



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

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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.
- Utilize the schematic Community Park DB 5 design to prepare areaelevation 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.

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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-

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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

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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.

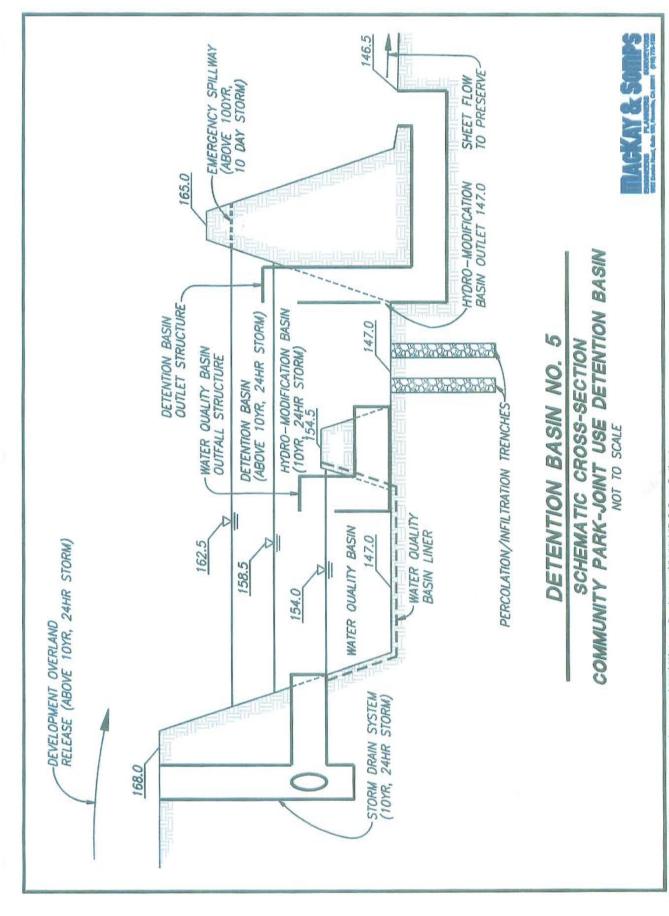
E. Conclusion

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.

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Appendix A



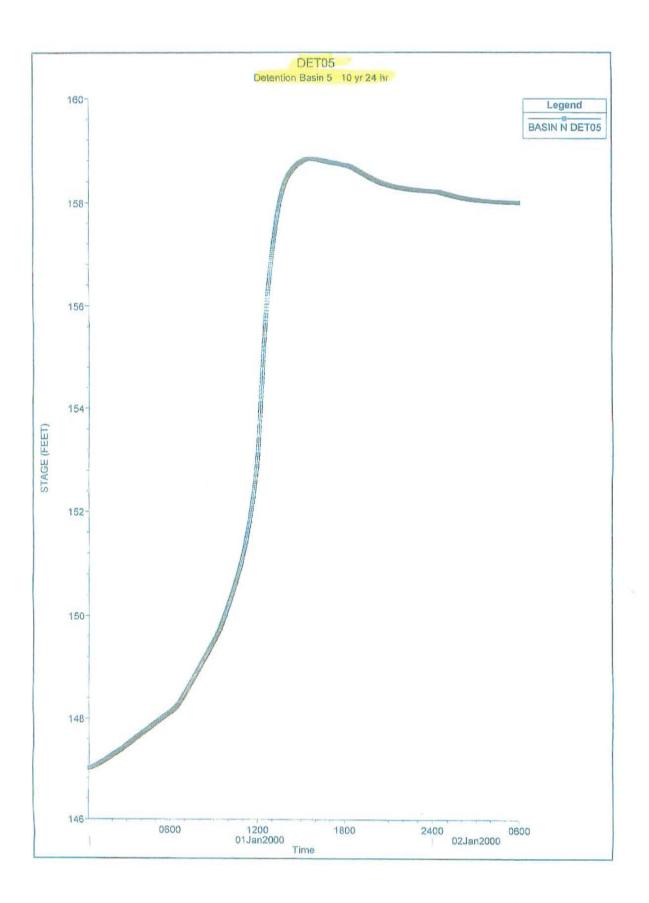


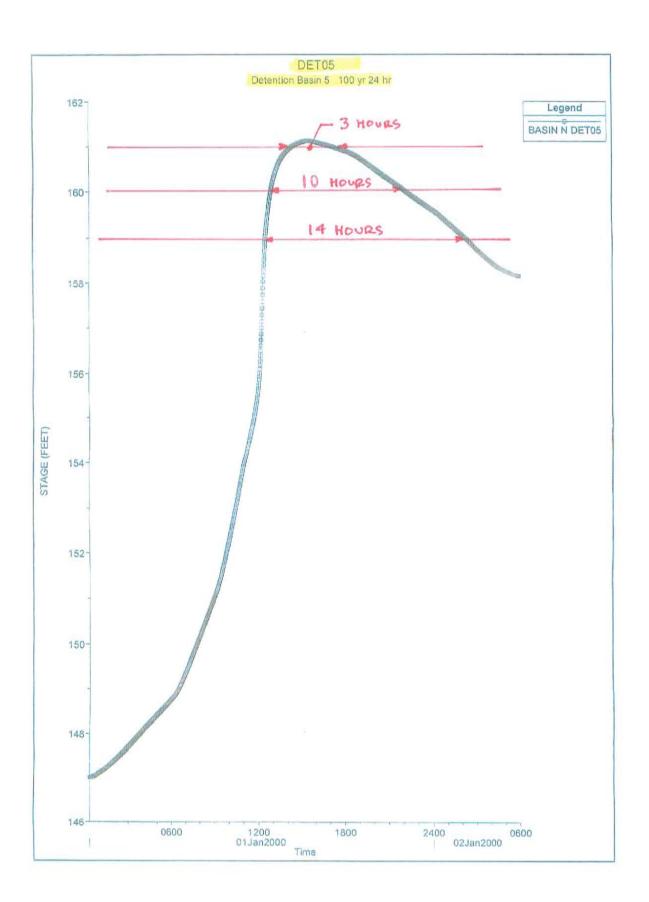
08:18:49 ddenzer L. | Socramento | 7991 | 00 | Mostar Plans | Drainage | Exhibits | 06., 5, Cross_Section diag

