

# **Revised Draft SEIR Appendix 5.5a**

## **(Continued)**

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Entrada South Hydrology and Drainage  
Concept (Part 2 of 6)



**ENTRADA SOUTH**  
**DRAINAGE CONCEPT REPORT**  
**DEVELOPED CONDITION**



201D-A.OUT

Program Package Serial Number: 2084

08/17/10 FILE: 201D-A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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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<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | DAY 4<br>PCT<br>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                  |

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\* 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 \*

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| LOCATION | SUBAREA<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>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  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL STORM DAY 4
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(Ft) SLOPE SIZE(Ft) Z Q(CFS) NAME TC RAIN PCT
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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL RAIN PCT
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(Ft) SLOPE SIZE(Ft) Z Q(CFS) NAME TC ZONE 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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL RAIN PCT
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(Ft) SLOPE SIZE(Ft) Z Q(CFS) NAME TC ZONE 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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL RAIN PCT
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(Ft) SLOPE SIZE(Ft) Z Q(CFS) NAME TC ZONE 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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL RAIN PCT
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(Ft) SLOPE SIZE(Ft) Z Q(CFS) NAME TC ZONE 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

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# DEBRIS VOLUME

x

$$\text{DPA } 8 - 35,000 \text{ CY/mi}^2 = 55 \text{ CY/Ac}$$

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## AREA 1A + 2A

1A: UNDEVELOPED OFFSITE AREA = 18.82 AC

2A: ONSITE AREA = 3.5 AC

$$A_T = 22.32 \text{ AC}$$

$$\text{D.V.} = 1,228 \text{ CY}$$

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## AREA 8C

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

$$\text{D.V.} = 363 \text{ CY}$$

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## AREA 15L

$$A = 7.3 \text{ AC.}$$

$$\text{D.V.} = 402 \text{ CY}$$

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## AREA 20C

$$A = 8.8 \text{ AC}$$

$$\text{D.V.} = 484 \text{ CY}$$

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201D-A.HHD

Program Package Serial Number: 2084

08/17/10 FILE: 201D-A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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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)

## 201D-A.HIN

|           |         |      |            |            |            |            |      |
|-----------|---------|------|------------|------------|------------|------------|------|
| 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.   |

|           |         |         | 201D-A.HIN |         |    |
|-----------|---------|---------|------------|---------|----|
| 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  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 1  
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<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>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.                | 98           | 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         |  |  |  |
| *****                                                         |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| 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 |                   |              |    |              |             |  |  |  |
| *****                                                         |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| CONFLUENCE Q'S                                                |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| *****                                                         |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| LOCATION                                                      | SUBAREA<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>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.                | 98           | 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         |  |  |  |
| *****                                                         |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| 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 |                   |              |    |              |             |  |  |  |
| *****                                                         |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| CONFLUENCE Q'S                                                |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| *****                                                         |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    |              |             |  |  |  |
| LOCATION                                                      | SUBAREA<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>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  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 2  
PROG F0601M

