V. = 99 CY

Program Package Serial Number: 2084
01/07/10 FILE: 201D-E INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 5A
HYDROGRAPH AT 201 5A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.60	100	2.27	200	2.37	300	2.49	400	2.63
500	2.80	600	3.00	700	3.27	800	3.63	900	4.33
1000	6.48	1050	9.36	1100	13.74	1110	17.03	1120	21.08
1130	25.49	1131	26.05	1132	26.51	1133	27.02	1134	27.67
1135	28.41	1136	29.15	1137	29.99	1138	30.95	1139	31.91
1140	32.92	1141	34.07	1142	35.28	1143	36.58	1144	37.98
1145	39.71	1146	41.79	1147	44.04	1148	46.34	1149	50.55
1150	56.79	1151	64.09	1152	72.43	1153	81.97	1154	90.18
1155	96.30	1156	101.14	1157	102.90	1158	100.84	1159	95.46
1160	88.09	1161	79.54	1162	72.00	1163	66.09	1164	60.87
1165	55.47	1166	50.00	1167	44.56	1168	39.34	1169	34.65
1170	30.68	1171	27.52	1172	25.01	1173	23.02	1174	21.33
1175	19.95	1176	18.78	1177	17.79	1178	16.94	1179	16.18
1180	15.49	1181	14.82	1182	14.25	1183	13.75	1184	13.32
1185	12.86	1186	12.46	1187	12.09	1188	11.73	1189	11.40
1190	11.09	1191	10.80	1192	10.52	1193	10.25	1194	9.98
1195	9.74	1196	9.49	1197	9.28	1198	9.07	1199	8.86
1200	8.66	1201	8.49	1202	8.31	1203	8.13	1204	7.99
1205	7.83	1206	7.70	1207	7.56	1208	7.42	1209	7.25
1210	7.08	1211	6.94	1212	6.82	1213	6.72	1214	6.57
1215	6.44	1216	6.33	1217	6.23	1218	6.14	1219	6.04
1220	5.96	1221	5.83	1222	5.75	1223	5.64	1224	5.56
1225	5.47	1226	5.36	1227	5.30	1228	5.21	1229	5.14
1230	5.07	1231	5.02	1232	4.94	1233	4.85	1234	4.77
1235	4.68	1236	4.61	1237	4.55	1238	4.47	1239	4.42
1240	4.36	1241	4.30	1242	4.26	1243	4.21	1244	4.17
1245	4.13	1246	4.10	1247	4.06	1248	4.04	1249	4.01
1250	3.97	1251	3.94	1252	3.91	1253	3.89	1254	3.86
1255	3.84	1256	3.82	1257	3.78	1258	3.78	1259	3.76
1260	3.74	1261	3.72	1262	3.72	1263	3.69	1264	3.68
1265	3.66	1266	3.64	1267	3.61	1268	3.61	1269	3.57
1270	3.56	1271	3.54	1272	3.53	1273	3.52	1274	3.51
1275	3.50	1276	3.47	1277	3.47	1278	3.44	1279	3.42
1280	3.41	1281	3.40	1282	3.37	1283	3.37	1284	3.36
1285	3.33	1286	3.34	1287	3.33	1288	3.30	1289	3.29
1290	3.30	1291	3.27	1292	3.26	1293	3.25	1294	3.22
1295	3.22	1296	3.21	1297	3.21	1298	3.19	1299	3.18
1300	3.16	1310	3.07	1320	3.00	1330	2.90	1340	2.81
1350	2.75	1360	2.69	1370	2.61	1380	2.56	1390	2.50
1400	2.46	1420	2.38	1440	2.29	1460	1.94	1500	1.94

TOTAL VOLUME THIS HYDROGRAPH = 11.18(Ac.Ft)

Basin E

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	23.1	0.01	98	1970	.133	6.20	11	2.55	0.82	0.82
2A	6.9	0.01	98	680	.080	6.20	6	3.40	0.85	0.85
3A	11.5	0.01	98	900	0.035	6.20	8	2.97	0.84	0.84
4A	2.5	0.01	98	410	0.30	6.20	5	3.70	0.86	0.86
5A	2.9	0.91	98	700	0.030	5.36	8	2.56	0.82	0.89

Program Package Serial Number: 2084
01/07/10 FILE: 201D-F INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN F

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
201	1A	3.9	11.97	3.9	11.97	4	80.	.04000	2.00	.00	0.	298	6	A31	.01
201	2A	.0	.00	3.9	11.97	4	1.	.01000	2.00	.00	0.	98	99	A31	.00

DEBRIS VOLUME

DPA - 35,000 CY/AC = 55 CY/AC

AREA 1A

AREA = 3.9 AC

D.V. = 215 CY

Program Package Serial Number: 2084
01/07/10 FILE: 201D-F INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 2A
HYDROGRAPH AT 201 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	1.00	200	1.00	300	1.00	400	1.00
500	1.00	600	1.00	700	1.00	800	1.00	900	1.00
1000	1.00	1050	1.00	1100	1.15	1110	1.60	1120	1.88
1130	2.29	1131	2.36	1132	2.39	1133	2.46	1134	2.59
1135	2.70	1136	2.80	1137	2.91	1138	3.05	1139	3.15
1140	3.22	1141	3.38	1142	3.58	1143	3.73	1144	3.86
1145	4.13	1146	4.49	1147	4.74	1148	4.97	1149	6.17
1150	7.84	1151	9.13	1152	10.44	1153	11.75	1154	11.97
1155	10.74	1156	9.03	1157	7.43	1158	5.61	1159	3.87
1160	2.98	1161	2.72	1162	2.35	1163	2.16	1164	1.99
1165	1.85	1166	1.72	1167	1.62	1168	1.53	1169	1.46
1170	1.38	1171	1.33	1172	1.27	1173	1.22	1174	1.16
1175	1.11	1176	1.08	1177	1.04	1178	1.01	1179	1.00
1180	1.00	1181	1.00	1182	1.00	1183	1.00	1184	1.00
1185	1.00	1186	1.00	1187	1.00	1188	1.00	1189	1.00
1190	1.00	1191	1.00	1192	1.00	1193	1.00	1194	1.00
1195	1.00	1196	1.00	1197	1.00	1198	1.00	1199	1.00
1200	1.00	1201	1.00	1202	1.00	1203	1.00	1204	1.00
1205	1.00	1206	1.00	1207	1.00	1208	1.00	1209	1.00
1210	1.00	1211	1.00	1212	1.00	1213	1.00	1214	1.00
1215	1.00	1216	1.00	1217	1.00	1218	1.00	1219	1.00
1220	1.00	1221	1.00	1222	1.00	1223	1.00	1224	1.00
1225	1.00	1226	1.00	1227	1.00	1228	1.00	1229	1.00
1230	1.00	1231	1.00	1232	1.00	1233	1.00	1234	1.00
1235	1.00	1236	1.00	1237	1.00	1238	1.00	1239	1.00
1240	1.00	1241	1.00	1242	1.00	1243	1.00	1244	1.00
1245	1.00	1246	1.00	1247	1.00	1248	1.00	1249	1.00
1250	1.00	1251	1.00	1252	1.00	1253	1.00	1254	1.00
1255	1.00	1256	1.00	1257	1.00	1258	1.00	1259	1.00
1260	1.00	1261	1.00	1262	1.00	1263	1.00	1264	1.00
1265	1.00	1266	1.00	1267	1.00	1268	1.00	1269	1.00
1270	1.00	1271	1.00	1272	1.00	1273	1.00	1274	1.00
1275	1.00	1276	1.00	1277	1.00	1278	1.00	1279	1.00
1280	1.00	1281	1.00	1282	1.00	1283	1.00	1284	1.00
1285	1.00	1286	1.00	1287	1.00	1288	1.00	1289	1.00
1290	1.00	1291	1.00	1292	1.00	1293	1.00	1294	1.00
1295	1.00	1296	1.00	1297	1.00	1298	1.00	1299	1.00
1300	1.00	1310	1.00	1320	1.00	1330	1.00	1340	1.00
1350	1.00	1360	1.00	1370	1.00	1380	1.00	1390	1.00
1400	1.00	1420	1.00	1440	1.00	1460	1.00	1500	1.00

TOTAL VOLUME THIS HYDROGRAPH = 2.22(Ac.Ft)

Basin F

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	3.9	0.01	98	640	0.100	6.1	6	3.34	0.85	0.85

Program Package Serial Number: 2084
05/07/10 FILE: 201D-G INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

ENTRADA TTM NO. 53295 - DRAINAGE CONCEPT - OFFSITE BASIN G

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
201	1A	35.8	63.87	35.8	63.87	2	100.	.10000	.00	.00	0.	297	16	A32	.01
201	2A	37.4	77.54	73.2	141.09	2	1200.	.06000	.00	.00	0.	297	12	A32	.01
201	3A	12.9	29.65	86.1	167.41	2	580.	.10000	.00	.00	0.	297	10	A32	.01
201	4A	29.1	51.91	115.2	217.51	2	300.	.06000	.00	.00	0.	297	16	A32	.01
201	5A	37.6	67.08	152.8	282.89	2	11.	.05000	.00	.00	0.	297	16	A32	.01
201	6A	27.4	56.81	180.2	336.85	2	50.	.05000	.00	.00	0.	297	12	A32	.01
201	7A	37.1	66.19	217.3	401.96	2	820.	.05000	.00	.00	0.	297	16	A32	.01
201	8A	24.9	51.62	242.2	448.65	2	70.	.05000	.00	.00	0.	297	12	A32	.01
201	9B	21.4	46.56	21.4	46.56	2	490.	.06000	.00	.00	0.	297	11	A32	.01
201	10B	26.8	55.56	48.2	101.66	2	1030.	.06000	.00	.00	0.	297	12	A32	.01
201	11B	12.3	30.27	60.5	126.56	2	540.	.06000	.00	.00	0.	297	8	A31	.01
201	12B	30.1	53.57	90.6	177.77	2	180.	.06000	.00	.00	0.	297	15	A31	.01

CONFLUENCE Q'S

201 13A TA 1158 QA 448.47 QAB 625.39 QB 176.93 201 13B TB 1158 QB 176.93 QBA 625.39 QA 448.47

201 13AB TAB 1158 QAB 625.39 QA 448.47 QB 176.93

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	13AB	90.6	176.93	332.8	625.39	2	710.	.05000	.00	.00	0.	297	0	A31	.00
201	14A	33.0	68.42	365.8	684.88	2	920.	.04000	.00	.00	0.	297	12	A32	.01
201	15A	30.2	60.36	396.0	735.09	2	130.	.05000	.00	.00	0.	297	12	A31	.01
201	16A	22.1	44.17	418.1	773.46	2	960.	.04000	.00	.00	0.	297	12	A31	.01
201	17A	37.5	66.73	455.6	828.57	2	200.	.04000	.00	.00	0.	297	15	A31	.01
201	18C	12.0	25.13	12.0	25.13	2	150.	.03000	.00	.00	0.	297	11	A31	.01

CONFLUENCE Q'S

201 19A TA 1161 QA 828.41 QAC 846.82 QC 18.41 201 19C TC 1155 QC 25.13 QCA 631.77 QA 606.64

201 19AC TAC 1161 QAC 846.82 QA 828.41 QC 18.41

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
201	19AC	12.0	25.13	467.6	846.82	4	200.	.01000	7.75	.00	0.	297	0	A31	.00

BULKING CALCULATION

SAMPLE CALCULATION

Q_{BB} - Q BURNED BULKED Q_B - Q BURNED

DPA 5 - BULKING FACTOR = 1.47 DPA 8 - BULKING FACTOR = 1.36

$Q_{BB} = Q_B \times$ BULKING FACTOR

AREA 1A

Q_B = 63.87 CFS DPA 5 Q_{BB} = 93.89 CFS ADD 30.02 cfs TO All DOWNSTREAM

AREA 2A

Q_B = 77.54 cfs DPA 5 Q_{BB} = 113.98 cfs ADD 36.44 cfs TO All Downstream

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AREA 3A

Q_B = 29.65 cfs DPA 5 Q_{BB} = 43.59 cfs ADD 13.94 cfs TO All Downstream

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AREA 4A

Q_B = 51.91 cfs DPA 5 Q_{BB} = 76.31 cfs ADD 24.40 cfs TO All Downstream

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AREA 5A

Q_B = 67.08 cfs 60% DPA 5, 40% DPA 8 Q_{BB} = 95.66 cfs ADD 28.58 cfs TO All DOWNSTREAM

AREA 6A

Q_B = 56.81 cfs 80% DPA 5, 20% DPA 8 Q_{BB} = 82.26 cfs ADD 25.45 cfs TO All DOWNSTREAM

AREA 7A

Q_B = 66.19 CFS DPA 8 Q_{BB} = 90.02 cfs ADD 23.83 cfs TO All DOWNSTREAM

AREA 8A

Q_B = 51.62 cfs 70% DPA 5, 30% DPA 8 Q_{BB} = 74.18 cfs ADD 22.56 cfs TO All DOWNSTREAM

AREA 9B

Q_B = 46.56 cfs DPA 8 Q_{BB} = 63.32 cfs ADD 16.76 cfs TO All DOWNSTREAM

+ 221.98

AREA 10B Q_B = 55.56 cfs	DPA 8	Q_{BB} = 75.56 cfs	ADD 20.00 cfs TO All DOWNSTREAM
AREA 11B Q_B = 30.27 cfs	DPA 8	Q_{BB} = 41.17 cfs	ADD 10.90 cfs TO All DOWNSTREAM
AREA 12B Q_B = 53.57 cfs	DPA 8	Q_{BB} = 72.86 cfs	ADD 19.29 cfs TO All DOWNSTREAM
AREA 14A Q_B = 68.42 cfs	DPA 8	Q_{BB} = 93.05 cfs	ADD 24.63 cfs TO All DOWNSTREAM
AREA 15A Q_B = 60.36 cfs	30% DPA 5 70% DPA 8	Q_{BB} = 84.08 cfs	ADD 23.72 cfs TO All DOWNSTREAM
AREA 16A Q_B = 44.17 cfs	DPA 8	Q_{BB} = 60.07 cfs	ADD 15.90 cfs TO All DOWNSTREAM
EA 17A Q_B 66.73 cfs	DPA 8	Q_{BB} = 90.75 cfs	ADD 24.02 cfs TO All DOWNSTREAM
AREA 18C Q_B = 25.13 cfs	DPA 8	Q_{BB} = 34.18 cfs	ADD 9.05 cfs To All DOWNSTREAM + 147.51

DEBRIS VOLUME

DPA 5 - 46,500 CY/mi² — 0.38 mi²

DPA 8 - 18,000 CY/mi² — 0.57 mi²

DEBRIS VOLUME = 27,930 CY — TOTAL AREA = 6.05 AC.

D.V. = 4.6 CY/AC

AREA 17A

ΣA = 4.676 AC

DV = 21,510 CY

Program Package Serial Number: 2084
05/07/10 FILE: 201D-G INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 19AC
HYDROGRAPH AT 201 19A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	22.64	200	23.40	300	24.64	400	25.90
500	27.48	600	29.46	700	31.98	800	35.31	900	40.19
1000	48.85	1050	71.95	1100	114.76	1110	133.84	1120	165.96
1130	204.74	1131	208.97	1132	213.16	1133	217.60	1134	222.39
1135	227.34	1136	232.30	1137	237.52	1138	243.24	1139	249.43
1140	256.23	1141	263.81	1142	272.18	1143	281.35	1144	291.19
1145	302.17	1146	314.62	1147	328.36	1148	343.35	1149	363.72
1150	391.58	1151	425.98	1152	467.76	1153	517.91	1154	573.44
1155	631.77	1156	691.31	1157	746.86	1158	793.48	1159	826.97
1160	844.99	1161	846.82	1162	834.04	1163	806.42	1164	765.39
1165	715.50	1166	663.03	1167	609.60	1168	557.64	1169	509.69
1170	464.89	1171	421.40	1172	380.56	1173	342.68	1174	308.44
1175	278.23	1176	252.23	1177	230.30	1178	211.89	1179	196.48
1180	183.10	1181	171.10	1182	160.87	1183	152.12	1184	144.12
1185	136.97	1186	130.75	1187	125.28	1188	120.22	1189	115.62
1190	111.53	1191	107.79	1192	104.24	1193	100.78	1194	97.53
1195	94.49	1196	91.62	1197	88.87	1198	86.17	1199	83.59
1200	81.24	1201	78.94	1202	76.69	1203	74.60	1204	72.68
1205	70.98	1206	69.41	1207	67.85	1208	66.35	1209	64.87
1210	63.40	1211	62.01	1212	60.66	1213	59.37	1214	58.13
1215	56.89	1216	55.72	1217	54.60	1218	53.55	1219	52.53
1220	51.58	1221	50.74	1222	49.98	1223	49.29	1224	48.70
1225	48.21	1226	47.69	1227	47.21	1228	46.76	1229	46.33
1230	45.94	1231	45.55	1232	45.19	1233	44.84	1234	44.49
1235	44.16	1236	43.82	1237	43.49	1238	43.17	1239	42.86
1240	42.56	1241	42.28	1242	41.98	1243	41.69	1244	41.43
1245	41.15	1246	40.88	1247	40.64	1248	40.43	1249	40.22
1250	40.02	1251	39.81	1252	39.61	1253	39.42	1254	39.20
1255	38.99	1256	38.79	1257	38.58	1258	38.37	1259	38.18
1260	37.97	1261	37.76	1262	37.57	1263	37.37	1264	37.17
1265	37.00	1266	36.83	1267	36.64	1268	36.44	1269	36.27
1270	36.12	1271	35.94	1272	35.79	1273	35.64	1274	35.47
1275	35.32	1276	35.16	1277	34.99	1278	34.84	1279	34.68
1280	34.53	1281	34.39	1282	34.24	1283	34.10	1284	33.96
1285	33.81	1286	33.68	1287	33.55	1288	33.40	1289	33.26
1290	33.14	1291	33.04	1292	32.92	1293	32.79	1294	32.69
1295	32.59	1296	32.48	1297	32.38	1298	32.26	1299	32.14
1300	32.03	1310	30.91	1320	30.00	1330	29.21	1340	28.42
1350	27.67	1360	26.95	1370	26.28	1380	25.75	1390	25.29
1400	24.78	1420	23.82	1440	23.06	1460	22.64	1500	22.64

TOTAL VOLUME THIS HYDROGRAPH = 102.28(Ac.Ft)

Basin G

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	35.8	0.01	97	2860	0.100	6.40	16	2.21	0.68	0.68
2A	37.4	0.01	97	2120	0.130	6.40	12	2.53	0.70	0.70
3A	12.9	0.01	97	1360	0.100	6.40	10	2.76	0.71	0.71
4A	29.1	0.01	97	2780	0.090	6.40	16	2.21	0.68	0.68
5A	37.6	0.01	97	3000	0.130	6.40	16	2.21	0.68	0.68
6A	27.4	0.01	97	1900	0.085	6.40	12	2.53	0.70	0.70
7A	37.1	0.01	97	2670	0.090	6.40	16	2.21	0.68	0.68
8A	24.9	0.01	97	1730	0.085	6.40	12	2.53	0.70	0.70
9B	21.4	0.01	97	1540	0.090	6.30	11	2.59	0.70	0.71
10B	26.8	0.01	97	1800	0.090	6.30	12	2.49	0.70	0.70
11B	12.3	0.01	97	1050	0.140	6.20	8	2.97	0.72	0.72
12B	30.1	0.01	97	2260	0.065	6.20	15	2.21	0.68	0.68
14A	33.0	0.01	97	1840	0.100	6.30	12	2.49	0.70	0.70
15A	30.2	0.01	97	1900	0.110	6.20	12	2.45	0.69	0.69
16A	22.1	0.01	97	1720	0.100	6.20	12	2.45	0.69	0.69
17A	37.5	0.01	97	2400	0.090	6.10	15	2.17	0.68	0.68
18C	12.0	0.01	97	1525	0.090	6.20	11	2.55	0.70	0.70

Program Package Serial Number: 2084
05/07/10 FILE: 930D-H INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

ENTRADA TTM NO. 53295 - DRAINAGE CONCEPT - OFFSITE BASIN H

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
930	1A	37.7	78.16	37.7	78.16	1	230.	.12000	.00	.00	0.	297	12	A32	.01
930	2A	30.6	58.56	68.3	136.73	4	200.	.01000	4.00	.00	0.	297	14	A32	.01

BULKING CALCULATION

SAMPLE CALCULATION

Q_{BB} - Q BURNED BULKED Q_B - Q BURNED

DPA 5 - BULKING FACTOR = 1.47 DPA 8 - BULKING FACTOR = 1.36

$Q_{BB} = Q_B \times$ BULKING FACTOR

AREA 1A

$Q_B = 78.16$cfs DPA 8 $Q_{BB} = 106.30$cfs ADD 28.14cfs TO All DOWNSTREAM

AREA 2A

$Q_B = 58.56$cfs DPA 8 $Q_{BB} = 79.64$cfs ADD 21.08cfs TO All DOWNSTREAM

DEBRIS VOLUME

DPA 5 - 82,000 CY/mi² — 0.10 mi²

DPA 8 - 35,000 CY/mi² — 0.10 mi²

DEBRIS VOLUME = 54.68 CY/AC

AREA 2A

ΣA = 68.3 AC

DV = 3,734 CY

Program Package Serial Number: 2084
05/07/10 FILE: 930D-H INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 2A
HYDROGRAPH AT 930 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.60	100	3.28	200	3.41	300	3.60	400	3.79
500	4.04	600	4.35	700	4.74	800	5.26	900	6.01
1000	7.40	1050	11.68	1100	18.05	1110	23.17	1120	28.51
1130	34.39	1131	35.25	1132	36.24	1133	37.27	1134	38.34
1135	39.19	1136	39.93	1137	41.06	1138	42.41	1139	43.87
1140	45.17	1141	47.05	1142	49.28	1143	51.59	1144	53.73
1145	56.81	1146	60.13	1147	63.50	1148	66.73	1149	76.34
1150	89.35	1151	102.78	1152	116.30	1153	129.71	1154	135.77
1155	136.73	1156	136.13	1157	134.17	1158	131.14	1159	126.96
1160	122.83	1161	115.78	1162	105.50	1163	90.35	1164	75.40
1165	60.71	1166	47.67	1167	37.59	1168	33.51	1169	30.55
1170	28.18	1171	26.43	1172	24.76	1173	23.44	1174	22.16
1175	21.03	1176	20.01	1177	19.05	1178	18.28	1179	17.60
1180	16.94	1181	16.34	1182	15.67	1183	15.21	1184	14.73
1185	14.21	1186	13.68	1187	13.19	1188	12.80	1189	12.51
1190	12.20	1191	11.93	1192	11.56	1193	11.30	1194	10.91
1195	10.58	1196	10.27	1197	10.06	1198	9.85	1199	9.60
1200	9.34	1201	9.09	1202	8.88	1203	8.61	1204	8.31
1205	8.10	1206	7.90	1207	7.72	1208	7.63	1209	7.38
1210	7.22	1211	7.13	1212	7.09	1213	7.02	1214	6.98
1215	6.91	1216	6.90	1217	6.88	1218	6.76	1219	6.73
1220	6.70	1221	6.65	1222	6.62	1223	6.55	1224	6.52
1225	6.44	1226	6.41	1227	6.34	1228	6.31	1229	6.23
1230	6.20	1231	6.15	1232	6.14	1233	6.06	1234	6.02
1235	6.01	1236	5.97	1237	5.94	1238	5.92	1239	5.91
1240	5.86	1241	5.84	1242	5.76	1243	5.73	1244	5.66
1245	5.65	1246	5.65	1247	5.63	1248	5.55	1249	5.55
1250	5.54	1251	5.52	1252	5.45	1253	5.44	1254	5.39
1255	5.37	1256	5.34	1257	5.33	1258	5.33	1259	5.29
1260	5.26	1261	5.24	1262	5.23	1263	5.18	1264	5.16
1265	5.13	1266	5.08	1267	5.08	1268	5.08	1269	5.05
1270	5.03	1271	4.97	1272	4.97	1273	4.97	1274	4.95
1275	4.88	1276	4.87	1277	4.86	1278	4.84	1279	4.79
1280	4.83	1281	4.79	1282	4.83	1283	4.77	1284	4.76
1285	4.76	1286	4.71	1287	4.74	1288	4.69	1289	4.68
1290	4.66	1291	4.66	1292	4.61	1293	4.63	1294	4.58
1295	4.58	1296	4.51	1297	4.53	1298	4.48	1299	4.49
1300	4.48	1310	4.32	1320	4.27	1330	4.12	1340	3.99
1350	3.85	1360	3.81	1370	3.72	1380	3.67	1390	3.58
1400	3.44	1420	3.40	1440	3.28	1460	1.81	1500	1.81

TOTAL VOLUME THIS HYDROGRAPH = 14.95(Ac.Ft)

Basin H

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	37.7	0.01	97	1820	0.100	6.40	12	2.53	0.70	0.70
2A	30.6	0.01	97	2400	0.120	6.40	14	2.35	0.69	0.69

Program Package Serial Number: 2084
06/16/10 FILE: 930D-I INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

ENTRADA TTM NO. 53295 - DRAINAGE CONCEPT - OFFSITE BASIN I STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	1A	30.1	48.35	30.1	48.35	2	300.	.04000	.00	.00	0.	297	17	A30	.05
930	2B	27.4	52.95	27.4	52.95	2	800.	.08000	.00	.00	0.	297	12	A30	.05
930	3B	9.1	19.50	36.5	71.28	2	300.	.05000	.00	.00	0.	297	10	A30	.05

CONFLUENCE Q'S

930 4A TA 1156 QA 48.29 QAB 118.98 QB 70.69 930 4B TB 1157 QB 71.05 QBA 119.35 QA 48.29
930 4AB TAB 1157 QAB 119.35 QA 48.29 QB 71.05

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	4AB	36.5	71.05	66.6	119.35	4	200.	.01000	3.75	.00	0.	297	0	A30	.00

BULKING CALCULATION

SAMPLE CALCULATION

Q_{BB} - Q BURNED BULKED Q_B - Q BURNED

DPA 5 - BULKING FACTOR = 1.47 DPA 8 - BULKING FACTOR = 1.36

$Q_{BB} = Q_B \times$ BULKING FACTOR

AREA 1A

Q_B = 48.35cfs DPA 8 Q_{BB} = 65.76cfs ADD 17.41 cfs TO All DOWNSTREAM

AREA 2B

Q_B = 52.95cfs DPA 8 Q_{BB} = 72.01 cfs ADD 19.06cfs TO All Downstream

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AREA 3B

Q_B = 19.50cfs DPA 8 Q_{BB} = 26.52 cfs ADD 7.02cfs TO All Downstream

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DEBRIS VOLUME

DPA 5 - 82,000 CY/mi² — 0.10 mi²

DPA 8 - 35,000 CY/mi² — 0.10 mi² = 55 CY/AC

AREA 3B

ΣA = 66.6 AC

DV = 3,663 CY

Program Package Serial Number: 2084
06/16/10 FILE: 930D-I INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 4AB
HYDROGRAPH AT 930 4A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	3.20	200	3.32	300	3.51	400	3.70
500	3.95	600	4.24	700	4.62	800	5.11	900	5.87
1000	7.10	1050	10.37	1100	16.10	1110	19.75	1120	25.01
1130	30.28	1131	30.88	1132	31.45	1133	32.10	1134	32.87
1135	33.71	1136	34.56	1137	35.45	1138	36.49	1139	37.60
1140	38.72	1141	39.96	1142	41.43	1143	43.11	1144	44.91
1145	46.93	1146	49.42	1147	52.26	1148	55.22	1149	59.49
1150	66.68	1151	76.40	1152	87.59	1153	99.63	1154	110.05
1155	116.37	1156	118.98	1157	119.35	1158	118.32	1159	115.64
1160	111.42	1161	106.60	1162	100.80	1163	93.29	1164	85.09
1165	77.36	1166	69.18	1167	59.98	1168	51.12	1169	43.50
1170	36.92	1171	31.47	1172	27.78	1173	25.49	1174	23.70
1175	22.22	1176	20.95	1177	19.88	1178	18.90	1179	17.99
1180	17.18	1181	16.44	1182	15.77	1183	15.19	1184	14.62
1185	14.07	1186	13.63	1187	13.18	1188	12.75	1189	12.36
1190	11.95	1191	11.54	1192	11.19	1193	10.86	1194	10.53
1195	10.27	1196	10.02	1197	9.74	1198	9.49	1199	9.25
1200	9.00	1201	8.74	1202	8.49	1203	8.24	1204	8.01
1205	7.81	1206	7.65	1207	7.55	1208	7.46	1209	7.38
1210	7.32	1211	7.24	1212	7.17	1213	7.11	1214	7.05
1215	6.99	1216	6.92	1217	6.87	1218	6.82	1219	6.77
1220	6.71	1221	6.65	1222	6.60	1223	6.54	1224	6.47
1225	6.42	1226	6.38	1227	6.32	1228	6.27	1229	6.22
1230	6.17	1231	6.14	1232	6.12	1233	6.08	1234	6.05
1235	6.01	1236	5.98	1237	5.94	1238	5.90	1239	5.85
1240	5.80	1241	5.76	1242	5.72	1243	5.68	1244	5.66
1245	5.63	1246	5.59	1247	5.57	1248	5.54	1249	5.49
1250	5.45	1251	5.43	1252	5.40	1253	5.37	1254	5.36
1255	5.34	1256	5.33	1257	5.30	1258	5.26	1259	5.25
1260	5.22	1261	5.19	1262	5.18	1263	5.16	1264	5.13
1265	5.09	1266	5.07	1267	5.05	1268	5.03	1269	5.00
1270	4.97	1271	4.94	1272	4.93	1273	4.91	1274	4.90
1275	4.88	1276	4.84	1277	4.82	1278	4.80	1279	4.77
1280	4.77	1281	4.76	1282	4.75	1283	4.72	1284	4.69
1285	4.68	1286	4.68	1287	4.66	1288	4.63	1289	4.61
1290	4.58	1291	4.56	1292	4.57	1293	4.56	1294	4.55
1295	4.52	1296	4.50	1297	4.48	1298	4.46	1299	4.45
1300	4.43	1310	4.29	1320	4.19	1330	4.06	1340	3.91
1350	3.84	1360	3.76	1370	3.63	1380	3.55	1390	3.54
1400	3.48	1420	3.29	1440	3.21	1460	3.20	1500	3.20

TOTAL VOLUME THIS HYDROGRAPH = 14.18(Ac.Ft)

Basin I

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	30.1	0.01	97	2660	0.075	6.10	17	2.05	0.67	0.67
2B	27.4	0.01	97	1750	0.090	6.00	12	2.37	0.69	0.69
3B	9.1	0.01	97	1130	0.050	6.00	10	2.58	0.70	0.70

Program Package Serial Number: 2084
02/13/10 FILE: 930D-J INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN J

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
930	1A	24.5	32.03	24.5	32.03	2	1680.	.04000	.00	.00	0.	220	18	A29	.01
930	2A	19.0	22.71	43.5	51.90	2	400.	.02500	.00	.00	0.	220	21	A29	.01
930	3B	32.9	59.63	32.9	59.63	2	1700.	.04000	.00	.00	0.	298	15	A29	.01
930	4B	33.1	64.26	66.0	115.31	2	50.	.02000	.00	.00	0.	298	13	A29	.01

CONFLUENCE Q'S

930 5A TA 1163 QA 51.75 QAB 150.35 QB 98.60
930 5B TB 1158 QB 115.22 QBA 161.61 QA 46.39
930 5AB TAB 1160 QAB 164.21 QA 50.00 QB 114.21

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	5AB	66.0	115.22	109.5	164.21	4	540.	.01000	4.25	.00	0.	20	0	A29	.00

DEBRIS Volume

DPA 8 - 35,000 CY/mi² = 55 CY/AC

AREA 1A, 2A, 3B, & 4B

A_{Total} = 109.5 AC

D.V. = 6,023 CY

Program Package Serial Number: 2084
02/13/10 FILE: 930D-J INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
HYDROGRAPH AT POINT 5AB
HYDROGRAPH AT 930 5A STORM DAY 4 REDUCTION FACTOR = 1.000

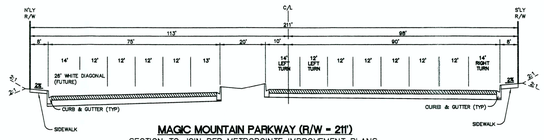
TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	4.58	200	4.76	300	5.02	400	5.29
500	5.62	600	6.05	700	6.59	800	7.31	900	8.35
1000	11.56	1050	16.81	1100	25.13	1110	29.80	1120	36.39
1130	45.05	1131	46.13	1132	47.19	1133	48.42	1134	49.49
1135	50.49	1136	51.56	1137	52.87	1138	54.38	1139	55.90
1140	57.47	1141	59.39	1142	61.55	1143	63.72	1144	65.84
1145	68.49	1146	71.62	1147	74.81	1148	78.19	1149	85.44
1150	94.92	1151	104.35	1152	115.39	1153	127.55	1154	136.92
1155	144.35	1156	151.80	1157	157.53	1158	161.61	1159	163.61
1160	164.21	1161	163.58	1162	158.12	1163	150.35	1164	142.51
1165	133.52	1166	124.12	1167	116.86	1168	110.80	1169	103.79
1170	96.92	1171	88.99	1172	80.66	1173	72.71	1174	65.51
1175	58.91	1176	53.17	1177	48.49	1178	44.51	1179	41.10
1180	38.29	1181	35.79	1182	33.66	1183	31.78	1184	30.09
1185	28.64	1186	27.35	1187	26.18	1188	25.09	1189	24.08
1190	23.26	1191	22.47	1192	21.66	1193	21.00	1194	20.34
1195	19.65	1196	19.18	1197	18.67	1198	18.14	1199	17.65
1200	17.15	1201	16.78	1202	16.39	1203	15.87	1204	15.49
1205	15.24	1206	14.90	1207	14.52	1208	14.24	1209	13.93
1210	13.57	1211	13.32	1212	13.04	1213	12.79	1214	12.55
1215	12.23	1216	12.10	1217	11.93	1218	11.62	1219	11.42
1220	11.28	1221	11.07	1222	10.80	1223	10.63	1224	10.44
1225	10.28	1226	10.19	1227	10.08	1228	9.98	1229	9.81
1230	9.63	1231	9.51	1232	9.39	1233	9.29	1234	9.21
1235	9.13	1236	9.05	1237	8.98	1238	8.88	1239	8.77
1240	8.69	1241	8.63	1242	8.55	1243	8.51	1244	8.49
1245	8.41	1246	8.35	1247	8.29	1248	8.22	1249	8.18
1250	8.11	1251	8.08	1252	8.05	1253	7.99	1254	7.94
1255	7.91	1256	7.87	1257	7.81	1258	7.78	1259	7.72
1260	7.70	1261	7.67	1262	7.58	1263	7.56	1264	7.53
1265	7.47	1266	7.45	1267	7.42	1268	7.37	1269	7.35
1270	7.32	1271	7.27	1272	7.24	1273	7.22	1274	7.19
1275	7.17	1276	7.12	1277	7.08	1278	7.05	1279	7.03
1280	7.01	1281	6.99	1282	6.95	1283	6.90	1284	6.89
1285	6.87	1286	6.82	1287	6.78	1288	6.76	1289	6.74
1290	6.72	1291	6.70	1292	6.65	1293	6.60	1294	6.59
1295	6.57	1296	6.54	1297	6.52	1298	6.50	1299	6.49
1300	6.47	1310	6.28	1320	6.10	1330	5.92	1340	5.71
1350	5.57	1360	5.43	1370	5.33	1380	5.21	1390	5.06
1400	5.00	1420	4.81	1440	4.61	1460	4.58	1500	4.58

TOTAL VOLUME THIS HYDROGRAPH = 21.63(Ac.Ft)

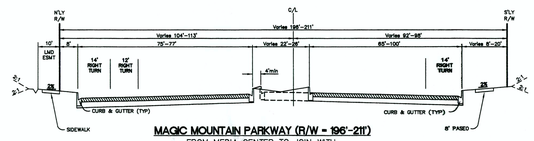
Basin J

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
1A	24.5	0.01	20	1760	0.050	5.80	18	1.90	0.50	0.50
2A	19.0	0.01	20	2040	0.040	5.80	21	1.76	0.48	0.48
3B	32.9	0.01	98	2330	0.060	5.80	15	2.06	0.80	0.80
4B	33.1	0.01	98	1750	0.040	5.80	13	2.21	0.81	0.81

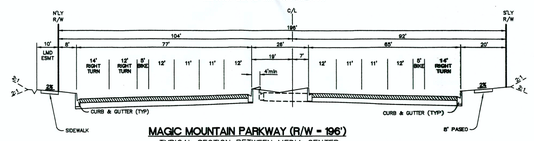
DRAINAGE CONCEPT/HYDROLOGY STUDY
ENTRADA
TENTATIVE TRACT 53295



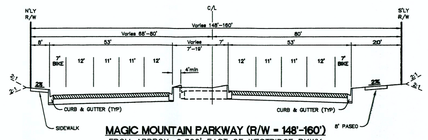
MAGIC MOUNTAIN PARKWAY (R/W = 211')
SECTION TO JOIN PER METROPOINTE IMPROVEMENT PLANS
APPROXIMATELY 300 FT WEST OF THE OLD ROAD



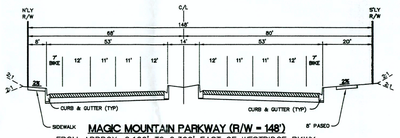
MAGIC MOUNTAIN PARKWAY (R/W = 196'-211')
FROM MEDIA CENTER TO JOIN WITH
METROPOINTE IMPROVEMENTS



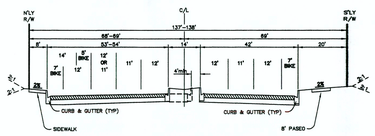
MAGIC MOUNTAIN PARKWAY (R/W = 196')
TYPICAL SECTION BETWEEN MEDIA CENTER
AND THEME PARK ENTRANCE



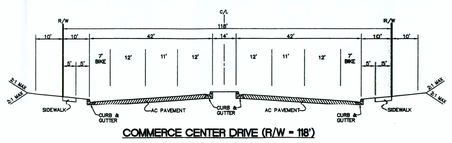
MAGIC MOUNTAIN PARKWAY (R/W = 148'-160')
FROM APPROX. 2,300' EAST OF WESTRIDGE PKWY
TO THE THEME PARK ENTRANCE



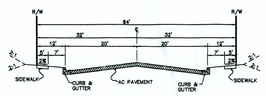
MAGIC MOUNTAIN PARKWAY (R/W = 148')
FROM APPROX. 2,100' TO 2,300' EAST OF WESTRIDGE PKWY



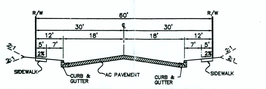
MAGIC MOUNTAIN PARKWAY (R/W = 137'-138')
FROM APPROX. 1,300' TO 2,100' EAST OF WESTRIDGE PKWY



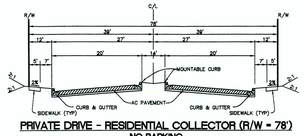
COMMERCE CENTER DRIVE (R/W = 118')



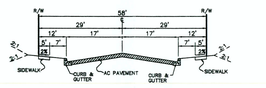
PUBLIC STREET - RESIDENTIAL COLLECTOR (R/W = 64')
WITH PARALLEL PARKING
"A" STREET



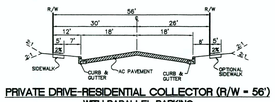
PRIVATE DRIVE-RESIDENTIAL COLLECTOR (R/W = 60')
WITH PARALLEL PARKING
"D" DRIVE, "I" DRIVE, "J" DRIVE, "K" DRIVE, "L" DRIVE,
"M" DRIVE, "O" DRIVE, "P" DRIVE, "U" DRIVE, "V" DRIVE



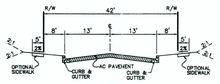
PRIVATE DRIVE - RESIDENTIAL COLLECTOR (R/W = 78')
NO PARKING
"B" DRIVE



PRIVATE DRIVE-LOCAL CUL DE SAC (R/W = 58')
WITH PARALLEL PARKING
"E" DRIVE, "F" DRIVE, "G" DRIVE, "H" DRIVE, "M" DRIVE, "N" DRIVE,
"Q" DRIVE, "R" DRIVE, "S" DRIVE, "T" DRIVE, "W" DRIVE



PRIVATE DRIVE-RESIDENTIAL COLLECTOR (R/W = 56')
WITH PARALLEL PARKING
"C" DRIVE



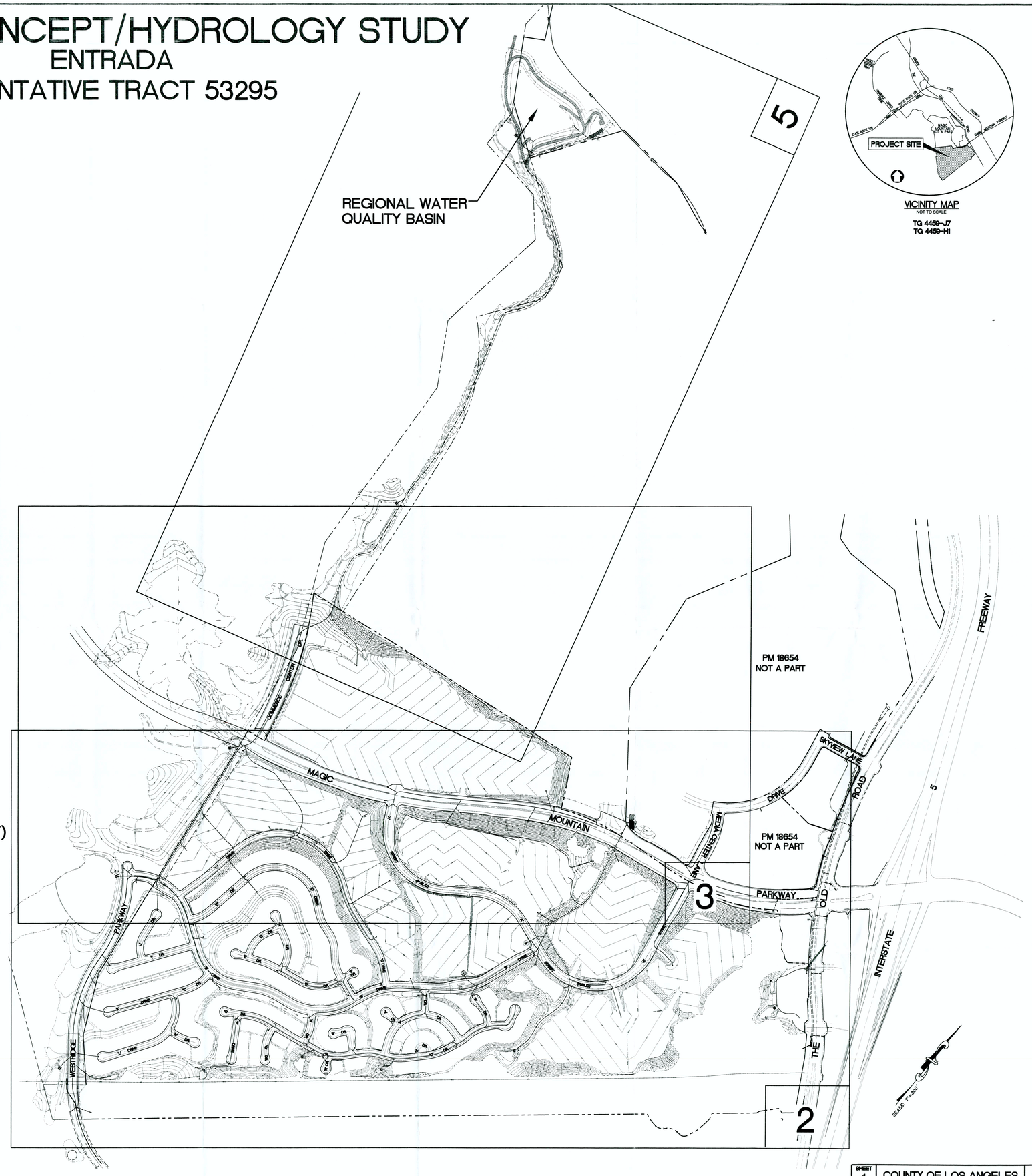
PRIVATE DRIVE-LOCAL (R/W = 42')
NO PARKING
"X" DRIVE

SEE SHEET 4 (OFFSITE HYDROLOGY)

DRAINAGE CONCEPT/HYDROLOGY STUDY/SUSMP/LID PLAN
APPROVED FOR AREA AND Q ONLY
APPROVED BY: [signature] DATE: 12/7/2011
CHECKED BY: [signature] DATE: 12/7/2011
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

