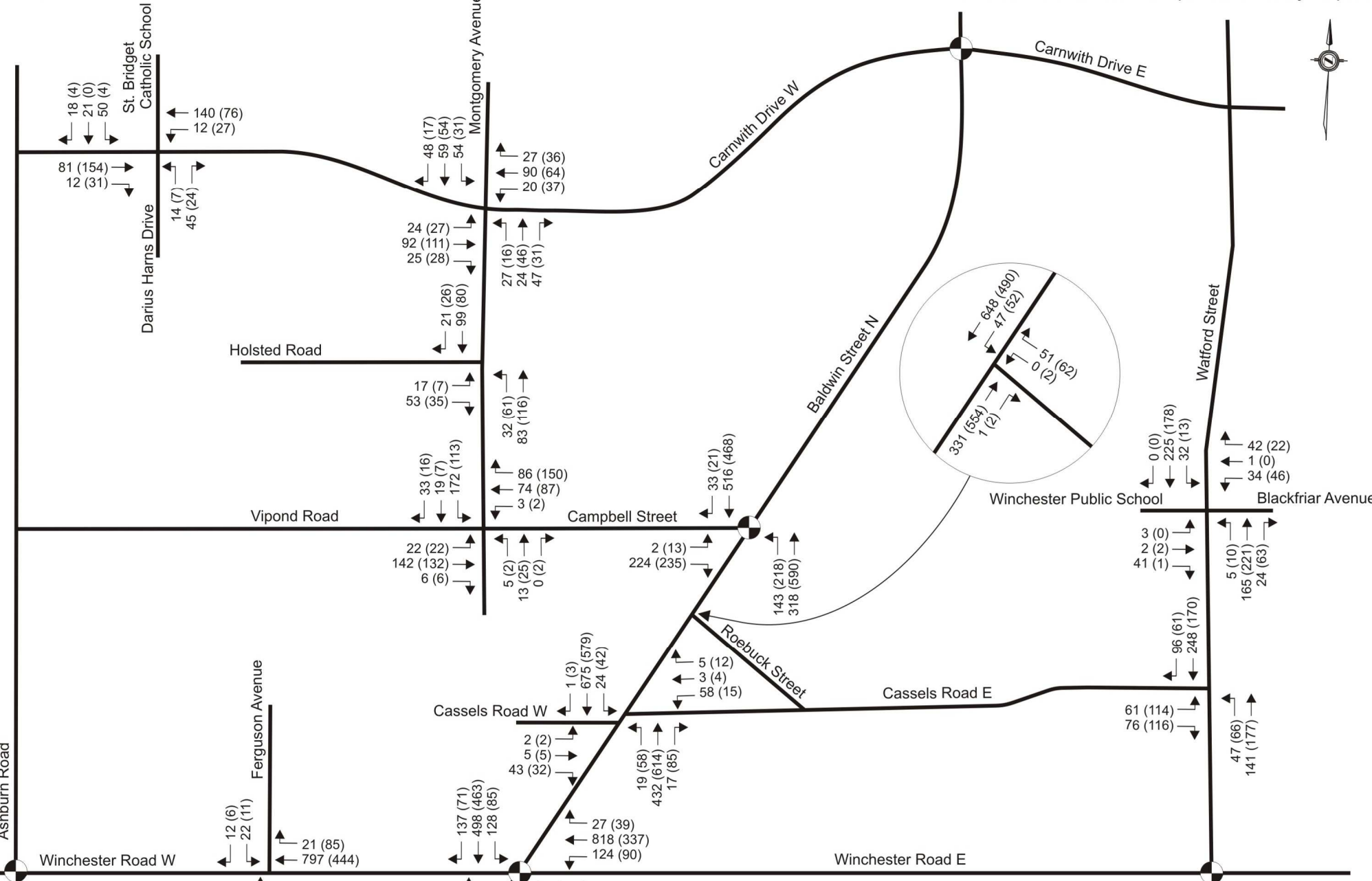


APPENDIX A
Traffic Volumes
Synchro Analysis for Existing and Near Term Conditions
Signal Warrant



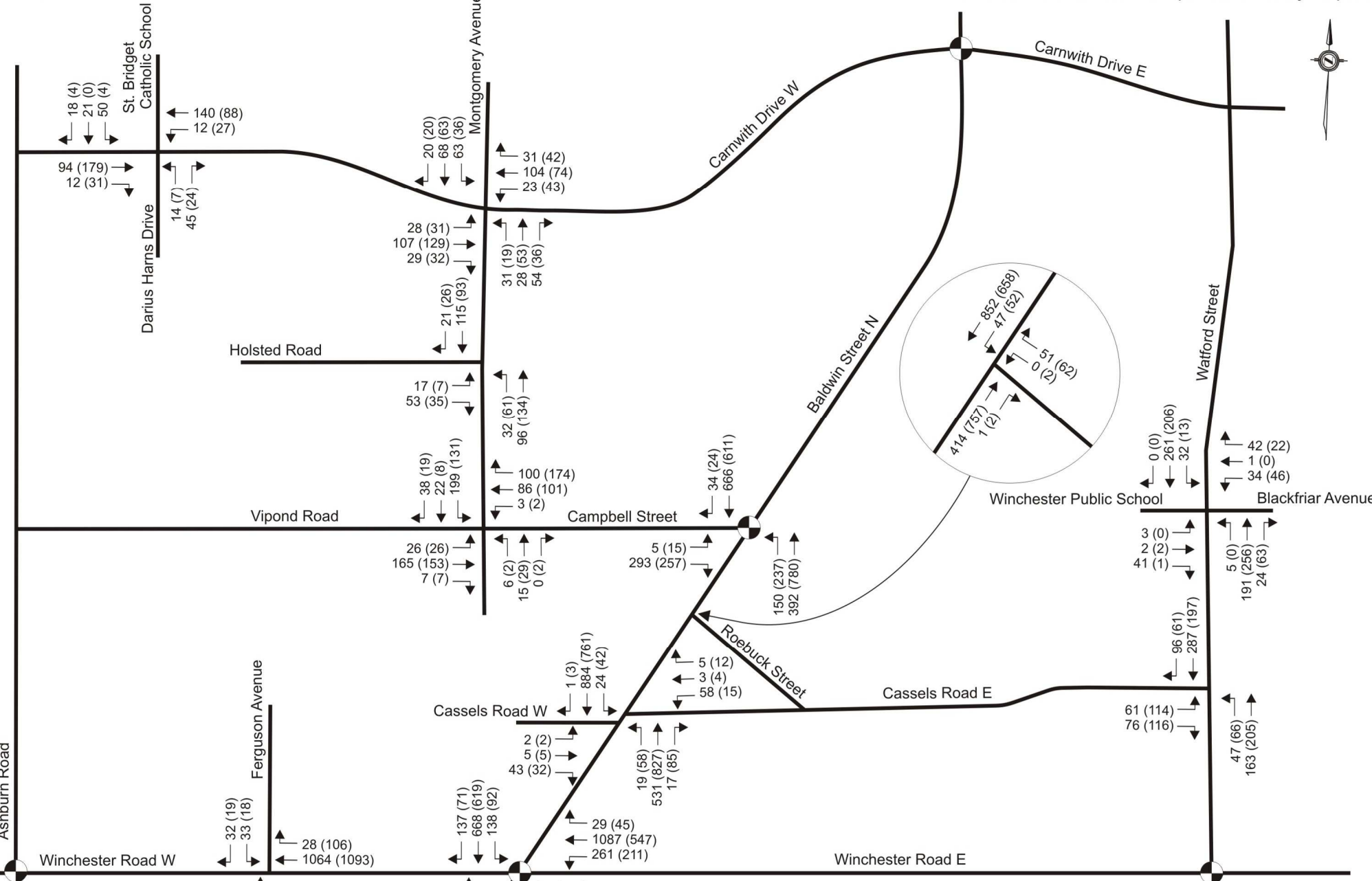
Legend
 XX AM PEAK HOUR TRAFFIC VOLUME
 (XX) PM PEAK HOUR TRAFFIC VOLUME