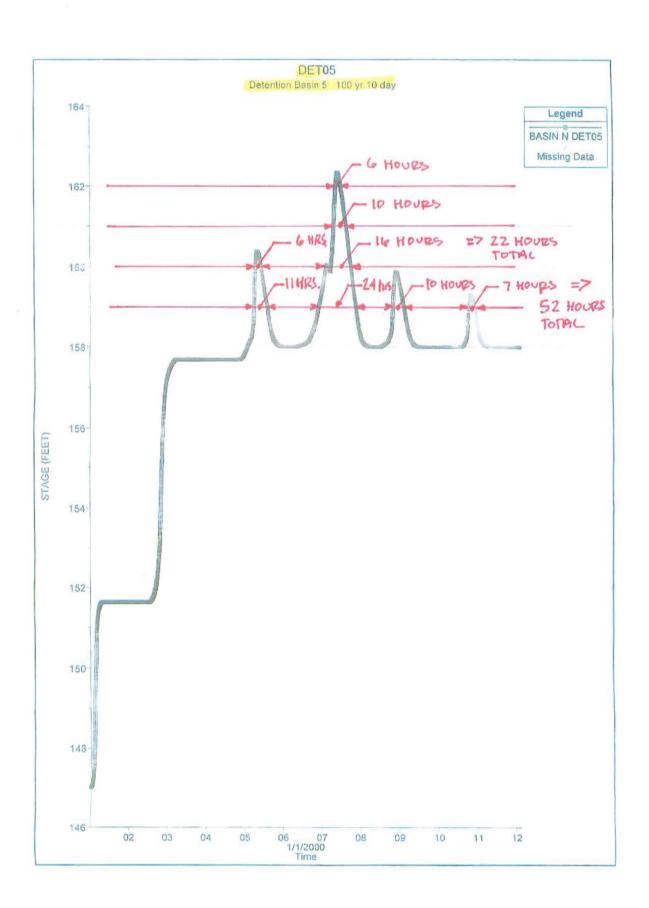
there are no kreferences in this drawing.

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Sac-Calc Results







View HEC-1 output

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

		- Committee of the Comm	00-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		011	,	
DET08	22.	15:14	.20	140.	22.	.00	
J06	571.	12:44	1.92			10.00	
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.		
KCDVII	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				
19	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				

		(1	0-year, 1-day r	ainfall)		
ID KCOS15	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			1
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			
102	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
104	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	
105	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	100 mil 1500.	200.0007	e mode.
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			
M . C						
R8	502.	12:53	2.38			

1201	12	10.12	00				
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	
108	520.	12:53	2.55				
R9	510.	13:02	2.55				
19	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		4		

Sacramento County HEC-1 method

8/6/2008

Watershed Hydrologic Summary Data

		Mean	Lag Ti		Basin	"n"	Loss .	Rates	Percent I	mpervious
Watershed	Area (acres)	Elevation (ft)	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	42
KCDV2	120.2	199.7	Basin "n"	-	Specified	0.043	Computed	i.	Computed	21
KCDV3	76.9	185	Basin "n"	-	Computed	-	Computed	-	Computed	(4)
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	(4)
KCDV9	82.2	144.2	Basin "n"	н н	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"	2	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"	2	Specified	.042	Computed	2	Computed	21
KCOS12	65	156.5	Basin "n"	4	Specified	0.070	Computed	_	Computed	-
KCOS13	21	154	Basin "n"	-	Specified	0.070	Computed		Computed	- 2
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
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Basin "n" N	Aethod Dat	a for Lag 7	Time Com	putation																		
	Channel Length	Centroid Length	Slope								Land	Use I	nperv (% or			crcent						
Watershed		(ft)	(ft/ft)	Channelization	95	9 0	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
KCOS1	1576	850	0.0159	Undeveloped	-	-	-	<u> </u>	<u> </u>	<u> </u>	-	-	-	<u> </u>	-		-	-	-		-	-
				Developed	-	<u> </u>	-	 - -	<u> </u>	<u> </u>	-	<u> </u>	-	<u> </u>	-	-	-	<u> </u>		-	-	-
KCDV2	3940	750	0.0156	Undeveloped Developed	-	-	-	-	<u> </u>	-	-	-	-	-	-	-	-	-	-	-	-	-
-				Undeveloped	2.6	6.8		<u> </u>		-	8.1	21.4	- -	 	<u> </u>	<u> </u>	<u> </u>	<u> </u>	12.9	25.1	┝╌	 -
KCDV3	1920	444	0.0042	Developed	0	0.6		<u> </u>	-	<u> </u>	0	0				-			0	0	 	
14 000 114		1005	0.0100	Undeveloped	-	Ť	-	_	-	-	Ť	-	-	-	-	-	Ţ	Ι.	Ť	<u> </u>	-	-
KCDV5	4464	1907	0.0103	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV4	3297	917	0.003	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RCDV4	3277	917	0.003	Developed	•		-	-	Ŀ	-			-	-	-	-	-	-	-	·	-	-
KCDV7	1655	580	0.0091	Undeveloped	-	<u> </u>		-	-	<u> </u>		-		-	-	-	-	<u> </u>		1	-	-
				Developed	-	-	-	-	-	<u> </u>	-	<u> </u>	-	-	-	-	-	-	-	-	<u> </u>	-
KCDV8	4054	2363	0.0081	Undeveloped Developed	-	-	<u> </u>	-	-		-	<u> </u>		-	-	-	-	-	-	-	<u> </u>	
				Undeveloped	-	-	<u>-</u>		-	-	-	-	-	-	-	-	-	-	-	-	-	
KCDV9	4360	2120	.0083	Developed	-	<u> </u>	<u> </u>	-	- -	-	-		-			-	-	-	-	-	-	-
V COC02	2000	21.46	202	Undeveloped	-	-	-	-	-	_		-	-	-	_	-	-	_	-	-	-	-
KCOS02	3900	2145	.005	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS03	2089	415	.0048	Undeveloped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-
Reoss	2007	-1.5	.0040	Developed	-	-	-		_	-	-	-	-	-		-	-	-	-	-	-	-
OSKC05	4804	2082	.0081	Undeveloped	-	•	-	-	<u> </u>			<u> </u>	-	·	-	-	-	-	-		-	Ŀ
				Developed	-	-	-	-	Ŀ			-	-	- :	-	-	-	-	-	-	-	-
KCDV06	3313	1851	.0063	Undeveloped Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Undeveloped	-	-	<u> </u>	-	H	-	-		- -	-	-	-		-	-	-		-
KCOS04	2745	1385	005	Developed	- 1	-	-	-	-	-	-	-	-	-	-	-	-	- -		-		-
KCOS06	2377	1207	0027	Undeveloped	-	-	-	-	-	-	-	_	-	-	-	-	-	-	-	-	-	-
KCO200	2311	1387	0027	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCA3	7016	3899	.006	Undeveloped	-	-	-	-	-	-	-	-		•	•	-	•	-	-		-	-
110110	1010		.000	Developed	-	-	-	-			-	-	-			-		-	-	•	-	-
KCOS11	726	572	.0069	Undeveloped				-			-		_	-	-	-	-	-	-	-	-	-
				Developed	-	-	-	-	-	-	-				-		<u> </u>	-	-	-		-
KCDVII	850	322	.0213	Undeveloped Developed	-	-	-	-	-	-	-	-	-	-	-	<u> </u>	-	-	-	-	-	<u> </u>
				Undeveloped			-	-	-	-	-	H	-	-	-	-	<u> </u>	-	-	-	-	-
KCDV10	2474	1482	.0178	Developed	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-
KCDV12	3407	1770	0110	Undeveloped	-	-	-	-	-	-	-	-	-	-	_	-	-	-		-	-	-
KCDV12	3407	1720	.0119	Developed	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
KCOS12	2632	1237	.0057	Undeveloped	-	-	-	-	-	-	-	•	-	-		-	-	1		-	-	-
		1231	.0037	Developed	-	-	-	-	-	-	-	-	-	-		-	-	•		-	-	-
KCOS13	1370	566	.0088	Undeveloped		-	-	-	-	-	-		-	-		-		-	-	-	-	-
				Developed					-	-	-	- 1	-	-	-	-	-	~	-	-	-	-
KCOS14	1990	908	.0085	Undeveloped Developed		-	-	-	-	-	-	-	-	-		-	-	,	-	-	-	-
				Undeveloped	-		-	-		-	-	-	-	-	-		-	-		-	-	-
KCOS15	3317	1334	.0027	Developed		_		<u>, </u>	-	-		-	_	-	-	-	-	-	-	-		-
KCOS3A	3787	1556	0122	Undeveloped	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
LCO33A	3/8/	1555	.0132	Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXKC13	4651	2747	0105	Undeveloped																100		
	102,	4,177	0100	Developed																0		
EXKC14	79700	3064	.003	Undeveloped								ļ.,								100		
	I			Developed																0		L_]