REGIONAL WATER QUALITY BASIN

VICINITY MAP
NOT TO SCALE
TG 4459-J7
TG 4459-H1



ALLIANCE LAND PLANNING & ENGINEERING INC.	PLANS PREPARED BY: ALLIANCE LAND PLANNING & ENGINEERING INC. 2248 FARADAY AVE. CARLSBAD, CA. 92008 (760) 431-9896	PLANS PREPARED FOR: NEWHALL LAND 23823 WEST VALENCIA BOULEVARD VALENCIA, CALIFORNIA 91355 TELEPHONE: (661) 255-4000 REPRESENTATIVE : ALEX HERRELL	LEGAL DESCRIPTION: THAT PORTION OF RANCHO SAN FRANCISCO, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP RECORDED IN BOOK 1 PAGES 521 PAGES 522 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.
2248 FARADAY AVE. CARLSBAD, CA 92008 TEL: (760) 431-9896 FAX: (760) 431-5803	PLANS PREPARED UNDER THE DIRECTION OF: CRAIG M. WHITTEKER R.C.E. 51929 12-2-10 DATE	REGISTERED PROFESSIONAL ENGINEER CRAIG M. WHITTEKER No. 51929 EXP. 6-30-12 CIVIL STATE OF CALIFORNIA	
37433 TOURNEY ROAD SUITE 200 PALMDALE, CA. 91386 TEL: (661) 789-2760 FAX: (661) 254-1929			
CIVIL ENGINEERING • LAND PLANNING • HELISKE DESIGN • SURVEYING			
CRAIG WHITTEKER R.C.E. 51929 DATE			

NO.	DATE	REVISIONS	BY	APPR

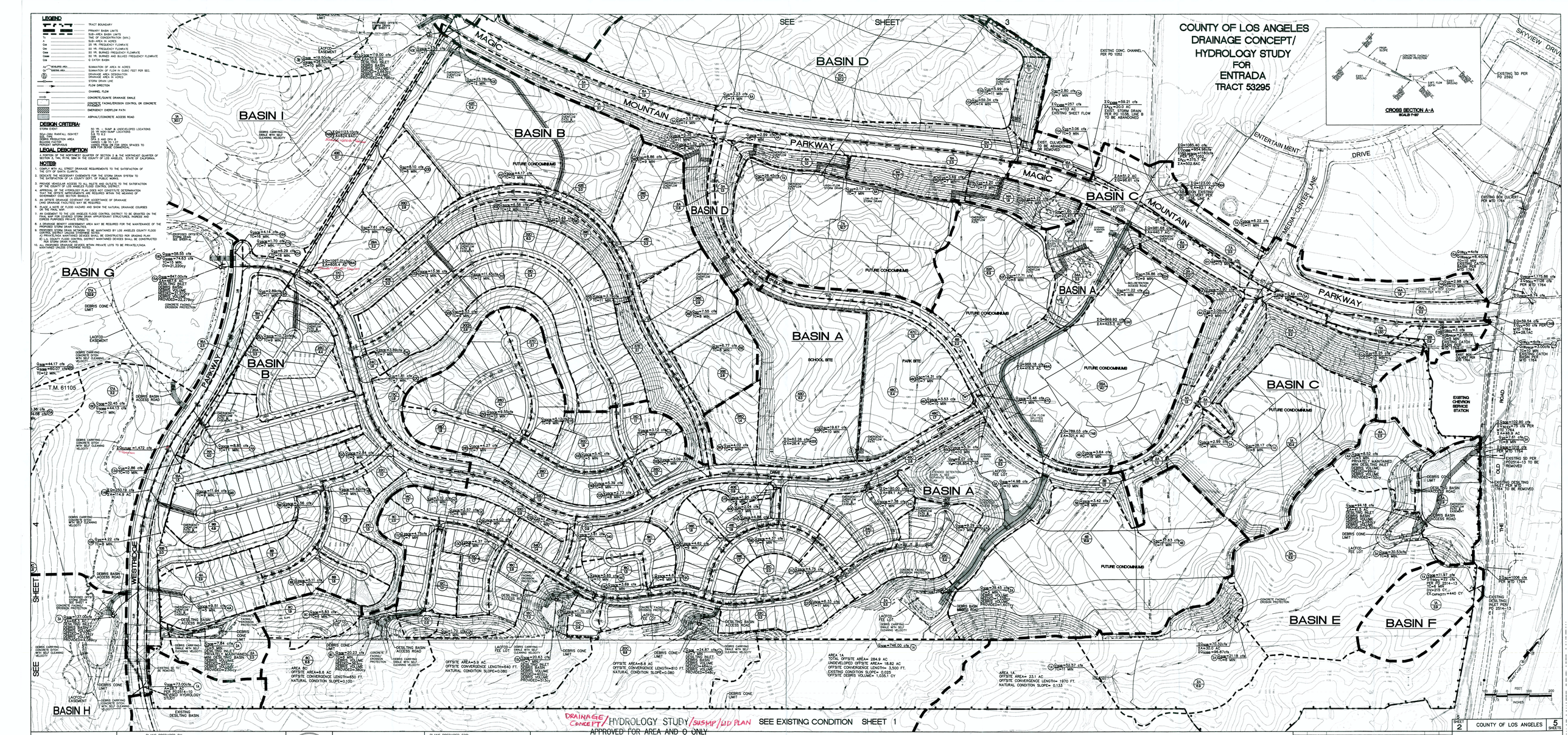
SHEET 1 | COUNTY OF LOS ANGELES | 5 SHEETS

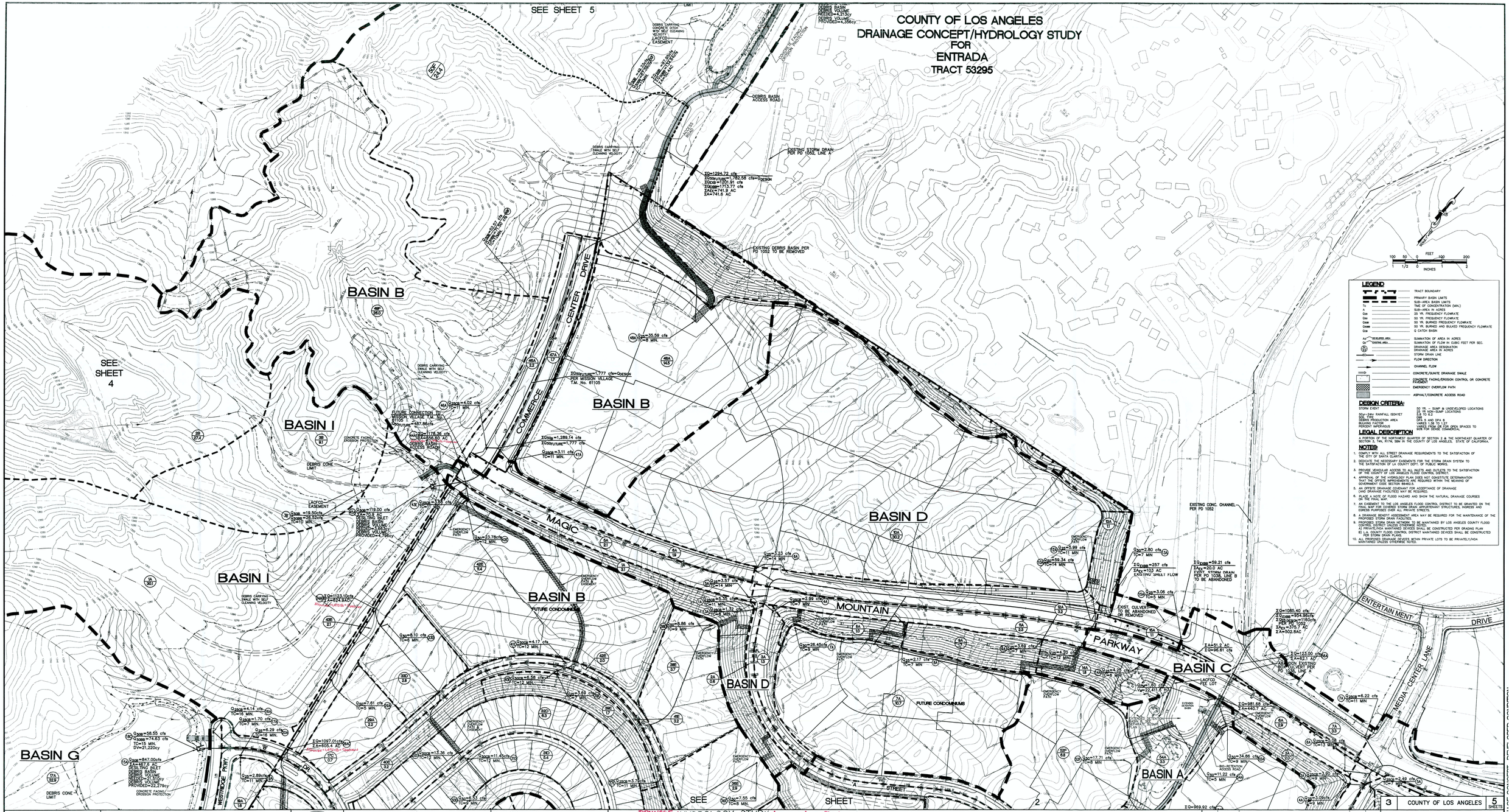
DRAINAGE CONCEPT/HYDROLOGY/ SUSMP FOR ENTRADA TENTATIVE TRACT 53295

COUNTY CASE NO. _____
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

I:\CAD\0201\HYDROLOGY\HYDRO-SHT-01.dwg

DEC 01 2010


COUNTY OF LOS ANGELES
DRAINAGE CONCEPT/
HYDROLOGY STUDY
FOR
ENTRADA
TRACT 53295
LEGEND
TRACT BOUNDARY
PRIMARY BASIN LIMITS
SUB-AREA BASIN LIMITS
TIME OF CONCENTRATION (MIN.)
SUB-AREA IN ACRES
25 YR. FREQUENCY FLOWRATE
50 YR. FREQUENCY FLOWRATE
50 YR. BURNED FREQUENCY FLOWRATE
50 YR. BURNED AND BULKED FREQUENCY FLOWRATE
Q CATCH BASIN
SUMMATION OF AREA IN ACRES
SUMMATION OF FLOW IN CUBIC FEET PER SEC.
DRAINAGE AREA DESIGNATION
DRAINAGE AREA IN ACRES
STORM DRAIN LINE
FLOW DIRECTION
CHANNEL FLOW
CONCRETE/GUNITE DRAINAGE SWALE
CONCRETE FACING/EROSION CONTROL OR CONCRETE LINING
EMERGENCY OVERFLOW PATH
ASPHALT/CONCRETE ACCESS ROAD
DESIGN CRITERIA
STORM EVENT
50 YR. = SUMP & UNDEVELOPED LOCATIONS
25 YR. = ALL OTHER LOCATIONS
100-YEAR RAINFALL ISOHYET
DEBRIS PRODUCTION AREA
BULKING FACTOR
BULKING METHODOLOGY
PARKING REQUIRED
LEGAL DESCRIPTION
A PORTION OF THE NORTHWEST QUARTER OF SECTION 3 & THE NORTHEAST QUARTER OF SECTION 3, TWL 1STN, SBM IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA
NOTES:
1. COMPLY WITH ALL STREET DRAINAGE REQUIREMENTS TO THE SATISFACTION OF THE CITY OF SANTA CLARITA.
2. PROVIDE ALL NECESSARY EASEMENTS FOR THE STORM DRAIN SYSTEM TO THE SATISFACTION OF LA COUNTY DEPT. OF PUBLIC WORKS.
3. PROVIDE VEHICULAR ACCESS TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE COUNTY OF LOS ANGELES FLOOD CONTROL DISTRICT.
4. APPROVAL OF THE HYDROLOGY PLAN DOES NOT CONSTITUTE DETERMINATION THAT THE FLOOD HAZARD AREAS ARE REQUIRED WITHIN THE MEANING OF SECTION 8102.0 OF THE BUILDING CODE.
5. AN OFFSITE DRAINAGE COVENANT FOR ACCEPTANCE OF DRAINAGE AND DRAINAGE FACILITIES MAY BE REQUIRED.
6. PLACE A NOTE OF FLOOD HAZARD AND SHOW THE NATURAL DRAINAGE COURSES ON THE FINAL MAP.
7. AN EASEMENT TO THE LOS ANGELES FLOOD CONTROL DISTRICT TO BE GRANTED ON THE FINAL MAP FOR ALL DRAINAGE FACILITIES WITHIN PERMANENT STRUCTURES, PUBLIC AND CERTAIN PURPOSES PRIVATE STREETS.
8. A DRAINAGE BENEFIT ASSESSMENT AREA MAY BE REQUIRED FOR THE MAINTENANCE OF THE PROPOSED STORM DRAIN FACILITIES.
9. DRAINAGE DEVICES SHALL BE MAINTAINED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, EXCEPTING THE FOLLOWING:
A) PRIVATELY MAINTAINED DEVICES SHALL BE CONSTRUCTED PER GRADING PLAN
B) L.A. COUNTY FLOOD CONTROL DISTRICT MAINTAINED DEVICES SHALL BE CONSTRUCTED PER STORM DRAIN PLAN
10. ALL PROPOSED PUBLIC DRAINAGE DEVICES WITHIN PRIVATE LOTS TO BE PRIVATELY/HOA MAINTAINED UNLESS OTHERWISE NOTED.
SEE SHEET 3
SEE SHEET 4
SEE SHEET 2
BASIN A
BASIN B
BASIN C
BASIN D
BASIN E
BASIN F
BASIN G
BASIN H
BASIN I
MAGIC MOUNTAIN PARKWAY
WESTRIDGE PARKWAY
ENTERTAIN MENT DRIVE
MEDIA CENTER LANE
SKYVIEW DRIVE
OLD ROAD
THE TRAIL
FUTURE CONDOMINIUMS
SCHOOL SITE
PARK SITE
EXISTING CHEVRON SERVICE STATION
EXISTING CONVC. CHANNEL PER PD 1052
EXISTING SD PER PD 2592
EXISTING BOX CULVERT PER MTD 1764
EXISTING SD PER PD2514-13 TO BE REMOVED
EXISTING DESILTING INLET PER PD 2514-13
EXIST. CULVERT TO BE ABANDONED OR REMOVED
CROSS SECTION A-A
SCALE: 1"=50'
T.M. 61105
LACFCD EASEMENT
LACFCD FEE LOT
DEBRIS CONE LIMIT
DEBRIS BASIN ACCESS ROAD
EXISTING BASIN ACCESS ROAD
DEBRIS CARRYING CONCRETE DITCH WITH SELF CLEANING VELOCITY
DEBRIS CARRYING SWALE WITH SELF CLEANING VELOCITY
CONCRETE FACING/ EROSION PROTECTION
EMERGENCY OVERFLOW PATH
EXISTING BASIN
DRAINAGE CONCEPT/HYDROLOGY STUDY/SUSMP/LID PLAN SEE EXISTING CONDITION SHEET 1
APPROVED FOR AREA AND Q ONLY
APPROVED BY: _____ RCE NO 51929 DATE: 12/15/10
CHECKED BY: _____ DATE: 12/15/10
LAND DEVELOPMENT DIVISION
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
ALLIANCE
LAND PLANNING & ENGINEERING
2248 FARADAY AVE. CARLSBAD, CA. 92008
(760) 431-9885
PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE. CARLSBAD, CA. 92008
(760) 431-9885
PLANS PREPARED UNDER THE DIRECTION OF:
12-2-10
DAVID J. WHITTAKER R.C.E. 51929 DATE
PLANS PREPARED FOR:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE: ALEX HERRELL
SHEET 2
COUNTY OF LOS ANGELES
5 SHEETS
DRAINAGE CONCEPT/
HYDROLOGY STUDY
FOR ENTRADA
TENTATIVE TRACT 53295
DEVELOPED CONDITION
NO. DATE BY APPR
FILM RECORDING DATE
DEC 01 2010



ALLIANCE LAND PLANNING & ENGINEERING
2248 FARADAY AVE. CARLSBAD, CA 92008 TEL: (760) 431-9896 FAX: (760) 431-9860
27433 TOURNEY ROAD SUITE 200 VALENCIA, CA 91355 TEL: (661) 294-2765 FAX: (661) 254-1928
CIVIL ENGINEERING • LAND PLANNING • NILSOC DESIGN • SURVEYING

PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE. CARLSBAD, CA. 92008
(760) 431-9896

PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG W. WESTMOR R.C.E. 51929 — 12-2-10 DATE

REGISTERED PROFESSIONAL ENGINEER CRAIG WESTMOR No. 51929 EXP. 6-30-11 CIVIL STATE OF CALIFORNIA

PLANS PREPARED FOR:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4500
REPRESENTATIVE: ALEX HERRELL

DRAINAGE CONCEPT / HYDROLOGY STUDY / SUSMP / LID PLAN
APPROVED FOR AREA AND Q ONLY
APPROVED BY: [signature] RCE NO. 51929 DATE: 11/29/11
CHECKED BY: [signature] DATE: 11/29/11
LAND DEVELOPMENT DIVISION
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

NO.	DATE	BY	APPR

DRAINAGE CONCEPT/ HYDROLOGY STUDY FOR ENTRADA TENTATIVE TRACT 53295 DEVELOPED CONDITION

COUNTY OF LOS ANGELES | 5 SHEETS

PLAN PREPARATION DATE: DEC 01 2010

\\CAD\2630\HYDROLOGY\2630-HYDRO-SHT-03.dwg

COUNTY OF LOS ANGELES
DRAINAGE CONCEPT/
HYDROLOGY STUDY
ENTRADA
TENTATIVE TRACT 53295

BASIN G

BASIN H

BASIN I

TRACT 45433

DEBRIS PRODUCTION BOUNDARY

DPA 8

DPA 5

ONSITE STORM DRAIN
SEE SHEET 2

ONSITE STORM DRAIN
SEE SHEET 2

SEE SHEET 3

SEE SHEET 5

EXISTING STORM DRAIN PER PD 2514-10

LACFCD EASEMENT

DEBRIS CONE LIMIT

CONCRETE FACING/ EROSION PROTECTION

PARKWAY

MORAN

LEGEND

- TRACT BOUNDARY
- PRIMARY BASIN LIMITS
- SUB-AREA BASIN LIMITS
- Tc — TIME OF CONCENTRATION (MIN.)
- A — SUB-AREA IN ACRES
- Q25 — 25 YR. FREQUENCY FLOWRATE
- Q50 — 50 YR. FREQUENCY FLOWRATE
- Q50B — 50 YR. BURNED FREQUENCY FLOWRATE
- Q50BB — 50 YR. BURNED AND BULKED FREQUENCY FLOWRATE
- Q25 — Q CATCH BASIN
- ΣA — DEVELOPED AREA — SUMMATION OF AREA IN ACRES
- ΣQ — SUBTRIB. AREA — SUMMATION OF FLOW IN CUBIC FEET PER SEC.
- DRAINAGE AREA DESIGNATION
- DRAINAGE AREA IN ACRES
- STORM DRAIN LINE
- FLOW DIRECTION
- CHANNEL FLOW
- CONCRETE/GUNITE DRAINAGE SWALE

DESIGN CRITERIA:

STORM EVENT	50 YR. — SUMP & UNDEVELOPED LOCATIONS 25 YR. NON-SUMP LOCATIONS
50 yr-24hr RAINFALL ISOHYET	6.0" TO 6.5"
SOIL TYPE	008 & 009
DEBRIS PRODUCTION AREA	DPA 8 & 5

LEGAL DESCRIPTION

NOTES:

1. COMPLY WITH ALL STREET DRAINAGE REQUIREMENTS TO THE SATISFACTION OF THE CITY OF SANTA CLARITA.
2. DEDICATE THE NECESSARY EASEMENTS FOR THE STORM DRAIN SYSTEM TO THE SATISFACTION OF THE CITY OF SANTA CLARITA.
3. PROVIDE VEHICULAR ACCESS TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE COUNTY OF LOS ANGELES FLOOD CONTROL DISTRICT.
4. APPROVAL OF THIS CONCEPT PLAN DOES NOT CONSTITUTE DETERMINATION THAT THE OFFSITE IMPROVEMENTS ARE REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 66462.5.
5. AN OFFSITE DRAINAGE COVENANT FOR ACCEPTANCE OF DRAINAGE (AND DRAINAGE FACILITIES) MAY BE REQUIRED.
6. PLACE A NOTE OF FLOOD HAZARD AND SHOW THE NATURAL DRAINAGE COURSES ON THE FINAL MAP.
7. AN EASEMENT TO THE LOS ANGELES FLOOD CONTROL DISTRICT TO BE GRANTED ON THE FINAL MAP FOR COVERED STORM DRAIN APPURTENANT STRUCTURES AND STORM DRAIN INGRESS AND EGRESS OVER ALL PRIVATE STREETS.
8. A DRAINAGE BENEFIT ASSESSMENT AREA MAY BE REQUIRED FOR THE MAINTENANCE OF THE PROPOSED STORM DRAIN FACILITIES.
9. PROPOSED STORM DRAIN NETWORK TO BE MAINTAINED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT UNLESS OTHERWISE NOTED.

ALLIANCE
LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE.
CARLSBAD, CA. 92008
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FAX:(760) 431-8802
27343 TOURNEY ROAD
SUITE 250
VALENCIA, CA. 91355
TEL: (661) 799-2780
FAX: (661) 254-1929
CIVIL ENGINEERING • LAND PLANNING • HILLSIDE DESIGN • SURVEYING

PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARDAY AVE.
(760) 431-9896

PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG M. WHITTAKER R.C.E. 51929 — DATE 12-2-10

REGISTERED PROFESSIONAL ENGINEER — CRAIG M. WHITTAKER — No. 51929 — EXP 6-30-12 — CIVIL — STATE OF CALIFORNIA

DRAINAGE CONCEPT/ HYDROLOGY STUDY/ SUSMP/ LID PLAN

APPROVED FOR AREA AND Q ONLY

APPROVED BY: [signature] RCE NO 46838 DATE: 1/27/2011

CHECKED BY: [signature] DATE: 1/27/2011

LAND DEVELOPMENT DIVISION
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PLANS PREPARED FOR:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : ALEX HERRELL

NO.	DATE	BY	APPR

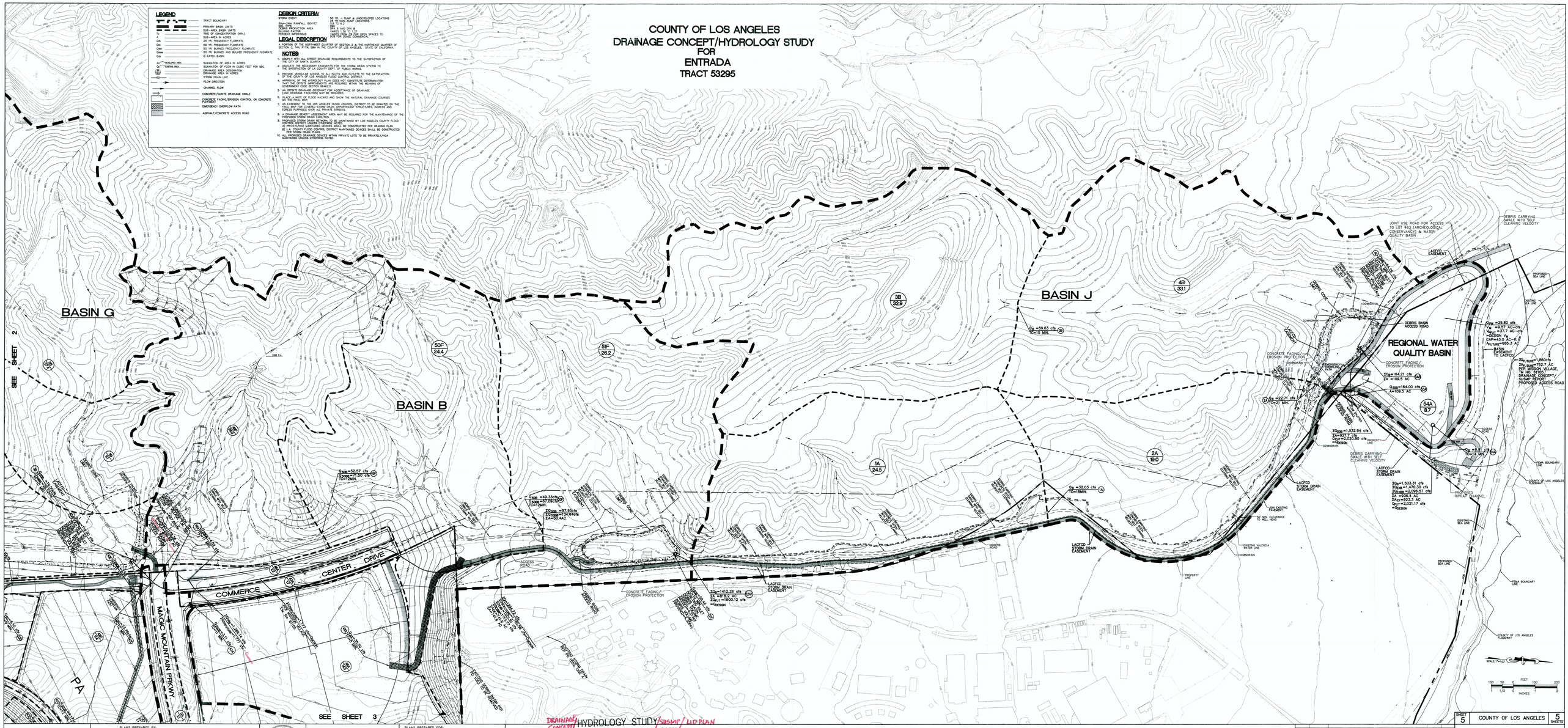
4 | COUNTY OF LOS ANGELES | 5 SHEETS

DRAINAGE CONCEPT/
HYDROLOGY STUDY
FOR ENTRADA
TENTATIVE TRACT 53295
DEVELOPED CONDITION

ENTRADA DRAINAGE CONCEPT - DEVELOPED CONDITION

RECEIVED
DEC 0 1 2010

0830/HYDROLOGY/0830-HYDRO-SHT-04.DWG


COUNTY OF LOS ANGELES
DRAINAGE CONCEPT/HYDROLOGY STUDY
FOR
ENTRADA
TRACT 53295
LEGEND
TRACT BOUNDARY
PRIMARY BASIN LIMITS
SUB-AREA BASIN LIMITS
TIME OF CONCENTRATION (MIN.)
25 YR. FREQUENCY FLOWRATE
25 YR. FREQUENCY FLOWRATE
50 YR. FREQUENCY FLOWRATE
50 YR. BURNED FREQUENCY FLOWRATE
50 YR. BURNED AND BULKED FREQUENCY FLOWRATE
Q CATCH BASIN
SUMNATION OF AREA IN ACRES
SUMNATION OF FLOW IN CUBIC FEET PER SEC.
DRAINAGE AREA DESIGNATION
DRAINAGE AREA IN ACRES
STORM DRAIN LINE
FLOW DIRECTION
CHANNEL FLOW
CONCRETE/GUNITE DRAINAGE SWALE
CONCRETE FACING/EROSION CONTROL OR CONCRETE PAVEMENT
EMERGENCY OVERFLOW PATH
ASPHALT/CONCRETE ACCESS ROAD
DESIGN CRITERIA:
STORM EVENT
50 YR. — SUMP & UNDEVELOPED LOCATIONS
25 YR. — ALL NON-SUMP LOCATIONS
50yr-24hr RAINFALL ISOHYET
2.5 TO 4.0
SOIL TYPE
D
RUNOFF PRODUCTION AREA
DPA 5 AND DPA B
BULKING FACTOR
VARIES 1.38 TO 1.27
PERVIOUS / IMPERVIOUS
VARIES FROM 35 FOR OPEN SPACES TO 90/10 FOR DENSE CONDITIONS
LEGAL DESCRIPTION
A PORTION OF THE NORTHWEST QUARTER OF SECTION 2 & THE NORTHEAST QUARTER OF SECTION 3, T4N, R17W, SBM IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.
NOTES:
1. COMPLY WITH ALL STREET DRAINAGE REQUIREMENTS TO THE SATISFACTION OF THE CITY OF SANTA CLARITA.
2. DEDICATE THE NECESSARY EASEMENTS FOR THE STORM DRAIN SYSTEM TO THE SATISFACTION OF LA COUNTY DEPT. OF PUBLIC WORKS.
3. PROVIDE 20X20-AR ACCESS TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF LA COUNTY DEPT. OF PUBLIC WORKS FOR MAINTENANCE.
4. GRADING OUTSIDE THE HORSHOED IS DOES NOT CONSTITUTE DETERMINATION THAT NO OFFSITE IMPROVEMENTS ARE REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 66462.5.
5. AN OFFSITE DRAINAGE COVENANT FOR ACCEPTANCE OF DRAINAGE CONCENTRATED ONTO ADJACENT PROPERTIES MAY BE REQUIRED.
6. PLACE A NOTE OF FLOOD HAZARD AND SHOW THE NATURAL DRAINAGE COURSES ON THE FINAL MAP.
7. AN EASEMENT TO THE LOS ANGELES FLOOD CONTROL DISTRICT TO BE GRANTED ON THE FINAL MAP FOR ACCESS TO ALL DRAINAGE APPURTENANT STRUCTURES, INLETS AND LINES PURSUED OVER ALL PRIVATE STREETS.
8. A DRAINAGE BENEFIT ASSESSMENT AREA MAY BE REQUIRED FOR THE MAINTENANCE OF THE PROPOSED STORM DRAIN FACILITIES.
9. PROPOSED STORM DRAIN NETWORK TO BE MAINTAINED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT EXCEPT AS NOTED BELOW:
A) PRIVATELY MAINTAINED DEVICES SHALL BE CONSTRUCTED PER GRADING PLAN
B) L.A. COUNTY FLOOD CONTROL DISTRICT MAINTAINED DEVICES SHALL BE CONSTRUCTED PER STORM DRAIN PLANS.
10. ALL DRAINAGE FACILITIES LOCATED WITHIN PRIVATE LOTS TO BE PRIVATELY/HOA MAINTAINED UNLESS OTHERWISE NOTED.
BASIN G
BASIN B
BASIN J
SEE SHEET 2
SEE SHEET 3
COMMERCE CENTER DRIVE
MAGIC MOUNTAIN PKWY.
REGIONAL WATER QUALITY BASIN
JOINT USE ROAD FOR ACCESS TO LOT 443 (ARCHEOLOGICAL CONSERVANCY) & WATER QUALITY BASIN
DEBRIS CARRYING SWALE WITH SELF CLEANING VELOCITY
DEBRIS BASIN ACCESS ROAD
CONCRETE FACING/ EROSION PROTECTION
LACFCD STORM DRAIN EASEMENT
EXISTING SEA LINE
PROPOSED SEA LINE
EXISTING VALENCIA WATER LINE
PROPERTY LINE
ITEM BOUNDARY LINE
COUNTY OF LOS ANGELES FLOODWAY
PROPOSED RIPRAP CHANNEL
ACCESS ROAD
50' MIN. CLEARANCE TO WELL HEAD
ADJ. EXISTING PAVEMENT
SCALE: 1"=100'
FEET
INCHES
PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE. CARLSBAD, CA. 92008
(760) 431-9696
PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG W. WHITTAKER R.C.E. 51929
12-2-10
DATE
REGISTERED PROFESSIONAL ENGINEER
CRAIG W. WHITTAKER
No. 51929
EXP. 6-30-12
CIVIL
STATE OF CALIFORNIA
PLANS PREPARED FOR:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : ALEX HERRELL
DRAINAGE CONCEPT/HYDROLOGY STUDY/SUSMP/LID PLAN
APPROVED FOR AREA AND Q ONLY
APPROVED BY: _____ RCE NO. 46826 DATE: 12/21/2010
CHECKED BY: _____ DATE: 12/21/2010
LAND DEVELOPMENT DIVISION
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
SHEET 5
COUNTY OF LOS ANGELES
5 SHEETS
DRAINAGE CONCEPT/
HYDROLOGY STUDY
FOR ENTRADA
TENTATIVE TRACT 53295
DEVELOPED CONDITION
NO. DATE BY APP.
FOR PRELIMINARY USE ONLY
DEC 01 2010

ENTRADA SOUTH

DRAINAGE CONCEPT REPORT

DEBRIS BASIN CAPACITY CALCULATIONS

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin A, Subarea 8C
JOB NO. : 930
BY: Jason
DATE: 2/12/2010

SCALE: 1"= 60'
AREA LABEL: A
UNIT FACTOR: 66.67
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1335	0.00				
		0.8	1	66.67	53
1336	0.80				
		1.8	1	66.67	120
1337	1.00				
		2.05	1	66.67	137
1338	1.05				
		1.05	1	66.67	70
1339	0.00				
		0	1	66.67	0
1340	0.00				
		0	1	66.67	0
1341	0.00				
		0	1	66.67	0
1342	0.00				
		0	1	66.67	0
1343	0.00				
		0	1	66.67	0
1344	0.00				
		0	1	66.67	0
1345	0.00				
		0	1	66.67	0
1346	0.00				
		0	1	66.67	0
1347	0.00				
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		CUBIC	YARDS		380

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin A, Subarea 15C
JOB NO. : 930
BY: Jason
DATE: 2/19/2010

SCALE: 1"= 60'
AREA LABEL: A
UNIT FACTOR: 66.67
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1304	0.00				
		1.634	1	66.67	109
1305	1.63				
		3.847	1	66.67	256
1306	2.21				
		2.213	1	66.67	148
1307	0.00				
		0	1	66.67	0
1308	0.00				
		0	1	66.67	0
1309	0.00				
		0	1	66.67	0
1310	0.00				
		0	1	66.67	0
1311	0.00				
		0	1	66.67	0
1312	0.00				
		0	1	66.67	0
1313	0.00				
		0	1	66.67	0
1314	0.00				
		0	1	66.67	0
1315	0.00				
		0	1	66.67	0
1316	0.00				
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		CUBIC	YARDS		513

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin A, Subarea 20C
JOB NO. : 930
BY: Jason
DATE: 11/11/2009

SCALE: 1"= 60'
AREA LABEL: A
UNIT FACTOR: 66.67
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1269	0.00				
		0.26	1	66.67	17
1270	0.26				
		0.68	1	66.67	45
1271	0.42				
		1.03	1	66.67	69
1272	0.61				
		1.53	1	66.67	102
1273	0.92				
		2.12	1	66.67	141
1274	1.20				
		2.53	1	66.67	84
1274.5	1.33				
		1.33	1	66.67	89
1275.5	0.00				
		0	1	66.67	0
1276.5	0.00				
		0	1	66.67	0
1277.5	0.00				
		0	1	66.67	0
1278.5	0.00				
		0	1	66.67	0
1279.5	0.00				
		0	1	66.67	0
1280.5	0.00				
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		CUBIC	YARDS		548

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin B, Subarea 2A
JOB NO. : 930
BY: Jason
DATE: 5/6/2010

SCALE: 1"= 60'
AREA LABEL: A
UNIT FACTOR: 66.67
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1339	0.00				
		0.8	1	66.67	53
1340	0.80				
		1.77	1	66.67	118
1341	0.97				
		0.97	1	66.67	65
1342	0.00				
		0	1	66.67	0
1343	0.00				
		0	1	66.67	0
1344	0.00				
		0	1	66.67	0
1345	0.00				
		0	1	66.67	0
1346	0.00				
		0	1	66.67	0
1347	0.00				
		0	1	66.67	0
1348	0.00				
		0	1	66.67	0
1349	0.00				
		0	1	66.67	0
1350	0.00				
		0	1	66.67	0
1351	0.00				
		0	1	66.67	0
1352					
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		CUBIC	YARDS		236

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin B, Subarea 51F
JOB NO. : 930
BY: Jason
DATE: 2/19/2010

SCALE: 1"= 40'
AREA LABEL: A
UNIT FACTOR: 29.63
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1125	0.00				
		5.512	1	29.63	163
1126	5.51				
		19.692	1	29.63	583
1127	14.18				
		37.15	1	29.63	1101
1128	22.97				
		53.82	1	29.63	1595
1129	30.85				
		30.85	1	29.63	914
1130	0.00				
		0	1	29.63	0
1131	0.00				
		0	1	29.63	0
1132	0.00				
		0	1	29.63	0
1133	0.00				
		0	1	29.63	0
1134	0.00				
		0	1	29.63	0
1135	0.00				
		0	1	29.63	0
1136	0.00				
		0	1	29.63	0
1137	0.00				
		0	1	29.63	0
1138					
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		CUBIC	YARDS		4356

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin E, Subarea 3A
JOB NO. : 930
BY: Jason
DATE: 11/11/2009

SCALE: 1"= 40'
AREA LABEL: A
UNIT FACTOR: 29.63
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1108	0.00				
		3.31	1	29.63	98
1109	3.31				
		8.94	1	29.63	265
1110	5.63				
		12.06	1	29.63	357
1111	6.43				
		13.48	1	29.63	399
1112	7.05				
		14.99	1	29.63	444
1113	7.94				
		16.55	1	29.63	490
1114	8.61				
		8.61	1	29.63	255
1115	0.00				
		0	1	29.63	0
1116	0.00				
		0	1	29.63	0
1117	0.00				
		0	1	29.63	0
1118	0.00				
		0	1	29.63	0
1119	0.00				
		0	1	29.63	0
1120	0.00				
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		CUBIC	YARDS		2309

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin E, Subarea 4A
JOB NO. : 930
BY: Jason
DATE: 11/11/2009

SCALE: 1"= 40'
AREA LABEL: A
UNIT FACTOR: 29.63
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1107	0.00				
		1.58	1	29.63	47
1108	1.58				
		3.42	1	29.63	51
1108.5	1.84				
		1.84	1	29.63	55
1109.5	0.00				
		0	1	29.63	0
1110.5	0.00				
		0	1	29.63	0
1111.5	0.00				
		0	1	29.63	0
1112.5	0.00				
		0	1	29.63	0
1113.5	0.00				
		0	1	29.63	0
1114.5	0.00				
		0	1	29.63	0
1115.5	0.00				
		0	1	29.63	0
1116.5	0.00				
		0	1	29.63	0
1117.5	0.00				
		0	1	29.63	0
1118.5	0.00				
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		CUBIC	YARDS		152

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin G, Subarea 17A
JOB NO. : 930
BY: Jason
DATE: 5/7/2010

SCALE: 1"= 60'
AREA LABEL: A
UNIT FACTOR: 66.67
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1270	0.00				
		4	1	66.67	267
1271	4.00				
		19.93	1	66.67	1329
1272	15.93				
		48.35	1	66.67	3223
1273	32.42				
		80.87	1	66.67	5391
1274	48.45				
		114.74	1	66.67	7649
1275	66.29				
		66.29	1	66.67	4419
1276	0.00				
		0	1	66.67	0
1277	0.00				
		0	1	66.67	0
1278	0.00				
		0	1	66.67	0
1279	0.00				
		0	1	66.67	0
1280	0.00				
		0	1	66.67	0
1281	0.00				
		0	1	66.67	0
1282	0.00				
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		0	0	66.67	0
		CUBIC	YARDS		22279

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin H, Subarea 2A
JOB NO. : 930
BY: Jason
DATE: 2/19/2010

SCALE: 1"= 40'
AREA LABEL: A
UNIT FACTOR: 29.63
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1328	0.00				
		4.93	1	29.63	146
1329	4.93				
		18.23	1	29.63	540
1330	13.30				
		28.09	1	29.63	832
1331	14.79				
		30.88	1	29.63	915
1332	16.09				
		35.98	1	29.63	1066
1333	19.89				
		19.89	1	29.63	589
1334	0.00				
		0	1	29.63	0
1335	0.00				
		0	1	29.63	0
1336	0.00				
		0	1	29.63	0
1337	0.00				
		0	1	29.63	0
1338	0.00				
		0	1	29.63	0
1339	0.00				
		0	1	29.63	0
1340	0.00				
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		0	0	29.63	0
		CUBIC	YARDS		4089

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

JOB NAME: Entrada Drainage Basin I, Subarea 1A
JOB NO. : 930
BY: Jason
DATE: 5/10/2010

SCALE: 1"= 100'
AREA LABEL: A
UNIT FACTOR: 185.19
CUT OR FILL: FILL

ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1230	0.00				
		1.31	1	185.19	243
1231	1.31				
		5.35	1	185.19	991
1232	4.04				
		11.64	1	185.19	2156
1233	7.60				
		7.6	1	185.19	1407
1234	0.00				
		0	1	185.19	0
1235	0.00				
		0	1	185.19	0
1236	0.00				
		0	1	185.19	0
1237	0.00				
		0	1	185.19	0
1238	0.00				
		0	1	185.19	0
1239	0.00				
		0	1	185.19	0
1240	0.00				
		0	1	185.19	0
1241	0.00				
		0	1	185.19	0
1242	0.00				
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		CUBIC	YARDS		4796

ALLIANCE LAND PLANNING AND ENGINEERING

EARTHWORK VOLUMES

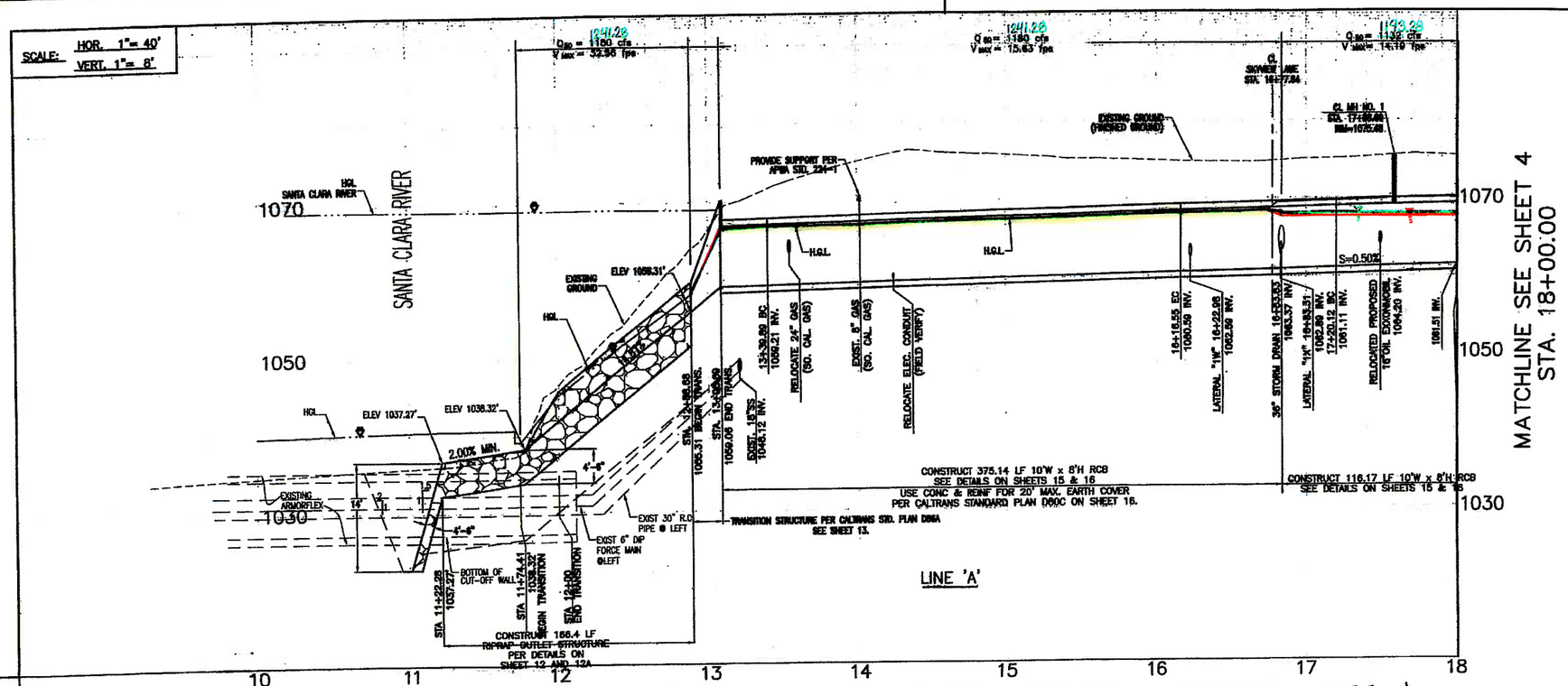
JOB NAME: Entrada Drainage Basin J, Subarea 4B
JOB NO. : 930
BY: Jason
DATE: 1/15/2010

SCALE: 1"= 100'
AREA LABEL: 4B
UNIT FACTOR: 185.19
CUT OR FILL: FILL

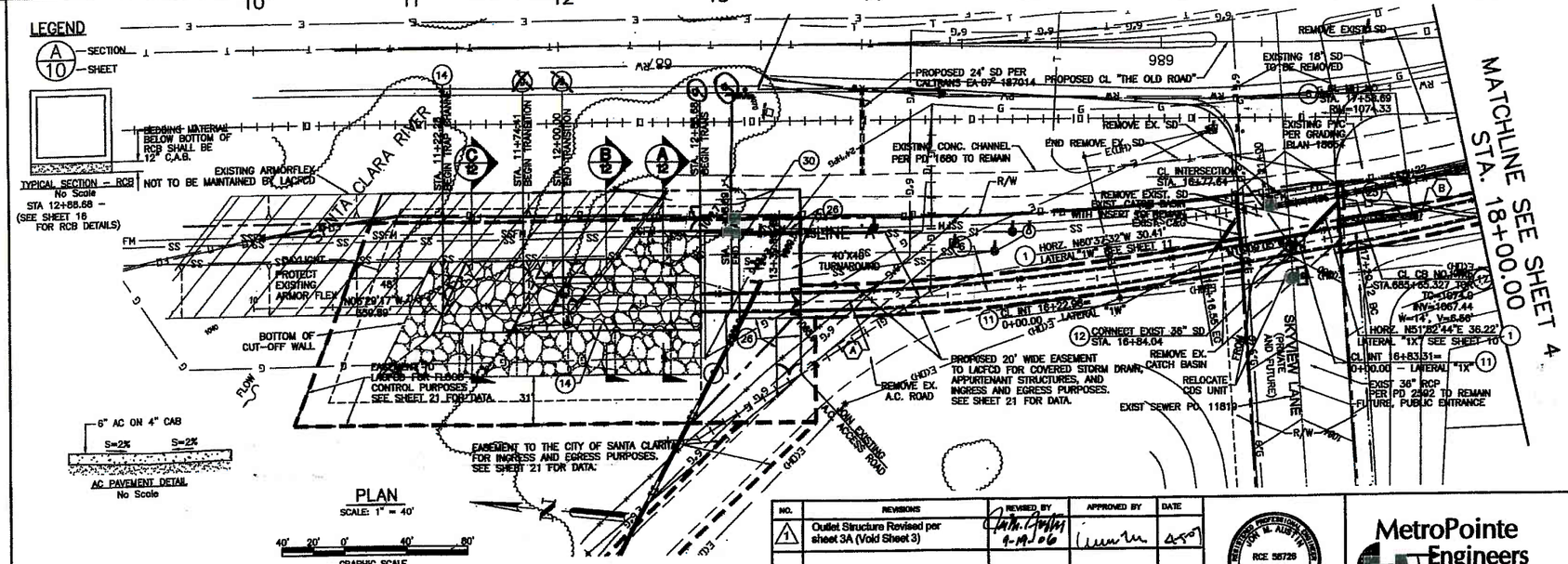
ELEVATION/ STATION	PLANIM. READING "INCHES"	SUM "INCHES"	INTERVAL "FEET"	FACTOR	QUANTITY "CY"
1041	0.00				
		2.51	1	185.19	465
1042	2.51				
		6.09	1	185.19	1128
1043	3.58				
		7.4	1	185.19	1370
1044	3.82				
		8.064	1	185.19	1493
1045	4.24				
		9.554	1	185.19	885
1045.5	5.31				
		5.31	1	185.19	983
1046.5	0.00				
		0	1	185.19	0
1047.5	0.00				
		0	1	185.19	0
1048.5	0.00				
		0	1	185.19	0
1049.5	0.00				
		0	1	185.19	0
1050.5	0.00				
		0	1	185.19	0
1051.5	0.00				
		0	1	185.19	0
1052.5	0.00				
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		0	0	185.19	0
		CUBIC	YARDS		6324

SECTION 5A
Existing Condition
Hydraulic Exhibits

SCALE: HOR. 1"= 40'
VERT. 1"= 8'



LEGEND
PROPOSED HGL
EXISTING HGL
EXISTING HGL



Curve Data				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
A	1640.36'	276.67'	138.67'	09°39'48"
B	1640.36'	263.28'	131.92'	09°11'46"

APPROVED FOR CONSTRUCTION BY:
ROBERT W. BEHMAN, P.E., L.S.
DIRECTOR OF PUBLIC WORKS
CITY OF SANTA CLARITA
4-5-07
DATE

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
1	Outlet Structure Revised per sheet 3A (Void Sheet 3)			4-5-07

REGISTERED PROFESSIONAL ENGINEER
JOHN M. AUSTIN
RCE 58728
Exp. 03/31/07
CIVIL
STATE OF CALIFORNIA
PROJECT ENGINEER
9/19/06
DATE

MetroPointe Engineers
3555 Harbor Gateway South, Suite A
Costa Mesa, CA 92626
(714) 438-1095

CONSTRUCTION NOTES

1. CONSTRUCT 18" RCP (D-LOAD PER PROFILE)
6. CONSTRUCT 10' x 8' RCB PER CALTRANS STD D80A ON SHEET 16.
8. CONSTRUCT MANHOLE CONCRETE BOX STORM DRAIN PER APWA STD 323-1.
9. CONSTRUCT TRANSITION STRUCTURE PER CALTRANS DETAIL D86A ON SHEET 20.
11. CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET < 30" PER APWA STD 334-1.
12. CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET > 30" PER APWA STD STD 333-1.
14. CONSTRUCT RIPRAP OUTLET STRUCTURE PER DETAIL 2 ON SHEET 12A.
17. MODIFIED CURB OPENING CATCH BASIN PER APWA STD. 300-2 B=3'-8", Wupstream 2'-6". (W&V PER PLAN). LOCAL DEPRESSION PER APWA STD. 313-1, CASE E. SEE STREET PLANS. INSTALL OCEAN-PRO CATCH BASIN INSERT, 3 DEBRIS GATES, 5 FILTER TRAYS, AND 10 POLLUTANT FILTERS.
25. CONSTRUCT 4' WIDE, 4" THICK PCC PEDESTRIAN ACCESS TO MANHOLE PER DETAIL 3 ON SHEET 12. CONSTRUCT MINIMUM 5'X5' CONCRETE PAD AROUND MANHOLE LID.
26. CONSTRUCT CHAIN LINK FENCE AND GATE PER APWA STD. 600-2.
27. CONSTRUCT 16' WIDE DRIVEWAY APPROACH PER APWA STD. 110-1, TYPE A. W=16', X=3', Y=4'. DRIVEWAY SHALL BE 6" THICK PCC.
30. CONSTRUCT 6" THICK A.C. ACCESS ROAD PER SECTION HEREIN.

