# WEBSTER

## WEbster Based Signal Timing Evaluation Routine

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

**2009 CMP Data**

**base Line @ Mt. vernon 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 | | | | | 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 | S | 1 | 2 | S | 1 | 2 | 1 | 1 | 2 | S |
| Unadjusted Volume | 86 | 508 | 108 | 58 | 348 | 31 | 105 | 206 | 53 | 78 | 279 | 88 |
| 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 | | | 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 | - |

**Parameter Values (using default set 'Webster')**

| | 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) | | 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) | 86 | 508 | 108 | 58 | 348 | 31 | 105 | 206 | 53 | 78 | 279 | 88 |
| Saturation Flow (vph) | 1800 | 3800 | Shrd | 1800 | 3800 | Shrd | 1800 | 3800 | 1800 | 1800 | 3800 | Shrd |
| X or V/C | 0.36 | 0.54 | - | 0.24 | 0.33 | - | 0.44 | 0.18 | 0.06 | 0.33 | 0.32 | - |
| Effective green (sec) | 8 | 18 | - | 8 | 18 | - | 8 | 18 | 28 | 8 | 18 | - |
| Split Time (sec) | 10 | 20 | - | 10 | 20 | - | 10 | 20 | 30 | 10 | 20 | - |
| Min. Time or Ped. Time (sec) | 10 | 20 | - | 10 | 20 | - | 10 | 20 | 20 | 10 | 20 | - |
| Delay - 15 min pk (sec/veh) | 28 | 19 | - | 26 | 17 | - | 30 | 16 | 9 | 27 | 17 | - |
| Level of Service (LOS) | C | B | - | C | B | - | C | B | A | C | B | - |
| Average 'Q' (veh/ln) | 1 | 4 | - | 1 | 2 | - | 2 | 1 | 1 | 1 | 2 | - |
| Design 'Q'- ft/ln | 40 | 120 | - | 40 | 60 | - | 60 | 40 | 40 | 40 | 60 | - |
| Do Vehicles Clear? | 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 = 0.42

