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HYDOLOGY STUDY

FOR

TENTATIVE TRACT MAP NO. 71742
AGOURA ROAD
AGOURA HILLS, CA

OUR JOB NO. 02-537

02-DEC-2014

Prepared under the direction of:

REGISTERED PROFESSIONAL ENGINEER
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No. 36538
Expires 30-JUN-16
CIVIL
STATE OF CALIFORNIA

02-DEC-14

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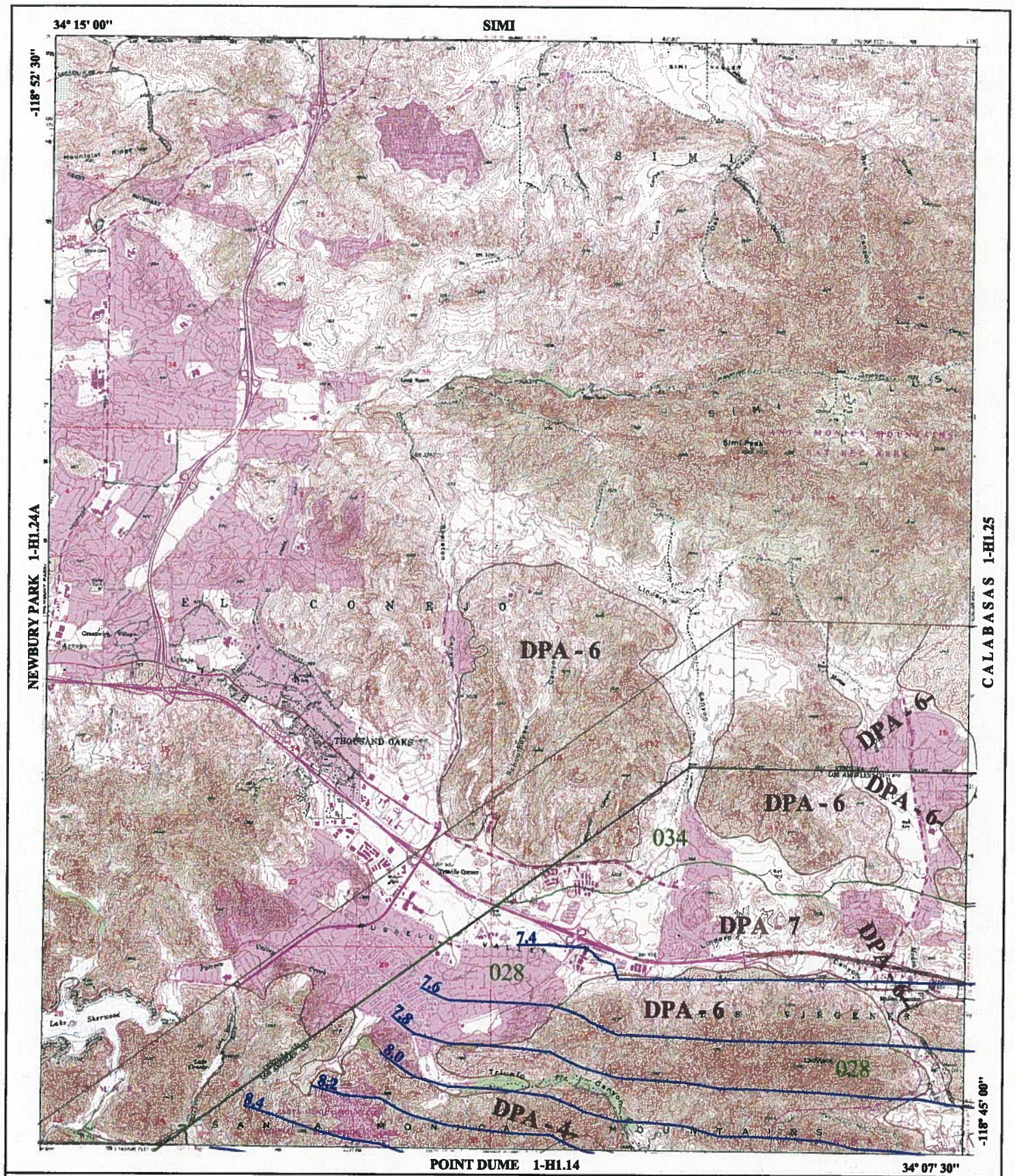


