

APPENDIX C

HYDROLOGY STUDY

**ONSITE
HYDROLOGY REPORT**

FOR

**LONG BEACH SPORTS PARK
Long Beach, California**

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June 19, 2003

Revised August 10, 2004

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Long Beach Sports Park

ONSITE HYDROLOGY REPORT

Introduction

This report provides onsite hydrology calculations to support the design of storm drain systems to serve the Long Beach Sports Park development in the City of Long Beach. The development is generally bounded on the north by Spring Street, on the east by Orange Avenue, on the west by California Avenue and on the south by two existing cemetery sites. The improvement site covers about 55 acres. The location is shown on the vicinity map.

This report only covers onsite hydrology. Offsite hydrology is per an LACDPW memo dated April 30, 1992, from Richard Smith to Donald Nichols. A copy of this memo is included in Appendix C.

Hydrology

Hydrology calculations were based on the Modified Rational Method as presented in the Los Angeles County Department of Public Works "Hydrology/Sedimentation Manual", dated December 1991, and "Addendum to the 1991 Hydrology/Sedimentation Manual", dated June 2002. The calculations were performed using the Time of Concentration Calculator developed by Los Angeles County Department of Public Works Water Resources Division.

Since the proposed Long Beach Sports Park site is to contain a detention basin, calculations were performed for a 50-year, 25-year and 10-year storm frequencies consistent with the LACDPW manual using MORA software. The 5-year and 2-year discharges were determined using factors 0.584 and 0.387 respectively as provided by LACDPW. As shown on the hydrologic soils map, the majority of the site falls within Soil Classification Area 013 with a couple areas to the south in Area 014. As shown on the isohyet map, the 50-Year 24-Hour Isohyet is 5.2.

Existing Conditions

The site presently drains, primarily by surface flow, to seven separate sump areas (none of which are picked up by a storm drain) and an existing detention basin located onsite. A portion of the eastern part of the site drains to Orange Avenue (Sub areas 10A and 14A), while a portion of the western part of the site drains to California Avenue (Sub area 6A and 11A). Presently, there is a 78-inch storm drain (Walnut-Spring Drain, Unit 1) and a 69-inch storm drain (LBWD Drawing No. B-2035a and c) that gather storm flows from 207 acres offsite and convey the total flow of 460 cfs to an existing 108-inch storm drain (Walnut-Spring Drain, Unit 2) that runs through the northern half of the site and

discharges into the detention basin. All flows up to 100 cfs drain out of the detention basin through an existing 54-inch storm drain (LACFCD Project No. 5109). The remaining flows, combined with direct rainfall over the basin (Sub area 8A) and flow from the east (Sub area 9A) total 473 cfs with an equivalent storage volume of 36.07 acre-feet. All flows in excess of 100 cfs are stored in the basin and/or onsite until capacity in the downstream storm drain (Project No. 5109) is available. Detailed existing hydrology calculations are included in Appendix A.

Proposed Conditions

Due to grading operations, the existing storm drains will be removed and a new 108-inch storm drain will be constructed downstream of Spring Street to carry and discharge the existing pipe flow of 460 cfs into a proposed 0.08-acre stilling basin area with a floor elevation of 44.5. The stilling basin will incorporate a 51-inch storm drain outlet with an invert elevation of 48.98. The storage volume in the stilling basin below the outlet is 0.52 acre-feet. The total storage volume of the stilling basin up to the access road is 1.66 acre-feet. The total flow discharged out of the stilling basin by the 51-inch storm drain will be 100 cfs. Flows in excess of 100 cfs will spill out of the stilling basin and into the soccer fields that act as a detention basin. The soccer field detention basin will have a total volume of 42.5 acre-feet.

The proposed site was broken into eleven drainage areas. Sub areas 1A through 9A are collected upstream of the proposed desilting basin. Areas 10A and 11A are collected into the 51-inch storm drain downstream of the desilting basin. The 51-inch storm drain discharges into the existing 54-inch RCP at the southwest corner of the site. Detailed hydrology calculations are included in Appendix B.

Storm Water Management Plan

As required by the Standard Urban Storm Water Mitigation Plan (SUSMP) for Los Angeles County and the City of Long Beach Municipal Code Chapter 18.95, developments that will result in 100,000 square feet or more of impermeable surface, including parking lots, are subject to specific source control and treatment control best management practice (BMP) requirements. The project shall incorporate BMPs applicable to the site into its description and design that address pollutants of concern such as trash and petroleum hydrocarbons.

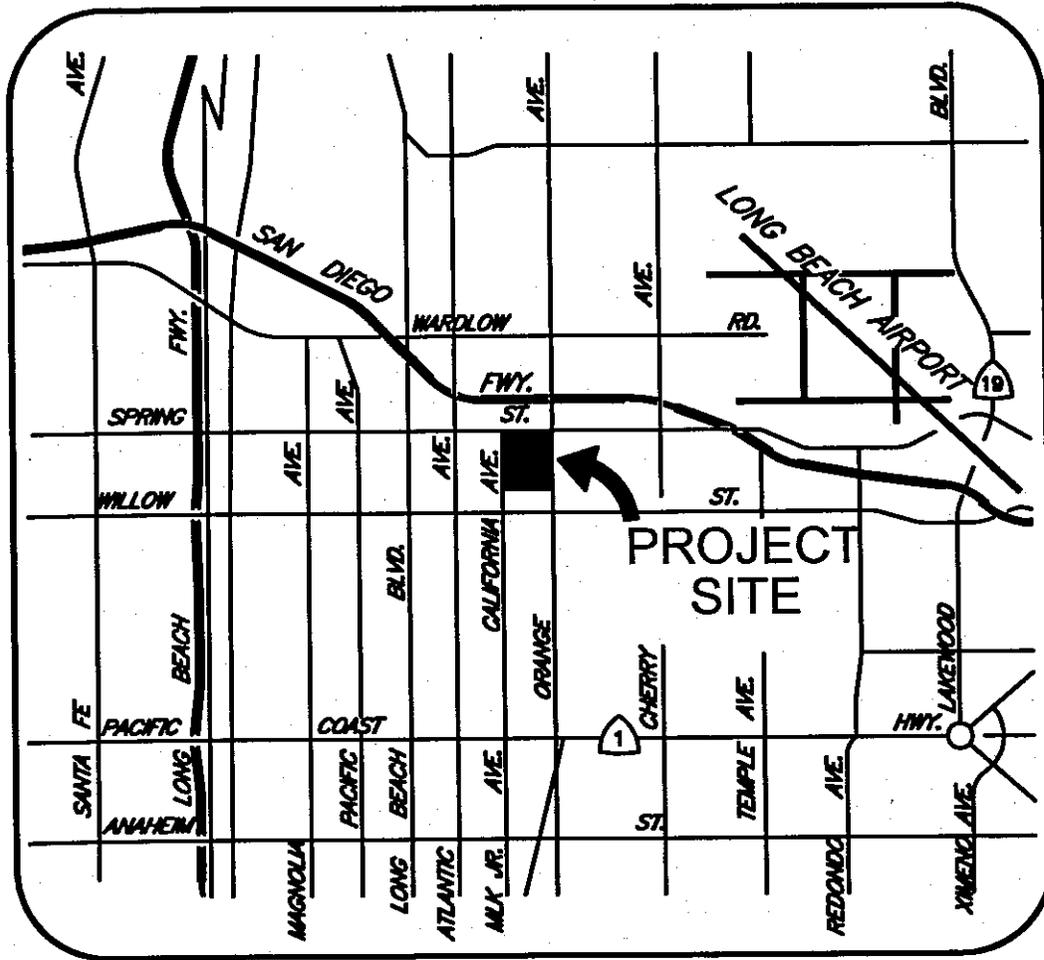
Dry Weather Flow

Dry weather flow is defined as surface water runoff from non-storm events (excess landscape irrigation, washing off of sidewalks, street cleaning activities, etc.). All dry weather flows generated onsite are expected to be contained onsite. Runoff from all significant hardscape areas will be picked up by the proposed onsite storm drain system and discharged into the 108" storm drain upstream of the stilling basin. The stilling basin has a capacity of 0.52 acre-feet below the outlet elevation. This capacity will allow the dry weather flows to be contained onsite and percolate into the ground. Site areas

downstream of the stilling basin are predominately soccer fields or golf oriented areas. By controlling irrigation activities dry weather flows will be eliminated from these areas.