STORM DRAIN PLANS IN
CITY OF SANTA CLARITA MTD. No. 1764

CITY OF SANTA CLARITA

STORM DRAIN PLAN AND PROFILE
MTD NO. 1764
SYSTEM A
FROM STA. 10+00 TO STA. 18+00

DWG | SHEET 3A OF 21

SCALE: HOR. 1"= 40'
VERT. 1"= 8'

MATCHLINE SEE SHEET 3 STA. 18+00.00

MATCHLINE SEE SHEET 5 STA. 28+00.00

1090
1070
1050

1193.28 Q 50= 1132 cfs V max= 24.18 fps

1193.28 Q 50= 1132 cfs V max= 26.94 fps

1193.28 Q 50= 1132 cfs V max= 28.51 fps

1193.28 Q 50= 1132 cfs V max= 28.27 fps

1187.28 Q 50= 1132 cfs V max= 27.24 fps

EXISTING GROUND

FINISHED GROUND

Cl. MH NO. 2 STA. 21+80.43 GB RIM=1078.27

Cl. MH NO. 3 STA. 24+85.06 RIM=1082.93

Cl. MH NO. 4 STA. 27+75.00 RIM=1090.84

H.G.L.

S=0.50%

S=1.09%

S=2.76%

19+53.40 EQ. ⊕1062.43 INV.

20+43.47 BC ⊕1062.75 INV.

21+80.43 GB ⊕1063.41 INV.

LATERAL "1T" 21+82.40 1065.51 INV.

LATERAL "1S" 22+14.82 1065.78 INV.

22+38.79 RCD ⊕1064.03 INV.

LATERAL "1H" 23+79.72 1067.33 INV.

LATERAL "1H" 24+37.85 1067.55 INV.

24+86.22 ⊕1066.75 INV.

24+86.06 ⊕1066.88 INV.

LATERAL "1P" 25+30.57 1067.10 INV.

LATERAL "1P" 26+71.71 1070.87 INV.

SUMP, GRATED SURFACE

27+75.00 ⊕1090.84 INV.

⊕1075.59 INV.

CONSTRUCT 656.22 LF 10'W x 8'H RCB SEE DETAIL ON SHEETS 15 & 16

CONSTRUCT 656.22 LF 10'W x 8'H RCB SEE DETAIL ON SHEETS 15 & 16

CONSTRUCT 45.31 LF 10'W x 7'H RCB SEE DETAIL ON SHEET 14

TRANS 10'W x 8'H RCB TO 10'W x 7'H RCB

CONSTRUCT 215.78 LF 10'W x 7'H RCB SEE DETAIL ON SHEETS 15 & 16

CONSTRUCT 45.87 LF 10'W x 7'H RCB SEE DETAIL ON SHEETS 15 & 16

LINE 'A' ⚠2

⊕ ALL RCB INVERT ELEVATIONS TO BE 1" HIGHER THAN DESIGN INVERT ELEVATIONS

18 19 20 21 22 23 24 25 26 27 28

PROP. STORM DRAIN PER CALTRANS EA 07-187014

R/W

DRIVEWAY

Cl. C.B. NO. 1Sb ST. STA. 684+17.652 TC=1076.61, INV.=1070.03 W=7', V=6.56'

EXIST. CONC. CHANNEL TO BE REMOVED

Cl. C.B. 1Rb ST. STA. 683+20.00 TC=1081.25, INV.=1080.91 W=7', V=8.56'

⚠2 Cl. INT LACSD 6" SSFM 0+57.22 – LATERAL "1S" PROVIDE PIPE SUPPORT PER LACSD STD PLAN S-8-217. PROVIDE MINIMUM 8" CLEARANCE FROM BOTTOM OF 6" SSFM TO TOP OF 24" RCP.

HORZ. N71°45'04"E, 107.86' LATERAL "1S" SEE SHEET 10

6"SSFM

EXISTING 6" SSFM

CL THE OLD ROAD

684+41.146 THE OLD ROAD= 10+00.00

EXIST. CONC. CHANNEL TO BE REMOVED

Cl. INT 22+00.49= 0+00.00 – LATERAL "1T"

Cl. INT 22+14.82= 0+00.00 – LATERAL "1S"

Cl. INT 23+79.72= 0+00.00 – LATERAL "1H"

Cl. INT 24+37.85= 0+00.00 – LATERAL "1R"

Cl. INT 25+30.57= 0+00.00 – LATERAL "1Q"

Cl. INT 26+71.71= 0+00.00 – LATERAL "1P"

STA. 24+86.06 END TRANS.

STA. 24+86.22 BEGIN TRANS.

Cl. MH NO. 3 STA. 24+85.06 RIM=1082.93

AT "1R" SEE SHEET 10A

19+53.40 EQ.

20+43.47 BC

22+38.79 RCD

N25°20'5"W

LINE 'A'

R/W

Cl. CB NO. 1Tc ST. STA. 684+21.317 TC=1078.89, INV.=1067.91 W=14', V=10.98'

HORZ. N71°56'35"E, 4.01' LATERAL "1T" SEE SHEET 10A

HORZ. N72°06'17"E, 13.12' LATERAL "1T" SEE SHEET 10

ST. STA. 684+21.074 TC=1079.02, INV.=1070.79 NOT TO BE MAINTAINED BY LACFCD

RETAINING WALL SEE SEPARATE PLAN

SEE GRADING PLAN

HORZ. N66°04'48"E, 24.70' LATERAL "1Q" SEE SHEET 11

HORZ. N66°04'48"E, 4.00' LATERAL "1Q" SEE SHEET 11

Cl. C.B. NO. 10b ST. STA. 683+20.508 TC=1084.78, INV.=1076.56 W=7', V=8.22'

ST. STA. 683+20.980 TG=1084.77, INV.=1081.18

HORZ. N78°04'11"E, 61.87' LATERAL "1P" SEE SHEET 10

Cl. C.B. NO. 1Pb ST. STA. 682+55.033 TC=1088.97, INV.=1081.82 W=10', V=7.22'

HORZ. N63°18'07"E, 85.65' LATERAL "1P" SEE SHEET 10

ST. STA. 92+11.325 MMP TC=1089.15, INV.=1082.21 W=7', V=6.89'

PROPOSED 24" VCP SEWER (BY OTHERS)

EXIST. TERRACE DRAIN

CONTINUE BRIDGE DETAIL B-2, STD. PLAN 80-3 TO OUTLET STRUCTURE, REFERENCE SHEET 20. IN UNPAVED AREAS.

PROPOSED 28' WIDE EASEMENT TO LACFCD FOR COVERED STORM DRAIN, APPURTENANT STRUCTURES, AND INGRESS AND EGRESS PURPOSES. SEE SHEET 21 FOR DATA

CONSTRUCTION NOTES

1. CONSTRUCT 18" RCP (D-LOAD PER PROFILE)
2. CONSTRUCT 24" RCP (D-LOAD PER PROFILE)
6. CONSTRUCT 10' x 8' RCB PER CALTRANS STD D80A ON SHEET 16.
7. CONSTRUCT 10' x 7' RCB PER CALTRANS STD D80A ON SHEET 16.
8. CONSTRUCT MANHOLE CONCRETE BOX STORM DRAIN PER APWA STD 323-1.
10. CONSTRUCT TRANSITION STRUCTURE SINGLE RCB TO SINGLE RCB PER APWA STD 341-1.
11. CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET < 30" PER APWA STD 334-1.
17. MODIFIED CURB OPENING CATCH BASIN PER APWA STD. 300-2. B=3'-6", Wupstream ≥ 2'-6". (W=V PER PLAN). LOCAL DEPRESSION PER APWA STD. 313-1, CASE E. SEE STREET PLANS. INSTALL OCEAN-PRO CATCH BASIN INSERT. DEBRIS GATES, FILTER TRAYS, AND POLLUTANT FILTERS PER SCHEDULE ON SHEET 2.
18. GRATING CATCH BASIN PER STREET PLANS. NOT TO BE MAINTAINED BY LACFCD.
19. 24" DIA. PERFORATED CMP RISER WITH ASPHALT APRON PER GRADING PLAN. NOT TO BE MAINTAINED BY LACFCD.
28. 12" DIA. PVC, SCH 40 PIPE PER GRADING PLAN. NOT TO BE MAINTAINED BY LACFCD.

PLAN
SCALE: 1" = 40'
40' 20' 0' 40' 80'

GRADING 30-02

APPROVED FOR CONSTRUCTION BY:

ROBERT G. MEDMAN, P.E., L.S. DIRECTOR OF PUBLIC WORKS CITY OF SANTA CLARITA

DATE

Curve Data				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
B	1640.36'	263.28'	131.93'	09°11'46"
C	1640.36'	193.32'	98.77'	06°45'08"
D	3636.48'	1612.61'	819.78'	25°24'29"

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
⚠1	LACSD 24" VCP SEWER CROSSING	6/23/17		9-17-18
⚠2	OLD ROAD SUPERELEVATION REVISION, SEE CALTRANS PLAN SET SHEET P-8. RELOCATED LATERAL "1R"	6/23/17		9-17-18

REGISTERED PROFESSIONAL ENGINEER JASON M. AUSTIN RCE 56726 Exp. 03/31/10 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER DATE 6/29/18

MetroPointe Engineers
3555 Harbor Gateway South, Suite A
Costa Mesa, CA 92626
(714) 438-1095

"PF837570"

STORM DRAIN PLANS IN CITY OF SANTA CLARITA MTD. No. 1764

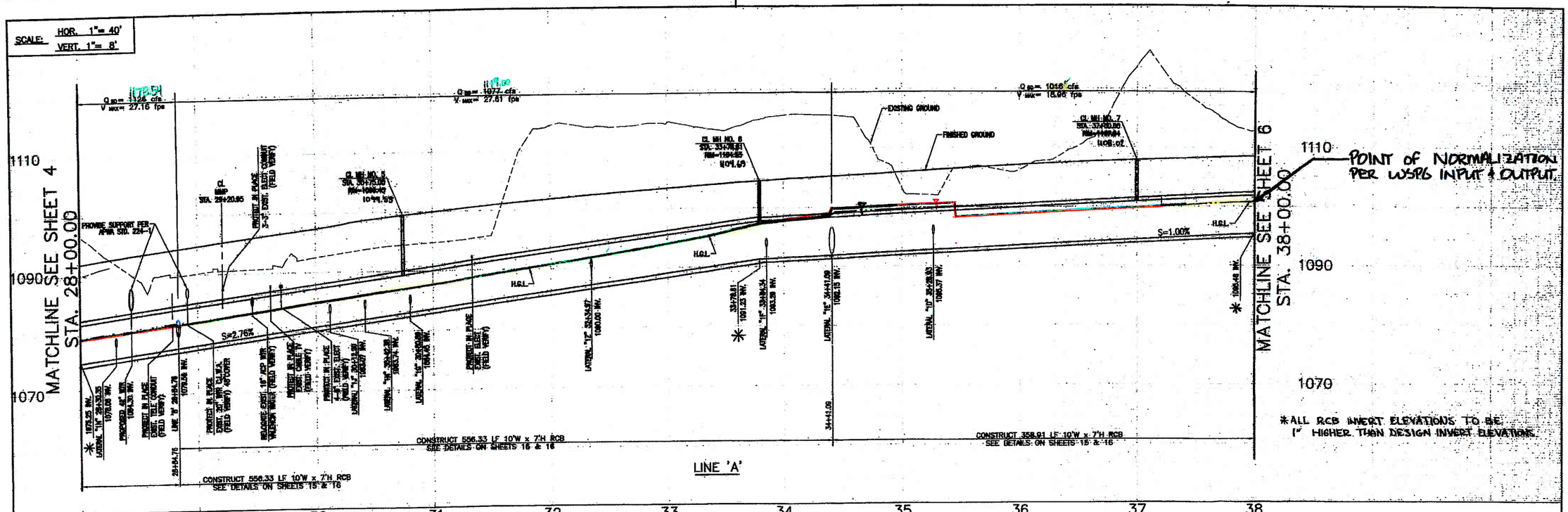
CITY OF SANTA CLARITA

STORM DRAIN PLAN AND PROFILE
MTD NO. 1764
SYSTEM A
FROM STA. 18+00 TO STA. 28+00

DWG

SHEET 4A OF 21

SCALE: HOR. 1"= 40'
VERT. 1"= 8'



CONSTRUCTION NOTES

1. CONSTRUCT 18" RCP (D-LOAD PER PROFILE)
5. CONSTRUCT 54" RCP (D-LOAD PER PROFILE)
7. CONSTRUCT 10' x 7' RCB PER CALTRANS STD D80A ON SHEET 16.
8. CONSTRUCT MANHOLE CONCRETE BOX STORM DRAIN PER APWA STD 323-1.
11. CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET < 30" PER APWA STD 334-1.
12. CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET > 30" PER APWA STD 333-1.
17. MODIFIED CURB OPENING CATCH BASIN PER APWA STD. 300-2. B=3'-8", Vupstream ≥ 2'-6". (WxV PER PLAN). LOCAL DEPRESSION PER APWA STD. 313-1, CASE E. SEE STREET PLANS. INSTALL OCEAN-PRO CATCH BASIN INSERT. DEBRIS GATES, FILTER TRAYS, AND POLLUTANT FILTERS PER SCHEDULE ON SHEET 2.
19. 24" DIA. PERFORATED CMP RISER WITH ASPHALT APRON PER GRADING PLAN. NOT TO BE MAINTAINED BY LACFCD.
22. CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. 320-1.
31. CURBSIDE GRATING CATCH BASIN PER CHEVRON GRADING PLANS. NOT TO BE MAINTAINED BY LACFCD.

PF534686

Curve Data				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
D	3636.46'	1612.61'	819.78'	25°24'29"
E	22.50'	15.46'	8.05'	39°22'14"

PLAN
SCALE: 1" = 40'

GRAPHIC SCALE

APPROVED FOR CONSTRUCTION BY:
ROBERT B. NEWMAN, P.E. L.S.
DIRECTOR OF PUBLIC WORKS
CITY OF SANTA CLARITA
For RGN 6-7-06
DATE

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
1	LACSD 24"VCP SEWER CROSSING	8/29/07		9-12-07

REGISTERED PROFESSIONAL ENGINEER
JOHN M. AUSTIN
RCE 58726
Exp. 03/31/07
CIVIL
STATE OF CALIFORNIA
PROJECT ENGINEER 5-31-06 DATE

MetroPointe Engineers
3555 Harbor Gateway South, Suite A
Costa Mesa, CA 92626
(714) 438-1095

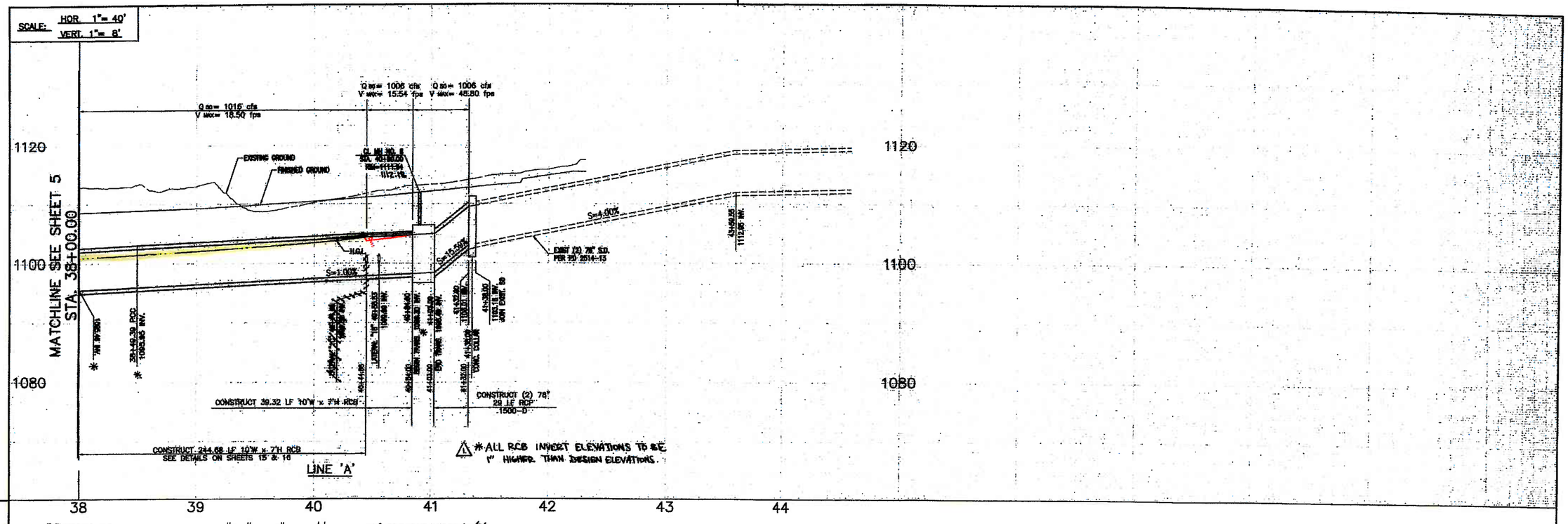
STORM DRAIN PLANS IN
CITY OF SANTA CLARITA MTD. No. 1764

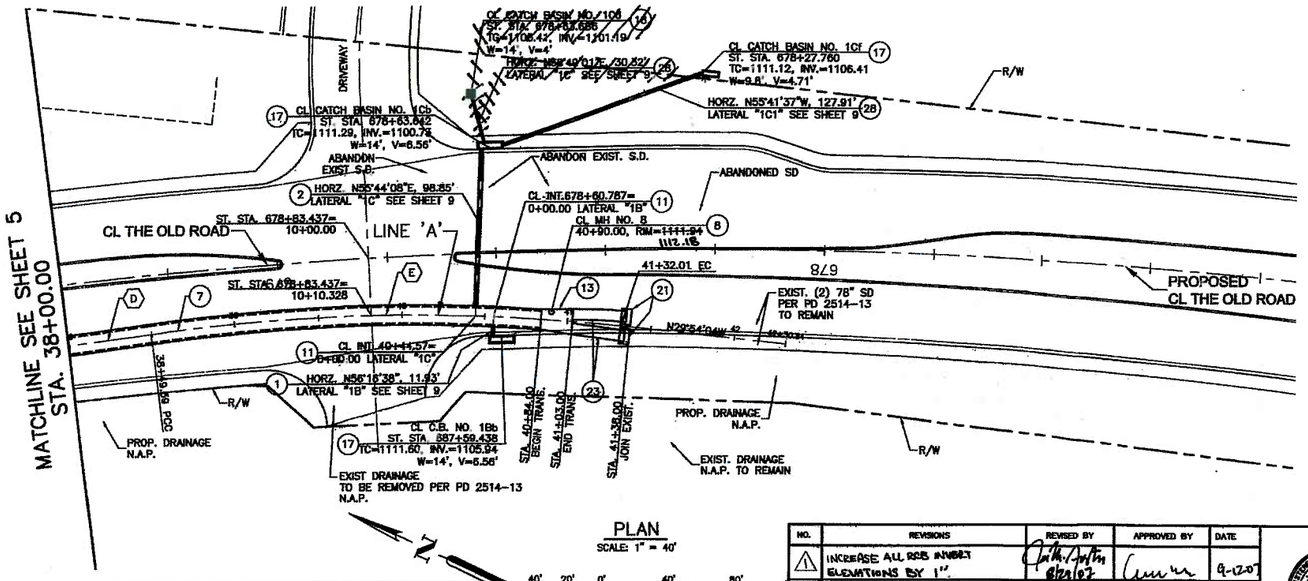
CITY OF SANTA CLARITA

STORM DRAIN PLAN AND PROFILE
MTD NO. 1764
SYSTEM A
FROM STA. 28+00 TO STA. 38+00

DWG | SHEET 5 OF 21

SCALE: HOR. 1"= 40'
VERT. 1"= 8'





CONSTRUCTION NOTES

1. CONSTRUCT 18" RCP (D-LOAD PER PROFILE)
2. CONSTRUCT 24" RCP (D-LOAD PER PROFILE)
7. CONSTRUCT 10' x 7' RCB PER CALTRANS STD D80A ON SHEET 16.
11. CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET < 30° PER APWA STD 334-1.
13. CONSTRUCT TRANSITION STRUCTURE DOUBLE RCP TO SINGLE RCB PER MODIFIED APWA STD 342-1 & 343-1 PER DETAIL 1 SHEET 12.
17. MODIFIED CURB OPENING CATCH BASIN PER APWA STD. 300-2. B=3'-8", Wupstream 2.2'-8". (W=V PER PLAN). LOCAL DEPRESSION PER APWA STD. 313-1, CASE E. SEE STREET PLANS. INSTALL OCEAN-PRO CATCH BASIN INSERT. DEBRIS GATES, FILTER TRAYS, AND POLLUTANT FILTERS PER SCHEDULE ON SHEET 2.
18. GRATING CATCH BASIN PER STREET PLANS. NOT TO BE MAINTAINED BY LACFCD.
21. CONSTRUCT CONCRETE COLLAR FOR RCP PER APWA STD. 380-2.
23. CONSTRUCT 78" RCP (D-LOAD PER PROFILE)
28. 12" PVC, SCH40 PER GRADING PLANS. NOT TO BE MAINTAINED BY LACFCD.

"PF534686"

PLAN
SCALE: 1" = 40'
40' 20' 0' 40' 80'
GRAPHIC SCALE

Curve Data				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
D	3636.48'	1612.61'	819.78'	25°24'29"
E	1148.25'	282.61'	142.02'	14°06'07"

APPROVED FOR CONSTRUCTION BY:

ROBERT C. NEWMAN, P.E., L.S.
DIRECTOR OF PUBLIC WORKS
CITY OF SANTA CLARITA
DATE 6-7-06

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
1	INCREASE ALL RCB INVERT ELEVATIONS BY 1'.			9-12-07

REGISTERED PROFESSIONAL ENGINEER
JON M. AUSTIN
RCE 58726
Exp. 03/31/07
CIVIL
STATE OF CALIFORNIA
PROJECT ENGINEER 5-31-06 DATE

MetroPointe Engineers
3555 Harbor Gateway South, Suite A
Costa Mesa, CA 92626
(714) 438-1095

STORM DRAIN PLANS IN
CITY OF SANTA CLARITA MTD. No. 1764
CITY OF SANTA CLARITA

STORM DRAIN PLAN AND PROFILE
MTD NO. 1764
SYSTEM A
FROM STA. 38+00 TO 41+38.00

DWG | SHEET 6 OF 21

Section 5

Existing Condition Hydraulics

MTD 1764

EXISTING CONDITION

HYDRAULICS

```
T1 MTD NO. 1764 HYDRAULICS                                              0
T2 LINE A
T3 FILE: MTD-1764-LINEA.WSW

SO   1286.6801055.310  1                                  1062.310
R    1308.6901059.060  1       .013                                    .000    .000 0
R    1339.8901059.210  1       .013                                    .000    .000 0
R    1616.5501060.590  1       .013                                   9.500    .000 0
R    1681.8301060.920  1       .013                                    .000    .000 0
JX   1683.8301060.930  1  2    .013     48.00          1062.890      90.000    .000 0
R    1720.1201061.110  1       .013                                    .000    .000 0
R    1800.0001061.510  1       .013                                   2.000    .000 0
R    1983.4001062.430  1       .013                                   7.000    .000 0
R    2043.4701062.730  1       .013                                    .000    .000 0
R    2180.4301063.410  1       .013                                   6.000    .000 0
R    2236.7901064.030  1       .013                                   1.000    .000 0
R    2486.2201066.750  1       .013                                   4.000    .000 0
TS   2496.0601066.850  3       .013                                    .000    .000 0
R    2749.0601073.840  3       .013                                   4.000    .000 0
JX   2751.0601073.890  3  4    .013      6.00          1075.870      90.000    .000 0
R    2800.0001075.250  3       .013                                   1.000    .000 0
R    2882.7601077.530  3       .013                                   1.300    .000 0
JX   2884.7601077.590  3  5    .013     49.00          1076.560      40.000    .000 0
R    3378.6101091.230  3       .013                                   7.800    .000 0
R    3439.0901092.130  3       .013                                   1.000    .000 0
JX   3441.0901092.150  3  6    .013    103.00          1092.650      30.000    .000 0
R    3800.0001095.460  3       .013                                    .000    .000 0
R    3849.3901095.950  3       .013                                    .800    .000 0
R    4042.6801097.890  3       .013                                  12.000    .000 0
JX   4044.6801097.910  3  4    .013     10.00          1099.910      90.000    .000 0
R    4084.0001098.300  3       .013                                   2.000    .000 0
SH   4084.0001098.300  3       .013                                    .000    .000 0

CD   1  3   0    .000   8.000   10.000  .000  .000   .00
CD   2  4   1    .000   3.000     .000  .000  .000   .00
CD   3  3   0    .000   7.000   10.000  .000  .000   .00
CD   4  4   1    .000   2.000     .000  .000  .000   .00
CD   5  4   1    .000   3.500     .000  .000  .000   .00
CD   6  4   1    .000   4.500     .000  .000  .000   .00
CD   7  4   1    .000   1.500     .000  .000  .000   .00
Q          1006.000   .0
```

FILE: MTD-1764-LINEA-EX.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1
Program Package Serial Number: 1488
WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 1:46:15
MTD NO. 1764 HYDRAULICS 0
LINE A
FILE: MTD-1764-LINEA.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1286.680	1055.310	4.714	1060.024	1222.00	25.92	10.44	1070.46	.00	7.74	10.00	8.000	10.000	.00	0 .0
1.595	.1704					.0155	.02	4.71	2.10	2.03	.013	.00	.00	BOX
1288.275	1055.582	4.788	1060.370	1222.00	25.52	10.11	1070.48	.00	7.74	10.00	8.000	10.000	.00	0 .0
4.392	.1704					.0142	.06	4.79	2.06	2.03	.013	.00	.00	BOX
1292.667	1056.330	5.022	1061.352	1222.00	24.33	9.20	1070.55	.00	7.74	10.00	8.000	10.000	.00	0 .0
3.743	.1704					.0125	.05	5.02	1.91	2.03	.013	.00	.00	BOX
1296.410	1056.968	5.267	1062.235	1222.00	23.20	8.36	1070.59	.00	7.74	10.00	8.000	10.000	.00	0 .0
3.156	.1704					.0110	.03	5.27	1.78	2.03	.013	.00	.00	BOX
1299.566	1057.505	5.524	1063.029	1222.00	22.12	7.60	1070.63	.00	7.74	10.00	8.000	10.000	.00	0 .0
2.622	.1704					.0097	.03	5.52	1.66	2.03	.013	.00	.00	BOX
1302.188	1057.952	5.793	1063.746	1222.00	21.09	6.91	1070.65	.00	7.74	10.00	8.000	10.000	.00	0 .0
2.134	.1704					.0086	.02	5.79	1.54	2.03	.013	.00	.00	BOX
1304.322	1058.316	6.076	1064.392	1222.00	20.11	6.28	1070.67	.00	7.74	10.00	8.000	10.000	.00	0 .0
1.685	.1704					.0076	.01	6.08	1.44	2.03	.013	.00	.00	BOX
1306.008	1058.603	6.373	1064.976	1222.00	19.18	5.71	1070.69	.00	7.74	10.00	8.000	10.000	.00	0 .0
1.271	.1704					.0067	.01	6.37	1.34	2.03	.013	.00	.00	BOX
1307.279	1058.820	6.684	1065.503	1222.00	18.28	5.19	1070.69	.00	7.74	10.00	8.000	10.000	.00	0 .0
.886	.1704					.0059	.01	6.68	1.25	2.03	.013	.00	.00	BOX

FILE: MTD-1764-LINEA-EX.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2
Program Package Serial Number: 1488
WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 1:46:15
MTD NO. 1764 HYDRAULICS 0
LINE A
FILE: MTD-1764-LINEA.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1308.164	1058.970	7.010	1065.981	1222.00	17.43	4.72	1070.70	.00	7.74	10.00	8.000	10.000	.00	0 .0
.526	.1704					.0053	.00	7.01	1.16	2.03	.013	.00	.00	BOX
1308.690	1059.060	7.352	1066.412	1222.00	16.62	4.29	1070.70	.00	7.74	10.00	8.000	10.000	.00	0 .0
31.200	.0048					.0050	.15	7.35	1.08	7.43	.013	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
1339.890	1059.210	7.324	1066.534	1222.00	16.69	4.32	1070.86	.05	7.74	10.00	8.000	10.000	.00	0 .0
38.411	.0050					.0050	.19	7.38	1.09	7.32	.013	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
1378.301	1059.402	7.324	1066.725	1222.00	16.69	4.32	1071.05	.05	7.74	10.00	8.000	10.000	.00	0 .0
238.249	.0050					.0051	1.22	7.38	1.09	7.32	.013	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
1616.550	1060.590	7.192	1067.782	1222.00	16.99	4.48	1072.26	.00	7.74	10.00	8.000	10.000	.00	0 .0
65.280	.0051					.0053	.34	7.19	1.12	7.28	.013	.00	.00	BOX
1681.830	1060.920	7.138	1068.058	1222.00	17.12	4.55	1072.61	.00	7.74	10.00	8.000	10.000	.00	0 .0
JUNCT STR	.0050					.0065	.01	7.14	1.13		.013	.00	.00	BOX

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 1:46:15

MTD NO. 1764 HYDRAULICS

LINE A 0

FILE: MTD-1764-LINEA.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1683.830	1060.930	5.981	1066.911	1174.00	19.63	5.98	1072.89	.00	7.54	10.00	8.000	10.000	.00	0 .0
36.290	.0050					.0079	.29	5.98	1.41	7.11	.013	.00	.00	BOX
1720.120	1061.110	5.878	1066.988	1174.00	19.97	6.19	1073.18	.05	7.54	10.00	8.000	10.000	.00	0 .0
79.880	.0050					.0086	.68	5.93	1.45	7.09	.013	.00	.00	BOX
1800.000	1061.510	5.649	1067.159	1174.00	20.78	6.71	1073.87	.09	7.54	10.00	8.000	10.000	.00	0 .0
13.390	.0050					.0091	.12	5.74	1.54	7.08	.013	.00	.00	BOX

1813.390	1061.577	5.610	1067.187	1174.00	20.93	6.80	1073.99	.09	7.54	10.00	8.000	10.000	.00	0 .0
87.913	.0050					.0098	.86	5.70	1.56	7.08	.013	.00	.00	BOX
1901.303	1062.018	5.349	1067.367	1174.00	21.95	7.48	1074.85	.10	7.54	10.00	8.000	10.000	.00	0 .0
82.097	.0050					.0111	.91	5.45	1.67	7.08	.013	.00	.00	BOX
1983.400	1062.430	5.100	1067.530	1174.00	23.02	8.23	1075.76	.00	7.54	10.00	8.000	10.000	.00	0 .0
60.070	.0050					.0124	.75	5.10	1.80	7.09	.013	.00	.00	BOX
2043.470	1062.730	4.915	1067.645	1174.00	23.88	8.86	1076.50	.14	7.54	10.00	8.000	10.000	.00	0 .0
66.842	.0050					.0138	.92	5.05	1.90	7.11	.013	.00	.00	BOX
2110.312	1063.062	4.707	1067.769	1174.00	24.94	9.66	1077.43	.15	7.54	10.00	8.000	10.000	.00	0 .0
70.118	.0050					.0156	1.09	4.86	2.03	7.11	.013	.00	.00	BOX
2180.430	1063.410	4.488	1067.898	1174.00	26.16	10.62	1078.52	.07	7.54	10.00	8.000	10.000	.00	0 .0
56.360	.0110					.0171	.96	4.55	2.18	5.24	.013	.00	.00	BOX

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 1:46:15

MTD NO. 1764 HYDRAULICS

LINE A

FILE: MTD-1764-LINEA.WSW

0

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2236.790	1064.030	4.400	1068.430	1174.00	26.68	11.06	1079.49	.06	7.54	10.00	8.000	10.000	.00	0 .0
50.118	.0109					.0180	.90	4.46	2.24	5.25	.013	.00	.00	BOX
2286.908	1064.577	4.314	1068.891	1174.00	27.21	11.50	1080.39	.06	7.54	10.00	8.000	10.000	.00	0 .0
106.961	.0109					.0198	2.12	4.38	2.31	5.25	.013	.00	.00	BOX
2393.869	1065.743	4.113	1069.856	1174.00	28.54	12.65	1082.51	.07	7.54	10.00	8.000	10.000	.00	0 .0
92.351	.0109					.0225	2.08	4.18	2.48	5.25	.013	.00	.00	BOX
2486.220	1066.750	3.922	1070.672	1174.00	29.93	13.91	1084.59	.00	7.54	10.00	8.000	10.000	.00	0 .0
TRANS STR	.0102					.0242	.24	3.92	2.66		.013	.00	.00	BOX
2496.060	1066.850	3.893	1070.742	1174.00	30.16	14.13	1084.87	.08	7.00	10.00	7.000	10.000	.00	0 .0
32.106	.0276					.0244	.78	3.97	2.69	3.73	.013	.00	.00	BOX
2528.167	1067.737	3.909	1071.646	1174.00	30.03	14.00	1085.65	.08	7.00	10.00	7.000	10.000	.00	0 .0

220.894	.0276					.0227	5.02	3.99	2.68	3.73	.013	.00	.00	BOX		
2749.060	1073.840	4.100	1077.940	1174.00	28.63	12.73	1090.67	.00	7.00	10.00	7.000	10.000	.00	0	.0	
JUNCT STR	.0250					.0215	.04	4.19	2.49		.013	.00	.00	BOX		
2751.060	1073.890	4.053	1077.943	1168.00	28.81	12.89	1090.84	.09	7.00	10.00	7.000	10.000	.00	0	.0	
48.940	.0278					.0213	1.04	4.15	2.52	3.70	.013	.00	.00	BOX		
2800.000	1075.250	4.115	1079.365	1168.00	28.39	12.51	1091.88	.07	7.00	10.00	7.000	10.000	.00	0	.0	
82.760	.0275					.0200	1.65	4.18	2.47	3.72	.013	.00	.00	BOX		

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 1:46:15

MTD NO. 1764 HYDRAULICS

LINE A 0

FILE: MTD-1764-LINEA.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2882.760	1077.530	4.244	1081.774	1168.00	27.52	11.76	1093.53	.00	7.00	10.00	7.000	10.000	.00	0 .0
JUNCT STR	.0300					.0209	.04	4.31	2.35		.013	.00	.00	BOX
2884.760	1077.590	3.870	1081.460	1119.00	28.91	12.98	1094.44	.07	7.00	10.00	7.000	10.000	.00	0 .0
135.469	.0276					.0214	2.91	3.94	2.59	3.60	.013	.00	.00	BOX
3020.229	1081.332	4.027	1085.358	1119.00	27.79	11.99	1097.35	.07	7.00	10.00	7.000	10.000	.00	0 .0
104.224	.0276					.0190	1.98	4.09	2.44	3.60	.013	.00	.00	BOX
3124.453	1084.210	4.223	1088.433	1119.00	26.50	10.90	1099.34	.06	7.00	10.00	7.000	10.000	.00	0 .0
72.065	.0276					.0167	1.21	4.28	2.27	3.60	.013	.00	.00	BOX
3196.518	1086.201	4.429	1090.630	1119.00	25.26	9.91	1100.54	.05	7.00	10.00	7.000	10.000	.00	0 .0
53.015	.0276					.0147	.78	4.48	2.12	3.60	.013	.00	.00	BOX
3249.533	1087.665	4.645	1092.310	1119.00	24.09	9.01	1101.32	.05	7.00	10.00	7.000	10.000	.00	0 .0
40.331	.0276					.0129	.52	4.70	1.97	3.60	.013	.00	.00	BOX
3289.864	1088.779	4.872	1093.651	1119.00	22.97	8.19	1101.84	.05	7.00	10.00	7.000	10.000	.00	0 .0
31.217	.0276					.0114	.36	4.92	1.83	3.60	.013	.00	.00	BOX
3321.080	1089.641	5.110	1094.751	1119.00	21.90	7.45	1102.20	.04	7.00	10.00	7.000	10.000	.00	0 .0

24.303	.0276					.0100	.24	5.15	1.71	3.60	.013	.00	.00	BOX		
3345.384	1090.312	5.359	1095.672	1119.00	20.88	6.77	1102.44	.04	7.00	10.00	7.000	10.000	.00	0	.0	
18.842	.0276					.0088	.17	5.40	1.59	3.60	.013	.00	.00	BOX		

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 1:46:15

MTD NO. 1764 HYDRAULICS

0

LINE A

FILE: MTD-1764-LINEA.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3364.225	1090.833	5.621	1096.454	1119.00	19.91	6.15	1102.61	.03	7.00	10.00	7.000	10.000	.00	0 .0
14.385	.0276					.0078	.11	5.65	1.48	3.60	.013	.00	.00	BOX
3378.610	1091.230	5.895	1097.125	1119.00	18.98	5.59	1102.72	.03	7.00	10.00	7.000	10.000	.00	0 .0
17.919	.0149					.0071	.13	5.93	1.38	4.51	.013	.00	.00	BOX
3396.530	1091.497	6.067	1097.563	1119.00	18.45	5.28	1102.85	.03	7.00	10.00	7.000	10.000	.00	0 .0
21.697	.0149					.0064	.14	6.10	1.32	4.51	.013	.00	.00	BOX
3418.227	1091.820	6.363	1098.182	1119.00	17.59	4.80	1102.98	.03	7.00	10.00	7.000	10.000	.00	0 .0
13.657	.0149					.0057	.08	6.39	1.23	4.51	.013	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
3431.884	1092.023	6.673	1098.696	1119.00	16.77	4.37	1103.06	.03	7.00	10.00	7.000	10.000	.00	0 .0
7.206	.0149					.0064	.05	6.70	1.14	4.51	.013	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
3439.090	1092.130	7.000	1099.130	1119.00	15.99	3.97	1103.10	.00	7.00	10.00	7.000	10.000	.00	0 .0
JUNCT STR	.0100					.0062	.01	7.00	1.06		.013	.00	.00	BOX
3441.090	1092.150	8.091	1100.241	1016.00	14.51	3.27	1103.51	.00	6.85	10.00	7.000	10.000	.00	0 .0
104.740	.0092					.0062	.64	8.09	.97	5.02	.013	.00	.00	BOX

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 1:46:15

MTD NO. 1764 HYDRAULICS

0

LINE A

FILE: MTD-1764-LINEA.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3545.830	1093.116	7.770	1100.885	1016.00	14.51	3.27	1104.16	.00	6.85	10.00	7.000	10.000	.00	0 .0
HYDRAULIC JUMP														
3545.830	1093.116	5.123	1098.239	1016.00	19.83	6.11	1104.35	.00	6.85	10.00	7.000	10.000	.00	0 .0
254.170	.0092					.0084	2.15	5.12	1.54	5.02	.013	.00	.00	BOX
3800.000	1095.460	5.254	1100.714	1016.00	19.34	5.81	1106.52	.03	6.85	10.00	7.000	10.000	.00	0 .0
49.390	.0099					.0080	.40	5.29	1.49	4.88	.013	.00	.00	BOX
3849.390	1095.950	5.336	1101.286	1016.00	19.04	5.63	1106.92	.12	6.85	10.00	7.000	10.000	.00	0 .0
65.571	.0100					.0075	.49	5.46	1.45	4.86	.013	.00	.00	BOX
3914.961	1096.608	5.496	1102.104	1016.00	18.49	5.31	1107.41	.12	6.85	10.00	7.000	10.000	.00	0 .0
66.610	.0100					.0068	.45	5.61	1.39	4.86	.013	.00	.00	BOX
3981.571	1097.277	5.764	1103.041	1016.00	17.63	4.82	1107.86	.10	6.85	10.00	7.000	10.000	.00	0 .0
39.149	.0100					.0060	.24	5.87	1.29	4.86	.013	.00	.00	BOX
4020.720	1097.670	6.046	1103.715	1016.00	16.81	4.39	1108.10	.10	6.85	10.00	7.000	10.000	.00	0 .0
21.960	.0100					.0053	.12	6.14	1.20	4.86	.013	.00	.00	BOX
4042.680	1097.890	6.341	1104.231	1016.00	16.02	3.99	1108.22	.00	6.85	10.00	7.000	10.000	.00	0 .0
JUNCT STR	.0100					.0054	.01	6.41	1.12		.013	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
4044.680	1097.910	5.957	1103.867	1006.00	16.89	4.43	1108.30	.08	6.80	10.00	7.000	10.000	.00	0 .0
20.602	.0099					.0055	.11	6.04	1.22	4.85	.013	.00	.00	BOX
4065.282	1098.114	6.181	1104.295	1006.00	16.28	4.11	1108.41	.07	6.80	10.00	7.000	10.000	.00	0 .0
14.478	.0099					.0049	.07	6.25	1.15	4.85	.013	.00	.00	BOX
4079.760	1098.258	6.482	1104.740	1006.00	15.52	3.74	1108.48	.07	6.80	10.00	7.000	10.000	.00	0 .0

