Sun Valley Area Drainage Master Plan

Technical Appendices

Step 2

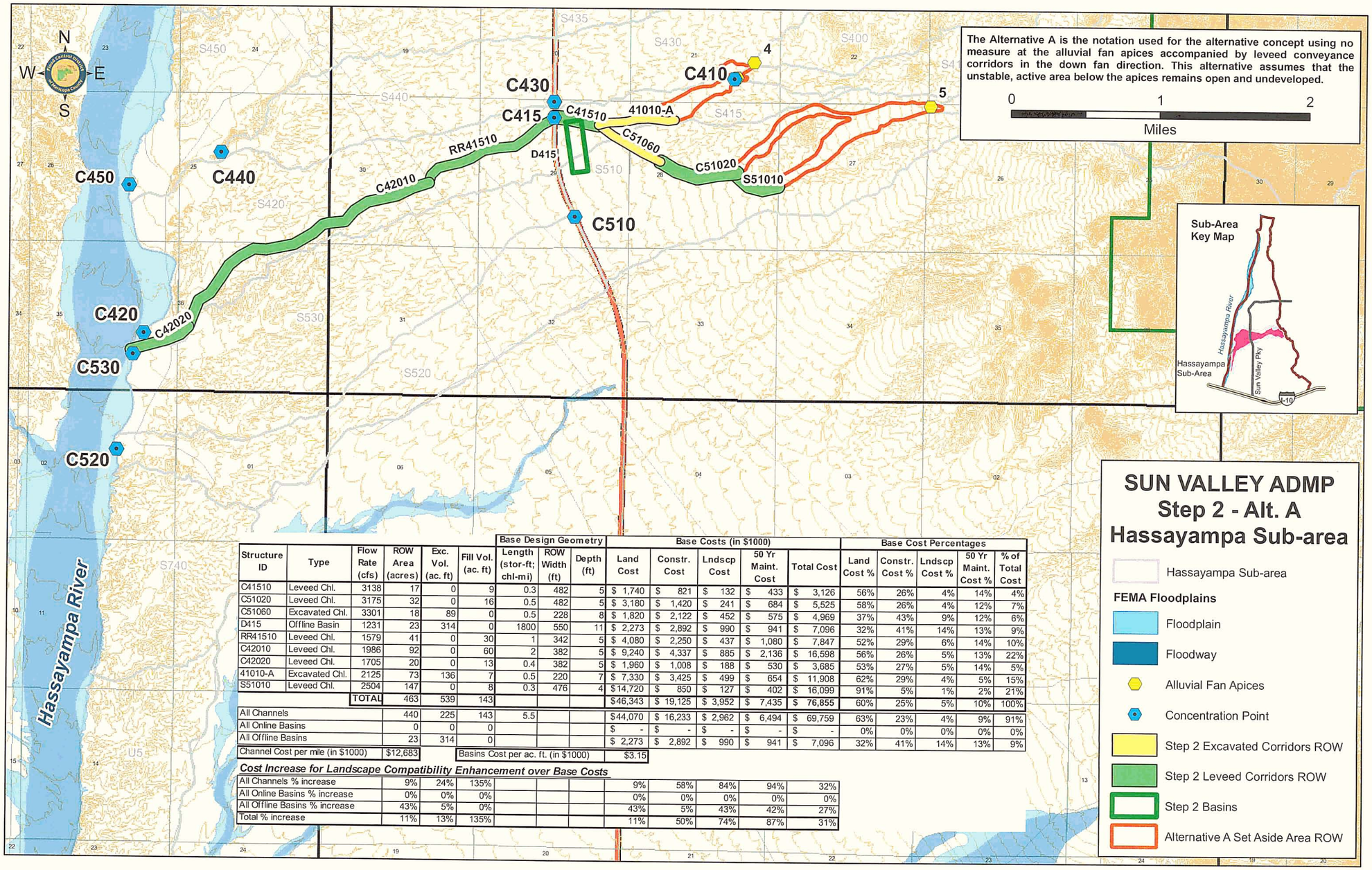
Proposed Alternatives Analysis Report

Volume 4

HASSAYAMPA SUB-AREA

Flood Control District of Maricopa County

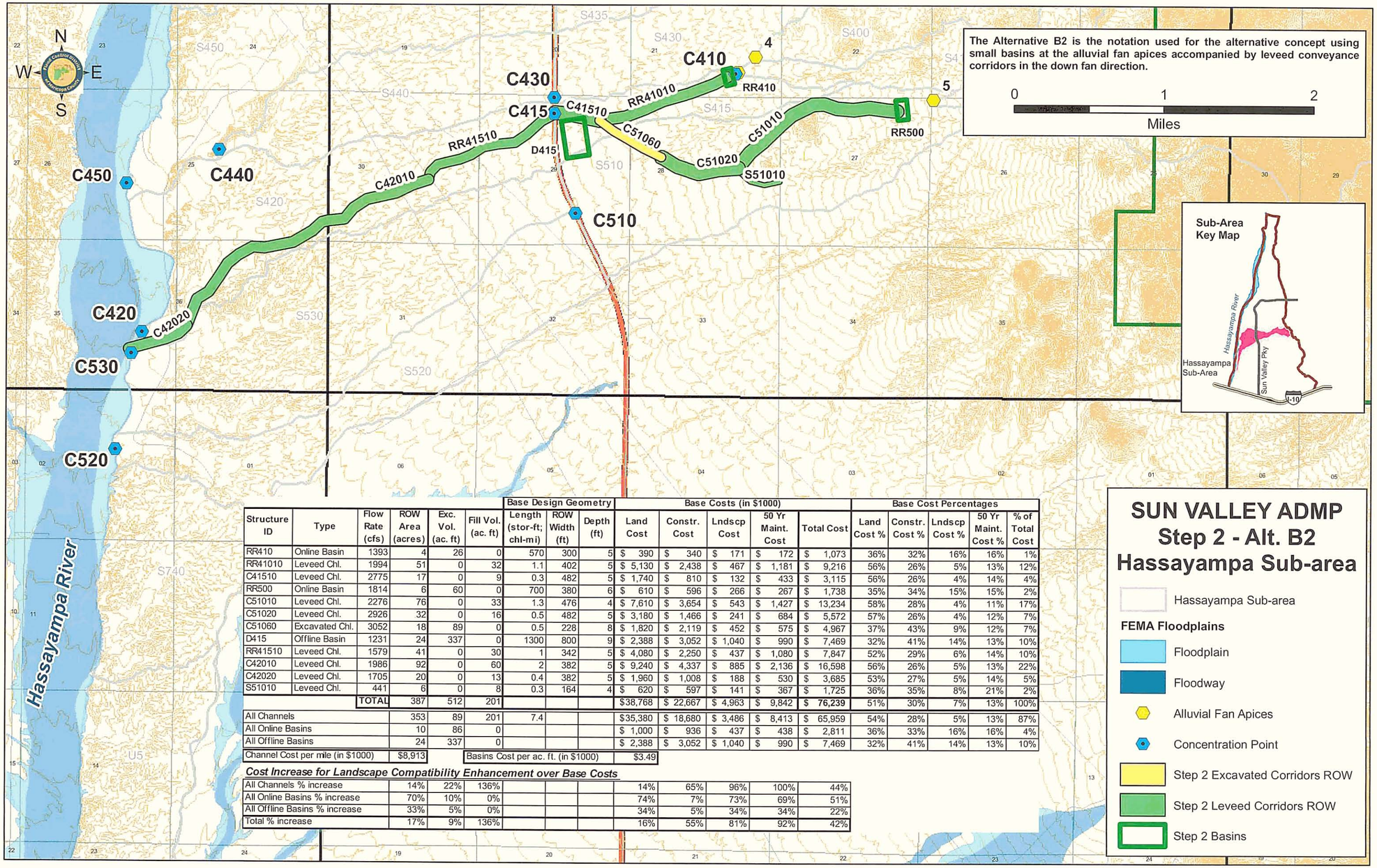
September 2006



						Base Design Geometry			Base Costs (in $1000)					Base Cost Percentages				
Structure ID	Type	Flow Rate (cfs)	ROW Area (acres)	Exc. Vol. (ac. ft)	Fill Vol. (ac. ft)	Length (stor-ft; chl-mi)	ROW Width (ft)	Depth (ft)	Land Cost	Constr. Cost	Lndscp Cost	50 Yr Maint. Cost	Total Cost	Land Cost %	Constr. Cost %	Lndscp Cost %	50 Yr Maint. Cost %	% of Total Cost
C41510	Leveed Chl.	3138	17	0	9	0.3	482	5	$ 1,740	$ 821	$ 132	$ 433	$ 3,126	56%	26%	4%	14%	4%
C51020	Leveed Chl.	3175	32	0	16	0.5	482	5	$ 3,180	$ 1,420	$ 241	$ 684	$ 5,525	58%	26%	4%	12%	7%
C51060	Excavated Chl.	3301	18	89	0	0.5	228	8	$ 1,820	$ 2,122	$ 452	$ 575	$ 4,969	37%	43%	9%	12%	6%
D415	Offline Basin	1231	23	314	0	1800	550	11	$ 2,273	$ 2,892	$ 990	$ 941	$ 7,096	32%	41%	14%	13%	9%
RR41510	Leveed Chl.	1579	41	0	30	1	342	5	$ 4,080	$ 2,250	$ 437	$ 1,080	$ 7,847	52%	29%	6%	14%	10%
C42010	Leveed Chl.	1986	92	0	60	2	382	5	$ 9,240	$ 4,337	$ 885	$ 2,136	$ 16,598	56%	26%	5%	13%	22%
C42020	Leveed Chl.	1705	20	0	13	0.4	382	5	$ 1,960	$ 1,008	$ 188	$ 530	$ 3,685	53%	27%	5%	14%	5%
41010-A	Excavated Chl.	2125	73	136	7	0.5	220	7	$ 7,330	$ 3,425	$ 499	$ 654	$ 11,908	62%	29%	4%	5%	15%
S51010	Leveed Chl.	2504	147	0	8	0.3	476	4	$14,720	$ 850	$ 127	$ 402	$ 16,099	91%	5%	1%	2%	21%
		TOTAL	463	539	143				$46,343	$ 19,125	$ 3,952	$ 7,435	**$ 76,855**	60%	25%	5%	10%	100%
All Channels			440	225	143	5.5			$44,070	$ 16,233	$ 2,962	$ 6,494	$ 69,759	63%	23%	4%	9%	91%
All Online Basins			0	0	0				$ -	$ -	$ -	$ -	$ -	0%	0%	0%	0%	0%
All Offline Basins			23	314	0				$ 2,273	$ 2,892	$ 990	$ 941	$ 7,096	32%	41%	14%	13%	9%
Channel Cost per mile (in $1000)			$12,683			Basins Cost per ac. ft. (in $1000)			$3.15									

Cost Increase for Landscape Compatibility Enhancement over Base Costs

All Channels % increase	9%	24%	135%				9%	58%	84%	94%	32%
All Online Basins % increase	0%	0%	0%				0%	0%	0%	0%	0%
All Offline Basins % increase	43%	5%	0%				43%	5%	43%	42%	27%
Total % increase	11%	13%	135%				11%	50%	74%	87%	31%



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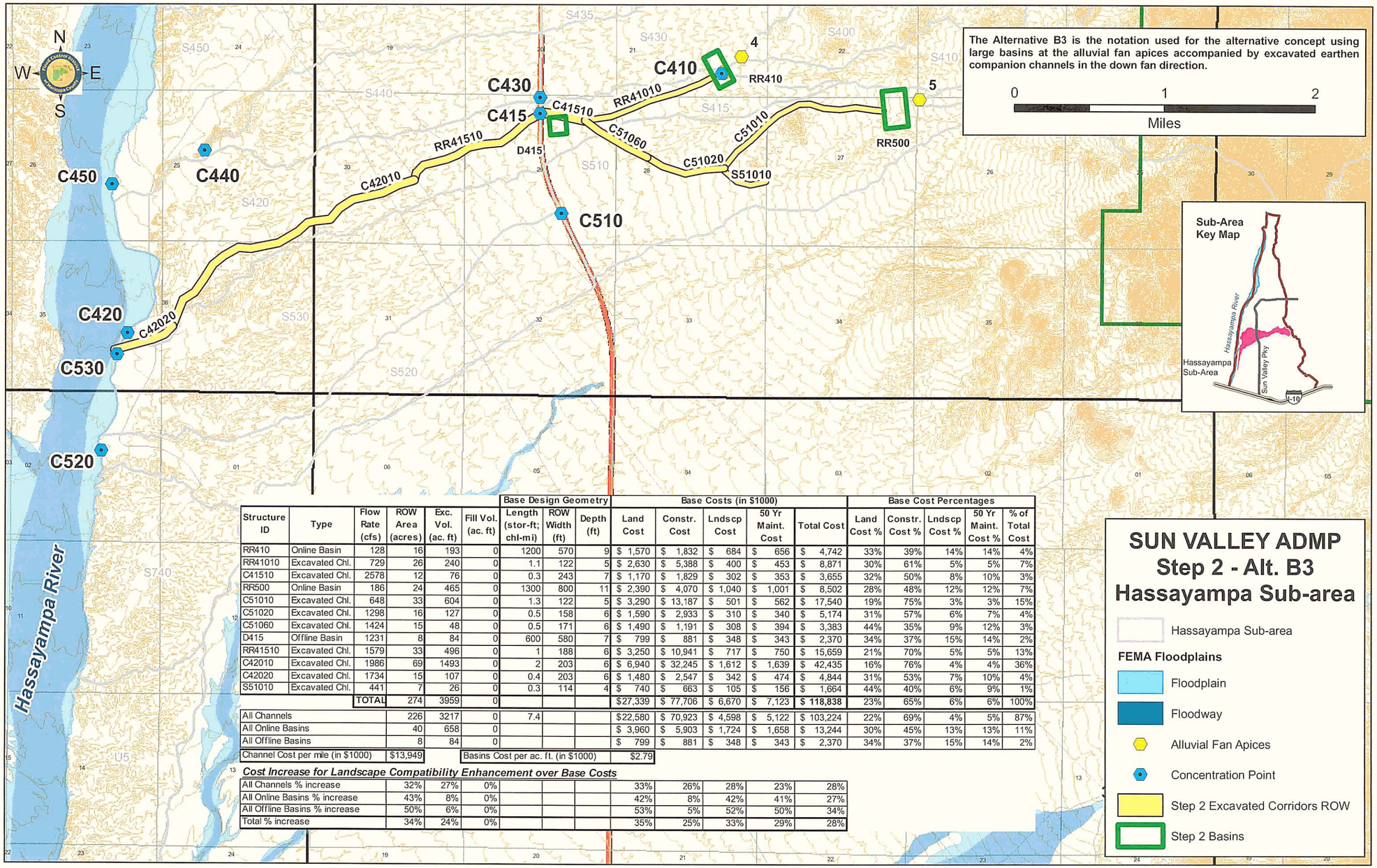
Structure ID	Type	Flow Rate (cfs)	ROW Area (acres)	Exc. Vol. (ac. ft)	Fill Vol. (ac. ft)	Length (stor-ft; chl-mi)	ROW Width (ft)	Depth (ft)	Land Cost	Constr. Cost	Lndscp Cost	50 Yr Maint. Cost	Total Cost	Land Cost %	Constr. Cost %	Lndscp Cost %	50 Yr Maint. Cost %	% of Total Cost
RR410	Online Basin	1393	4	26	0	570	300	5	$ 390	$ 340	$ 171	$ 172	$ 1,073	36%	32%	16%	16%	1%
RR41010	Leveed Chl.	1994	51	0	32	1.1	402	5	$ 5,130	$ 2,438	$ 467	$ 1,181	$ 9,216	56%	26%	5%	13%	12%
C41510	Leveed Chl.	2775	17	0	9	0.3	482	5	$ 1,740	$ 810	$ 132	$ 433	$ 3,115	56%	26%	4%	14%	4%
RR500	Online Basin	1814	6	60	0	700	380	6	$ 610	$ 596	$ 266	$ 267	$ 1,738	35%	34%	15%	15%	2%
C51010	Leveed Chl.	2276	76	0	33	1.3	476	4	$ 7,610	$ 3,654	$ 543	$ 1,427	$ 13,234	58%	28%	4%	11%	17%
C51020	Leveed Chl.	2926	32	0	16	0.5	482	5	$ 3,180	$ 1,466	$ 241	$ 684	$ 5,572	57%	26%	4%	12%	7%
C51060	Excavated Chl.	3052	18	89	0	0.5	228	8	$ 1,820	$ 2,119	$ 452	$ 575	$ 4,967	37%	43%	9%	12%	7%
D415	Offline Basin	1231	24	337	0	1300	800	9	$ 2,388	$ 3,052	$ 1,040	$ 990	$ 7,469	32%	41%	14%	13%	10%
RR41510	Leveed Chl.	1579	41	0	30	1	342	5	$ 4,080	$ 2,250	$ 437	$ 1,080	$ 7,847	52%	29%	6%	14%	10%
C42010	Leveed Chl.	1986	92	0	60	2	382	5	$ 9,240	$ 4,337	$ 885	$ 2,136	$ 16,598	56%	26%	5%	13%	22%
C42020	Leveed Chl.	1705	20	0	13	0.4	382	5	$ 1,960	$ 1,008	$ 188	$ 530	$ 3,685	53%	27%	5%	14%	5%
S51010	Leveed Chl.	441	6	0	8	0.3	164	4	$ 620	$ 597	$ 141	$ 367	$ 1,725	36%	35%	8%	21%	2%
	TOTAL	387	512	201					$38,768	$ 22,667	$ 4,963	$ 9,842	**$ 76,239**	51%	30%	7%	13%	100%
All Channels		353	89	201		7.4			$35,380	$ 18,680	$ 3,486	$ 8,413	$ 65,959	54%	28%	5%	13%	87%
All Online Basins		10	86	0					$ 1,000	$ 936	$ 437	$ 438	$ 2,811	36%	33%	16%	16%	4%
All Offline Basins		24	337	0					$ 2,388	$ 3,052	$ 1,040	$ 990	$ 7,469	32%	41%	14%	13%	10%
Channel Cost per mile (in $1000)		$8,913		Basins Cost per ac. ft. (in $1000)					$3.49									

Cost Increase for Landscape Compatibility Enhancement over Base Costs

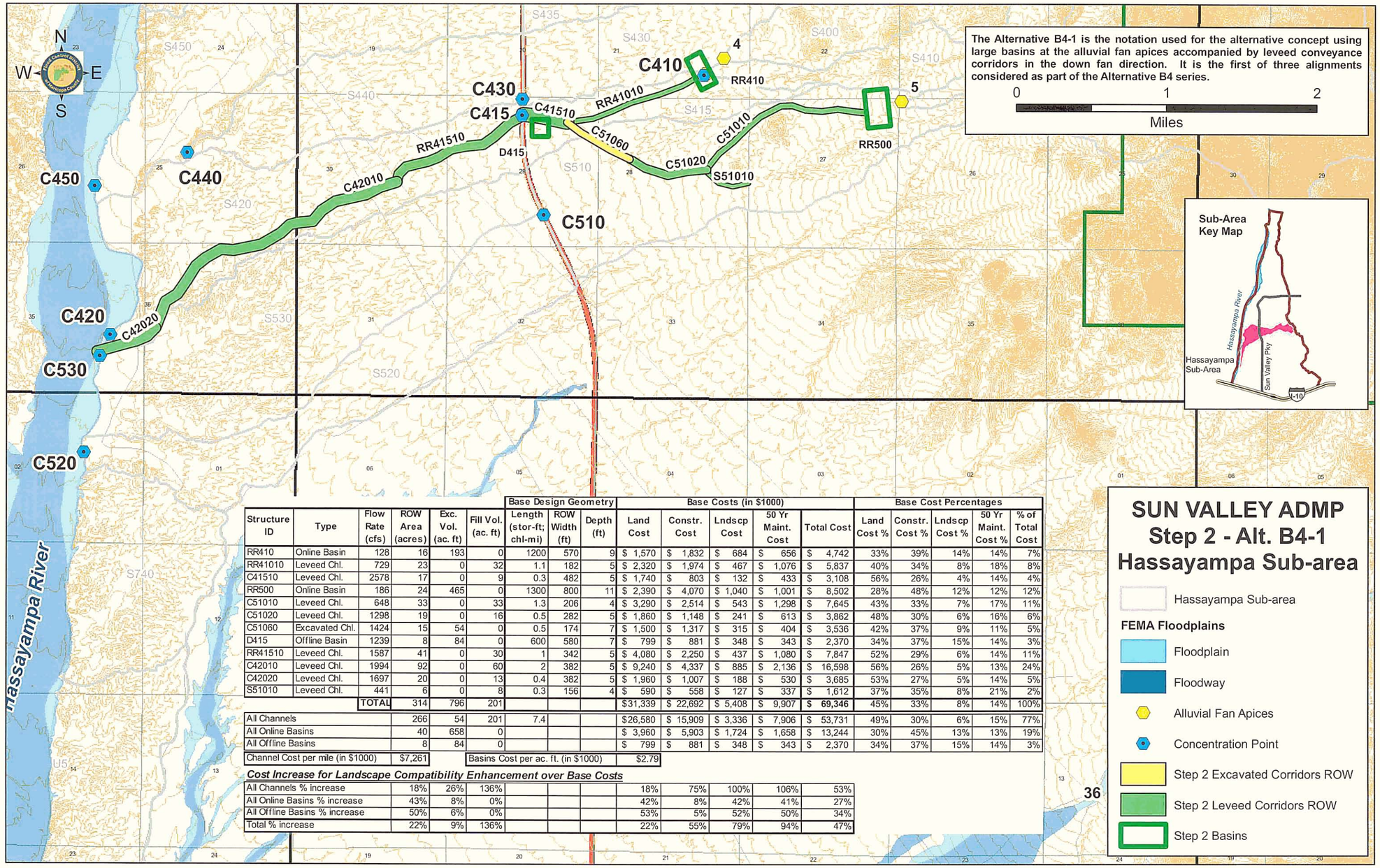
All Channels % increase	14%	22%	136%				14%	65%	96%	100%	44%
All Online Basins % increase	70%	10%	0%				74%	7%	73%	69%	51%
All Offline Basins % increase	33%	5%	0%				34%	5%	34%	34%	22%
Total % increase	17%	9%	136%				16%	55%	81%	92%	42%



						Base Design Geometry			Base Costs (in $1000)					Base Cost Percentages				
Structure ID	Type	Flow Rate (cfs)	ROW Area (acres)	Exc. Vol. (ac. ft)	Fill Vol. (ac. ft)	Length (stor-ft; chl-mi)	ROW Width (ft)	Depth (ft)	Land Cost	Constr. Cost	Lndscp Cost	50 Yr Maint. Cost	Total Cost	Land Cost %	Constr. Cost %	Lndscp Cost %	50 Yr Maint. Cost %	% of Total Cost
RR410	Online Basin	128	16	193	0	1200	570	9	$ 1,570	$ 1,832	$ 684	$ 656	$ 4,742	33%	39%	14%	14%	4%
RR41010	Excavated Chl.	729	26	240	0	1.1	122	5	$ 2,630	$ 5,388	$ 400	$ 453	$ 8,871	30%	61%	5%	5%	7%
C41510	Excavated Chl.	2578	12	76	0	0.3	243	7	$ 1,170	$ 1,829	$ 302	$ 353	$ 3,655	32%	50%	8%	10%	3%
RR500	Online Basin	186	24	465	0	1300	800	11	$ 2,390	$ 4,070	$ 1,040	$ 1,001	$ 8,502	28%	48%	12%	12%	7%
C51010	Excavated Chl.	648	33	604	0	1.3	122	5	$ 3,290	$ 13,187	$ 501	$ 562	$ 17,540	19%	75%	3%	3%	15%
C51020	Excavated Chl.	1298	16	127	0	0.5	158	6	$ 1,590	$ 2,933	$ 310	$ 340	$ 5,174	31%	57%	6%	7%	4%
C51060	Excavated Chl.	1424	15	48	0	0.5	171	6	$ 1,490	$ 1,191	$ 308	$ 394	$ 3,383	44%	35%	9%	12%	3%
D415	Offline Basin	1231	8	84	0	600	580	7	$ 799	$ 881	$ 348	$ 343	$ 2,370	34%	37%	15%	14%	2%
RR41510	Excavated Chl.	1579	33	496	0	1	188	6	$ 3,250	$ 10,941	$ 717	$ 750	$ 15,659	21%	70%	5%	5%	13%
C42010	Excavated Chl.	1986	69	1493	0	2	203	6	$ 6,940	$ 32,245	$ 1,612	$ 1,639	$ 42,435	16%	76%	4%	4%	36%
C42020	Excavated Chl.	1734	15	107	0	0.4	203	6	$ 1,480	$ 2,547	$ 342	$ 474	$ 4,844	31%	53%	7%	10%	4%
S51010	Excavated Chl.	441	7	26	0	0.3	114	4	$ 740	$ 663	$ 105	$ 156	$ 1,664	44%	40%	6%	9%	1%
		TOTAL	274	3959	0				$27,339	$ 77,706	$ 6,670	$ 7,123	**$ 118,838**	23%	65%	6%	6%	100%
All Channels			226	3217	0	7.4			$22,580	$ 70,923	$ 4,598	$ 5,122	$ 103,224	22%	69%	4%	5%	87%
All Online Basins			40	658	0				$ 3,960	$ 5,903	$ 1,724	$ 1,658	$ 13,244	30%	45%	13%	13%	11%
All Offline Basins			8	84	0				$ 799	$ 881	$ 348	$ 343	$ 2,370	34%	37%	15%	14%	2%
Channel Cost per mile (in $1000)			$13,949		Basins Cost per ac. ft. (in $1000)				$2.79									

Cost Increase for Landscape Compatibility Enhancement over Base Costs

All Channels % increase	32%	27%	0%				33%	26%	28%	23%	28%
All Online Basins % increase	43%	8%	0%				42%	8%	42%	41%	27%
All Offline Basins % increase	50%	6%	0%				53%	5%	52%	50%	34%
Total % increase	34%	24%	0%				35%	25%	33%	29%	28%



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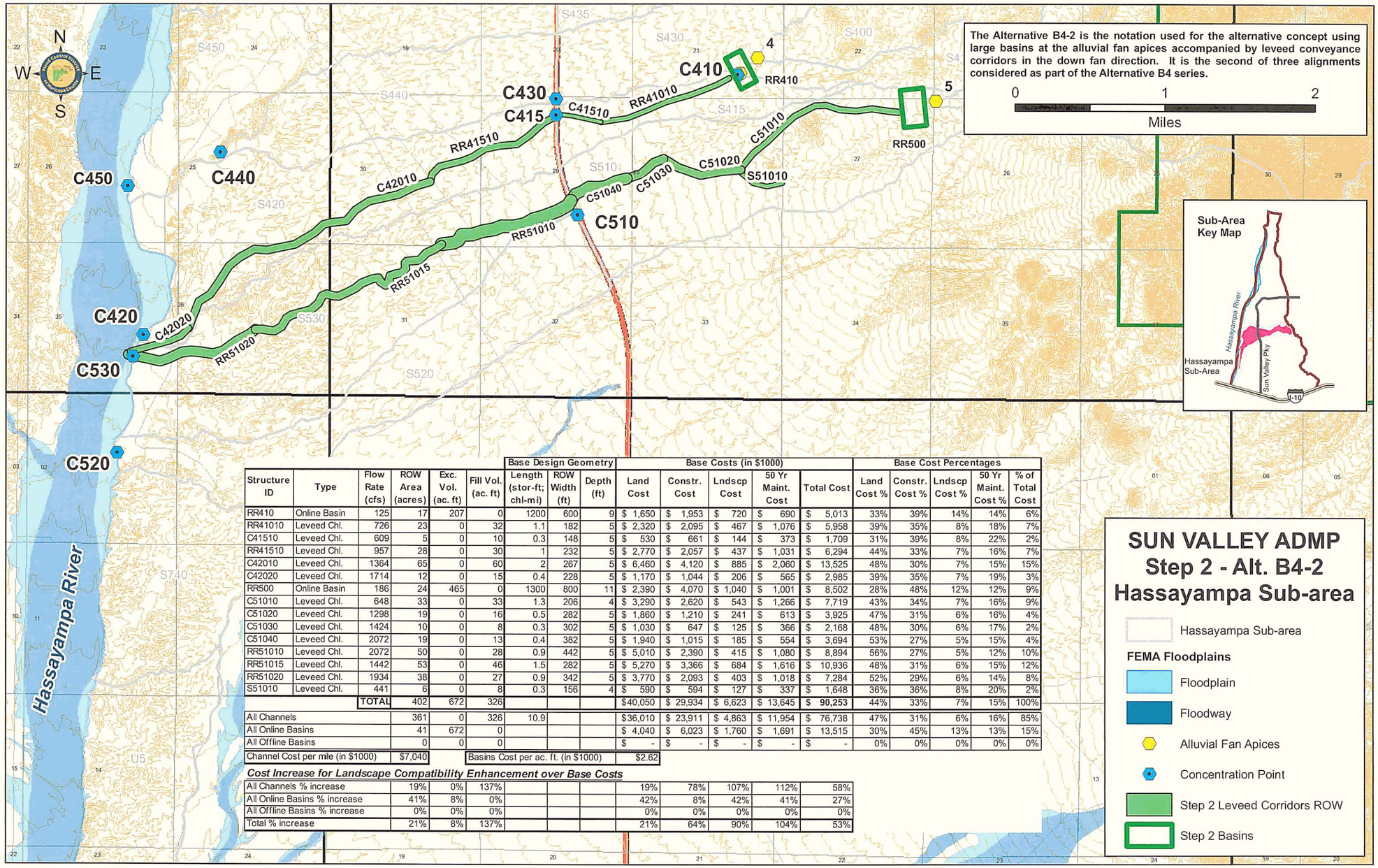
RR410	Online Basin	128	16	193	0	1200	570	9	$ 1,570	$ 1,832	$ 684	$ 656	$ 4,742	33%	39%	14%	14%	7%
RR41010	Leveed Chl.	729	23	0	32	1.1	182	5	$ 2,320	$ 1,974	$ 467	$ 1,076	$ 5,837	40%	34%	8%	18%	8%
C41510	Leveed Chl.	2578	17	0	9	0.3	482	5	$ 1,740	$ 803	$ 132	$ 433	$ 3,108	56%	26%	4%	14%	4%
RR500	Online Basin	186	24	465	0	1300	800	11	$ 2,390	$ 4,070	$ 1,040	$ 1,001	$ 8,502	28%	48%	12%	12%	12%
C51010	Leveed Chl.	648	33	0	33	1.3	206	4	$ 3,290	$ 2,514	$ 543	$ 1,298	$ 7,645	43%	33%	7%	17%	11%
C51020	Leveed Chl.	1298	19	0	16	0.5	282	5	$ 1,860	$ 1,148	$ 241	$ 613	$ 3,862	48%	30%	6%	16%	6%
C51060	Excavated Chl.	1424	15	54	0	0.5	174	7	$ 1,500	$ 1,317	$ 315	$ 404	$ 3,536	42%	37%	9%	11%	5%
D415	Offline Basin	1239	8	84	0	600	580	7	$ 799	$ 881	$ 348	$ 343	$ 2,370	34%	37%	15%	14%	3%
RR41510	Leveed Chl.	1587	41	0	30	1	342	5	$ 4,080	$ 2,250	$ 437	$ 1,080	$ 7,847	52%	29%	6%	14%	11%
C42010	Leveed Chl.	1994	92	0	60	2	382	5	$ 9,240	$ 4,337	$ 885	$ 2,136	$ 16,598	56%	26%	5%	13%	24%
C42020	Leveed Chl.	1697	20	0	13	0.4	382	5	$ 1,960	$ 1,007	$ 188	$ 530	$ 3,685	53%	27%	5%	14%	5%
S51010	Leveed Chl.	441	6	0	8	0.3	156	4	$ 590	$ 558	$ 127	$ 337	$ 1,612	37%	35%	8%	21%	2%
		TOTAL	314	796	201				$31,339	$ 22,692	$ 5,408	$ 9,907	**$ 69,346**	45%	33%	8%	14%	100%
All Channels			266	54	201	7.4			$26,580	$ 15,909	$ 3,336	$ 7,906	$ 53,731	49%	30%	6%	15%	77%
All Online Basins			40	658	0				$ 3,960	$ 5,903	$ 1,724	$ 1,658	$ 13,244	30%	45%	13%	13%	19%
All Offline Basins			8	84	0				$ 799	$ 881	$ 348	$ 343	$ 2,370	34%	37%	15%	14%	3%
Channel Cost per mile (in $1000)			$7,261		Basins Cost per ac. ft. (in $1000)				$2.79									

Cost Increase for Landscape Compatibility Enhancement over Base Costs

All Channels % increase	18%	26%	136%				18%	75%	100%	106%	53%
All Online Basins % increase	43%	8%	0%				42%	8%	42%	41%	27%
All Offline Basins % increase	50%	6%	0%				53%	5%	52%	50%	34%
Total % increase	22%	9%	136%				22%	55%	79%	94%	47%



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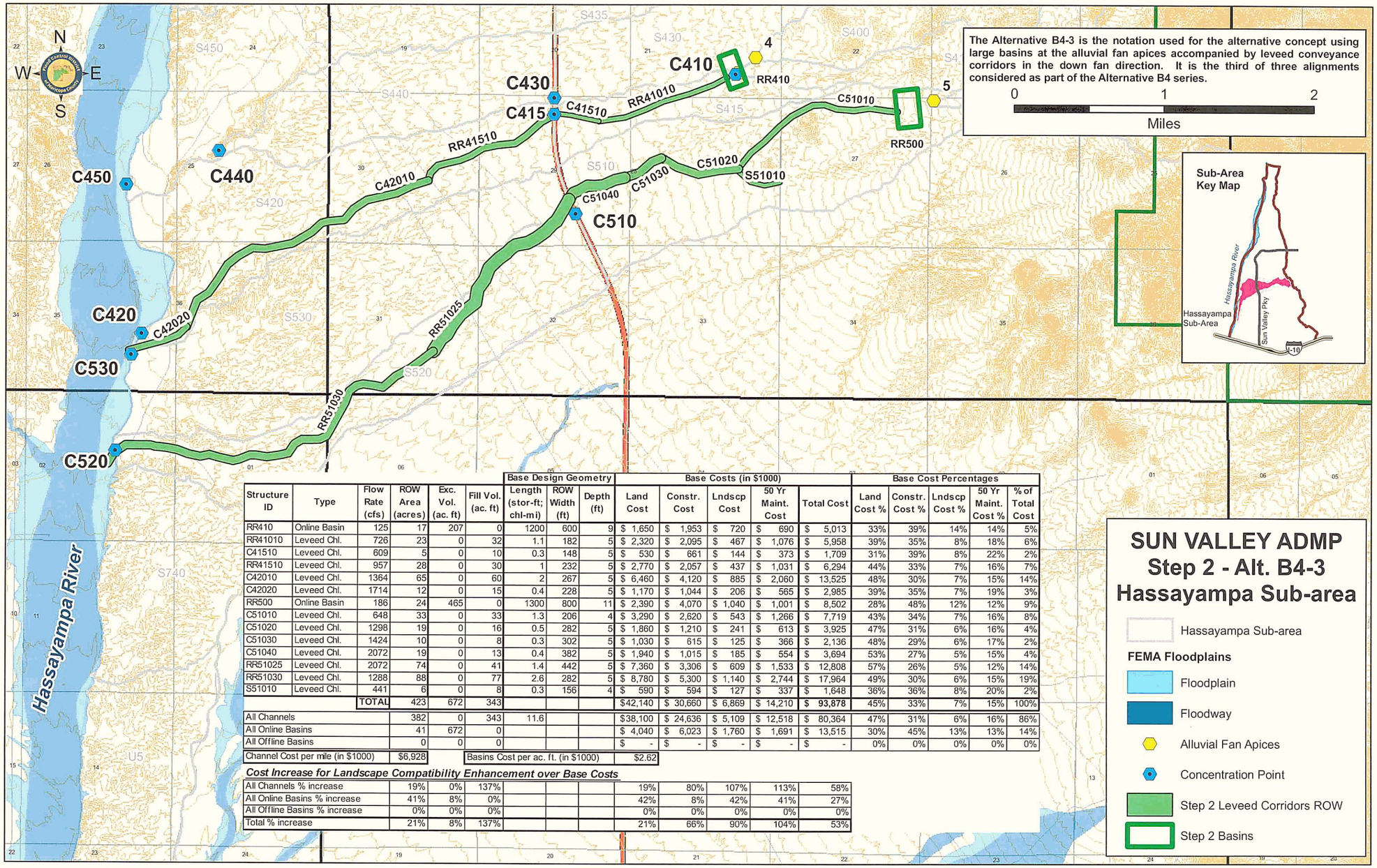
RR410	Online Basin	125	17	207	0	1200	600	9	$ 1,650	$ 1,953	$ 720	$ 690	$ 5,013	33%	39%	14%	14%	6%
RR41010	Leveed Chl.	726	23	0	32	1.1	182	5	$ 2,320	$ 2,095	$ 467	$ 1,076	$ 5,958	39%	35%	8%	18%	7%
C41510	Leveed Chl.	609	5	0	10	0.3	148	5	$ 530	$ 661	$ 144	$ 373	$ 1,709	31%	39%	8%	22%	2%
RR41510	Leveed Chl.	957	28	0	30	1	232	5	$ 2,770	$ 2,057	$ 437	$ 1,031	$ 6,294	44%	33%	7%	16%	7%
C42010	Leveed Chl.	1364	65	0	60	2	267	5	$ 6,460	$ 4,120	$ 885	$ 2,060	$ 13,525	48%	30%	7%	15%	15%
C42020	Leveed Chl.	1714	12	0	15	0.4	228	5	$ 1,170	$ 1,044	$ 206	$ 565	$ 2,985	39%	35%	7%	19%	3%
RR500	Online Basin	186	24	465	0	1300	800	11	$ 2,390	$ 4,070	$ 1,040	$ 1,001	$ 8,502	28%	48%	12%	12%	9%
C51010	Leveed Chl.	648	33	0	33	1.3	206	4	$ 3,290	$ 2,620	$ 543	$ 1,266	$ 7,719	43%	34%	7%	16%	9%
C51020	Leveed Chl.	1298	19	0	16	0.5	282	5	$ 1,860	$ 1,210	$ 241	$ 613	$ 3,925	47%	31%	6%	16%	4%
C51030	Leveed Chl.	1424	10	0	8	0.3	302	5	$ 1,030	$ 647	$ 125	$ 366	$ 2,168	48%	30%	6%	17%	2%
C51040	Leveed Chl.	2072	19	0	13	0.4	382	5	$ 1,940	$ 1,015	$ 185	$ 554	$ 3,694	53%	27%	5%	15%	4%
RR51010	Leveed Chl.	2072	50	0	28	0.9	442	5	$ 5,010	$ 2,390	$ 415	$ 1,080	$ 8,894	56%	27%	5%	12%	10%
RR51015	Leveed Chl.	1442	53	0	46	1.5	282	5	$ 5,270	$ 3,366	$ 684	$ 1,616	$ 10,936	48%	31%	6%	15%	12%
RR51020	Leveed Chl.	1934	38	0	27	0.9	342	5	$ 3,770	$ 2,093	$ 403	$ 1,018	$ 7,284	52%	29%	6%	14%	8%
S51010	Leveed Chl.	441	6	0	8	0.3	156	4	$ 590	$ 594	$ 127	$ 337	$ 1,648	36%	36%	8%	20%	2%
		TOTAL	402	672	326				$40,050	$ 29,934	$ 6,623	$ 13,645	**$ 90,253**	44%	33%	7%	15%	100%
All Channels			361	0	326	10.9			$36,010	$ 23,911	$ 4,863	$ 11,954	$ 76,738	47%	31%	6%	16%	85%
All Online Basins			41	672	0				$ 4,040	$ 6,023	$ 1,760	$ 1,691	$ 13,515	30%	45%	13%	13%	15%
All Offline Basins			0	0	0				$ -	$ -	$ -	$ -	$ -	0%	0%	0%	0%	0%

Channel Cost per mile (in $1000)	$7,040	Basins Cost per ac. ft. (in $1000)	$2.62	

Cost Increase for Landscape Compatibility Enhancement over Base Costs

All Channels % increase	19%	0%	137%				19%	78%	107%	112%	58%
All Online Basins % increase	41%	8%	0%				42%	8%	42%	41%	27%
All Offline Basins % increase	0%	0%	0%				0%	0%	0%	0%	0%
Total % increase	21%	8%	137%				21%	64%	90%	104%	53%



