APPENDIX F

Community Park Detention Basin

MacKay & Somps
ENGINEERS PLANNERS SURVEYORS
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TECHNICAL MEMORANDUM

Date:	August 6, 2010
To:	Bob Shattuck, Lennar Communities
From:	Craig Zoller, MacKay & Somps
TM No.:	Technical Memorandum No. 5
Subject:	Community Park Detention Basin SunCreek Specific Plan Rancho Cordova, CA
Job No.:	7991-10
Task No.:	Task B.1

A. Introduction

The SunCreek Community Park is located in the center of the Plan Area. The area located north of the Community Park is planned for development with various types of land uses which include a high school and middle school that abut the northern boundary. The area located to the south of the Community Park is planned as a wetland preserve that is centered over a tributary to Laguna Creek. The Community Park is located in a 214 acre watershed that drains from the north to the south through the Community Park site towards the wetland preserve and the Laguna Creek tributary.

The United States Army Corps of Engineers (Corps) established a Conceptual Level Strategy (Strategy) for preserving the natural resources within the SunCreek Specific Plan Area which mandates that runoff from developed areas cannot drain directly into a preserve area. Instead the runoff must be directed to strategically located detention basins for water quality treatment and peak flow attenuation. Since the Community Park is located adjacent to a wetland preserve and is within a large developed watershed that drains through it, a water quality/detention basin needs to be located within the park.

The SunCreek Master Drainage Study (SDMP) has designated the Community Park detention basin as Detention Basin no. 5 (DB 5). The SDMP has designed the water quality/detention basins as a single use component of the plan area that will be improved as a visual amenity. However, they do not include any type of park improvement that could be used by the Plan Area residents. The SDMP has determined that DB 5 has a basin footprint area of approximately 9.43 areas. This footprint is the area necessary to provide water quality treatment and peak flow

attenuation for all storms occurring within the watershed up to and including the 100-year, 10-day storm.

The Community Park site is 39.04 acres with approximately 24% of that area being utilized as DB 5. The large area needed to be set aside as DB 5 severely impacts the area that can be used for park amenities.

The Cordova Park and Recreation District (CPRD) will allow for a portion of the Community Park to be designed as a joint use park/storm runoff water quality treatment detention facility allowing inundation of the park turf areas for no more than 72 hours during a peak storm event.

The intent of this technical memorandum is to document that BD 5 can be designed as a joint use facility reducing the basin footprint area and increasing the useable community park area and not exceed the CPRD requirements of maximum turf area inundation duration of 72 hours.

B. Methodology

Building on the storm drainage Sac-Calc Baseline Conditions modeling contained in the SDMP, the approach to this analysis is briefly summarized as follows:

1. Prepare a schematic Community Park - DB 5 layout and design to maximize the recreational use of the park.
2. Utilize the schematic Community Park - DB 5 design to prepare area-elevation curves for incorporation into the SDMP Sac-Calc model.
3. Run the SDMP Sac-Calc model and develop time stage duration graphs for the various storm durations modeled to determine how much of the park is inundated with runoff and how long the inundation last.
4. Utilize the Sac-Calc results to determine how much partial park credit the Community Park site will provide when used as a joint use facility.

The CRPD has the following criteria for a park site to meet and still receive partial credit as a park.

Table 1: Floodplain Limits on Park Acres

Accepted park acreage based on flood plain level	Percentage of acreage accepted*
100 year flood or above	100%
50 year flood to 100 year flood	90%
25 year to 50 year flood	70%
10 year to 25 year	50%
10 year flood and below	0%

* Inundation is limited to only turf areas with duration not to exceed 72 hours.

C. Analysis

In accordance with the methodology outlined above, the following analysis was performed:

Utilizing a schematic Community Park site plan and the adjacent land use plan, the preparation of a schematic Community Park rough grading contour plan was completed. The adjacent development areas schematic contour grading was adjusted so the overland releases from the development releases into the detention basin and not the preserve area. The Community Park site plan schematic contour grading plan was designed so only the turf play fields would be inundated with runoff and features such as shade structures, bathrooms, parking lots, play structures, amphitheaters and courts where above the 100-year, 10-day water surface. The schematic rough grading contour plan was used to develop an area-volume curve for the joint use Community Park detention basin. Refer to Exhibit 1: Community Park –Detention Basin Site Plan in the Appendix.

In compliance with the Corps Strategy, a permanent water quality basin must be provided. The water quality basin will treat all runoff from the developed area of the watershed including the summertime irrigation runoff. The summertime irrigation runoff is required to be withheld from discharging into the preserve areas. Therefore, it is highly likely that some water would always be within the water quality basin. In order to maintain the health of the aquatic plants and species within the water quality basin, a minimum water depth of 4 feet is desirable. DB 5 water quality basin is sized to hold up to 4.0 acre-feet of water. DB 5 water quality basin will be lined to prevent infiltration and loss of water and will have an outlet set at an elevation of 7 feet above the basin floor. Should the water quality basin reach is its capacity; the basin will have an outfall structure and pipeline that connects to the hydro-modification basin. The hydro-

modification basin will have a leach field constructed in the basin floor that will percolate any excess summertime irrigation runoff. Refer to Exhibit 2: Detention Basin No. 5, Schematic Cross Section in the Appendix

The Corps Strategy also suggests that the existing tributaries and creeks within the Plan Area should not be modified hydraulically due to development occurring within the watershed. The existing tributaries and creeks within the Plan Area should not experience an increase in erosive energy during any storm up to and including the 10-year, 24-hour storm the due to development occurring within the watershed. To achieve this goal, a hydro-modification basin is required that will meter the release rate out of the basin so it mimics the undeveloped watershed. The hydro-modification basin slowly meters the runoff out through an outlet structure designed so the pre- and post-development flow duration curves for the receiving water course is within the allowed tolerance.

The Baseline Conditions Sac-Calc model was modified to incorporate the changes in DB 5 and rerun. The nearest downstream compliance point will be used to compare peak flows from the Baseline Conditions Model and the revised DB 5 model to insure that there is a "No Net Change" condition.

D. Summary of Results

The Sac-Calc technical results together with the schematic contour grading plan of the Community Park demonstrates that it is technically feasible to have a joint use park-water quality-detention facility. The Sac-Calc program indicates that the Community Park would be inundated as shown in Table 2:

Table 2: Community Park Inundation – Duration

Water Surface Elevation	Hours Water is Above Elevation (100-Year, 24-Hour)	Hours Water is Above Elevation (100-Year, 10-Day)
162.5	0	2
162.0	0	6
161.0	3	10
160.0	10	22
159.0	14	52

The DB 5 hydro-modification basin has a holding capacity of 26.3 acre-feet of water below elevation 159.0 The SDMP 10-year, 24-hour hydro-modification storage volume for DB 5 is 19.0 acre-feet.