4.240	.0099				.0044	.02	6.55	1.07	4.85	.013		.00	.00	BOX	
		---------- WARNING - Flow depth near top of box conduit ----------													
4084.000	1098.300	6.800	1105.100	1006.00	14.79	3.40	1108.50	.06	6.80	10.00	7.000	10.000	.00	0	.0

MTD 1764
PROPOSED CONDITION HYDRAULICS

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T1 MTD NO. 1764 HYDRAULICS                                                0
T2 LINE A
T3 FILE: MTD-1764-LINEA.WSW

SO   1286.6801055.310  1                                  1062.310
R    1308.6901059.060  1       .013                                  .000    .000 0
R    1339.8901059.210  1       .013                                  .000    .000 0
R    1616.5501060.590  1       .013                                 9.500    .000 0
R    1681.8301060.920  1       .013                                  .000    .000 0
JX   1683.8301060.930  1  2    .013     48.00          1062.890     90.000    .000 0
R    1720.1201061.110  1       .013                                  .000    .000 0
R    1800.0001061.510  1       .013                                 2.000    .000 0
R    1983.4001062.430  1       .013                                 7.000    .000 0
R    2043.4701062.730  1       .013                                  .000    .000 0
R    2180.4301063.410  1       .013                                 6.000    .000 0
R    2236.7901064.030  1       .013                                 1.000    .000 0
R    2486.2201066.750  1       .013                                 4.000    .000 0
TS   2496.0601066.850  3       .013                                  .000    .000 0
R    2749.0601073.840  3       .013                                 4.000    .000 0
JX   2751.0601073.890  3  4    .013      6.00          1076.390     90.000    .000 0
R    2800.0001075.250  3       .013                                 1.000    .000 0
R    2828.2901076.030  3       .013                                 0.300    .000 0
JX   2830.2901076.090  3  7    .013      8.74          1075.870     90.000    .000 0
R    2882.7601077.530  3       .013                                 1.000    .000 0
JX   2884.7601077.590  3  5    .013     59.54          1079.560     40.000    .000 0
R    3378.6101091.230  3       .013                                 7.800    .000 0
R    3439.0901092.130  3       .013                                 1.000    .000 0
JX   3441.0901092.150  3  6    .013    103.00          1092.650     30.000    .000 0
R    3800.0001095.460  3       .013                                  .000    .000 0
R    3849.3901095.950  3       .013                                  .800    .000 0
R    4042.6801097.890  3       .013                                12.000    .000 0
JX   4044.6801097.910  3  4    .013     10.00          1099.910     90.000    .000 0
R    4084.0001098.300  3       .013                                 2.000    .000 0
SH   4084.0001098.300  3       .013                  1105.500        .000    .000 0

CD   1  3   0    .000   8.000   10.000  .000  .000   .00
CD   2  4   1    .000   3.000     .000  .000  .000   .00
CD   3  3   0    .000   7.000   10.000  .000  .000   .00
CD   4  4   1    .000   2.000     .000  .000  .000   .00
CD   5  4   1    .000   3.500     .000  .000  .000   .00
CD   6  4   1    .000   4.500     .000  .000  .000   .00
CD   7  4   1    .000   1.500     .000  .000  .000   .00
Q          1006.000   .0
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FILE: MTD-1764-LINEA.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS

LINE A 0

FILE: MTD-1764-LINEA.WSW

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1286.680	1055.310	4.775	1060.085	1241.28	26.00	10.50	1070.58	.00	7.82	10.00	8.000	10.000	.00	0 .0
1.561	.1704					.0154	.02	4.77	2.10	2.05	.013	.00	.00	BOX
1288.241	1055.576	4.848	1060.424	1241.28	25.60	10.18	1070.60	.00	7.82	10.00	8.000	10.000	.00	0 .0
4.411	.1704					.0142	.06	4.85	2.05	2.05	.013	.00	.00	BOX
1292.651	1056.328	5.084	1061.412	1241.28	24.41	9.25	1070.67	.00	7.82	10.00	8.000	10.000	.00	0 .0
3.757	.1704					.0125	.05	5.08	1.91	2.05	.013	.00	.00	BOX
1296.408	1056.968	5.333	1062.300	1241.28	23.28	8.41	1070.71	.00	7.82	10.00	8.000	10.000	.00	0 .0
3.166	.1704					.0110	.03	5.33	1.78	2.05	.013	.00	.00	BOX
1299.575	1057.507	5.593	1063.100	1241.28	22.19	7.65	1070.75	.00	7.82	10.00	8.000	10.000	.00	0 .0
2.629	.1704					.0097	.03	5.59	1.65	2.05	.013	.00	.00	BOX
1302.204	1057.955	5.866	1063.821	1241.28	21.16	6.95	1070.77	.00	7.82	10.00	8.000	10.000	.00	0 .0
2.137	.1704					.0086	.02	5.87	1.54	2.05	.013	.00	.00	BOX
1304.341	1058.319	6.152	1064.471	1241.28	20.18	6.32	1070.79	.00	7.82	10.00	8.000	10.000	.00	0 .0
1.685	.1704					.0076	.01	6.15	1.43	2.05	.013	.00	.00	BOX
1306.026	1058.606	6.452	1065.059	1241.28	19.24	5.75	1070.81	.00	7.82	10.00	8.000	10.000	.00	0 .0
1.268	.1704					.0067	.01	6.45	1.33	2.05	.013	.00	.00	BOX
1307.294	1058.822	6.767	1065.590	1241.28	18.34	5.22	1070.81	.00	7.82	10.00	8.000	10.000	.00	0 .0
.879	.1704					.0059	.01	6.77	1.24	2.05	.013	.00	.00	BOX

FILE: MTD-1764-LINEA.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS

LINE A 0

FILE: MTD-1764-LINEA.WSW

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT) / SE Dpth	Water Elev / Froude N	Q (CFS) / Norm Dp	Vel (FPS) / "N"	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / X-Fall	Critical Depth / ZR	Flow Top Width / Type Ch	Height/Dia.-FT / No Prs/Pip	Base Wt or I.D. /	ZL /
1308.173	1058.972	7.098	1066.070	1241.28	17.49	4.75	1070.82	.00	7.82	10.00	8.000	10.000	.00
.517	.1704					.0053	.00	7.10	1.16	2.05	.013	.00	.00
1308.690	1059.060	7.444	1066.504	1241.28	16.67	4.32	1070.82	.00	7.82	10.00	8.000	10.000	.00
31.200	.0048					.0050	.15	7.44	1.08	7.52	.013	.00	.00
		WARNING - Flow depth near top of box conduit											
1339.890	1059.210	7.414	1066.624	1241.28	16.74	4.35	1070.98	.05	7.82	10.00	8.000	10.000	.00
40.600	.0050					.0050	.20	7.47	1.08	7.41	.013	.00	.00
		WARNING - Flow depth near top of box conduit											
1380.490	1059.412	7.414	1066.827	1241.28	16.74	4.35	1071.18	.05	7.82	10.00	8.000	10.000	.00
236.060	.0050					.0051	1.21	7.47	1.08	7.41	.013	.00	.00
		WARNING - Flow depth near top of box conduit											
1616.550	1060.590	7.271	1067.861	1241.28	17.07	4.52	1072.39	.00	7.82	10.00	8.000	10.000	.00
65.280	.0051					.0053	.35	7.27	1.12	7.37	.013	.00	.00
		WARNING - Flow depth near top of box conduit											

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT) / SE Dpth	Water Elev / Froude N	Q (CFS) / Norm Dp	Vel (FPS) / "N"	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / X-Fall	Critical Depth / ZR	Flow Top Width / Type Ch	Height/Dia.-FT / No Prs/Pip	Base Wt or I.D. /	ZL /
1681.830	1060.920	7.211	1068.131	1241.28	17.21	4.60	1072.73	.00	7.82	10.00	8.000	10.000	.00
JUNCT STR	.0050					.0066	.01	7.21	1.13		.013	.00	.00
		WARNING - Flow depth near top of box conduit											
1683.830	1060.930	6.055	1066.985	1193.28	19.71	6.03	1073.02	.00	7.62	10.00	8.000	10.000	.00
36.290	.0050					.0079	.29	6.05	1.41	7.20	.013	.00	.00
1720.120	1061.110	5.951	1067.061	1193.28	20.05	6.24	1073.30	.05	7.62	10.00	8.000	10.000	.00
79.880	.0050					.0086	.68	6.01	1.45	7.18	.013	.00	.00
1800.000	1061.510	5.720	1067.230	1193.28	20.86	6.76	1073.99	.09	7.62	10.00	8.000	10.000	.00

12.278	.0050					.0091	.11	5.81	1.54	7.17	.013	.00	.00	BOX				
1812.278	1061.572	5.684	1067.256	1193.28	20.99	6.84	1074.10	.09	7.62	10.00	8.000	10.000	.00	0	.0			
88.455	.0050					.0098	.86	5.78	1.55	7.17	.013	.00	.00	BOX				
1900.733	1062.015	5.420	1067.435	1193.28	22.02	7.53	1074.96	.10	7.62	10.00	8.000	10.000	.00	0	.0			
82.667	.0050					.0111	.92	5.52	1.67	7.17	.013	.00	.00	BOX				
1983.400	1062.430	5.167	1067.597	1193.28	23.09	8.28	1075.88	.00	7.62	10.00	8.000	10.000	.00	0	.0			
60.070	.0050					.0124	.74	5.17	1.79	7.19	.013	.00	.00	BOX				
2043.470	1062.730	4.982	1067.712	1193.28	23.95	8.91	1076.62	.14	7.62	10.00	8.000	10.000	.00	0	.0			
66.171	.0050					.0138	.91	5.12	1.89	7.20	.013	.00	.00	BOX				

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2109.641	1063.059	4.775	1067.833	1193.28	24.99	9.70	1077.53	.15	7.62	10.00	8.000	10.000	.00	0	.0			
70.789	.0050					.0155	1.10	4.92	2.02	7.20	.013	.00	.00	BOX				
2180.430	1063.410	4.552	1067.963	1193.28	26.21	10.67	1078.63	.07	7.62	10.00	8.000	10.000	.00	0	.0			
56.360	.0110					.0170	.96	4.62	2.16	5.30	.013	.00	.00	BOX				
2236.790	1064.030	4.464	1068.494	1193.28	26.73	11.10	1079.59	.06	7.62	10.00	8.000	10.000	.00	0	.0			
45.529	.0109					.0178	.81	4.53	2.23	5.32	.013	.00	.00	BOX				
2282.319	1064.526	4.386	1068.913	1193.28	27.20	11.49	1080.40	.06	7.62	10.00	8.000	10.000	.00	0	.0			
109.558	.0109					.0195	2.14	4.45	2.29	5.32	.013	.00	.00	BOX				
2391.877	1065.721	4.182	1069.903	1193.28	28.53	12.64	1082.54	.07	7.62	10.00	8.000	10.000	.00	0	.0			
94.343	.0109					.0222	2.10	4.25	2.46	5.32	.013	.00	.00	BOX				
2486.220	1066.750	3.988	1070.738	1193.28	29.92	13.90	1084.64	.00	7.62	10.00	8.000	10.000	.00	0	.0			
TRANS STR	.0102					.0239	.24	3.99	2.64		.013	.00	.00	BOX				
2496.060	1066.850	3.958	1070.808	1193.28	30.15	14.11	1084.92	.08	7.00	10.00	7.000	10.000	.00	0	.0			
59.240	.0276					.0239	1.41	4.04	2.67	3.77	.013	.00	.00	BOX				

2555.300	1068.487	3.995	1072.481	1193.28	29.87	13.86	1086.34	.08	7.00	10.00	7.000	10.000	.00	0 .0
193.760	.0276					.0221	4.29	4.07	2.63	3.77	.013	.00	.00	BOX
2749.060	1073.840	4.190	1078.030	1193.28	28.48	12.60	1090.63	.00	7.00	10.00	7.000	10.000	.00	0 .0
JUNCT STR	.0250					.0209	.04	4.28	2.45		.013	.00	.00	BOX

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS 0

LINE A

FILE: MTD-1764-LINEA.WSW

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT) /	Water Elev /	Q (CFS) /	Vel (FPS) /	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2751.060	1073.890	4.143	1078.033	1187.28	28.66	12.75	1090.78	.09	7.00	10.00	7.000	10.000	.00	0 .0
48.940	.0278					.0207	1.01	4.23	2.48	3.75	.013	.00	.00	BOX
2800.000	1075.250	4.213	1079.463	1187.28	28.18	12.33	1091.80	.05	7.00	10.00	7.000	10.000	.00	0 .0
28.290	.0276					.0199	.56	4.26	2.42	3.76	.013	.00	.00	BOX
2828.290	1076.030	4.258	1080.288	1187.28	27.88	12.07	1092.36	.00	7.00	10.00	7.000	10.000	.00	0 .0
JUNCT STR	.0300					.0199	.04	4.34	2.38		.013	.00	.00	BOX
2830.290	1076.090	4.194	1080.284	1178.54	28.10	12.26	1092.55	.08	7.00	10.00	7.000	10.000	.00	0 .0
52.470	.0274					.0196	1.03	4.28	2.42	3.75	.013	.00	.00	BOX
2882.760	1077.530	4.282	1081.812	1178.54	27.52	11.76	1093.58	.00	7.00	10.00	7.000	10.000	.00	0 .0
JUNCT STR	.0300					.0208	.04	4.35	2.34		.013	.00	.00	BOX
2884.760	1077.590	3.870	1081.460	1119.00	28.91	12.98	1094.44	.07	7.00	10.00	7.000	10.000	.00	0 .0
135.469	.0276					.0214	2.91	3.94	2.59	3.60	.013	.00	.00	BOX
3020.229	1081.332	4.027	1085.358	1119.00	27.79	11.99	1097.35	.07	7.00	10.00	7.000	10.000	.00	0 .0
104.224	.0276					.0190	1.98	4.09	2.44	3.60	.013	.00	.00	BOX
3124.453	1084.210	4.223	1088.433	1119.00	26.50	10.90	1099.34	.06	7.00	10.00	7.000	10.000	.00	0 .0
72.065	.0276					.0167	1.21	4.28	2.27	3.60	.013	.00	.00	BOX
3196.518	1086.201	4.429	1090.630	1119.00	25.26	9.91	1100.54	.05	7.00	10.00	7.000	10.000	.00	0 .0
53.015	.0276					.0147	.78	4.48	2.12	3.60	.013	.00	.00	BOX

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
3249.533	1087.665	4.645	1092.310	1119.00	24.09	9.01	1101.32	.05	7.00	10.00	7.000	10.000	.00	0 .0
40.331	.0276					.0129	.52	4.70	1.97	3.60	.013	.00	.00	BOX
3289.864	1088.779	4.872	1093.651	1119.00	22.97	8.19	1101.84	.05	7.00	10.00	7.000	10.000	.00	0 .0
31.217	.0276					.0114	.36	4.92	1.83	3.60	.013	.00	.00	BOX
3321.080	1089.641	5.110	1094.751	1119.00	21.90	7.45	1102.20	.04	7.00	10.00	7.000	10.000	.00	0 .0
24.303	.0276					.0100	.24	5.15	1.71	3.60	.013	.00	.00	BOX
3345.384	1090.312	5.359	1095.672	1119.00	20.88	6.77	1102.44	.04	7.00	10.00	7.000	10.000	.00	0 .0
18.842	.0276					.0088	.17	5.40	1.59	3.60	.013	.00	.00	BOX
3364.225	1090.833	5.621	1096.454	1119.00	19.91	6.15	1102.61	.03	7.00	10.00	7.000	10.000	.00	0 .0
14.385	.0276					.0078	.11	5.65	1.48	3.60	.013	.00	.00	BOX
3378.610	1091.230	5.895	1097.125	1119.00	18.98	5.59	1102.72	.03	7.00	10.00	7.000	10.000	.00	0 .0
17.919	.0149					.0071	.13	5.93	1.38	4.51	.013	.00	.00	BOX
3396.530	1091.497	6.067	1097.563	1119.00	18.45	5.28	1102.85	.03	7.00	10.00	7.000	10.000	.00	0 .0
21.697	.0149					.0064	.14	6.10	1.32	4.51	.013	.00	.00	BOX
3418.227	1091.820	6.363	1098.182	1119.00	17.59	4.80	1102.98	.03	7.00	10.00	7.000	10.000	.00	0 .0
13.657	.0149					.0057	.08	6.39	1.23	4.51	.013	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch

3431.884	1092.023	6.673	1098.696	1119.00	16.77	4.37	1103.06	.03	7.00	10.00	7.000	10.000	.00	0	.0
7.206	.0149					.0064	.05	6.70	1.14	4.51	.013	.00	.00	BOX	

---------- WARNING - Flow depth near top of box conduit ----------

3439.090	1092.130	7.000	1099.130	1119.00	15.99	3.97	1103.10	.00	7.00	10.00	7.000	10.000	.00	0	.0
JUNCT STR	.0100					.0062	.01	7.00	1.06		.013	.00	.00	BOX	
3441.090	1092.150	8.091	1100.241	1016.00	14.51	3.27	1103.51	.00	6.85	10.00	7.000	10.000	.00	0	.0
104.740	.0092					.0062	.64	8.09	.97	5.02	.013	.00	.00	BOX	
3545.830	1093.116	7.770	1100.885	1016.00	14.51	3.27	1104.16	.00	6.85	10.00	7.000	10.000	.00	0	.0
HYDRAULIC JUMP															
3545.830	1093.116	5.123	1098.239	1016.00	19.83	6.11	1104.35	.00	6.85	10.00	7.000	10.000	.00	0	.0
254.170	.0092					.0084	2.15	5.12	1.54	5.02	.013	.00	.00	BOX	
3800.000	1095.460	5.254	1100.714	1016.00	19.34	5.81	1106.52	.03	6.85	10.00	7.000	10.000	.00	0	.0
49.390	.0099					.0080	.40	5.29	1.49	4.88	.013	.00	.00	BOX	
3849.390	1095.950	5.336	1101.286	1016.00	19.04	5.63	1106.92	.12	6.85	10.00	7.000	10.000	.00	0	.0
65.571	.0100					.0075	.49	5.46	1.45	4.86	.013	.00	.00	BOX	
3914.961	1096.608	5.496	1102.104	1016.00	18.49	5.31	1107.41	.12	6.85	10.00	7.000	10.000	.00	0	.0
66.610	.0100					.0068	.45	5.61	1.39	4.86	.013	.00	.00	BOX	

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS 0

LINE A

FILE: MTD-1764-LINEA.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3981.571	1097.277	5.764	1103.041	1016.00	17.63	4.82	1107.86	.10	6.85	10.00	7.000	10.000	.00	0 .0
39.149	.0100					.0060	.24	5.87	1.29	4.86	.013	.00	.00	BOX
4020.720	1097.670	6.046	1103.715	1016.00	16.81	4.39	1108.10	.10	6.85	10.00	7.000	10.000	.00	0 .0
21.960	.0100					.0053	.12	6.14	1.20	4.86	.013	.00	.00	BOX
4042.680	1097.890	6.341	1104.231	1016.00	16.02	3.99	1108.22	.00	6.85	10.00	7.000	10.000	.00	0 .0
JUNCT STR	.0100					.0054	.01	6.41	1.12		.013	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

4044.680	1097.910	5.957	1103.867	1006.00	16.89	4.43	1108.30	.08	6.80	10.00	7.000	10.000	.00	0 .0
20.602	.0099					.0055	.11	6.04	1.22	4.85	.013	.00	.00	BOX
4065.282	1098.114	6.181	1104.295	1006.00	16.28	4.11	1108.41	.07	6.80	10.00	7.000	10.000	.00	0 .0
14.478	.0099					.0049	.07	6.25	1.15	4.85	.013	.00	.00	BOX
4079.760	1098.258	6.482	1104.740	1006.00	15.52	3.74	1108.48	.07	6.80	10.00	7.000	10.000	.00	0 .0
4.240	.0099					.0044	.02	6.55	1.07	4.85	.013	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

4084.000	1098.300	6.800	1105.100	1006.00	14.79	3.40	1108.50	.06	6.80	10.00	7.000	10.000	.00	0 .0

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

NEWHALL 1-H1.44
50-YEAR 24-HOUR ISOHYET

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

PEAK BULKING FACTOR

1.65
1.60
1.55
1.50
1.47
1.45
1.40
1.36
1.35
1.30
1.27
1.25
1.20
1.15
1.10
1.05
1.00

DPA-3
DPA-5
DPA-8
DPA-9

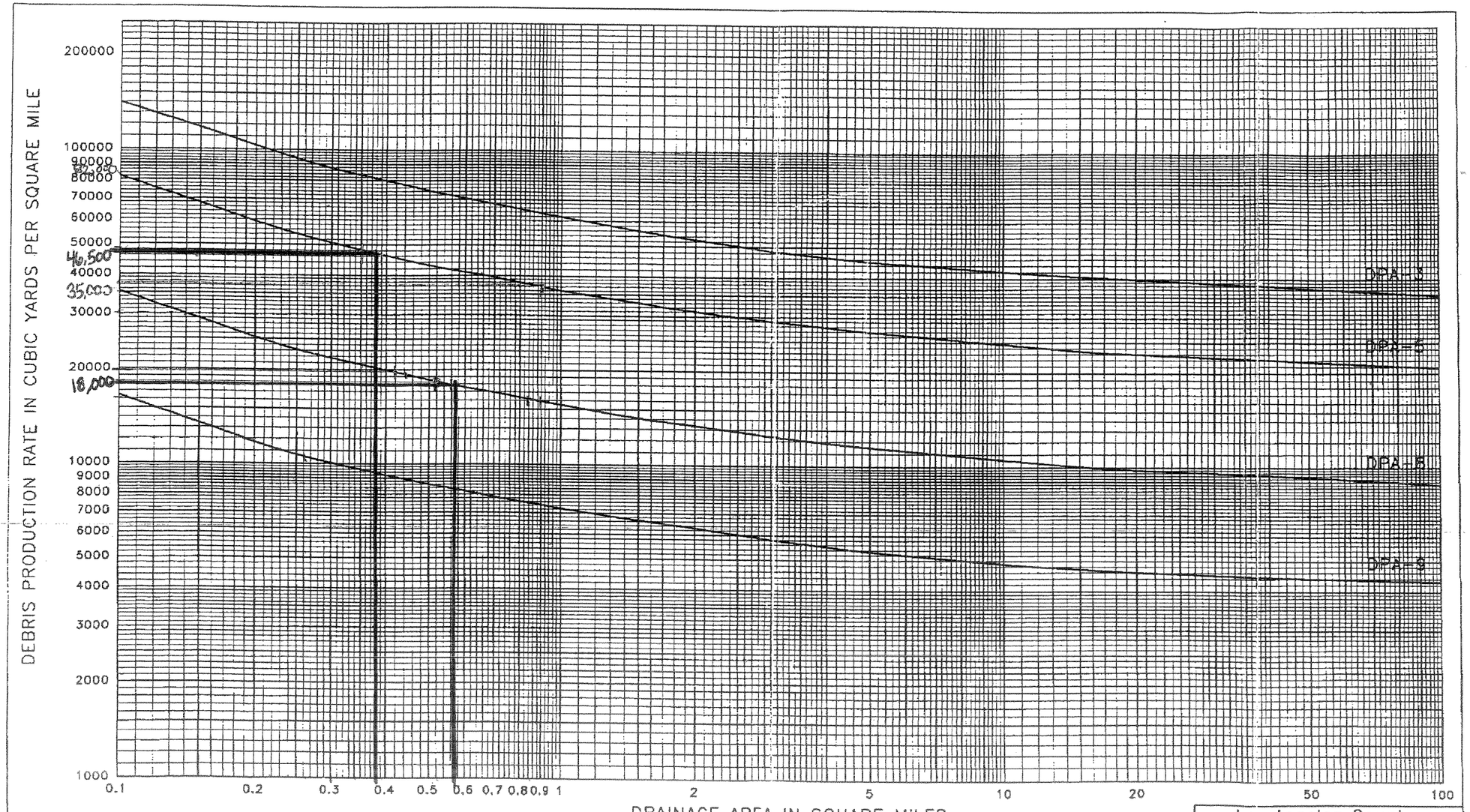
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 5 10 20 50 100

DRAINAGE AREA IN SQUARE MILES

Los Angeles County
Department of Public Works

PEAK BULKING FACTORS
for Santa Clara Basin

2.SPG



Los Angeles County
Department of Public Works

DEBRIS PRODUCTION RATES
for Santa Clara Basin

LID/SUSMP REPORT

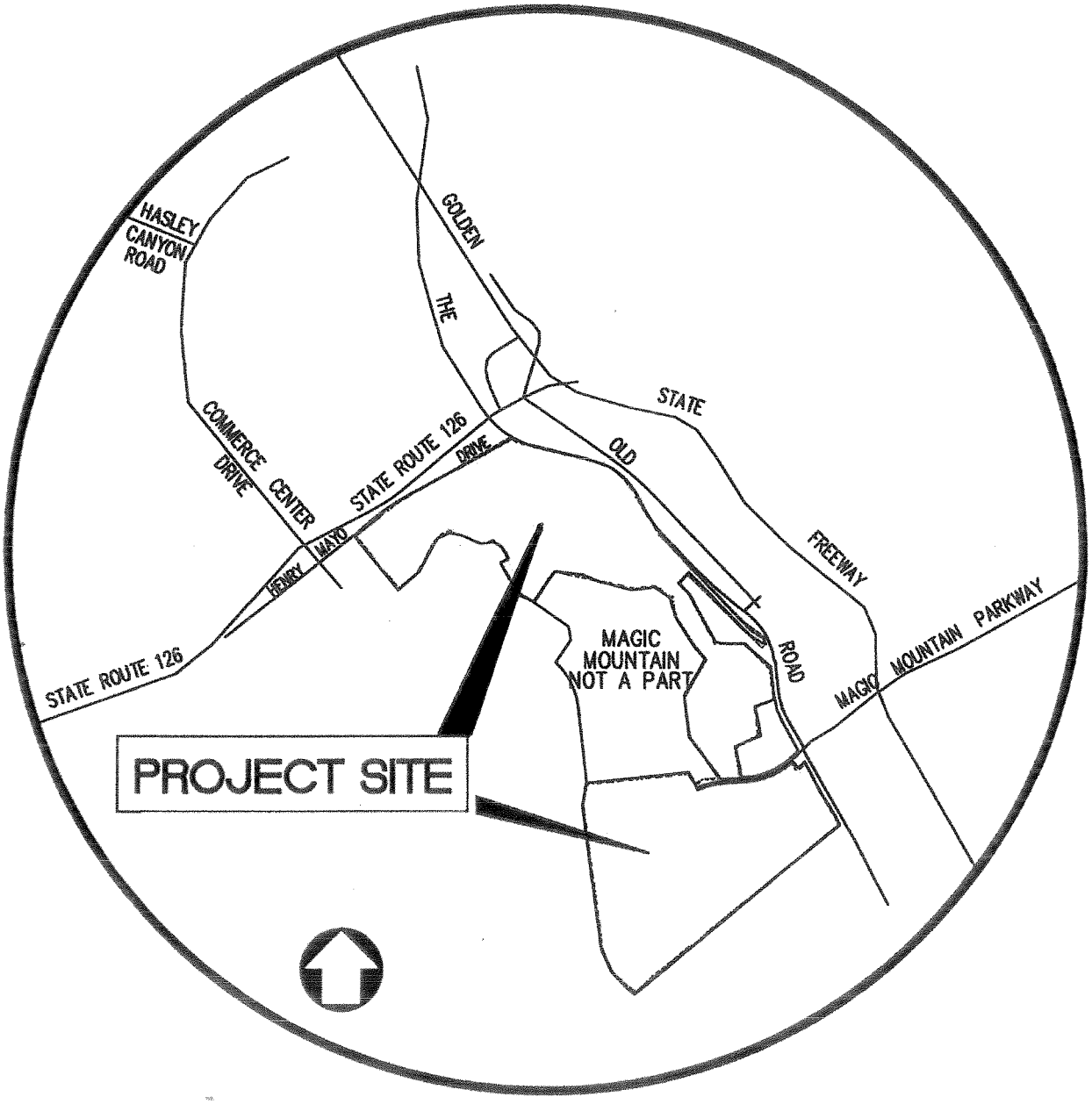
for

ENTRADA
COUNTY FOR LOS ANGELES
Tentative Tract No. 53295
Job No. 0930

Prepared For:
Newhall Land & Farming, Co.
25124 Springfield Ct. Suite 300
Valencia, CA 91355

Prepared By:
Alliance Land Planning & Engineering, Inc.
2248 Faraday Ave.
Carlsbad, CA 92008

MAY 2010



VICINITY MAP

NOT TO SCALE

Geosyntec consultants

475 14th Street, Suite 400
Oakland, California 94612
PH 510.836.3034
FAX 510.836.3036
www.geosyntec.com

Memorandum

Date:	1 December 2010
To:	Jason Vroom, Alliance Land Planning and Engineering
Copy to:	Miles Helfrich, Newhall Land
From:	Lisa Austin, Aaron Poresky, and Kelly Havens, Geosyntec Consultants
Subject:	Entrada - Evaluation of Stormwater Treatment Control BMP Sizing and Equivalency with Los Angeles County Low Impact Development Standards

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The purpose of this memorandum is to verify that the treatment control BMPs for the Entrada Project (the Project) shown on the *WQMP Map for Portion of Tentative Tract 53295 (WQMP Map)* and *LID Infiltration Exhibit for Tentative Tract 53295 (LID Infiltration Exhibit)*, both prepared by Alliance Land Planning and Engineering (dated September 2010 and received by Geosyntec for final review on December 1, 2010) are sized in compliance with the requirements of the Los Angeles County Department of Public Works' (LACDPW) *Development Planning for Storm Water Management, A Manual for the Standard Urban Stormwater Mitigation Plan* (SUSMP) (September 2002) and to verify consistency with the *Newhall Ranch Sub-Regional Stormwater Mitigation Plan (*NRSSMP*)* (Geosyntec Consultants, 2008). This memorandum also demonstrates that the performance of the Project's BMPs is equivalent to the performance of BMPs sized per the *Los Angeles County LID Standards Manual* (Los Angeles County, 2009).

SUMMARY OF FINDINGS

The treatment control BMPs shown on the *WQMP Map* and *LID Infiltration Exhibit* are sized sufficiently to meet SUSMP and NRSSMP sizing criteria.

The average annual stormwater runoff volume reductions achieved by the BMPs depicted on *WQMP Map* and *LID Infiltration Exhibit* are equivalent to the LID performance standard as computed per the method described in Attachment A (*Addendum to the Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan* (SRPA) (Geosyntec Consultants, 2010)). Therefore, the performance of the Project's BMPs is deemed to be equivalent to the requirements and intent of the *LID Standards Manual*, and no further commitments are required above those which are currently included on the referenced exhibits.

TREATMENT CONTROL BMPS

The stormwater treatment control BMPs for the Project will consist of extended detention basins (EDBs), on-site biofiltration, and media filtration. EDBs for the Project will include two on-site basins (A and B), which will provide treatment for a portion of the Project's developed area and a small portion of off-site area tributary to the developed area. The western portion of the Project will drain to a regional EDB proposed as part of the Mission Village Project (Regional Basin D). Regional Basin D will also provide treatment for portions of the Mission Village and Legacy Village Projects, as well as limited portions of the existing developed areas to the south of the Project. This basin is designed for the ultimate condition in which Mission Village and Legacy Village are developed. Biofiltration BMPs, including bioretention areas, vegetated swales, or equivalent, will be distributed throughout the project to treat multi-family, commercial, and park pads that are not tributary to the EDBs. Media filtration BMPs, which are anticipated to be located within catch basins or vaults, will be used to treat portions of the major roads running through the Project.

The applicable sizing criterion for the Project's EDBs, established in the NRSSMP, is capture and treatment of 80 percent of the average annual runoff volume. This sizing criterion utilizes historical rainfall data with continuous simulation modeling and is consistent with volume-based sizing criterion #2 from the SUSMP Manual. Project biofiltration BMPs will also be designed to capture and treat 80 percent of the average annual runoff volume, consistent with SUSMP volume-based sizing criterion #2.

The applicable sizing criterion for the Project media filtration BMPs (assumed to be flow-based BMPs), established in the NRSSMP, is the full capture of runoff resulting from 0.3 inches per hour rainfall intensity. This sizing criterion was developed using Project-specific rainfall to result in approximately 80 percent capture of average annual runoff volume, which is consistent with flow-based sizing criterion #3 from the SUSMP Manual.

VERIFICATION OF BMP SIZING

Sizing calculations have been performed to verify that the treatment control BMPs shown on the *WQMP Map* and *LID Infiltration Exhibit* are adequately sized to meet the applicable sizing criteria.

For the proposed EDBs, the EPA Stormwater Management Model (SWMM) was used to conduct continuous simulation modeling to confirm BMP sizing. Models were developed based on catchment delineations and land uses from spatial files received from Alliance, which correspond to the *WQMP Map*, along with NCRS and LA County soil map spatial files. The spatial files were intersected to provide catchment acreages, imperviousness, and soil parameters for the tributary drainage areas. This information, along with a 40 year precipitation record from

the nearby NCDC Newhall rain gauge (station number 046162), was inputted into SWMM to calculate a 40 year timeseries of runoff to the basins.

The resultant runoff timeseries from tributary areas were routed into respective BMP models, which were represented by stage storage discharge (SSD) curves. An explanation of how the SSDs in the model correspond to the actual extended detention basin geometry is included in Attachment C. The SSDs were iteratively modified to represent different facility volumes until a volume was found that resulted in 80 percent capture of the total runoff produced from the tributary drainage area for the entire rainfall record. This volume was then increased by 5 percent to allow for sediment storage and represents the NRSSMP design volume. Infiltration rates under the basin were determined based on soil types and characteristics below the proposed basins. See Attachment B for an explanation of how evaporation and infiltration rates were derived for basin simulations. Based on a comparison of the required NRSSMP design volumes obtained from model simulations to the volumes shown on the *WQMP Map*, the provided volumes of EDBs A and B are sufficient to achieve equal to or greater than 80 percent average annual capture. Model output files are included in Attachment C.

For the purpose of modeling the capture of runoff from the area of Entrada that is tributary to Regional Basin D, design drawings from the Legacy Village Project (*Drainage Concept Study for Tentative Tract 61996,* Hunsaker and Associates, December 2010) and the Mission Village Project (*Drainage Concept/SUSMP for Mission Village VTTM 61105,* Psomas, February 2010) were used. Model calculations were conducted as described above to yield the required NRSSMP design volume for Regional Basin D under the ultimate condition. Based on comparison of required NRSSMP design volumes to volumes shown on the *WQMP Map*, the provided volume of Regional Basin D is adequate to achieve 80 percent capture of the average annual runoff volume from all tributary area in the ultimate condition. Model output files are included in Attachment C.

The EDBs for the Project are listed in Table 1 along with the tributary area, SUSMP minimum mitigation volume, NRSSMP required volume (to achieve 80 percent average annual capture efficiency), and the volume of the basin provided on the Entrada *WQMP Map.*

Table 1: Catchment Parameters and Basin Sizing Results

BMP ID	Tributary Area[1] (acres)	Impervious Fraction of Catchment[2]	Minimum SUSMP Mitigation Volume Required (0.75 inches) (ac-ft)[3]	NRSSMP Volume Required, (ac-ft)[4]	Basin Volume Provided (ac-ft)[5]
Basin A	90.3	45%	2.9	6.0	6.7
Basin B	14.0	69%	0.51	1.2	1.5
Regional Basin D	738[1]	45%	37.7	41.5	43.0

[1]Tributary area of Regional Basin D includes future conditions of Mission Village and Legacy Village Projects based on most recent available designs.
[2]Imperviousness based on area weighted average of land use-based values. Values are consistent with (or more conservative than) Los Angeles County Hydrology Manual recommended values.
[3]Basin sizing for the volume of runoff produced from a 0.75 inch storm event based on SUSMP Manual Appendix A runoff calculations. SUSMP Basins A and B volumes provided per the Entrada VTTM No. 53295 (*WQMP Map for Portion of Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010). Regional Basin D SUSMP Volume taken from *Drainage Concept/SUSMP for: Mission Village VTTM 61105* (Psomas, February 2010).
[4]NRSSMP required volumes are based on volume required to capture and treat 80 percent of annual average runoff volume. Basin volumes include 5 percent allowance for sediment storage.
[5]Basin volume provided per the Entrada VTTM No. 53295 (*WQMP Map for Portion of Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010).

As shown in Table 1, the provided EDB volume is greater than the minimum SUSMP volume and the NRSSMP required basin volume for all basins. Therefore, the proposed extended detention basins are in conformance with both the SUSMP and NRSSMP sizing criteria.

Regional Basin D will receive runoff from somewhat greater tributary area in the interim condition (i.e. without Legacy Village and Mission Village constructed), however the watershed will contain substantially less impervious area in this condition than in the ultimate condition. Because impervious area is the most important parameter for BMP sizing, the ultimate condition is the controlling design condition. Table 2 provides standard SUSMP calculations demonstrating that the ultimate condition is more conservative for basin sizing than the interim condition.

Table 2: Comparison of Interim and Ultimate Sizing Conditions for Regional Basin D

Condition	Tributary Area, ac	% Imp	Cu	Cd[1]	SUSMP (0.75 inch) Design Volume, ac-ft
Interim	818	10.9%	0.1	0.187	9.6
Ultimate	738	45%	0.1	0.46	21.2

Cd = Cu × (1-Imp) + 0.9 × Imp, where Imp is the impervious fraction and varies from 0 to 1.
SUSMP Volume = Cd × Area × 0.75 inches × 1 ft/12 inches

Based on the results contained in Table 2, the ultimate condition is much more conservative (more than twice as much required volume) than the interim condition. The NRSSMP required volumes parallel the trends in the SUSMP volumes, although the absolute volume would be greater in magnitude for both conditions. The ultimate condition is more conservative for both the SUSMP and the NRSSMP BMP sizing requirements. This is the condition for which Regional Basin D was sized, therefore the proposed basin volume is in conformance with both the SUSMP and NRSSMP sizing criteria for both the interim and ultimate conditions.

A portion of one multi-family pad (Basin Z) is proposed to be treated on-site in a biofiltration BMP with discharge infiltrated in a dry well or series of dry wells. A SWMM model was used to confirm the sizing of the biofiltration BMP to achieve 80 percent average annual capture of treated water, as shown in Table 3. Average annual runoff volume and BMP performance was determined using the SWMM model methodology described above with SSD curves representative of the biofiltration system. An explanation of the biofiltration model SSD curve is included in Attachment C; SWMM model output files are also included in Attachment C.

Table 3: Biofiltration Basin Z Catchment Parameters and Sizing Results

Tributary Area (acres)	Impervious Fraction of Catchment[1]	NRSSMP Volume Required[2], (ft^3)	Basin Volume Provided[3] (ft^3)	Required Drywell Flowrate to Infiltrate Captured Volume[4] (cfs)	Dry Well Flowrate[5] Provided (cfs)
7.6	80%	16,900	16,900	0.45	0.45

[1] Imperviousness estimated by Alliance based on knowledge of product type. This value is consistent with the Los Angeles County Hydrology Manual recommended range of values.
[2] BMP is sized to capture and treat 80 percent of annual average runoff volume. Basin volume includes 5 percent allowance for sediment storage.
[3] Basin volume provided per the Entrada VTTM No. 53295 (*LID Infiltration Exhibit for Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010).
[4] Treated discharges from Biofiltration Basin Z will be infiltrated in drywells.
[5] Provided flowrate as specified on *LID Infiltration Exhibit for Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010. Drywell design to achieve required flowrate is to be developed as part of the final improvement plans.

The volume provided for Biofiltration Basin Z, as shown in Table 3, is sufficient to achieve 80 percent average annual capture of stormwater runoff, therefore the proposed basin volume is in conformance with both the SUSMP and NRSSMP sizing criteria. A drywell system will be designed by the project engineer with the final improvement plans to meet the infiltration flowrate requirement listed in Table 3 such that all treated water will be infiltrated.

On-site biofiltration BMPs are proposed for some multi-family, commercial, and park pads. The location, type, and design of these facilities have not been identified at this time; however, the sizing requirements for bioretention areas with underdrains (one possible type of biofiltration

BMP) are provided on the *WQMP Map*. Required sizing of these BMPs was determined using generic land-use specific runoff and routing models for each land use type proposed to be treated by biofiltration BMPs, including commercial, multi-family, and park land uses. The simulated runoff flow timeseries from each land use type was routed through bioretention areas with underdrains, which were iteratively sized to achieve 80 percent capture. These BMPs were assumed with have a maximum ponding depth of 1.5 feet. Required NRSSMP bioretention sizes are expressed as the area of bioretention with underdrains required per area of land use. These sizing factors were multiplied by the land use acreages on each pad to yield a total bioretention area requirement for each pad. The required bioretention areas for each pad are included in Table 4 below.

Table 4: Required Bioretention Areas for Pads Treated On-site

Pad ID	Land Use	Acreage	%Imp[1]	Required Sizing Factor (bioretention as fraction of drain area)[2]	Required Bioretention Area[2], sq-ft	Provided Bioretention Area[3], sq-ft
Basin C	Park	5.4	10%	0.027	6,420	6,420
Basin E	Commercial	30.2	91%	0.036	46,960	46,960
Basin F	MF-Condos	6.8	80%	0.034	9,950	9,950
Basin P	MF-Condos	15.8	80%	0.034	23,130	23,130
Basin W	MF-Condos	6.5	80%	0.034	9,510	9,510
Basin X	MF-Condos	10.4	80%	0.034	15,220	15,220
Basin Y	Commercial	3.4	91%	0.036	5,290	5,290

[1] These values are consistent with the Los Angeles County Hydrology Manual recommended range of imperviousness values by land use.
[2] Required surface area per acre is based on 18 inch basin ponding depth. Bioretention is sized to capture and treat 80 percent of annual average runoff volume. Basin ratios include 5 percent allowance for sediment storage.
[3] Bioretention area provided per the Entrada VTTM No. 53295 (*WQMP Map for Portion of Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010). The area provided assumes 1.5 ft maximum ponding depth and should be measured at mid depth (0.75 ft) of the facilities to account for the effects of side slopes.

A commitment is made on the *WQMP Map* to provide bioretention areas meeting the sizing requirements contained in Table 4 or to provide equivalent biofiltration BMPs substituted with final improvement plans and demonstrated to capture and treat 80 percent of the average annual runoff volume and provide equivalent average annual volume reduction. Therefore the proposed system for management of stormwater from these pads is in conformance with both the SUSMP and NRSSMP sizing criteria.

Media filtration BMPs will treat portions of major roadways throughout the project. Table 5 provides the SUSMP design flow rate, NRSSMP required design flow rate, and the provided design flowrate for the media filtration BMPs.

Table 5: Catchment Parameters and Media Filtration BMP Sizing Requirements

Tributary Area ID	Tributary Area (acres)[1]	Impervious Fraction of Catchment[1]	SUSMP Qpm (cfs)[2]	NRSSMP Required Design Flow Rate (cfs)[3]	Provided Design Qpm (cfs)[4]
Basin G	0.6	88%	0.10	0.14	0.14
Basin H	1.3	63%	0.17	0.24	0.24
Basin I	1.9	79%	0.27	0.42	0.42
Basin J	2.1	80%	0.30	0.47	0.47
Basin K	2.3	80%	0.33	0.51	0.51
Basin L	3.2	68%	0.46	0.62	0.62
Basin M	2.9	91%	0.46	0.72	0.72
Basin N	1.1	88%	0.18	0.27	0.27
Basin O	3.3	91%	0.48	0.82	0.82
Basin R	2.2	87%	0.32	0.53	0.53
Basin S	1.5	86%	0.20	0.35	0.35
Basin T	1.3	83%	0.17	0.30	0.30
Basin U	1.5	46%	0.24	0.21	0.24
Basin V	1.1	52%	0.11	0.17	0.17
Basin AA	0.9	78%	0.15	0.20	0.20
Basin BB	1.5	91%	0.24	0.37	0.37
Basin CC	3.2	91%	0.52	0.79	0.79
Basin DD	0.6	91%	0.11	0.15	0.15
Basin EE	0.5	91%	0.09	0.12	0.12

[1] Area and imperviousness based on spatial analysis of drainage areas imported from WQMP CAD files and proposed land uses.
[2] Flowrates ("Q_{pm}") as shown on Entrada VTTM No. 53295 (*WQMP Map for Portion of Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010), calculated per SUSMP Appendix A methodology.
[3] Design flow based on an intensity of 0.3 in/hr per NRSSMP performance criteria.
[4] Selected design flow rate shown as "Design Q_{pm}" on Entrada VTTM No. 53295 (*WQMP Map for Portion of Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010).

As shown in Table 5, media filtration BMPs have been sized using the more conservative NRSSMP design flow rate, thus their use is in conformance with both SUSMP and NRSSMP sizing criteria.