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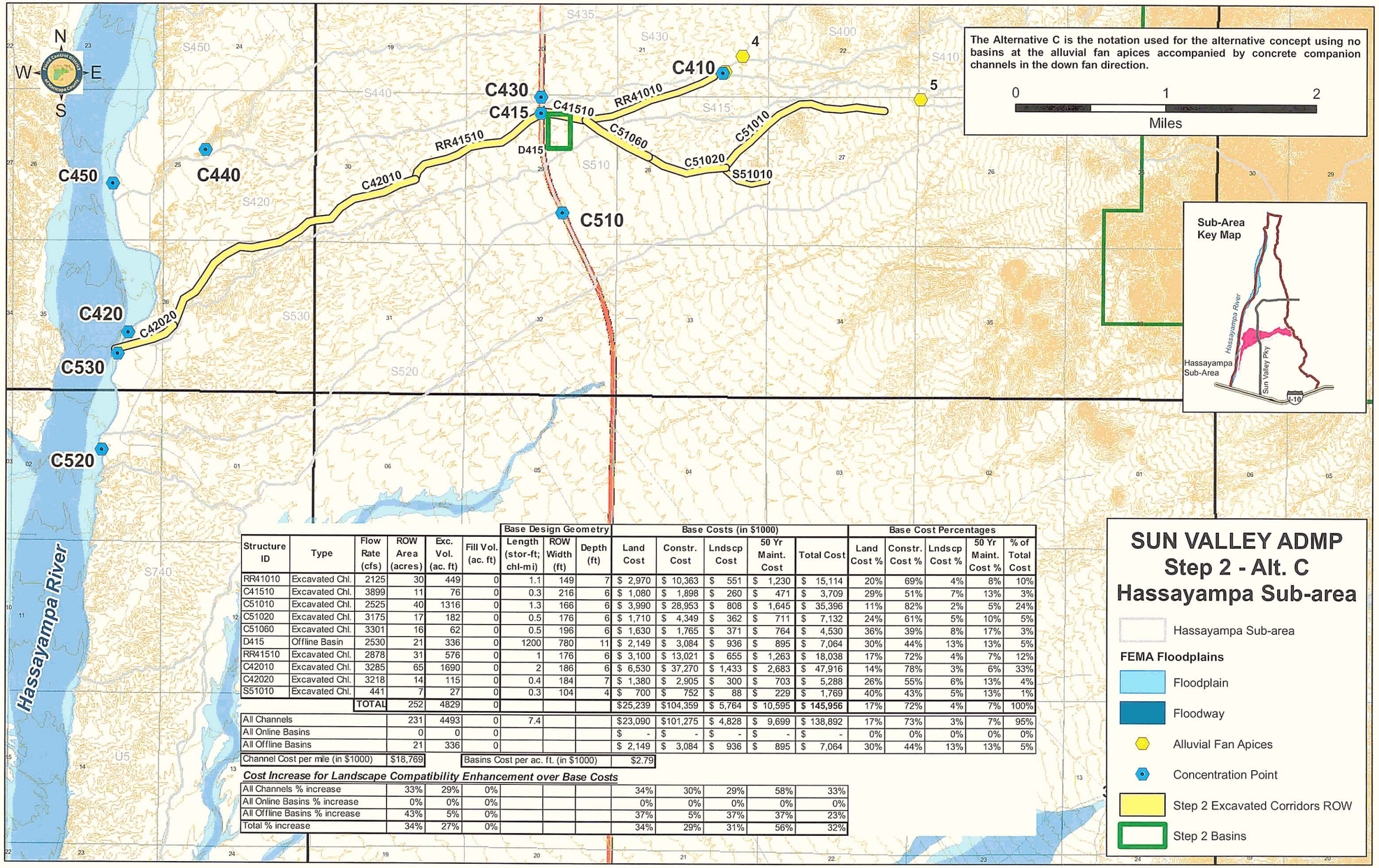
RR410	Online Basin	125	17	207	0	1200	600	9	$ 1,650	$ 1,953	$ 720	$ 690	$ 5,013	33%	39%	14%	14%	5%
RR41010	Leveed Chl.	726	23	0	32	1.1	182	5	$ 2,320	$ 2,095	$ 467	$ 1,076	$ 5,958	39%	35%	8%	18%	6%
C41510	Leveed Chl.	609	5	0	10	0.3	148	5	$ 530	$ 661	$ 144	$ 373	$ 1,709	31%	39%	8%	22%	2%
RR41510	Leveed Chl.	957	28	0	30	1	232	5	$ 2,770	$ 2,057	$ 437	$ 1,031	$ 6,294	44%	33%	7%	16%	7%
C42010	Leveed Chl.	1364	65	0	60	2	267	5	$ 6,460	$ 4,120	$ 885	$ 2,060	$ 13,525	48%	30%	7%	15%	14%
C42020	Leveed Chl.	1714	12	0	15	0.4	228	5	$ 1,170	$ 1,044	$ 206	$ 565	$ 2,985	39%	35%	7%	19%	3%
RR500	Online Basin	186	24	465	0	1300	800	11	$ 2,390	$ 4,070	$ 1,040	$ 1,001	$ 8,502	28%	48%	12%	12%	9%
C51010	Leveed Chl.	648	33	0	33	1.3	206	4	$ 3,290	$ 2,620	$ 543	$ 1,266	$ 7,719	43%	34%	7%	16%	8%
C51020	Leveed Chl.	1298	19	0	16	0.5	282	5	$ 1,860	$ 1,210	$ 241	$ 613	$ 3,925	47%	31%	6%	16%	4%
C51030	Leveed Chl.	1424	10	0	8	0.3	302	5	$ 1,030	$ 615	$ 125	$ 366	$ 2,136	48%	29%	6%	17%	2%
C51040	Leveed Chl.	2072	19	0	13	0.4	382	5	$ 1,940	$ 1,015	$ 185	$ 554	$ 3,694	53%	27%	5%	15%	4%
RR51025	Leveed Chl.	2072	74	0	41	1.4	442	5	$ 7,360	$ 3,306	$ 609	$ 1,533	$ 12,808	57%	26%	5%	12%	14%
RR51030	Leveed Chl.	1288	88	0	77	2.6	282	5	$ 8,780	$ 5,300	$ 1,140	$ 2,744	$ 17,964	49%	30%	6%	15%	19%
S51010	Leveed Chl.	441	6	0	8	0.3	156	4	$ 590	$ 594	$ 127	$ 337	$ 1,648	36%	36%	8%	20%	2%
		TOTAL	423	672	343				$42,140	$ 30,660	$ 6,869	$ 14,210	**$ 93,878**	45%	33%	7%	15%	100%
All Channels			382	0	343	11.6			$38,100	$ 24,636	$ 5,109	$ 12,518	$ 80,364	47%	31%	6%	16%	86%
All Online Basins			41	672	0				$ 4,040	$ 6,023	$ 1,760	$ 1,691	$ 13,515	30%	45%	13%	13%	14%
All Offline Basins			0	0	0				$ -	$ -	$ -	$ -	$ -	0%	0%	0%	0%	0%

Channel Cost per mile (in $1000)	$6,928	Basins Cost per ac. ft. (in $1000)	$2.62	

Cost Increase for Landscape Compatibility Enhancement over Base Costs

All Channels % increase	19%	0%	137%				19%	80%	107%	113%	58%
All Online Basins % increase	41%	8%	0%				42%	8%	42%	41%	27%
All Offline Basins % increase	0%	0%	0%				0%	0%	0%	0%	0%
Total % increase	21%	8%	137%				21%	66%	90%	104%	53%



						Base Design Geometry			Base Costs (in $1000)					Base Cost Percentages				
Structure ID	Type	Flow Rate (cfs)	ROW Area (acres)	Exc. Vol. (ac. ft)	Fill Vol. (ac. ft)	Length (stor-ft; chl-mi)	ROW Width (ft)	Depth (ft)	Land Cost	Constr. Cost	Lndscp Cost	50 Yr Maint. Cost	Total Cost	Land Cost %	Constr. Cost %	Lndscp Cost %	50 Yr Maint. Cost %	% of Total Cost
RR41010	Excavated Chl.	2125	30	449	0	1.1	149	7	$ 2,970	$ 10,363	$ 551	$ 1,230	$ 15,114	20%	69%	4%	8%	10%
C41510	Excavated Chl.	3899	11	76	0	0.3	216	6	$ 1,080	$ 1,898	$ 260	$ 471	$ 3,709	29%	51%	7%	13%	3%
C51010	Excavated Chl.	2525	40	1316	0	1.3	166	6	$ 3,990	$ 28,953	$ 808	$ 1,645	$ 35,396	11%	82%	2%	5%	24%
C51020	Excavated Chl.	3175	17	182	0	0.5	176	6	$ 1,710	$ 4,349	$ 362	$ 711	$ 7,132	24%	61%	5%	10%	5%
C51060	Excavated Chl.	3301	16	62	0	0.5	196	6	$ 1,630	$ 1,765	$ 371	$ 764	$ 4,530	36%	39%	8%	17%	3%
D415	Offline Basin	2530	21	336	0	1200	780	11	$ 2,149	$ 3,084	$ 936	$ 895	$ 7,064	30%	44%	13%	13%	5%
RR41510	Excavated Chl.	2878	31	576	0	1	176	6	$ 3,100	$ 13,021	$ 655	$ 1,263	$ 18,038	17%	72%	4%	7%	12%
C42010	Excavated Chl.	3285	65	1690	0	2	186	6	$ 6,530	$ 37,270	$ 1,433	$ 2,683	$ 47,916	14%	78%	3%	6%	33%
C42020	Excavated Chl.	3218	14	115	0	0.4	184	7	$ 1,380	$ 2,905	$ 300	$ 703	$ 5,288	26%	55%	6%	13%	4%
S51010	Excavated Chl.	441	7	27	0	0.3	104	4	$ 700	$ 752	$ 88	$ 229	$ 1,769	40%	43%	5%	13%	1%
		TOTAL	252	4829	0				$25,239	$104,359	$ 5,764	$ 10,595	**$ 145,956**	17%	72%	4%	7%	100%
All Channels			231	4493	0	7.4			$23,090	$101,275	$ 4,828	$ 9,699	$ 138,892	17%	73%	3%	7%	95%
All Online Basins			0	0	0				$ -	$ -	$ -	$ -	$ -	0%	0%	0%	0%	0%
All Offline Basins			21	336	0				$ 2,149	$ 3,084	$ 936	$ 895	$ 7,064	30%	44%	13%	13%	5%
Channel Cost per mile (in $1000)			$18,769		Basins Cost per ac. ft. (in $1000)				$2.79									

Cost Increase for Landscape Compatibility Enhancement over Base Costs

All Channels % increase	33%	29%	0%				34%	30%	29%	58%	33%
All Online Basins % increase	0%	0%	0%				0%	0%	0%	0%	0%
All Offline Basins % increase	43%	5%	0%				37%	5%	37%	37%	23%
Total % increase	34%	27%	0%				34%	29%	31%	56%	32%

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   19APR06  TIME  14:45:59  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                          HEC-1 INPUT                                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         1          ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
         2          ID      - HASSAYAMPA SUB-AREA
         3          ID      - ALTERNATIVE A
         4          ID          No measure at the apex, levee corridors
         5          ID
         6          ID  Alternative Description
         7          ID  The main design objective of the A Alternative is to allow the
         8          ID  natural geomorphic processes to occur within a designated active
         9          ID  area downstream of the apex.  The objective then is to control
        10          ID  the flow path downstream of the region of uncertainty.  The flows
        11          ID  will be captured in the up-fan area by excavated collector channels
        12          ID  and/or diversion levees.  Once collected, the flows are routed
        13          ID  downstream using leveed corridors similar to the B alternatives.
        14          ID
        15          ID
        16          ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
        17          ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
        18          ID   MODELER: TED LEHMAN
        19          ID   FILENAME: A4_EX6.DAT
        20          ID
        21          ID   100-YEAR 6-HOUR MODEL
        22          ID   EXISTING CONDITIONS
        23          ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
        24          ID            MODELED AREA = 76.8 SQ. MILES
        25          ID
        26          ID   GREEN-AMPT LOSS METHOD
        27          ID   S-GRAPH UNIT HYDROGRAPHS
        28          ID     - MOUNTAIN
        29          ID     - DESERT/RANGELAND
        30          ID   NORMAL-DEPTH CHANNEL ROUTING
        31          ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
        32          ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
        33          ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
        34          ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
        35          ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
        36          IT       5  1JAN99    1200    2000
        37          IN      15
        38          IO       5
                    *DIAGRAM
                    *
        39          JD   3.196  0.1000
        40          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
        41          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
        42          PC   0.962   0.972   0.983   0.991   1.000
        43          JD   3.181  0.5000
        44          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
        45          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
        46          PC   0.962   0.972   0.983   0.991   1.000
        47          JD   3.120     2.8
        48          PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
        49          PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
        50          PC   0.950   0.963   0.975   0.988   1.000
        51          JD   2.950    16.0
        52          PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
        53          PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
1                                          HEC-1 INPUT                                                    PAGE  2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  54          PC   0.946   0.960   0.973   0.987   1.000
  55          JD   2.592    90.0
  56          PC   0.000   0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
  57          PC   0.179   0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
  58          PC   0.927   0.945   0.964   0.982   1.000
              *

  59          KK    S400   BASIN
  60          KM        Compute runoff from subbasin 400
  61          BA   1.544
  62          LG    0.25    0.35    4.20    0.43       3
  63          UI     106     106     252     429     616     729     819    1050    1206     793
  64          UI     665     601     543     493     440     385     339     276     254     239
  65          UI     212     174     144     133     116     116      82      81      81      52
  66          UI      51      53      51      39      21      20      20      21      20      20
  67          UI      20      21      20      20      20       0       0       0       0       0
              *

  68          KK    S410   BASIN
  69          KM        Compute runoff from subbasin 410
  70          BA   0.639
  71          LG    0.15    0.35    3.85    0.43       3
  72          UI      53      70     177     290     367     429     593     473     342     300
  73          UI     268     232     202     173     136     126     115      89      72      65
  74          UI      58      47      41      38      26      26      26      19      11      10
  75          UI      10      10      11      10      10      10      11       0       0       0
              *

  76          KK    C410 COMBINE
  77          KM        Combine runoff from S400 and S410
  78          HC       2
              *

  79          KK   R410A   ROUTE
  80          KM    ROUTE COMBINED FLOW ACROSS ACTIVE AREA
  81          KM    SLOPE = (1528 - 1454) / 5000
  82          RS       3    FLOW      -1
  83          RC   0.045   0.035   0.045    5000  0.0148  103.00
  84          RX    0.00   30.00  200.00  203.00  253.00  256.00  426.00  456.00
  85          RY  103.00  101.00  101.00  100.00  100.00  101.00  101.00  103.00
              *

  86          KK  410415   ROUTE
  87          KM   PROPOSED CHANNEL
  88          KM    STRUCTURE ID(s): C41510
  89          KM    Slope=(1454.2 - 1432.7) / 1567.1
  90          RS      10    FLOW      -1
  91          RC   0.045   0.045   0.045  1567.10.013729   104.5
  92          RX     0.0    13.5    13.5    13.5   413.5   413.5   413.5   427.0
  93          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  94          KK    S415   BASIN
  95          KM        Compute runoff from subbasin 415
  96          BA   0.451
  97          LG    0.35    0.35    3.64    0.49       0
  98          UI      92     356     623     728     617     389     253     161     101      65
  99          UI      44      18      19      19       0       0       0       0       0       0
              *

 100          KK   C415R COMBINE
 101          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 102          HC       2
              *

 103          KK    S500   BASIN
 104          KM        Compute runoff from subbasin 500
 105          BA   3.638
 106          LG    0.25    0.35    3.92    0.41       9
 107          UI     184     186     184     515     713     935    1143    1294    1413    1581
 108          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
 109          UI     716     629     568     487     456     435     408     387     311     297
 110          UI     237     239     212     201     204     146     142     143     141      94
 111          UI      91      90      90      92      90      51      35      36      35      36
              *

 112          KK   R500A   ROUTE
 113          KM    ROUTE COMBINED FLOW ACROSS ACTIVE AREA
 114          KM    SLOPE = (1690 - 1512) / 7800
 115          RS       4    FLOW      -1
 116          RC   0.045   0.035   0.045    7800  0.0228  104.00
 117          RX    0.00   20.00  100.00  106.00  206.00  212.00  292.00  312.00
 118          RY  104.00  103.00  102.00  100.00  100.00  102.00  103.00  104.00
              *

 119          KK  500415   ROUTE
 120          KM   PROPOSED CHANNEL
 121          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
 122          KM    STRUCTURE ID(s): C51020, C51060
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 123          KM    Slope=(1512.2 - 1454.2) / 5415.5
 124          RS       8    FLOW      -1
 125          RC   0.045   0.045   0.045  5415.50.010712   105.0
 126          RX     0.0    15.0    60.0    69.0   109.0   118.0   163.0   178.0
 127          RY   105.0   100.0   100.0    97.0    97.0   100.0   100.0   105.0
              *

 128          KK    S510   BASIN
 129          KM        Compute runoff from subbasin 510
 130          BA   1.840
 131          LG    0.35    0.35    3.95    0.40       0
 132          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
 133          UI     433     307     220     160     106      57      58      56      57       0
              *
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 134          KK   C415L COMBINE
 135          KM    COMBINE S500 AND S510 AT C415
 136          HC       2
              *

 137          KK    C415 COMBINE
 138          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
 139          HC       2
              *

 140          KK    D415  DIVERT
 141          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
 142          KM    STRUCTURE ID:D415
 143          KM    DIMENSIONS: L=1800ft, W=550ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 198.2 ac
 144          DT   D415O
 145          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
 146          DI  4000.0     0.0
 147          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
 148          DQ  2769.0     0.0
              *

 149          KK  415420   ROUTE
 150          KM   PROPOSED CHANNEL
 151          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 152          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 153          KM    Slope=(1432.5 - 1191.3) / 17970.9
 154          RS      10    FLOW      -1
 155          RC   0.045   0.045   0.045 17970.90.013422   104.5
 156          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
 157          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
              *

 158          KK    S420   BASIN
 159          KM        Compute runoff from subbasin 420
 160          BA   1.767
 161          LG    0.35    0.35    4.30    0.41       0
 162          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 163          UI     582     417     328     242     183     132     115      47      47      48
 164          UI      47      47       0       0       0       0       0       0       0       0
              *

 165          KK    C420 COMBINE
 166          KM        Combine flows from S400, S410, S415, S420
 167          KM         AND S500 AND S510 at Hassayampa River
 168          HC       2
              *

 169          KK    S430   BASIN
 170          KM        Compute runoff from subbasin 430
 171          BA   0.795
 172          LG    0.35    0.35    4.55    0.35       0
 173          UI     127     515     918    1163    1116     779     521     349     228     153
 174          UI     100      72      30      30      30       0       0       0       0       0
              *
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 175          KK  430440   ROUTE
 176          KM        Route flows from Sun Valley Parkway through S440.
 177          RS       7    FLOW      -1
 178          RC   0.035   0.035   0.035   13256  0.0128  106.00
 179          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 180          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

 181          KK    S440   BASIN
 182          KM        Compute runoff from subbasin 440
 183          BA   1.068
 184          LG    0.35    0.35    4.20    0.43       0
 185          UI     137     414     838    1167    1323    1221     910     657     468     330
 186          UI     240     168     118      95      46      33      35      33      34       0
              *

 187          KK    C440 COMBINE
```

```
188          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
189          HC       2
             *

190          KK  440450   ROUTE
191          KM        Route combined flows to the Hassayampa River.
192          RS       3    FLOW      -1
193          RC   0.035   0.040   0.035    4154  0.0104
194          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
195          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

196          KK    S450   BASIN
197          KM        Compute runoff from subbasin 450
198          BA   2.521
199          LG    0.23    0.35    4.25    0.42       0
200          UI     167     169     381     664     938    1152    1392    1514    1599    1599
201          UI    1528    1333    1142     951     803     683     567     481     395     336
202          UI     287     255     184     177     130     116     115      88      41      41
203          UI      41      41      41      41      41      40      41       0       0       0
             *

204          KK    S435   BASIN
205          KM        Compute runoff from subbasin 435
206          BA   0.393
207          LG    0.35    0.35    4.45    0.37       0
208          UI     130     505     775     686     414     231     134      75      42      20
209          UI      20       0       0       0       0       0       0       0       0       0
             *

210          KK  435450   ROUTE
211          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
212          RS      10    FLOW      -1
213          RC   0.045   0.035   0.045   18781  0.0119    0.00
214          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
215          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *
1                                          HEC-1 INPUT                                          PAGE  6

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

216          KK    C450 COMBINE
217          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
218          HC       3
             *

219          KK    S520   BASIN
220          KM        Compute runoff from subbasin 520
221          BA   1.481
222          LG    0.35    0.35    4.50    0.36       0
223          UI     133     206     510     780    1043    1196    1285    1241    1061     847
224          UI     672     531     420     330     262     210     159     135      91      93
225          UI      54      33      33      32      33      32      33       0       0       0
             *

226          KK    S530   BASIN
227          KM        Compute runoff from subbasin 530
228          BA   2.226
229          LG    0.20    0.35    4.30    0.41       0
230          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
231          UI    1198     964     787     657     513     417     348     283     227     189
232          UI     141     120     122      56      43      43      43      43      43      43
233          UI      43       0       0       0       0       0       0       0       0       0
234          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    59       S400
                .
                .
    68          .        S410
                .           .
                .           .
    76       C410............
                V
                V
    79      R410A
                V
                V
    86     410415
                .
                .
    94          .        S415
                .           .
                .           .
   100      C415R...........
                .
                .
   103          .        S500
                .           V
```

```
                .          V
  112           .       R500A
                .          V
                .          V
  119           .      500415
                .          .
                .          .
  128           .          .        S510
                .          .          .
                .          .          .
  134           .       C415L...........
                .          .
                .          .
  137        C415...........
                .
                .
  144           .-------->   D4150
  140        D415
                V
                V
  149      415420
                .
                .
  158           .        S420
                .          .
                .          .
  165        C420...........
                .
                .
  169           .        S430
                .          V
                .          V
  175           .      430440
                .          .
                .          .
  181           .          .        S440
                .          .          .
                .          .          .
  187           .        C440...........
                .          V
                .          V
  190           .      440450
                .          .
                .          .
  196           .          .        S450
                .          .          .
                .          .          .
  204           .          .          .        S435
                .          .          .           V
                .          .          .           V
  210           .          .          .      435450
                .          .          .           .
                .          .          .           .
  216           .        C450........................
                .          .
                .          .
  219           .          .        S520
                .          .          .
                .          .          .
  226           .          .          .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   19APR06  TIME  14:45:59  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE A
  No measure at the apex, levee corridors

Alternative Description
The main design objective of the A Alternative is to allow the natural geomorphic processes to occur within a designated active area downstream of the apex. The objective then is to control the flow path downstream of the region of uncertainty. The flows will be captured in the up-fan area by excavated collector channels and/or diversion levees. Once collected, the flows are routed downstream using leveed corridors similar to the B alternatives.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX6.DAT

```
                    100-YEAR 6-HOUR MODEL
                    EXISTING CONDITIONS
                    AREA 4 WATERSHED AREA = 90.5 SQ. MILES
                             MODELED AREA = 76.8 SQ. MILES

                    GREEN-AMPT LOSS METHOD
                    S-GRAPH UNIT HYDROGRAPHS
                      - MOUNTAIN
                      - DESERT/RANGELAND
                    NORMAL-DEPTH CHANNEL ROUTING
                    LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                      - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                      - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                      - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                    SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

38 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN99  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     8JAN99  ENDING DATE
                    NDTIME       1035  ENDING TIME
                     ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE  166.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

39 JD          INDEX STORM NO. 1
                     STRM       3.20  PRECIPITATION DEPTH
                     TRDA        .10  TRANSPOSITION DRAINAGE AREA

40 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

43 JD          INDEX STORM NO. 2
                     STRM       3.18  PRECIPITATION DEPTH
                     TRDA        .50  TRANSPOSITION DRAINAGE AREA

44 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

47 JD          INDEX STORM NO. 3
                     STRM       3.12  PRECIPITATION DEPTH
                     TRDA       2.80  TRANSPOSITION DRAINAGE AREA

48 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .07       .07       .07       .08       .08       .08       .05       .05
                   .05       .02       .02       .02       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

51 JD          INDEX STORM NO. 4
                     STRM       2.95  PRECIPITATION DEPTH
                     TRDA      16.00  TRANSPOSITION DRAINAGE AREA

52 PI            PRECIPITATION PATTERN
                   .01       .01       .00       .00       .00       .00       .00       .00       .00       .01
                   .01       .01       .00       .01       .00       .00       .00       .00       .00       .00
                   .00       .00       .01       .00       .00       .00       .00       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
                   .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
```

```
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

55 JD          INDEX STORM NO. 5
                    STRM       2.59  PRECIPITATION DEPTH
                    TRDA      90.00  TRANSPOSITION DRAINAGE AREA

56 PI            PRECIPITATION PATTERN
                    .01      .01      .01      .00      .00      .00      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .05      .05      .05      .05      .05      .05      .04      .04
                    .04      .02      .02      .02      .02      .02      .02      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01
1
                                                RUNOFF SUMMARY
                                        FLOW IN CUBIC FEET PER SECOND
                                     TIME IN HOURS,  AREA IN SQUARE MILES

                                      PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
        OPERATION        STATION      FLOW    PEAK                                          AREA      STAGE     MAX STAGE
+                                                          6-HOUR     24-HOUR     72-HOUR

        HYDROGRAPH AT
+                          S400      1019.    4.50         193.        48.         16.       1.54

        HYDROGRAPH AT
+                          S410       638.    4.42          97.        24.          8.        .64

        2 COMBINED AT
+                          C410      1372.    4.50         262.        66.         22.       2.18

        ROUTED TO
+                         R410A      1237.    4.75         262.        66.         22.       2.18

        ROUTED TO
+                        410415      1235.    4.83         262.        66.         22.       2.18

        HYDROGRAPH AT
+                          S415       791.    4.17          61.        15.          5.        .45

        2 COMBINED AT
+                         C415R      1232.    4.83         302.        76.         25.       2.63

        HYDROGRAPH AT
+                          S500      1743.    4.75         454.       115.         38.       3.64

        ROUTED TO
+                         R500A      1713.    4.92         453.       115.         38.       3.64

        ROUTED TO
+                        500415      1691.    5.08         452.       115.         38.       3.64

        HYDROGRAPH AT
+                          S510      1844.    4.25         216.        54.         18.       1.84

        2 COMBINED AT
+                         C415L      1690.    5.08         601.       152.         51.       5.48

        2 COMBINED AT
+                          C415      2435.    5.00         801.       202.         67.       8.11

        DIVERSION TO
+                         D415O      1204.    5.00         214.        54.         18.       8.11

        HYDROGRAPH AT
+                          D415      1231.    4.17         587.       149.         50.       8.11

        ROUTED TO
+                        415420      1231.    5.92         563.       149.         50.       8.11

        HYDROGRAPH AT
+                          S420      1576.    4.33         200.        50.         17.       1.77

        2 COMBINED AT
+                          C420      1252.    5.58         676.       182.         61.       9.88

        HYDROGRAPH AT
+                          S430      1207.    4.17         110.        27.          9.        .80

        ROUTED TO
+                        430440      1057.    4.50         110.        27.          9.        .80

        HYDROGRAPH AT
+                          S440      1237.    4.25         130.        32.         11.       1.07

        2 COMBINED AT
+                          C440      1581.    4.42         213.        53.         18.       1.86

        ROUTED TO
+                        440450      1402.    4.67         213.        53.         18.       1.86
```

```
+        HYDROGRAPH AT
                      S450     1467.   4.58      279.      70.      23.     2.52
+        HYDROGRAPH AT
                      S435      822.   4.08       57.      14.       5.      .39
+        ROUTED TO
                    435450      443.   4.92       57.      14.       5.      .39
+        3 COMBINED AT
                      C450     2589.   4.67      463.     116.      39.     4.78
+        HYDROGRAPH AT
                      S520     1272.   4.42      183.      46.      15.     1.48
+        HYDROGRAPH AT
                      S530     1563.   4.50      258.      64.      21.     2.23

*** NORMAL END OF HEC-1 ***
```

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN  1998               *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   19APR06  TIME  14:45:59  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X                X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X                X
                                        X     X  X        X     X          X
                                        X     X  XXXXXXX   XXXXX          XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                          PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE A
        4           ID
        5           ID
        6           ID  Alternative Description
        7           ID  The main design objective of the A Alternative is to allow the
        8           ID  natural geomorphic processes to occur within a designated active
        9           ID  area downstream of the apex.  The objective then is to control
       10           ID  the flow path downstream of the region of uncertainty.  The flows
       11           ID  will be captured in the up-fan area by excavated collector channels
       12           ID  and/or diversion levees.  Once collected, the flows are routed
       13           ID  downstream using leveed corridors similar to the B alternatives.
       14           ID
       15           ID
       16           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       17           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       18           ID   MODELER: TED LEHMAN
       19           ID   FILENAME: A4_EX24.DAT
       20           ID
       21           ID   100-YEAR 24-HOUR MODEL
       22           ID   EXISTING CONDITIONS
       23           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       24           ID            MODELED AREA = 76.8 SQ. MILES
       25           ID
       26           ID   GREEN-AMPT LOSS METHOD
       27           ID   S-GRAPH UNIT HYDROGRAPHS
       28           ID     - MOUNTAIN
       29           ID     - DESERT/RANGELAND
       30           ID   NORMAL-DEPTH CHANNEL ROUTING
       31           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       32           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       33           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       34           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       35           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       36           IT       5  1JAN99    1200    2000
       37           IN      15
       38           IO       5
                    *DIAGRAM
                    *
       39           JD   4.198  0.1000
       40           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
       41           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
       42           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
       43           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
       44           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
       45           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
       46           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
       47           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
       48           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
       49           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
       50           JD   3.990    10.0
                    *
1                                          HEC-1 INPUT                                          PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
 51          KK    S400   BASIN
 52          KM        Compute runoff from subbasin 400
 53          BA   1.544
 54          LG    0.25    0.35    4.20    0.43       3
 55          UI     106     106     252     429     616     729     819    1050    1206     793
 56          UI     665     601     543     493     440     385     339     276     254     239
 57          UI     212     174     144     133     116     116      82      81      81      52
 58          UI      51      53      51      39      21      20      20      21      20      20
 59          UI      20      21      20      20      20       0       0       0       0       0
             *

 60          KK    S410   BASIN
 61          KM        Compute runoff from subbasin 410
 62          BA   0.639
 63          LG    0.15    0.35    3.85    0.43       3
 64          UI      53      70     177     290     367     429     593     473     342     300
 65          UI     268     232     202     173     136     126     115      89      72      65
 66          UI      58      47      41      38      26      26      26      19      11      10
 67          UI      10      10      11      10      10      10      11       0       0       0
             *

 68          KK    C410 COMBINE
 69          KM        Combine runoff from S400 and S410
 70          HC       2
             *

 71          KK   R410A   ROUTE
 72          KM    ROUTE COMBINED FLOW ACROSS ACTIVE AREA
 73          KM    SLOPE = (1528 - 1454) / 5000
 74          RS       3    FLOW      -1
 75          RC   0.045   0.035   0.045    5000  0.0148  103.00
 76          RX    0.00   30.00  200.00  203.00  253.00  256.00  426.00  456.00
 77          RY  103.00  101.00  101.00  100.00  100.00  101.00  101.00  103.00
             *

 78          KK  410415   ROUTE
 79          KM   PROPOSED CHANNEL
 80          KM    STRUCTURE ID(s): C41510
 81          KM    Slope=(1454.2 - 1432.7) / 1567.1
 82          RS      10    FLOW      -1
 83          RC   0.045   0.045   0.045  1567.10.013729   104.5
 84          RX     0.0    13.5    13.5    13.5   413.5   413.5   413.5   427.0
 85          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

 86          KK    S415   BASIN
 87          KM        Compute runoff from subbasin 415
 88          BA   0.451
 89          LG    0.35    0.35    3.64    0.49       0
 90          UI      92     356     623     728     617     389     253     161     101      65
 91          UI      44      18      19      19       0       0       0       0       0       0
             *
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 92          KK   C415R COMBINE
 93          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 94          HC       2
             *

 95          KK    S500   BASIN
 96          KM        Compute runoff from subbasin 500
 97          BA   3.638
 98          LG    0.25    0.35    3.92    0.41       9
 99          UI     184     186     184     515     713     935    1143    1294    1413    1581
100          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
101          UI     716     629     568     487     456     435     408     387     311     297
102          UI     237     239     212     201     204     146     142     143     141      94
103          UI      91      90      90      92      90      51      35      36      35      36
             *

104          KK   R500A   ROUTE
105          KM    ROUTE COMBINED FLOW ACROSS ACTIVE AREA
106          KM    SLOPE = (1690 - 1512) / 7800
107          RS       4    FLOW      -1
108          RC   0.045   0.035   0.045    7800  0.0228  104.00
109          RX    0.00   20.00  100.00  106.00  206.00  212.00  292.00  312.00
110          RY  104.00  103.00  102.00  100.00  100.00  102.00  103.00  104.00
             *

111          KK  500415   ROUTE
112          KM   PROPOSED CHANNEL
113          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
114          KM    STRUCTURE ID(s): C51020, C51060
115          KM    Slope=(1512.2 - 1454.2) / 5415.5
116          RS       8    FLOW      -1
117          RC   0.045   0.045   0.045  5415.50.010712   105.0
118          RX     0.0    15.0    60.0    69.0   109.0   118.0   163.0   178.0
119          RY   105.0   100.0   100.0    97.0    97.0   100.0   100.0   105.0
             *

120          KK    S510   BASIN
```

```
121          KM        Compute runoff from subbasin 510
122          BA   1.840
123          LG    0.35    0.35    3.95    0.40       0
124          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
125          UI     433     307     220     160     106      57      58      56      57       0
             *

126          KK   C415L COMBINE
127          KM    COMBINE S500 AND S510 AT C415
128          HC       2
             *
1                                          HEC-1 INPUT                                          PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

129          KK    C415 COMBINE
130          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
131          HC       2
             *

132          KK    D415  DIVERT
133          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
134          KM    STRUCTURE ID:D415
135          KM    DIMENSIONS: L=1800ft, W=550ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 198.2 ac
136          DT   D415O
137          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
138          DI  4000.0     0.0
139          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
140          DQ  2769.0     0.0
             *

141          KK  415420   ROUTE
142          KM   PROPOSED CHANNEL
143          KM        Route flow from sun Valley Parkway to Hassayampa River.
144          KM    STRUCTURE ID(s): RR41510, C42010, C42020
145          KM    Slope=(1432.5 - 1191.3) / 17970.9
146          RS      10    FLOW      -1
147          RC   0.045   0.045   0.045 17970.90.013422   104.5
148          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
149          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

150          KK    S420   BASIN
151          KM        Compute runoff from subbasin 420
152          BA   1.767
153          LG    0.35    0.35    4.30    0.41       0
154          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
155          UI     582     417     328     242     183     132     115      47      47      48
156          UI      47      47       0       0       0       0       0       0       0       0
             *

157          KK    C420 COMBINE
158          KM        Combine flows from S400, S410, S415, S420
159          KM         AND S500 AND S510 at Hassayampa River
160          HC       2
             *

161          KK    S430   BASIN
162          KM        Compute runoff from subbasin 430
163          BA   0.795
164          LG    0.35    0.35    4.55    0.35       0
165          UI     127     515     918    1163    1116     779     521     349     228     153
166          UI     100      72      30      30      30       0       0       0       0       0
             *
1                                          HEC-1 INPUT                                          PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

167          KK  430440   ROUTE
168          KM        Route flows from Sun Valley Parkway through S440.
169          RS       7    FLOW      -1
170          RC   0.035   0.035   0.035   13256  0.0128  106.00
171          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
172          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
             *

173          KK    S440   BASIN
174          KM        Compute runoff from subbasin 440
175          BA   1.068
176          LG    0.35    0.35    4.20    0.43       0
177          UI     137     414     838    1167    1323    1221     910     657     468     330
178          UI     240     168     118      95      46      33      35      33      34       0
             *

179          KK    C440 COMBINE
180          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
181          HC       2
             *

182          KK  440450   ROUTE
183          KM        Route combined flows to the Hassayampa River.
184          RS       3    FLOW      -1
185          RC   0.035   0.040   0.035    4154  0.0104
```

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186          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
187          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

188          KK    S450   BASIN
189          KM        Compute runoff from subbasin 450
190          BA   2.521
191          LG    0.23    0.35    4.25    0.42       0
192          UI     167     169     381     664     938    1152    1392    1514    1599    1599
193          UI    1528    1333    1142     951     803     683     567     481     395     336
194          UI     287     255     184     177     130     116     115      88      41      41
195          UI      41      41      41      41      41      40      41       0       0       0
             *

196          KK    S435   BASIN
197          KM        Compute runoff from subbasin 435
198          BA   0.393
199          LG    0.35    0.35    4.45    0.37       0
200          UI     130     505     775     686     414     231     134      75      42      20
201          UI      20       0       0       0       0       0       0       0       0       0
             *

202          KK  435450   ROUTE
203          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
204          RS      10    FLOW      -1
205          RC   0.045   0.035   0.045   18781  0.0119    0.00
206          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
207          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *
1                                          HEC-1 INPUT                                          PAGE  6

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

208          KK    C450 COMBINE
209          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
210          HC       3
             *

211          KK    S520   BASIN
212          KM        Compute runoff from subbasin 520
213          BA   1.481
214          LG    0.35    0.35    4.50    0.36       0
215          UI     133     206     510     780    1043    1196    1285    1241    1061     847
216          UI     672     531     420     330     262     210     159     135      91      93
217          UI      54      33      33      32      33      32      33       0       0       0
             *

218          KK    S530   BASIN
219          KM        Compute runoff from subbasin 530
220          BA   2.226
221          LG    0.20    0.35    4.30    0.41       0
222          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
223          UI    1198     964     787     657     513     417     348     283     227     189
224          UI     141     120     122      56      43      43      43      43      43      43
225          UI      43       0       0       0       0       0       0       0       0       0
226          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    51       S400
                .
                .
    60          .        S410
                .           .
                .           .
    68       C410............
                V
                V
    71      R410A
                V
                V
    78     410415
                .
                .
    86          .        S415
                .           .
                .           .
    92      C415R...........
                .
                .
    95          .        S500
                .           V
                .           V
   104          .       R500A
                .           V
                .           V
   111          .      500415
                .           .
                .           .
   120          .           .        S510
```

```
                .          .          .
                .          .          .
  126           .      C415L...........
                .          .
                .          .
  129       C415...........
                .
                .
  136           .-------> D4150
  132       D415
                V
                V
  141     415420
                .
                .
  150           .       S420
                .          .
                .          .
  157       C420...........
                .
                .
  161           .       S430
                .          V
                .          V
  167           .     430440
                .          .
                .          .
  173           .          .       S440
                .          .          .
                .          .          .
  179           .       C440...........
                .          V
                .          V
  182           .     440450
                .          .
                .          .
  188           .          .       S450
                .          .          .
                .          .          .
  196           .          .          .       S435
                .          .          .          V
                .          .          .          V
  202           .          .          .     435450
                .          .          .          .
                .          .          .          .
  208           .       C450........................
                .          .
                .          .
  211           .          .       S520
                .          .          .
                .          .          .
  218           .          .          .       S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   19APR06  TIME  14:45:59  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE A

Alternative Description
The main design objective of the A Alternative is to allow the natural geomorphic processes to occur within a designated active area downstream of the apex. The objective then is to control the flow path downstream of the region of uncertainty. The flows will be captured in the up-fan area by excavated collector channels and/or diversion levees. Once collected, the flows are routed downstream using leveed corridors similar to the B alternatives.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX24.DAT

100-YEAR 24-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES
MODELED AREA = 76.8 SQ. MILES

GREEN-AMPT LOSS METHOD
S-GRAPH UNIT HYDROGRAPHS

```
                    - MOUNTAIN
                    - DESERT/RANGELAND
                  NORMAL-DEPTH CHANNEL ROUTING
                  LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                    - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                    - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                    - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                  SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

38 IO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                NMIN           5  MINUTES IN COMPUTATION INTERVAL
                IDATE      1JAN99  STARTING DATE
                ITIME        1200  STARTING TIME
                  NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
               NDDATE      8JAN99  ENDING DATE
               NDTIME        1035  ENDING TIME
                ICENT          19  CENTURY MARK

             COMPUTATION INTERVAL     .08 HOURS
                  TOTAL TIME BASE  166.58 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

39 JD        INDEX STORM NO. 1
                STRM        4.20  PRECIPITATION DEPTH
                TRDA         .10  TRANSPOSITION DRAINAGE AREA

40 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00

50 JD        INDEX STORM NO. 2
                STRM        3.99  PRECIPITATION DEPTH
                TRDA       10.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
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.00	.00	.00	.00	.00	.00	.00	.00		

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S400	1047.	12.50	184.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	526.	12.42	80.	21.	7.	.64		
+	2 COMBINED AT	C410	1524.	12.50	262.	67.	23.	2.18		
+	ROUTED TO	R410A	1334.	12.75	262.	67.	23.	2.18		
+	ROUTED TO	410415	1333.	12.83	262.	67.	23.	2.18		
+	HYDROGRAPH AT	S415	624.	12.17	50.	13.	4.	.45		
+	2 COMBINED AT	C415R	1353.	12.83	309.	79.	26.	2.63		
+	HYDROGRAPH AT	S500	2063.	12.75	476.	129.	43.	3.64		
+	ROUTED TO	R500A	1989.	12.92	476.	129.	43.	3.64		
+	ROUTED TO	500415	1940.	13.08	476.	129.	43.	3.64		
+	HYDROGRAPH AT	S510	2099.	12.25	213.	53.	18.	1.84		
+	2 COMBINED AT	C415L	2094.	12.25	680.	180.	60.	5.48		
+	2 COMBINED AT	C415	3138.	13.00	978.	257.	86.	8.11		
+	DIVERSION TO	D415O	1907.	13.00	362.	91.	30.	8.11		
+	HYDROGRAPH AT	D415	1231.	12.00	615.	166.	56.	8.11		
+	ROUTED TO	415420	1231.	14.00	592.	166.	56.	8.11		
+	HYDROGRAPH AT	S420	1740.	12.33	198.	50.	17.	1.77		
+	2 COMBINED AT	C420	1705.	12.33	765.	214.	71.	9.88		
+	HYDROGRAPH AT	S430	1090.	12.17	95.	24.	8.	.80		
+	ROUTED TO	430440	932.	12.50	95.	24.	8.	.80		
+	HYDROGRAPH AT	S440	1205.	12.25	119.	30.	10.	1.07		
+	2 COMBINED AT	C440	1700.	12.42	211.	53.	18.	1.86		
+	ROUTED TO	440450	1502.	12.58	211.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1624.	12.58	287.	72.	24.	2.52		
+	HYDROGRAPH AT	S435	656.	12.08	47.	12.	4.	.39		
+	ROUTED TO	435450	378.	12.83	47.	12.	4.	.39		

```
          3 COMBINED AT
+                        C450     3338.   12.67        536.       134.        45.       4.78

          HYDROGRAPH AT
+                        S520     1288.   12.42        174.        43.        14.       1.48

          HYDROGRAPH AT
+                        S530     1697.   12.50        257.        64.        21.       2.23

 *** NORMAL END OF HEC-1 ***
```

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1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN  1998               *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   19APR06  TIME  14:50:51  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                    X     X  XXXXXXX   XXXXX           X
                                    X     X  X        X     X         XX
                                    X     X  X        X                X
                                    XXXXXXX  XXXX     X        XXXXX   X
                                    X     X  X        X                X
                                    X     X  X        X     X          X
                                    X     X  XXXXXXX   XXXXX         XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                          PAGE  1

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

    1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
    2           ID      - HASSAYAMPA SUB-AREA
    3           ID      - ALTERNATIVE B2
    4           ID          Small detention basin at apex, levee corridors
    5           ID
    6           ID   Alternative Description
    7           ID   The purpose of Alternative B is to capture the upstream flow at the
    8           ID   apex using online detention basins.  The presence of the detention
    9           ID   basins eliminates the downstream alluvial fan uncertainties by
   10           ID   controlling the flow from the apices to the outfall.  Alternative B2
   11           ID   is based on using a relatively smaller on-line detention basin at the
   12           ID   apex accompanied by larger leveed channel sections in the down fan
   13           ID   direction.
   14           ID
   15           ID
   16           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
   17           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
   18           ID   MODELER: TED LEHMAN
   19           ID   FILENAME: A4_EX6.DAT
   20           ID
   21           ID   100-YEAR 6-HOUR MODEL
   22           ID   EXISTING CONDITIONS
   23           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
   24           ID            MODELED AREA = 76.8 SQ. MILES
   25           ID
   26           ID   GREEN-AMPT LOSS METHOD
   27           ID   S-GRAPH UNIT HYDROGRAPHS
   28           ID     - MOUNTAIN
   29           ID     - DESERT/RANGELAND
   30           ID   NORMAL-DEPTH CHANNEL ROUTING
   31           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
   32           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
   33           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
   34           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
   35           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
   36           IT       5  1JAN99    1200    2000
   37           IN      15
   38           IO       5
                *DIAGRAM
                *
   39           JD   3.196  0.1000
   40           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
   41           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
   42           PC   0.962   0.972   0.983   0.991   1.000
   43           JD   3.181  0.5000
   44           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
   45           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
   46           PC   0.962   0.972   0.983   0.991   1.000
   47           JD   3.120     2.8
   48           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
   49           PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
   50           PC   0.950   0.963   0.975   0.988   1.000
   51           JD   2.950    16.0
   52           PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
   53           PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
1                                          HEC-1 INPUT                                          PAGE  2
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  54          PC   0.946   0.960   0.973   0.987   1.000
  55          JD   2.592    90.0
  56          PC   0.000   0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
  57          PC   0.179   0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
  58          PC   0.927   0.945   0.964   0.982   1.000
              *