Refer to the Drainage manual for Land Use Impervious Are (Percent *Dense Oaks, Shrubs, Vines

	Soil							Ī	Land Us	e Imperv	ious Are acres)	ea Perce	nt						
Watershed	Cover	95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	В			1		ļ	<u> </u>								<u> </u>	<u> </u>			H
KCOS1	С																4.8		
	D																12		
	В							<u> </u>					ļ						
KCDV2	С	1.1		<u> </u>				26.2	12.2				ļ	ļ		8.2	2.2		_
	D	2		├				36.7	21.6			ļ	<u> </u>		<u> </u>	2.2	7.8		-
KCDV3	B C			╁							 			ļ		<u> </u>			├-
KCD V3	D	2.6	6.8					8.1	21.4							12.9	25.1		-
	В	2.0	0.0	 				0.1	21.7		-		 			12.7	23.1		
KCDV5	c			 												1.1			\vdash
	D	7.2					3.7	25.9	81.2							23.7	58.5		
	В																		
KCDV4	С																4.7		
	D			ļ			6.4	57.5	6.4	41						14	5.3		
	В			ļ	<u> </u>										ļ				
KCDV7	C	2.6		ļ								ļ			ļ	1			<u> </u>
	D	4.2	12.4	ļ			11.6	15.7					<u> </u>			4.5			
KCDV8	B C	1.6		 				<u> </u>											
KCDV6	D	5		 				58.9	37.2		<u> </u>	<u> </u>				18.3	5.2		\vdash
	В		 	<u> </u>				36.7	37.2							10.5	3.2		
KCDV9	C		 	†			l	<u> </u>											_
	D	16.2	2.5						24.5	ì						9.8	28		\vdash
	В																		
KCOS02	С																16.3		
	D																38.6		
	В																		
KCOS03	C		<u> </u>														12.7		
	D B			├	<u> </u>	ļ	 		ļ		ļ					ļ	17.7		—
OSKC05	C				 						<u> </u>								
OSKCOS	D											<u> </u>			_		102.3		\vdash
	В					l	 		-								102.5		_
KCDV06	c	0.9																	
	D	23					10.9	46.9				-			<u> </u>	5.5	7		<u> </u>
	В																		
KCOS04	С																20.4		
	D																8.9		
	В																		
KCOS06	C				ļ	ļ						<u> </u>			<u> </u>				
	D B								 			ļ					20.3		_
KCA3	С				 		 		120		-	-			 	0.6	26.3		
	D		 		 		 		78.4	-		\vdash			 	4.4	67.6		<u> </u>
	В		<u> </u>	 	 	-			, 3.4			<u> </u>			l	7.7	07.0		\vdash
KCOS11	С													 	l		5.9		_
	D																5.2		\vdash
	В																		
KCDV11	С																		
	D	2.1							8.9							2.8			
KCDI	В			ļ		ļ			<u> </u>			L		<u> </u>					
KCDV10	C	- F	-	-	<u> </u>	ļ			12.2	20.5		ļ			ļ		1.		<u> </u>
	D B	5	5		 	 			13.2	32.5						8	4.7		\vdash
KCDV12	С	1.5	-	 	-	 											1		├─
+ 12	D	5.5	24	-	 	 	<u> </u>		23.2	24.9						15.8	1.3		
	В					 									-	13.0	٠.,ـ		
KCOS12	C				<u> </u>	<u> </u>											27.1		
	D																37.9		
	В					1													

