WEBSTER

WEbster Based Signal Timing Evaluation Routine

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

July 30, 2008

Base Line Road at I-15 Freeway **Rancho Cucamonga** **AM Peak Hour**

Input

Movement Times	Eastbound L	Eastbound T	Eastbound *R*	Westbound *L*	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound *R*
Movement 1: 27 secs				X	X							
Movement 2: 20 secs		X	X		X							
Movement 3: 20 secs										X		X
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)		2	1	2	2					1		1
Unadjusted Volume		210	277	738	326					134		149
Peak Hour Factor (PHF)		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		20	20	10	20					10		20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)		1.00	1.00	1.00	1.00					1.00		1.00

Parameter Values (using default set 'Webste

	Old	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)		1800
Sat Flow (2 Left lanes, vphg)		3500
Sat Flow (1 Thru lane, vphg)		1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

			***	***								***
Pk. Hr. Vol. (vph)		210	277	738	326					134		149
Saturation Flow (vph)		3800	1800	3500	3800					1800		1800
X or V/C		0.21	0.57	0.57	0.13					0.28		0.31
Effective green (sec)		18	18	25	45					18		18
Split Time (sec)		20	20	27	47					20		20
Min. Time or Ped. Time (sec)		20	20	10	20					10		20
Delay - 15 min pk (sec/veh)		19	26	18	4					21		21
Level of Service (LOS)		B	C	B	A					C+		C+
Average 'Q' (veh/ln)		1	4	4	1					2		2
Design 'Q'- ft/ln		40	120	120	40					60		60
Do Vehicles Clear?		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) = 21
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.49

Required Cycle Length is 67 sec

Min./Ped. Times Satisfied

WEBSTER

WEbster Based Signal Timing Evaluation Routine

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

July 30, 2008

Base Line Road at I-15 Freeway **Rancho Cucamonga** **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							
Movement 2: 20 secs		X	X		X							
Movement 3: 11 secs										X		X
Movement 4: 0 secs												
Movement 5: 0 secs												
Movement 6: 0 secs												
# of Lanes (#, S, P)		2	1	2	2					1		1
Unadjusted Volume		784	166	487	576					251		176
Peak Hour Factor (PHF)		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		20	20	10	20					10		20
Permissive Veh/Cycle												
Progression Adj. Factor (PAF)		1.00	1.00	1.00	1.00					1.00		1.00

Parameter Values (using default set 'Webste

	Out	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)		1800
Sat Flow (2 Left lanes, vphg)		3500
Sat Flow (1 Thru lane, vphg)		1900
Sat Flow (1 Right lane, vphg)		1800
Vehicle Length (feet)		20

Output

		***		***						***		
Pk. Hr. Vol. (vph)		784	166	487	576					251		176
Saturation Flow (vph)		3800	1800	3500	3800					1800		1800
X or V/C		0.48	0.22	0.65	0.22					0.65		0.46
Effective green (sec)		18	18	9	29					9		9
Split Time (sec)		20	20	11	31					11		11
Min. Time or Ped. Time (sec)		20	20	10	20					10		20
Delay - 15 min pk (sec/veh)		10	8	19	3					23		18
Level of Service (LOS)		A	A	B	A					C+		B
Average 'Q' (veh/ln)		3	1	2	1					2		2
Design 'Q'- ft/ln		100	40	60	40					60		60
Do Vehicles Clear?		YES	YES	YES	YES					YES		YES