LID EQUIVALENCY

Los Angeles County's *LID Standards Manual* (Los Angeles County, 2009) outlines stormwater runoff quantity and quality control development principles, technologies, and design standards for achieving the LID Standards of the Los Angeles County LID Ordinance (Los Angeles County, 2008). An analysis was performed to demonstrate that the LID and treatment control BMPs included in the Project would provide equivalent or greater volume reductions on an average annual basis to that which would be achieved by BMPs designed per the specific requirements of the Los Angeles County *LID Standards Manual* (Los Angeles County, 2009). A detailed description of the analysis methodology for evaluating equivalency to the LID Standards Manual is provided in the SRPA, included as Attachment A.

To demonstrate LID equivalency, a two tiered analysis was conducted. The first tier of the analysis divided the Project area into open space areas, areas where infiltration is likely feasible, and areas where infiltration is likely infeasible, based on infiltration feasibility criteria specified by the *LID Standards Manual.* Infiltration infeasibility screening was conducted by R.T. Frankian and Associates (RTF&A, 2010b) based on these criteria. For off-site improvements within the Mission Village Project boundary, infiltration feasibility was based on the Mission Village infiltration feasibility screening, also prepared by R.T. Frankian and Associates (RTF&A, 2010a). See Figure 1 for an illustration of Tier One infiltration feasibility screening results.

The Tier Two analysis involved:

1) Calculation of the volume reduction that would be achieved by well designed BMPs per the specific requirements of the *LID Standards Manual*, with consideration for the infiltration feasibility screening conducted in the Tier One analysis.
2) Calculation of the volume reductions achieved by the Project's BMPs.
3) Comparing these values.

Table 6 provides the assumptions and calculations used to estimate the volume reduction that would be achieved by well designed BMPs per the specific requirements of the *LID Standards Manual* (i.e., the *LID Standards Manual* performance standard).

Table 6: LID Standards Manual Performance Standard

Feasibility Category	Open Space[1]	Infiltration Feasible[2]	Infiltration Infeasible[2]	Total
Total Area, ac	211	23	245	
Composite Imperviousness[3]		73%	77%	
Average Annual Runoff Volume[4], ac-ft		24	263	
Average Annual Capture Efficiency of BMPs Designed per LID Standards Manual[5]		48%	48%	
Average Annual Volume Reduction of Captured Water in Vegetated BMPs[6]		100%	20%	
LID Standards Manual Performance Standard Volume Reduction, ac-ft/yr		11.4	25.2	36.6

[1] Includes water quality basins as open space (does not include parks).
[2] Per infiltration feasibility screening prepared by R.T. Frankian and Associates (2010a, 2010b).
[3] Composite imperviousness based on distribution of developed land uses within each analysis area.
[4] Calculated using the rational method with the average annual rainfall at the Project site.
[5] Capture efficiency estimated through continuous simulation modeling of 40 years of precipitation, runoff, and routing for a hypothetical volume-based BMP sized per the *LID Standards Manual.*
[6] Assumed volume reductions in vegetated BMPs are discussed in the SRPA (include as Attachment A).

The volume reductions achieved by Project BMPs are provided in Table 7. The following types of volume reductions are included:

- Incidental volume reduction in EDB A and B.
- Volume infiltrated in Biofiltration Basin Z and associated drywell(s).
- Incidental volume reduction achieved in biofiltration BMPs on the multi-family, commercial, and park pads.

EDBs are designed to treat and release stormwater, and they are also anticipated to provide significant incidental infiltration. Volume reductions in EDBs A and B were estimated with the SWMM modeling approach described above. These models considered volume reductions resulting from infiltration and evaporation of ponded water. The models also partially accounted for volume reductions resulting from soaking and drying of amended soils below the basins. Evaporation and infiltration rates used in these simulations are described in Attachment B.

While Regional Basin D will likely achieve some incidental volume reduction as a result of soil soaking and drying, volume reductions were not accounted for in this basin because of the shallow groundwater conditions under the basin which will likely limit overall infiltration.

Biofiltration Basin Z is located over alluvial soils and will be designed such that all treated water will be routed to dry well(s) and infiltrated. Therefore, the volume reduction in this basin is equal to the volume of runoff captured by the basin (80 percent of average annual runoff volume).

The other on-site biofiltration BMPs will be designed to treat and release water back to the storm drain, and are expected to provide incidental volume reduction as a result of infiltration and evapotranspiration. Volume reductions in biofiltration BMPs were estimated to be 20 percent of captured water based on a review of biofiltration BMP monitoring data contained in the International BMP Database (see SRPA included as Attachment A). The validity of this assumption is supported by modeling results (see Attachment C).

Table 7: Volume Reductions Achieved by Project

Volume Reduction Category	Infiltration Only BMPs	Treat and Release BMPs Achieving Incidental Infiltration	Total
Volume Reduction Achieved in Extended Detention Basins, ac-ft/yr[1]			
Extended Detention Basin A		13.7	13.7
Extended Detention Basin B		4.8	4.8
Regional Basin D (Mission Village)[2]		0	0
Volume Reduction Calculations for Areas Draining to On-site BMPs[3]			
Areas Treated with On-site Biofiltration BMPs, ac	7.6	78.5	
Composite Imperviousness of Areas Treated with On-site Biofiltration BMPs	80%	80%	
Total Runoff Volume from Areas Treated with On-site Biofiltration BMPs , ac-ft/yr	8	87	
NRSSMP Capture Efficiency	80%	80%	
Volume Reduction of Captured Water in On-site Biofiltration BMPs	100%	20%	
Volume Reduction from Areas Treated with On-site Biofiltration BMPs, ac-ft/yr	6.7	13.9	20.6
Average Annual Volume Reduction Achieved, ac-ft/yr[4]	6.7	32.4	**39.1**
LID Standards Manual Performance Standard Volume Reduction, ac-ft/yr (from Table 6)			**36.6**
Surplus Volume Reduction[5]**, ac-ft/yr**			**2.5**

[1]Achieved volume reduction determined from SWMM simulations of extended detention basins.
[2]Volume reductions achieved in regional Basin D have not been considered in this analysis. While Regional Basin D will likely achieve some volume reductions, these losses are expected to be limited by shallow groundwater.
[3]Achieved volume reduction based on 80 percent capture efficiency for all biofiltration BMPs. Infiltration Only BMPs (Basin Z) will infiltrate or evapotranspire 100 percent of captured runoff. Remaining biofiltration BMPs are assumed to infiltrate or evapotranspire 20 percent of captured water.
[4]Sum of volume reductions from extended detention basins and volume reduction from areas with on-site biofiltration BMPs.
[5]Positive surplus volume indicated volume reduction achieved by Project BMPs greater than *LID Standards Manual* performance standard.

Based on this analysis, the Project LID and treatment control BMPs result in greater average annual volume reduction to that which would be achieved by BMPs designed per the requirements of the *LID Standards Manual*, thus are deemed to be equivalent to the intent and requirements of the *LID Standards Manual*.

REFERENCES

Alliance Land Planning and Engineering, 2010. *LID Infiltration Exhibit for Portion of Tentative Tract 53295*, September 2010. Received from Alliance for final review on December 1, 2010.

Geosyntec, 2008. Newhall Ranch Sub-Regional Stormwater Mitigation Plan.

Hunsaker and Associates, 2010. Drainage Concept Study for Tentative Tract 61996, December 2010.

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Los Angeles County, 2008. Low Impact Development Standards Ordinance (Ordinance No. 2008-0063).

Los Angeles County, 2009. County of Los Angeles Low Impact Development Standards Manual, January, 2009.

Psomas, 2010. Drainage Concept/SUSMP for Mission Village VTTM 61105, February 2010.

RTF&A, 2010a. Geotechnical Evaluation of Infiltration Vesting Tentative Tract Map No. 61105, Mission Village (plus attached map and shapefile). January 28, 2010.

RTF&A, 2010b. Geotechnical Evaluation of Infiltration Vesting Tentative Tract Map No. 53295, Entrada (plus attached map and shapefile). February 10, 2010.

Attachment A

Addendum to the Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan (SRPA)

December 29, 2010

TO: Anthony Nyivih
Land Development Division

Attention Amir Ibrahim

FROM: Gary Hildebrand
Watershed Management Division

REVIEW OF NEWHALL RANCH SUB-REGIONAL STORMWATER MITIGATION PLAN ADDENDUM TO THE NEWHALL RANCH SPECIFIC PLAN DATED NOVEMBER 20, 2010 SUB-REGIONAL STORMWATER MITIGATION PLAN

As you requested, the subject plan has been reviewed and is approved.

We agreed to review this addendum since we participated in the review of the original plan. We participated at that time because Watershed Management Division was intently involved in the development of the Low-Impact Development (LID) Ordinance and Manual.

However, with the LID Ordinance adopted and the Manual complete, Land Development Division is now responsible for LID implementation. We expect that Land Development Division will independently handle the review of these projects in the future.

If you have any questions, please call Menerva Ariki at Extension 4316.

BD:jtz
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Placeholder for Approved Newhall Ranch Sub-Regional Plan Addendum

Attachment B

Evaporation and Infiltration Rates

Introduction

USEPA Stormwater Management Model (SWMM) Version 4 was used to model the project extended detention basins proposed by the Entrada Project and estimate the volume reductions resulting from infiltration and evaporation of ponded water in the basins. The following sections describe the source of the parameter estimates for evaporation and infiltration for the basins.

Evaporation Rates

Evaporation rates were based on monthly normal reference evapotranspiration (ETo) rates provided by the California Department of Water Resources California Irrigation Management Information System (CIMIS, http://www.cimis.water.ca.gov/cimis/images/etomap.jpg). The Project is located in Zone 14. Reference ET values for zone 14 are reproduced in Table B-1.

Table B-1: Evaporation Parameters for SWMM Model (from CA ET map)

Month	Reference ET Rates			60% of Reference	
	inch / day	days / month	inch / month	inch / day	inch / month
January	0.05	31	1.55	0.03	0.93
February	0.08	28	2.24	0.048	1.34
March	0.12	31	3.72	0.072	2.23
April	0.17	30	5.1	0.102	3.06
May	0.22	31	6.82	0.132	4.09
June	0.26	30	7.8	0.156	4.68
July	0.28	31	8.68	0.168	5.21
August	0.25	31	7.75	0.15	4.65
September	0.19	30	5.7	0.114	3.42
October	0.13	31	4.03	0.078	2.42
November	0.07	30	2.1	0.042	1.26
December	0.05	31	1.55	0.03	0.93
Total (year)		*365*	*57.04*		*34.22*

ET includes both evaporation and transpiration, however only evaporation from the free water surface (i.e., "lake" or "pond" evaporation) is simulated in the model. To estimate lake evaporation from ETo data, the data were first converted to "pan evaporation" (i.e., the evaporation that would occur from a small pan of water) by dividing by a "pan coefficient." Typical pan coefficients (ratio of ET to pan evaporation) range from 0.6 to 0.85 (FAO-24, Doorenbos and Pruitt, 1977) indicating that pan evaporation is higher than ETo. The pan evaporation is then converted to a "lake evaporation" estimate by multiplying by a "lake coefficient." Typical lake (or pond) coefficients (ratio of lake evaporation to pan evaporation) are in the range of 0.75 (Linacre, 2002) indicating that less evaporation is expected from lakes and ponds than from pans. These factors combine to yield a multiplier near 1.0, indicating that lake/pond evaporation will be similar to ETo. For modeling, a multiplier of 0.6 was applied to

the reference ET values to include a factor of safety in these estimates. This assumption is believed to result in somewhat lower evaporation that would actually be expected to occur from EDBs, therefore somewhat underestimates volume losses. It is also noted that evapotranspiration from the amended soil layer and root zone in the bottom and sides of the basin (i.e., the "ET sponge") is not simulated by the model, also resulting in underestimates of volume reduction achieved in the EDBs.

Infiltration Rates

Infiltration rates under EDBs were determined by intersecting EDB outlines with available soil maps in a geographic information system (GIS) and estimating infiltration characteristics based on values provided with these data sources and a literature review. Because of the high variability in soil infiltration rate estimates and the relatively coarse resolution of these datasets, this "preponderance of evidence" approach is believed to be more reliable that selecting a value from a single source.

Soil maps used for this analysis included:

- Natural Resources Conservation Service (NRCS) Soil Survey Number CA675: Antelope Valley Area, California.
- Los Angeles County Soil Layer
- Infiltration screening map prepared by RT Frankian and Associates for the Project, characterizing areas as less than or greater than 0.5 in/hr.

The NRCS soil survey was used because of its relatively fine resolution of Map Unit boundaries compared to the Los Angeles County survey. Infiltration rates were derived for each NRCS Map Unit based on infiltration rate provided by the Soil Survey and the designations of hydrologic soil group (HSG) (e.g., A, B, C, and D) provided by the Soil Survey. The Soil Survey provides a wide range of infiltration rates for each map unit. The lower end of this range was selected for the purposes of modeling to result in a lower (i.e., more conservative) estimate of volume reduction and to represent ultimate conditions with some compaction and siltation. In addition, the HSG provided by the Soil Survey was used to look up infiltration rates from a literature source specifically applicable to the SWMM model[1] and this value was averaged with the low range of infiltration rate provided by the NRCS Soil Survey.

The LA County Soil Map was used because of its local applicability and consistency with the LACDPW hydrologic modeling framework. Inspection of the soil runoff curves yielded an estimate of the saturated infiltration rate of each soil type. This method of interpreting soil maps

[1] James and James, 2000, *Hydrology: Guide to the Rain, Temperature, and Runoff Modules of EPA SWMM4.*

was suggested and guided by LACDPW as part of the development of the Structural BMP Prioritization and Analysis Tool (SBPAT) project in 2008[2].

The NRCS Soil Survey and LA County Soil Layer were intersected with the outline of each EDB the three estimates of infiltration rate were averaged to yield the model input infiltration rate for each basin. Area-weighted averages were used where a basin intersected multiple soil units. The modeled infiltration rates, NRCS soil group and type designations, and LA County designations for each basin are contained in Table B-2 below.

Table B-2: Infiltration Rates Under EDBs Assumed for Modeling

Basin	NRCS Soil Map Unit	Soil Group	LA County Soil Type	Area (Acres)	Fraction of Total Area	Resultant Infiltration Rate (in/hr)	Modeled Infiltration Rate with 25% reduction (in/hr)
EDB A	MgB	A/B	098	1.50	78.4%	0.33	0.25
	CmF	C	098	0.42	21.7%		
EDB B	MgB	A/B	098	0.55	66.0%	0.31	0.23
	CmF	C	098	0.29	34.0%		

Compaction and long term siltation were accounted for in these estimates. In addition to selecting data sources that specifically represent soils with long term compaction and siltation, an additional reduction of 25 percent was applied to the calculated infiltration rates prior to modeling. Because these BMPs are not designed to infiltrate as their only discharge, and because they do not pose a safety risk if they infiltrate at somewhat less than their design rate, a greater factor of safety is not recommended for this calculation.

Based on the geotechnical evaluation of infiltration feasibility conducted by RT Frankian and Associates (RTFA, 2010), basins A and B are underlain primarily by geologic formations characterized as having an infiltration rate greater than 0.5 inches per hour. This provides site-specific support for estimated infiltration rates and indicates that the modeled infiltration rates of 0.25 in/hr and 0.23 in/hr are appropriately conservative for estimating volume reduction from the extended detention basins.

Volume Reduction Cross Check in Superpad Bioretention Areas

Volume reduction estimates used in equivalency calculations for bioretention areas are based on empirical analysis of data from the International BMP Database (See Attachment A). This is the most appropriate source of volume reductions prior to design of facilities. An appropriate factor of safety is applied to empirical estimates to allow for a variety of vegetated BMPs capable of achieving volume reductions equivalent to or better than the assumed volume reduction.

[2] Technical guidance and review of this methodology was provided by Ben Willardson, LACDPW.

However, volume reductions in prototypical bioretention areas were also estimated using SWMM to confirm the reasonableness of the empirically-based assumptions for the local climate and soil conditions. Volume reductions in prototypical bioretention areas were estimated by simulating evapotranspiration of standing water and infiltration of water from the drain rock layer assumed to be constructed below the underdrain elevation.

Evaporation rates were simulated as described above.

Underlying infiltration rates were estimated for each superpad based on the method described above. The superpad with the lowest infiltration rates was assumed for modeling. The modeled infiltration rates, NRCS soil group and type designations, and LA County designations for the worst case superpad are contained in Table B-3 below.

Table B-3: Infiltration Rates Under Worst Case Superpad Assumed for Modeling

Basin	NRCS Soil Map Unit	Soil Group	LA County Soil Type	Area (Acres)	Fraction of Total Area	Resultant Infiltration Rate (in/hr)	Modeled Infiltration Rate with 25% reduction (in/hr)
Worst Case Superpad (Basin C)	CmF	C	098	5.4	100%	0.19	0.14

SWMM modeling results (Attachment C) yield volume reduction of captured water ranged from 23 to 42 percent depending on the imperviousness of the tributary area. This is greater than the assumed 20 percent volume reduction of captured flow based on analysis of the BMP Database. The modeling framework did not account for lateral percolation nor fully account for soil soaking and drying, therefore modeled volume reductions are likely biased somewhat low.

Cited References

Doorenbos J, Pruitt WO, 1977. Guidelines for prediction of crop water requirements. FAO Irrig. and Drain. Paper No. 24 (revised), Rome

James and James, 2000, *Hydrology: Guide to the Rain, Temperature, and Runoff Modules of EPA SWMM4.*

Linacre, E., 2002. Ratio of lake to pan evaporation rates. http://www-das.uwyo.edu/~geerts/cwx/notes/chap04/eoep.html

Los Angeles County Department of Public Works. Los Angeles County Soils Map GIS Shapefile, CA State Plane Coordinate System, NAD83, Zone V, US Survey Feet. Obtained from LACDPW in 2008; date of creation not known.

National Resource Conservation Service (USDA), 2008. Los Angeles County, CA Soil Survey Spatial and Tabular Data GIS Shapefile, CA State Plane Coordinate System, NAD83, Zone V, US Survey Feet.

RTFA, 2010. Geotechnical Evaluation of Infiltration Vesting Tentative Tract Map No. 53295, Entrada (plus attached map and shapefile). February 10, 2010.

Attachment C

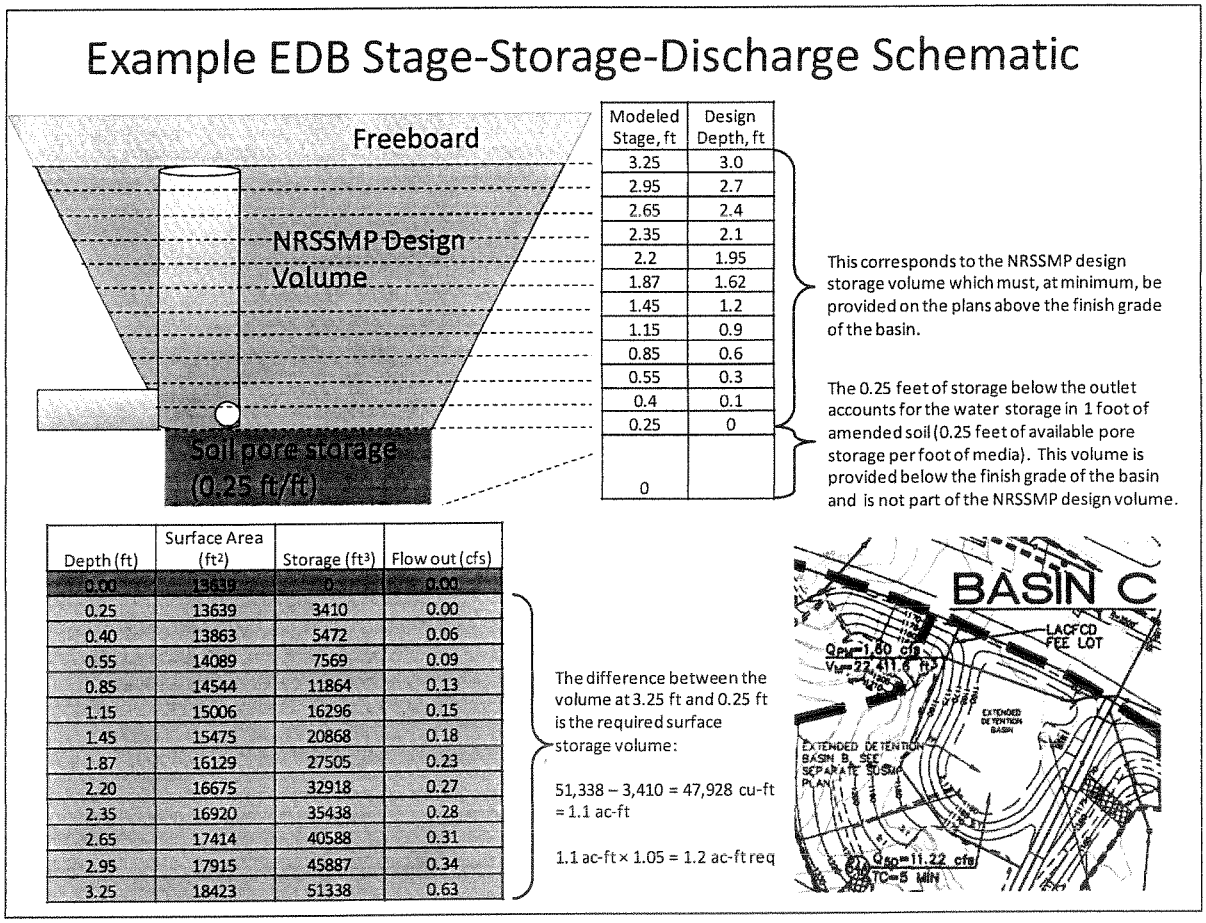
1. Stage-Storage-Discharge Table Schematics
2. Model Output from SWMM Sizing Simulations
    - Extended Detention Basin A
    - Extended Detention Basin B
    - Regional Extended Detention Basin D
    - Biofiltration Basin Z
    - Generic Biofiltration Model: Commercial Land Use
    - Generic Biofiltration Model: Multi-Family Land Use
    - Generic Biofiltration Model: Park Land Use

1. Storage-Area-Discharge Table Schematics

The following schematics illustrate how the stage-area-storage-discharge (SSD) tables used to represent BMPs in the SWMM Storage-Treatment Block are linked to BMP design attributes.

Extended Detention Basin (EDB) SSD Schematic

The EDB SSD tables were used to model EDB A, EDB B, and Regional Basin D. The schematic below demonstrates how the SSD table is related to the physical design attributes of the EDB. The example below is for Basin B.



An explanation of each column in the table is below:

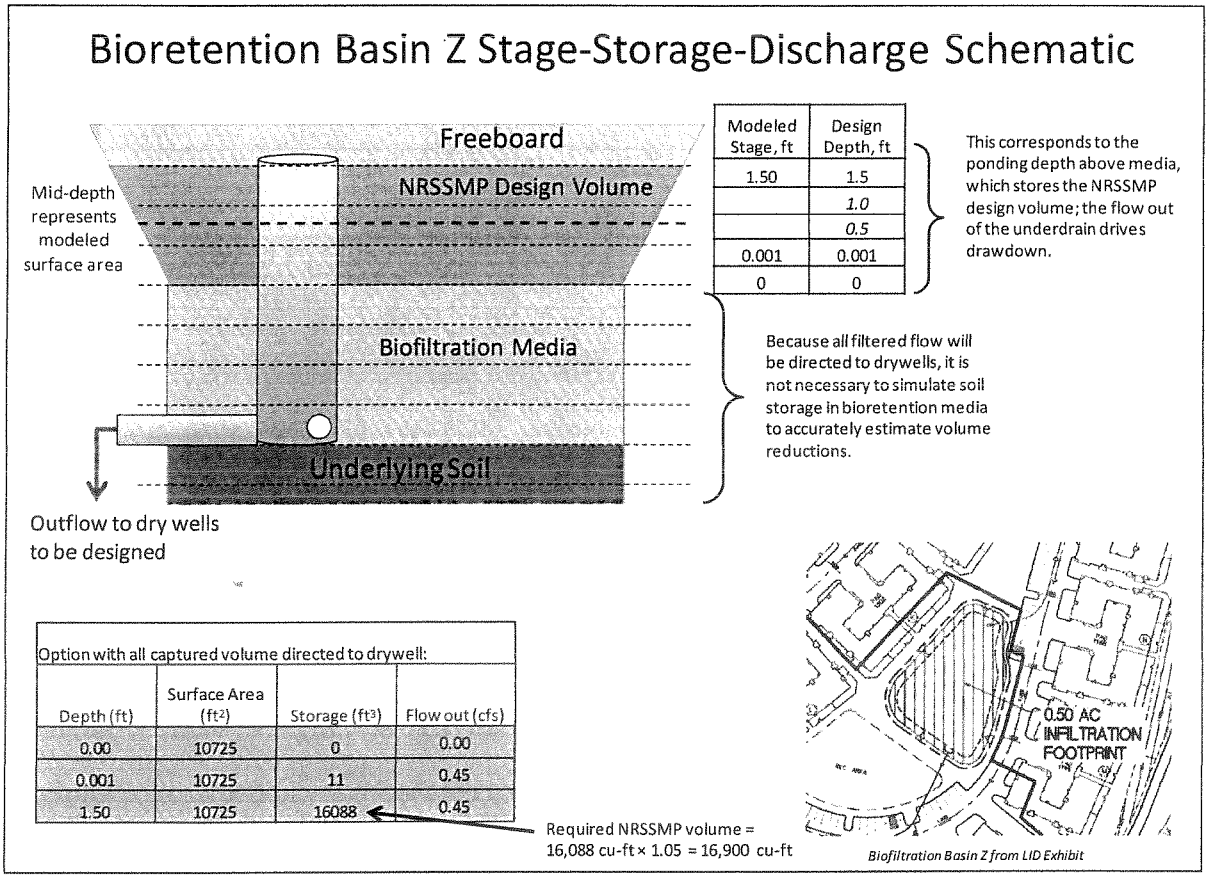
- The "depth" column in the table corresponds to the basin stage. The depth is measured as distance from the bottom of the basin to the stage (the greater the stage, the closer the stage is to the pond surface).
- The "surface area" column corresponds to the surface area of the water in the basin at that particular stage (if the basin was full to that stage). This varies, getting larger with

progressive stages, due to Basin side slopes, which give the basin the trapezoidal cross-section shown above.

- The "storage" column corresponds to the volume of water at that stage (assuming the basin was full to that stage).
- The "flow out" column corresponds to the flow out of the basin outlet structure. Volume stored at a stages with zero "flow out" (for example, below 0.25 feet in the example above) is lost only to infiltration and evaporation. Flow through the outlet is considered treated. When the basin exceeds the highest stage in the table, the overflow is tracked as "bypass". At the end of each simulation, a check is done to ensure that bypass does not constitute more than 20 percent of the total inflow to the basin. This confirms that the simulated basin is sized adequately.

Biofiltration Basin Z Stage Area Discharge Schematic

The Biofiltration Basin Z SSD table was used to model the infiltrating Biofiltration facility proposed for the Basin Z drainage area. The schematic below demonstrates how the SSD table is related to the physical design attributes of the Biofiltration basin.



- The "depth" column in the table corresponds to the depth of ponding above the biofiltration media surface.

- The "surface area" column corresponds to the surface area of the water in the basin. The surface area was modeled as constant throughout the ponding depth, even though the surface area will change with ponding depth due to side slopes. This simplification does not have important sensitivity for relatively shallow basins. For evaluating conformance, the surface area of the basin at mid ponding depth (i.e. 0.75 ft) should be compared to the modeled surface area.

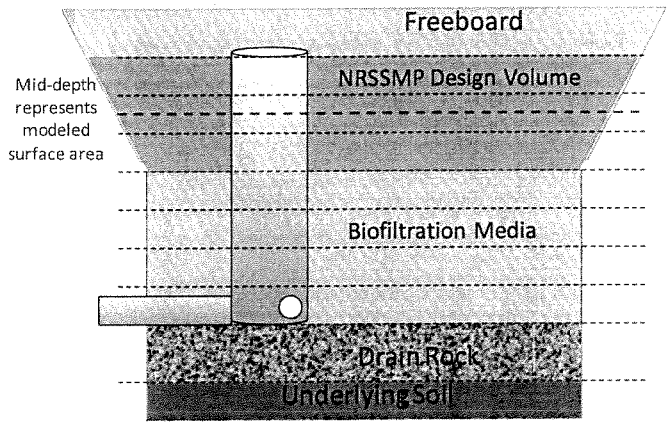
- The "storage" column corresponds to the volume of water at the ponding depth (assuming the basin was full to that stage).

- The "flow out" column corresponds to the flowrate filtered through the amended media. While ponding of water will increase flowrate somewhat, this affect was not considered and has the effect of making the model simulations more conservative for sizing calculations. All captured volume was assumed to flow to the drywell (i.e. no infiltration under the basin was assumed). When the basin exceeds the highest stage in the table, the overflow is tracked as "bypass". At the end of each simulation, a check is done to ensure that bypass does not constitute more than 20 percent of the total inflow to the basin. This confirms that the simulated basin is sized adequately.

Unit Sizing Simulations of Biofiltration Area - Stage Area Discharge Schematic

A generic set of bioretention SSD tables was used to model bioretention to determine the sizing factors (percent of area) needed for 80 percent capture of the runoff produced from an acre of a specific land use. Land uses modeled included Commercial, Multi-Family, and Park. The schematic below demonstrates how the SSD table is related to the physical attributes of the generic bioretention basins.

Generic Bioretention Stage-Storage-Discharge Schematic for Unit Sizing Factor Simulations



Modeled Stage, ft	Design Depth, ft
1.75	1.5
	1.0
	0.5
0.251	0.001
	0
	0.5
0.25	*1.0*
	1.5
0	2.0

This corresponds to the ponding depth above media, which stores the NRSSMP design volume; once storage in the media is 'full', the flow through the underdrain drives drawdown.

There is assumed to be 0.25-ft of equivalent water storage in the biofiltration media and drain rock that is available to accept water before water exits via underdrain. This volume is lost to infiltration and evaporation only.

2 ft min media × 0.25 ft/ft + 0.5 ft min drain rock × 0.3 ft/ft = 0.65 ft

Therefore 0.25 ft is conservative.

Italics correspond to actual facility stage that is not directly expressed in modeled stages

Option with discharge to underdrain and infiltration:

Depth (ft)	Surface Area (ft²)	Storage (ft³)	Flow out (cfs)	
0.00	1400	0	0.00	→ DATUM (bottom of facility)
0.25	1400	350	0.00	→ Storage within media and drain rock lost to evaporation and infiltration below underdrains (no surface discharge)
0.251	1400	351	0.06	Simulates drawdown of NRSSMP design volume from ponded surface (1.5 ft); driven by flow through media and out underdrain
1.75	1400	2450	0.06	

- The "depth" column in the table corresponds to: 1) the depth of ponding above the basin and 2) the effective depth of storage within the biofiltration media, depending on stage. The bright blue stages correspond to depth of ponding above the media, while the light green stage corresponds to effective depth within the media.

- The "surface area" column corresponds to the surface area of the water in the basin. The surface area was modeled as constant throughout the ponding depth, even though the surface area will change with ponding depth due to side slopes. This simplification does not have important sensitivity for relatively shallow basins. For evaluating conformance, the surface area of the basin should be measured at mid ponding depth (i.e. 0.75 ft).

- The "storage" column corresponds to the volume of water at the ponding depth (assuming the basin was full to that stage).

- The "flow out" column corresponds to the flow out of the basin through the underdrain. Water retained in the media drain rock is discharged to evaporation and infiltration. When the basin exceeds the highest stage in the table, the overflow is tracked as "bypass". At the end of each simulation, a check is done to ensure that bypass does not constitute more than 20 percent of the total inflow to the basin. This confirms that the simulated basin is sized adequately.

Extended Detention Basin A

SWMM RUNOFF Module Output File

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*                CDM/OSU Beta                    *
*          Release Date - July 1, 2003           *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*           Chuck Moore and Wayne Huber          *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                  Developed by

**************************************************
*              Metcalf & Eddy, Inc.              *
*             University of Florida              *
*         Water Resources Engineers, Inc.        *
*        (Now Camp Dresser & McKee, Inc.)        *
*                September 1970                  *
**************************************************

          Version 4.3 (outdated) is
         Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*             960 College Station Road           *
*             Athens, GA    30605-2720           *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMMM5 at:    *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************

**************************************************
*  This is an implementation of EPA SWMM 4.4H    *
*  "Nature is full of infinite causes which      *
```

```
*   have never occurred in experience" da Vinci *
*************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    0  JIN.UF
  JOUT for Block #     1 File #    9  RN0.int

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  NEWHALL_PATCHED_20091119.INT
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF
NSCRAT #     8 File #   14  SCRT8.UF
NSCRAT #     9 File #   15  SCRT9.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)......... 4000
 Number of Pumps in Extran (NEP)...................... 1000
 Number of Orifices in Extran (NEO)....................  200
```

```
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW)..........................  400
 Number of Extran Printout Locations (NPO).............  150
 Number of Tide Elements in Extran (NTE)...............   50
 Number of Natural Channels (NNC)...................... 1200
 Number of Storage Junctions in Extran (NVSE).......... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST)..........................  200
 Number of Input Hydrographs in Extran (NEH)...........  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN)................   15
 Number Rain Gages in Rain and Runoff (MAXRG)..........  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA)......................................   10
 Number of Variable Orifices in Extran (NVORF).........   50
 Number of Variable Orifice Data Points (NVOTIM).......   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG)..........40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW).......................................  400


##################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., July 2003.                         #
##################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                    Tom Robbins       #
##################################################


                % Capture Analysis

                EntradaBasin A


Snowmelt parameter - ISNOW.....................          0

Number of rain gages - NRGAG...................          0

Green-Ampt infiltration equation used - INFILM...        1
```

```
Quality is not simulated - KWALTY.....................          0
Read evaporation data on line(s) F1 (F2) - IVAP..                2
Hour of day at start of storm - NHR.....................         0
Minute of hour at start of storm - NMN..................         0
Time TZERO at start of storm (hours)....................     0.000
Use U.S. Customary units for most I/O - METRIC...                0
Runoff input print control...                                    0
Runoff graph plot control....                                    1
Runoff output print control..                                    0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)              1
Print land use load percentages -LANDUPR (0=no, 1=yes)           0
Limit number of groundwater convergence messages to     50 (if simulated)
Month, day, year of start of storm is:              10/ 1/1968
Wet time step length (seconds).......                    900.
Dry time step length (seconds).......                  14400.
Wet/Dry time step length (seconds)...                    900.
Simulation length is......                        20081001.0 Yr/Mo/Dy
Percent of impervious area with zero detention depth     25.0

*********************************************************
*   Processed Precipitation will be read on NSCRAT(1)   *
*********************************************************

  ##############################
  #        Data Group F1       #
  # Evaporation Rate (in/month)#
  ##############################

 JAN.   FEB.   MAR.   APR.   MAY    JUN.   JUL.   AUG.   SEP.   OCT.   NOV.   DEC.
 ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----
```

0.93 1.34 2.23 3.06 4.09 4.68 5.21 4.65 3.42 2.42 1.26 0.93

1

****
* C H A N N E L A N D P I P E D A T A *
****

Input Sequen Number	NAMEG: Channel ID #	Drains to NGTO:	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Intial Depth (ft)	Max Depth (ft)	Mann-ings "N"	Full Flow (cfs)	Infilt Rate (in/hr)
1	101	100	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000		
0.00E+00	0.00												
2	102	100	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000		
0.00E+00	0.00												

1

****
* S U B C A T C H M E N T D A T A *
****

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

SUBCATCH-MENT NO.	CHANNEL OR INLET	WIDTH PRINT (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	DEPRES. STORAGE(IN) IMPERV.	DEPRES. STORAGE(IN) PERV.	GREEN-AMPT INFIL PARAMS SUCTION (IN)	GREEN-AMPT INFIL PARAMS HYD.CON (IN/HR)	GAGE IMD	PRINT NO.	PRINT WB
1 A-AB	101	558.00	3.20	54.06	0.0500	0.012	0.250	0.020	0.060	8.00	0.280	0.320	1	0
2 A-C	101	15176.00	87.10	44.98	0.0500	0.012	0.250	0.020	0.060	8.00	0.150	0.290	1	0

TOTAL NUMBER OF SUBCATCHMENTS... 2
TOTAL TRIBUTARY AREA (ACRES).... 90.30
IMPERVIOUS AREA (ACRES)..... 40.91
PERVIOUS AREA (ACRES)..... 49.39
TOTAL WIDTH (FEET)..... 15734.00
PERCENT IMPERVIOUSNESS..... 45.30

1

****

```
*    Arrangement of Subcatchments and Channel/Pipes     *
*********************************************************
* See second subcatchment output table for connectivity *
* of subcatchment to subcatchment flows.                *
*********************************************************


   Channel
   or Pipe
101            No Tributary Channel/Pipes
               Tributary Subareas........ A-AB       A-C
102            No Tributary Channel/Pipes
               No Tributary Subareas.....


    INLET
100            Tributary Channel/Pipes... 101        102
               No Tributary Subareas.....

*********************************************************
* Hydrographs will be stored for the following   1 INLETS *
*********************************************************
100


************************************************
*  Quality simulation not included in this run *
************************************************



    ************************
    *    DATA GROUP M1     *
    ************************


TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT..        1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV..        0
STARTING AND STOPPING PRINTOUT DATES.............       0        0


    ************************
    *    DATA GROUP M3     *
    ************************

CHANNEL/INLET PRINT DATA GROUPS......100
```

```
    **********************
    *    DATA GROUP M8     *
    **********************

STORM EVENT TRACKING.....
    Storm event data file =    Sm0.out


End of preliminary input data and data echo.

*************************************************
*  Precipitation Interface File Summary         *
*  Number of precipitation station....      1   *
*************************************************

Location Station Number
-------- --------------
       1.             0

***********************************************
*      End of time step DO-loop in Runoff     *
***********************************************

Final Date (Mo/Day/Year)   =                10/ 1/2008
Total number of time steps =                    115989
Final Julian Date  =                           2008275
Final time of day  =                            86398. seconds.
Final time of day  =                             24.00   hours.
Final running time =                         350664.0000   hours.
Final running time =                          14611.0000    days.

***********************************************
*     Extrapolation Summary for Watersheds    *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls    *
***********************************************

  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls
  --------   -------   -------  --------   -------   -------  --------   -------   -------
A-AB          667025     57655A-C           667666     58062

***********************************************
*     Extrapolation Summary for Channel/Pipes *
* # Steps ==> Total Number of Extrapolated Steps *
```

```
* # Calls ==> Total Number of GUTNR Calls        *
************************************************

 Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls
  --------   -------   ------- --------   -------   ------- --------   -------   -------
101                0         0102               0         0
1
 ********************************************
 *       Continuity Check for Surface Water   *
 ********************************************

                                                                 Inches over
                                                  cubic feet     Total Basin
 Total Precipitation (Rain plus Snow)             2.402890E+08     733.060
 Total Irrigation                                 0.000000E+00       0.000
 Total Infiltration                               1.142070E+08     348.416
 Total Evaporation                                6.767983E+06      20.647
 Surface Runoff from Watersheds                   1.203443E+08     367.140
 Total Water remaining in Surface Storage         0.000000E+00       0.000
 Infiltration over the Pervious Area...           1.142070E+08     636.979
                    --------
 Infiltration + Evaporation +
 Surface Runoff + Snow removal +
 Water remaining in Surface Storage +
 Water remaining in Snow Cover.....               2.413193E+08     736.203
 Total Precipitation + Initial Storage +
 Total Irrigation.....................            2.402890E+08     733.060


 The error in continuity is calculated as
 ****************************************
 * Precipitation + Initial Snow Cover  *
 *      - Infiltration -               *
 *Evaporation - Snow removal -         *
 *Surface Runoff from Watersheds -     *
 *Water in Surface Storage -           *
 *Water remaining in Snow Cover        *
 *-------------------------------------*
 * Precipitation + Initial Snow Cover  *
 ****************************************
 Error.................................      -0.429 Percent


 ********************************************
 *       Continuity Check for Channel/Pipes   *
 ********************************************

                                                                 Inches over
                                                  cubic feet     Total Basin
 Initial Channel/Pipe Storage.............        0.000000E+00       0.000
```

Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	1.203443E+08	367.140
Groundwater Subsurface Inflow.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Infiltration Loss from Channels.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	0.120344E+09	367.140
Initial Storage + Inflow.....	1.203443E+08	367.140
Final Storage + Outflow.....	1.203443E+08	367.140

```
*******************************************
* Final Storage + Outflow + Evaporation  - *
* Watershed Runoff - Groundwater Inflow  - *
*     Initial Channel/Pipe Storage         *
*     ---------------------------------    *
*  Final Storage + Outflow  + Evaporation  *
*******************************************
```

Error..... 0.000 Percent

1

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCHMENT	AREA				PERVIOUS AREA			IMPERVIOUS AREA		TOTAL	
	GUTTER			TOTAL SIMULATED	TOTAL RUNOFF	TOTAL	PEAK RUNOFF	PEAK RUNOFF	PEAK RUNOFF	PEAK RUNOFF	PEAK RUNOFF
UNIT SUBCATCHMENT NO.	OR INLET NO.	AREA (AC)	PERCENT IMPER.	RAINFALL (IN)	DEPTH (IN)	LOSSES (IN)	RATE (CFS)	DEPTH (IN)	RATE (CFS)	DEPTH (IN)	RATE (CFS)
A-AB 101		3.20	54.1	733.64	31.035	702.649	1.698	707.391	2.491	396.673	4.189
1.309											
A-C 101		87.10	45.0	733.64	87.083	646.876	61.588	707.288	56.412	366.051	118.000
1.355											

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

MAXIMUM SURCHARGE CHANNEL VOLUME NUMBER (AC-FT)	RATIO OF FULL FLOW MAX. TO FULL FLOW (CFS)	RATIO OF FULL VELOCITY TO FULL DEPTH (FPS)	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY	TIME OF OCCURRENCE HR.	LENGTH OF SURCHARGE (HOUR)
102				0.00				1/ 0/1900	0.00	
101				122.19				2/ 7/1998	20.00	
100				122.19				2/ 7/1998	20.00	

TOTAL NUMBER OF CHANNELS/PIPES = 3

*** NOTE *** THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL
1

****
* Summary of quantity results (flow in cfs) *
****

% Capture Analysis
EntradaBasin A

Date Mo/Da/Year	Time Hr:Min	Chan/Inlt 100 Flow Cfs
Flow wt'd means.....		0.0953
Flow wt'd std-devs...		1.2004
Maximum value.....		122.1891
Minimum value.....		0.0000
Total loads.....		1.2034E+08 Cubic-ft

===> Runoff simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : EntradaBasinA_RN0.in
===> Your output file was named: EntradaBasinA_RN0.out

```
************************************************************
*       SWMM 4.4H   Simulation Date and Time Summary       *
************************************************************
* Starting Date... August     24, 2010                      *
*          Time...          10:44:56.346                     *
*   Ending Date... August     24, 2010                      *
*          Time...          10:45: 4.600                     *
*  Elapsed Time...               0.138 minutes.             *
*  Elapsed Time...               8.254 seconds.             *
************************************************************
```

Extended Detention Basin A

SWMM STORAGE Module Output File

Interpretation of Stage Storage Discharge Table from Storage Treatment Output File
Basin A

DEPTH, FT	*SURFACE AREA, SQ-FT*	*STORAGE, CU-FT*	*OUTFLOW, CFS*	*RESIDUAL FLOW, CFS*	*Explanation*
0.00E+00	3.39E+04	0.00E+00	0.00E+00	0.00E+00	Depth 0 to 0.25 ft = Pore storage (not part of NRSSMP required volume)
2.50E-01	3.39E+04	8.48E+03	0.00E+00	0.00E+00	
5.50E-01	3.46E+04	1.88E+04	4.20E-01	0.00E+00	Depth 0.25 to 6.25 feet = active surface storage, part of NRSSMP Required Volume (Basin Depth = 6 feet on plans)
8.50E-01	3.53E+04	2.93E+04	6.00E-01	0.00E+00	
1.45E+00	3.68E+04	5.09E+04	8.40E-01	0.00E+00	
2.05E+00	3.83E+04	7.34E+04	1.03E+00	0.00E+00	
2.65E+00	3.98E+04	9.68E+04	1.19E+00	0.00E+00	
3.53E+00	4.20E+04	1.33E+05	1.44E+00	0.00E+00	
4.15E+00	4.36E+04	1.59E+05	1.61E+00	0.00E+00	
4.45E+00	4.44E+04	1.73E+05	1.68E+00	0.00E+00	
5.05E+00	4.60E+04	2.00E+05	1.81E+00	0.00E+00	
5.65E+00	4.76E+04	2.28E+05	1.94E+00	0.00E+00	
6.25E+00	4.93E+04	2.57E+05	3.60E+00	0.00E+00	

NRSSMP Design Volume = [(Volume @ 6.25 ft) - (Volume @ 0.25 ft)] × 1.05

NRSSMP Design Volume = (2.57E+5 - 8.48E+3)× 1.05 = 2.48E+5 cu-ft × 1.05 = 5.7 ac-ft × 1.05 = 6.0 ac-ft

Modeled surface area at mid depth of surface storage (DEPTH = 3.25 ft) = 41,274 sq-ft (by linear interpolation from table)

1

```
************************************************
*    U.S. Environmental Protection Agency      *
*    Storm Water Management Model  (SWMM)      *
*                Version 4.4H                  *
*                                              *
*               CDM/OSU Beta                   *
*         Release Date - July 1, 2003          *
*   Camp Dresser & McKee and Oregon St. Univ.  *
*         Chuck Moore and Wayne Huber          *
*   Compiled using Compaq Visual Fortran v.6.6 *
************************************************

                Developed by

************************************************
*             Metcalf & Eddy, Inc.             *
*           University of Florida              *
*       Water Resources Engineers, Inc.        *
*      (Now Camp Dresser & McKee, Inc.)        *
*               September 1970                 *
************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

************************************************
*      U.S. Environmental Protection Agency    *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory  *
*            960 College Station Road          *
*            Athens, GA    30605-2720          *
************************************************

************************************************
*     This is an updated release of SWMM4.4h,  *
*     no longer formally supported by the EPA. *
*     If problems occur executing this model   *
*     contact Wayne Huber at Oregon State. U., *
*     wayne.huber@orst.edu,                    *
*     or Robert Dickinson at Camp Dresser &    *
*     McKee, DickinsonRE@CDM.COM.              *
*     The EPA-supported version is SWMM5 at:   *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm *
************************************************
```

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H   *
          *  "Nature is full of infinite causes which     *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    8  RN0.int
  JOUT for Block #     1 File #    9  JOT.UF

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  SCRT1.UF
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
```

```
Number of Transport input locations on R lines (NTHR).   80
Number of Transport printed output locations (NTOA)... 2000
Number of Tabular Flow Splitters in Transport (NTSP).. 1000
Number of Elements in the Extran Block (NEE)......... 4000
Number of Pumps in Extran (NEP)...................... 1000
Number of Orifices in Extran (NEO)....................  200
Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
Number of Extran Weirs (NEW)..........................  400
Number of Extran Printout Locations (NPO).............  150
Number of Tide Elements in Extran (NTE)...............   50
Number of Natural Channels (NNC)...................... 1200
Number of Storage Junctions in Extran (NVSE)......... 2000
Number of Time History Data Points in Extran (NTVAL)..  500
Number of Data Points for Variable Storage Elements
  in the Extran Block (NVST)..........................  200
Number of Input Hydrographs in Extran (NEH)...........  500
Number of Allowable Channel Connections to
  Junctions in the Extran Block (NCHN)................   15
Number Rain Gages in Rain and Runoff (MAXRG).........  200
Number PRATE/VRATE Points for Extran Pump
  Input (MAXPRA)......................................   10
Number of Variable Orifices in Extran (NVORF).........   50
Number of Variable Orifice Data Points (NVOTIM).......   50
Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
Number of Storm Events for Rain Analysis (LSTORM).....20000
Number of Plugs for Plug-flow in S/T (NPLUG).........40000
Number Conduits for Extran Results to ASCII
  File (MXFLOW).......................................  400


##########################################
# Entry made to Storage/Treatment Block.  #
# Storage/Treatment model written by the  #
# University of Florida, June 1981.       #
# Last updated July 1995 at Oregon St. U. #
##########################################

VALUE OF NOTAPE           :         0

INPUT DATA SOURCE         :  EXTERNAL FILE

EXTERNAL ELEMENT NUMBER   :  100
```

```
NUMBER OF TIME STEPS      :   1402560

TIME STEP SIZE,SECONDS    :     900.0

NUMBER OF S/T UNITS       :         1

COST MODEL USED?          :        NO

STARTING DATE             :    10/ 1/1968

STARTING JULIAN DATE      :   1968275

STARTING TIME             :    0:  0:  0

SIMULATION DURATION, HOURS:350640.000

ENDING JULIAN DATE        :   2008275

ENDING TIME OF DAY        :     0.000 HOURS

PRINT TOTAL SIMULATION SUMMARY ONLY (ISUM = 0)

IDET = 0. NO DETAILED (TIME STEP) PRINT-OUTS.

NO OUTPUT FOR AVERAGE DETENTION TIME RESULTS


##########################################
# Header information from interface file: #
##########################################

Title from first computational block:
% Capture Analysis
EntradaBasin A

Title from immediately preceding computational block:
% Capture Analysis
EntradaBasin A

Name of preceding block:.............Runoff Block
Initial Julian date (IDATEZ)..................... 1968275
Initial time of day in seconds (TZERO).....          0.0
No. transfered input locations.................          1
```

No. transfered pollutants..... 0
Size of total catchment area (acres)..... 90.30
ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1

##
Element numbers of interface inlet locations:
##
100

Conversion factor to cfs for flow units
on interface file. Multiply by: 1.00000

INPUT/OUTPUT UNITS : U.S. CUSTOMARY

TRIBUTARY AREA, ACRES : 90.3

NUMBER OF POLLUTANTS : 0

MONTHLY EVAPORATION RATES, IN/DAY

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
0.030	0.048	0.072	0.102	0.132	0.156	0.168	0.150	0.114	0.078	0.042	0.030

BASIN INFILTRATION RATE FOR UNIT 1 IN (IN/HR) = 0.2500
1

UNIT CHARACTERISTICS

****
UNIT # 1 CHARACTERISTICS
****

GENERAL UNIT DESCRIPTION :

NAME : MV Basin A
IDENT : 1
TYPE OF UNIT : DETENTION
MAX. ALLOWABLE INFLOW, CFS: 0.1000E+05

FLOW DIRECTIONS:
BYPASS TO UNIT # 100
TREATED OUTFLOW TO UNIT # 100
RESIDUALS TO UNIT # 100

===> NOTE: UNIT 100 IS THE NEXT BLOCK AND UNIT 200 IS ULTIMATE DISPOSAL.