016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

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

THOUSAND OAKS
50-YEAR 24-HOUR ISOHYET

1-H1.24

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

Proposed Project Characteristics

A_{total} (acres):	7.09
Type of Development:	Senior Residential Apartment
Predominate Soil Type No.:	028
Design Storm:	50-year
24-hour Isohyet (inch):	7.4

Site Description

The subject property is located along the south side of Agoura Road approximately 200 feet from the westerly City Boundary in the City of Agoura Hills. The site is presently two undeveloped parcels totaling 7.09 acres that generally drains in a northerly direction with two natural drainage courses that cross Agoura Road with storm drains maintained by Los Angeles County.

Two senior apartment buildings are proposed for the site with graded pads, parking lots and driveways serving each of the two building. The graded pads are designed to avoid the natural drainage courses. The onsite runoff will be treated with a combination of infiltration basins and bioswales with the remaining outflow joining the existing natural drainage courses via the bioswales.

Regularity Jurisdiction

The area of the study site is under the jurisdiction of the City of Los Angeles Department of City Planning. All values are calculated in accordance with the Los Angeles County Department of Public Works hydrological standards.

Watershed Hydrology Study

The main scope of this study is to determine the runoff of area within the watershed for 50-year storms. The hydrology methodology will be the new modified rational method by the Los Angeles County Department of Public Works (LACDPW), Land Development Division. The computer program performing the calculation is LAR04, which is a text-based implementation of the modified rational method.

Proposed Condition

In post-development conditions, the site is divided into five (5) drainage subareas (subareas I to V of HYD02). Among those, Subarea I encompasses Building A, Subarea IV encompasses Building B. Subareas II, III and IV are natural drainage subareas.

The north and east half of Subarea I (Building A) drains northerly into the bioswale along the Agoura Road, which directs flow gradually towards east. The south and west half of Subarea I drains south-easterly to the proposed detention basin #1, which discharges the outflow north-easterly towards Agoura Road. Runoff from Subarea II flows north-easterly along natural rip-rap channel. These three courses join at a CMP box off the Agoura Road that is connected to existing storm drain.

Runoff from Subarea III flows north-westerly, and is caught by bioswale along the Agoura Road at the north end of the subarea. The south-west portion runoff from Subarea IV (Building B) flows north-westerly along the driveway, is collected at catch basins and directed to the proposed detention basin #2 located at north-west of

Subarea IV. The north-east portion runoff from Subarea IV flows northerly, and is collected by the bioswale along the Agoura Road at the northern end of the subarea. The runoff from Subarea V flows northerly into the existing storm drain via a 48" existing inlet tower.

Time of concentration calculation – Modified Rational Method

Time of Concentration - Kinematic Wave Theory

$$T_c = t_o + t_c \quad (1)$$

where:
T_c = Time of concentration in minutes
t_o = Overland flow travel time in minutes
t_c= Sum of all conveyance travel times in minutes

$$t_o = \frac{10^{-0.507} * L_0^{0.483}}{I_x^{0.519} S_0^{0.135}} \quad (2)$$

$$I_x = C_d * I \quad (3)$$

where:
L_0 = Overland flow length in feet
n_0 = Roughness for overland flow surface dimensionless
I_x = Rainfall excess in in/hr
S_0 = Slope of overland flow in ft/ft
C_d = Runoff coefficient, ratio of runoff rate to rainfall intensity in in/in
I = Rainfall intensity in in/hr

$$C_d = (0.9 * IMP) + (1 - IMP) * C_u \qquad \text{if } C_d < C_u, \text{ use } C_d = C_u \quad (4)$$