APPENDIX A

EXISTING HYDROLOGY CALCULATIONS

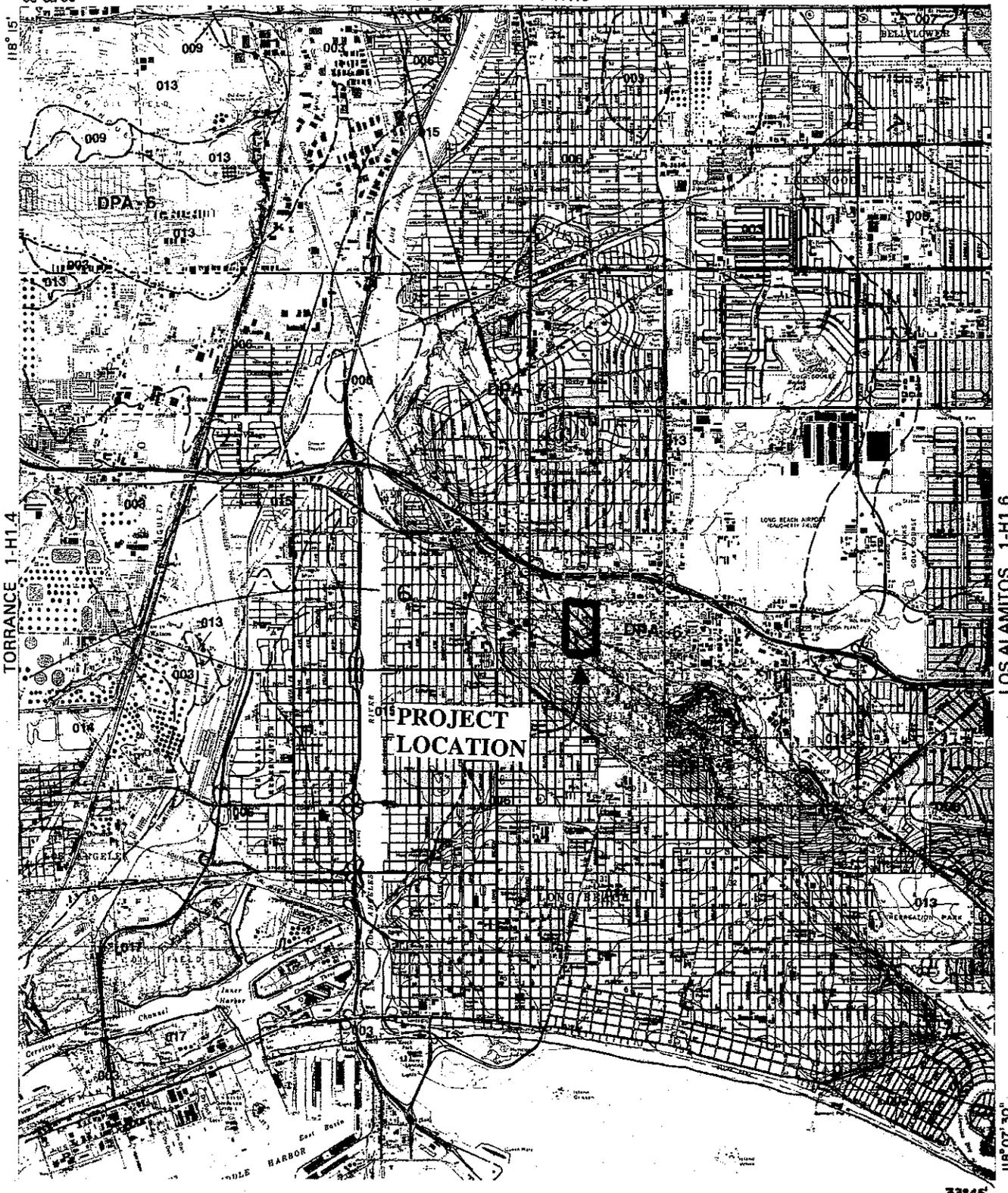


VICINITY MAP
N.T.S.



**LONG BEACH
SPORTS PARK**

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LEGEND

- SOIL CLASSIFICATION AREA
- DEBRIS POTENTIAL AREA

- (K) RAINFALL ZONE
- 12— 50-YEAR ISOHYET (MAX. 24-HOUR AMOUNT)

LACDPW



LONG BEACH

1981

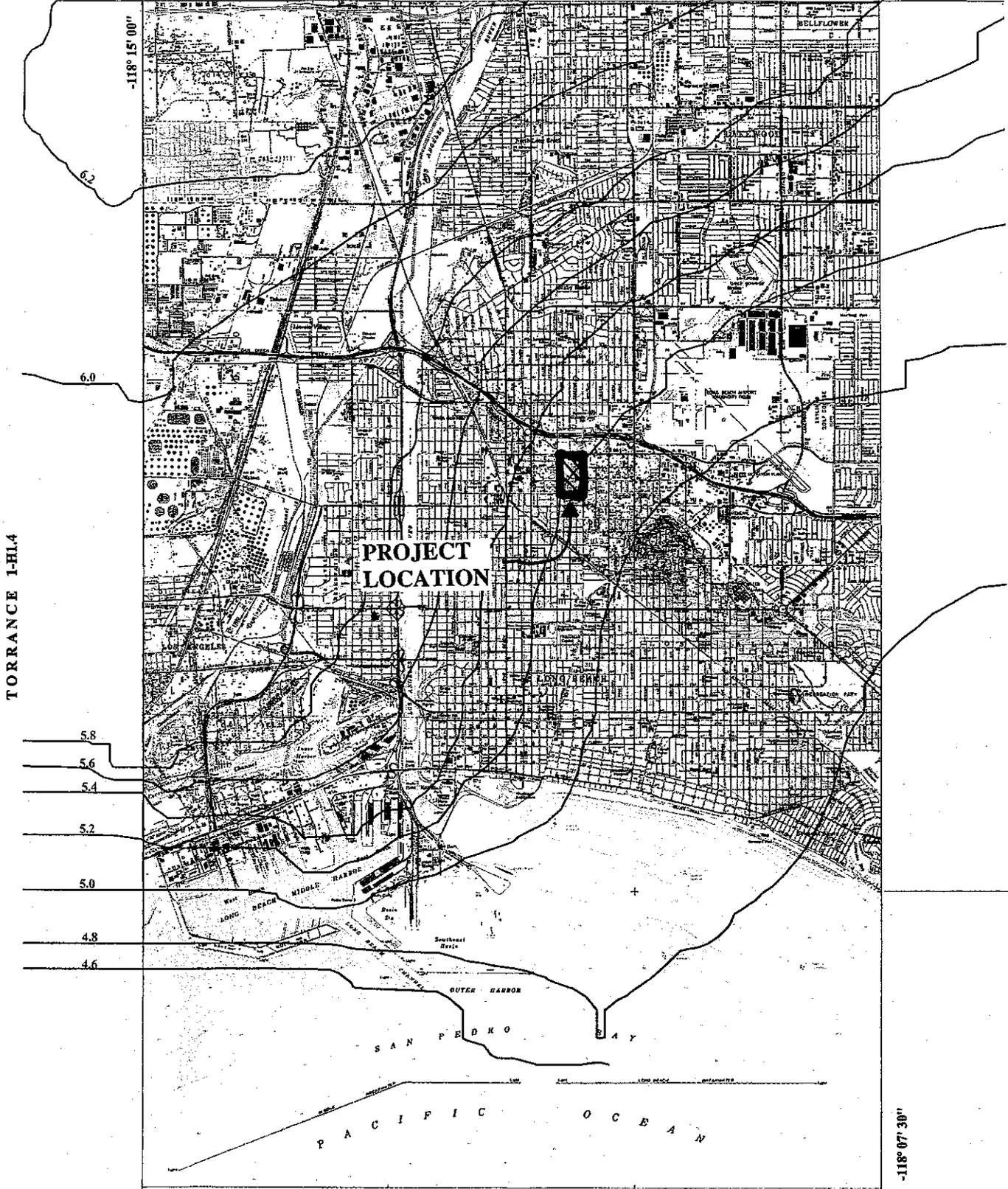


hydrologic map

33° 52' 30"

SOUTH GATE 1-H1.9

-118° 15' 00"



TORRANCE 1-H1.4

LOS ALAMITOS 1-H1.6

6.0

5.8

5.6

5.4

5.2

5.0

4.8

4.6

PROJECT LOCATION

SAN PEDRO BAY
PACIFIC OCEAN

-118° 07' 30"

33° 43' 30"

1 0 1 2 Miles



7.2
INCHES OF RAINFALL

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

**LONG BEACH
50-YEAR 24-HOUR ISOHYET**

1-H1.5



APPENDIX E: Proportion Impervious Values

Residential

Single-Family _____	0.418
Two-Unit _____	0.418
Three-Unit _____	0.682
Four-Unit _____	0.819
Five-Unit _____	0.855

