WEBSTER

WEbster Based Signal Timing Evaluation Routine

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

2009 CMP Data

Barton Road @ 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: 13 secs	X			X								X
Movement 2: 19 secs		X	X		X	X						
Movement 3: 10 secs							X	X	X			
Movement 4: 14 secs						X				X	X	X
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	2	2	1	1	2	1	1	1	1	2	1	1
Unadjusted Volume	474	888	3	3	443	378	1	1	5	549	7	120
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)												
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	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)	474	888	10	10	443	378	10	10	10	549	10	120
Saturation Flow (vph)	3200	3600	1800	1700	3600	1800	1700	1800	1800	3200	1800	1800
X or V/C	0.75	0.81	0.02	0.03	0.41	0.38	0.04	0.04	0.04	0.80	0.03	0.15
Effective green (sec)	11	17	17	11	17	31	8	8	8	12	12	25
Split Time (sec)	13	19	19	13	19	33	10	10	10	14	14	27
Min. Time or Ped. Time (sec)	10	10	10	10	10	10	10	10	10	10	10	10
Delay - 15 min pk (sec/veh)	29	25	14	18	17	8	21	21	21	30	18	10
Level of Service (LOS)	C	C+	B	B	B	A	C+	C+	C+	C-	B	A
Average 'Q' (veh/ln)	3	5	1	1	2	3	1	1	1	4	1	1
Design 'Q'- ft/ln	100	160	40	40	60	100	40	40	40	120	40	40
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 22
Level of Service - LOS = C+

Critical Movements

Weighted Avg Delay (sec) = 27
Level of Service - LOS = C
Intersection Capacity Utilization - ICU = 0.67

