City of Redlands

Municipal Utilities and Engineering Department

September 4, 2012

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SEP - 6 2012

SAN BERNARDINO ASSOCIATED GOVTS

Steve Smith
Chief of Planning
San Bernardino Associated Governments
1170 W. 3rd Street, 2nd Floor
San Bernardino CA 92410-1715

Congestion Management Plan Level of Service Analysis for 2012

Enclosed please find the required 2012 level of service analysis updates for the following CMP intersections:

1. Alabama Street and Redlands Boulevard.
2. California Street and San Bernardino Avenue.
3. California Street and Redlands Boulevard.
4. Orange Street and Citrus Avenue.
5. Orange Street and Redlands Boulevard.
6. Redlands Boulevard and Citrus Avenue.
7. San Mateo Street and Brookside Avenue.
8. Tennessee Street and Redlands Boulevard.
9. Citrus Avenue and Church Street.
10. Citrus Avenue and Judson/Ford Street.

If you have any questions, please call Art Creef at (909)798-7585, xt.5.

ART CREEF
Associate Engineer
Municipal Utilites and Engineering Department
35 Cajon Street
Redlands, CA 92373

ac

FILE: CMP LOS 2012

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SEP - 6 2012
SAN BERNARDINO ASSOCIATED GOVTS

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 29, 2012

Redlands Blvd. & Alabama St. **CITY OF REDLANDS** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	T	R	L	*T*	R	L	*T*	R	L	*T*	R
Movement 1: 13 secs	X			X								
Movement 2: 36 secs		X	X		X	X						
Movement 3: 36 secs										X	X	X
Movement 4: 36 secs							X	X	X			
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	1	2	S	1	2	S
Unadjusted Volume	99	158	42	55	216	100	62	414	26	95	388	132
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	36	36	10	36	36	10	36	36	10	36	36
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***				***			***			***	
Pk. Hr. Vol. (vph)	110	176	47	61	240	111	69	460	29	106	431	147
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	1700	3600	Shrd	1700	3600	Shrd
X or V/C	0.71	0.17	0.09	0.39	0.24	0.22	0.14	0.48	-	0.22	0.57	-
Effective green (sec)	11	34	34	11	34	34	34	34	-	34	34	-
Split Time (sec)	13	36	36	13	36	36	36	36	-	36	36	-
Min. Time or Ped. Time (sec)	10	36	36	10	36	36	10	36	-	10	36	-
Delay - 15 min pk (sec/veh)	78	33	32	59	34	34	33	38	-	34	40	-
Level of Service (LOS)	E-	C-	C-	E+	C-	C-	C-	D+	-	C-	D+	-
Average 'Q' (veh/ln)	4	2	1	2	3	3	2	6	-	3	7	-
Design 'Q'- ft/ln	120	60	40	60	100	100	60	180	-	100	220	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 40
Level of Service - LOS = D+

Critical Movements

Weighted Avg Delay (sec) = 41
Level of Service - LOS = D
Intersection Capacity Utilization - ICU = 0.46

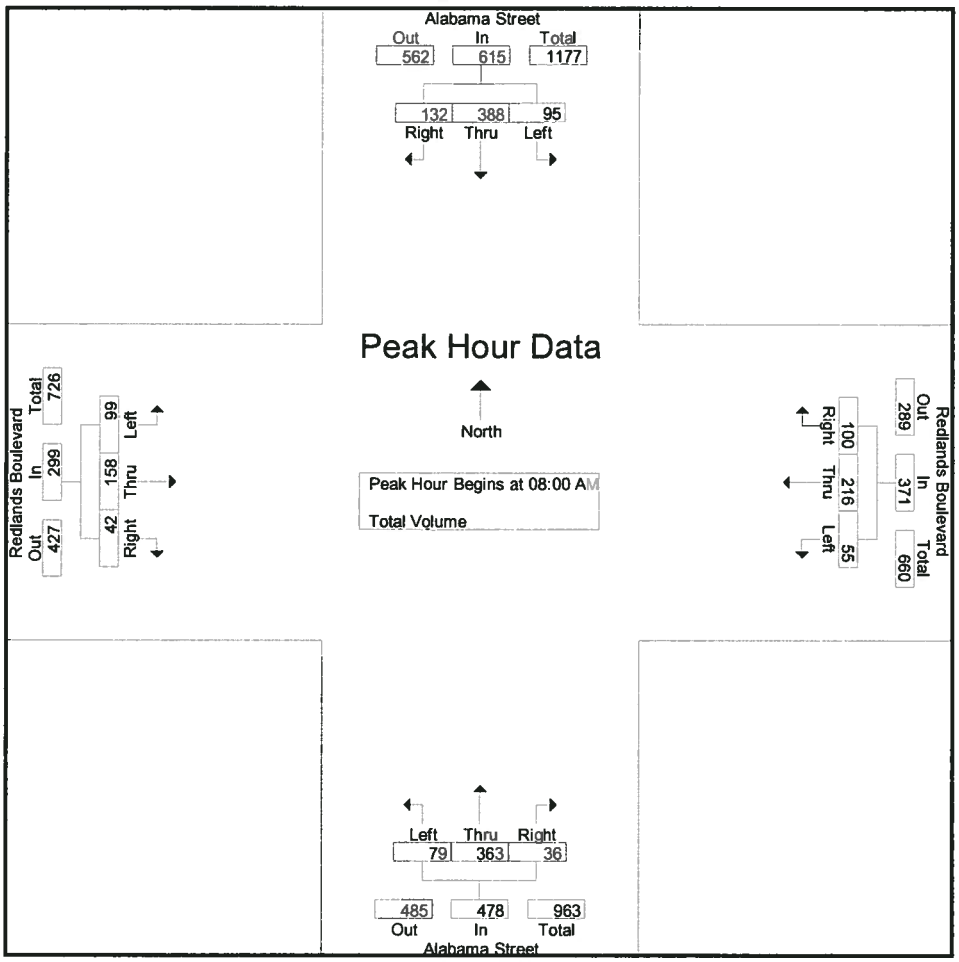
Required Cycle Length is 121 sec

Min./Ped. Times Satisfied

Counts Unlimited Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redlands
N/S: Alabama Street
E/W: Redlands Boulevard
Weather: Suny

File Name : REDALREAM
Site Code : 00000001
Start Date : 6/27/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	08:00 AM				08:00 AM				07:15 AM				08:00 AM			
				S				W				N				E
+0 mins.	22	88	**39**	149	12	53	24	89	17	105	6	128	17	31	10	58
+15 mins.	24	87	21	132	6	53	19	78	11	103	**9**	123	19	36	**13**	68
+30 mins.	18	85	37	140	14	48	23	85	14	91	6	111	29	41	6	76
+45 mins.	**31**	**128**	35	**194**	**23**	**62**	**34**	**119**	**20**	**115**	5	**140**	**34**	**50**	13	**97**
Total Volume	95	388	132	615	55	216	100	371	62	414	26	502	99	158	42	299
% App. Total	15.4	63.1	21.5		14.8	58.2	27		12.4	82.5	5.2		33.1	52.8	14	
PHF	.766	.758	.846	.793	.598	.871	.735	.779	.775	.900	.722	.896	.728	.790	.808	.771
	L	T	R		L	T	R		L	T	R		L	T	R	

Counts Unlimited Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redlands
N/S: Alabama Street
E/W: Redlands Boulevard
Weather: Suny

File Name : REDALREAM
Site Code : 00000001
Start Date : 6/27/2012
Page No : 1

Groups Printed- Total Volume

	Alabama Street Southbound				Redlands Boulevard Westbound				Alabama Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	15	75	29	119	8	32	23	63	11	79	3	93	15	19	8	42	317
07:15 AM	21	77	25	123	9	44	20	73	17	105	6	128	20	28	4	52	376
07:30 AM	16	102	27	145	7	65	23	95	11	103	9	123	21	31	1	53	416
07:45 AM	23	120	24	167	12	63	20	95	14	91	6	111	20	36	7	63	436
Total	75	374	105	554	36	204	86	326	53	378	24	455	76	114	20	210	1545
08:00 AM	22	88	39	149	12	53	24	89	20	115	5	140	17	31	10	58	436
08:15 AM	24	87	21	132	6	53	19	78	21	82	5	108	19	36	13	68	386
08:30 AM	18	85	37	140	14	48	23	85	24	89	12	125	29	41	6	76	426
08:45 AM	31	128	35	194	23	62	34	119	14	77	14	105	34	50	13	97	515
Total	95	388	132	615	55	216	100	371	79	363	36	478	99	158	42	299	1763
Grand Total	170	762	237	1169	91	420	186	697	132	741	60	933	175	272	62	509	3308
Apprch %	14.5	65.2	20.3		13.1	60.3	26.7		14.1	79.4	6.4		34.4	53.4	12.2		
Total %	5.1	23	7.2	35.3	2.8	12.7	5.6	21.1	4	22.4	1.8	28.2	5.3	8.2	1.9	15.4	

	Alabama Street Southbound				Redlands Boulevard Westbound				Alabama Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	22	88	**39**	149	12	53	24	89	20	**115**	5	**140**	17	31	10	58	436
08:15 AM	24	87	21	132	6	53	19	78	21	82	5	108	19	36	**13**	68	386
08:30 AM	18	85	37	140	14	48	23	85	**24**	89	12	125	29	41	6	76	426
08:45 AM	**31**	**128**	35	**194**	**23**	**62**	**34**	**119**	14	77	**14**	105	**34**	**50**	13	**97**	**515**
Total Volume	95	388	132	615	55	216	100	371	79	363	36	478	99	158	42	299	1763
% App. Total	15.4	63.1	21.5		14.8	58.2	27		16.5	75.9	7.5		33.1	52.8	14		
PHF	.766	.758	.846	.793	.598	.871	.735	.779	.823	.789	.643	.854	.728	.790	.808	.771	.856

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 29, 2012

Redlands Blvd. & Alabama St. **CITY OF REDLANDS** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	T	R	L	*T*	R	L	*T*	R	L	*T*	R
Movement 1: 17 secs	X			X								
Movement 2: 12 secs	X	X	X									
Movement 3: 21 secs		X	X		X	X						
Movement 4: 33 secs							X	X	X			
Movement 5: 37 secs										X	X	X
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	1	2	S	1	2	S
Unadjusted Volume	243	500	78	92	356	172	94	516	84	107	515	159
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	36	36	10	36	36	10	35	35	10	35	35
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***				***			***			***	
Pk. Hr. Vol. (vph)	270	556	87	102	396	191	104	573	93	119	572	177
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	1700	3600	Shrd	1700	3600	Shrd
X or V/C	0.71	0.60	0.19	0.48	0.69	0.67	0.24	0.72	-	0.24	0.71	-
Effective green (sec)	27	31	31	15	19	19	31	31	-	35	35	-
Split Time (sec)	29	33	33	17	21	21	33	33	-	37	37	-
Min. Time or Ped. Time (sec)	10	36	36	10	36	36	10	35	-	10	35	-
Delay - 15 min pk (sec/veh)	53	42	36	56	55	59	36	45	-	34	42	-
Level of Service (LOS)	D-	D	D+	E+	D-	E+	D+	D	-	C-	D	-
Average 'Q' (veh/ln)	7	7	2	3	6	5	3	8	-	3	9	-
Design 'Q'- ft/ln	220	220	60	100	180	160	100	240	-	100	280	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 46
Level of Service - LOS = D

Critical Movements

Weighted Avg Delay (sec) = 47
Level of Service - LOS = D
Intersection Capacity Utilization - ICU = 0.71

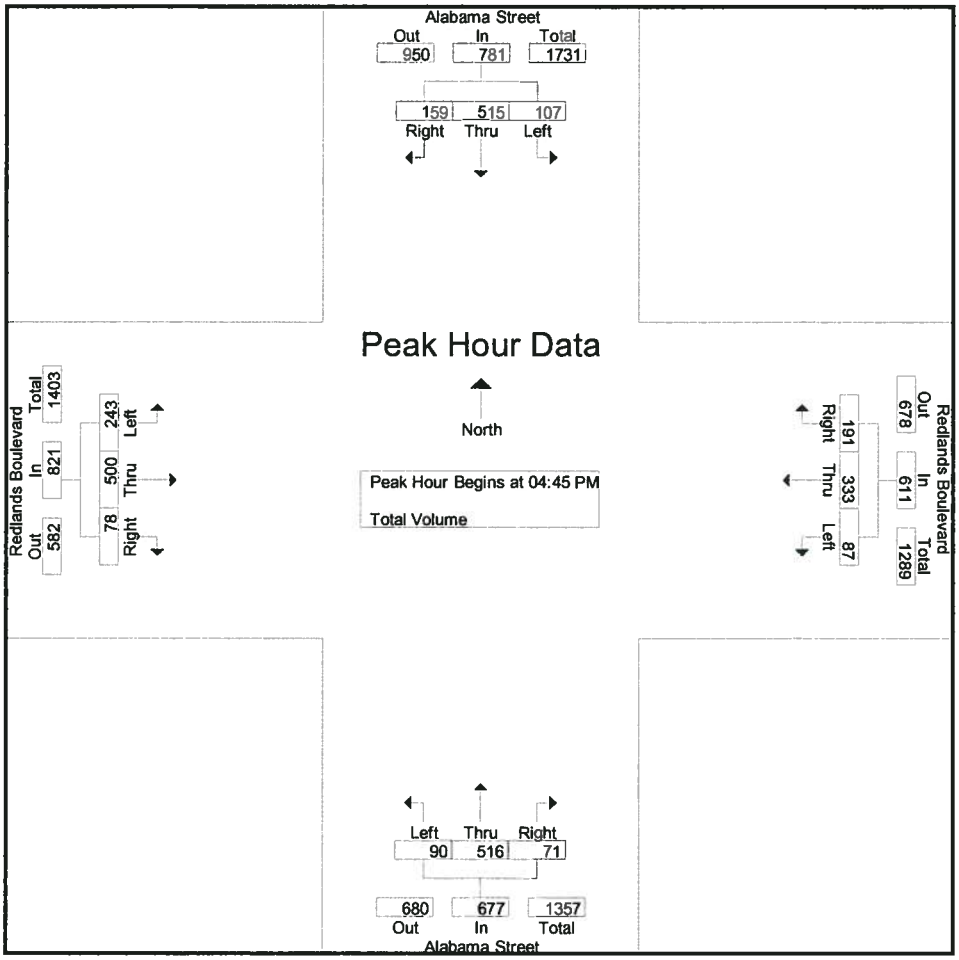
Predetermined Cycle Length is 120 sec

Min./Ped. Times May Not Be Satisfied

Counts Unlimited Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redlands
N/S: Alabama Street
E/W: Redlands Boulevard
Weather: Suny

File Name : REDALREPM
Site Code : 00000001
Start Date : 6/27/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM			S	04:15 PM			W	04:00 PM			N	04:45 PM			E
+0 mins.	29	133	30	192	**27**	84	31	142	24	**145**	**24**	**193**	52	117	20	189
+15 mins.	**30**	112	34	176	26	79	36	141	23	115	20	158	**67**	**134**	18	**219**
+30 mins.	22	132	41	195	14	**107**	49	**170**	22	140	20	182	66	124	**23**	213
+45 mins.	26	**138**	**54**	**218**	25	86	**56**	167	**25**	116	20	161	58	125	17	200
Total Volume	107	515	159	781	92	356	172	620	94	516	84	694	243	500	78	821
% App. Total	13.7	65.9	20.4		14.8	57.4	27.7		13.5	74.4	12.1		29.6	60.9	9.5	
PHF	.892	.933	.736	.896	.852	.832	.768	.912	.940	.890	.875	.899	.907	.933	.848	.937
	L	T	R		L	T	R		L	T	R		L	T	R	

Counts Unlimited Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redlands
N/S: Alabama Street
E/W: Redlands Boulevard
Weather: Suny

File Name : REDALREPM
Site Code : 00000001
Start Date : 6/27/2012
Page No : 1

Groups Printed- Total Volume

	Alabama Street Southbound				Redlands Boulevard Westbound				Alabama Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	33	110	44	187	26	91	43	160	24	145	24	193	71	135	13	219	759
04:15 PM	23	118	37	178	27	84	31	142	23	115	20	158	58	111	15	184	662
04:30 PM	37	97	45	179	26	79	36	141	22	140	20	182	69	109	19	197	699
04:45 PM	29	133	30	192	14	107	49	170	25	116	20	161	52	117	20	189	712
Total	122	458	156	736	93	361	159	613	94	516	84	694	250	472	67	789	2832
05:00 PM	30	112	34	176	25	86	56	167	27	138	19	184	67	134	18	219	746
05:15 PM	22	132	41	195	18	81	40	139	23	112	17	152	66	124	23	213	699
05:30 PM	26	138	54	218	30	59	46	135	15	150	15	180	58	125	17	200	733
05:45 PM	22	117	35	174	31	81	29	141	23	108	16	147	60	60	15	135	597
Total	100	499	164	763	104	307	171	582	88	508	67	663	251	443	73	767	2775
Grand Total	222	957	320	1499	197	668	330	1195	182	1024	151	1357	501	915	140	1556	5607
Apprch %	14.8	63.8	21.3		16.5	55.9	27.6		13.4	75.5	11.1		32.2	58.8	9		
Total %	4	17.1	5.7	26.7	3.5	11.9	5.9	21.3	3.2	18.3	2.7	24.2	8.9	16.3	2.5	27.8	

	Alabama Street Southbound				Redlands Boulevard Westbound				Alabama Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	29	133	30	192	14	**107**	49	**170**	25	116	**20**	161	52	117	20	189	712
05:00 PM	**30**	112	34	176	25	86	**56**	167	**27**	138	19	**184**	**67**	**134**	18	**219**	**746**
05:15 PM	22	132	41	195	18	81	40	139	23	112	17	152	66	124	**23**	213	699
05:30 PM	26	**138**	**54**	**218**	**30**	59	46	135	15	**150**	15	180	58	125	17	200	733
Total Volume	107	515	159	781	87	333	191	611	90	516	71	677	243	500	78	821	2890
% App. Total	13.7	65.9	20.4		14.2	54.5	31.3		13.3	76.2	10.5		29.6	60.9	9.5		
PHF	.892	.933	.736	.896	.725	.778	.853	.899	.833	.860	.888	.920	.907	.933	.848	.937	.968

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 29, 2012

California St. & San Bernardino Ave. **City of Redlands** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	T	R	*L*	*T*	R	*L*	*T*	R	L	T	R
Movement 1: 10 secs	X			X								
Movement 2: 20 secs		X	X		X	X						
Movement 3: 10 secs							X			X		
Movement 4: 20 secs								X	X		X	X
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	1	2	S	1	2	S
Unadjusted Volume	2	137	62	69	335	7	101	87	51	3	35	17
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	20	20	10	20	20	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

				***	***		***	***				
Pk. Hr. Vol. (vph)	10	152	69	77	372	10	112	97	57	10	39	19
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	1700	3600	Shrd	1700	3600	Shrd
X or V/C	0.04	0.14	0.13	0.34	0.34	0.02	0.49	0.14	-	0.04	0.05	-
Effective green (sec)	8	18	18	8	18	18	8	18	-	8	18	-
Split Time (sec)	10	20	20	10	20	20	10	20	-	10	20	-
Min. Time or Ped. Time (sec)	10	20	20	10	20	20	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	23	16	16	28	17	15	32	16	-	23	15	-
Level of Service (LOS)	C+	B	B	C	B	B	C-	B	-	C+	B	-
Average 'Q' (veh/ln)	1	1	1	1	2	1	2	1	-	1	1	-
Design 'Q'- ft/ln	40	40	40	40	60	40	60	40	-	40	40	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 19
Level of Service - LOS = B

Critical Movements

Weighted Avg Delay (sec) = 20
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.30