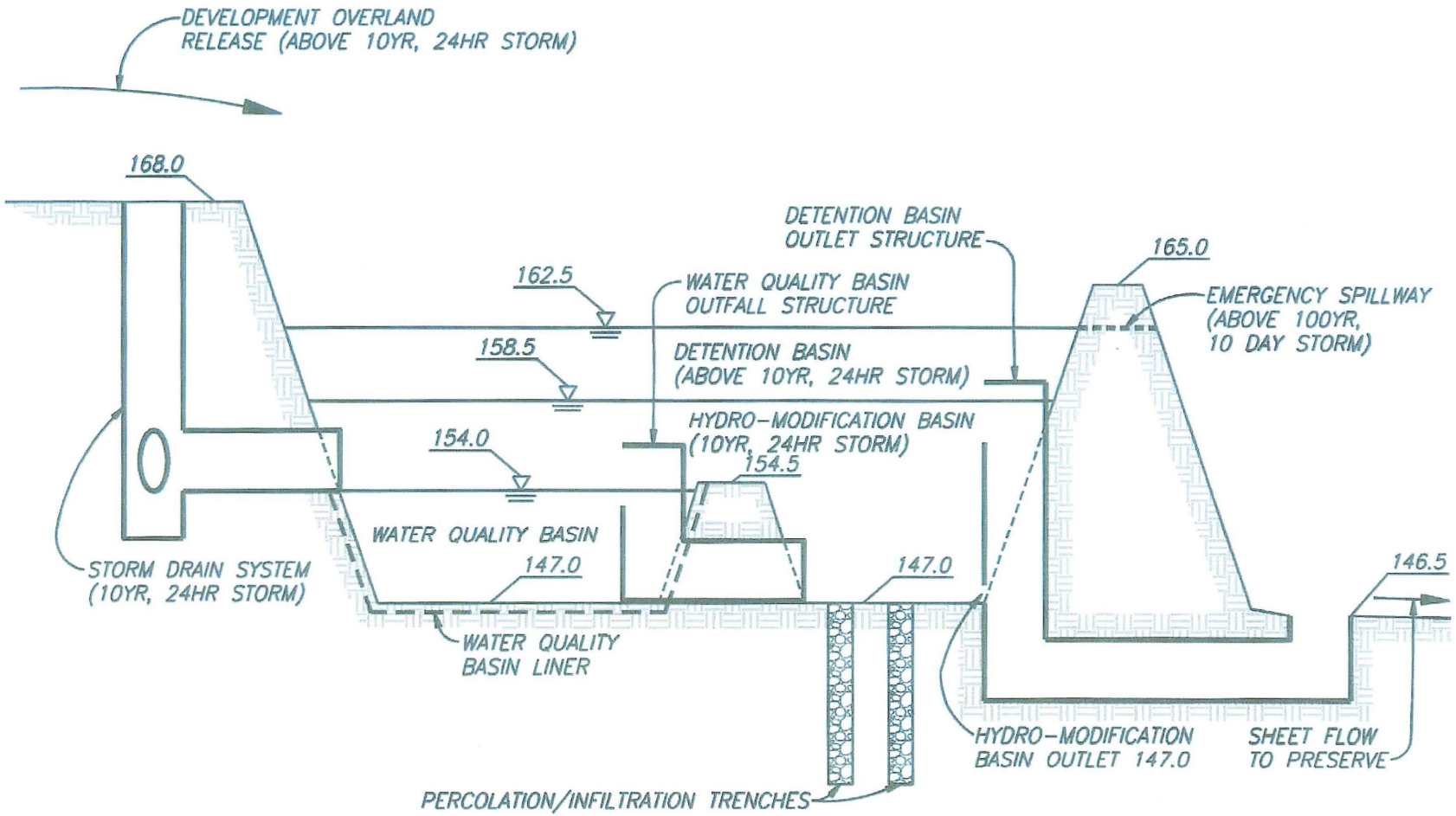
Once the water surface elevation drops below the invert elevation of the Detention Basin Outlet Structure, the remaining runoff is dissipated at a rate of approximately 5 cfs over a 48-hour period. The runoff will enter the Outlet Structure through a series of small orifices set at various elevations to control the release rate. Depending on the final design elevations of the basin bottom, the runoff will be discharged in one of two ways; a gravity pipeline or a pump station. A gravity outfall pipe could be extended downstream approximately 2,000 feet where it will discharge into the preserve area or a small 5 cubic foot per second pump station be could be constructed adjacent to BD 5 and discharged to the preserve area.

E. Conclusion

The SDMP DB 5 can be designed in conjunction with the SunCreek Community Park Site to meet the Corps Strategy and CRPD recreational needs of the SunCreek Specific Plan Area.

Appendix A

BASIN 'D'
100 Year 10 Day Storm
Surface. Elev. 162.5
BASIN 'B'
Permanent Hydro-modification
10 Year, 24 Hour Storm
Surface Elevation 159'
BASIN 'C'
100 Year, 24 Hour Storm
Surface Elev. 161.5'
Discharge to Natural
Drainage
Berm Elev. 165.0'
BASIN 'A'
Permanent Water Quality Basin
Surface Elevation 154'
SPILLWAY to open space
Elevation 163.0'
above 100 Year, 10 Day Storm



DETENTION BASIN NO. 5

SCHEMATIC CROSS-SECTION
COMMUNITY PARK-JOINT USE DETENTION BASIN

NOT TO SCALE

MACKAY & SOMPS
ENGINEERS PLANNERS SURVEYORS

8-03-2010 08:18:49 ddenzer L:\Sacramento\7991\00\Master Plans\Drainage\Exhibits\DB_5_Cross_Section.dwg

There are no xreferences in this drawing.