Commercial

Stores, Office Buildings, Manufacturing Outlets _____	0.909
Shopping Centers (Regional), Restaurants, Service Shops, Auto Equipment, Parking Lots _____	0.946
Shopping Centers (Neighborhood), Motels, Hotels, Kennels, Professional Buildings, Banks, Service Stations _____	0.958
Supermarkets _____	0.976
Department Stores _____	0.985

Industrial

Mineral Processing _____	0.473
Open Storage _____	0.655
Motion Picture, Radio, Television _____	0.819
Manufacturing, Warehousing, Storage, Parking _____	0.909
Food Processing Plants, Lumber Yards _____	0.958

Institutional Property

Colleges, Universities _____	0.473
Homes for the Aged _____	0.682
Hospitals, Cemeteries, Mausoleums, Mortuaries _____	0.744
Churches, Schools _____	0.819

Undeveloped Property

Rural _____	0.01
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LONG BEACH SPORTS COMPLEX HYDROLOGY EXISTING FLOWS									
AREA	LAND COVER		%IMP	%IMP	2-YR	5-YR	10-YR	25-YR	50-YR
1a	60%	Parking Lot	0.946	0.572	2	3	5	7	9
	40%	Rural	0.01						
2a	100%	Rural	0.01	0.010	0	1	2	3	3
3a	10%	Parking Lot	0.946	0.463	5	13	18	28	35
	40%	Warehousing	0.909						
	50%	Rural	0.01						
4a	80%	Manufacturing	0.909	0.729	1	2	2	3	4
	20%	Rural	0.01						
5a	100%	Rural	0.01	0.010	0	1	1	1	1
6a	100%	Rural	0.01	0.010	0	0	1	1	2
7a	10%	Concrete (Storage)	0.909	0.100	1	5	8	16	20
	90%	Rural	0.01						
8a	100%	Rural	0.01	0.010	0	1	2	2	3
9a	10%	Manufacturing	0.909	0.100	0	3	5	8	10
	90%	Rural	0.01						
10a	80%	Manufacturing	0.909	0.729	0	1	1	1	1
	20%	Rural	0.01						
11a	100%	Rural	0.01	0.010	0	1	1	2	2
12a	100%	Rural	0.01	0.010	0	0	1	2	2
13a	10%	Storage	0.909	0.100	1	1	3	8	13
	90%	Rural	0.01						
14a	30%	Manufacturing	0.909	0.973	1	2	3	5	7
	70	Rural	0.01						

LONG BEACH SPORTS PARK EXISTING 50-YR HYDROLOGY

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
590050	1a	3.44	0.572	50	13	481.36	0.0233	5.2	6	2.85	0.9	0.9	9
590050	2a	1.08	0.01	50	13	246.7	0.0451	5.2	5	3.1	0.91	0.9	3
590050	3a	15.95	0.463	50	13	818.26	0.035	5.2	8	2.49	0.88	0.89	35
590050	4a	1.65	0.729	50	13	574.94	0.0218	5.2	7	2.65	0.89	0.9	4
590050	5a	0.52	0.01	50	13	118	0.1	5.2	5	3.1	0.91	0.9	1
590050	6a	0.88	0.01	50	14	471.23	0.0525	5.2	7	2.65	0.7	0.7	2
590050	7a	10.63	0.1	50	14	591.66	0.0841	5.2	7	2.65	0.7	0.72	20
590050	8a	0.97	0.01	50	13	194.79	0.2116	5.2	5	3.1	0.91	0.9	3
590050	9a	4.06	0.1	50	13	729.84	0.1058	5.2	6	2.85	0.9	0.9	10
590050	10a	0.47	0.729	50	13	362.83	0.0155	5.2	6	2.85	0.9	0.9	1
590050	11a	0.91	0.01	50	14	108.83	0.1167	5.2	5	3.1	0.74	0.74	2
590050	12a	1.14	0.01	50	14	402.87	0.0242	5.2	7	2.65	0.7	0.7	2
590050	13a	10.67	0.1	50	14	1385.53	0.0495	5.2	14	1.91	0.6	0.63	13
590050	14a	3.59	0.28	50	14	686.91	0.0518	5.2	8	2.49	0.69	0.75	7

LONG BEACH SPORTS PARK EXISTING 25-YR HYDROLOGY

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
590050	1a	3.44	0.572	25	13	481.36	0.0233	4.57	7	2.33	0.87	0.89	7
590050	2a	1.08	0.01	25	13	246.7	0.0451	4.57	5	2.73	0.89	0.89	3
590050	3a	15.95	0.463	25	13	818.26	0.035	4.57	9	2.07	0.82	0.86	28
590050	4a	1.65	0.729	25	13	574.94	0.0218	4.57	8	2.19	0.84	0.88	3
590050	5a	0.52	0.01	25	13	118	0.1	4.57	5	2.73	0.89	0.89	1
590050	6a	0.88	0.01	25	14	471.23	0.0525	4.57	7	2.33	0.68	0.68	1
590050	7a	10.63	0.1	25	14	591.66	0.0841	4.57	8	2.19	0.65	0.68	16
590050	8a	0.97	0.01	25	13	194.79	0.2116	4.57	5	2.73	0.89	0.89	2
590050	9a	4.06	0.1	25	13	729.84	0.1058	4.57	7	2.33	0.87	0.87	8
590050	10a	0.47	0.729	25	13	362.83	0.0155	4.57	6	2.5	0.88	0.89	1
590050	11a	0.91	0.01	25	14	108.83	0.1167	4.57	5	2.73	0.71	0.71	2
590050	12a	1.14	0.01	25	14	402.87	0.0242	4.57	8	2.19	0.65	0.65	2
590050	13a	10.67	0.1	25	14	1385.53	0.0495	4.57	17	1.53	0.48	0.52	8
590050	14a	3.59	0.28	25	14	686.91	0.0518	4.57	9	2.07	0.64	0.71	5

LONG BEACH SPORTS PARK EXISTING 10-YR HYDROLOGY

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Ischvet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
590050	1a	3.44	0.572	10	13	481.36	0.0233	3.71	9	1.68	0.71	0.82	5
590050	2a	1.08	0.01	10	13	246.7	0.0451	3.71	5	2.21	0.85	0.85	2
590050	3a	15.95	0.463	10	13	818.26	0.035	3.71	12	1.47	0.65	0.77	18
590050	4a	1.65	0.729	10	13	574.94	0.0218	3.71	10	1.6	0.69	0.84	2
590050	5a	0.52	0.01	10	13	118	0.1	3.71	5	2.21	0.85	0.85	1
590050	6a	0.88	0.01	10	14	471.23	0.0525	3.71	11	1.53	0.48	0.48	1
590050	7a	10.63	0.1	10	14	591.66	0.0841	3.71	11	1.53	0.48	0.52	8
590050	8a	0.97	0.01	10	13	194.79	0.2116	3.71	5	2.21	0.85	0.85	2
590050	9a	4.06	0.1	10	13	729.84	0.1058	3.71	9	1.68	0.71	0.73	5
590050	10a	0.47	0.729	10	13	362.83	0.0155	3.71	7	1.89	0.78	0.87	1
590050	11a	0.91	0.01	10	14	108.83	0.1167	3.71	5	2.21	0.66	0.66	1
590050	12a	1.14	0.01	10	14	402.87	0.0242	3.71	11	1.53	0.48	0.48	1
590050	13a	10.67	0.1	10	14	1385.53	0.0495	3.71	29	0.97	0.23	0.3	3
590050	14a	3.59	0.28	10	14	686.91	0.0518	3.71	12	1.47	0.47	0.59	3

LONG BEACH SPORTS PARK EXISTING 2-YR HYDROLOGY

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
590050	1a	3.44	0.572	2	13	481.36	0.0233	2.01	15	0.72	0.33	0.66	2
590050	2a	1.08	0.01	2	13	246.7	0.0451	2.01	13	0.77	0.36	0.37	0
590050	3a	15.95	0.463	2	13	818.26	0.035	2.01	23	0.59	0.21	0.53	5
590050	4a	1.65	0.729	2	13	574.94	0.0218	2.01	16	0.69	0.31	0.74	1
590050	5a	0.52	0.01	2	13	118	0.1	2.01	6	1.1	0.53	0.53	0
590050	6a	0.88	0.01	2	14	471.23	0.0525	2.01	30	0.52	0.1	0.11	0
590050	7a	10.63	0.1	2	14	591.66	0.0841	2.01	30	0.52	0.1	0.18	1
590050	8a	0.97	0.01	2	13	194.79	0.2116	2.01	7	1.02	0.5	0.5	0
590050	9a	4.06	0.1	2	13	729.84	0.1058	2.01	30	0.52	0.12	0.2	0
590050	10a	0.47	0.729	2	13	362.83	0.0155	2.01	12	0.79	0.37	0.76	0
590050	11a	0.91	0.01	2	14	108.83	0.1167	2.01	15	0.72	0.1	0.11	0
590050	12a	1.14	0.01	2	14	402.87	0.0242	2.01	30	0.52	0.1	0.11	0
590050	13a	10.67	0.1	2	14	1385.53	0.0495	2.01	30	0.52	0.1	0.18	1
590050	14a	3.59	0.28	2	14	686.91	0.0518	2.01	27	0.54	0.1	0.32	1