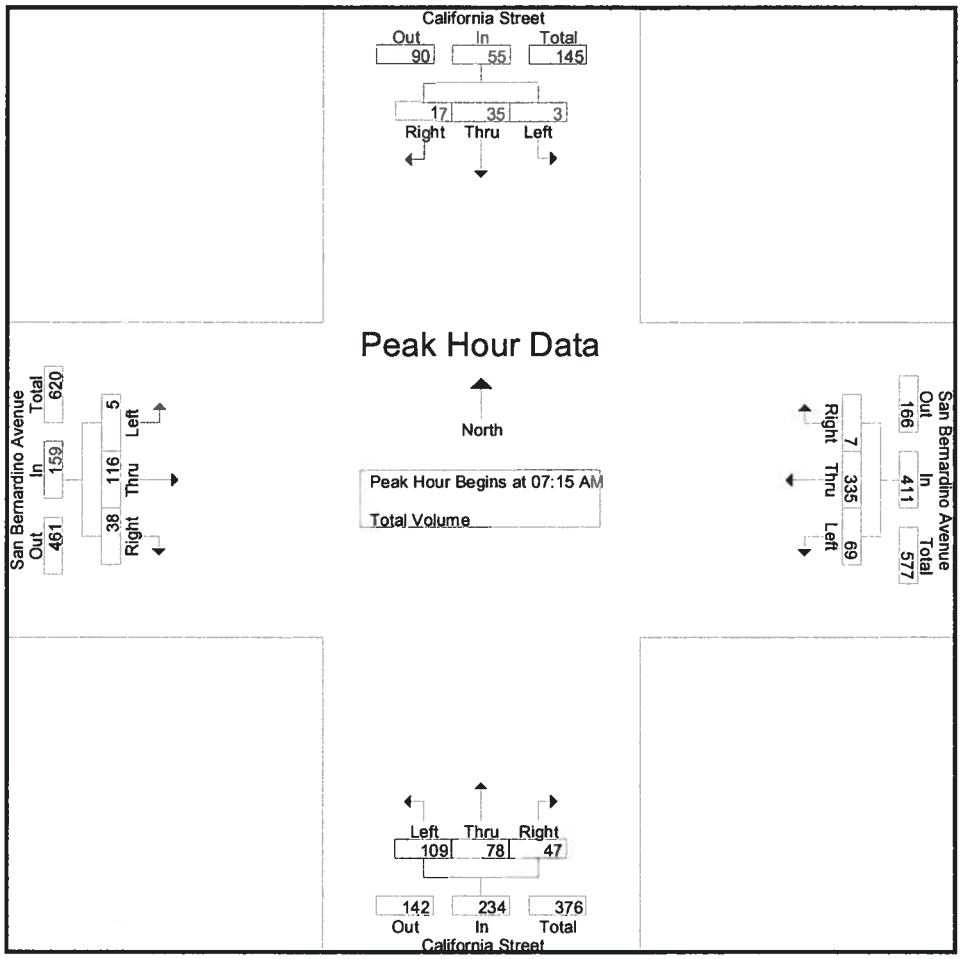
Required Cycle Length is 60 sec

Min./Ped. Times Satisfied

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redlands
N/S: California Street
E/W: San Bernardino Avenue
Weather: Clear

File Name : REDCASBAM
Site Code : 00000097
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 AM			S	07:15 AM			W	07:00 AM			N	08:00 AM			E
+0 mins.	0	4	5	9	9	68	4	81	11	27	14	52	1	41	13	55
+15 mins.	0	5	4	9	17	104	1	122	26	25	18	69	0	40	22	62
+30 mins.	0	14	7	21	24	110	1	135	33	16	6	55	0	26	12	38
+45 mins.	3	12	1	16	19	53	1	73	31	19	13	63	1	30	15	46
Total Volume	3	35	17	55	69	335	7	411	101	87	51	239	2	137	62	201
% App. Total	5.5	63.6	30.9		16.8	81.5	1.7		42.3	36.4	21.3		1	68.2	30.8	
PHF	.250	.625	.607	.655	.719	.761	.438	.761	.765	.806	.708	.866	.500	.835	.705	.810
	L	T	R		L	T	R		L	T	R		L	T	R	

Counts Unlimited, Inc.
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City of Redlands
N/S: California Street
E/W: San Bernardino Avenue
Weather: Clear

File Name : REDCASBAM
Site Code : 00000097
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	California Street Southbound				San Bernardino Avenue Westbound				California Street Northbound				San Bernardino Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	5	4	9	15	44	3	62	11	27	14	52	3	31	11	45	168
07:15 AM	0	4	5	9	9	68	4	81	26	25	18	69	2	32	4	38	197
07:30 AM	0	5	4	9	17	104	1	122	33	16	6	55	1	27	5	33	219
07:45 AM	0	14	7	21	24	110	1	135	31	19	13	63	1	16	16	33	252
Total	0	28	20	48	65	326	9	400	101	87	51	239	7	106	36	149	836
08:00 AM	3	12	1	16	19	53	1	73	19	18	10	47	1	41	13	55	191
08:15 AM	0	6	2	8	18	32	6	56	16	16	5	37	0	40	22	62	163
08:30 AM	1	3	4	8	13	34	0	47	19	14	6	39	0	26	12	38	132
08:45 AM	0	7	1	8	13	35	1	49	19	12	1	32	1	30	15	46	135
Total	4	28	8	40	63	154	8	225	73	60	22	155	2	137	62	201	621
Grand Total	4	56	28	88	128	480	17	625	174	147	73	394	9	243	98	350	1457
Apprch %	4.5	63.6	31.8		20.5	76.8	2.7		44.2	37.3	18.5		2.6	69.4	28		
Total %	0.3	3.8	1.9	6	8.8	32.9	1.2	42.9	11.9	10.1	5	27	0.6	16.7	6.7	24	

	California Street Southbound				San Bernardino Avenue Westbound				California Street Northbound				San Bernardino Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	4	5	9	9	68	4	81	26	**25**	**18**	**69**	**2**	32	4	38	197
07:30 AM	0	5	4	9	17	104	1	122	**33**	16	6	55	1	27	5	33	219
07:45 AM	0	**14**	**7**	**21**	**24**	**110**	1	**135**	31	19	13	63	1	16	**16**	33	**252**
08:00 AM	**3**	12	1	16	19	53	1	73	19	18	10	47	1	**41**	13	**55**	191
Total Volume	3	35	17	55	69	335	7	411	109	78	47	234	5	116	38	159	859
% App. Total	5.5	63.6	30.9		16.8	81.5	1.7		46.6	33.3	20.1		3.1	73	23.9		
PHF	.250	.625	.607	.655	.719	.761	.438	.761	.826	.780	.653	.848	.625	.707	.594	.723	.852

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

California St. & San Bernardino Ave.

California & San Bernardino **City of Redlands** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	*T*	R	*L*	T	R	*L*	T	R	L	*T*	R
Movement 1: 10 secs	X			X								
Movement 2: 24 secs		X	X		X	X						
Movement 3: 10 secs							X			X		
Movement 4: 20 secs								X	X		X	X
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	1	2	S	1	2	S
Unadjusted Volume	19	529	174	71	195	6	88	70	68	8	123	29
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	20	20	10	20	20	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

		***		***			***				***	
Pk. Hr. Vol. (vph)	21	588	193	79	217	10	98	78	76	10	137	32
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	1700	3600	Shrd	1700	3600	Shrd
X or V/C	0.10	0.48	0.31	0.37	0.18	0.02	0.46	0.15	-	0.05	0.17	-
Effective green (sec)	8	22	22	8	22	22	8	18	-	8	18	-
Split Time (sec)	10	24	24	10	24	24	10	20	-	10	20	-
Min. Time or Ped. Time (sec)	10	20	20	10	20	20	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	26	18	17	31	15	14	33	18	-	25	18	-
Level of Service (LOS)	C	B	B	C-	B	B	C-	B	-	C	B	-
Average 'Q' (veh/ln)	1	3	2	1	1	1	2	1	-	1	1	-
Design 'Q'- ft/ln	40	100	60	40	40	40	60	40	-	40	40	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 19
Level of Service - LOS = B

Critical Movements

Weighted Avg Delay (sec) = 20
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.36

Required Cycle Length is 64 sec

Min./Ped. Times Satisfied

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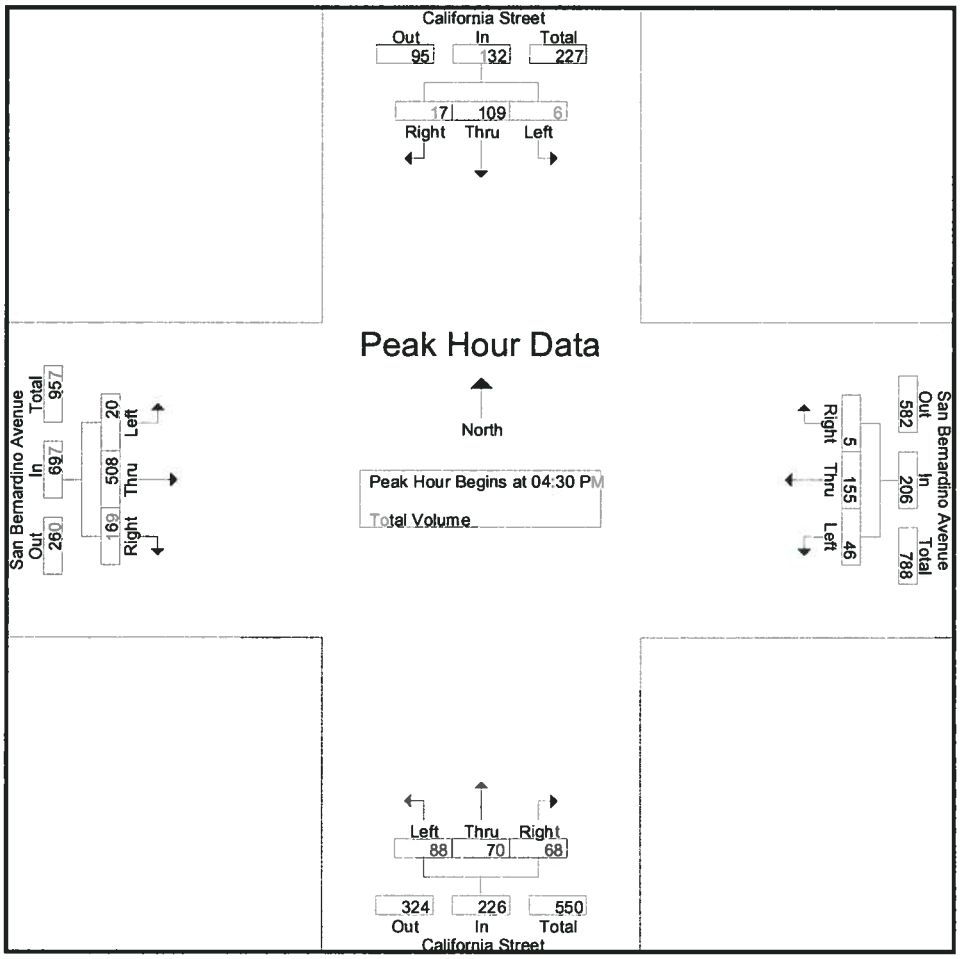
City of Redlands
N/S: California Street
E/W: San Bernardino Avenue
Weather: Clear

File Name : REDCASBpm
Site Code : 00000097
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:30 PM				04:45 PM			
				S				W				N				E
+0 mins.	**3**	**54**	**9**	**66**	13	37	**2**	52	19	20	**20**	**59**	2	117	30	149
+15 mins.	1	12	8	21	**31**	**75**	1	**107**	**28**	13	14	55	**13**	120	50	183
+30 mins.	3	46	9	58	16	41	2	59	18	**21**	18	57	2	**168**	**54**	**224**
+45 mins.	1	11	3	15	11	42	1	54	23	16	16	55	2	124	40	166
Total Volume	8	123	29	160	71	195	6	272	88	70	68	226	19	529	174	722
% App. Total	5	76.9	18.1		26.1	71.7	2.2		38.9	31	30.1		2.6	73.3	24.1	
PHF	.667	.569	.806	.606	.573	.650	.750	.636	.786	.833	.850	.958	.365	.787	.806	.806
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: California Street
E/W: San Bernardino Avenue
Weather: Clear

File Name : REDCASBpm
Site Code : 00000097
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	California Street Southbound				San Bernardino Avenue Westbound				California Street Northbound				San Bernardino Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	3	54	9	66	13	37	2	52	11	16	17	44	4	85	23	112	274
04:15 PM	1	12	8	21	31	75	1	107	28	11	14	53	1	77	34	112	293
04:30 PM	3	46	9	58	16	41	2	59	19	20	20	59	3	103	35	141	317
04:45 PM	1	11	3	15	11	42	1	54	28	13	14	55	2	117	30	149	273
Total	8	123	29	160	71	195	6	272	86	60	65	211	10	382	122	514	1157
05:00 PM	1	32	3	36	7	31	1	39	18	21	18	57	13	120	50	183	315
05:15 PM	1	20	2	23	12	41	1	54	23	16	16	55	2	168	54	224	356
05:30 PM	0	14	2	16	14	46	1	61	17	7	12	36	2	124	40	166	279
05:45 PM	3	12	2	17	8	38	0	46	14	13	16	43	4	92	28	124	230
Total	5	78	9	92	41	156	3	200	72	57	62	191	21	504	172	697	1180
Grand Total	13	201	38	252	112	351	9	472	158	117	127	402	31	886	294	1211	2337
Apprch %	5.2	79.8	15.1		23.7	74.4	1.9		39.3	29.1	31.6		2.6	73.2	24.3		
Total %	0.6	8.6	1.6	10.8	4.8	15	0.4	20.2	6.8	5	5.4	17.2	1.3	37.9	12.6	51.8	

	California Street Southbound				San Bernardino Avenue Westbound				California Street Northbound				San Bernardino Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	**3**	**46**	**9**	**58**	**16**	41	**2**	**59**	19	20	**20**	**59**	3	103	35	141	317
04:45 PM	1	11	3	15	11	**42**	1	54	**28**	13	14	55	2	117	30	149	273
05:00 PM	1	32	3	36	7	31	1	39	18	**21**	18	57	**13**	120	50	183	315
05:15 PM	1	20	2	23	12	41	1	54	23	16	16	55	2	**168**	**54**	**224**	**356**
Total Volume	6	109	17	132	46	155	5	206	88	70	68	226	20	508	169	697	1261
% App. Total	4.5	82.6	12.9		22.3	75.2	2.4		38.9	31	30.1		2.9	72.9	24.2		
PHF	.500	.592	.472	.569	.719	.923	.625	.873	.786	.833	.850	.958	.385	.756	.782	.778	.886

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 30, 2012

Redlands Blvd. & California St. **City of Redlands** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	T	R	L	T	*R*	L	*T*	R	*L*	T	R
Movement 1: 10 secs				X	X	X						
Movement 2: 24 secs		X	X		X	X						
Movement 3: 10 secs	X	X	X									
Movement 4: 25 secs										X	X	X
Movement 5: 33 secs							X	X	X			
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	S	1	S	1	1	1
Unadjusted Volume	66	151	81	23	250	227	89	282	5	263	240	225
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			
Min. Time or Ped. Time	10	34	34	10	34	34	10	12	12	10	12	12
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	-	1.00	1.00	1.00

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***					***		***		***		
Pk. Hr. Vol. (vph)	73	168	90	26	278	252	99	313	10	292	267	250
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	Shrd	1800	Shrd	1700	1800	1800
X or V/C	0.55	0.15	0.16	0.20	0.25	0.45	-	0.77	-	0.76	0.66	0.62
Effective green (sec)	8	32	32	8	32	32	-	31	-	23	23	23
Split Time (sec)	10	34	34	10	34	34	-	33	-	25	25	25
Min. Time or Ped. Time (sec)	10	34	34	10	34	34	-	12	-	10	12	12
Delay - 15 min pk (sec/veh)	60	25	26	47	27	30	-	42	-	50	44	42
Level of Service (LOS)	E	C	C	D	C	C-	-	D	-	D-	D	D
Average 'Q' (veh/ln)	2	2	2	1	3	5	-	9	-	7	6	6
Design 'Q'- ft/ln	60	60	60	40	100	160	-	280	-	220	180	180
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	-	YES	-	YES	YES	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 39
Level of Service - LOS = D+

Critical Movements

Weighted Avg Delay (sec) = 43
Level of Service - LOS = D
Intersection Capacity Utilization - ICU = 0.64

Required Cycle Length is 102 sec

Min./Ped. Times Satisfied

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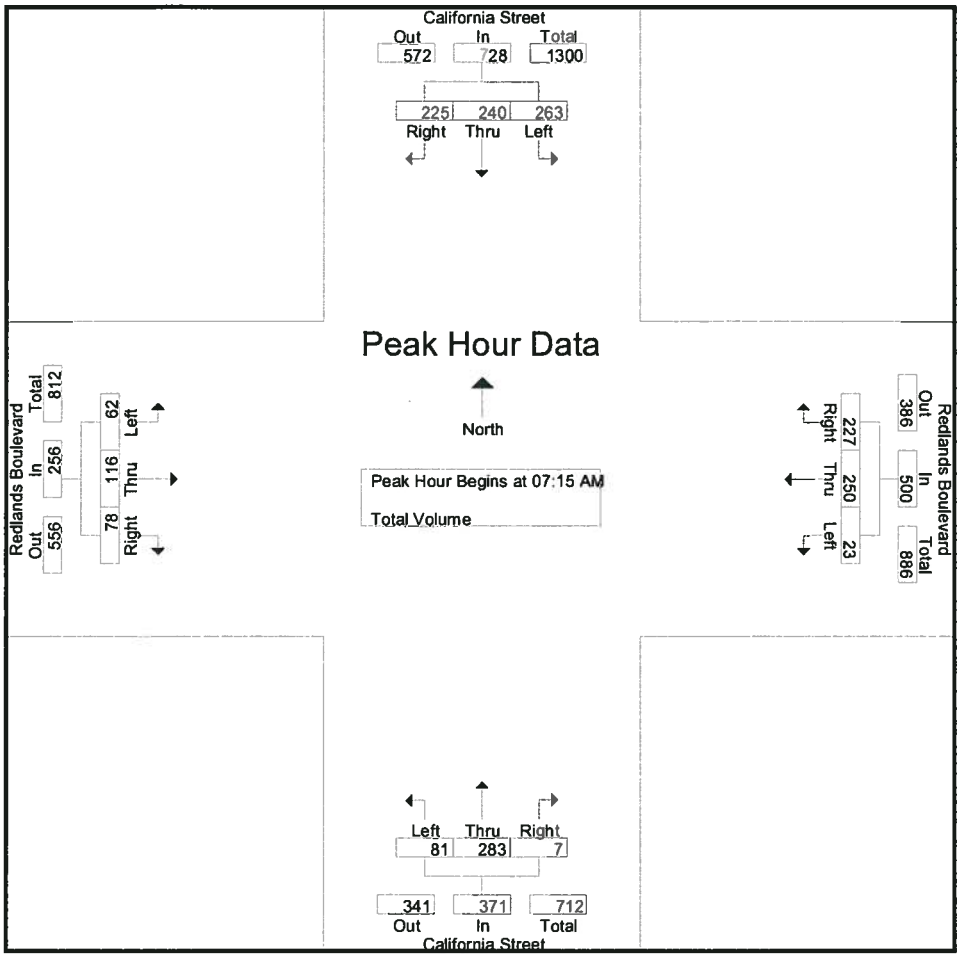
City of Redlands
N/S: California Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDCAREAM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:15 AM				07:00 AM				08:00 AM			
			S				W				N				E	
+0 mins.	55	61	**61**	177	5	68	47	120	21	66	0	87	18	28	**25**	71
+15 mins.	**78**	**71**	53	**202**	**8**	**69**	**64**	**141**	23	76	1	100	**23**	37	17	**77**
+30 mins.	71	56	58	185	8	69	54	131	19	**81**	**2**	**102**	10	39	21	70
+45 mins.	59	52	53	164	2	44	62	108	**26**	59	2	87	15	**47**	18	**80**
Total Volume	263	240	225	728	23	250	227	500	89	282	5	376	66	151	81	298
% App. Total	36.1	33	30.9		4.6	50	45.4		23.7	75	1.3		22.1	50.7	27.2	
PHF	.843	.845	.922	.901	.719	.906	.887	.887	.856	.870	.625	.922	.717	.803	.810	.931
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: California Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDCAREAM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	California Street Southbound				Redlands Boulevard Westbound				California Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	44	54	39	137	3	45	43	91	21	66	0	87	19	14	10	43	358
07:15 AM	55	61	61	177	5	68	47	120	23	76	1	100	13	30	17	60	457
07:30 AM	78	71	53	202	8	69	64	141	19	81	2	102	22	29	18	69	514
07:45 AM	71	56	58	185	8	69	54	131	26	59	2	87	9	29	18	56	459
Total	248	242	211	701	24	251	208	483	89	282	5	376	63	102	63	228	1788
08:00 AM	59	52	53	164	2	44	62	108	13	67	2	82	18	28	25	71	425
08:15 AM	48	58	40	146	9	35	56	100	20	77	4	101	23	37	17	77	424
08:30 AM	63	57	52	172	7	46	48	101	17	70	4	91	10	39	21	70	434
08:45 AM	74	55	48	177	1	47	38	86	10	61	7	78	15	47	18	80	421
Total	244	222	193	659	19	172	204	395	60	275	17	352	66	151	81	298	1704
Grand Total	492	464	404	1360	43	423	412	878	149	557	22	728	129	253	144	526	3492
Apprch %	36.2	34.1	29.7		4.9	48.2	46.9		20.5	76.5	3		24.5	48.1	27.4		
Total %	14.1	13.3	11.6	38.9	1.2	12.1	11.8	25.1	4.3	16	0.6	20.8	3.7	7.2	4.1	15.1	