Technical Memorandum
August 6, 2010

Sac-Calc Results

-SINCE 1953-
1552 EUREKA ROAD SUITE 100 ROSEVILLE, CALIFORNIA 95661-3040 PHONE (916) 773-1189 FAX (916) 773-2595
OFFICES: PLEASANTON ROSEVILLE
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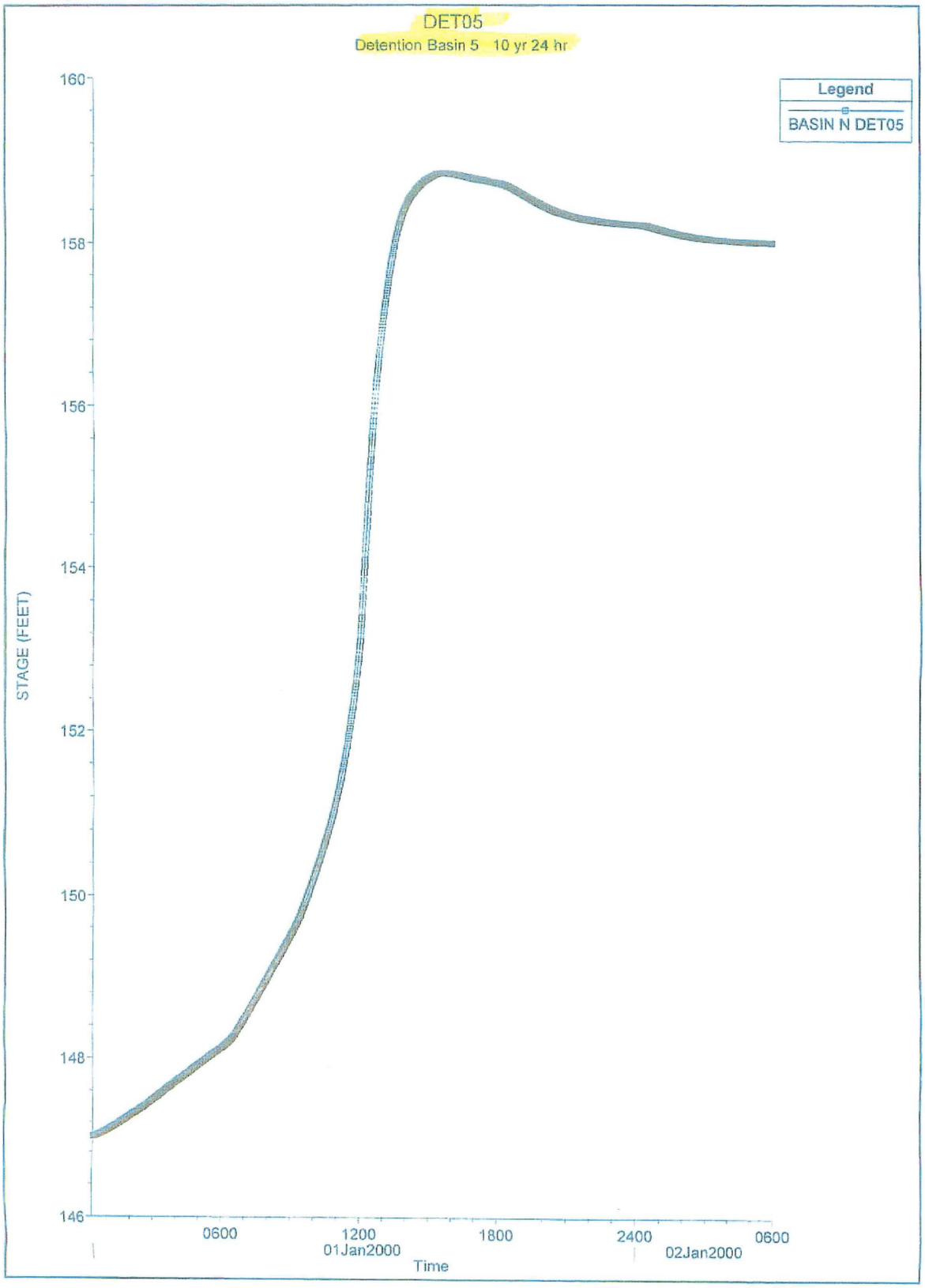
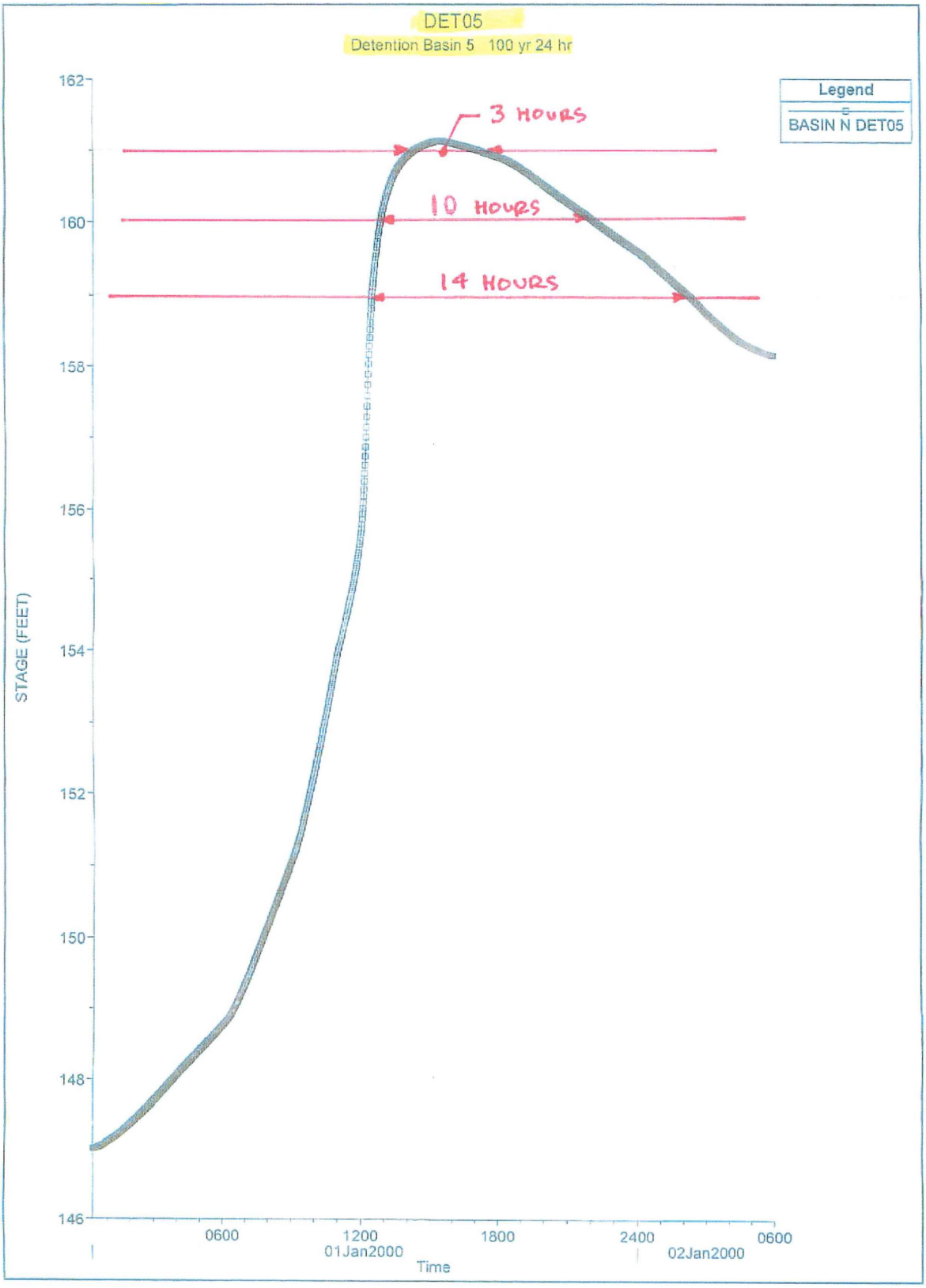
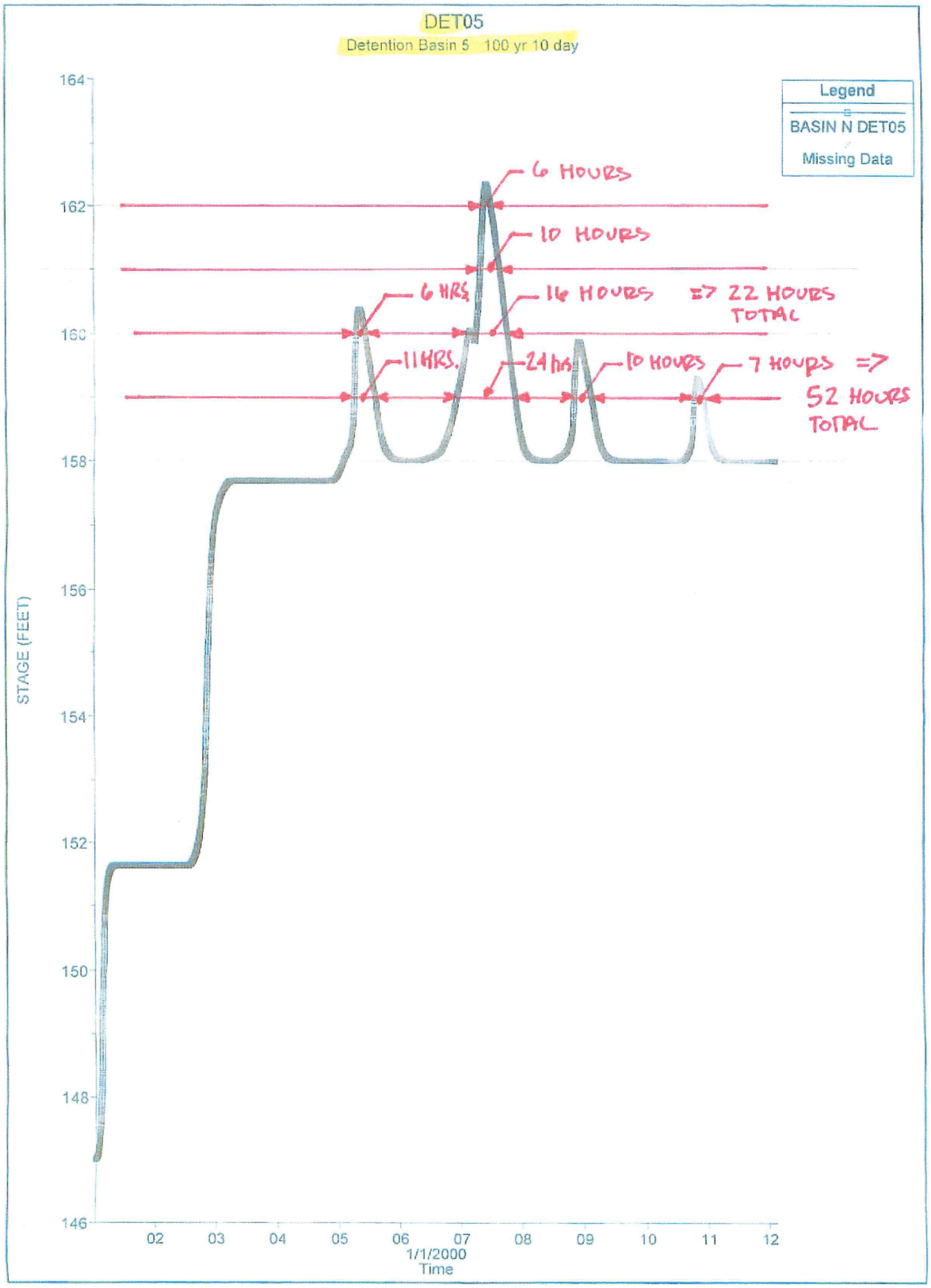