  59          KK    S400   BASIN
  60          KM        Compute runoff from subbasin 400
  61          BA   1.544
  62          LG   0.25    0.35    4.20    0.43       3
  63          UI    106     106     252     429     616     729     819    1050    1206     793
  64          UI    665     601     543     493     440     385     339     276     254     239
  65          UI    212     174     144     133     116     116      82      81      81      52
  66          UI     51      53      51      39      21      20      20      21      20      20
  67          UI     20      21      20      20      20       0       0       0       0       0
              *

  68          KK    S410   BASIN
  69          KM        Compute runoff from subbasin 410
  70          BA   0.639
  71          LG   0.15    0.35    3.85    0.43       3
  72          UI     53      70     177     290     367     429     593     473     342     300
  73          UI    268     232     202     173     136     126     115      89      72      65
  74          UI     58      47      41      38      26      26      26      19      11      10
  75          UI     10      10      11      10      10      10      11       0       0       0
              *

  76          KK    C410 COMBINE
  77          KM        Combine runoff from S400 and S410
  78          HC       2
              *

  79          KK   RR410 STORAGE
  80          KM   PROPOSED DETENTION BASIN
  81          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
  82          KM    STRUCTURE ID:RR410
  83          KM    DIMENSIONS: L=570ft, W=300ft, D=5ft, Sideslope (?H:1V)= 3,  Vol.= 13.6 ac-ft
  84          RS       1    STOR       0
  85          SV     0.0     3.2     6.6    10.1    13.6    17.3    21.2    25.1    29.1    33.3
  86          SE     0.0     1.0     2.0     3.0     4.0     5.0     6.0     7.0     8.0     9.0
  87          SQ     0.0   850.9  1203.3  1473.8  1701.8  1902.6  2084.2  2251.2  2406.6  2552.6
              *

  88          KK  410415   ROUTE
  89          KM   PROPOSED CHANNEL
  90          KM    STRUCTURE ID(s): RR41010, C41S10
  91          KM    Slope=(1533.5 - 1432.7) / 7128.5
  92          RS      10    FLOW      -1
  93          RC   0.045   0.045   0.045  7128.50.014139   104.5
  94          RX     0.0    13.5    13.5    13.5   413.5   413.5   413.5   427.0
  95          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
              *
```

1 HEC-1 INPUT PAGE 3

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  96          KK    S415   BASIN
  97          KM        Compute runoff from subbasin 415
  98          BA   0.451
  99          LG   0.35    0.35    3.64    0.49       0
 100          UI     92     366     623     728     617     389     253     161     101      65
 101          UI     44      18      19      19       0       0       0       0       0       0
              *

 102          KK   C415R COMBINE
 103          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 104          HC       2
              *

 105          KK    S500   BASIN
 106          KM        Compute runoff from subbasin 500
 107          BA   3.638
 108          LG   0.25    0.35    3.92    0.41       9
 109          UI    184     186     184     515     713     935    1143    1294    1413    1581
 110          UI   1968    2186    1462    1252    1119    1051     979     907     837     769
 111          UI    716     629     568     487     456     435     408     387     311     297
 112          UI    237     239     212     201     204     146     142     143     141      94
 113          UI     91      90      90      92      90      51      35      36      35      36
              *

 114          KK   RR500 STORAGE
 115          KM   PROPOSED DETENTION BASIN
 116          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
 117          KM    STRUCTURE ID:RR500
 118          KM    DIMENSIONS: L=700ft, W=380ft, D=6ft, Sideslope (?H:1V)= 3,  Vol.= 25.8 ac-ft
 119          RS       1    STOR       0
 120          SV     0.0     4.9     9.9    15.1    20.4    25.8    31.4    37.1    43.0    49.0
 121          SE     0.0     1.0     2.0     3.0     4.0     5.0     6.0     7.0     8.0     9.0
 122          SQ     0.0   945.4  1337.0  1637.5  1890.8  2114.0  2315.8  2501.3  2674.0  2836.3
              *
```

```
 123          KK  500415   ROUTE
 124          KM   PROPOSED CHANNEL
 125          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
 126          KM    STRUCTURE ID(s): C51010, C51020, C51060
 127          KM    Slope=(1666.0 - 1454.2) / 12379.2
 128          RS       8    FLOW      -1
 129          RC   0.045   0.045   0.045 12379.2 0.01711   105.0
 130          RX     0.0    15.0    60.0    69.0   109.0   118.0   163.0   178.0
 131          RY   105.0   100.0   100.0    97.0    97.0   100.0   100.0   105.0
              *

 132          KK    S510   BASIN
 133          KM         Compute runoff from subbasin 510
 134          BA   1.840
 135          LG    0.35    0.35    3.95    0.40       0
 136          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
 137          UI     433     307     220     160     106      57      58      56      57       0
              *
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 138          KK   C415L COMBINE
 139          KM    COMBINE S500 AND S510 AT C415
 140          HC       2
              *

 141          KK    C415 COMBINE
 142          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
 143          HC       2
              *

 144          KK    D415  DIVERT
 145          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
 146          KM    STRUCTURE ID:D415
 147          KM    DIMENSIONS: L=1300ft, W=800ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 171.2 ac-
 148          DT   D4150
 149          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
 150          DI  4000.0     0.0
 151          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
 152          DQ  2769.0     0.0
              *

 153          KK  415420   ROUTE
 154          KM   PROPOSED CHANNEL
 155          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 156          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 157          KM    Slope=(1432.5 - 1191.3) / 17970.9
 158          RS      10    FLOW      -1
 159          RC   0.045   0.045   0.045 17970.90.013422   104.5
 160          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
 161          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
              *

 162          KK    S420   BASIN
 163          KM         Compute runoff from subbasin 420
 164          BA   1.767
 165          LG    0.35    0.35    4.30    0.41       0
 166          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 167          UI     582     417     328     242     183     132     115      47      47      48
 168          UI      47      47       0       0       0       0       0       0       0       0
              *

 169          KK    C420 COMBINE
 170          KM        Combine flows from S400, S410, S415, S420
 171          KM         AND S500 AND S510 at Hassayampa River
 172          HC       2
              *

 173          KK    S430   BASIN
 174          KM        Compute runoff from subbasin 430
 175          BA   0.795
 176          LG    0.35    0.35    4.55    0.35       0
 177          UI     127     515     918    1163    1116     779     521     349     228     153
 178          UI     100      72      30      30      30       0       0       0       0       0
              *
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 179          KK  430440   ROUTE
 180          KM        Route flows from Sun Valley Parkway through S440.
 181          RS       7    FLOW      -1
 182          RC   0.035   0.035   0.035   13256  0.0128  106.00
 183          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 184          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

 185          KK    S440   BASIN
 186          KM        Compute runoff from subbasin 440
 187          BA   1.068
 188          LG    0.35    0.35    4.20    0.43       0
 189          UI     137     414     838    1167    1323    1221     910     657     468     330
```

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190          UI     240     168     118      95      46      33      35      33      34       0
             *

191          KK    C440 COMBINE
192          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
193          HC       2
             *

194          KK  440450   ROUTE
195          KM        Route combined flows to the Hassayampa River.
196          RS       3    FLOW      -1
197          RC   0.035   0.040   0.035    4154  0.0104
198          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
199          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

200          KK    S450   BASIN
201          KM        Compute runoff from subbasin 450
202          BA   2.521
203          LG    0.23    0.35    4.25    0.42       0
204          UI     167     169     381     664     938    1152    1392    1514    1599    1599
205          UI    1528    1333    1142     951     803     683     567     481     395     336
206          UI     287     255     184     177     130     116     115      88      41      41
207          UI      41      41      41      41      41      40      41       0       0       0
             *

208          KK    S435   BASIN
209          KM        Compute runoff from subbasin 435
210          BA   0.393
211          LG    0.35    0.35    4.45    0.37       0
212          UI     130     505     775     686     414     231     134      75      42      20
213          UI      20       0       0       0       0       0       0       0       0       0
             *

214          KK  435450   ROUTE
215          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
216          RS      10    FLOW      -1
217          RC   0.045   0.035   0.045   18781  0.0119    0.00
218          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
219          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *
```

1 HEC-1 INPUT PAGE 6

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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

220          KK    C450 COMBINE
221          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
222          HC       3
             *

223          KK    S520   BASIN
224          KM        Compute runoff from subbasin 520
225          BA   1.481
226          LG    0.35    0.35    4.50    0.36       0
227          UI     133     206     510     780    1043    1196    1285    1241    1061     847
228          UI     672     531     420     330     262     210     159     135      91      93
229          UI      54      33      33      32      33      32      33       0       0       0
             *

230          KK    S530   BASIN
231          KM        Compute runoff from subbasin 530
232          BA   2.226
233          LG    0.20    0.35    4.30    0.41       0
234          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
235          UI    1198     964     787     657     513     417     348     283     227     189
236          UI     141     120     122      56      43      43      43      43      43      43
237          UI      43       0       0       0       0       0       0       0       0       0
238          ZZ
```

1

```
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

   59       S400
              .
              .
   68         .        S410
              .          .
              .          .
   76       C410............
              V
              V
   79      RR410
              V
              V
   88     410415
              .
              .
   96         .        S415
              .          .
              .          .
  102      C415R............
```

```
                .
                .
  105           .        S500
                .           V
                .           V
  114           .       RR500
                .           V
                .           V
  123           .      500415
                .           .
                .           .
  132           .           .        S510
                .           .           .
                .           .           .
  138           .       C415L............
                .           .
                .           .
  141        C415............
                .
                .
  148           .------->   D415O
  144        D415
                V
                V
  153      415420
                .
                .
  162           .        S420
                .           .
                .           .
  169        C420............
                .
                .
  173           .        S430
                .           V
                .           V
  179           .      430440
                .           .
                .           .
  185           .           .        S440
                .           .           .
                .           .           .
  191           .        C440............
                .           V
                .           V
  194           .      440450
                .           .
                .           .
  200           .           .        S450
                .           .           .
                .           .           .
  208           .           .           .        S435
                .           .           .           V
                .           .           .           V
  214           .           .           .      435450
                .           .           .           .
                .           .           .           .
  220           .        C450........................
                .           .
                .           .
  223           .           .        S520
                .           .           .
                .           .           .
  230           .           .           .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   19APR06  TIME  14:50:51  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B2
  Small detention basin at apex, levee corridors

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B2 is based on using a relatively smaller on-line detention basin at the apex accompanied by larger leveed channel sections in the down fan direction.

```
                    SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
                    JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
                    MODELER: TED LEHMAN
                    FILENAME: A4_EX6.DAT

                    100-YEAR 6-HOUR MODEL
                    EXISTING CONDITIONS
                    AREA 4 WATERSHED AREA = 90.5 SQ. MILES
                           MODELED AREA = 76.8 SQ. MILES

                    GREEN-AMPT LOSS METHOD
                    S-GRAPH UNIT HYDROGRAPHS
                      - MOUNTAIN
                      - DESERT/RANGELAND
                    NORMAL-DEPTH CHANNEL ROUTING
                    LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                      - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                      - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                      - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                    SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

38 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN99  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     8JAN99  ENDING DATE
                    NDTIME       1035  ENDING TIME
                     ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL     .08 HOURS
                    TOTAL TIME BASE  166.58 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

39 JD           INDEX STORM NO. 1
                      STRM       3.20  PRECIPITATION DEPTH
                      TRDA        .10  TRANSPOSITION DRAINAGE AREA

40 PI             PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

43 JD           INDEX STORM NO. 2
                      STRM       3.18  PRECIPITATION DEPTH
                      TRDA        .50  TRANSPOSITION DRAINAGE AREA

44 PI             PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

47 JD           INDEX STORM NO. 3
                      STRM       3.12  PRECIPITATION DEPTH
                      TRDA       2.80  TRANSPOSITION DRAINAGE AREA

48 PI             PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .07       .07       .07       .08       .08       .08       .05       .05
                   .05       .02       .02       .02       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

51 JD           INDEX STORM NO. 4
                      STRM       2.95  PRECIPITATION DEPTH
                      TRDA      16.00  TRANSPOSITION DRAINAGE AREA

52 PI             PRECIPITATION PATTERN
                   .01       .01       .00       .00       .00       .00       .00       .00       .00       .01
```

```
                .01     .01     .00     .01     .00     .00     .00     .00     .00     .00
                .00     .00     .01     .00     .00     .00     .00     .01     .01     .01
                .01     .01     .01     .01     .01     .01     .02     .02     .02     .03
                .03     .03     .06     .06     .06     .07     .07     .07     .04     .04
                .04     .02     .02     .02     .01     .01     .01     .01     .01     .01
                .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                .00     .00

55 JD        INDEX STORM NO. 5
                STRM        2.59  PRECIPITATION DEPTH
                TRDA       90.00  TRANSPOSITION DRAINAGE AREA

56 PI          PRECIPITATION PATTERN
                .01     .01     .01     .00     .00     .00     .01     .01     .01     .01
                .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                .01     .01     .01     .01     .01     .01     .02     .02     .02     .03
                .03     .03     .05     .05     .05     .05     .05     .05     .04     .04
                .04     .02     .02     .02     .02     .02     .02     .01     .01     .01
                .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                .01     .01
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S400	1019.	4.50	193.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	638.	4.42	97.	24.	8.	.64		
+	2 COMBINED AT	C410	1372.	4.50	262.	66.	22.	2.18		
+	ROUTED TO	RR410	1288.	4.58	262.	66.	22.	2.18		
+	ROUTED TO	410415	1245.	4.92	262.	66.	22.	2.18		
+	HYDROGRAPH AT	S415	791.	4.17	61.	15.	5.	.45		
+	2 COMBINED AT	C415R	1245.	4.92	304.	76.	25.	2.63		
+	HYDROGRAPH AT	S500	1743.	4.75	454.	115.	38.	3.64		
+	ROUTED TO	RR500	1619.	4.92	454.	115.	38.	3.64		
+	ROUTED TO	500415	1557.	5.33	453.	115.	38.	3.64		
+	HYDROGRAPH AT	S510	1844.	4.25	216.	54.	18.	1.84		
+	2 COMBINED AT	C415L	1520.	4.58	607.	153.	51.	5.48		
+	2 COMBINED AT	C415	2323.	5.00	802.	202.	67.	8.11		
+	DIVERSION TO	D415O	1092.	5.00	194.	49.	16.	8.11		
+	HYDROGRAPH AT	D415	1231.	4.17	608.	154.	51.	8.11		
+	ROUTED TO	415420	1231.	5.92	584.	154.	51.	8.11		
+	HYDROGRAPH AT	S420	1576.	4.33	200.	50.	17.	1.77		
+	2 COMBINED AT	C420	1253.	5.58	696.	187.	62.	9.88		
+	HYDROGRAPH AT	S430	1207.	4.17	110.	27.	9.	.80		
+	ROUTED TO	430440	1057.	4.50	110.	27.	9.	.80		
+	HYDROGRAPH AT	S440	1237.	4.25	130.	32.	11.	1.07		
+	2 COMBINED AT	C440	1581.	4.42	213.	53.	18.	1.86		

+	ROUTED TO	440450	1402.	4.67	213.	53.	18.	1.86
+	HYDROGRAPH AT	S450	1467.	4.58	279.	70.	23.	2.52
+	HYDROGRAPH AT	S435	822.	4.08	57.	14.	5.	.39
+	ROUTED TO	435450	443.	4.92	57.	14.	5.	.39
+	3 COMBINED AT	C450	2589.	4.67	463.	116.	39.	4.78
+	HYDROGRAPH AT	S520	1272.	4.42	183.	46.	15.	1.48
+	HYDROGRAPH AT	S530	1563.	4.50	258.	64.	21.	2.23

*** NORMAL END OF HEC-1 ***

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN  1998               *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   19APR06  TIME  14:50:52  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                    HEC-1 INPUT                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE B2
        4           ID          Small detention basin at apex, levee corridors
        5           ID
        6           ID   Alternative Description
        7           ID   The purpose of Alternative B is to capture the upstream flow at the
        8           ID   apex using online detention basins.  The presence of the detention
        9           ID   basins eliminates the downstream alluvial fan uncertainties by
       10           ID   controlling the flow from the apices to the outfall.  Alternative B2
       11           ID   is based on using a relatively smaller on-line detention basin at the
       12           ID   apex accompanied by larger leveed channel sections in the down fan
       13           ID   direction.
       14           ID
       15           ID
       16           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       17           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       18           ID   MODELER: TED LEHMAN
       19           ID   FILENAME: A4_EX24.DAT
       20           ID
       21           ID   100-YEAR 24-HOUR MODEL
       22           ID   EXISTING CONDITIONS
       23           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       24           ID            MODELED AREA = 76.8 SQ. MILES
       25           ID
       26           ID   GREEN-AMPT LOSS METHOD
       27           ID   S-GRAPH UNIT HYDROGRAPHS
       28           ID     - MOUNTAIN
       29           ID     - DESERT/RANGELAND
       30           ID   NORMAL-DEPTH CHANNEL ROUTING
       31           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       32           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       33           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       34           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       35           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       36           IT       5  1JAN99    1200    2000
       37           IN      15
       38           IO       5
                    *DIAGRAM
                    *
       39           JD   4.198  0.1000
       40           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
       41           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
       42           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
       43           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
       44           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
       45           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
       46           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
       47           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
       48           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
       49           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
       50           JD   3.990    10.0
                    *
1                                    HEC-1 INPUT                                    PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
 51          KK    S400    BASIN
 52          KM        Compute runoff from subbasin 400
 53          BA   1.544
 54          LG    0.25    0.35    4.20    0.43       3
 55          UI     106     106     252     429     616     729     819    1050    1206     793
 56          UI     665     601     543     493     440     385     339     276     254     239
 57          UI     212     174     144     133     116     116      82      81      81      52
 58          UI      51      53      51      39      21      20      20      21      20      20
 59          UI      20      21      20      20      20       0       0       0       0       0
             *

 60          KK    S410    BASIN
 61          KM        Compute runoff from subbasin 410
 62          BA   0.639
 63          LG    0.15    0.35    3.85    0.43       3
 64          UI      53      70     177     290     367     429     593     473     342     300
 65          UI     268     232     202     173     136     126     115      89      72      65
 66          UI      58      47      41      38      26      26      26      19      11      10
 67          UI      10      10      11      10      10      10      11       0       0       0
             *

 68          KK    C410 COMBINE
 69          KM        Combine runoff from S400 and S410
 70          HC       2
             *

 71          KK   RR410 STORAGE
 72          KM   PROPOSED DETENTION BASIN
 73          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
 74          KM    STRUCTURE ID:RR410
 75          KM    DIMENSIONS: L=570ft, W=300ft, D=5ft, Sideslope (?H:1V)= 3,  Vol.= 13.6 ac-ft
 76          RS       1    STOR       0
 77          SV     0.0     3.2     6.6    10.1    13.6    17.3    21.2    25.1    29.1    33.3
 78          SE     0.0     1.0     2.0     3.0     4.0     5.0     6.0     7.0     8.0     9.0
 79          SQ     0.0   850.9  1203.3  1473.8  1701.8  1902.6  2084.2  2251.2  2406.6  2552.6
             *

 80          KK  410415    ROUTE
 81          KM   PROPOSED CHANNEL
 82          KM    STRUCTURE ID(s): RR41010, C41510
 83          KM    Slope=(1533.5 - 1432.7) / 7128.5
 84          RS      10    FLOW      -1
 85          RC   0.045   0.045   0.045  7128.50.014139   104.5
 86          RX     0.0    13.5    13.5    13.5   413.5   413.5   413.5   427.0
 87          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

 88          KK    S415    BASIN
 89          KM        Compute runoff from subbasin 415
 90          BA   0.451
 91          LG    0.35    0.35    3.64    0.49       0
 92          UI      92     356     623     728     617     389     253     161     101      65
 93          UI      44      18      19      19       0       0       0       0       0       0
             *
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 94          KK   C415R COMBINE
 95          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 96          HC       2
             *

 97          KK    S500    BASIN
 98          KM        Compute runoff from subbasin 500
 99          BA   3.638
100          LG    0.25    0.35    3.92    0.41       9
101          UI     184     186     184     515     713     935    1143    1294    1413    1581
102          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
103          UI     716     629     568     487     456     435     408     387     311     297
104          UI     237     239     212     201     204     146     142     143     141      94
105          UI      91      90      90      92      90      51      35      36      35      36
             *

106          KK   RR500 STORAGE
107          KM   PROPOSED DETENTION BASIN
108          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
109          KM    STRUCTURE ID:RR500
110          KM    DIMENSIONS: L=700ft, W=380ft, D=6ft, Sideslope (?H:1V)= 3,  Vol.= 25.8 ac-ft
111          RS       1    STOR       0
112          SV     0.0     4.9     9.9    15.1    20.4    25.8    31.4    37.1    43.0    49.0
113          SE     0.0     1.0     2.0     3.0     4.0     5.0     6.0     7.0     8.0     9.0
114          SQ     0.0   945.4  1337.0  1637.5  1890.8  2114.0  2315.8  2501.3  2674.0  2836.3
             *

115          KK  500415    ROUTE
116          KM   PROPOSED CHANNEL
117          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
118          KM    STRUCTURE ID(s): C51010, C51020, C51060
119          KM    Slope=(1666.0 - 1454.2) / 12379.2
120          RS       8    FLOW      -1
121          RC   0.045   0.045   0.045 12379.2 0.01711   105.0
122          RX     0.0    15.0    60.0    69.0   109.0   118.0   163.0   178.0
```

```
 123          RY   105.0   100.0   100.0    97.0    97.0   100.0   100.0   105.0
              *

 124          KK    S510   BASIN
 125          KM        Compute runoff from subbasin 510
 126          BA   1.840
 127          LG    0.35    0.35    3.95    0.40       0
 128          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
 129          UI     433     307     220     160     106      57      58      56      57       0
              *

 130          KK   C415L COMBINE
 131          KM    COMBINE S500 AND S510 AT C415
 132          HC       2
              *
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 133          KK    C415 COMBINE
 134          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
 135          HC       2
              *

 136          KK    D415  DIVERT
 137          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
 138          KM    STRUCTURE ID:D415
 139          KM    DIMENSIONS: L=1300ft, W=800ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 171.2 ac-
 140          DT   D415O
 141          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
 142          DI  4000.0     0.0
 143          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
 144          DQ  2769.0     0.0
              *

 145          KK  415420   ROUTE
 146          KM   PROPOSED CHANNEL
 147          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 148          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 149          KM    Slope=(1432.5 - 1191.3) / 17970.9
 150          RS      10    FLOW      -1
 151          RC   0.045   0.045   0.045 17970.90.013422   104.5
 152          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
 153          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
              *

 154          KK    S420   BASIN
 155          KM        Compute runoff from subbasin 420
 156          BA   1.767
 157          LG    0.35    0.35    4.30    0.41       0
 158          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 159          UI     582     417     328     242     183     132     115      47      47      48
 160          UI      47      47       0       0       0       0       0       0       0       0
              *

 161          KK    C420 COMBINE
 162          KM        Combine flows from S400, S410, S415, S420
 163          KM         AND S500 AND S510 at Hassayampa River
 164          HC       2
              *

 165          KK    S430   BASIN
 166          KM        Compute runoff from subbasin 430
 167          BA   0.795
 168          LG    0.35    0.35    4.55    0.35       0
 169          UI     127     515     918    1163    1116     779     521     349     228     153
 170          UI     100      72      30      30      30       0       0       0       0       0
              *
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 171          KK  430440   ROUTE
 172          KM        Route flows from Sun Valley Parkway through S440.
 173          RS       7    FLOW      -1
 174          RC   0.035   0.035   0.035   13256  0.0128  106.00
 175          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 176          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

 177          KK    S440   BASIN
 178          KM        Compute runoff from subbasin 440
 179          BA   1.068
 180          LG    0.35    0.35    4.20    0.43       0
 181          UI     137     414     838    1167    1323    1221     910     657     468     330
 182          UI     240     168     118      95      46      33      35      33      34       0
              *

 183          KK    C440 COMBINE
 184          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
 185          HC       2
              *
```

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186          KK  440450   ROUTE
187          KM        Route combined flows to the Hassayampa River.
188          RS       3    FLOW      -1
189          RC   0.035   0.040   0.035    4154  0.0104
190          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
191          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

192          KK    S450   BASIN
193          KM        Compute runoff from subbasin 450
194          BA   2.521
195          LG    0.23    0.35    4.25    0.42       0
196          UI     167     169     381     664     938    1152    1392    1514    1599    1599
197          UI    1528    1333    1142     951     803     683     567     481     395     336
198          UI     287     255     184     177     130     116     115      88      41      41
199          UI      41      41      41      41      41      40      41       0       0       0
             *

200          KK    S435   BASIN
201          KM        Compute runoff from subbasin 435
202          BA   0.393
203          LG    0.35    0.35    4.45    0.37       0
204          UI     130     505     775     686     414     231     134      75      42      20
205          UI      20       0       0       0       0       0       0       0       0       0
             *

206          KK  435450   ROUTE
207          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
208          RS      10    FLOW      -1
209          RC   0.045   0.035   0.045   18781  0.0119    0.00
210          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
211          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *
1                                                HEC-1 INPUT                                                PAGE  6

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


212          KK    C450 COMBINE
213          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
214          HC       3
             *

215          KK    S520   BASIN
216          KM        Compute runoff from subbasin 520
217          BA   1.481
218          LG    0.35    0.35    4.50    0.36       0
219          UI     133     206     510     780    1043    1196    1285    1241    1061     847
220          UI     672     531     420     330     262     210     159     135      91      93
221          UI      54      33      33      32      33      32      33       0       0       0
             *

222          KK    S530   BASIN
223          KM        Compute runoff from subbasin 530
224          BA   2.226
225          LG    0.20    0.35    4.30    0.41       0
226          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
227          UI    1198     964     787     657     513     417     348     283     227     189
228          UI     141     120     122      56      43      43      43      43      43      43
229          UI      43       0       0       0       0       0       0       0       0       0
230          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   51        S400
                .
                .
   60           .        S410
                .           .
                .           .
   68       C410............
                V
                V
   71       RR410
                V
                V
   80      410415
                .
                .
   88           .        S415
                .           .
                .           .
   94      C415R............
                .
                .
   97           .        S500
                .           V
                .           V
  106           .       RR500
                .           V
                .           V
```

```
115          .      500415
             .           .
             .           .
124          .           .        S510
             .           .           .
             .           .           .
130          .       C415L............
             .           .
             .           .
133       C415............
             .
             .
140          .-------->   D4150
136       D415
             V
             V
145     415420
             .
             .
154          .        S420
             .           .
             .           .
161       C420............
             .
             .
165          .        S430
             .           V
             .           V
171          .      430440
             .           .
             .           .
177          .           .        S440
             .           .           .
             .           .           .
183          .        C440............
             .           V
             .           V
186          .      440450
             .           .
             .           .
192          .           .        S450
             .           .           .
             .           .           .
200          .           .           .        S435
             .           .           .           V
             .           .           .           V
206          .           .           .      435450
             .           .           .           .
             .           .           .           .
212          .        C450........................
             .           .
             .           .
215          .           .        S520
             .           .           .
             .           .           .
222          .           .           .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   19APR06  TIME  14:50:52  *
*                                      *
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```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
*   HYDROLOGIC ENGINEERING CENTER   *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*          (916) 756-1104           *
*                                   *
*************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B2
  Small detention basin at apex, levee corridors

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B2 is based on using a relatively smaller on-line detention basin at the apex accompanied by larger leveed channel sections in the down fan direction.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX24.DAT

100-YEAR 24-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES

```
                    MODELED AREA = 76.8 SQ. MILES

              GREEN-AMPT LOSS METHOD
              S-GRAPH UNIT HYDROGRAPHS
                - MOUNTAIN
                - DESERT/RANGELAND
              NORMAL-DEPTH CHANNEL ROUTING
              LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
              SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

38 IO      OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT      HYDROGRAPH TIME DATA
                NMIN           5  MINUTES IN COMPUTATION INTERVAL
               IDATE      1JAN99  STARTING DATE
               ITIME        1200  STARTING TIME
                  NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE      8JAN99  ENDING DATE
              NDTIME        1035  ENDING TIME
               ICENT          19  CENTURY MARK

          COMPUTATION INTERVAL     .08 HOURS
               TOTAL TIME BASE  166.58 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

39 JD      INDEX STORM NO. 1
               STRM        4.20  PRECIPITATION DEPTH
               TRDA         .10  TRANSPOSITION DRAINAGE AREA

40 PI        PRECIPITATION PATTERN
             .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
             .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
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             .01    .01    .01    .01    .01    .01    .01    .01    .03    .03
             .03    .09    .09    .09    .01    .01    .01    .01    .01    .01
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50 JD      INDEX STORM NO. 2
               STRM        3.99  PRECIPITATION DEPTH
               TRDA       10.00  TRANSPOSITION DRAINAGE AREA

 0 PI        PRECIPITATION PATTERN
             .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
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             .03    .09    .09    .09    .01    .01    .01    .01    .01    .01
             .01    .01    .01    .01    .01    .01    .00    .00    .00    .00
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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S400	1047.	12.50	184.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	526.	12.42	80.	21.	7.	.64		
+	2 COMBINED AT	C410	1524.	12.50	262.	67.	23.	2.18		
+	ROUTED TO	RR410	1393.	12.58	262.	67.	23.	2.18		
+	ROUTED TO	410415	1327.	12.92	262.	67.	23.	2.18		
+	HYDROGRAPH AT	S415	624.	12.17	50.	13.	4.	.45		
+	2 COMBINED AT	C415R	1339.	12.92	309.	79.	26.	2.63		
+	HYDROGRAPH AT	S500	2063.	12.75	476.	129.	43.	3.64		
+	ROUTED TO	RR500	1814.	12.92	476.	129.	43.	3.64		
+	ROUTED TO	500415	1711.	13.33	476.	129.	43.	3.64		
+	HYDROGRAPH AT	S510	2099.	12.25	213.	53.	18.	1.84		
+	2 COMBINED AT	C415L	2112.	12.25	680.	180.	60.	5.48		
+	2 COMBINED AT	C415	2775.	13.00	978.	257.	86.	8.11		
+	DIVERSION TO	D415O	1544.	13.00	342.	86.	29.	8.11		
+	HYDROGRAPH AT	D415	1231.	12.00	636.	171.	57.	8.11		
+	ROUTED TO	415420	1231.	14.08	612.	171.	57.	8.11		
+	HYDROGRAPH AT	S420	1740.	12.33	198.	50.	17.	1.77		
+	2 COMBINED AT	C420	1705.	12.33	784.	219.	73.	9.88		
+	HYDROGRAPH AT	S430	1090.	12.17	95.	24.	8.	.80		
+	ROUTED TO	430440	932.	12.50	95.	24.	8.	.80		
+	HYDROGRAPH AT	S440	1205.	12.25	119.	30.	10.	1.07		
+	2 COMBINED AT	C440	1700.	12.42	211.	53.	18.	1.86		
+	ROUTED TO	440450	1502.	12.58	211.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1624.	12.58	287.	72.	24.	2.52		
	HYDROGRAPH AT									

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+                          S435      656.   12.08        47.        12.        4.       .39
        ROUTED TO
+                        435450      378.   12.83        47.        12.        4.       .39
        3 COMBINED AT
+                          C450     3338.   12.67       536.       134.       45.      4.78
        HYDROGRAPH AT
+                          S520     1288.   12.42       174.        43.       14.      1.48
        HYDROGRAPH AT
+                          S530     1697.   12.50       257.        64.       21.      2.23

 *** NORMAL END OF HEC-1 ***
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1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   19APR06  TIME  14:55:41  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                    X     X  XXXXXXX   XXXXX           X
                                    X     X  X        X     X         XX
                                    X     X  X        X               X
                                    XXXXXXX  XXXX     X        XXXXX  X
                                    X     X  X        X               X
                                    X     X  X        X     X         X
                                    X     X  XXXXXXX   XXXXX         XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                HEC-1 INPUT                                                PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE B3
        4           ID
        5           ID   Alternative Description
        6           ID   The purpose of Alternative B is to capture the upstream flow at the
        7           ID   apex using online detention basins.  The presence of the detention
        8           ID   basins eliminates the downstream alluvial fan uncertainties by
        9           ID   controlling the flow from the apices to the outfall.  Alternative B3
       10           ID   is based on using a relatively larger on-line detention basin at the
       11           ID   apex accompanied by smaller excavated channel sections in the down fan
       12           ID   direction.  The excavated earthen channels are complemented with a
       13           ID   120-foot wide adjacent riparian preservation corridor.
       14           ID
       15           ID
       16           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       17           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       18           ID   MODELER: TED LEHMAN
       19           ID   FILENAME: A4_EX6.DAT
       20           ID
       21           ID   100-YEAR 6-HOUR MODEL
       22           ID   EXISTING CONDITIONS
       23           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       24           ID            MODELED AREA = 76.8 SQ. MILES
       25           ID
       26           ID   GREEN-AMPT LOSS METHOD
       27           ID   S-GRAPH UNIT HYDROGRAPHS
       28           ID     - MOUNTAIN
       29           ID     - DESERT/RANGELAND
       30           ID   NORMAL-DEPTH CHANNEL ROUTING
       31           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       32           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       33           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       34           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       35           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       36           IT       5  1JAN99    1200    2000
       37           IN      15
       38           IO       5
                    *DIAGRAM
                    *
       39           JD   3.196  0.1000
       40           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
       41           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
       42           PC   0.962   0.972   0.983   0.991   1.000
       43           JD   3.181  0.5000
       44           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
       45           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
       46           PC   0.962   0.972   0.983   0.991   1.000
       47           JD   3.120     2.8
       48           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
       49           PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
       50           PC   0.950   0.963   0.975   0.988   1.000
       51           JD   2.950    16.0
       52           PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
       53           PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
1                                                HEC-1 INPUT                                                PAGE  2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  54          PC   0.946   0.960   0.973   0.987   1.000
  55          JD   2.592    90.0
  56          PC   0.000   0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
  57          PC   0.179   0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
  58          PC   0.927   0.945   0.964   0.982   1.000
              *

  59          KK    S400   BASIN
  60          KM        Compute runoff from subbasin 400
  61          BA   1.544
  62          LG    0.25    0.35    4.20    0.43       3
  63          UI     106     106     252     429     616     729     819    1050    1206     793
  64          UI     665     601     543     493     440     385     339     276     254     239
  65          UI     212     174     144     133     116     116      82      81      81      52
  66          UI      51      53      51      39      21      20      20      21      20      20
  67          UI      20      21      20      20      20       0       0       0       0       0
              *

  68          KK    S410   BASIN
  69          KM        Compute runoff from subbasin 410
  70          BA   0.639
  71          LG    0.15    0.35    3.85    0.43       3
  72          UI      53      70     177     290     367     429     593     473     342     300
  73          UI     268     232     202     173     136     126     115      89      72      65
  74          UI      58      47      41      38      26      26      26      19      11      10
  75          UI      10      10      11      10      10      10      11       0       0       0
              *

  76          KK    C410 COMBINE
  77          KM        Combine runoff from S400 and S410
  78          HC       2
              *

  79          KK   RR410 STORAGE
  80          KM   PROPOSED DETENTION BASIN
  81          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
  82          KM    STRUCTURE ID:RR410
  83          KM    DIMENSIONS: L=1200ft, W=570ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 110.5 ac-
  84          RS       1    STOR       0
  85          SV     0.0    13.0    39.7    67.3    81.5    95.9   110.5   125.3   140.5   155.8
  86          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
  87          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
              *

  88          KK  410415   ROUTE
  89          KM   PROPOSED CHANNEL
  90          KM    STRUCTURE ID(s): RR41010, C41510
  91          KM    Slope=(1533.5 - 1432.7) / 7128.5
  92          RS      10    FLOW      -1
  93          RC   0.045   0.045   0.045  7128.50.014139   104.0
  94          RX     0.0    24.0    64.0    79.0   114.0   129.0   169.0   193.0
  95          RY   104.0   100.0   100.0    97.5    97.5   100.0   100.0   104.0
              *
1                                          HEC-1 INPUT                                          PAGE  3

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  96          KK    S415   BASIN
  97          KM        Compute runoff from subbasin 415
  98          BA   0.451
  99          LG    0.35    0.35    3.64    0.49       0
 100          UI      92     356     623     728     617     389     253     161     101      65
 101          UI      44      18      19      19       0       0       0       0       0       0
              *

 102          KK   C415R COMBINE
 103          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 104          HC       2
              *

 105          KK    S500   BASIN
 106          KM        Compute runoff from subbasin 500
 107          BA   3.638
 108          LG    0.25    0.35    3.92    0.41       9
 109          UI     184     186     184     515     713     935    1143    1294    1413    1581
 110          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
 111          UI     716     629     568     487     456     435     408     387     311     297
 112          UI     237     239     212     201     204     146     142     143     141      94
 113          UI      91      90      90      92      90      51      35      36      35      36
              *

 114          KK   RR500 STORAGE
 115          KM   PROPOSED DETENTION BASIN
 116          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
 117          KM    STRUCTURE ID:RR500
 118          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
 119          RS       1    STOR       0
 120          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
 121          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
 122          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
              *
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KK  500415   ROUTE
KM   PROPOSED CHANNEL
KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
KM    STRUCTURE ID(s): C51010, C51020, C51060
KM    Slope=(1666.0 - 1454.2) / 12379.2
RS       8    FLOW      -1
RC   0.045   0.045   0.045 12379.2 0.01711   103.0
RX     0.0     9.0    39.0    48.0    73.0    82.0   112.0   121.0
RY   103.0   100.0   100.0    97.0    97.0   100.0   100.0   103.0
*

KK    S510   BASIN
KM        Compute runoff from subbasin 510
BA   1.840
LG    0.35    0.35    3.95    0.40       0
UI     232     677    1390    1950    2228    2094    1604    1165     828     599
UI     433     307     220     160     106      57      58      56      57       0
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1 HEC-1 INPUT PAGE 4

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK   C415L COMBINE
KM    COMBINE S500 AND S510 AT C415
HC       2
*

KK    C415 COMBINE
KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
HC       2
*

KK    D415  DIVERT
KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
KM    STRUCTURE ID:D415
KM    DIMENSIONS: L=600ft, W=580ft, D=7ft, Sideslope (?H:1V)= 3,  Vol.= 42.1 ac-ft
DT   D415O
DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
DI  4000.0     0.0
DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
DQ  2769.0     0.0
*

KK  415420   ROUTE
KM   PROPOSED CHANNEL
KM        Route flow from Sun Valley Parkway to Hassayampa River.
KM    STRUCTURE ID(s): RR41510, C42010, C42020
KM    Slope=(1432.5 - 1191.3) / 17970.9
RS      10    FLOW      -1
RC   0.045   0.045   0.045 17970.90.013422   103.0
RX     0.0    12.0    47.0    59.0    94.0   106.0   141.0   153.0
RY   103.0   100.0   100.0    97.0    97.0   100.0   100.0   103.0
*

KK    S420   BASIN
KM        Compute runoff from subbasin 420
BA   1.767
LG    0.35    0.35    4.30    0.41       0
UI     193     427     964    1407    1752    1846    1712    1346    1015     760
UI     582     417     328     242     183     132     115      47      47      48
UI      47      47       0       0       0       0       0       0       0       0
*

KK    C420 COMBINE
KM        Combine flows from S400, S410, S415, S420
KM         AND S500 AND S510 at Hassayampa River
HC       2
*

KK    S430   BASIN
KM        Compute runoff from subbasin 430
BA   0.795
LG    0.35    0.35    4.55    0.35       0
UI     127     515     918    1163    1116     779     521     349     228     153
UI     100      72      30      30      30       0       0       0       0       0
*
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1 HEC-1 INPUT PAGE 5

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  430440   ROUTE
KM        Route flows from Sun Valley Parkway through S440.
RS       7    FLOW      -1
RC   0.035   0.035   0.035   13256  0.0128  106.00
RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
*

KK    S440   BASIN
KM        Compute runoff from subbasin 440
BA   1.068
LG    0.35    0.35    4.20    0.43       0
UI     137     414     838    1167    1323    1221     910     657     468     330
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 190          UI     240     168     118      95      46      33      35      33      34       0
              *

 191          KK    C440 COMBINE
 192          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
 193          HC       2
              *

 194          KK  440450   ROUTE
 195          KM        Route combined flows to the Hassayampa River.
 196          RS       3    FLOW      -1
 197          RC   0.035   0.040   0.035    4154  0.0104
 198          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
 199          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
              *

 200          KK    S450   BASIN
 201          KM        Compute runoff from subbasin 450
 202          BA   2.521
 203          LG    0.23    0.35    4.25    0.42       0
 204          UI     167     169     381     664     938    1152    1392    1514    1599    1599
 205          UI    1528    1333    1142     951     803     683     567     481     395     336
 206          UI     287     255     184     177     130     116     115      88      41      41
 207          UI      41      41      41      41      41      40      41       0       0       0
              *

 208          KK    S435   BASIN
 209          KM        Compute runoff from subbasin 435
 210          BA   0.393
 211          LG    0.35    0.35    4.45    0.37       0
 212          UI     130     505     775     686     414     231     134      75      42      20
 213          UI      20       0       0       0       0       0       0       0       0       0
              *

 214          KK  435450   ROUTE
 215          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
 216          RS      10    FLOW      -1
 217          RC   0.045   0.035   0.045   18781  0.0119    0.00
 218          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
 219          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
              *
1                                          HEC-1 INPUT                                          PAGE  6

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 220          KK    C450 COMBINE
 221          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
 222          HC       3
              *

 223          KK    S520   BASIN
 224          KM        Compute runoff from subbasin 520
 225          BA   1.481
 226          LG    0.35    0.35    4.50    0.36       0
 227          UI     133     206     510     780    1043    1196    1285    1241    1061     847
 228          UI     672     531     420     330     262     210     159     135      91      93
 229          UI      54      33      33      32      33      32      33       0       0       0
              *

 230          KK    S530   BASIN
 231          KM        Compute runoff from subbasin 530
 232          BA   2.226
 233          LG    0.20    0.35    4.30    0.41       0
 234          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
 235          UI    1198     964     787     657     513     417     348     283     227     189
 236          UI     141     120     122      56      43      43      43      43      43      43
 237          UI      43       0       0       0       0       0       0       0       0       0
 238          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  59        S400
              .
              .
  68          .        S410
              .           .
              .           .
  76       C410............
              V
              V
  79      RR410
              V
              V
  88      410415
              .
              .
  96          .        S415
              .           .
              .           .
 102      C415R...........
```