	California Street Southbound				Redlands Boulevard Westbound				California Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	55	61	**61**	177	5	68	47	120	23	76	1	100	13	**30**	17	60	457
07:30 AM	**78**	**71**	53	**202**	**8**	**69**	**64**	**141**	19	**81**	**2**	**102**	**22**	29	18	69	**514**
07:45 AM	71	56	58	185	8	69	54	131	**26**	59	2	87	9	29	18	56	459
08:00 AM	59	52	53	164	2	44	62	108	13	67	2	82	18	28	**25**	71	425
Total Volume	263	240	225	728	23	250	227	500	81	283	7	371	62	116	78	256	1855
% App. Total	36.1	33	30.9		4.6	50	45.4		21.8	76.3	1.9		24.2	45.3	30.5		
PHF	.843	.845	.922	.901	.719	.906	.887	.887	.779	.873	.875	.909	.705	.967	.780	.901	.902

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 30, 2012

Redlands Blvd. & California St. **City of Redlands** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	T	R	L	T	*R*	L	*T*	R	*L*	T	R
Movement 1: 15 secs				X	X	X						
Movement 2: 19 secs		X	X		X	X						
Movement 3: 15 secs	X	X	X									
Movement 4: 25 secs										X	X	X
Movement 5: 34 secs							X	X	X			
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	S	1	S	1	1	1
Unadjusted Volume	155	391	85	70	346	366	49	335	38	290	287	71
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			
Min. Time or Ped. Time	10	34	34	10	34	34	10	12	12	10	12	12
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	-	1.00	1.00	1.00

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***					***		***		***		
Pk. Hr. Vol. (vph)	172	434	94	78	384	407	54	372	42	322	319	79
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	Shrd	1800	Shrd	1700	1800	1800
X or V/C	0.84	0.41	0.18	0.38	0.36	0.76	-	0.88	-	0.89	0.83	0.21
Effective green (sec)	13	32	32	13	32	32	-	32	-	23	23	23
Split Time (sec)	15	34	34	15	34	34	-	34	-	25	25	25
Min. Time or Ped. Time (sec)	10	34	34	10	34	34	-	12	-	10	12	12
Delay - 15 min pk (sec/veh)	79	32	29	49	31	44	-	54	-	67	59	36
Level of Service (LOS)	E-	C-	C	D	C-	D	-	D-	-	E	E+	D+
Average 'Q' (veh/ln)	5	5	2	2	4	9	-	10	-	8	8	2
Design 'Q'- ft/ln	160	160	60	60	120	280	-	300	-	240	240	60
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	-	YES	-	YES	YES	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 48
Level of Service - LOS = D

Critical Movements

Weighted Avg Delay (sec) = 58
Level of Service - LOS = E+
Intersection Capacity Utilization - ICU = 0.84

Required Cycle Length is 108 sec

Min./Ped. Times Satisfied

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Corona, CA 92878
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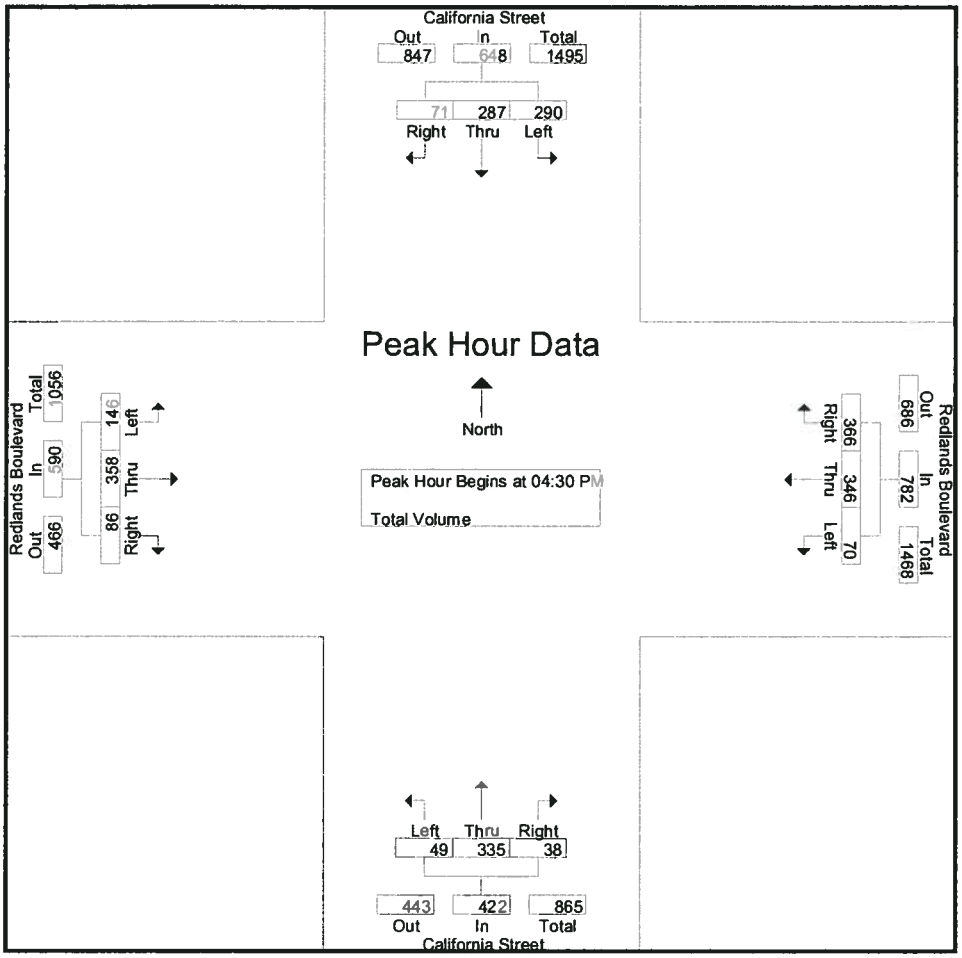
City of Redlands
N/S: California Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDCAREPM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			S	04:30 PM			W	04:30 PM			N	05:00 PM			E
+0 mins.	**81**	79	18	**178**	14	81	91	186	13	84	9	106	**44**	92	18	154
+15 mins.	80	63	**24**	167	**20**	79	74	173	**14**	79	**10**	103	40	**108**	19	167
+30 mins.	62	68	13	143	20	**106**	**107**	**233**	14	**93**	9	**116**	38	107	**33**	**178**
+45 mins.	67	77	16	160	16	80	94	190	8	79	10	97	33	84	15	132
Total Volume	290	287	71	648	70	346	366	782	49	335	38	422	155	391	85	631
% App. Total	44.8	44.3	11		9	44.2	46.8		11.6	79.4	9		24.6	62	13.5	
PHF	.895	.908	.740	.910	.875	.816	.855	.839	.875	.901	.950	.909	.881	.905	.644	.886
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: California Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDCAREPM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	California Street Southbound				Redlands Boulevard Westbound				California Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	58	54	15	127	17	94	103	214	17	59	16	92	24	92	21	137	570
04:15 PM	80	57	16	153	20	84	64	168	4	62	6	72	39	90	17	146	539
04:30 PM	81	79	18	178	14	81	91	186	13	84	9	106	30	80	31	141	611
04:45 PM	80	63	24	167	20	79	74	173	14	79	10	103	32	78	18	128	571
Total	299	253	73	625	71	338	332	741	48	284	41	373	125	340	87	552	2291
05:00 PM	62	68	13	143	20	106	107	233	14	93	9	116	44	92	18	154	646
05:15 PM	67	77	16	160	16	80	94	190	8	79	10	97	40	108	19	167	614
05:30 PM	74	68	12	154	20	98	62	180	10	74	10	94	38	107	33	178	606
05:45 PM	77	78	19	174	17	79	70	166	7	47	8	62	33	84	15	132	534
Total	280	291	60	631	73	363	333	769	39	293	37	369	155	391	85	631	2400
Grand Total	579	544	133	1256	144	701	665	1510	87	577	78	742	280	731	172	1183	4691
Apprch %	46.1	43.3	10.6		9.5	46.4	44		11.7	77.8	10.5		23.7	61.8	14.5		
Total %	12.3	11.6	2.8	26.8	3.1	14.9	14.2	32.2	1.9	12.3	1.7	15.8	6	15.6	3.7	25.2	

	California Street Southbound				Redlands Boulevard Westbound				California Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	**81**	**79**	18	**178**	14	81	91	186	13	84	9	106	30	80	**31**	141	611
04:45 PM	80	63	**24**	167	**20**	79	74	173	**14**	79	**10**	103	32	78	18	128	571
05:00 PM	62	68	13	143	20	**106**	**107**	**233**	14	**93**	9	**116**	**44**	92	18	154	**646**
05:15 PM	67	77	16	160	16	80	94	190	8	79	10	97	40	**108**	19	**167**	614
Total Volume	290	287	71	648	70	346	366	782	49	335	38	422	146	358	86	590	2442
% App. Total	44.8	44.3	11		9	44.2	46.8		11.6	79.4	9		24.7	60.7	14.6		
PHF	.895	.908	.740	.910	.875	.816	.855	.839	.875	.901	.950	.909	.830	.829	.694	.883	.945

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 30, 2012

Orange St. & Citrus Ave. **CITY OF REDLANDS** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	T	R	L	*T*	R	L	*T*	R	L	T	R
Movement 1: **10** secs	X	X	X	X	**X**	X						
Movement 2: **10** secs							X	**X**	X	X	X	X
Movement 3: **0** secs												
Movement 4: **0** secs												
Movement 5: **0** secs												
Movement 6: **0** secs												
# of Lanes (#, S, P)	1	1	1	1	**1**	S	1	**2**	S	1	2	S
Unadjusted Volume	49	171	70	15	**204**	23	74	**286**	27	32	178	27
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	**0.90**	0.90	0.90	**0.90**	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)						Shrd			Shrd			Shrd
Min. Time or Ped. Time	10	10	10	10	**10**	10	10	**10**	10	10	10	10
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	**1.00**	-	1.00	**1.00**	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

					***			***				
Pk. Hr. Vol. (vph)	54	190	78	17	**227**	26	82	**318**	30	36	198	30
Saturation Flow (vph)	1100	1800	1800	1100	**1800**	Shrd	1100	**3600**	Shrd	1000	3600	Shrd
X or V/C	0.12	0.26	0.11	0.04	**0.35**	-	0.19	**0.24**	-	0.09	0.16	-
Effective green (sec)	8	8	8	8	**8**	-	8	**8**	-	8	8	-
Split Time (sec)	10	10	10	10	**10**	-	10	**10**	-	10	10	-
Min. Time or Ped. Time (sec)	10	10	10	10	**10**	-	10	**10**	-	10	10	-
Delay - 15 min pk (sec/veh)	4	5	4	4	**6**	-	5	**4**	-	4	4	-
Level of Service (LOS)	A	A	A	A	**A**	-	A	**A**	-	A	A	-
Average 'Q' (veh/ln)	1	1	1	1	**1**	-	1	**1**	-	1	1	-
Design 'Q'- ft/ln	40	40	40	40	**40**	-	40	**40**	-	40	40	-
Do Vehicles Clear?	YES	YES	YES	YES	**YES**	-	YES	**YES**	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 5
Level of Service - LOS = A

Critical Movements

Weighted Avg Delay (sec) = 5
Level of Service - LOS = A
Intersection Capacity Utilization - ICU = 0.30

Required Cycle Length Is 20 sec

Min./Ped. Times Satisfied

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City of Redlands
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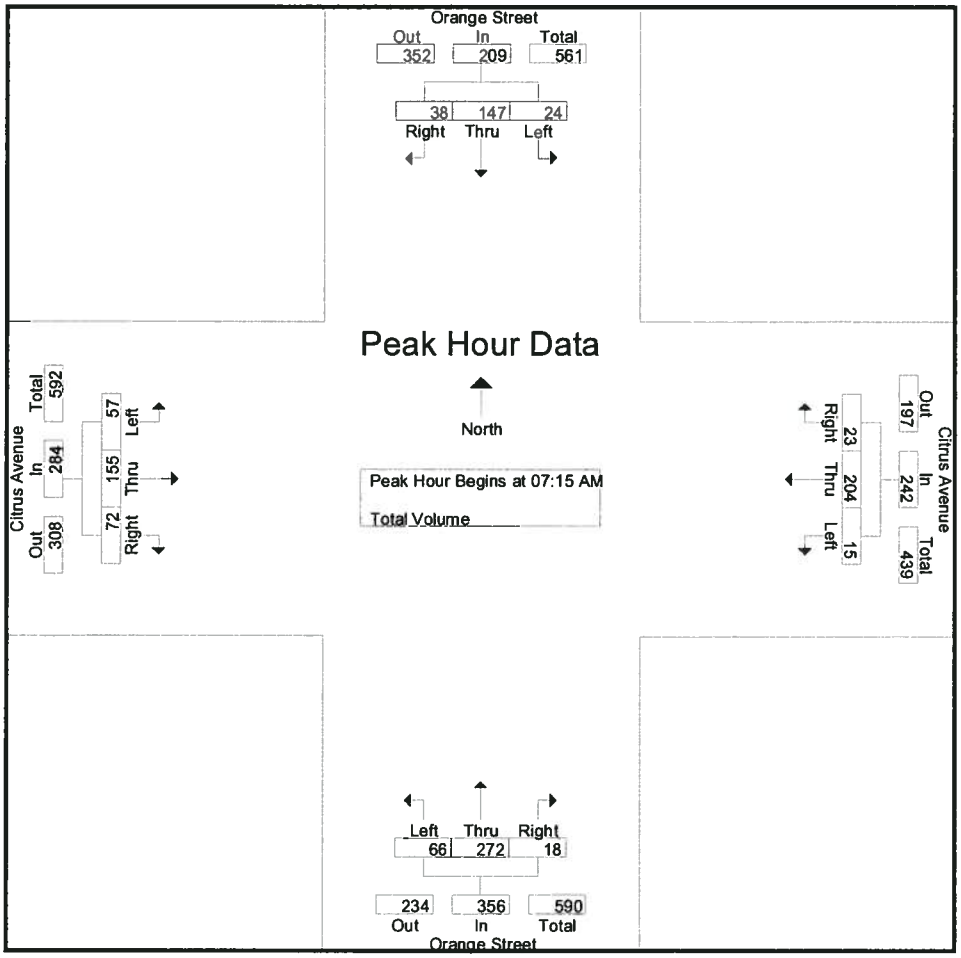
E/W: Citrus Avenue
Weather: Sunny

File Name : REDORCIAM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:45 AM			S	07:15 AM			W	07:45 AM			N	07:00 AM			E
+0 mins.	5	**52**	5	62	3	**67**	**9**	**79**	**21**	64	4	89	8	44	15	67
+15 mins.	9	38	**9**	56	**6**	56	5	67	20	**80**	3	**103**	13	**50**	**21**	**84**
+30 mins.	5	43	6	54	4	37	6	47	17	74	7	98	10	**39**	18	67
+45 mins.	**13**	45	7	**65**	2	44	3	49	16	68	**13**	97	**18**	38	16	72
Total Volume	32	178	27	237	15	204	23	242	74	286	27	387	49	171	70	290
% App. Total	13.5	75.1	11.4		6.2	84.3	9.5		19.1	73.9	7		16.9	59	24.1	
PHF	.615	.856	.750	.912	.625	.761	.639	.766	.881	.894	.519	.939	.681	.855	.833	.863
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Orange Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDORCIAM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Orange Street Southbound				Citrus Avenue Westbound				Orange Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	3	30	4	37	1	44	0	45	12	62	2	76	8	44	15	67	225
07:15 AM	6	31	12	49	3	67	9	79	9	64	5	78	13	50	21	84	290
07:30 AM	4	26	12	42	6	56	5	67	16	64	6	86	10	39	18	67	262
07:45 AM	5	52	5	62	4	37	6	47	21	64	4	89	18	38	16	72	270
Total	18	139	33	190	14	204	20	238	58	254	17	329	49	171	70	290	1047
08:00 AM	9	38	9	56	2	44	3	49	20	80	3	103	16	28	17	61	269
08:15 AM	5	43	6	54	3	33	12	48	17	74	7	98	11	42	16	69	269
08:30 AM	13	45	7	65	4	28	9	41	16	68	13	97	10	27	6	43	246
08:45 AM	9	42	10	61	6	33	4	43	20	58	10	88	16	35	9	60	252
Total	36	168	32	236	15	138	28	181	73	280	33	386	53	132	48	233	1036
Grand Total	54	307	65	426	29	342	48	419	131	534	50	715	102	303	118	523	2083
Apprch %	12.7	72.1	15.3		6.9	81.6	11.5		18.3	74.7	7		19.5	57.9	22.6		
Total %	2.6	14.7	3.1	20.5	1.4	16.4	2.3	20.1	6.3	25.6	2.4	34.3	4.9	14.5	5.7	25.1	

	Orange Street Southbound				Citrus Avenue Westbound				Orange Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	6	31	**12**	49	3	**67**	**9**	**79**	9	64	5	78	13	**50**	**21**	**84**	**290**
07:30 AM	4	26	12	42	**6**	56	5	67	16	64	**6**	86	10	39	18	67	262
07:45 AM	5	**52**	5	**62**	4	37	6	47	**21**	64	4	89	**18**	38	16	72	270
08:00 AM	**9**	38	9	56	2	44	3	49	20	**80**	3	**103**	16	28	17	61	269
Total Volume	24	147	38	209	15	204	23	242	66	272	18	356	57	155	72	284	1091
% App. Total	11.5	70.3	18.2		6.2	84.3	9.5		18.5	76.4	5.1		20.1	54.6	25.4		
PHF	.667	.707	.792	.843	.625	.761	.639	.766	.786	.850	.750	.864	.792	.775	.857	.845	.941

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 30, 2012

Orange St. & Citrus Ave. **CITY OF REDLANDS** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	*T*	R	L	T	R	L	*T*	R	L	T	R
Movement 1: 11 secs	X	X	X	X	X	X						
Movement 2: 10 secs							X	X	X	X	X	X
Movement 3: 0 secs												
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	1	1	1	1	S	1	2	S	1	2	S
Unadjusted Volume	142	356	154	29	224	107	61	360	18	37	232	62
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)						Shrd			Shrd			Shrd
Min. Time or Ped. Time	10	10	10	10	10	10	10	10	10	10	10	10
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

		***						***				
Pk. Hr. Vol. (vph)	158	396	171	32	249	119	68	400	20	41	258	69
Saturation Flow (vph)	1000	1800	1800	800	1800	Shrd	1000	3600	Shrd	900	3600	Shrd
X or V/C	0.37	0.51	0.22	0.09	0.48	-	0.18	0.31	-	0.12	0.24	-
Effective green (sec)	9	9	9	9	9	-	8	8	-	8	8	-
Split Time (sec)	11	11	11	11	11	-	10	10	-	10	10	-
Min. Time or Ped. Time (sec)	10	10	10	10	10	-	10	10	-	10	10	-
Delay - 15 min pk (sec/veh)	7	7	4	4	6	-	5	5	-	5	5	-
Level of Service (LOS)	A	A	A	A	A	-	A	A	-	A	A	-
Average 'Q' (veh/ln)	1	1	1	1	1	-	1	1	-	1	1	-
Design 'Q'- ft/ln	40	40	40	40	40	-	40	40	-	40	40	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	-	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 6
Level of Service - LOS = A

Critical Movements

Weighted Avg Delay (sec) = 6
Level of Service - LOS = A
Intersection Capacity Utilization - ICU = 0.42

Required Cycle Length is 21 sec

Min./Ped. Times Satisfied

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City of Redlands
N/S: Orange Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDORCIPM
Site Code : 00000018
Start Date : 6/26/2012
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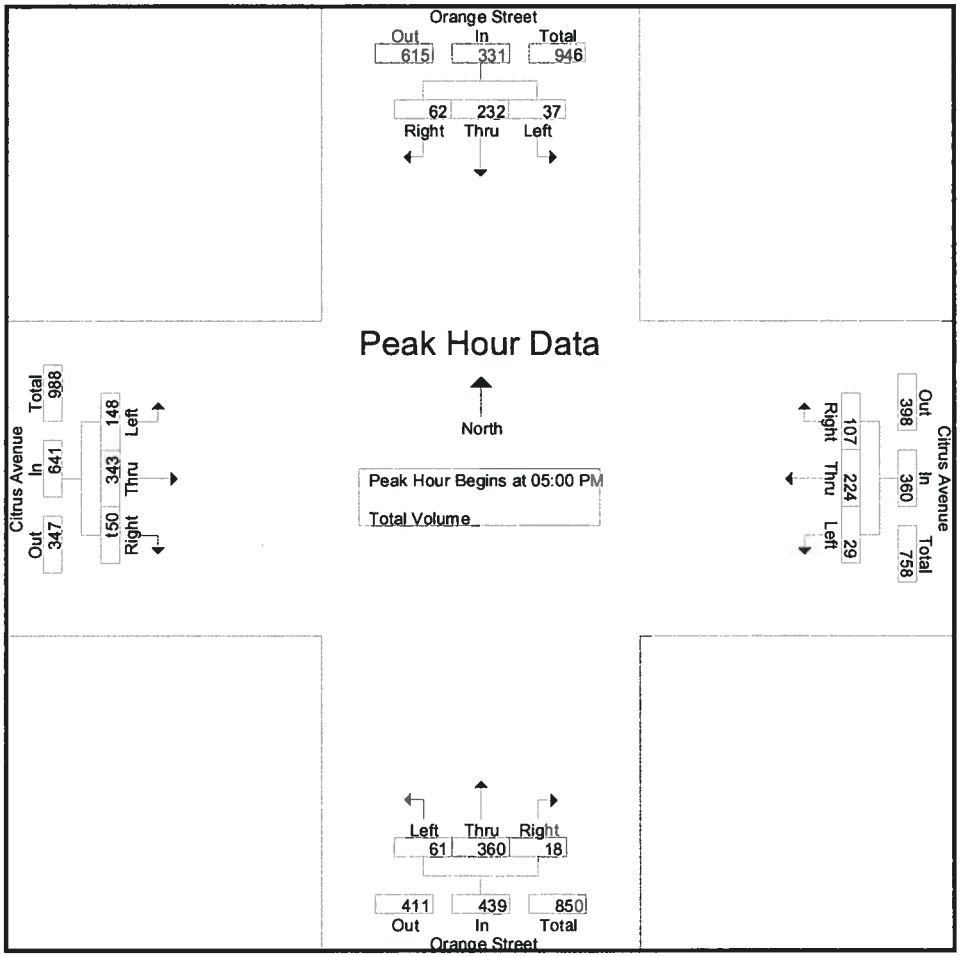