	_			_	_								
KCOS13	С										1.3		
KC0313	D										19.7		
	В												
KCOS14	С												
	D										14		
	В												
KCOS15	С		_										
	D										68.2		
	В												
KCOS3A	С										32.6		
	D										135.9		
	В											-	
EXKC13	С										6.5		
	D										66.8		
	В												
EXKC14	С										4.1		
	D										91		

Refer to the help file for Land Use Impervious Area Percent

Dense Oaks, Shrubs, Vines

	Hydrograph	Routing -	Muskingum	-Cunge	(Standard)
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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	Jl	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	103	Trapezoidal	3485	.0313	5	3:1	0.03
R6	J05	106	Trapezoidal	2283	0.0031	20	3:1	0.03
R8	J7	J08	Trapezoidal	95	0.0025	10	1:1	0.025
R8A	KCOS11	108	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	JIO	Pipe	2907	0.0034	4		0.015
R3A	KCOS3A	J1	Pipe	2628	0.005	5		0.015
R10	110	J11	Trapezoidal	1028	0.0022	15	2.5:1	0.07
R11	JH	J12	Trapezoidal	2966	0.0022	15	2.5:1	0.07

J.J.M.O. D.	asin Data															t Data	
Detention Basin	Initial Cor	dition					Pond Sto	rage Rela	ation					Elev. (ft)	Arca (sq ft)	Q Coef.	Expone
	Elevation		Elevation (ft)	127.4	128.5	128.5	130.5	131.5						124.41	.54	.61	0.5
	(ft)	0	Arca (ac)	6.38	6.61	6.89	7.23	7.81						128.50	84	2.6	1.5
								Pump l									
A3DET	Pump Hyo	irograp	h Name		Pump Di	scharge		Pum	p l	Pump	0.2	Pum	р3	Pun	ıp 4	Pun	ıp 5
					(cf	s)											
	ļ			Elevation	at which		ums On									_	
				Elevati	on at whi Off		Turns										
														Elev.	Outle Area	t Data	r
Detention Basin	Initial Co	ndition					Pond Sto	orage Rela	ation					(ft)	(sq fl)	Q Coef.	Expone
	Elevation	17 1	Elevation (ft)	171	172	173	174	175	176	177				171.875	2.41	.61	0.5
	(ft)	1/1	Area (ac)	3.228	3.403	3.582	3.765	3.954	4.147	4.344				176.5	230	2.6	1.5
								Pump l									
DET02	Pump Hy	drogran	h Name		Pump D	ischarge		Purr	np I	Pum	p 2	Pun	1p 3	Pun	np 4	Pun	np 5
					(cf	s)					_			L	•		
				Elevati	on at whi On		Turns										
				Elevati	on at whi	ch Pump	Tums										
			T		Off	(H)								<u> </u>	Outl	et Data	
Detention Basin	Initial Co	ndition			,		Pond St	orage Rel	lation					Elev. (ft)	Area (sq ft)	Q Coef.	Expone
	Elevation	170.5	Elevation (ft)	170.5	171.5	172.5	173.5	174.5	175.5	176.5				171.	.785	.61	0.5
	(ft)	170.5	Area (ac)	2.654	2.812	2.975	3.143	3.315	3.492	3.673				176	190	2.6	1.5
								Pump				T		1 5			
DET03	Pump Hv	drograp	h Name		Pump D	ischarge		Pun	npl	Pun	ър 2	Pur	np 3	Pur	np 4	Pun	np 5
					· (c	fs)								<u> </u>			
				Elevat	ion at wh On	ich Pum (ft)	p Turns										
				Elevat	ion at wh	ich Pum (ft)	p Turns										
		-			On	()									Outl	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Expone
~40,111	Elevation		Elevation (ft)	161.5	162.5	163.5	164.5	165.5	166.5	167.5				162.375		.61	0.5
	(ft)	161.5	Arca (ac)	3.954	4.147	4.344	4.546	4.753	4.964	5.18				167	251	2.6	1.5
				·				Pump			•						
DET04	Pump Hy	drogran	h Name		Puma D	ischarge		Pan	np l	Pun	ıp 2	Pun	np 3	Pun	np 4	Pun	np 5
					(c	fs)								<u> </u>			
				Elevat	ion at wh On	ich Pump (ft)	Turns					<u></u>					
				Elevat	ion at wh Off	ich Pump (ft)	Turns										
														Flori		et Data	Υ
D-4																	ir.
Detention Basin	Initial Co	ndition			,	,	Pond St	orage Re	lation				,	Elev. (ft)	Arca (sq ft)	Q Coef.	Expone
	Initial Co	ndition 156.5	Elevation	156.5	157.5	158.5	Pond St 159.5	160.5	lation 161.5	162.5						Q Coef.	0.:

	(ft)		Area (ac)	5.739	5.971	6.208	6.449	6.694	6.944	7.199	İ			162	315	2.6	1.5
			1 1 1 2		!			Pump	Data			.	L			L	1
								Рш	np l	Pun	np 2	Pu	mp 3	Pur	np 4	Pur	np 5
DET05	Pump Hy	/drograp	h Name			oischarge (fs)	;										
				Elevat	ion at wh		p Tums			 		-		 			
					On	(ft)											
				Elevat	ion at wh	iich Pum (ft)	p Turns			l				-			
PRODUCTION OF THE PROPERTY OF			1	dansi	011	(11)	Description of pro-					<u></u>			Outl	et Data	M.C. COLUMN TO THE PARTY OF THE
Detention														Elev.	Arca	Γ	L
Basin	Initial Co	ndition			T		Pond St	orage Re	lation	·			,	(ft)	(sq ft)	Q Coet.	Exponen
	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
	(1)		Area (ac)	2.812	2.975	3.143	3.315	3,492	3.676	3.859				158	170	2.6	1.5
DET06				1				Pump	Data np l	Pun	an ?	D	mp 3	D	np 4	D.c.	np 5
BETOO	Pump Hy	drograp	h Name		Pump D	ischarge	:	FW	прт	Full	np Z	r ui	тр 3	Pur	np 4	Pun	np 5
					`(c	fs)											
				Elevat	ion at wh	ich Pum (ft)	p Turns										
				Elevat	ion at wh		p Turns	 						 			
etilonem voo announce						(ft)	J										
D-4																et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Re	lation					Elev.	Area (sq ft)	Q Coef.	Exponen
	Elevation	120.5	Elevation (ft)	139.5	140.5	143.5	141.5	142.5	144.5	145.5				140.	1.57	.61	0.5
	(ft)	139.5	Area (ac)	0.965	1.061	1.162	1.268	1.378	1.493	1.612				145	135	2.6	1.5
								Pump	Data								<u> </u>
DET07	D 11		L N1					Pun	np I	Pun	ър 2	Pur	np 3	Pun	n p 4	Pun	np 5
	Pump Hy	drograp.	h Name			ischarge fs)											
				Elevati	ion at wh	<u></u>	p Turns						-	1			
					On	(ft)											
				Elevati	ion at wh Off		p Turns										
			f			(11)		L		L				 	Ontle	t Data	
Detention Basin	Initial Co	ndition					Pand Sta	orage Rel	ation					Elev.	Area		Exponen
Dusti	Inida co	ildition.	Elevation					Jiage Rei	ation					(ft)	(sq ft)	<u> </u>	
	Elevation (ft)	135.5	(ft)	135.5	136.5	137.5	139.5	138.5	140.5	141.5				136.875	2.41	.61	0.5
			(ac)	4.147	4.344	4.546	4.753	4.964	5.18	5.4				141	235	2.6	1.5
								Pump I	Data					L	L	l	L
DET08								Pun	тр 1	Pum	p 2	Pun	ıp 3	Purr	np 4	Pun	np 5
	Pump Hy	drograpi	n Name		Pump D: (cf												
					on at whi On	ch Pump (fl)											
				Elevati	on at whi		Turns										
			l		Off	(II)	***************************************	********		***************************************					Ontle	t Data	
Detention			ļ											Elev.	Area	T	
Basin	Initial Co	ndition	ļ				Pond Sto	rage Rel	ation					(fl)	(sq ft)	Q Coef.	Exponent
	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
DETTO			Area (ac)	2.425	2.576	2.732	2.893	3.058	3.228	3.403				137	130	2.6	1.5
DET09			<u></u>					Pump I Pum		Pum	n 2	Pun	ın 3	Dur	n 4	D.	
	Pump Hye	drograpl	n Name		Pump Di (cf			run	i di	rum	P 2	run	ih 2	Pum	ıb 4	Рия	ıμο
				Elevati	on at whi	ch Pump	Turns										

l	ı			1	On	(ft)		l		ı		1		I		1	
		,	Web To the state of the state o	Elevat	ion at wh	```	p Turns								-		
												-	··		Out	let Data	
Detention Basin	Initial Co	ndition			·		Pond St	torage Re	lation	,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	130.5	Elevation (ft)	130.5	131.5	132.5	133.5	134.5	135.5	136.5				131.5	.785	.61	0.5
	(ft)	150.5	Area (ac)	0.112	0.147	0.186	0.23	0.278	0.331	0.388				136	50	2.6	1.5
								Pump									
DET11	Pump Hy	drograpl	n Name			ischarge fs)		Pur	np l	Pun	ip 2	Pur	np 3	Pur	np 4	Pun	np 5
				Elevat	ion at wh		Turns							1			
				Elevat	ion at wh Off	ich Pum) Turns										
										303.33		-33/25/102			·	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Re	lation				,	Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	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
	(ft)		Arca (ac)	1.493	1.612	1.736	1.865	1.998	2.136	2.278				133	150	2.6	1.5
								Pump :	Data						L		
DET10	Pump Hy	drograpl	ı Name		Pump D	ischarge		Рил	np 1	Pum	p 2	Pur	np 3	Pun	np 4	Pun	ı p 5
				Elevati	on at wh	ch Pump	Turns	!									
***************************************				Elevati	on at wh Off		Turns										
																et Data	
Detention Basin	Initial Cor	ndition					Pond Ste	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Cocf.	Exponent
	Elevation	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
	(ft)	126.5	Area (ac)	2.278	2.425	2.576	2.732	2.893	3.058	3.228				132	200	2.6	1.5
								Pump l	Data					L		<u> </u>	
DET12	Pump Hyo	1-0	Nama		D 0			Pun	np l	Pum	p 2	Pun	1p 3	Pun	np 4	Purr	p 5
	rump riyo	mograpn	Name		Pump Di (cf												
					on at whi On	(fi) ·											
				Elevati	on at whi Off		Turns										

Sacramento Hydrologic Calculator Report August 9, 2010 8:03 Method: Sacra Project Title: Basin # Proposed Conditions Metho
Comments: Proposed Conditions with local detention Detention Basin 5 modified 10
propared by: KEC August 9, 2010 8:03
Metho
Date: Sacramento County HEC-1 method

Watershed Hydrologic Summary Data

		Mean	Lag T	imes	Basin '	'n"	Loss	Rates	Percent 1	mpervious
Watershed	Area (acres)	Elevation (ft)	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"	2	Computed		Computed		Computed	-
KCDV5	201.3	175	Basin "n"	9	Specified	0.051	Computed	2	Computed	
KCDV4	134.1	174	Basin "n"	-	Specified	0,044	Computed	2	Computed	
KCDV7	52	153.5	Basin "n"	9	Specified	0.037	Computed	2	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	Busin "n"		Specified	0.07	Computed		Computed	-
KCDV11	13.8	145.1	Basin "n"	2	Specified	0.044	Computed		Computed	-
KCDV10	68.4	140.1	Basin "n"	2	Specified	0.045	Computed	12 1	Computed	2
KCDV12	96.8	138.3	Basin "n"	2	Specified	.042	Computed	- 2	Computed	- 2
KCOS12	65	156,5	Basin "n"	1	Specified	0.070	Computed	-	Computed	-
KCOS13	21	154	Basin "n"		Specified	0.070	Computed	-	Computed	- 1
KCOS14	14	145.5	Basin "n"	#	Specified	,070	Computed	12	Computed	
KCOS15	68.2	122.5	Basin "a"	- 2	Specified	0.07	Computed		Computed	-
KCOS3A	168.5	213	Basin "n"		Specified	0.07	Computed	-	Computed	- 4
EXKC13	73,3	140	Basin "n"	-	Computed	-	Computed	(4)	Computed	-
EXKC14	95.1	120	Basin "n"	-	Computed	-	Computed) in:	Computed	-