```
                .
                .
  105           .        S500
                .           V
                .           V
  114           .       RR500
                .           V
                .           V
  123           .      500415
                .           .
                .           .
  132           .           .        S510
                .           .           .
                .           .           .
  138           .       C415L............
                .           .
                .           .
  141        C415............
                .
                .
  148           .------->   D4150
  144        D415
                V
                V
  153      415420
                .
                .
  162           .        S420
                .           .
                .           .
  169        C420............
                .
                .
  173           .        S430
                .           V
                .           V
  179           .      430440
                .           .
                .           .
  185           .           .        S440
                .           .           .
                .           .           .
  191           .        C440............
                .           V
                .           V
  194           .      440450
                .           .
                .           .
  200           .           .        S450
                .           .           .
                .           .           .
  208           .           .           .        S435
                .           .           .           V
                .           .           .           V
  214           .           .           .      435450
                .           .           .           .
                .           .           .           .
  220           .        C450........................
                .           .
                .           .
  223           .           .        S520
                .           .           .
                .           .           .
  230           .           .           .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   19APR06  TIME  14:55:41  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B3

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B3 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller excavated channel sections in the down fan direction. The excavated earthen channels are complemented with a 120-foot wide adjacent riparian preservation corridor.

```
                    SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
                    JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
                    MODELER: TED LEHMAN
                    FILENAME: A4_EX6.DAT

                    100-YEAR 6-HOUR MODEL
                    EXISTING CONDITIONS
                    AREA 4 WATERSHED AREA = 90.5 SQ. MILES
                           MODELED AREA = 76.8 SQ. MILES

                    GREEN-AMPT LOSS METHOD
                    S-GRAPH UNIT HYDROGRAPHS
                      - MOUNTAIN
                      - DESERT/RANGELAND
                    NORMAL-DEPTH CHANNEL ROUTING
                    LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                      - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                      - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                      - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                    SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

38 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN99  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     8JAN99  ENDING DATE
                    NDTIME       1035  ENDING TIME
                     ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL     .08 HOURS
                    TOTAL TIME BASE  166.58 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

39 JD          INDEX STORM NO. 1
                      STRM       3.20  PRECIPITATION DEPTH
                      TRDA        .10  TRANSPOSITION DRAINAGE AREA

40 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

43 JD          INDEX STORM NO. 2
                      STRM       3.18  PRECIPITATION DEPTH
                      TRDA        .50  TRANSPOSITION DRAINAGE AREA

44 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

47 JD          INDEX STORM NO. 3
                      STRM       3.12  PRECIPITATION DEPTH
                      TRDA       2.80  TRANSPOSITION DRAINAGE AREA

48 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .07       .07       .07       .08       .08       .08       .05       .05
                   .05       .02       .02       .02       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

51 JD          INDEX STORM NO. 4
                      STRM       2.95  PRECIPITATION DEPTH
                      TRDA      16.00  TRANSPOSITION DRAINAGE AREA

52 PI            PRECIPITATION PATTERN
                   .01       .01       .00       .00       .00       .00       .00       .00       .00       .01
```

```
                    .01      .01      .00      .01      .00      .00      .00      .00      .00      .00
                    .00      .00      .01      .00      .00      .00      .00      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

55 JD          INDEX STORM NO. 5
                     STRM        2.59  PRECIPITATION DEPTH
                     TRDA       90.00  TRANSPOSITION DRAINAGE AREA

56 PI            PRECIPITATION PATTERN
                    .01      .01      .01      .00      .00      .00      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .05      .05      .05      .05      .05      .05      .04      .04
                    .04      .02      .02      .02      .02      .02      .02      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S400	1019.	4.50	193.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	638.	4.42	97.	24.	8.	.64		
+	2 COMBINED AT	C410	1372.	4.50	262.	66.	22.	2.18		
+	ROUTED TO	RR410	128.	6.08	118.	65.	22.	2.18		
+	ROUTED TO	410415	128.	6.50	118.	65.	22.	2.18		
+	HYDROGRAPH AT	S415	791.	4.17	61.	15.	5.	.45		
+	2 COMBINED AT	C415R	422.	4.17	141.	74.	25.	2.63		
+	HYDROGRAPH AT	S500	1743.	4.75	454.	115.	38.	3.64		
+	ROUTED TO	RR500	181.	6.92	171.	109.	38.	3.64		
+	ROUTED TO	S00415	181.	7.42	170.	108.	38.	3.64		
+	HYDROGRAPH AT	S510	1844.	4.25	216.	54.	18.	1.84		
+	2 COMBINED AT	C415L	1386.	4.25	303.	146.	51.	5.48		
+	2 COMBINED AT	C415	1581.	4.25	405.	196.	67.	8.11		
+	DIVERSION TO	D415O	350.	4.25	19.	5.	2.	8.11		
+	HYDROGRAPH AT	D415	1231.	4.17	386.	191.	66.	8.11		
+	ROUTED TO	415420	1095.	4.92	369.	190.	66.	8.11		
+	HYDROGRAPH AT	S420	1576.	4.33	200.	50.	17.	1.77		
+	2 COMBINED AT	C420	1501.	4.67	474.	218.	75.	9.88		
+	HYDROGRAPH AT	S430	1207.	4.17	110.	27.	9.	.80		
+	ROUTED TO	430440	1057.	4.50	110.	27.	9.	.80		
+	HYDROGRAPH AT	S440	1237.	4.25	130.	32.	11.	1.07		
+	2 COMBINED AT	C440	1581.	4.42	213.	53.	18.	1.86		

+	ROUTED TO 440450	1402.	4.67	213.	53.	18.	1.86
+	HYDROGRAPH AT S450	1467.	4.58	279.	70.	23.	2.52
+	HYDROGRAPH AT S435	822.	4.08	57.	14.	5.	.39
+	ROUTED TO 435450	443.	4.92	57.	14.	5.	.39
+	3 COMBINED AT C450	2589.	4.67	463.	116.	39.	4.78
+	HYDROGRAPH AT S520	1272.	4.42	183.	46.	15.	1.48
+	HYDROGRAPH AT S530	1563.	4.50	258.	64.	21.	2.23

*** NORMAL END OF HEC-1 ***

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   19APR06  TIME  14:55:41  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                  X     X  XXXXXXX   XXXXX           X
                                  X     X  X        X     X         XX
                                  X     X  X        X               X
                                  XXXXXXX  XXXX     X        XXXXX  X
                                  X     X  X        X               X
                                  X     X  X        X     X         X
                                  X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                          HEC-1 INPUT                                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE B3
        4           ID
        5           ID   Alternative Description
        6           ID   The purpose of Alternative B is to capture the upstream flow at the
        7           ID   apex using online detention basins.  The presence of the detention
        8           ID   basins eliminates the downstream alluvial fan uncertainties by
        9           ID   controlling the flow from the apices to the outfall.  Alternative B3
       10           ID   is based on using a relatively larger on-line detention basin at the
       11           ID   apex accompanied by smaller excavated channel sections in the down fan
       12           ID   direction.  The excavated earthen channels are complemented with a
       13           ID   120-foot wide adjacent riparian preservation corridor.
       14           ID
       15           ID
       16           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       17           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       18           ID   MODELER: TED LEHMAN
       19           ID   FILENAME: A4_EX24.DAT
       20           ID
       21           ID   100-YEAR 24-HOUR MODEL
       22           ID   EXISTING CONDITIONS
       23           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       24           ID            MODELED AREA = 76.8 SQ. MILES
       25           ID
       26           ID   GREEN-AMPT LOSS METHOD
       27           ID   S-GRAPH UNIT HYDROGRAPHS
       28           ID     - MOUNTAIN
       29           ID     - DESERT/RANGELAND
       30           ID   NORMAL-DEPTH CHANNEL ROUTING
       31           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       32           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       33           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       34           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       35           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       36           IT       5  1JAN99    1200    2000
       37           IN      15
       38           IO       5
                    *DIAGRAM
                    *
       39           JD   4.198  0.1000
       40           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
       41           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
       42           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
       43           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
       44           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
       45           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
       46           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
       47           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
       48           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
       49           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
       50           JD   3.990    10.0
                    *
1                                          HEC-1 INPUT                                                    PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
 51          KK    S400   BASIN
 52          KM        Compute runoff from subbasin 400
 53          BA   1.544
 54          LG    0.25    0.35    4.20    0.43       3
 55          UI     106     106     252     429     616     729     819    1050    1206     793
 56          UI     665     601     543     493     440     385     339     276     254     239
 57          UI     212     174     144     133     116     116      82      81      81      52
 58          UI      51      53      51      39      21      20      20      21      20      20
 59          UI      20      21      20      20      20       0       0       0       0       0
             *

 60          KK    S410   BASIN
 61          KM        Compute runoff from subbasin 410
 62          BA   0.639
 63          LG    0.15    0.35    3.85    0.43       3
 64          UI      53      70     177     290     367     429     593     473     342     300
 65          UI     268     232     202     173     136     126     115      89      72      65
 66          UI      58      47      41      38      26      26      26      19      11      10
 67          UI      10      10      11      10      10      10      11       0       0       0
             *

 68          KK    C410 COMBINE
 69          KM        Combine runoff from S400 and S410
 70          HC       2
             *

 71          KK   RR410 STORAGE
 72          KM   PROPOSED DETENTION BASIN
 73          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
 74          KM    STRUCTURE ID:RR410
 75          KM    DIMENSIONS: L=1200ft, W=570ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 110.5 ac-
 76          RS       1    STOR       0
 77          SV     0.0    13.0    39.7    67.3    81.5    95.9   110.5   125.3   140.5   155.8
 78          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
 79          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
             *

 80          KK  410415   ROUTE
 81          KM   PROPOSED CHANNEL
 82          KM    STRUCTURE ID(s): RR41010, C41510
 83          KM    Slope=(1533.5 - 1432.7) / 7128.5
 84          RS      10    FLOW      -1
 85          RC   0.045   0.045   0.045  7128.50.014139   104.0
 86          RX     0.0    24.0    64.0    79.0   114.0   129.0   169.0   193.0
 87          RY   104.0   100.0   100.0    97.5    97.5   100.0   100.0   104.0
             *

 88          KK    S415   BASIN
 89          KM        Compute runoff from subbasin 415
 90          BA   0.451
 91          LG    0.35    0.35    3.64    0.49       0
 92          UI      92     356     623     728     617     389     253     161     101      65
 93          UI      44      18      19      19       0       0       0       0       0       0
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 94          KK   C415R COMBINE
 95          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 96          HC       2
             *

 97          KK    S500   BASIN
 98          KM        Compute runoff from subbasin 500
 99          BA   3.638
100          LG    0.25    0.35    3.92    0.41       9
101          UI     184     186     184     515     713     935    1143    1294    1413    1581
102          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
103          UI     716     629     568     487     456     435     408     387     311     297
104          UI     237     239     212     201     204     146     142     143     141      94
105          UI      91      90      90      92      90      51      35      36      35      36
             *

106          KK   RR500 STORAGE
107          KM   PROPOSED DETENTION BASIN
108          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
109          KM    STRUCTURE ID:RR500
110          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
111          RS       1    STOR       0
112          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
113          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
114          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
             *

115          KK  500415   ROUTE
116          KM   PROPOSED CHANNEL
117          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
118          KM    STRUCTURE ID(s): C51010, C51020, C51060
119          KM    Slope=(1666.0 - 1454.2) / 12379.2
120          RS       8    FLOW      -1
121          RC   0.045   0.045   0.045 12379.2 0.01711   103.0
122          RX     0.0     9.0    39.0    48.0    73.0    82.0   112.0   121.0
```

```
 123          RY   103.0   100.0   100.0    97.0    97.0   100.0   100.0   103.0
              *

 124          KK    S510   BASIN
 125          KM        Compute runoff from subbasin 510
 126          BA   1.840
 127          LG    0.35    0.35    3.95    0.40       0
 128          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
 129          UI     433     307     220     160     106      57      58      56      57       0
              *

 130          KK   C415L COMBINE
 131          KM    COMBINE S500 AND S510 AT C415
 132          HC       2
              *
1                                        HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 133          KK    C415 COMBINE
 134          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
 135          HC       2
              *

 136          KK    D415  DIVERT
 137          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
 138          KM    STRUCTURE ID:D415
 139          KM    DIMENSIONS: L=600ft, W=580ft, D=7ft, Sideslope (?H:1V)= 3,  Vol.= 42.1 ac-ft
 140          DT   D415O
 141          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
 142          DI  4000.0     0.0
 143          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
 144          DQ  2769.0     0.0
              *

 145          KK  415420   ROUTE
 146          KM   PROPOSED CHANNEL
 147          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 148          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 149          KM    Slope=(1432.5 - 1191.3) / 17970.9
 150          RS      10    FLOW      -1
 151          RC   0.045   0.045   0.045 17970.90.013422   103.0
 152          RX     0.0    12.0    47.0    59.0    94.0   106.0   141.0   153.0
 153          RY   103.0   100.0   100.0    97.0    97.0   100.0   100.0   103.0
              *

 154          KK    S420   BASIN
 155          KM        Compute runoff from subbasin 420
 156          BA   1.767
 157          LG    0.35    0.35    4.30    0.41       0
 158          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 159          UI     582     417     328     242     183     132     115      47      47      48
 160          UI      47      47       0       0       0       0       0       0       0       0
              *

 161          KK    C420 COMBINE
 162          KM        Combine flows from S400, S410, S415, S420
 163          KM         AND S500 AND S510 at Hassayampa River
 164          HC       2
              *

 165          KK    S430   BASIN
 166          KM        Compute runoff from subbasin 430
 167          BA   0.795
 168          LG    0.35    0.35    4.55    0.35       0
 169          UI     127     515     918    1163    1116     779     521     349     228     153
 170          UI     100      72      30      30      30       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 171          KK  430440   ROUTE
 172          KM        Route flows from Sun Valley Parkway through S440.
 173          RS       7    FLOW      -1
 174          RC   0.035   0.035   0.035   13256  0.0128  106.00
 175          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 176          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

 177          KK    S440   BASIN
 178          KM        Compute runoff from subbasin 440
 179          BA   1.068
 180          LG    0.35    0.35    4.20    0.43       0
 181          UI     137     414     838    1167    1323    1221     910     657     468     330
 182          UI     240     168     118      95      46      33      35      33      34       0
              *

 183          KK    C440 COMBINE
 184          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
 185          HC       2
              *
```

```
186          KK  440450   ROUTE
187          KM        Route combined flows to the Hassayampa River.
188          RS       3    FLOW      -1
189          RC   0.035   0.040   0.035    4154  0.0104
190          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
191          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

192          KK    S450   BASIN
193          KM        Compute runoff from subbasin 450
194          BA   2.521
195          LG    0.23    0.35    4.25    0.42       0
196          UI     167     169     381     664     938    1152    1392    1514    1599    1599
197          UI    1528    1333    1142     951     803     683     567     481     395     336
198          UI     287     255     184     177     130     116     115      88      41      41
199          UI      41      41      41      41      41      40      41       0       0       0
             *

200          KK    S435   BASIN
201          KM        Compute runoff from subbasin 435
202          BA   0.393
203          LG    0.35    0.35    4.45    0.37       0
204          UI     130     505     775     686     414     231     134      75      42      20
205          UI      20       0       0       0       0       0       0       0       0       0
             *

206          KK  435450   ROUTE
207          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
208          RS      10    FLOW      -1
209          RC   0.045   0.035   0.045   18781  0.0119    0.00
210          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
211          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *
```

1 HEC-1 INPUT PAGE 6

```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

212          KK    C450 COMBINE
213          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
214          HC       3
             *

215          KK    S520   BASIN
216          KM        Compute runoff from subbasin 520
217          BA   1.481
218          LG    0.35    0.35    4.50    0.36       0
219          UI     133     206     510     780    1043    1196    1285    1241    1061     847
220          UI     672     531     420     330     262     210     159     135      91      93
221          UI      54      33      33      32      33      32      33       0       0       0
             *

222          KK    S530   BASIN
223          KM        Compute runoff from subbasin 530
224          BA   2.226
225          LG    0.20    0.35    4.30    0.41       0
226          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
227          UI    1198     964     787     657     513     417     348     283     227     189
228          UI     141     120     122      56      43      43      43      43      43      43
229          UI      43       0       0       0       0       0       0       0       0       0
230          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   51        S400
                .
                .
   60           .        S410
                .           .
                .           .
   68       C410............
               V
               V
   71      RR410
               V
               V
   80     410415
                .
                .
   88           .        S415
                .           .
                .           .
   94      C415R...........
                .
                .
   97           .        S500
                .           V
                .           V
  106           .       RR500
                .           V
                .           V
```

```
115          .      500415
             .          .
             .          .
124          .          .        S510
             .          .          .
             .          .          .
130          .      C415L...........
             .          .
             .          .
133       C415...........
             .
             .
140          .-------->   D415O
136       D415
             V
             V
145     415420
             .
             .
154          .       S420
             .          .
             .          .
161       C420...........
             .
             .
165          .       S430
             .          V
             .          V
171          .     430440
             .          .
             .          .
177          .          .        S440
             .          .          .
             .          .          .
183          .       C440...........
             .          V
             .          V
186          .     440450
             .          .
             .          .
192          .          .        S450
             .          .          .
             .          .          .
200          .          .          .        S435
             .          .          .          V
             .          .          .          V
206          .          .          .     435450
             .          .          .          .
             .          .          .          .
212          .       C450........................
             .          .
             .          .
215          .          .        S520
             .          .          .
             .          .          .
222          .          .          .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   19APR06  TIME  14:55:41  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B3

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B3 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller excavated channel sections in the down fan direction. The excavated earthen channels are complemented with a 120-foot wide adjacent riparian preservation corridor.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX24.DAT

100-YEAR 24-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES

```
                    MODELED AREA = 76.8 SQ. MILES

              GREEN-AMPT LOSS METHOD
              S-GRAPH UNIT HYDROGRAPHS
                - MOUNTAIN
                - DESERT/RANGELAND
              NORMAL-DEPTH CHANNEL ROUTING
              LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
              SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

38 IO      OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT      HYDROGRAPH TIME DATA
                NMIN           5  MINUTES IN COMPUTATION INTERVAL
               IDATE      1JAN99  STARTING DATE
               ITIME        1200  STARTING TIME
                  NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE      8JAN99  ENDING DATE
              NDTIME        1035  ENDING TIME
               ICENT          19  CENTURY MARK

          COMPUTATION INTERVAL      .08 HOURS
               TOTAL TIME BASE  166.58 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

39 JD       INDEX STORM NO. 1
                STRM        4.20  PRECIPITATION DEPTH
                TRDA         .10  TRANSPOSITION DRAINAGE AREA

40 PI         PRECIPITATION PATTERN
              .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
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              .01    .01    .01    .01    .01    .01    .01    .01    .03    .03
              .03    .09    .09    .09    .01    .01    .01    .01    .01    .01
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              .00    .00    .00    .00    .00    .00    .00    .00

50 JD       INDEX STORM NO. 2
                STRM        3.99  PRECIPITATION DEPTH
                TRDA       10.00  TRANSPOSITION DRAINAGE AREA

 0 PI         PRECIPITATION PATTERN
              .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S400	1047.	12.50	184.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	526.	12.42	80.	21.	7.	.64		
+	2 COMBINED AT	C410	1524.	12.50	262.	67.	23.	2.18		
+	ROUTED TO	RR410	128.	14.08	119.	66.	23.	2.18		
+	ROUTED TO	410415	128.	14.50	118.	66.	23.	2.18		
+	HYDROGRAPH AT	S415	624.	12.17	50.	13.	4.	.45		
+	2 COMBINED AT	C415R	609.	12.17	148.	78.	26.	2.63		
+	HYDROGRAPH AT	S500	2063.	12.75	476.	129.	43.	3.64		
+	ROUTED TO	RR500	186.	15.00	177.	119.	43.	3.64		
+	ROUTED TO	500415	186.	15.50	177.	119.	43.	3.64		
+	HYDROGRAPH AT	S510	2099.	12.25	213.	53.	18.	1.84		
+	2 COMBINED AT	C415L	2073.	12.25	347.	170.	60.	5.48		
+	2 COMBINED AT	C415	2578.	12.25	489.	245.	86.	8.11		
+	DIVERSION TO	D415O	1347.	12.25	74.	18.	6.	8.11		
+	HYDROGRAPH AT	D415	1231.	12.00	415.	226.	80.	8.11		
+	ROUTED TO	415420	1135.	12.92	401.	225.	80.	8.11		
+	HYDROGRAPH AT	S420	1740.	12.33	198.	50.	17.	1.77		
+	2 COMBINED AT	C420	1734.	12.58	564.	271.	95.	9.88		
+	HYDROGRAPH AT	S430	1090.	12.17	95.	24.	8.	.80		
+	ROUTED TO	430440	932.	12.50	95.	24.	8.	.80		
+	HYDROGRAPH AT	S440	1205.	12.25	119.	30.	10.	1.07		
+	2 COMBINED AT	C440	1700.	12.42	211.	53.	18.	1.86		
+	ROUTED TO	440450	1502.	12.58	211.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1624.	12.58	287.	72.	24.	2.52		
	HYDROGRAPH AT									

+		S435	656.	12.08	47.	12.	4.	.39
+	ROUTED TO	435450	378.	12.83	47.	12.	4.	.39
+	3 COMBINED AT	C450	3338.	12.67	536.	134.	45.	4.78
+	HYDROGRAPH AT	S520	1288.	12.42	174.	43.	14.	1.48
+	HYDROGRAPH AT	S530	1697.	12.50	257.	64.	21.	2.23

*** NORMAL END OF HEC-1 ***

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   19APR06  TIME  15:00:35  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*          (916) 756-1104              *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
  2           ID      - HASSAYAMPA SUB-AREA
  3           ID      - ALTERNATIVE B41
  4           ID
  5           ID   Alternative Description
  6           ID   The purpose of Alternative B is to capture the upstream flow at the
  7           ID   apex using online detention basins.  The presence of the detention basins
  8           ID   eliminates the downstream alluvial fan uncertainties by controlling the
  9           ID   flow from the apices to the outfall.  Alternative B4-1 is based on using a
 10           ID   relatively larger on-line detention basin at the apex accompanied by smaller
 11           ID   leveed channel sections in the down fan direction.  It is the first of three
 12           ID   corridor alignments considered as part of the Alternative B4 series.
 13           ID
 14           ID
 15           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
 16           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
 17           ID   MODELER: TED LEHMAN
 18           ID   FILENAME: A4_EX6.DAT
 19           ID
 20           ID   100-YEAR 6-HOUR MODEL
 21           ID   EXISTING CONDITIONS
 22           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
 23           ID            MODELED AREA = 76.8 SQ. MILES
 24           ID
 25           ID   GREEN-AMPT LOSS METHOD
 26           ID   S-GRAPH UNIT HYDROGRAPHS
 27           ID     - MOUNTAIN
 28           ID     - DESERT/RANGELAND
 29           ID   NORMAL-DEPTH CHANNEL ROUTING
 30           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
 31           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
 32           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
 33           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
 34           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
 35           IT       5  1JAN99    1200    2000
 36           IN      15
 37           IO       5
              *DIAGRAM
              *
 38           JD   3.196  0.1000
 39           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 40           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 41           PC   0.962   0.972   0.983   0.991   1.000
 42           JD   3.181  0.5000
 43           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 44           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 45           PC   0.962   0.972   0.983   0.991   1.000
 46           JD   3.120     2.8
 47           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
 48           PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
 49           PC   0.950   0.963   0.975   0.988   1.000
 50           JD   2.950    16.0
 51           PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
 52           PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
 53           PC   0.946   0.960   0.973   0.987   1.000
```

1 HEC-1 INPUT PAGE 2

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  54          JD   2.592    90.0
  55          PC   0.000    0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
  56          PC   0.179    0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
  57          PC   0.927    0.945   0.964   0.982   1.000
              *

  58          KK    S400   BASIN
  59          KM        Compute runoff from subbasin 400
  60          BA   1.544
  61          LG    0.25    0.35    4.20    0.43       3
  62          UI     106     106     252     429     616     729     819    1050    1206     793
  63          UI     665     601     543     493     440     385     339     276     254     239
  64          UI     212     174     144     133     116     116      82      81      81      52
  65          UI      51      53      51      39      21      20      20      21      20      20
  66          UI      20      21      20      20      20       0       0       0       0       0
              *

  67          KK    S410   BASIN
  68          KM        Compute runoff from subbasin 410
  69          BA   0.639
  70          LG    0.15    0.35    3.85    0.43       3
  71          UI      53      70     177     290     367     429     593     473     342     300
  72          UI     268     232     202     173     136     126     115      89      72      65
  73          UI      58      47      41      38      26      26      26      19      11      10
  74          UI      10      10      11      10      10      10      11       0       0       0
              *

  75          KK    C410 COMBINE
  76          KM        Combine runoff from S400 and S410
  77          HC       2
              *

  78          KK   RR410 STORAGE
  79          KM   PROPOSED DETENTION BASIN
  80          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
  81          KM    STRUCTURE ID:RR410
  82          KM    DIMENSIONS: L=1200ft, W=570ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 110.5 ac-
  83          RS       1    STOR       0
  84          SV     0.0    13.0    39.7    67.3    81.5    95.9   110.5   125.3   140.5   155.8
  85          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
  86          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
              *

  87          KK  410415   ROUTE
  88          KM   PROPOSED CHANNEL
  89          KM    STRUCTURE ID(s): RR41010, C41510
  90          KM    Slope=(1533.5 - 1432.7) / 7128.5
  91          RS      10    FLOW      -1
  92          RC   0.045   0.045   0.045  7128.50.014139   104.5
  93          RX     0.0    13.5    13.5    13.5   413.5   413.5   413.5   427.0
  94          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
              *
1                                          HEC-1 INPUT                                          PAGE  3

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  95          KK    S415   BASIN
  96          KM        Compute runoff from subbasin 415
  97          BA   0.451
  98          LG    0.35    0.35    3.64    0.49       0
  99          UI      92     356     623     728     617     389     253     161     101      65
 100          UI      44      18      19      19       0       0       0       0       0       0
              *

 101          KK   C415R COMBINE
 102          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 103          HC       2
              *

 104          KK    S500   BASIN
 105          KM        Compute runoff from subbasin 500
 106          BA   3.638
 107          LG    0.25    0.35    3.92    0.41       9
 108          UI     184     186     184     515     713     935    1143    1294    1413    1581
 109          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
 110          UI     716     629     568     487     456     435     408     387     311     297
 111          UI     237     239     212     201     204     146     142     143     141      94
 112          UI      91      90      90      92      90      51      35      36      35      36
              *

 113          KK   RR500 STORAGE
 114          KM   PROPOSED DETENTION BASIN
 115          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
 116          KM    STRUCTURE ID:RR500
 117          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
 118          RS       1    STOR       0
 119          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
 120          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
 121          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
              *

 122          KK  500415   ROUTE
```

```
 123          KM   PROPOSED CHANNEL
 124          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
 125          KM    STRUCTURE ID(s): C51010, C51020, C51060
 126          KM    Slope=(1666.0 - 1454.2) / 12379.2
 127          RS       8    FLOW      -1
 128          RC   0.045   0.045   0.045 12379.2 0.01711   104.0
 129          RX     0.0    12.0    42.0    49.5    74.5    82.0   112.0   124.0
 130          RY   104.0   100.0   100.0    97.5    97.5   100.0   100.0   104.0
              *

 131          KK    S510   BASIN
 132          KM        Compute runoff from subbasin 510
 133          BA   1.840
 134          LG    0.35    0.35    3.95    0.40       0
 135          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
 136          UI     433     307     220     160     106      57      58      56      57       0
              *
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 137          KK   C415L COMBINE
 138          KM    COMBINE S500 AND S510 AT C415
 139          HC       2
              *

 140          KK    C415 COMBINE
 141          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
 142          HC       2
              *

 143          KK    D415  DIVERT
 144          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
 145          KM    STRUCTURE ID:D415
 146          KM    DIMENSIONS: L=600ft, W=580ft, D=7ft, Sideslope (?H:1V)= 3,  Vol.= 42.1 ac-ft
 147          DT   D415O
 148          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
 149          DI  4000.0     0.0
 150          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
 151          DQ  2769.0     0.0
              *

 152          KK  415420   ROUTE
 153          KM   PROPOSED CHANNEL
 154          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 155          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 156          KM    Slope=(1432.5 - 1191.3) / 17970.9
 157          RS      10    FLOW      -1
 158          RC   0.045   0.045   0.045 17970.90.013422   104.5
 159          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
 160          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
              *

 161          KK    S420   BASIN
 162          KM        Compute runoff from subbasin 420
 163          BA   1.767
 164          LG    0.35    0.35    4.30    0.41       0
 165          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 166          UI     582     417     328     242     183     132     115      47      47      48
 167          UI      47      47       0       0       0       0       0       0       0       0
              *

 168          KK    C420 COMBINE
 169          KM        Combine flows from S400, S410, S415, S420
 170          KM         AND S500 AND S510 at Hassayampa River
 171          HC       2
              *

 172          KK    S430   BASIN
 173          KM        Compute runoff from subbasin 430
 174          BA   0.795
 175          LG    0.35    0.35    4.55    0.35       0
 176          UI     127     515     918    1163    1116     779     521     349     228     153
 177          UI     100      72      30      30      30       0       0       0       0       0
              *
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 178          KK  430440   ROUTE
 179          KM        Route flows from Sun Valley Parkway through S440.
 180          RS       7    FLOW      -1
 181          RC   0.035   0.035   0.035   13256  0.0128  106.00
 182          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 183          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

 184          KK    S440   BASIN
 185          KM        Compute runoff from subbasin 440
 186          BA   1.068
 187          LG    0.35    0.35    4.20    0.43       0
 188          UI     137     414     838    1167    1323    1221     910     657     468     330
 189          UI     240     168     118      95      46      33      35      33      34       0
```

```
                 *
190              KK    C440 COMBINE
191              KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
192              HC       2
                 *

193              KK  440450   ROUTE
194              KM        Route combined flows to the Hassayampa River.
195              RS       3    FLOW      -1
196              RC   0.035   0.040   0.035    4154  0.0104
197              RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
198              RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
                 *

199              KK    S450   BASIN
200              KM        Compute runoff from subbasin 450
201              BA   2.521
202              LG    0.23    0.35    4.25    0.42       0
203              UI     167     169     381     664     938    1152    1392    1514    1599    1599
204              UI    1528    1333    1142     951     803     683     567     481     395     336
205              UI     287     255     184     177     130     116     115      88      41      41
206              UI      41      41      41      41      41      40      41       0       0       0
                 *

207              KK    S435   BASIN
208              KM        Compute runoff from subbasin 435
209              BA   0.393
210              LG    0.35    0.35    4.45    0.37       0
211              UI     130     505     775     686     414     231     134      75      42      20
212              UI      20       0       0       0       0       0       0       0       0       0
                 *

213              KK  435450   ROUTE
214              KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
215              RS      10    FLOW      -1
216              RC   0.045   0.035   0.045   18781  0.0119    0.00
217              RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
218              RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
                 *
1                                          HEC-1 INPUT                                          PAGE  6

LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

219              KK    C450 COMBINE
220              KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
221              HC       3
                 *

222              KK    S520   BASIN
223              KM        Compute runoff from subbasin 520
224              BA   1.481
225              LG    0.35    0.35    4.50    0.36       0
226              UI     133     206     510     780    1043    1196    1285    1241    1061     847
227              UI     672     531     420     330     262     210     159     135      91      93
228              UI      54      33      33      32      33      32      33       0       0       0
                 *

229              KK    S530   BASIN
230              KM        Compute runoff from subbasin 530
231              BA   2.226
232              LG    0.20    0.35    4.30    0.41       0
233              UI     176     194     574     895    1189    1473    1624    1704    1622    1456
234              UI    1198     964     787     657     513     417     348     283     227     189
235              UI     141     120     122      56      43      43      43      43      43      43
236              UI      43       0       0       0       0       0       0       0       0       0
237              ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   58        S400
                .
                .
   67           .        S410
                .           .
                .           .
   75        C410............
                V
                V
   78       RR410
                V
                V
   87      410415
                .
                .
   95           .        S415
                .           .
                .           .
  101       C415R............
                .
```

```
                .
  104           .        S500
                .           V
                .           V
  113           .       RR500
                .           V
                .           V
  122           .      500415
                .           .
                .           .
  131           .           .        S510
                .           .           .
                .           .           .
  137           .       C415L............
                .           .
                .           .
  140        C415............
                .
                .
  147           .------->   D415O
  143        D415
                V
                V
  152      415420
                .
                .
  161           .        S420
                .           .
                .           .
  168        C420............
                .
                .
  172           .        S430
                .           V
                .           V
  178           .      430440
                .           .
                .           .
  184           .           .        S440
                .           .           .
                .           .           .
  190           .        C440............
                .           V
                .           V
  193           .      440450
                .           .
                .           .
  199           .           .        S450
                .           .           .
                .           .           .
  207           .           .           .        S435
                .           .           .           V
                .           .           .           V
  213           .           .           .      435450
                .           .           .           .
                .           .           .           .
  219           .        C450........................
                .           .
                .           .
  222           .           .        S520
                .           .           .
                .           .           .
  229           .           .           .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   19APR06  TIME  15:00:35  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B41

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B4-1 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller leveed channel sections in the down fan direction. It is the first of three corridor alignments considered as part of the Alternative B4 series.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.

```
                    MODELER: TED LEHMAN
                    FILENAME: A4_EX6.DAT

                    100-YEAR 6-HOUR MODEL
                    EXISTING CONDITIONS
                    AREA 4 WATERSHED AREA = 90.5 SQ. MILES
                             MODELED AREA = 76.8 SQ. MILES

                    GREEN-AMPT LOSS METHOD
                    S-GRAPH UNIT HYDROGRAPHS
                      - MOUNTAIN
                      - DESERT/RANGELAND
                    NORMAL-DEPTH CHANNEL ROUTING
                    LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                      - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                      - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                      - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                    SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

37 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN99  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     8JAN99  ENDING DATE
                    NDTIME       1035  ENDING TIME
                     ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL     .08 HOURS
                    TOTAL TIME BASE  166.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

38 JD          INDEX STORM NO. 1
                     STRM       3.20  PRECIPITATION DEPTH
                     TRDA        .10  TRANSPOSITION DRAINAGE AREA

39 PI            PRECIPITATION PATTERN
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .01    .01    .01    .01    .01    .01    .03
                  .03    .03    .05    .05    .05    .15    .15    .15    .03    .03
                  .03    .01    .01    .01    .01    .01    .01    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00

42 JD          INDEX STORM NO. 2
                     STRM       3.18  PRECIPITATION DEPTH
                     TRDA        .50  TRANSPOSITION DRAINAGE AREA

43 PI            PRECIPITATION PATTERN
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .01    .01    .01    .01    .01    .01    .03
                  .03    .03    .05    .05    .05    .15    .15    .15    .03    .03
                  .03    .01    .01    .01    .01    .01    .01    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00

46 JD          INDEX STORM NO. 3
                     STRM       3.12  PRECIPITATION DEPTH
                     TRDA       2.80  TRANSPOSITION DRAINAGE AREA

47 PI            PRECIPITATION PATTERN
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00    .00    .01    .01    .01    .01    .01    .01    .03
                  .03    .03    .07    .07    .07    .08    .08    .08    .05    .05
                  .05    .02    .02    .02    .01    .01    .01    .00    .00    .00
                  .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                  .00    .00

50 JD          INDEX STORM NO. 4
                     STRM       2.95  PRECIPITATION DEPTH
                     TRDA      16.00  TRANSPOSITION DRAINAGE AREA

51 PI            PRECIPITATION PATTERN
                  .01    .01    .00    .00    .00    .00    .00    .00    .00    .01
                  .01    .01    .00    .01    .00    .00    .00    .00    .00    .00
                  .00    .00    .01    .00    .00    .00    .00    .01    .01    .01
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                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

54 JD          INDEX STORM NO. 5
                     STRM        2.59  PRECIPITATION DEPTH
                     TRDA       90.00  TRANSPOSITION DRAINAGE AREA

55 PI            PRECIPITATION PATTERN
                    .01      .01      .01      .00      .00      .00      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .05      .05      .05      .05      .05      .05      .04      .04
                    .04      .02      .02      .02      .02      .02      .02      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S400	1019.	4.50	193.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	638.	4.42	97.	24.	8.	.64		
+	2 COMBINED AT	C410	1372.	4.50	262.	66.	22.	2.18		
+	ROUTED TO	RR410	128.	6.08	118.	65.	22.	2.18		
+	ROUTED TO	410415	127.	7.58	117.	65.	22.	2.18		
+	HYDROGRAPH AT	S415	791.	4.17	61.	15.	5.	.45		
+	2 COMBINED AT	C415R	422.	4.17	127.	74.	25.	2.63		
+	HYDROGRAPH AT	S500	1743.	4.75	454.	115.	38.	3.64		
+	ROUTED TO	RR500	181.	6.92	171.	109.	38.	3.64		
+	ROUTED TO	500415	181.	7.50	170.	108.	38.	3.64		
+	HYDROGRAPH AT	S510	1844.	4.25	216.	54.	18.	1.84		
+	2 COMBINED AT	C415L	1386.	4.25	303.	146.	51.	5.48		
+	2 COMBINED AT	C415	1581.	4.25	393.	196.	67.	8.11		
+	DIVERSION TO	D415O	350.	4.25	19.	5.	2.	8.11		
+	HYDROGRAPH AT	D415	1231.	4.17	374.	191.	66.	8.11		
+	ROUTED TO	415420	803.	5.33	330.	189.	66.	8.11		
+	HYDROGRAPH AT	S420	1576.	4.33	200.	50.	17.	1.77		
+	2 COMBINED AT	C420	1021.	4.33	410.	216.	75.	9.88		
+	HYDROGRAPH AT	S430	1207.	4.17	110.	27.	9.	.80		
+	ROUTED TO	430440	1057.	4.50	110.	27.	9.	.80		
+	HYDROGRAPH AT	S440	1237.	4.25	130.	32.	11.	1.07		
+	2 COMBINED AT	C440	1581.	4.42	213.	53.	18.	1.86		
	ROUTED TO									

```
+                          440450     1402.    4.67        213.        53.        18.      1.86
          HYDROGRAPH AT
+                            S450     1467.    4.58        279.        70.        23.      2.52
          HYDROGRAPH AT
+                            S435      822.    4.08         57.        14.         5.       .39
          ROUTED TO
+                          435450      443.    4.92         57.        14.         5.       .39
          3 COMBINED AT
+                            C450     2589.    4.67        463.       116.        39.      4.78
          HYDROGRAPH AT
+                            S520     1272.    4.42        183.        46.        15.      1.48
          HYDROGRAPH AT
+                            S530     1563.    4.50        258.        64.        21.      2.23

*** NORMAL END OF HEC-1 ***
```

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1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
*            VERSION 4.1               *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   19APR06  TIME  15:00:35  *                    *          (916) 756-1104              *
*                                      *                    *                                      *
****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X                X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X                X
                                        X     X  X        X     X          X
                                        X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                                HEC-1 INPUT                                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE B41
        4           ID
        5           ID   Alternative Description
        6           ID   The purpose of Alternative B is to capture the upstream flow at the
        7           ID   apex using online detention basins.  The presence of the detention basins
        8           ID   eliminates the downstream alluvial fan uncertainties by controlling the
        9           ID   flow from the apices to the outfall.  Alternative B4-1 is based on using a
       10           ID   relatively larger on-line detention basin at the apex accompanied by smaller
       11           ID   leveed channel sections in the down fan direction.  It is the first of three
       12           ID   corridor alignments considered as part of the Alternative B4 series.
       13           ID
       14           ID
       15           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       16           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       17           ID   MODELER: TED LEHMAN
       18           ID   FILENAME: A4_EX24.DAT
       19           ID
       20           ID   100-YEAR 24-HOUR MODEL
       21           ID   EXISTING CONDITIONS
       22           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       23           ID            MODELED AREA = 76.8 SQ. MILES
       24           ID
       25           ID   GREEN-AMPT LOSS METHOD
       26           ID   S-GRAPH UNIT HYDROGRAPHS
       27           ID     - MOUNTAIN
       28           ID     - DESERT/RANGELAND
       29           ID   NORMAL-DEPTH CHANNEL ROUTING
       30           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       31           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       32           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       33           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       34           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       35           IT       5  1JAN99    1200    2000
       36           IN      15
       37           IO       5
                    *DIAGRAM
                    *
       38           JD   4.198  0.1000
       39           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
       40           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
       41           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
       42           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
       43           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
       44           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
       45           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
       46           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
       47           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
       48           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
       49           JD   3.990    10.0
                    *
1                                                HEC-1 INPUT                                                    PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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 50          KK    S400   BASIN
 51          KM        Compute runoff from subbasin 400
 52          BA   1.544
 53          LG    0.25    0.35    4.20    0.43       3
 54          UI     106     106     252     429     616     729     819    1050    1206     793
 55          UI     665     601     543     493     440     385     339     276     254     239
 56          UI     212     174     144     133     116     116      82      81      81      52
 57          UI      51      53      51      39      21      20      20      21      20      20
 58          UI      20      21      20      20      20       0       0       0       0       0
             *

 59          KK    S410   BASIN
 60          KM        Compute runoff from subbasin 410
 61          BA   0.639
 62          LG    0.15    0.35    3.85    0.43       3
 63          UI      53      70     177     290     367     429     593     473     342     300
 64          UI     268     232     202     173     136     126     115      89      72      65
 65          UI      58      47      41      38      26      26      26      19      11      10
 66          UI      10      10      11      10      10      10      11       0       0       0
             *

 67          KK    C410 COMBINE
 68          KM        Combine runoff from S400 and S410
 69          HC       2
             *

 70          KK   RR410 STORAGE
 71          KM   PROPOSED DETENTION BASIN
 72          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
 73          KM    STRUCTURE ID:RR410
 74          KM    DIMENSIONS: L=1200ft, W=570ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 110.5 ac-
 75          RS       1    STOR       0
 76          SV     0.0    13.0    39.7    67.3    81.5    95.9   110.5   125.3   140.5   155.8
 77          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
 78          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
             *

 79          KK  410415   ROUTE
 80          KM   PROPOSED CHANNEL
 81          KM    STRUCTURE ID(s): RR41010, C41510
 82          KM    Slope=(1533.5 - 1432.7) / 7128.5
 83          RS      10    FLOW      -1
 84          RC   0.045   0.045   0.045  7128.50.014139   104.5
 85          RX     0.0    13.5    13.5    13.5   413.5   413.5   413.5   427.0
 86          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

 87          KK    S415   BASIN
 88          KM        Compute runoff from subbasin 415
 89          BA   0.451
 90          LG    0.35    0.35    3.64    0.49       0
 91          UI      92     356     623     728     617     389     253     161     101      65
 92          UI      44      18      19      19       0       0       0       0       0       0
             *
1                                          HEC-1 INPUT                                          PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 93          KK   C415R COMBINE
 94          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 95          HC       2
             *