2011 Baseline Condition

Not to Scale - Conceptual Drawing Only

TR11-531 (February 2014)





Legend
 XX AM PEAK HOUR TRAFFIC VOLUME
 (XX) PM PEAK HOUR TRAFFIC VOLUME

2016 Condition

Not to Scale - Conceptual Drawing Only

TR11-531 (February 2014)



HCM Unsignalized Intersection Capacity Analysis
 1: Carnwith Drive W & Darius Harnes Drive/School

2011 Baseline Condition
 AM Peak Hour

























| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | ↑↓ | | | ↑↓ | |
| Volume (veh/h) | 0 | 81 | 12 | 12 | 140 | 0 | 14 | 0 | 45 | 50 | 21 | 18 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 88 | 13 | 13 | 152 | 0 | 15 | 0 | 49 | 54 | 23 | 20 |
| Pedestrians | | 140 | | | 2 | | | 72 | | | 17 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 12 | | | 0 | | | 6 | | | 1 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 169 | | | 173 | | | 440 | 362 | 125 | 290 | 368 | 233 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 169 | | | 173 | | | 440 | 362 | 125 | 290 | 368 | 233 |
| tC, single (s) | 4.1 | | | 4.3 | | | 7.5 | 6.5 | 6.9 | 7.8 | 6.6 | 7.0 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.3 | | | 3.5 | 4.0 | 3.3 | 3.6 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 99 | | | 96 | 100 | 94 | 90 | 95 | 97 |
| cM capacity (veh/h) | 1400 | | | 1275 | | | 366 | 520 | 852 | 529 | 506 | 662 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | SB 1 |
|-----------------------|------|------|------|------|------|------|
| Volume Total | 59 | 42 | 64 | 101 | 64 | 97 |
| Volume Left | 0 | 0 | 13 | 0 | 15 | 54 |
| Volume Right | 0 | 13 | 0 | 0 | 49 | 20 |
| cSH | 1700 | 1700 | 1275 | 1700 | 648 | 545 |
| Volume to Capacity | 0.03 | 0.02 | 0.01 | 0.06 | 0.10 | 0.18 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.2 | 0.0 | 2.5 | 4.9 |
| Control Delay (s) | 0.0 | 0.0 | 1.7 | 0.0 | 11.2 | 13.0 |
| Lane LOS | | | A | | B | B |
| Approach Delay (s) | 0.0 | | 0.6 | | 11.2 | 13.0 |
| Approach LOS | | | | | B | B |

| Intersection Summary | | |
|-----------------------------------|-------|----------------------|
| Average Delay | | 4.9 |
| Intersection Capacity Utilization | 32.4% | ICU Level of Service |
| Analysis Period (min) | | 15 |
| | | A |

HCM Unsignalized Intersection Capacity Analysis
 2: Carnwith Drive W & Montgomery Avenue

2011 Baseline Condition
 AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  | |  |  | |  |  |  |
| Sign Control | Stop | | | | | Stop | | | | | Stop | |
| Volume (vph) | 24 | 92 | 25 | 20 | 90 | 27 | 27 | 24 | 47 | 54 | 59 | 48 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 26 | 100 | 27 | 22 | 98 | 29 | 29 | 26 | 51 | 59 | 64 | 52 |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | | | |
| Volume Total (vph) | 26 | 100 | 27 | 22 | 127 | 29 | 77 | 59 | 116 | | | |
| Volume Left (vph) | 26 | 0 | 0 | 22 | 0 | 29 | 0 | 59 | 0 | | | |
| Volume Right (vph) | 0 | 0 | 27 | 0 | 29 | 0 | 51 | 0 | 52 | | | |
| Hadj (s) | 0.57 | 0.15 | -0.70 | 0.50 | -0.05 | 0.57 | -0.32 | 0.50 | -0.26 | | | |
| Departure Headway (s) | 5.9 | 5.5 | 3.2 | 5.9 | 5.3 | 6.0 | 5.1 | 5.8 | 5.1 | | | |
| Degree Utilization, x | 0.04 | 0.15 | 0.02 | 0.04 | 0.19 | 0.05 | 0.11 | 0.10 | 0.16 | | | |
| Capacity (veh/h) | 572 | 619 | 1121 | 585 | 646 | 572 | 667 | 585 | 674 | | | |
| Control Delay (s) | 8.0 | 8.3 | 5.1 | 7.9 | 8.3 | 8.1 | 7.5 | 8.2 | 7.9 | | | |
| Approach Delay (s) | 7.7 | | | 8.2 | | 7.7 | | 8.0 | | | | |
| Approach LOS | A | | | A | | A | | A | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 7.9 | | | | | | | | | |
| HCM Level of Service | | | A | | | | | | | | | |
| Intersection Capacity Utilization | | | 30.8% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

