

2-Year Expected Value Storm Event Lag Time Estimation - Proposed Condition SA UH

U/S Node	D/S Node	U/S Drainage Area (acre)	D/S Drainage Area (acre)	U/S Lag Time	U/S Q (cfs)	Flow Length (feet)	U/S Elev. (feet)	D/S Elev. (feet)	Slope	Manning's N	Side Slope	Width (feet)	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	Tc (minutes)	D/S Lag Time (hour)	D/S Q (cfs)	Q average (cfs)	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	D/S Tc (minutes)	D/S Lag Time (hour)	D/S Q (cfs)
																							402.35		
118c	119/118C	48826	49512	5.365	540	532	347.47	341.63	0.01097	0.04	3		5.07	7.00	1.27	403.62	5.382	527	540	5.07	7.00	1.27	403.62	5.382	527
119	126	49512	50406	5.382	527	6204	341.63	286	0.00897	0.03	3		4.68	8.01	12.91	416.53	5.554	510	527	4.68	8.01	12.91	416.53	5.554	510
126	127	50406	53500	5.554	510	7191	286	240	0.0064	0.03	3		4.93	7.00	17.13	433.66	5.782	583	547	5.06	7.12	16.83	433.36	5.778	583
127	133u	53500	54352	5.778	583	4905	240	212	0.00571	0.03	3		5.29	6.93	11.79	445.16	5.935	580	583	5.29	6.93	11.79	445.16	5.935	580
133u	133c	54352	60993	5.935	580	0	212	212	0.01	0.03	3		4.76	8.54	0.00	445.16	5.935	722	651	4.97	8.79	0.00	445.16	5.935	722
133c	134u	60993	62698	5.935	722	6461	212	173	0.00604	0.03	3		5.68	7.47	14.42	459.58	6.128	757	739	5.73	7.51	14.33	459.49	6.127	757
134u	134c	62698	66558	6.127	757	0	173	173	0.01	0.03	3		5.26	9.13	0.00	459.49	6.127	790	773	5.30	9.18	0.00	459.49	6.127	790
134c	137	66558	67798	6.127	790	6064	173	133	0.0066	0.03	3		5.77	7.90	12.80	472.29	6.297	817	803	5.81	7.93	12.75	472.24	6.296	817
137	138	67798	69102	6.296	817	4644	133	119.7	0.00286	0.03	3		6.84	5.82	13.29	485.53	6.474	825	821	6.85	5.83	13.27	485.51	6.473	825
138	139	69102	69530	6.473	825	3108	119.7	100	0.00634	0.03	3		5.91	7.86	6.59	492.10	6.561	831	828	5.92	7.87	6.58	492.09	6.561	831
139		69530			831																				

5-Year Expected Value Storm Event Lag Time Estimation

5-year EV flow rate at La Novia based on frequency analysis is:
2940 cfs

Total drainage area is:
69532 acres

Unit Yield 0.042283 (cfs/acre)

Nodes upstream of Node 118c (Natural Area)

U/S Node	D/S Node	Flowrate based on Unit Yield					Flow Length (feet)	U/S Elev. (feet)	D/S Elev. (feet)	Slope	Manning's N	Side Slope	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	Tc (minutes)	U/S Lag Time (hour)
		U/S Area (acre)	D/S Area (acre)	U/S Q per Yield (cfs)	D/S Q per Yield (cfs)	Average Q (cfs)											
101u															113.17	1.51	
101c															113.17	1.51	
103															115.44	1.54	
104															121.18	1.62	
10640	106	10443.6	12502	442	529	485	2254	1444	1320	0.0550	0.06	3	4.19	9.21	4.08	139.58	1.86
106	108	12502	16599	529	702	615	12951	1320	961	0.0277	0.06	3	5.21	7.56	28.56	143.66	1.92
108	113	16599	23614	702	998	850	10867	961	679	0.0260	0.05	3	5.56	9.17	19.76	172.22	2.30
113	114	23614	25186	998	1065	1032	2070	679	652	0.0132	0.05	3	6.79	7.46	4.63	191.98	2.56
114	115	25186	31889	1065	1348	1207	17899	652	436	0.0120	0.04	3	6.74	8.87	33.65	196.60	2.62
115	118u	31889	32917	1348	1392	1370	8745	436	347	0.0101	0.04	3	7.29	8.58	16.98	230.25	3.07
118c															247.23	3.30	

For natural area upstream of Node 118c, Unit Yield method is used to estimate lag time. The procedures include the following steps.