 96          KK    S500   BASIN
 97          KM        Compute runoff from subbasin 500
 98          BA   3.638
 99          LG    0.25    0.35    3.92    0.41       9
100          UI     184     186     184     515     713     935    1143    1294    1413    1581
101          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
102          UI     716     629     568     487     456     435     408     387     311     297
103          UI     237     239     212     201     204     146     142     143     141      94
104          UI      91      90      90      92      90      51      35      36      35      36
             *

105          KK   RR500 STORAGE
106          KM   PROPOSED DETENTION BASIN
107          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
108          KM    STRUCTURE ID:RR500
109          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
110          RS       1    STOR       0
111          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
112          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
113          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
             *

114          KK  500415   ROUTE
115          KM   PROPOSED CHANNEL
116          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
117          KM    STRUCTURE ID(s): C51010, C51020, C51060
118          KM    Slope=(1666.0 - 1454.2) / 12379.2
119          RS       8    FLOW      -1
120          RC   0.045   0.045   0.045 12379.2 0.01711   104.0
121          RX     0.0    12.0    42.0    49.5    74.5    82.0   112.0   124.0
122          RY   104.0   100.0   100.0    97.5    97.5   100.0   100.0   104.0
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                 *
 123             KK    S510   BASIN
 124             KM        Compute runoff from subbasin 510
 125             BA   1.840
 126             LG    0.35    0.35    3.95    0.40       0
 127             UI     232     677    1390    1950    2228    2094    1604    1165     828     599
 128             UI     433     307     220     160     106      57      58      56      57       0
                 *

 129             KK   C415L COMBINE
 130             KM    COMBINE S500 AND S510 AT C415
 131             HC       2
                 *
1                                          HEC-1 INPUT                                          PAGE  4

LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 132             KK    C415 COMBINE
 133             KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
 134             HC       2
                 *

 135             KK    D415  DIVERT
 136             KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
 137             KM    STRUCTURE ID:D415
 138             KM    DIMENSIONS: L=600ft, W=580ft, D=7ft, Sideslope (?H:1V)= 3,  Vol.= 42.1 ac-ft
 139             DT   D4150
 140             DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
 141             DI  4000.0     0.0
 142             DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
 143             DQ  2769.0     0.0
                 *

 144             KK  415420   ROUTE
 145             KM   PROPOSED CHANNEL
 146             KM        Route flow from Sun Valley Parkway to Hassayampa River.
 147             KM    STRUCTURE ID(s): RR41510, C42010, C42020
 148             KM    Slope=(1432.5 - 1191.3) / 17970.9
 149             RS      10    FLOW      -1
 150             RC   0.045   0.045   0.045 17970.90.013422   104.5
 151             RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
 152             RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
                 *

 153             KK    S420   BASIN
 154             KM        Compute runoff from subbasin 420
 155             BA   1.767
 156             LG    0.35    0.35    4.30    0.41       0
 157             UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 158             UI     582     417     328     242     183     132     115      47      47      48
 159             UI      47      47       0       0       0       0       0       0       0       0
                 *

 160             KK    C420 COMBINE
 161             KM        Combine flows from S400, S410, S415, S420
 162             KM         AND S500 AND S510 at Hassayampa River
 163             HC       2
                 *

 164             KK    S430   BASIN
 165             KM        Compute runoff from subbasin 430
 166             BA   0.795
 167             LG    0.35    0.35    4.55    0.35       0
 168             UI     127     515     918    1163    1116     779     521     349     228     153
 169             UI     100      72      30      30      30       0       0       0       0       0
                 *
1                                          HEC-1 INPUT                                          PAGE  5

LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 170             KK  430440   ROUTE
 171             KM        Route flows from Sun Valley Parkway through S440.
 172             RS       7    FLOW      -1
 173             RC   0.035   0.035   0.035   13256  0.0128  106.00
 174             RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 175             RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
                 *

 176             KK    S440   BASIN
 177             KM        Compute runoff from subbasin 440
 178             BA   1.068
 179             LG    0.35    0.35    4.20    0.43       0
 180             UI     137     414     838    1167    1323    1221     910     657     468     330
 181             UI     240     168     118      95      46      33      35      33      34       0
                 *

 182             KK    C440 COMBINE
 183             KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
 184             HC       2
                 *

 185             KK  440450   ROUTE
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186          KM        Route combined flows to the Hassayampa River.
187          RS       3    FLOW      -1
188          RC   0.035   0.040   0.035    4154  0.0104
189          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
190          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

191          KK    S450   BASIN
192          KM        Compute runoff from subbasin 450
193          BA   2.521
194          LG    0.23    0.35    4.25    0.42       0
195          UI     167     169     381     664     938    1152    1392    1514    1599    1599
196          UI    1528    1333    1142     951     803     683     567     481     395     336
197          UI     287     255     184     177     130     116     115      88      41      41
198          UI      41      41      41      41      41      40      41       0       0       0
             *

199          KK    S435   BASIN
200          KM        Compute runoff from subbasin 435
201          BA   0.393
202          LG    0.35    0.35    4.45    0.37       0
203          UI     130     505     775     686     414     231     134      75      42      20
204          UI      20       0       0       0       0       0       0       0       0       0
             *

205          KK  435450   ROUTE
206          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
207          RS      10    FLOW      -1
208          RC   0.045   0.035   0.045   18781  0.0119    0.00
209          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
210          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *
1                                          HEC-1 INPUT                                          PAGE  6

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

211          KK    C450 COMBINE
212          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
213          HC       3
             *

214          KK    S520   BASIN
215          KM        Compute runoff from subbasin 520
216          BA   1.481
217          LG    0.35    0.35    4.50    0.36       0
218          UI     133     206     510     780    1043    1196    1285    1241    1061     847
219          UI     672     531     420     330     262     210     159     135      91      93
220          UI      54      33      33      32      33      32      33       0       0       0
             *

221          KK    S530   BASIN
222          KM        Compute runoff from subbasin 530
223          BA   2.226
224          LG    0.20    0.35    4.30    0.41       0
225          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
226          UI    1198     964     787     657     513     417     348     283     227     189
227          UI     141     120     122      56      43      43      43      43      43      43
228          UI      43       0       0       0       0       0       0       0       0       0
229          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    50        S400
                .
                .
    59          .        S410
                .           .
                .           .
    67        C410............
                V
                V
    70       RR410
                V
                V
    79      410415
                .
                .
    87          .        S415
                .           .
                .           .
    93       C415R...........
                .
                .
    96          .        S500
                .           V
                .           V
   105          .       RR500
                .           V
                .           V
   114          .      500415
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                .           .
                .           .
  123           .           .        S510
                .           .           .
                .           .           .
  129           .       C415L............
                .           .
                .           .
  132       C415............
                .
                .
  139           .-------->   D415O
  135       D415
               V
               V
  144     415420
                .
                .
  153           .        S420
                .           .
                .           .
  160       C420............
                .
                .
  164           .        S430
                .           V
                .           V
  170           .      430440
                .           .
                .           .
  176           .           .        S440
                .           .           .
                .           .           .
  182           .        C440............
                .           V
                .           V
  185           .      440450
                .           .
                .           .
  191           .           .        S450
                .           .           .
                .           .           .
  199           .           .           .        S435
                .           .           .           V
                .           .           .           V
  205           .           .           .      435450
                .           .           .           .
                .           .           .           .
  211           .        C450........................
                .           .
                .           .
  214           .           .        S520
                .           .           .
                .           .           .
  221           .           .           .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   19APR06  TIME  15:00:35  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B41

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B4-1 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller leveed channel sections in the down fan direction. It is the first of three corridor alignments considered as part of the Alternative B4 series.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX24.DAT

100-YEAR 24-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES
MODELED AREA = 76.8 SQ. MILES

```
                    GREEN-AMPT LOSS METHOD
                    S-GRAPH UNIT HYDROGRAPHS
                      - MOUNTAIN
                      - DESERT/RANGELAND
                    NORMAL-DEPTH CHANNEL ROUTING
                    LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                      - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                      - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                      - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                    SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

37 IO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                NMIN           5  MINUTES IN COMPUTATION INTERVAL
                IDATE      1JAN99  STARTING DATE
                ITIME        1200  STARTING TIME
                  NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE      8JAN99  ENDING DATE
              NDTIME        1035  ENDING TIME
               ICENT          19  CENTURY MARK

          COMPUTATION INTERVAL      .08 HOURS
               TOTAL TIME BASE  166.58 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

38 JD        INDEX STORM NO. 1
                STRM        4.20  PRECIPITATION DEPTH
                TRDA         .10  TRANSPOSITION DRAINAGE AREA

39 PI          PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
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49 JD        INDEX STORM NO. 2
                STRM        3.99  PRECIPITATION DEPTH
                TRDA       10.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S400	1047.	12.50	184.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	526.	12.42	80.	21.	7.	.64		
+	2 COMBINED AT	C410	1524.	12.50	262.	67.	23.	2.18		
+	ROUTED TO	RR410	128.	14.08	119.	66.	23.	2.18		
+	ROUTED TO	410415	127.	15.58	117.	66.	23.	2.18		
+	HYDROGRAPH AT	S415	624.	12.17	50.	13.	4.	.45		
+	2 COMBINED AT	C415R	609.	12.17	134.	78.	26.	2.63		
+	HYDROGRAPH AT	S500	2063.	12.75	476.	129.	43.	3.64		
+	ROUTED TO	RR500	186.	15.00	177.	119.	43.	3.64		
+	ROUTED TO	500415	186.	15.50	177.	119.	43.	3.64		
+	HYDROGRAPH AT	S510	2099.	12.25	213.	53.	18.	1.84		
+	2 COMBINED AT	C415L	2073.	12.25	347.	170.	60.	5.48		
+	2 COMBINED AT	C415	2578.	12.25	476.	245.	86.	8.11		
+	DIVERSION TO	D415O	1347.	12.25	74.	18.	6.	8.11		
+	HYDROGRAPH AT	D415	1231.	12.00	402.	226.	80.	8.11		
+	ROUTED TO	415420	866.	13.33	357.	222.	80.	8.11		
+	HYDROGRAPH AT	S420	1740.	12.33	198.	50.	17.	1.77		
+	2 COMBINED AT	C420	1697.	12.33	493.	267.	95.	9.88		
+	HYDROGRAPH AT	S430	1090.	12.17	95.	24.	8.	.80		
+	ROUTED TO	430440	932.	12.50	95.	24.	8.	.80		
+	HYDROGRAPH AT	S440	1205.	12.25	119.	30.	10.	1.07		
+	2 COMBINED AT	C440	1700.	12.42	211.	53.	18.	1.86		
+	ROUTED TO	440450	1502.	12.58	211.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1624.	12.58	287.	72.	24.	2.52		
+	HYDROGRAPH AT	S435	656.	12.08	47.	12.	4.	.39		

+	ROUTED TO	435450	378.	12.83	47.	12.	4.	.39
+	3 COMBINED AT	C450	3338.	12.67	536.	134.	45.	4.78
+	HYDROGRAPH AT	S520	1288.	12.42	174.	43.	14.	1.48
+	HYDROGRAPH AT	S530	1697.	12.50	257.	64.	21.	2.23

*** NORMAL END OF HEC-1 ***

```
1****************************************                                    ****************************************
 *                                      *                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                                    *         609 SECOND STREET            *
 *                                      *                                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   19APR06  TIME  15:05:53  *                                    *          (916) 756-1104              *
 *                                      *                                    *                                      *
 ****************************************                                    ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X                X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X                X
                                        X     X  X        X     X          X
                                        X     X  XXXXXXX   XXXXX         XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                HEC-1 INPUT                                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE B42
        4           ID
        5           ID   Alternative Description
        6           ID   The purpose of Alternative B is to capture the upstream flow at the
        7           ID   apex using online detention basins.  The presence of the detention
        8           ID   basins eliminates the downstream alluvial fan uncertainties by controlling
        9           ID   the flow from the apices to the outfall.  Alternative B4-2 is based on
       10           ID   using a relatively larger on-line detention basin at the apex accompanied
       11           ID   by smaller leveed channel sections in the down fan direction.  It is the
       12           ID   second of three corridor alignments considered as part of the Alternative B4
       13           ID   series.
       14           ID
       15           ID
       16           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       17           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       18           ID   MODELER: TED LEHMAN
       19           ID   FILENAME: A4_EX6.DAT
       20           ID
       21           ID   100-YEAR 6-HOUR MODEL
       22           ID   EXISTING CONDITIONS
       23           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       24           ID            MODELED AREA = 76.8 SQ. MILES
       25           ID
       26           ID   GREEN-AMPT LOSS METHOD
       27           ID   S-GRAPH UNIT HYDROGRAPHS
       28           ID     - MOUNTAIN
       29           ID     - DESERT/RANGELAND
       30           ID   NORMAL-DEPTH CHANNEL ROUTING
       31           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       32           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       33           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       34           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       35           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       36           IT       5  1JAN99    1200    2000
       37           IN      15
       38           IO       5
                    *DIAGRAM
                    *
       39           JD   3.196  0.1000
       40           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
       41           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
       42           PC   0.962   0.972   0.983   0.991   1.000
       43           JD   3.181  0.5000
       44           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
       45           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
       46           PC   0.962   0.972   0.983   0.991   1.000
       47           JD   3.120     2.8
       48           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
       49           PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
       50           PC   0.950   0.963   0.975   0.988   1.000
       51           JD   2.950    16.0
       52           PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
       53           PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
1                                                HEC-1 INPUT                                                    PAGE  2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  54          PC   0.946   0.960   0.973   0.987   1.000
  55          JD   2.592    90.0
  56          PC   0.000   0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
  57          PC   0.179   0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
  58          PC   0.927   0.945   0.964   0.982   1.000
              *

  59          KK    S430   BASIN
  60          KM        Compute runoff from subbasin 430
  61          BA   0.795
  62          LG    0.35    0.35    4.55    0.35       0
  63          UI     127     515     918    1163    1116     779     521     349     228     153
  64          UI     100      72      30      30      30       0       0       0       0       0
              *

  65          KK  430440   ROUTE
  66          KM        Route flows from Sun Valley Parkway through S440.
  67          RS       7    FLOW      -1
  68          RC   0.035   0.035   0.035   13256  0.0128  106.00
  69          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
  70          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

  71          KK    S440   BASIN
  72          KM        Compute runoff from subbasin 440
  73          BA   1.068
  74          LG    0.35    0.35    4.20    0.43       0
  75          UI     137     414     838    1167    1323    1221     910     657     468     330
  76          UI     240     168     118      95      46      33      35      33      34       0
              *

  77          KK    C440 COMBINE
  78          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
  79          HC       2
              *

  80          KK  440450   ROUTE
  81          KM        Route combined flows to the Hassayampa River.
  82          RS       3    FLOW      -1
  83          RC   0.035   0.040   0.035    4154  0.0104
  84          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
  85          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
              *

  86          KK    S450   BASIN
  87          KM        Compute runoff from subbasin 450
  88          BA   2.521
  89          LG    0.23    0.35    4.25    0.42       0
  90          UI     167     169     381     664     938    1152    1392    1514    1599    1599
  91          UI    1528    1333    1142     951     803     683     567     481     395     336
  92          UI     287     255     184     177     130     116     115      88      41      41
  93          UI      41      41      41      41      41      40      41       0       0       0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  94          KK    S435   BASIN
  95          KM        Compute runoff from subbasin 435
  96          BA   0.393
  97          LG    0.35    0.35    4.45    0.37       0
  98          UI     130     505     775     686     414     231     134      75      42      20
  99          UI      20       0       0       0       0       0       0       0       0       0
              *

 100          KK  435450   ROUTE
 101          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
 102          RS      10    FLOW      -1
 103          RC   0.045   0.035   0.045   18781  0.0119    0.00
 104          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
 105          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
              *

 106          KK    C450 COMBINE
 107          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
 108          HC       3
              *

 109          KK    S400   BASIN
 110          KM        Compute runoff from subbasin 400
 111          BA   1.544
 112          LG    0.25    0.35    4.20    0.43       3
 113          UI     106     106     252     429     616     729     819    1050    1206     793
 114          UI     665     601     543     493     440     385     339     276     254     239
 115          UI     212     174     144     133     116     116      82      81      81      52
 116          UI      51      53      51      39      21      20      20      21      20      20
 117          UI      20      21      20      20      20       0       0       0       0       0
              *

 118          KK    S410   BASIN
 119          KM        Compute runoff from subbasin 410
 120          BA   0.639
```

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 121          LG    0.15    0.35    3.85    0.43       3
 122          UI      53      70     177     290     367     429     593     473     342     300
 123          UI     268     232     202     173     136     126     115      89      72      65
 124          UI      58      47      41      38      26      26      26      19      11      10
 125          UI      10      10      11      10      10      10      11       0       0       0
              *

 126          KK    C410 COMBINE
 127          KM        Combine runoff from S400 and S410
 128          HC       2
              *

 129          KK   RR410 STORAGE
 130          KM   PROPOSED DETENTION BASIN
 131          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
 132          KM     outlet assumed a 2 ft pipe
 133          KM    STRUCTURE ID:RR410
 134          KM    DIMENSIONS: L=1200ft, W=600ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 116.7 ac-
 135          RS       1    STOR       0
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 136          SV     0.0    13.8    42.0    71.2    86.1   101.3   116.7   132.4   148.3   164.4
 137          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
 138          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
              *

 139          KK  410415   ROUTE
 140          KM   PROPOSED CHANNEL
 141          KM    STRUCTURE ID(s): RR41010, C41510
 142          KM    Slope=(1533.5 - 1432.7) / 7128.5
 143          RS      10    FLOW      -1
 144          RC   0.045   0.045   0.045  7128.50.014139   105.0
 145          RX     0.0    15.0    15.0    15.0    75.0    75.0    75.0    90.0
 146          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
              *

 147          KK    S415   BASIN
 148          KM        Compute runoff from subbasin 415
 149          BA   0.451
 150          LG    0.35    0.35    3.64    0.49       0
 151          UI      92     356     623     728     617     389     253     161     101      65
 152          UI      44      18      19      19       0       0       0       0       0       0
              *

 153          KK    C415 COMBINE
 154          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 155          HC       2
              *

 156          KK  415420   ROUTE
 157          KM   PROPOSED CHANNEL
 158          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 159          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 160          KM    Slope=(1432.5 - 1191.3) / 17970.9
 161          RS      10    FLOW      -1
 162          RC   0.045   0.045   0.045 17970.90.013422   105.0
 163          RX     0.0    15.0    15.0    15.0   155.0   155.0   155.0   170.0
 164          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
              *

 165          KK    S420   BASIN
 166          KM        Compute runoff from subbasin 420
 167          BA   1.767
 168          LG    0.35    0.35    4.30    0.41       0
 169          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 170          UI     582     417     328     242     183     132     115      47      47      48
 171          UI      47      47       0       0       0       0       0       0       0       0
              *

 172          KK    C420 COMBINE
 173          KM        Combine flows from S400, S410, S415, S420 at Hassayampa River
 174          HC       2
              *
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 175          KK    S500   BASIN
 176          KM        Compute runoff from subbasin 500
 177          BA   3.638
 178          LG    0.25    0.35    3.92    0.41       9
 179          UI     184     186     184     515     713     935    1143    1294    1413    1581
 180          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
 181          UI     716     629     568     487     456     435     408     387     311     297
 182          UI     237     239     212     201     204     146     142     143     141      94
 183          UI      91      90      90      92      90      51      35      36      35      36
              *

 184          KK   RR500 STORAGE
 185          KM   PROPOSED DETENTION BASIN
 186          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
 187          KM     outlet assumed a 2 ft pipe
```

```
188          KM    STRUCTURE ID:RR500
189          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
190          RS       1    STOR       0
191          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
192          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
193          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
             *

194          KK  500510   ROUTE
195          KM   PROPOSED CHANNEL
196          KM    ROUTE FLOW FROM S500 TO C510 IN NEW CHANNEL
197          KM    STRUCTURE ID(s): C51010, C51020, C51030, C51040
198          KM    Slope=(1666.0 - 1424.5) / 13527.8
199          RS       8    FLOW      -1
200          RC   0.045   0.045   0.045 13527.80.017858   104.5
201          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
202          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

203          KK    S510   BASIN
204          KM        Compute runoff from subbasin 510
205          BA   1.840
206          LG    0.35    0.35    3.95    0.40       0
207          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
208          UI     433     307     220     160     106      57      58      56      57       0
             *

209          KK    C510 COMBINE
210          KM    COMBINE S500 AND S510 AT SUN VALLEY PARKWAY
211          HC       2
             *

212          KK  510530   ROUTE
213          KM   PROPOSED CHANNEL
214          KM    ROUTE FLOW FROM C510 TO C530 IN NEW CHANNEL
215          KM    STRUCTURE ID(s): RR51010, RR51015, RR51020
216          KM    Slope=(1424.5 - 1192.1) / 17879.8
217          RS       8    FLOW      -1
218          RC   0.045   0.045   0.045 17879.80.012993   104.5
1                                          HEC-1 INPUT                                                    PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

219          RX     0.0    13.5    13.5    13.5   273.5   273.5   273.5   287.0
220          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

221          KK    S530   BASIN
222          KM        Compute runoff from subbasin 530
223          BA   2.226
224          LG    0.20    0.35    4.30    0.41       0
225          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
226          UI    1198     964     787     657     513     417     348     283     227     189
227          UI     141     120     122      56      43      43      43      43      43      43
228          UI      43       0       0       0       0       0       0       0       0       0
             *

229          KK    C530 COMBINE
230          KM    COMBINE FLOWS AT THE HASSAYAMPA RIVER AT C530
231          HC       2
             *

232          KK    S520   BASIN
233          KM        Compute runoff from subbasin 520
234          BA   1.481
235          LG    0.35    0.35    4.50    0.36       0
236          UI     133     206     510     780    1043    1196    1285    1241    1061     847
237          UI     672     531     420     330     262     210     159     135      91      93
238          UI      54      33      33      32      33      32      33       0       0       0
239          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   59        S430
                V
                V
   65      430440
                .
                .
   71           .        S440
                .           .
                .           .
   77        C440............
                V
                V
   80      440450
                .
                .
   86           .        S450
                .           .
                .           .
```

```
  94          .           .       S435
              .           .          V
              .           .          V
 100          .           .     435450
              .           .          .
              .           .          .
 106       C450.......................
              .
              .
 109          .       S400
              .          .
              .          .
 118          .           .       S410
              .           .          .
              .           .          .
 126          .       C410............
              .          V
              .          V
 129          .      RR410
              .          V
              .          V
 139          .     410415
              .          .
              .          .
 147          .           .       S415
              .           .          .
              .           .          .
 153          .       C415............
              .          V
              .          V
 156          .     415420
              .          .
              .          .
 165          .           .       S420
              .           .          .
              .           .          .
 172          .       C420............
              .          .
              .          .
 175          .           .       S500
              .           .          V
              .           .          V
 184          .           .      RR500
              .           .          V
              .           .          V
 194          .           .     500510
              .           .          .
              .           .          .
 203          .           .          .       S510
              .           .          .          .
              .           .          .          .
 209          .           .       C510............
              .           .          V
              .           .          V
 212          .           .     510530
              .           .          .
              .           .          .
 221          .           .          .       S530
              .           .          .          .
              .           .          .          .
 229          .           .       C530............
              .           .          .
              .           .          .
 232          .           .          .       S520
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   19APR06  TIME  15:05:53  *
*                                      *
****************************************
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B42

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B4-2 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller leveed channel sections in the down fan direction. It is the second of three corridor alignments considered as part of the Alternative B4 series.

```
                    SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
                    JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
                    MODELER: TED LEHMAN
                    FILENAME: A4_EX6.DAT

                    100-YEAR 6-HOUR MODEL
                    EXISTING CONDITIONS
                    AREA 4 WATERSHED AREA = 90.5 SQ. MILES
                           MODELED AREA = 76.8 SQ. MILES

                    GREEN-AMPT LOSS METHOD
                    S-GRAPH UNIT HYDROGRAPHS
                      - MOUNTAIN
                      - DESERT/RANGELAND
                    NORMAL-DEPTH CHANNEL ROUTING
                    LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                      - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                      - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                      - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                    SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

38 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN99  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     8JAN99  ENDING DATE
                    NDTIME       1035  ENDING TIME
                     ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL      .08 HOURS
                    TOTAL TIME BASE  166.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

39 JD          INDEX STORM NO. 1
                      STRM       3.20  PRECIPITATION DEPTH
                      TRDA        .10  TRANSPOSITION DRAINAGE AREA

40 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

43 JD          INDEX STORM NO. 2
                      STRM       3.18  PRECIPITATION DEPTH
                      TRDA        .50  TRANSPOSITION DRAINAGE AREA

44 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
                   .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

47 JD          INDEX STORM NO. 3
                      STRM       3.12  PRECIPITATION DEPTH
                      TRDA       2.80  TRANSPOSITION DRAINAGE AREA

48 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
                   .03       .03       .07       .07       .07       .08       .08       .08       .05       .05
                   .05       .02       .02       .02       .01       .01       .01       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00

51 JD          INDEX STORM NO. 4
                      STRM       2.95  PRECIPITATION DEPTH
                      TRDA      16.00  TRANSPOSITION DRAINAGE AREA

52 PI            PRECIPITATION PATTERN
                   .01       .01       .00       .00       .00       .00       .00       .00       .00       .01
```

```
                    .01      .01      .00      .01      .00      .00      .00      .00      .00      .00
                    .00      .00      .01      .00      .00      .00      .00      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

55 JD          INDEX STORM NO. 5
                     STRM        2.59  PRECIPITATION DEPTH
                     TRDA       90.00  TRANSPOSITION DRAINAGE AREA

56 PI            PRECIPITATION PATTERN
                    .01      .01      .01      .00      .00      .00      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .05      .05      .05      .05      .05      .05      .04      .04
                    .04      .02      .02      .02      .02      .02      .02      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S430	1207.	4.17	110.	27.	9.	.80		
+	ROUTED TO	430440	1057.	4.50	110.	27.	9.	.80		
+	HYDROGRAPH AT	S440	1237.	4.25	130.	32.	11.	1.07		
+	2 COMBINED AT	C440	1581.	4.42	213.	53.	18.	1.86		
+	ROUTED TO	440450	1402.	4.67	213.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1467.	4.58	279.	70.	23.	2.52		
+	HYDROGRAPH AT	S435	822.	4.08	57.	14.	5.	.39		
+	ROUTED TO	435450	443.	4.92	57.	14.	5.	.39		
+	3 COMBINED AT	C450	2589.	4.67	463.	116.	39.	4.78		
+	HYDROGRAPH AT	S400	1019.	4.50	193.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	638.	4.42	97.	24.	8.	.64		
+	2 COMBINED AT	C410	1372.	4.50	262.	66.	22.	2.18		
+	ROUTED TO	RR410	125.	6.08	116.	65.	22.	2.18		
+	ROUTED TO	410415	125.	6.50	115.	65.	22.	2.18		
+	HYDROGRAPH AT	S415	791.	4.17	61.	15.	5.	.45		
+	2 COMBINED AT	C415	422.	4.17	137.	74.	25.	2.63		
+	ROUTED TO	415420	165.	5.75	121.	73.	25.	2.63		
+	HYDROGRAPH AT	S420	1576.	4.33	200.	50.	17.	1.77		
+	2 COMBINED AT	C420	1227.	4.33	252.	108.	37.	4.40		
+	HYDROGRAPH AT	S500	1743.	4.75	454.	115.	38.	3.64		
+	ROUTED TO	RR500	181.	6.92	171.	109.	38.	3.64		
+	ROUTED TO	500510	180.	8.08	168.	108.	38.	3.64		

+	HYDROGRAPH AT	S510	1844.	4.25	216.	54.	18.	1.84
+	2 COMBINED AT	C510	1384.	4.25	271.	145.	51.	5.48
+	ROUTED TO	510530	745.	5.33	231.	140.	51.	5.48
+	HYDROGRAPH AT	S530	1563.	4.50	258.	64.	21.	2.23
+	2 COMBINED AT	C530	1198.	4.50	390.	182.	65.	7.70
+	HYDROGRAPH AT	S520	1272.	4.42	183.	46.	15.	1.48

*** NORMAL END OF HEC-1 ***

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN  1998               *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   19APR06  TIME  15:05:53  *
 *                                      *
 ****************************************
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                    HEC-1 INPUT                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE B42
        4           ID
        5           ID   Alternative Description
        6           ID   The purpose of Alternative B is to capture the upstream flow at the
        7           ID   apex using online detention basins.  The presence of the detention
        8           ID   basins eliminates the downstream alluvial fan uncertainties by controlling
        9           ID   the flow from the apices to the outfall.  Alternative B4-2 is based on
       10           ID   using a relatively larger on-line detention basin at the apex accompanied
       11           ID   by smaller leveed channel sections in the down fan direction.  It is the
       12           ID   second of three corridor alignments considered as part of the Alternative B4
       13           ID   series.
       14           ID
       15           ID
       16           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       17           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       18           ID   MODELER: TED LEHMAN
       19           ID   FILENAME: A4_EX24.DAT
       20           ID
       21           ID   100-YEAR 24-HOUR MODEL
       22           ID   EXISTING CONDITIONS
       23           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       24           ID            MODELED AREA = 76.8 SQ. MILES
       25           ID
       26           ID   GREEN-AMPT LOSS METHOD
       27           ID   S-GRAPH UNIT HYDROGRAPHS
       28           ID     - MOUNTAIN
       29           ID     - DESERT/RANGELAND
       30           ID   NORMAL-DEPTH CHANNEL ROUTING
       31           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       32           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       33           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       34           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       35           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       36           IT       5  1JAN99    1200    2000
       37           IN      15
       38           IO       5
                    *DIAGRAM
                    *
       39           JD   4.198  0.1000
       40           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
       41           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
       42           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
       43           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
       44           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
       45           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
       46           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
       47           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
       48           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
       49           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
       50           JD   3.990    10.0
                    *
1                                    HEC-1 INPUT                                    PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
 51          KK    S430   BASIN
 52          KM         Compute runoff from subbasin 430
 53          BA   0.795
 54          LG    0.35    0.35    4.55    0.35       0
 55          UI     127     515     918    1163    1116     779     521     349     228     153
 56          UI     100      72      30      30      30       0       0       0       0       0
             *

 57          KK  430440   ROUTE
 58          KM         Route flows from Sun Valley Parkway through S440.
 59          RS       7    FLOW      -1
 60          RC   0.035   0.035   0.035   13256  0.0128  106.00
 61          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 62          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
             *

 63          KK    S440   BASIN
 64          KM         Compute runoff from subbasin 440
 65          BA   1.068
 66          LG    0.35    0.35    4.20    0.43       0
 67          UI     137     414     838    1167    1323    1221     910     657     468     330
 68          UI     240     168     118      95      46      33      35      33      34       0
             *

 69          KK    C440 COMBINE
 70          KM         Combine runoff from S440 with routed flows from Sun Valley Parkway.
 71          HC       2
             *

 72          KK  440450   ROUTE
 73          KM         Route combined flows to the Hassayampa River.
 74          RS       3    FLOW      -1
 75          RC   0.035   0.040   0.035    4154  0.0104
 76          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
 77          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

 78          KK    S450   BASIN
 79          KM         Compute runoff from subbasin 450
 80          BA   2.521
 81          LG    0.23    0.35    4.25    0.42       0
 82          UI     167     169     381     664     938    1152    1392    1514    1599    1599
 83          UI    1528    1333    1142     951     803     683     567     481     395     336
 84          UI     287     255     184     177     130     116     115      88      41      41
 85          UI      41      41      41      41      41      40      41       0       0       0
             *

 86          KK    S435   BASIN
 87          KM         Compute runoff from subbasin 435
 88          BA   0.393
 89          LG    0.35    0.35    4.45    0.37       0
 90          UI     130     505     775     686     414     231     134      75      42      20
 91          UI      20       0       0       0       0       0       0       0       0       0
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 92          KK  435450   ROUTE
 93          KM         Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
 94          RS      10    FLOW      -1
 95          RC   0.045   0.035   0.045   18781  0.0119    0.00
 96          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
 97          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *

 98          KK    C450 COMBINE
 99          KM         Combine flows from S430, S435, S440, and S450 at Hassayampa River
100          HC       3
             *

101          KK    S400   BASIN
102          KM         Compute runoff from subbasin 400
103          BA   1.544
104          LG    0.25    0.35    4.20    0.43       3
105          UI     106     106     252     429     616     729     819    1050    1206     793
106          UI     665     601     543     493     440     385     339     276     254     239
107          UI     212     174     144     133     116     116      82      81      81      52
108          UI      51      53      51      39      21      20      20      21      20      20
109          UI      20      21      20      20      20       0       0       0       0       0
             *

110          KK    S410   BASIN
111          KM         Compute runoff from subbasin 410
112          BA   0.639
113          LG    0.15    0.35    3.85    0.43       3
114          UI      53      70     177     290     367     429     593     473     342     300
115          UI     268     232     202     173     136     126     115      89      72      65
116          UI      58      47      41      38      26      26      26      19      11      10
117          UI      10      10      11      10      10      10      11       0       0       0
             *

118          KK    C410 COMBINE
```

```
 119          KM        Combine runoff from S400 and S410
 120          HC       2
              *

 121          KK   RR410 STORAGE
 122          KM   PROPOSED DETENTION BASIN
 123          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
 124          KM     outlet assumed a 2 ft pipe
 125          KM    STRUCTURE ID:RR410
 126          KM    DIMENSIONS: L=1200ft, W=600ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 116.7 ac-
 127          RS       1    STOR       0
 128          SV     0.0    13.8    42.0    71.2    86.1   101.3   116.7   132.4   148.3   164.4
 129          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
 130          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
              *
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 131          KK  410415   ROUTE
 132          KM   PROPOSED CHANNEL
 133          KM    STRUCTURE ID(s): RR41010, C41510
 134          KM    Slope=(1533.5 - 1432.7) / 7128.5
 135          RS      10    FLOW      -1
 136          RC   0.045   0.045   0.045  7128.50.014139   105.0
 137          RX     0.0    15.0    15.0    15.0    75.0    75.0    75.0    90.0
 138          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
              *

 139          KK    S415   BASIN
 140          KM        Compute runoff from subbasin 415
 141          BA   0.451
 142          LG    0.35    0.35    3.64    0.49       0
 143          UI      92     356     623     728     617     389     253     161     101      65
 144          UI      44      18      19      19       0       0       0       0       0       0
              *

 145          KK    C415 COMBINE
 146          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 147          HC       2
              *

 148          KK  415420   ROUTE
 149          KM   PROPOSED CHANNEL
 150          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 151          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 152          KM    Slope=(1432.5 - 1191.3) / 17970.9
 153          RS      10    FLOW      -1
 154          RC   0.045   0.045   0.045 17970.90.013422   105.0
 155          RX     0.0    15.0    15.0    15.0   155.0   155.0   155.0   170.0
 156          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
              *

 157          KK    S420   BASIN
 158          KM        Compute runoff from subbasin 420
 159          BA   1.767
 160          LG    0.35    0.35    4.30    0.41       0
 161          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 162          UI     582     417     328     242     183     132     115      47      47      48
 163          UI      47      47       0       0       0       0       0       0       0       0
              *

 164          KK    C420 COMBINE
 165          KM        Combine flows from S400, S410, S415, S420 at Hassayampa River
 166          HC       2
              *

 167          KK    S500   BASIN
 168          KM        Compute runoff from subbasin 500
 169          BA   3.638
 170          LG    0.25    0.35    3.92    0.41       9
 171          UI     184     186     184     515     713     935    1143    1294    1413    1581
 172          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 173          UI     716     629     568     487     456     435     408     387     311     297
 174          UI     237     239     212     201     204     146     142     143     141      94
 175          UI      91      90      90      92      90      51      35      36      35      36
              *

 176          KK   RR500 STORAGE
 177          KM   PROPOSED DETENTION BASIN
 178          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
 179          KM     outlet assumed a 2 ft pipe
 180          KM    STRUCTURE ID:RR500
 181          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
 182          RS       1    STOR       0
 183          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
 184          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
 185          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
              *
```

```
186          KK  500510   ROUTE
187          KM   PROPOSED CHANNEL
188          KM    ROUTE FLOW FROM S500 TO C510 IN NEW CHANNEL
189          KM    STRUCTURE ID(s): C51010, C51020, C51030, C51040
190          KM    Slope=(1666.0 - 1424.5) / 13527.8
191          RS       8    FLOW      -1
192          RC   0.045   0.045   0.045 13527.80.017858   104.5
193          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
194          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

195          KK    S510   BASIN
196          KM        Compute runoff from subbasin 510
197          BA   1.840
198          LG    0.35    0.35    3.95    0.40       0
199          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
200          UI     433     307     220     160     106      57      58      56      57       0
             *

201          KK    C510 COMBINE
202          KM    COMBINE S500 AND S510 AT SUN VALLEY PARKWAY
203          HC       2
             *

204          KK  510530   ROUTE
205          KM   PROPOSED CHANNEL
206          KM    ROUTE FLOW FROM C510 TO C530 IN NEW CHANNEL
207          KM    STRUCTURE ID(s): RR51010, RR51015, RR51020
208          KM    Slope=(1424.5 - 1192.1) / 17879.8
209          RS       8    FLOW      -1
210          RC   0.045   0.045   0.045 17879.80.012993   104.5
211          RX     0.0    13.5    13.5    13.5   273.5   273.5   273.5   287.0
212          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

213          KK    S530   BASIN
214          KM        Compute runoff from subbasin 530
215          BA   2.226
216          LG    0.20    0.35    4.30    0.41       0
217          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
218          UI    1198     964     787     657     513     417     348     283     227     189
219          UI     141     120     122      56      43      43      43      43      43      43
220          UI      43       0       0       0       0       0       0       0       0       0
             *

221          KK    C530 COMBINE
222          KM    COMBINE FLOWS AT THE HASSAYAMPA RIVER AT C530
223          HC       2
             *

224          KK    S520   BASIN
225          KM        Compute runoff from subbasin 520
226          BA   1.481
227          LG    0.35    0.35    4.50    0.36       0
228          UI     133     206     510     780    1043    1196    1285    1241    1061     847
229          UI     672     531     420     330     262     210     159     135      91      93
230          UI      54      33      33      32      33      32      33       0       0       0
231          ZZ
```

1

```
            SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  51        S430
               V
               V
  57      430440
               .
               .
  63            .        S440
                .           .
                .           .
  69        C440............
               V
               V
  72      440450
               .
               .
  78            .        S450
                .           .
                .           .
  86            .           .        S435
                .           .           V
                .           .           V
  92            .           .      435450
                .           .           .
                .           .           .
  98        C450........................
               .
```

```
  101          .        S400
               .          .
               .          .
  110          .          .        S410
               .          .          .
               .          .          .
  118          .        C410...........
               .          V
               .          V
  121          .       RR410
               .          V
               .          V
  131          .      410415
               .          .
               .          .
  139          .          .        S415
               .          .          .
               .          .          .
  145          .        C415...........
               .          V
               .          V
  148          .      415420
               .          .
               .          .
  157          .          .        S420
               .          .          .
               .          .          .
  164          .        C420...........
               .          .
               .          .
  167          .          .        S500
               .          .          V
               .          .          V
  176          .          .       RR500
               .          .          V
               .          .          V
  186          .          .      500510
               .          .          .
               .          .          .
  195          .          .          .        S510
               .          .          .          .
               .          .          .          .
  201          .          .        C510...........
               .          .          V
               .          .          V
  204          .          .      510530
               .          .          .
               .          .          .
  213          .          .          .        S530
               .          .          .          .
               .          .          .          .
  221          .          .        C530...........
               .          .          .
               .          .          .
  224          .          .          .        S520
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   19APR06  TIME  15:05:53   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
*************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B42

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B4-2 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller leveed channel sections in the down fan direction. It is the second of three corridor alignments considered as part of the Alternative B4 series.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX24.DAT

100-YEAR 24-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES

```
                              MODELED AREA = 76.8 SQ. MILES

                         GREEN-AMPT LOSS METHOD
                         S-GRAPH UNIT HYDROGRAPHS
                           - MOUNTAIN
                           - DESERT/RANGELAND
                         NORMAL-DEPTH CHANNEL ROUTING
                         LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                           - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                           - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                           - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                         SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

 38 IO         OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN          5  MINUTES IN COMPUTATION INTERVAL
                    IDATE     1JAN99  STARTING DATE
                    ITIME       1200  STARTING TIME
                       NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     8JAN99  ENDING DATE
                   NDTIME       1035  ENDING TIME
                    ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL      .08 HOURS
                     TOTAL TIME BASE   166.58 HOURS

      ENGLISH UNITS
           DRAINAGE AREA           SQUARE MILES
           PRECIPITATION DEPTH     INCHES
           LENGTH, ELEVATION       FEET
           FLOW                    CUBIC FEET PER SECOND
           STORAGE VOLUME          ACRE-FEET
           SURFACE AREA            ACRES
           TEMPERATURE             DEGREES FAHRENHEIT

 39 JD          INDEX STORM NO. 1
                     STRM       4.20  PRECIPITATION DEPTH
                     TRDA        .10  TRANSPOSITION DRAINAGE AREA

 40 PI           PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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 50 JD          INDEX STORM NO. 2
                     STRM       3.99  PRECIPITATION DEPTH
                     TRDA      10.00  TRANSPOSITION DRAINAGE AREA

  0 PI           PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                      .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S430	1090.	12.17	95.	24.	8.	.80		
+	ROUTED TO	430440	932.	12.50	95.	24.	8.	.80		
+	HYDROGRAPH AT	S440	1205.	12.25	119.	30.	10.	1.07		
+	2 COMBINED AT	C440	1700.	12.42	211.	53.	18.	1.86		
+	ROUTED TO	440450	1502.	12.58	211.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1624.	12.58	287.	72.	24.	2.52		
+	HYDROGRAPH AT	S435	656.	12.08	47.	12.	4.	.39		
+	ROUTED TO	435450	378.	12.83	47.	12.	4.	.39		
+	3 COMBINED AT	C450	3338.	12.67	536.	134.	45.	4.78		
+	HYDROGRAPH AT	S400	1047.	12.50	184.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	526.	12.42	80.	21.	7.	.64		
+	2 COMBINED AT	C410	1524.	12.50	262.	67.	23.	2.18		
+	ROUTED TO	RR410	125.	14.08	116.	66.	23.	2.18		
+	ROUTED TO	410415	125.	14.50	116.	66.	23.	2.18		
+	HYDROGRAPH AT	S415	624.	12.17	50.	13.	4.	.45		
+	2 COMBINED AT	C415	609.	12.17	144.	78.	26.	2.63		
+	ROUTED TO	415420	191.	13.50	126.	77.	26.	2.63		
+	HYDROGRAPH AT	S420	1740.	12.33	198.	50.	17.	1.77		
+	2 COMBINED AT	C420	1714.	12.33	293.	124.	42.	4.40		
+	HYDROGRAPH AT	S500	2063.	12.75	476.	129.	43.	3.64		
+	ROUTED TO	RR500	186.	15.00	177.	119.	43.	3.64		
+	ROUTED TO	500510	186.	16.08	175.	119.	43.	3.64		
+	HYDROGRAPH AT	S510	2099.	12.25	213.	53.	18.	1.84		
+	2 COMBINED AT	C510	2072.	12.25	315.	168.	60.	5.48		
	ROUTED TO									