3: Holsted Road & Montgomery Avenue

2011 Baseline Condition
AM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 17 | 53 | 32 | 83 | 99 | 21 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 18 | 58 | 35 | 90 | 108 | 23 |
| Pedestrians | 38 | | | 35 | 4 | |
| Lane Width (m) | 3.7 | | | 3.7 | 3.7 | |
| Walking Speed (m/s) | 1.2 | | | 1.2 | 1.2 | |
| Percent Blockage | 3 | | | 3 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 321 | 192 | 168 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 321 | 192 | 168 | | | |
| tC, single (s) | 6.5 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.3 | 2.2 | | | |
| p0 queue free % | 97 | 93 | 97 | | | |
| cM capacity (veh/h) | 624 | 797 | 1357 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 76 | 125 | 130 | | | |
| Volume Left | 18 | 35 | 0 | | | |
| Volume Right | 58 | 0 | 23 | | | |
| cSH | 747 | 1357 | 1700 | | | |
| Volume to Capacity | 0.10 | 0.03 | 0.08 | | | |
| Queue Length 95th (m) | 2.6 | 0.6 | 0.0 | | | |
| Control Delay (s) | 10.4 | 2.3 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.4 | 2.3 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.2 | | | |
| Intersection Capacity Utilization | | | 30.7% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
4: Vipond Road & Montgomery Avenue

2011 Baseline Condition
AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | ↔ | ↔ | ↔ |
| Sign Control | | Stop | | | Stop | | | Stop | | | Stop | Stop |
| Volume (vph) | 22 | 142 | 6 | 3 | 74 | 86 | 5 | 13 | 0 | 172 | 19 | 33 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 24 | 154 | 7 | 3 | 80 | 93 | 5 | 14 | 0 | 187 | 21 | 36 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | SB 2 |
|-----------------------|------|-------|------|------|-------|
| Volume Total (vph) | 185 | 177 | 20 | 187 | 57 |
| Volume Left (vph) | 24 | 3 | 5 | 187 | 0 |
| Volume Right (vph) | 7 | 93 | 0 | 0 | 36 |
| Hadj (s) | 0.12 | -0.18 | 0.24 | 0.53 | -0.28 |
| Departure Headway (s) | 5.0 | 4.7 | 5.5 | 6.0 | 5.1 |
| Degree Utilization, x | 0.26 | 0.23 | 0.03 | 0.31 | 0.08 |
| Capacity (veh/h) | 682 | 719 | 589 | 572 | 661 |
| Control Delay (s) | 9.7 | 9.1 | 8.7 | 10.4 | 7.4 |
| Approach Delay (s) | 9.7 | 9.1 | 8.7 | 9.7 | |
| Approach LOS | A | A | A | A | |

| Intersection Summary | | | | |
|-----------------------------------|--|-------|----------------------|---|
| Delay | | | 9.5 | |
| HCM Level of Service | | | A | |
| Intersection Capacity Utilization | | 43.3% | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | |

HCM Signalized Intersection Capacity Analysis
6: Campbell Street & Baldwin Street N

2011 Baseline Condition
AM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 2 | 224 | 143 | 318 | 516 | 33 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.98 | 1.00 | |
| Satd. Flow (prot) | 1825 | 1522 | | 1794 | 1807 | |
| Flt Permitted | 0.95 | 1.00 | | 0.68 | 1.00 | |
| Satd. Flow (perm) | 1825 | 1522 | | 1248 | 1807 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 2 | 243 | 155 | 346 | 561 | 36 |
| RTOR Reduction (vph) | 0 | 215 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 2 | 28 | 0 | 501 | 595 | 0 |
| Confl. Peds. (#/hr) | | 10 | 5 | | | 5 |
| Heavy Vehicles (%) | 0% | 3% | 6% | 5% | 5% | 9% |
| Turn Type | | Perm | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Actuated Green, G (s) | 7.5 | 7.5 | | 45.0 | 45.0 | |
| Effective Green, g (s) | 7.5 | 7.5 | | 45.0 | 45.0 | |
| Actuated g/C Ratio | 0.12 | 0.12 | | 0.70 | 0.70 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 212 | 177 | | 871 | 1261 | |
| v/s Ratio Prot | 0.00 | | | | 0.33 | |
| v/s Ratio Perm | | c0.02 | | c0.40 | | |
| v/c Ratio | 0.01 | 0.16 | | 0.58 | 0.47 | |
| Uniform Delay, d1 | 25.2 | 25.7 | | 4.9 | 4.4 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.0 | 0.4 | | 2.8 | 1.3 | |
| Delay (s) | 25.2 | 26.1 | | 7.7 | 5.7 | |
| Level of Service | C | C | | A | A | |
| Approach Delay (s) | 26.1 | | | 7.7 | 5.7 | |
| Approach LOS | C | | | A | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 10.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 64.5 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 75.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis
 8: Baldwin Street N & Roebuck Street

2011 Baseline Condition
 AM Peak Hour

| | ↑ | ↖ | ↙ | ↓ | ↘ | ↗ |
|-----------------------------------|-------------|-------------|-------------|------|----------------------|------|
| Movement | NBT | NBR | SBL | SBT | NWL | NWR |
| Lane Configurations | ↖ | | | ↗ | ↘ | |
| Volume (veh/h) | 331 | 1 | 47 | 648 | 0 | 51 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 360 | 1 | 51 | 704 | 0 | 55 |
| Pedestrians | | | | | 4 | |
| Lane Width (m) | | | | | 3.7 | |
| Walking Speed (m/s) | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | 144 | | |
| pX, platoon unblocked | | | | | 0.92 | |
| vC, conflicting volume | | | 365 | | 1171 | 364 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 365 | | 1142 | 364 |
| tC, single (s) | | | 4.2 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.3 | | 3.5 | 3.3 |
| p0 queue free % | | | 96 | | 100 | 92 |
| cM capacity (veh/h) | | | 1168 | | 196 | 674 |
| Direction, Lane # | NB 1 | SB 1 | NW 1 | | | |
| Volume Total | 361 | 755 | 55 | | | |
| Volume Left | 0 | 51 | 0 | | | |
| Volume Right | 1 | 0 | 55 | | | |
| cSH | 1700 | 1168 | 674 | | | |
| Volume to Capacity | 0.21 | 0.04 | 0.08 | | | |
| Queue Length 95th (m) | 0.0 | 1.0 | 2.0 | | | |
| Control Delay (s) | 0.0 | 1.1 | 10.8 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.1 | 10.8 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.2 | | | |
| Intersection Capacity Utilization | | | 67.5% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 9: Cassels Road W & Baldwin Street N