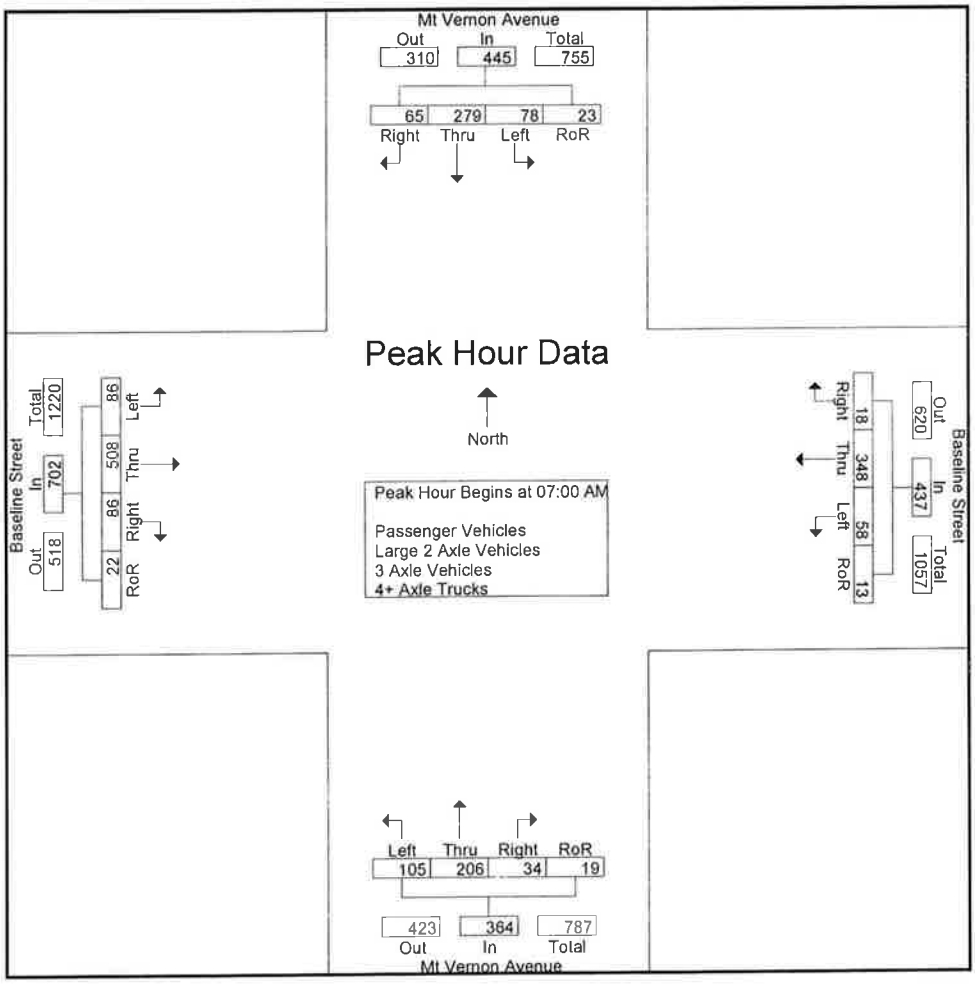
**Required Cycle Length is 60 sec**

**Min./Ped. Times Satisfied**

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

City of San Bernardino
N/S: Mt Vernon Avenue
E/W: Baseline Street
Weather: Sunny

File Name : SBCMVBAAM
Site Code : 9153093
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. | 9 | 62 | **22** | **10** | 103 | 12 | 80 | 3 | 3 | 98 | **32** | **61** | 7 | 4 | 104 | 16 | 96 | 12 | 8 | 132 |
| +15 mins. | **31** | 82 | 17 | 4 | **134** | 12 | **118** | 3 | 2 | **135** | 30 | 60 | **12** | 6 | **108** | 25 | 132 | **30** | 3 | 190 |
| +30 mins. | 27 | **86** | 10 | 5 | 128 | **19** | 71 | 5 | **4** | 99 | 23 | 49 | 10 | **7** | 89 | **26** | **145** | 21 | **9** | **201** |
| +45 mins. | 21 | 53 | 9 | 3 | 86 | 15 | 79 | **7** | 4 | 105 | 13 | 42 | 7 | 2 | 64 | **19** | **135** | **23** | 2 | 179 |
| Total Volume | 88 | 283 | 58 | 22 | 451 | 58 | 348 | 18 | 13 | 437 | 98 | 212 | 36 | 19 | 365 | 86 | 508 | 86 | 22 | 702 |
| % App. Total | 19.5 | 62.7 | 12.9 | 4.9 | | 13.3 | 79.6 | 4.1 | 3 | | 26.8 | 58.1 | 9.9 | 5.2 | | 12.3 | 72.4 | 12.3 | 3.1 | |
| PHF | .710 | .823 | .659 | .550 | .841 | .763 | .737 | .643 | .813 | .809 | .766 | .869 | .750 | .679 | .845 | .827 | .876 | .717 | .611 | .873 |

# WEBSTER

## WEbster Based Signal Timing Evaluation Routine

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

**2009 CMP Data**

**base Line @ Mt. vernon 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: 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 | S | 1 | 2 | S | 1 | 2 | 1 | 1 | 2 | S |
| Unadjusted Volume | 70 | 457 | 87 | 134 | 540 | 84 | 173 | 436 | 99 | 67 | 246 | 76 |
| 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 | | | 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 | - |

**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) | 70 | 457 | 87 | 134 | 540 | 84 | 173 | 436 | 99 | 67 | 246 | 76 |
| Saturation Flow (vph) | 1700 | 3600 | Shrd | 1700 | 3600 | Shrd | 1700 | 3600 | 1800 | 1700 | 3600 | Shrd |
| X or V/C | 0.31 | 0.51 | - | 0.60 | 0.59 | - | 0.69 | 0.41 | 0.12 | 0.27 | 0.30 | - |
| Effective green (sec) | 8 | 18 | - | 8 | 18 | - | 9 | 18 | 28 | 9 | 18 | - |
| Split Time (sec) | 10 | 20 | - | 10 | 20 | - | 11 | 20 | 30 | 11 | 20 | - |
| Min. Time or Ped. Time (sec) | 10 | 20 | - | 10 | 20 | - | 10 | 20 | 20 | 10 | 20 | - |
| Delay - 15 min pk (sec/veh) | 28 | 20 | - | 36 | 21 | - | 39 | 18 | 10 | 26 | 17 | - |
| Level of Service (LOS) | C | B | - | D+ | C+ | - | D+ | B | A | C | B | - |
| Average 'Q' (veh/ln) | 1 | 3 | - | 2 | 4 | - | 3 | 3 | 1 | 1 | 2 | - |
| Design 'Q'- ft/ln | 40 | 100 | - | 60 | 120 | - | 100 | 100 | 40 | 40 | 60 | - |
| Do Vehicles Clear? | 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) = 24
Level of Service - LOS = C+
Intersection Capacity Utilization - ICU = 0.55