## 930d-b.OUT

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

```

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN B
SUBAREA SUBAREA TOTAL CONV CONV CONV CONV CONTROL SOIL STORM DAY 4
LOCATION AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(FT) SLOPE SIZE(FT) Z Q(CFS) NAME TC RAIN PCT
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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL RAIN PCT
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(FT) SLOPE SIZE(FT) Z Q(CFS) NAME TC ZONE 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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL RAIN PCT
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(FT) SLOPE SIZE(FT) Z Q(CFS) NAME TC ZONE 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 SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL RAIN PCT
AREA(AC) Q(CFS) AREA(AC) Q(CFS) TYPE LNTH(FT) SLOPE SIZE(FT) Z Q(CFS) NAME TC ZONE 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

DPAB - BULKING FACTOR = 1.36

---

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

---

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

---

# DERRIS VOLUME

$$\text{DPA 8} - 35,000 \text{ LY/mi}^2 = 55 \text{ LY/AL}$$

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C: AREA 51F

$$A_{\text{total}} = 76.6 \text{ AL}$$

$$\text{D.V.} = 4,213 \text{ LY}$$

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Program Package Serial Number: 2084

06/16/10 FILE: 930d-b

INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 3  
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)

## 930D-B.HIN

|   |          |      |      |        |         |       |      |       |
|---|----------|------|------|--------|---------|-------|------|-------|
| 7 | 930      | 1A   | 28.7 | 411155 | 73.200  | 4     |      |       |
| 8 | 5        | 0.   | 0.   | 100.   | 2.      | 200.  | 2.   | 300.  |
| 8 | 10       | 500. | 3.   | 600.   | 3.      | 700.  | 3.   | 800.  |
| 8 | 151000.  |      | 5.   | 1050.  | 7.      | 1100. | 9.   | 1110. |
| 8 | 201130.  |      | 16.  | 1131.  | 17.     | 1132. | 17.  | 1133. |
| 8 | 251135.  |      | 19.  | 1136.  | 19.     | 1137. | 20.  | 1138. |
| 8 | 301140.  |      | 22.  | 1141.  | 23.     | 1142. | 23.  | 1143. |
| 8 | 351145.  |      | 27.  | 1146.  | 28.     | 1147. | 30.  | 1148. |
| 8 | 401150.  |      | 41.  | 1151.  | 49.     | 1152. | 58.  | 1153. |
| 8 | 451155.  |      | 73.  | 1156.  | 69.     | 1157. | 61.  | 1158. |
| 8 | 501160.  |      | 35.  | 1161.  | 29.     | 1162. | 24.  | 1163. |
| 8 | 551165.  |      | 16.  | 1166.  | 15.     | 1167. | 14.  | 1168. |
| 8 | 601170.  |      | 12.  | 1171.  | 12.     | 1172. | 11.  | 1173. |
| 8 | 651175.  |      | 10.  | 1176.  | 10.     | 1177. | 10.  | 1178. |
| 8 | 701180.  |      | 9.   | 1181.  | 9.      | 1182. | 8.   | 1183. |
| 8 | 751185.  |      | 8.   | 1186.  | 8.      | 1187. | 8.   | 1188. |
| 8 | 801190.  |      | 7.   | 1191.  | 7.      | 1192. | 7.   | 1193. |
| 8 | 851195.  |      | 6.   | 1196.  | 6.      | 1197. | 6.   | 1198. |
| 8 | 901200.  |      | 6.   | 1201.  | 6.      | 1202. | 6.   | 1203. |
| 8 | 951205.  |      | 6.   | 1206.  | 6.      | 1207. | 5.   | 1208. |
| 8 | 1001210. |      | 5.   | 1211.  | 5.      | 1212. | 5.   | 1213. |
| 8 | 1051215. |      | 5.   | 1216.  | 5.      | 1217. | 5.   | 1218. |
| 8 | 1101220. |      | 5.   | 1221.  | 5.      | 1222. | 5.   | 1223. |
| 8 | 1151225. |      | 4.   | 1226.  | 4.      | 1227. | 4.   | 1228. |
| 8 | 1201230. |      | 4.   | 1231.  | 4.      | 1232. | 4.   | 1233. |
| 8 | 1251235. |      | 4.   | 1236.  | 4.      | 1237. | 4.   | 1238. |
| 8 | 1301240. |      | 4.   | 1241.  | 4.      | 1242. | 4.   | 1243. |
| 8 | 1351245. |      | 4.   | 1246.  | 4.      | 1247. | 4.   | 1248. |
| 8 | 1401250. |      | 4.   | 1251.  | 4.      | 1252. | 4.   | 1253. |
| 8 | 1451255. |      | 4.   | 1256.  | 4.      | 1257. | 4.   | 1258. |
| 8 | 1501260. |      | 4.   | 1261.  | 4.      | 1262. | 4.   | 1263. |
| 8 | 1551265. |      | 4.   | 1266.  | 4.      | 1267. | 4.   | 1268. |
| 8 | 1601270. |      | 4.   | 1271.  | 4.      | 1272. | 3.   | 1273. |
| 8 | 1651275. |      | 3.   | 1276.  | 3.      | 1277. | 3.   | 1278. |
| 8 | 1701280. |      | 3.   | 1281.  | 3.      | 1282. | 3.   | 1283. |
| 8 | 1751285. |      | 3.   | 1286.  | 3.      | 1287. | 3.   | 1288. |
| 8 | 1801290. |      | 3.   | 1291.  | 3.      | 1292. | 3.   | 1293. |
| 8 | 1851295. |      | 3.   | 1296.  | 3.      | 1297. | 3.   | 1298. |
| 8 | 1901300. |      | 3.   | 1310.  | 3.      | 1320. | 3.   | 1330. |
| 8 | 1951350. |      | 3.   | 1360.  | 3.      | 1370. | 3.   | 1380. |
| 8 | 2001400. |      | 2.   | 1420.  | 2.      | 1440. | 2.   | 1460. |
| 7 | 930      | 3A   | 68.3 | 411155 | 137.200 | 4     |      |       |
| 8 | 5        | 0.   | 1.   | 100.   | 3.      | 200.  | 3.   | 300.  |
| 8 | 10       | 500. | 4.   | 600.   | 4.      | 700.  | 5.   | 800.  |
| 8 | 151000.  |      | 7.   | 1050.  | 12.     | 1100. | 18.  | 1110. |
| 8 | 201130.  |      | 34.  | 1131.  | 35.     | 1132. | 36.  | 1133. |
| 8 | 251135.  |      | 39.  | 1136.  | 40.     | 1137. | 41.  | 1138. |
| 8 | 301140.  |      | 45.  | 1141.  | 47.     | 1142. | 49.  | 1143. |
| 8 | 351145.  |      | 57.  | 1146.  | 60.     | 1147. | 64.  | 1148. |
| 8 | 401150.  |      | 89.  | 1151.  | 103.    | 1152. | 116. | 1153. |
| 8 | 451155.  |      | 137. | 1156.  | 136.    | 1157. | 134. | 1158. |
| 8 | 501160.  |      | 123. | 1161.  | 116.    | 1162. | 105. | 1163. |
| 8 | 551165.  |      | 61.  | 1166.  | 48.     | 1167. | 38.  | 1168. |
| 8 | 601170.  |      | 28.  | 1171.  | 26.     | 1172. | 25.  | 1173. |
| 8 | 651175.  |      | 21.  | 1176.  | 20.     | 1177. | 19.  | 1178. |
| 8 | 701180.  |      | 17.  | 1181.  | 16.     | 1182. | 16.  | 1183. |
| 8 | 751185.  |      | 14.  | 1186.  | 14.     | 1187. | 13.  | 1188. |
| 8 | 801190.  |      | 12.  | 1191.  | 12.     | 1192. | 12.  | 1193. |
| 8 | 851195.  |      | 11.  | 1196.  | 10.     | 1197. | 10.  | 1198. |
| 8 | 901200.  |      | 9.   | 1201.  | 9.      | 1202. | 9.   | 1203. |
| 8 | 951205.  |      | 8.   | 1206.  | 8.      | 1207. | 8.   | 1208. |
| 8 | 1001210. |      | 7.   | 1211.  | 7.      | 1212. | 7.   | 1213. |
| 8 | 1051215. |      | 7.   | 1216.  | 7.      | 1217. | 7.   | 1218. |
| 8 | 1101220. |      | 7.   | 1221.  | 7.      | 1222. | 7.   | 1223. |
| 8 | 1151225. |      | 6.   | 1226.  | 6.      | 1227. | 6.   | 1228. |
| 8 | 1201230. |      | 6.   | 1231.  | 6.      | 1232. | 6.   | 1233. |
| 8 | 1251235. |      | 6.   | 1236.  | 6.      | 1237. | 6.   | 1238. |
| 8 | 1301240. |      | 6.   | 1241.  | 6.      | 1242. | 6.   | 1243. |
| 8 | 1351245. |      | 6.   | 1246.  | 6.      | 1247. | 6.   | 1248. |
| 8 | 1401250. |      | 6.   | 1251.  | 6.      | 1252. | 5.   | 1253. |
| 8 | 1451255. |      | 5.   | 1256.  | 5.      | 1257. | 5.   | 1258. |
| 8 | 1501260. |      | 5.   | 1261.  | 5.      | 1262. | 5.   | 1263. |
| 8 | 1551265. |      | 5.   | 1266.  | 5.      | 1267. | 5.   | 1268. |
| 8 | 1601270. |      | 5.   | 1271.  | 5.      | 1272. | 5.   | 1273. |
| 8 | 1651275. |      | 5.   | 1276.  | 5.      | 1277. | 5.   | 1278. |
| 8 | 1701280. |      | 5.   | 1281.  | 5.      | 1282. | 5.   | 1283. |
| 8 | 1751285. |      | 5.   | 1286.  | 5.      | 1287. | 5.   | 1288. |
| 8 | 1801290. |      | 5.   | 1291.  | 5.      | 1292. | 5.   | 1293. |
| 8 | 1851295. |      | 5.   | 1296.  | 5.      | 1297. | 5.   | 1298. |

## 930D-B.HIN

|           |           |           |           |           |      |
|-----------|-----------|-----------|-----------|-----------|------|
| 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.   |

| 930D-B.HIN |           |           |           |           |      |
|------------|-----------|-----------|-----------|-----------|------|
| 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.   |



## 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 |

201D-C.OUT

Program Package Serial Number: 2084

08/17/10 FILE: 201D-C INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

PAGE 1  
PROG F0601M

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

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| LOCATION | SUBAREA<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>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         |

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*                                     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                                     *
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| LOCATION | SUBAREA<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>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         |

201D-C.HHD

Program Package Serial Number: 2084

08/17/10 FILE: 201D-C INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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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 |           |      |           |             |               |              |                     |                   |      |      |

201D-D.OUT

Program Package Serial Number: 2084

05/04/10 FILE: 201D-D INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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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<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>IMPV |
| 201 1A                                                        | 3.14                | 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         |

## 201D-D.HHD

Program Package Serial Number: 2084

05/04/10 FILE: 201D-D INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
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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



201D-E.OUT

Program Package Serial Number: 2084

01/07/10 FILE: 201D-E INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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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 |    |                     |                   |                   |                 |              |                  |               |                  |           |                   |              | STORM DAY 4 |              |             |
|---------------------------------------------------------------|----|---------------------|-------------------|-------------------|-----------------|--------------|------------------|---------------|------------------|-----------|-------------------|--------------|-------------|--------------|-------------|
| LOCATION                                                      |    | SUBAREA<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNTH(FT) | CONV<br>SLOPE | CONV<br>SIZE(FT) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC          | RAIN<br>ZONE | PCT<br>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

DPAB - BULKING FACTOR = 1.36

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

---

### AREA 1A

$$Q_B = 52.57 \text{ cfs}$$

$$Q_{BB} = 71.50 \text{ cfs}$$

Add 18.93 cfs to All Downstream

### AREA 2A

$$Q_B = 21.18 \text{ cfs}$$

$$Q_{BB} = 28.80 \text{ cfs}$$

Add 7.62 cfs to All Downstream

---

## DEBRIS VOLUME

$$DPA 8 - 35,000 \text{ CY/sq mi} = 55 \text{ CY/AC}$$

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### AREA 1A, 2A & 3A

$$1A: \text{OFFSITE AREA} = 23.1 \text{ AC}$$

$$2A: \text{OFFSITE AREA} = 6.9 \text{ AC}$$

$$3A: \text{ONSITE AREA} = 11.5 \text{ AC}$$

$$A_T = 41.5 \text{ AC}$$

$$\underline{D.V. = 2283 \text{ CY}}$$

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### AREA 4A

$$A_T = 2.5 \text{ AC}$$

$$A_{\text{UNDEVELOPED}} = 1.8 \text{ AC}$$

$$\underline{D.V. = 99 \text{ CY}}$$

Program Package Serial Number: 2084

01/07/10 FILE: 201D-E INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 2  
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 |

201D-F.OUT

Program Package Serial Number: 2084

01/07/10 FILE: 201D-F INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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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 |    |                     |                   |                   |                 |              |                  |               |                  |           |                   |              |    | STORM        | DAY 4       |
|---------------------------------------------------------------|----|---------------------|-------------------|-------------------|-----------------|--------------|------------------|---------------|------------------|-----------|-------------------|--------------|----|--------------|-------------|
| LOCATION                                                      |    | SUBAREA<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LGTH(FT) | CONV<br>SLOPE | CONV<br>SIZE(FT) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | RAIN<br>ZONE | PCT<br>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         |

## DERRIS VOLUME

$$\text{DPA} - 35,000 \text{ LY/AC} = 55 \text{ LY/AC}$$

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AREA 1A

$$\text{AREA} = 3.9 \text{ AC}$$

$$\text{DN}_1 = 2.15 \text{ LY}$$

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Program Package Serial Number: 2084

01/07/10 FILE: 201D-F INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 2  
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    | 1.00  | 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 DISTRICTPAGE 1  
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 |          |         |          |        |        |          |        |          |        |         |      |      |      | STORM DAY 4 |  |
|------------------------------------------------------------|----------|---------|----------|--------|--------|----------|--------|----------|--------|---------|------|------|------|-------------|--|
| LOCATION                                                   | SUBAREA  | SUBAREA | TOTAL    | TOTAL  | CONV   | CONV     | CONV   | CONV     | CONV   | CONTROL | SOIL | RAIN | PCT  |             |  |
|                                                            | AREA(AC) | Q(CFS)  | AREA(AC) | Q(CFS) | TYPE   | LNTH(Ft) | SLOPE  | SIZE(Ft) | Z      | Q(CFS)  | NAME | TC   | IMPV |             |  |
| 201                                                        | 1A       | 35.8    | 63.87    | 35.8   | 63.87  | 2        | 100.   | .10000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 2A       | 37.4    | 77.54    | 73.2   | 141.09 | 2        | 1200.  | .06000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 3A       | 12.9    | 29.65    | 86.1   | 167.41 | 2        | 580.   | .10000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 4A       | 29.1    | 51.91    | 115.2  | 217.51 | 2        | 300.   | .06000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 5A       | 37.6    | 67.08    | 152.8  | 282.89 | 2        | 11.    | .05000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 6A       | 27.4    | 56.81    | 180.2  | 336.85 | 2        | 50.    | .05000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 7A       | 37.1    | 66.19    | 217.3  | 401.96 | 2        | 820.   | .05000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 8A       | 24.9    | 51.62    | 242.2  | 448.65 | 2        | 70.    | .05000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 9B       | 21.4    | 46.56    | 21.4   | 46.56  | 2        | 490.   | .06000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 10B      | 26.8    | 55.56    | 48.2   | 101.66 | 2        | 1030.  | .06000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 11B      | 12.3    | 30.27    | 60.5   | 126.56 | 2        | 540.   | .06000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 12B      | 30.1    | 53.57    | 90.6   | 177.77 | 2        | 180.   | .06000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| *****                                                      |          |         |          |        |        |          |        |          |        |         |      |      |      |             |  |
| CONFLUENCE Q'S                                             |          |         |          |        |        |          |        |          |        |         |      |      |      |             |  |
| 201                                                        | 13A      | TA      | 1158     | QA     | 448.47 | QAB      | 625.39 | QB       | 176.93 | 201     | 13B  | TB   | 1158 |             |  |
| 201                                                        | 13AB     | TAB     | 1158     | QAB    | 625.39 | QA       | 448.47 | QB       | 176.93 | 201     | 13C  | TC   | 1155 |             |  |
| *****                                                      |          |         |          |        |        |          |        |          |        |         |      |      |      |             |  |
| LOCATION                                                   | SUBAREA  | SUBAREA | TOTAL    | TOTAL  | CONV   | CONV     | CONV   | CONV     | CONV   | CONTROL | SOIL | RAIN | PCT  |             |  |
|                                                            | AREA(AC) | Q(CFS)  | AREA(AC) | Q(CFS) | TYPE   | LNTH(Ft) | SLOPE  | SIZE(Ft) | Z      | Q(CFS)  | NAME | TC   | IMPV |             |  |
| 201                                                        | 13AB     | 90.6    | 176.93   | 332.8  | 625.39 | 2        | 710.   | .05000   | .00    | .00     | 0.   | 297  | .00  |             |  |
| 201                                                        | 14A      | 33.0    | 68.42    | 365.8  | 684.88 | 2        | 920.   | .04000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 15A      | 30.2    | 60.36    | 396.0  | 735.09 | 2        | 130.   | .05000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 16A      | 22.1    | 44.17    | 418.1  | 773.46 | 2        | 960.   | .04000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 17A      | 37.5    | 66.73    | 455.6  | 828.57 | 2        | 200.   | .04000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| 201                                                        | 18C      | 12.0    | 25.13    | 12.0   | 25.13  | 2        | 150.   | .03000   | .00    | .00     | 0.   | 297  | .01  |             |  |
| *****                                                      |          |         |          |        |        |          |        |          |        |         |      |      |      |             |  |
| CONFLUENCE Q'S                                             |          |         |          |        |        |          |        |          |        |         |      |      |      |             |  |
| 201                                                        | 19A      | TA      | 1161     | QA     | 828.41 | QAC      | 846.82 | QC       | 18.41  | 201     | 19C  | TC   | 1155 |             |  |
| 201                                                        | 19AC     | TAC     | 1161     | QAC    | 846.82 | QA       | 828.41 | QC       | 18.41  | 201     | 19D  | TD   | 1155 |             |  |
| *****                                                      |          |         |          |        |        |          |        |          |        |         |      |      |      |             |  |
| LOCATION                                                   | SUBAREA  | SUBAREA | TOTAL    | TOTAL  | CONV   | CONV     | CONV   | CONV     | CONV   | CONTROL | SOIL | RAIN | PCT  |             |  |
|                                                            | AREA(AC) | Q(CFS)  | AREA(AC) | Q(CFS) | TYPE   | LNTH(Ft) | SLOPE  | SIZE(Ft) | Z      | Q(CFS)  | NAME | TC   | IMPV |             |  |
| 201                                                        | 19AC     | 12.0    | 25.13    | 467.6  | 846.82 | 4        | 200.   | .01000   | 7.75   | .00     | 0.   | 297  | .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

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

### AREA 1A

$Q_B = 63.87 \text{ cfs}$

DPA 5

$Q_{BB} = 93.89 \text{ cfs}$

ADD 30.02 cfs TO ALL DOWNSTREAM

### AREA 2A

$Q_B = 77.54 \text{ cfs}$

DPA 5

$Q_{BB} = 113.98 \text{ cfs}$

ADD 36.44 cfs TO ALL DOWNSTREAM

### AREA 3A

$Q_B = 29.65 \text{ cfs}$

DPA 5

$Q_{BB} = 43.59 \text{ cfs}$

ADD 13.94 cfs TO ALL DOWNSTREAM

### AREA 4A

$Q_B = 51.91 \text{ cfs}$

DPA 5

$Q_{BB} = 76.31 \text{ cfs}$

ADD 24.40 cfs TO ALL DOWNSTREAM

### AREA 5A

$Q_B = 67.08 \text{ cfs}$

60% DPA 5  
40% DPA 8

$Q_{BB} = 95.66 \text{ cfs}$

ADD 28.58 cfs TO ALL DOWNSTREAM

### AREA 6A

$Q_B = 56.81 \text{ cfs}$

80% DPA 5  
20% DPA 8

$Q_{BB} = 82.26 \text{ cfs}$

ADD 25.45 cfs TO ALL DOWNSTREAM

### AREA 7A

$Q_B = 66.19 \text{ cfs}$

DPA 8

$Q_{BB} = 90.02 \text{ cfs}$

ADD 23.83 cfs TO ALL DOWNSTREAM

### AREA 8A

$Q_B = 51.62 \text{ cfs}$

70% DPA 5  
30% DPA 8

$Q_{BB} = 74.18 \text{ cfs}$

ADD 22.56 cfs TO ALL DOWNSTREAM

### AREA 9B

$Q_B = 46.56 \text{ cfs}$

DPA 8