C_u = Undeveloped runoff coefficient, ratio of runoff rate to rainfall intensity in in/in
IMP = Percent Impervious, percent expressed as 0.0 to 1.0

$$I_t = I_{1440} * (\frac{1440}{t})^{0.47} \quad (5)$$

where:
t = Duration in minutes
I_t= Rainfall intensity for the duration in in/hr
I_{1440}= 24-hour rainfall intensity in in/hr

$$t_c = \frac{Reach\ length}{V_{ave} * 60} \quad (6)$$

where:
V_{ave} = Average conveyance velocity based on Manning equation in ft/sec, read from natural channel curves (from natural channel curves)

Calculation procedure

The calculation of Tc is performed in an iterative manner by trial and error. The steps are carried out as follow:

1. Determine subarea boundaries and then calculate flow path length and flow path slope
2. Assume an initial value for T_C
3. Use Equation (5) to calculate intensity at time t (Appendix I)
4. Determine the developed soil runoff coefficient using the soil curve data and Equation (4) (Appendix J)
5. Use Equation (2) to calculate travel time for overland flow
6. Calculate the discharge at the top of each reach
7. Obtain the mean velocity from natural channel curves (Appendix K)
8. Use Equation (6) to calculate travel time for channel flow
9. Use Equation (1) to obtain Tc
10. Compare Tc from (9) with the assumed Tc from (2). If the value is not within 0.5 minutes of the assumed, use the new Tc value and begin at Step 3 to complete another iteration

Conclusion

In the interest of clarity, the hydrologic calculations have been divided into two sections – Building A and Building B. The following summarizes the results:

Building A

The Building A site includes primarily subarea1 with an area of 1.17 acres. The proposed project will result in 53% of the site as impervious area. The detention volume required is 435.6 ft^3. Treatment flow for this portion of the site is 0.14 cfs resulting in a treatment volume of 1,670 ft^3.

Building B

The Building B site includes a total area of 1.91 acres and the proposed project will result in 47% of the site as impervious area. The detention volume is 871.2 ft^3. The treatment flow for this portion of the site is 0.22 cfs resulting in a treatment volume of 3,288 ft^3

The total required detention volume is 1,306.8 ft^3, and the total treatment volume for this site is 4,958 ft^3 (183 yd^3). The combination of infiltration basins and bioswales will be sized to handle the total required treatment flow and volumes.

Existing Condition

Hydrology Calculation Summary

Subarea	Area (ac)	Imperviousness (decimal)	Frequency (Design Storm)	Soil Type	Length (ft)	50-yr 24-hr Isohyet (in)	Tc calculated(min)	Cu	Cd
1	1.98	0.01	50	28	477	7.4	5	0.69	0.69
2	3.41	0.01	50	28	562	7.4	5	0.69	0.69
3	1.7	0.01	50	28	398	7.4	5	0.69	0.69
Total	7.09								

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 537 3A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	2.00	200	2.00	300	2.00	400	2.00
500	2.00	600	2.00	700	2.00	800	2.00	900	2.00
1000	2.00	1050	2.00	1100	2.00	1110	2.00	1120	2.00
1130	2.00	1131	2.00	1132	2.00	1133	2.00	1134	2.00
1135	2.00	1136	2.00	1137	2.00	1138	2.00	1139	2.00
1140	2.00	1141	2.00	1142	2.00	1143	2.00	1144	2.00
1145	2.00	1146	2.00	1147	2.00	1148	2.01	1149	2.13
1150	2.60	1151	3.40	1152	4.32	1153	5.24	1154	5.70
1155	5.23	1156	4.28	1157	3.33	1158	2.56	1159	2.15
1160	2.02	1161	2.00	1162	2.00	1163	2.00	1164	2.00
1165	2.00	1166	2.00	1167	2.00	1168	2.00	1169	2.00
1170	2.00	1171	2.00	1172	2.00	1173	2.00	1174	2.00
1175	2.00	1176	2.00	1177	2.00	1178	2.00	1179	2.00
1180	2.00	1181	2.00	1182	2.00	1183	2.00	1184	2.00
1185	2.00	1186	2.00	1187	2.00	1188	2.00	1189	2.00
1190	2.00	1191	2.00	1192	2.00	1193	2.00	1194	2.00
1195	2.00	1196	2.00	1197	2.00	1198	2.00	1199	2.00
1200	2.00	1201	2.00	1202	2.00	1203	2.00	1204	2.00
1205	2.00	1206	2.00	1207	2.00	1208	2.00	1209	2.00
1210	2.00	1211	2.00	1212	2.00	1213	2.00	1214	2.00
1215	2.00	1216	2.00	1217	2.00	1218	2.00	1219	2.00
1220	2.00	1221	2.00	1222	2.00	1223	2.00	1224	2.00
1225	2.00	1226	2.00	1227	2.00	1228	2.00	1229	2.00
1230	2.00	1231	2.00	1232	2.00	1233	2.00	1234	2.00
1235	2.00	1236	2.00	1237	2.00	1238	2.00	1239	2.00
1240	2.00	1241	2.00	1242	2.00	1243	2.00	1244	2.00
1245	2.00	1246	2.00	1247	2.00	1248	2.00	1249	2.00
1250	2.00	1251	2.00	1252	2.00	1253	2.00	1254	2.00
1255	2.00	1256	2.00	1257	2.00	1258	2.00	1259	2.00
1260	2.00	1261	2.00	1262	2.00	1263	2.00	1264	2.00