2011 Baseline Condition
 AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↑ | ↗ | | ↑ | ↗ |
| Volume (veh/h) | 2 | 5 | 43 | 58 | 3 | 5 | 19 | 432 | 17 | 24 | 675 | 1 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 2 | 5 | 47 | 63 | 3 | 5 | 21 | 470 | 18 | 26 | 734 | 1 |
| Pedestrians | | 8 | | | 8 | | | | | | 2 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | | | | 1.2 | |
| Percent Blockage | | 1 | | | 1 | | | | | | 0 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | 328 | | | 237 | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 1308 | 1313 | 742 | 1307 | 1313 | 480 | 742 | | | 478 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 1308 | 1313 | 742 | 1307 | 1313 | 480 | 742 | | | 478 | | |
| tC, single (s) | 7.6 | 6.5 | 6.2 | 7.1 | 6.5 | 6.6 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 4.0 | 4.0 | 3.3 | 3.5 | 4.0 | 3.7 | 2.2 | | | 2.2 | | |
| p0 queue free % | 98 | 96 | 89 | 43 | 98 | 99 | 98 | | | 98 | | |
| cM capacity (veh/h) | 100 | 150 | 416 | 111 | 150 | 511 | 868 | | | 1088 | | |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|-----------------------|------|------|------|------|------|------|
| Volume Total | 54 | 72 | 490 | 18 | 760 | 1 |
| Volume Left | 2 | 63 | 21 | 0 | 26 | 0 |
| Volume Right | 47 | 5 | 0 | 18 | 0 | 1 |
| cSH | 319 | 119 | 868 | 1700 | 1088 | 1700 |
| Volume to Capacity | 0.17 | 0.60 | 0.02 | 0.01 | 0.02 | 0.00 |
| Queue Length 95th (m) | 4.6 | 22.9 | 0.6 | 0.0 | 0.6 | 0.0 |
| Control Delay (s) | 18.6 | 73.0 | 0.7 | 0.0 | 0.6 | 0.0 |
| Lane LOS | C | F | A | | A | |
| Approach Delay (s) | 18.6 | 73.0 | 0.7 | | 0.6 | |
| Approach LOS | C | F | | | | |

| Intersection Summary | | |
|-----------------------------------|-------|----------------------|
| Average Delay | | 5.1 |
| Intersection Capacity Utilization | 72.1% | ICU Level of Service |
| Analysis Period (min) | | 15 |
| | | C |

HCM Unsignalized Intersection Capacity Analysis
 11: Winchester Road W & Ferguson Avenue

2011 Baseline Condition
 AM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 7 | 453 | 797 | 21 | 22 | 12 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 8 | 492 | 866 | 23 | 24 | 13 |
| Pedestrians | | | | | 1 | |
| Lane Width (m) | | | | | 3.7 | |
| Walking Speed (m/s) | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 867 | | | | 1375 | 867 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 867 | | | | 1375 | 867 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 99 | | | | 85 | 96 |
| cM capacity (veh/h) | 784 | | | | 160 | 355 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | |
| Volume Total | 8 | 492 | 866 | 23 | 37 | |
| Volume Left | 8 | 0 | 0 | 0 | 24 | |
| Volume Right | 0 | 0 | 0 | 23 | 13 | |
| cSH | 784 | 1700 | 1700 | 1700 | 199 | |
| Volume to Capacity | 0.01 | 0.29 | 0.51 | 0.01 | 0.19 | |
| Queue Length 95th (m) | 0.2 | 0.0 | 0.0 | 0.0 | 5.0 | |
| Control Delay (s) | 9.6 | 0.0 | 0.0 | 0.0 | 27.2 | |
| Lane LOS | A | | | | D | |
| Approach Delay (s) | 0.1 | | 0.0 | | 27.2 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.8 | | | |
| Intersection Capacity Utilization | | | 51.9% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
7: Blackfriar Avenue/School & Watford Street

2011 Baseline Condition
AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Volume (veh/h) | 3 | 2 | 41 | 34 | 1 | 42 | 5 | 165 | 24 | 32 | 225 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 3 | 2 | 45 | 37 | 1 | 46 | 5 | 179 | 26 | 35 | 245 | 0 |
| Pedestrians | | 141 | | | 60 | | | 5 | | | 61 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 12 | | | 5 | | | 0 | | | 5 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 766 | 731 | 391 | 628 | 718 | 313 | 386 | | | 265 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 766 | 731 | 391 | 628 | 718 | 313 | 386 | | | 265 | | |
| tC, single (s) | 7.4 | 6.5 | 6.3 | 7.1 | 6.5 | 6.4 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.8 | 4.0 | 3.4 | 3.5 | 4.0 | 3.5 | 2.2 | | | 2.2 | | |
| p0 queue free % | 98 | 99 | 92 | 87 | 100 | 93 | 99 | | | 97 | | |
| cM capacity (veh/h) | 186 | 283 | 561 | 293 | 288 | 619 | 1041 | | | 1226 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 50 | 84 | 211 | 279 | | | | | | | | |
| Volume Left | 3 | 37 | 5 | 35 | | | | | | | | |
| Volume Right | 45 | 46 | 26 | 0 | | | | | | | | |
| cSH | 478 | 411 | 1041 | 1226 | | | | | | | | |
| Volume to Capacity | 0.10 | 0.20 | 0.01 | 0.03 | | | | | | | | |
| Queue Length 95th (m) | 2.6 | 5.7 | 0.1 | 0.7 | | | | | | | | |
| Control Delay (s) | 13.4 | 16.0 | 0.3 | 1.2 | | | | | | | | |
| Lane LOS | B | C | A | A | | | | | | | | |
| Approach Delay (s) | 13.4 | 16.0 | 0.3 | 1.2 | | | | | | | | |
| Approach LOS | B | C | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 3.9 | | | | | | | | | |
| Intersection Capacity Utilization | | | 48.2% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
 10: Cassels Road E & Watford Street