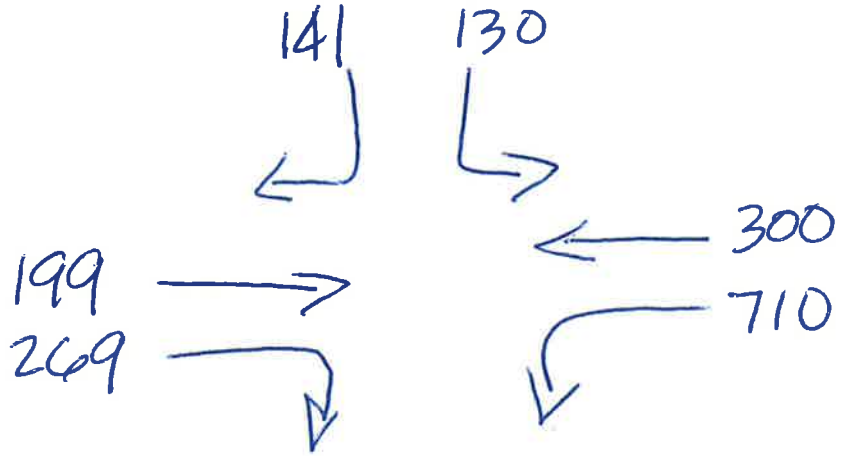
Summary

Whole Intersection
Weighted Avg Delay (sec) = 12
Level of Service - LOS = B

Critical Movements
Weighted Avg Delay (sec) = 15
Level of Service - LOS = B
Intersection Capacity Utilization - ICU = 0.57

Required Cycle Length Is 42 sec
Min./Ped. Times May Not Be Satisfied

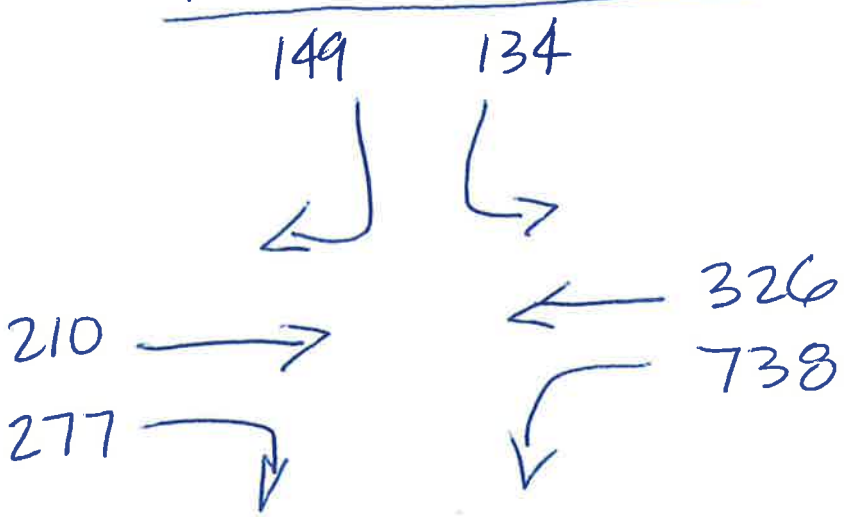
AM



Truck Adjustments:

269 − 6 + 8 + 6 = 277
199 − 9 + 14 + 6 = 210
141 − 4 + 12 = 149
130 − 3 + 7 = 134
300 − 20 + 28 + 18 = 326
710 − 22 + 32 + 18 = 738

AM (with Trucks)



PM

173 246

773 → ← 576

165 → ↓ ↓ ← 487

Truck Adjustments:

165 − 1 + 2 = 166

773 − 11 + 12 = 784

173 − 2 + 5 = 176

246 − 3 + 8 = 251

559 − 12 + 29 = 576

445 − 29 + 71 = 487

PM (with Trucks)