Program Package Serial Number: 2091

12/02/14 FILE: 537exi_Building A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: c:\civild\537\lar_soilx_71.dat

Agoura Road

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
537	1A	1.2	3.69	1.2	3.69	3	200.	.05660	.00	.00	0.	28	5	A37	.01
537	2B	.8	2.46	.8	2.46	3	200.	.09361	.00	.00	0.	28	5	A37	.01
537	3AB	.8	2.28	2.0	5.70	0	0.	.00000	.00	.00	0.	28	0	A37	.00

1265	2.00	1266	2.00	1267	2.00	1268	2.00	1269	2.00
1270	2.00	1271	2.00	1272	2.00	1273	2.00	1274	2.00
1275	2.00	1276	2.00	1277	2.00	1278	2.00	1279	2.00
1280	2.00	1281	2.00	1282	2.00	1283	2.00	1284	2.00
1285	2.00	1286	2.00	1287	2.00	1288	2.00	1289	2.00
1290	2.00	1291	2.00	1292	2.00	1293	2.00	1294	2.00
1295	2.00	1296	2.00	1297	2.00	1298	2.00	1299	2.00
1300	2.00	1310	2.00	1320	2.00	1330	2.00	1340	2.00
1350	2.00	1360	2.00	1370	2.00	1380	2.00	1390	2.00
1400	2.00	1420	2.00	1440	2.00	1460	2.00	1500	2.00

TOTAL VOLUME THIS HYDROGRAPH = 4.02(Ac.Ft)

Program Package Serial Number: 2091

12/02/14 FILE: exi_Building B INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: c:\civild\537\lar_soilx_71.dat

Agoura Road

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM RAIN ZONE	DAY 4 PCT IMPV
537	1A	1.9	5.84	1.9	5.84	3	562.	.11110	.00	.00	0.	28	5	A37	.01
537	2AB	.0	.00	1.9	5.20	0	0.	.00000	.00	.00	0.	28	0	A37	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 537 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	1.00	200	1.00	300	1.00	400	1.00
500	1.00	600	1.00	700	1.00	800	1.00	900	1.00
1000	1.00	1050	1.00	1100	1.00	1110	1.00	1120	1.00
1130	1.00	1131	1.00	1132	1.00	1133	1.00	1134	1.00
1135	1.00	1136	1.00	1137	1.00	1138	1.00	1139	1.00
1140	1.00	1141	1.00	1142	1.00	1143	1.00	1144	1.01
1145	1.04	1146	1.10	1147	1.19	1148	1.30	1149	1.43
1150	1.73	1151	2.34	1152	3.14	1153	4.02	1154	4.89
1155	5.20	1156	4.76	1157	4.01	1158	3.18	1159	2.37
1160	1.72	1161	1.35	1162	1.18	1163	1.09	1164	1.05
1165	1.02	1166	1.01	1167	1.01	1168	1.00	1169	1.00
1170	1.00	1171	1.00	1172	1.00	1173	1.00	1174	1.00
1175	1.00	1176	1.00	1177	1.00	1178	1.00	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 = 2.04(Ac.Ft)