I	Basin "n"	Method	Data	for	Lag	Time	Com	putation

Basin "n" N	Method Da	ta for Lag	Time Com	putation																		
	Channel Length	Centroid Length	Slope						,	,	Land	Use I		ious A		ercent						
Watershed	(ft)	(ft)	(ft/ft)	Channelization	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	-	-	-	-		-	Ē	-	-	-	-	Ē	Ŀ	-	-	-	-	-
KCDV3	1920	444	0.0042	Undeveloped	2.6	6.8	-	-	-	<u> </u>	8.1	21.4	-	<u> </u>	-	-	-		12.9	25.1	-	-
	1720	777	0.0042	Developed	0	0		_			0	0							0	0		
KCDV5	4464	1907	0.0103	Undeveloped Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ŀ	-
KCDV4	3297	917	0.003	Undeveloped Developed	,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV7	1655	580	0.0091	Undeveloped	-	-	٠	-	-	-	-	-	-	-	-	-	<u> </u>	-	-	_	-	-
KCDV8	4054	2363	0.0081	Developed Undeveloped	-	-	-	=	-	-	-	-	-	-	-	 	┝╧	-	-	-	-	-
KCDV8	4034	2303	0.0061	Developed	-	-	·	_	-	-	-	-	-	-		Ŀ	-	-	-	-	Ξ	-
KCDV9	4360	2120	.0083	Undeveloped Developed	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCOS02	3900	2145	.005	Undeveloped Developed	-	-	-	-	- 1	-	-	-	-	-		-	-	-	-	-	-	-
KCOS03	2089	415	.0048	Undeveloped	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
OSKC05	4804	2082	.0081	Developed Undeveloped	-	-	-	-	-	-	-	-	-	-	<u>-</u>	-	-	-	-	-	-	-
				Developed Undeveloped	-	-					-	-	-		-	-		-	-	-	-	-
KCDV06	3313	1851	.0063	Developed		-	-	-	-	-	-	-	-	-		Ŀ	-		-	-	-	-
KCOS04	2745	1385	005	Undeveloped Developed	-	-	-	-	-	-	-	,	-	-	-	-	-	-	-		-	-
KCOS06	2377	1387	0027	Undeveloped Developed	-	-		-		-	-		-	-	-	-	-	-	-	-	-	-
KCA3	7016	3899	.006	Undeveloped	-	-	-	-	-	-		-		-	-	-	٠	-	-	-	-	-
KCOS11	726	572	.0069	Developed Undeveloped		-	-	-			-	-	-	-	-	-	-	-		-	-	-
	720	312	.0009	Developed Undeveloped	-	-		-	-	-	-	-	-	-	-	-	-	-		-	-	-
KCDVII	850	322	.0213	Developed	-		-		-	-		-	_	-	-	-	_	-	-	-	-	-
KCDV10	2474	1482	.0178	Undeveloped Developed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KCDV12	3407	1720	.0119	Undeveloped Developed	-	-	-	-	-	-	÷	-	-	-	-	-	-	~	-	-	-	-
KCOS12	2632	1237	.0057	Undeveloped	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Developed Undeveloped	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
KCOS13	1370	566	.0088	Developed	-		-	-	-	-	-	-	-	-	-	_	-		-	-	-	-
KCOS14	1990	908	.0085	Undeveloped Developed	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-
KCOS15	3317	1334	.0027	Undeveloped Developed	-	-	-	-	-	-			-	-	-	-	•	-	-	-	-	-
KCOS3A	3787	1555	.0132	Undeveloped	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-
EXKC13	4651	2747	0105	Developed Undeveloped	-	-		-	-	-	-	-	-		-	-	-		-	100	-	-
				Developed Undeveloped																0 100		
EXKC14	79700	3064	.003	Developed																0		

Refer to the Drainage manual for Land Use Impervious Area Percent

Dense Oaks, Shrubs, Vines

Infiltration L	Soil	Data				· · · · · · · · · · · · · · · · · · ·			Land Us	e Imperv	ious Areacres)	ea Perce	nt						
Watershed	Cover Group	95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
	В					1		 	 						<u> </u>	-		<u> </u>	<u> </u>
KCOS1	С										1	<u> </u>	 	†	-	 -	4.8		
	D							i			<u> </u>			<u> </u>			12	 -	
	В		1					1					 			 	··-		
KCDV2	С	1.1					†	26.2	12.2		1	-	1			8.2	2.2		
	D	2						36.7	21.6		1		 			2.2	7.8		
	В							İ				<u> </u>					 		
KCDV3	С												†				1		
	D	2.6	6.8	1			<u> </u>	8.1	21.4				1			12.9	25.1		
	В						T												
KCDV5	С															1.1	1		l
	D	7.2					3.7	25.9	81.2							23.7	58.5		
	В																		
KCDV4	С															<u> </u>	4.7		
	D						6.4	57.5	6.4	41						14	5.3		
	В																		
KCDV7	С	2.6														ı			
	D	4.2	12.4				11.6	15.7								4.5			
	В																		
KCDV8	С	1.6																	
	D	5						58.9	37.2							18.3	5.2		
	В																		
KCDV9	С							l											
	D	16.2	2.5						24.5	1						9.8	28		
	В																		
KCOS02	С																16.3		
	D																38.6		
	В																i		
KCOS03	С																12.7		
	D																17.7		
	В															_			
OSKC05	С																		
	D																102.3		
	В																		
KCDV06	С	0.9																	
	D	23					10.9	46.9								5.5	7		
ļ	В																		
KCOS04	С																20.4		
	D																8.9		
	В																		
KCOS06	С																		
	D																20.3		
	В																		
KCA3	С								120							0.6	26.3		
	D					L			78.4							4.4	67.6]	
	В						ļ]	
KCOS11	С																5.9]	
	D																5.2]
	В																		
KCDVII	С																		
	D	2,1							8.9							2.8			
	В																		
KCDV10	C																		
	D	5	5						13.2	32,5						8	4.7		
, l	В																		
KCDV12	С	1.5															1		
	D	5.5	24						23.2	24.9						15.8	1.3		
V.COO.	В																		
KCOS12	С																27.1		
	D																37.9		
1	В																		