DET05
Detention Basin 5 10 yr 24 hr
Legend
BASIN N DET05
160
158
156
154
152
150
148
146
STAGE (FEET)
0600
1200
01Jan2000
1800
2400
02Jan2000
0600
Time


DET05
Detention Basin 5 100 yr 24 hr
Legend
BASIN N DET05
3 HOURS
10 HOURS
14 HOURS
STAGE (FEET)
162
160
158
156
154
152
150
148
146
0600
1200
01Jan2000
1800
2400
02Jan2000
0600
Time


DET05
Detention Basin 5 100 yr 10 day
Legend
BASIN N DET05
Missing Data
6 HOURS
10 HOURS
6 HRS
16 HOURS
=> 22 HOURS TOTAL
11 HRS.
24 hrs
10 HOURS
7 HOURS
=> 52 HOURS TOTAL
STAGE (FEET)
164
162
160
158
156
154
152
150
148
146
02
03
04
05
06
07
08
09
10
11
12
1/1/2000
Time

View HEC-1 output

Sacramento method results
(Project: Basin n Proposed Conditions)
(100-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
KCOS15	82.	12:30	.11			
KCA3	338.	12:34	.46			
A3DET	278.	12:46	.46	130.	15.	
OSKC05	117.	12:33	.16			
R6A	117.	12:34	.16			
KCOS06	60.	12:04	.03			
KCOS02	61.	12:33	.09			
KCOS1	31.	12:14	.03			
R2A	31.	12:18	.03			
KCDV3	115.	12:21	.12			
DET03	7.9	16:02	.12	175.	14.	
R1	7.9	16:09	.12			
KCDV2	253.	12:11	.19			
DET02	24.	13:55	.19	176.	18.	
KCOS3A	225.	12:25	.26			
R3A	224.	12:28	.26			
J1	251.	12:28	.57			
R2	250.	12:30	.57			
J02	271.	12:29	.60			
R3	271.	12:33	.60			
KCDV4	239.	12:15	.21			
DET04	23.	15:07	.21	166.	22.	
J03	353.	12:33	.89			
R4	352.	12:37	.89			
KCOS03	54.	12:15	.05			
KCDV5	302.	12:21	.31			
DET05	32.	15:18	.31	161.	31.	
J04	404.	12:36	1.25			
R5	403.	12:40	1.25			
KCOS04	74.	12:07	.05			
KCDV06	170.	12:15	.15			
DET06	16.	15:15	.15	157.	16.	.00
J05	433.	12:40	1.45			
R6	428.	12:45	1.45			
KCDV7	138.	12:06	.08			

DET07	16.	13:08	.08	144.	6.1	.00
KCDV8	201.	12:19	.20			
DET08	22.	15:14	.20	140.	22.	.00
J06	571.	12:44	1.92			
R7	567.	12:48	1.92			
J7	844.	12:48	2.38			
R8	844.	12:48	2.38			
KCOS11	23.	12:10	.02			
R8A	23.	12:13	.02			
KCDV9	119.	12:23	.13			
DET09	12.	15:27	.13	136.	14.	
KCDV11	43.	12:04	.02			
DET11	7.9	12:35	.02	136.	1.0	
J08	868.	12:48	2.55			
R9	851.	12:56	2.55			
J9	901.	12:55	2.66			
KCOS14	23.	12:18	.02			
KCOS13	40.	12:13	.03			
KCOS12	89.	12:23	.10			
R10B	89.	12:25	.10			
J10B	115.	12:23	.13			
R10C	115.	12:27	.13			
J10C	133.	12:26	.16			
R10D	132.	12:31	.16			
KCDV10	137.	12:12	.11			
DET10	16.	13:43	.11	132.	8.8	.00
KCDV12	179.	12:14	.15			
DET12	24.	13:52	.15	131.	13.	.00
J10	1020.	12:54	3.07			
R10	1007.	12:57	3.07			
EXKC13	151.	12:11	.11			
J11	1039.	12:57	3.19			
R11	1008.	13:07	3.19			
EXKC14	34.	15:09	.15			
J12	1024.	13:07	3.33			

(10-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
KCOS15	48.	12:30	.11			
KCA3	199.	12:34	.46			

A3DET	153.	12:51	.46	129.	12.	
OSKC05	68.	12:33	.16			
R6A	68.	12:35	.16			
KCOS06	33.	12:04	.03			
KCOS02	36.	12:34	.09			
KCOS1	17.	12:14	.03			
R2A	17.	12:19	.03			
KCDV3	67.	12:21	.12			
DET03	6.1	15:28	.12	173.	8.4	
R1	6.1	15:36	.12			
KCDV2	145.	12:11	.19			
DET02	18.	13:41	.19	174.	12.	
KCOS3A	130.	12:25	.26			
R3A	130.	12:29	.26			
J1	150.	12:29	.57			
R2	150.	12:31	.57			
J02	162.	12:30	.60			
R3	162.	12:35	.60			
KCDV4	138.	12:15	.21			
DET04	18.	14:04	.21	165.	14.	.00
J03	213.	12:35	.89			
R4	212.	12:39	.89			
KCOS03	30.	12:15	.05			
KCDV5	176.	12:21	.31			
DET05	24.	14:34	.31	160.	19.	.00
J04	248.	12:38	1.25			
R5	247.	12:43	1.25			
KCOS04	41.	12:07	.05			
KCDV06	99.	12:15	.15			
DET06	13.	14:12	.15	156.	9.8	
J05	268.	12:42	1.45			
R6	265.	12:49	1.45			
KCDV7	79.	12:06	.08			
DET07	13.	13:06	.08	143.	3.7	.00
KCDV8	117.	12:19	.20			
DET08	16.	14:30	.20	139.	15.	
J06	352.	12:48	1.92			
R7	350.	12:53	1.92			
J7	502.	12:53	2.38			
R8	502.	12:53	2.38			
KCOS11	13.	12:10	.02			

R8A	13.	12:13	.02			
KCDV9	70.	12:23	.13			
DET09	9.3	15:00	.13	135.	8.3	.00
KCDV11	24.	12:04	.02			
DET11	6.2	12:30	.02	134.	.6	.00
J08	520.	12:53	2.55			
R9	510.	13:02	2.55			
J9	538.	13:01	2.66			
KCOS14	13.	12:18	.02			
KCOS13	23.	12:13	.03			
KCOS12	51.	12:23	.10			
R10B	51.	12:26	.10			
J10B	66.	12:24	.13			
R10C	66.	12:28	.13			
J10C	76.	12:27	.16			
R10D	76.	12:33	.16			
KCDV10	79.	12:12	.11			
DET10	13.	13:36	.11	131.	5.4	.00
KCDV12	104.	12:14	.15			
DET12	19.	13:41	.15	130.	7.8	.00
J10	613.	13:00	3.07			
R10	605.	13:04	3.07			
EXKC13	86.	12:11	.11			
J11	625.	13:04	3.19			
R11	607.	13:16	3.19			
EXKC14	20.	15:09	.15			
J12	617.	13:16	3.33			

Sacramento Hydrologic Calculator Report

July 27, 2010 18:41

Project Title: Basin n Proposed Conditions
Comments: Proposed Conditions. with local detention - Baseline Condition 10 yr and 100 yr 24 hour storms
Prepared by: KEC
Method: Sacramento County HEC-1 method
Date: 8/6/2008