Proposed Condition

Hydrology Calculation Summary

Subarea	Area (ac)	Imperviousness (decimal)	Frequency (Design Storm)	Soil Type	Length (ft)	50-yr 24-hr Isohyet (in)	Tc calculated(min)	Cu	Cd
I	1.18	0.53	50	28	556	7.4	5	0.69	0.80
II	0.81	0.01	50	28	670	7.4	5	0.69	0.69
III	2.09	0.01	50	28	567	7.4	5	0.69	0.69
IV	1.91	0.47	50	28	598	7.4	5	0.69	0.79
V	1.10	0.01	50	28	498	7.4	5	0.69	0.69
Total	7.09								

Program Package Serial Number: 2091

12/02/14 FILE: 537pro_Building A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: c:\civild\537new\lar_soilx_71.dat

Agoura Road

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
537	1A	.8	2.46	.8	2.46	3	258.	.09361	.00	.00	0.	28	5	A37	.01
537	2B	1.2	4.26	1.2	4.26	3	556.	.04414	.00	.00	0.	28	5	A37	.53
537	3AB	1.2	3.59	2.0	5.65	0	0.	.00000	.00	.00	0.	28	0	A37	.00

Program Package Serial Number: 2091
12/02/14 FILE: 537pro_Building A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 537 3A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	2.00	200	2.00	300	2.00	400	2.00
500	2.00	600	2.00	700	2.00	800	2.00	900	2.00
1000	2.00	1050	2.00	1100	2.00	1110	2.00	1120	2.00
1130	2.00	1131	2.00	1132	2.00	1133	2.00	1134	2.00
1135	2.00	1136	2.00	1137	2.00	1138	2.00	1139	2.00
1140	2.00	1141	2.00	1142	2.00	1143	2.01	1144	2.03
1145	2.06	1146	2.10	1147	2.16	1148	2.23	1149	2.32
1150	2.50	1151	2.96	1152	3.70	1153	4.56	1154	5.33
1155	5.65	1156	5.39	1157	4.80	1158	4.13	1159	3.54
1160	3.03	1161	2.62	1162	2.37	1163	2.23	1164	2.14
1165	2.09	1166	2.06	1167	2.04	1168	2.02	1169	2.01
1170	2.01	1171	2.01	1172	2.00	1173	2.00	1174	2.00
1175	2.00	1176	2.00	1177	2.00	1178	2.00	1179	2.00
1180	2.00	1181	2.00	1182	2.00	1183	2.00	1184	2.00
1185	2.00	1186	2.00	1187	2.00	1188	2.00	1189	2.00
1190	2.00	1191	2.00	1192	2.00	1193	2.00	1194	2.00
1195	2.00	1196	2.00	1197	2.00	1198	2.00	1199	2.00
1200	2.00	1201	2.00	1202	2.00	1203	2.00	1204	2.00
1205	2.00	1206	2.00	1207	2.00	1208	2.00	1209	2.00
1210	2.00	1211	2.00	1212	2.00	1213	2.00	1214	2.00
1215	2.00	1216	2.00	1217	2.00	1218	2.00	1219	2.00
1220	2.00	1221	2.00	1222	2.00	1223	2.00	1224	2.00
1225	2.00	1226	2.00	1227	2.00	1228	2.00	1229	2.00
1230	2.00	1231	2.00	1232	2.00	1233	2.00	1234	2.00
1235	2.00	1236	2.00	1237	2.00	1238	2.00	1239	2.00
1240	2.00	1241	2.00	1242	2.00	1243	2.00	1244	2.00
1245	2.00	1246	2.00	1247	2.00	1248	2.00	1249	2.00
1250	2.00	1251	2.00	1252	2.00	1253	2.00	1254	2.00
1255	2.00	1256	2.00	1257	2.00	1258	2.00	1259	2.00
1260	2.00	1261	2.00	1262	2.00	1263	2.00	1264	2.00
1265	2.00	1266	2.00	1267	2.00	1268	2.00	1269	2.00
1270	2.00	1271	2.00	1272	2.00	1273	2.00	1274	2.00
1275	2.00	1276	2.00	1277	2.00	1278	2.00	1279	2.00