$Q_{BB} = 63.32 \text{ cfs}$

ADD 16.76 cfs TO ALL DOWNSTREAM

+ 221.98

AREA 10B

$Q_B = 55.56 \text{ cfs}$

DPA 8

$Q_{BB} = 75.56 \text{ cfs}$

ADD 20.00 cfs TO ALL DOWNSTREAM

AREA 11B

$Q_B = 30.27 \text{ cfs}$

DPA 8

$Q_{BB} = 41.17 \text{ cfs}$

ADD 10.90 cfs TO ALL DOWNSTREAM

AREA 12B

$Q_B = 53.57 \text{ cfs}$

DPA 8

$Q_{BB} = 72.86 \text{ cfs}$

ADD 19.29 cfs TO ALL DOWNSTREAM

AREA 14A

$Q_B = 68.42 \text{ cfs}$

DPA 8

$Q_{BB} = 93.05 \text{ cfs}$

ADD 24.63 cfs TO ALL DOWNSTREAM

AREA 15A

$Q_B = 60.36 \text{ cfs}$

30% DPA 5  
70% DPA 8

$Q_{BB} = 84.08 \text{ cfs}$

ADD 23.72 cfs TO ALL DOWNSTREAM

AREA 16A

$Q_B = 44.17 \text{ cfs}$

DPA 8

$Q_{BB} = 60.07 \text{ cfs}$

ADD 15.90 cfs TO ALL DOWNSTREAM

EA 17A

$Q_B = 66.73 \text{ cfs}$

DPA 8

$Q_{BB} = 90.75 \text{ cfs}$

ADD 24.02 cfs TO ALL DOWNSTREAM

AREA 18C

$Q_B = 25.13 \text{ cfs}$

DPA 8

$Q_{BB} = 34.18 \text{ cfs}$

ADD 9.05 cfs TO ALL DOWNSTREAM  
+ 147.51

## DEBRIS VOLUME

DPA 5 - 46,500 CY/mi<sup>2</sup> - 0.38 mi<sup>2</sup>

DPA 8 - 18,000 CY/mi<sup>2</sup> - 0.57 mi<sup>2</sup>

DEBRIS VOLUME = 27,930 CY — TOTAL AREA = 605 AC.

AREA 17A

D.V. = 46 CY/AC

$\Sigma A = 467.6 AC$

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  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 2  
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 |

930D-H.OUT

Program Package Serial Number: 2084

05/07/10 FILE: 930D-H INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

PAGE 1  
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<br>AREA(AC) | SUBAREA<br>Q(CFS) | TOTAL<br>AREA(AC) | TOTAL<br>Q(CFS) | CONV<br>TYPE | CONV<br>LNPTH(Ft) | CONV<br>SLOPE | CONV<br>SIZE(Ft) | CONV<br>Z | CONTROL<br>Q(CFS) | SOIL<br>NAME | TC | STORM DAY 4<br>RAIN PCT<br>ZONE 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

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

AREA 1A

$$Q_B = 78.16 \text{ cfs}$$

DPA 8  $Q_{BB} = 106.30 \text{ cfs}$  ADD 28.14 cfs TO ALL DOWNSTREAM

AREA 2A

$$Q_B = 58.56 \text{ cfs}$$

DPA 8  $Q_{BB} = 79.64 \text{ cfs}$  ADD 21.08 cfs TO ALL DOWNSTREAM

## DEBRIS VOLUME

DPA 5 - 82,000 CY/mi<sup>2</sup> - 0.10 mi<sup>2</sup>

DPA 8 - 35,000 CY/mi<sup>2</sup> - 0.10 mi<sup>2</sup>

DEBRIS VOLUME = 54.68 CY/AC

AREA 2A

$\Sigma A = 68.3 \text{ AC}$

DV = 3,734 CY

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Program Package Serial Number: 2084

05/07/10 FILE: 930D-H INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 2  
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  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 1  
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 | CONV | CONV    | CONV | CONV        | CONTROL | SOIL   | TC  | RAIN  | PCT |
| 930                                                                           | 1A      | 30.1     | 48.35   | 30.1   | 48.35  | 2        | 300.  | .04000 | .00  | .00  | .00     | .00  | .00         | 0.      | 297    | 17  | A30   | .05 |
| 930                                                                           | 2B      | 27.4     | 52.95   | 27.4   | 52.95  | 2        | 800.  | .08000 | .00  | .00  | .00     | .00  | .00         | 0.      | 297    | 12  | A30   | .05 |
| 930                                                                           | 3B      | 9.1      | 19.50   | 36.5   | 71.28  | 2        | 300.  | .05000 | .00  | .00  | .00     | .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 |     |
| *****                                                                         |         |          |         |        |        |          |       |        |      |      |         |      |             |         |        |     |       |     |
| SUBAREA SUBAREA TOTAL TOTAL CONV CONV CONV CONV CONV CONTROL SOIL TC RAIN PCT |         |          |         |        |        |          |       |        |      |      |         |      |             |         |        |     |       |     |
| 930                                                                           | 4AB     | 36.5     | 71.05   | 66.6   | 119.35 | 4        | 200.  | .01000 | 3.75 | .00  | .00     | .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

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

### AREA 1A

$Q_B = 48.35 \text{ cfs}$

DPA 8

$Q_{BB} = 65.76 \text{ cfs}$

ADD 17.41 cfs TO ALL  
DOWNSTREAM

### AREA 2B

$Q_B = 52.95 \text{ cfs}$

DPA 8

$Q_{BB} = 72.01 \text{ cfs}$

ADD 19.06 cfs TO ALL Downstream

### AREA 3B

$Q_B = 19.50 \text{ cfs}$

DPA 8

$Q_{BB} = 26.52 \text{ cfs}$

ADD 7.02 cfs TO ALL Downstream

## DEBRIS VOLUME

DPA 5 - 82,000 CY/mi<sup>2</sup> - 0.10 mi<sup>2</sup>

DPA 8 - 35,000 CY/mi<sup>2</sup> - 0.10 mi<sup>2</sup> = 55 CY/AC

AREA 3B

$\Sigma A = 66.6 \text{ AC}$

DV = 3,663 CY

930D-I.HHD

Program Package Serial Number: 2084

06/16/10 FILE: 930D-I INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

PAGE 2  
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  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 1  
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) | Q(CFS) | TOTAL AREA(AC) | TOTAL Q(CFS) | CONV TYPE | CONV LENGTH(Ft) | CONV SLOPE | CONV SIZE(Ft) | CONV Z | CONTROL Q(CFS) | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|----------|---------|----------|--------|----------------|--------------|-----------|-----------------|------------|---------------|--------|----------------|-----------|----|-----------|----------|
| 930 1A   | 24.5    | 32.03    | 24.5   | 32.03          | 2            | 1680.     | .04000          | .00        | .00           | .00    | 0.             | 220       | 18 | A29       | .01      |
| 930 2A   | 19.0    | 22.71    | 43.5   | 51.90          | 2            | 400.      | .02500          | .00        | .00           | .00    | 0.             | 220       | 21 | A29       | .01      |
| 930 3B   | 32.9    | 59.63    | 32.9   | 59.63          | 2            | 1700.     | .04000          | .00        | .00           | .00    | 0.             | 298       | 15 | A29       | .01      |
| 930 4B   | 33.1    | 64.26    | 66.0   | 115.31         | 2            | 50.       | .02000          | .00        | .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) | Q(CFS) | TOTAL AREA(AC) | TOTAL Q(CFS) | CONV TYPE | CONV LENGTH(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           | .00    | 0.             | 20        | 0  | A29       | .00      |

# DEBRIS VOLUME

$$\text{DPA 8} - 35,000 \text{ CY/mi}^2 = 55 \text{ CY/AL}$$

---

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

$$A_{\text{Total}} = 109.5 \text{ AL}$$

$$\underline{\text{D.V.} = 6,023 \text{ CY}}$$

Program Package Serial Number: 2084

02/13/10 FILE: 930D-J INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units  
LOS ANGELES COUNTY FLOOD CONTROL DISTRICTPAGE 2  
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   |

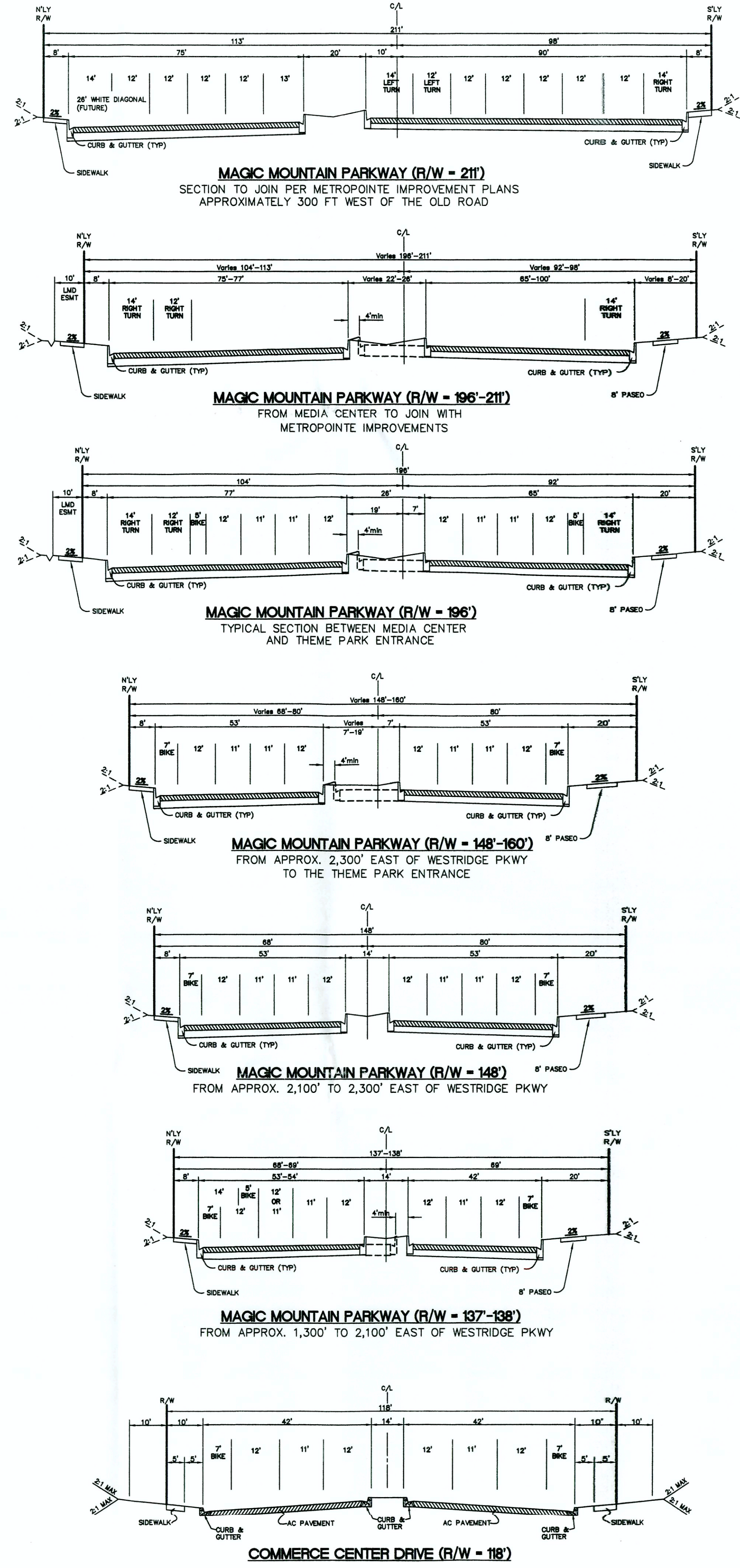
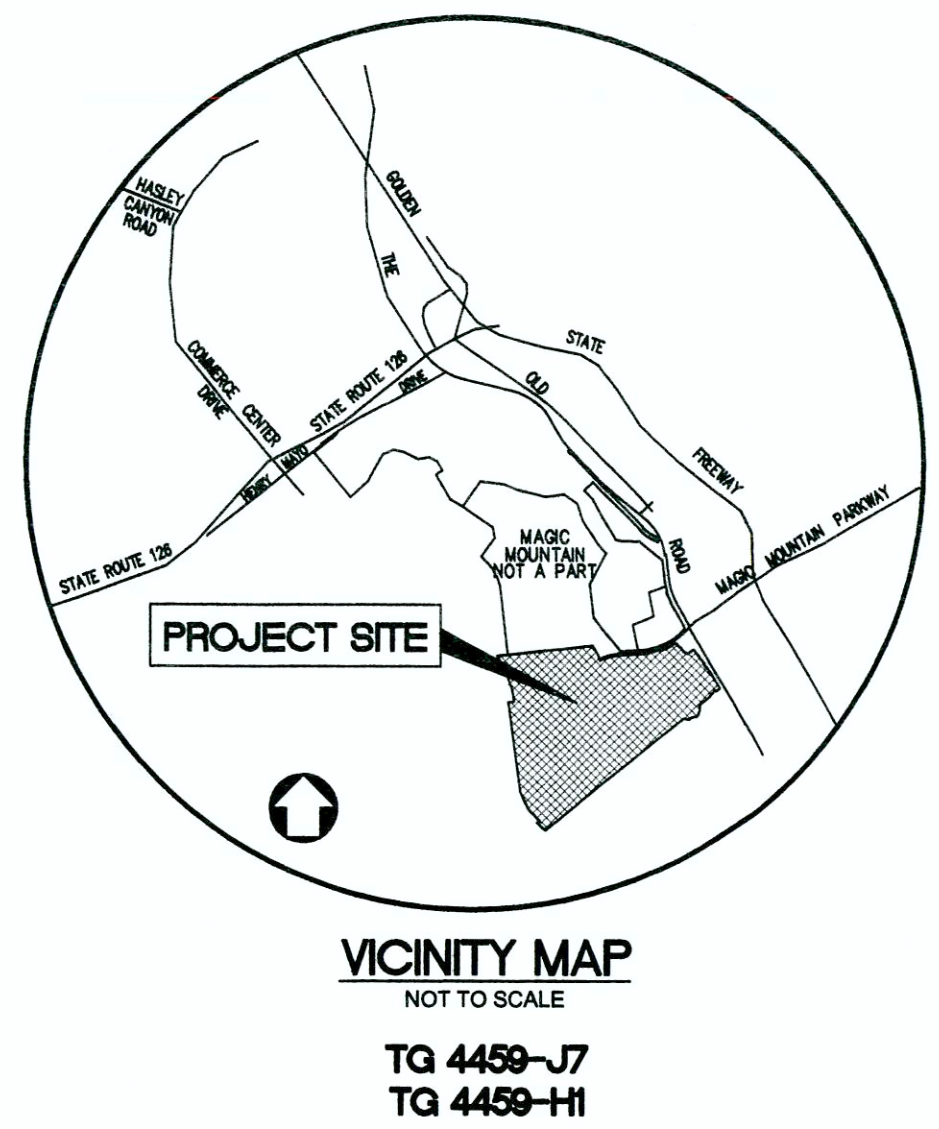
TOTAL VOLUME THIS HYDROGRAPH = 21.63(Ac.Ft)

### Basin J

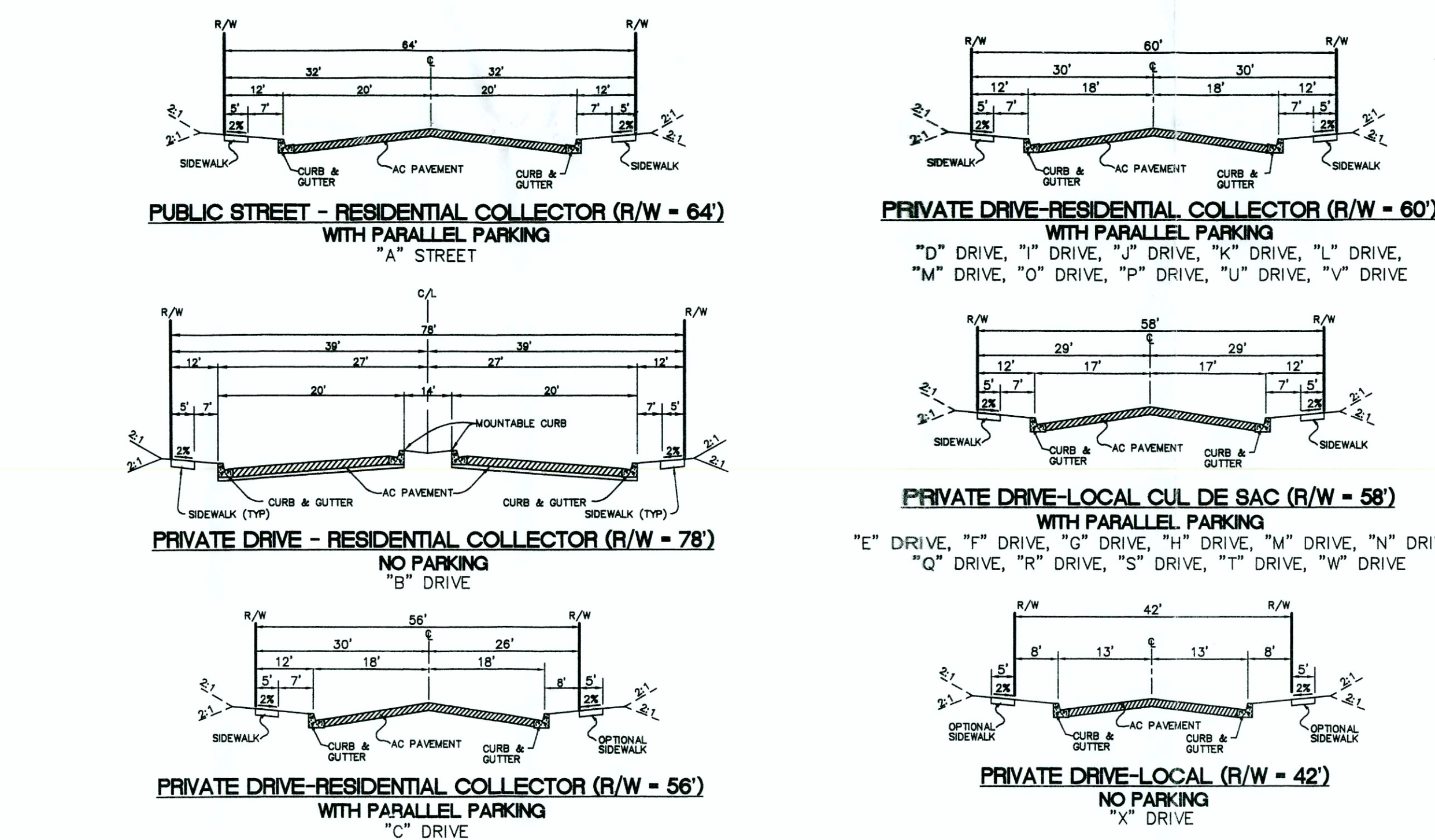
| Subarea | Area (Ac) | %imp | Soil Type | Length (ft) | Slope (ft/ft) | Isohyet (in) | Tc-calculated (min) | Intensity (in/hr) | Cu   | Cd   |
|---------|-----------|------|-----------|-------------|---------------|--------------|---------------------|-------------------|------|------|
| 1A      | 24.5      | 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 |



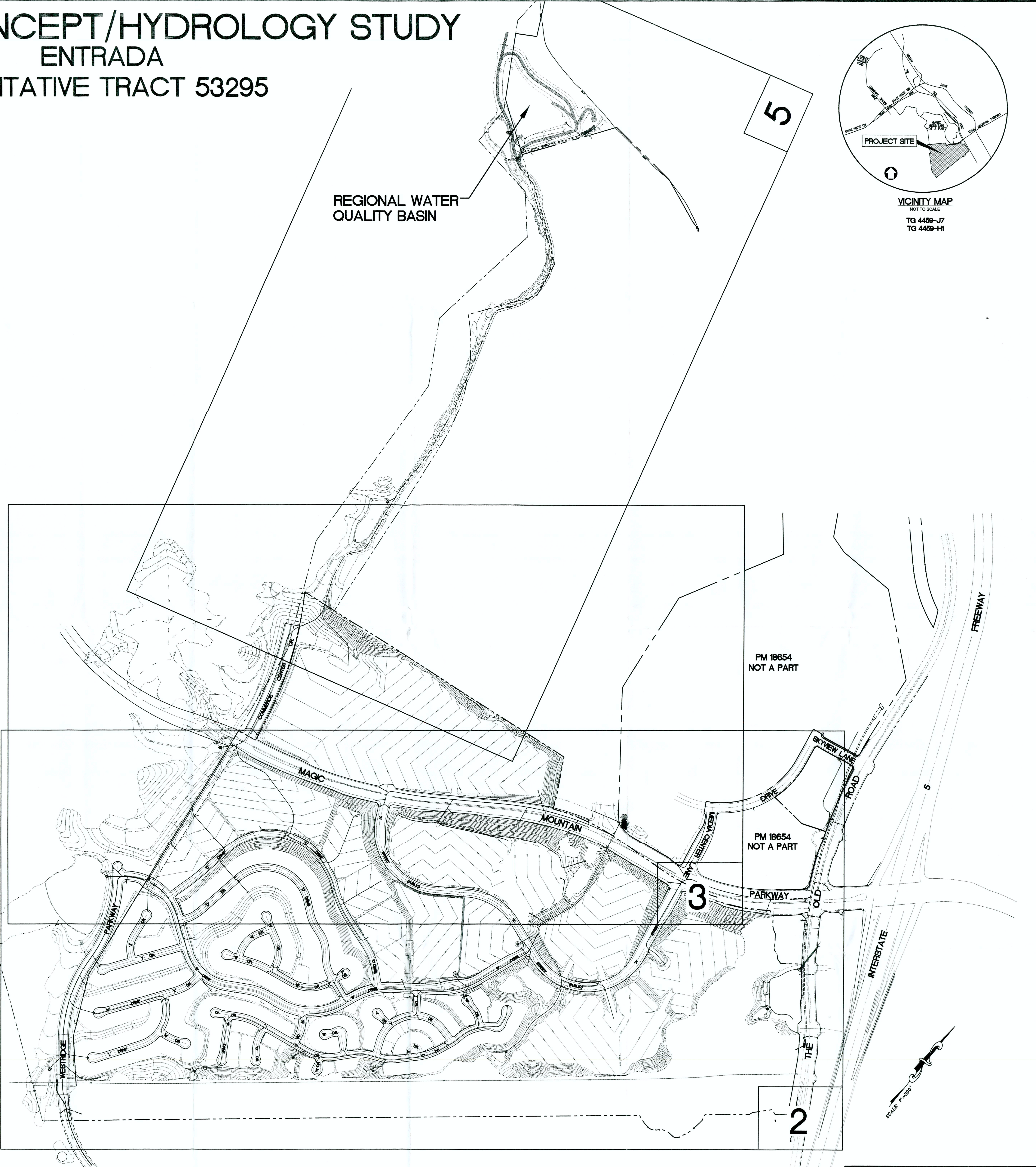
DRAINAGE CONCEPT/HYDROLOGY STUDY  
ENTRADA  
TENTATIVE TRACT 53295



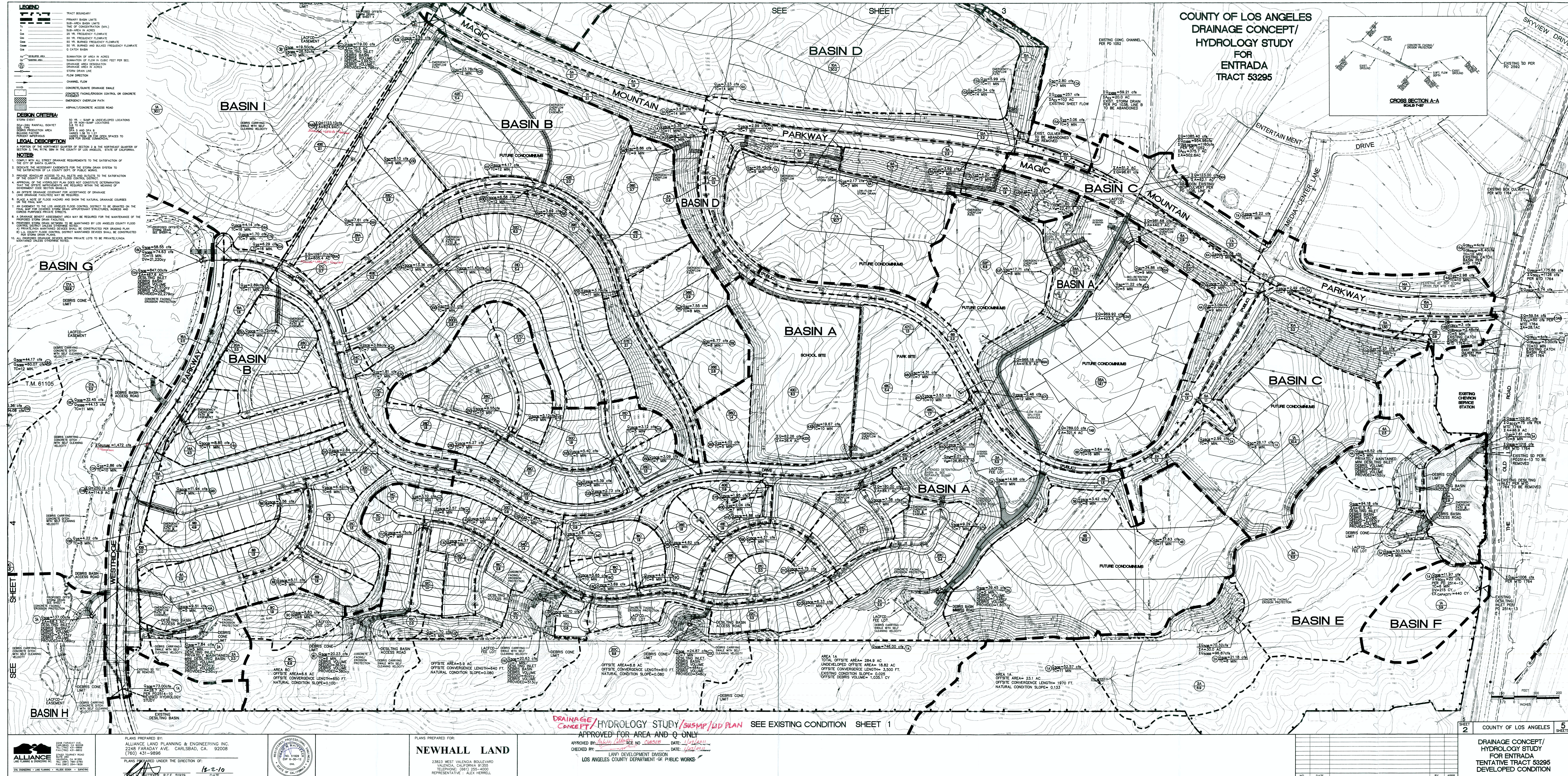
SEE SHEET  
4  
(OFFSITE HYDROLOGY)



DRAINAGE CONCEPT/HYDROLOGY STUDY/SUSMP/LID PLAN  
APPROVED FOR AREA AND Q ONLY  
APPROVED BY: [Signature] DATE: 1/21/2011  
CHECKED BY: [Signature] DATE: 1/21/2011  
LAND DEVELOPMENT DIVISION  
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

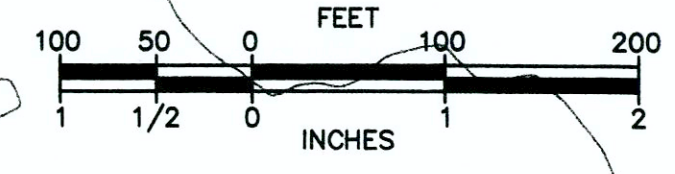








SEE SHEET 5



- |   |                       |            |
|---|-----------------------|------------|
| 3 | COUNTY OF LOS ANGELES | 5<br>SHEET |
|---|-----------------------|------------|

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



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

**BASIN G**

**BASIN H**

**BASIN I**

**TRACT 45433**

**ONSITE STORM DRAIN  
SEE SHEET 2**

**ONSITE STORM DRAIN  
SEE SHEET 2**

**ONSITE STORM DRAIN  
SEE SHEET 2**

**LEGEND**

TRACT BOUNDARY  
PRIMARY BASIN LIMITS  
SUB-AREA BASIN LIMITS  
TIME OF CONCENTRATION (MIN.)  
A 25 YR. FREQUENCY FLOWRATE  
Q<sub>25</sub> 50 YR. FREQUENCY FLOWRATE  
Q<sub>50</sub> 50 YR. BURIED FREQUENCY FLOWRATE  
Q<sub>50B</sub> 50 YR. BURIED AND BULKED FREQUENCY FLOWRATE  
Q<sub>50B</sub> 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/JOINT DRAINAGE SWALE

**DESIGN CRITERIA:**  
STORM EVENT 50 YR. - SWAMP & UNDEVELOPED LOCATIONS  
25 YR. - RAINFALL (50%  
25 YR. - NON-SWAMP LOCATIONS  
SOIL TYPE DBS 6 & 7  
DEBRIS PRODUCTION AREA DBS 6 & 7

**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 THE HYDROLOGICAL PLAN DOES NOT CONSTITUTE DETERMINATION THAT THE OFFSITE IMPROVEMENTS ARE REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 86462.5.  
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 IMPROVEMENT 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.

**SEE SHEET 2**

**SEE SHEET 3**

**SEE SHEET 4**

**SEE SHEET 5**

**4 COUNTY OF LOS ANGELES 5**

**DRAINAGE CONCEPT - DEVELOPED CONDITION**



**5**  
SHEETS

**ENTRADA DRAINAGE CONCEPT - DEVELOPED CONDITION**

DEC 01 2010



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

PLAN PREPARATION DATE:  
DEC 01 2010



**ENTRADA SOUTH**  
**DRAINAGE CONCEPT REPORT**  
**DEBRIS BASIN CAPACITY CALCULATIONS**



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I:\EARTHWORK\Entrada\IDB F - Basin A-subarea 8C.xls\B-FILL



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I:\EARTHWORK\Entrada\[(DB G - Basin A-subarea 15C.xls]B-FILL



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I:\EARTHWORK\Entrada\[DB H - Basin A-subarea 20C.xls]B-FILL



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I:\EARTHWORK\Entrada\DB N - Basin B-subarea 2A.xls\B-FILL



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BY: Jason  
DATE: 2/19/2010

UNIT FACTOR: 29.63  
CUT OR FILL: FILL

|  |      |       |        |   |       |      |
|--|------|-------|--------|---|-------|------|
|  | 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    |
|  |      |       | 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 |

\\EARTHWORK\Entrada\DB M - Basin B-subarea 51F.xls\B-FILL



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\\EARTHWORK\Entrada\DB A - Basin G-subarea 3A.xls|B-FILL



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CUT OR FILL:      FILL

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I:\EARTHWORK\Entrada\DB E - Basin E-subarea 4A.xls\B-FILL



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CUT OR FILL:      FILL

| ELEVATION/<br>STATION | PLANIM.<br>READING | SUM<br>"INCHES" | INTERVAL<br>"FEET" | FACTOR | QUANTITY<br>"CY" |
|-----------------------|--------------------|-----------------|--------------------|--------|------------------|
|                       | "INCHES"           |                 |                    |        |                  |

I:\EARTHWORK\Entrada\DB C - Basin G-subarea 17A.xls\B-FILL



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\\EARTHWORK\Entrada\[DB B - Basin H-subarea 2A.xls]B-FILL



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I:\EARTHWORK\Entrada\[DB D - Basin I-subarea 1A.xls]B-FILL

4796



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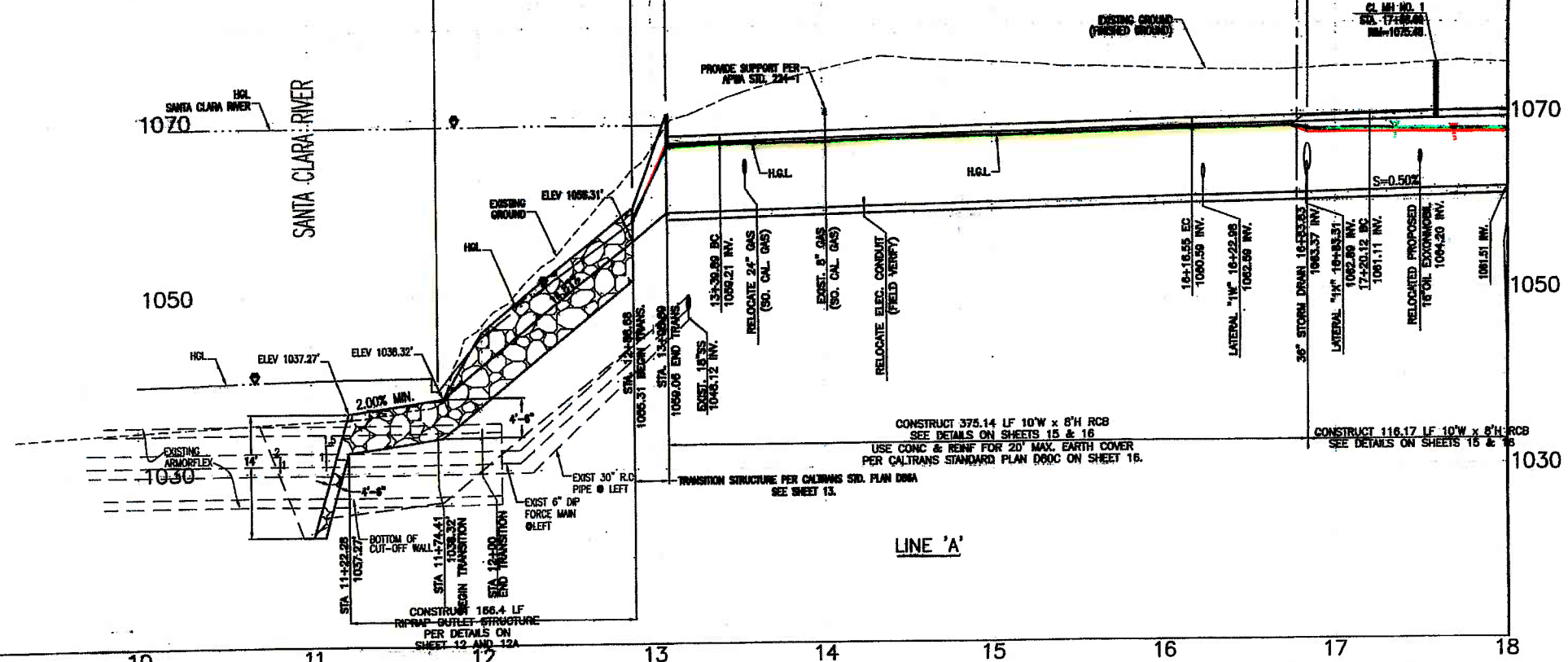
I:\EARTHWORK\Entrada\[DB L - Basin J-subarea 4B.xls]B-FILL



SECTION 5A  
Existing Condition  
Hydraulic Exhibits



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



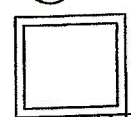
MATCHLINE SEE SHEET 4  
STA. 18+00.00

**LEGEND**  
 PROPOSED HGL  
 EXISTING HGL  
 EXISTING HGL

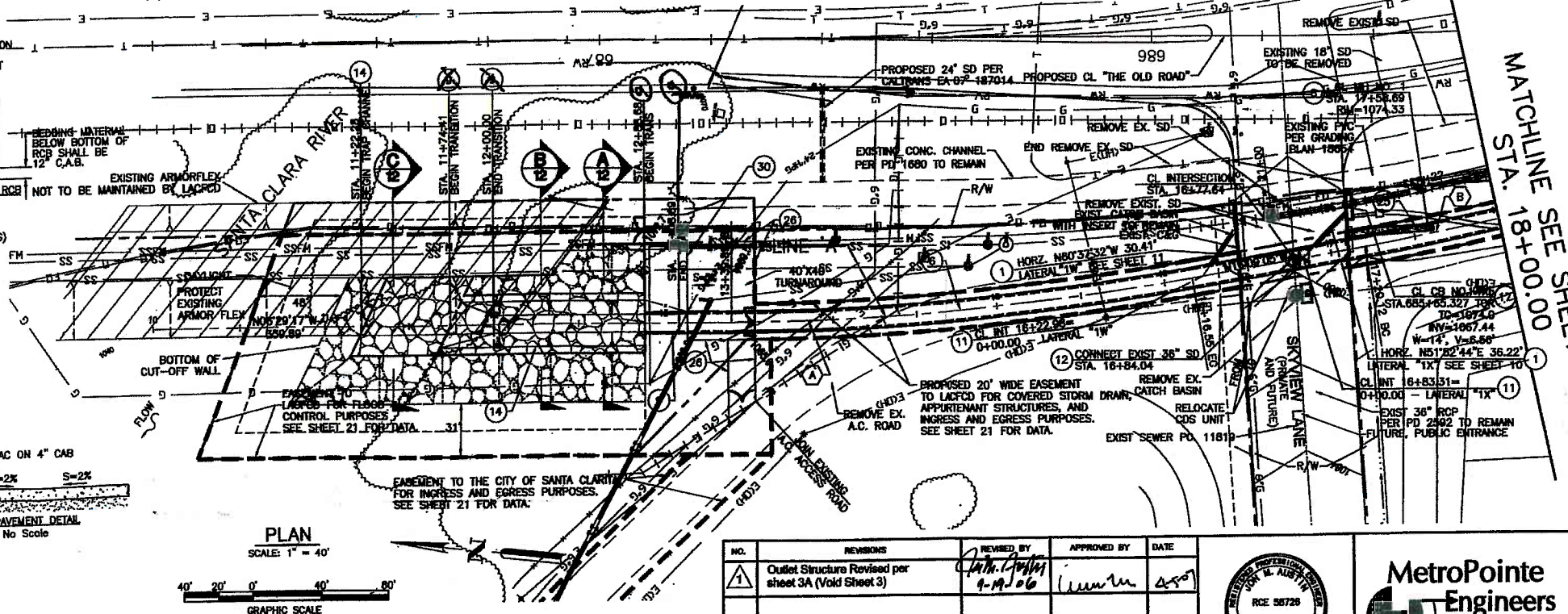


**LEGEND**

SECTION 1  
SHEET 10



TYPICAL SECTION - RCB  
No Scale  
STA 12+88.68 -  
(SEE SHEET 16  
FOR RCB DETAILS)



MATCHLINE SEE SHEET 4  
STA. 18+00.00

**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 D88A 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 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'-6", Vupstream 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.

| Curve Data |          |         |         |           |
|------------|----------|---------|---------|-----------|
| CURVE      | RADIUS   | LENGTH  | TANGENT | DELTA     |
| A          | 1640.36' | 276.67' | 138.67' | 09°38'48" |
| B          | 1640.36' | 263.28' | 131.92' | 09°11'48" |

APPROVED FOR CONSTRUCTION BY:  
  
 ROBERT J. MORAN, P.E., L.E.  
 DIRECTOR OF PUBLIC WORKS  
 CITY OF SANTA CLARITA

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



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

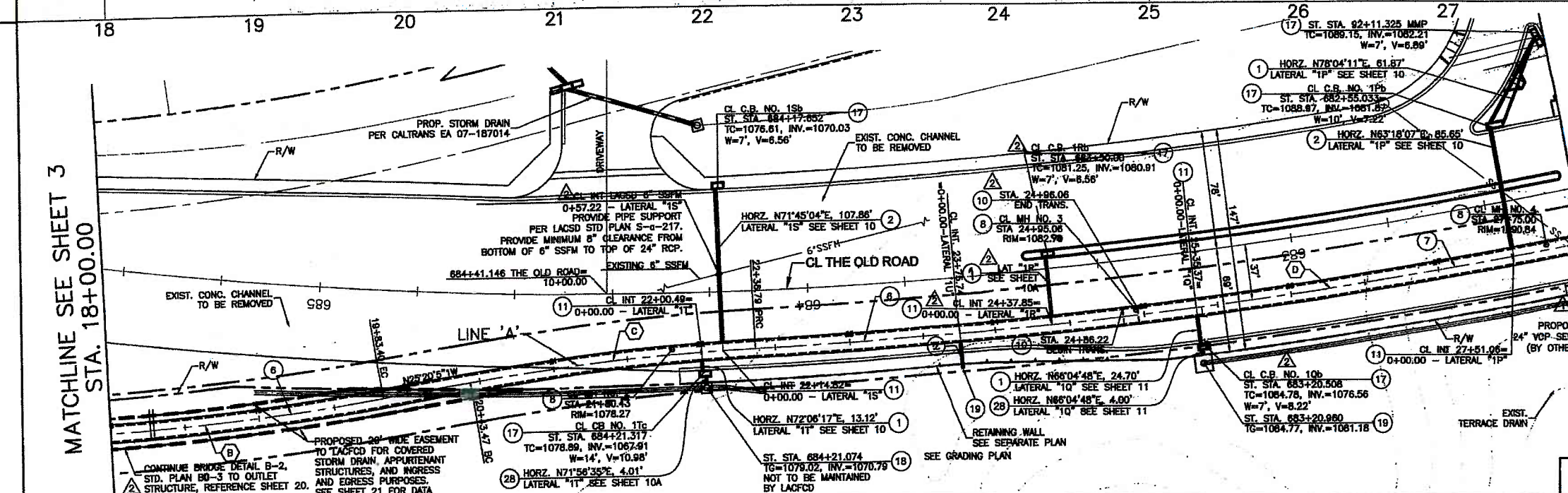
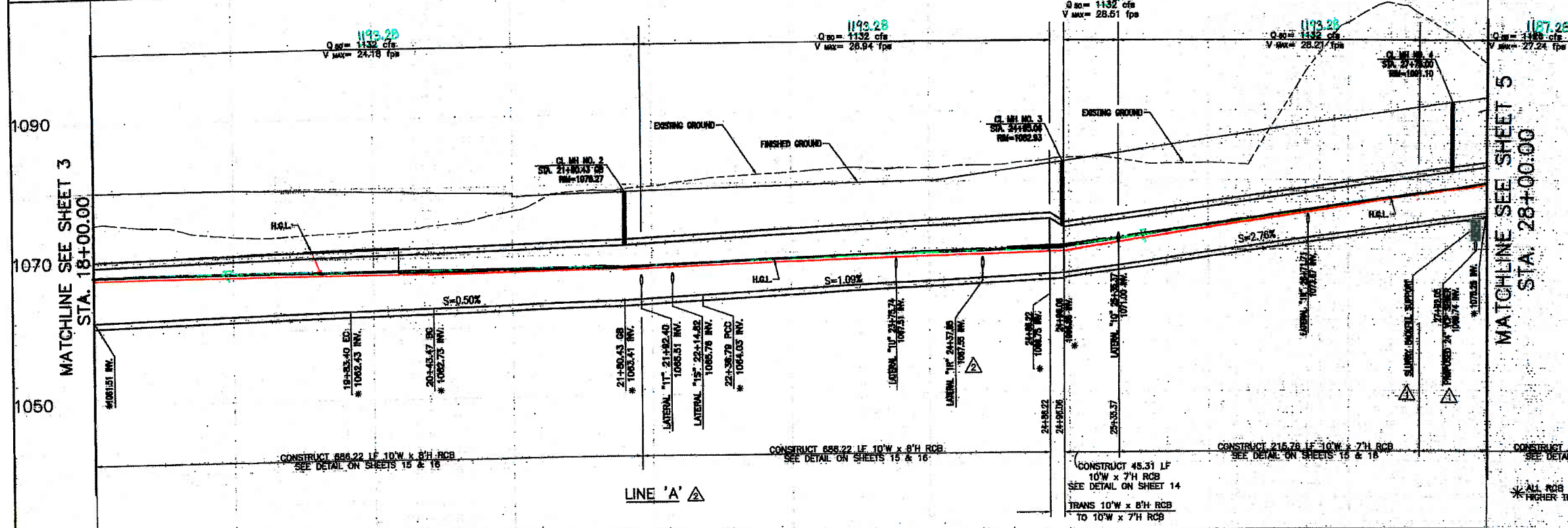
STORM DRAIN PLANS IN  
CITY OF SANTA CLARITA MTD. No. 1764  
CITY OF SANTA CLARITA

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

DWG SHEET 3A OF 21



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



- ### CONSTRUCTION NOTES
- CONSTRUCT 18" RCP (D-LOAD PER PROFILE)
  - CONSTRUCT 24" RCP (D-LOAD PER PROFILE)
  - CONSTRUCT 10" x 8" RCB PER CALTRANS STD D80A ON SHEET 16.
  - CONSTRUCT 10" x 7" RCB PER CALTRANS STD D80A ON SHEET 16.
  - CONSTRUCT MANHOLE CONCRETE BOX STORM DRAIN PER APWA STD 323-1.
  - CONSTRUCT TRANSITION STRUCTURE SINGLE RCB TO SINGLE RCB PER APWA STD 341-1.
  - CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET < 30" PER APWA STD 334-1.
  - MODIFIED CURB OPENING CATCH BASIN PER APWA STD. 300-2. 6'-3"-8", Upstream 2'-2"-6" (WAV 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.
  - GRATING CATCH BASIN PER STREET PLANS. NOT TO BE MAINTAINED BY LACFCO.
  - 24" DIA. PERFORATED CMP RISER WITH ASPHALT APRON PER GRADING PLAN. NOT TO BE MAINTAINED BY LACFCO.
  - 12" DIA. PVC, SCH40 PIPE PER GRADING PLAN. NOT TO BE MAINTAINED BY LACFCO.

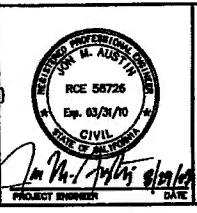
| Curve Data |          |          |         |           |
|------------|----------|----------|---------|-----------|
| CURVE      | RADIUS   | LENGTH   | TANGENT | DELTA     |
| B          | 1640.36' | 263.28'  | 131.93' | 09°11'46" |
| C          | 1640.36' | 193.32'  | 96.77'  | 06°45'08" |
| D          | 3636.48' | 1612.61' | 819.78' | 25°24'29" |

PLAN  
SCALE: 1" = 40'

APPROVED FOR CONSTRUCTION BY: \_\_\_\_\_  
DATE: \_\_\_\_\_

ROBERT B. MORGAN, P.E., L.S.  
DIRECTOR OF PUBLIC WORKS  
CITY OF SANTA CLARITA

| NO. | REVISIONS                                                                                 | REVISED BY | APPROVED BY | DATE    |
|-----|-------------------------------------------------------------------------------------------|------------|-------------|---------|
| 1   | LACSD 24" VCP SEWER CROSSING                                                              | _____      | _____       | 9-12-07 |
| 2   | OLD ROAD SUPERELEVATION REVISION. SEE CALTRANS PLAN SET SHEET P-8. RELOCATED LATERAL "1R" | _____      | _____       | 9-12-07 |



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

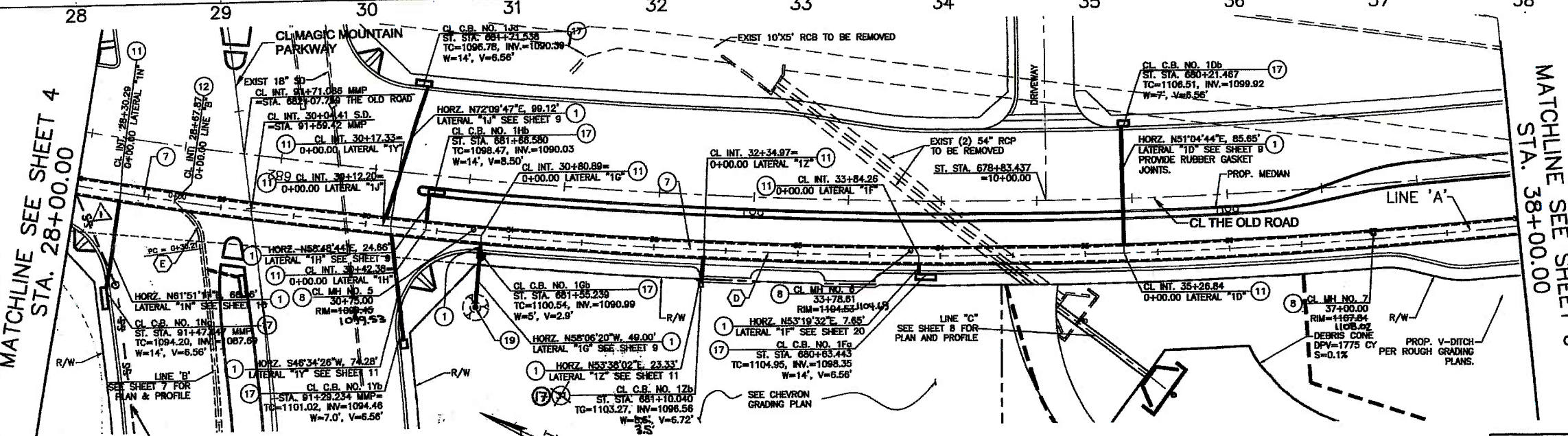
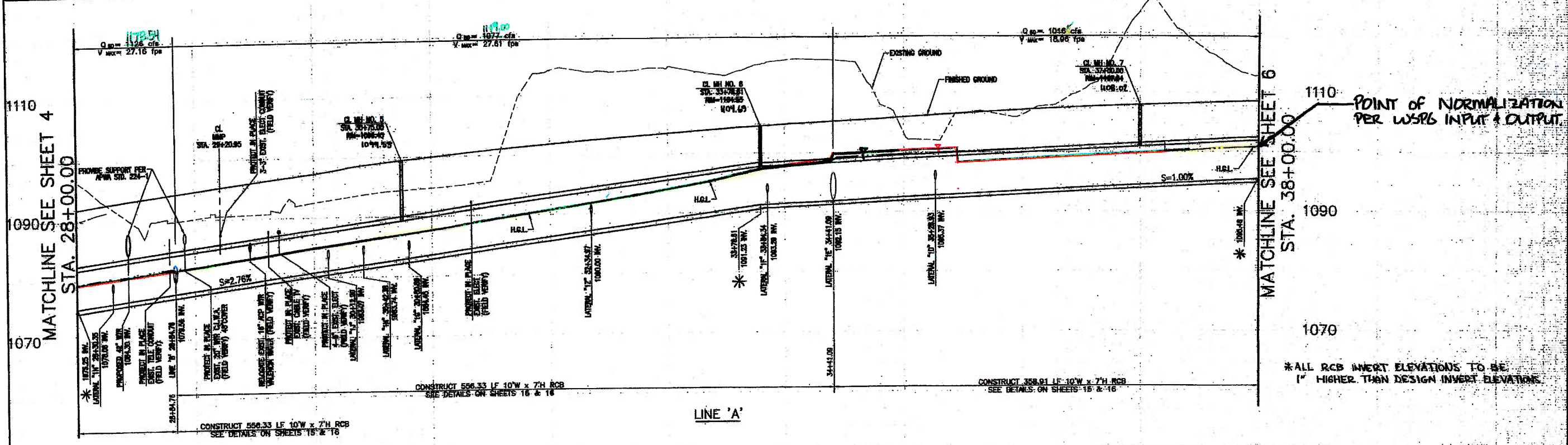
STORM DRAIN PLANS IN  
CITY OF SANTA CLARITA MTD. No. 1764  
CITY OF SANTA CLARITA

**STORM DRAIN PLAN AND PROFILE  
MTD NO. 1764  
SYSTEM A  
FROM STA. 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)
  - 2- CONSTRUCT 54" RCP (D-LOAD PER PROFILE)
  - 3- CONSTRUCT 10' x 7' RCB PER CALTRANS STD D80A ON SHEET 16.
  - 4- CONSTRUCT MANHOLE CONCRETE BOX STORM DRAIN PER APWA STD 323-1.
  - 5- CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET < 30" PER APWA STD 333-1.
  - 6- CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET > 30" PER APWA STD 333-1.
  - 7- MODIFIED CURB OPENING CATCH BASIN PER APWA STD. 300-2. B=3'-8", Upstream 2'-6". (WAY 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.
  - 8- 24" DIA. PERFORATED CMP RISER WITH ASPHALT APRON PER GRADING PLAN. NOT TO BE MAINTAINED BY LACFD.
  - 9- CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. 320-1.
  - 10- CURBSIDE GRATING CATCH BASIN PER CHEVRON GRADING PLANS. NOT TO BE MAINTAINED BY LACFD.

Curve Data

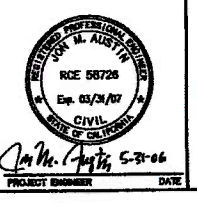
| CURVE | RADIUS   | LENGTH   | TANGENT | DELTA     |
|-------|----------|----------|---------|-----------|
| D     | 3636.46' | 1612.61' | 819.78' | 25°24'29" |
| E     | 22.50'   | 15.46'   | 8.05'   | 39°22'14" |

PLAN  
SCALE: 1"=40'

APPROVED FOR CONSTRUCTION BY: *[Signature]* DATE: 6-7-06

FOR RCB 6-7-06

| NO. | REVISIONS                    | REVISED BY         | APPROVED BY        | DATE    |
|-----|------------------------------|--------------------|--------------------|---------|
| 1   | LACSD 24" VCP SEWER CROSSING | <i>[Signature]</i> | <i>[Signature]</i> | 4-12-07 |



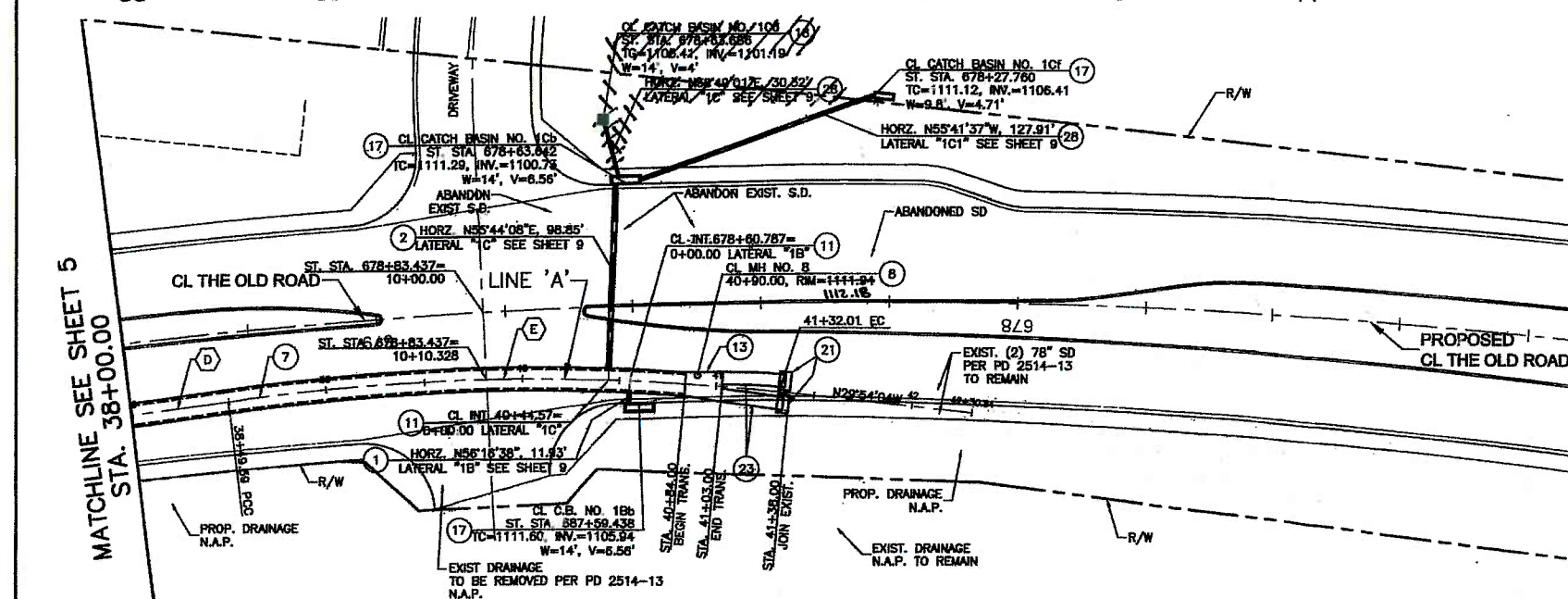
**MetroPointe Engineers**  
3535 Harbor Gateway South, Suite A  
Costa Mesa, CA 92626  
(714) 438-1095

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





**SHEET 8 OF 21**



Section 5  
Existing Condition  
Hydraulics



**MTD 1764**

**EXISTING CONDITION**

**HYDRAULICS**



T1 MTD NO. 1764 HYDRAULICS  
 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  |        | 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   |       |        |          |        |      |   |  |



MTD-1764-LINEA-EX.OUT

FILE: MTD-1764-LINEA-EX.WSW

W S P G W - CIVILDESIGN Version 14.06  
Program Package Serial Number: 1488

PAGE 1

WATER SURFACE PROFILE LISTING

Date: 8-17-2010 Time: 1:46:15

MTD NO. 1764 HYDRAULICS

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

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

\*\*\*\*\*



| MTD-1764-LINEA-EX.OUT                                    |             |            |            |         |           |          |                |            |                |                |                |                 |       |                |
|----------------------------------------------------------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-------|----------------|
| 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            |

FILE: MTD-1764-LINEA-EX.WSW

W S P G W - CIVILDESIGN Version 14.06

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

| *****    |             |            |            |         |           |          |                |            |                |                |                |                 |       |                |
|----------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|-------|----------------|
| 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            |



MTD-1764-LINEA-EX.OUT

|          |          |       |          |         |       |       |         |      |      |       |       |        |     |     |    |
|----------|----------|-------|----------|---------|-------|-------|---------|------|------|-------|-------|--------|-----|-----|----|
| 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 |    |

FILE: MTD-1764-LINEA-EX.WSW W S P G W - CIVILDESIGN Version 14.06  
 Program Package Serial Number: 1488  
 WATER SURFACE PROFILE LISTING  
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MTD NO. 1764 HYDRAULICS

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        |
| 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           |



MTD-1764-LINEA-EX.OUT

|           |          |       |          |         |       |       |         |      |      |       |       |        |     |      |
|-----------|----------|-------|----------|---------|-------|-------|---------|------|------|-------|-------|--------|-----|------|
| 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  |

FILE: MTD-1764-LINEA-EX.WSW W S P G W - CIVILDESIGN Version 14.06  
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MTD NO. 1764 HYDRAULICS  
 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        |
| 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 MTD-1764-LINEA-EX.OUT  
 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  
 □ FILE: MTD-1764-LINEA-EX.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 6  
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WATER SURFACE PROFILE LISTING

Date: 8-17-2010 Time: 1:46:15

MTD NO. 1764 HYDRAULICS

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            |

□ FILE: MTD-1764-LINEA-EX.WSW W S P G W - CIVILDESIGN Version 14.06  
 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

| 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 |
|---------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|----|----------------|
|---------|-------------|------------|------------|---------|-----------|----------|----------------|------------|----------------|----------------|----------------|-----------------|----|----------------|



