WEBSTER

WEbster Based Signal Timing Evaluation Routine

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

2009 CMP Data

Highland Ave @ Waterman Ave **City of SBD** **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: **11** 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**	S	1	2	1	**1**	**2**	1
Unadjusted Volume	45	293	152	**83**	**281**	47	115	257	102	**156**	**623**	60
Peak Hour Factor (PHF)	1.00	1.00	1.00	**1.00**	**1.00**	1.00	1.00	1.00	1.00	**1.00**	**1.00**	1.00
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)						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**	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)	45	293	152	**83**	**281**	47	115	257	102	**156**	**623**	60
Saturation Flow (vph)	1700	3600	1800	**1700**	**3600**	Shrd	1700	3600	1800	**1700**	**3600**	1800
X or V/C	0.20	0.28	0.29	**0.37**	**0.31**	-	0.46	0.24	0.19	**0.62**	**0.59**	0.11
Effective green (sec)	8	18	18	**8**	**18**	-	9	18	18	**9**	**18**	18
Split Time (sec)	10	20	20	**10**	**20**	-	11	20	20	**11**	**20**	20
Min. Time or Ped. Time (sec)	10	20	20	**10**	**20**	-	10	20	20	**10**	**20**	20
Delay - 15 min pk (sec/veh)	26	17	18	**29**	**17**	-	30	17	17	**35**	**21**	16
Level of Service (LOS)	C	B	B	**C**	**B**	-	C	B	B	**D+**	**C+**	B
Average 'Q' (veh/ln)	1	2	2	**1**	**2**	-	2	2	1	**2**	**4**	1
Design 'Q'- ft/ln	40	60	60	**40**	**60**	-	60	60	40	**60**	**120**	40
Do Vehicles Clear?	YES	YES	YES	**YES**	**YES**	-	YES	YES	YES	**YES**	**YES**	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 21
Level of Service - LOS = C+

Critical Movements

Weighted Avg Delay (sec) = 22
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.47