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				04:45 PM			
	S				W				N				E			
+0 mins.	9	53	13	75	7	52	29	88	19	115	10	144	30	83	40	153
+15 mins.	13	63	16	92	14	60	23	97	13	79	2	94	43	86	42	171
+30 mins.	10	57	18	85	4	44	28	76	15	77	5	97	30	109	40	179
+45 mins.	5	59	15	79	4	68	27	99	14	89	1	104	39	78	32	149
Total Volume	37	232	62	331	29	224	107	360	61	360	18	439	142	356	154	652
% App. Total	11.2	70.1	18.7		8.1	62.2	29.7		13.9	82	4.1		21.8	54.6	23.6	
PHF	.712	.921	.861	.899	.518	.824	.922	.909	.803	.783	.450	.762	.826	.817	.917	.911
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Orange Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDORCIPM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Orange Street Southbound				Citrus Avenue Westbound				Orange Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	8	60	16	84	4	49	33	86	5	77	3	85	32	61	40	133	388
04:15 PM	11	44	14	69	8	55	18	81	12	59	8	79	27	64	36	127	356
04:30 PM	10	41	15	66	4	48	28	80	14	76	2	92	35	58	27	120	358
04:45 PM	10	45	20	75	6	50	24	80	17	77	7	101	30	83	40	153	409
Total	39	190	65	294	22	202	103	327	48	289	20	357	124	266	143	533	1511
05:00 PM	9	53	13	75	7	52	29	88	19	115	10	144	43	86	42	171	478
05:15 PM	13	63	16	92	14	60	23	97	13	79	2	94	30	109	40	179	462
05:30 PM	10	57	18	85	4	44	28	76	15	77	5	97	39	78	32	149	407
05:45 PM	5	59	15	79	4	68	27	99	14	89	1	104	36	70	36	142	424
Total	37	232	62	331	29	224	107	360	61	360	18	439	148	343	150	641	1771
Grand Total	76	422	127	625	51	426	210	687	109	649	38	796	272	609	293	1174	3282
Apprch %	12.2	67.5	20.3		7.4	62	30.6		13.7	81.5	4.8		23.2	51.9	25		
Total %	2.3	12.9	3.9	19	1.6	13	6.4	20.9	3.3	19.8	1.2	24.3	8.3	18.6	8.9	35.8	

	Orange Street Southbound				Citrus Avenue Westbound				Orange Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	9	53	13	75	7	52	**29**	88	**19**	**115**	**10**	**144**	**43**	86	**42**	171	**478**
05:15 PM	**13**	**63**	16	**92**	**14**	60	23	97	13	79	2	94	30	**109**	40	**179**	462
05:30 PM	10	57	**18**	85	4	44	28	76	15	77	5	97	39	78	32	149	407
05:45 PM	5	59	15	79	4	**68**	27	**99**	14	89	1	104	36	70	36	142	424
Total Volume	37	232	62	331	29	224	107	360	61	360	18	439	148	343	150	641	1771
% App. Total	11.2	70.1	18.7		8.1	62.2	29.7		13.9	82	4.1		23.1	53.5	23.4		
PHF	.712	.921	.861	.899	.518	.824	.922	.909	.803	.783	.450	.762	.860	.787	.893	.895	.926

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 30, 2012

Redlands Blvd. & Orange St. **CITY OF REDLANDS** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	T	R	L	T	*R*	L	*T*	R	*L*	T	R
Movement 1: 10 secs	X			X								
Movement 2: 34 secs		X	X		X	X						
Movement 3: 13 secs							X			X		
Movement 4: 39 secs								X	X		X	X
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	1	2	S	1	2	S
Unadjusted Volume	44	160	44	25	289	246	23	284	30	97	175	36
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	31	31	10	34	34	10	36	36	10	39	39
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***					***		***		***		
Pk. Hr. Vol. (vph)	49	178	49	28	321	273	26	316	33	108	194	40
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	1700	3600	Shrd	1700	3600	Shrd
X or V/C	0.35	0.15	0.08	0.20	0.27	0.46	0.13	0.25	-	0.55	0.17	-
Effective green (sec)	8	32	32	8	32	32	11	37	-	11	37	-
Split Time (sec)	10	34	34	10	34	34	13	39	-	13	39	-
Min. Time or Ped. Time (sec)	10	31	31	10	34	34	10	36	-	10	39	-
Delay - 15 min pk (sec/veh)	48	23	22	44	24	28	40	21	-	51	20	-
Level of Service (LOS)	D	C+	C+	D	C+	C	D+	C+	-	D-	B	-
Average 'Q' (veh/ln)	1	2	1	1	3	5	1	3	-	3	2	-
Design 'Q'- ft/ln	40	60	40	40	100	160	40	100	-	100	60	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 26
Level of Service - LOS = C

Critical Movements

Weighted Avg Delay (sec) = 29
Level of Service - LOS = C
Intersection Capacity Utilization - ICU = 0.37

Required Cycle Length is 96 sec

Min./Ped. Times Satisfied

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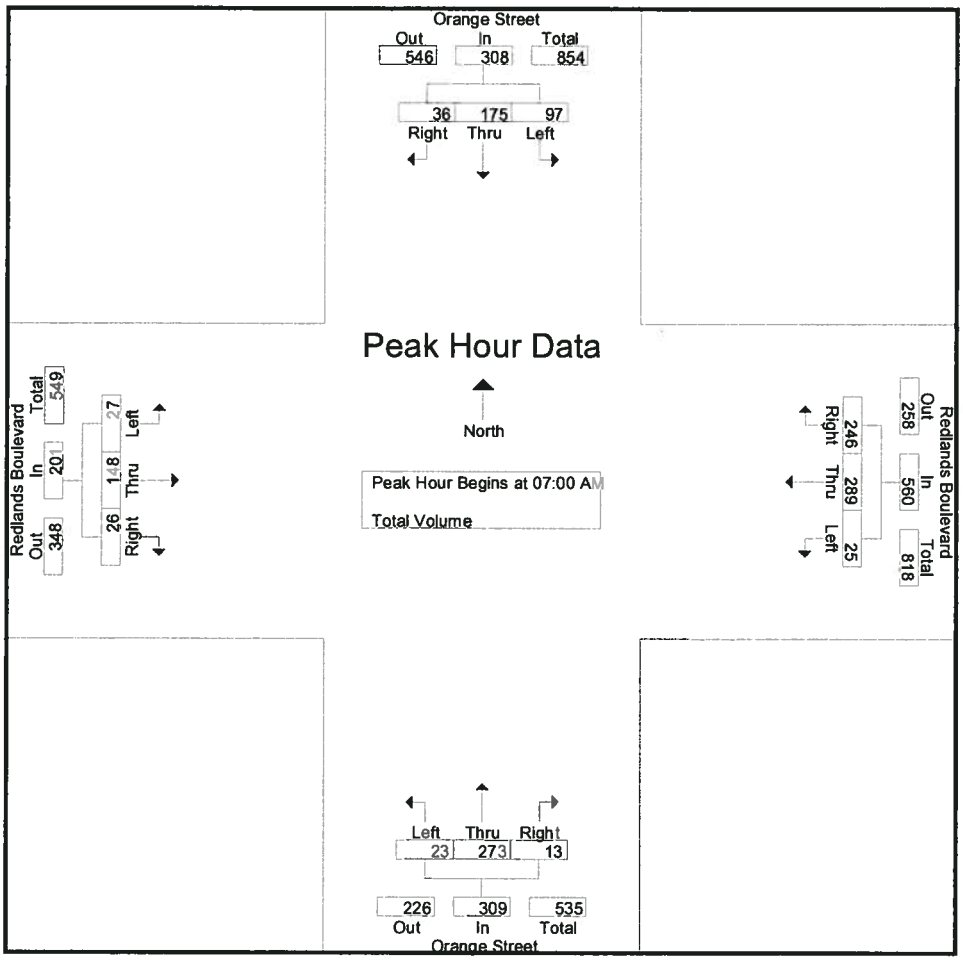
City of Redlands
N/S: Orange Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDORREAM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			S	07:00 AM			W	07:45 AM			N	08:00 AM			E
+0 mins.	25	40	7	72	1	56	66	123	5	71	3	79	11	34	10	55
+15 mins.	**37**	37	10	84	9	**110**	**112**	**231**	4	61	**10**	75	9	38	**14**	61
+30 mins.	17	40	5	62	3	61	39	103	**7**	**85**	7	**99**	10	39	12	61
+45 mins.	18	**58**	**14**	**90**	**12**	62	29	103	7	67	10	84	**14**	**49**	8	**71**
Total Volume	97	175	36	308	25	289	246	560	23	284	30	337	44	160	44	248
% App. Total	31.5	56.8	11.7		4.5	51.6	43.9		6.8	84.3	8.9		17.7	64.5	17.7	
PHF	.655	.754	.643	.856	.521	.657	.549	.606	.821	.835	.750	.851	.786	.816	.786	.873
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Orange Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDORREAM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Orange Street Southbound				Redlands Boulevard Westbound				Orange Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	25	40	7	72	1	56	66	123	5	68	5	78	8	32	4	44	317
07:15 AM	37	37	10	84	9	110	112	231	6	65	1	72	6	44	4	54	441
07:30 AM	17	40	5	62	3	61	39	103	7	69	4	80	8	31	7	46	291
07:45 AM	18	58	14	90	12	62	29	103	5	71	3	79	5	41	11	57	329
Total	97	175	36	308	25	289	246	560	23	273	13	309	27	148	26	201	1378
08:00 AM	18	38	8	64	10	57	36	103	4	61	10	75	11	34	10	55	297
08:15 AM	16	50	4	70	6	43	27	76	7	85	7	99	9	38	14	61	306
08:30 AM	12	50	12	74	11	54	36	101	7	67	10	84	10	39	12	61	320
08:45 AM	25	59	12	96	4	58	35	97	8	60	8	76	14	49	8	71	340
Total	71	197	36	304	31	212	134	377	26	273	35	334	44	160	44	248	1263
Grand Total	168	372	72	612	56	501	380	937	49	546	48	643	71	308	70	449	2641
Apprch %	27.5	60.8	11.8		6	53.5	40.6		7.6	84.9	7.5		15.8	68.6	15.6		
Total %	6.4	14.1	2.7	23.2	2.1	19	14.4	35.5	1.9	20.7	1.8	24.3	2.7	11.7	2.7	17	

	Orange Street Southbound				Redlands Boulevard Westbound				Orange Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	25	40	7	72	1	56	66	123	5	68	**5**	78	**8**	32	4	44	317
07:15 AM	**37**	37	10	84	9	**110**	**112**	**231**	6	65	1	72	6	**44**	4	54	**441**
07:30 AM	17	40	5	62	3	61	39	103	7	69	4	**80**	8	31	7	46	291
07:45 AM	18	**58**	**14**	**90**	**12**	62	29	103	5	71	3	79	5	41	**11**	**57**	329
Total Volume	97	175	36	308	25	289	246	560	23	273	13	309	27	148	26	201	1378
% App. Total	31.5	56.8	11.7		4.5	51.6	43.9		7.4	88.3	4.2		13.4	73.6	12.9		
PHF	.655	.754	.643	.856	.521	.657	.549	.606	.821	.961	.650	.966	.844	.841	.591	.882	.781

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

August 30, 2012

Redlands Blvd. & Orange St. **CITY OF REDLANDS** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	*T*	R	L	T	R	L	*T*	R	*L*	T	R
Movement 1: 18 secs	X			X								
Movement 2: 34 secs		X	X		X	X						
Movement 3: 15 secs							X			X		
Movement 4: 39 secs								X	X		X	X
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	1	2	S	1	2	S
Unadjusted Volume	169	510	72	40	247	209	40	445	43	141	285	59
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	31	31	10	34	34	10	36	36	10	39	39
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***	***						***		***		
Pk. Hr. Vol. (vph)	188	567	80	44	274	232	44	494	48	157	317	66
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	1700	3600	Shrd	1700	3600	Shrd
X or V/C	0.73	0.52	0.15	0.17	0.25	0.43	0.21	0.43	-	0.75	0.30	-
Effective green (sec)	16	32	32	16	32	32	13	37	-	13	37	-
Split Time (sec)	18	34	34	18	34	34	15	39	-	15	39	-
Min. Time or Ped. Time (sec)	10	31	31	10	34	34	10	36	-	10	39	-
Delay - 15 min pk (sec/veh)	60	32	28	41	29	32	44	28	-	67	26	-
Level of Service (LOS)	E+	C-	C	D	C	C-	D	C	-	E	C	-
Average 'Q' (veh/ln)	5	6	2	1	3	5	1	5	-	4	4	-
Design 'Q'- ft/ln	160	180	60	40	100	160	40	160	-	120	120	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 34
Level of Service - LOS = C-

Critical Movements

Weighted Avg Delay (sec) = 38
Level of Service - LOS = D+
Intersection Capacity Utilization - ICU = 0.55

Required Cycle Length is 106 sec

Min./Ped. Times Satisfied

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City of Redlands
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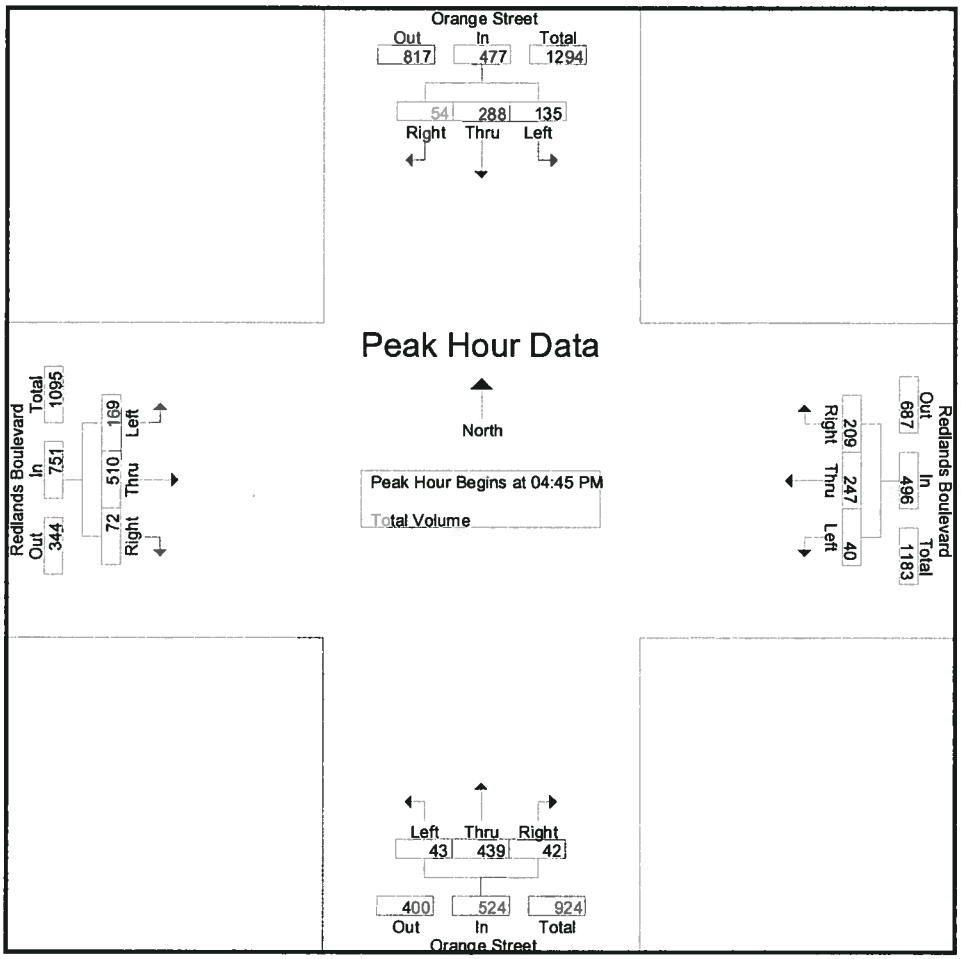
File Name : REDORREPM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			S	04:45 PM			W	04:30 PM			N	04:45 PM			E
+0 mins.	34	61	17	112	9	58	43	110	11	98	7	116	35	119	19	173
+15 mins.	31	77	10	118	8	57	**59**	124	9	104	13	126	**53**	**145**	15	**213**
+30 mins.	33	66	15	114	11	**69**	54	**134**	7	**143**	9	**159**	36	121	14	171
+45 mins.	**43**	**81**	17	**141**	**12**	63	53	128	**13**	100	**14**	127	45	125	**24**	194
Total Volume	141	285	59	485	40	247	209	496	40	445	43	528	169	510	72	751
% App. Total	29.1	58.8	12.2		8.1	49.8	42.1		7.6	84.3	8.1		22.5	67.9	9.6	
PHF	.820	.880	.868	.860	.833	.895	.886	.925	.769	.778	.768	.830	.797	.879	.750	.881
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Orange Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDORREPM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Orange Street Southbound				Redlands Boulevard Westbound				Orange Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	25	80	10	115	9	58	47	114	8	111	5	124	28	106	19	153	506
04:15 PM	29	65	27	121	17	56	38	111	12	81	9	102	20	106	22	148	482
04:30 PM	34	61	17	112	13	62	42	117	11	98	7	116	41	114	16	171	516
04:45 PM	31	77	10	118	9	58	43	110	9	104	13	126	35	119	19	173	527
Total	119	283	64	466	48	234	170	452	40	394	34	468	124	445	76	645	2031
05:00 PM	33	66	15	114	8	57	59	124	7	143	9	159	53	145	15	213	610
05:15 PM	43	81	17	141	11	69	54	134	13	100	14	127	36	121	14	171	573
05:30 PM	28	64	12	104	12	63	53	128	14	92	6	112	45	125	24	194	538
05:45 PM	21	82	15	118	13	52	43	108	6	102	14	122	25	102	21	148	496
Total	125	293	59	477	44	241	209	494	40	437	43	520	159	493	74	726	2217
Grand Total	244	576	123	943	92	475	379	946	80	831	77	988	283	938	150	1371	4248
Apprch %	25.9	61.1	13		9.7	50.2	40.1		8.1	84.1	7.8		20.6	68.4	10.9		
Total %	5.7	13.6	2.9	22.2	2.2	11.2	8.9	22.3	1.9	19.6	1.8	23.3	6.7	22.1	3.5	32.3	

	Orange Street Southbound				Redlands Boulevard Westbound				Orange Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	31	77	10	118	9	58	43	110	9	104	13	126	35	119	19	173	527
05:00 PM	33	66	15	114	8	57	59	124	7	143	9	159	53	145	15	213	610
05:15 PM	43	81	17	141	11	69	54	134	13	100	14	127	36	121	14	171	573
05:30 PM	28	64	12	104	12	63	53	128	14	92	6	112	45	125	24	194	538
Total Volume	135	288	54	477	40	247	209	496	43	439	42	524	169	510	72	751	2248
% App. Total	28.3	60.4	11.3		8.1	49.8	42.1		8.2	83.8	8		22.5	67.9	9.6		
PHF	.785	.889	.794	.846	.833	.895	.886	.925	.768	.767	.750	.824	.797	.879	.750	.881	.921

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Redlands Boulevard and Citrus Avenue **City of Redlands** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	T	R	L	*T*	R	L	*T*	R	L	*T*	R
Movement 1: **42** secs	X	X	X	X	X	X						
Movement 2: **33** secs										X	X	X
Movement 3: **29** secs							X	X	X			
Movement 4: **0** secs												
Movement 5: **0** secs												
Movement 6: **0** secs												
# of Lanes (#, S, P)	1	1	S	1	1	S	S	2	1	S	2	1
Unadjusted Volume	16	119	61	55	219	241	115	270	21	66	165	22
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)			Shrd			Shrd				Shrd		
Min. Time or Ped. Time	10	35	35	10	35	35	10	29	29	10	33	33
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	-	1.00	1.00	-	-	1.00	1.00	-	1.00	1.00