| MTD-1764-LINEA-EX.OUT |          |       |          |         |       |        |         |         |          |         |       |        |       |         |
|-----------------------|----------|-------|----------|---------|-------|--------|---------|---------|----------|---------|-------|--------|-------|---------|
| 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 -----

□ FILE: MTD-1764-LINEA-EX.WSW

W S P G W - CIVILDESIGN Version 14.06

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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        |
| *****    | *****       | *****      | *****      | *****   | *****     | *****    | *****          | *****      | *****          | *****          | *****          | *****           | ***** | *****          |
| 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           |



MTD-1764-LINEA-EX.OUT

|                                                          |          |       |          |         |       |      |         |       |      |       |       |        |      |     |     |     |
|----------------------------------------------------------|----------|-------|----------|---------|-------|------|---------|-------|------|-------|-------|--------|------|-----|-----|-----|
| 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**



T1 MTD NO. 1764 HYDRAULICS  
 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   |       |        |          |          |        |        |



MTD-1764-LINEA.OUT

FILE: MTD-1764-LINEA.WSW

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PAGE 1

MTD NO. 1764 HYDRAULICS  
LINE A

0

Date: 8-17-2010 Time: 2:25:59

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    | 4.775      | 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            |

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MTD NO. 1764 HYDRAULICS  
LINE A

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Date: 8-17-2010 Time: 2:25:59

FILE: MTD-1764-LINEA.WSW

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MTD-1764-LINEA.OUT

| 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        |
| 1308.173                                                 | 1058.972    | 7.098      | 1066.070   | 1241.28 | 17.49     | 4.75     | 1070.82        | .00        | 7.82           | 10.00          | 8.000          | 10.000          | .00 | 0 .0           |
| .517                                                     | .1704       |            |            |         |           | .0053    | .00            | 7.10       | 1.16           | 2.05           | .013           | .00             | .00 | BOX            |
| 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 | 0 .0           |
| 31.200                                                   | .0048       |            |            |         |           | .0050    | .15            | 7.44       | 1.08           | 7.52           | .013           | .00             | .00 | BOX            |
| ----- 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 | 0 .0           |
| 40.600                                                   | .0050       |            |            |         |           | .0050    | .20            | 7.47       | 1.08           | 7.41           | .013           | .00             | .00 | BOX            |
| ----- 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 | 0 .0           |
| 236.060                                                  | .0050       |            |            |         |           | .0051    | 1.21           | 7.47       | 1.08           | 7.41           | .013           | .00             | .00 | BOX            |
| ----- 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 | 0 .0           |
| 65.280                                                   | .0051       |            |            |         |           | .0053    | .35            | 7.27       | 1.12           | 7.37           | .013           | .00             | .00 | BOX            |
| ----- WARNING - Flow depth near top of box conduit ----- |             |            |            |         |           |          |                |            |                |                |                |                 |     |                |

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MTD NO. 1764 HYDRAULICS

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        |
| 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 | 0 .0           |
| JUNCT STR                                                | .0050       |            |            |         |           | .0066    | .01            | 7.21       | 1.13           |                | .013           | .00             | .00 | BOX            |
| ----- 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 | 0 .0           |
| 36.290                                                   | .0050       |            |            |         |           | .0079    | .29            | 6.05       | 1.41           | 7.20           | .013           | .00             | .00 | BOX            |
| 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 | 0 .0           |
| 79.880                                                   | .0050       |            |            |         |           | .0086    | .68            | 6.01       | 1.45           | 7.18           | .013           | .00             | .00 | BOX            |
| 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 | 0 .0           |



MTD-1764-LINEA.OUT

|          |          |       |          |         |       |       |         |      |      |       |       |        |     |     |    |  |
|----------|----------|-------|----------|---------|-------|-------|---------|------|------|-------|-------|--------|-----|-----|----|--|
| 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 |    |  |

FILE: MTD-1764-LINEA.WSW

W S P G W - CIVILDESIGN Version 14.06

Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING

Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS

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        |
| 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            |



MTD-1764-LINEA.OUT

|           |          |       |          |         |       |       |         |      |      |       |       |        |     |     |    |
|-----------|----------|-------|----------|---------|-------|-------|---------|------|------|-------|-------|--------|-----|-----|----|
| 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 |    |

□ FILE: MTD-1764-LINEA.WSW  
 W S P G W - CIVILDESIGN Version 14.06  
 Program Package Serial Number: 1488  
 WATER SURFACE PROFILE LISTING  
 Date: 8-17-2010 Time: 2:25:59  
 0

MTD NO. 1764 HYDRAULICS

LINE A

FILE: MTD-1764-LINEA.WSW

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| 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        |
| 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            |

□ FILE: MTD-1764-LINEA.WSW

W S P G W - CIVILDESIGN Version 14.06



MTD-1764-LINEA.OUT  
 Program Package Serial Number: 1488  
 WATER SURFACE PROFILE LISTING

Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS

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        |
| 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 -----

FILE: MTD-1764-LINEA.WSW

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Program Package Serial Number: 1488

WATER SURFACE PROFILE LISTING

Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS

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        |
| *****   | *****       | *****      | *****      | *****   | *****     | *****    | *****          | *****      | *****          | *****          | *****          | *****           | ***** | *****          |



MTD-1764-LINEA.OUT

|                                                          |          |       |          |         |       |       |         |      |      |       |       |        |     |     |    |
|----------------------------------------------------------|----------|-------|----------|---------|-------|-------|---------|------|------|-------|-------|--------|-----|-----|----|
| 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 |    |

FILE: MTD-1764-LINEA.WSW W S P G W - CIVILDESIGN Version 14.06  
 Program Package Serial Number: 1488  
 WATER SURFACE PROFILE LISTING

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Date: 8-17-2010 Time: 2:25:59

MTD NO. 1764 HYDRAULICS

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 -----



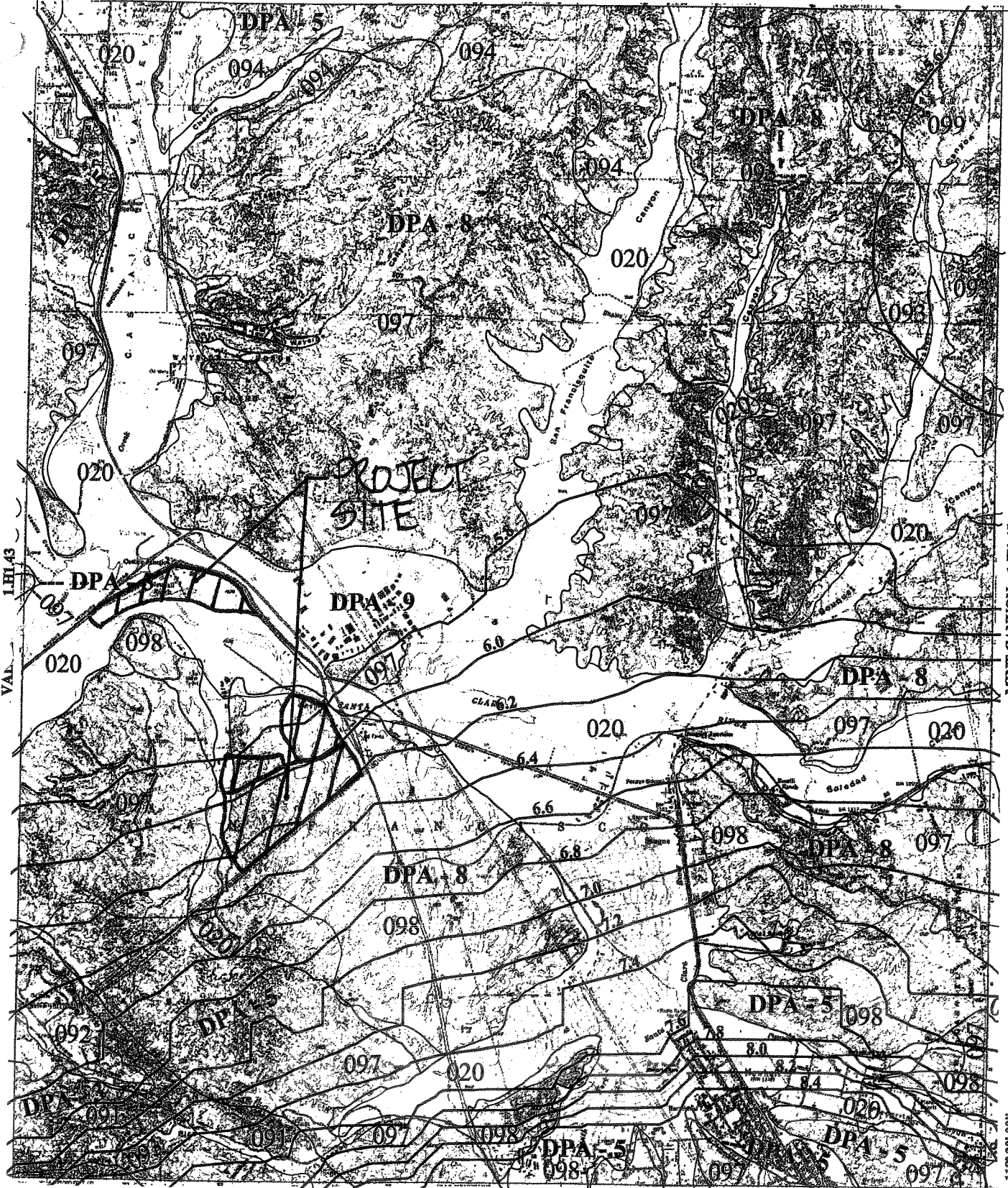
MTD-1764-LINEA.OUT

|                                                          |          |       |          |         |       |       |         |      |      |       |       |        |     |     |    |
|----------------------------------------------------------|----------|-------|----------|---------|-------|-------|---------|------|------|-------|-------|--------|-----|-----|----|
| 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 |



34° 30' 00"

WARM SPRINGS MOUNTAIN 1-H1.53



MINT CANYON 1-H1.45

OAT MOUNTAIN 1-H1.35

34° 22' 30"

118° 30' 00"



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

**NEW HALL**  
**50-YEAR 24-HOUR ISOHYET**

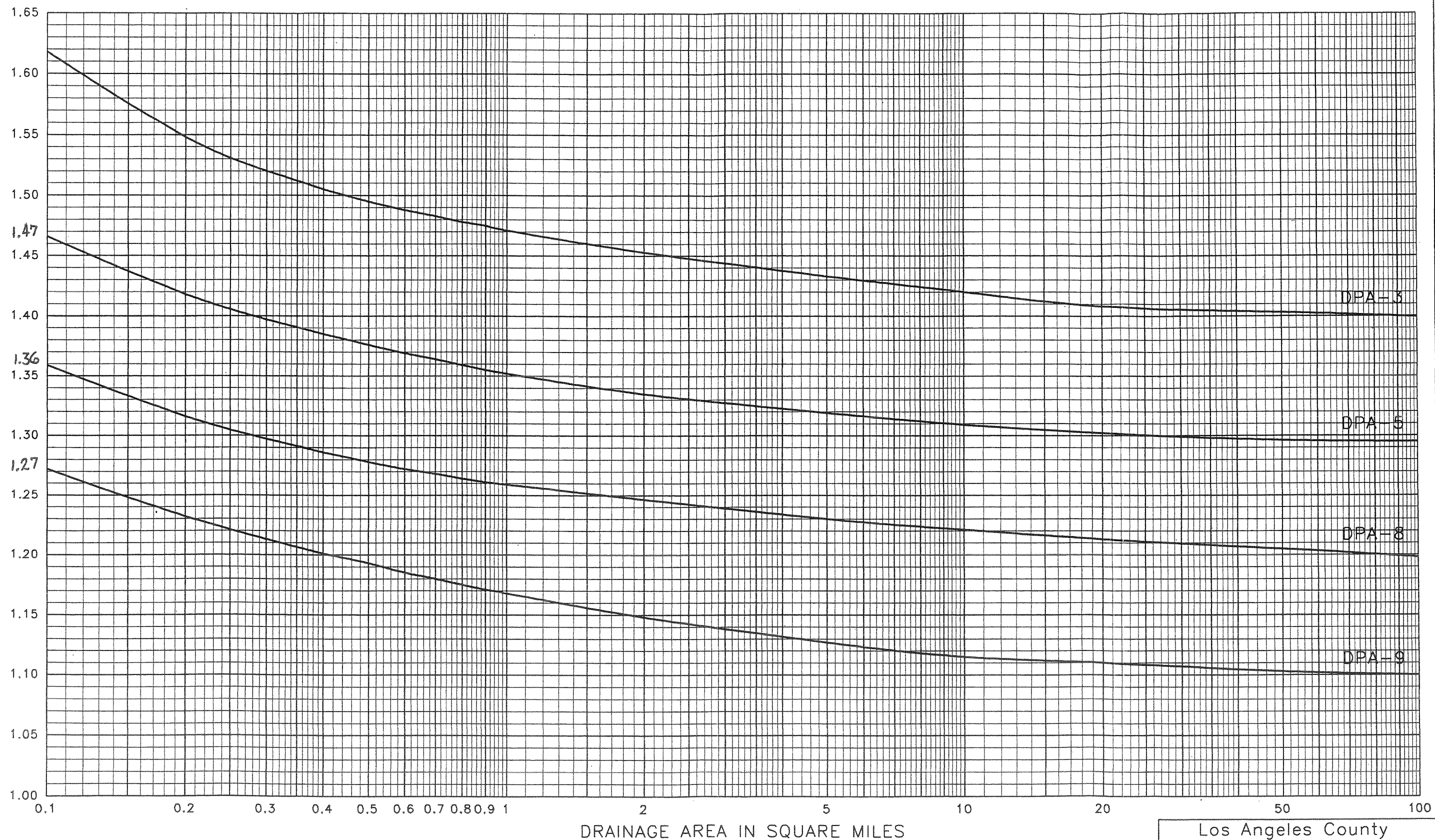
1-H1.44





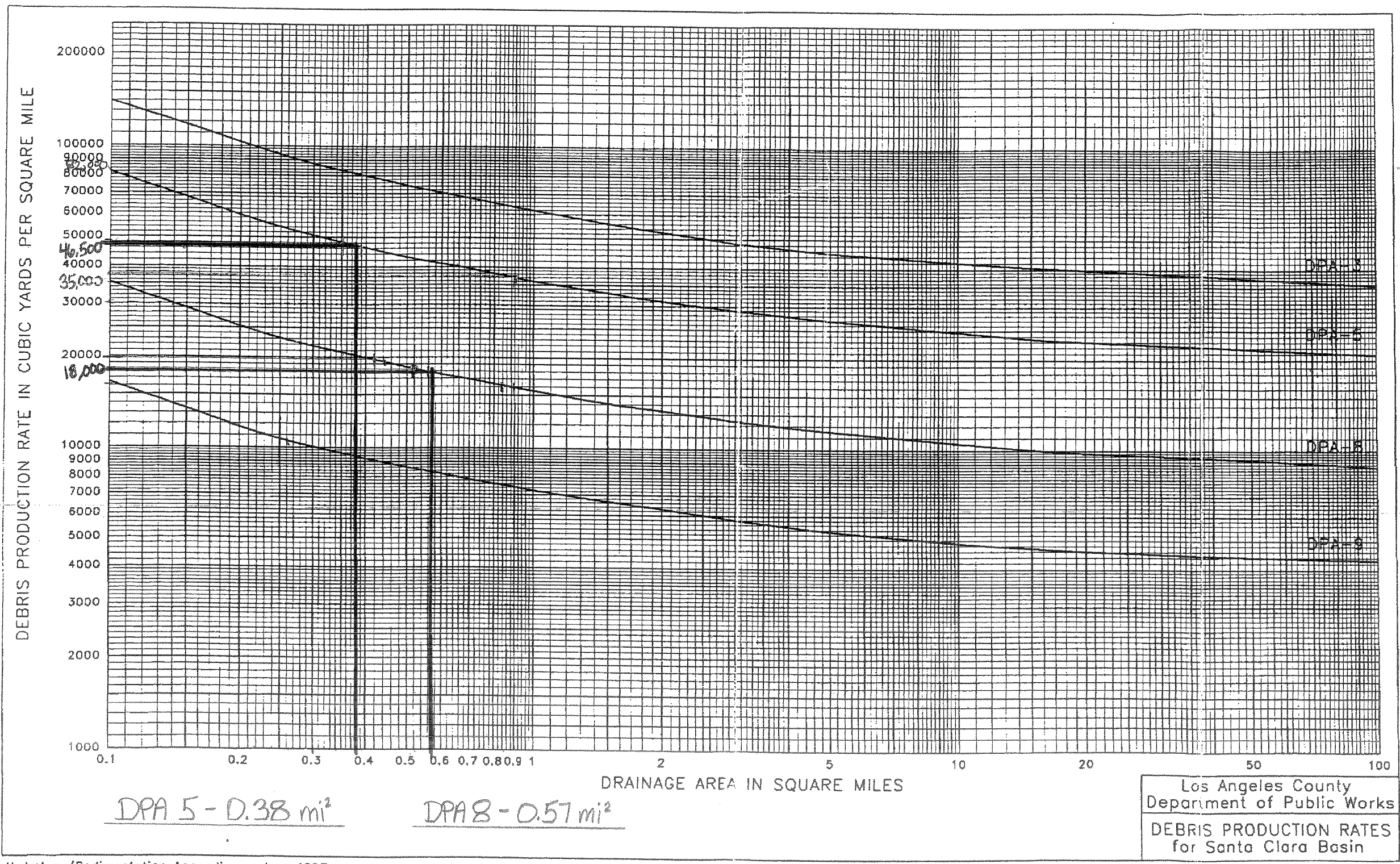
P-2.SPG

PEAK BULKING FACTOR



Los Angeles County  
Department of Public Works  
PEAK BULKING FACTORS  
for Santa Clara Basin







# **LID/SUSMP REPORT**

for

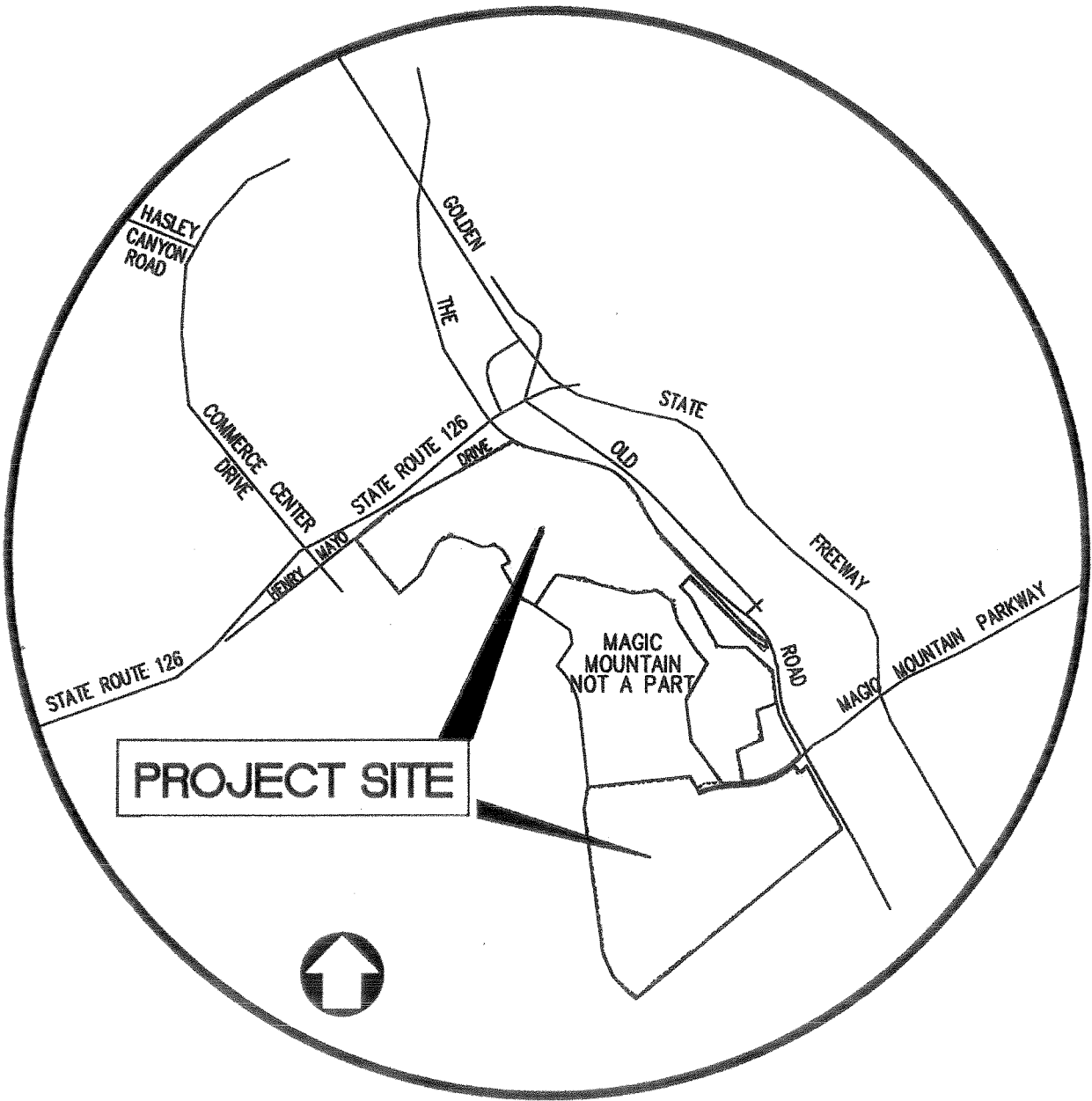
**ENTRADA**  
COUNTY FOR LOS ANGELES  
Tentative Tract No. 53295  
Job No. 0930

*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



## 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

---

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 <sup>1</sup><br>(acres) | Impervious Fraction of Catchment <sup>2</sup> | Minimum SUSMP Mitigation Volume Required (0.75 inches) (ac-ft) <sup>3</sup> | NRSSMP Volume Required, (ac-ft) <sup>4</sup> | Basin Volume Provided (ac-ft) <sup>5</sup> |
|------------------|----------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|
| 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 <sup>1</sup>                       | 45%                                           | 37.7                                                                        | 41.5                                         | 43.0                                       |

<sup>1</sup>Tributary area of Regional Basin D includes future conditions of Mission Village and Legacy Village Projects based on most recent available designs.

<sup>2</sup>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.

<sup>3</sup>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).

<sup>4</sup>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.

<sup>5</sup>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 <sup>1</sup> | 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                                   |

$Cd = Cu \times (1 - Imp) + 0.9 \times Imp$ , where Imp is the impervious fraction and varies from 0 to 1.

SUSMP Volume =  $Cd \times Area \times 0.75 \text{ inches} \times 1 \text{ ft}/12 \text{ inches}$



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 <sup>1</sup> | NRSSMP Volume Required <sup>2</sup> , (ft <sup>3</sup> ) | Basin Volume Provided <sup>3</sup> (ft <sup>3</sup> ) | Required Drywell Flowrate to Infiltrate Captured Volume <sup>4</sup> (cfs) | Dry Well Flowrate <sup>5</sup> Provided (cfs) |
|------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------|
| 7.6                    | 80%                                           | 16,900                                                   | 16,900                                                | 0.45                                                                       | 0.45                                          |

<sup>1</sup> 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.

<sup>2</sup> BMP is sized to capture and treat 80 percent of annual average runoff volume. Basin volume includes 5 percent allowance for sediment storage.

<sup>3</sup> Basin volume provided per the Entrada VTTM No. 53295 (*LID Infiltration Exhibit for Tentative Tract 53295*, Alliance Land Planning and Engineering, September 2010).

<sup>4</sup> Treated discharges from Biofiltration Basin Z will be infiltrated in drywells.

<sup>5</sup> 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 to 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 <sup>1</sup> | Required Sizing Factor (bioretention as fraction of drain area) <sup>2</sup> | Required Bioretention Area <sup>2</sup> , sq-ft | Provided Bioretention Area <sup>3</sup> , 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                                           |

<sup>1</sup> These values are consistent with the Los Angeles County Hydrology Manual recommended range of imperviousness values by land use.

<sup>2</sup> 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.

<sup>3</sup> 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) <sup>1</sup> | Impervious Fraction of Catchment <sup>1</sup> | SUSMP Qpm (cfs) <sup>2</sup> | NRSSMP Required Design Flow Rate (cfs) <sup>3</sup> | Provided Design Qpm (cfs) <sup>4</sup> |
|-------------------|-------------------------------------|-----------------------------------------------|------------------------------|-----------------------------------------------------|----------------------------------------|
| 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                                   |

<sup>1</sup> Area and imperviousness based on spatial analysis of drainage areas imported from WQMP CAD files and proposed land uses.

<sup>2</sup> Flowrates ("Q<sub>pm</sub>") 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.

<sup>3</sup> Design flow based on an intensity of 0.3 in/hr per NRSSMP performance criteria.

<sup>4</sup> Selected design flow rate shown as "Design Q<sub>pm</sub>" 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 <sup>1</sup> | Infiltration Feasible <sup>2</sup> | Infiltration Infeasible <sup>2</sup> | Total |
|------------------------------------------------------------------------------------------|-------------------------|------------------------------------|--------------------------------------|-------|
| Total Area, ac                                                                           | 211                     | 23                                 | 245                                  |       |
| Composite Imperviousness <sup>3</sup>                                                    |                         | 73%                                | 77%                                  |       |
| Average Annual Runoff Volume <sup>4</sup> , ac-ft                                        |                         | 24                                 | 263                                  |       |
| Average Annual Capture Efficiency of BMPs Designed per LID Standards Manual <sup>5</sup> |                         | 48%                                | 48%                                  |       |
| Average Annual Volume Reduction of Captured Water in Vegetated BMPs <sup>6</sup>         |                         | 100%                               | 20%                                  |       |
| <b>LID Standards Manual Performance Standard Volume Reduction, ac-ft/yr</b>              |                         | 11.4                               | 25.2                                 | 36.6  |

<sup>1</sup> Includes water quality basins as open space (does not include parks).

<sup>2</sup> Per infiltration feasibility screening prepared by R.T. Frankian and Associates (2010a, 2010b).

<sup>3</sup> Composite imperviousness based on distribution of developed land uses within each analysis area.

<sup>4</sup> Calculated using the rational method with the average annual rainfall at the Project site.

<sup>5</sup> 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*.

<sup>6</sup> 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       |
|--------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------|-------------|
| <i>Volume Reduction Achieved in Extended Detention Basins, ac-ft/yr<sup>1</sup></i>        |                        |                                                          |             |
| Extended Detention Basin A                                                                 |                        | 13.7                                                     | 13.7        |
| Extended Detention Basin B                                                                 |                        | 4.8                                                      | 4.8         |
| Regional Basin D (Mission Village) <sup>2</sup>                                            |                        | 0                                                        | 0           |
| <i>Volume Reduction Calculations for Areas Draining to On-site BMPs<sup>3</sup></i>        |                        |                                                          |             |
| 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        |
| <b>Average Annual Volume Reduction Achieved, ac-ft/yr<sup>4</sup></b>                      | 6.7                    | 32.4                                                     | <b>39.1</b> |
| <b>LID Standards Manual Performance Standard Volume Reduction, ac-ft/yr (from Table 6)</b> |                        |                                                          | <b>36.6</b> |
| <b>Surplus Volume Reduction<sup>5</sup>, ac-ft/yr</b>                                      |                        |                                                          | <b>2.5</b>  |

<sup>1</sup>Achieved volume reduction determined from SWMM simulations of extended detention basins.

<sup>2</sup>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.

<sup>3</sup>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.

<sup>4</sup>Sum of volume reductions from extended detention basins and volume reduction from areas with on-site biofiltration BMPs.

<sup>5</sup>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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- 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 (ET<sub>o</sub>) 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         |
| <i>Total (year)</i> |                    | 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 ET<sub>o</sub> 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 ET<sub>o</sub>. 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 ET<sub>o</sub>. 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 than 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<sup>1</sup> 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

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<sup>1</sup> James and James, 2000, *Hydrology: Guide to the Rain, Temperature, and Runoff Modules of EPA SWMM4*.



## Attachment B: Evaporation and Infiltration Rates

### B-4

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

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.

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<sup>2</sup> Technical guidance and review of this methodology was provided by Ben Willardson, LACDPW.



## Attachment B: Evaporation and Infiltration Rates

### B-5

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<br>Soil<br>Map<br>Unit | Soil<br>Group | LA<br>County<br>Soil Type | Area<br>(Acres) | Fraction of<br>Total Area | Resultant<br>Infiltration<br>Rate (in/hr) | Modeled<br>Infiltration Rate<br>with 25%<br>reduction (in/hr) |
|-------------------------------------|-----------------------------|---------------|---------------------------|-----------------|---------------------------|-------------------------------------------|---------------------------------------------------------------|
| Worst Case<br>Superpad<br>(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.uwo.edu/~geerts/cwx/notes/chap04/coep.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.



Attachment B: Evaporation and Infiltration Rates

B-6

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

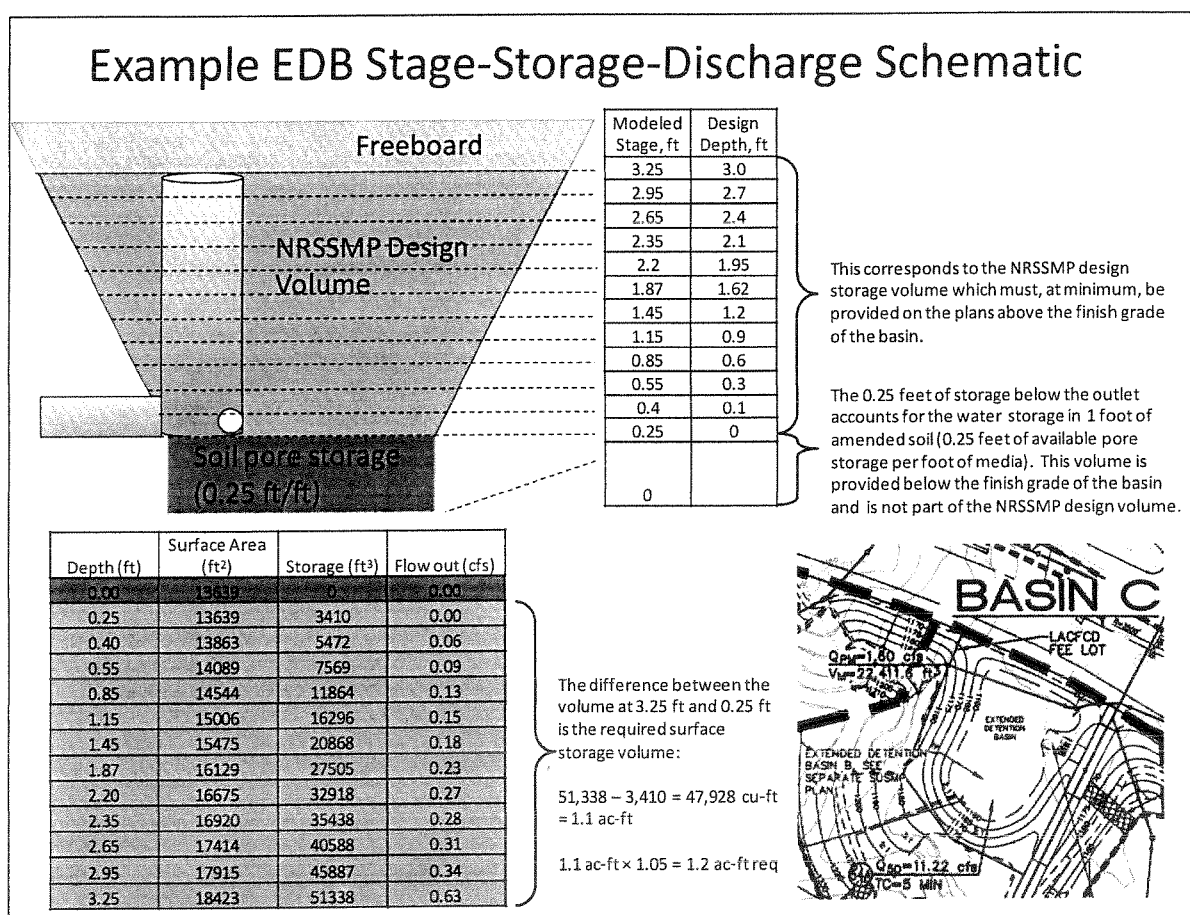


## 1. Storage-Area-Discharge Table Schematics

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



## Attachment C: Key to Stage-Storage-Discharge Curves Used in SWMM Sizing Simulations

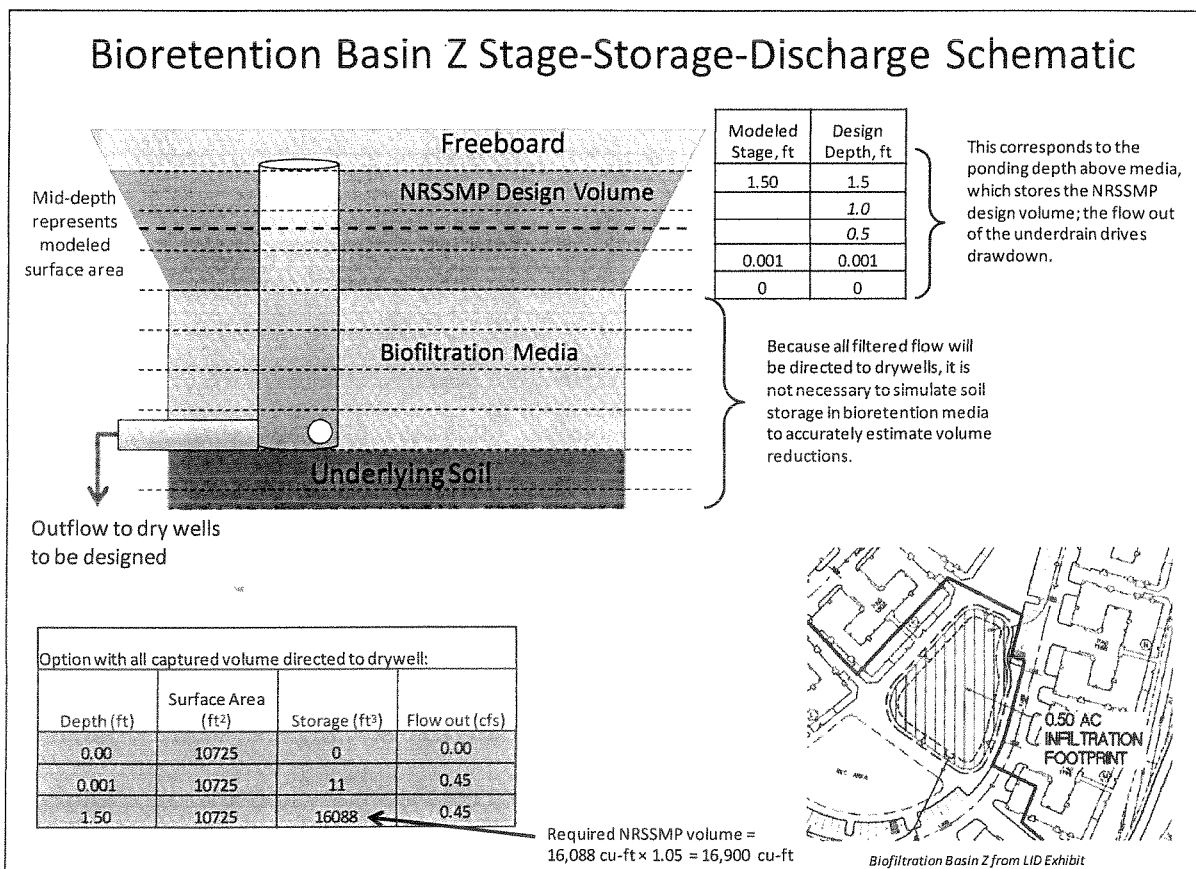
### C-3

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.



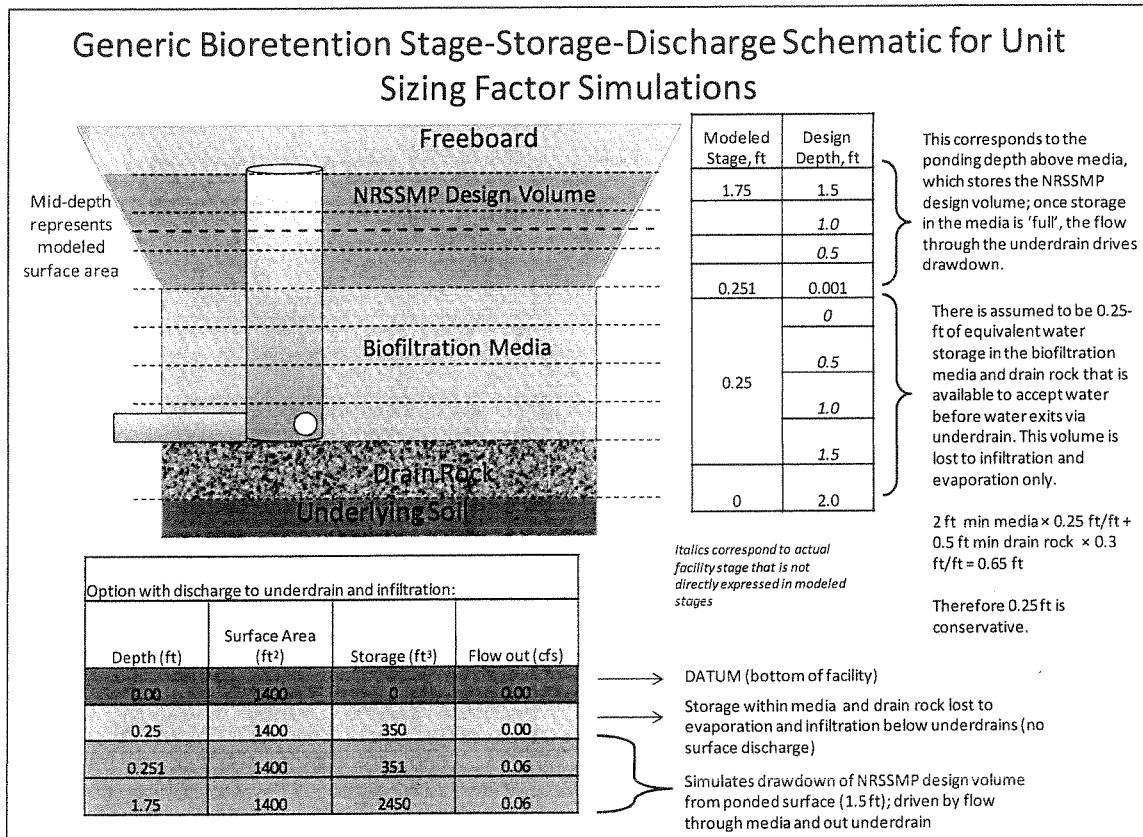


- The “depth” column in the table corresponds to the depth of ponding above the biofiltration media surface.
- The “surface area” column corresponds to the surface area of the water in the basin. The surface area was modeled as constant throughout the ponding depth, even though the surface area will 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.





- 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

EntradaBasinA\_RN0.out