KCOS13	С							1	1	1.3	
KCO313	D									19.7	
	В										
KCOS14	С										
	D									14	
	В										
KCOS15	С										
	D									68.2	
	В						 ***************************************				
KCOS3A	C									32.6	
	D									135.9	
	В										
EXKC13	C									6.5	
	D									66.8	
	В										
EXKC14	С									4.1	
	D									91	

Refer to the help file for Land Use Impervious Area Percent

^{*}Dense Oaks, Shrubs, Vines

Hydrograph Routin	ng – Muskingum–C	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"
RI	DET03	JI	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	KC0S11	108	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
RIOD	J10C	110	Pipe	2907	0.0034	4		0.015
R3A	KCOS3A	JI	Pipe	2628	0.005	5		0.015
R10	110	J11	Trapezoidal	1028	0.0022	15	2.5:1	0.07
R11	JH	312	Trapezoidal	2966	0.0022	15	2.5:1	0.07

																et Data	
Detention Basin	Initial Co	ndition			1		Pond St	orage Re	elation	,	,	,	·	Elev. (fl)	Area (sq ft)	Q Coef.	Expone
	Elevation	0	Elevation (ft)	127.4	128.5	128.5	130.5	131.5						124.41	.54	.61	0.5
	(ft)		Arca (ac)	6.38	6.61	6.89	7.23	7.81						128.50	84	2.6	1.5
A3DET									Data			·		,		,	
ASDEI	Pump Hy	drogran	h Name		Pump Discharge			Pur	mp l	Pur	np 2	Pun	np 3	Pun	ւթ 4	Pun	np 5
:					(c	fs)		<u> </u>									
				Elevatio		h Pump (ft)	Turns On										
				Elevat	ion at wh		p Turns										
	The same of the sa				•			4		4			***************************************		Outle	et Data	***************************************
Detention Basin	Initial Co	ndition					Pond St	orage Re	dation					Elev.	Arca (sq ft)	Q Coef.	Expone
Dasin	Elevation	idition	Elevation (ft)	171	172	173	174	175	176	177	T			171.875	2.41	.61	0.5
	(ft)	171	Area (ac)	3.228	3.403	3.582	3.765	3.954	4.147	4.344				176.5	230	2.6	1.5
			I	Pump Data									<u> </u>				
DET02								Pu	mp 1	Put	np 2	Pur	np 3	Purr	ıp 4	Pun	1p 5
	Pump Hy	drograp	h Name			ischarge fs)											
				Elevat	ion at wh	ich Pum	p Tums					†		†			
				Florest	On ion at wh	(ft)	- T.,			ļ		<u> </u>					
				Bievai		(ft)	pruns										
															Outl	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage R	clation					Elev.	Area (sq ft)	Q Cocf.	Expond
	Elevation		Elevation (ft)	170.5	171.5	172.5	173.5	174.5	175.5	176.5				171.	.785	.61	0.5
	(ft)	170.5	Area (ac)	2.654	2.812	2.975	3.143	3.315	3.492	3.673				176	190	2.6	1.5
				<u>' </u>				Pump	Data				1			<u> </u>	
DET03	Drame Hay	dua aman	h Nome					Pu	mp l	Pu	mp 2	Pur	mp 3	Pun	1p 4	Pun	ıp 5
	Pump Hyo	подтар	n Name			Discharge (fs)	;										
				Eleva	ion at wh	ich Pum	p Turns										
				Eleva	tion at wh	i (ft) nich Pum (ft)	p Turns										
				I	- 01	7		<u> </u>							Outle	t Data	
Detention Basin	Initial Cor	ndition			,	,	Pond St	orage Re	lation			,		Elev. (ft)	Area (sq fl)	Q Coef.	Expone
	Elevation	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
	(ft)	-	Arca (ac)	3.954	4.147	4.344	4.546	4.753	4.964	5.18				167	251	2,6	1.5
DET04	<u> </u>			Ι				Pump	Data mp l	l n		T n.		n	4		
DETO	Pump Hyo	drograp	h Name		Pump D	ischarge		Fu	mp i	ru	mp 2	rui	np 3	Pur	ıp +	Pun	рο
			(cfs) Elevation at which Pump Turns On (ft)						 								
				Elevat	ion at wh		p Turns										
***************************************	***************************************		***************************************	.						<u> </u>		<u>.</u>	***************************************		Outl	et Data	
Detention Basin	Initial Condition						Pond C	orage Re	elation					Elev. (ft)	Arca (sq fl)	Q Coef.	Expone
	IIIII COI	147	Elevation (ft)	147	153.9	154	158.5	158.9	159	160	161	162	163	158.0	3.14	.61	0.5
	Elevation		. 7									ļ	-	+		 	