DETENTION UNIT CHARACTERISTICS:

RESIDUALS DRAW-OFF SCHEME: NEVER DRAWN OFF

DEPTH-AREA-STORAGE-FLOW RELATIONSHIPS :

DEPTH, FT	SURFACE AREA, SQ FT	STORAGE, CU FT	TREATED OUTFLOW, CFS	RESIDUAL FLOW, CFS
0.0000E+00	3.3918E+04	0.0000E+00	0.0000E+00	0.0000E+00
2.5000E-01	3.3918E+04	8.4795E+03	0.0000E+00	0.0000E+00
5.5000E-01	3.4624E+04	1.8761E+04	4.2000E-01	0.0000E+00
8.5000E-01	3.5337E+04	2.9255E+04	6.0000E-01	0.0000E+00
1.4500E+00	3.6782E+04	5.0891E+04	8.4000E-01	0.0000E+00
2.0500E+00	3.8254E+04	7.3401E+04	1.0300E+00	0.0000E+00
2.6500E+00	3.9751E+04	9.6803E+04	1.1900E+00	0.0000E+00
3.5300E+00	4.1985E+04	1.3277E+05	1.4400E+00	0.0000E+00
4.1500E+00	4.3607E+04	1.5930E+05	1.6100E+00	0.0000E+00
4.4500E+00	4.4398E+04	1.7250E+05	1.6800E+00	0.0000E+00
5.0500E+00	4.5999E+04	1.9962E+05	1.8100E+00	0.0000E+00
5.6500E+00	4.7625E+04	2.2771E+05	1.9400E+00	0.0000E+00
6.2500E+00	4.9278E+04	2.5678E+05	3.6000E+00	0.0000E+00

INITIAL CONDITIONS:

VOLUME, CU FT : 0.0000E+00

****
* NOTE: IF THERE IS ONLY ONE UNIT THE PLANT *
* PERFORMANCE SUMMARY WILL NOT BE PRINTED. *
****

Note !! UNIT 1 HAS EXCEEDED THE MAXIMUM STORAGE VOLUME ON 1/19/1969 AT 17: 0

The excess has been bypassed and is included in BYPASS volume. Further messages will be suppressed. But summaries of number of all volume-bypass time steps and number of days with volume-bypasses will be printed.

1

```
**************************************
*    ENTIRE SIMULATION UNIT SUMMARIES *
**************************************
 OCT  1, 1968,  0 0: 0 TO  OCT  1, 2008,  0 0: 0.
```

UNIT	PARAMETER	VOLUME CU FT
1	INFLOW,TOTAL	1.2022E+08
	INFLOW,NET	9.6117E+07
	BYPASS	2.4106E+07
	TREATED OUTFLOW	7.2285E+07
	RESIDUAL FLOW	0.0000E+00
	REMAINING	0.0000E+00
	EVAPORATION	2.2053E+05
	INFILTRATION	2.3674E+07
	NO. VOL. BYPASSES	2202
	NO. VOL. BYPASS DAYS	130
	INITIAL COND.	0.0000E+00
	PERCENT ERROR	-0.0506

```
===> Storage/Treatment simulation ended normally.

===> SWMM 4.4H   simulation ended normally.
     Always check output file for possible warning messages.

===> Your input file was named : EntradaBasinA_St0.in
===> Your output file was named: EntradaBasinA_St0.out

*****************************************************
*       SWMM 4.4H   Simulation Date and Time Summary  *
*****************************************************
* Starting Date... August     24, 2010                *
*          Time...          10:45:41.884               *
*   Ending Date... August     24, 2010                *
*          Time...          10:46:44.665               *
*  Elapsed Time...               1.046 minutes.       *
*  Elapsed Time...              62.783 seconds.       *
```

****

Extended Detention Basin B

SWMM RUNOFF Module Output File

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                Version 4.4H                    *
*                                                *
*               CDM/OSU Beta                     *
*         Release Date - July 1, 2003            *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*          Chuck Moore and Wayne Huber           *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                Developed by

**************************************************
*             Metcalf & Eddy, Inc.               *
*            University of Florida               *
*       Water Resources Engineers, Inc.          *
*      (Now Camp Dresser & McKee, Inc.)          *
*               September 1970                   *
**************************************************

        Version 4.3 (outdated) is
       Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*            960 College Station Road            *
*            Athens, GA    30605-2720            *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMM5 at:     *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************

**************************************************
*  This is an implementation of EPA SWMM 4.4H    *
*  "Nature is full of infinite causes which      *
```

```
*   have never occurred in experience" da Vinci *
*************************************************


########################################
#        File names by SWMM Block      #
#         JIN  -> Input to a Block     #
#        JOUT  -> Output from a Block  #
########################################

   JIN for Block #     1 File #    0  JIN.UF
  JOUT for Block #     1 File #    9  RN0.int

########################################
# Scratch file names for this simulation. #
########################################

NSCRAT #     1 File #    1  NEWHALL_PATCHED_20091119.INT
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF
NSCRAT #     8 File #   14  SCRT8.UF
NSCRAT #     9 File #   15  SCRT9.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)......... 4000
 Number of Pumps in Extran (NEP)...................... 1000
 Number of Orifices in Extran (NEO)....................  200
```

```
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW).........................  400
 Number of Extran Printout Locations (NPO).............  150
 Number of Tide Elements in Extran (NTE)...............   50
 Number of Natural Channels (NNC)...................... 1200
 Number of Storage Junctions in Extran (NVSE).......... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST)..........................  200
 Number of Input Hydrographs in Extran (NEH)...........  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN)................   15
 Number Rain Gages in Rain and Runoff (MAXRG)..........  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA)......................................   10
 Number of Variable Orifices in Extran (NVORF).........   50
 Number of Variable Orifice Data Points (NVOTIM).......   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG).........40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW).......................................  400


##################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., July 2003.                         #
##################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                    Tom Robbins       #
##################################################


                % Capture Analysis

                EntradaBasin B


Snowmelt parameter - ISNOW.....................          0

Number of rain gages - NRGAG...................          0

Green-Ampt infiltration equation used - INFILM...        1
```

Quality is not simulated - KWALTY.....	0
Read evaporation data on line(s) F1 (F2) - IVAP..	2
Hour of day at start of storm - NHR.....	0
Minute of hour at start of storm - NMN.....	0
Time TZERO at start of storm (hours).....	0.000
Use U.S. Customary units for most I/O - METRIC...	0
Runoff input print control...	0
Runoff graph plot control....	1
Runoff output print control..	0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)	1
Print land use load percentages -LANDUPR (0=no, 1=yes)	0
Limit number of groundwater convergence messages to	50 (if simulated)
Month, day, year of start of storm is:	10/ 1/1968
Wet time step length (seconds).....	900.
Dry time step length (seconds).....	14400.
Wet/Dry time step length (seconds)...	900.
Simulation length is.....	20081001.0 Yr/Mo/Dy
Percent of impervious area with zero detention depth	25.0

****
* Processed Precipitation will be read on NSCRAT(1) *
****

##############################
Data Group F1
Evaporation Rate (in/month)#
##############################

JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.

0.93 1.34 2.23 3.06 4.09 4.68 5.21 4.65 3.42 2.42 1.26 0.93

1

****
* C H A N N E L A N D P I P E D A T A *
****

Input Sequen Number	NAMEG: Channel ID #	Drains to NGTO:	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Intial Depth (ft)	Max Depth (ft)	Mann- ings "N"	Full Flow (cfs)	Infilt Rate (in/hr)
1	201	200	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
2	202	200	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00

1

****
* S U B C A T C H M E N T D A T A *
****

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

SUBCATCH- MENT NO.	CHANNEL OR INLET	WIDTH PRINT (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	DEPRES. STORAGE(IN) IMPERV.	DEPRES. STORAGE(IN) PERV.	GREEN-AMPT INFIL PARAMS SUCTION (IN)	GREEN-AMPT INFIL PARAMS HYD.CON (IN/HR)	GAGE IMD	PRINT NO.	WB
1 B-AB	201	159.00	0.91	47.42	0.0500	0.012	0.250	0.020	0.060	8.00	0.280	0.320	1	0
2 B-C	201	2281.00	13.09	69.99	0.0500	0.012	0.250	0.020	0.060	8.00	0.150	0.290	1	0

TOTAL NUMBER OF SUBCATCHMENTS... 2
TOTAL TRIBUTARY AREA (ACRES).... 14.00
IMPERVIOUS AREA (ACRES)..... 9.59
PERVIOUS AREA (ACRES)..... 4.41
TOTAL WIDTH (FEET)..... 2440.00
PERCENT IMPERVIOUSNESS..... 68.52

1

****

```
*    Arrangement of Subcatchments and Channel/Pipes     *
*********************************************************
* See second subcatchment output table for connectivity *
* of subcatchment to subcatchment flows.                *
*********************************************************


   Channel
   or Pipe
201            No Tributary Channel/Pipes
               Tributary Subareas........ B-AB       B-C
202            No Tributary Channel/Pipes
               No Tributary Subareas.....


    INLET
200            Tributary Channel/Pipes... 201        202
               No Tributary Subareas.....


*********************************************************
* Hydrographs will be stored for the following   1 INLETS *
*********************************************************
200


***********************************************
*  Quality simulation not included in this run *
***********************************************


    ************************
    *    DATA GROUP M1     *
    ************************


TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT..        1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV..        0
STARTING AND STOPPING PRINTOUT DATES.....               0        0


    ************************
    *    DATA GROUP M3     *
    ************************

CHANNEL/INLET PRINT DATA GROUPS......200
```

```
    **********************
    *    DATA GROUP M8     *
    **********************

STORM EVENT TRACKING.....
    Storm event data file =    Sm0.out


End of preliminary input data and data echo.


*************************************************
*  Precipitation Interface File Summary         *
*  Number of precipitation station....      1   *
*************************************************

Location Station Number
-------- --------------
       1.             0


***********************************************
*      End of time step DO-loop in Runoff     *
***********************************************

Final Date (Mo/Day/Year)   =                  10/ 2/2008
Total number of time steps =                      117046
Final Julian Date  =                             2008276
Final time of day  =                                  0. seconds.
Final time of day  =                                0.00   hours.
Final running time =                           350664.0000   hours.
Final running time =                            14611.0000    days.

***********************************************
*     Extrapolation Summary for Watersheds    *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls    *
***********************************************

  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls
  --------   -------   -------  --------   -------   -------  --------   -------   -------
B-AB          672625     56147B-C           694356     62032

***********************************************
*     Extrapolation Summary for Channel/Pipes *
* # Steps ==> Total Number of Extrapolated Steps *
```

```
* # Calls ==> Total Number of GUTNR Calls          *
*************************************************
```

Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls
201	0	0202		0	0			

1

```
*********************************************
*       Continuity Check for Surface Water  *
*********************************************
```

	cubic feet	Inches over Total Basin
Total Precipitation (Rain plus Snow)	3.723378E+07	732.660
Total Irrigation	0.000000E+00	0.000
Total Infiltration	1.021089E+07	200.923
Total Evaporation	1.306903E+06	25.716
Surface Runoff from Watersheds	2.596444E+07	510.910
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Pervious Area...	1.021089E+07	638.315
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	3.748224E+07	737.549
Total Precipitation + Initial Storage + Total Irrigation.....	3.723378E+07	732.660

The error in continuity is calculated as

```
**************************************
* Precipitation + Initial Snow Cover  *
*      - Infiltration -               *
*Evaporation - Snow removal -         *
*Surface Runoff from Watersheds -     *
*Water in Surface Storage -           *
*Water remaining in Snow Cover        *
*-------------------------------------*
* Precipitation + Initial Snow Cover  *
**************************************
```

Error..... -0.667 Percent

```
*********************************************
*       Continuity Check for Channel/Pipes  *
*********************************************
```

	cubic feet	Inches over Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000

Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	2.596444E+07	510.910
Groundwater Subsurface Inflow.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Infiltration Loss from Channels.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	0.259644E+08	510.910
Initial Storage + Inflow.....	2.596444E+07	510.910
Final Storage + Outflow.....	2.596444E+07	510.910

```
*******************************************
* Final Storage + Outflow + Evaporation  - *
* Watershed Runoff - Groundwater Inflow  - *
*     Initial Channel/Pipe Storage         *
*     ---------------------------------    *
*  Final Storage + Outflow  + Evaporation  *
*******************************************
```

Error..... 0.000 Percent

1

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCHMENT	AREA				PERVIOUS AREA			IMPERVIOUS AREA		TOTAL	
	GUTTER			TOTAL SIMULATED	TOTAL RUNOFF	TOTAL	PEAK RUNOFF	PEAK RUNOFF	PEAK RUNOFF	PEAK RUNOFF	PEAK RUNOFF
SUBCATCHMENT NO.	OR INLET NO.	AREA (AC)	PERCENT IMPER.	RAINFALL (IN)	DEPTH (IN)	LOSSES (IN)	RATE (CFS)	DEPTH (IN)	RATE (CFS)	DEPTH (IN)	RATE (CFS)
B-AB 201		0.91	47.4	733.64	30.619	702.610	0.552	706.987	0.621	351.352	
1.173 1.289											
B-C 201		13.09	70.0	733.64	90.583	643.396	5.061	706.979	13.192	521.999	
18.253 1.394											

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

MAXIMUM CHANNEL VOLUME NUMBER	RATIO OF FULL SURCHARGE MAX. TO FULL FLOW (AC-FT)	RATIO OF FULL MAX. DEPTH TO FULL DEPTH	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY	TIME OF OCCURRENCE HR.	LENGTH OF SURCHARGE (HOUR)
202				0.00				1/	0/1900	0.00
201				19.43				2/	7/1998	20.00
200				19.43				2/	7/1998	20.00

TOTAL NUMBER OF CHANNELS/PIPES = 3

*** NOTE *** THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL
1

****
* Summary of quantity results (flow in cfs) *
****

% Capture Analysis
EntradaBasin B

Date Mo/Da/Year	Time Hr:Min	Chan/Inlt 200 Flow cfs
Flow wt'd means.....		0.0206
Flow wt'd std-devs...		0.2353
Maximum value.....		19.4264
Minimum value.....		0.0000
Total loads.....		2.5965E+07 Cubic-ft

===> Runoff simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : EntradaBasinB_RN0.in
===> Your output file was named: EntradaBasinB_RN0.out

```
************************************************************
*       SWMM 4.4H   Simulation Date and Time Summary       *
************************************************************
* Starting Date... August     24, 2010                      *
*          Time...          10:52: 0.886                    *
*   Ending Date... August     24, 2010                      *
*          Time...          10:52:10.169                    *
*  Elapsed Time...               0.155 minutes.            *
*  Elapsed Time...               9.284 seconds.            *
************************************************************
```

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*                CDM/OSU Beta                    *
*          Release Date - July 1, 2003           *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*          Chuck Moore and Wayne Huber           *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                Developed by

**************************************************
*             Metcalf & Eddy, Inc.               *
*            University of Florida               *
*       Water Resources Engineers, Inc.          *
*      (Now Camp Dresser & McKee, Inc.)          *
*                September 1970                  *
**************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*            960 College Station Road            *
*            Athens, GA    30605-2720            *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMM5 at:     *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************
```

Extended Detention Basin B

SWMM STORAGE Module Output File

Interpretation of Stage Storage Discharge Table from Storage Treatment Output File
Basin B

DEPTH, FT	*SURFACE AREA, SQ-FT*	*STORAGE, CU-FT*	*OUTFLOW, CFS*	*RESIDUAL FLOW, CFS*	*Explanation*
0.00E+00	1.36E+04	0.00E+00	0.00E+00	0.00E+00	Depth 0 to 0.25 ft = Pore storage (not part of NRSSMP required volume)
2.50E-01	1.36E+04	3.41E+03	0.00E+00	0.00E+00	
4.00E-01	1.39E+04	5.47E+03	6.00E-02	0.00E+00	Depth 0.25 to 3.25 feet = active surface storage, part of NRSSMP Required Volume (Basin Depth = 3 feet on plans)
5.50E-01	1.41E+04	7.57E+03	9.00E-02	0.00E+00	
8.50E-01	1.45E+04	1.19E+04	1.30E-01	0.00E+00	
1.15E+00	1.50E+04	1.63E+04	1.50E-01	0.00E+00	
1.45E+00	1.55E+04	2.09E+04	1.80E-01	0.00E+00	
1.87E+00	1.61E+04	2.75E+04	2.30E-01	0.00E+00	
2.20E+00	1.67E+04	3.29E+04	2.70E-01	0.00E+00	
2.35E+00	1.69E+04	3.54E+04	2.80E-01	0.00E+00	
2.65E+00	1.74E+04	4.06E+04	3.10E-01	0.00E+00	
2.95E+00	1.79E+04	4.59E+04	3.40E-01	0.00E+00	
3.25E+00	1.84E+04	5.13E+04	6.30E-01	0.00E+00	

NRSSMP Design Volume = [(Volume @ 3.25 ft) - (Volume @ 0.25 ft)] × 1.05

NRSSMP Design Volume = (5.13E+4 - 3.41E+3)× 1.05 = 4.79E+4 cu-ft × 1.05 = 1.1 ac-ft × 1.05 = 1.2 ac-ft

Modeled surface area at mid depth of surface storage (DEPTH = 1.75 ft) = 15,942 sq-ft (by linear interpolation from table)

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H   *
          *  "Nature is full of infinite causes which     *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    8  RN0.int
  JOUT for Block #     1 File #    9  JOT.UF

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  SCRT1.UF
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
```

```
Number of Transport input locations on R lines (NTHR).    80
Number of Transport printed output locations (NTOA)... 2000
Number of Tabular Flow Splitters in Transport (NTSP).. 1000
Number of Elements in the Extran Block (NEE)..........  4000
Number of Pumps in Extran (NEP)....................... 1000
Number of Orifices in Extran (NEO).....................  200
Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
Number of Extran Weirs (NEW)...........................  400
Number of Extran Printout Locations (NPO).............  150
Number of Tide Elements in Extran (NTE)...............   50
Number of Natural Channels (NNC)....................... 1200
Number of Storage Junctions in Extran (NVSE).......... 2000
Number of Time History Data Points in Extran (NTVAL)..  500
Number of Data Points for Variable Storage Elements
  in the Extran Block (NVST)...........................  200
Number of Input Hydrographs in Extran (NEH)...........  500
Number of Allowable Channel Connections to
  Junctions in the Extran Block (NCHN)................   15
Number Rain Gages in Rain and Runoff (MAXRG)..........  200
Number PRATE/VRATE Points for Extran Pump
  Input (MAXPRA).......................................   10
Number of Variable Orifices in Extran (NVORF).........   50
Number of Variable Orifice Data Points (NVOTIM).......   50
Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
Number of Storm Events for Rain Analysis (LSTORM).....20000
Number of Plugs for Plug-flow in S/T (NPLUG)..........40000
Number Conduits for Extran Results to ASCII
  File (MXFLOW)........................................  400


##########################################
# Entry made to Storage/Treatment Block.  #
# Storage/Treatment model written by the  #
# University of Florida, June 1981.       #
# Last updated July 1995 at Oregon St. U. #
##########################################

VALUE OF NOTAPE           :         0

INPUT DATA SOURCE         :  EXTERNAL FILE

EXTERNAL ELEMENT NUMBER   :  200
```

```
NUMBER OF TIME STEPS      :   1402560

TIME STEP SIZE,SECONDS    :     900.0

NUMBER OF S/T UNITS       :         1

COST MODEL USED?          :        NO

STARTING DATE             :    10/ 1/1968

STARTING JULIAN DATE      :   1968275

STARTING TIME             :    0:  0:  0

SIMULATION DURATION, HOURS:350640.000

ENDING JULIAN DATE        :   2008275

ENDING TIME OF DAY        :     0.000 HOURS

PRINT TOTAL SIMULATION SUMMARY ONLY (ISUM = 0)

IDET = 0. NO DETAILED (TIME STEP) PRINT-OUTS.

NO OUTPUT FOR AVERAGE DETENTION TIME RESULTS


##########################################
# Header information from interface file: #
##########################################

Title from first computational block:
% Capture Analysis
EntradaBasin B

Title from immediately preceding computational block:
% Capture Analysis
EntradaBasin B

Name of preceding block:.............Runoff Block
Initial Julian date (IDATEZ)..................... 1968275
Initial time of day in seconds (TZERO).....      0.0
No. transfered input locations.....                1
```

No. transfered pollutants..... 0
Size of total catchment area (acres)..... 14.00
ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1

##
Element numbers of interface inlet locations:
##
200

Conversion factor to cfs for flow units
on interface file. Multiply by: 1.00000

INPUT/OUTPUT UNITS : U.S. CUSTOMARY

TRIBUTARY AREA, ACRES : 14.0

NUMBER OF POLLUTANTS : 0

MONTHLY EVAPORATION RATES, IN/DAY

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
0.030	0.048	0.072	0.102	0.132	0.156	0.168	0.150	0.114	0.078	0.042	0.030

BASIN INFILTRATION RATE FOR UNIT 1 IN (IN/HR) = 0.2300
1

UNIT CHARACTERISTICS

****
UNIT # 1 CHARACTERISTICS
****

GENERAL UNIT DESCRIPTION :

NAME : Entrada Basin B
IDENT : 1
TYPE OF UNIT : DETENTION
MAX. ALLOWABLE INFLOW, CFS: 0.1000E+05

FLOW DIRECTIONS:
BYPASS TO UNIT # 100
TREATED OUTFLOW TO UNIT # 100
RESIDUALS TO UNIT # 100

===> NOTE: UNIT 100 IS THE NEXT BLOCK AND UNIT 200 IS ULTIMATE DISPOSAL.

DETENTION UNIT CHARACTERISTICS:

RESIDUALS DRAW-OFF SCHEME: NEVER DRAWN OFF

DEPTH-AREA-STORAGE-FLOW RELATIONSHIPS :

DEPTH, FT	SURFACE AREA, SQ FT	STORAGE, CU FT	TREATED OUTFLOW, CFS	RESIDUAL FLOW, CFS
0.0000E+00	1.3639E+04	0.0000E+00	0.0000E+00	0.0000E+00
2.5000E-01	1.3639E+04	3.4098E+03	0.0000E+00	0.0000E+00
4.0000E-01	1.3863E+04	5.4724E+03	6.0000E-02	0.0000E+00
5.5000E-01	1.4089E+04	7.5688E+03	9.0000E-02	0.0000E+00
8.5000E-01	1.4544E+04	1.1864E+04	1.3000E-01	0.0000E+00
1.1500E+00	1.5006E+04	1.6296E+04	1.5000E-01	0.0000E+00
1.4500E+00	1.5475E+04	2.0868E+04	1.8000E-01	0.0000E+00
1.8700E+00	1.6129E+04	2.7505E+04	2.3000E-01	0.0000E+00
2.2000E+00	1.6675E+04	3.2918E+04	2.7000E-01	0.0000E+00
2.3500E+00	1.6920E+04	3.5438E+04	2.8000E-01	0.0000E+00
2.6500E+00	1.7414E+04	4.0588E+04	3.1000E-01	0.0000E+00
2.9500E+00	1.7915E+04	4.5887E+04	3.4000E-01	0.0000E+00
3.2500E+00	1.8423E+04	5.1338E+04	6.3000E-01	0.0000E+00

INITIAL CONDITIONS:

VOLUME, CU FT : 0.0000E+00

****
* NOTE: IF THERE IS ONLY ONE UNIT THE PLANT *
* PERFORMANCE SUMMARY WILL NOT BE PRINTED. *
****

Note !! UNIT 1 HAS EXCEEDED THE MAXIMUM STORAGE VOLUME ON 1/19/1969 AT 16:15

The excess has been bypassed and is included in BYPASS volume. Further messages will be suppressed. But summaries of number of all volume-bypass time steps and number of days with volume-bypasses will be printed.

1

```
**************************************
*    ENTIRE SIMULATION UNIT SUMMARIES *
**************************************
 OCT  1, 1968,  0 0: 0 TO  OCT  1, 2008,  0 0: 0.
```

UNIT	PARAMETER	VOLUME CU FT
1	INFLOW,TOTAL	2.5944E+07
	INFLOW,NET	2.0898E+07
	BYPASS	5.0461E+06
	TREATED OUTFLOW	1.2530E+07
	RESIDUAL FLOW	0.0000E+00
	REMAINING	0.0000E+00
	EVAPORATION	8.2906E+04
	INFILTRATION	8.3043E+06
	NO. VOL. BYPASSES	2807
	NO. VOL. BYPASS DAYS	162
	INITIAL COND.	0.0000E+00
	PERCENT ERROR	-0.0740

```
===> Storage/Treatment simulation ended normally.

===> SWMM 4.4H   simulation ended normally.
     Always check output file for possible warning messages.

===> Your input file was named : EntradaBasinB_St0.in
===> Your output file was named: EntradaBasinB_St0.out

*****************************************************
*       SWMM 4.4H   Simulation Date and Time Summary  *
*****************************************************
* Starting Date... August     24, 2010                *
*          Time...          11: 0:25.891               *
*   Ending Date... August     24, 2010                *
*          Time...          11: 1:23.223               *
*  Elapsed Time...               0.956 minutes.       *
*  Elapsed Time...              57.330 seconds.       *
```

****

Regional Extended Detention Basin D

SWMM RUNOFF Module Output File

1

```
***************************************************
*    U.S. Environmental Protection Agency         *
*    Storm Water Management Model  (SWMM)         *
*                 Version 4.4H                    *
*                                                 *
*                CDM/OSU Beta                     *
*          Release Date - July 1, 2003            *
*   Camp Dresser & McKee and Oregon St. Univ.     *
*          Chuck Moore and Wayne Huber            *
*   Compiled using Compaq Visual Fortran v.6.6    *
***************************************************

                 Developed by

***************************************************
*             Metcalf & Eddy, Inc.                *
*            University of Florida                *
*       Water Resources Engineers, Inc.           *
*      (Now Camp Dresser & McKee, Inc.)           *
*                September 1970                   *
***************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

***************************************************
*      U.S. Environmental Protection Agency       *
* Center for Exposure Assessment Modeling (CEAM)  *
*    Athens Environmental Research Laboratory     *
*             960 College Station Road            *
*             Athens, GA    30605-2720            *
***************************************************

***************************************************
*     This is an updated release of SWMM4.4h,     *
*     no longer formally supported by the EPA.    *
*     If problems occur executing this model      *
*     contact Wayne Huber at Oregon State. U.,    *
*     wayne.huber@orst.edu,                       *
*     or Robert Dickinson at Camp Dresser &       *
*     McKee, DickinsonRE@CDM.COM.                 *
*     The EPA-supported version is SWMM5 at:      *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm    *
***************************************************
```

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H  *
          *  "Nature is full of infinite causes which    *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    0  JIN.UF
  JOUT for Block #     1 File #    9  RN0.int

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  NEWHALL_PATCHED_20091119.INT
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF
NSCRAT #     8 File #   14  SCRT8.UF
NSCRAT #     9 File #   15  SCRT9.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
```

```
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)..... 4000
 Number of Pumps in Extran (NEP)..... 1000
 Number of Orifices in Extran (NEO).....  200
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW).....  400
 Number of Extran Printout Locations (NPO).....  150
 Number of Tide Elements in Extran (NTE).....   50
 Number of Natural Channels (NNC)..... 1200
 Number of Storage Junctions in Extran (NVSE)..... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST).....  200
 Number of Input Hydrographs in Extran (NEH).....  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN).....   15
 Number Rain Gages in Rain and Runoff (MAXRG).....  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA).....   10
 Number of Variable Orifices in Extran (NVORF).....   50
 Number of Variable Orifice Data Points (NVOTIM).....   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG).....40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW).....  400


##################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., July 2003.                         #
##################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                    Tom Robbins       #
##################################################
```

% Capture Analysis

Mission Village Basin D

Snowmelt parameter - ISNOW.....	0
Number of rain gages - NRGAG.....	0
Green-Ampt infiltration equation used - INFILM...	1
Quality is not simulated - KWALTY.....	0
Read evaporation data on line(s) F1 (F2) - IVAP..	2
Hour of day at start of storm - NHR.....	0
Minute of hour at start of storm - NMN.....	0
Time TZERO at start of storm (hours).....	0.000
Use U.S. Customary units for most I/O - METRIC...	0
Runoff input print control...	0
Runoff graph plot control....	1
Runoff output print control..	0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)	1
Print land use load percentages -LANDUPR (0=no, 1=yes)	0
Limit number of groundwater convergence messages to	50 (if simulated)
Month, day, year of start of storm is:	10/ 1/1968
Wet time step length (seconds).....	900.
Dry time step length (seconds).....	14400.
Wet/Dry time step length (seconds)...	900.

Simulation length is..... 20081001.0 Yr/Mo/Dy

Percent of impervious area with zero detention depth 25.0

****
* Processed Precipitation will be read on NSCRAT(1) *
****

##############################
Data Group F1
Evaporation Rate (in/month)#
##############################

JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
0.93	1.34	2.23	3.06	4.09	4.68	5.21	4.65	3.42	2.42	1.26	0.93

1

****
* C H A N N E L A N D P I P E D A T A *
****

Input Sequen Number	NAMEG: Channel ID #	Drains to NGTO:	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Intial Depth (ft)	Max Depth (ft)	Mann- ings "N"	Full Flow (cfs)	Infilt Rate (in/hr)
1	401	420	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
2	402	420	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
3	403	420	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
4	404	420	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
5	405	420	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
6	406	430	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
7	407	430	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00

0.00												
8	408	430	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
9	409	430	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
10	410	430	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
11	411	440	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
12	412	440	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
13	413	440	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
14	414	440	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
15	420	400	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
16	430	400	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
17	440	400	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00
0.00												
1												

****
* S U B C A T C H M E N T D A T A *
****

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

	SUBCATCH-	CHANNEL		WIDTH	AREA	PERCENT	SLOPE	RESISTANCE	FACTOR	DEPRES. STORAGE(IN)		
GREEN-AMPT INFIL PARAMS	MENT NO.	OR INLET	GAGE	PRINT								
SUCTION HYD.CON		IMD	NO.	WB								(IN)
(IN/HR)												
1	DMV-AB	401		7234.00	41.52	54.10	0.0500	0.012	0.250	0.020	0.060	8.00
0.280	0.320		1	0								
2	DMV-C	402		22712.00	130.35	46.83	0.0500	0.012	0.250	0.020	0.060	8.00
0.160	0.290		1	0								
3	DLN-AB	403		3.00	0.03	1.00	0.0500	0.012	0.250	0.020	0.060	8.00
0.390	0.320		1	0								
4	DLN-C	404		1520.00	17.44	1.00	0.0500	0.012	0.250	0.020	0.060	8.00
0.210	0.290		1	0								

5 DLN-CB	405		3437.00	39.45	1.00	0.0500	0.012	0.250	0.020	0.060	8.00
0.290	0.300	1	0								
6 DL-AB	406		1410.00	8.09	64.04	0.0500	0.012	0.250	0.020	0.060	8.00
0.290	0.320	1	0								
7 DL-C	407		14368.00	82.46	35.13	0.0500	0.012	0.250	0.020	0.060	8.00
0.160	0.290	1	0								
8 DL-CB	408		41299.00	237.02	45.80	0.0500	0.012	0.250	0.020	0.060	8.00
0.220	0.300	1	0								
9 DE-AB	409		3608.00	20.71	71.21	0.0500	0.012	0.250	0.020	0.060	8.00
0.280	0.320	1	0								
10 DE-C	410		14055.00	80.67	54.69	0.0500	0.012	0.250	0.020	0.060	8.00
0.150	0.290	1	0								
11 DHS-AB	411		480.00	2.76	60.00	0.0500	0.012	0.250	0.020	0.060	8.00
0.280	0.320	1	0								
12 DHS-C	412		8855.00	50.82	60.00	0.0500	0.012	0.250	0.020	0.060	8.00
0.150	0.290	1	0								
13 DSFD-AB	413		811.00	4.65	42.00	0.0500	0.012	0.250	0.020	0.060	8.00
0.280	0.320	1	0								
14 DSFD-C	414		3847.00	22.08	42.00	0.0500	0.012	0.250	0.020	0.060	8.00
0.150	0.290	1	0								

TOTAL NUMBER OF SUBCATCHMENTS...	14
TOTAL TRIBUTARY AREA (ACRES)....	738.05
IMPERVIOUS AREA (ACRES).....	329.02
PERVIOUS AREA (ACRES).....	409.03
TOTAL WIDTH (FEET).....	123639.00
PERCENT IMPERVIOUSNESS.....	44.58

1

```
**********************************************************
*    Arrangement of Subcatchments and Channel/Pipes      *
**********************************************************
* See second subcatchment output table for connectivity *
* of subcatchment to subcatchment flows.                 *
**********************************************************
```

Channel or Pipe		
401	No Tributary Channel/Pipes	
	Tributary Subareas.....	DMV-AB
402	No Tributary Channel/Pipes	
	Tributary Subareas.....	DMV-C
403	No Tributary Channel/Pipes	

```
                Tributary Subareas........ DLN-AB
404             No Tributary Channel/Pipes
                Tributary Subareas........ DLN-C
405             No Tributary Channel/Pipes
                Tributary Subareas........ DLN-CB
406             No Tributary Channel/Pipes
                Tributary Subareas........ DL-AB
407             No Tributary Channel/Pipes
                Tributary Subareas........ DL-C
408             No Tributary Channel/Pipes
                Tributary Subareas........ DL-CB
409             No Tributary Channel/Pipes
                Tributary Subareas........ DE-AB
410             No Tributary Channel/Pipes
                Tributary Subareas........ DE-C
411             No Tributary Channel/Pipes
                Tributary Subareas........ DHS-AB
412             No Tributary Channel/Pipes
                Tributary Subareas........ DHS-C
413             No Tributary Channel/Pipes
                Tributary Subareas........ DSFD-AB
414             No Tributary Channel/Pipes
                Tributary Subareas........ DSFD-C
420             Tributary Channel/Pipes... 401       402       403       404       405
                No Tributary Subareas.....
430             Tributary Channel/Pipes... 406       407       408       409       410
                No Tributary Subareas.....
440             Tributary Channel/Pipes... 411       412       413       414
                No Tributary Subareas.....


   INLET
400             Tributary Channel/Pipes... 420       430       440
                No Tributary Subareas.....

************************************************************
* Hydrographs will be stored for the following   1 INLETS *
************************************************************
400

************************************************
*  Quality simulation not included in this run *
```

****

****
* DATA GROUP M1 *
****

TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT.. 1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV.. 0
STARTING AND STOPPING PRINTOUT DATES..... 0 0

****
* DATA GROUP M3 *
****

CHANNEL/INLET PRINT DATA GROUPS.....400

****
* DATA GROUP M8 *
****

STORM EVENT TRACKING.....
  Storm event data file = Sm0.out

End of preliminary input data and data echo.