2011 Baseline Condition
 AM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Volume (vph) | 61 | 76 | 47 | 141 | 248 | 96 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 66 | 83 | 51 | 153 | 270 | 104 |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total (vph) | 149 | 204 | 374 | | | |
| Volume Left (vph) | 66 | 51 | 0 | | | |
| Volume Right (vph) | 83 | 0 | 104 | | | |
| Hadj (s) | -0.11 | 0.16 | -0.09 | | | |
| Departure Headway (s) | 5.1 | 4.9 | 4.5 | | | |
| Degree Utilization, x | 0.21 | 0.28 | 0.46 | | | |
| Capacity (veh/h) | 637 | 703 | 776 | | | |
| Control Delay (s) | 9.5 | 9.8 | 11.3 | | | |
| Approach Delay (s) | 9.5 | 9.8 | 11.3 | | | |
| Approach LOS | A | A | B | | | |
| Intersection Summary | | | | | | |
| Delay | | | 10.5 | | | |
| HCM Level of Service | | | B | | | |
| Intersection Capacity Utilization | | | 49.3% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Signalized Intersection Capacity Analysis
 12: Winchester Road W & Baldwin Street N

2011 Baseline Condition
 AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|-------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 84 | 279 | 102 | 124 | 818 | 27 | 197 | 276 | 58 | 128 | 498 | 137 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | | 1.00 | 0.97 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1788 | 1883 | 1579 | 1788 | 3559 | | 1787 | 3470 | | 1783 | 3579 | 1565 |
| Flt Permitted | 0.25 | 1.00 | 1.00 | 0.54 | 1.00 | | 0.44 | 1.00 | | 0.54 | 1.00 | 1.00 |
| Satd. Flow (perm) | 470 | 1883 | 1579 | 1025 | 3559 | | 820 | 3470 | | 1004 | 3579 | 1565 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 91 | 303 | 111 | 135 | 889 | 29 | 214 | 300 | 63 | 139 | 541 | 149 |
| RTOR Reduction (vph) | 0 | 0 | 67 | 0 | 6 | 0 | 0 | 38 | 0 | 0 | 0 | 32 |
| Lane Group Flow (vph) | 91 | 303 | 44 | 135 | 912 | 0 | 214 | 325 | 0 | 139 | 541 | 117 |
| Confl. Peds. (#/hr) | 3 | | 2 | 2 | | 3 | 2 | | 5 | 5 | | 2 |
| Turn Type | Perm | | Perm | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Actuated g/C Ratio | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | | 0.40 | 0.40 | | 0.40 | 0.40 | 0.40 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | 188 | 753 | 632 | 410 | 1424 | | 328 | 1388 | | 402 | 1432 | 626 |
| v/s Ratio Prot | | 0.16 | | | c0.26 | | | 0.09 | | | 0.15 | |
| v/s Ratio Perm | 0.19 | | 0.03 | 0.13 | | | c0.26 | | | 0.14 | | 0.07 |
| v/c Ratio | 0.48 | 0.40 | 0.07 | 0.33 | 0.64 | | 0.65 | 0.23 | | 0.35 | 0.38 | 0.19 |
| Uniform Delay, d1 | 8.9 | 8.6 | 7.4 | 8.3 | 9.7 | | 9.7 | 7.9 | | 8.4 | 8.5 | 7.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 8.7 | 1.6 | 0.2 | 2.1 | 2.2 | | 9.7 | 0.4 | | 2.3 | 0.8 | 0.7 |
| Delay (s) | 17.6 | 10.2 | 7.6 | 10.4 | 11.9 | | 19.4 | 8.3 | | 10.7 | 9.2 | 8.4 |
| Level of Service | B | B | A | B | B | | B | A | | B | A | A |
| Approach Delay (s) | | 11.0 | | | 11.7 | | | 12.5 | | | 9.3 | |
| Approach LOS | | B | | | B | | | B | | | A | |

| Intersection Summary | | |
|-----------------------------------|-------|--------------------------|
| HCM Average Control Delay | 11.1 | HCM Level of Service B |
| HCM Volume to Capacity ratio | 0.65 | |
| Actuated Cycle Length (s) | 40.0 | Sum of lost time (s) 8.0 |
| Intersection Capacity Utilization | 66.1% | ICU Level of Service C |
| Analysis Period (min) | 15 | |
| c Critical Lane Group | | |

HCM Unsignalized Intersection Capacity Analysis
 1: Carnwith Drive W & Darius Harnes Drive/School

2011 Baseline Condition
 PM Peak Hour

























| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↑↑ | | | ↑↑ | | | ↑↓ | | | ↑↓ | |
| Volume (veh/h) | 0 | 154 | 31 | 27 | 76 | 0 | 7 | 0 | 24 | 4 | 0 | 4 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 167 | 34 | 29 | 83 | 0 | 8 | 0 | 26 | 4 | 0 | 4 |
| Pedestrians | | 16 | | | 2 | | | 1 | | | 6 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 1 | | | 0 | | | 0 | | | 1 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 89 | | | 202 | | | 306 | 333 | 104 | 259 | 349 | 63 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 89 | | | 202 | | | 306 | 333 | 104 | 259 | 349 | 63 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 98 | | | 99 | 100 | 97 | 99 | 100 | 100 |
| cM capacity (veh/h) | 1512 | | | 1381 | | | 604 | 575 | 935 | 641 | 562 | 976 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | SB 1 |
|-----------------------|------|------|------|------|------|------|
| Volume Total | 112 | 89 | 57 | 55 | 34 | 9 |
| Volume Left | 0 | 0 | 29 | 0 | 8 | 4 |
| Volume Right | 0 | 34 | 0 | 0 | 26 | 4 |
| cSH | 1700 | 1700 | 1381 | 1700 | 832 | 774 |
| Volume to Capacity | 0.07 | 0.05 | 0.02 | 0.03 | 0.04 | 0.01 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.5 | 0.0 | 1.0 | 0.3 |
| Control Delay (s) | 0.0 | 0.0 | 4.0 | 0.0 | 9.5 | 9.7 |
| Lane LOS | | | A | | A | A |
| Approach Delay (s) | 0.0 | | 2.0 | | 9.5 | 9.7 |
| Approach LOS | | | | | A | A |

| Intersection Summary | | |
|-----------------------------------|-------|----------------------|
| Average Delay | | 1.8 |
| Intersection Capacity Utilization | 28.1% | ICU Level of Service |
| Analysis Period (min) | | 15 |
| | | A |