176 251

784 → ← 576

166 → ↓ ↓ ← 487

INTERSECTION TURN COUNT

PEAK HOUR

NORTH-SOUTH STREET: I-15 SB RAMPS
EAST-WEST STREET: BASELINE
JURISDICTION: RANCHO CUCAMONGA

DATE: 07-30-08

PEAK HOUR: 07:15AM

NORTH LEG

TOTAL: 271

	Rt	Thru	Lt
Total	141		130
1st	37		30
2nd	41		24
3rd	38		41
4th	25		35

EAST LEG TOTAL: 1,010

	1st	2nd	3rd	4th	Total
Rt					
Thru	67	73	93	67	300
Lt	186	190	151	183	710

	Total	1st	2nd	3rd	4th
Lt					
Thru	199	57	43	57	42
Rt	269	69	79	54	67

WEST LEG TOTAL: 468

PEAK HOUR FACTORS

NORTH LEG = 0.86
SOUTH LEG =
EAST LEG = 0.96
WEST LEG = 0.93

ALL LEGS = 0.97

SOUTH LEG

	Lt	Thru	Rt
1st			
2nd			
3rd			
4th			
Total			

TOTAL: 0

HOUR TOTAL: 1,749

Prepared by NEWPORT TRAFFIC STUDIES

INTERSECTION TURN COUNT

PEAK HOUR

NORTH-SOUTH STREET: I-15 SB RAMPS
EAST-WEST STREET: BASELINE
JURISDICTION: RANCHO CUCAMONGA

DATE: 07-30-08

PEAK HOUR: 05:00PM

NORTH LEG

TOTAL: 419

Rt	Thru	Lt	
173		246	Total
33		47	1st
36		59	2nd
50		71	3rd
54		69	4th

EAST LEG TOTAL: 1,004

	1st	2nd	3rd	4th	Total
Rt					
Thru	156	112	137	154	559
Lt	110	105	124	106	445

WEST LEG TOTAL: 938

Total	1st	2nd	3rd	4th	
					Lt
773	199	209	179	186	Thru
165	44	43	44	34	Rt

PEAK HOUR FACTORS

NORTH LEG = 0.85
SOUTH LEG =
EAST LEG = 0.94
WEST LEG = 0.93

ALL LEGS = 0.98

SOUTH LEG

	Lt	Thru	Rt
1st			
2nd			
3rd			
4th			
Total			

TOTAL: 0

HOUR TOTAL: 2,361

Prepared by NEWPORT TRAFFIC STUDIES

INTERSECTION TURNING COUNT

NORTH-SOUTH STREET: I-15 SB RAMPS

EAST-WEST STREET: BASELINE

TIME: 07:00AM-08:00AM DATE: 07-30-08

NORTH LEG

Rt	Thru	Lt	
143		124	Total
27		29	1st
37		30	2nd
41		24	3rd
38		41	4th

	1st	2nd	3rd	4th	Total
Rt					
Thru	56	67	73	93	289
Lt	189	186	190	151	716

Total	1st	2nd	3rd	4th	
					Lt
188	31	57	43	57	Thru
256	54	69	79	54	Rt

	Lt	Thru	Rt
1st			
2nd			
3rd			
4th			
Total			

Prepared by NEWPORT TRAFFIC STUDIES

INTERSECTION TURNING COUNT

NORTH-SOUTH STREET: I-15 SB RAMPS

EAST-WEST STREET: BASELINE

TIME: 08:00AM-09:00AM DATE: 07-30-08

NORTH LEG

Rt	Thru	Lt	
109		134	Total
25		35	1st
27		37	2nd
23		31	3rd
34		31	4th

	1st	2nd	3rd	4th	Total
Rt					
Thru	67	64	65	83	279
Lt	183	173	182	172	710

Total	1st	2nd	3rd	4th	
					Lt
185	42	45	45	53	Thru
253	67	57	70	59	Rt

	Lt	Thru	Rt
1st			
2nd			
3rd			
4th			
Total			

Prepared by NEWPORT TRAFFIC STUDIES

INTERSECTION TURNING COUNT

NORTH-SOUTH STREET: I-15 SB RAMPS

EAST-WEST STREET: BASELINE

TIME: 04:00PM-05:00PM DATE: 07-30-08

NORTH LEG

Rt	Thru	Lt	
152		232	Total
33		60	1st
46		72	2nd
33		46	3rd
40		54	4th

	1st	2nd	3rd	4th	Total
Rt					
Thru	116	127	135	135	513
Lt	98	79	141	121	439

Total	1st	2nd	3rd	4th	
					Lt
555	113	151	140	151	Thru
156	30	42	43	41	Rt

	Lt	Thru	Rt
1st			
2nd			
3rd			
4th			
Total			

Prepared by NEWPORT TRAFFIC STUDIES

INTERSECTION TURNING COUNT

NORTH-SOUTH STREET: I-15 SB RAMPS

EAST-WEST STREET: BASELINE

TIME: 05:00PM-06:00PM DATE: 07-30-08