****
* Precipitation Interface File Summary *
* Number of precipitation station.... 1 *
****

Location	Station Number
1.	0

****

```
*      End of time step DO-loop in Runoff      *
************************************************

Final Date (Mo/Day/Year)    =                  10/ 2/2008
Total number of time steps =                      117076
Final Julian Date  =                             2008276
Final time of day  =                                  1. seconds.
Final time of day  =                                0.00   hours.
Final running time =                           350664.0000   hours.
Final running time =                            14611.0000    days.

************************************************
*     Extrapolation Summary for Watersheds     *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls     *
************************************************
```

Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls
DMV-AB	652254	57678	DMV-C	684296	57828	DLN-AB	671115	46209
DLN-C	689503	47905	DLN-CB	652434	46762	DL-AB	651451	58421
DL-C	674927	56265	DL-CB	669920	56712	DE-AB	664409	60203
DE-C	678046	59774	DHS-AB	668973	58239	DHS-C	686666	60190
DSFD-AB	657719	55517	DSFD-C	677552	57556			

```
************************************************
*     Extrapolation Summary for Channel/Pipes  *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of GUTNR Calls       *
************************************************
```

Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls
401	0	0402		0	0403		0	0
404	0	0405		0	0406		0	0
407	0	0408		0	0409		0	0
410	0	0411		0	0412		0	0
413	0	0414		0	0420		0	0
430	0	0440		0	0			

```
1
*********************************************
*      Continuity Check for Surface Water   *
*********************************************
                                                    Inches over
```

MVBasinD_RN0.out

	cubic feet	Total Basin
Total Precipitation (Rain plus Snow)	1.962885E+09	732.660
Total Irrigation	0.000000E+00	0.000
Total Infiltration	9.801866E+08	365.861
Total Evaporation	5.491680E+07	20.498
Surface Runoff from Watersheds	9.360535E+08	349.388
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Pervious Area...	9.801866E+08	660.155
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	1.971157E+09	735.747
Total Precipitation + Initial Storage + Total Irrigation.....	1.962885E+09	732.660

The error in continuity is calculated as

```
*************************************
* Precipitation + Initial Snow Cover  *
*      - Infiltration -               *
*Evaporation - Snow removal -         *
*Surface Runoff from Watersheds -     *
*Water in Surface Storage -           *
*Water remaining in Snow Cover        *
*-----------------------------------*
* Precipitation + Initial Snow Cover  *
*************************************
```

Error..... -0.421 Percent

```
*********************************************
*       Continuity Check for Channel/Pipes  *
*********************************************
```

	cubic feet	Inches over Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	9.360535E+08	349.388
Groundwater Subsurface Inflow.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Infiltration Loss from Channels.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	0.936054E+09	349.388
Initial Storage + Inflow.....	9.360535E+08	349.388

```
 Final Storage + Outflow.....                    9.360535E+08    349.388
 ******************************************
 * Final Storage + Outflow + Evaporation  - *
 * Watershed Runoff - Groundwater Inflow  - *
 *     Initial Channel/Pipe Storage         *
 *     ---------------------------------    *
 *  Final Storage + Outflow  + Evaporation  *
 ******************************************
 Error.....                                      0.000 Percent
1
```

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCHMENT NO.	GUTTER OR INLET NO.	AREA (AC)	PERCENT IMPER.	TOTAL SIMULATED RAINFALL (IN)	PERVIOUS AREA TOTAL RUNOFF DEPTH (IN)	PERVIOUS AREA TOTAL LOSSES (IN)	PERVIOUS AREA PEAK RUNOFF RATE (CFS)	IMPERVIOUS AREA PEAK RUNOFF DEPTH (IN)	IMPERVIOUS AREA PEAK RUNOFF RATE (CFS)	TOTAL SUBCATCHMENT PEAK RUNOFF DEPTH (IN)	TOTAL SUBCATCHMENT PEAK RUNOFF RATE (CFS)	UNIT AREA RUNOFF (IN/HR)
DMV-AB	401	41.52	54.1	733.64	31.046	702.252	22.013	707.031	32.344	396.754	54.356	1.309
DMV-C	402	130.35	46.8	733.64	80.401	653.130	88.395	706.972	87.896	373.824	176.291	1.352
DLN-AB	403	0.03	1.0	733.64	11.318	721.491	0.028	707.830	0.000	18.284	0.028	0.938
DLN-C	404	17.44	1.0	733.64	47.468	685.503	19.502	707.085	0.271	54.065	19.773	1.134
DLN-CB	405	39.45	1.0	733.64	23.687	709.194	40.291	707.075	0.613	30.521	40.905	1.037
DL-AB	406	8.09	64.0	733.64	29.211	704.152	3.335	707.040	7.460	463.293	10.795	1.334
DL-C	407	82.46	35.1	733.64	79.039	654.396	68.063	706.624	41.711	299.509	109.774	1.331
DL-CB	408	237.02	45.8	733.64	51.258	682.097	155.978	706.960	156.309	351.569	312.287	

1.318											
DE-AB	409	20.71	71.2	733.64	32.406	701.132	6.900	706.965	21.235	512.760	28.135
1.359											
DE-C	410	80.67	54.7	733.64	88.300	645.370	47.040	707.020	63.526	426.678	110.566
1.371											
DHS-AB	411	2.76	60.0	733.64	31.463	701.895	1.276	707.038	2.384	436.808	3.661
1.326											
DHS-C	412	50.82	60.0	733.64	89.023	644.714	26.175	707.043	43.906	459.835	70.080
1.379											
DSFD-AB	413	4.65	42.0	733.64	30.287	702.894	3.107	706.865	2.812	314.450	5.919
1.273											
DSFD-C	414	22.08	42.0	733.64	86.759	646.790	16.449	706.858	13.353	347.201	29.803
1.350											

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

RATIO OF MAX. TO FULL FLOW	RATIO OF MAX. DEPTH TO FULL DEPTH	CHANNEL NUMBER	FULL FLOW (CFS)	FULL VELOCITY (FPS)	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY	TIME OF OCCURRENCE HR.	LENGTH OF SURCHARGE (HOUR)	MAXIMUM SURCHARGE VOLUME (AC-FT)
		414				29.80				2/ 7/1998	20.00		
		413				5.92				2/ 7/1998	20.00		
		412				70.08				2/ 7/1998	20.00		
		411				3.66				2/ 7/1998	20.00		
		410				110.57				2/ 7/1998	20.00		
		409				28.14				2/ 7/1998	20.00		
		408				312.29				2/ 7/1998	20.00		
		407				109.77				2/ 7/1998	20.00		
		406				10.80				2/ 7/1998	20.00		
		405				40.86				2/ 7/1998	20.00		
		404				19.75				2/ 7/1998	20.00		
		403				0.03				2/ 7/1998	20.00		
		402				176.29				2/ 7/1998	20.00		

401	54.36	2/ 7/1998 20.00
440	109.46	2/ 7/1998 20.00
430	571.56	2/ 7/1998 20.00
420	291.29	2/ 7/1998 20.00
400	972.31	2/ 7/1998 20.00

TOTAL NUMBER OF CHANNELS/PIPES = 18

*** NOTE *** THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL

1

****
* Summary of quantity results (flow in cfs) *
****

% Capture Analysis
Mission Village Basin D

	Chan/Inlt 400
Date Mo/Da/Year	Time Hr:Min
	Flow Cfs
Flow wt'd means.....	0.7415
Flow wt'd std-devs...	9.1583
Maximum value.....	972.3074
Minimum value.....	0.0000
Total loads.....	9.3603E+08 Cubic-ft

===> Runoff simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : MVBasinD_RN0.in
===> Your output file was named: MVBasinD_RN0.out

****
* SWMM 4.4H Simulation Date and Time Summary *
****
* Starting Date... August 24, 2010 *
* Time... 16:56:13.101 *

```
*   Ending Date... August     24, 2010                  *
*          Time...          16:56:31.882                *
*  Elapsed Time...               0.313 minutes.        *
*  Elapsed Time...              18.781 seconds.        *
************************************************************
```

Regional Extended Detention Basin D

SWMM STORAGE Module Output File

Interpretation of Stage Storage Discharge Table from Storage Treatment Output File
Regional Basin D

DEPTH, FT	*SURFACE AREA, SQ-FT*	*STORAGE, CU-FT*	*OUTFLOW, CFS*	*RESIDUAL FLOW, CFS*	*Explanation*
0.00E+00	1.16E+05	0.00E+00	0.00E+00	0.00E+00	Depth 0 to 12 feet = active surface storage, part of NRSSMP Required Volume (Basin Depth = 12 feet on plans; no pore storage accounted for in modeling)
6.00E-01	1.18E+05	7.02E+04	3.73E+00	0.00E+00	
1.20E+00	1.21E+05	1.42E+05	5.28E+00	0.00E+00	
2.40E+00	1.26E+05	2.90E+05	7.47E+00	0.00E+00	
3.60E+00	1.32E+05	4.45E+05	9.15E+00	0.00E+00	
4.80E+00	1.37E+05	6.07E+05	1.06E+01	0.00E+00	
6.59E+00	1.46E+05	8.60E+05	1.24E+01	0.00E+00	
7.80E+00	1.52E+05	1.04E+06	1.35E+01	0.00E+00	
8.40E+00	1.55E+05	1.13E+06	1.40E+01	0.00E+00	
9.60E+00	1.61E+05	1.32E+06	1.49E+01	0.00E+00	
1.08E+01	1.67E+05	1.52E+06	1.58E+01	0.00E+00	
1.20E+01	1.73E+05	1.72E+06	3.25E+01	0.00E+00	

NRSSMP Design Volume = [(Volume @ 12 ft) - (Volume @ 0 ft)] × 1.05

NRSSMP Design Volume = (1.72E+6 - 0)× 1.05 = 39.5 ac-ft × 1.05 = 41.5 ac-ft

1

```
************************************************
*    U.S. Environmental Protection Agency      *
*    Storm Water Management Model  (SWMM)      *
*                Version 4.4H                  *
*                                              *
*                CDM/OSU Beta                  *
*          Release Date - July 1, 2003         *
*   Camp Dresser & McKee and Oregon St. Univ.  *
*          Chuck Moore and Wayne Huber         *
*   Compiled using Compaq Visual Fortran v.6.6 *
************************************************

                Developed by

************************************************
*              Metcalf & Eddy, Inc.            *
*             University of Florida            *
*         Water Resources Engineers, Inc.      *
*        (Now Camp Dresser & McKee, Inc.)      *
*                September 1970                *
************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

************************************************
*      U.S. Environmental Protection Agency    *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory  *
*             960 College Station Road         *
*             Athens, GA    30605-2720         *
************************************************

************************************************
*     This is an updated release of SWMM4.4h,  *
*     no longer formally supported by the EPA. *
*     If problems occur executing this model   *
*     contact Wayne Huber at Oregon State. U., *
*     wayne.huber@orst.edu,                    *
*     or Robert Dickinson at Camp Dresser &    *
*     McKee, DickinsonRE@CDM.COM.              *
*     The EPA-supported version is SWMM5 at:   *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm *
************************************************

************************************************
*  This is an implementation of EPA SWMM 4.4H  *
*  "Nature is full of infinite causes which    *
```

```
*   have never occurred in experience" da Vinci *
************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    8  RN0.int
  JOUT for Block #     1 File #    9  JOT.UF

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  SCRT1.UF
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)......... 4000
 Number of Pumps in Extran (NEP)...................... 1000
 Number of Orifices in Extran (NEO)....................  200
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW)..........................  400
```

```
Number of Extran Printout Locations (NPO).............  150
Number of Tide Elements in Extran (NTE)...............   50
Number of Natural Channels (NNC)...................... 1200
Number of Storage Junctions in Extran (NVSE).......... 2000
Number of Time History Data Points in Extran (NTVAL)..  500
Number of Data Points for Variable Storage Elements
  in the Extran Block (NVST)..........................  200
Number of Input Hydrographs in Extran (NEH)...........  500
Number of Allowable Channel Connections to
  Junctions in the Extran Block (NCHN)................   15
Number Rain Gages in Rain and Runoff (MAXRG)..........  200
Number PRATE/VRATE Points for Extran Pump
  Input (MAXPRA)......................................   10
Number of Variable Orifices in Extran (NVORF).........   50
Number of Variable Orifice Data Points (NVOTIM).......   50
Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
Number of Storm Events for Rain Analysis (LSTORM).....20000
Number of Plugs for Plug-flow in S/T (NPLUG)..........40000
Number Conduits for Extran Results to ASCII
  File (MXFLOW).......................................  400


##########################################
# Entry made to Storage/Treatment Block.  #
# Storage/Treatment model written by the  #
# University of Florida, June 1981.       #
# Last updated July 1995 at Oregon St. U. #
##########################################

VALUE OF NOTAPE           :         0

INPUT DATA SOURCE         :  EXTERNAL FILE

EXTERNAL ELEMENT NUMBER   :  400

NUMBER OF TIME STEPS      :   1402560

TIME STEP SIZE,SECONDS    :     900.0

NUMBER OF S/T UNITS       :         1

COST MODEL USED?          :        NO

STARTING DATE             :    10/ 1/1968

STARTING JULIAN DATE      :   1968275
```

```
STARTING TIME              :    0:  0:  0

SIMULATION DURATION, HOURS:350640.000

ENDING JULIAN DATE         :   2008275

ENDING TIME OF DAY         :     0.000 HOURS

PRINT TOTAL SIMULATION SUMMARY ONLY (ISUM = 0)

IDET = 0. NO DETAILED (TIME STEP) PRINT-OUTS.

NO OUTPUT FOR AVERAGE DETENTION TIME RESULTS


##########################################
# Header information from interface file: #
##########################################

Title from first computational block:
% Capture Analysis
Mission Village Basin D

Title from immediately preceding computational block:
% Capture Analysis
Mission Village Basin D

Name of preceding block:.............Runoff Block
Initial Julian date (IDATEZ)..................... 1968275
Initial time of day in seconds (TZERO).....          0.0
No. transfered input locations.....                    1
No. transfered pollutants.....                         0
Size of total catchment area (acres).....          738.05
ID numbers (JCE=0) or alphanumeric (JCE=1).....        1

################################################
# Element numbers of interface inlet locations: #
################################################
400

Conversion factor to cfs for flow units
on interface file.  Multiply by:     1.00000


INPUT/OUTPUT UNITS         :   U.S. CUSTOMARY

TRIBUTARY AREA, ACRES      :     738.1
```

NUMBER OF POLLUTANTS : 0

MONTHLY EVAPORATION RATES, IN/DAY

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
0.030	0.048	0.072	0.102	0.132	0.156	0.168	0.150	0.114	0.078	0.042	0.030

BASIN INFILTRATION RATE FOR UNIT 1 IN (IN/HR) = 0.0000
1

UNIT CHARACTERISTICS

****
UNIT # 1 CHARACTERISTICS
****

GENERAL UNIT DESCRIPTION :

NAME : MV Basin D
IDENT : 1
TYPE OF UNIT : DETENTION
MAX. ALLOWABLE INFLOW, CFS: 0.1000E+05

FLOW DIRECTIONS:
BYPASS TO UNIT # 200
TREATED OUTFLOW TO UNIT # 200
RESIDUALS TO UNIT # 200

===> NOTE: UNIT 100 IS THE NEXT BLOCK AND UNIT 200 IS ULTIMATE DISPOSAL.

DETENTION UNIT CHARACTERISTICS:

RESIDUALS DRAW-OFF SCHEME: NEVER DRAWN OFF

DEPTH-AREA-STORAGE-FLOW RELATIONSHIPS :

DEPTH, FT	SURFACE AREA, SQ FT	STORAGE, CU FT	TREATED OUTFLOW, CFS	RESIDUAL FLOW, CFS
0.0000E+00	1.1568E+05	0.0000E+00	0.0000E+00	0.0000E+00
6.0000E-01	1.1829E+05	7.0192E+04	3.7300E+00	0.0000E+00

1.2000E+00	1.2093E+05	1.4196E+05	5.2800E+00	0.0000E+00
2.4000E+00	1.2628E+05	2.9028E+05	7.4700E+00	0.0000E+00
3.6000E+00	1.3173E+05	4.4509E+05	9.1500E+00	0.0000E+00
4.8000E+00	1.3729E+05	6.0650E+05	1.0560E+01	0.0000E+00
6.5900E+00	1.4579E+05	8.5985E+05	1.2380E+01	0.0000E+00
7.8000E+00	1.5164E+05	1.0398E+06	1.3470E+01	0.0000E+00
8.4000E+00	1.5458E+05	1.1317E+06	1.3970E+01	0.0000E+00
9.6000E+00	1.6056E+05	1.3207E+06	1.4940E+01	0.0000E+00
1.0800E+01	1.6663E+05	1.5171E+06	1.5840E+01	0.0000E+00
1.2000E+01	1.7281E+05	1.7207E+06	3.2460E+01	0.0000E+00

INITIAL CONDITIONS:

VOLUME, CU FT : 0.0000E+00

```
**************************************************
* NOTE: IF THERE IS ONLY ONE UNIT THE PLANT      *
*       PERFORMANCE SUMMARY WILL NOT BE PRINTED. *
**************************************************
```

Note !! UNIT 1 HAS EXCEEDED THE MAXIMUM STORAGE VOLUME ON 1/19/1969 AT 16:30
The excess has been bypassed and is included in BYPASS volume. Further
messages will be suppressed. But summaries of number of all volume-bypass
time steps and number of days with volume-bypasses will be printed.

1

```
**************************************
*    ENTIRE SIMULATION UNIT SUMMARIES *
**************************************
```

OCT 1, 1968, 0 0: 0 TO OCT 1, 2008, 0 0: 0.

UNIT	PARAMETER	VOLUME CU FT
1	INFLOW,TOTAL	9.3531E+08
	INFLOW,NET	7.4544E+08
	BYPASS	1.8988E+08
	TREATED OUTFLOW	7.4430E+08
	RESIDUAL FLOW	0.0000E+00
	REMAINING	0.0000E+00
	EVAPORATION	1.0491E+06
	INFILTRATION	0.0000E+00
	NO. VOL. BYPASSES	2481
	NO. VOL. BYPASS DAYS	156
	INITIAL COND.	0.0000E+00

```
     PERCENT ERROR         0.0084

===> Storage/Treatment simulation ended normally.

===> SWMM 4.4H   simulation ended normally.
     Always check output file for possible warning messages.

===> Your input file was named : MVBasinD_St0.in
===> Your output file was named: MVBasinD_St0.out

************************************************
*       SWMM 4.4H   Simulation Date and Time Summary  *
************************************************
* Starting Date... August     24, 2010                 *
*          Time...          16:58:11.696               *
*   Ending Date... August     24, 2010                 *
*          Time...          16:59:15.899               *
*  Elapsed Time...               1.070 minutes.       *
*  Elapsed Time...              64.201 seconds.       *
************************************************
```

Biofiltration Basin Z

SWMM RUNOFF Module Output File

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*                CDM/OSU Beta                    *
*          Release Date - July 1, 2003           *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*           Chuck Moore and Wayne Huber          *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                  Developed by

**************************************************
*              Metcalf & Eddy, Inc.              *
*             University of Florida              *
*        Water Resources Engineers, Inc.         *
*       (Now Camp Dresser & McKee, Inc.)         *
*                September 1970                  *
**************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*             960 College Station Road           *
*             Athens, GA    30605-2720           *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMMM5 at:    *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************

**************************************************
*  This is an implementation of EPA SWMM 4.4H    *
*  "Nature is full of infinite causes which      *
```

```
*   have never occurred in experience" da Vinci *
**************************************************


########################################
#        File names by SWMM Block      #
#         JIN  -> Input to a Block     #
#        JOUT  -> Output from a Block  #
########################################

   JIN for Block #     1 File #    0  JIN.UF
  JOUT for Block #     1 File #    9  RN0.int

########################################
# Scratch file names for this simulation. #
########################################

NSCRAT #     1 File #    1  NEWHALL_PATCHED_20091119.INT
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF
NSCRAT #     8 File #   14  SCRT8.UF
NSCRAT #     9 File #   15  SCRT9.UF

**************************************************
*    Parameter Values on the Tapes Common Block   *
**************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)......... 4000
 Number of Pumps in Extran (NEP)...................... 1000
 Number of Orifices in Extran (NEO)....................  200
```

```
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW).........................  400
 Number of Extran Printout Locations (NPO).............  150
 Number of Tide Elements in Extran (NTE)...............   50
 Number of Natural Channels (NNC)...................... 1200
 Number of Storage Junctions in Extran (NVSE).......... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST)..........................  200
 Number of Input Hydrographs in Extran (NEH)...........  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN)................   15
 Number Rain Gages in Rain and Runoff (MAXRG)..........  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA)......................................   10
 Number of Variable Orifices in Extran (NVORF).........   50
 Number of Variable Orifice Data Points (NVOTIM).......   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG).........40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW).......................................  400


##################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., July 2003.                         #
##################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                    Tom Robbins       #
##################################################


                % Capture Analysis

                Entrada Bioretention


Snowmelt parameter - ISNOW.....................          0

Number of rain gages - NRGAG...................          0

Green-Ampt infiltration equation used - INFILM...        1
```

```
Quality is not simulated - KWALTY.....................          0
Read evaporation data on line(s) F1 (F2) - IVAP..              2
Hour of day at start of storm - NHR.....................       0
Minute of hour at start of storm - NMN..................       0
Time TZERO at start of storm (hours)....................   0.000
Use U.S. Customary units for most I/O - METRIC...              0
Runoff input print control...                                  0
Runoff graph plot control....                                  1
Runoff output print control..                                  0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)            1
Print land use load percentages -LANDUPR (0=no, 1=yes)         0
Limit number of groundwater convergence messages to       50 (if simulated)
Month, day, year of start of storm is:                 10/ 1/1968
Wet time step length (seconds).......                      900.
Dry time step length (seconds).......                    14400.
Wet/Dry time step length (seconds)...                      900.
Simulation length is......                          20081001.0 Yr/Mo/Dy
Percent of impervious area with zero detention depth      25.0

*********************************************************
*   Processed Precipitation will be read on NSCRAT(1)   *
*********************************************************

  ##############################
  #        Data Group F1       #
  # Evaporation Rate (in/month)#
  ##############################

 JAN.   FEB.   MAR.   APR.   MAY    JUN.   JUL.   AUG.   SEP.   OCT.   NOV.   DEC.
 ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----
```

0.93 1.34 2.23 3.06 4.09 4.68 5.21 4.65 3.42 2.42 1.26 0.93

1

****
* CHANNEL AND PIPE DATA *
****

Input Sequen Number	NAMEG: Channel ID #	Drains to NGTO:	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Intial Depth (ft)	Max Depth (ft)	Mann-ings "N"	Full Flow (cfs)	Infilt Rate (in/hr)
1	101	100	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00
2	102	100	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00

1

****
* SUBCATCHMENT DATA *
****

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

SUBCATCH-MENT NO.	CHANNEL OR INLET	GAGE PRINT	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	DEPRES. STORAGE(IN) IMPERV.	DEPRES. STORAGE(IN) PERV.	GREEN-AMPT INFIL PARAMS SUCTION (IN)	GREEN-AMPT INFIL PARAMS HYD.CON (IN/HR)
1 Bio-AB	101	957.00	5.49	80.00	0.0500	0.012	0.250	0.020	0.060	8.00	0.280	
2 Bio-C	102	367.00	2.11	80.00	0.0500	0.012	0.250	0.020	0.060	8.00	0.150	

IMD NO. WB: 0.320 1 0 (Bio-AB); 0.290 1 0 (Bio-C)

TOTAL NUMBER OF SUBCATCHMENTS...	2
TOTAL TRIBUTARY AREA (ACRES)....	7.60
IMPERVIOUS AREA (ACRES).....	6.08
PERVIOUS AREA (ACRES).....	1.52
TOTAL WIDTH (FEET).....	1324.00
PERCENT IMPERVIOUSNESS.....	80.00

1

****

```
*    Arrangement of Subcatchments and Channel/Pipes     *
*********************************************************
* See second subcatchment output table for connectivity *
* of subcatchment to subcatchment flows.                *
*********************************************************


   Channel
   or Pipe
101            No Tributary Channel/Pipes
               Tributary Subareas........ Bio-AB
102            No Tributary Channel/Pipes
               Tributary Subareas........ Bio-C


    INLET
100            Tributary Channel/Pipes... 101        102
               No Tributary Subareas.....


************************************************************
* Hydrographs will be stored for the following   1 INLETS *
************************************************************
100


*********************************************
*  Quality simulation not included in this run *
*********************************************



    ***********************
    *    DATA GROUP M1    *
    ***********************


TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT..        1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV..        0
STARTING AND STOPPING PRINTOUT DATES.....               0         0


    ***********************
    *    DATA GROUP M3    *
    ***********************

CHANNEL/INLET PRINT DATA GROUPS......101
```

```
    **********************
    *    DATA GROUP M8     *
    **********************

STORM EVENT TRACKING.....
    Storm event data file =    Sm0.out


End of preliminary input data and data echo.

*************************************************
*  Precipitation Interface File Summary         *
*  Number of precipitation station....      1   *
*************************************************

Location Station Number
-------- --------------
       1.             0

***********************************************
*      End of time step DO-loop in Runoff     *
***********************************************

Final Date (Mo/Day/Year)   =                  10/ 2/2008
Total number of time steps =                      117489
Final Julian Date  =                             2008276
Final time of day  =                                  1. seconds.
Final time of day  =                               0.00   hours.
Final running time =                          350664.0000   hours.
Final running time =                           14611.0000    days.

***********************************************
*     Extrapolation Summary for Watersheds    *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls    *
***********************************************

  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls
  --------   -------   -------  --------   -------   -------  --------   -------   -------
Bio-AB        649684     61080Bio-C         663506     62894

***********************************************
*     Extrapolation Summary for Channel/Pipes *
* # Steps ==> Total Number of Extrapolated Steps *
```

```
* # Calls ==> Total Number of GUTNR Calls          *
**************************************************

 Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls
 ---------   -------   ------- ---------   -------   ------- ---------   -------   -------
101                0         0102                0         0
1
 ***********************************************
 *       Continuity Check for Surface Water    *
 ***********************************************
                                                                 Inches over
                                                  cubic feet     Total Basin
 Total Precipitation (Rain plus Snow)           2.021428E+07      732.720
 Total Irrigation                               0.000000E+00        0.000
 Total Infiltration                             3.712073E+06      134.554
 Total Evaporation                              7.798877E+05       28.269
 Surface Runoff from Watersheds                 1.587581E+07      575.461
 Total Water remaining in Surface Storage       0.000000E+00        0.000
 Infiltration over the Pervious Area...         3.712073E+06      672.770
                  --------
 Infiltration + Evaporation +
 Surface Runoff + Snow removal +
 Water remaining in Surface Storage +
 Water remaining in Snow Cover.....             2.036777E+07      738.284
 Total Precipitation + Initial Storage +
 Total Irrigation.....                          2.021428E+07      732.720


 The error in continuity is calculated as
 ****************************************
 * Precipitation + Initial Snow Cover  *
 *      - Infiltration -               *
 *Evaporation - Snow removal -         *
 *Surface Runoff from Watersheds -     *
 *Water in Surface Storage -           *
 *Water remaining in Snow Cover        *
 *-------------------------------------*
 * Precipitation + Initial Snow Cover  *
 ****************************************
 Error.................................      -0.759 Percent


 ***********************************************
 *       Continuity Check for Channel/Pipes    *
 ***********************************************
                                                                 Inches over
                                                  cubic feet     Total Basin
 Initial Channel/Pipe Storage.............      0.000000E+00        0.000
```

Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	1.587581E+07	575.461
Groundwater Subsurface Inflow.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Infiltration Loss from Channels.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	0.158758E+08	575.461
Initial Storage + Inflow.....	1.587581E+07	575.461
Final Storage + Outflow.....	1.587581E+07	575.461

```
*****************************************
* Final Storage + Outflow + Evaporation  - *
* Watershed Runoff - Groundwater Inflow  - *
*     Initial Channel/Pipe Storage         *
*     ---------------------------------    *
*  Final Storage + Outflow  + Evaporation  *
*****************************************
```

Error..... 0.000 Percent

1

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCHMENT	GUTTER OR INLET NO.	AREA (AC)	PERCENT IMPER.	TOTAL SIMULATED RAINFALL (IN)	PERVIOUS AREA TOTAL RUNOFF DEPTH (IN)	PERVIOUS AREA TOTAL LOSSES (IN)	PERVIOUS AREA PEAK RUNOFF RATE (CFS)	IMPERVIOUS AREA RUNOFF DEPTH (IN)	IMPERVIOUS AREA PEAK RUNOFF RATE (CFS)	TOTAL RUNOFF DEPTH (IN)	TOTAL PEAK RUNOFF RATE (CFS)	PEAK UNIT RUNOFF (IN/HR)
Bio-AB	101	5.49	80.0	733.64	33.327	700.444	1.271	706.886	6.324	572.174	7.595	1.383
Bio-C	102	2.11	80.0	733.64	92.489	641.884	0.544	706.882	2.431	584.003	2.974	1.410

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

MAXIMUM SURCHARGE VOLUME (AC-FT)	RATIO OF FULL CHANNEL FLOW NUMBER	RATIO OF FULL MAX. TO FULL FLOW (CFS)	MAX. DEPTH TO FULL VELOCITY (FPS)	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY	HR.	LENGTH OF SURCHARGE (HOUR)
	102				2.97				2/ 7/1998	20.00	
	101				7.60				2/ 7/1998	20.00	
	100				10.57				2/ 7/1998	20.00	

TOTAL NUMBER OF CHANNELS/PIPES = 3

*** NOTE *** THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL
1

****
* Summary of quantity results (flow in cfs) *
****

% Capture Analysis
Entrada Bioretention

Date Mo/Da/Year	Time Hr:Min	Chan/Inlt 101 Flow Cfs
Flow wt'd means.....		0.0090
Flow wt'd std-devs...		0.0992
Maximum value.....		7.5950
Minimum value.....		0.0000
Total loads.....		1.1402E+07 Cubic-ft

===> Runoff simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : Bioretention_RN0.in
===> Your output file was named: Bioretention_RN0.out

```
************************************************************
*       SWMM 4.4H   Simulation Date and Time Summary       *
************************************************************
* Starting Date... May        11, 2010                     *
*          Time...          11:41:10.271                    *
*   Ending Date... May        11, 2010                     *
*          Time...          11:41:19.475                    *
*  Elapsed Time...              0.153 minutes.             *
*  Elapsed Time...              9.204 seconds.             *
************************************************************
```

Biofiltration Basin Z

SWMM STORAGE Module Output File

1

```
************************************************
*    U.S. Environmental Protection Agency      *
*    Storm Water Management Model  (SWMM)      *
*                 Version 4.4H                 *
*                                              *
*                CDM/OSU Beta                  *
*          Release Date - July 1, 2003         *
*   Camp Dresser & McKee and Oregon St. Univ.  *
*         Chuck Moore and Wayne Huber          *
*   Compiled using Compaq Visual Fortran v.6.6 *
************************************************

                 Developed by

************************************************
*             Metcalf & Eddy, Inc.             *
*            University of Florida             *
*       Water Resources Engineers, Inc.        *
*      (Now Camp Dresser & McKee, Inc.)        *
*                 September 1970               *
************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

************************************************
*      U.S. Environmental Protection Agency    *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory  *
*             960 College Station Road         *
*             Athens, GA    30605-2720         *
************************************************

************************************************
*     This is an updated release of SWMM4.4h,  *
*     no longer formally supported by the EPA. *
*     If problems occur executing this model   *
*     contact Wayne Huber at Oregon State. U.,  *
*     wayne.huber@orst.edu,                    *
*     or Robert Dickinson at Camp Dresser &    *
*     McKee, DickinsonRE@CDM.COM.              *
*     The EPA-supported version is SWMM5 at:   *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm *
************************************************
```

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H   *
          *  "Nature is full of infinite causes which     *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    8  RN0.int
  JOUT for Block #     1 File #    9  JOT.UF

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  SCRT1.UF
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
```

```
Number of Transport input locations on R lines (NTHR).    80
Number of Transport printed output locations (NTOA)... 2000
Number of Tabular Flow Splitters in Transport (NTSP).. 1000
Number of Elements in the Extran Block (NEE)..........4000
Number of Pumps in Extran (NEP)....................... 1000
Number of Orifices in Extran (NEO).....................  200
Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
Number of Extran Weirs (NEW)...........................  400
Number of Extran Printout Locations (NPO).............  150
Number of Tide Elements in Extran (NTE)...............   50
Number of Natural Channels (NNC)....................... 1200
Number of Storage Junctions in Extran (NVSE).......... 2000
Number of Time History Data Points in Extran (NTVAL)..  500
Number of Data Points for Variable Storage Elements
  in the Extran Block (NVST)...........................  200
Number of Input Hydrographs in Extran (NEH)...........  500
Number of Allowable Channel Connections to
  Junctions in the Extran Block (NCHN)................   15
Number Rain Gages in Rain and Runoff (MAXRG).........  200
Number PRATE/VRATE Points for Extran Pump
  Input (MAXPRA).......................................   10
Number of Variable Orifices in Extran (NVORF).........   50
Number of Variable Orifice Data Points (NVOTIM).......   50
Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
Number of Storm Events for Rain Analysis (LSTORM).....20000
Number of Plugs for Plug-flow in S/T (NPLUG).........40000
Number Conduits for Extran Results to ASCII
  File (MXFLOW)........................................  400


##########################################
# Entry made to Storage/Treatment Block.  #
# Storage/Treatment model written by the  #
# University of Florida, June 1981.       #
# Last updated July 1995 at Oregon St. U. #
##########################################

VALUE OF NOTAPE            :         0

INPUT DATA SOURCE          :  EXTERNAL FILE

EXTERNAL ELEMENT NUMBER    :  100
```

```
NUMBER OF TIME STEPS      :   1402560

TIME STEP SIZE,SECONDS    :     900.0

NUMBER OF S/T UNITS       :         1

COST MODEL USED?          :        NO

STARTING DATE             :    10/ 1/1968

STARTING JULIAN DATE      :   1968275

STARTING TIME             :    0:  0:  0

SIMULATION DURATION, HOURS:350640.000

ENDING JULIAN DATE        :   2008275

ENDING TIME OF DAY        :     0.000 HOURS

PRINT TOTAL SIMULATION SUMMARY ONLY (ISUM = 0)

IDET = 0. NO DETAILED (TIME STEP) PRINT-OUTS.

NO OUTPUT FOR AVERAGE DETENTION TIME RESULTS


##########################################
# Header information from interface file: #
##########################################

Title from first computational block:
% Capture Analysis
Entrada Bioretention

Title from immediately preceding computational block:
% Capture Analysis
Entrada Bioretention

Name of preceding block:.............Runoff Block
Initial Julian date (IDATEZ)..................... 1968275
Initial time of day in seconds (TZERO).....     0.0
No. transfered input locations.....               1
```

No. transfered pollutants..... 0
Size of total catchment area (acres)..... 7.60
ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1

```
################################################
# Element numbers of interface inlet locations: #
################################################
100
```

Conversion factor to cfs for flow units
on interface file. Multiply by: 1.00000

INPUT/OUTPUT UNITS : U.S. CUSTOMARY

TRIBUTARY AREA, ACRES : 7.6

NUMBER OF POLLUTANTS : 0

MONTHLY EVAPORATION RATES, IN/DAY

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
0.030	0.048	0.072	0.102	0.132	0.156	0.168	0.150	0.114	0.078	0.042	0.030

BASIN INFILTRATION RATE FOR UNIT 1 IN (IN/HR) = 0.0000
1

UNIT CHARACTERISTICS

```
************************
UNIT #  1 CHARACTERISTICS
************************
```

GENERAL UNIT DESCRIPTION :

NAME : Bioretention
IDENT : 1
TYPE OF UNIT : DETENTION
MAX. ALLOWABLE INFLOW, CFS: 0.1000E+05

```
FLOW DIRECTIONS:
BYPASS TO UNIT #           100
TREATED OUTFLOW TO UNIT # 100
RESIDUALS TO UNIT #        100

===> NOTE: UNIT 100 IS THE NEXT BLOCK AND UNIT 200 IS ULTIMATE DISPOSAL.


DETENTION UNIT CHARACTERISTICS:

RESIDUALS DRAW-OFF SCHEME: NEVER DRAWN OFF

DEPTH-AREA-STORAGE-FLOW RELATIONSHIPS :

  DEPTH,        SURFACE        STORAGE,       TREATED        RESIDUAL
    FT       AREA, SQ FT       CU FT       OUTFLOW, CFS    FLOW, CFS
0.0000E+00    1.0725E+04    0.0000E+00     0.0000E+00     0.0000E+00
1.0000E-03    1.0725E+04    1.0725E+01     4.4700E-01     0.0000E+00
1.5000E+00    1.0725E+04    1.6088E+04     4.4700E-01     0.0000E+00

INITIAL CONDITIONS:

VOLUME, CU FT      : 0.0000E+00


**************************************************
* NOTE: IF THERE IS ONLY ONE UNIT THE PLANT      *
*       PERFORMANCE SUMMARY WILL NOT BE PRINTED. *
**************************************************


Note !! UNIT 1 HAS EXCEEDED THE MAXIMUM STORAGE VOLUME ON  1/19/1969 AT 16:45
The excess has been bypassed and is included in BYPASS volume.  Further
messages will be suppressed.  But summaries of number of all volume-bypass
time steps and number of days with volume-bypasses will be printed.
1
**************************************
*    ENTIRE SIMULATION UNIT SUMMARIES *
**************************************
 OCT  1, 1968,  0 0: 0 TO  OCT  1, 2008,  0 0: 0.
```

UNIT	PARAMETER	VOLUME CU FT
1	INFLOW,TOTAL	1.5861E+07
	INFLOW,NET	1.2688E+07
	BYPASS	3.1725E+06
	TREATED OUTFLOW	1.2670E+07
	RESIDUAL FLOW	0.0000E+00
	REMAINING	0.0000E+00
	EVAPORATION	1.6974E+04
	INFILTRATION	0.0000E+00
	NO. VOL. BYPASSES	3091
	NO. VOL. BYPASS DAYS	193
	INITIAL COND.	0.0000E+00
	PERCENT ERROR	0.0095

===> Storage/Treatment simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : Bioretention_St0.in
===> Your output file was named: Bioretention_St0.out

```
**********************************************************
*       SWMM 4.4H   Simulation Date and Time Summary     *
**********************************************************
* Starting Date... May        11, 2010                   *
*          Time...          12:40:43.362                  *
*   Ending Date... May        11, 2010                   *
*          Time...          12:41:50.254                  *
*  Elapsed Time...               1.115 minutes.          *
*  Elapsed Time...              66.893 seconds.          *
**********************************************************
```

Generic Biofiltration Model: Commercial Land Use

SWMM RUNOFF Module Output File

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*                CDM/OSU Beta                    *
*          Release Date - July 1, 2003           *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*          Chuck Moore and Wayne Huber           *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                 Developed by

**************************************************
*             Metcalf & Eddy, Inc.               *
*            University of Florida               *
*       Water Resources Engineers, Inc.          *
*      (Now Camp Dresser & McKee, Inc.)          *
*                September 1970                  *
**************************************************

        Version 4.3 (outdated) is
       Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*            960 College Station Road            *
*            Athens, GA    30605-2720            *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMM5 at:     *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************
```

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H  *
          *  "Nature is full of infinite causes which    *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    0  JIN.UF
  JOUT for Block #     1 File #    9  RN0.int

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  NEWHALL_PATCHED_20091119.INT
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF
NSCRAT #     8 File #   14  SCRT8.UF
NSCRAT #     9 File #   15  SCRT9.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).....      20
 Number of Runoff Land Uses per Subcatchment (NLU).....  20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
```

```
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)..... 4000
 Number of Pumps in Extran (NEP)..... 1000
 Number of Orifices in Extran (NEO).....  200
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW).....  400
 Number of Extran Printout Locations (NPO).....  150
 Number of Tide Elements in Extran (NTE).....   50
 Number of Natural Channels (NNC)..... 1200
 Number of Storage Junctions in Extran (NVSE)..... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST).....  200
 Number of Input Hydrographs in Extran (NEH).....  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN).....   15
 Number Rain Gages in Rain and Runoff (MAXRG).....  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA).....   10
 Number of Variable Orifices in Extran (NVORF).....   50
 Number of Variable Orifice Data Points (NVOTIM).....   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG).....40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW).....  400


##################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., July 2003.                         #
##################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                    Tom Robbins       #
##################################################
```

% Capture Analysis

Bioretention Unit Area- Comm

Snowmelt parameter - ISNOW.....	0
Number of rain gages - NRGAG.....	0
Green-Ampt infiltration equation used - INFILM...	1
Quality is not simulated - KWALTY.....	0
Read evaporation data on line(s) F1 (F2) - IVAP..	2
Hour of day at start of storm - NHR.....	0
Minute of hour at start of storm - NMN.....	0
Time TZERO at start of storm (hours).....	0.000
Use U.S. Customary units for most I/O - METRIC...	0
Runoff input print control...	0
Runoff graph plot control....	1
Runoff output print control..	0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)	1
Print land use load percentages -LANDUPR (0=no, 1=yes)	0
Limit number of groundwater convergence messages to	50 (if simulated)
Month, day, year of start of storm is:	10/ 1/1968
Wet time step length (seconds).....	900.
Dry time step length (seconds).....	14400.
Wet/Dry time step length (seconds)...	900.

Simulation length is..... 20081001.0 Yr/Mo/Dy

Percent of impervious area with zero detention depth 25.0

****
* Processed Precipitation will be read on NSCRAT(1) *
****

##############################
Data Group F1
Evaporation Rate (in/month)#
##############################

JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
0.93	1.34	2.23	3.06	4.09	4.68	5.21	4.65	3.42	2.42	1.26	0.93

1

****
* C H A N N E L A N D P I P E D A T A *
****

Input Sequen Number	NAMEG: Channel ID #	Drains to NGTO:	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Intial Depth (ft)	Max Depth (ft)	Mann- ings "N"	Full Flow (cfs)	Infilt Rate (in/hr)
1	201	200	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00

1

****
* S U B C A T C H M E N T D A T A *
****

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

SUBCATCH- MENT NO.	CHANNEL OR INLET	GAGE PRINT	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	DEPRES. STORAGE(IN) IMPERV.	DEPRES. STORAGE(IN) PERV.	GREEN-AMPT INFIL PARAMS SUCTION	GREEN-AMPT INFIL PARAMS HYD.CON	GREEN-AMPT INFIL PARAMS IMD
NO.	WB												

```
  (IN/HR)                                                                                                                (IN)
  ---  --------    -------- --------- --------  -----    -------     -------  --------     ------     ------      ----
-------  -------  ------  ----
   1 Comm        201           174.00     1.00  91.00     0.0500       0.012      0.250      0.020      0.060      8.00
 0.140    0.290        1     0

 TOTAL NUMBER OF SUBCATCHMENTS...                1
 TOTAL TRIBUTARY AREA (ACRES)....             1.00
 IMPERVIOUS AREA (ACRES).........             0.91
 PERVIOUS AREA (ACRES)...........             0.09
 TOTAL WIDTH (FEET)..............           174.00
 PERCENT IMPERVIOUSNESS..........            91.00

1
 ************************************************************
 *    Arrangement of Subcatchments and Channel/Pipes        *
 ************************************************************
 * See second subcatchment output table for connectivity *
 * of subcatchment to subcatchment flows.                 *
 ************************************************************


    Channel
    or Pipe
 201            No Tributary Channel/Pipes
                Tributary Subareas........ Comm


     INLET
 200            Tributary Channel/Pipes... 201
                No Tributary Subareas.....


 ************************************************************
 * Hydrographs will be stored for the following   1 INLETS *
 ************************************************************
 200


 ************************************************
 *  Quality simulation not included in this run *
 ************************************************
```

```
    ************************
    *    DATA GROUP M1     *
    ************************


TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT..        1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV..        0
STARTING AND STOPPING PRINTOUT DATES.............       0         0


    ************************
    *    DATA GROUP M3     *
    ************************

CHANNEL/INLET PRINT DATA GROUPS......201


    ************************
    *    DATA GROUP M8     *
    ************************

STORM EVENT TRACKING.....
    Storm event data file =     Sm0.out


End of preliminary input data and data echo.

*****************************************************
*  Precipitation Interface File Summary             *
*  Number of precipitation station....        1     *
*****************************************************

Location Station Number
-------- --------------
       1.             0

*************************************************
*      End of time step DO-loop in Runoff       *
*************************************************
```

```
 Final Date (Mo/Day/Year)    =                  10/ 1/2008
 Total number of time steps =                      118056
 Final Julian Date  =                             2008275
 Final time of day  =                               86400. seconds.
 Final time of day  =                                24.00   hours.
 Final running time =                           350664.0000   hours.
 Final running time =                            14611.0000    days.

 ************************************************
 *     Extrapolation Summary for Watersheds     *
 * # Steps ==> Total Number of Extrapolated Steps *
 * # Calls ==> Total Number of OVERLND Calls    *
 ************************************************

  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls
  --------   -------   -------  --------   -------   -------  --------   -------   -------
Comm           666466     64330

 ************************************************
 *     Extrapolation Summary for Channel/Pipes  *
 * # Steps ==> Total Number of Extrapolated Steps *
 * # Calls ==> Total Number of GUTNR Calls      *
 ************************************************

 Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls
  --------   -------   ------- --------   -------   ------- --------   -------   -------
201                0         0
1
 ********************************************
 *       Continuity Check for Surface Water   *
 ********************************************

                                                                  Inches over
                                                  cubic feet      Total Basin
 Total Precipitation (Rain plus Snow)          2.660137E+06       732.820
 Total Irrigation                              0.000000E+00         0.000
 Total Infiltration                            2.026227E+05        55.819
 Total Evaporation                             1.118766E+05        30.820
 Surface Runoff from Watersheds                2.368515E+06       652.483
 Total Water remaining in Surface Storage      0.000000E+00         0.000
 Infiltration over the Pervious Area...        2.026227E+05       620.211
                        --------
 Infiltration + Evaporation +
 Surface Runoff + Snow removal +
```

Water remaining in Surface Storage + Water remaining in Snow Cover.....	2.683014E+06	739.122
Total Precipitation + Initial Storage + Total Irrigation.....	2.660136E+06	732.820

The error in continuity is calculated as

```
*************************************
* Precipitation + Initial Snow Cover  *
*      - Infiltration -               *
*Evaporation - Snow removal -         *
*Surface Runoff from Watersheds -     *
*Water in Surface Storage -           *
*Water remaining in Snow Cover        *
*-----------------------------------*
* Precipitation + Initial Snow Cover  *
*************************************
```

Error..... -0.860 Percent

```
*********************************************
*       Continuity Check for Channel/Pipes  *
*********************************************
```

	cubic feet	Inches over Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	2.368515E+06	652.483
Groundwater Subsurface Inflow.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Infiltration Loss from Channels.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	0.236851E+07	652.483
Initial Storage + Inflow.....	2.368515E+06	652.483
Final Storage + Outflow.....	2.368515E+06	652.483

```
*****************************************
* Final Storage + Outflow + Evaporation  - *
* Watershed Runoff - Groundwater Inflow  - *
*     Initial Channel/Pipe Storage         *
*     ---------------------------------    *
*  Final Storage + Outflow  + Evaporation  *
*****************************************
```

Error..... 0.000 Percent

1

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCHMENT NO.	GUTTER OR INLET NO.	AREA (AC)	PERCENT IMPER.	TOTAL SIMULATED RAINFALL (IN)	PERVIOUS AREA TOTAL RUNOFF DEPTH (IN)	PERVIOUS AREA TOTAL LOSSES (IN)	PERVIOUS AREA PEAK RUNOFF RATE (CFS)	IMPERVIOUS AREA RUNOFF DEPTH (IN)	IMPERVIOUS AREA PEAK RUNOFF RATE (CFS)	TOTAL SUBCATCHMENT RUNOFF DEPTH (IN)	TOTAL SUBCATCHMENT PEAK RUNOFF RATE (CFS)	UNIT PEAK RUNOFF (IN/HR)
Comm	201	1.00	91.0	733.64	103.695	631.745	0.114	706.766	1.310	652.489	1.424	1.424

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

CHANNEL NUMBER	FULL FLOW (CFS)	FULL VELOCITY (FPS)	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY	TIME OF OCCURRENCE HR.	LENGTH OF SURCHARGE (HOUR)	MAXIMUM SURCHARGE VOLUME (AC-FT)	RATIO OF MAX. FLOW TO FULL FLOW	RATIO OF MAX. DEPTH TO FULL DEPTH
201				1.42				2/ 7/1998	20.00				
200				1.42				2/ 7/1998	20.00				

TOTAL NUMBER OF CHANNELS/PIPES = 2

*** NOTE *** THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL

1

```
 ********************************************
 *  Summary of quantity results (flow in cfs) *
 ********************************************

    % Capture Analysis
    Bioretention Unit Area- Comm

                         Chan/Inlt
                         201
      Date      Time          Flow
  Mo/Da/Year  Hr:Min           Cfs
  ----------  ------         ----

Flow wt'd means.....       0.0019
Flow wt'd std-devs...      0.0205
Maximum value........      1.4239
Minimum value........      0.0000
Total loads..........  2.3685E+06
                         Cubic-ft

 ===> Runoff simulation ended normally.

 ===> SWMM 4.4H   simulation ended normally.
      Always check output file for possible warning messages.

 ===> Your input file was named : Comm_RN0.in
 ===> Your output file was named: Comm_RN0.out

 ********************************************************
 *       SWMM 4.4H   Simulation Date and Time Summary   *
 ********************************************************
 * Starting Date... August     20, 2010                 *
 *          Time...          13:15:30.541               *
 *   Ending Date... August     20, 2010                 *
 *          Time...          13:15:39. 73               *
 *  Elapsed Time...               0.142 minutes.        *
 *  Elapsed Time...               8.534 seconds.        *
 ********************************************************
```

Generic Biofiltration Model: Commercial Land Use

SWMM STORAGE Module Output File

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*                CDM/OSU Beta                    *
*          Release Date - July 1, 2003           *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*          Chuck Moore and Wayne Huber           *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                Developed by

**************************************************
*             Metcalf & Eddy, Inc.               *
*            University of Florida               *
*       Water Resources Engineers, Inc.          *
*      (Now Camp Dresser & McKee, Inc.)          *
*                September 1970                  *
**************************************************

        Version 4.3 (outdated) is
       Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*            960 College Station Road            *
*            Athens, GA    30605-2720            *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMM5 at:     *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************
```

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H   *
          *  "Nature is full of infinite causes which     *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    8  RN0.int
  JOUT for Block #     1 File #    9  JOT.UF

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  SCRT1.UF
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
```

```
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)..........4000
 Number of Pumps in Extran (NEP)....................... 1000
 Number of Orifices in Extran (NEO).....................  200
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW)...........................  400
 Number of Extran Printout Locations (NPO).............  150
 Number of Tide Elements in Extran (NTE)...............   50
 Number of Natural Channels (NNC)....................... 1200
 Number of Storage Junctions in Extran (NVSE).......... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST)...........................  200
 Number of Input Hydrographs in Extran (NEH)...........  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN)................   15
 Number Rain Gages in Rain and Runoff (MAXRG)..........  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA).......................................   10
 Number of Variable Orifices in Extran (NVORF).........   50
 Number of Variable Orifice Data Points (NVOTIM).......   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG)..........40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW)........................................  400


##########################################
# Entry made to Storage/Treatment Block.  #
# Storage/Treatment model written by the  #
# University of Florida, June 1981.       #
# Last updated July 1995 at Oregon St. U. #
##########################################

VALUE OF NOTAPE            :         0

INPUT DATA SOURCE          :  EXTERNAL FILE

EXTERNAL ELEMENT NUMBER    :  200
```

```
NUMBER OF TIME STEPS      :   1402560

TIME STEP SIZE,SECONDS    :     900.0

NUMBER OF S/T UNITS       :         1

COST MODEL USED?          :        NO

STARTING DATE             :    10/ 1/1968

STARTING JULIAN DATE      :   1968275

STARTING TIME             :    0:  0:  0

SIMULATION DURATION, HOURS:350640.000

ENDING JULIAN DATE        :   2008275

ENDING TIME OF DAY        :     0.000 HOURS

PRINT TOTAL SIMULATION SUMMARY ONLY (ISUM = 0)

IDET = 0. NO DETAILED (TIME STEP) PRINT-OUTS.

NO OUTPUT FOR AVERAGE DETENTION TIME RESULTS


##########################################
# Header information from interface file: #
##########################################

Title from first computational block:
% Capture Analysis
Bioretention Unit Area- Comm

Title from immediately preceding computational block:
% Capture Analysis
Bioretention Unit Area- Comm

Name of preceding block:.............Runoff Block
Initial Julian date (IDATEZ)..................... 1968275
Initial time of day in seconds (TZERO).....          0.0
No. transfered input locations.................          1
```

No. transfered pollutants..... 0
Size of total catchment area (acres)..... 1.00
ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1

##
Element numbers of interface inlet locations:
##
200

Conversion factor to cfs for flow units
on interface file. Multiply by: 1.00000

INPUT/OUTPUT UNITS : U.S. CUSTOMARY

TRIBUTARY AREA, ACRES : 1.0

NUMBER OF POLLUTANTS : 0

MONTHLY EVAPORATION RATES, IN/DAY

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
0.030	0.048	0.072	0.102	0.132	0.156	0.168	0.150	0.114	0.078	0.042	0.030

BASIN INFILTRATION RATE FOR UNIT 1 IN (IN/HR) = 0.1400
1

UNIT CHARACTERISTICS

****
UNIT # 1 CHARACTERISTICS
****

GENERAL UNIT DESCRIPTION :

NAME : Commercial
IDENT : 1
TYPE OF UNIT : DETENTION
MAX. ALLOWABLE INFLOW, CFS: 0.1000E+05

FLOW DIRECTIONS:
BYPASS TO UNIT # 100
TREATED OUTFLOW TO UNIT # 100
RESIDUALS TO UNIT # 100

===> NOTE: UNIT 100 IS THE NEXT BLOCK AND UNIT 200 IS ULTIMATE DISPOSAL.