```
*****
*   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 *
*****
```



EntradaBasinA\_RN0.out

\* 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  |



```

                                EntradaBasinA_RN0.out
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

```



EntradaBasinA\_RN0.out

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 Infiltration<br>Sequencer<br>Rate<br>Number<br>(in/hr) | NAMEG:<br>Channel<br>ID # | Drains<br>to<br>NGTO: | Channel<br>Type | width<br>(ft) | Length<br>(ft) | Invert<br>slope<br>(ft/ft) | L Side<br>Slope<br>(ft/ft) | R Side<br>Slope<br>(ft/ft) | Initial<br>Depth<br>(ft) | Max<br>Depth<br>(ft) | Mann-<br>ings<br>"N" | Full<br>Flow<br>(cfs) |
|--------------------------------------------------------------|---------------------------|-----------------------|-----------------|---------------|----------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------|----------------------|-----------------------|
| 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-<br>GREEN-AMPT<br>SUCTION | CHANNEL<br>INFIL<br>HYD.CON | PARAMS<br>OR INLET<br>IMD | GAGE<br>NO. | WIDTH<br>PRINT<br>WB | AREA<br>(AC) | PERCENT<br>IMPERV. | SLOPE<br>(FT/FT) | RESISTANCE<br>IMPERV. | FACTOR<br>PERV. | DEPRES.<br>IMPERV. | STORAGE(IN)<br>PERV. |
|------------------------------------|-----------------------------|---------------------------|-------------|----------------------|--------------|--------------------|------------------|-----------------------|-----------------|--------------------|----------------------|
| 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

```



EntradaBasinA\_RN0.out

\*\*\*\*\*  
 \* 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       | 0       |           |         |         |

1

\*\*\*\*\*  
 \* Continuity Check for surface water \*  
 \*\*\*\*\*

|                                          | cubic feet   | Inches over<br>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 \*  
 \*\*\*\*\*

|                                   | cubic feet   | Inches over<br>Total Basin |
|-----------------------------------|--------------|----------------------------|
| Initial Channel/Pipe Storage..... | 0.000000E+00 | 0.000                      |



EntradaBasinA\_RN0.out

|                                             |              |         |
|---------------------------------------------|--------------|---------|
| 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         |               |         |
|-----------------------|-----------------|--------------|-------------------|------------------|---------------|-----------------|---------------|---------------|---------------|---------|
| -----                 |                 |              |                   | -----            |               | -----           |               | -----         |               |         |
| PEAK                  |                 |              |                   | TOTAL            | PEAK          |                 | PEAK          |               | PEAK          |         |
| UNIT                  | GUTTER          | SIMULATED    |                   |                  | TOTAL         | RUNOFF          |               | RUNOFF        |               |         |
| SUBCATCH-<br>MENT NO. | OR INLET<br>NO. | AREA<br>(AC) | PERCENT<br>IMPER. | RAINFALL<br>(IN) | DEPTH<br>(IN) | LOSSES<br>(IN)  | RATE<br>(CFS) | DEPTH<br>(IN) | RATE<br>(CFS) |         |
| RUNOFF<br>(IN/HR)     |                 |              |                   |                  |               |                 |               |               |               |         |
| 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



EntradaBasinA\_RN0.out

| MAXIMUM<br>SURCHARGE<br>CHANNEL<br>VOLUME<br>(AC-FT) | RATIO OF<br>FULL<br>MAX. TO<br>FLOW<br>FULL<br>(CFS)<br>FLOW | RATIO OF<br>FULL<br>MAX. DEPTH<br>VELOCITY<br>TO FULL<br>(FPS)<br>DEPTH | FULL<br>DEPTH<br>(FT) | MAXIMUM<br>COMPUTED<br>INFLOW<br>(CFS) | MAXIMUM<br>COMPUTED<br>OUTFLOW<br>(CFS) | MAXIMUM<br>COMPUTED<br>DEPTH<br>(FT) | MAXIMUM<br>COMPUTED<br>VELOCITY<br>(FPS) | TIME<br>OF<br>OCCURRENCE<br>DAY HR. | LENGTH<br>OF<br>SURCHARGE<br>(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<br>Mo/Da/Year    | Time<br>Hr:Min | chan/Inlt<br>100<br>Flow<br>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



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**

| <i>DEPTH, FT</i> | <i>SURFACE<br/>AREA, SQ-FT</i> | <i>STORAGE, CU-<br/>FT</i> | <i>OUTFLOW,<br/>CFS</i> | <i>RESIDUAL<br/>FLOW, CFS</i> | <i>Explanation</i>                                                                                                     |
|------------------|--------------------------------|----------------------------|-------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 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<br>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<br>storage, part of NRSSMP Required Volume<br>(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

EntradaBasinA\_St0.out

```
*****
*   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 *
*****
```



EntradaBasinA\_St0.out

```
*****
* 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 RNO.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
```



EntradaBasina\_St0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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
```



EntradaBasinA\_St0.out

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



EntradaBasinA\_St0.out

No. transferred 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



EntradaBasinA\_St0.out

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,<br>FT | SURFACE<br>AREA, SQ FT | STORAGE,<br>CU FT | TREATED<br>OUTFLOW, CFS | RESIDUAL<br>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



EntradaBasinA\_St0.out

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<br>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. | * |



EntradaBasinA\_St0.out  
\*\*\*\*\*



Extended Detention Basin B  
SWMM RUNOFF Module Output File



1

EntradaBasinB\_RN0.out

```
*****
*   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 *
*****
```



EntradaBasinB\_RN0.out

\* 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  |



EntradaBasinB\_RN0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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 |



```

                                EntradaBasinB_RN0.out
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.
-----

```



EntradaBasinB\_RNO.out  
 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 Infiltration<br>Sequencer<br>Rate<br>Number<br>(in/hr) | NAMEG:<br>Channel<br>ID # | Drains<br>to<br>NGTO: | Channel<br>Type | width<br>(ft) | Length<br>(ft) | Invert<br>slope<br>(ft/ft) | L Side<br>slope<br>(ft/ft) | R Side<br>slope<br>(ft/ft) | Initial<br>Depth<br>(ft) | Max<br>Depth<br>(ft) | Mann-<br>ings<br>"N" | Full<br>Flow<br>(cfs) |
|--------------------------------------------------------------|---------------------------|-----------------------|-----------------|---------------|----------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------|----------------------|-----------------------|
| 1 201<br>0.00E+00                                            | 200<br>0.00               |                       | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               |                       |
| 2 202<br>0.00E+00                                            | 200<br>0.00               |                       | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               |                       |

1

\*\*\*\*\*  
 \* SUBCATCHMENT DATA \*  
 \*\*\*\*\*

\*NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS\*

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

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

```



# EntradaBasinB\_RN0.out

```
*****
*   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  | 56147   | B-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       | 0       | 202       | 0       | 0       |           |         |         |

1

\*\*\*\*\*  
 \* Continuity Check for Surface Water \*  
 \*\*\*\*\*

|                                          | cubic feet   | Inches over<br>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<br>Total Basin |
|-----------------------------------|--------------|----------------------------|
| Initial Channel/Pipe Storage..... | 0.000000E+00 | 0.000                      |



EntradaBasinB\_RN0.out

|                                             |              |         |
|---------------------------------------------|--------------|---------|
| 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         |               |         |
|-----------------------|-----------------|--------------|-------------------|------------------|---------------|-----------------|---------------|---------------|---------------|---------|
| -----                 |                 |              |                   | -----            |               | -----           |               | -----         |               |         |
| PEAK                  |                 |              |                   | TOTAL            | PEAK          |                 | PEAK          |               | PEAK          |         |
| UNIT                  | GUTTER          |              |                   | SIMULATED        | RUNOFF TOTAL  | RUNOFF          | RUNOFF        | RUNOFF        | RUNOFF        |         |
| SUBCATCH-<br>MENT NO. | OR INLET<br>NO. | AREA<br>(AC) | PERCENT<br>IMPER. | RAINFALL<br>(IN) | DEPTH<br>(IN) | LOSSES<br>(IN)  | RATE<br>(CFS) | DEPTH<br>(IN) | RATE<br>(CFS) |         |
| RUNOFF<br>(IN/HR)     |                 |              |                   |                  |               |                 |               |               |               |         |
| 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



EntradaBasinB\_RN0.out

| MAXIMUM<br>SURCHARGE<br>CHANNEL<br>VOLUME<br>(AC-FT) | RATIO OF<br>FULL<br>MAX. TO<br>FLOW<br>FULL<br>(CFS)<br>FLOW | RATIO OF<br>FULL<br>MAX. DEPTH<br>VELOCITY<br>TO FULL<br>(FPS)<br>DEPTH | FULL<br>DEPTH<br>(FT) | MAXIMUM<br>COMPUTED<br>INFLOW<br>(CFS) | MAXIMUM<br>COMPUTED<br>OUTFLOW<br>(CFS) | MAXIMUM<br>COMPUTED<br>DEPTH<br>(FT) | MAXIMUM<br>COMPUTED<br>VELOCITY<br>(FPS) | TIME<br>OF<br>OCCURRENCE<br>DAY HR. | LENGTH<br>OF<br>SURCHARGE<br>(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<br>Mo/Da/Year    | Time<br>Hr:Min | Chan/Inlt<br>200<br>Flow<br>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<br>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



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

EntradaBasinB\_St0.out

```
*****
*   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**

| <i>DEPTH, FT</i> | <i>SURFACE<br/>AREA, SQ-FT</i> | <i>STORAGE, CU-<br/>FT</i> | <i>OUTFLOW,<br/>CFS</i> | <i>RESIDUAL<br/>FLOW, CFS</i> | <i>Explanation</i>                                                                                                     |
|------------------|--------------------------------|----------------------------|-------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 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<br>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<br>storage, part of NRSSMP Required Volume<br>(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)



EntradaBasinB\_St0.out

```
*****
* 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
```



EntradaBasinB\_St0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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
```



EntradaBasinB\_St0.out

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



EntradaBasinB\_St0.out  
 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



# EntradaBasinB\_St0.out

## 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,<br>FT | SURFACE<br>AREA, SQ FT | STORAGE,<br>CU FT | TREATED<br>OUTFLOW, CFS | RESIDUAL<br>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



EntradaBasinB\_St0.out

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<br>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. \*



EntradaBasinB\_St0.out  
\*\*\*\*\*



Regional Extended Detention Basin D  
SWMM RUNOFF Module Output File



1

MVBasinD\_RN0.out

```
*****
*   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/ednrmrl/swmm/index.htm *
*****
```



# MVBasinD\_RN0.out