Watershed Hydrologic Summary Data

Watershed	Area (acres)	Mean Elevation (ft)	Lag Times		Basin "n"		Loss Rates		Percent Impervious	
			Method	Lag Time (min)	Method	Basin "n"	Method	Loss Rate (in/hr)	Method	Impervious Area (%)
KCOS1	16.8	203.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV2	120.2	199.7	Basin "n"	-	Specified	0.043	Computed	-	Computed	-
KCDV3	76.9	185	Basin "n"	-	Computed	-	Computed	-	Computed	-
KCDV5	201.3	175	Basin "n"	-	Specified	0.051	Computed	-	Computed	-
KCDV4	134.1	174	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV7	52	153.5	Basin "n"	-	Specified	0.037	Computed	-	Computed	-
KCDV8	126.2	152.9	Basin "n"	-	Specified	0.043	Computed	-	Computed	-
KCDV9	82.2	144.2	Basin "n"	-	Specified	.051	Computed	-	Computed	-
KCOS02	54.9	166.3	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS03	30.4	153	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
OSKC05	102.3	181.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV06	94.2	166.5	Basin "n"	-	Specified	0.039	Computed	-	Computed	-
KCOS04	29.3	145.2	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS06	20.3	166	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCA3	297.3	151	Basin "n"	-	Specified	0.049	Computed	-	Computed	-
KCOS11	11.1	157.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV11	13.8	145.1	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV10	68.4	140.1	Basin "n"	-	Specified	0.045	Computed	-	Computed	-
KCDV12	96.8	138.3	Basin "n"	-	Specified	.042	Computed	-	Computed	-
KCOS12	65	156.5	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS13	21	154	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS14	14	145.5	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS15	68.2	122.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS3A	168.5	213	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
EXKC13	73.3	140	Basin "n"	-	Computed	-	Computed	-	Computed	-
EXKC14	95.1	120	Basin "n"	-	Computed	-	Computed	-	Computed	-

Basin "n" Method Data for Lag Time Computation

Watershed	Channel Length (ft)	Centroid Length (ft)	Slope (ft/ft)	Channelization	Land Use Impervious Area Percent (% or acres)																
					95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
KCOS1	1576	850	0.0159	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV2	3940	750	0.0156	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV3	1920	444	0.0042	Undeveloped	2.6	6.8					8.1	21.4							12.9	25.1		
				Developed	0	0					0	0							0	0		
KCDV5	4464	1907	0.0103	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV4	3297	917	0.003	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV7	1655	580	0.0091	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV8	4054	2363	0.0081	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV9	4360	2120	.0083	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS02	3900	2145	.005	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS03	2089	415	.0048	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OSKC05	4804	2082	.0081	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV06	3313	1851	.0063	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS04	2745	1385	005	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS06	2377	1387	0027	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCA3	7016	3899	.006	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS11	726	572	.0069	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV11	850	322	.0213	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV10	2474	1482	.0178	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV12	3407	1720	.0119	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS12	2632	1237	.0057	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS13	1370	566	.0088	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS14	1990	908	.0085	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS15	3317	1334	.0027	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS3A	3787	1555	.0132	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXKC13	4651	2747	0105	Undeveloped																100		
				Developed																0		
EXKC14	79700	3064	.003	Undeveloped																100		
				Developed																0		

Refer to the Drainage manual for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Infiltration Loss Rate Data

Watershed	Soil Cover Group	Land Use Impervious Area Percent (% or acres)																	
		95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
KCOS1	B																		
	C																4.8		
	D																12		
KCDV2	B																		
	C	1.1						26.2	12.2							8.2	2.2		
	D	2						36.7	21.6							2.2	7.8		
KCDV3	B																		
	C																		
	D	2.6	6.8					8.1	21.4							12.9	25.1		
KCDV5	B																		
	C															1.1			
	D	7.2					3.7	25.9	81.2							23.7	58.5		
KCDV4	B																		
	C																4.7		
	D						6.4	57.5	6.4	41						14	5.3		
KCDV7	B																		
	C	2.6														1			
	D	4.2	12.4				11.6	15.7								4.5			
KCDV8	B																		
	C	1.6																	
	D	5						58.9	37.2							18.3	5.2		
KCDV9	B																		
	C																		
	D	16.2	2.5						24.5	1						9.8	28		
KCOS02	B																		
	C																16.3		
	D																38.6		
KCOS03	B																		
	C																12.7		
	D																17.7		
OSKC05	B																		
	C																		
	D																102.3		
KCDV06	B																		
	C	0.9																	
	D	23					10.9	46.9								5.5	7		
KCOS04	B																		
	C																20.4		
	D																8.9		
KCOS06	B																		
	C																		
	D																20.3		
KCA3	B																		
	C								120							0.6	26.3		
	D								78.4							4.4	67.6		
KCOS11	B																		
	C																5.9		
	D																5.2		
KCDV11	B																		
	C																		
	D	2.1							8.9							2.8			
KCDV10	B																		
	C																		
	D	5	5						13.2	32.5						8	4.7		
KCDV12	B																		
	C	1.5															1		
	D	5.5	24						23.2	24.9						15.8	1.3		
KCOS12	B																		
	C																27.1		
	D																37.9		
	B																		

KCOS13	C															1.3		
	D															19.7		
KCOS14	B																	
	C																	
	D															14		
KCOS15	B																	
	C																	
	D															68.2		
KCOS3A	B																	
	C															32.6		
	D															135.9		
EXKC13	B																	
	C															6.5		
	D															66.8		
EXKC14	B																	
	C															4.1		
	D															91		

Refer to the help file for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Hydrograph Routing – Muskingum-Cunge (Standard)

Routing ID	Route From	Route To	Channel Type	Length (ft)	Slope (ft/ft)	Width or Diameter (ft)	Side Slope (H:V)	Mannings "n"
R1	DET03	J1	Pipe	2814	0.005	3	3:1	0.015
R6A	OSKC05	J06	Trapezoidal	555	0.007	20	4:1	0.030
R4	J03	J04	Trapezoidal	2319	0.0048	30	4:1	0.014
R5	J04	J05	Trapezoidal	2582	0.0039	20	3:1	0.015
R7	J06	J7	Trapezoidal	2058	0.0025	20	3:1	0.025
R2A	KCOS1	J02	Trapezoidal	1510	0.0159	05	3:1	0.03
R2	J1	J02	Trapezoidal	644	0.0047	5	3:1	0.03
R3	J02	J03	Trapezoidal	3485	.0313	5	3:1	0.03
R6	J05	J06	Trapezoidal	2283	0.0031	20	3:1	0.03
R8	J7	J08	Trapezoidal	95	0.0025	10	1:1	0.025
R8A	KCOS11	J08	Pipe	1147	0.005	3		0.015
R9	J08	J9	Trapezoidal	3214	0.0019	20	3:1	0.03
R10B	KCOS12	J10B	Trapezoidal	524	0.005	20	3:1	0.03
R10C	J10B	J10C	Trapezoidal	1398	0.005	10	3:1	0.03
R10D	J10C	J10	Pipe	2907	0.0034	4		0.015
R3A	KCOS3A	J1	Pipe	2628	0.005	5		0.015
R10	J10	J11	Trapezoidal	1028	0.0022	15	2.5:1	0.07
R11	J11	J12	Trapezoidal	2966	0.0022	15	2.5:1	0.07

Detention Basin Data

Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
A3DET	Elevation (ft)	0	Elevation (ft)	127.4	128.5	128.5	130.5	131.5						124.41	.54	.61	0.5
			Area (ac)	6.38	6.61	6.89	7.23	7.81						128.50	84	2.6	1.5
	Pump Data																
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)														
			Elevation at which Pump Turns On (ft)														
			Elevation at which Pump Turns Off (ft)														

Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET02	Elevation (ft)	171	Elevation (ft)	171	172	173	174	175	176	177				171.875	2.41	.61	0.5
			Area (ac)	3.228	3.403	3.582	3.765	3.954	4.147	4.344				176.5	230	2.6	1.5
	Pump Data																
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)														
			Elevation at which Pump Turns On (ft)														
			Elevation at which Pump Turns Off (ft)														

Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET03	Elevation (ft)	170.5	Elevation (ft)	170.5	171.5	172.5	173.5	174.5	175.5	176.5				171.	.785	.61	0.5
			Area (ac)	2.654	2.812	2.975	3.143	3.315	3.492	3.673				176	190	2.6	1.5
	Pump Data																
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)														
			Elevation at which Pump Turns On (ft)														
			Elevation at which Pump Turns Off (ft)														

Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET04	Elevation (ft)	161.5	Elevation (ft)	161.5	162.5	163.5	164.5	165.5	166.5	167.5				162.375	2.41	.61	0.5
			Area (ac)	3.954	4.147	4.344	4.546	4.753	4.964	5.18				167	251	2.6	1.5
	Pump Data																
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)														
			Elevation at which Pump Turns On (ft)														
			Elevation at which Pump Turns Off (ft)														

Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	156.5	Elevation (ft)	156.5	157.5	158.5	159.5	160.5	161.5	162.5				157.0	3.14	.61	0.5

	(ft)		Area (ac)	5.739	5.971	6.208	6.449	6.694	6.944	7.199				162	315	2.6	1.5
DET05	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET06	Elevation (ft)	152.5	Elevation (ft)	152.5	153.5	154.5	155.5	156.5	157.5	158.5				153.	1.57	.61	0.5
			Area (ac)	2.812	2.975	3.143	3.315	3.492	3.676	3.859				158	170	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET07	Elevation (ft)	139.5	Elevation (ft)	139.5	140.5	143.5	141.5	142.5	144.5	145.5				140.	1.57	.61	0.5
			Area (ac)	0.965	1.061	1.162	1.268	1.378	1.493	1.612				145	135	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET08	Elevation (ft)	135.5	Elevation (ft)	135.5	136.5	137.5	139.5	138.5	140.5	141.5				136.875	2.41	.61	0.5
			Area (ac)	4.147	4.344	4.546	4.753	4.964	5.18	5.4				141	235	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET09	Elevation (ft)	131.5	Elevation (ft)	131.5	132.5	133.5	134.5	135.5	136.5	137.5				132.125	1.23	.61	0.5
			Area (ac)	2.425	2.576	2.732	2.893	3.058	3.228	3.403				137	130	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns													

			On (ft)													
			Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET11	Elevation (ft)	130.5	Elevation (ft)	130.5	131.5	132.5	133.5	134.5	135.5	136.5				131.5	.785	.61	0.5
			Area (ac)	0.112	0.147	0.186	0.23	0.278	0.331	0.388				136	50	2.6	1.5
	Pump Data															
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5
			Pump Discharge (cfs)													
			Elevation at which Pump Turns On (ft)													
			Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET10	Elevation (ft)	127.5	Elevation (ft)	127.5	128.5	129.5	130.5	131.5	132.5	133.5				128.0	1.57	.61	0.5
			Area (ac)	1.493	1.612	1.736	1.865	1.998	2.136	2.278				133	150	2.6	1.5
	Pump Data															
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5
			Pump Discharge (cfs)													
			Elevation at which Pump Turns On (ft)													
			Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET12	Elevation (ft)	126.5	Elevation (ft)	126.5	127.5	128.5	129.5	130.5	131.5	132.5				127.0	2.355	.61	0.5
			Area (ac)	2.278	2.425	2.576	2.732	2.893	3.058	3.228				132	200	2.6	1.5
	Pump Data															
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5
			Pump Discharge (cfs)													
			Elevation at which Pump Turns On (ft)													
			Elevation at which Pump Turns Off (ft)													

Sacramento Hydrologic Calculator Report

August 9, 2010 8:03

Project Title: Basin n Proposed Conditions
Comments: Proposed Conditions, with local detention Detention Basin 5 modified 10 yr and 100 yr 24 hr
Prepared by: KEC
Method: Sacramento County HEC-1 method
Date: 8/6/2008

Watershed Hydrologic Summary Data

Watershed	Area (acres)	Mean Elevation (ft)	Lag Times		Basin "n"		Loss Rates		Percent Impervious	
			Method	Lag Time (min)	Method	Basin "n"	Method	Loss Rate (in/hr)	Method	Impervious Area (%)
KCOS1	16.8	203.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV2	120.2	199.7	Basin "n"	-	Specified	0.043	Computed	-	Computed	-
KCDV3	76.9	185	Basin "n"	-	Computed	-	Computed	-	Computed	-
KCDV5	201.3	175	Basin "n"	-	Specified	0.051	Computed	-	Computed	-
KCDV4	134.1	174	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV7	52	153.5	Basin "n"	-	Specified	0.037	Computed	-	Computed	-
KCDV8	126.2	152.9	Basin "n"	-	Specified	0.043	Computed	-	Computed	-
KCDV9	82.2	144.2	Basin "n"	-	Specified	.051	Computed	-	Computed	-
KCOS02	54.9	166.3	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS03	30.4	153	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
OSKC05	102.3	181.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV06	94.2	166.5	Basin "n"	-	Specified	0.039	Computed	-	Computed	-
KCOS04	29.3	145.2	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS06	20.3	166	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCA3	297.3	151	Basin "n"	-	Specified	0.049	Computed	-	Computed	-
KCOS11	11.1	157.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCDV11	13.8	145.1	Basin "n"	-	Specified	0.044	Computed	-	Computed	-
KCDV10	68.4	140.1	Basin "n"	-	Specified	0.045	Computed	-	Computed	-
KCDV12	96.8	138.3	Basin "n"	-	Specified	.042	Computed	-	Computed	-
KCOS12	65	156.5	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS13	21	154	Basin "n"	-	Specified	0.070	Computed	-	Computed	-
KCOS14	14	145.5	Basin "n"	-	Specified	.070	Computed	-	Computed	-
KCOS15	68.2	122.5	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
KCOS3A	168.5	213	Basin "n"	-	Specified	0.07	Computed	-	Computed	-
EXKC13	73.3	140	Basin "n"	-	Computed	-	Computed	-	Computed	-
EXKC14	95.1	120	Basin "n"	-	Computed	-	Computed	-	Computed	-

Basin "n" Method Data for Lag Time Computation

Watershed	Channel Length (ft)	Centroid Length (ft)	Slope (ft/ft)	Channelization	Land Use Impervious Area Percent (% or acres)																	
					95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
KCOS1	1576	850	0.0159	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV2	3940	750	0.0156	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV3	1920	444	0.0042	Undeveloped	2.6	6.8					8.1	21.4							12.9	25.1		
				Developed	0	0					0	0							0	0		
KCDV5	4464	1907	0.0103	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV4	3297	917	0.003	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV7	1655	580	0.0091	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV8	4054	2363	0.0081	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV9	4360	2120	.0083	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS02	3900	2145	.005	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS03	2089	415	.0048	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OSKC05	4804	2082	.0081	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV06	3313	1851	.0063	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS04	2745	1385	005	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS06	2377	1387	0027	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCA3	7016	3899	.006	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS11	726	572	.0069	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV11	850	322	.0213	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV10	2474	1482	.0178	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV12	3407	1720	.0119	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS12	2632	1237	.0057	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS13	1370	566	.0088	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS14	1990	908	.0085	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS15	3317	1334	.0027	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS3A	3787	1555	.0132	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXKC13	4651	2747	0105	Undeveloped																100		
				Developed																0		
EXKC14	79700	3064	.003	Undeveloped																100		
				Developed																0		

Refer to the Drainage manual for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Infiltration Loss Rate Data

Watershed	Soil Cover Group	Land Use Impervious Area Percent (% or acres)																	
		95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
KCOS1	B																		
	C																4.8		
	D																12		
KCDV2	B																		
	C	1.1						26.2	12.2							8.2	2.2		
	D	2						36.7	21.6							2.2	7.8		
KCDV3	B																		
	C																		
	D	2.6	6.8					8.1	21.4							12.9	25.1		
KCDV5	B																		
	C															1.1			
	D	7.2					3.7	25.9	81.2							23.7	58.5		
KCDV4	B																		
	C																4.7		
	D						6.4	57.5	6.4	41						14	5.3		
KCDV7	B																		
	C	2.6														1			
	D	4.2	12.4				11.6	15.7								4.5			
KCDV8	B																		
	C	1.6																	
	D	5						58.9	37.2							18.3	5.2		
KCDV9	B																		
	C																		
	D	16.2	2.5						24.5	1						9.8	28		
KCOS02	B																		
	C																16.3		
	D																38.6		
KCOS03	B																		
	C																12.7		
	D																17.7		
OSKC05	B																		
	C																		
	D																102.3		
KCDV06	B																		
	C	0.9																	
	D	23					10.9	46.9								5.5	7		
KCOS04	B																		
	C																20.4		
	D																8.9		
KCOS06	B																		
	C																		
	D																20.3		
KCA3	B																		
	C								120							0.6	26.3		
	D								78.4							4.4	67.6		
KCOS11	B																		
	C																5.9		
	D																5.2		
KCDV11	B																		
	C																		
	D	2.1							8.9							2.8			
KCDV10	B																		
	C																		
	D	5	5						13.2	32.5						8	4.7		
KCDV12	B																		
	C	1.5															1		
	D	5.5	24						23.2	24.9						15.8	1.3		
KCOS12	B																		
	C																27.1		
	D																37.9		
	B																		