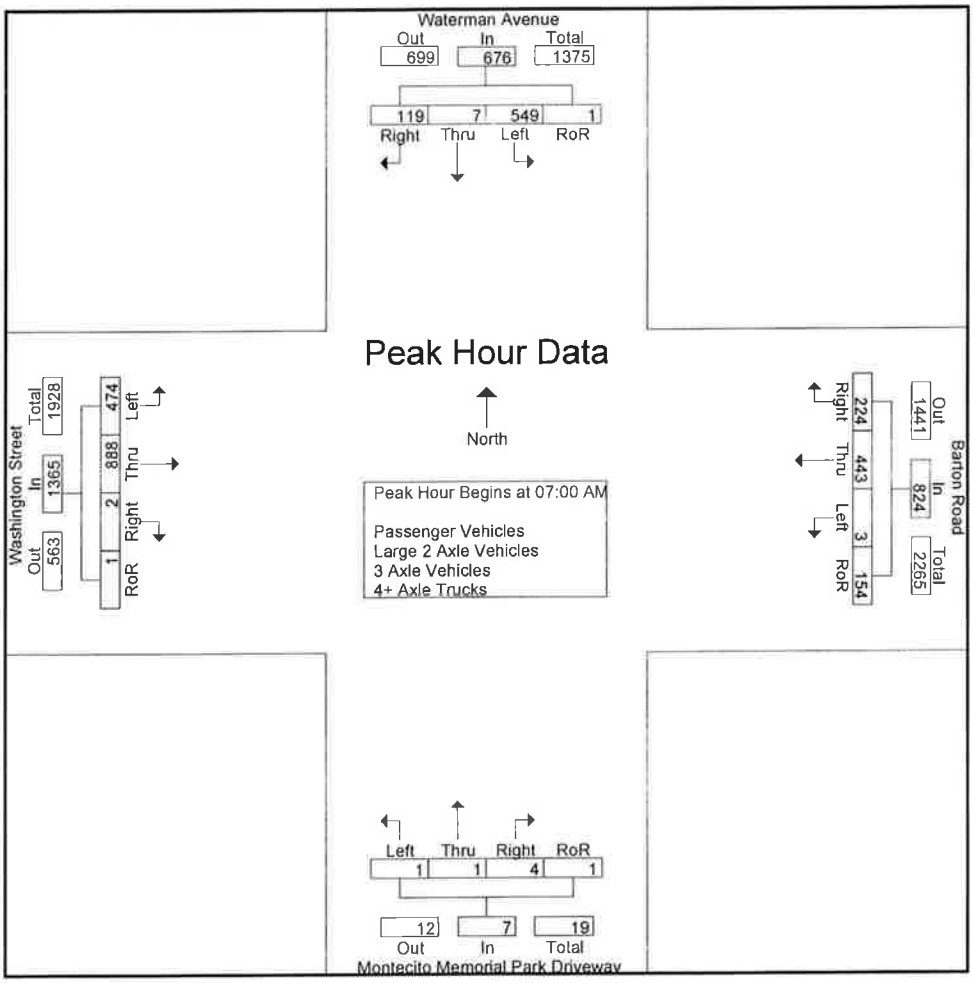
Required Cycle Length is 56 sec

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/Driveway
E/W: Barton Road/Washington Street
Weather: Sunny

File Name : SBCWABAAM1
Site Code : 9153009
Start Date : 6/10/2009
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:

	07:15 AM					07:00 AM					07:15 AM					07:00 AM				
+0 mins.	139	0	28	**1**	168	0	100	36	42	178	0	**1**	0	0	1	103	187	**2**	**1**	293
+15 mins.	**156**	**2**	43	0	**201**	0	110	42	**46**	198	0	0	**3**	0	**3**	118	**241**	0	0	359
+30 mins.	143	1	32	0	176	**2**	100	**76**	37	215	0	0	1	1	2	120	227	0	0	347
+45 mins.	93	1	**65**	1	160	1	**133**	70	29	**233**	0	0	0	**2**	2	**133**	233	0	0	**366**
Total Volume	531	4	168	2	705	3	443	224	154	824	0	1	4	3	8	474	888	2	1	1365
% App. Total	75.3	0.6	23.8	0.3		0.4	53.8	27.2	18.7		0	12.5	50	37.5		34.7	65.1	0.1	0.1	
PHF	.851	.500	.646	.500	.877	.375	.833	.737	.837	.884	.000	.250	.333	.375	.667	.891	.921	.250	.250	.932

WEBSTER

WEbster Based Signal Timing Evaluation Routine

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

2009 CMP Data

Barton Road @ 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								X
Movement 2: 23 secs		X	X		X	X						
Movement 3: 10 secs							X	X	X			
Movement 4: 11 secs						X				X	X	X
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)	2	2	1	1	2	1	1	1	1	2	1	1
Unadjusted Volume	311	557	15	2	1041	662	7	15	3	375	16	561
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)												
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	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)	311	557	15	10	1041	662	10	15	10	375	16	561
Saturation Flow (vph)	3200	3600	1800	1700	3600	1800	1700	1800	1800	3200	1800	1800
X or V/C	0.66	0.40	0.02	0.04	0.74	0.62	0.04	0.06	0.04	0.70	0.05	0.89
Effective green (sec)	8	21	21	8	21	32	8	8	8	9	9	19
Split Time (sec)	10	23	23	10	23	34	10	10	10	11	11	21
Min. Time or Ped. Time (sec)	10	10	10	10	10	10	10	10	10	10	10	10
Delay - 15 min pk (sec/veh)	29	13	10	20	18	10	20	20	20	29	19	33
Level of Service (LOS)	C	B	B	C+	B	A	C+	C+	B	C	B	C-
Average 'Q' (veh/ln)	2	3	1	1	5	4	1	1	1	2	1	6
Design 'Q'- ft/ln	60	100	40	40	160	120	40	40	40	60	40	180
Do Vehicles Clear?	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Summary

Whole Intersection

Weighted Avg Delay (sec) = 20
Level of Service - LOS = C+

Critical Movements

Weighted Avg Delay (sec) = 22
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.60