```
+                    510530     1052.   13.17      274.      163.      60.      5.48
        HYDROGRAPH AT
+                     S530      1697.   12.50      257.       64.      21.      2.23
        2 COMBINED AT
+                     C530      1669.   12.50      496.      222.      81.      7.70
        HYDROGRAPH AT
+                     S520      1288.   12.42      174.       43.      14.      1.48

 *** NORMAL END OF HEC-1 ***
```

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1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   19APR06  TIME  15:11:36  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X                X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X                X
                                        X     X  X        X     X          X
                                        X     X  XXXXXXX   XXXXX          XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE B43
        4           ID
        5           ID   Alternative Description
        6           ID   The purpose of Alternative B is to capture the upstream flow at the
        7           ID   apex using online detention basins.  The presence of the detention basins
        8           ID   eliminates the downstream alluvial fan uncertainties by controlling the
        9           ID   flow from the apices to the outfall.  Alternative B4-3 is based on using a
       10           ID   relatively larger on-line detention basin at the apex accompanied by smaller
       11           ID   leveed channel sections in the down fan direction.  It is the third of three
       12           ID   corridor alignments considered as part of the Alternative B4 series.
       13           ID
       14           ID
       15           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       16           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       17           ID   MODELER: TED LEHMAN
       18           ID   FILENAME: A4_EX6.DAT
       19           ID
       20           ID   100-YEAR 6-HOUR MODEL
       21           ID   EXISTING CONDITIONS
       22           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       23           ID            MODELED AREA = 76.8 SQ. MILES
       24           ID
       25           ID   GREEN-AMPT LOSS METHOD
       26           ID   S-GRAPH UNIT HYDROGRAPHS
       27           ID     - MOUNTAIN
       28           ID     - DESERT/RANGELAND
       29           ID   NORMAL-DEPTH CHANNEL ROUTING
       30           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       31           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       32           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       33           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       34           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       35           IT       5  1JAN99    1200    2000
       36           IN      15
       37           IO       5
                    *DIAGRAM
                    *
       38           JD   3.196  0.1000
       39           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
       40           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
       41           PC   0.962   0.972   0.983   0.991   1.000
       42           JD   3.181  0.5000
       43           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
       44           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
       45           PC   0.962   0.972   0.983   0.991   1.000
       46           JD   3.120     2.8
       47           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
       48           PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
       49           PC   0.950   0.963   0.975   0.988   1.000
       50           JD   2.950    16.0
       51           PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
       52           PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
       53           PC   0.946   0.960   0.973   0.987   1.000
1                                          HEC-1 INPUT                                                    PAGE  2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  54          JD   2.592    90.0
  55          PC   0.000   0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
  56          PC   0.179   0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
  57          PC   0.927   0.945   0.964   0.982   1.000
              *

  58          KK    S430   BASIN
  59          KM        Compute runoff from subbasin 430
  60          BA   0.795
  61          LG    0.35    0.35    4.55    0.35       0
  62          UI     127     515     918    1163    1116     779     521     349     228     153
  63          UI     100      72      30      30      30       0       0       0       0       0
              *

  64          KK  430440   ROUTE
  65          KM        Route flows from Sun Valley Parkway through S440.
  66          RS       7    FLOW      -1
  67          RC   0.035   0.035   0.035   13256  0.0128  106.00
  68          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
  69          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

  70          KK    S440   BASIN
  71          KM        Compute runoff from subbasin 440
  72          BA   1.068
  73          LG    0.35    0.35    4.20    0.43       0
  74          UI     137     414     838    1167    1323    1221     910     657     468     330
  75          UI     240     168     118      95      46      33      35      33      34       0
              *

  76          KK    C440 COMBINE
  77          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
  78          HC       2
              *

  79          KK  440450   ROUTE
  80          KM        Route combined flows to the Hassayampa River.
  81          RS       3    FLOW      -1
  82          RC   0.035   0.040   0.035    4154  0.0104
  83          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
  84          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
              *

  85          KK    S450   BASIN
  86          KM        Compute runoff from subbasin 450
  87          BA   2.521
  88          LG    0.23    0.35    4.25    0.42       0
  89          UI     167     169     381     664     938    1152    1392    1514    1599    1599
  90          UI    1528    1333    1142     951     803     683     567     481     395     336
  91          UI     287     255     184     177     130     116     115      88      41      41
  92          UI      41      41      41      41      41      40      41       0       0       0
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  93          KK    S435   BASIN
  94          KM        Compute runoff from subbasin 435
  95          BA   0.393
  96          LG    0.35    0.35    4.45    0.37       0
  97          UI     130     505     775     686     414     231     134      75      42      20
  98          UI      20       0       0       0       0       0       0       0       0       0
              *

  99          KK  435450   ROUTE
 100          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
 101          RS      10    FLOW      -1
 102          RC   0.045   0.035   0.045   18781  0.0119    0.00
 103          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
 104          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
              *

 105          KK    C450 COMBINE
 106          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
 107          HC       3
              *

 108          KK    S400   BASIN
 109          KM        Compute runoff from subbasin 400
 110          BA   1.544
 111          LG    0.25    0.35    4.20    0.43       3
 112          UI     106     106     252     429     616     729     819    1050    1206     793
 113          UI     665     601     543     493     440     385     339     276     254     239
 114          UI     212     174     144     133     116     116      82      81      81      52
 115          UI      51      53      51      39      21      20      20      21      20      20
 116          UI      20      21      20      20      20       0       0       0       0       0
              *

 117          KK    S410   BASIN
 118          KM        Compute runoff from subbasin 410
 119          BA   0.639
 120          LG    0.15    0.35    3.85    0.43       3
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 121          UI      53      70     177     290     367     429     593     473     342     300
 122          UI     268     232     202     173     136     126     115      89      72      65
 123          UI      58      47      41      38      26      26      26      19      11      10
 124          UI      10      10      11      10      10      10      11       0       0       0
              *

 125          KK    C410 COMBINE
 126          KM        Combine runoff from S400 and S410
 127          HC       2
              *

 128          KK   RR410 STORAGE
 129          KM   PROPOSED DETENTION BASIN
 130          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
 131          KM     outlet assumed a 2 ft pipe
 132          KM    STRUCTURE ID:RR410
 133          KM    DIMENSIONS: L=1200ft, W=600ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 116.7 ac-
 134          RS       1    STOR       0
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 135          SV     0.0    13.8    42.0    71.2    86.1   101.3   116.7   132.4   148.3   164.4
 136          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
 137          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
              *

 138          KK  410415   ROUTE
 139          KM   PROPOSED CHANNEL
 140          KM    STRUCTURE ID(s): RR41010, C41510
 141          KM    Slope=(1533.5 - 1432.7) / 7128.5
 142          RS      10    FLOW      -1
 143          RC   0.045   0.045   0.045  7128.50.014139   105.0
 144          RX     0.0    15.0    15.0    15.0    75.0    75.0    75.0    90.0
 145          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
              *

 146          KK    S415   BASIN
 147          KM        Compute runoff from subbasin 415
 148          BA   0.451
 149          LG    0.35    0.35    3.64    0.49       0
 150          UI      92     356     623     728     617     389     253     161     101      65
 151          UI      44      18      19      19       0       0       0       0       0       0
              *

 152          KK    C415 COMBINE
 153          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 154          HC       2
              *

 155          KK  415420   ROUTE
 156          KM   PROPOSED CHANNEL
 157          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 158          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 159          KM    Slope=(1432.5 - 1191.3) / 17970.9
 160          RS      10    FLOW      -1
 161          RC   0.045   0.045   0.045 17970.90.013422   105.0
 162          RX     0.0    15.0    15.0    15.0   155.0   155.0   155.0   170.0
 163          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
              *

 164          KK    S420   BASIN
 165          KM        Compute runoff from subbasin 420
 166          BA   1.767
 167          LG    0.35    0.35    4.30    0.41       0
 168          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 169          UI     582     417     328     242     183     132     115      47      47      48
 170          UI      47      47       0       0       0       0       0       0       0       0
              *

 171          KK    C420 COMBINE
 172          KM        Combine flows from S400, S410, S415, S420 at Hassayampa River
 173          HC       2
              *
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 174          KK    S500   BASIN
 175          KM        Compute runoff from subbasin 500
 176          BA   3.638
 177          LG    0.25    0.35    3.92    0.41       9
 178          UI     184     186     184     515     713     935    1143    1294    1413    1581
 179          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
 180          UI     716     629     568     487     456     435     408     387     311     297
 181          UI     237     239     212     201     204     146     142     143     141      94
 182          UI      91      90      90      92      90      51      35      36      35      36
              *

 183          KK   RR500 STORAGE
 184          KM   PROPOSED DETENTION BASIN
 185          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
 186          KM     outlet assumed a 2 ft pipe
 187          KM    STRUCTURE ID:RR500
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188          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
189          RS       1    STOR       0
190          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
191          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
192          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
             *

193          KK  500510   ROUTE
194          KM   PROPOSED CHANNEL
195          KM    ROUTE FLOW FROM S500 TO C510 IN NEW CHANNEL
196          KM    STRUCTURE ID(s): C51010, C51020, C51030, C51040
197          KM    Slope=(1666.0 - 1424.5) / 13527.8
198          RS       8    FLOW      -1
199          RC   0.045   0.045   0.045 13527.80.017858   104.5
200          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
201          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

202          KK    S510   BASIN
203          KM        Compute runoff from subbasin 510
204          BA   1.840
205          LG    0.35    0.35    3.95    0.40       0
206          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
207          UI     433     307     220     160     106      57      58      56      57       0
             *

208          KK    C510
209          KM    COMBINE S500 AND S510 AT SUN VALLEY PARKWAY
210          HC       2
             *

211          KK  510520   ROUTE
212          KM   PROPOSED CHANNEL
213          KM    ROUTE FLOW FROM C510 TO C520 IN NEW CHANNEL
214          KM    STRUCTURE ID(s): RR51025, RR51030
215          KM    Slope=(1421.8 - 1174.3) / 20814.0
216          RS       8    FLOW      -1
217          RC   0.045   0.045   0.045 20814.00.011891   104.5
```



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1                                          HEC-1 INPUT

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

218          RX     0.0    13.5    13.5    13.5   213.5   213.5   213.5   227.0
219          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

220          KK    S520   BASIN
221          KM        Compute runoff from subbasin 520
222          BA   1.481
223          LG    0.35    0.35    4.50    0.36       0
224          UI     133     206     510     780    1043    1196    1285    1241    1061     847
225          UI     672     531     420     330     262     210     159     135      91      93
226          UI      54      33      33      32      33      32      33       0       0       0
             *

227          KK    C520 COMBINE
228          KM    COMBINE FLOWS AT THE HASSAYAMPA RIVER AT C520
229          HC       2
             *

230          KK    S530   BASIN
231          KM        Compute runoff from subbasin 530
232          BA   2.226
233          LG    0.20    0.35    4.30    0.41       0
234          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
235          UI    1198     964     787     657     513     417     348     283     227     189
236          UI     141     120     122      56      43      43      43      43      43      43
237          UI      43       0       0       0       0       0       0       0       0       0
238          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  58         S430
                V
                V
  64       430440
                .
                .
  70            .        S440
                .           .
                .           .
  76         C440............
                V
                V
  79       440450
                .
                .
  85            .        S450
                .           .
                .           .
  93            .           .        S435
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                .          .          V
                .          .          V
   99           .          .     435450
                .          .          .
                .          .          .
  105        C450.......................
                .
                .
  108           .       S400
                .          .
                .          .
  117           .          .       S410
                .          .          .
                .          .          .
  125           .       C410............
                .          V
                .          V
  128           .      RR410
                .          V
                .          V
  138           .     410415
                .          .
                .          .
  146           .          .       S415
                .          .          .
                .          .          .
  152           .       C415............
                .          V
                .          V
  155           .     415420
                .          .
                .          .
  164           .          .       S420
                .          .          .
                .          .          .
  171           .       C420............
                .          .
                .          .
  174           .          .       S500
                .          .          V
                .          .          V
  183           .          .      RR500
                .          .          V
                .          .          V
  193           .          .     500510
                .          .          .
                .          .          .
  202           .          .          .       S510
                .          .          .          .
                .          .          .          .
  208           .          .       C510............
                .          .          V
                .          .          V
  211           .          .     510520
                .          .          .
                .          .          .
  220           .          .          .       S520
                .          .          .          .
                .          .          .          .
  227           .          .       C520............
                .          .          .
                .          .          .
  230           .          .          .       S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   19APR06  TIME  15:11:36  *
*                                      *
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B43

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B4-3 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller leveed channel sections in the down fan direction. It is the third of three corridor alignments considered as part of the Alternative B4 series.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.

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                    MODELER: TED LEHMAN
                    FILENAME: A4_EX6.DAT

                    100-YEAR 6-HOUR MODEL
                    EXISTING CONDITIONS
                    AREA 4 WATERSHED AREA = 90.5 SQ. MILES
                           MODELED AREA = 76.8 SQ. MILES

                    GREEN-AMPT LOSS METHOD
                    S-GRAPH UNIT HYDROGRAPHS
                      - MOUNTAIN
                      - DESERT/RANGELAND
                    NORMAL-DEPTH CHANNEL ROUTING
                    LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
                      - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
                      - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
                      - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
                    SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

37 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN99  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     8JAN99  ENDING DATE
                    NDTIME       1035  ENDING TIME
                     ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE  166.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

38 JD          INDEX STORM NO. 1
                     STRM       3.20  PRECIPITATION DEPTH
                     TRDA        .10  TRANSPOSITION DRAINAGE AREA

39 PI            PRECIPITATION PATTERN
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .01     .01     .01     .01     .01     .01     .03
                  .03     .03     .05     .05     .05     .15     .15     .15     .03     .03
                  .03     .01     .01     .01     .01     .01     .01     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00

42 JD          INDEX STORM NO. 2
                     STRM       3.18  PRECIPITATION DEPTH
                     TRDA        .50  TRANSPOSITION DRAINAGE AREA

43 PI            PRECIPITATION PATTERN
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .01     .01     .01     .01     .01     .01     .03
                  .03     .03     .05     .05     .05     .15     .15     .15     .03     .03
                  .03     .01     .01     .01     .01     .01     .01     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00

46 JD          INDEX STORM NO. 3
                     STRM       3.12  PRECIPITATION DEPTH
                     TRDA       2.80  TRANSPOSITION DRAINAGE AREA

47 PI            PRECIPITATION PATTERN
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00     .00     .01     .01     .01     .01     .01     .01     .03
                  .03     .03     .07     .07     .07     .08     .08     .08     .05     .05
                  .05     .02     .02     .02     .01     .01     .01     .00     .00     .00
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                  .00     .00

50 JD          INDEX STORM NO. 4
                     STRM       2.95  PRECIPITATION DEPTH
                     TRDA      16.00  TRANSPOSITION DRAINAGE AREA

51 PI            PRECIPITATION PATTERN
                  .01     .01     .00     .00     .00     .00     .00     .00     .00     .01
                  .01     .01     .00     .01     .00     .00     .00     .00     .00     .00
                  .00     .00     .01     .00     .00     .00     .00     .01     .01     .01
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                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .06      .06      .06      .07      .07      .07      .04      .04
                    .04      .02      .02      .02      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00

54 JD          INDEX STORM NO. 5
                    STRM        2.59  PRECIPITATION DEPTH
                    TRDA       90.00  TRANSPOSITION DRAINAGE AREA

55 PI           PRECIPITATION PATTERN
                    .01      .01      .01      .00      .00      .00      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .02      .02      .02      .03
                    .03      .03      .05      .05      .05      .05      .05      .05      .04      .04
                    .04      .02      .02      .02      .02      .02      .02      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S430	1207.	4.17	110.	27.	9.	.80		
+	ROUTED TO	430440	1057.	4.50	110.	27.	9.	.80		
+	HYDROGRAPH AT	S440	1237.	4.25	130.	32.	11.	1.07		
+	2 COMBINED AT	C440	1581.	4.42	213.	53.	18.	1.86		
+	ROUTED TO	440450	1402.	4.67	213.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1467.	4.58	279.	70.	23.	2.52		
+	HYDROGRAPH AT	S435	822.	4.08	57.	14.	5.	.39		
+	ROUTED TO	435450	443.	4.92	57.	14.	5.	.39		
+	3 COMBINED AT	C450	2589.	4.67	463.	116.	39.	4.78		
+	HYDROGRAPH AT	S400	1019.	4.50	193.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	638.	4.42	97.	24.	8.	.64		
+	2 COMBINED AT	C410	1372.	4.50	262.	66.	22.	2.18		
+	ROUTED TO	RR410	125.	6.08	116.	65.	22.	2.18		
+	ROUTED TO	410415	125.	6.50	115.	65.	22.	2.18		
+	HYDROGRAPH AT	S415	791.	4.17	61.	15.	5.	.45		
+	2 COMBINED AT	C415	422.	4.17	137.	74.	25.	2.63		
+	ROUTED TO	415420	165.	5.75	121.	73.	25.	2.63		
+	HYDROGRAPH AT	S420	1576.	4.33	200.	50.	17.	1.77		
+	2 COMBINED AT	C420	1227.	4.33	252.	108.	37.	4.40		
+	HYDROGRAPH AT	S500	1743.	4.75	454.	115.	38.	3.64		
+	ROUTED TO	RR500	181.	6.92	171.	109.	38.	3.64		
+	ROUTED TO	500510	180.	8.08	168.	108.	38.	3.64		
	HYDROGRAPH AT									

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+                          S510      1844.   4.25        216.        54.        18.      1.84
        2 COMBINED AT
+                          C510      1384.   4.25        271.       145.        51.      5.48
        ROUTED TO
+                        510520       689.   5.42        227.       139.        51.      5.48
        HYDROGRAPH AT
+                          S520      1272.   4.42        183.        46.        15.      1.48
        2 COMBINED AT
+                          C520       890.   4.42        324.       166.        60.      6.96
        HYDROGRAPH AT
+                          S530      1563.   4.50        258.        64.        21.      2.23

*** NORMAL END OF HEC-1 ***
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1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   19APR06  TIME  15:11:36  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                          PAGE  1

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
  2           ID      - HASSAYAMPA SUB-AREA
  3           ID      - ALTERNATIVE B43
  4           ID
  5           ID   Alternative Description
  6           ID   The purpose of Alternative B is to capture the upstream flow at the
  7           ID   apex using online detention basins.  The presence of the detention basins
  8           ID   eliminates the downstream alluvial fan uncertainties by controlling the
  9           ID   flow from the apices to the outfall.  Alternative B4-3 is based on using a
 10           ID   relatively larger on-line detention basin at the apex accompanied by smaller
 11           ID   leveed channel sections in the down fan direction.  It is the third of three
 12           ID   corridor alignments considered as part of the Alternative B4 series.
 13           ID
 14           ID
 15           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
 16           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
 17           ID   MODELER: TED LEHMAN
 18           ID   FILENAME: A4_EX24.DAT
 19           ID
 20           ID   100-YEAR 24-HOUR MODEL
 21           ID   EXISTING CONDITIONS
 22           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
 23           ID           MODELED AREA = 76.8 SQ. MILES
 24           ID
 25           ID   GREEN-AMPT LOSS METHOD
 26           ID   S-GRAPH UNIT HYDROGRAPHS
 27           ID     - MOUNTAIN
 28           ID     - DESERT/RANGELAND
 29           ID   NORMAL-DEPTH CHANNEL ROUTING
 30           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
 31           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
 32           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
 33           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
 34           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
 35           IT       5  1JAN99    1200    2000
 36           IN      15
 37           IO       5
              *DIAGRAM
              *
 38           JD   4.198  0.1000
 39           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
 40           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
 41           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
 42           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
 43           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
 44           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
 45           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
 46           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
 47           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
 48           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
 49           JD   3.990    10.0
              *
1                                          HEC-1 INPUT                                          PAGE  2

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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KK    S430   BASIN
KM         Compute runoff from subbasin 430
BA   0.795
LG    0.35    0.35    4.55    0.35       0
UI     127     515     918    1163    1116     779     521     349     228     153
UI     100      72      30      30      30       0       0       0       0       0
*

KK  430440   ROUTE
KM         Route flows from Sun Valley Parkway through S440.
RS       7    FLOW      -1
RC   0.035   0.035   0.035   13256  0.0128  106.00
RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
*

KK    S440   BASIN
KM         Compute runoff from subbasin 440
BA   1.068
LG    0.35    0.35    4.20    0.43       0
UI     137     414     838    1167    1323    1221     910     657     468     330
UI     240     168     118      95      46      33      35      33      34       0
*

KK    C440 COMBINE
KM         Combine runoff from S440 with routed flows from Sun Valley Parkway.
HC       2
*

KK  440450   ROUTE
KM         Route combined flows to the Hassayampa River.
RS       3    FLOW      -1
RC   0.035   0.040   0.035    4154  0.0104
RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
*

KK    S450   BASIN
KM         Compute runoff from subbasin 450
BA   2.521
LG    0.23    0.35    4.25    0.42       0
UI     167     169     381     664     938    1152    1392    1514    1599    1599
UI    1528    1333    1142     951     803     683     567     481     395     336
UI     287     255     184     177     130     116     115      88      41      41
UI      41      41      41      41      41      40      41       0       0       0
*

KK    S435   BASIN
KM         Compute runoff from subbasin 435
BA   0.393
LG    0.35    0.35    4.45    0.37       0
UI     130     505     775     686     414     231     134      75      42      20
UI      20       0       0       0       0       0       0       0       0       0
*
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  435450   ROUTE
KM         Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
RS      10    FLOW      -1
RC   0.045   0.035   0.045   18781  0.0119    0.00
RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
*

KK    C450 COMBINE
KM         Combine flows from S430, S435, S440, and S450 at Hassayampa River
HC       3
*

KK    S400   BASIN
KM         Compute runoff from subbasin 400
BA   1.544
LG    0.25    0.35    4.20    0.43       3
UI     106     106     252     429     616     729     819    1050    1206     793
UI     665     601     543     493     440     385     339     276     254     239
UI     212     174     144     133     116     116      82      81      81      52
UI      51      53      51      39      21      20      20      21      20      20
UI      20      21      20      20      20       0       0       0       0       0
*

KK    S410   BASIN
KM         Compute runoff from subbasin 410
BA   0.639
LG    0.15    0.35    3.85    0.43       3
UI      53      70     177     290     367     429     593     473     342     300
UI     268     232     202     173     136     126     115      89      72      65
UI      58      47      41      38      26      26      26      19      11      10
UI      10      10      11      10      10      10      11       0       0       0
*

KK    C410 COMBINE
KM         Combine runoff from S400 and S410
```

```
119          HC       2
             *

120          KK   RR410 STORAGE
121          KM   PROPOSED DETENTION BASIN
122          KM    ROUTE COMBINED FLOW AT APEX 4 THROUGH PROPOSED DETENTION BASIN
123          KM     outlet assumed a 2 ft pipe
124          KM    STRUCTURE ID:RR410
125          KM    DIMENSIONS: L=1200ft, W=600ft, D=9ft, Sideslope (?H:1V)= 3,  Vol.= 116.7 ac-
126          RS       1    STOR       0
127          SV     0.0    13.8    42.0    71.2    86.1   101.3   116.7   132.4   148.3   164.4
128          SE     0.0     1.0     3.0     5.0     6.0     7.0     8.0     9.0    10.0    11.0
129          SQ     0.0    46.3    80.2   103.6   113.5   122.6   131.0   139.0   146.5   153.6
             *
1                                          HEC-1 INPUT                                          PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

130          KK  410415   ROUTE
131          KM   PROPOSED CHANNEL
132          KM    STRUCTURE ID(s): RR41010, C41510
133          KM    Slope=(1533.5 - 1432.7) / 7128.5
134          RS      10    FLOW      -1
135          RC   0.045   0.045   0.045  7128.50.014139   105.0
136          RX     0.0    15.0    15.0    15.0    75.0    75.0    75.0    90.0
137          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
             *

138          KK    S415   BASIN
139          KM        Compute runoff from subbasin 415
140          BA   0.451
141          LG    0.35    0.35    3.64    0.49       0
142          UI      92     356     623     728     617     389     253     161     101      65
143          UI      44      18      19      19       0       0       0       0       0       0
             *

144          KK    C415 COMBINE
145          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
146          HC       2
             *

147          KK  415420   ROUTE
148          KM   PROPOSED CHANNEL
149          KM        Route flow from Sun Valley Parkway to Hassayampa River.
150          KM    STRUCTURE ID(s): RR41510, C42010, C42020
151          KM    Slope=(1432.5 - 1191.3) / 17970.9
152          RS      10    FLOW      -1
153          RC   0.045   0.045   0.045 17970.90.013422   105.0
154          RX     0.0    15.0    15.0    15.0   155.0   155.0   155.0   170.0
155          RY   105.0   100.0   100.0   100.0   100.0   100.0   100.0   105.0
             *

156          KK    S420   BASIN
157          KM        Compute runoff from subbasin 420
158          BA   1.767
159          LG    0.35    0.35    4.30    0.41       0
160          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
161          UI     582     417     328     242     183     132     115      47      47      48
162          UI      47      47       0       0       0       0       0       0       0       0
             *

163          KK    C420 COMBINE
164          KM        Combine flows from S400, S410, S415, S420 at Hassayampa River
165          HC       2
             *

166          KK    S500   BASIN
167          KM        Compute runoff from subbasin 500
168          BA   3.638
169          LG    0.25    0.35    3.92    0.41       9
170          UI     184     186     184     515     713     935    1143    1294    1413    1581
171          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
1                                          HEC-1 INPUT                                          PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

172          UI     716     629     568     487     456     435     408     387     311     297
173          UI     237     239     212     201     204     146     142     143     141      94
174          UI      91      90      90      92      90      51      35      36      35      36
             *

175          KK   RR500 STORAGE
176          KM   PROPOSED DETENTION BASIN
177          KM    ROUTE COMBINED FLOW AT APEX 5 THROUGH PROPOSED DETENTION BASIN
178          KM     outlet assumed a 2 ft pipe
179          KM    STRUCTURE ID:RR500
180          KM    DIMENSIONS: L=1300ft, W=800ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 204.4 ac
181          RS       1    STOR       0
182          SV     0.0    38.7    78.5   119.4   161.3   182.7   204.4   226.3   248.5   271.0
183          SE     0.0     2.0     4.0     6.0     8.0     9.0    10.0    11.0    12.0    13.0
184          SQ     0.0    85.6   121.0   148.2   171.1   181.5   191.3   200.7   209.6   218.2
             *

185          KK  500510   ROUTE
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```
186          KM   PROPOSED CHANNEL
187          KM    ROUTE FLOW FROM S500 TO C510 IN NEW CHANNEL
188          KM    STRUCTURE ID(s): C51010, C51020, C51030, C51040
189          KM    Slope=(1666.0 - 1424.5) / 13527.8
190          RS       8    FLOW      -1
191          RC   0.045   0.045   0.045 13527.80.017858   104.5
192          RX     0.0    13.5    13.5    13.5   313.5   313.5   313.5   327.0
193          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *

194          KK    S510   BASIN
195          KM        Compute runoff from subbasin 510
196          BA   1.840
197          LG    0.35    0.35    3.95    0.40       0
198          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
199          UI     433     307     220     160     106      57      58      56      57       0
             *

200          KK    C510
201          KM    COMBINE S500 AND S510 AT SUN VALLEY PARKWAY
202          HC       2
             *

203          KK  510520   ROUTE
204          KM   PROPOSED CHANNEL
205          KM    ROUTE FLOW FROM C510 TO C520 IN NEW CHANNEL
206          KM    STRUCTURE ID(s): RR51025, RR51030
207          KM    Slope=(1421.8 - 1174.3) / 20814.0
208          RS       8    FLOW      -1
209          RC   0.045   0.045   0.045 20814.00.011891   104.5
210          RX     0.0    13.5    13.5    13.5   213.5   213.5   213.5   227.0
211          RY   104.5   100.0   100.0   100.0   100.0   100.0   100.0   104.5
             *
1                                          HEC-1 INPUT                                          PAGE  6

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


212          KK    S520   BASIN
213          KM        Compute runoff from subbasin 520
214          BA   1.481
215          LG    0.35    0.35    4.50    0.36       0
216          UI     133     206     510     780    1043    1196    1285    1241    1061     847
217          UI     672     531     420     330     262     210     159     135      91      93
218          UI      54      33      33      32      33      32      33       0       0       0
             *

219          KK    C520 COMBINE
220          KM    COMBINE FLOWS AT THE HASSAYAMPA RIVER AT C520
221          HC       2
             *

222          KK    S530   BASIN
223          KM        Compute runoff from subbasin 530
224          BA   2.226
225          LG    0.20    0.35    4.30    0.41       0
226          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
227          UI    1198     964     787     657     513     417     348     283     227     189
228          UI     141     120     122      56      43      43      43      43      43      43
229          UI      43       0       0       0       0       0       0       0       0       0
230          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    50        S430
                 V
                 V
    56      430440
                 .
                 .
    62           .        S440
                 .           .
                 .           .
    68        C440............
                 V
                 V
    71      440450
                 .
                 .
    77           .        S450
                 .           .
                 .           .
    85           .           .        S435
                 .           .           V
                 .           .           V
    91           .           .      435450
                 .           .           .
                 .           .           .
    97        C450........................
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```
  100          .        S400
               .           .
               .           .
  109          .           .        S410
               .           .           .
               .           .           .
  117          .        C410............
               .           V
               .           V
  120          .       RR410
               .           V
               .           V
  130          .      410415
               .           .
               .           .
  138          .           .        S415
               .           .           .
               .           .           .
  144          .        C415............
               .           V
               .           V
  147          .      415420
               .           .
               .           .
  156          .           .        S420
               .           .           .
               .           .           .
  163          .        C420............
               .           .
               .           .
  166          .           .        S500
               .           .           V
               .           .           V
  175          .           .       RR500
               .           .           V
               .           .           V
  185          .           .      500510
               .           .           .
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  194          .           .           .        S510
               .           .           .           .
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  200          .           .        C510............
               .           .           V
               .           .           V
  203          .           .      510520
               .           .           .
               .           .           .
  212          .           .           .        S520
               .           .           .           .
               .           .           .           .
  219          .           .        C520............
               .           .           .
               .           .           .
  222          .           .           .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   19APR06  TIME  15:11:36  *
*                                      *
****************************************
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE B43

Alternative Description
The purpose of Alternative B is to capture the upstream flow at the apex using online detention basins. The presence of the detention basins eliminates the downstream alluvial fan uncertainties by controlling the flow from the apices to the outfall. Alternative B4-3 is based on using a relatively larger on-line detention basin at the apex accompanied by smaller leveed channel sections in the down fan direction. It is the third of three corridor alignments considered as part of the Alternative B4 series.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_BX24.DAT

100-YEAR 24-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES
MODELED AREA = 76.8 SQ. MILES

GREEN-AMPT LOSS METHOD
S-GRAPH UNIT HYDROGRAPHS
- MOUNTAIN
- DESERT/RANGELAND
NORMAL-DEPTH CHANNEL ROUTING
LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
- UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
- HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
- MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

37 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1JAN99 STARTING DATE
ITIME 1200 STARTING TIME
NQ 2000 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 8JAN99 ENDING DATE
NDTIME 1035 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 166.58 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

38 JD INDEX STORM NO. 1
STRM 4.20 PRECIPITATION DEPTH
TRDA .10 TRANSPOSITION DRAINAGE AREA

39 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
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49 JD INDEX STORM NO. 2
STRM 3.99 PRECIPITATION DEPTH
TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S430	1090.	12.17	95.	24.	8.	.80		
+	ROUTED TO	430440	932.	12.50	95.	24.	8.	.80		
+	HYDROGRAPH AT	S440	1205.	12.25	119.	30.	10.	1.07		
+	2 COMBINED AT	C440	1700.	12.42	211.	53.	18.	1.86		
+	ROUTED TO	440450	1502.	12.58	211.	53.	18.	1.86		
+	HYDROGRAPH AT	S450	1624.	12.58	287.	72.	24.	2.52		
+	HYDROGRAPH AT	S435	656.	12.08	47.	12.	4.	.39		
+	ROUTED TO	435450	378.	12.83	47.	12.	4.	.39		
+	3 COMBINED AT	C450	3338.	12.67	536.	134.	45.	4.78		
+	HYDROGRAPH AT	S400	1047.	12.50	184.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	526.	12.42	80.	21.	7.	.64		
+	2 COMBINED AT	C410	1524.	12.50	262.	67.	23.	2.18		
+	ROUTED TO	RR410	125.	14.08	116.	66.	23.	2.18		
+	ROUTED TO	410415	125.	14.50	116.	66.	23.	2.18		
+	HYDROGRAPH AT	S415	624.	12.17	50.	13.	4.	.45		
+	2 COMBINED AT	C415	609.	12.17	144.	78.	26.	2.63		
+	ROUTED TO	415420	191.	13.50	126.	77.	26.	2.63		
+	HYDROGRAPH AT	S420	1740.	12.33	198.	50.	17.	1.77		
+	2 COMBINED AT	C420	1714.	12.33	293.	124.	42.	4.40		
+	HYDROGRAPH AT	S500	2063.	12.75	476.	129.	43.	3.64		
+	ROUTED TO	RR500	186.	15.00	177.	119.	43.	3.64		
+	ROUTED TO	500510	186.	16.08	175.	119.	43.	3.64		
+	HYDROGRAPH AT	S510	2099.	12.25	213.	53.	18.	1.84		
+	2 COMBINED AT	C510	2072.	12.25	315.	168.	60.	5.48		
+	ROUTED TO	510520	965.	13.25	269.	161.	60.	5.48		

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          HYDROGRAPH AT
+                         S520     1288.   12.42        174.        43.        14.       1.48

          2 COMBINED AT
+                         C520     1260.   12.42        407.       200.        74.       6.96

          HYDROGRAPH AT
+                         S530     1697.   12.50        257.        64.        21.       2.23

 *** NORMAL END OF HEC-1 ***
```

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1*************************************                    *************************************
 *                                   *                    *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS     *
 *              JUN   1998           *                    *   HYDROLOGIC ENGINEERING CENTER   *
 *           VERSION 4.1             *                    *         609 SECOND STREET         *
 *                                   *                    *      DAVIS, CALIFORNIA 95616      *
 *  RUN DATE   19APR06  TIME  15:16:18   *                    *          (916) 756-1104           *
 *                                   *                    *                                   *
 *************************************                    *************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X        XXXXX  X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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1                                                HEC-1 INPUT                                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         1          ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
         2          ID      - HASSAYAMPA SUB-AREA
         3          ID      - ALTERNATIVE C - Concrete Channels, sediment basins only
         4          ID          except for offline basin at Sun Valley Parkway
         5          ID
         6          ID   Alternative Description
         7          ID   Alternative C is based on the concept of an excavated concrete-lined
         8          ID   channel from the apex to the outfall, without providing any detention
         9          ID   basin is at the apex.  To address sedimentation associated with the
        10          ID   alluvial fan systems, sedimentation basins are provided throughout the
        11          ID   system.  The excavated concrete channels are complemented with a 120-foot
        12          ID   wide adjacent riparian preservation corridor.
        13          ID
        14          ID
        15          ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
        16          ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
        17          ID   MODELER: TED LEHMAN
        18          ID   FILENAME: A4_EX6.DAT
        19          ID
        20          ID   100-YEAR 6-HOUR MODEL
        21          ID   EXISTING CONDITIONS
        22          ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
        23          ID           MODELED AREA = 76.8 SQ. MILES
        24          ID
        25          ID   GREEN-AMPT LOSS METHOD
        26          ID   S-GRAPH UNIT HYDROGRAPHS
        27          ID     - MOUNTAIN
        28          ID     - DESERT/RANGELAND
        29          ID   NORMAL-DEPTH CHANNEL ROUTING
        30          ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
        31          ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
        32          ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
        33          ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
        34          ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
        35          IT       5  1JAN99    1200    2000
        36          IN      15
        37          IO       5
                    *DIAGRAM
                    *
        38          JD   3.196  0.1000
        39          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
        40          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
        41          PC   0.962   0.972   0.983   0.991   1.000
        42          JD   3.181  0.5000
        43          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
        44          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
        45          PC   0.962   0.972   0.983   0.991   1.000
        46          JD   3.120     2.8
        47          PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
        48          PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
        49          PC   0.950   0.963   0.975   0.988   1.000
        50          JD   2.950    16.0
        51          PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
        52          PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
        53          PC   0.946   0.960   0.973   0.987   1.000
1                                                HEC-1 INPUT                                                    PAGE  2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  54          JD   2.592    90.0
  55          PC   0.000   0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
  56          PC   0.179   0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
  57          PC   0.927   0.945   0.964   0.982   1.000
              *

  58          KK    S400   BASIN
  59          KM        Compute runoff from subbasin 400
  60          BA   1.544
  61          LG    0.25    0.35    4.20    0.43       3
  62          UI     106     106     252     429     616     729     819    1050    1206     793
  63          UI     665     601     543     493     440     385     339     276     254     239
  64          UI     212     174     144     133     116     116      82      81      81      52
  65          UI      51      53      51      39      21      20      20      21      20      20
  66          UI      20      21      20      20      20       0       0       0       0       0
              *

  67          KK    S410   BASIN
  68          KM        Compute runoff from subbasin 410
  69          BA   0.639
  70          LG    0.15    0.35    3.85    0.43       3
  71          UI      53      70     177     290     367     429     593     473     342     300
  72          UI     268     232     202     173     136     126     115      89      72      65
  73          UI      58      47      41      38      26      26      26      19      11      10
  74          UI      10      10      11      10      10      10      11       0       0       0
              *

  75          KK    C410 COMBINE
  76          KM        Combine runoff from S400 and S410
  77          HC       2
              *

  78          KK  410415   ROUTE
  79          KM   PROPOSED CHANNEL
  80          KM    STRUCTURE ID(s): RR41010, C41510
  81          KM    Slope=(1533.5 - 1432.7) / 7128.5
  82          RS      10    FLOW      -1
  83          RC    0.02    0.02    0.02  7128.50.014139   104.0
  84          RX     0.0    12.0    57.0    63.0   103.0   109.0   154.0   166.0
  85          RY   104.0   100.0   100.0    98.0    98.0   100.0   100.0   104.0
              *

  86          KK    S415   BASIN
  87          KM        Compute runoff from subbasin 415
  88          BA   0.451
  89          LG    0.35    0.35    3.64    0.49       0
  90          UI      92     356     623     728     617     389     253     161     101      65
  91          UI      44      18      19      19       0       0       0       0       0       0
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  92          KK   C415R COMBINE
  93          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
  94          HC       2
              *

  95          KK    S500   BASIN
  96          KM        Compute runoff from subbasin 500
  97          BA   3.638
  98          LG    0.25    0.35    3.92    0.41       9
  99          UI     184     186     184     515     713     935    1143    1294    1413    1581
 100          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
 101          UI     716     629     568     487     456     435     408     387     311     297
 102          UI     237     239     212     201     204     146     142     143     141      94
 103          UI      91      90      90      92      90      51      35      36      35      36
              *

 104          KK  500415   ROUTE
 105          KM   PROPOSED CHANNEL
 106          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
 107          KM    STRUCTURE ID(s): C51010, C51020, C51060
 108          KM    Slope=(1666.0 - 1454.2) / 12379.2
 109          RS       8    FLOW      -1
 110          RC    0.02    0.02    0.02 12379.2 0.01711   104.0
 111          RX     0.0    12.0    52.0    58.0    88.0    94.0   134.0   146.0
 112          RY   104.0   100.0   100.0    98.0    98.0   100.0   100.0   104.0
              *

 113          KK    S510   BASIN
 114          KM        Compute runoff from subbasin 510
 115          BA   1.840
 116          LG    0.35    0.35    3.95    0.40       0
 117          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
 118          UI     433     307     220     160     106      57      58      56      57       0
              *

 119          KK   C415L COMBINE
 120          KM    COMBINE S500 AND S510 AT C415
 121          HC       2
              *
```

```
 122          KK    C415 COMBINE
 123          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
 124          HC       2
              *

 125          KK    D415  DIVERT
 126          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
 127          KM    STRUCTURE ID:D415
 128          KM    DIMENSIONS: L=1200ft, W=780ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 189.5 ac
 129          DT   D415O
 130          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
 131          DI  4000.0     0.0
 132          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
 133          DQ  2769.0     0.0
              *
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 134          KK  415420   ROUTE
 135          KM   PROPOSED CHANNEL
 136          KM        Route flow from Sun Valley Parkway to Hassayampa River.
 137          KM    STRUCTURE ID(s): RR41510, C42010, C42020
 138          KM    Slope=(1432.5 - 1191.3) / 17970.9
 139          RS      10     FLOW      -1
 140          RC    0.02    0.02    0.02 17970.90.013422   104.5
 141          RX     0.0    13.5    48.5    54.5    79.5    85.5   120.5   134.0
 142          RY   104.5   100.0   100.0    98.0    98.0   100.0   100.0   104.5
              *

 143          KK    S420   BASIN
 144          KM        Compute runoff from subbasin 420
 145          BA   1.767
 146          LG    0.35    0.35    4.30    0.41       0
 147          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
 148          UI     582     417     328     242     183     132     115      47      47      48
 149          UI      47      47       0       0       0       0       0       0       0       0
              *

 150          KK    C420 COMBINE
 151          KM        Combine flows from S400, S410, S415, S420
 152          KM         AND S500 AND S510 at Hassayampa River
 153          HC       2
              *

 154          KK    S430   BASIN
 155          KM        Compute runoff from subbasin 430
 156          BA   0.795
 157          LG    0.35    0.35    4.55    0.35       0
 158          UI     127     515     918    1163    1116     779     521     349     228     153
 159          UI     100      72      30      30      30       0       0       0       0       0
              *

 160          KK  430440   ROUTE
 161          KM        Route flows from Sun Valley Parkway through S440.
 162          RS       7     FLOW      -1
 163          RC   0.035   0.035   0.035   13256  0.0128  106.00
 164          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
 165          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
              *

 166          KK    S440   BASIN
 167          KM        Compute runoff from subbasin 440
 168          BA   1.068
 169          LG    0.35    0.35    4.20    0.43       0
 170          UI     137     414     838    1167    1323    1221     910     657     468     330
 171          UI     240     168     118      95      46      33      35      33      34       0
              *
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 172          KK    C440 COMBINE
 173          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
 174          HC       2
              *

 175          KK  440450   ROUTE
 176          KM        Route combined flows to the Hassayampa River.
 177          RS       3     FLOW      -1
 178          RC   0.035   0.040   0.035    4154  0.0104
 179          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
 180          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
              *

 181          KK    S450   BASIN
 182          KM        Compute runoff from subbasin 450
 183          BA   2.521
 184          LG    0.23    0.35    4.25    0.42       0
 185          UI     167     169     381     664     938    1152    1392    1514    1599    1599
 186          UI    1528    1333    1142     951     803     683     567     481     395     336
 187          UI     287     255     184     177     130     116     115      88      41      41
```

```
188          UI      41      41      41      41      41      40      41       0       0       0
             *

189          KK    S435   BASIN
190          KM         Compute runoff from subbasin 435
191          BA   0.393
192          LG    0.35    0.35    4.45    0.37       0
193          UI     130     505     775     686     414     231     134      75      42      20
194          UI      20       0       0       0       0       0       0       0       0       0
             *

195          KK  435450   ROUTE
196          KM         Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
197          RS      10    FLOW      -1
198          RC   0.045   0.035   0.045   18781  0.0119    0.00
199          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
200          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *

201          KK    C450 COMBINE
202          KM         Combine flows from S430, S435, S440, and S450 at Hassayampa River
203          HC       3
             *

204          KK    S520   BASIN
205          KM         Compute runoff from subbasin 520
206          BA   1.481
207          LG    0.35    0.35    4.50    0.36       0
208          UI     133     206     510     780    1043    1196    1285    1241    1061     847
209          UI     672     531     420     330     262     210     159     135      91      93
210          UI      54      33      33      32      33      32      33       0       0       0
             *
1                                                HEC-1 INPUT                                          PAGE  6

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

211          KK    S530   BASIN
212          KM         Compute runoff from subbasin 530
213          BA   2.226
214          LG    0.20    0.35    4.30    0.41       0
215          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
216          UI    1198     964     787     657     513     417     348     283     227     189
217          UI     141     120     122      56      43      43      43      43      43      43
218          UI      43       0       0       0       0       0       0       0       0       0
219          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    58       S400
                .
                .
    67          .        S410
                .           .
                .           .
    75       C410...........
                V
                V
    78      410415
                .
                .
    86          .        S415
                .           .
                .           .
    92      C415R...........
                .
                .
    95          .        S500
                .           V
                .           V
   104          .      500415
                .           .
                .           .
   113          .           .        S510
                .           .           .
                .           .           .
   119          .      C415L...........
                .           .
                .           .
   122       C415...........
                .
                .
   129          .-------->   D4150
   125       D415
                V
                V
   134      415420
                .
                .
   143          .        S420
                .           .
```

```
                .          .
150         C420............
                .
                .
154             .       S430
                .          V
                .          V
160             .     430440
                .          .
                .          .
166             .          .       S440
                .          .          .
                .          .          .
172             .       C440............
                .          V
                .          V
175             .     440450
                .          .
                .          .
181             .          .       S450
                .          .          .
                .          .          .
189             .          .          .       S435
                .          .          .          V
                .          .          .          V
195             .          .          .     435450
                .          .          .          .
                .          .          .          .
201             .       C450........................
                .          .
                .          .
204             .          .       S520
                .          .          .
                .          .          .
211             .          .          .       S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   19APR06  TIME  15:16:18  *                    *          (916) 756-1104              *
*                                      *                    *                                      *
****************************************                    ****************************************
```

```
HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
  - HASSAYAMPA SUB-AREA
  - ALTERNATIVE C - Concrete Channels, sediment basins only
      except for offline basin at Sun Valley Parkway

Alternative Description
Alternative C is based on the concept of an excavated concrete-lined
channel from the apex to the outfall, without providing any detention
basin is at the apex.  To address sedimentation associated with the
alluvial fan systems, sedimentation basins are provided throughout the
system.  The excavated concrete channels are complemented with a 120-foot
wide adjacent riparian preservation corridor.


SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX6.DAT

100-YEAR 6-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES
         MODELED AREA = 76.8 SQ. MILES

GREEN-AMPT LOSS METHOD
S-GRAPH UNIT HYDROGRAPHS
  - MOUNTAIN
  - DESERT/RANGELAND
NORMAL-DEPTH CHANNEL ROUTING
LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
  - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
  - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
  - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

37 IO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN           5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1JAN99  STARTING DATE
                     ITIME        1200  STARTING TIME
```

```
                NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
            NDDATE      8JAN99  ENDING DATE
            NDTIME        1035  ENDING TIME
             ICENT          19  CENTURY MARK

        COMPUTATION INTERVAL      .08 HOURS
            TOTAL TIME BASE  166.58 HOURS

    ENGLISH UNITS
        DRAINAGE AREA          SQUARE MILES
        PRECIPITATION DEPTH    INCHES
        LENGTH, ELEVATION      FEET
        FLOW                   CUBIC FEET PER SECOND
        STORAGE VOLUME         ACRE-FEET
        SURFACE AREA           ACRES
        TEMPERATURE            DEGREES FAHRENHEIT

38 JD      INDEX STORM NO. 1
              STRM        3.20  PRECIPITATION DEPTH
              TRDA         .10  TRANSPOSITION DRAINAGE AREA

39 PI        PRECIPITATION PATTERN
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
              .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
              .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00

42 JD      INDEX STORM NO. 2
              STRM        3.18  PRECIPITATION DEPTH
              TRDA         .50  TRANSPOSITION DRAINAGE AREA

43 PI        PRECIPITATION PATTERN
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
              .03       .03       .05       .05       .05       .15       .15       .15       .03       .03
              .03       .01       .01       .01       .01       .01       .01       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00

46 JD      INDEX STORM NO. 3
              STRM        3.12  PRECIPITATION DEPTH
              TRDA        2.80  TRANSPOSITION DRAINAGE AREA

47 PI        PRECIPITATION PATTERN
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00       .00       .01       .01       .01       .01       .01       .01       .03
              .03       .03       .07       .07       .07       .08       .08       .08       .05       .05
              .05       .02       .02       .02       .01       .01       .01       .00       .00       .00
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00

50 JD      INDEX STORM NO. 4
              STRM        2.95  PRECIPITATION DEPTH
              TRDA       16.00  TRANSPOSITION DRAINAGE AREA

51 PI        PRECIPITATION PATTERN
              .01       .01       .00       .00       .00       .00       .00       .00       .00       .01
              .01       .01       .00       .01       .00       .00       .00       .00       .00       .00
              .00       .00       .01       .00       .00       .00       .00       .01       .01       .01
              .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
              .03       .03       .06       .06       .06       .07       .07       .07       .04       .04
              .04       .02       .02       .02       .01       .01       .01       .01       .01       .01
              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
              .00       .00

54 JD      INDEX STORM NO. 5
              STRM        2.59  PRECIPITATION DEPTH
              TRDA       90.00  TRANSPOSITION DRAINAGE AREA

55 PI        PRECIPITATION PATTERN
              .01       .01       .01       .00       .00       .00       .01       .01       .01       .01
              .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
              .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
              .01       .01       .01       .01       .01       .01       .02       .02       .02       .03
              .03       .03       .05       .05       .05       .05       .05       .05       .04       .04
              .04       .02       .02       .02       .02       .02       .02       .01       .01       .01
              .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
              .01       .01
1
                                          RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                 TIME IN HOURS,  AREA IN SQUARE MILES

                                 PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
        OPERATION       STATION  FLOW    PEAK                                            AREA      STAGE     MAX STAGE
+                                                     6-HOUR     24-HOUR     72-HOUR
```