APPENDIX B

PROPOSED HYDROLOGY CALCULATIONS

SUB AREA	AREA (AC)	COMPOS % IMPER.	SOIL TYPE	L (FT)	U/S ELEV	D/S ELEV	SLOPE	50 YR TC	I50 IN/HR	CU	CD	Q50 (CFS)	Q25 (CFS)	Q10 (CFS)	* Q5 (CFS)	* Q2 (CFS)
1A	6.08	0.10	13	640	100	87	.020	8	2.51	0.88	0.88	13	11	9	8	5
2A	3.23	0.10	13	370	95	85	.027	5	3.11	0.91	0.90	9	8	6	5	4
3A	2.86	0.73	13	560	95	93	.004	10	2.25	0.85	0.89	6	6	5	4	2
4A	3.42	0.10	13	460	95	84	.024	6	2.88	0.90	0.90	10	9	7	6	4
5A	272	0.10	13	370	95	85	.027	5	3.10	0.91	0.90	9	8	6	5	4
6A	5.14	0.46	13	470	95	84	.023	6	2.85	0.90	0.90	13	12	9	8	5
7A	3.37	0.10	13	380	95	84	.029	5	3.14	0.91	0.90	9	8	6	5	4
8A	8.70	0.85	13	600	105	83	.037	7	2.64	0.89	0.90	23	20	17	13	9
9A	2.82	0.10	14	600	70	45	.042	8	2.49	0.69	0.71	5	4	3	3	2
10A	5.23	0.06	14	500	125	95	.060	7	2.64	0.70	0.71	10	8	6	6	4
11A	9.50	0.01	14	760	66	45	.028	10	2.24	0.66	0.66	15	12	9	9	6

Note: Q5 and Q2 discharge determined by factors provided by LACDPW

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

LONG BEACH SPORTS PARK - 50-YEAR DISCHARGES TALLEY 3/19/04

STORM DAY 4

LOCATION	SUBAREA AREA	SUBAREA Q	TOTAL AREA	TOTAL Q	CONV TYPE	CONV LENGTH	CONV SLOPE	CONV SIZE	CONV Z	CONTROL Q	SOIL NAME	TC	RAIN ZONE	PCT IMPV
59 1A	6.	13.	6.	13.	0	0.	0.00000	0.00	0.00	0.	13	8	A26	0.10
59 2A	3.	9.	9.	22.	0	0.	0.00000	0.00	0.00	0.	13	5	A26	0.10
59 3A	3.	6.	12.	28.	0	0.	0.00000	0.00	0.00	0.	13	10	A26	0.73
59 4A	4.	10.	16.	39.	0	0.	0.00000	0.00	0.00	0.	13	6	A26	0.10
59 5A	3.	9.	19.	47.	0	0.	0.00000	0.00	0.00	0.	13	5	A26	0.10
59 6A	5.	13.	24.	61.	0	0.	0.00000	0.00	0.00	0.	13	6	A26	0.46
59 7A	3.	9.	27.	69.	0	0.	0.00000	0.00	0.00	0.	13	5	A26	0.10
59 8A	9.	23.	36.	92.	0	0.	0.00000	0.00	0.00	0.	13	7	A26	0.85
59 9A	3.	5.	39.	98.	0	0.	0.00000	0.00	0.00	0.	14	8	A26	0.10
59 10A	5.	10.	44.	107.	0	0.	0.00000	0.00	0.00	0.	14	7	A26	0.06
59 11A	10.	15.	54.	122.	0	0.	0.00000	0.00	0.00	0.	14	10	A26	0.01

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

END OF CALCULATION

HYDROGRAPH AT		59	11A	STORM DAY 4		REDUCTION FACTOR = 1.000			
TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	0.	100	2.	200	2.	300	2.	400	3.
500	3.	600	3.	700	3.	800	4.	900	4.
1000	5.	1050	6.	1100	8.	1110	10.	1120	12.
1130	16.	1131	16.	1132	17.	1133	17.	1134	18.
1135	19.	1136	19.	1137	20.	1138	21.	1139	22.
1140	23.	1141	24.	1142	26.	1143	28.	1144	30.
1145	34.	1146	38.	1147	41.	1148	44.	1149	61.
1150	77.	1151	93.	1152	107.	1153	122.	1154	119.
1155	110.	1156	96.	1157	80.	1158	63.	1159	47.
1160	34.	1161	25.	1162	20.	1163	15.	1164	13.
1165	12.	1166	11.	1167	10.	1168	10.	1169	9.
1170	9.	1171	9.	1172	8.	1173	8.	1174	8.
1175	8.	1176	8.	1177	7.	1178	7.	1179	7.
1180	7.	1181	7.	1182	7.	1183	6.	1184	6.
1185	6.	1186	6.	1187	6.	1188	6.	1189	6.
1190	6.	1191	6.	1192	6.	1193	6.	1194	6.
1195	6.	1196	5.	1197	5.	1198	5.	1199	5.
1200	5.	1201	5.	1202	5.	1203	5.	1204	5.
1205	5.	1206	5.	1207	5.	1208	5.	1209	5.
1210	5.	1211	5.	1212	5.	1213	5.	1214	5.
1215	5.	1216	5.	1217	4.	1218	4.	1219	4.
1220	4.	1221	4.	1222	4.	1223	4.	1224	4.
1225	4.	1226	4.	1227	4.	1228	4.	1229	4.
1230	4.	1231	4.	1232	4.	1233	4.	1234	4.
1235	4.	1236	4.	1237	4.	1238	4.	1239	4.
1240	4.	1241	4.	1242	4.	1243	4.	1244	4.
1245	4.	1246	4.	1247	4.	1248	4.	1249	4.
1250	4.	1251	4.	1252	4.	1253	4.	1254	4.
1255	4.	1256	3.	1257	3.	1258	3.	1259	3.
1260	3.	1261	3.	1262	3.	1263	3.	1264	3.
1265	3.	1266	3.	1267	3.	1268	3.	1269	3.
1270	3.	1271	3.	1272	3.	1273	3.	1274	3.
1275	3.	1276	3.	1277	3.	1278	3.	1279	3.
1280	3.	1281	3.	1282	3.	1283	3.	1284	3.
1285	3.	1286	3.	1287	3.	1288	3.	1289	3.
1290	3.	1291	3.	1292	3.	1293	3.	1294	3.
1295	3.	1296	3.	1297	3.	1298	3.	1299	3.
1300	3.	1310	3.	1320	3.	1330	3.	1340	3.
1350	3.	1360	2.	1370	2.	1380	2.	1390	2.
1400	2.	1420	2.	1440	2.	1460	0.	1500	0.

Total Runoff = 8.735 Acre-Ft.

Peak Q = 122 CFS

Time to Peak Q = 1153 Minutes

4LADEPTH.RDT

5	59	1A	LONG BEACH SPORTS PARK - 50-YEAR DISCHARGES			TALLEY REV 3/9/0
5	59	11A	END OF CALCULATION			
6	59	1A	13	10	6 8A26	G1
6	59	2A	13	10	3 5A26	
6	59	3A	13	73	310A26	
6	59	4A	13	10	4 6A26	
6	59	5A	13	10	3 5A26	
6	59	6A	13	46	5 6A26	
6	59	7A	13	10	3 5A26	
6	59	8A	13	85	9 7A26	
6	59	9A	14	10	3 8A26	
6	59	10A	14	6	5 7A26	
6	59	11A	14	1	1010A26	1 2