1280	2.00	1281	2.00	1282	2.00	1283	2.00	1284	2.00
1285	2.00	1286	2.00	1287	2.00	1288	2.00	1289	2.00
1290	2.00	1291	2.00	1292	2.00	1293	2.00	1294	2.00
1295	2.00	1296	2.00	1297	2.00	1298	2.00	1299	2.00
1300	2.00	1310	2.00	1320	2.00	1330	2.00	1340	2.00
1350	2.00	1360	2.00	1370	2.00	1380	2.00	1390	2.00
1400	2.00	1420	2.00	1440	2.00	1460	2.00	1500	2.00

TOTAL VOLUME THIS HYDROGRAPH = 4.03(Ac.Ft)

Program Package Serial Number: 2091

12/02/14 FILE: prop_Building B INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: c:\civild\537\lar_soilx_71.dat

Agoura Road

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM RAIN ZONE	DAY 4 PCT IMPV
537	1A	1.9	6.64	1.9	6.64	3	598.	.10424	.00	.00	0.	28	5	A37	.47
537	2AB	.0	.00	1.9	5.99	0	0.	.00000	.00	.00	0.	28	0	A37	.00

Program Package Serial Number: 2091
12/02/14 FILE: prop_Building B INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 537 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	1.00	200	1.00	300	1.00	400	1.00
500	1.00	600	1.00	700	1.00	800	1.00	900	1.00
1000	1.00	1050	1.00	1100	1.00	1110	1.00	1120	1.00
1130	1.01	1131	1.01	1132	1.01	1133	1.02	1134	1.04
1135	1.08	1136	1.12	1137	1.17	1138	1.21	1139	1.27
1140	1.32	1141	1.36	1142	1.42	1143	1.50	1144	1.57
1145	1.65	1146	1.74	1147	1.86	1148	1.99	1149	2.13
1150	2.45	1151	3.07	1152	3.86	1153	4.74	1154	5.62
1155	5.99	1156	5.58	1157	4.85	1158	4.00	1159	3.13
1160	2.38	1161	1.86	1162	1.54	1163	1.32	1164	1.18
1165	1.10	1166	1.05	1167	1.03	1168	1.02	1169	1.01
1170	1.01	1171	1.00	1172	1.00	1173	1.00	1174	1.00
1175	1.00	1176	1.00	1177	1.00	1178	1.00	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 = 2.06(Ac.Ft)

Detention Volume Calculations

	Building A	Building B
proposed (ac-ft)	4.03	2.06
existing (ac-ft)	4.02	2.04
Detention Volume (ac-ft)	0.01	0.02
Detention Volume (ft^3)	435.6	871.2

Infiltration Basin Design

	Basin 1	Basin 2
Detention Volume Required (ft^3)	435.6	871.2
Infiltration Volume Required (ft^3)	1,670	3,288
Total Volume Required (ft^3)	2,105.6	4,159.2
Top Area (ft^2)	1,023	2,178
Board Elevation (ft)	977	956
Top Elevation (ft)	976.1	954
Bottom Area (ft^2)	1,023	716
Bottom Elevation (ft)	974	950.5
Free Board (ft)	0.9	2
Depth (ft)	2	3.5
Side Slope	-	3
Total Volume Provided (ft^3)	2,148	5,064