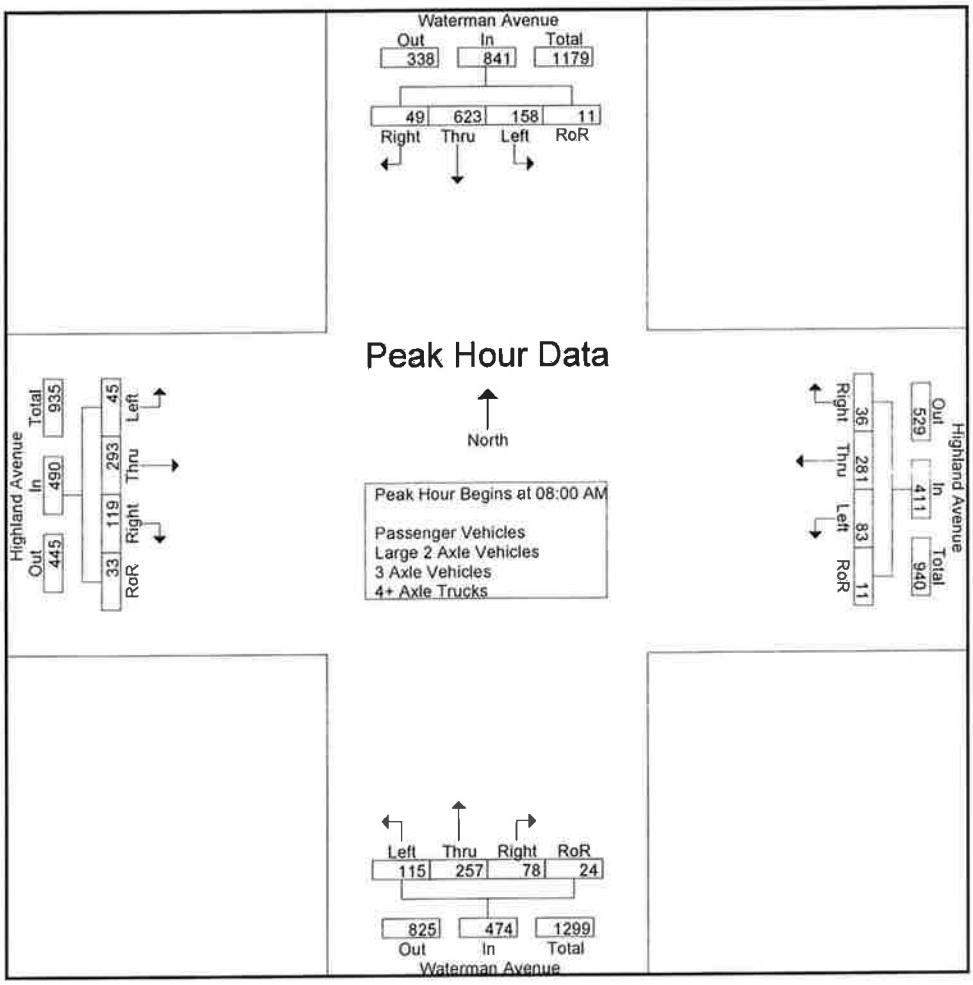
Required Cycle Length is 61 sec

Min./Ped. Times Satisfied

Counts Unlimited Inc.
25286 Jaclyn Avenue
Moreno Valley, CA 92557
951-485-7934

City of San Bernardino
N/S: Waterman Avenue
E/W: Highland Avenue
Weather: Sunny

File Name : SBCWAHIAM
Site Code : 9153063
Start Date : 6/11/2009
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					08:00 AM					08:00 AM					08:00 AM				
+0 mins.	37	173	7	**3**	220	21	57	7	**5**	90	28	59	16	2	105	**15**	**81**	**36**	**9**	**141**
+15 mins.	44	**188**	10	0	242	21	57	8	2	88	18	51	17	6	92	14	70	28	9	121
+30 mins.	31	161	10	0	202	17	74	8	2	101	32	72	18	**8**	130	9	70	23	6	108
+45 mins.	**47**	186	**13**	1	**247**	**24**	**93**	**13**	2	**132**	**37**	**75**	**27**	8	**147**	7	72	32	9	120
Total Volume	159	708	40	4	911	83	281	36	11	411	115	257	78	24	474	45	293	119	33	490
% App. Total	17.5	77.7	4.4	0.4		20.2	68.4	8.8	2.7		24.3	54.2	16.5	5.1		9.2	59.8	24.3	6.7	
PHF	.846	.941	.769	.333	.922	.865	.755	.692	.550	.778	.777	.857	.722	.750	.806	.750	.904	.826	.917	.869

WEBSTER

WEbster Based Signal Timing Evaluation Routine

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

2009 CMP Data

Highland Ave @ Waterman Ave **City of SBD** **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: 13 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	S	1	2	1	1	2	1
Unadjusted Volume	100	505	147	123	437	79	203	626	153	112	373	66
Peak Hour Factor (PHF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (%)												
Project Trip Volume (vph)												
Sat. Flow Override (vph)						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	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)	100	505	147	123	437	79	203	626	153	112	373	66
Saturation Flow (vph)	1700	3600	1800	1700	3600	Shrd	1700	3600	1800	1700	3600	1800
X or V/C	0.46	0.49	0.29	0.57	0.50	-	0.68	0.61	0.30	0.38	0.36	0.13
Effective green (sec)	8	18	18	8	18	-	11	18	18	11	18	18
Split Time (sec)	10	20	20	10	20	-	13	20	20	13	20	20
Min. Time or Ped. Time (sec)	10	20	20	10	20	-	10	20	20	10	20	20
Delay - 15 min pk (sec/veh)	33	20	19	36	21	-	36	22	19	27	19	17
Level of Service (LOS)	C-	C+	B	D+	C+	-	D+	C+	B	C	B	B
Average 'Q' (veh/ln)	2	3	2	2	3	-	3	4	2	2	2	1
Design 'Q'- ft/ln	60	100	60	60	100	-	100	120	60	60	60	40
Do Vehicles Clear?	YES	YES	YES	YES	YES	-	YES	YES	YES	YES	YES	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 23
Level of Service - LOS = C+

Critical Movements

Weighted Avg Delay (sec) = 25
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.58