```
*****
* 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
```



MVBasinD\_RN0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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.....

MVBasinD\_RN0.out  
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<br>Infiltration<br>Rate<br>Number<br>(in/hr) | NAMEG:<br>Channel<br>ID # | Drains<br>to<br>NGTO: | Channel<br>Type | Width<br>(ft) | Length<br>(ft) | Invert<br>Slope<br>(ft/ft) | L Side<br>Slope<br>(ft/ft) | R Side<br>Slope<br>(ft/ft) | Initial<br>Depth<br>(ft) | Max<br>Depth<br>(ft) | Mann-<br>ings<br>"N" | Full<br>Flow<br>(cfs) |
|----------------------------------------------------|---------------------------|-----------------------|-----------------|---------------|----------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------|----------------------|-----------------------|
| 1                                                  | 401                       | 420                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |
| 2                                                  | 402                       | 420                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |
| 3                                                  | 403                       | 420                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |
| 4                                                  | 404                       | 420                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |
| 5                                                  | 405                       | 420                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |
| 6                                                  | 406                       | 430                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |
| 7                                                  | 407                       | 430                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |



MVBasinD\_RN0.out

|      |    |     |     |       |     |     |        |        |        |     |     |        |          |
|------|----|-----|-----|-------|-----|-----|--------|--------|--------|-----|-----|--------|----------|
| 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 |

1

\*\*\*\*\*  
 \* SUBCATCHMENT DATA \*  
 \*\*\*\*\*

\*NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS\*

| SUBCATCH-  |          | CHANNEL | WIDTH    | AREA    | PERCENT | SLOPE   | RESISTANCE | FACTOR  | DEPRES. | STORAGE(IN) |         |
|------------|----------|---------|----------|---------|---------|---------|------------|---------|---------|-------------|---------|
| GREEN-AMPT | INFIL    | PARAMS  | GAGE     | PRINT   |         |         |            |         |         |             |         |
| MENT NO.   | OR INLET | (FT)    | (AC)     | IMPERV. | (FT/FT) | IMPERV. | PERV.      | IMPERV. | PERV.   |             | (IN)    |
| SUCTION    | HYD.CON  | IMD     | NO.      | WB      |         |         |            |         |         |             |         |
|            |          |         |          |         |         |         |            |         |         |             | (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        |         |         |         |            |         |         |             |         |



|       |         |     |  |          |        | MVBasinD_RN0.out |        |       |       |       |       |      |  |  |  |
|-------|---------|-----|--|----------|--------|------------------|--------|-------|-------|-------|-------|------|--|--|--|
| 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<br>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.....       |         |     |     |     |     |
|     |                                  |         |     |     |     |     |
| 400 | INLET 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 \*



MVBasinD\_RN0.out

\*\*\*\*\*

\*\*\*\*\*  
\* 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 \*  
 \*\*\*\*\*  
 MVBasinD\_RN0.out

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         |         |         |

\*\*\*\*\*  
 \* Continuity Check for Surface Water \*  
 \*\*\*\*\*

Inches over



|                                          | MVBasinD_RN0.out<br>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<br>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.....  
 \*\*\*\*\*  
 \* Final Storage + Outflow + Evaporation - \*  
 \* Watershed Runoff - Groundwater Inflow - \*  
 \* Initial Channel/Pipe Storage \*  
 \* ----- \*  
 \* Final Storage + Outflow + Evaporation \*  
 \*\*\*\*\*  
 Error..... 0.000 Percent  
 1

MVBasinD\_RN0.out  
 9.360535E+08 349.388

# SUMMARY STATISTICS FOR SUBCATCHMENTS =====

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



MVBasinD\_RN0.out

|         |     |       |      |        |        |         |        |         |        |         |         |  |
|---------|-----|-------|------|--------|--------|---------|--------|---------|--------|---------|---------|--|
| 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 |            | RATIO OF |       | FULL     |       | FULL     |          | MAXIMUM  | MAXIMUM  | MAXIMUM   | MAXIMUM   | TIME   | LENGTH  | MAXIMUM   |
|----------|------------|----------|-------|----------|-------|----------|----------|----------|----------|-----------|-----------|--------|---------|-----------|
| MAX. TO  | MAX. DEPTH | CHANNEL  | FLOW  | VELOCITY | DEPTH | COMPUTED | COMPUTED | COMPUTED | COMPUTED | COMPUTED  | COMPUTED  | OF     | OF      | SURCHARGE |
| FULL     | TO FULL    | NUMBER   | (CFS) | (FPS)    | (FT)  | INFLOW   | OUTFLOW  | DEPTH    | VELOCITY | OCURRENCE | SURCHARGE | VOLUME |         |           |
| FLOW     | DEPTH      |          |       |          |       | (CFS)    | (CFS)    | (FT)     | (FPS)    | DAY       | HR.       | (HOUR) | (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  |         |           |



|     |        |                  |                 |
|-----|--------|------------------|-----------------|
|     |        | MVBasinD_RN0.out |                 |
| 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                  | Time   | Flow       |
| Mo/Da/Year            | Hr:Min | 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      MVBasinD_RN0.out
* 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**

| <i>DEPTH, FT</i> | <i>SURFACE<br/>AREA, SQ-FT</i> | <i>STORAGE, CU-<br/>FT</i> | <i>OUTFLOW,<br/>CFS</i> | <i>RESIDUAL<br/>FLOW, CFS</i> | <i>Explanation</i>                                                                                                                                               |
|------------------|--------------------------------|----------------------------|-------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.00E+00         | 1.16E+05                       | 0.00E+00                   | 0.00E+00                | 0.00E+00                      | Depth 0 to 12 feet = active surface<br>storage, part of NRSSMP Required Volume<br>(Basin Depth = 12 feet on plans; no pore<br>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

MVBasinD\_St0.out

```
*****
*   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 *
*****
```



MVBasinD\_St0.out

\* 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 RNO.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  |

MVBasinD\_St0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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

MVBasinD\_St0.out

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 |

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

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,<br>FT | SURFACE<br>AREA, SQ FT | STORAGE,<br>CU FT | TREATED<br>OUTFLOW, CFS | RESIDUAL<br>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            |



```

                                MVBasinD_St0.out
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<br>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      |

```

                                MVBasinD_St0.out
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

Bioretention\_RN0.out

```
*****
*   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/ednrmrl/swmm/index.htm *
*****
```

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



Bioretention\_RN0.out

\* 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  |

Bioretention\_RN0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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 |



```

                                Bioretention_RN0.out
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

Bioretention\_RN0.out

1

\*\*\*\*\*  
\* CHANNEL AND PIPE DATA \*  
\*\*\*\*\*

| Input Infiltration<br>Sequenced Rate<br>Number (in/hr) | NAMEG: Channel ID # | Drains to NGTO: Type | Channel Width (ft) | Length (ft) | Invert Slope (ft/ft) | L Side Slope (ft/ft) | R Side Slope (ft/ft) | Initial Depth (ft) | Max Depth (ft) | Manning's "N" | Full Flow (cfs) |
|--------------------------------------------------------|---------------------|----------------------|--------------------|-------------|----------------------|----------------------|----------------------|--------------------|----------------|---------------|-----------------|
| 1 101<br>0.00E+00                                      | 100                 | Dummy                | 0.0                | 0.0         | 0.0000               | 0.0000               | 0.0000               | 0.0                | 0.0            | 0.0000        |                 |
| 2 102<br>0.00E+00                                      | 100                 | Dummy                | 0.0                | 0.0         | 0.0000               | 0.0000               | 0.0000               | 0.0                | 0.0            | 0.0000        |                 |

\*\*\*\*\*  
\* SUBCATCHMENT DATA \*  
\*\*\*\*\*

\*NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS\*

| GREEN-AMPT SUCTION | INFILTRATION RATE (IN/HR) | PARAMS OR INLET | GAGE NO. | WIDTH (FT) | PRINT | AREA (AC) | PERCENT IMPERV. | SLOPE (FT/FT) | RESISTANCE IMPERV. | FACTOR PERV. | DEPRES. IMPERV. | STORAGE (IN) PERV. |
|--------------------|---------------------------|-----------------|----------|------------|-------|-----------|-----------------|---------------|--------------------|--------------|-----------------|--------------------|
| 1 Bio-AB           | 0.280                     | 101             |          | 957.00     | 0     | 5.49      | 80.00           | 0.0500        | 0.012              | 0.250        | 0.020           | 0.060              |
| 2 Bio-C            | 0.150                     | 102             |          | 367.00     | 0     | 2.11      | 80.00           | 0.0500        | 0.012              | 0.250        | 0.020           | 0.060              |

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

\*\*\*\*\*



```

                                Bioretention_RN0.out
*   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

```

# Bioretention\_RN0.out

```
*****
*   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  | 61080   | Bio-C    | 663506  | 62894   |          |         |         |

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



Bioretention\_RN0.out

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

\*\*\*\*\*

| Chan/Pipe | # Steps | # Calls | Chan/Pipe | # Steps | # Calls | Chan/Pipe | # Steps | # Calls |
|-----------|---------|---------|-----------|---------|---------|-----------|---------|---------|
| 101       | 0       | 0       | 102       | 0       | 0       |           |         |         |

1 \*\*\*\*\*

\* Continuity Check for Surface Water \*

\*\*\*\*\*

|                                          | cubic feet   | Inches over 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 \*

\*\*\*\*\*

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

Bioretention\_RN0.out

|                                             |              |         |
|---------------------------------------------|--------------|---------|
| 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 AREA     |          |      |         |           | PERVIOUS AREA |         | IMPERVIOUS AREA |         | TOTAL  |         |
|-----------------------|----------|------|---------|-----------|---------------|---------|-----------------|---------|--------|---------|
| -----                 |          |      |         |           | -----         |         | -----           |         | -----  |         |
| PEAK                  | GUTTER   |      | TOTAL   |           | TOTAL         | PEAK    | PEAK            | PEAK    | PEAK   |         |
| UNIT                  | OR INLET | AREA | PERCENT | SIMULATED | RUNOFF TOTAL  | RUNOFF  | RUNOFF          | RUNOFF  | RUNOFF |         |
| SUBCATCH-<br>MENT NO. | NO.      | (AC) | IMPER.  | RAINFALL  | DEPTH LOSSES  | RATE    | DEPTH           | RATE    | DEPTH  |         |
| RUNOFF<br>(IN/HR)     |          |      |         | (IN)      | (IN) (IN)     | (CFS)   | (IN)            | (CFS)   | (IN)   |         |
|                       |          |      |         |           |               |         |                 |         |        |         |
| 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



Bioretention\_RN0.out

| MAXIMUM SURCHARGE VOLUME (AC-FT) | RATIO OF FULL MAX. TO FLOW FULL (CFS) | RATIO OF FULL 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<br>Mo/Da/Year    | Time<br>Hr:Min | Chan/Inlt<br>101 | Flow<br>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

```

*****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

```

*****Bioretention_St0.out*****
*   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 *
*****
```



# Bioretention\_St0.out

```
*****
* 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
```

Bioretention\_St0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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
```



Bioretention\_St0.out

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

Bioretention\_St0.out  
 No. transferred 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



Bioretention\_St0.out

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,<br>FT | SURFACE<br>AREA, SQ FT | STORAGE,<br>CU FT | TREATED<br>OUTFLOW, CFS | RESIDUAL<br>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.

Bioretention\_St0.out

| UNIT | PARAMETER            | VOLUME<br>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

Comm\_RNO.out

```
*****
*   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 *
*****
```



# Comm\_RN0.out

```
*****
* 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
```

|                                                                                         | Comm_RN0.out |
|-----------------------------------------------------------------------------------------|--------------|
| 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<br>in the Extran Block (NVST).....  | 200          |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500          |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15           |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200          |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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

Comm\_RN0.out

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.....

Comm\_RN0.out  
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<br>Infiltration<br>Sequencing<br>Rate<br>Number<br>(in/hr) | NAMEG:<br>Channel<br>ID # | Drains<br>to<br>NGTO: | Channel<br>Type | width<br>(ft) | Length<br>(ft) | Invert<br>Slope<br>(ft/ft) | L Side<br>Slope<br>(ft/ft) | R Side<br>Slope<br>(ft/ft) | Initial<br>Depth<br>(ft) | Max<br>Depth<br>(ft) | Mann-<br>ings<br>"N" | Full<br>Flow<br>(cfs) |
|------------------------------------------------------------------|---------------------------|-----------------------|-----------------|---------------|----------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------|----------------------|-----------------------|
| 1<br>0.00<br>1                                                   | 201                       | 200                   | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               | 0.00E+00              |

\*\*\*\*\*  
\* SUBCATCHMENT DATA \*  
\*\*\*\*\*

\*NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS\*

| SUBCATCH-<br>GREEN-AMPT INFIL<br>SUCTION | CHANNEL<br>PARAMS<br>OR INLET<br>HYD.CON | WIDTH<br>GAGE<br>PRINT<br>(FT) | AREA<br>(AC) | PERCENT<br>IMPERV. | SLOPE<br>(FT/FT) | RESISTANCE<br>IMPERV. | FACTOR<br>PERV. | DEPRES.<br>IMPERV. | STORAGE(IN)<br>PERV. |
|------------------------------------------|------------------------------------------|--------------------------------|--------------|--------------------|------------------|-----------------------|-----------------|--------------------|----------------------|
|------------------------------------------|------------------------------------------|--------------------------------|--------------|--------------------|------------------|-----------------------|-----------------|--------------------|----------------------|



Comm\_RN0.out

| (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 \*  
 \*\*\*\*\*

Comm\_RN0.out

```
*****
*   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
```

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

CHANNEL/INLET PRINT DATA GROUPS.....201

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

STORM EVENT TRACKING...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   *
*****
```



Comm\_RNO.out

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 \*  
 \*\*\*\*\*

|                                          | cubic feet   | Inches over<br>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 +          |              |                            |

|                                         |              |         |
|-----------------------------------------|--------------|---------|
|                                         | Comm_RN0.out |         |
| 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<br>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



Comm\_RN0.out  
SUMMARY STATISTICS FOR SUBCATCHMENTS  
=====

| AREA                             |                 |              |                   | PERVIOUS AREA    |               |                | IMPERVIOUS AREA |               |               | TOTAL SUBCATCHMENT |               |
|----------------------------------|-----------------|--------------|-------------------|------------------|---------------|----------------|-----------------|---------------|---------------|--------------------|---------------|
| -----                            |                 |              |                   | -----            |               |                | -----           |               |               |                    |               |
| PEAK                             |                 |              |                   | TOTAL            | TOTAL         | PEAK           |                 | PEAK          |               | PEAK               |               |
| UNIT                             | GUTTER          | SIMULATED    |                   |                  | RUNOFF TOTAL  | RUNOFF         |                 | RUNOFF        | RUNOFF        | RUNOFF             | RUNOFF        |
| SUBCATCH-<br>MENT NO.<br>(IN/HR) | OR INLET<br>NO. | AREA<br>(AC) | PERCENT<br>IMPER. | RAINFALL<br>(IN) | DEPTH<br>(IN) | LOSSES<br>(IN) | RATE<br>(CFS)   | DEPTH<br>(IN) | RATE<br>(CFS) | DEPTH<br>(IN)      | RATE<br>(CFS) |
| -----                            |                 |              |                   |                  |               |                |                 |               |               |                    |               |
| Comm<br>1.424                    | 201             | 1.00         | 91.0              | 733.64           | 103.695       | 631.745        | 0.114           | 706.766       | 1.310         | 652.489            | 1.424         |

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

SUMMARY STATISTICS FOR CHANNEL/PIPES  
=====

|                                     |                                              |                           |                       | MAXIMUM         | MAXIMUM          | MAXIMUM       | MAXIMUM           | TIME       |        | LENGTH              | MAXIMUM           |
|-------------------------------------|----------------------------------------------|---------------------------|-----------------------|-----------------|------------------|---------------|-------------------|------------|--------|---------------------|-------------------|
|                                     |                                              |                           |                       | COMPUTED        | COMPUTED         | COMPUTED      | COMPUTED          | OF         |        | OF                  | SURCHARGE         |
| RATIO OF<br>MAX. TO<br>FULL<br>FLOW | RATIO OF<br>FULL<br>FLOW<br>TO FULL<br>DEPTH | FULL<br>VELOCITY<br>(FPS) | FULL<br>DEPTH<br>(FT) | INFLOW<br>(CFS) | OUTFLOW<br>(CFS) | DEPTH<br>(FT) | VELOCITY<br>(FPS) | OCCURRENCE |        | SURCHARGE<br>(HOUR) | VOLUME<br>(AC-FT) |
| -----                               |                                              |                           |                       | -----           |                  |               |                   | -----      |        | -----               |                   |
| 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
```

| Date<br>Mo/Da/Year    | Time<br>Hr:Min | chan/Inlt<br>201 | Flow<br>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

```
*****Comm_St0.out*****
*   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 *
*****
```



Comm\_St0.out

```
*****
* 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 RNO.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
```

Comm\_St0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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
```



Comm\_St0.out

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. transferred pollutants..... Comm\_St0.out  
 Size of total catchment area (acres)..... 0  
 ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1.00  
 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



Comm\_St0.out

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,<br>FT | SURFACE<br>AREA, SQ FT | STORAGE,<br>CU FT | TREATED<br>OUTFLOW, CFS | RESIDUAL<br>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.

Comm\_St0.out

| UNIT | PARAMETER            | VOLUME<br>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

MultiFam\_RN0.out

```
*****
*   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 *
*****
```



MultiFam\_RNO.out

\* 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 RNO.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  |

MultiFam\_RN0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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 |



```

MultiFam_RNO.out
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<br>Infiltration<br>Sequenced<br>Rate<br>Number<br>(in/hr) | NAMEG:<br>Channel<br>ID # | Drains<br>to<br>NGTO: | Channel<br>Type | Width<br>(ft) | Length<br>(ft) | Invert<br>Slope<br>(ft/ft) | L Side<br>Slope<br>(ft/ft) | R Side<br>Slope<br>(ft/ft) | Initial<br>Depth<br>(ft) | Max<br>Depth<br>(ft) | Mann-<br>ings<br>"N" | Full<br>Flow<br>(cfs) |
|-----------------------------------------------------------------|---------------------------|-----------------------|-----------------|---------------|----------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------|----------------------|-----------------------|
| 1 101<br>0.00E+00                                               | 100<br>0.00               |                       | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               |                       |

1

\*\*\*\*\*  
 \* SUBCATCHMENT DATA \*  
 \*\*\*\*\*

\*NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS\*

| SUBCATCH-<br>GREEN-AMPT<br>SUCTION | CHANNEL<br>INFIL<br>HYD.CON | PARAMS<br>OR INLET<br>IMD | GAGE<br>NO. | WIDTH<br>PRINT<br>(FT)<br>WB | AREA<br>(AC) | PERCENT<br>IMPERV. | SLOPE<br>(FT/FT) | RESISTANCE<br>IMPERV. | FACTOR<br>PERV. | DEPRES.<br>IMPERV. | STORAGE(IN)<br>PERV. |
|------------------------------------|-----------------------------|---------------------------|-------------|------------------------------|--------------|--------------------|------------------|-----------------------|-----------------|--------------------|----------------------|
| 1 MF<br>8.00                       | 0.140                       | 101<br>0.290              |             | 174.00<br>1                  | 1.00         | 80.00              | 0.0500           | 0.012                 | 0.250           | 0.020              | 0.060                |

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 MultiFam\_RN0.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       |           |         |         |           |         |         |



## MultiFam\_RN0.out

1

\*\*\*\*\*  
 \* Continuity Check for Surface Water \*  
 \*\*\*\*\*

|                                          | cubic feet   | Inches over<br>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<br>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                    |

MultiFam\_RN0.out

```

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         |               |               |
|--------------------------------------------|-----------------|--------------|-------------------|------------------|---------------|----------------|-----------------|---------------|---------------|---------------|---------------|
|                                            |                 |              |                   |                  | -----         |                | -----           |               |               |               |               |
|                                            |                 |              |                   |                  | TOTAL         |                |                 |               |               |               |               |
| PEAK                                       | GUTTER          |              |                   |                  | SIMULATED     | TOTAL          | PEAK            |               |               | PEAK          | PEAK          |
| UNIT                                       |                 |              |                   |                  |               | RUNOFF TOTAL   | RUNOFF          | RUNOFF        | RUNOFF        | RUNOFF        | RUNOFF        |
| SUBCATCH-<br>RUNOFF<br>MENT NO.<br>(IN/HR) | OR INLET<br>NO. | AREA<br>(AC) | PERCENT<br>IMPER. | RAINFALL<br>(IN) | DEPTH<br>(IN) | LOSSES<br>(IN) | RATE<br>(CFS)   | DEPTH<br>(IN) | RATE<br>(CFS) | DEPTH<br>(IN) | RATE<br>(CFS) |
| MF<br>1.404                                | 101<br>1.404    | 1.00         | 80.0              | 733.64           | 100.704       | 633.769        | 0.252           | 706.878       | 1.152         | 585.643       |               |

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

#### SUMMARY STATISTICS FOR CHANNEL/PIPES

| MAXIMUM   | RATIO OF<br>FULL | RATIO OF<br>FULL | FULL  | MAXIMUM  | MAXIMUM  | MAXIMUM  | MAXIMUM  | TIME       |     | LENGTH    |
|-----------|------------------|------------------|-------|----------|----------|----------|----------|------------|-----|-----------|
| SURCHARGE | MAX. TO          | MAX. DEPTH       | DEPTH | COMPUTED | COMPUTED | COMPUTED | COMPUTED | OF         |     | OF        |
| CHANNEL   | FLOW             | VELOCITY         | DEPTH | INFLOW   | OUTFLOW  | DEPTH    | VELOCITY | OCCURRENCE |     | SURCHARGE |
| VOLUME    | FULL             | TO FULL          | (FT)  | (CFS)    | (CFS)    | (FT)     | (FPS)    | DAY        | HR. | (HOUR)    |
| NUMBER    | (CFS)            | (FPS)            |       |          |          |          |          |            |     |           |



| (AC-FT) | FLOW | DEPTH | MultiFam_RN0.out |
|---------|------|-------|------------------|
| 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

| Date                  | Time   | Chan/Inlt  | Flow |
|-----------------------|--------|------------|------|
| Mo/Da/Year            | Hr:Min | 101        | 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. \*

MultiFam\_RNO.out  
\*\*\*\*\*



Generic Biofiltration Model: Multi-Family Land Use  
SWMM STORAGE Module Output File

1

MultiFam\_St0.out

```
*****
*   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 *
*****
```



MultiFam\_St0.out

```
*****
* 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 RNO.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
```

MultiFam\_St0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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
```



MultiFam\_St0.out

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

MultiFam\_St0.out  
 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



# MultiFam\_St0.out

## 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,<br>FT | SURFACE<br>AREA, SQ FT | STORAGE,<br>CU FT | TREATED<br>OUTFLOW, CFS | RESIDUAL<br>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.

## MultiFam\_St0.out

| UNIT | PARAMETER            | VOLUME<br>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

Park\_RNO.out

```
*****
*   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/ednrmrl/swmm/index.htm *
*****
```

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



Park\_RN0.out

\* 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  |

Park\_RN0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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 |



Park\_RN0.out

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. |
| ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

Park\_RN0.out

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 Infiltration<br>Sequencer<br>Rate<br>Number<br>(in/hr) | NAMEG:<br>Channel<br>ID # | Drains<br>to<br>NGTO: | Channel<br>Type | Width<br>(ft) | Length<br>(ft) | Invert<br>Slope<br>(ft/ft) | L Side<br>Slope<br>(ft/ft) | R Side<br>Slope<br>(ft/ft) | Initial<br>Depth<br>(ft) | Max<br>Depth<br>(ft) | Mann-<br>ings<br>"N" | Full<br>Flow<br>(cfs) |
|--------------------------------------------------------------|---------------------------|-----------------------|-----------------|---------------|----------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------|----------------------|-----------------------|
| 1 301<br>0.00E+00                                            | 300<br>0.00               |                       | Dummy           | 0.0           | 0.0            | 0.0000                     | 0.0000                     | 0.0000                     | 0.0                      | 0.0                  | 0.0000               |                       |

1

\*\*\*\*\*  
 \* SUBCATCHMENT DATA \*  
 \*\*\*\*\*

\*NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS\*

| SUBCATCH-<br>GREEN-AMPT<br>SUCTION | CHANNEL<br>INFIL PARAMS<br>HYD.CON | WIDTH<br>GAGE<br>IMD | AREA<br>PRINT<br>NO. | PERCENT<br>IMPERV.<br>WB | SLOPE<br>(FT/FT) | RESISTANCE<br>IMPERV. | FACTOR<br>PERV. | DEPRES.<br>IMPERV. | STORAGE(IN)<br>PERV. |
|------------------------------------|------------------------------------|----------------------|----------------------|--------------------------|------------------|-----------------------|-----------------|--------------------|----------------------|
| 1 Park<br>8.00                     | 301<br>0.140                       | 174.00<br>0.290      | 1<br>0               | 1.00                     | 10.00            | 0.0500                | 0.012           | 0.250              | 0.020                |

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                      Park\_RN0.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<br>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<br>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.....
Final Storage + Outflow.....
*****
* Final Storage + Outflow + Evaporation - *
* Watershed Runoff - Groundwater Inflow - *
* Initial Channel/Pipe Storage          *
* ----- *
* Final Storage + Outflow + Evaporation *
*****
Error.....

```

Park\_RN0.out  
5.555276E+05    153.038  
5.555276E+05    153.038

0. 00 Percent

1

#### SUMMARY STATISTICS FOR SUBCATCHMENTS

| SUBCATCHMENT AREA     |                 |              |                   |                  | PERVIOUS AREA |                |               | IMPERVIOUS AREA |               | TOTAL         |               |
|-----------------------|-----------------|--------------|-------------------|------------------|---------------|----------------|---------------|-----------------|---------------|---------------|---------------|
| -----                 |                 |              |                   |                  | -----         |                |               | -----           |               |               |               |
| PEAK                  | TOTAL           |              |                   |                  | TOTAL         | PEAK           |               | PEAK            |               | PEAK          |               |
| UNIT                  | GUTTER          | SIMULATED    |                   |                  |               | RUNOFF TOTAL   | RUNOFF        | RUNOFF          | RUNOFF        | RUNOFF        | RUNOFF        |
| SUBCATCH-<br>MENT NO. | OR INLET<br>NO. | AREA<br>(AC) | PERCENT<br>IMPER. | RAINFALL<br>(IN) | DEPTH<br>(IN) | LOSSES<br>(IN) | RATE<br>(CFS) | DEPTH<br>(IN)   | RATE<br>(CFS) | DEPTH<br>(IN) | RATE<br>(CFS) |
| RUNOFF<br>(IN/HR)     |                 |              |                   |                  |               |                |               |                 |               |               |               |
| -----                 |                 |              |                   |                  |               |                |               |                 |               |               |               |
| Park<br>1.264         | 301<br>1.264    | 1.00         | 10.0              | 733.64           | 91.712        | 642.512        | 1.119         | 704.967         | 0.146         | 153.038       |               |

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

#### SUMMARY STATISTICS FOR CHANNEL/PIPES

| MAXIMUM   | RATIO OF | RATIO OF   | FULL  | MAXIMUM  | MAXIMUM  | MAXIMUM  | MAXIMUM  | TIME       | LENGTH    |
|-----------|----------|------------|-------|----------|----------|----------|----------|------------|-----------|
| SURCHARGE | FULL     | FULL       | FULL  | COMPUTED | COMPUTED | COMPUTED | COMPUTED | OF         | OF        |
| CHANNEL   | MAX. TO  | MAX. DEPTH | DEPTH | INFLOW   | OUTFLOW  | DEPTH    | VELOCITY | OCCURRENCE | SURCHARGE |
| VOLUME    | FLOW     | VELOCITY   |       |          |          |          |          |            |           |
| NUMBER    | FULL     | TO FULL    | (FT)  | (CFS)    | (CFS)    | (FT)     | (FPS)    | DAY HR.    | (HOUR)    |
|           | (CFS)    | (FPS)      |       |          |          |          |          |            |           |



| (AC-FT) | FLOW | DEPTH | Park_RN0.out |
|---------|------|-------|--------------|
| 301     |      |       |              |
| 300     |      |       |              |

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

| Date                  | Time   | Chan/Inlt  | Flow |
|-----------------------|--------|------------|------|
| Mo/Da/Year            | Hr:Min | 301        | 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. \*

Park\_RN0.out

\*\*\*\*\*



Generic Biofiltration Model: Park Land Use  
SWMM STORAGE Module Output File

1

Park\_St0.out

```
*****
*   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 *
*****
```



Park\_St0.out

```
*****
* 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
```

Park\_St0.out

|                                                                                         |       |
|-----------------------------------------------------------------------------------------|-------|
| 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<br>in the Extran Block (NVST).....  | 200   |
| Number of Input Hydrographs in Extran (NEH).....                                        | 500   |
| Number of Allowable Channel Connections to<br>Junctions in the Extran Block (NCHN)..... | 15    |
| Number Rain Gages in Rain and Runoff (MAXRG).....                                       | 200   |
| Number PRATE/VRATE Points for Extran Pump<br>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<br>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
```



Park\_St0.out

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. transferred pollutants..... Park\_St0.out  
 Size of total catchment area (acres)..... 0  
 ID numbers (JCE=0) or alphanumeric (JCE=1)..... 1.00  
 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



Park\_St0.out

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,<br>FT | SURFACE<br>AREA, SQ FT | STORAGE,<br>CU FT | TREATED<br>OUTFLOW, CFS | RESIDUAL<br>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.

Park\_St0.out

| UNIT | PARAMETER            | VOLUME<br>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.             *
*****

```



SECTION 8  
MITIGATED  
FLOW CALCS

**APPENDIX A**

**ENTRADA SOUTH**

**MITIGATED FLOW CALCULATIONS**



**APPENDIX A****VOLUME & FLOW RATE CALCULATIONS****TABLE 1**

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL  
FOR ALL RAINFALL ZONES

| Duration, T <sub>c</sub> (min) | Rainfall Intensity, I <sub>x</sub> (in/hr) |
|--------------------------------|--------------------------------------------|
| 5                              | 0.447                                      |
| 6                              | 0.411                                      |
| 7                              | 0.382                                      |
| 8                              | 0.359                                      |
| 9                              | 0.339                                      |
| 10                             | 0.323                                      |
| 11                             | 0.309                                      |
| 12                             | 0.297                                      |
| 13                             | 0.286                                      |
| 14                             | 0.276                                      |
| 15                             | 0.267                                      |
| 16                             | 0.259                                      |
| 17                             | 0.252                                      |
| 18                             | 0.245                                      |
| 19                             | 0.239                                      |
| 20                             | 0.233                                      |
| 21                             | 0.228                                      |
| 22                             | 0.223                                      |
| 23                             | 0.218                                      |
| 24                             | 0.214                                      |
| 25                             | 0.210                                      |
| 26                             | 0.206                                      |
| 27                             | 0.203                                      |
| 28                             | 0.199                                      |
| 29                             | 0.196                                      |
| 30                             | 0.193                                      |

**BASIN: A**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                   |                                |       |
|---------------------------------------------------|--------------------------------|-------|
| <b>A<sub>TOTAL</sub></b>                          | <u>818.00</u>                  | Acres |
| <b>Type of Development</b>                        | <u>Undeveloped/Residential</u> |       |
| <b>Predominate Soil Type #</b>                    | <u>98</u>                      |       |
| <b>% of Project Impervious</b>                    | <u>10.9</u>                    |       |
| <b>% of Project Pervious</b>                      | <u>8.1</u>                     |       |
| <b>% of Project Contributing Undeveloped Area</b> | <u>80.97</u>                   |       |
| <b>A<sub>I</sub></b>                              | <u>89.16</u>                   | Acres |
| <b>A<sub>P</sub></b>                              | <u>66.50</u>                   | Acres |
| <b>A<sub>U</sub></b>                              | <u>662.33</u>                  | Acres |



BASIN: A

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub>      30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub>      0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* I<sub>mp</sub>) + [(1.0 - I<sub>mp</sub>) \* C<sub>u</sub>]

C<sub>D</sub>      0.19

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub>      0.0361

Length = 6000

Slope = 0.01

6. Calculate the time of concentration, T<sub>c</sub> = 10 <sup>$\frac{-0.507}{C_D * I_x} - 0.519$</sup>  \* Length <sup>$\frac{0.483}{Slope} - 0.135$</sup>

Calculated T<sub>c</sub>      216.93 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: A

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>U</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.19           | 0.03613                                | 216.9                           | -187             |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 29.80 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 416895.3 ft<sup>3</sup>



**BASIN: B AND Q**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                      |       |
|-------------------------------------------------------|----------------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>90.30</u>         | Acres |
| <b>Type of Development</b>                            | <u>SINGLE FAMILY</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>            |       |
| <b>% of Project Impervious</b>                        | <u>52.0</u>          |       |
| <b>% of Project Pervious</b>                          | <u>48.0</u>          |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>          |       |
| <b>A<sub>I</sub></b>                                  | <u>46.96</u>         | Acres |
| <b>A<sub>P</sub></b>                                  | <u>43.34</u>         | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>          | Acres |

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

Tc 30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

lx      0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

Cu 0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_U]$

$C_D$  0.52

5. Calculate the value for  $C_D \cdot l_x$

|             |               |               |
|-------------|---------------|---------------|
|             |               | Length = 4300 |
| $C_D * I_x$ | <u>0.0996</u> | Slope = 0.065 |

6. Calculate the time of concentration,  $T_c = 10^{-0.507} \cdot (C_D \cdot I_x)^{-0.519} \cdot \text{Length}^{0.483} \cdot \text{Slope}^{-0.135}$

Calculated Tc                      84.75    minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.