Bioswale Design

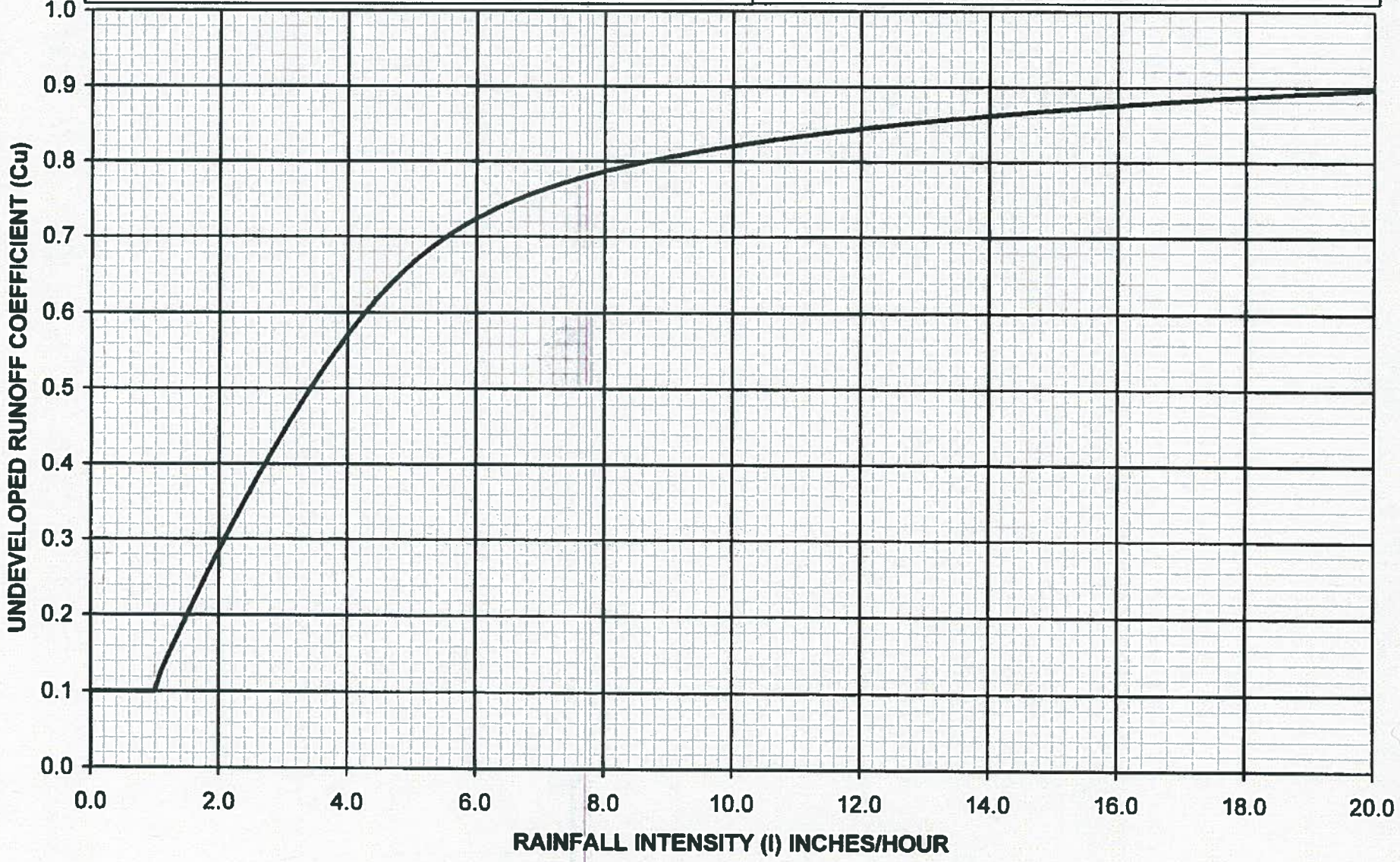
	Swale I	Swale II	Swale III
Length (ft)	79.40	157.60	159.80
Bottom Width (ft)	1.00	1.00	1.00
Slope	0.038	0.025	0.013
Side Slope (H:V)	3.00	3.00	3.00
Manning's n	0.04	0.04	0.04
Q (ft^3/s)	2.49	4.17	6.38
Flow Depth (ft)	0.40	0.56	0.78
Velocity (ft/s)	2.86	2.80	2.45