NORTH LEG

Rt	Thru	Lt	
173		246	Total
33		47	1st
36		59	2nd
50		71	3rd
54		69	4th

	1st	2nd	3rd	4th	Total
Rt					
Thru	156	112	137	154	559
Lt	110	105	124	106	445

Total	1st	2nd	3rd	4th	
					Lt
773	199	209	179	186	Thru
165	44	43	44	34	Rt

	Lt	Thru	Rt
1st			
2nd			
3rd			
4th			
Total			

Prepared by NEWPORT TRAFFIC STUDIES

SANBAG CLASSIFICATION SUMMARY

NORTH-SOUTH STREET : I-15 SB RAMPS RANCHO CUCAMONGA

EAST-WEST STREET : BASELINE 07-30-08

BEGINNING TIME : 07:00AM

AUTOS			LARGE 2 AXLE			3 AXLE			4(+) AXLE			TOTALS
RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	
						NORTH LEG						
27	0	29	0	0	0	0	0	0	0	0	0	56
35	0	30	0	0	0	1	0	0	1	0	0	67
41	0	24	0	0	0	0	0	0	0	0	0	65
38	0	41	0	0	0	0	0	0	0	0	0	79
25	0	33	0	0	1	0	0	1	0	0	0	60
27	0	37	0	0	0	0	0	0	0	0	0	64
23	0	31	0	0	0	0	0	0	0	0	0	54
32	0	30	0	0	1	0	0	0	2	0	0	65
248	0	255	0	0	2	1	0	1	3	0	0	510
						SOUTH LEG						
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
						EAST LEG						
0	52	187	0	2	2	0	0	0	0	2	0	245
0	66	183	0	1	3	0	0	0	0	0	0	253
0	71	186	0	2	2	0	0	1	0	0	1	263
0	91	149	0	2	1	0	0	0	0	0	1	244
0	65	181	0	2	2	0	0	0	0	0	0	250
0	63	172	0	0	1	0	0	0	0	1	0	237
0	63	177	0	2	4	0	0	0	0	0	1	247
0	77	169	0	3	1	0	1	0	0	2	2	255
0	548	1404	0	14	16	0	1	1	0	5	5	1994
						WEST LEG						
54	30	0	0	1	0	0	0	0	0	0	0	85
68	56	0	0	1	0	0	0	0	1	0	0	126
78	43	0	0	0	0	1	0	0	0	0	0	122
52	56	0	2	1	0	0	0	0	0	0	0	111
67	41	0	0	1	0	0	0	0	0	0	0	109
57	41	0	0	3	0	0	0	0	0	1	0	102
69	44	0	1	0	0	0	0	0	0	1	0	115
58	53	0	1	0	0	0	0	0	0	0	0	112
503	364	0	4	7	0	1	0	0	1	2	0	882

Prepared by Newport Traffic Studies

SANBAG CLASSIFICATION SUMMARY

NORTH-SOUTH STREET : I-15 SB RAMPS
EAST-WEST STREET : BASELINE

RANCHO CUCAMONGA
07-30-08

BEGINNING TIME : 04:00PM

AUTOS			LARGE 2 AXLE			3 AXLE			4(+) AXLE			TOTALS
RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	
						NORTH LEG						
33	0	60	0	0	0	0	0	0	0	0	0	93
46	0	69	0	0	1	0	0	1	0	0	1	118
33	0	46	0	0	0	0	0	0	0	0	0	79
40	0	54	0	0	0	0	0	0	0	0	0	94
33	0	47	0	0	0	0	0	0	0	0	0	80
35	0	59	1	0	0	0	0	0	0	0	0	95
49	0	71	0	0	0	1	0	0	0	0	0	121
54	0	69	0	0	0	0	0	0	0	0	0	123
323	0	475	1	0	1	1	0	1	0	0	1	803
						SOUTH LEG						
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
						EAST LEG						
0	115	90	0	1	5	0	0	0	0	0	3	214
0	126	74	0	0	4	0	0	0	0	1	1	206
0	133	137	0	1	2	0	0	0	0	1	2	276
0	134	118	0	0	1	0	0	1	0	1	1	256
0	152	107	0	3	1	0	0	1	0	1	1	266
0	111	103	0	1	1	0	0	0	0	0	1	217
0	135	121	0	1	1	0	0	1	0	1	1	261
0	154	105	0	0	1	0	0	0	0	0	0	260
0	1060	855	0	7	16	0	0	3	0	5	10	1956
						WEST LEG						
30	112	0	0	1	0	0	0	0	0	0	0	143
42	149	0	0	1	0	0	0	0	0	1	0	193
43	138	0	0	1	0	0	0	0	0	1	0	183
40	150	0	1	1	0	0	0	0	0	0	0	192
44	199	0	0	0	0	0	0	0	0	0	0	243
43	205	0	0	4	0	0	0	0	0	0	0	252
44	178	0	0	0	0	0	1	0	0	0	0	223
34	186	0	0	0	0	0	0	0	0	0	0	220
320	1317	0	1	8	0	0	1	0	0	2	0	1649

Prepared by Newport Traffic Studies