BASIN: B AND Q

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.52           | 0.099588                               | 84.8                            | -55              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 9.07 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 126854.3 ft<sup>3</sup>

BASIN: C

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                  |       |
|-------------------------------------------------------|------------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>5.40</u>      | Acres |
| <b>Type of Development</b>                            | <u>PARK SITE</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>        |       |
| <b>% of Project Impervious</b>                        | <u>10.0</u>      |       |
| <b>% of Project Pervious</b>                          | <u>90.0</u>      |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>      |       |
| <b>A<sub>I</sub></b>                                  | <u>0.54</u>      | Acres |
| <b>A<sub>P</sub></b>                                  | <u>4.86</u>      | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>      | Acres |



BASIN: C

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):**

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.18

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.0347

Length = 620

Slope = 0.02

6. Calculate the time of concentration, T<sub>c</sub> = 10<sup>-0.507</sup> \* (C<sub>D</sub> \* I<sub>x</sub>)<sup>-0.519</sup> \* Length<sup>0.483</sup> \* Slope<sup>-0.135</sup>

Calculated T<sub>c</sub> 67.36 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: C

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.18           | 0.03474                                | 67.4                            | -37              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.19 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 2646.3 ft<sup>3</sup>



BASIN: D

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                          |              |
|-------------------------------------------------------|--------------------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>14.00</u>             | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Multi-Family/Open</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>                |              |
| <b>% of Project Impervious</b>                        | <u>61.0</u>              |              |
| <b>% of Project Pervious</b>                          | <u>32.0</u>              |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>7.00</u>              |              |
| <b>A<sub>I</sub></b>                                  | <u>8.54</u>              | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>4.48</u>              | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.98</u>              | <b>Acres</b> |

BASIN: D

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.59

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.1135

Length = 1700

Slope = 0.04

6. Calculate the time of concentration, T<sub>c</sub> = 10<sup>-0.507</sup> \* (C<sub>D</sub> \* I<sub>x</sub>)<sup>-0.519</sup> \* Length<sup>0.483</sup> \* Slope<sup>-0.135</sup>

Calculated T<sub>c</sub> 54.02 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.



BASIN: D

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.59           | 0.113484                               | 54.0                            | -24              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 1.60 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 22411.6 ft<sup>3</sup>

BASIN: E

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                   |       |
|-------------------------------------------------------|-------------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>30.20</u>      | Acres |
| <b>Type of Development</b>                            | <u>COMMERCIAL</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>         |       |
| <b>% of Project Impervious</b>                        | <u>91.0</u>       |       |
| <b>% of Project Pervious</b>                          | <u>9.0</u>        |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>       |       |
| <b>A<sub>I</sub></b>                                  | <u>27.48</u>      | Acres |
| <b>A<sub>P</sub></b>                                  | <u>2.72</u>       | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>       | Acres |



BASIN: E

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.83

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1598      Length = 2000  
Slope = 0.03

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       50.85 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: E

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.83           | 0.159804                               | 50.9                            | -21              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 4.87 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 68077.7 ft<sup>3</sup>



BASIN: F

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                     |       |
|-------------------------------------------------------|---------------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>6.80</u>         | Acres |
| <b>Type of Development</b>                            | <u>Multi-Family</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>           |       |
| <b>% of Project Impervious</b>                        | <u>80.0</u>         |       |
| <b>% of Project Pervious</b>                          | <u>20.0</u>         |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>         |       |
| <b>A<sub>I</sub></b>                                  | <u>5.44</u>         | Acres |
| <b>A<sub>P</sub></b>                                  | <u>1.36</u>         | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>         | Acres |

BASIN: F

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1428

Length = 840

Slope = 0.02

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       37.45 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.



BASIN: F

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 37.5                            | -7               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.98 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 13699.6 ft<sup>3</sup>

**BASIN: G**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |              |
|-------------------------------------------------------|----------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>0.60</u>    | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Roadway</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |              |
| <b>% of Project Impervious</b>                        | <u>90.0</u>    |              |
| <b>% of Project Pervious</b>                          | <u>10.0</u>    |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |              |
| <b>A<sub>I</sub></b>                                  | <u>0.54</u>    | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>0.06</u>    | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | <b>Acres</b> |



BASIN: G

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.82

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1583      Length = 780  
Slope = 0.05

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       30.27 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: G

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**TABLE FOR ITERATIONS**

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.82           | 0.15826                                | 30.3                            | 0                |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.10 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 1339.5 ft<sup>3</sup>

**BASIN: H**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |              |
|-------------------------------------------------------|----------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.30</u>    | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Roadway</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |              |
| <b>% of Project Impervious</b>                        | <u>70.0</u>    |              |
| <b>% of Project Pervious</b>                          | <u>30.0</u>    |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |              |
| <b>A<sub>I</sub></b>                                  | <u>0.91</u>    | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>0.39</u>    | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | <b>Acres</b> |



BASIN: H

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.66

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.1274

Length = 710

Slope = 0.05

-0.507      -0.519      0.483      -0.135

6. Calculate the time of concentration, T<sub>c</sub> = 10 \* (C<sub>D</sub> \* I<sub>x</sub>) \* Length \* Slope

Calculated T<sub>c</sub> 32.38 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: H

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>U</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.66           | 0.12738                                | 32.4                            | -2               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.17 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 2335.9 ft<sup>3</sup>

BASIN: I

## **APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

### **PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.90</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>80.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>20.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>1.52</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.38</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: I

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation  $Q_{PM}$  for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1428      Length = 1410  
Slope = 0.012

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       51.53 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: I

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 51.5                            | -22              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.27 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 3827.8 ft<sup>3</sup>

BASIN: J

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>2.10</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>80.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>20.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>1.68</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.42</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: J

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.74

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.1428

Length = 1330

Slope = 0.012

6. Calculate the time of concentration, T<sub>c</sub> = 10<sup>-0.507</sup> \* (C<sub>D</sub> \* I<sub>x</sub>)<sup>-0.519</sup> \* Length<sup>0.483</sup> \* Slope<sup>-0.135</sup>

Calculated T<sub>c</sub> 50.10 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: J

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 50.1                            | -20              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.30 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 4230.8 ft<sup>3</sup>

**BASIN: K**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |              |
|-------------------------------------------------------|----------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>2.30</u>    | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Roadway</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |              |
| <b>% of Project Impervious</b>                        | <u>80.0</u>    |              |
| <b>% of Project Pervious</b>                          | <u>20.0</u>    |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |              |
| <b>A<sub>I</sub></b>                                  | <u>1.84</u>    | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>0.46</u>    | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | <b>Acres</b> |



BASIN: K

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub>      30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub>      0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub>      0.74

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub>      0.1428

Length = 1420

Slope = 0.043

6. Calculate the time of concentration, T<sub>c</sub> = 10<sup>-0.507</sup> \* (C<sub>D</sub> \* I<sub>x</sub>)<sup>-0.519</sup> \* Length<sup>0.483</sup> \* Slope<sup>-0.135</sup>

Calculated T<sub>c</sub>      43.52 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: K

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**TABLE FOR ITERATIONS**

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 43.5                            | -14              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.33 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 4633.7 ft<sup>3</sup>

BASIN: L

## **APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

### **PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>3.20</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>80.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>20.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>2.56</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.64</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: L

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation  $Q_{PM}$  for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1428

Length = 1380  
Slope = 0.043

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       42.92 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: L

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 42.9                            | -13              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.46 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_i) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 6446.9 ft<sup>3</sup>

BASIN: M

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>2.90</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>90.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>10.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>2.61</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.29</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: M

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.82

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1583      Length = 1240  
Slope = 0.012

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       45.92 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: M

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**TABLE FOR ITERATIONS**

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.82           | 0.15826                                | 45.9                            | -16              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.46 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 6474.1 ft<sup>3</sup>

**BASIN: N**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |              |
|-------------------------------------------------------|----------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.10</u>    | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Roadway</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |              |
| <b>% of Project Impervious</b>                        | <u>80.0</u>    |              |
| <b>% of Project Pervious</b>                          | <u>20.0</u>    |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |              |
| <b>A<sub>I</sub></b>                                  | <u>0.88</u>    | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>0.22</u>    | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | <b>Acres</b> |



BASIN: N

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation  $Q_{PM}$  for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$  23 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$  0.218 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$  0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$  0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$  0.1613

Length = 360  
Slope = 0.025

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$  22.66 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: N

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 23                           | 0.218                  | 0.10           | 0.74           | 0.16132                                | 22.7                            | 0                |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 23 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.18 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 2216.1 ft<sup>3</sup>

BASIN:    O

**APPENDIX A    VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>3.30</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>80.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>20.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>2.64</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.66</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: O

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):**

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub>      30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub>      0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub>      0.74

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub>      0.1428

Length = 900  
Slope = 0.012

6. Calculate the time of concentration, T<sub>c</sub> = 10 \* (C<sub>D</sub> \* I<sub>x</sub>) \* Length \* Slope

Calculated T<sub>c</sub>      41.48 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN:     ○

## **APPENDIX A                      VOLUME & FLOW RATE CALCULATIONS**

**TABLE FOR ITERATIONS**

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 41.5                            | -11              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value     30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub>     0.48 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_i) (0.9) + (A_P + A_U)(C_u) ]$$

V<sub>M</sub>     6648.3 ft<sup>3</sup>

BASIN: P

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                    |              |
|-------------------------------------------------------|--------------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>15.80</u>       | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Condominium</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>          |              |
| <b>% of Project Impervious</b>                        | <u>80.0</u>        |              |
| <b>% of Project Pervious</b>                          | <u>20.0</u>        |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>        |              |
| <b>A<sub>I</sub></b>                                  | <u>12.64</u>       | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>3.16</u>        | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>        | <b>Acres</b> |



BASIN: P

## **APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### **CALCULATION STEPS:**

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1428      Length = 760  
Slope = 0.02

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       35.68 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: P

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 35.7                            | -6               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 2.28 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_U) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 31831.5 ft<sup>3</sup>

**BASIN Q**

COMBINED WITH BASIN B

SEE BASIN B FOR CALCULATIONS



**BASIN: R**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |              |
|-------------------------------------------------------|----------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>2.20</u>    | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Roadway</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |              |
| <b>% of Project Impervious</b>                        | <u>80.0</u>    |              |
| <b>% of Project Pervious</b>                          | <u>20.0</u>    |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |              |
| <b>A<sub>I</sub></b>                                  | <u>1.76</u>    | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>0.44</u>    | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | <b>Acres</b> |

BASIN: R

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1428      Length = 1980  
Slope = 0.02

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       56.66 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: R

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>d</sub> | C <sub>d</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 56.7                            | -27              |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_d * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.32 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_i) (0.9) + (A_P + A_U)(C_u) ]$$

V<sub>M</sub> 4432.2 ft<sup>3</sup>



**BASIN: S**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |              |
|-------------------------------------------------------|----------------|--------------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.50</u>    | <b>Acres</b> |
| <b>Type of Development</b>                            | <u>Roadway</u> |              |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |              |
| <b>% of Project Impervious</b>                        | <u>75.0</u>    |              |
| <b>% of Project Pervious</b>                          | <u>25.0</u>    |              |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |              |
| <b>A<sub>I</sub></b>                                  | <u>1.13</u>    | <b>Acres</b> |
| <b>A<sub>P</sub></b>                                  | <u>0.38</u>    | <b>Acres</b> |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | <b>Acres</b> |

BASIN: S

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):**

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.70

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.1351

Length = 840  
Slope = 0.035

6. Calculate the time of concentration, T<sub>c</sub> = 10 \* (C<sub>D</sub> \* I<sub>x</sub>) \* Length \* Slope

Calculated T<sub>c</sub> 35.74 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: S

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**TABLE FOR ITERATIONS**

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.70           | 0.1351                                 | 35.7                            | -6               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.20 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 2858.6 ft<sup>3</sup>



BASIN: T

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.30</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>70.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>30.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>0.91</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.39</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |

BASIN: T

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):**

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.66

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.1274      Length = 720  
Slope = 0.055

6. Calculate the time of concentration, T<sub>c</sub> = 10 <sup>$\frac{-0.507}{C_D * I_x} - 0.519$</sup>  \* Length <sup>$\frac{0.483}{Slope} - 0.135$</sup>

Calculated T<sub>c</sub> 32.18 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: T

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.66           | 0.12738                                | 32.2                            | -2               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.17 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 2335.9 ft<sup>3</sup>



BASIN: U

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.50</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>90.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>10.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>1.35</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.15</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |

BASIN: U

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$  30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$  0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$  0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$  0.82

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$  0.1583

Length = 1170  
Slope = 0.04

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$  37.95 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: U

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.82           | 0.15826                                | 37.9                            | -8               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.24 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 3348.7 ft<sup>3</sup>



**BASIN: V**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.10</u>    | Acres |
| <b>Type of Development</b>                            | <u>Roadway</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>50.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>50.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>0.55</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.55</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |

BASIN: V

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.50

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.0965      Length = 720  
Slope = 0.05

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       37.65 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: V

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.50           | 0.0965                                 | 37.6                            | -8               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.11 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 1497.4 ft<sup>3</sup>



BASIN: W

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                    |       |
|-------------------------------------------------------|--------------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>6.50</u>        | Acres |
| <b>Type of Development</b>                            | <u>Condominium</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>          |       |
| <b>% of Project Impervious</b>                        | <u>80.0</u>        |       |
| <b>% of Project Pervious</b>                          | <u>20.0</u>        |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>        |       |
| <b>A<sub>I</sub></b>                                  | <u>5.20</u>        | Acres |
| <b>A<sub>P</sub></b>                                  | <u>1.30</u>        | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>        | Acres |

BASIN: W

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       29 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.196 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1450      Length = 490  
Slope = 0.02

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       28.64 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: W

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**TABLE FOR ITERATIONS**

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 29                           | 0.196                  | 0.10           | 0.74           | 0.14504                                | 28.6                            | 0                |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 29 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.95 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 13095.2 ft<sup>3</sup>



BASIN: X

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.74

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.1428

Length = 760

Slope = 0.02

6. Calculate the time of concentration, T<sub>c</sub> = 10 <sup>$\frac{-0.507}{C_D * I_x} - \frac{-0.519}{Length} + \frac{0.483}{Slope} - 0.135$</sup>

Calculated T<sub>c</sub> 35.68 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: X

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.74           | 0.14282                                | 35.7                            | -6               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 1.50 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_U) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 20952.4 ft<sup>3</sup>

BASIN: Y

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### PROVIDE PROPOSED PROJECT CHARACTERISTICS

|                                                       |                   |       |
|-------------------------------------------------------|-------------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>3.40</u>       | Acres |
| <b>Type of Development</b>                            | <u>Commercial</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>         |       |
| <b>% of Project Impervious</b>                        | <u>90.0</u>       |       |
| <b>% of Project Pervious</b>                          | <u>10.0</u>       |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>       |       |
| <b>A<sub>I</sub></b>                                  | <u>3.06</u>       | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.34</u>       | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>       | Acres |



BASIN: Y

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

#### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 30 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>D</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>D</sub> 0.82

5. Calculate the value for C<sub>D</sub> \* I<sub>x</sub>

C<sub>D</sub> \* I<sub>x</sub> 0.1583      Length = 700  
Slope = 0.02

6. Calculate the time of concentration, T<sub>c</sub> = 10<sup>-0.507</sup> \* (C<sub>D</sub> \* I<sub>x</sub>)<sup>-0.519</sup> \* Length<sup>0.483</sup> \* Slope<sup>-0.135</sup>

Calculated T<sub>c</sub> 32.51 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: Y

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.82           | 0.15826                                | 32.5                            | -3               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.54 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 7590.3 ft<sup>3</sup>

BASIN: Z

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                    |       |
|-------------------------------------------------------|--------------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>7.60</u>        | Acres |
| <b>Type of Development</b>                            | <u>Condominium</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>          |       |
| <b>% of Project Impervious</b>                        | <u>80.0</u>        |       |
| <b>% of Project Pervious</b>                          | <u>20.0</u>        |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>        |       |
| <b>A<sub>I</sub></b>                                  | <u>6.08</u>        | Acres |
| <b>A<sub>P</sub></b>                                  | <u>1.52</u>        | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>        | Acres |



BASIN: Z

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       29 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.196 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.74

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1450      Length = 510  
Slope = 0.02

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       29.19 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: Z

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 29                           | 0.196                  | 0.10           | 0.74           | 0.14504                                | 29.2                            | 0                |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 29 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 1.11 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_i) (0.9) + (A_P + A_U) (C_u) ]$$

V<sub>M</sub> 15311.3 ft<sup>3</sup>

**BASIN: AA**

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

**A<sub>TOTAL</sub>** 0.90 Acres

**Type of Development** ROADWAY

**Predominate Soil Type #** 98

**% of Project Impervious** 78.0

**% of Project Pervious** 22.0

**% of Project Contributing  
Undeveloped Area** 0.00

**A<sub>I</sub>** 0.70 Acres

**A<sub>P</sub>** 0.20 Acres

**A<sub>U</sub>** 0.00 Acres



BASIN: AA

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       22 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.223 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.72

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1615      Length = 400  
Slope = 0.04

6. Calculate the time of concentration,  $T_c = 10^{(-0.507 * (C_D * I_x) + 0.483)} * Length^{0.519} * Slope^{-0.135}$

Calculated  $T_c$       22.36 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: AA

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 22                           | 0.223                  | 0.10           | 0.72           | 0.161452                               | 22.4                            | 0                |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 22 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.15 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 1774.0 ft<sup>3</sup>

BASIN: BB

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>1.50</u>    | Acres |
| <b>Type of Development</b>                            | <u>ROADWAY</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>91.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>9.0</u>     |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>1.37</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.14</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: BB

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.83

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1598

Length = 1170  
Slope = 0.04

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       37.76 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: BB

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.83           | 0.159804                               | 37.8                            | -8               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.24 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U)(C_U) ]$$

V<sub>M</sub> 3381.3 ft<sup>3</sup>

BASIN: CC

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>3.20</u>    | Acres |
| <b>Type of Development</b>                            | <u>ROADWAY</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>91.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>9.0</u>     |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>2.91</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.29</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: CC

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### CALCULATION STEPS:

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       30 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub>      0.193 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.83

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1598

$Length = 1140$   
 $Slope = 0.04$

6. Calculate the time of concentration,  $T_c = 10^{-0.507} * (C_D * I_x)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

Calculated  $T_c$       37.29 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: CC

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>d</sub> | C <sub>d</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 30                           | 0.193                  | 0.10           | 0.83           | 0.159804                               | 37.3                            | -7               |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_d * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.52 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 7213.5 ft<sup>3</sup>

BASIN: DD

**APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

|                                                       |                |       |
|-------------------------------------------------------|----------------|-------|
| <b>A<sub>TOTAL</sub></b>                              | <u>0.60</u>    | Acres |
| <b>Type of Development</b>                            | <u>ROADWAY</u> |       |
| <b>Predominate Soil Type #</b>                        | <u>98</u>      |       |
| <b>% of Project Impervious</b>                        | <u>90.0</u>    |       |
| <b>% of Project Pervious</b>                          | <u>10.0</u>    |       |
| <b>% of Project Contributing<br/>Undeveloped Area</b> | <u>0.00</u>    |       |
| <b>A<sub>I</sub></b>                                  | <u>0.54</u>    | Acres |
| <b>A<sub>P</sub></b>                                  | <u>0.06</u>    | Acres |
| <b>A<sub>U</sub></b>                                  | <u>0.00</u>    | Acres |



BASIN: DD

## **APPENDIX A VOLUME & FLOW RATE CALCULATIONS**

### **DETERMINING THE PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):**

In order to determine the peak mitigated flow rate ( $Q_{PM}$ ) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation  $Q_{PM}$  for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity ( $I_x$ ) values used.

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

#### **CALCULATION STEPS:**

1. Assume an initial  $T_c$  value between 5 and 30 minutes.

$T_c$       24 minutes

2. Using Table 1, look up the assumed  $T_c$  value and select the corresponding  $I_x$  intensity in inches/hour.

$I_x$       0.214 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type.

$C_u$       0.10

4. Calculate the Developed Runoff Coefficient,  $C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_u]$

$C_D$       0.82

5. Calculate the value for  $C_D * I_x$

$C_D * I_x$       0.1755      Length = 380  
Slope = 0.013

6. Calculate the time of concentration,  $T_c = 10^{(-0.507 * (C_D * I_x) + 0.483 * Length - 0.135 * Slope)}$

Calculated  $T_c$       24.32 minutes

7. Calculate the difference between the initially assumed  $T_c$  and the calculated  $T_c$ , if the difference is greater than 0.5 minutes, use the calculated  $T_c$  as the assumed initial  $T_c$  in the second iteration. If the  $T_c$  value is within 0.5 minutes, round the acceptable  $T_c$  value to the nearest minute.

BASIN: DD

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 24                           | 0.214                  | 0.10           | 0.82           | 0.17548                                | 24.3                            | 0                |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 24 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.11 cfs

In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 1339.5 ft<sup>3</sup>

BASIN: EE

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### PROVIDE PROPOSED PROJECT CHARACTERISTICS

|                                               |                |       |
|-----------------------------------------------|----------------|-------|
| $A_{TOTAL}$                                   | <u>0.50</u>    | Acres |
| Type of Development                           | <u>ROADWAY</u> |       |
| Predominate Soil Type #                       | <u>98</u>      |       |
| % of Project Impervious                       | <u>90.0</u>    |       |
| % of Project Pervious                         | <u>10.0</u>    |       |
| % of Project Contributing<br>Undeveloped Area | <u>0.00</u>    |       |
| $A_I$                                         | <u>0.45</u>    | Acres |
| $A_P$                                         | <u>0.05</u>    | Acres |
| $A_U$                                         | <u>0.00</u>    | Acres |



BASIN: EE

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

### DETERMINING THE PEAK MITIGATED FLOW RATE (Q<sub>PM</sub>):

In order to determine the peak mitigated flow rate (Q<sub>PM</sub>) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation QPM for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (I<sub>x</sub>) values used.

By trial and error, determine the time of concentration (T<sub>c</sub>), as shown below:

### CALCULATION STEPS:

1. Assume an initial T<sub>c</sub> value between 5 and 30 minutes.

T<sub>c</sub> 24 minutes

2. Using Table 1, look up the assumed T<sub>c</sub> value and select the corresponding I<sub>x</sub> intensity in inches/hour.

I<sub>x</sub> 0.214 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C<sub>u</sub>, using the runoff coefficient curve corresponding to the predominant soil type.

C<sub>u</sub> 0.10

4. Calculate the Developed Runoff Coefficient, C<sub>d</sub> = (0.9 \* Imp.) + [(1.0 - Imp.) \* C<sub>u</sub>]

C<sub>d</sub> 0.82

5. Calculate the value for C<sub>d</sub> \* I<sub>x</sub>

C<sub>d</sub> \* I<sub>x</sub> 0.1755      Length = 380  
Slope = 0.013

6. Calculate the time of concentration, T<sub>c</sub> = 10<sup>-0.507</sup> \* (C<sub>d</sub> \* I<sub>x</sub>)<sup>-0.519</sup> \* Length<sup>0.483</sup> \* Slope<sup>-0.135</sup>

Calculated T<sub>c</sub> 24.32 minutes

7. Calculate the difference between the initially assumed T<sub>c</sub> and the calculated T<sub>c</sub>, if the difference is greater than 0.5 minutes, use the calculated T<sub>c</sub> as the assumed initial T<sub>c</sub> in the second iteration. If the T<sub>c</sub> value is within 0.5 minutes, round the acceptable T<sub>c</sub> value to the nearest minute.