HCM Unsignalized Intersection Capacity Analysis
 2: Carnwith Drive W & Montgomery Avenue

2011 Baseline Condition
 PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  | |  |  | |  |  |  |
| Sign Control | Stop | | | | | Stop | | | Stop | | | |
| Volume (vph) | 27 | 111 | 28 | 37 | 64 | 36 | 16 | 46 | 31 | 31 | 54 | 17 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 29 | 121 | 30 | 40 | 70 | 39 | 17 | 50 | 34 | 34 | 59 | 18 |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | | | |
| Volume Total (vph) | 29 | 121 | 30 | 40 | 109 | 17 | 84 | 34 | 77 | | | |
| Volume Left (vph) | 29 | 0 | 0 | 40 | 0 | 17 | 0 | 34 | 0 | | | |
| Volume Right (vph) | 0 | 0 | 30 | 0 | 39 | 0 | 34 | 0 | 18 | | | |
| Hadj (s) | 0.50 | 0.03 | -0.63 | 0.50 | -0.20 | 0.50 | -0.26 | 0.50 | -0.12 | | | |
| Departure Headway (s) | 5.7 | 5.2 | 3.2 | 5.7 | 5.0 | 5.9 | 5.1 | 5.9 | 5.2 | | | |
| Degree Utilization, x | 0.05 | 0.18 | 0.03 | 0.06 | 0.15 | 0.03 | 0.12 | 0.05 | 0.11 | | | |
| Capacity (veh/h) | 600 | 659 | 1121 | 605 | 688 | 581 | 665 | 581 | 650 | | | |
| Control Delay (s) | 7.8 | 8.1 | 5.1 | 7.9 | 7.7 | 7.8 | 7.6 | 8.0 | 7.7 | | | |
| Approach Delay (s) | 7.6 | | | 7.7 | | 7.6 | | 7.8 | | | | |
| Approach LOS | A | | | A | | A | | A | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 7.7 | | | | | | | | | |
| HCM Level of Service | | | A | | | | | | | | | |
| Intersection Capacity Utilization | | | 25.3% | | ICU Level of Service | | | A | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

3: Holsted Road & Montgomery Avenue

2011 Baseline Condition
PM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 7 | 35 | 61 | 116 | 80 | 26 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 8 | 38 | 66 | 126 | 87 | 28 |
| Pedestrians | 20 | | | 9 | 1 | |
| Lane Width (m) | 3.7 | | | 3.7 | 3.7 | |
| Walking Speed (m/s) | 1.2 | | | 1.2 | 1.2 | |
| Percent Blockage | 2 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 381 | 130 | 135 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 381 | 130 | 135 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 96 | 95 | | | |
| cM capacity (veh/h) | 586 | 894 | 1437 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 46 | 192 | 115 | | | |
| Volume Left | 8 | 66 | 0 | | | |
| Volume Right | 38 | 0 | 28 | | | |
| cSH | 822 | 1437 | 1700 | | | |
| Volume to Capacity | 0.06 | 0.05 | 0.07 | | | |
| Queue Length 95th (m) | 1.3 | 1.1 | 0.0 | | | |
| Control Delay (s) | 9.6 | 2.9 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.6 | 2.9 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.8 | | | |
| Intersection Capacity Utilization | | | 28.7% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 4: Vipond Road & Montgomery Avenue

2011 Baseline Condition
 PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | ↕ | ↕ | ↕ |
| Sign Control | | Stop | | | Stop | | | Stop | | | Stop | Stop |
| Volume (vph) | 22 | 132 | 6 | 2 | 87 | 150 | 2 | 25 | 2 | 113 | 7 | 16 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 24 | 143 | 7 | 2 | 95 | 163 | 2 | 27 | 2 | 123 | 8 | 17 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | SB 2 | | | | | | | |
| Volume Total (vph) | 174 | 260 | 32 | 123 | 25 | | | | | | | |
| Volume Left (vph) | 24 | 2 | 2 | 123 | 0 | | | | | | | |
| Volume Right (vph) | 7 | 163 | 2 | 0 | 17 | | | | | | | |
| Hadj (s) | 0.02 | -0.33 | -0.03 | 0.52 | -0.49 | | | | | | | |
| Departure Headway (s) | 4.7 | 4.3 | 5.2 | 6.1 | 5.0 | | | | | | | |
| Degree Utilization, x | 0.23 | 0.31 | 0.05 | 0.21 | 0.04 | | | | | | | |
| Capacity (veh/h) | 717 | 795 | 618 | 554 | 660 | | | | | | | |
| Control Delay (s) | 9.1 | 9.2 | 8.5 | 9.4 | 7.0 | | | | | | | |
| Approach Delay (s) | 9.1 | 9.2 | 8.5 | 9.0 | | | | | | | | |
| Approach LOS | A | A | A | A | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 9.1 | | | | | | | | | |
| HCM Level of Service | | | A | | | | | | | | | |
| Intersection Capacity Utilization | | | 42.3% | ICU Level of Service | A | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
6: Campbell Street & Baldwin Street N