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

LONG BEACH SPORTS PARK - 25-YEAR DISCHARGES TALLEY 3/19/04

LONG BEACH SPORTS PARK - 25-YEAR DISCHARGES TALLEY 3/19/04											STORM DAY 4			
LOCATION	SUBAREA AREA	SUBAREA Q	TOTAL AREA	TOTAL Q	CONV TYPE	CONV LNPTH	CONV SLOPE	CONV SIZE	CONV Z	CONTROL Q	SOIL NAME	TC	RAIN ZONE	PCT IMPV
59 1A	6.	11.	6.	11.	0	0.	0.00000	0.00	0.00	0.	13	8	A23	0.10
59 2A	3.	8.	9.	19.	0	0.	0.00000	0.00	0.00	0.	13	5	A23	0.10
59 3A	3.	6.	12.	24.	0	0.	0.00000	0.00	0.00	0.	13	10	A23	0.73
59 4A	4.	9.	16.	33.	0	0.	0.00000	0.00	0.00	0.	13	6	A23	0.10
59 5A	3.	8.	19.	41.	0	0.	0.00000	0.00	0.00	0.	13	5	A23	0.10
59 6A	5.	12.	24.	52.	0	0.	0.00000	0.00	0.00	0.	13	6	A23	0.46
59 7A	3.	8.	27.	60.	0	0.	0.00000	0.00	0.00	0.	13	5	A23	0.10
59 8A	9.	20.	36.	80.	0	0.	0.00000	0.00	0.00	0.	13	7	A23	0.85
59 9A	3.	4.	39.	85.	0	0.	0.00000	0.00	0.00	0.	14	8	A23	0.10
59 10A	5.	8.	44.	93.	0	0.	0.00000	0.00	0.00	0.	14	7	A23	0.06
59 11A	10.	12.	54.	105.	0	0.	0.00000	0.00	0.00	0.	14	10	A23	0.01

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
 MODIFIED RATIONAL METHOD HYDROLOGY

END OF CALCULATION

HYDROGRAPH AT 59 11A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	0.	100	2.	200	2.	300	2.	400	2.
500	2.	600	3.	700	3.	800	3.	900	4.
1000	4.	1050	5.	1100	7.	1110	9.	1120	10.
1130	13.	1131	13.	1132	14.	1133	14.	1134	15.
1135	16.	1136	16.	1137	17.	1138	18.	1139	18.
1140	19.	1141	20.	1142	21.	1143	22.	1144	23.
1145	26.	1146	30.	1147	33.	1148	36.	1149	51.
1150	65.	1151	79.	1152	92.	1153	105.	1154	102.
1155	94.	1156	82.	1157	67.	1158	53.	1159	39.
1160	28.	1161	21.	1162	15.	1163	12.	1164	11.
1165	10.	1166	9.	1167	9.	1168	8.	1169	8.
1170	8.	1171	8.	1172	7.	1173	7.	1174	7.
1175	7.	1176	7.	1177	6.	1178	6.	1179	6.
1180	6.	1181	6.	1182	6.	1183	6.	1184	6.
1185	6.	1186	5.	1187	5.	1188	5.	1189	5.
1190	5.	1191	5.	1192	5.	1193	5.	1194	5.
1195	5.	1196	5.	1197	5.	1198	5.	1199	5.
1200	5.	1201	5.	1202	5.	1203	4.	1204	4.
1205	4.	1206	4.	1207	4.	1208	4.	1209	4.
1210	4.	1211	4.	1212	4.	1213	4.	1214	4.
1215	4.	1216	4.	1217	4.	1218	4.	1219	4.
1220	4.	1221	4.	1222	4.	1223	4.	1224	4.
1225	4.	1226	4.	1227	4.	1228	4.	1229	4.
1230	4.	1231	4.	1232	4.	1233	4.	1234	4.
1235	4.	1236	3.	1237	3.	1238	3.	1239	3.
1240	3.	1241	3.	1242	3.	1243	3.	1244	3.
1245	3.	1246	3.	1247	3.	1248	3.	1249	3.
1250	3.	1251	3.	1252	3.	1253	3.	1254	3.
1255	3.	1256	3.	1257	3.	1258	3.	1259	3.
1260	3.	1261	3.	1262	3.	1263	3.	1264	3.
1265	3.	1266	3.	1267	3.	1268	3.	1269	3.
1270	3.	1271	3.	1272	3.	1273	3.	1274	3.
1275	3.	1276	3.	1277	3.	1278	3.	1279	3.
1280	3.	1281	3.	1282	3.	1283	3.	1284	3.
1285	3.	1286	3.	1287	3.	1288	3.	1289	3.
1290	3.	1291	3.	1292	3.	1293	3.	1294	3.
1295	3.	1296	3.	1297	3.	1298	3.	1299	3.
1300	3.	1310	3.	1320	2.	1330	2.	1340	2.
1350	2.	1360	2.	1370	2.	1380	2.	1390	2.
1400	2.	1420	2.	1440	2.	1460	0.	1500	0.

Total Runoff = 7.552 Acre-Ft.

Peak Q = 105 CFS

Time to Peak Q = 1153 Minutes

4LADEPTH.RDT

5	59	1A	LONG BEACH SPORTS PARK - 25-YEAR DISCHARGES				TALLEY 3/19/04
5	59	11A	END OF CALCULATION				
6	59	1A	13	10	6	8A23	G1
6	59	2A	13	10	3	5A23	
6	59	3A	13	73	310	A23	
6	59	4A	13	10	4	6A23	
6	59	5A	13	10	3	5A23	
6	59	6A	13	46	5	6A23	
6	59	7A	13	10	3	5A23	
6	59	8A	13	85	9	7A23	
6	59	9A	14	10	3	8A23	
6	59	10A	14	6	5	7A23	
6	59	11A	14	1	1010	A23	1 2

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

LONG BEACH SPORTS PARK - 10-YEAR DISCHARGES TALLEY 3/19/04

STORM DAY 4

LOCATION	SUBAREA		TOTAL	TOTAL	CONV	CONV	CONV	CONV	CONV	CONTROL	SOIL	RAIN		PCT
	AREA	Q	AREA	Q	TYPE	LNTH	SLOPE	SIZE	Z			Q	NAME	
59 1A	6.	9.	6.	9.	0	0.	0.00000	0.00	0.00	0.	13	8	A19	0.10
59 2A	3.	6.	9.	14.	0	0.	0.00000	0.00	0.00	0.	13	5	A19	0.10
59 3A	3.	5.	12.	19.	0	0.	0.00000	0.00	0.00	0.	13	10	A19	0.73
59 4A	4.	7.	16.	26.	0	0.	0.00000	0.00	0.00	0.	13	6	A19	0.10
59 5A	3.	6.	19.	32.	0	0.	0.00000	0.00	0.00	0.	13	5	A19	0.10
59 6A	5.	9.	24.	41.	0	0.	0.00000	0.00	0.00	0.	13	6	A19	0.46
59 7A	3.	6.	27.	47.	0	0.	0.00000	0.00	0.00	0.	13	5	A19	0.10
59 8A	9.	17.	36.	64.	0	0.	0.00000	0.00	0.00	0.	13	7	A19	0.85
59 9A	3.	3.	39.	67.	0	0.	0.00000	0.00	0.00	0.	14	8	A19	0.10
59 10A	5.	6.	44.	73.	0	0.	0.00000	0.00	0.00	0.	14	7	A19	0.06
59 11A	10.	9.	54.	82.	0	0.	0.00000	0.00	0.00	0.	14	10	A19	0.01

4LADEPTH.RDT

5	59	1A	LONG BEACH SPORTS PARK - 10-YEAR DISCHARGES			TALLEY 3/19/04
5	59	11A	END OF CALCULATION			
6	59	1A	13	10	6 8A19	G1
6	59	2A	13	10	3 5A19	
6	59	3A	13	73	310A19	
6	59	4A	13	10	4 6A19	
6	59	5A	13	10	3 5A19	
6	59	6A	13	46	5 6A19	
6	59	7A	13	10	3 5A19	
6	59	8A	13	85	9 7A19	
6	59	9A	14	10	3 8A19	
6	59	10A	14	6	5 7A19	
6	59	11A	14	1	1010A19	1 2