BASIN: EE

## APPENDIX A VOLUME & FLOW RATE CALCULATIONS

TABLE FOR ITERATIONS

| Iteration No. | Initial T <sub>c</sub> (min) | I <sub>x</sub> (in/hr) | C <sub>u</sub> | C <sub>D</sub> | C <sub>D</sub> *I <sub>x</sub> (in/hr) | Calculated T <sub>c</sub> (min) | Difference (min) |
|---------------|------------------------------|------------------------|----------------|----------------|----------------------------------------|---------------------------------|------------------|
| 1             | 24                           | 0.214                  | 0.10           | 0.82           | 0.17548                                | 24.3                            | 0                |
| 2             |                              |                        |                |                |                                        |                                 |                  |
| 3             |                              |                        |                |                |                                        |                                 |                  |
| 4             |                              |                        |                |                |                                        |                                 |                  |
| 5             |                              |                        |                |                |                                        |                                 |                  |
| 6             |                              |                        |                |                |                                        |                                 |                  |
| 7             |                              |                        |                |                |                                        |                                 |                  |
| 8             |                              |                        |                |                |                                        |                                 |                  |
| 9             |                              |                        |                |                |                                        |                                 |                  |
| 10            |                              |                        |                |                |                                        |                                 |                  |

Acceptable T<sub>c</sub> value 24 minutes

8. Calculate the Peak Mitigation Flow Rate,

$$Q_{PM} = C_D * I_x * A_{Total} * (1.008333 \text{ ft}^3\text{-hour/acre-inches-seconds})$$

Q<sub>PM</sub> 0.09 cfs

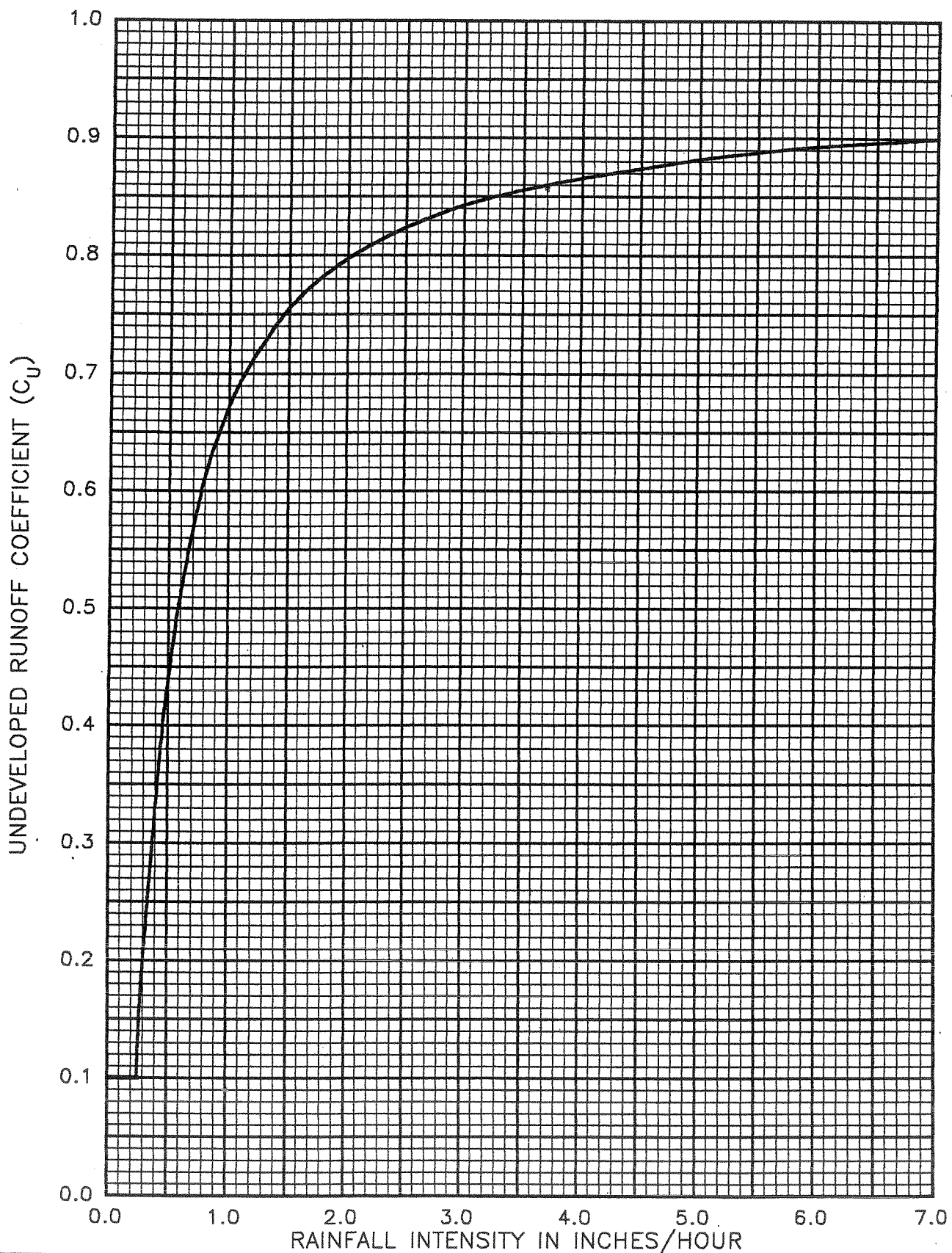
In order to determine the volume (V<sub>M</sub>) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2,722.5 \text{ ft}^3 / \text{acre}) * [ (A_I) (0.9) + (A_P + A_U) (C_U) ]$$

V<sub>M</sub> 1116.2 ft<sup>3</sup>







Equation:

$$C_D = (0.9 * IMP) + (1.0 - IMP) C_U$$

$C_D$  = Developed runoff coefficient.

Where: IMP = Proportion impervious.

$C_U$  = Undeveloped runoff coefficient.

Los Angeles County  
Department of Public Works

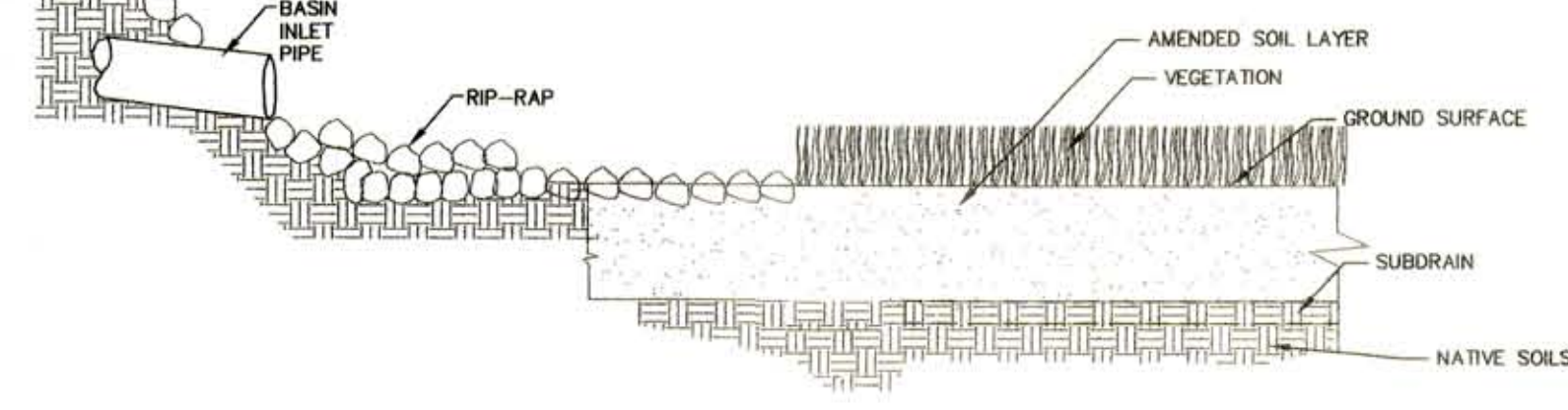
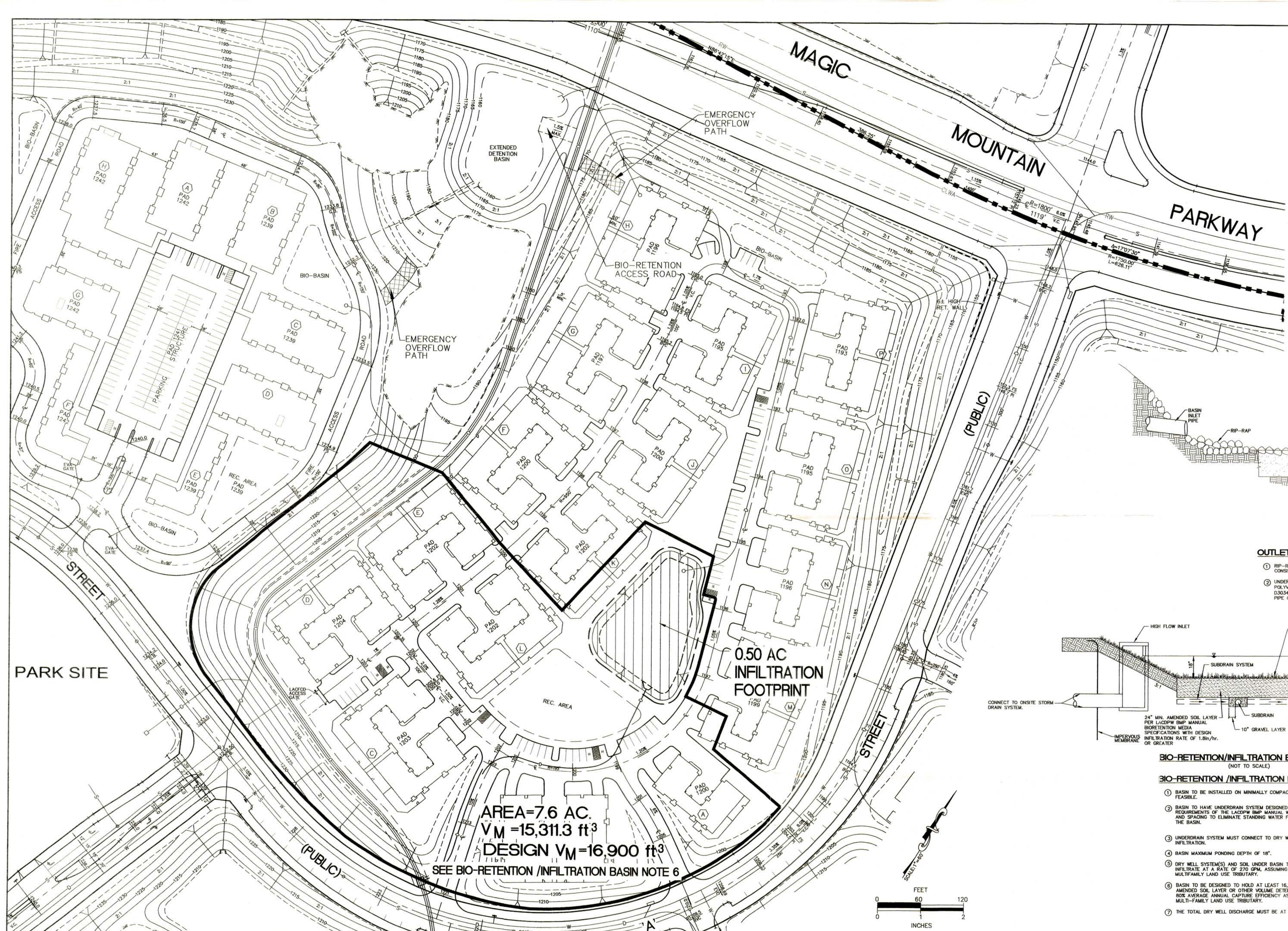
RUNOFF COEFFICIENT CURVE

SOIL TYPE NO. 098



DRAINAGE CONCEPT / HYDROLOGY STUDY / SUMP / LID PLAN  
APPROVED FOR AREA AND Q ONLY

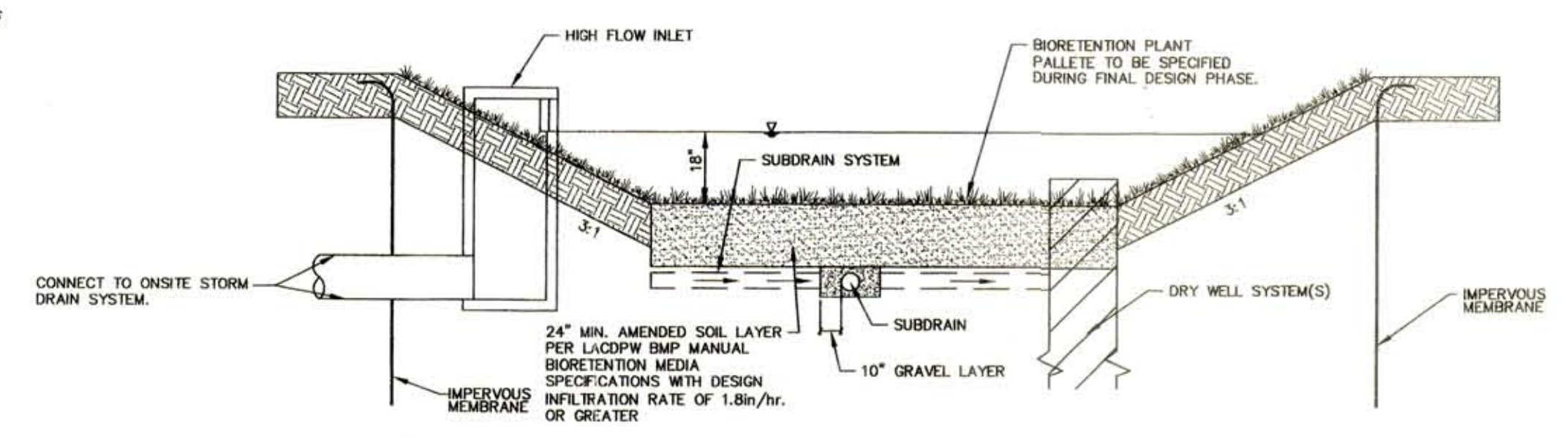
APPROVED BY: *[Signature]* DATE: 1/27/2011  
CHECKED BY: *[Signature]* DATE: 1/27/2011  
LAND DEVELOPMENT DIVISION  
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS



OUTLET DETAIL  
(NOT TO SCALE)

OUTLET NOTES:

- 1 RIP-RAP USED SHALL CONSIST OF WELL GRADED STONE CONSISTING OF A MIXTURE OF ROCK SIZES.
- 2 UNDERDRAINS/SUBRAINS MUST BE MADE OF SLOTTED, POLYVINYL CHLORIDE(PVC) PIPE CONFORMING TO ASTM STD. D3034, CORRUGATED HIGH DENSITY POLYETHYLENE (HDPE) PIPE CONFORMING TO AASHTO 252 M OR EQUIVALENT



BIO-RETENTION/INFILTRATION BASIN SECTION  
(NOT TO SCALE)

BIO-RETENTION /INFILTRATION BASIN NOTES:

- 1 BASIN TO BE INSTALLED ON MINIMALLY COMPACTED SOIL, AS FEASIBLE.
- 2 BASIN TO HAVE UNDERDRAIN SYSTEM DESIGNED PER THE REQUIREMENTS OF THE LACDPW BMP MANUAL WITH CONFIGURATION AND SPACING TO ELIMINATE STANDING WATER FROM ALL PARTS OF THE BASIN.
- 3 UNDERDRAIN SYSTEM MUST CONNECT TO DRY WELL SYSTEM(S) FOR INFILTRATION.
- 4 BASIN MAXIMUM PONDING DEPTH OF 18\"/>

AREA=7.6 AC  
 $V_M = 15,311.3 \text{ ft}^3$   
DESIGN  $V_M = 16,900 \text{ ft}^3$   
SEE BIO-RETENTION /INFILTRATION BASIN NOTE 6

**ALLIANCE**  
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VALENCIA, CA 91355  
TEL: (661) 799-2760  
FAX: (661) 254-1929  
CIVIL ENGINEERING • LAND PLANNING • HILLSIDE DESIGN • SURVEYING

PLANS PREPARED BY:  
ALLIANCE LAND PLANNING & ENGINEERING INC.  
2248 FARADAY AVE.  
(760) 431-9896  
PLANS PREPARED UNDER THE DIRECTION OF:  
*[Signature]*  
CRAIG M. WHITFIELD R.C.E. 51929  
DATE: 5-26-10



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

| NO. | DATE | BY | APPR |
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1 COUNTY OF LOS ANGELES 1 SHEETS  
**ENTRADA**  
**LID INFILTRATION**  
**EXHIBIT**  
**TENTATIVE TRACT 53295**  
DEC 01 2010  
SEP 15 2010



# ENTRADA-SOUTH

## LID/SUSMP/WATER QUALITY MAINTENANCE MAP PLAN

### PORTION OF TENTATIVE TRACT 53295

#### LEGEND

- BIO-RETENTION: --WHOLE AREA NEEDS TO BE SLOPE < 1%  
-- MUST HAVE SUB-DRAIN
- BIO-SWALE: --WHOLE SWALE NEEDS TO BE > 2%  
IF SLOPE < 2% REQUIRES SUBDRAIN  
--100 FT. MIN. LENGTH
- PROPOSED STORM DRAIN
- FLOW AREAS BOUNDARIES
- FLOW DIRECTION

OFFSITE  
UNDEVELOPED-NORTH  
AREA=66.7 AC

Q<sub>DM</sub>=28.94 cfs  
DESIGN Q<sub>DM</sub>=28.94 cfs  
DESIGN V<sub>DM</sub>=404,535.4 ft<sup>3</sup>

A<sub>T</sub>=745.9 AC  
TO REGIONAL WATER  
QUALITY BASIN

BASIN A<sub>TOTAL</sub>=745.9 AC  
BASIN A2  
AREA=19.4 AC

BASIN I  
AREA=1.9 AC

BASIN E  
AREA=30.2 AC

BASIN L  
AREA=3.2 AC

BASIN N  
AREA=1.1 AC

BASIN EE  
AREA=0.5 AC

BASIN DD  
AREA=0.6 AC

BASIN CC  
AREA=3.2 AC

BASIN AA  
AREA=0.8 AC

BASIN J  
AREA=2.1 AC

BASIN H  
AREA=1.3 AC

BASIN D1  
AREA=10.7 AC

BASIN K  
AREA=2.3 AC

BASIN D2  
AREA=5.3 AC

BASIN W  
AREA=0.5 AC

BASIN V  
AREA=1.1 AC

BASIN BB  
AREA=1.3 AC

BASIN Y  
AREA=3.4 AC

BASIN X  
AREA=1.5 AC

BASIN S  
AREA=1.3 AC

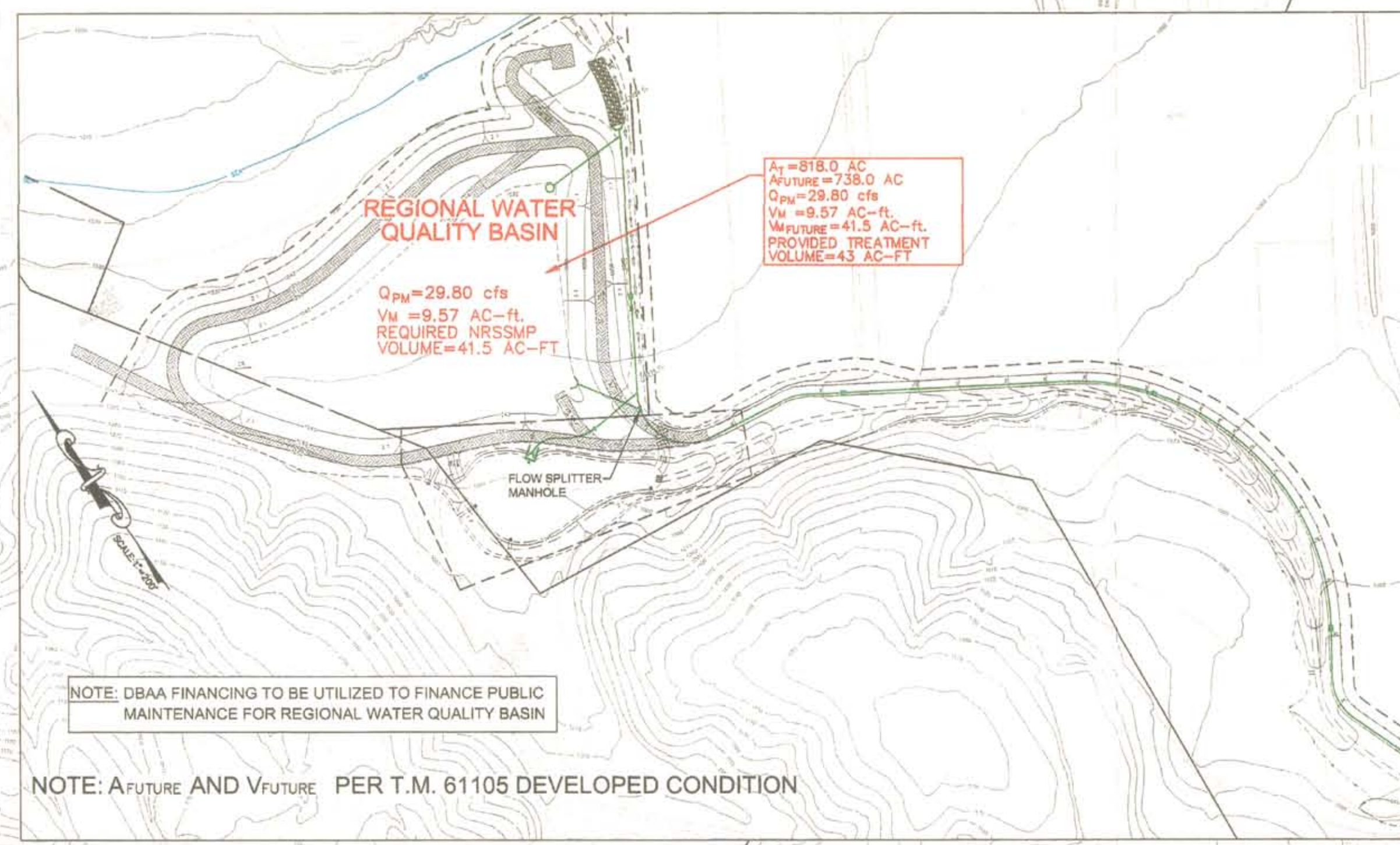
BASIN P  
AREA=1.5 AC

BASIN T  
AREA=1.3 AC

BASIN Q  
AREA=1.3 AC

OFFSITE UNDEVELOPED WEST  
AREA=602.5 AC

OFFSITE-SOUTH  
AREA=28.7 AC



NOTE: DBAA FINANCING TO BE UTILIZED TO FINANCE PUBLIC  
MAINTENANCE FOR REGIONAL WATER QUALITY BASIN

NOTE: A<sub>FUTURE</sub> AND V<sub>FUTURE</sub> PER T.M. 61105 DEVELOPED CONDITION

DRAINAGE / HYDROLOGY STUDY / SUSMP / LID PLAN

APPROVED FOR AREA AND Q ONLY  
DATE: 1/27/2011  
CHECKED BY: [Signature]  
LAND DEVELOPMENT DIVISION  
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

- #### NRSSMP TREATMENT NOTES
- STORMWATER TO BE DESIGNED AND PLACED WITHIN THE BASIN WITH FINAL IMPROVEMENT PLANS TO SATISFY LOS ANGELES COUNTY DEPT. OF PUBLIC WORKS AND TO MEET THE REQUIREMENTS OF NEWHALL RANCH SUB-REGIONAL STORMWATER MITIGATION PLAN (NRSSMP) (80 PERCENT CAPTURE OF ANNUAL RUNOFF) FOR ALL DEVELOPED AREAS WITHIN BASIN.
  - EQUIVALENT BIOFILTRATION BMP'S MAY BE SUBSTITUTED WITH IMPROVEMENT PLANS IF EQUIVALENT BIOFILTRATION BMP'S ARE USED, CALCULATIONS SHALL BE PROVIDED WITH FINAL IMPROVEMENT PLANS TO DEMONSTRATE CAPTURE AND TREATMENT OF 80 PERCENT OF THE AVERAGE ANNUAL RUNOFF VOLUME AND EQUIVALENT AVERAGE ANNUAL VOLUME REDUCTION.
  - REQUIRED SURFACE AREA IS BASED ON 18 INCH POOLING DEPTH. BIO RETENTION SURFACE AREA SHALL BE MEASURED ALONG THE CONTOUR OF THE SIDE SLOPE OF THE BIO RETENTION AREA MEASURING BETWEEN THE TOE OF THE SLOPE AND THE DESIGN WATER SURFACE ELEVATION CORRESPONDING TO A DEPTH OF 8 INCHES. CALCULATIONS MAY BE SUBMITTED WITH FINAL IMPROVEMENT PLANS TO JUSTIFY OTHER METHODS OF AREA CALCULATION OR SUPPORT OTHER SIZING FACTORS (SEE NOTE 2).

NOTE: SEE ENTRADA LID INFILTRATION EXHIBIT FOR LID INFILTRATION FOR BASIN Z

NOTE: DBAA FINANCING TO BE UTILIZED TO FINANCE MAINTENANCE FOR MEDIA FILTRATIONS DEVICES AND EXTENDED DETENTION BASINS

NOTE: DESIGN Q<sub>DM</sub> AND DESIGN V<sub>DM</sub> ARE PER NEWHALL RANCH SUB-REGIONAL STORMWATER MITIGATION PLAN SIZING CRITERIA. Q<sub>DM</sub> AND V<sub>DM</sub> ARE CALCULATED PER SUSMP APPENDIX A METHODS. ALL BMP'S ARE SIZED TO TREAT THE DESIGN Q<sub>DM</sub>/V<sub>DM</sub> OR Q<sub>DM</sub>/V<sub>DM</sub>, WHICHEVER VALUE IS GREATER.

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FAX: (925) 254-1928

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

PLANS PREPARED UNDER THE DIRECTION OF:  
[Signature]  
CHANG M. WHITTAKER R.C.E. 51928

DATE: 9-14-10



PLANS PREPARED FOR:

**NEWHALL LAND**

23823 WEST VALENCIA BOULEVARD  
VALENCIA, CALIFORNIA 91355  
TELEPHONE: (661) 255-4000  
REPRESENTATIVE: ALEX HERRELL

1 COUNTY OF LOS ANGELES 1 SHEETS

LID/SUSMP/WATER QUALITY  
MAINTENANCE PLAN MAP  
FOR ENTRADA-SOUTH  
TENTATIVE TRACT 53295

PLAN PREPARATION DATE: 9-14-10