2011 Baseline Condition
PM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 13 | 235 | 218 | 590 | 468 | 21 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 0.90 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.99 | 1.00 | |
| Satd. Flow (prot) | 1825 | 1456 | | 1830 | 1835 | |
| Flt Permitted | 0.95 | 1.00 | | 0.70 | 1.00 | |
| Satd. Flow (perm) | 1825 | 1456 | | 1295 | 1835 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 14 | 255 | 237 | 641 | 509 | 23 |
| RTOR Reduction (vph) | 0 | 228 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 14 | 27 | 0 | 878 | 530 | 0 |
| Confl. Peds. (#/hr) | 1 | 35 | 13 | | | 13 |
| Heavy Vehicles (%) | 0% | 1% | 1% | 4% | 4% | 1% |
| Turn Type | | Perm | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Actuated Green, G (s) | 7.9 | 7.9 | | 54.1 | 54.1 | |
| Effective Green, g (s) | 7.9 | 7.9 | | 54.1 | 54.1 | |
| Actuated g/C Ratio | 0.11 | 0.11 | | 0.73 | 0.73 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 195 | 155 | | 947 | 1342 | |
| v/s Ratio Prot | 0.01 | | | | 0.29 | |
| v/s Ratio Perm | | c0.02 | | c0.68 | | |
| v/c Ratio | 0.07 | 0.18 | | 0.93 | 0.40 | |
| Uniform Delay, d1 | 29.7 | 30.1 | | 8.3 | 3.8 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.5 | | 16.2 | 0.9 | |
| Delay (s) | 29.9 | 30.6 | | 24.5 | 4.6 | |
| Level of Service | C | C | | C | A | |
| Approach Delay (s) | 30.6 | | | 24.5 | 4.6 | |
| Approach LOS | C | | | C | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 19.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.83 | | |
| Actuated Cycle Length (s) | 74.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 94.3% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis
 8: Baldwin Street N & Roebuck Street

2011 Baseline Condition
 PM Peak Hour

| | ↑ | ↗ | ↘ | ↓ | ↙ | ↖ |
|-----------------------------------|-------------|-------------|-------------|------|----------------------|------|
| Movement | NBT | NBR | SBL | SBT | NWL | NWR |
| Lane Configurations | ↗ | | | ↖ | ↗ | ↘ |
| Volume (veh/h) | 554 | 2 | 52 | 490 | 2 | 62 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 602 | 2 | 57 | 533 | 2 | 67 |
| Pedestrians | 2 | | | 1 | 11 | |
| Lane Width (m) | 3.7 | | | 3.7 | 3.7 | |
| Walking Speed (m/s) | 1.2 | | | 1.2 | 1.2 | |
| Percent Blockage | 0 | | | 0 | 1 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | 144 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 615 | | 1262 | 615 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 615 | | 1262 | 615 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 94 | | 99 | 86 |
| cM capacity (veh/h) | | | 955 | | 176 | 486 |
| Direction, Lane # | NB 1 | SB 1 | NW 1 | | | |
| Volume Total | 604 | 589 | 70 | | | |
| Volume Left | 0 | 57 | 2 | | | |
| Volume Right | 2 | 0 | 67 | | | |
| cSH | 1700 | 955 | 461 | | | |
| Volume to Capacity | 0.36 | 0.06 | 0.15 | | | |
| Queue Length 95th (m) | 0.0 | 1.4 | 4.0 | | | |
| Control Delay (s) | 0.0 | 1.6 | 14.2 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.6 | 14.2 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.5 | | | |
| Intersection Capacity Utilization | | | 72.3% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 9: Cassels Road W & Baldwin Street N

2011 Baseline Condition
 PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↑ | ↗ | | ↖ | ↗ |
| Volume (veh/h) | 2 | 5 | 32 | 15 | 4 | 12 | 58 | 614 | 85 | 42 | 579 | 3 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 2 | 5 | 35 | 16 | 4 | 13 | 63 | 667 | 92 | 46 | 629 | 3 |
| Pedestrians | | 8 | | | 20 | | | | | | | 5 |
| Lane Width (m) | | 3.7 | | | 3.7 | | | | | | | 3.7 |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | | | | | 1.2 |
| Percent Blockage | | 1 | | | 2 | | | | | | | 0 |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | 328 | | | 237 | |
| pX, platoon unblocked | 0.80 | 0.80 | | 0.80 | 0.80 | 0.80 | | | | 0.80 | | |
| vC, conflicting volume | 1529 | 1542 | 637 | 1537 | 1542 | 692 | 637 | | | 687 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 1537 | 1553 | 637 | 1546 | 1553 | 485 | 637 | | | 479 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 97 | 93 | 93 | 72 | 94 | 97 | 93 | | | 95 | | |
| cM capacity (veh/h) | 63 | 78 | 477 | 58 | 78 | 456 | 940 | | | 847 | | |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|-----------------------|------|------|------|------|------|------|
| Volume Total | 42 | 34 | 730 | 92 | 675 | 3 |
| Volume Left | 2 | 16 | 63 | 0 | 46 | 0 |
| Volume Right | 35 | 13 | 0 | 92 | 0 | 3 |
| cSH | 240 | 92 | 940 | 1700 | 847 | 1700 |
| Volume to Capacity | 0.18 | 0.37 | 0.07 | 0.05 | 0.05 | 0.00 |
| Queue Length 95th (m) | 4.8 | 11.0 | 1.6 | 0.0 | 1.3 | 0.0 |
| Control Delay (s) | 23.2 | 65.0 | 1.7 | 0.0 | 1.4 | 0.0 |
| Lane LOS | C | F | A | | A | |
| Approach Delay (s) | 23.2 | 65.0 | 1.5 | | 1.4 | |
| Approach LOS | C | F | | | | |

| Intersection Summary | | |
|-----------------------------------|-------|------------------------|
| Average Delay | | 3.4 |
| Intersection Capacity Utilization | 87.2% | ICU Level of Service E |
| Analysis Period (min) | | 15 |

HCM Unsignalized Intersection Capacity Analysis
 11: Winchester Road W & Ferguson Avenue

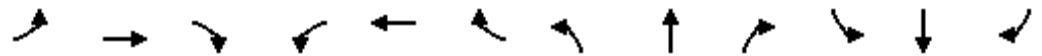
2011 Baseline Condition
 PM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 11 | 1008 | 444 | 85 | 11 | 6 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 12 | 1096 | 483 | 92 | 12 | 7 |
| Pedestrians | | | | | 2 | |
| Lane Width (m) | | | | | 3.7 | |
| Walking Speed (m/s) | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 485 | | | | 1604 | 485 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 485 | | | | 1604 | 485 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.4 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.5 |
| p0 queue free % | 99 | | | | 90 | 99 |
| cM capacity (veh/h) | 1087 | | | | 116 | 552 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | |
| Volume Total | 12 | 1096 | 483 | 92 | 18 | |
| Volume Left | 12 | 0 | 0 | 0 | 12 | |
| Volume Right | 0 | 0 | 0 | 92 | 7 | |
| cSH | 1087 | 1700 | 1700 | 1700 | 161 | |
| Volume to Capacity | 0.01 | 0.64 | 0.28 | 0.05 | 0.12 | |
| Queue Length 95th (m) | 0.3 | 0.0 | 0.0 | 0.0 | 2.9 | |
| Control Delay (s) | 8.3 | 0.0 | 0.0 | 0.0 | 30.3 | |
| Lane LOS | A | | | | D | |
| Approach Delay (s) | 0.1 | | 0.0 | | 30.3 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.4 | | | |
| Intersection Capacity Utilization | | | 63.1% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
7: Blackfriar Avenue/School & Watford Street