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

					***			***			***	
Pk. Hr. Vol. (vph)	18	132	68	61	243	268	128	300	23	73	183	24
Saturation Flow (vph)	800	1800	Shrd	1200	1800	Shrd	Shrd	3600	1800	Shrd	3600	1800
X or V/C	0.06	0.29	-	0.13	0.74	-	-	0.46	0.05	-	0.24	0.04
Effective green (sec)	40	40	-	40	40	-	-	27	27	-	31	31
Split Time (sec)	42	42	-	42	42	-	-	29	29	-	33	33
Min. Time or Ped. Time (sec)	10	35	-	10	35	-	-	29	29	-	33	33
Delay - 15 min pk (sec/veh)	21	23	-	21	34	-	-	34	29	-	28	26
Level of Service (LOS)	C+	C+	-	C+	C-	-	-	C-	C	-	C	C
Average 'Q' (veh/ln)	1	4	-	1	9	-	-	5	1	-	3	1
Design 'Q'- ft/ln	40	120	-	40	280	-	-	160	40	-	100	40
Do Vehicles Clear?	YES	YES	-	YES	YES	-	-	YES	YES	-	YES	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 31
Level of Service - LOS = C-

Critical Movements

Weighted Avg Delay (sec) = 33
Level of Service - LOS = C-
Intersection Capacity Utilization - ICU = 0.50

Required Cycle Length is 104 sec

Min./Ped. Times Satisfied

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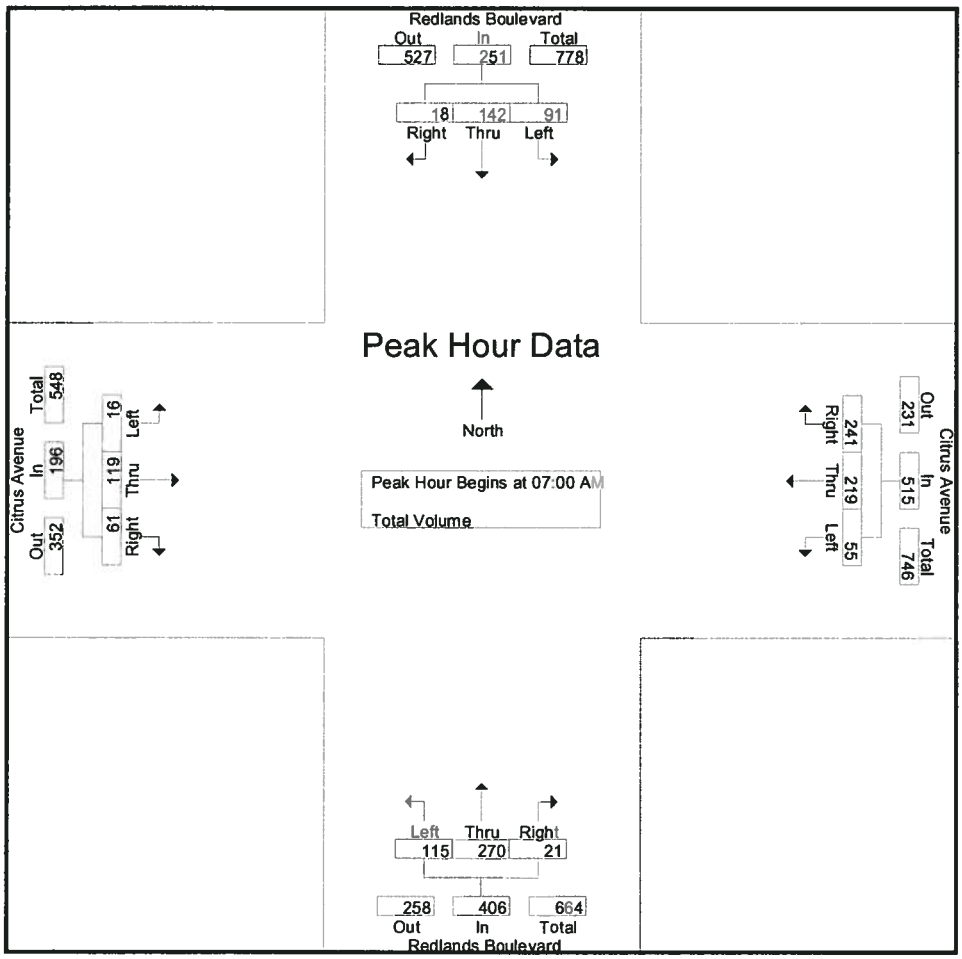
City of Redlands
N/S: Redlands Boulevard
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCIREAM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			S	07:00 AM			W	07:00 AM			N	07:00 AM			E
+0 mins.	**40**	44	6	**90**	13	37	62	112	23	57	**6**	86	5	**38**	13	**56**
+15 mins.	11	29	3	43	**28**	**61**	**123**	**212**	**35**	**96**	5	**136**	2	36	16	54
+30 mins.	7	42	6	55	11	61	27	99	34	56	5	95	**7**	15	**19**	41
+45 mins.	8	**50**	**7**	65	3	60	29	92	23	61	5	89	2	30	13	45
Total Volume	66	165	22	253	55	219	241	515	115	270	21	406	16	119	61	196
% App. Total	26.1	65.2	8.7		10.7	42.5	46.8		28.3	66.5	5.2		8.2	60.7	31.1	
PHF	.413	.825	.786	.703	.491	.898	.490	.607	.821	.703	.875	.746	.571	.783	.803	.875
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Redlands Boulevard
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCIREAM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Redlands Boulevard Southbound				Citrus Avenue Westbound				Redlands Boulevard Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	33	27	3	63	13	37	62	112	23	57	6	86	5	38	13	56	317
07:15 AM	40	44	6	90	28	61	123	212	35	96	5	136	2	36	16	54	492
07:30 AM	11	29	3	43	11	61	27	99	34	56	5	95	7	15	19	41	278
07:45 AM	7	42	6	55	3	60	29	92	23	61	5	89	2	30	13	45	281
Total	91	142	18	251	55	219	241	515	115	270	21	406	16	119	61	196	1368
08:00 AM	8	50	7	65	7	49	25	81	17	46	5	68	3	23	15	41	255
08:15 AM	7	29	3	39	4	44	26	74	25	53	2	80	7	22	12	41	234
08:30 AM	12	36	4	52	6	43	31	80	23	62	7	92	8	23	16	47	271
08:45 AM	23	34	4	61	8	54	36	98	21	47	3	71	3	21	13	37	267
Total	50	149	18	217	25	190	118	333	86	208	17	311	21	89	56	166	1027
Grand Total	141	291	36	468	80	409	359	848	201	478	38	717	37	208	117	362	2395
Apprch %	30.1	62.2	7.7		9.4	48.2	42.3		28	66.7	5.3		10.2	57.5	32.3		
Total %	5.9	12.2	1.5	19.5	3.3	17.1	15	35.4	8.4	20	1.6	29.9	1.5	8.7	4.9	15.1	

	Redlands Boulevard Southbound				Citrus Avenue Westbound				Redlands Boulevard Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	33	27	3	63	13	37	62	112	23	57	6	86	5	38	13	56	317
07:15 AM	40	44	6	90	28	61	123	212	35	96	5	136	2	36	16	54	492
07:30 AM	11	29	3	43	11	61	27	99	34	56	5	95	7	15	19	41	278
07:45 AM	7	42	6	55	3	60	29	92	23	61	5	89	2	30	13	45	281
Total Volume	91	142	18	251	55	219	241	515	115	270	21	406	16	119	61	196	1368
% App. Total	36.3	56.6	7.2		10.7	42.5	46.8		28.3	66.5	5.2		8.2	60.7	31.1		
PHF	.569	.807	.750	.697	.491	.898	.490	.607	.821	.703	.875	.746	.571	.783	.803	.875	.695

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Redlands Boulevard and Citrus Avenue **City of Redlands** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	*T*	R	L	T	R	L	*T*	R	L	*T*	R
Movement 1: **36** secs	X	X	X	X	X	X						
Movement 2: **33** secs										X	X	X
Movement 3: **29** secs							X	X	X			
Movement 4: **0** secs												
Movement 5: **0** secs												
Movement 6: **0** secs												
# of Lanes (#, S, P)	1	**1**	S	1	1	S	S	**2**	1	S	**2**	1
Unadjusted Volume	36	**275**	160	58	181	111	71	**231**	43	157	**400**	36
Peak Hour Factor (PHF)	0.90	**0.90**	0.90	0.90	0.90	0.90	0.90	**0.90**	0.90	0.90	**0.90**	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)			Shrd			Shrd						
Min. Time or Ped. Time	10	**35**	35	10	35	35	10	**29**	29	10	**33**	33
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	**1.00**	-	1.00	1.00	-	-	**1.00**	1.00	-	**1.00**	1.00

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

		***						***			***	
Pk. Hr. Vol. (vph)	40	**306**	178	64	201	123	79	**257**	48	174	**444**	40
Saturation Flow (vph)	1100	**1800**	Shrd	900	1800	Shrd	Shrd	**3600**	1800	Shrd	**3600**	1800
X or V/C	0.10	**0.78**	-	0.20	0.52	-	-	**0.34**	0.10	-	**0.54**	0.07
Effective green (sec)	34	**34**	-	34	34	-	-	**27**	27	-	**31**	31
Split Time (sec)	36	**36**	-	36	36	-	-	**29**	29	-	**33**	33
Min. Time or Ped. Time (sec)	10	**35**	-	10	35	-	-	**29**	29	-	**33**	33
Delay - 15 min pk (sec/veh)	22	**38**	-	24	29	-	-	**29**	27	-	**30**	24
Level of Service (LOS)	C+	**D+**	-	C+	C	-	-	**C**	C	-	**C**	C+
Average 'Q' (veh/ln)	1	**9**	-	1	6	-	-	**3**	1	-	**6**	1
Design 'Q'- ft/ln	40	**280**	-	40	180	-	-	**100**	40	-	**180**	40
Do Vehicles Clear?	YES	**YES**	-	YES	YES	-	-	**YES**	YES	-	**YES**	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 31
Level of Service - LOS = C-

Critical Movements

Weighted Avg Delay (sec) = 32
Level of Service - LOS = C-
Intersection Capacity Utilization - ICU = 0.57

Required Cycle Length is 98 sec

Min./Ped. Times Satisfied

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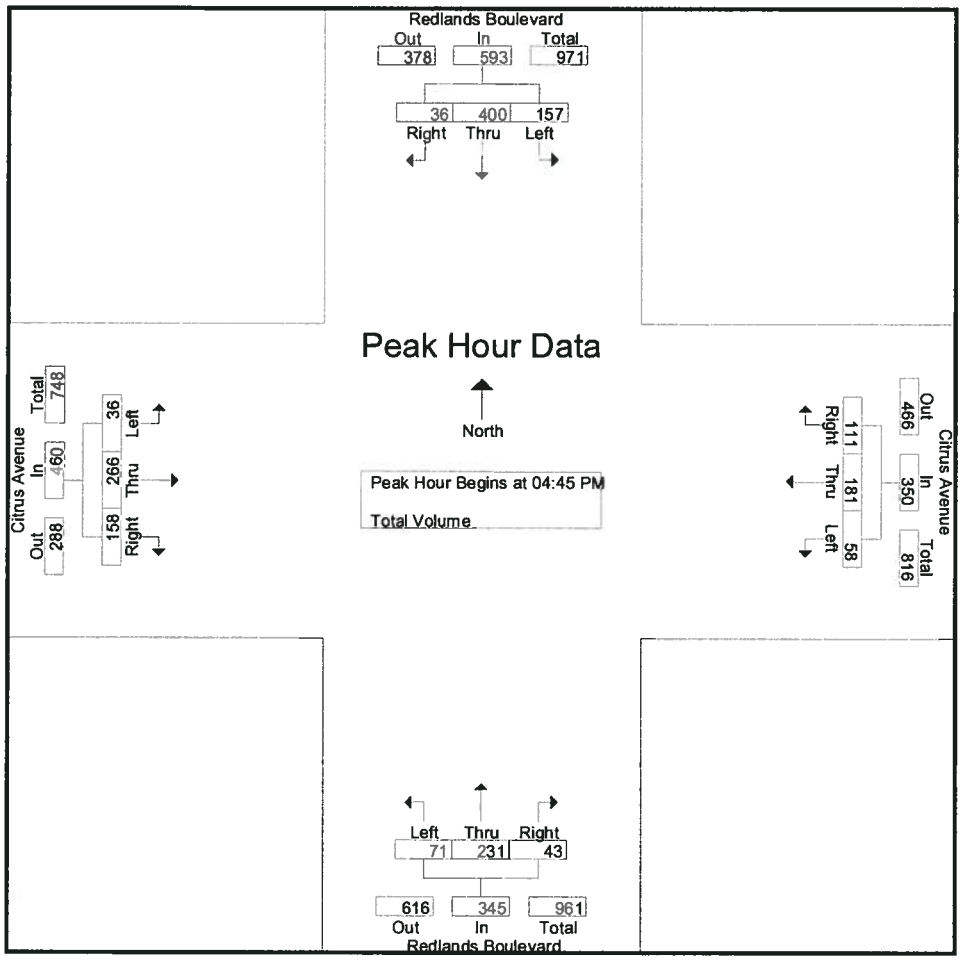
City of Redlands
N/S: Redlands Boulevard
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCIREPM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM			S	04:45 PM			W	04:45 PM			N	04:30 PM			E
+0 mins.	**45**	92	**11**	148	**20**	38	31	89	**19**	44	14	77	7	63	29	99
+15 mins.	42	100	7	149	12	**55**	26	93	15	**72**	9	**96**	**12**	55	41	108
+30 mins.	38	**106**	9	**153**	15	47	**36**	**98**	18	65	12	95	11	68	44	123
+45 mins.	32	102	9	143	11	41	18	70	19	50	8	77	6	**89**	**46**	**141**
Total Volume	157	400	36	593	58	181	111	350	71	231	43	345	36	275	160	471
% App. Total	26.5	67.5	6.1		16.6	51.7	31.7		20.6	67	12.5		7.6	58.4	34	
PHF	.872	.943	.818	.969	.725	.823	.771	.893	.934	.802	.768	.898	.750	.772	.870	.835
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Redlands Boulevard
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCIREPM
Site Code : 00000007
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Redlands Boulevard Southbound				Citrus Avenue Westbound				Redlands Boulevard Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	27	79	6	112	6	50	20	76	18	53	8	79	9	50	36	95	362
04:15 PM	25	78	1	104	7	48	22	77	20	40	6	66	7	44	48	99	346
04:30 PM	29	88	8	125	9	39	16	64	15	46	6	67	7	63	29	99	355
04:45 PM	45	92	11	148	20	38	31	89	19	44	14	77	12	55	41	108	422
Total	126	337	26	489	42	175	89	306	72	183	34	289	35	212	154	401	1485
05:00 PM	42	100	7	149	12	55	26	93	15	72	9	96	11	68	44	123	461
05:15 PM	38	106	9	153	15	47	36	98	18	65	12	95	6	89	46	141	487
05:30 PM	32	102	9	143	11	41	18	70	19	50	8	77	7	54	27	88	378
05:45 PM	40	87	12	139	6	52	27	85	12	40	11	63	10	61	43	114	401
Total	152	395	37	584	44	195	107	346	64	227	40	331	34	272	160	466	1727
Grand Total	278	732	63	1073	86	370	196	652	136	410	74	620	69	484	314	867	3212
Apprch %	25.9	68.2	5.9		13.2	56.7	30.1		21.9	66.1	11.9		8	55.8	36.2		
Total %	8.7	22.8	2	33.4	2.7	11.5	6.1	20.3	4.2	12.8	2.3	19.3	2.1	15.1	9.8	27	

	Redlands Boulevard Southbound				Citrus Avenue Westbound				Redlands Boulevard Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**45**	92	**11**	148	**20**	38	31	89	**19**	44	**14**	77	**12**	55	41	108	422
05:00 PM	42	100	7	149	12	**55**	26	93	15	**72**	9	**96**	11	68	44	123	461
05:15 PM	38	**106**	9	**153**	15	47	**36**	**98**	18	65	12	95	6	**89**	**46**	141	**487**
05:30 PM	32	102	9	143	11	41	18	70	19	50	8	77	7	54	27	88	378
Total Volume	157	400	36	593	58	181	111	350	71	231	43	345	36	266	158	460	1748
% App. Total	26.5	67.5	6.1		16.6	51.7	31.7		20.6	67	12.5		7.8	57.8	34.3		
PHF	.872	.943	.818	.969	.725	.823	.771	.893	.934	.802	.768	.898	.750	.747	.859	.816	.897

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Brookside Ave. & San Mateo St. **CITY OF REDLANDS** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	*T*	R	L	T	R	L	T	R	L	*T*	R
Movement 1: 10 secs	X			X								
Movement 2: 27 secs		X	X		X	X						
Movement 3: 20 secs							X	X	X	X	X	X
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	1	1	1	1	1	1	1	S	1	1	S
Unadjusted Volume	82	542	151	25	358	56	57	221	12	40	320	65
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	20	20	10	20	20	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***	***									***	
Pk. Hr. Vol. (vph)	91	602	168	28	398	62	63	246	13	44	356	72
Saturation Flow (vph)	1700	1800	1800	1700	1800	1800	900	1800	Shrd	1100	1800	Shrd
X or V/C	0.38	0.76	0.21	0.12	0.50	0.08	0.22	0.46	-	0.13	0.75	-
Effective green (sec)	8	25	25	8	25	25	18	18	-	18	18	-
Split Time (sec)	10	27	27	10	27	27	20	20	-	20	20	-
Min. Time or Ped. Time (sec)	10	20	20	10	20	20	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	27	20	11	22	14	9	16	18	-	15	26	-
Level of Service (LOS)	C	C+	B	C+	B	A	B	B	-	B	C	-
Average 'Q' (veh/ln)	1	6	1	1	4	1	1	3	-	1	5	-
Design 'Q'- ft/ln	40	180	40	40	120	40	40	100	-	40	160	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 19
Level of Service - LOS = B

Critical Movements

Weighted Avg Delay (sec) = 23
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.70

Required Cycle Length is 57 sec

Min./Ped. Times Satisfied

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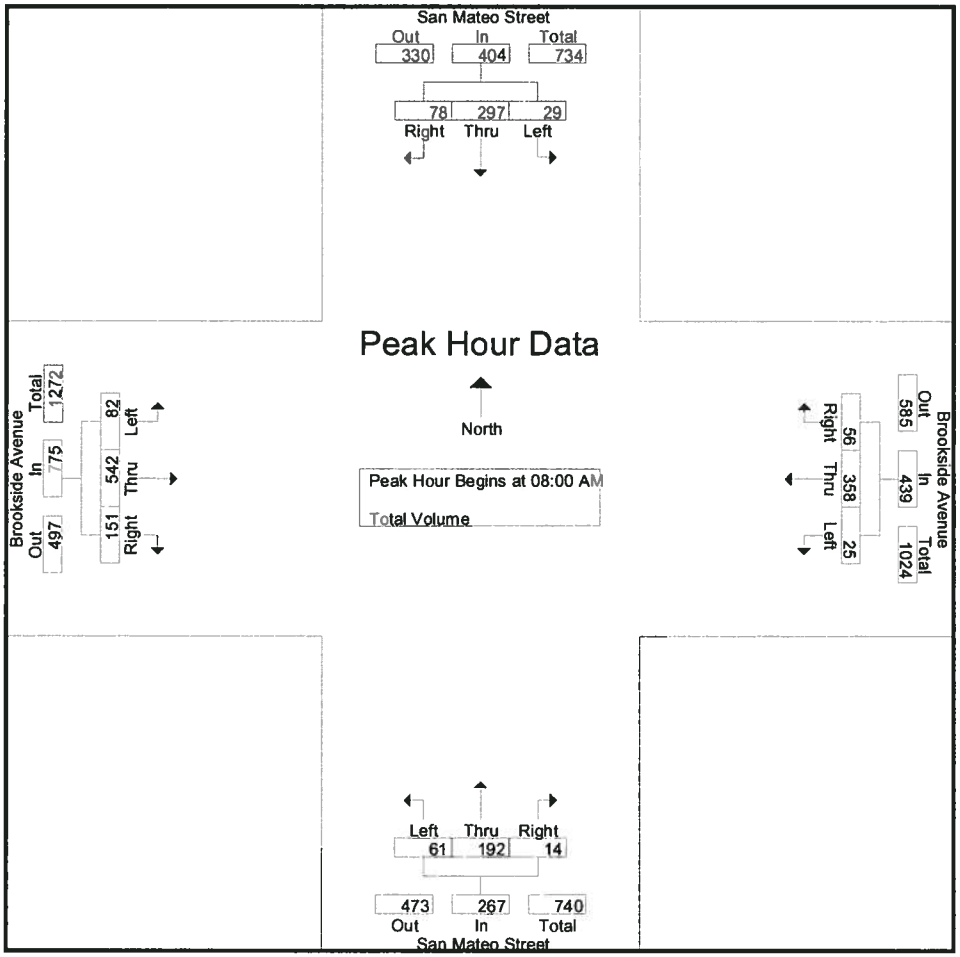
City of Redlands
N/S: San Mateo Street
E/W: Brookside Avenue
Weather: Sunny