KCOS13	C															1.3			
	D															19.7			
KCOS14	B																		
	C																		
	D															14			
KCOS15	B																		
	C																		
	D															68.2			
KCOS3A	B																		
	C															32.6			
	D															135.9			
EXKC13	B																		
	C															6.5			
	D															66.8			
EXKC14	B																		
	C															4.1			
	D															91			

Refer to the help file for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Hydrograph Routing – Muskingum-Cunge (Standard)

Routing ID	Route From	Route To	Channel Type	Length (ft)	Slope (ft/ft)	Width or Diameter (ft)	Side Slope (H:V)	Mannings "n"
R1	DET03	J1	Pipe	2814	0.005	3	3:1	0.015
R6A	OSKC05	J06	Trapezoidal	555	0.007	20	4:1	0.030
R4	J03	J04	Trapezoidal	2319	0.0048	30	4:1	0.014
R5	J04	J05	Trapezoidal	2582	0.0039	20	3:1	0.015
R7	J06	J7	Trapezoidal	2058	0.0025	20	3:1	0.025
R2A	KCOS1	J02	Trapezoidal	1510	0.0159	05	3:1	0.03
R2	J1	J02	Trapezoidal	644	0.0047	5	3:1	0.03
R3	J02	J03	Trapezoidal	3485	.0313	5	3:1	0.03
R6	J05	J06	Trapezoidal	2283	0.0031	20	3:1	0.03
R8	J7	J08	Trapezoidal	95	0.0025	10	1:1	0.025
R8A	KCOS11	J08	Pipe	1147	0.005	3		0.015
R9	J08	J9	Trapezoidal	3214	0.0019	20	3:1	0.03
R10B	KCOS12	J10B	Trapezoidal	524	0.005	20	3:1	0.03
R10C	J10B	J10C	Trapezoidal	1398	0.005	10	3:1	0.03
R10D	J10C	J10	Pipe	2907	0.0034	4		0.015
R3A	KCOS3A	J1	Pipe	2628	0.005	5		0.015
R10	J10	J11	Trapezoidal	1028	0.0022	15	2.5:1	0.07
R11	J11	J12	Trapezoidal	2966	0.0022	15	2.5:1	0.07

Detention Basin Data

Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
A3DET	Elevation (ft)	0	Elevation (ft)	127.4	128.5	128.5	130.5	131.5					124.41	.54	.61	0.5
			Area (ac)	6.38	6.61	6.89	7.23	7.81					128.50	84	2.6	1.5
	Pump Data															
	Pump Hydrograph Name						Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)													
			Elevation at which Pump Turns On (ft)													
			Elevation at which Pump Turns Off (ft)													

Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET02	Elevation (ft)	171	Elevation (ft)	171	172	173	174	175	176	177			171.875	2.41	.61	0.5
			Area (ac)	3.228	3.403	3.582	3.765	3.954	4.147	4.344			176.5	230	2.6	1.5
	Pump Data															
	Pump Hydrograph Name						Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)													
			Elevation at which Pump Turns On (ft)													
			Elevation at which Pump Turns Off (ft)													

Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET03	Elevation (ft)	170.5	Elevation (ft)	170.5	171.5	172.5	173.5	174.5	175.5	176.5			171.	.785	.61	0.5
			Area (ac)	2.654	2.812	2.975	3.143	3.315	3.492	3.673			176	190	2.6	1.5
	Pump Data															
	Pump Hydrograph Name						Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)													
			Elevation at which Pump Turns On (ft)													
			Elevation at which Pump Turns Off (ft)													

Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET04	Elevation (ft)	161.5	Elevation (ft)	161.5	162.5	163.5	164.5	165.5	166.5	167.5			162.375	2.41	.61	0.5
			Area (ac)	3.954	4.147	4.344	4.546	4.753	4.964	5.18			167	251	2.6	1.5
	Pump Data															
	Pump Hydrograph Name						Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)													
			Elevation at which Pump Turns On (ft)													
			Elevation at which Pump Turns Off (ft)													

Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	147	Elevation (ft)	147	153.9	154	158.5	158.9	159	160	161	162	163	158.0	3.14	.61	0.5

	(ft)		Area (ac)	1.263	2.138	2.424	3.243	3.464	4.591	5.005	6.887	8.655	10.686	162.9	315	2.6	1.5
DET05	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET06	Elevation (ft)	152.5	Elevation (ft)	152.5	153.5	154.5	155.5	156.5	157.5	158.5				153.	1.57	.61	0.5
			Area (ac)	2.812	2.975	3.143	3.315	3.492	3.676	3.859				158	170	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET07	Elevation (ft)	139.5	Elevation (ft)	139.5	140.5	143.5	141.5	142.5	144.5	145.5				140.	1.57	.61	0.5
			Area (ac)	0.965	1.061	1.162	1.268	1.378	1.493	1.612				145	135	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET08	Elevation (ft)	135.5	Elevation (ft)	135.5	136.5	137.5	139.5	138.5	140.5	141.5				136.875	2.41	.61	0.5
			Area (ac)	4.147	4.344	4.546	4.753	4.964	5.18	5.4				141	235	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns On (ft)													
				Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET09	Elevation (ft)	131.5	Elevation (ft)	131.5	132.5	133.5	134.5	135.5	136.5	137.5				132.125	1.23	.61	0.5
			Area (ac)	2.425	2.576	2.732	2.893	3.058	3.228	3.403				137	130	2.6	1.5
	Pump Data																
	Pump Hydrograph Name			Pump Discharge (cfs)				Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
				Elevation at which Pump Turns													

			On (ft)													
			Elevation at which Pump Turns Off (ft)													
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET11	Elevation (ft)	130.5	Elevation (ft)	130.5	131.5	132.5	133.5	134.5	135.5	136.5				131.5	.785	.61	0.5
			Area (ac)	0.112	0.147	0.186	0.23	0.278	0.331	0.388				136	50	2.6	1.5
	Pump Data																
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)														
			Elevation at which Pump Turns On (ft)														
			Elevation at which Pump Turns Off (ft)														
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET10	Elevation (ft)	127.5	Elevation (ft)	127.5	128.5	129.5	130.5	131.5	132.5	133.5				128.0	1.57	.61	0.5
			Area (ac)	1.493	1.612	1.736	1.865	1.998	2.136	2.278				133	150	2.6	1.5
	Pump Data																
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)														
			Elevation at which Pump Turns On (ft)														
			Elevation at which Pump Turns Off (ft)														
Detention Basin	Initial Condition		Pond Storage Relation											Outlet Data			
														Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DET12	Elevation (ft)	126.5	Elevation (ft)	126.5	127.5	128.5	129.5	130.5	131.5	132.5				127.0	2.355	.61	0.5
			Area (ac)	2.278	2.425	2.576	2.732	2.893	3.058	3.228				132	200	2.6	1.5
	Pump Data																
	Pump Hydrograph Name							Pump 1		Pump 2		Pump 3		Pump 4		Pump 5	
			Pump Discharge (cfs)														
			Elevation at which Pump Turns On (ft)														
			Elevation at which Pump Turns Off (ft)														