	(ft)	1	Arca	1 263	2 138	2 424	3 243	3.464	4 501	5.005	6.887	8.655	10.686	162.9	315	2.6	1.5
		<u></u>	(ac)	1.505	2.130	2.727	3.243	Pump		3.003	0.007	0.055	10.050	102.5	1 313	2.0	L '
								Pun		Pum	p 2	Pun	np 3	Pui	mp 4	Pur	np 5
DET05	Pump Hy	drograp	h Name		Pump Di (cf												
				Elevati	on at whi	ch Pump	Turns							1			
				Elevati	On on at whi	ch Pump	Turns										
					Off	(ft)				· · · · · · · · · · · · · · · · · · ·					Ont	et Data	
Detention														Elev.	Arca	T	Exponen
Basin	Initial Co	ndition	Elevation				Pond S	torage Re	lation	T	1	1	1	(ft)	(sq ft)	Q 0001.	Exponent
	Elevation (ft)	152.5	(ft) Area	152.5	153.5	154.5	155.5	156.5	157.5	158.5	-			153.	1.57	.61	0.5
			(ac)	2.812	2.975	3,143	3.315	3.492	3.676	3.859				158	170	2.6	1.5
D ETTO.				1				Pump		7.						T	
DET06	Pump Hy	drograp	h Name		Pump D	Discharge	:	Pui	np 1	Pur	np 2	Pur	np 3	Pur	np 4	Pun	np 5
				E1	(c	fs)		ļ		ļ		<u> </u>					
				Elevai	ion at wh On	iich Pum (ft)	p Iums										
				Elevat	ion at wh	iich Pum f (ft)	p Turns										
					***************************************	(11)					- Inches de la constitución de l	4			Outl	et Data	
Detention Basin	Initial Co	ndition					Pond S	torage Re	lation					Elev.	Area (sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	139.5	140.5	143.5	141.5	142.5	144.5	145.5				140.	1.57	.61	0.5
	(ft)	139.5	Area (ac)	0.965	1.061	1.162	1.268	1.378	1.493	1.612	<u> </u>			145	135	2.6	1.5
DET07				r				Pump		1 ,		Τ ,				1 .	
DLIO	Pump Hy	drograpl	h Name		Pump D	ischarge		rui	np l	Pur	np 2	Pur	np 3	Pun	np 4	Pun	ip o
				Flevat	(c ion at wh	ifs) uich Pum	n Turns	<u> </u>		-		 					
					On	(ft)		ļ									
				Elevat	ion at wh Off	iich Pumj '(ft)	p Turns										
D						- 10000000						./				t Data	1
Detention Basin	Initial Co	ndition					Pond St	orage Rcl	ation					Elev. (ft)	Area (sq ft)	Q Cocf.	Exponent
	Elevation	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
	(ft)	133.3	Area (ac)	4.147	4.344	4.546	4.753	4.964	5.18	5.4				141	235	2.6	1.5
			(ac)				J	Pump	Data						<u> </u>	<u> </u>	l
DET08	D	,							ıp l	Pun	1р 2	Pun	ıp 3	Pun	ıp 4	Pun	ւթ 5
	Pump Hy	arograpi	n Name		(c	ischarge fs)											
			_		ion at wh On	(ft)											
				Elevati	ion at wh Off	ich Pump (fl)	Turns										
.,					Oli	127		L		<u></u>					Outle	t Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	ation					Elev. (ft)	Area (sq fl)	Q Cocf.	Exponent
	Elevation		Elevation (ft)	131.5	132.5	133.5	134.5	135.5	136.5	137.5				132.125	1.23	.61	0.5
	(ft)	131.5	Атеа (ac)	2.425	2.576	2.732	2.893	3.058	3.228	3.403				137	130	2.6	1.5
DET09								Pump l		D	2	n		D	1	n.:	
	Pump Hye	drograpi	n Name		Pump D	ischarge fs)		Pun	ip i	Pun	ip 2	Purr	υps	Puir	ър 4	Pun	ı p 3
!				Elevati	on at wh	ich Pump	Turns										

	1				On	(ft)						l		١		!	
				Elevat	ion at whi Off		Turns										
															Outle	et Data	
Detention Basin	Initial Co	ndition				·	Pond St	orage Re	lation			,		Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	130.5	Elevation (ft)	130.5	131.5	132.5	133.5	134.5	135.5	136.5				131.5	.785	.61	0.5
	(ft)	150.5	Area (ac)	0.112	0.147	0.186	0.23	0.278	0.331	0.388				136	50	2.6	1.5
								Pump		,							
DETH	Pump Hydrograph Name		n Name	Pump Discharge			Pun	np 1	Pum	p 2	Pun	որ 3	Pun	np 4	Pun	np 5	
				Elevat	on at wh	ich Pump	Turns										
				Elevat	ion at wh	ich Pump	Turns				*****************						
															Outl	et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Re	ation	·				Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation		Elevation (ft)	127.5	128.5	129.5	130.5	131.5	132.5	133.5				128.0	1.57	.61	0.5
	(ft)	127.3	Area (ac)	1.493	1.612	1.736	1.865	1.998	2.136	2.278				133	150	2.6	1.5
								Pump	Data								
DET10			ν,					Pun	np I	Pum	ip 2	Pun	1p 3	Pur	np 4	Pun	ıp 5
	Pump Hy	arograpi	i Name		Pump D (c	fs)				ļ				<u> </u>			
					ion at wh On	(ft) ·						ļ		ļ			
				Elevat	ion at wh Off		Turns						······································			<u> </u>	
																et Data	
Detention Basin	Initial Co	ndition					Pond St	orage Rel	ation					Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
	Elevation	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
	(ft)	120.5	Area (ac)	2.278	2.425	2.576	2.732	2.893	3.058	3.228				132	200	2.6	1.5
				<u> </u>				Pump	Data								
DET12	Pump Hydrograph Name							Pur	np I	Pum	ıp 2	Pun	որ 3	Pur	np 4	Pun	ıp 5
			n Name		(c												
					ion at wh On	(fl)											
				Elevat	ion at wh Off	ich Pump (ft)	Turns										

View HEC-1 output

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

(100-year, 1-day rainfall)												
D	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	HA. WARREN								
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	10,100		10.0	
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		
108	857.	12:48	2.55				
R9	840.	12:56	2.55				
19	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				
RI1	993.	13:08	3.19				
EXKC14	34.	15:09	.15				
J12	1009.	13:08	3.33				

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	Peak flow	Time of peak	Basin area	Peak stage	Peak storage	Diversion volume
ID	(cfs)	(hours)	(sq. mi)	(feet)	(ac-ft)	(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			
П	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	
105	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		2.63	
R7	329.	12:53	1.92			
J7	481.	12:53	2.38			
R8	481.	12:53	2.38			

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	
108	499.	12:53	2.55				
R9	490,	13:02	2.55				
19	517.	13:01	2.66				
KCOS14	13.	12:18	.02				
KCOS13	23.	12:13	.03				
KCOS12	51.	12:23	.10				
RIOB	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				

		(10	00-year, 10-day	rainfall)		
ID	Peak flow (cfs)	Time of peak (hours)	Basin arca (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
RI	8.2	154:57	.12	175.	1	.00
KCDV2	82.	153:00	.19			
DET02	23.	154:15	.19	176	18	00
KCOS3A	100.	153:06	.26	176.	18.	.00
R3A	100.					
JI		153:10	.26			
	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
103	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.	
106	361.	153:18	1.92			
R7	361.	153:23	1.92			
17	524.	153:25	2.38			
R8			2.38			
KCOS11			.02			
R8A			.02			
KCDV9			.13			
DET09			.13			.00
KCDV11			.02			,00
DETI1			.02			.00
J08			2.55			,00
R9			2.55			
1907			months.			

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	.03 .10 .10 .13 .13 .13 .16 .16 .11 .11 .15 .15 .15 .3.07 3.07 .11 3.19 3.19 3.19