File Name : REDSMBRAM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:30 AM			S	08:00 AM			W	07:30 AM			N	08:00 AM			E
+0 mins.	**14**	67	16	97	6	89	**24**	119	11	55	**5**	71	21	**141**	**44**	**206**
+15 mins.	13	**88**	13	**114**	4	88	13	105	**18**	59	4	**81**	13	132	35	180
+30 mins.	6	80	**19**	105	4	77	9	90	15	45	3	63	**25**	139	42	206
+45 mins.	7	85	17	109	**11**	**104**	10	**125**	13	**62**	0	75	23	130	30	183
Total Volume	40	320	65	425	25	358	56	439	57	221	12	290	82	542	151	775
% App. Total	9.4	75.3	15.3		5.7	81.5	12.8		19.7	76.2	4.1		10.6	69.9	19.5	
PHF	.714	.909	.855	.932	.568	.861	.583	.878	.792	.891	.600	.895	.820	.961	.858	.941
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: San Mateo Street
E/W: Brookside Avenue
Weather: Sunny

File Name : REDSMBRAM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	San Mateo Street Southbound				Brookside Avenue Westbound				San Mateo Street Northbound				Brookside Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	13	63	16	92	6	74	6	86	22	48	2	72	13	86	18	117	367
07:15 AM	18	47	12	77	8	81	9	98	14	40	3	57	21	86	22	129	361
07:30 AM	14	67	16	97	7	84	9	100	11	55	5	71	23	112	36	171	439
07:45 AM	13	88	13	114	9	84	8	101	18	59	4	81	27	113	27	167	463
Total	58	265	57	380	30	323	32	385	65	202	14	281	84	397	103	584	1630
08:00 AM	6	80	19	105	6	89	24	119	15	45	3	63	21	141	44	206	493
08:15 AM	7	85	17	109	4	88	13	105	13	62	0	75	13	132	35	180	469
08:30 AM	9	62	23	94	4	77	9	90	19	35	5	59	25	139	42	206	449
08:45 AM	7	70	19	96	11	104	10	125	14	50	6	70	23	130	30	183	474
Total	29	297	78	404	25	358	56	439	61	192	14	267	82	542	151	775	1885
Grand Total	87	562	135	784	55	681	88	824	126	394	28	548	166	939	254	1359	3515
Apprch %	11.1	71.7	17.2		6.7	82.6	10.7		23	71.9	5.1		12.2	69.1	18.7		
Total %	2.5	16	3.8	22.3	1.6	19.4	2.5	23.4	3.6	11.2	0.8	15.6	4.7	26.7	7.2	38.7	

	San Mateo Street Southbound				Brookside Avenue Westbound				San Mateo Street Northbound				Brookside Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	6	80	19	105	6	89	**24**	119	15	45	3	63	21	**141**	**44**	**206**	**493**
08:15 AM	7	**85**	17	**109**	4	88	13	105	13	**62**	0	**75**	13	132	35	180	469
08:30 AM	**9**	62	**23**	94	4	77	9	90	**19**	35	5	59	**25**	139	42	206	449
08:45 AM	7	70	19	96	**11**	**104**	10	**125**	14	50	**6**	70	23	130	30	183	474
Total Volume	29	297	78	404	25	358	56	439	61	192	14	267	82	542	151	775	1885
% App. Total	7.2	73.5	19.3		5.7	81.5	12.8		22.8	71.9	5.2		10.6	69.9	19.5		
PHF	.806	.874	.848	.927	.568	.861	.583	.878	.803	.774	.583	.890	.820	.961	.858	.941	.956

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Brookside Ave. & San Mateo St. **CITY OF REDLANDS** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	*L*	T	R	L	*T*	R	L	*T*	R	L	T	R
Movement 1: 10 secs	X			X								
Movement 2: 20 secs		X	X		X	X						
Movement 3: 20 secs							X	X	X	X	X	X
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	1	1	1	1	1	1	1	S	1	1	S
Unadjusted Volume	55	215	43	13	259	31	86	258	16	23	128	38
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	20	20	10	20	20	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

	***				***			***				
Pk. Hr. Vol. (vph)	61	239	48	14	288	34	96	287	18	26	142	42
Saturation Flow (vph)	1700	1800	1800	1700	1800	1800	1200	1800	Shrd	1100	1800	Shrd
X or V/C	0.22	0.37	0.07	0.05	0.44	0.05	0.22	0.47	-	0.07	0.28	-
Effective green (sec)	8	18	18	8	18	18	18	18	-	18	18	-
Split Time (sec)	10	20	20	10	20	20	20	20	-	20	20	-
Min. Time or Ped. Time (sec)	10	20	20	10	20	20	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	20	13	11	18	14	11	12	15	-	11	13	-
Level of Service (LOS)	C+	B	B	B	B	B	B	B	-	B	B	-
Average 'Q' (veh/ln)	1	2	1	1	3	1	1	3	-	1	2	-
Design 'Q'- ft/ln	40	60	40	40	100	40	40	100	-	40	60	-
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 14
Level of Service - LOS = B

Critical Movements

Weighted Avg Delay (sec) = 15
Level of Service - LOS = B
Intersection Capacity Utilization - ICU = 0.42

Required Cycle Length is 50 sec

Min./Ped. Times Satisfied

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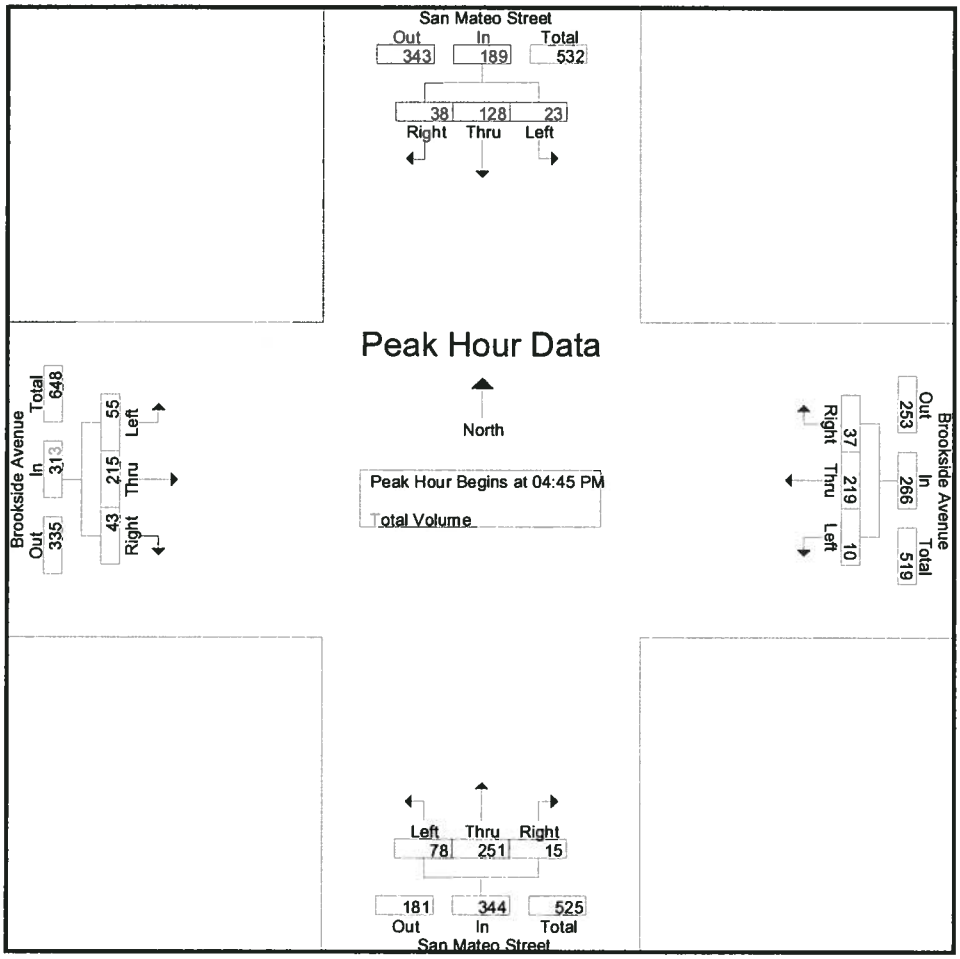
City of Redlands
N/S: San Mateo Street
E/W: Brookside Avenue
Weather: Sunny

File Name : REDSMBRPM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM			S	04:15 PM			W	05:00 PM			N	04:45 PM			E
+0 mins.	6	**45**	8	**59**	2	**82**	6	**90**	21	**70**	4	95	**18**	56	**11**	**85**
+15 mins.	5	22	8	35	**6**	67	**9**	82	16	60	**6**	82	11	48	11	70
+30 mins.	5	33	**12**	50	3	61	8	72	24	60	1	85	11	54	10	75
+45 mins.	**7**	28	10	45	2	49	8	59	**25**	68	5	**98**	15	**57**	11	83
Total Volume	23	128	38	189	13	259	31	303	86	258	16	360	55	215	43	313
% App. Total	12.2	67.7	20.1		4.3	85.5	10.2		23.9	71.7	4.4		17.6	68.7	13.7	
PHF	.821	.711	.792	.801	.542	.790	.861	.842	.860	.921	.667	.918	.764	.943	.977	.921
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: San Mateo Street
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Weather: Sunny

File Name : REDSMBRPM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	San Mateo Street Southbound				Brookside Avenue Westbound				San Mateo Street Northbound				Brookside Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	6	19	4	29	0	41	5	46	16	61	2	79	8	70	12	90	244
04:15 PM	2	20	10	32	2	82	6	90	31	56	1	88	8	49	9	66	276
04:30 PM	2	19	13	34	6	67	9	82	18	70	0	88	9	32	9	50	254
04:45 PM	6	45	8	59	3	61	8	72	17	61	4	82	18	56	11	85	298
Total	16	103	35	154	11	251	28	290	82	248	7	337	43	207	41	291	1072
05:00 PM	5	22	8	35	2	49	8	59	21	70	4	95	11	48	11	70	259
05:15 PM	5	33	12	50	4	51	10	65	16	60	6	82	11	54	10	75	272
05:30 PM	7	28	10	45	1	58	11	70	24	60	1	85	15	57	11	83	283
05:45 PM	5	25	7	37	0	56	8	64	25	68	5	98	26	46	9	81	280
Total	22	108	37	167	7	214	37	258	86	258	16	360	63	205	41	309	1094
Grand Total	38	211	72	321	18	465	65	548	168	506	23	697	106	412	82	600	2166
Apprch %	11.8	65.7	22.4		3.3	84.9	11.9		24.1	72.6	3.3		17.7	68.7	13.7		
Total %	1.8	9.7	3.3	14.8	0.8	21.5	3	25.3	7.8	23.4	1.1	32.2	4.9	19	3.8	27.7	

	San Mateo Street Southbound				Brookside Avenue Westbound				San Mateo Street Northbound				Brookside Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	6	**45**	8	**59**	3	**61**	8	**72**	17	61	4	82	**18**	56	**11**	**85**	**298**
05:00 PM	5	22	8	35	2	49	8	59	21	**70**	4	**95**	11	48	11	70	259
05:15 PM	5	33	**12**	50	4	51	10	65	16	60	**6**	82	11	54	10	75	272
05:30 PM	**7**	28	10	45	1	58	**11**	70	**24**	60	1	85	15	**57**	11	83	283
Total Volume	23	128	38	189	10	219	37	266	78	251	15	344	55	215	43	313	1112
% App. Total	12.2	67.7	20.1		3.8	82.3	13.9		22.7	73	4.4		17.6	68.7	13.7		
PHF	.821	.711	.792	.801	.625	.898	.841	.924	.813	.896	.625	.905	.764	.943	.977	.921	.933

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Redlands Blvd. & Tennessee St. **CITY OF REDLANDS** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	T	R	*L*	*T*	R	L	*T*	R	L	*T*	R
Movement 1: 7 secs	X			X								
Movement 2: 21 secs		X	X		X	X						
Movement 3: 54 secs										X	X	X
Movement 4: 38 secs							X	X	X			
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	2	1	1	2	1	S	2	1	S	2	1
Unadjusted Volume	15	119	19	26	189	54	36	335	29	158	365	14
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)												
Min. Time or Ped. Time	10	34	34	10	34	34	10	12	12	10	12	12
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-	1.00	1.00

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

				***	***			***			***	
Pk. Hr. Vol. (vph)	17	132	21	29	210	60	40	372	32	176	406	16
Saturation Flow (vph)	1700	3600	1800	1700	3600	1800	Shrd	3600	1800	Shrd	3600	1800
X or V/C	0.24	0.23	0.07	0.41	0.37	0.21	-	0.38	0.06	-	0.37	0.02
Effective green (sec)	5	19	19	5	19	19	-	36	36	-	52	52
Split Time (sec)	7	21	21	7	21	21	-	38	38	-	54	54
Min. Time or Ped. Time (sec)	10	34	34	10	34	34	-	12	12	-	12	12
Delay - 15 min pk (sec/veh)	64	45	44	73	47	46	-	34	30	-	24	19
Level of Service (LOS)	E	D	D	E	D	D	-	C-	C-	-	C+	B
Average 'Q' (veh/ln)	1	2	1	1	3	2	-	5	1	-	5	1
Design 'Q'- ft/ln	40	60	40	40	100	60	-	160	40	-	160	40
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	-	YES	YES	-	YES	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 34
Level of Service - LOS = C-

Critical Movements

Weighted Avg Delay (sec) = 32
Level of Service - LOS = C-
Intersection Capacity Utilization - ICU = 0.38

Predetermined Cycle Length is 120 sec

Min./Ped. Times May Not Be Satisfied

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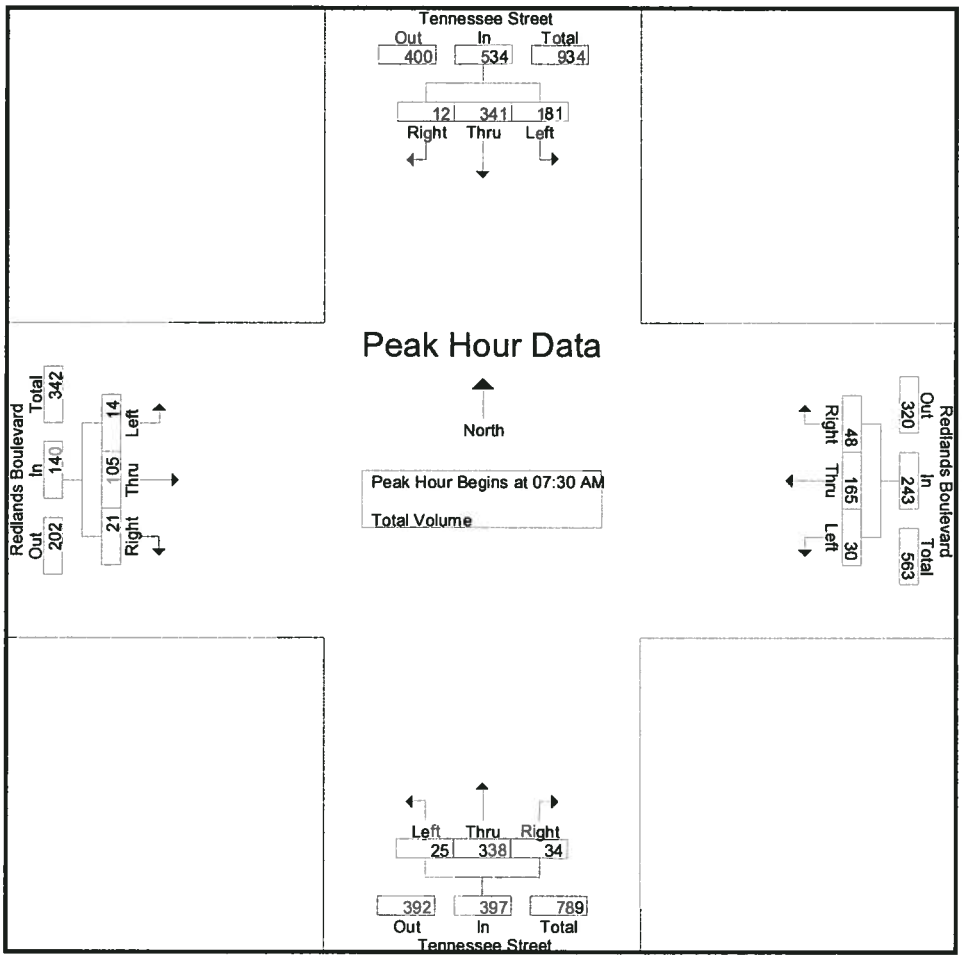
City of Redlands
N/S: Tennessee Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDTEREAM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:15 AM				07:15 AM				08:00 AM			
			S				W				N				E	
+0 mins.	37	**119**	4	**160**	2	**55**	**17**	**74**	**11**	71	0	82	4	21	**7**	32
+15 mins.	**47**	76	3	126	**11**	47	13	71	9	**94**	**10**	113	**6**	33	4	43
+30 mins.	46	76	2	124	8	39	15	62	10	94	10	**114**	2	28	3	33
+45 mins.	28	94	**5**	127	5	48	9	62	6	76	9	91	3	**37**	5	**45**
Total Volume	158	365	14	537	26	189	54	269	36	335	29	400	15	119	19	153
% App. Total	29.4	68	2.6		9.7	70.3	20.1		9	83.8	7.2		9.8	77.8	12.4	
PHF	.840	.767	.700	.839	.591	.859	.794	.909	.818	.891	.725	.877	.625	.804	.679	.850
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Tennessee Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDTEREAM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Tennessee Street Southbound				Redlands Boulevard Westbound				Tennessee Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	32	49	7	88	4	20	13	37	5	75	1	81	3	12	2	17	223
07:15 AM	49	52	4	105	2	55	17	74	11	71	0	82	1	25	4	30	291
07:30 AM	51	70	3	124	11	47	13	71	9	94	10	113	1	19	5	25	333
07:45 AM	37	119	4	160	8	39	15	62	10	94	10	114	3	32	5	40	376
Total	169	290	18	477	25	161	58	244	35	334	21	390	8	88	16	112	1223
08:00 AM	47	76	3	126	5	48	9	62	6	76	9	91	4	21	7	32	311
08:15 AM	46	76	2	124	6	31	11	48	0	74	5	79	6	33	4	43	294
08:30 AM	28	94	5	127	4	34	19	57	6	68	9	83	2	28	3	33	300
08:45 AM	44	90	2	136	5	48	14	67	12	77	7	96	3	37	5	45	344
Total	165	336	12	513	20	161	53	234	24	295	30	349	15	119	19	153	1249
Grand Total	334	626	30	990	45	322	111	478	59	629	51	739	23	207	35	265	2472
Apprch %	33.7	63.2	3		9.4	67.4	23.2		8	85.1	6.9		8.7	78.1	13.2		
Total %	13.5	25.3	1.2	40	1.8	13	4.5	19.3	2.4	25.4	2.1	29.9	0.9	8.4	1.4	10.7	

	Tennessee Street Southbound				Redlands Boulevard Westbound				Tennessee Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**51**	70	3	124	**11**	47	13	**71**	9	**94**	**10**	113	1	19	5	25	333
07:45 AM	37	**119**	**4**	**160**	8	39	**15**	62	**10**	94	10	**114**	3	32	5	40	**376**
08:00 AM	47	76	3	126	5	**48**	9	62	6	76	9	91	4	21	7	32	311
08:15 AM	46	76	2	124	6	31	11	48	0	74	5	79	**6**	**33**	4	**43**	294
Total Volume	181	341	12	534	30	165	48	243	25	338	34	397	14	105	21	140	1314
% App. Total	33.9	63.9	2.2		12.3	67.9	19.8		6.3	85.1	8.6		10	75	15		
PHF	.887	.716	.750	.834	.682	.859	.800	.856	.625	.899	.850	.871	.583	.795	.750	.814	.874

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Redlands Blvd. & Tennessee St. **CITY OF REDLANDS** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	T	R	*L*	T	*R*	L	*T*	R	L	*T*	R
Movement 1: **10** secs	X			X								
Movement 2: **34** secs		X	X		X	X						
Movement 3: **26** secs										X	X	X
Movement 4: **27** secs							X	X	X			
Movement 5: **0** secs												
Movement 6: **0** secs												
# of Lanes (#, S, P)	1	2	1	**1**	2	**1**	S	**2**	1	S	**2**	1
Unadjusted Volume	31	291	41	**35**	240	**166**	51	**534**	47	113	**448**	17
Peak Hour Factor (PHF)	0.90	0.90	0.90	**0.90**	0.90	**0.90**	0.90	**0.90**	0.90	0.90	**0.90**	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)												
Min. Time or Ped. Time	10	34	34	**10**	34	**34**	10	**12**	12	10	**12**	12
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	1.00	**1.00**	1.00	**1.00**	-	**1.00**	1.00	-	**1.00**	1.00