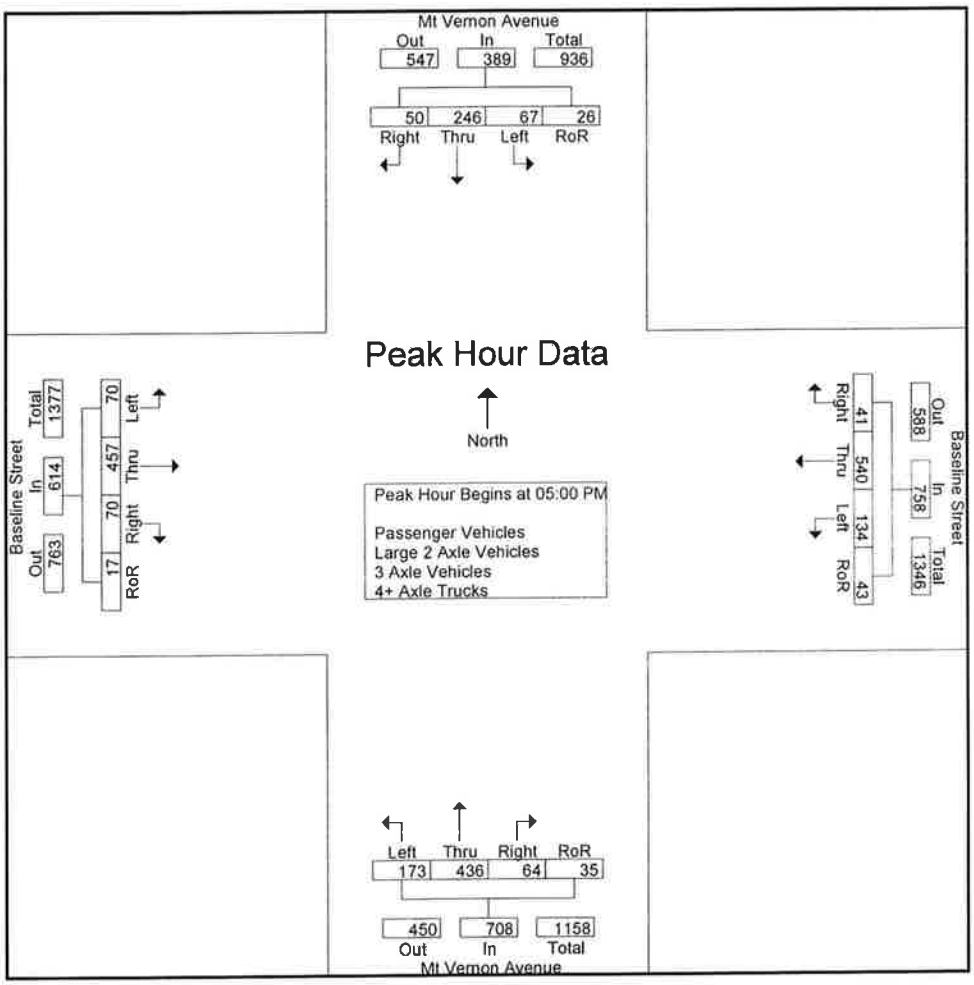
**Required Cycle Length is 61 sec**

**Min./Ped. Times Satisfied**

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

City of San Bernardino
N/S: Mt Vernon Avenue
E/W: Baseline Street
Weather: Sunny

File Name : SBCMVBAPM
Site Code : 9153093
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:

| | 04:45 PM | | | | | 04:45 PM | | | | | 05:00 PM | | | | | 05:00 PM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0 mins. | 16 | 64 | **18** | 3 | **101** | 37 | 129 | 14 | **12** | 192 | **50** | **121** | **24** | 8 | **203** | 18 | 102 | 19 | 5 | 144 |
| +15 mins. | 16 | 64 | 8 | **8** | 96 | 27 | 127 | 9 | 11 | 174 | 43 | 105 | 8 | 8 | 164 | 17 | 110 | **20** | 4 | 151 |
| +30 mins. | **18** | 54 | 18 | 2 | 92 | 37 | **169** | **17** | 9 | **232** | 47 | 110 | 16 | **10** | 183 | **25** | **133** | 14 | 1 | **173** |
| +45 mins. | 12 | **65** | 16 | 7 | 100 | **42** | 122 | 12 | 12 | 188 | 33 | 100 | 16 | 9 | 158 | 10 | 112 | 17 | **7** | 146 |
| Total Volume | 62 | 247 | 60 | 20 | 389 | 143 | 547 | 52 | 44 | 786 | 173 | 436 | 64 | 35 | 708 | 70 | 457 | 70 | 17 | 614 |
| % App. Total | 15.9 | 63.5 | 15.4 | 5.1 | | 18.2 | 69.6 | 6.6 | 5.6 | | 24.4 | 61.6 | 9 | 4.9 | | 11.4 | 74.4 | 11.4 | 2.8 | |
| PHF | .861 | .950 | .833 | .625 | .963 | .851 | .809 | .765 | .917 | .847 | .865 | .901 | .667 | .875 | .872 | .700 | .859 | .875 | .607 | .887 |