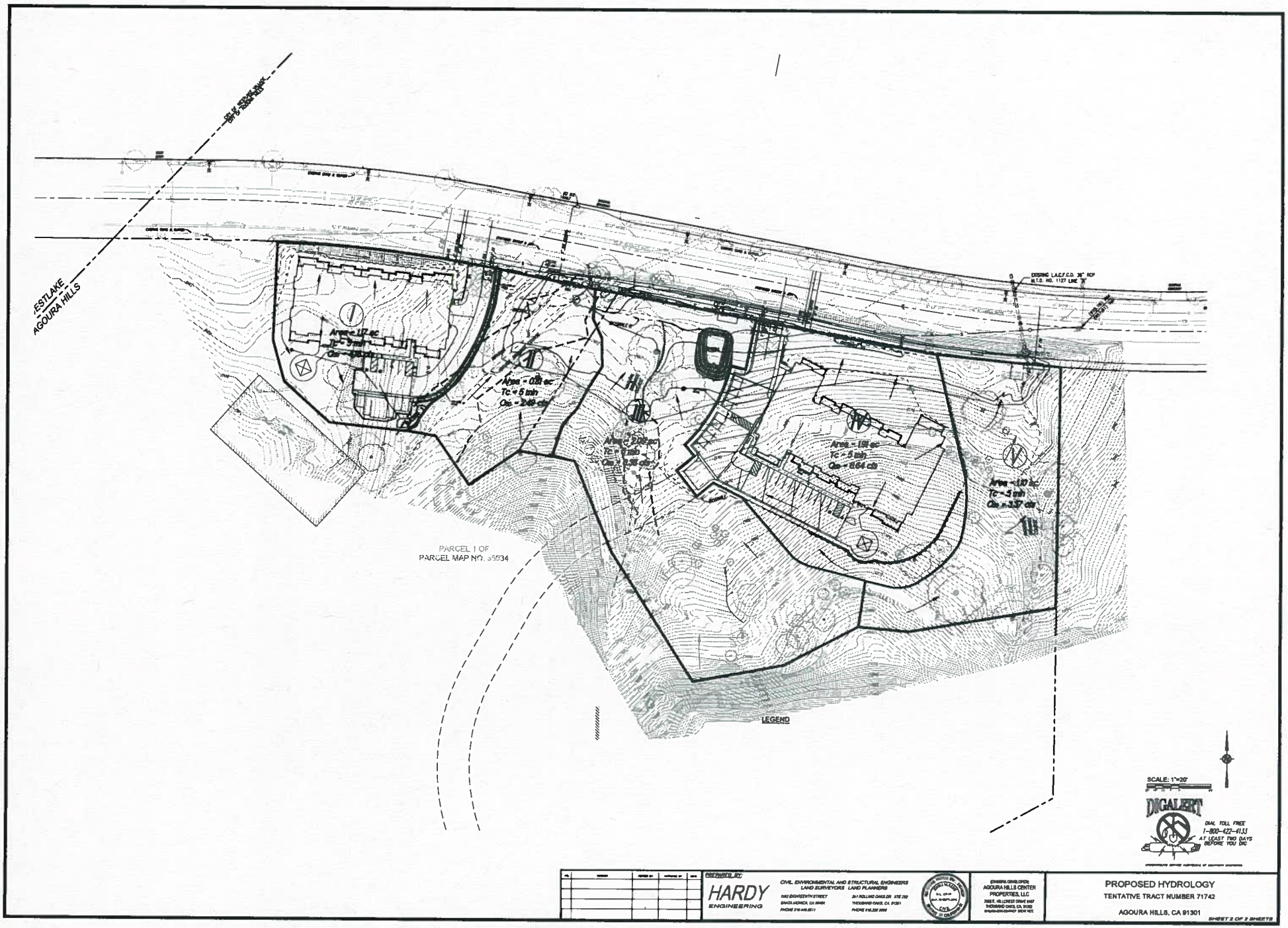
$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 019





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OWNER/DEVELOPER:
AGOURA HILLS CENTER
PROPERTIES, LLC
2655 E. VILLCREST DRIVE #407
THOUSAND OAKS, CA. 91362

PROPOSED HYDROLOGY

TENTATIVE TRACT NUMBER 71742

AGOURA HILLS, CA 91301

SHEET 2 OF 2 SHEETS