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

				***		***		***			***	
Pk. Hr. Vol. (vph)	34	323	46	**39**	267	**184**	57	**593**	52	126	**498**	19
Saturation Flow (vph)	1700	3600	1800	**1700**	3600	**1800**	Shrd	**3600**	1800	Shrd	**3600**	1800
X or V/C	0.24	0.27	0.08	**0.28**	0.22	**0.31**	-	**0.70**	0.11	-	**0.70**	0.04
Effective green (sec)	8	32	32	**8**	32	**32**	-	**25**	25	-	**24**	24
Split Time (sec)	10	34	34	**10**	34	**34**	-	**27**	27	-	**26**	26
Min. Time or Ped. Time (sec)	10	34	34	**10**	34	**34**	-	**12**	12	-	**12**	12
Delay - 15 min pk (sec/veh)	46	24	23	**47**	24	**26**	-	**37**	28	-	**38**	28
Level of Service (LOS)	D	C+	C+	**D**	C+	**C**	-	**D+**	C	-	**D+**	C
Average 'Q' (veh/ln)	1	3	1	**1**	2	**3**	-	**7**	1	-	**6**	1
Design 'Q'- ft/ln	40	100	40	**40**	60	**100**	-	**220**	40	-	**180**	40
Do Vehicles Clear?	YES	YES	YES	**YES**	YES	**YES**	-	**YES**	YES	-	**YES**	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 33
Level of Service - LOS = C-

Critical Movements

Weighted Avg Delay (sec) = 36
Level of Service - LOS = D+
Intersection Capacity Utilization - ICU = 0.52

Required Cycle Length is 97 sec

Min./Ped. Times Satisfied

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City of Redlands
N/S: Tennessee Street
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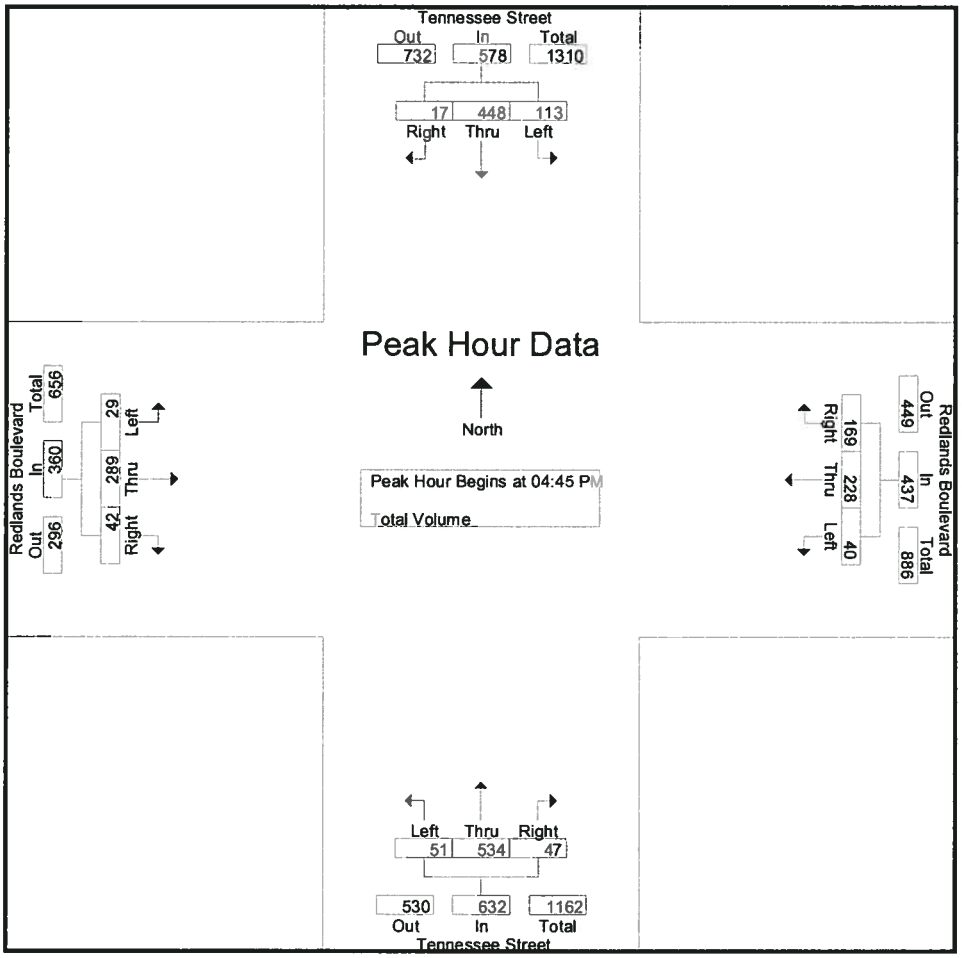
Weather: Sunny

File Name : REDTEREPM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:15 PM				04:45 PM				04:30 PM			
			S				W				N				E	
+0 mins.	31	95	3	129	5	**67**	34	106	**14**	133	9	156	**11**	**80**	9	**100**
+15 mins.	28	115	4	147	7	60	43	110	13	**160**	**16**	**189**	4	56	9	69
+30 mins.	**32**	106	**5**	143	**12**	59	34	105	14	107	13	134	11	76	10	97
+45 mins.	22	**132**	5	**159**	11	54	**55**	**120**	10	134	9	153	5	79	**13**	97
Total Volume	113	448	17	578	35	240	166	441	51	534	47	632	31	291	41	363
% App. Total	19.6	77.5	2.9		7.9	54.4	37.6		8.1	84.5	7.4		8.5	80.2	11.3	
PHF	.883	.848	.850	.909	.729	.896	.755	.919	.911	.834	.734	.836	.705	.909	.788	.908
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Tennessee Street
E/W: Redlands Boulevard
Weather: Sunny

File Name : REDTEREPM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Tennessee Street Southbound				Redlands Boulevard Westbound				Tennessee Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	23	91	4	118	4	77	30	111	14	95	15	124	9	71	16	96	449
04:15 PM	28	93	9	130	5	67	34	106	15	128	12	155	3	57	14	74	465
04:30 PM	28	85	5	118	7	60	43	110	13	104	10	127	11	80	9	100	455
04:45 PM	31	95	3	129	12	59	34	105	14	133	9	156	4	56	9	69	459
Total	110	364	21	495	28	263	141	432	56	460	46	562	27	264	48	339	1828
05:00 PM	28	115	4	147	11	54	55	120	13	160	16	189	11	76	10	97	553
05:15 PM	32	106	5	143	4	59	41	104	14	107	13	134	5	79	13	97	478
05:30 PM	22	132	5	159	13	56	39	108	10	134	9	153	9	78	10	97	517
05:45 PM	18	74	7	99	4	39	29	72	12	75	5	92	8	40	6	54	317
Total	100	427	21	548	32	208	164	404	49	476	43	568	33	273	39	345	1865
Grand Total	210	791	42	1043	60	471	305	836	105	936	89	1130	60	537	87	684	3693
Apprch %	20.1	75.8	4		7.2	56.3	36.5		9.3	82.8	7.9		8.8	78.5	12.7		
Total %	5.7	21.4	1.1	28.2	1.6	12.8	8.3	22.6	2.8	25.3	2.4	30.6	1.6	14.5	2.4	18.5	

	Tennessee Street Southbound				Redlands Boulevard Westbound				Tennessee Street Northbound				Redlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	31	95	3	129	12	59	34	105	14	133	9	156	4	56	9	69	459
05:00 PM	28	115	4	147	11	54	55	120	13	160	16	189	11	76	10	97	553
05:15 PM	32	106	5	143	4	59	41	104	14	107	13	134	5	79	13	97	478
05:30 PM	22	132	5	159	13	56	39	108	10	134	9	153	9	78	10	97	517
Total Volume	113	448	17	578	40	228	169	437	51	534	47	632	29	289	42	360	2007
% App. Total	19.6	77.5	2.9		9.2	52.2	38.7		8.1	84.5	7.4		8.1	80.3	11.7		
PHF	.883	.848	.850	.909	.769	.966	.768	.910	.911	.834	.734	.836	.659	.915	.808	.928	.907

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Citrus & Church **city of redlands** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	T	R	L	*T*	R	L	T	R	L	*T*	R
Movement 1: **34** secs	X	X	X	X	X	X						
Movement 2: **20** secs							X	X	X	X	X	X
Movement 3: **0** secs												
Movement 4: **0** secs												
Movement 5: **0** secs												
Movement 6: **0** secs												
# of Lanes (#, S, P)	1	1	S	1	1	S	1	1	S	1	1	S
Unadjusted Volume	43	171	11	54	405	89	38	78	75	44	95	117
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)			Shrd			Shrd			Shrd			Shrd
Min. Time or Ped. Time	10	34	34	10	34	34	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	-	1.00	1.00	-	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

					***						***	
Pk. Hr. Vol. (vph)	48	190	12	60	450	99	42	87	83	49	106	130
Saturation Flow (vph)	800	1800	Shrd	1200	1800	Shrd	1100	1800	Shrd	1200	1800	Shrd
X or V/C	0.10	0.19	-	0.08	0.51	-	0.11	0.28	-	0.12	0.39	-
Effective green (sec)	32	32	-	32	32	-	18	18	-	18	18	-
Split Time (sec)	34	34	-	34	34	-	20	20	-	20	20	-
Min. Time or Ped. Time (sec)	10	34	-	10	34	-	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	5	5	-	5	8	-	13	14	-	13	16	-
Level of Service (LOS)	A	A	-	A	A	-	B	B	-	B	B	-
Average 'Q' (veh/ln)	1	1	-	1	3	-	1	2	-	1	2	-
Design 'Q'- ft/ln	40	40	-	40	100	-	40	60	-	40	60	-
Do Vehicles Clear?	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 10
Level of Service - LOS = A

Critical Movements

Weighted Avg Delay (sec) = 10
Level of Service - LOS = B
Intersection Capacity Utilization - ICU = 0.47

Required Cycle Length is 54 sec

Min./Ped. Times Satisfied

Counts Unlimited, Inc.
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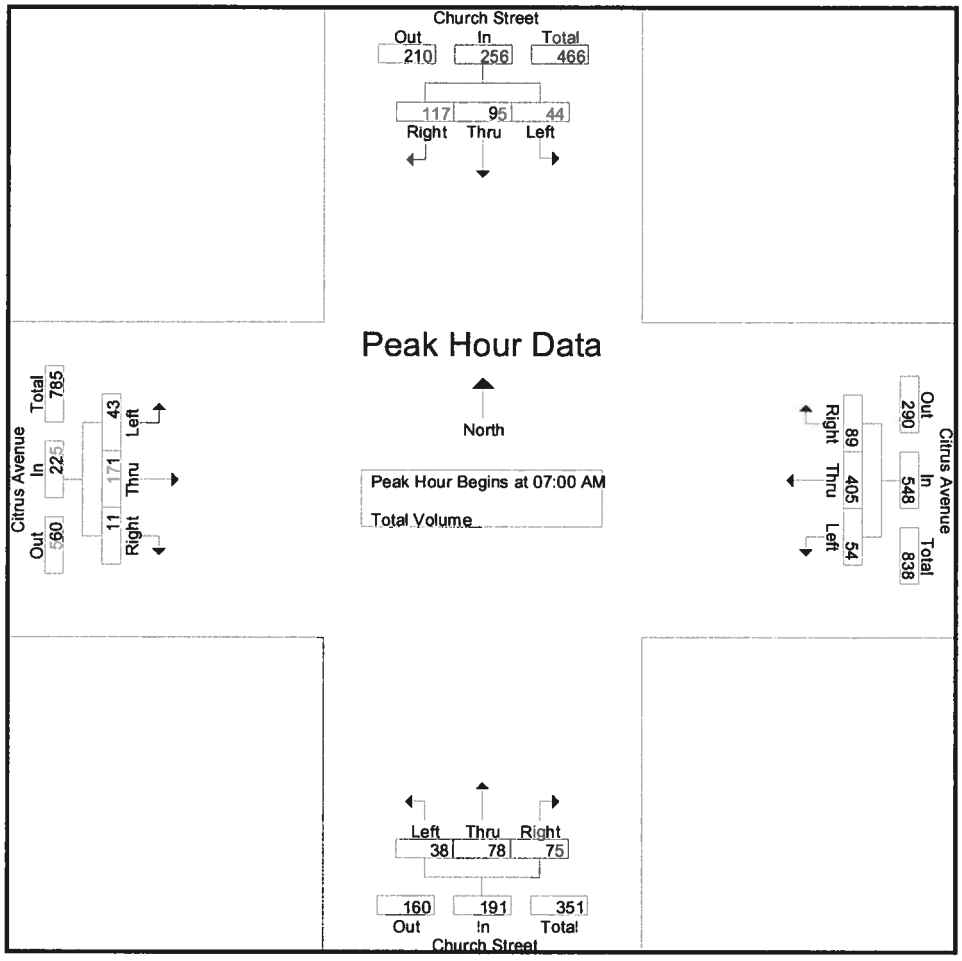
City of: Redlands
N/S: Church Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCHCIAM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			S	07:00 AM			W	07:00 AM			N	07:00 AM			E
+0 mins.	16	22	25	63	21	103	33	157	10	18	31	59	15	50	5	70
+15 mins.	**22**	**28**	**41**	**91**	**22**	**159**	**48**	**229**	**18**	**26**	**35**	**79**	**18**	**64**	2	**84**
+30 mins.	4	22	20	46	4	76	6	86	4	10	8	22	3	21	0	24
+45 mins.	2	23	31	56	7	67	2	76	6	24	1	31	7	36	4	47
Total Volume	44	95	117	256	54	405	89	548	38	78	75	191	43	171	11	225
% App. Total	17.2	37.1	45.7		9.9	73.9	16.2		19.9	40.8	39.3		19.1	76	4.9	
PHF	.500	.848	.713	.703	.614	.637	.464	.598	.528	.750	.536	.604	.597	.668	.550	.670
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of: Redlands
N/S: Church Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCHCIAM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Church Street Southbound				Citrus Avenue Westbound				Church Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	16	22	25	63	21	103	33	157	10	18	31	59	15	50	5	70	349
07:15 AM	22	28	41	91	22	159	48	229	18	26	35	79	18	64	2	84	483
07:30 AM	4	22	20	46	4	76	6	86	4	10	8	22	3	21	0	24	178
07:45 AM	2	23	31	56	7	67	2	76	6	24	1	31	7	36	4	47	210
Total	44	95	117	256	54	405	89	548	38	78	75	191	43	171	11	225	1220
08:00 AM	6	20	16	42	9	63	2	74	5	16	4	25	15	22	1	38	179
08:15 AM	8	15	9	32	4	67	5	76	1	13	5	19	3	22	1	26	153
08:30 AM	2	18	13	33	1	77	1	79	3	15	6	24	3	44	4	51	187
08:45 AM	4	20	14	38	6	71	3	80	0	10	4	14	3	36	1	40	172
Total	20	73	52	145	20	278	11	309	9	54	19	82	24	124	7	155	691
Grand Total	64	168	169	401	74	683	100	857	47	132	94	273	67	295	18	380	1911
Apprch %	16	41.9	42.1		8.6	79.7	11.7		17.2	48.4	34.4		17.6	77.6	4.7		
Total %	3.3	8.8	8.8	21	3.9	35.7	5.2	44.8	2.5	6.9	4.9	14.3	3.5	15.4	0.9	19.9	

	Church Street Southbound				Citrus Avenue Westbound				Church Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	16	22	25	63	21	103	33	157	10	18	31	59	15	50	5	70	349
07:15 AM	**22**	**28**	**41**	**91**	**22**	**159**	**48**	**229**	**18**	**26**	**35**	**79**	**18**	**64**	2	**84**	**483**
07:30 AM	4	22	20	46	4	76	6	86	4	10	8	22	3	21	0	24	178
07:45 AM	2	23	31	56	7	67	2	76	6	24	1	31	7	36	4	47	210
Total Volume	44	95	117	256	54	405	89	548	38	78	75	191	43	171	11	225	1220
% App. Total	17.2	37.1	45.7		9.9	73.9	16.2		19.9	40.8	39.3		19.1	76	4.9		
PHF	.500	.848	.713	.703	.614	.637	.464	.598	.528	.750	.536	.604	.597	.668	.550	.670	.631

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4, 2012

Citrus & Church **city of redlands** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	*T*	R	L	T	R	L	T	R	L	*T*	R
Movement 1: 34 secs	X	X	X	X	X	X						
Movement 2: 20 secs							X	X	X	X	X	X
Movement 3: 0 secs												
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	1	1	S	1	1	S	1	1	S	1	1	S
Unadjusted Volume	73	397	4	36	283	10	12	105	60	53	118	80
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)			Shrd			Shrd			Shrd			Shrd
Min. Time or Ped. Time	10	34	34	10	34	34	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	1.00	1.00	-	1.00	1.00	-	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

		***									***	
Pk. Hr. Vol. (vph)	81	441	10	40	314	11	13	117	67	59	131	89
Saturation Flow (vph)	1000	1800	Shrd	900	1800	Shrd	1200	1800	Shrd	1200	1800	Shrd
X or V/C	0.14	0.42	-	0.08	0.30	-	0.03	0.31	-	0.15	0.37	-
Effective green (sec)	32	32	-	32	32	-	18	18	-	18	18	-
Split Time (sec)	34	34	-	34	34	-	20	20	-	20	20	-
Min. Time or Ped. Time (sec)	10	34	-	10	34	-	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	5	7	-	5	6	-	12	15	-	13	15	-
Level of Service (LOS)	A	A	-	A	A	-	B	B	-	B	B	-
Average 'Q' (veh/ln)	1	3	-	1	2	-	1	2	-	1	2	-
Design 'Q'- ft/ln	40	100	-	40	60	-	40	60	-	40	60	-
Do Vehicles Clear?	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 9
Level of Service - LOS = A

Critical Movements

Weighted Avg Delay (sec) = 10
Level of Service - LOS = A
Intersection Capacity Utilization - ICU = 0.40

Required Cycle Length is 54 sec

Min./Ped. Times Satisfied

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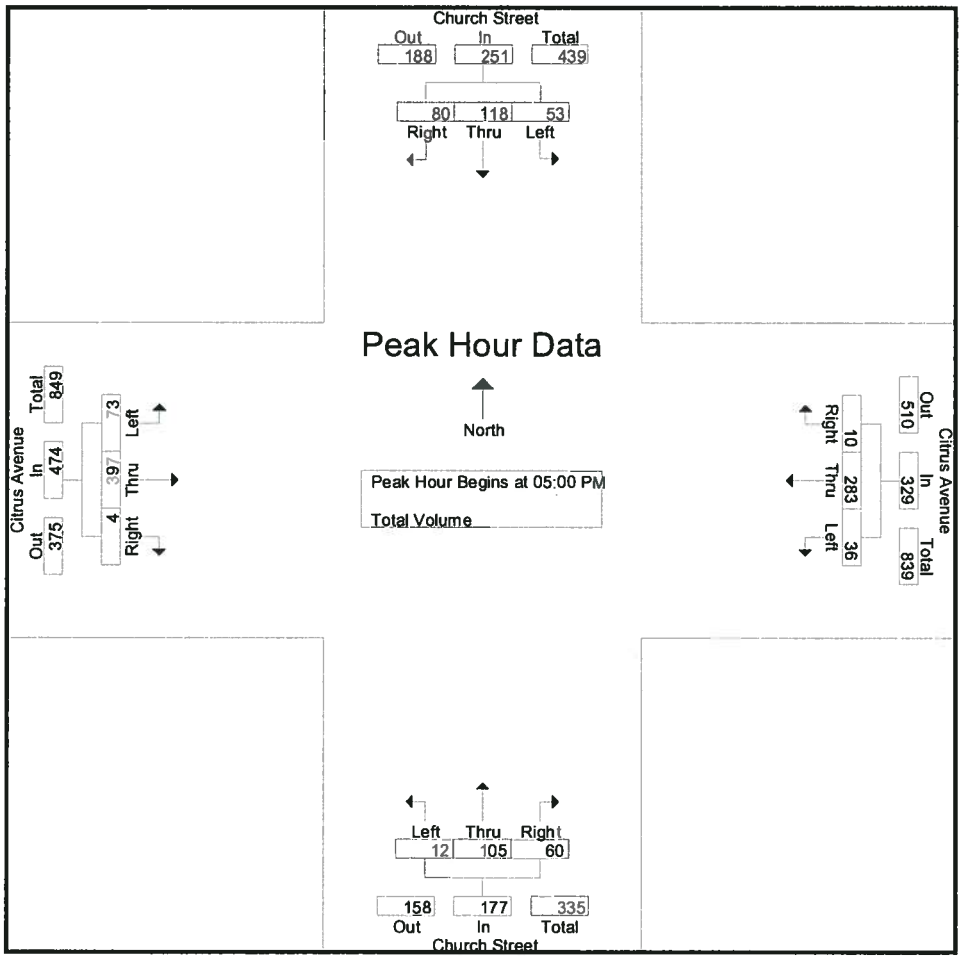
City of: Redlands
N/S: Church Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCHCIPM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			S	05:00 PM			W	05:00 PM			N	05:00 PM			E
+0 mins.	7	31	21	59	**11**	76	1	88	2	23	**23**	**48**	18	98	**2**	118
+15 mins.	16	24	20	60	7	**82**	2	**91**	4	19	16	39	**30**	**114**	0	**144**
+30 mins.	**18**	26	16	60	7	61	2	70	1	**36**	8	45	13	82	1	96
+45 mins.	12	**37**	**23**	**72**	11	64	**5**	80	5	27	13	45	12	103	1	116
Total Volume	53	118	80	251	36	283	10	329	12	105	60	177	73	397	4	474
% App. Total	21.1	47	31.9		10.9	86	3		6.8	59.3	33.9		15.4	83.8	0.8	
PHF	.736	.797	.870	.872	.818	.863	.500	.904	.600	.729	.652	.922	.608	.871	.500	.823
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of: Redlands
N/S: Church Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDCHCIPM
Site Code : 00000018
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Church Street Southbound				Citrus Avenue Westbound				Church Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	6	20	22	48	4	58	2	64	4	17	20	41	16	72	4	92	245
04:15 PM	7	25	22	54	10	47	3	60	10	20	12	42	9	63	4	76	232
04:30 PM	8	27	18	53	3	60	2	65	1	26	13	40	19	82	1	102	260
04:45 PM	12	22	18	52	9	67	2	78	2	28	10	40	10	89	1	100	270
Total	33	94	80	207	26	232	9	267	17	91	55	163	54	306	10	370	1007
05:00 PM	7	31	21	59	11	76	1	88	2	23	23	48	18	98	2	118	313
05:15 PM	16	24	20	60	7	82	2	91	4	19	16	39	30	114	0	144	334
05:30 PM	18	26	16	60	7	61	2	70	1	36	8	45	13	82	1	96	271
05:45 PM	12	37	23	72	11	64	5	80	5	27	13	45	12	103	1	116	313
Total	53	118	80	251	36	283	10	329	12	105	60	177	73	397	4	474	1231
Grand Total	86	212	160	458	62	515	19	596	29	196	115	340	127	703	14	844	2238
Apprch %	18.8	46.3	34.9		10.4	86.4	3.2		8.5	57.6	33.8		15	83.3	1.7		
Total %	3.8	9.5	7.1	20.5	2.8	23	0.8	26.6	1.3	8.8	5.1	15.2	5.7	31.4	0.6	37.7	