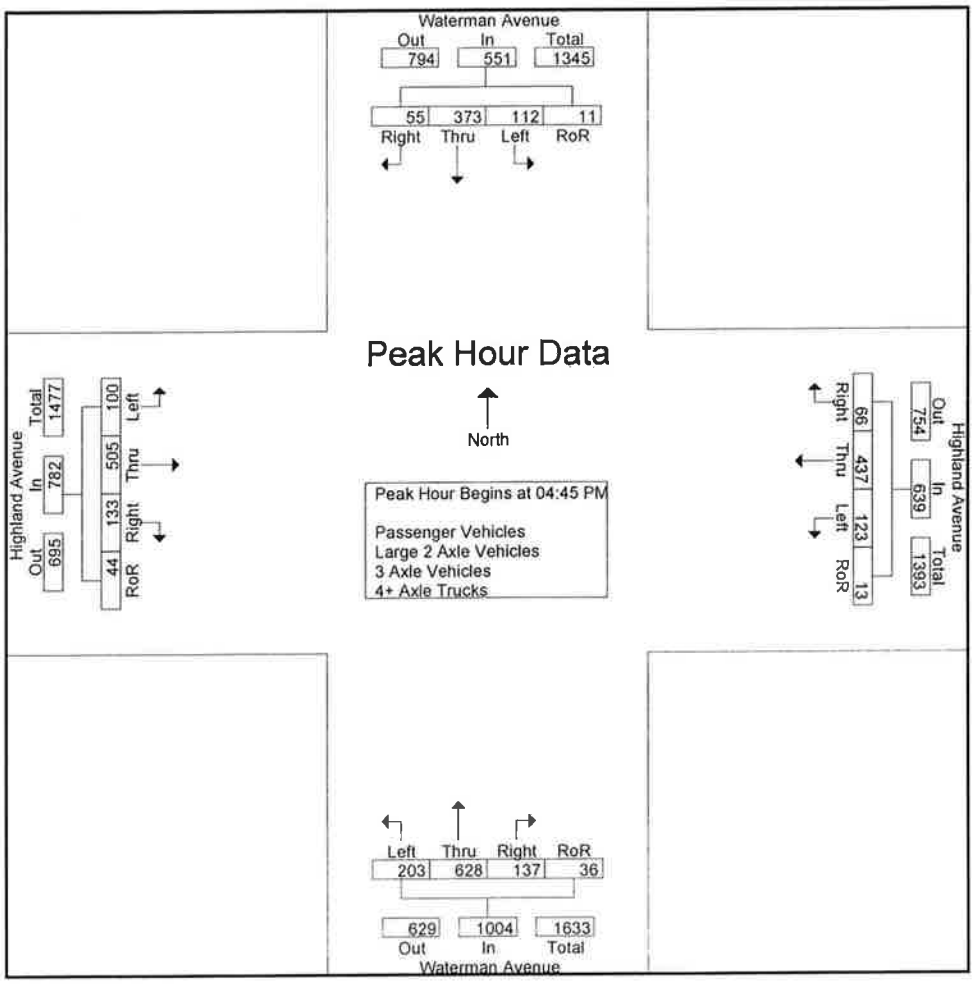
Required Cycle Length is 63 sec

Min./Ped. Times Satisfied

Counts Unlimited Inc.
25286 Jaclyn Avenue
Moreno Valley, CA 92557
951-485-7934

City of San Bernardino
N/S: Waterman Avenue
E/W: Highland Avenue
Weather: Sunny

File Name : SBCWAHIPM
Site Code : 9153063
Start Date : 6/11/2009
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					04:15 PM					04:45 PM					04:45 PM				
+0 mins.	22	**108**	**25**	3	**158**	**36**	115	18	**7**	176	47	139	35	7	228	24	132	37	13	**206**
+15 mins.	31	102	22	1	156	31	112	**26**	3	172	46	150	**37**	9	242	20	131	**42**	7	200
+30 mins.	30	93	15	2	140	34	95	15	2	146	**55**	**185**	36	**12**	**288**	**32**	107	23	**15**	177
+45 mins.	**32**	95	16	**5**	148	36	**126**	18	7	**187**	55	154	29	8	246	24	**135**	31	9	199
Total Volume	115	398	78	11	602	137	448	77	19	681	203	628	137	36	1004	100	505	133	44	782
% App. Total	19.1	66.1	13	1.8		20.1	65.8	11.3	2.8		20.2	62.5	13.6	3.6		12.8	64.6	17	5.6	
PHF	.898	.921	.780	.550	.953	.951	.889	.740	.679	.910	.923	.849	.926	.750	.872	.781	.935	.792	.733	.949