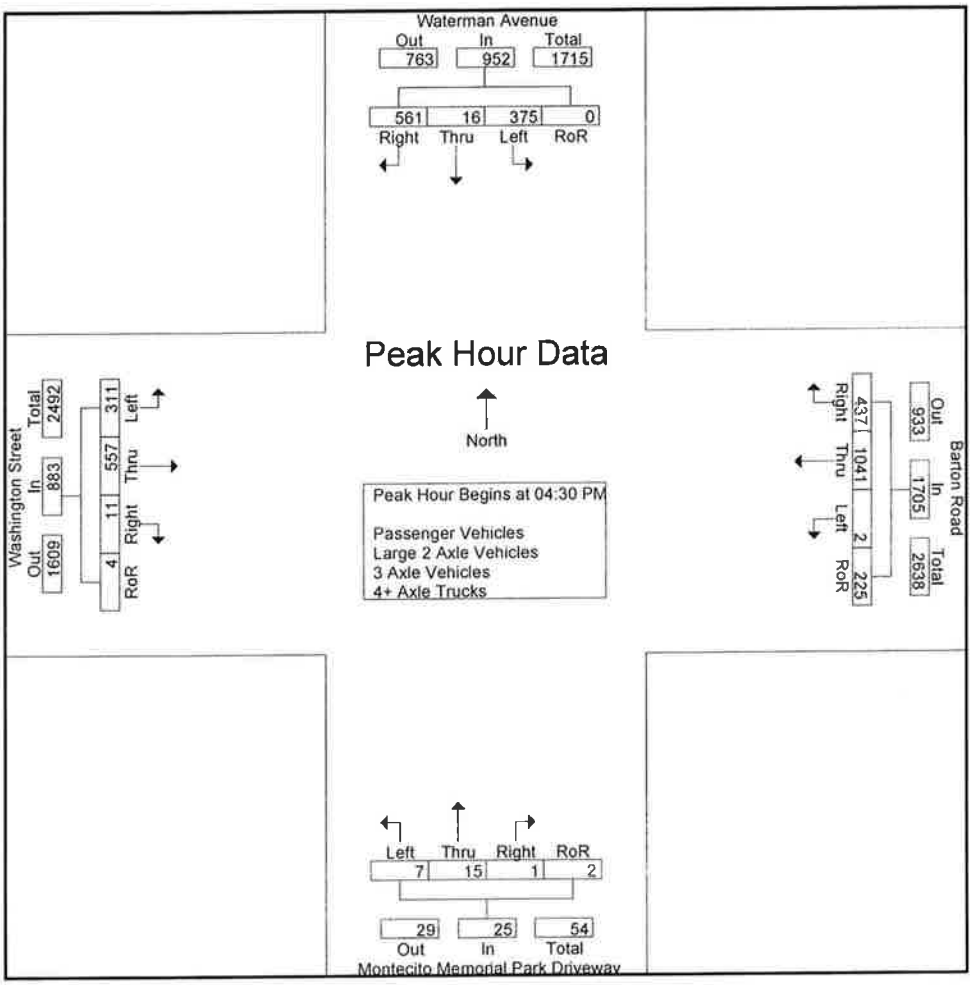
Required Cycle Length is 54 sec

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/Driveway
E/W: Barton Road/Washington Street
Weather: Sunny

File Name : SBCWABAPM1
Site Code : 9153009
Start Date : 6/10/2009
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:

	04:30 PM					04:15 PM					04:00 PM					05:00 PM				
+0 mins.	91	2	126	0	219	**2**	247	85	52	386	**5**	**7**	0	0	**12**	**89**	133	**5**	**3**	230
+15 mins.	90	**10**	144	0	244	0	264	116	**74**	454	3	1	**3**	**2**	9	75	154	0	0	229
+30 mins.	90	3	**148**	0	241	1	239	**119**	43	402	0	3	0	0	3	76	142	1	0	219
+45 mins.	**104**	1	143	0	**248**	0	**307**	116	58	**481**	3	2	0	2	7	73	**160**	0	0	**233**
Total Volume	375	16	561	0	952	3	1057	436	227	1723	11	13	3	4	31	313	589	6	3	911
% App. Total	39.4	1.7	58.9	0		0.2	61.3	25.3	13.2		35.5	41.9	9.7	12.9		34.4	64.7	0.7	0.3	
PHF	.901	.400	.948	.000	.960	.375	.861	.916	.767	.896	.550	.464	.250	.500	.646	.879	.920	.300	.250	977