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

END OF CALCULATION

HYDROGRAPH AT 59 11A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q								
0	0.	100	2.	200	2.	300	2.	400	2.
500	2.	600	2.	700	2.	800	3.	900	3.
1000	4.	1050	4.	1100	6.	1110	7.	1120	8.
1130	9.	1131	9.	1132	10.	1133	10.	1134	11.
1135	11.	1136	12.	1137	13.	1138	13.	1139	14.
1140	14.	1141	16.	1142	16.	1143	17.	1144	18.
1145	20.	1146	21.	1147	23.	1148	24.	1149	37.
1150	49.	1151	60.	1152	71.	1153	82.	1154	80.
1155	73.	1156	63.	1157	51.	1158	40.	1159	28.
1160	20.	1161	14.	1162	11.	1163	9.	1164	9.
1165	8.	1166	8.	1167	7.	1168	7.	1169	7.
1170	6.	1171	6.	1172	6.	1173	6.	1174	6.
1175	6.	1176	5.	1177	5.	1178	5.	1179	5.
1180	5.	1181	5.	1182	5.	1183	5.	1184	5.
1185	5.	1186	5.	1187	5.	1188	4.	1189	4.
1190	4.	1191	4.	1192	4.	1193	4.	1194	4.
1195	4.	1196	4.	1197	4.	1198	4.	1199	4.
1200	4.	1201	4.	1202	4.	1203	4.	1204	4.
1205	4.	1206	4.	1207	4.	1208	4.	1209	3.
1210	3.	1211	3.	1212	3.	1213	3.	1214	3.
1215	3.	1216	3.	1217	3.	1218	3.	1219	3.
1220	3.	1221	3.	1222	3.	1223	3.	1224	3.
1225	3.	1226	3.	1227	3.	1228	3.	1229	3.
1230	3.	1231	3.	1232	3.	1233	3.	1234	3.
1235	3.	1236	3.	1237	3.	1238	3.	1239	3.
1240	3.	1241	3.	1242	3.	1243	3.	1244	3.
1245	3.	1246	3.	1247	3.	1248	3.	1249	3.
1250	3.	1251	3.	1252	3.	1253	3.	1254	3.
1255	3.	1256	3.	1257	3.	1258	2.	1259	3.
1260	3.	1261	3.	1262	2.	1263	3.	1264	3.
1265	3.	1266	2.	1267	2.	1268	2.	1269	2.
1270	2.	1271	2.	1272	2.	1273	2.	1274	2.
1275	2.	1276	2.	1277	2.	1278	2.	1279	2.
1280	2.	1281	2.	1282	2.	1283	2.	1284	2.
1285	2.	1286	2.	1287	2.	1288	2.	1289	2.
1290	2.	1291	2.	1292	2.	1293	2.	1294	2.
1295	2.	1296	2.	1297	2.	1298	2.	1299	2.
1300	2.	1310	2.	1320	2.	1330	2.	1340	2.
1350	2.	1360	2.	1370	2.	1380	2.	1390	2.
1400	2.	1420	2.	1440	2.	1460	0.	1500	0.

Total Runoff = 6.341 Acre-Ft.

Peak Q = 82 CFS

Time to Peak Q = 1153 Minutes

Project No.
 Computed By
 Date:

590050
 BP
 3/31/2003

LONG BEACH SPORTS PARK DETENTION BASIN VOLUME					
ELEVATION (FT)	AREA (ACRE)	AVG AREA (ACRE)	DEPTH (FT)	VOLUME (ACRE-FT)	TOTAL VOL (ACRE-FT)
45	0.00				
		0.15	1.00	0.15	0.15
46	0.30				
		0.80	1.00	0.80	0.95
47	1.30				
		1.90	1.00	1.90	2.85
48	2.50				
		3.30	1.00	3.30	6.15
49	4.10				
		5.04	1.00	5.04	11.19
50	5.98				
		6.74	1.00	6.74	17.93
51	7.49				
		7.86	1.00	7.86	25.78
52	8.22				
		8.29	1.00	8.29	34.07
53	8.36				
		8.43	1.00	8.43	42.50
54	8.49				

YEAR STORM	PERCENTAGE	FLOW (CFS)	STORAGE VOLUME (ACRE-FT)
50	1	620.00	36.07
1	0.4179552	259.13	15.08
2	0.4878198	302.45	17.60
5	0.5984116	371.02	21.58
10	0.698441	433.03	25.19
25	0.8567819	531.20	30.90

*Percentages based on L.A. County 50 Year Flow Rate

Project No. 590050
Computed By: DT
Date: 3/8/2004

LONG BEACH SPORTS PARK DESILTING BASIN VOLUME					
ELEVATION (FT)	AREA (ACRE)	AVG AREA (ACRE)	DEPTH (FT)	VOLUME (ACRE-FT)	TOTAL VOL (ACRE-FT)
44.5	0.076				0.000
45	0.092	0.84	0.50	0.042	
46	0.108	0.100	1.00	0.100	0.042
47	0.124	0.116	1.00	0.116	0.142
48	0.140	0.132	1.00	0.132	0.258
49	0.156	0.148	1.00	0.148	0.390
50	0.173	0.166	1.00	0.166	0.538
51	0.204	0.190	1.00	0.190	0.704
52	0.235	0.220	1.00	0.220	0.894
53	0.267	0.251	1.00	0.251	1.114
54	0.301	0.284	1.00	0.284	1.365

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

LONG BEACH SPORTS PARK PROJECT

HEADING LINE NO 2 IS -

SYSTEM '1'- 51"RCP CULVERT ACROSS DETENTION BASIN TO DESILTER

HEADING LINE NO 3 IS -

PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSF1/LBSF1Q

WATER SURFACE PROFILE LISTING

LONG BEACH SPORTS PARK PROJECT
 SYSTEM '1' - 51" RCP CULVERT ACROSS DETENTION BASIN TO DESILTER
 PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSPI/LBSP1Q

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD. EL.	SUPER ELEV	CRITICAL DEPTH	HGT/DIA	BASE/ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
100.00	39.59	11.410	51.000	100.0	7.05	0.772	51.772	0.00	2.986	4.25	0.00	0.00	0	0.00
690.00	0.01361					.003508	2.42		2.144			0.00		
790.00	48.98	4.440	53.420	100.0	7.05	0.772	54.192	0.00	2.986	4.25	0.00	0.00	0	0.00
WALL ENTRANCE												0.00		
790.00	48.98	5.894	54.874	100.0	1.70	0.045	54.919	0.00	1.459	6.00	10.00	0.00	0	0.00

LONG BEACH SPORTS PARK PROJECT
 SYSTEM '1' - 51" RCP CULVERT ACROSS DETENTION BASIN TO DESILTER
 PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSPI/LBSP1Q

	I	C	H				W	E		R	
100.00											
114.08											
128.16											
142.24											
156.33											
170.41											
184.49											
198.57											
212.65											
226.73											
240.82											
254.90											
268.98											
283.06											
297.14											
311.22											
325.31											
339.39											
353.47											
367.55											
381.63											
395.71											
409.80											
423.88											
437.96											
452.04											
466.12											
480.20											
494.29											
508.37											
522.45											
536.53											
550.61											
564.69											
578.78											
592.86											
606.94											
621.02											
635.10											
649.18											
663.27											
677.35											
691.43											
705.51											
719.59											
733.67											
747.76											
761.84											
775.92											
790.00											
							XXXXXXXXXXXXXXXXXXXX		E	WE	
	39.59	41.13	42.67	44.21	45.75	47.29	48.82	50.36	51.90	53.44	54.98

NOTES

- GLOSSARY
 - I = INVERT ELEVATION
 - C = CRITICAL DEPTH
 - W = WATER SURFACE ELEVATION
 - H = HEIGHT OF CHANNEL
 - E = ENERGY GRADE LINE
 - X = CURVES CROSSING OVER
 - B = BRIDGE ENTRANCE OR EXIT
 - Y = WALL ENTRANCE OR EXIT
- STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

LONG BEACH SPORTS PARK PROJECT

HEADING LINE NO 2 IS -

SYSTEM '1' - 54"RCP CULVERT ACROSS DETENTION BASIN TO DESILTER

HEADING LINE NO 3 IS -

PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSF1A/LBSF1AQ

LONG BEACH SPORTS PARK PROJECT
 SYSTEM '1' - 54"RCP CULVERT ACROSS DETENTION BASIN TO DESILTER
 PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSPIA/LBSPIAQ

Elevation	I	C	H	W	E	R					
100.00	.										
114.08	.										
128.16	.										
142.24	.										
156.33	.										
170.41	.										
184.49	.										
198.57	.										
212.65	.										
226.73	.										
240.82	.										
254.90	.										
268.98	.										
283.06	.										
297.14	.										
311.22	.										
325.31	.										
339.39	.										
353.47	.										
367.55	.										
381.63	.										
395.71	.										
409.80	.										
423.88	.										
437.96	.										
452.04	.										
466.12	.										
480.20	.										
494.29	.										
508.37	.										
522.45	.										
536.53	.										
550.61	.										
564.69	.										
578.78	.										
592.86	.										
606.94	.										
621.02	.										
635.10	.										
649.18	.										
663.27	.										
677.35	.										
691.43	.										
705.51	.										
719.59	.										
733.67	.	I		C	X E	R					
747.76	.										
761.84	.				C W H E	R					
775.92	.				C W H E	R					
790.00	.				C W X	R					
	39.59	41.13	42.67	44.21	45.75	47.29	48.82	50.36	51.90	53.44	54.98

NOTES

1. GLOSSARY

- I = INVERT ELEVATION
- C = CRITICAL DEPTH
- W = WATER SURFACE ELEVATION
- H = HEIGHT OF CHANNEL
- E = ENERGY GRADE LINE
- X = CURVES CROSSING OVER
- B = BRIDGE ENTRANCE OR EXIT
- Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