View HEC-1 output

Sacramento method results
(Project: Basin n Proposed Conditions)
(100-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
KCOS15	82.	12:30	.11			
KCA3	338.	12:34	.46			
A3DET	278.	12:46	.46	130.	15.	
OSKC05	117.	12:33	.16			
R6A	117.	12:34	.16			
KCOS06	60.	12:04	.03			
KCOS02	61.	12:33	.09			
KCOS1	31.	12:14	.03			
R2A	31.	12:18	.03			
KCDV3	115.	12:21	.12			
DET03	7.9	16:02	.12	175.	14.	
R1	7.9	16:09	.12			
KCDV2	253.	12:11	.19			
DET02	24.	13:55	.19	176.	18.	
KCOS3A	225.	12:25	.26			
R3A	224.	12:28	.26			
J1	251.	12:28	.57			
R2	250.	12:30	.57			
J02	271.	12:29	.60			
R3	271.	12:33	.60			
KCDV4	239.	12:15	.21			
DET04	23.	15:07	.21	166.	22.	
J03	353.	12:33	.89			
R4	352.	12:37	.89			
KCOS03	54.	12:15	.05			
KCDV5	302.	12:21	.31			
DET05	27.	15:28	.31	161.	38.	
J04	394.	12:37	1.25			
R5	393.	12:40	1.25			
KCOS04	74.	12:07	.05			
KCDV06	170.	12:15	.15			
DET06	16.	15:15	.15	157.	16.	.00
J05	424.	12:40	1.45			
R6	418.	12:46	1.45			
KCDV7	138.	12:06	.08			

DET07	16.	13:08	.08	144.	6.1	.00
KCDV8	201.	12:19	.20			
DET08	22.	15:14	.20	140.	22.	.00
J06	561.	12:44	1.92			
R7	556.	12:49	1.92			
J7	833.	12:48	2.38			
R8	833.	12:48	2.38			
KCOS11	23.	12:10	.02			
R8A	23.	12:13	.02			
KCDV9	119.	12:23	.13			
DET09	12.	15:27	.13	136.	14.	
KCDV11	43.	12:04	.02			
DET11	7.9	12:35	.02	136.	1.0	
J08	857.	12:48	2.55			
R9	840.	12:56	2.55			
J9	889.	12:55	2.66			
KCOS14	23.	12:18	.02			
KCOS13	40.	12:13	.03			
KCOS12	89.	12:23	.10			
R10B	89.	12:25	.10			
J10B	115.	12:23	.13			
R10C	115.	12:27	.13			
J10C	133.	12:26	.16			
R10D	132.	12:31	.16			
KCDV10	137.	12:12	.11			
DET10	16.	13:43	.11	132.	8.8	.00
KCDV12	179.	12:14	.15			
DET12	24.	13:52	.15	131.	13.	.00
J10	1007.	12:54	3.07			
R10	993.	12:58	3.07			
EXKC13	151.	12:11	.11			
J11	1025.	12:57	3.19			
R11	993.	13:08	3.19			
EXKC14	34.	15:09	.15			
J12	1009.	13:08	3.33			

(10-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
KCOS15	48.	12:30	.11			
KCA3	199.	12:34	.46			

A3DET	153.	12:51	.46	129.	12.	
OSKC05	68.	12:33	.16			
R6A	68.	12:35	.16			
KCOS06	33.	12:04	.03			
KCOS02	36.	12:34	.09			
KCOS1	17.	12:14	.03			
R2A	17.	12:19	.03			
KCDV3	67.	12:21	.12			
DET03	6.1	15:28	.12	173.	8.4	
R1	6.1	15:36	.12			
KCDV2	145.	12:11	.19			
DET02	18.	13:41	.19	174.	12.	
KCOS3A	130.	12:25	.26			
R3A	130.	12:29	.26			
J1	150.	12:29	.57			
R2	150.	12:31	.57			
J02	162.	12:30	.60			
R3	162.	12:35	.60			
KCDV4	138.	12:15	.21			
DET04	18.	14:04	.21	165.	14.	.00
J03	213.	12:35	.89			
R4	212.	12:39	.89			
KCOS03	30.	12:15	.05			
KCDV5	176.	12:21	.31			
DET05	14.	15:40	.31	159.	26.	
J04	227.	12:38	1.25			
R5	227.	12:43	1.25			
KCOS04	41.	12:07	.05			
KCDV06	99.	12:15	.15			
DET06	13.	14:12	.15	156.	9.8	
J05	247.	12:42	1.45			
R6	244.	12:49	1.45			
KCDV7	79.	12:06	.08			
DET07	13.	13:06	.08	143.	3.7	.00
KCDV8	117.	12:19	.20			
DET08	16.	14:30	.20	139.	15.	
J06	331.	12:48	1.92			
R7	329.	12:53	1.92			
J7	481.	12:53	2.38			
R8	481.	12:53	2.38			
KCOS11	13.	12:10	.02			

R8A	13.	12:13	.02			
KCDV9	70.	12:23	.13			
DET09	9.3	15:00	.13	135.	8.3	.00
KCDV11	24.	12:04	.02			
DET11	6.2	12:30	.02	134.	.6	.00
J08	499.	12:53	2.55			
R9	490.	13:02	2.55			
J9	517.	13:01	2.66			
KCOS14	13.	12:18	.02			
KCOS13	23.	12:13	.03			
KCOS12	51.	12:23	.10			
R10B	51.	12:26	.10			
J10B	66.	12:24	.13			
R10C	66.	12:28	.13			
J10C	76.	12:27	.16			
R10D	76.	12:33	.16			
KCDV10	79.	12:12	.11			
DET10	13.	13:36	.11	131.	5.4	.00
KCDV12	104.	12:14	.15			
DET12	19.	13:41	.15	130.	7.8	.00
J10	591.	13:00	3.07			
R10	584.	13:04	3.07			
EXKC13	86.	12:11	.11			
J11	603.	13:04	3.19			
R11	586.	13:16	3.19			
EXKC14	20.	15:09	.15			
J12	596.	13:17	3.33			

(100-year, 10-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
KCOS15	39.	153:10	.11			
KCA3	171.	153:12	.46			
A3DET	162.	153:26	.46	129.	13.	
OSKC05	58.	153:11	.16			
R6A	58.	153:14	.16			
KCOS06	13.	152:48	.03			
KCOS02	30.	153:12	.09			
KCOS1	11.	153:01	.03			
R2A	11.	153:07	.03			
KCDV3	49.	153:04	.12			

DET03	8.2	154:49	.12	175.	15.	.00
R1	8.2	154:57	.12			
KCDV2	82.	153:00	.19			
DET02	23.	154:15	.19	176.	18.	.00
KCOS3A	100.	153:06	.26			
R3A	100.	153:10	.26			
J1	129.	153:11	.57			
R2	129.	153:13	.57			
J02	139.	153:12	.60			
R3	139.	153:17	.60			
KCDV4	89.	153:02	.21			
DET04	24.	154:24	.21	166.	22.	.00
J03	191.	153:16	.89			
R4	191.	153:21	.89			
KCOS03	19.	153:02	.05			
KCDV5	128.	153:04	.31			
DET05	32.	154:35	.31	162.	48.	.00
J04	236.	153:16	1.25			
R5	236.	153:21	1.25			
KCOS04	19.	153:00	.05			
KCDV06	64.	153:02	.15			
DET06	16.	154:25	.15	157.	16.	.00
J05	262.	153:18	1.45			
R6	262.	153:24	1.45			
KCDV7	37.	153:00	.08			
DET07	15.	154:06	.08	144.	5.1	.00
KCDV8	83.	153:03	.20			
DET08	22.	154:30	.20	141.	23.	
J06	361.	153:18	1.92			
R7	361.	153:23	1.92			
J7	524.	153:25	2.38			
R8			2.38			
KCOS11			.02			
R8A			.02			
KCDV9			.13			
DET09			.13			.00
KCDV11			.02			
DET11			.02			.00
J08			2.55			
R9			2.55			
J9			2.66			

KCOS14	.02	
KCOS13	.03	
KCOS12	.10	
R10B	.10	
J10B	.13	
R10C	.13	
J10C	.16	
R10D	.16	
KCDV10	.11	
DET10	.11	.00
KCDV12	.15	
DET12	.15	.00
J10	3.07	
R10	3.07	
EXKC13	.11	
J11	3.19	
R11	3.19	
EXKC14	.15	
J12	3.33	