1. Flow rates based on unit yield are estimated for upstream and downstream nodes
2. Average flow rate is calculated from upstream and downstream nodes flow rates.
3. Average flow rate is used to estimate the travel time between upstream and downstream nodes.
4. Travel time is added to upstream Tc to get the downstream Tc.

Notes:
Node 10640 is the rational method node. The rational method model doesn't apply to the nodes downstream of Node 10640 because the rainfall intensity is lower than the infiltration rate. Travel time based on unit yield is added to the Tc of node 10640 to get downstream node Tc. The lag time for Node 101u, 101c, 103, and 104 are based on rational method model.

5-Year Expected Value Storm Event Lag Time Estimation - Proposed Condition SA UH

U/S Node	D/S Node	U/S Drainage Area (acre)	D/S Drainage Area (acre)	U/S Lag Time	U/S Q (cfs)	Flow Length (feet)	U/S Elev. (feet)	D/S Elev. (feet)	Slope	Manning's N	Side Slope	Width (feet)	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	Tc (minutes)	D/S Lag Time (hour)	D/S Q (cfs)	Q average (cfs)	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	D/S Tc (minutes)	D/S Lag Time (hour)	D/S Q (cfs)
																							247.23		
118c	119/118C	48826	49512	3.30	2414	532	347.47	341.63	0.01097	0.04	3		8.89	10.18	0.87	248.10	3.308	2407	2414	8.89	10.18	0.87	248.10	3.308	2407
119	126	49512	50406	3.31	2407	6204	341.63	286	0.00897	0.03	3		8.28	11.71	8.83	256.93	3.426	2343	2407	8.28	11.71	8.83	256.93	3.426	2343
126	127	50406.1	53500	3.43	2343	7191	286	240	0.0064	0.03	3		8.73	10.24	11.70	268.63	3.582	2450	2397	8.81	10.30	11.63	268.57	3.581	2450
127	133U	53500.2	54352	3.58	2450	4905	240	212	0.00571	0.03	3		9.07	9.93	8.24	276.80	3.691	2537	2494	9.13	9.97	8.20	276.77	3.690	2537
133U	133c	54352	60993	3.69	2537	0	212	212	0.01	0.03	3		8.27	12.36	0.00	276.77	3.690	2672	2605	8.35	12.44	0.00	276.77	3.690	2672
133c	134u	60993	62698	3.69	2672	6461	212	173	0.00604	0.03	3		9.27	10.36	10.40	287.16	3.829	2734	2703	9.31	10.39	10.37	287.13	3.828	2734
134u	134c	62698	66558	3.83	2734	0	173	173	0.01	0.03	3		8.51	12.59	0.00	287.13	3.828	2812	2773	8.55	12.63	0.00	287.13	3.828	2812
134c	137	66558	67798	3.83	2812	6064	173	133	0.0066	0.03	3		9.30	10.85	9.32	296.45	3.953	2834	2823	9.31	10.86	9.31	296.44	3.953	2834
137	138	67798	69102	3.95	2834	4644	133	119.7	0.00286	0.03	3		10.90	7.95	9.74	306.18	4.082	2835	2835	10.90	7.95	9.74	306.18	4.082	2835
138	139	69102	69530	4.08	2835	3108	119.7	100	0.00634	0.03	3		9.39	10.71	4.84	311.02	4.147	2839	2837	9.40	10.71	4.84	311.02	4.147	2839
139		69530			2839																				