LONG BEACH SPORTS PARK PROJECT

HEADING LINE NO 2 IS -

SYSTEM '2'- 18" RCP CULVERT ACROSS DETENTION BASIN TO AREA 1A

HEADING LINE NO 3 IS -

PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSP2A/LBSP2AQ

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	DESCRIPTION	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS A SYSTEM OUTLET		100.00	40.00	1	51.20				
2	IS A REACH		690.00	45.00	1		0.00	0.00	0.00	0
3	IS A REACH		730.00	61.00	1		0.00	0.00	0.00	0
4	IS A WALL ENTRANCE		730.00	61.00	2					
5	IS A SYSTEM HEADWORKS		730.00	61.00	2	0.00				

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

WATER SURFACE PROFILE LISTING
 LONG BEACH SPORTS PARK PROJECT
 SYSTEM '2'- 18" RCP CULVERT ACROSS DETENTION BASIN TO AREA 1A
 PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSP2A/LBSP2AQ

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/DIA	BASE/ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
100.00	40.00	11.200	51.200	9.0	5.09	0.403	51.603	0.00	1.161	1.50	0.00	0.00	0	0.00
590.00	0.00847					.007341	4.33		1.140			0.00		
690.00	45.00	10.531	55.531	9.0	5.09	0.403	55.934	0.00	1.161	1.50	0.00	0.00	0	0.00
18.14	0.40000					.007341	0.13		0.370			0.00		
708.14	52.26	3.415	55.670	9.0	5.09	0.403	56.073	0.00	1.161	1.50	0.00	0.00	0	0.00
HYDRAULIC JUMP												0.00		
708.14	52.26	0.428	52.683	9.0	21.63	7.268	59.951	0.00	1.161	1.50	0.00	0.00	0	0.00
1.63	0.40000					.225804	0.37		0.370			0.00		
709.77	52.91	0.434	53.343	9.0	21.18	6.963	60.306	0.00	1.161	1.50	0.00	0.00	0	0.00
3.18	0.40000					.205351	0.65		0.370			0.00		
712.95	54.18	0.449	54.630	9.0	20.22	6.352	60.982	0.00	1.161	1.50	0.00	0.00	0	0.00
2.55	0.40000					.179792	0.46		0.370			0.00		
715.50	55.20	0.465	55.663	9.0	19.27	5.767	61.430	0.00	1.161	1.50	0.00	0.00	0	0.00
2.09	0.40000					.157436	0.33		0.370			0.00		
717.59	56.03	0.481	56.516	9.0	18.37	5.239	61.755	0.00	1.161	1.50	0.00	0.00	0	0.00
1.75	0.40000					.137858	0.24		0.370			0.00		
719.34	56.74	0.498	57.234	9.0	17.51	4.761	61.995	0.00	1.161	1.50	0.00	0.00	0	0.00
1.49	0.40000					.120812	0.18		0.370			0.00		
720.83	57.33	0.516	57.846	9.0	16.70	4.329	62.175	0.00	1.161	1.50	0.00	0.00	0	0.00
1.27	0.40000					.105877	0.13		0.370			0.00		
722.10	57.84	0.534	58.375	9.0	15.93	3.940	62.315	0.00	1.161	1.50	0.00	0.00	0	0.00
1.11	0.40000					.092782	0.10		0.370			0.00		

WATER SURFACE PROFILE LISTING
 LONG BEACH SPORTS PARK PROJECT
 SYSTEM '2'- 18" RCP CULVERT ACROSS DETENTION BASIN TO AREA 1A
 PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSP2A/LBSP2AQ

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD. EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH		ZR		
723.21	58.28	0.553	58.835	9.0	15.18	3.577	62.412	0.00	1.161	1.50	0.00	0.00	0	0.00
0.95	0.40000					.081361	0.08			0.370		0.00		
724.16	58.66	0.573	59.238	9.0	14.47	3.251	62.489	0.00	1.161	1.50	0.00	0.00	0	0.00
0.84	0.40000					.071390	0.06			0.370		0.00		
725.00	59.00	0.594	59.594	9.0	13.80	2.959	62.553	0.00	1.161	1.50	0.00	0.00	0	0.00
0.73	0.40000					.062676	0.05			0.370		0.00		
725.73	59.29	0.616	59.908	9.0	13.16	2.688	62.596	0.00	1.161	1.50	0.00	0.00	0	0.00
0.65	0.40000					.055023	0.04			0.370		0.00		
726.38	59.55	0.638	60.188	9.0	12.55	2.447	62.635	0.00	1.161	1.50	0.00	0.00	0	0.00
0.56	0.40000					.048323	0.03			0.370		0.00		
726.94	59.77	0.662	60.437	9.0	11.97	2.224	62.661	0.00	1.161	1.50	0.00	0.00	0	0.00
0.49	0.40000					.042488	0.02			0.370		0.00		
727.43	59.97	0.687	60.660	9.0	11.41	2.020	62.680	0.00	1.161	1.50	0.00	0.00	0	0.00
0.44	0.40000					.037353	0.02			0.370		0.00		
727.87	60.15	0.712	60.860	9.0	10.87	1.835	62.695	0.00	1.161	1.50	0.00	0.00	0	0.00
0.38	0.40000					.032850	0.01			0.370		0.00		
728.25	60.30	0.739	61.040	9.0	10.37	1.669	62.709	0.00	1.161	1.50	0.00	0.00	0	0.00
0.33	0.40000					.028918	0.01			0.370		0.00		
728.58	60.43	0.767	61.201	9.0	9.88	1.516	62.717	0.00	1.161	1.50	0.00	0.00	0	0.00
0.29	0.40000					.025481	0.01			0.370		0.00		
728.87	60.55	0.797	61.346	9.0	9.42	1.379	62.725	0.00	1.161	1.50	0.00	0.00	0	0.00
0.25	0.40000					.022474	0.01			0.370		0.00		

WATER SURFACE PROFILE LISTING
 LONG BEACH SPORTS PARK PROJECT
 SYSTEM '2' - 18" RCP CULVERT ACROSS DETENTION BASIN TO AREA 1A
 PRELIMINARY HYDRAULICS TALLEY 8/9/04 FILES: LBSP2A/LBSP2AQ

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD. EL.	SUPER ELEV	CRITICAL DEPTH	HGT/DIA	BASE/ID NO.	ZL	NO FIER	AVBPR
L/ELEM	SO				SF AVE	HF	NORM DEPTH			ZR				
729.12	60.65	0.828	61.477	9.0	8.98	1.253	62.730	0.00	1.161	1.50	0.00	0.00	0	0.00
0.22	0.40000					.019838	0.00			0.370				0.00
729.34	60.73	0.861	61.595	9.0	8.57	1.141	62.736	0.00	1.161	1.50	0.00	0.00	0	0.00
0.18	0.40000					.017536	0.00			0.370				0.00
729.52	60.81	0.896	61.702	9.0	8.17	1.036	62.738	0.00	1.161	1.50	0.00	0.00	0	0.00
0.14	0.40000					.015523	0.00			0.370				0.00
729.66	60.87	0.933	61.799	9.0	7.79	0.943	62.742	0.00	1.161	1.50	0.00	0.00	0	0.00
0.13	0.40000					.013760	0.00			0.370				0.00
729.79	60.91	0.972	61.886	9.0	7.43	0.856	62.742	0.00	1.161	1.50	0.00	0.00	0	0.00
0.09	0.40000					.012214	0.00			0.370				0.00
729.88	60.95	1.013	61.965	9.0	7.08	0.779	62.744	0.00	1.161	1.50	0.00	0.00	0	0.00
0.07	0.40000					.010870	0.00			0.370				0.00
729.95	60.98	1.058	62.037	9.0	6.75	0.708	62.745	0.00	1.161	1.50	0.00	0.00	0	0.00
0.04	0.40000					.009709	0.00			0.370				0.00
729.99	60.99	1.107	62.101	9.0	6.44	0.644	62.745	0.00	1.161	1.50	0.00	0.00	0	0.00
0.01	0.40000					.008699	0.00			0.370				0.00
730.00	61.00	1.161	62.161	9.0	6.13	0.584	62.745	0.00	1.161	1.50	0.00	0.00	0	0.00
WALL ENTRANCE												0.00		
730.00	61.00	2.149	63.149	9.0	0.42	0.003	63.152	0.00	0.293	3.00	10.00	0.00	0	0.00