+	HYDROGRAPH AT	S400	1019.	4.50	193.	48.	16.	1.54
+	HYDROGRAPH AT	S410	638.	4.42	97.	24.	8.	.64
+	2 COMBINED AT	C410	1372.	4.50	262.	66.	22.	2.18
+	ROUTED TO	410415	1344.	4.67	262.	66.	22.	2.18
+	HYDROGRAPH AT	S415	791.	4.17	61.	15.	5.	.45
+	2 COMBINED AT	C415R	1370.	4.58	298.	75.	25.	2.63
+	HYDROGRAPH AT	S500	1743.	4.75	454.	115.	38.	3.64
+	ROUTED TO	500415	1703.	5.00	453.	115.	38.	3.64
+	HYDROGRAPH AT	S510	1844.	4.25	216.	54.	18.	1.84
+	2 COMBINED AT	C415L	2017.	4.42	603.	152.	51.	5.48
+	2 COMBINED AT	C415	2953.	4.42	803.	202.	67.	8.11
+	DIVERSION TO	D415O	1722.	4.42	272.	68.	23.	8.11
+	HYDROGRAPH AT	D415	1231.	4.08	530.	134.	45.	8.11
+	ROUTED TO	415420	1233.	4.75	530.	134.	45.	8.11
+	HYDROGRAPH AT	S420	1576.	4.33	200.	50.	17.	1.77
+	2 COMBINED AT	C420	1957.	4.50	663.	168.	56.	9.88
+	HYDROGRAPH AT	S430	1207.	4.17	110.	27.	9.	.80
+	ROUTED TO	430440	1057.	4.50	110.	27.	9.	.80
+	HYDROGRAPH AT	S440	1237.	4.25	130.	32.	11.	1.07
+	2 COMBINED AT	C440	1581.	4.42	213.	53.	18.	1.86
+	ROUTED TO	440450	1402.	4.67	213.	53.	18.	1.86
+	HYDROGRAPH AT	S450	1467.	4.58	279.	70.	23.	2.52
+	HYDROGRAPH AT	S435	822.	4.08	57.	14.	5.	.39
+	ROUTED TO	435450	443.	4.92	57.	14.	5.	.39
+	3 COMBINED AT	C450	2589.	4.67	463.	116.	39.	4.78
+	HYDROGRAPH AT	S520	1272.	4.42	183.	46.	15.	1.48
+	HYDROGRAPH AT	S530	1563.	4.50	258.	64.	21.	2.23

*** NORMAL END OF HEC-1 ***

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   19APR06  TIME  15:16:18  *                    *         (916) 756-1104               *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X                X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X                X
                                        X     X  X        X     X          X
                                        X     X  XXXXXXX   XXXXX          XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                          PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID    HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
        2           ID      - HASSAYAMPA SUB-AREA
        3           ID      - ALTERNATIVE C - Concrete Channels, sediment basins only
        4           ID          except for offline basin at Sun Valley Parkway
        5           ID
        6           ID   Alternative Description
        7           ID   Alternative C is based on the concept of an excavated concrete-lined
        8           ID   channel from the apex to the outfall, without providing any detention
        9           ID   basin is at the apex.  To address sedimentation associated with the
       10           ID   alluvial fan systems, sedimentation basins are provided throughout the
       11           ID   system.  The excavated concrete channels are complemented with a 120-foot
       12           ID   wide adjacent riparian preservation corridor.
       13           ID
       14           ID
       15           ID   SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
       16           ID   JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
       17           ID   MODELER: TED LEHMAN
       18           ID   FILENAME: A4_EX24.DAT
       19           ID
       20           ID   100-YEAR 24-HOUR MODEL
       21           ID   EXISTING CONDITIONS
       22           ID   AREA 4 WATERSHED AREA = 90.5 SQ. MILES
       23           ID            MODELED AREA = 76.8 SQ. MILES
       24           ID
       25           ID   GREEN-AMPT LOSS METHOD
       26           ID   S-GRAPH UNIT HYDROGRAPHS
       27           ID     - MOUNTAIN
       28           ID     - DESERT/RANGELAND
       29           ID   NORMAL-DEPTH CHANNEL ROUTING
       30           ID   LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
       31           ID     - UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
       32           ID     - HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
       33           ID     - MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
       34           ID   SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)
       35           IT       5  1JAN99    1200    2000
       36           IN      15
       37           IO       5
                    *DIAGRAM
                    *
       38           JD   4.198  0.1000
       39           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
       40           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
       41           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
       42           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
       43           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
       44           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
       45           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
       46           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
       47           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
       48           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
       49           JD   3.990    10.0
                    *
1                                          HEC-1 INPUT                                          PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
 50          KK    S400   BASIN
 51          KM        Compute runoff from subbasin 400
 52          BA   1.544
 53          LG    0.25    0.35    4.20    0.43       3
 54          UI     106     106     252     429     616     729     819    1050    1206     793
 55          UI     665     601     543     493     440     385     339     276     254     239
 56          UI     212     174     144     133     116     116      82      81      81      52
 57          UI      51      53      51      39      21      20      20      21      20      20
 58          UI      20      21      20      20      20       0       0       0       0       0
             *

 59          KK    S410   BASIN
 60          KM        Compute runoff from subbasin 410
 61          BA   0.639
 62          LG    0.15    0.35    3.85    0.43       3
 63          UI      53      70     177     290     367     429     593     473     342     300
 64          UI     268     232     202     173     136     126     115      89      72      65
 65          UI      58      47      41      38      26      26      26      19      11      10
 66          UI      10      10      11      10      10      10      11       0       0       0
             *

 67          KK    C410 COMBINE
 68          KM        Combine runoff from S400 and S410
 69          HC       2
             *

 70          KK  410415   ROUTE
 71          KM   PROPOSED CHANNEL
 72          KM    STRUCTURE ID(s): RR41010, C41510
 73          KM    Slope=(1533.5 - 1432.7) / 7128.5
 74          RS      10    FLOW      -1
 75          RC    0.02    0.02    0.02  7128.50.014139   104.0
 76          RX     0.0    12.0    57.0    63.0   103.0   109.0   154.0   166.0
 77          RY   104.0   100.0   100.0    98.0    98.0   100.0   100.0   104.0
             *

 78          KK    S415   BASIN
 79          KM        Compute runoff from subbasin 415
 80          BA   0.451
 81          LG    0.35    0.35    3.64    0.49       0
 82          UI      92     356     623     728     617     389     253     161     101      65
 83          UI      44      18      19      19       0       0       0       0       0       0
             *

 84          KK   C415R COMBINE
 85          KM        Combine runoff FROM S400, S410, & S415 at Sun Valley Parkway
 86          HC       2
             *
```

1 HEC-1 INPUT PAGE 3

```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 87          KK    S500   BASIN
 88          KM        Compute runoff from subbasin 500
 89          BA   3.638
 90          LG    0.25    0.35    3.92    0.41       9
 91          UI     184     186     184     515     713     935    1143    1294    1413    1581
 92          UI    1968    2186    1462    1252    1119    1051     979     907     837     769
 93          UI     716     629     568     487     456     435     408     387     311     297
 94          UI     237     239     212     201     204     146     142     143     141      94
 95          UI      91      90      90      92      90      51      35      36      35      36
             *

 96          KK  500415   ROUTE
 97          KM   PROPOSED CHANNEL
 98          KM    ROUTE FLOW FROM S500 TO C415 IN NEW CHANNEL
 99          KM    STRUCTURE ID(s): C51010, C51020, C51060
100          KM    Slope=(1666.0 - 1454.2) / 12379.2
101          RS       8    FLOW      -1
102          RC    0.02    0.02    0.02 12379.2 0.01711   104.0
103          RX     0.0    12.0    52.0    58.0    88.0    94.0   134.0   146.0
104          RY   104.0   100.0   100.0    98.0    98.0   100.0   100.0   104.0
             *

105          KK    S510   BASIN
106          KM        Compute runoff from subbasin 510
107          BA   1.840
108          LG    0.35    0.35    3.95    0.40       0
109          UI     232     677    1390    1950    2228    2094    1604    1165     828     599
110          UI     433     307     220     160     106      57      58      56      57       0
             *

111          KK   C415L COMBINE
112          KM    COMBINE S500 AND S510 AT C415
113          HC       2
             *

114          KK    C415 COMBINE
115          KM    COMBINE ALL FLOW AT SUN VALLEY PARKWAY AT C415
116          HC       2
             *

117          KK    D415  DIVERT
118          KM   PROPOSED BASIN AT EXISTING CULVERT AT SUN VALLEY PARKWAY AT STA. 512+67
```

```
119          KM    STRUCTURE ID:D415
120          KM    DIMENSIONS: L=1200ft, W=780ft, D=11ft, Sideslope (?H:1V)= 3,  Vol.= 189.5 ac
121          DT   D4150
122          DI     0.0   200.0   400.0   600.0   800.0  1000.0  1231.0  1400.0  2000.0  3000.0
123          DI  4000.0     0.0
124          DQ     0.0     0.0     0.0     0.0     0.0     0.0     0.0   169.0   769.0  1769.0
125          DQ  2769.0     0.0
             *
1                                          HEC-1 INPUT                                          PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

126          KK  415420   ROUTE
127          KM   PROPOSED CHANNEL
128          KM        Route flow from Sun Valley Parkway to Hassayampa River.
129          KM    STRUCTURE ID(s): RR41510, C42010, C42020
130          KM    Slope=(1432.5 - 1191.3) / 17970.9
131          RS      10    FLOW      -1
132          RC    0.02    0.02    0.02 17970.90.013422   104.5
133          RX     0.0    13.5    48.5    54.5    79.5    85.5   120.5   134.0
134          RY   104.5   100.0   100.0    98.0    98.0   100.0   100.0   104.5
             *

135          KK    S420   BASIN
136          KM        Compute runoff from subbasin 420
137          BA   1.767
138          LG    0.35    0.35    4.30    0.41       0
139          UI     193     427     964    1407    1752    1846    1712    1346    1015     760
140          UI     582     417     328     242     183     132     115      47      47      48
141          UI      47      47       0       0       0       0       0       0       0       0
             *

142          KK    C420 COMBINE
143          KM        Combine flows from S400, S410, S415, S420
144          KM         AND S500 AND S510 at Hassayampa River
145          HC       2
             *

146          KK    S430   BASIN
147          KM        Compute runoff from subbasin 430
148          BA   0.795
149          LG    0.35    0.35    4.55    0.35       0
150          UI     127     515     918    1163    1116     779     521     349     228     153
151          UI     100      72      30      30      30       0       0       0       0       0
             *

152          KK  430440   ROUTE
153          KM        Route flows from Sun Valley Parkway through S440.
154          RS       7    FLOW      -1
155          RC   0.035   0.035   0.035   13256  0.0128  106.00
156          RX    0.00   16.00   32.00   38.00   68.00   74.00   90.00  106.00
157          RY  106.00  104.50  103.00  100.00  100.00  103.00  104.50  106.00
             *

158          KK    S440   BASIN
159          KM        Compute runoff from subbasin 440
160          BA   1.068
161          LG    0.35    0.35    4.20    0.43       0
162          UI     137     414     838    1167    1323    1221     910     657     468     330
163          UI     240     168     118      95      46      33      35      33      34       0
             *
1                                          HEC-1 INPUT                                          PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

164          KK    C440 COMBINE
165          KM        Combine runoff from S440 with routed flows from Sun Valley Parkway.
166          HC       2
             *

167          KK  440450   ROUTE
168          KM        Route combined flows to the Hassayampa River.
169          RS       3    FLOW      -1
170          RC   0.035   0.040   0.035    4154  0.0104
171          RX    0.00  150.00  300.00  303.00  333.00  336.00  486.00  636.00
172          RY  104.00  101.50  101.00  100.00  100.00  101.00  101.50  104.00
             *

173          KK    S450   BASIN
174          KM        Compute runoff from subbasin 450
175          BA   2.521
176          LG    0.23    0.35    4.25    0.42       0
177          UI     167     169     381     664     938    1152    1392    1514    1599    1599
178          UI    1528    1333    1142     951     803     683     567     481     395     336
179          UI     287     255     184     177     130     116     115      88      41      41
180          UI      41      41      41      41      41      40      41       0       0       0
             *

181          KK    S435   BASIN
182          KM        Compute runoff from subbasin 435
183          BA   0.393
184          LG    0.35    0.35    4.45    0.37       0
185          UI     130     505     775     686     414     231     134      75      42      20
```

```
186          UI      20       0       0       0       0       0       0       0       0       0
             *

187          KK  435450   ROUTE
188          KM        Route runoff from S435 at Sun Valley Parkway to Hassayampa River.
189          RS      10    FLOW      -1
190          RC   0.045   0.035   0.045   18781  0.0119    0.00
191          RX    0.00   40.00  120.00  126.00  146.00  152.00  232.00  272.00
192          RY  105.00  103.00  102.00  100.00  100.00  102.00  103.00  105.00
             *

193          KK    C450 COMBINE
194          KM        Combine flows from S430, S435, S440, and S450 at Hassayampa River
195          HC       3
             *

196          KK    S520   BASIN
197          KM        Compute runoff from subbasin 520
198          BA   1.481
199          LG    0.35    0.35    4.50    0.36       0
200          UI     133     206     510     780    1043    1196    1285    1241    1061     847
201          UI     672     531     420     330     262     210     159     135      91      93
202          UI      54      33      33      32      33      32      33       0       0       0
             *
1                                                HEC-1 INPUT                                          PAGE  6

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


203          KK    S530   BASIN
204          KM        Compute runoff from subbasin 530
205          BA   2.226
206          LG    0.20    0.35    4.30    0.41       0
207          UI     176     194     574     895    1189    1473    1624    1704    1622    1456
208          UI    1198     964     787     657     513     417     348     283     227     189
209          UI     141     120     122      56      43      43      43      43      43      43
210          UI      43       0       0       0       0       0       0       0       0       0
211          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    50        S400
                .
                .
    59          .        S410
                .           .
                .           .
    67        C410............
                V
                V
    70      410415
                .
                .
    78          .        S415
                .           .
                .           .
    84       C415R...........
                .
                .
    87          .        S500
                .           V
                .           V
    96          .      500415
                .           .
                .           .
   105          .           .        S510
                .           .           .
                .           .           .
   111          .       C415L...........
                .           .
                .           .
   114        C415............
                .
                .
   121          .-------->   D4150
   117        D415
                V
                V
   126      415420
                .
                .
   135          .        S420
                .           .
                .           .
   142        C420............
                .
                .
   146          .        S430
                .           V
                .           V
   152          .      430440
```

```
                .          .
                .          .
  158           .          .        S440
                .          .          .
                .          .          .
  164           .       C440............
                .          V
                .          V
  167           .     440450
                .          .
                .          .
  173           .          .        S450
                .          .          .
                .          .          .
  181           .          .          .        S435
                .          .          .          V
                .          .          .          V
  187           .          .          .     435450
                .          .          .          .
                .          .          .          .
  193           .       C450........................
                .          .
                .          .
  196           .          .        S520
                .          .          .
                .          .          .
  203           .          .          .        S530
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   19APR06  TIME  15:16:18  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*          (916) 756-1104              *
*                                      *
****************************************
```

HYDROLOGY FOR STEP 2 ALTERNATIVES FOR SUN VALLEY ADMP
- HASSAYAMPA SUB-AREA
- ALTERNATIVE C - Concrete Channels, sediment basins only
  except for offline basin at Sun Valley Parkway

Alternative Description
Alternative C is based on the concept of an excavated concrete-lined channel from the apex to the outfall, without providing any detention basin is at the apex. To address sedimentation associated with the alluvial fan systems, sedimentation basins are provided throughout the system. The excavated concrete channels are complemented with a 120-foot wide adjacent riparian preservation corridor.

SUN VALLEY AREA DRAINAGE MASTER PLAN (SVADMP) - FCD 2004C049
JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
MODELER: TED LEHMAN
FILENAME: A4_EX24.DAT

100-YEAR 24-HOUR MODEL
EXISTING CONDITIONS
AREA 4 WATERSHED AREA = 90.5 SQ. MILES
MODELED AREA = 76.8 SQ. MILES

GREEN-AMPT LOSS METHOD
S-GRAPH UNIT HYDROGRAPHS
- MOUNTAIN
- DESERT/RANGELAND
NORMAL-DEPTH CHANNEL ROUTING
LAND USE DATA FROM EXAMINATION OF SLOPE FROM 10-FT DTM TO DISTINGUISH
- UNDEVELOPED DESERT RANGELAND (NDR) - SLOPES < 5 %
- HILLSLOPES, SONORAN DESERT (NHS) - SLOPES 5 - 10 %
- MOUNTAIN TERRAIN (NMT) - SLOPES > 10 %
SOILS DATA FROM FCDMC GIS DATABASE (RECEIVED FROM FCDMC JULY 2005)

```
  37 IO        OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT        HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN99  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     8JAN99  ENDING DATE
                    NDTIME       1035  ENDING TIME
                     ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE  166.58 HOURS
```

```
ENGLISH UNITS
      DRAINAGE AREA          SQUARE MILES
      PRECIPITATION DEPTH    INCHES
      LENGTH, ELEVATION      FEET
      FLOW                   CUBIC FEET PER SECOND
      STORAGE VOLUME         ACRE-FEET
      SURFACE AREA           ACRES
      TEMPERATURE            DEGREES FAHRENHEIT
```

```
38 JD         INDEX STORM NO. 1
                STRM       4.20  PRECIPITATION DEPTH
                TRDA        .10  TRANSPOSITION DRAINAGE AREA
```

39 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
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```
49 JD         INDEX STORM NO. 2
                STRM       3.99  PRECIPITATION DEPTH
                TRDA      10.00  TRANSPOSITION DRAINAGE AREA
```

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
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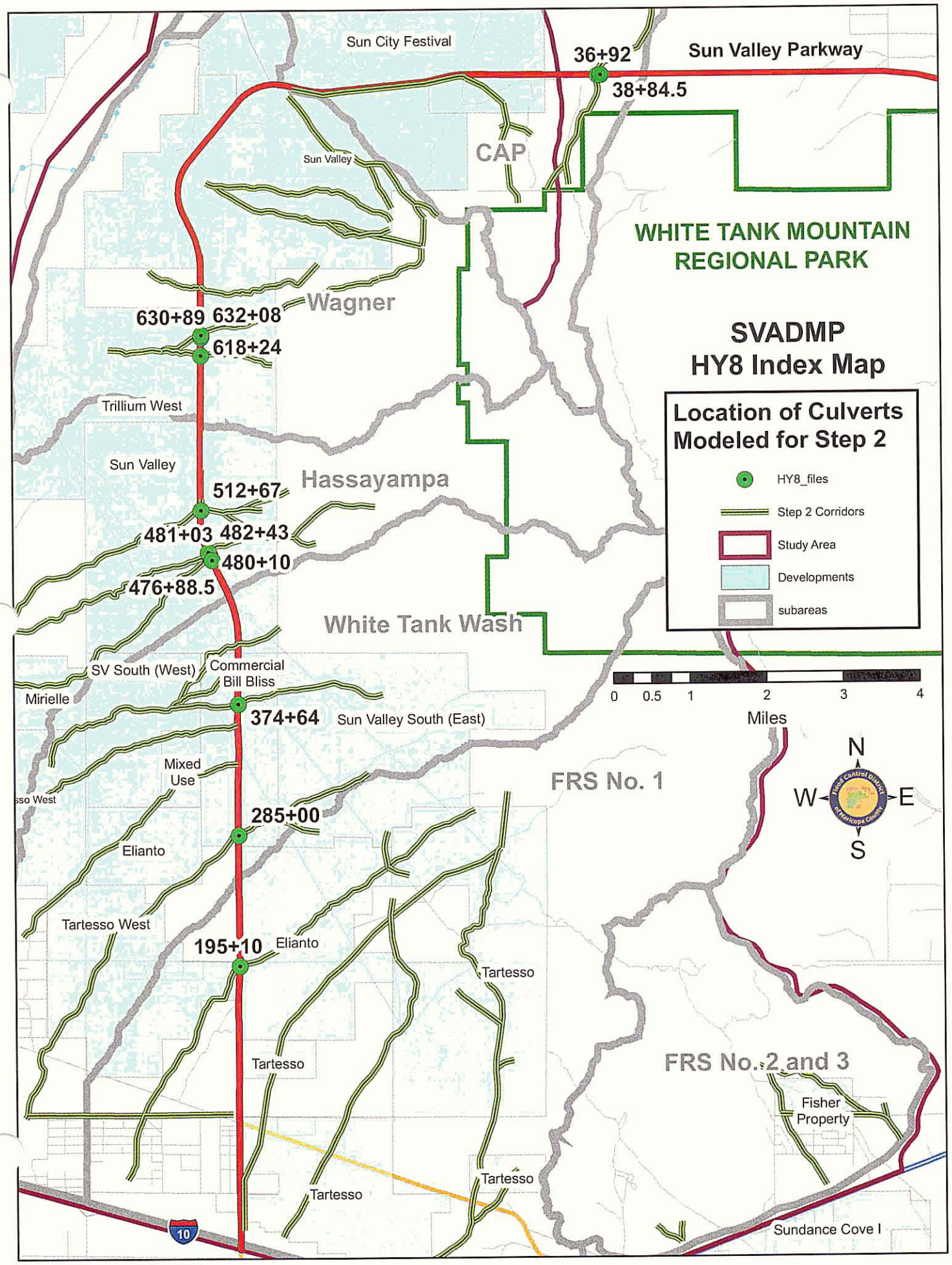
1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+										
+	HYDROGRAPH AT	S400	1047.	12.50	184.	48.	16.	1.54		
+	HYDROGRAPH AT	S410	526.	12.42	80.	21.	7.	.64		
+	2 COMBINED AT	C410	1524.	12.50	262.	67.	23.	2.18		

+	ROUTED TO	410415	1481.	12.67	262.	67.	23.	2.18
+	HYDROGRAPH AT	S415	624.	12.17	50.	13.	4.	.45
+	2 COMBINED AT	C415R	1539.	12.67	309.	79.	26.	2.63
+	HYDROGRAPH AT	S500	2063.	12.75	476.	129.	43.	3.64
+	ROUTED TO	500415	1981.	13.00	476.	129.	43.	3.64
+	HYDROGRAPH AT	S510	2099.	12.25	213.	53.	18.	1.84
+	2 COMBINED AT	C415L	2537.	12.33	681.	180.	60.	5.48
+	2 COMBINED AT	C415	3899.	12.33	979.	257.	86.	8.11
+	DIVERSION TO	D415O	2668.	12.33	422.	105.	35.	8.11
+	HYDROGRAPH AT	D415	1231.	12.00	557.	151.	51.	8.11
+	ROUTED TO	415420	1232.	12.75	557.	151.	51.	8.11
+	HYDROGRAPH AT	S420	1740.	12.33	198.	50.	17.	1.77
+	2 COMBINED AT	C420	2536.	12.33	747.	199.	66.	9.88
+	HYDROGRAPH AT	S430	1090.	12.17	95.	24.	8.	.80
+	ROUTED TO	430440	932.	12.50	95.	24.	8.	.80
+	HYDROGRAPH AT	S440	1205.	12.25	119.	30.	10.	1.07
+	2 COMBINED AT	C440	1700.	12.42	211.	53.	18.	1.86
+	ROUTED TO	440450	1502.	12.58	211.	53.	18.	1.86
+	HYDROGRAPH AT	S450	1624.	12.58	287.	72.	24.	2.52
+	HYDROGRAPH AT	S435	656.	12.08	47.	12.	4.	.39
+	ROUTED TO	435450	378.	12.83	47.	12.	4.	.39
+	3 COMBINED AT	C450	3338.	12.67	536.	134.	45.	4.78
+	HYDROGRAPH AT	S520	1288.	12.42	174.	43.	14.	1.48
+	HYDROGRAPH AT	S530	1697.	12.50	257.	64.	21.	2.23

*** NORMAL END OF HEC-1 ***


SVADMP
HY8 Index Map
Location of Culverts Modeled for Step 2
HY8_files
Step 2 Corridors
Study Area
Developments
subareas
0 0.5 1 2 3 4
Miles
N
W
E
S
Sun City Festival
Sun Valley Parkway
36+92
38+84.5
CAP
Sun Valley
WHITE TANK MOUNTAIN REGIONAL PARK
Wagner
630+89
632+08
618+24
Trillium West
Sun Valley
Hassayampa
512+67
481+03
482+43
480+10
476+88.5
White Tank Wash
SV South (West)
Commercial
Bill Bliss
Mirielle
374+64
Sun Valley South (East)
Mixed Use
FRS No. 1
285+00
Elianto
Tartesso West
195+10
Elianto
Tartesso
Tartesso
FRS No. 2 and 3
Fisher Property
Tartesso
Tartesso
Sundance Cove I
10

CURRENT DATE: 10-20-2005
CURRENT TIME: 19:37:34

FILE DATE: 10-20-2005
FILE NAME: SVC37464

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	62.80	62.17	100.00	4 RCB	10.00	3.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVC37464 DATE: 10-20-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
62.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
63.80	120.0	120.0	0.0	0.0	0.0	0.0	0.0	0.00	1
64.39	240.0	240.0	0.0	0.0	0.0	0.0	0.0	0.00	1
64.89	360.0	360.0	0.0	0.0	0.0	0.0	0.0	0.00	1
65.34	480.0	480.0	0.0	0.0	0.0	0.0	0.0	0.00	1
65.78	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
65.81	610.0	610.0	0.0	0.0	0.0	0.0	0.0	0.00	1
66.72	840.0	840.0	0.0	0.0	0.0	0.0	0.0	0.00	1
67.28	960.0	960.0	0.0	0.0	0.0	0.0	0.0	0.00	1
67.90	1080.0	1080.0	0.0	0.0	0.0	0.0	0.0	0.00	1
68.57	1200.0	1192.7	0.0	0.0	0.0	0.0	0.0	6.20	5
68.49	1179.7	1179.7	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVC37464 DATE: 10-20-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
62.80	0.000	0.00	0.00	0.00
63.80	0.000	120.00	0.00	0.00
64.39	0.000	240.00	0.00	0.00
64.89	0.000	360.00	0.00	0.00
65.34	0.000	480.00	0.00	0.00
65.78	0.000	600.00	0.00	0.00
65.81	0.000	610.00	0.00	0.00
66.72	0.000	840.00	0.00	0.00
67.28	0.000	960.00	0.00	0.00
67.90	0.000	1080.00	0.00	0.00
68.57	-0.003	1200.00	1.08	0.09

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-20-2005 FILE DATE: 10-20-2005
CURRENT TIME: 19:37:34 FILE NAME: SVC37464

PERFORMANCE CURVE FOR CULVERT 1 - 4(10.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	62.80	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
120.00	63.80	1.00	1.00	1-S2n	0.50	0.66	0.51	0.87	5.87	3.74
240.00	64.39	1.59	1.59	1-S2n	0.78	1.04	0.80	1.32	7.50	4.83
360.00	64.89	2.09	2.09	1-S2n	1.02	1.36	0.96	1.68	9.35	5.60
480.00	65.34	2.54	2.54	1-S2n	1.23	1.65	1.29	1.99	9.32	6.20
600.00	65.78	2.98	2.98	1-S2n	1.42	1.92	1.50	2.26	9.97	6.70
610.00	65.81	3.01	3.01	5-S2n	1.44	1.94	1.52	2.29	10.05	6.74
840.00	66.72	3.92	3.92	5-S2n	1.78	2.40	1.91	2.76	11.01	7.52
960.00	67.28	4.48	4.48	5-S2n	1.94	2.62	2.10	2.98	11.42	7.87
1080.00	67.90	5.10	4.75	4-FFt	2.11	2.84	2.11	3.19	12.81	8.19
1192.72	68.56	5.76	5.44	4-S2n	2.25	3.00	2.46	3.39	12.12	8.48

El. inlet face invert 62.80 ft El. outlet invert 62.17 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	62.80 ft
OUTLET STATION	100.00 ft
OUTLET ELEVATION	62.17 ft
NUMBER OF BARRELS	4
SLOPE (V/H)	0.0063
CULVERT LENGTH ALONG SLOPE	100.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 10-20-2005 FILE DATE: 10-20-2005
CURRENT TIME: 19:37:34 FILE NAME: SVC37464

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	35.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.010
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	62.17 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	62.17 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	62.17	0.000	0.00	0.00	0.00
120.00	63.04	0.704	0.87	3.74	0.55
240.00	63.49	0.741	1.32	4.83	0.82
360.00	63.85	0.762	1.68	5.60	1.05
480.00	64.16	0.775	1.99	6.20	1.24
600.00	64.43	0.785	2.26	6.70	1.41
610.00	64.46	0.786	2.29	6.74	1.43
840.00	64.93	0.799	2.76	7.52	1.72
960.00	65.15	0.804	2.98	7.87	1.86
1080.00	65.36	0.808	3.19	8.19	1.99
1200.00	65.56	0.812	3.39	8.48	2.11

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	80.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	68.49 ft

CURRENT DATE: 10-21-2005
CURRENT TIME: 08:11:53

FILE DATE: 10-21-2005
FILE NAME: SVP28500

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	8.56	7.96	135.00	4 RCB	10.00	4.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP28500 DATE: 10-21-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
8.56	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
9.67	140.0	140.0	0.0	0.0	0.0	0.0	0.0	0.00	1
10.32	280.0	280.0	0.0	0.0	0.0	0.0	0.0	0.00	1
10.88	420.0	420.0	0.0	0.0	0.0	0.0	0.0	0.00	1
11.37	560.0	560.0	0.0	0.0	0.0	0.0	0.0	0.00	1
11.79	688.0	688.0	0.0	0.0	0.0	0.0	0.0	0.00	1
12.27	840.0	840.0	0.0	0.0	0.0	0.0	0.0	0.00	1
12.71	980.0	980.0	0.0	0.0	0.0	0.0	0.0	0.00	1
13.17	1120.0	1120.0	0.0	0.0	0.0	0.0	0.0	0.00	1
13.67	1260.0	1260.0	0.0	0.0	0.0	0.0	0.0	0.00	1
14.23	1400.0	1389.7	0.0	0.0	0.0	0.0	0.0	8.65	3
14.08	1367.2	1367.2	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP28500 DATE: 10-21-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
8.56	0.000	0.00	0.00	0.00
9.67	0.000	140.00	0.00	0.00
10.32	0.000	280.00	0.00	0.00
10.88	0.000	420.00	0.00	0.00
11.37	0.000	560.00	0.00	0.00
11.79	0.000	688.00	0.00	0.00
12.27	0.000	840.00	0.00	0.00
12.71	0.000	980.00	0.00	0.00
13.17	0.000	1120.00	0.00	0.00
13.67	0.000	1260.00	0.00	0.00
14.23	-0.004	1400.00	1.66	0.12

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-21-2005 FILE DATE: 10-21-2005
CURRENT TIME: 08:11:53 FILE NAME: SVP28500

PERFORMANCE CURVE FOR CULVERT 1 - 4(10.00 (ft) BY 4.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	8.56	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
140.00	9.67	1.11	1.11	1-S2n	0.61	0.73	0.53	1.09	6.65	3.05
280.00	10.32	1.76	1.76	1-S2n	0.96	1.15	0.95	1.64	7.35	3.94
420.00	10.88	2.32	2.32	1-S2n	1.26	1.51	1.21	2.09	8.67	4.55
560.00	11.37	2.81	2.81	1-S2n	1.53	1.83	1.55	2.47	9.01	5.04
688.00	11.79	3.23	3.23	1-S2n	1.75	2.10	1.70	2.79	10.12	5.41
840.00	12.27	3.71	3.71	1-S2n	2.01	2.40	2.05	3.13	10.22	5.80
980.00	12.71	4.15	4.15	5-S2n	2.23	2.66	2.29	3.43	10.71	6.11
1120.00	13.17	4.61	4.61	5-S2n	2.44	2.90	2.50	3.70	11.18	6.38
1260.00	13.67	5.11	5.11	5-S2n	2.65	3.14	2.73	3.96	11.53	6.64
1389.69	14.23	5.61	5.67	4-FFt	2.84	3.35	4.00	4.21	8.69	6.87

El. inlet face invert 8.56 ft El. outlet invert 7.96 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	8.56 ft
OUTLET STATION	135.00 ft
OUTLET ELEVATION	7.96 ft
NUMBER OF BARRELS	4
SLOPE (V/H)	0.0044
CULVERT LENGTH ALONG SLOPE	135.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	4.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 10-21-2005
CURRENT TIME: 08:11:53

FILE DATE: 10-21-2005
FILE NAME: SVP28500

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	40.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.005
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	7.96 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	7.96 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	7.96	0.000	0.00	0.00	0.00
140.00	9.05	0.515	1.09	3.05	0.34
280.00	9.60	0.541	1.64	3.94	0.51
420.00	10.05	0.556	2.09	4.55	0.65
560.00	10.43	0.565	2.47	5.04	0.77
688.00	10.75	0.571	2.79	5.41	0.87
840.00	11.09	0.577	3.13	5.80	0.98
980.00	11.39	0.581	3.43	6.11	1.07
1120.00	11.66	0.585	3.70	6.38	1.15
1260.00	11.92	0.588	3.96	6.64	1.24
1400.00	12.17	0.590	4.21	6.87	1.31

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	14.08 ft

CURRENT DATE: 10-21-2005
CURRENT TIME: 09:48:42

FILE DATE: 10-21-2005
FILE NAME: SVP19510

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	33.92	33.44	140.00	6 RCB	10.00	4.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP19510 DATE: 10-21-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
33.92	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
35.51	360.0	360.0	0.0	0.0	0.0	0.0	0.0	0.00	1
36.46	720.0	720.0	0.0	0.0	0.0	0.0	0.0	0.00	1
37.25	1080.0	1080.0	0.0	0.0	0.0	0.0	0.0	0.00	1
38.47	1440.0	1440.0	0.0	0.0	0.0	0.0	0.0	0.00	1
39.59	1800.0	1800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
39.65	1820.0	1820.0	0.0	0.0	0.0	0.0	0.0	0.00	1
41.47	2520.0	2264.7	0.0	0.0	0.0	0.0	0.0	255.75	3
42.21	2880.0	2400.1	0.0	0.0	0.0	0.0	0.0	480.38	3
42.89	3240.0	2513.1	0.0	0.0	0.0	0.0	0.0	726.08	3
43.53	3600.0	2615.2	0.0	0.0	0.0	0.0	0.0	987.04	3
40.05	1924.3	1924.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP19510 DATE: 10-21-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
33.92	0.000	0.00	0.00	0.00
35.51	0.000	360.00	0.00	0.00
36.46	0.000	720.00	0.00	0.00
37.25	0.000	1080.00	0.00	0.00
38.47	0.000	1440.00	0.00	0.00
39.59	0.000	1800.00	0.00	0.00
39.65	0.000	1820.00	0.00	0.00
41.47	0.001	2520.00	-0.42	-0.02
42.21	0.001	2880.00	-0.45	-0.02
42.89	-0.001	3240.00	0.86	0.03
43.53	0.003	3600.00	-2.27	-0.06

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-21-2005 FILE DATE: 10-21-2005
CURRENT TIME: 09:48:42 FILE NAME: SVP19510

PERFORMANCE CURVE FOR CULVERT 1 - 6(10.00 (ft) BY 4.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	33.92	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
360.00	35.51	1.59	1.59	1-S2n	0.95	1.04	0.84	1.79	7.14	3.76
720.00	36.46	2.54	2.54	1-S2n	1.50	1.65	1.45	2.69	8.27	4.82
1080.00	37.25	3.33	3.33	1-S2n	1.97	2.16	1.96	3.42	9.17	5.56
1440.00	38.47	4.09	4.55	4-FFt	2.40	2.62	4.00	4.04	6.00	6.13
1800.00	39.59	4.89	5.67	4-FFt	2.81	3.04	4.00	4.60	7.50	6.61
1820.00	39.65	4.94	5.73	4-FFt	2.83	3.06	4.00	4.63	7.58	6.63
2264.67	41.46	6.11	7.54	4-FFt	3.30	3.54	4.00	5.58	9.44	7.38
2400.07	42.21	6.51	8.29	4-FFt	3.44	3.68	4.00	6.02	10.00	7.71
2513.07	42.89	6.87	8.97	4-FFt	3.55	3.80	4.00	6.44	10.47	8.00
2615.23	43.53	7.21	9.61	4-FFt	4.00	3.90	4.00	6.84	10.90	8.27