DETENTION UNIT CHARACTERISTICS:

RESIDUALS DRAW-OFF SCHEME: NEVER DRAWN OFF

DEPTH-AREA-STORAGE-FLOW RELATIONSHIPS :

DEPTH, FT	SURFACE AREA, SQ FT	STORAGE, CU FT	TREATED OUTFLOW, CFS	RESIDUAL FLOW, CFS
0.0000E+00	1.5000E+03	0.0000E+00	0.0000E+00	0.0000E+00
2.5000E-01	1.5000E+03	3.7500E+02	0.0000E+00	0.0000E+00
2.5100E-01	1.5000E+03	3.7650E+02	6.3000E-02	0.0000E+00
1.7500E+00	1.5000E+03	2.6250E+03	6.3000E-02	0.0000E+00

INITIAL CONDITIONS:

VOLUME, CU FT : 0.0000E+00

****
* NOTE: IF THERE IS ONLY ONE UNIT THE PLANT *
* PERFORMANCE SUMMARY WILL NOT BE PRINTED. *
****

Note !! UNIT 1 HAS EXCEEDED THE MAXIMUM STORAGE VOLUME ON 1/19/1969 AT 16:30
The excess has been bypassed and is included in BYPASS volume. Further
messages will be suppressed. But summaries of number of all volume-bypass
time steps and number of days with volume-bypasses will be printed.
1
****
* ENTIRE SIMULATION UNIT SUMMARIES *
****
OCT 1, 1968, 0 0: 0 TO OCT 1, 2008, 0 0: 0.

UNIT	PARAMETER	VOLUME CU FT
1	INFLOW,TOTAL	2.3662E+06
	INFLOW,NET	1.8938E+06
	BYPASS	4.7244E+05
	TREATED OUTFLOW	1.4545E+06
	RESIDUAL FLOW	0.0000E+00
	REMAINING	0.0000E+00
	EVAPORATION	7.3355E+03
	INFILTRATION	4.3318E+05
	NO. VOL. BYPASSES	3161
	NO. VOL. BYPASS DAYS	193
	INITIAL COND.	0.0000E+00
	PERCENT ERROR	-0.0532

===> Storage/Treatment simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : Comm_St0.in
===> Your output file was named: Comm_St0.out

```
**********************************************************
*       SWMM 4.4H   Simulation Date and Time Summary     *
**********************************************************
* Starting Date... August     20, 2010                   *
*          Time...          13:19:32.415                 *
*   Ending Date... August     20, 2010                   *
*          Time...          13:20:43.867                 *
*  Elapsed Time...               1.191 minutes.          *
*  Elapsed Time...              71.453 seconds.          *
**********************************************************
```

Generic Biofiltration Model: Multi-Family Land Use

SWMM RUNOFF Module Output File

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*               CDM/OSU Beta                     *
*         Release Date - July 1, 2003            *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*          Chuck Moore and Wayne Huber           *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                  Developed by

**************************************************
*             Metcalf & Eddy, Inc.               *
*            University of Florida               *
*       Water Resources Engineers, Inc.          *
*      (Now Camp Dresser & McKee, Inc.)          *
*               September 1970                   *
**************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*            960 College Station Road            *
*            Athens, GA    30605-2720            *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMMM5 at:    *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************

**************************************************
*  This is an implementation of EPA SWMM 4.4H    *
*  "Nature is full of infinite causes which      *
```

```
*   have never occurred in experience" da Vinci *
**************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    0  JIN.UF
  JOUT for Block #     1 File #    9  RN0.int

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  NEWHALL_PATCHED_20091119.INT
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF
NSCRAT #     8 File #   14  SCRT8.UF
NSCRAT #     9 File #   15  SCRT9.UF

**************************************************
*    Parameter Values on the Tapes Common Block   *
**************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)......... 4000
 Number of Pumps in Extran (NEP)...................... 1000
 Number of Orifices in Extran (NEO)....................  200
```

```
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW).........................  400
 Number of Extran Printout Locations (NPO)............  150
 Number of Tide Elements in Extran (NTE).............   50
 Number of Natural Channels (NNC)..................... 1200
 Number of Storage Junctions in Extran (NVSE)......... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST)..........................  200
 Number of Input Hydrographs in Extran (NEH)..........  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN)...............   15
 Number Rain Gages in Rain and Runoff (MAXRG).........  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA)......................................   10
 Number of Variable Orifices in Extran (NVORF).........   50
 Number of Variable Orifice Data Points (NVOTIM).......   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG).........40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW).......................................  400


##################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., July 2003.                         #
##################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                      Tom Robbins     #
##################################################


                % Capture Analysis

                Bioretention Unit Area


Snowmelt parameter - ISNOW.....................          0

Number of rain gages - NRGAG...................          0

Green-Ampt infiltration equation used - INFILM...        1
```

```
Quality is not simulated - KWALTY.................          0
Read evaporation data on line(s) F1 (F2) - IVAP..          2
Hour of day at start of storm - NHR..............          0
Minute of hour at start of storm - NMN...........          0
Time TZERO at start of storm (hours).............      0.000
Use U.S. Customary units for most I/O - METRIC...          0
Runoff input print control...                              0
Runoff graph plot control....                              1
Runoff output print control..                              0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)        1
Print land use load percentages -LANDUPR (0=no, 1=yes)     0
Limit number of groundwater convergence messages to    50 (if simulated)
Month, day, year of start of storm is:             10/ 1/1968
Wet time step length (seconds).......                   900.
Dry time step length (seconds).......                 14400.
Wet/Dry time step length (seconds)...                   900.
Simulation length is......                       20081001.0 Yr/Mo/Dy
Percent of impervious area with zero detention depth    25.0

*********************************************************
*   Processed Precipitation will be read on NSCRAT(1)   *
*********************************************************

  ##############################
  #        Data Group F1       #
  # Evaporation Rate (in/month)#
  ##############################

 JAN.   FEB.   MAR.   APR.   MAY    JUN.   JUL.   AUG.   SEP.   OCT.   NOV.   DEC.
 ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----
```

0.93 1.34 2.23 3.06 4.09 4.68 5.21 4.65 3.42 2.42 1.26 0.93

1

```
 ************************************************************
 *         C H A N N E L  A N D  P I P E  D A T A            *
 ************************************************************
```

Input Sequen Number	NAMEG: Channel ID #	Drains to NGTO:	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Intial Depth (ft)	Max Depth (ft)	Mann-ings "N"	Full Flow (cfs)	Infilt Rate (in/hr)
1	101	100	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00

1

```
  ***************************************************
  *          S U B C A T C H M E N T  D A T A        *
  ***************************************************
```

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

SUBCATCH-MENT NO.	CHANNEL OR INLET	WIDTH PRINT (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	DEPRES. STORAGE(IN) IMPERV.	DEPRES. STORAGE(IN) PERV.	GREEN-AMPT INFIL PARAMS SUCTION (IN)	GREEN-AMPT INFIL PARAMS HYD.CON (IN/HR)	GAGE IMD	NO.	WB
1 MF	101	174.00	1.00	80.00	0.0500	0.012	0.250	0.020	0.060	8.00	0.140	0.290	1	0

```
 TOTAL NUMBER OF SUBCATCHMENTS...              1
 TOTAL TRIBUTARY AREA (ACRES)....           1.00
 IMPERVIOUS AREA (ACRES).........           0.80
 PERVIOUS AREA (ACRES)...........           0.20
 TOTAL WIDTH (FEET)..............         174.00
 PERCENT IMPERVIOUSNESS..........          80.00
```

1

```
 ************************************************************
 *    Arrangement of Subcatchments and Channel/Pipes        *
 ************************************************************
 * See second subcatchment output table for connectivity    *
 * of subcatchment to subcatchment flows.                   *
```

****

Channel
or Pipe
101 No Tributary Channel/Pipes
Tributary Subareas..... MF

INLET
100 Tributary Channel/Pipes... 101
No Tributary Subareas.....

****
* Hydrographs will be stored for the following 1 INLETS *
****
100

****
* Quality simulation not included in this run *
****

****
* DATA GROUP M1 *
****

TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT.. 1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV.. 0
STARTING AND STOPPING PRINTOUT DATES..... 0 0

****
* DATA GROUP M3 *
****

CHANNEL/INLET PRINT DATA GROUPS.....101

****
* DATA GROUP M8 *
****

STORM EVENT TRACKING.....

Storm event data file = Sm0.out

End of preliminary input data and data echo.

```
************************************************
*  Precipitation Interface File Summary        *
*  Number of precipitation station....      1  *
************************************************
```

Location	Station Number
1.	0

```
************************************************
*      End of time step DO-loop in Runoff      *
************************************************
```

Final Date (Mo/Day/Year) =	10/ 2/2008	
Total number of time steps =	117486	
Final Julian Date =	2008276	
Final time of day =	1.	seconds.
Final time of day =	0.00	hours.
Final running time =	350664.0000	hours.
Final running time =	14611.0000	days.

```
************************************************
*     Extrapolation Summary for Watersheds     *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls     *
************************************************
```

Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls
MF	667217	63147						

```
************************************************
*     Extrapolation Summary for Channel/Pipes  *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of GUTNR Calls       *
************************************************
```

Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls
101	0	0						

1

```
*********************************************
*       Continuity Check for Surface Water   *
*********************************************
```

	cubic feet	Inches over Total Basin
Total Precipitation (Rain plus Snow)	2.659774E+06	732.720
Total Irrigation	0.000000E+00	0.000
Total Infiltration	4.517356E+05	124.445
Total Evaporation	1.027156E+05	28.296
Surface Runoff from Watersheds	2.125904E+06	585.648
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Pervious Area...	4.517356E+05	622.225
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	2.680355E+06	738.390
Total Precipitation + Initial Storage + Total Irrigation.....	2.659774E+06	732.720

The error in continuity is calculated as

```
*************************************
* Precipitation + Initial Snow Cover  *
*      - Infiltration -               *
*Evaporation - Snow removal -         *
*Surface Runoff from Watersheds -     *
*Water in Surface Storage -           *
*Water remaining in Snow Cover        *
*-----------------------------------*
* Precipitation + Initial Snow Cover  *
*************************************
```

Error..... -0.774 Percent

```
*********************************************
*       Continuity Check for Channel/Pipes   *
*********************************************
```

	cubic feet	Inches over Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	2.125904E+06	585.648
Groundwater Subsurface Inflow.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Infiltration Loss from Channels.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	0.212590E+07	585.648

Initial Storage + Inflow.....	2.125904E+06	585.648
Final Storage + Outflow.....	2.125904E+06	585.648

```
*****************************************
* Final Storage + Outflow + Evaporation  - *
* Watershed Runoff - Groundwater Inflow  - *
*     Initial Channel/Pipe Storage         *
*     ---------------------------------    *
*  Final Storage + Outflow  + Evaporation  *
*****************************************
```

Error..... 0.000 Percent

1

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCHMENT	AREA			PERVIOUS AREA			IMPERVIOUS AREA			TOTAL	
UNIT SUBCATCHMENT NO.	GUTTER OR INLET NO.	AREA (AC)	PERCENT IMPER.	TOTAL SIMULATED RAINFALL (IN)	TOTAL RUNOFF DEPTH (IN)	TOTAL LOSSES (IN)	PEAK RUNOFF RATE (CFS)	PEAK RUNOFF DEPTH (IN)	PEAK RUNOFF RATE (CFS)	PEAK RUNOFF DEPTH (IN)	PEAK RUNOFF RATE (CFS)
MF 101		1.00	80.0	733.64	100.704	633.769	0.252	706.878	1.152	585.643	1.404
1.404											

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

CHANNEL NUMBER	MAXIMUM RATIO OF FULL FLOW (CFS)	RATIO OF MAX. TO FULL VELOCITY	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY	TIME OF OCCURRENCE HR.	LENGTH OF SURCHARGE (HOUR)	MAXIMUM SURCHARGE VOLUME FULL

```
(AC-FT)     FLOW        DEPTH
   -------- ----------------------   ----------------------------------------------
---------------------- ------------------
 101                                        1.40                                2/ 7/1998 20.00
 100                                        1.40                                2/ 7/1998 20.00

                                                  TOTAL NUMBER OF CHANNELS/PIPES =    2

  *** NOTE ***  THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL
1
 ********************************************
 *  Summary of quantity results (flow in cfs) *
 ********************************************

    % Capture Analysis
    Bioretention Unit Area


                        Chan/Inlt
                        101
      Date      Time          Flow
  Mo/Da/Year  Hr:Min          Cfs
   ----------  ------         ----

Flow wt'd means......       0.0017
Flow wt'd std-devs...       0.0188
Maximum value........       1.4042
Minimum value........       0.0000
Total loads..........   2.1259E+06
                        Cubic-ft

 ===> Runoff simulation ended normally.

 ===> SWMM 4.4H   simulation ended normally.
      Always check output file for possible warning messages.

 ===> Your input file was named : MultiFam_RN0.in
 ===> Your output file was named: MultiFam_RN0.out

 ******************************************************
 *       SWMM 4.4H   Simulation Date and Time Summary  *
 ******************************************************
 * Starting Date... August     19, 2010                *
 *          Time...          17:55:48.471               *
 *   Ending Date... August     19, 2010                *
 *          Time...          17:55:57.596               *
 *  Elapsed Time...               0.152 minutes.       *
 *  Elapsed Time...               9.127 seconds.       *
```

****

Generic Biofiltration Model: Multi-Family Land Use

SWMM STORAGE Module Output File

1

```
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*                CDM/OSU Beta                    *
*          Release Date - July 1, 2003           *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*          Chuck Moore and Wayne Huber           *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                Developed by

**************************************************
*             Metcalf & Eddy, Inc.               *
*            University of Florida               *
*       Water Resources Engineers, Inc.          *
*      (Now Camp Dresser & McKee, Inc.)          *
*                September 1970                  *
**************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*            960 College Station Road            *
*            Athens, GA    30605-2720            *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMM5 at:     *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************
```

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H  *
          *  "Nature is full of infinite causes which    *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    8  RN0.int
  JOUT for Block #     1 File #    9  JOT.UF

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  SCRT1.UF
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE)........  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
```

```
 Number of Transport input locations on R lines (NTHR).    80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)..........4000
 Number of Pumps in Extran (NEP)....................... 1000
 Number of Orifices in Extran (NEO)....................  200
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW)..........................  400
 Number of Extran Printout Locations (NPO).............  150
 Number of Tide Elements in Extran (NTE)...............   50
 Number of Natural Channels (NNC)...................... 1200
 Number of Storage Junctions in Extran (NVSE).......... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST)..........................  200
 Number of Input Hydrographs in Extran (NEH)...........  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN)................   15
 Number Rain Gages in Rain and Runoff (MAXRG)..........  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA)......................................   10
 Number of Variable Orifices in Extran (NVORF).........   50
 Number of Variable Orifice Data Points (NVOTIM).......   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG).........40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW).......................................  400


##########################################
# Entry made to Storage/Treatment Block.  #
# Storage/Treatment model written by the  #
# University of Florida, June 1981.       #
# Last updated July 1995 at Oregon St. U. #
##########################################

VALUE OF NOTAPE           :         0

INPUT DATA SOURCE         :  EXTERNAL FILE

EXTERNAL ELEMENT NUMBER   :  100
```

```
NUMBER OF TIME STEPS      :   1402560

TIME STEP SIZE,SECONDS    :     900.0

NUMBER OF S/T UNITS       :         1

COST MODEL USED?          :        NO

STARTING DATE             :    10/ 1/1968

STARTING JULIAN DATE      :   1968275

STARTING TIME             :    0:  0:  0

SIMULATION DURATION, HOURS:350640.000

ENDING JULIAN DATE        :   2008275

ENDING TIME OF DAY        :     0.000 HOURS

PRINT TOTAL SIMULATION SUMMARY ONLY (ISUM = 0)

IDET = 0. NO DETAILED (TIME STEP) PRINT-OUTS.

NO OUTPUT FOR AVERAGE DETENTION TIME RESULTS


##########################################
# Header information from interface file: #
##########################################

Title from first computational block:
% Capture Analysis
Bioretention Unit Area

Title from immediately preceding computational block:
% Capture Analysis
Bioretention Unit Area

Name of preceding block:.............Runoff Block
Initial Julian date (IDATEZ)..................... 1968275
Initial time of day in seconds (TZERO).....          0.0
No. transfered input locations.................          1
```

No. transfered pollutants..... 0
Size of total catchment area (acres)..... 1.00
ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1

##
Element numbers of interface inlet locations:
##
100

Conversion factor to cfs for flow units
on interface file. Multiply by: 1.00000

INPUT/OUTPUT UNITS : U.S. CUSTOMARY

TRIBUTARY AREA, ACRES : 1.0

NUMBER OF POLLUTANTS : 0

MONTHLY EVAPORATION RATES, IN/DAY

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
0.030	0.048	0.072	0.102	0.132	0.156	0.168	0.150	0.114	0.078	0.042	0.030

BASIN INFILTRATION RATE FOR UNIT 1 IN (IN/HR) = 0.1400
1

UNIT CHARACTERISTICS

****
UNIT # 1 CHARACTERISTICS
****

GENERAL UNIT DESCRIPTION :

NAME : MultiFamily
IDENT : 1
TYPE OF UNIT : DETENTION
MAX. ALLOWABLE INFLOW, CFS: 0.1000E+05

FLOW DIRECTIONS:
BYPASS TO UNIT # 100
TREATED OUTFLOW TO UNIT # 100
RESIDUALS TO UNIT # 100

===> NOTE: UNIT 100 IS THE NEXT BLOCK AND UNIT 200 IS ULTIMATE DISPOSAL.

DETENTION UNIT CHARACTERISTICS:

RESIDUALS DRAW-OFF SCHEME: NEVER DRAWN OFF

DEPTH-AREA-STORAGE-FLOW RELATIONSHIPS :

DEPTH, FT	SURFACE AREA, SQ FT	STORAGE, CU FT	TREATED OUTFLOW, CFS	RESIDUAL FLOW, CFS
0.0000E+00	1.4000E+03	0.0000E+00	0.0000E+00	0.0000E+00
2.5000E-01	1.4000E+03	3.5000E+02	0.0000E+00	0.0000E+00
2.5100E-01	1.4000E+03	3.5140E+02	5.8000E-02	0.0000E+00
1.7500E+00	1.4000E+03	2.4500E+03	5.8000E-02	0.0000E+00

INITIAL CONDITIONS:

VOLUME, CU FT : 0.0000E+00

****
* NOTE: IF THERE IS ONLY ONE UNIT THE PLANT *
* PERFORMANCE SUMMARY WILL NOT BE PRINTED. *
****

Note !! UNIT 1 HAS EXCEEDED THE MAXIMUM STORAGE VOLUME ON 1/19/1969 AT 16:45
The excess has been bypassed and is included in BYPASS volume. Further
messages will be suppressed. But summaries of number of all volume-bypass
time steps and number of days with volume-bypasses will be printed.
1
****
* ENTIRE SIMULATION UNIT SUMMARIES *
****
OCT 1, 1968, 0 0: 0 TO OCT 1, 2008, 0 0: 0.

UNIT	PARAMETER	VOLUME CU FT
1	INFLOW,TOTAL	2.1240E+06
	INFLOW,NET	1.7046E+06
	BYPASS	4.1947E+05
	TREATED OUTFLOW	1.2997E+06
	RESIDUAL FLOW	0.0000E+00
	REMAINING	0.0000E+00
	EVAPORATION	6.7456E+03
	INFILTRATION	3.9944E+05
	NO. VOL. BYPASSES	2935
	NO. VOL. BYPASS DAYS	184
	INITIAL COND.	0.0000E+00
	PERCENT ERROR	-0.0622

===> Storage/Treatment simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : MultiFam_St0.in
===> Your output file was named: MultiFam_St0.out

```
**********************************************************
*       SWMM 4.4H   Simulation Date and Time Summary     *
**********************************************************
* Starting Date... August     20, 2010                   *
*          Time...          13:11:37.902                 *
*   Ending Date... August     20, 2010                   *
*          Time...          13:12:43.121                 *
*  Elapsed Time...               1.087 minutes.          *
*  Elapsed Time...              65.219 seconds.          *
**********************************************************
```

Generic Biofiltration Model: Park Land Use

SWMM RUNOFF Module Output File

```
1
**************************************************
*    U.S. Environmental Protection Agency        *
*    Storm Water Management Model  (SWMM)        *
*                 Version 4.4H                   *
*                                                *
*                CDM/OSU Beta                    *
*          Release Date - July 1, 2003           *
*   Camp Dresser & McKee and Oregon St. Univ.    *
*           Chuck Moore and Wayne Huber          *
*   Compiled using Compaq Visual Fortran v.6.6   *
**************************************************

                  Developed by

**************************************************
*              Metcalf & Eddy, Inc.              *
*             University of Florida              *
*         Water Resources Engineers, Inc.        *
*        (Now Camp Dresser & McKee, Inc.)        *
*                September 1970                  *
**************************************************

          Version 4.3 (outdated) is
         Distributed and Maintained by

**************************************************
*      U.S. Environmental Protection Agency      *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory    *
*             960 College Station Road           *
*             Athens, GA    30605-2720           *
**************************************************

**************************************************
*     This is an updated release of SWMM4.4h,    *
*     no longer formally supported by the EPA.   *
*     If problems occur executing this model     *
*     contact Wayne Huber at Oregon State. U.,   *
*     wayne.huber@orst.edu,                      *
*     or Robert Dickinson at Camp Dresser &      *
*     McKee, DickinsonRE@CDM.COM.                *
*     The EPA-supported version is SWMMM5 at:    *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm   *
**************************************************

**************************************************
*  This is an implementation of EPA SWMM 4.4H    *
*  "Nature is full of infinite causes which      *
```

```
*   have never occurred in experience" da Vinci *
**************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    0  JIN.UF
  JOUT for Block #     1 File #    9  RN0.int

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  NEWHALL_PATCHED_20091119.INT
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF
NSCRAT #     8 File #   14  SCRT8.UF
NSCRAT #     9 File #   15  SCRT9.UF

**************************************************
*    Parameter Values on the Tapes Common Block   *
**************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)......... 4000
 Number of Pumps in Extran (NEP)...................... 1000
 Number of Orifices in Extran (NEO)....................  200
```

```
Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
Number of Extran Weirs (NEW)..........................  400
Number of Extran Printout Locations (NPO).............  150
Number of Tide Elements in Extran (NTE)...............   50
Number of Natural Channels (NNC)...................... 1200
Number of Storage Junctions in Extran (NVSE).......... 2000
Number of Time History Data Points in Extran (NTVAL)..  500
Number of Data Points for Variable Storage Elements
  in the Extran Block (NVST)..........................  200
Number of Input Hydrographs in Extran (NEH)...........  500
Number of Allowable Channel Connections to
  Junctions in the Extran Block (NCHN)................   15
Number Rain Gages in Rain and Runoff (MAXRG)..........  200
Number PRATE/VRATE Points for Extran Pump
  Input (MAXPRA)......................................   10
Number of Variable Orifices in Extran (NVORF).........   50
Number of Variable Orifice Data Points (NVOTIM).......   50
Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
Number of Storm Events for Rain Analysis (LSTORM).....20000
Number of Plugs for Plug-flow in S/T (NPLUG)..........40000
Number Conduits for Extran Results to ASCII
  File (MXFLOW).......................................  400
```

```
##################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., July 2003.                         #
##################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                    Tom Robbins       #
##################################################
```

% Capture Analysis

Bioretention Unit Area- Park

```
Snowmelt parameter - ISNOW.....................          0

Number of rain gages - NRGAG...................          0

Green-Ampt infiltration equation used - INFILM...        1
```

```
Quality is not simulated - KWALTY.....................          0
Read evaporation data on line(s) F1 (F2) - IVAP..                2
Hour of day at start of storm - NHR.....................         0
Minute of hour at start of storm - NMN..................         0
Time TZERO at start of storm (hours)....................     0.000
Use U.S. Customary units for most I/O - METRIC...                0
Runoff input print control...                                    0
Runoff graph plot control....                                    1
Runoff output print control..                                    0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)              1
Print land use load percentages -LANDUPR (0=no, 1=yes)           0
Limit number of groundwater convergence messages to     50 (if simulated)
Month, day, year of start of storm is:              10/ 1/1968
Wet time step length (seconds).......                    900.
Dry time step length (seconds).......                  14400.
Wet/Dry time step length (seconds)...                    900.
Simulation length is......                        20081001.0 Yr/Mo/Dy
Percent of impervious area with zero detention depth     25.0

*********************************************************
*   Processed Precipitation will be read on NSCRAT(1)   *
*********************************************************

  ##############################
  #        Data Group F1       #
  # Evaporation Rate (in/month)#
  ##############################

 JAN.   FEB.   MAR.   APR.   MAY    JUN.   JUL.   AUG.   SEP.   OCT.   NOV.   DEC.
 ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----   ----
```

0.93 1.34 2.23 3.06 4.09 4.68 5.21 4.65 3.42 2.42 1.26 0.93

1

****
* CHANNEL AND PIPE DATA *
****

Input Sequen Number	NAMEG: Channel ID #	Drains to NGTO:	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Intial Depth (ft)	Max Depth (ft)	Mann-ings "N"	Full Flow (cfs)	Infilt Rate (in/hr)
1	301	300	Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00	0.00

1

****
* SUBCATCHMENT DATA *
****

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

SUBCATCH-MENT NO.	CHANNEL PARAMS OR INLET	GAGE	WIDTH PRINT (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	DEPRES. STORAGE(IN) IMPERV.	DEPRES. STORAGE(IN) PERV.	GREEN-AMPT INFIL SUCTION (IN)	GREEN-AMPT INFIL HYD.CON (IN/HR)
1 Park	301		174.00	1.00	10.00	0.0500	0.012	0.250	0.020	0.060	8.00	0.140

IMD	NO.	WB
0.290	1	0

TOTAL NUMBER OF SUBCATCHMENTS...	1
TOTAL TRIBUTARY AREA (ACRES)....	1.00
IMPERVIOUS AREA (ACRES).....	0.10
PERVIOUS AREA (ACRES).....	0.90
TOTAL WIDTH (FEET).....	174.00
PERCENT IMPERVIOUSNESS.....	10.00

1

****
* Arrangement of Subcatchments and Channel/Pipes *
****
* See second subcatchment output table for connectivity *
* of subcatchment to subcatchment flows. *

****

Channel
or Pipe
301 No Tributary Channel/Pipes
Tributary Subareas..... Park

INLET
300 Tributary Channel/Pipes... 301
No Tributary Subareas.....

****
* Hydrographs will be stored for the following 1 INLETS *
****
300

****
* Quality simulation not included in this run *
****

****
* DATA GROUP M1 *
****

TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT.. 1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV.. 0
STARTING AND STOPPING PRINTOUT DATES..... 0 0

****
* DATA GROUP M3 *
****

CHANNEL/INLET PRINT DATA GROUPS.....301

****
* DATA GROUP M8 *
****

STORM EVENT TRACKING.....

Storm event data file = Sm0.out

End of preliminary input data and data echo.

```
************************************************
*  Precipitation Interface File Summary        *
*  Number of precipitation station....      1  *
************************************************
```

Location	Station Number
1.	0

```
************************************************
*      End of time step DO-loop in Runoff      *
************************************************
```

Final Date (Mo/Day/Year) =	10/ 1/2008	
Total number of time steps =	112245	
Final Julian Date =	2008275	
Final time of day =	86399.	seconds.
Final time of day =	24.00	hours.
Final running time =	350664.0000	hours.
Final running time =	14611.0000	days.

```
************************************************
*     Extrapolation Summary for Watersheds     *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls     *
************************************************
```

Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls
Park	661667	50677						

```
************************************************
*     Extrapolation Summary for Channel/Pipes  *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of GUTNR Calls       *
************************************************
```

Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls
301	0	0						

1

```
*********************************************
*       Continuity Check for Surface Water   *
*********************************************
```

	cubic feet	Inches over Total Basin
Total Precipitation (Rain plus Snow)	2.662678E+06	733.520
Total Irrigation	0.000000E+00	0.000
Total Infiltration	2.060187E+06	567.545
Total Evaporation	4.992052E+04	13.752
Surface Runoff from Watersheds	5.555276E+05	153.038
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Pervious Area...	2.060187E+06	630.605
Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	2.665636E+06	734.335
Total Precipitation + Initial Storage + Total Irrigation.....	2.662678E+06	733.520

The error in continuity is calculated as

```
*************************************
* Precipitation + Initial Snow Cover  *
*      - Infiltration -               *
*Evaporation - Snow removal -         *
*Surface Runoff from Watersheds -     *
*Water in Surface Storage -           *
*Water remaining in Snow Cover        *
*-----------------------------------*
* Precipitation + Initial Snow Cover  *
*************************************
```

Error..... -0.111 Percent

```
*********************************************
*       Continuity Check for Channel/Pipes   *
*********************************************
```

	cubic feet	Inches over Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	5.555276E+05	153.038
Groundwater Subsurface Inflow.....	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Infiltration Loss from Channels.....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	0.555528E+06	153.038

Initial Storage + Inflow.....	5.555276E+05	153.038
Final Storage + Outflow.....	5.555276E+05	153.038

```
*******************************************
* Final Storage + Outflow + Evaporation  - *
* Watershed Runoff - Groundwater Inflow  - *
*     Initial Channel/Pipe Storage         *
*     ---------------------------------    *
*  Final Storage + Outflow  + Evaporation  *
*******************************************
```

Error..... 0. 00 Percent

1

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCHMENT	GUTTER OR INLET NO.	AREA (AC)	PERCENT IMPER.	TOTAL SIMULATED RAINFALL (IN)	PERVIOUS AREA TOTAL RUNOFF DEPTH (IN)	PERVIOUS AREA TOTAL LOSSES (IN)	PERVIOUS AREA PEAK RUNOFF RATE (CFS)	IMPERVIOUS AREA PEAK RUNOFF DEPTH (IN)	IMPERVIOUS AREA PEAK RUNOFF RATE (CFS)	TOTAL PEAK RUNOFF DEPTH (IN)	TOTAL PEAK RUNOFF RATE (CFS)	PEAK UNIT RUNOFF (IN/HR)
Park	301	1.00	10.0	733.64	91.712	642.512	1.119	704.967	0.146	153.038	1.264	1.264

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

CHANNEL NUMBER	MAXIMUM SURCHARGE VOLUME	RATIO OF FULL FLOW TO FULL (CFS)	RATIO OF MAX. VELOCITY TO FULL (FPS)	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY	TIME OF OCCURRENCE HR.	LENGTH OF SURCHARGE (HOUR)

(AC-FT) FLOW DEPTH

301	1.26		2/ 7/1998 20.00
300	1.26		2/ 7/1998 20.00

TOTAL NUMBER OF CHANNELS/PIPES = 2

*** NOTE *** THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL

1

****
* Summary of quantity results (flow in cfs) *
****

% Capture Analysis
Bioretention Unit Area- Park

	Chan/Inlt 301
Date Mo/Da/Year	Time Hr:Min	Flow Cfs
Flow wt'd means.....		0.0004
Flow wt'd std-devs...		0.0091
Maximum value.....		1.2626
Minimum value.....		0.0000
Total loads.....		5.5555E+05 Cubic-ft

===> Runoff simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : Park_RN0.in
===> Your output file was named: Park_RN0.out

****
* SWMM 4.4H Simulation Date and Time Summary *
****
* Starting Date... August 20, 2010 *
* Time... 13:25:35.975 *
* Ending Date... August 20, 2010 *
* Time... 13:25:45.334 *
* Elapsed Time... 0.156 minutes. *
* Elapsed Time... 9.358 seconds. *

****

Generic Biofiltration Model: Park Land Use

SWMM STORAGE Module Output File

1

```
************************************************
*    U.S. Environmental Protection Agency      *
*    Storm Water Management Model  (SWMM)      *
*                 Version 4.4H                 *
*                                              *
*                CDM/OSU Beta                  *
*          Release Date - July 1, 2003         *
*   Camp Dresser & McKee and Oregon St. Univ.  *
*         Chuck Moore and Wayne Huber          *
*   Compiled using Compaq Visual Fortran v.6.6 *
************************************************

                 Developed by

************************************************
*             Metcalf & Eddy, Inc.             *
*            University of Florida             *
*       Water Resources Engineers, Inc.        *
*      (Now Camp Dresser & McKee, Inc.)        *
*               September 1970                 *
************************************************

         Version 4.3 (outdated) is
        Distributed and Maintained by

************************************************
*      U.S. Environmental Protection Agency    *
* Center for Exposure Assessment Modeling (CEAM)*
*    Athens Environmental Research Laboratory  *
*             960 College Station Road         *
*             Athens, GA    30605-2720         *
************************************************

************************************************
*     This is an updated release of SWMM4.4h,  *
*     no longer formally supported by the EPA. *
*     If problems occur executing this model   *
*     contact Wayne Huber at Oregon State. U.,  *
*     wayne.huber@orst.edu,                    *
*     or Robert Dickinson at Camp Dresser &    *
*     McKee, DickinsonRE@CDM.COM.              *
*     The EPA-supported version is SWMM5 at:   *
*   http://www.epa.gov/ednnrmrl/swmm/index.htm *
************************************************
```

```
          ************************************************
          *  This is an implementation of EPA SWMM 4.4H  *
          *  "Nature is full of infinite causes which    *
          *   have never occurred in experience" da Vinci *
          ************************************************


##########################################
#        File names by SWMM Block        #
#         JIN  -> Input to a Block       #
#        JOUT  -> Output from a Block    #
##########################################

   JIN for Block #     1 File #    8  RN0.int
  JOUT for Block #     1 File #    9  JOT.UF

##########################################
# Scratch file names for this simulation. #
##########################################

NSCRAT #     1 File #    1  SCRT1.UF
NSCRAT #     2 File #    2  SCRT2.UF
NSCRAT #     3 File #    3  SCRT3.UF
NSCRAT #     4 File #   10  SCRT4.UF
NSCRAT #     5 File #   11  SCRT5.UF
NSCRAT #     6 File #   12  SCRT6.UF
NSCRAT #     7 File #   13  SCRT7.UF

************************************************
*    Parameter Values on the Tapes Common Block   *
************************************************

 Number of Subcatchments in the Runoff Block (NW)..... 2000
 Number of Channel/Pipes in the Runoff Block (NG)..... 2000
 Number of Connections to Runoff Channels/Inlets (NCP).    6
 Number of Water Quality Constituents (MQUAL).........   20
 Number of Runoff Land Uses per Subcatchment (NLU).....   20
 Number of Groundwater Plot/prints in Runoff (NGW).....  500
 Number of Interface Locations for all Blocks (NIE).... 2000
 Number of Elements in the Transport Block (NET)....... 2000
 Number of Storage Junctions in Transport (NTSE).......  500
 Number of Transport interface input locations (NTHI).. 2000
 Number of Transport interface output locations (NTHO). 2000
```

```
 Number of Transport input locations on R lines (NTHR).   80
 Number of Transport printed output locations (NTOA)... 2000
 Number of Tabular Flow Splitters in Transport (NTSP).. 1000
 Number of Elements in the Extran Block (NEE)..........4000
 Number of Pumps in Extran (NEP)....................... 1000
 Number of Orifices in Extran (NEO).....................  200
 Number of Tide Gates/Free Outfalls in Extran (NTG).... 1000
 Number of Extran Weirs (NEW)...........................  400
 Number of Extran Printout Locations (NPO).............  150
 Number of Tide Elements in Extran (NTE)...............   50
 Number of Natural Channels (NNC)....................... 1200
 Number of Storage Junctions in Extran (NVSE).......... 2000
 Number of Time History Data Points in Extran (NTVAL)..  500
 Number of Data Points for Variable Storage Elements
   in the Extran Block (NVST)...........................  200
 Number of Input Hydrographs in Extran (NEH)...........  500
 Number of Allowable Channel Connections to
   Junctions in the Extran Block (NCHN)................   15
 Number Rain Gages in Rain and Runoff (MAXRG)..........  200
 Number PRATE/VRATE Points for Extran Pump
   Input (MAXPRA).....................................    10
 Number of Variable Orifices in Extran (NVORF).........   50
 Number of Variable Orifice Data Points (NVOTIM).......   50
 Number of Allowable Precip. Values/yr in Rain (LIMRN). 5000
 Number of Storm Events for Rain Analysis (LSTORM).....20000
 Number of Plugs for Plug-flow in S/T (NPLUG)..........40000
 Number Conduits for Extran Results to ASCII
   File (MXFLOW)....................................... 400


##########################################
# Entry made to Storage/Treatment Block.  #
# Storage/Treatment model written by the  #
# University of Florida, June 1981.       #
# Last updated July 1995 at Oregon St. U. #
##########################################

VALUE OF NOTAPE           :         0

INPUT DATA SOURCE         :  EXTERNAL FILE

EXTERNAL ELEMENT NUMBER   :  300
```

```
NUMBER OF TIME STEPS      :   1402560

TIME STEP SIZE,SECONDS    :     900.0

NUMBER OF S/T UNITS       :         1

COST MODEL USED?          :        NO

STARTING DATE             :    10/ 1/1968

STARTING JULIAN DATE      :   1968275

STARTING TIME             :    0:  0:  0

SIMULATION DURATION, HOURS:350640.000

ENDING JULIAN DATE        :   2008275

ENDING TIME OF DAY        :     0.000 HOURS

PRINT TOTAL SIMULATION SUMMARY ONLY (ISUM = 0)

IDET = 0. NO DETAILED (TIME STEP) PRINT-OUTS.

NO OUTPUT FOR AVERAGE DETENTION TIME RESULTS


##########################################
# Header information from interface file: #
##########################################

Title from first computational block:
% Capture Analysis
Bioretention Unit Area- Park

Title from immediately preceding computational block:
% Capture Analysis
Bioretention Unit Area- Park

Name of preceding block:.............Runoff Block
Initial Julian date (IDATEZ)..................... 1968275
Initial time of day in seconds (TZERO)...........     0.0
No. transfered input locations..................       1
```

No. transfered pollutants..... 0
Size of total catchment area (acres)..... 1.00
ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1

##
Element numbers of interface inlet locations:
##
300

Conversion factor to cfs for flow units
on interface file. Multiply by: 1.00000

INPUT/OUTPUT UNITS : U.S. CUSTOMARY

TRIBUTARY AREA, ACRES : 1.0

NUMBER OF POLLUTANTS : 0

MONTHLY EVAPORATION RATES, IN/DAY

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
0.030	0.048	0.072	0.102	0.132	0.156	0.168	0.150	0.114	0.078	0.042	0.030

BASIN INFILTRATION RATE FOR UNIT 1 IN (IN/HR) = 0.1400
1

UNIT CHARACTERISTICS

****
UNIT # 1 CHARACTERISTICS
****

GENERAL UNIT DESCRIPTION :

NAME : Park
IDENT : 1
TYPE OF UNIT : DETENTION
MAX. ALLOWABLE INFLOW, CFS: 0.1000E+05

FLOW DIRECTIONS:
BYPASS TO UNIT # 100
TREATED OUTFLOW TO UNIT # 100
RESIDUALS TO UNIT # 100

===> NOTE: UNIT 100 IS THE NEXT BLOCK AND UNIT 200 IS ULTIMATE DISPOSAL.

DETENTION UNIT CHARACTERISTICS:

RESIDUALS DRAW-OFF SCHEME: NEVER DRAWN OFF

DEPTH-AREA-STORAGE-FLOW RELATIONSHIPS :

DEPTH, FT	SURFACE AREA, SQ FT	STORAGE, CU FT	TREATED OUTFLOW, CFS	RESIDUAL FLOW, CFS
0.0000E+00	1.1500E+03	0.0000E+00	0.0000E+00	0.0000E+00
2.5000E-01	1.1500E+03	2.8750E+02	0.0000E+00	0.0000E+00
2.5100E-01	1.1500E+03	2.8865E+02	4.8000E-02	0.0000E+00
1.7500E+00	1.1500E+03	2.0125E+03	4.8000E-02	0.0000E+00

INITIAL CONDITIONS:

VOLUME, CU FT : 0.0000E+00

****
* NOTE: IF THERE IS ONLY ONE UNIT THE PLANT *
* PERFORMANCE SUMMARY WILL NOT BE PRINTED. *
****

Note !! UNIT 1 HAS EXCEEDED THE MAXIMUM STORAGE VOLUME ON 1/21/1969 AT 4:15
The excess has been bypassed and is included in BYPASS volume. Further
messages will be suppressed. But summaries of number of all volume-bypass
time steps and number of days with volume-bypasses will be printed.
1
****
* ENTIRE SIMULATION UNIT SUMMARIES *
****
OCT 1, 1968, 0 0: 0 TO OCT 1, 2008, 0 0: 0.

UNIT	PARAMETER	VOLUME CU FT
1	INFLOW,TOTAL	5.5540E+05
	INFLOW,NET	4.4605E+05
	BYPASS	1.0935E+05
	TREATED OUTFLOW	2.6253E+05
	RESIDUAL FLOW	0.0000E+00
	REMAINING	0.0000E+00
	EVAPORATION	2.8313E+03
	INFILTRATION	1.8106E+05
	NO. VOL. BYPASSES	581
	NO. VOL. BYPASS DAYS	48
	INITIAL COND.	0.0000E+00
	PERCENT ERROR	-0.0661

===> Storage/Treatment simulation ended normally.

===> SWMM 4.4H simulation ended normally.
Always check output file for possible warning messages.

===> Your input file was named : Park_St0.in
===> Your output file was named: Park_St0.out

```
**********************************************************
*       SWMM 4.4H   Simulation Date and Time Summary     *
**********************************************************
* Starting Date... August     20, 2010                   *
*          Time...          13:30: 3.786                 *
*   Ending Date... August     20, 2010                   *
*          Time...          13:31: 9.801                 *
*  Elapsed Time...               1.100 minutes.          *
*  Elapsed Time...              66.014 seconds.          *
**********************************************************
```