APPENDIX C

REFERENCE MATERIALS

April 30, 1992

TO: Richard J. Smith
Design Division

FROM: Donald F. Nichols
Hydraulic/Water Conservation Division

**LOS ANGELES RIVER
WALNUT SPRING DRAIN AND DETENTION BASIN - HYDROLOGY
FILE NO. 676.41**

This confirms the discussion with Ray Hashima and Bob Woo by the undersigned on April 16, 1992 in response to your request. The subject project entails a drain and a detention basin. It will be constructed as part of the City of Long Beach Redevelopment Plan of the area. The Basin and Project Drain 5109 will provide outlet to runoff from design level storms in the Walnut Spring Watershed. This transmittal amends our previous report dated July 8, 1986, File No. 676.41

Attachments

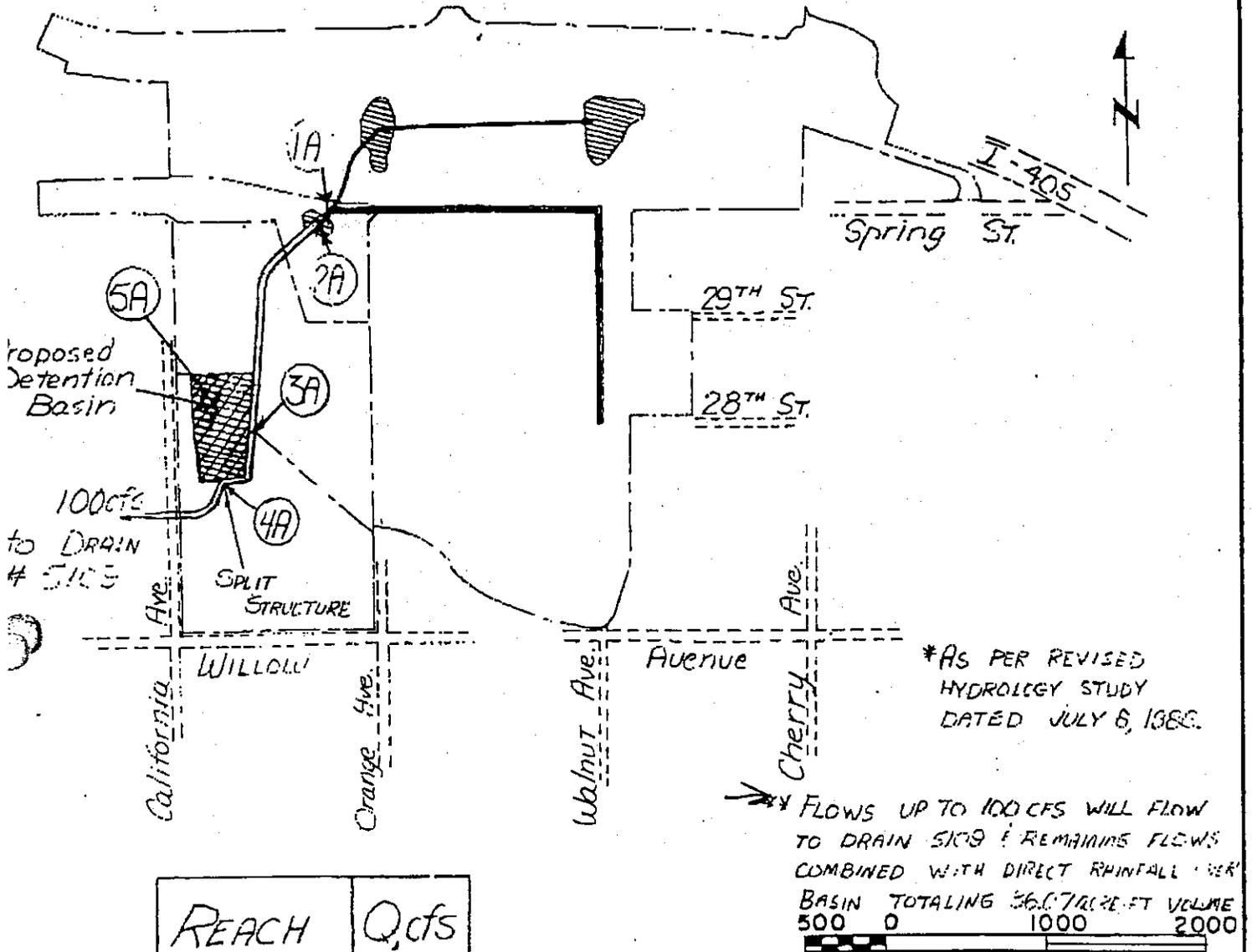
- A. Hydrologic map showing proposed and existing drain alignments and drainage area boundaries.
- B. Hydrologic data sheets listing subarea sizes and subarea and reach peak flow rates.
- C. Supporting information including design parameters, scaledown factor, flooding analysis, mandatory flood insurance requirements, and references.

Summary of Findings

- A. The proposed alignment shown in Attachment A represents the best hydrologic solution for the flooding problem as we understand it and may not necessarily correspond with the exact alignment proposed in the request.
- B. The peak inflow rate for the proposed basin is 620 cfs.
- C. There is no scale-down factor.
- D. Construction of the detention basin for 36.07 acre-feet volume as proposed will provide protection from a 50-year frequency rainfall.

ATTACHMENT A

Sheet 1 of 1



→ FLOWS UP TO 100 CFS WILL FLOW TO DRAIN SICKS. REMAINING FLOWS COMBINED WITH DIRECT RAINFALL TO BASIN TOTALING 560,700 CF VOLUME

500	0	1000	2000
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REACH	Q, cfs
1A-2A	460*
2A-3A	520
3A-4A	560
4A-SPLIT	620
SPLIT-5A	520
5A-BASIN	550**
SPLIT-PROJ SICKS	100**

LEGEND

- WATERSHED BOUNDARY
- ==== PROJECT DRAIN
- EXISTING DRAIN
- → SUBAREA AND COLLECTION POINT
- PROBABLE FUTURE DRAIN
- STREETS
- ▨ SUMP

PREPARED
 J. Jacobson
 DATE
 4-15-92
 SCALE
 1" = 1000'

LOS ANGELES COUNTY
 DEPARTMENT OF PUBLIC WORKS
 Los Angeles River
 Walnut Spring Drain
 50-Yr. Frequency Runoff

QUAD: Long Beach (1-H15)

ATTACHMENT B HYDROLOGIC DATA

Walnut Spring Drain

- Conveyance Types
- 1. Natural Mountain
 - 2. Natural Valley
 - 3. Street
 - 4. Pipe
 - 5. Rectangular Channel
 - 6. Trapezoidal Channel

50-Year Frequency Rainfall

Reach or Subarea	Preliminary Conveyance			Slope	Area (acres)		Peak Q (cfs)	
	Length (feet)	Type	Size (feet)		Subarea	Total	Subarea ¹	Reach ²
<u>LINE A</u>								
1A					207		460	
A - 2A	-	-	-			207		460
2A					17		40	
2A - 3A	1200	4	6.00'	0.02080		224		500
3A					32		110	
3A - 4A	450	4	8.00'	0.00330		256		560
4A					28		75	
4A-Split	-	-	-			282		620 ³
Split-5A						237		520
5A					6		25	
-Bsn(Tot.)						245		530
Split-5109								100

Flow rate from the subarea that can be proportioned (Q/A) for catch basin design within the subarea as per the Department's "Design Manual--Hydraulic".

Peak flow rate at the top of the reach for design of the conveyance.

The peak inflow hydrograph is split on a truncation basis whereby all flows up to 100 cfs continue to flow through the drain and the remaining flow will be transferred for storage in the basin.

ATTACHMENT C

SUPPORTING INFORMATION

Project: Walnut Spring Drain

Design Parameters

This hydrology meets the policies and procedures established in the Department of Public Works hydrology manual dated December 1991.

The total watershed size is 290 acres. The assumed ultimate development in the watershed is 93 % commercial, 7 % cemetery or other.

All reported flow rates are adequately collected runoff from a 50-year frequency rainfall.

Adequate collection assumes that the drainage system collects all incoming surface flows and that runoff will flow out of its appropriate subarea only at the collection point.

Scale-down Factor

The outlet drain flows into Project Drain No. 5109, which has capacity to receive 100 cfs.

Flood Insurance

The watershed is not in a mandatory flood insurance zone.

FULL SIZE EXISTING HYDROLOGY EXHIBIT IS

AVAILABLE FOR REVIEW AT THE CITY OF LONG BEACH

COMMUNITY DEVELOPMENT DEPARTMENT

FULL SIZE PROPOSED ON-SITE HYDROLOGY EXHIBIT IS

AVAILABLE FOR REVIEW AT THE CITY OF LONG BEACH

COMMUNITY DEVELOPMENT DEPARTMENT