	Church Street Southbound				Citrus Avenue Westbound				Church Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	7	31	21	59	11	76	1	88	2	23	23	48	18	98	2	118	313
05:15 PM	16	24	20	60	7	82	2	91	4	19	16	39	30	114	0	144	334
05:30 PM	18	26	16	60	7	61	2	70	1	36	8	45	13	82	1	96	271
05:45 PM	12	37	23	72	11	64	5	80	5	27	13	45	12	103	1	116	313
Total Volume	53	118	80	251	36	283	10	329	12	105	60	177	73	397	4	474	1231
% App. Total	21.1	47	31.9		10.9	86	3		6.8	59.3	33.9		15.4	83.8	0.8		
PHF	.736	.797	.870	.872	.818	.863	.500	.904	.600	.729	.652	.922	.608	.871	.500	.823	.921

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4,2012

Citrus Ave. & Ford St./Judson St. **City of Redlands** **AM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	*T*	R	L	*T*	R	L	T	R	L	*T*	R
Movement 1: 20 secs				X	X	X						
Movement 2: 20 secs	X	X	X									
Movement 3: 20 secs							X	X	X	X	X	X
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	S	2	1	S	2	1	1	1	S	1	1	S
Unadjusted Volume	45	181	33	30	375	21	39	93	24	13	125	103
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	20	20	10	20	20	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	-	1.00	1.00	-	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

		***			***						***	
Pk. Hr. Vol. (vph)	50	201	37	33	417	23	43	103	27	14	139	114
Saturation Flow (vph)	Shrd	3600	1800	Shrd	3600	1800	1100	1800	Shrd	1300	1800	Shrd
X or V/C	-	0.23	0.07	-	0.42	0.04	0.13	0.24	-	0.04	0.47	-
Effective green (sec)	-	18	18	-	18	18	18	18	-	18	18	-
Split Time (sec)	-	20	20	-	20	20	20	20	-	20	20	-
Min. Time or Ped. Time (sec)	-	20	20	-	20	20	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	-	16	15	-	18	15	16	17	-	15	20	-
Level of Service (LOS)	-	B	B	-	B	B	B	B	-	B	C+	-
Average 'Q' (veh/ln)	-	1	1	-	3	1	1	2	-	1	3	-
Design 'Q'- ft/ln	-	40	40	-	100	40	40	60	-	40	100	-
Do Vehicles Clear?	-	YES	YES	-	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 18
Level of Service - LOS = B

Critical Movements

Weighted Avg Delay (sec) = 18
Level of Service - LOS = B
Intersection Capacity Utilization - ICU = 0.37

Required Cycle Length is 60 sec

Min./Ped. Times Satisfied

Counts Unlimited, Inc.
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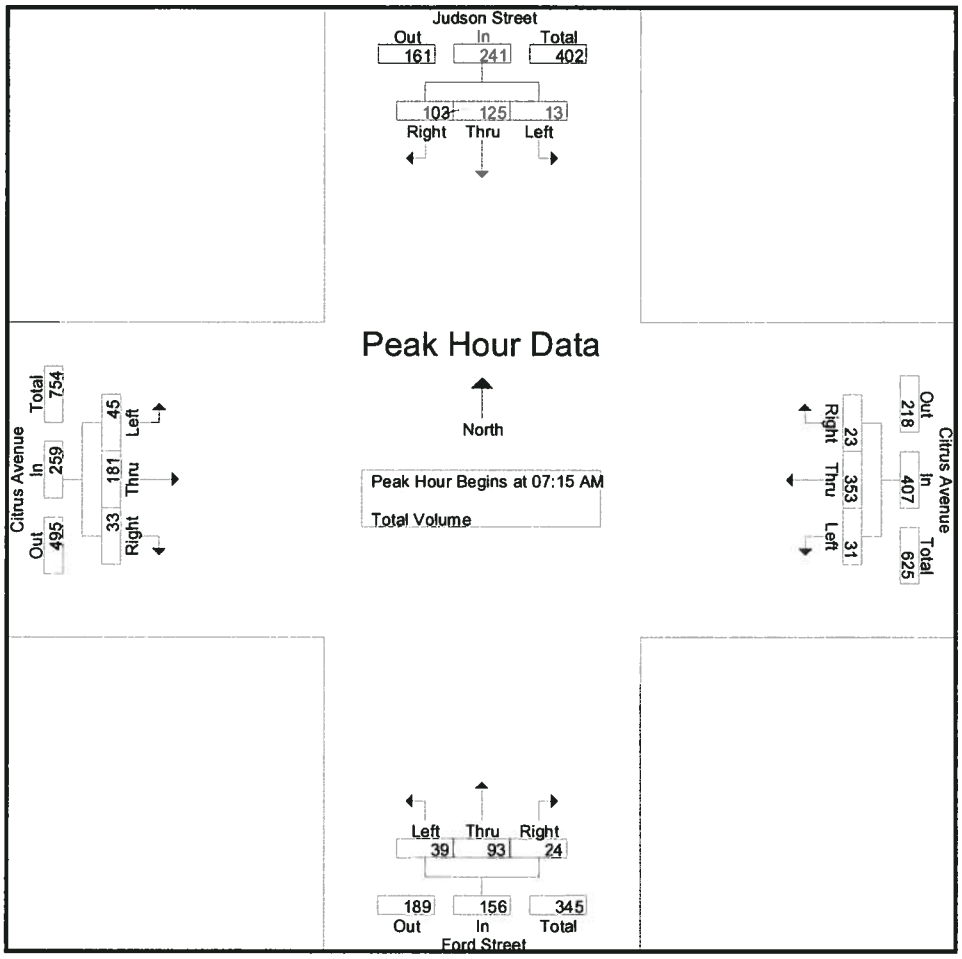
City of Redlands
N/S: Judson Street - Ford Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDJUCIAM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			S	07:00 AM			W	07:15 AM			N	07:15 AM			E
+0 mins.	2	38	**30**	70	4	98	4	106	**18**	13	6	37	12	42	8	62
+15 mins.	3	16	22	41	**11**	**110**	**6**	**127**	3	22	**10**	35	9	**50**	7	66
+30 mins.	**8**	**42**	22	**72**	9	78	5	92	4	21	2	27	11	48	**12**	**71**
+45 mins.	0	29	29	58	6	89	6	101	14	**37**	6	**57**	**13**	41	6	60
Total Volume	13	125	103	241	30	375	21	426	39	93	24	156	45	181	33	259
% App. Total	5.4	51.9	42.7		7	88	4.9		25	59.6	15.4		17.4	69.9	12.7	
PHF	.406	.744	.858	.837	.682	.852	.875	.839	.542	.628	.600	.684	.865	.905	.688	.912
	L	T	R		L	T	R		L	T	R		L	T	R	

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(951) 268-6268

City of Redlands
N/S: Judson Street - Ford Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDJUCIAM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Judson Street Southbound				Citrus Avenue Westbound				Ford Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	15	28	43	4	98	4	106	9	17	5	31	8	19	4	31	211
07:15 AM	2	38	30	70	11	110	6	127	18	13	6	37	12	42	8	62	296
07:30 AM	3	16	22	41	9	78	5	92	3	22	10	35	9	50	7	66	234
07:45 AM	8	42	22	72	6	89	6	101	4	21	2	27	11	48	12	71	271
Total	13	111	102	226	30	375	21	426	34	73	23	130	40	159	31	230	1012
08:00 AM	0	29	29	58	5	76	6	87	14	37	6	57	13	41	6	60	262
08:15 AM	1	24	18	43	6	71	5	82	7	17	4	28	6	41	3	50	203
08:30 AM	4	19	17	40	12	83	6	101	4	21	6	31	10	36	8	54	226
08:45 AM	5	31	21	57	3	94	5	102	6	16	6	28	14	40	5	59	246
Total	10	103	85	198	26	324	22	372	31	91	22	144	43	158	22	223	937
Grand Total	23	214	187	424	56	699	43	798	65	164	45	274	83	317	53	453	1949
Apprch %	5.4	50.5	44.1		7	87.6	5.4		23.7	59.9	16.4		18.3	70	11.7		
Total %	1.2	11	9.6	21.8	2.9	35.9	2.2	40.9	3.3	8.4	2.3	14.1	4.3	16.3	2.7	23.2	

	Judson Street Southbound				Citrus Avenue Westbound				Ford Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	2	38	**30**	70	**11**	**110**	**6**	**127**	**18**	13	6	37	12	42	8	62	**296**
07:30 AM	3	16	22	41	9	78	5	92	3	22	**10**	35	9	**50**	7	66	234
07:45 AM	**8**	**42**	22	**72**	6	89	6	101	4	21	2	27	11	48	**12**	**71**	271
08:00 AM	0	29	29	58	5	76	6	87	14	**37**	6	**57**	**13**	41	6	60	262
Total Volume	13	125	103	241	31	353	23	407	39	93	24	156	45	181	33	259	1063
% App. Total	5.4	51.9	42.7		7.6	86.7	5.7		25	59.6	15.4		17.4	69.9	12.7		
PHF	.406	.744	.858	.837	.705	.802	.958	.801	.542	.628	.600	.684	.865	.905	.688	.912	.898

WEBSTER

WEbster Based Signal Timing Evaluation Routine

For Capacity and Level of Service Analysis Using HCM 2000 Control Delay

September 4,2012

Citrus Ave. & Ford St./Judson St. **City of Redlands** **PM Peak Hour**

Input

	Eastbound			Westbound			Northbound			Southbound		
Movement Times	L	*T*	R	L	*T*	R	L	T	R	L	*T*	R
Movement 1: 20 secs				X	X	X						
Movement 2: 23 secs	X	X	X									
Movement 3: 20 secs							X	X	X	X	X	X
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	S	2	1	S	2	1	1	1	S	1	1	S
Unadjusted Volume	119	499	57	35	280	15	41	131	63	21	134	73
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)									Shrd			Shrd
Min. Time or Ped. Time	10	20	20	10	20	20	10	20	20	10	20	20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)	-	1.00	1.00	-	1.00	1.00	1.00	1.00	-	1.00	1.00	-

Parameter Values (using default set 'SANBAG (Existing)')

	Other	Default
Duration of Peak Period (min)		15
Lost Time (sec)		2
Min. Time (Left Turns, sec)		10
Min/Ped Time (Thru Lanes, sec)		20
Sat Flow (1 Left lane, vphg)	1700	1800
Sat Flow (2 Left lanes, vphg)	3200	3500
Sat Flow (1 Thru lane, vphg)	1800	1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

		***			***						***	
Pk. Hr. Vol. (vph)	132	554	63	39	311	17	46	146	70	23	149	81
Saturation Flow (vph)	Shrd	3600	1800	Shrd	3600	1800	1200	1800	Shrd	1200	1800	Shrd
X or V/C	-	0.57	0.11	-	0.34	0.03	0.13	0.42	-	0.07	0.45	-
Effective green (sec)	-	21	21	-	18	18	18	18	-	18	18	-
Split Time (sec)	-	23	23	-	20	20	20	20	-	20	20	-
Min. Time or Ped. Time (sec)	-	20	20	-	20	20	10	20	-	10	20	-
Delay - 15 min pk (sec/veh)	-	19	15	-	19	16	18	21	-	17	21	-
Level of Service (LOS)	-	B	B	-	B	B	B	C+	-	B	C+	-
Average 'Q' (veh/ln)	-	4	1	-	2	1	1	3	-	1	3	-
Design 'Q'- ft/ln	-	120	40	-	60	40	40	100	-	40	100	-
Do Vehicles Clear?	-	YES	YES	-	YES	YES	YES	YES	-	YES	YES	-

Summary

Whole Intersection

Weighted Avg Delay (sec) = 19
Level of Service - LOS = B

Critical Movements

Weighted Avg Delay (sec) = 19
Level of Service - LOS = B
Intersection Capacity Utilization - ICU = 0.46

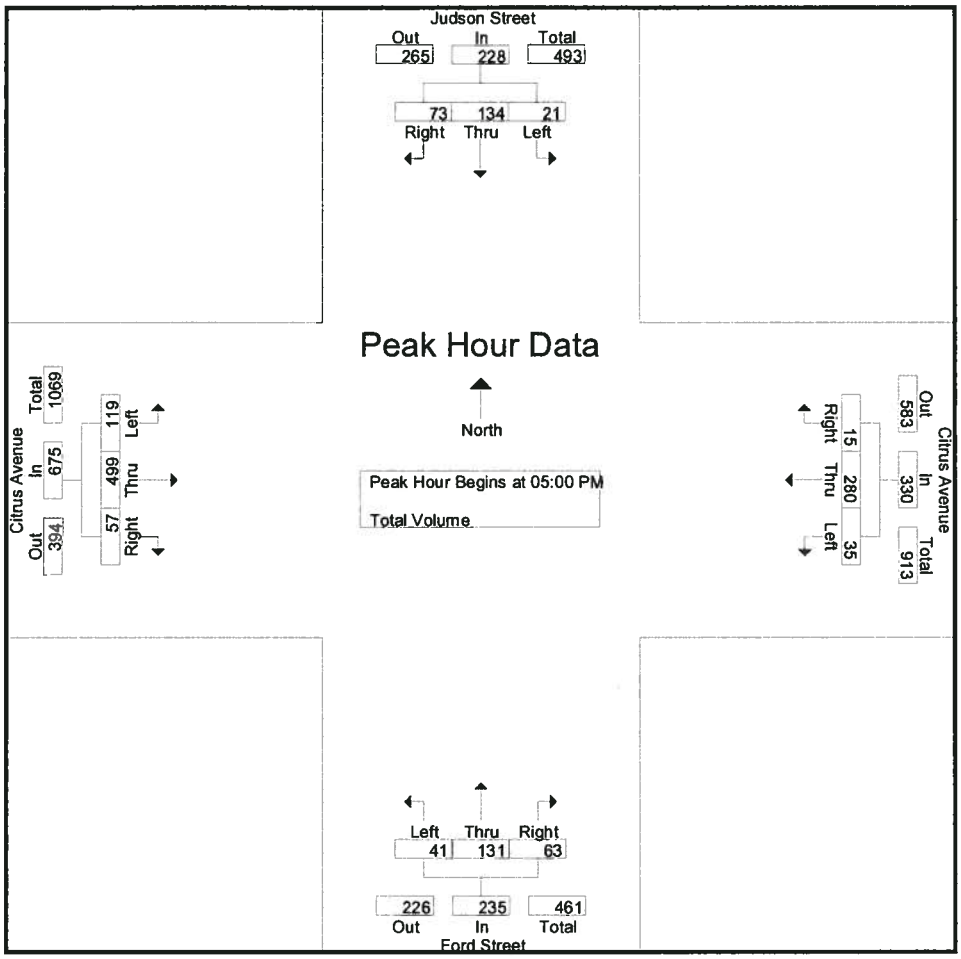
Required Cycle Length is 63 sec

Min./Ped. Times Satisfied

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Redlands
N/S: Judson Street - Ford Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDJUCIPM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			S	05:00 PM			W	05:00 PM			N	05:00 PM			E
+0 mins.	5	37	**19**	**61**	9	**81**	1	**91**	9	25	12	46	**35**	130	15	**180**
+15 mins.	4	31	19	54	**10**	71	**8**	89	9	35	16	60	22	**137**	**17**	176
+30 mins.	5	31	17	53	8	59	5	72	5	**39**	**18**	62	35	129	13	177
+45 mins.	7	35	18	60	8	69	1	78	**18**	32	17	**67**	27	103	12	142
Total Volume	21	134	73	228	35	280	15	330	41	131	63	235	119	499	57	675
% App. Total	9.2	58.8	32		10.6	84.8	4.5		17.4	55.7	26.8		17.6	73.9	8.4	
PHF	.750	.905	.961	.934	.875	.864	.469	.907	.569	.840	.875	.877	.850	.911	.838	.938
	L	T	R		L	T	R		L	T	R		L	T	R	

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City of Redlands
N/S: Judson Street - Ford Street
E/W: Citrus Avenue
Weather: Sunny

File Name : REDJUCIPM
Site Code : 00000006
Start Date : 6/26/2012
Page No : 1

Groups Printed- Total Volume

	Judson Street Southbound				Citrus Avenue Westbound				Ford Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	8	28	13	49	9	54	1	64	12	19	15	46	15	108	14	137	296
04:15 PM	5	16	13	34	4	53	3	60	8	25	8	41	18	92	13	123	258
04:30 PM	2	40	16	58	2	52	1	55	11	24	16	51	33	105	10	148	312
04:45 PM	2	32	12	46	3	59	3	65	13	29	15	57	29	91	15	135	303
Total	17	116	54	187	18	218	8	244	44	97	54	195	95	396	52	543	1169
05:00 PM	5	37	19	61	9	81	1	91	9	25	12	46	35	130	15	180	378
05:15 PM	4	31	19	54	10	71	8	89	9	35	16	60	22	137	17	176	379
05:30 PM	5	31	17	53	8	59	5	72	5	39	18	62	35	129	13	177	364
05:45 PM	7	35	18	60	8	69	1	78	18	32	17	67	27	103	12	142	347
Total	21	134	73	228	35	280	15	330	41	131	63	235	119	499	57	675	1468
Grand Total	38	250	127	415	53	498	23	574	85	228	117	430	214	895	109	1218	2637
Apprch %	9.2	60.2	30.6		9.2	86.8	4		19.8	53	27.2		17.6	73.5	8.9		
Total %	1.4	9.5	4.8	15.7	2	18.9	0.9	21.8	3.2	8.6	4.4	16.3	8.1	33.9	4.1	46.2	

	Judson Street Southbound				Citrus Avenue Westbound				Ford Street Northbound				Citrus Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	5	**37**	**19**	**61**	9	**81**	1	**91**	9	25	12	46	**35**	130	15	**180**	378
05:15 PM	4	31	19	54	**10**	71	**8**	89	9	35	16	60	22	**137**	**17**	176	**379**
05:30 PM	5	31	17	53	8	59	5	72	5	**39**	**18**	62	35	129	13	177	364
05:45 PM	**7**	35	18	60	8	69	1	78	**18**	32	17	**67**	27	103	12	142	347
Total Volume	21	134	73	228	35	280	15	330	41	131	63	235	119	499	57	675	1468
% App. Total	9.2	58.8	32		10.6	84.8	4.5		17.4	55.7	26.8		17.6	73.9	8.4		
PHF	.750	.905	.961	.934	.875	.864	.469	.907	.569	.840	.875	.877	.850	.911	.838	.938	.968