El. inlet face invert 33.92 ft El. outlet invert 33.44 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

```
***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                       33.92 ft
      OUTLET STATION                       140.00 ft
      OUTLET ELEVATION                      33.44 ft
      NUMBER OF BARRELS                      6
      SLOPE (V/H)                            0.0034
      CULVERT LENGTH ALONG SLOPE           140.00 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN            10.00 ft
      BARREL RISE             4.00 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE (30-75 DEG. FLARE)
      INLET DEPRESSION      NONE
```

CURRENT DATE: 10-21-2005 FILE DATE: 10-21-2005
CURRENT TIME: 09:48:42 FILE NAME: SVP19510

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	50.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.004
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	33.44 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	33.44 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	33.44	0.000	0.00	0.00	0.00
360.00	35.23	0.495	1.79	3.76	0.45
720.00	36.13	0.518	2.69	4.82	0.67
1080.00	36.86	0.530	3.42	5.56	0.85
1440.00	37.48	0.537	4.04	6.13	1.01
1800.00	38.04	0.543	4.60	6.61	1.15
1820.00	38.07	0.543	4.63	6.63	1.16
2520.00	39.02	0.551	5.58	7.38	1.39
2880.00	39.46	0.553	6.02	7.71	1.50
3240.00	39.88	0.556	6.44	8.00	1.61
3600.00	40.28	0.558	6.84	8.27	1.71

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	40.05 ft

CURRENT DATE: 10-24-2005
CURRENT TIME: 16:06:55

FILE DATE: 10-24-2005
FILE NAME: SVP3692

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	58.40	57.70	140.00	6 RCB	10.00	4.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP3692 DATE: 10-24-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
58.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
59.47	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
60.10	400.0	400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
60.64	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
61.12	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
61.56	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
61.77	1100.0	1100.0	0.0	0.0	0.0	0.0	0.0	0.00	1
62.40	1400.0	1400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
62.83	1600.0	1600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
63.29	1800.0	1800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
63.78	2000.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
64.55	2278.1	2278.1	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP3692 DATE: 10-24-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
58.40	0.000	0.00	0.00	0.00
59.47	0.000	200.00	0.00	0.00
60.10	0.000	400.00	0.00	0.00
60.64	0.000	600.00	0.00	0.00
61.12	0.000	800.00	0.00	0.00
61.56	0.000	1000.00	0.00	0.00
61.77	0.000	1100.00	0.00	0.00
62.40	0.000	1400.00	0.00	0.00
62.83	0.000	1600.00	0.00	0.00
63.29	0.000	1800.00	0.00	0.00
63.78	0.000	2000.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-24-2005 FILE DATE: 10-24-2005
CURRENT TIME: 16:06:55 FILE NAME: SVP3692

PERFORMANCE CURVE FOR CULVERT 1 - 6(10.00 (ft) BY 4.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	58.40	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
200.00	59.47	1.07	1.07	1-S2n	0.57	0.70	0.50	0.69	6.63	3.57
400.00	60.10	1.70	1.70	1-S2n	0.90	1.12	0.82	1.04	8.17	4.68
600.00	60.64	2.24	2.24	1-S2n	1.18	1.46	1.19	1.33	8.39	5.47
800.00	61.12	2.72	2.72	1-S2n	1.41	1.77	1.45	1.58	9.21	6.11
1000.00	61.56	3.16	3.16	1-S2n	1.64	2.06	1.69	1.80	9.89	6.65
1100.00	61.77	3.37	3.37	1-S2n	1.75	2.19	1.81	1.90	10.14	6.89
1400.00	62.40	4.00	4.00	1-S2n	2.06	2.57	2.13	2.20	10.94	7.55
1600.00	62.83	4.43	4.43	5-S2n	2.26	2.81	2.35	2.38	11.34	7.93
1800.00	63.29	4.89	4.89	5-S2n	2.45	3.04	2.55	2.55	11.76	8.28
2000.00	63.78	5.38	5.38	5-S2n	2.64	3.26	2.75	2.72	12.11	8.61

El. inlet face invert 58.40 ft El. outlet invert 57.70 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	58.40 ft
OUTLET STATION	140.00 ft
OUTLET ELEVATION	57.70 ft
NUMBER OF BARRELS	6
SLOPE (V/H)	0.0050
CULVERT LENGTH ALONG SLOPE	140.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	4.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 10-24-2005
CURRENT TIME: 16:06:55

FILE DATE: 10-24-2005
FILE NAME: SVP3692

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	80.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.012
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	57.70 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	57.70 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	57.70	0.000	0.00	0.00	0.00
200.00	58.39	0.759	0.69	3.57	0.51
400.00	58.74	0.808	1.04	4.68	0.78
600.00	59.03	0.837	1.33	5.47	0.99
800.00	59.28	0.858	1.58	6.11	1.18
1000.00	59.50	0.873	1.80	6.65	1.35
1100.00	59.60	0.880	1.90	6.89	1.43
1400.00	59.90	0.897	2.20	7.55	1.65
1600.00	60.08	0.906	2.38	7.93	1.78
1800.00	60.25	0.914	2.55	8.28	1.91
2000.00	60.42	0.921	2.72	8.61	2.04

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	64.55 ft

CURRENT DATE: 10-24-2005
CURRENT TIME: 16:28:28

FILE DATE: 10-24-2005
FILE NAME: SVP3884

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	58.40	57.60	136.00	2 RCB	10.00	3.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP3884 DATE: 10-24-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
58.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
59.40	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.00	1
59.99	120.0	120.0	0.0	0.0	0.0	0.0	0.0	0.00	1
60.49	180.0	180.0	0.0	0.0	0.0	0.0	0.0	0.00	1
60.94	240.0	240.0	0.0	0.0	0.0	0.0	0.0	0.00	1
61.38	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.00	1
61.83	360.0	360.0	0.0	0.0	0.0	0.0	0.0	0.00	1
62.32	420.0	420.0	0.0	0.0	0.0	0.0	0.0	0.00	1
62.88	480.0	480.0	0.0	0.0	0.0	0.0	0.0	0.00	1
63.50	540.0	540.0	0.0	0.0	0.0	0.0	0.0	0.00	1
63.87	600.0	571.6	0.0	0.0	0.0	0.0	0.0	27.79	4
63.54	543.1	543.1	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP3884 DATE: 10-24-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
58.40	0.000	0.00	0.00	0.00
59.40	0.000	60.00	0.00	0.00
59.99	0.000	120.00	0.00	0.00
60.49	0.000	180.00	0.00	0.00
60.94	0.000	240.00	0.00	0.00
61.38	0.000	300.00	0.00	0.00
61.83	0.000	360.00	0.00	0.00
62.32	0.000	420.00	0.00	0.00
62.88	0.000	480.00	0.00	0.00
63.50	0.000	540.00	0.00	0.00
63.87	-0.002	600.00	0.62	0.10

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-24-2005 FILE DATE: 10-24-2005
CURRENT TIME: 16:28:28 FILE NAME: SVP3884

PERFORMANCE CURVE FOR CULVERT 1 - 2(10.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	58.40	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
60.00	59.40	1.00	1.00	1-S2n	0.51	0.66	0.46	0.76	6.59	3.66
120.00	59.99	1.59	1.59	1-S2n	0.80	1.04	0.74	1.15	8.11	4.70
180.00	60.49	2.09	2.09	1-S2n	1.04	1.36	0.96	1.45	9.35	5.41
240.00	60.94	2.54	2.54	1-S2n	1.25	1.65	1.29	1.72	9.30	5.97
300.00	61.38	2.98	2.98	1-S2n	1.45	1.92	1.50	1.95	9.98	6.43
360.00	61.83	3.43	3.43	5-S2n	1.64	2.16	1.70	2.17	10.57	6.82
420.00	62.32	3.92	3.92	5-S2n	1.82	2.40	1.90	2.37	11.07	7.17
480.00	62.88	4.48	4.48	5-S2n	1.99	2.62	2.09	2.55	11.48	7.49
540.00	63.50	5.10	5.10	5-S2n	2.15	2.84	2.28	2.73	11.87	7.77
571.59	63.87	5.47	5.47	5-S2n	2.24	2.94	2.37	2.90	12.04	8.03

El. inlet face invert 58.40 ft El. outlet invert 57.60 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

```
***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                       58.40 ft
      OUTLET STATION                       136.00 ft
      OUTLET ELEVATION                      57.60 ft
      NUMBER OF BARRELS                     2
      SLOPE (V/H)                           0.0059
      CULVERT LENGTH ALONG SLOPE           136.00 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN            10.00 ft
      BARREL RISE             3.00 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE (30-75 DEG. FLARE)
      INLET DEPRESSION      NONE
```

CURRENT DATE: 10-24-2005
CURRENT TIME: 16:28:28

FILE DATE: 10-24-2005
FILE NAME: SVP3884

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	20.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.012
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	57.60 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	57.60 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	57.60	0.000	0.00	0.00	0.00
60.00	58.36	0.740	0.76	3.66	0.57
120.00	58.74	0.774	1.15	4.70	0.86
180.00	59.05	0.791	1.45	5.41	1.09
240.00	59.32	0.802	1.72	5.97	1.29
300.00	59.55	0.810	1.95	6.43	1.46
360.00	59.77	0.816	2.17	6.82	1.62
420.00	59.97	0.821	2.37	7.17	1.77
480.00	60.15	0.825	2.55	7.49	1.91
540.00	60.33	0.829	2.73	7.77	2.04
600.00	60.50	0.831	2.90	8.03	2.17

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	63.54 ft

CURRENT DATE: 12-06-2005
CURRENT TIME: 12:14:19

FILE DATE: 12-06-2005
FILE NAME: SVP47688

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	12.90	11.50	137.01	1 RCB	6.00	3.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP47688 DATE: 12-06-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
12.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
14.14	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.00	1
14.88	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.00	1
15.51	75.0	75.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.12	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.79	125.0	125.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.82	126.0	126.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.07	175.0	163.8	0.0	0.0	0.0	0.0	0.0	10.03	6
18.25	200.0	168.6	0.0	0.0	0.0	0.0	0.0	30.65	4
18.39	225.0	172.2	0.0	0.0	0.0	0.0	0.0	51.17	3
18.52	250.0	175.4	0.0	0.0	0.0	0.0	0.0	73.19	3
17.90	159.3	159.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP47688 DATE: 12-06-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
12.90	0.000	0.00	0.00	0.00
14.14	0.000	25.00	0.00	0.00
14.88	0.000	50.00	0.00	0.00
15.51	0.000	75.00	0.00	0.00
16.12	0.000	100.00	0.00	0.00
16.79	0.000	125.00	0.00	0.00
16.82	0.000	126.00	0.00	0.00
18.07	-0.006	175.00	1.15	0.66
18.25	-0.003	200.00	0.76	0.38
18.39	-0.007	225.00	1.68	0.75
18.52	-0.006	250.00	1.42	0.57

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 12-06-2005 FILE DATE: 12-06-2005
CURRENT TIME: 12:14:19 FILE NAME: SVP47688

PERFORMANCE CURVE FOR CULVERT 1 - 1(6.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	12.90	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
25.00	14.14	1.24	1.24	1-S2n	0.55	0.82	0.55	0.47	7.64	3.12
50.00	14.88	1.98	1.98	1-S2n	0.86	1.29	0.79	0.71	10.49	4.02
75.00	15.51	2.61	2.61	1-S2n	1.13	1.70	1.18	0.91	10.62	4.65
100.00	16.12	3.22	3.22	5-S2n	1.38	2.06	1.45	1.07	11.53	5.14
125.00	16.79	3.89	3.89	5-S2n	1.61	2.38	1.71	1.22	12.15	5.55
126.00	16.82	3.92	3.92	5-S2n	1.62	2.40	1.73	1.23	12.16	5.56
163.82	18.06	5.16	5.16	5-S2n	1.95	2.86	2.10	1.48	13.03	6.21
168.59	18.25	5.35	5.35	5-S2n	1.99	2.91	2.14	1.60	13.12	6.49
172.16	18.39	5.49	5.49	5-S2n	2.02	2.95	2.17	1.72	13.21	6.74
175.39	18.51	5.61	5.61	5-S2n	2.05	2.99	2.21	1.82	13.23	6.98

El. inlet face invert 12.90 ft El. outlet invert 11.50 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

```
***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                       12.90 ft
      OUTLET STATION                       137.00 ft
      OUTLET ELEVATION                      11.50 ft
      NUMBER OF BARRELS                      1
      SLOPE (V/H)                            0.0102
      CULVERT LENGTH ALONG SLOPE           137.01 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN             6.00 ft
      BARREL RISE             3.00 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE (30-75 DEG. FLARE)
      INLET DEPRESSION      NONE
```

CURRENT DATE: 12-06-2005
CURRENT TIME: 12:14:19

FILE DATE: 12-06-2005
FILE NAME: SVP47688

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	16.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.016
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	11.50 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	11.50 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	11.50	0.000	0.00	0.00	0.00
25.00	11.97	0.799	0.47	3.12	0.47
50.00	12.21	0.839	0.71	4.02	0.71
75.00	12.41	0.860	0.91	4.65	0.90
100.00	12.57	0.874	1.07	5.14	1.07
125.00	12.72	0.884	1.22	5.55	1.22
126.00	12.73	0.885	1.23	5.56	1.23
175.00	12.98	0.898	1.48	6.21	1.48
200.00	13.10	0.903	1.60	6.49	1.60
225.00	13.22	0.907	1.72	6.74	1.71
250.00	13.32	0.912	1.82	6.98	1.82

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	17.90 ft

CURRENT DATE: 12-06-2005
CURRENT TIME: 13:02:20

FILE DATE: 12-06-2005
FILE NAME: SVP48010

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	11.50	11.00	142.00	6 RCB	10.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP48010 DATE: 12-06-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
14.66	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
15.07	1200.0	1200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
15.46	1400.0	1400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
15.84	1600.0	1600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.21	1800.0	1800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.59	2000.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.97	2200.0	2200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.37	2400.0	2400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.80	2600.0	2600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.24	2800.0	2800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.69	3000.0	2986.6	0.0	0.0	0.0	0.0	0.0	12.13	3
18.50	2907.3	2907.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP48010 DATE: 12-06-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
14.66	0.000	1000.00	0.00	0.00
15.07	0.000	1200.00	0.00	0.00
15.46	0.000	1400.00	0.00	0.00
15.84	0.000	1600.00	0.00	0.00
16.21	0.000	1800.00	0.00	0.00
16.59	0.000	2000.00	0.00	0.00
16.97	0.000	2200.00	0.00	0.00
17.37	0.000	2400.00	0.00	0.00
17.80	0.000	2600.00	0.00	0.00
18.24	0.000	2800.00	0.00	0.00
18.69	-0.002	3000.00	1.31	0.04

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 12-06-2005 FILE DATE: 12-06-2005
CURRENT TIME: 13:02:20 FILE NAME: SVP48010

PERFORMANCE CURVE FOR CULVERT 1 - 6(10.00 (ft) BY 5.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
1000.00	14.66	3.16	3.16	1-S2n	1.85	2.06	1.76	1.83	9.50	8.58
1200.00	15.07	3.57	3.57	1-S2n	2.10	2.32	2.02	2.04	9.90	9.18
1400.00	15.46	3.96	3.96	1-S2n	2.33	2.57	2.27	2.23	10.27	9.72
1600.00	15.84	4.34	4.34	1-S2n	2.56	2.81	2.58	2.42	10.35	10.20
1800.00	16.21	4.71	4.71	1-S2n	2.77	3.04	2.80	2.59	10.72	10.65
2000.00	16.59	5.09	5.09	5-S2n	2.99	3.26	3.01	2.76	11.06	11.06
2200.00	16.97	5.47	5.47	5-S2n	3.20	3.48	3.22	2.92	11.37	11.45
2400.00	17.37	5.87	5.87	5-S2n	3.40	3.68	3.43	3.07	11.66	11.81
2600.00	17.80	6.30	6.30	5-S2n	3.60	3.89	3.63	3.22	11.93	12.15
2800.00	18.24	6.74	6.74	5-S2n	3.80	4.08	3.83	3.36	12.18	12.47
2986.57	18.69	7.19	7.19	5-S2n	3.99	4.26	4.01	3.50	12.41	12.78

El. inlet face invert 11.50 ft El. outlet invert 11.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

```
***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                       11.50 ft
      OUTLET STATION                       142.00 ft
      OUTLET ELEVATION                      11.00 ft
      NUMBER OF BARRELS                     6
      SLOPE (V/H)                           0.0035
      CULVERT LENGTH ALONG SLOPE           142.00 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN            10.00 ft
      BARREL RISE             5.00 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE (30-75 DEG. FLARE)
      INLET DEPRESSION      NONE
```

CURRENT DATE: 12-06-2005
CURRENT TIME: 13:02:20

FILE DATE: 12-06-2005
FILE NAME: SVP48010

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	60.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.020
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	11.00 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	11.00 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
1000.00	12.83	1.118	1.83	8.58	2.28
1200.00	13.04	1.133	2.04	9.18	2.55
1400.00	13.23	1.146	2.23	9.72	2.79
1600.00	13.42	1.156	2.42	10.20	3.02
1800.00	13.59	1.165	2.59	10.65	3.24
2000.00	13.76	1.173	2.76	11.06	3.44
2200.00	13.92	1.181	2.92	11.45	3.64
2400.00	14.07	1.187	3.07	11.81	3.84
2600.00	14.22	1.193	3.22	12.15	4.02
2800.00	14.36	1.198	3.36	12.47	4.20
3000.00	14.50	1.203	3.50	12.78	4.37

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	18.50 ft

CURRENT DATE: 12-06-2005
CURRENT TIME: 13:11:11

FILE DATE: 12-06-2005
FILE NAME: SVP48103

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	11.50	11.00	143.00	6 RCB	10.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP48103 DATE: 12-06-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
14.66	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
15.07	1200.0	1200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
15.46	1400.0	1400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
15.84	1600.0	1600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.21	1800.0	1800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.59	2000.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.97	2200.0	2200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.37	2400.0	2400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.80	2600.0	2600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.24	2800.0	2800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.69	3000.0	2988.0	0.0	0.0	0.0	0.0	0.0	9.46	3
18.55	2928.3	2928.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP48103 DATE: 12-06-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
14.66	0.000	1000.00	0.00	0.00
15.07	0.000	1200.00	0.00	0.00
15.46	0.000	1400.00	0.00	0.00
15.84	0.000	1600.00	0.00	0.00
16.21	0.000	1800.00	0.00	0.00
16.59	0.000	2000.00	0.00	0.00
16.97	0.000	2200.00	0.00	0.00
17.37	0.000	2400.00	0.00	0.00
17.80	0.000	2600.00	0.00	0.00
18.24	0.000	2800.00	0.00	0.00
18.69	-0.005	3000.00	2.58	0.09

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 12-06-2005 FILE DATE: 12-06-2005
CURRENT TIME: 13:11:11 FILE NAME: SVP48103

PERFORMANCE CURVE FOR CULVERT 1 - 6(10.00 (ft) BY 5.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
1000.00	14.66	3.16	3.16	1-S2n	1.85	2.06	1.76	1.83	9.50	8.58
1200.00	15.07	3.57	3.57	1-S2n	2.10	2.32	2.02	2.04	9.90	9.18
1400.00	15.46	3.96	3.96	1-S2n	2.33	2.57	2.27	2.23	10.27	9.72
1600.00	15.84	4.34	4.34	1-S2n	2.56	2.81	2.58	2.42	10.35	10.20
1800.00	16.21	4.71	4.71	1-S2n	2.77	3.04	2.80	2.59	10.72	10.65
2000.00	16.59	5.09	5.09	5-S2n	2.99	3.26	3.01	2.76	11.06	11.06
2200.00	16.97	5.47	5.47	5-S2n	3.20	3.48	3.22	2.92	11.37	11.45
2400.00	17.37	5.87	5.87	5-S2n	3.40	3.68	3.43	3.07	11.66	11.81
2600.00	17.80	6.30	6.30	5-S2n	3.60	3.89	3.63	3.22	11.93	12.15
2800.00	18.24	6.74	6.74	5-S2n	3.80	4.08	3.83	3.36	12.19	12.47
2987.96	18.69	7.19	7.19	5-S2n	3.99	4.26	4.01	3.50	12.41	12.78

El. inlet face invert 11.50 ft El. outlet invert 11.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

```
***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                       11.50 ft
      OUTLET STATION                       143.00 ft
      OUTLET ELEVATION                      11.00 ft
      NUMBER OF BARRELS                      6
      SLOPE (V/H)                            0.0035
      CULVERT LENGTH ALONG SLOPE           143.00 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN            10.00 ft
      BARREL RISE             5.00 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE (30-75 DEG. FLARE)
      INLET DEPRESSION      NONE
```

CURRENT DATE: 12-06-2005
CURRENT TIME: 13:11:11

FILE DATE: 12-06-2005
FILE NAME: SVP48103

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	60.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.020
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	11.00 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	11.00 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
1000.00	12.83	1.118	1.83	8.58	2.28
1200.00	13.04	1.133	2.04	9.18	2.55
1400.00	13.23	1.146	2.23	9.72	2.79
1600.00	13.42	1.156	2.42	10.20	3.02
1800.00	13.59	1.165	2.59	10.65	3.24
2000.00	13.76	1.173	2.76	11.06	3.44
2200.00	13.92	1.181	2.92	11.45	3.64
2400.00	14.07	1.187	3.07	11.81	3.84
2600.00	14.22	1.193	3.22	12.15	4.02
2800.00	14.36	1.198	3.36	12.47	4.20
3000.00	14.50	1.203	3.50	12.78	4.37

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	60.00 ft
OVERTOPPING CREST ELEVATION	18.55 ft

CURRENT DATE: 12-06-2005
CURRENT TIME: 13:22:12

FILE DATE: 12-06-2005
FILE NAME: SVP48243

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	11.50	11.00	164.00	3 RCB	12.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP48243 DATE: 12-06-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
16.27	1100.0	1100.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.50	1172.0	1172.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.73	1244.0	1244.0	0.0	0.0	0.0	0.0	0.0	0.00	1
16.96	1316.0	1316.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.20	1388.0	1388.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.44	1460.0	1460.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.58	1500.0	1500.0	0.0	0.0	0.0	0.0	0.0	0.00	1
17.96	1604.0	1604.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.23	1676.0	1676.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.51	1748.0	1748.0	0.0	0.0	0.0	0.0	0.0	0.00	1
18.73	1820.0	1801.8	0.0	0.0	0.0	0.0	0.0	16.41	3
18.50	1817.1	1817.1	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP48243 DATE: 12-06-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
16.27	0.000	1100.00	0.00	0.00
16.50	0.000	1172.00	0.00	0.00
16.73	0.000	1244.00	0.00	0.00
16.96	0.000	1316.00	0.00	0.00
17.20	0.000	1388.00	0.00	0.00
17.44	0.000	1460.00	0.00	0.00
17.58	0.000	1500.00	0.00	0.00
17.96	0.000	1604.00	0.00	0.00
18.23	0.000	1676.00	0.00	0.00
18.51	0.000	1748.00	0.00	0.00
18.73	-0.004	1820.00	1.80	0.10

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 12-06-2005 FILE DATE: 12-06-2005
CURRENT TIME: 13:22:12 FILE NAME: SVP48243

PERFORMANCE CURVE FOR CULVERT 1 - 3(12.00 (ft) BY 5.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
1100.00	16.27	4.77	4.77	1-S2n	2.88	3.08	2.78	2.45	11.00	10.02
1172.00	16.50	5.00	5.00	1-S2n	3.01	3.21	2.91	2.54	11.18	10.24
1244.00	16.73	5.23	5.23	5-S2n	3.14	3.34	3.04	2.63	11.36	10.46
1316.00	16.96	5.46	5.46	5-S2n	3.26	3.47	3.17	2.72	11.53	10.66
1388.00	17.20	5.70	5.70	5-S2n	3.39	3.60	3.30	2.80	11.70	10.86
1460.00	17.44	5.94	5.94	5-S2n	3.51	3.72	3.42	2.89	11.86	11.05
1500.00	17.58	6.08	6.08	5-S2n	3.58	3.79	3.49	2.93	11.95	11.15
1604.00	17.96	6.46	6.46	5-S2n	3.75	3.96	3.66	3.05	12.18	11.41
1676.00	18.23	6.73	6.73	5-S2n	3.87	4.08	3.78	3.13	12.33	11.58
1748.00	18.51	7.01	7.01	5-S2n	3.99	4.19	3.89	3.20	12.47	11.75
1801.79	18.73	7.23	7.23	5-S2n	4.08	4.28	3.98	3.28	12.58	11.91

El. inlet face invert 11.50 ft El. outlet invert 11.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	11.50 ft
OUTLET STATION	164.00 ft
OUTLET ELEVATION	11.00 ft
NUMBER OF BARRELS	3
SLOPE (V/H)	0.0030
CULVERT LENGTH ALONG SLOPE	164.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	12.00 ft
BARREL RISE	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 12-06-2005
CURRENT TIME: 13:22:12

FILE DATE: 12-06-2005
FILE NAME: SVP48243

TAILWATER

******* REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	40.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.020
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	11.00 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	11.00 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
1100.00	13.45	1.129	2.45	10.02	3.05
1172.00	13.54	1.133	2.54	10.24	3.17
1244.00	13.63	1.137	2.63	10.46	3.28
1316.00	13.72	1.140	2.72	10.66	3.39
1388.00	13.80	1.143	2.80	10.86	3.50
1460.00	13.89	1.146	2.89	11.05	3.60
1500.00	13.93	1.148	2.93	11.15	3.66
1604.00	14.05	1.152	3.05	11.41	3.81
1676.00	14.13	1.154	3.13	11.58	3.90
1748.00	14.20	1.157	3.20	11.75	4.00
1820.00	14.28	1.159	3.28	11.91	4.09

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	120.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	18.50 ft

CURRENT DATE: 11-21-2005
CURRENT TIME: 14:24:18

FILE DATE: 11-21-2005
FILE NAME: SVP51267

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	23.11	22.00	133.00	4 RCB	10.00	4.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP51267 DATE: 11-21-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
23.11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
24.51	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
25.34	400.0	400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
26.05	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
26.69	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
27.32	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
27.76	1132.0	1132.0	0.0	0.0	0.0	0.0	0.0	0.00	1
28.71	1400.0	1389.8	0.0	0.0	0.0	0.0	0.0	7.08	2
29.24	1600.0	1517.4	0.0	0.0	0.0	0.0	0.0	81.91	3
29.70	1800.0	1619.0	0.0	0.0	0.0	0.0	0.0	180.55	3
30.13	2000.0	1706.4	0.0	0.0	0.0	0.0	0.0	292.51	2
28.58	1357.2	1357.2	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP51267 DATE: 11-21-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
23.11	0.000	0.00	0.00	0.00
24.51	0.000	200.00	0.00	0.00
25.34	0.000	400.00	0.00	0.00
26.05	0.000	600.00	0.00	0.00
26.69	0.000	800.00	0.00	0.00
27.32	0.000	1000.00	0.00	0.00
27.76	0.000	1132.00	0.00	0.00
28.71	-0.009	1400.00	3.12	0.22
29.24	-0.002	1600.00	0.65	0.04
29.70	-0.001	1800.00	0.43	0.02
30.13	-0.002	2000.00	1.08	0.05

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 11-21-2005 FILE DATE: 11-21-2005
CURRENT TIME: 14:24:18 FILE NAME: SVP51267

PERFORMANCE CURVE FOR CULVERT 1 - 4(10.00 (ft) BY 4.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	23.11	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
200.00	24.51	1.40	1.40	1-S2n	0.63	0.92	0.65	1.08	7.70	6.79
400.00	25.34	2.23	2.23	1-S2n	0.99	1.46	1.03	1.63	9.69	8.68
600.00	26.05	2.94	2.94	1-S2n	1.29	1.92	1.38	2.07	10.90	9.97
800.00	26.69	3.58	3.58	1-S2n	1.57	2.32	1.69	2.44	11.83	10.97
1000.00	27.32	4.21	4.21	5-S2n	1.82	2.69	1.99	2.77	12.54	11.81
1132.00	27.76	4.65	4.65	5-S2n	1.98	2.93	2.18	2.98	13.01	12.29
1389.80	28.71	5.60	5.60	5-S2n	2.28	3.35	2.53	3.36	13.71	13.15
1517.44	29.24	6.13	6.13	5-S2n	2.42	3.56	2.71	3.62	14.02	13.71
1619.02	29.70	6.59	6.59	5-S2n	2.53	3.71	2.84	3.87	14.23	14.22
1706.40	30.12	7.01	6.08	4-FFt	2.62	3.85	2.62	4.10	16.26	14.69

El. inlet face invert 23.11 ft El. outlet invert 22.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

```
***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                       23.11 ft
      OUTLET STATION                       133.00 ft
      OUTLET ELEVATION                      22.00 ft
      NUMBER OF BARRELS                     4
      SLOPE (V/H)                           0.0083
      CULVERT LENGTH ALONG SLOPE           133.00 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN            10.00 ft
      BARREL RISE             4.00 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE (30-75 DEG. FLARE)
      INLET DEPRESSION      NONE
```

CURRENT DATE: 11-21-2005
CURRENT TIME: 14:24:18

FILE DATE: 11-21-2005
FILE NAME: SVP51267

TAILWATER

******* REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	25.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.026
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	22.00 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	22.00 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	22.00	0.000	0.00	0.00	0.00
200.00	23.08	1.148	1.08	6.79	1.76
400.00	23.63	1.197	1.63	8.68	2.65
600.00	24.07	1.222	2.07	9.97	3.35
800.00	24.44	1.238	2.44	10.97	3.96
1000.00	24.77	1.250	2.77	11.81	4.50
1132.00	24.98	1.256	2.98	12.29	4.83
1400.00	25.36	1.265	3.36	13.15	5.45
1600.00	25.62	1.270	3.62	13.71	5.87
1800.00	25.87	1.275	3.87	14.22	6.27
2000.00	26.10	1.278	4.10	14.69	6.65

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	28.58 ft

CURRENT DATE: 10-24-2005
CURRENT TIME: 14:52:12

FILE DATE: 10-24-2005
FILE NAME: SVP61824

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	44.20	42.86	135.01	4 RCB	10.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP61824 DATE: 10-24-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
44.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
45.60	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
46.42	400.0	400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
47.13	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
47.76	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
48.33	1000.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.00	1
48.89	1200.0	1200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
49.46	1400.0	1400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
49.95	1565.0	1565.0	0.0	0.0	0.0	0.0	0.0	0.00	1
50.70	1800.0	1800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
51.33	2000.0	1978.0	0.0	0.0	0.0	0.0	0.0	20.57	3
51.06	1902.0	1902.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP61824 DATE: 10-24-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
44.20	0.000	0.00	0.00	0.00
45.60	0.000	200.00	0.00	0.00
46.42	0.000	400.00	0.00	0.00
47.13	0.000	600.00	0.00	0.00
47.76	0.000	800.00	0.00	0.00
48.33	0.000	1000.00	0.00	0.00
48.89	0.000	1200.00	0.00	0.00
49.46	0.000	1400.00	0.00	0.00
49.95	0.000	1565.00	0.00	0.00
50.70	0.000	1800.00	0.00	0.00
51.33	-0.003	2000.00	1.45	0.07

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-24-2005 FILE DATE: 10-24-2005
CURRENT TIME: 14:52:12 FILE NAME: SVP61824

PERFORMANCE CURVE FOR CULVERT 1 - 4(10.00 (ft) BY 5.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	44.20	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
200.00	45.60	1.40	1.40	1-S2n	0.59	0.92	0.52	0.74	9.60	12.68
400.00	46.42	2.22	2.22	1-S2n	0.94	1.46	0.98	1.11	10.18	16.28
600.00	47.13	2.93	2.93	1-S2n	1.22	1.92	1.31	1.40	11.49	18.75
800.00	47.76	3.56	3.56	1-S2n	1.48	2.32	1.61	1.66	12.42	20.68
1000.00	48.33	4.13	4.13	1-S2n	1.71	2.69	1.89	1.89	13.21	22.28
1200.00	48.89	4.69	4.69	1-S2n	1.94	3.04	2.18	2.10	13.75	23.65
1400.00	49.46	5.26	5.26	5-S2n	2.15	3.37	2.44	2.29	14.34	24.88
1565.00	49.95	5.75	5.75	5-S2n	2.32	3.63	2.66	2.44	14.71	25.79
1800.00	50.70	6.50	6.50	5-S2n	2.56	3.99	2.96	2.64	15.23	26.96
1977.97	51.32	7.12	7.12	5-S2n	2.73	4.24	3.14	2.80	15.73	27.87

El. inlet face invert 44.20 ft El. outlet invert 42.86 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	44.20 ft
OUTLET STATION	135.00 ft
OUTLET ELEVATION	42.86 ft
NUMBER OF BARRELS	4
SLOPE (V/H)	0.0099
CULVERT LENGTH ALONG SLOPE	135.01 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 10-24-2005
CURRENT TIME: 14:52:12

FILE DATE: 10-24-2005
FILE NAME: SVP61824

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	20.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.150
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	42.86 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	42.86 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	42.86	0.000	0.00	0.00	0.00
200.00	43.60	2.607	0.74	12.68	6.88
400.00	43.97	2.727	1.11	16.28	10.35
600.00	44.26	2.789	1.40	18.75	13.13
800.00	44.52	2.829	1.66	20.68	15.53
1000.00	44.75	2.857	1.89	22.28	17.67
1200.00	44.96	2.878	2.10	23.65	19.63
1400.00	45.15	2.898	2.29	24.88	21.43
1565.00	45.30	2.910	2.44	25.79	22.83
1800.00	45.50	2.924	2.64	26.96	24.72
2000.00	45.66	2.934	2.80	27.87	26.23

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	51.06 ft

CURRENT DATE: 10-24-2005
CURRENT TIME: 13:45:20

FILE DATE: 10-24-2005
FILE NAME: SVP63089

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	50.40	49.50	155.00	4 RCB	10.00	3.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP63089 DATE: 10-24-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
50.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
51.81	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
52.65	400.0	400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
53.38	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
54.15	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
54.64	910.0	910.0	0.0	0.0	0.0	0.0	0.0	0.00	1
56.03	1200.0	1171.0	0.0	0.0	0.0	0.0	0.0	26.07	4
56.64	1400.0	1266.2	0.0	0.0	0.0	0.0	0.0	133.12	3
57.15	1600.0	1340.9	0.0	0.0	0.0	0.0	0.0	258.65	3
57.61	1800.0	1404.8	0.0	0.0	0.0	0.0	0.0	394.71	3
58.04	2000.0	1462.0	0.0	0.0	0.0	0.0	0.0	537.73	3
55.72	1117.9	1117.9	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP63089 DATE: 10-24-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
50.40	0.000	0.00	0.00	0.00
51.81	0.000	200.00	0.00	0.00
52.65	0.000	400.00	0.00	0.00
53.38	0.000	600.00	0.00	0.00
54.15	0.000	800.00	0.00	0.00
54.64	0.000	910.00	0.00	0.00
56.03	-0.009	1200.00	2.96	0.25
56.64	-0.002	1400.00	0.70	0.05
57.15	-0.001	1600.00	0.40	0.03
57.61	-0.001	1800.00	0.52	0.03
58.04	-0.001	2000.00	0.28	0.01

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-24-2005 FILE DATE: 10-24-2005
CURRENT TIME: 13:45:20 FILE NAME: SVP63089

PERFORMANCE CURVE FOR CULVERT 1 - 4(10.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	50.40	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
200.00	51.81	1.41	1.41	1-S2n	0.71	0.92	0.62	0.76	8.05	4.26
400.00	52.65	2.25	2.25	1-S2n	1.12	1.46	1.06	1.15	9.42	5.56
600.00	53.38	2.98	2.98	1-S2n	1.46	1.92	1.50	1.47	10.03	6.48
800.00	54.15	3.75	3.75	5-S2n	1.77	2.32	1.84	1.75	10.87	7.22
910.00	54.64	4.24	4.24	5-S2n	1.93	2.53	2.01	1.88	11.32	7.57
1170.97	56.03	5.63	5.63	5-S2n	2.29	2.99	2.41	2.22	12.14	8.38
1266.18	56.64	6.24	5.44	6-S2n	2.42	3.00	2.55	2.43	12.41	8.87
1340.95	57.15	6.75	5.85	6-S2n	2.51	3.00	2.67	2.63	12.56	9.31
1404.78	57.61	7.21	6.22	6-S2n	2.60	3.00	2.84	2.82	12.37	9.71
1461.99	58.04	7.64	6.56	4-S2n	2.67	3.00	2.90	3.00	12.60	10.09

El. inlet face invert 50.40 ft El. outlet invert 49.50 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	50.40 ft
OUTLET STATION	155.00 ft
OUTLET ELEVATION	49.50 ft
NUMBER OF BARRELS	4
SLOPE (V/H)	0.0058
CULVERT LENGTH ALONG SLOPE	155.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 10-24-2005
CURRENT TIME: 13:45:20

FILE DATE: 10-24-2005
FILE NAME: SVP63089

TAILWATER

******* REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	60.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.015
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	49.50 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	49.50 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	49.50	0.000	0.00	0.00	0.00
200.00	50.26	0.859	0.76	4.26	0.71
400.00	50.65	0.911	1.15	5.56	1.08
600.00	50.97	0.941	1.47	6.48	1.38
800.00	51.25	0.963	1.75	7.22	1.63
910.00	51.38	0.972	1.88	7.57	1.76
1200.00	51.72	0.991	2.22	8.38	2.08
1400.00	51.93	1.002	2.43	8.87	2.28
1600.00	52.13	1.011	2.63	9.31	2.46
1800.00	52.32	1.019	2.82	9.71	2.64
2000.00	52.50	1.025	3.00	10.09	2.81

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	110.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	55.72 ft

CURRENT DATE: 10-24-2005
CURRENT TIME: 14:21:03

FILE DATE: 10-24-2005
FILE NAME: SVP63208

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	49.54	49.27	135.00	3 RCB	12.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SVP63208 DATE: 10-24-2005

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
49.54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
51.19	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
52.17	400.0	400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
52.98	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
53.71	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.00	1
54.08	910.0	910.0	0.0	0.0	0.0	0.0	0.0	0.00	1
55.01	1200.0	1200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
55.60	1400.0	1400.0	0.0	0.0	0.0	0.0	0.0	0.00	1
56.16	1600.0	1600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
56.64	1800.0	1770.2	0.0	0.0	0.0	0.0	0.0	30.22	2
57.12	2000.0	1885.9	0.0	0.0	0.0	0.0	0.0	113.51	3
56.30	1648.9	1648.9	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SVP63208 DATE: 10-24-2005

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
49.54	0.000	0.00	0.00	0.00
51.19	0.000	200.00	0.00	0.00
52.17	0.000	400.00	0.00	0.00
52.98	0.000	600.00	0.00	0.00
53.71	0.000	800.00	0.00	0.00
54.08	0.000	910.00	0.00	0.00
55.01	0.000	1200.00	0.00	0.00
55.60	0.000	1400.00	0.00	0.00
56.16	0.000	1600.00	0.00	0.00
56.64	0.001	1800.00	-0.44	-0.02
57.12	-0.001	2000.00	0.55	0.03

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-24-2005 FILE DATE: 10-24-2005
CURRENT TIME: 14:21:03 FILE NAME: SVP63208

PERFORMANCE CURVE FOR CULVERT 1 - 3(12.00 (ft) BY 5.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	49.54	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
200.00	51.19	1.51	1.65	3-M1t	1.06	0.99	1.28	1.28	4.35	5.69
400.00	52.17	2.40	2.63	3-M1t	1.67	1.57	1.92	1.92	5.80	7.24
600.00	52.98	3.16	3.44	3-M1t	2.19	2.06	2.42	2.42	6.88	8.30
800.00	53.71	3.84	4.17	3-M1t	2.66	2.49	2.86	2.86	7.78	9.12
910.00	54.08	4.19	4.54	3-M1t	2.91	2.71	3.07	3.07	8.23	9.51
1200.00	55.01	5.09	5.47	3-M1t	3.53	3.26	3.59	3.59	9.27	10.37
1400.00	55.60	5.74	6.06	3-M2t	3.93	3.62	3.92	3.92	9.93	10.88
1600.00	56.16	6.45	6.62	3-M2t	4.33	3.95	4.22	4.22	10.53	11.34
1770.22	56.64	7.10	7.09	3-M2t	5.00	4.23	4.51	4.51	10.92	11.75
1885.94	57.12	7.58	7.39	3-M2t	5.00	4.41	4.77	4.77	10.97	12.13

El. inlet face invert 49.54 ft El. outlet invert 49.27 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

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***** SITE DATA ***** CULVERT INVERT **************
      INLET STATION                          0.00 ft
      INLET ELEVATION                       49.54 ft
      OUTLET STATION                       135.00 ft
      OUTLET ELEVATION                      49.27 ft
      NUMBER OF BARRELS                     3
      SLOPE (V/H)                           0.0020
      CULVERT LENGTH ALONG SLOPE           135.00 ft

***** CULVERT DATA SUMMARY ************************
      BARREL SHAPE          BOX
      BARREL SPAN            12.00 ft
      BARREL RISE             5.00 ft
      BARREL MATERIAL       CONCRETE
      BARREL MANNING'S n    0.012
      INLET TYPE            CONVENTIONAL
      INLET EDGE AND WALL   SQUARE EDGE (30-75 DEG. FLARE)
      INLET DEPRESSION      NONE
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CURRENT DATE: 10-24-2005 FILE DATE: 10-24-2005
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TAILWATER

******* REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	25.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.015
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	49.27 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	49.27 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	49.27	0.000	0.00	0.00	0.00
200.00	50.55	0.888	1.28	5.69	1.19
400.00	51.19	0.923	1.92	7.24	1.79
600.00	51.69	0.940	2.42	8.30	2.27
800.00	52.13	0.951	2.86	9.12	2.67
910.00	52.34	0.956	3.07	9.51	2.88
1200.00	52.86	0.964	3.59	10.37	3.36
1400.00	53.19	0.969	3.92	10.88	3.67
1600.00	53.49	0.972	4.22	11.34	3.95
1800.00	53.78	0.975	4.51	11.75	4.22
2000.00	54.04	0.978	4.77	12.13	4.47

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	100.00 ft
CREST LENGTH	50.00 ft
OVERTOPPING CREST ELEVATION	56.30 ft