2011 Baseline Condition
PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Volume (veh/h) | 0 | 2 | 1 | 46 | 0 | 22 | 0 | 221 | 63 | 13 | 178 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 2 | 1 | 50 | 0 | 24 | 0 | 240 | 68 | 14 | 193 | 0 |
| Pedestrians | | 16 | | | 10 | | | 2 | | | 5 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 1 | | | 1 | | | 0 | | | 0 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 541 | 556 | 211 | 510 | 522 | 289 | 209 | | | 319 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 541 | 556 | 211 | 510 | 522 | 289 | 209 | | | 319 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 100 | 99 | 100 | 89 | 100 | 97 | 100 | | | 99 | | |
| cM capacity (veh/h) | 421 | 427 | 821 | 458 | 447 | 733 | 1354 | | | 1242 | | |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|-----------------------|------|------|------|------|
| Volume Total | 3 | 74 | 309 | 208 |
| Volume Left | 0 | 50 | 0 | 14 |
| Volume Right | 1 | 24 | 68 | 0 |
| cSH | 508 | 521 | 1354 | 1242 |
| Volume to Capacity | 0.01 | 0.14 | 0.00 | 0.01 |
| Queue Length 95th (m) | 0.1 | 3.7 | 0.0 | 0.3 |
| Control Delay (s) | 12.1 | 13.1 | 0.0 | 0.6 |
| Lane LOS | B | B | | A |
| Approach Delay (s) | 12.1 | 13.1 | 0.0 | 0.6 |
| Approach LOS | B | B | | |

| Intersection Summary | | | |
|-----------------------------------|-------|-----|------------------------|
| Average Delay | | 1.9 | |
| Intersection Capacity Utilization | 37.9% | | ICU Level of Service A |
| Analysis Period (min) | | 15 | |

HCM Unsignalized Intersection Capacity Analysis
 10: Cassels Road E & Watford Street

2011 Baseline Condition
 PM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|------|------|------|------|------|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Volume (vph) | 114 | 116 | 66 | 177 | 170 | 61 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 124 | 126 | 72 | 192 | 185 | 66 |

| Direction, Lane # | EB 1 | NB 1 | SB 1 |
|-----------------------|-------|------|-------|
| Volume Total (vph) | 250 | 264 | 251 |
| Volume Left (vph) | 124 | 72 | 0 |
| Volume Right (vph) | 126 | 0 | 66 |
| Hadj (s) | -0.16 | 0.08 | -0.14 |
| Departure Headway (s) | 5.0 | 5.0 | 4.8 |
| Degree Utilization, x | 0.35 | 0.36 | 0.33 |
| Capacity (veh/h) | 669 | 689 | 710 |
| Control Delay (s) | 10.6 | 10.8 | 10.2 |
| Approach Delay (s) | 10.6 | 10.8 | 10.2 |
| Approach LOS | B | B | B |

| Intersection Summary | | | |
|-----------------------------------|-------|------|------------------------|
| Delay | | 10.5 | |
| HCM Level of Service | | B | |
| Intersection Capacity Utilization | 49.3% | | ICU Level of Service A |
| Analysis Period (min) | | 15 | |

HCM Signalized Intersection Capacity Analysis
 12: Winchester Road W & Baldwin Street N

2011 Baseline Condition
 PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 137 | 912 | 217 | 90 | 337 | 39 | 118 | 622 | 160 | 85 | 463 | 71 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.97 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1788 | 1883 | 1581 | 1789 | 3516 | | 1787 | 3436 | | 1777 | 3579 | 1565 |
| Flt Permitted | 0.51 | 1.00 | 1.00 | 0.25 | 1.00 | | 0.46 | 1.00 | | 0.25 | 1.00 | 1.00 |
| Satd. Flow (perm) | 964 | 1883 | 1581 | 471 | 3516 | | 871 | 3436 | | 469 | 3579 | 1565 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 149 | 991 | 236 | 98 | 366 | 42 | 128 | 676 | 174 | 92 | 503 | 77 |
| RTOR Reduction (vph) | 0 | 0 | 125 | 0 | 22 | 0 | 0 | 23 | 0 | 0 | 0 | 46 |
| Lane Group Flow (vph) | 149 | 991 | 111 | 98 | 386 | 0 | 128 | 827 | 0 | 92 | 503 | 31 |
| Confl. Peds. (#/hr) | 1 | | 1 | 1 | | 1 | 2 | | 21 | 21 | | 2 |
| Turn Type | Perm | | Perm | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Actuated g/C Ratio | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | | 0.40 | 0.40 | | 0.40 | 0.40 | 0.40 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | 386 | 753 | 632 | 188 | 1406 | | 348 | 1374 | | 188 | 1432 | 626 |
| v/s Ratio Prot | | c0.53 | | | 0.11 | | | c0.24 | | | | 0.14 |
| v/s Ratio Perm | 0.15 | | 0.07 | 0.21 | | | 0.15 | | | 0.20 | | 0.02 |
| v/c Ratio | 0.39 | 1.32 | 0.18 | 0.52 | 0.27 | | 0.37 | 0.60 | | 0.49 | 0.35 | 0.05 |
| Uniform Delay, d1 | 8.5 | 12.0 | 7.7 | 9.1 | 8.1 | | 8.4 | 9.5 | | 9.0 | 8.4 | 7.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.9 | 151.6 | 0.6 | 10.0 | 0.5 | | 3.0 | 2.0 | | 8.8 | 0.7 | 0.1 |
| Delay (s) | 11.4 | 163.6 | 8.4 | 19.1 | 8.6 | | 11.4 | 11.4 | | 17.8 | 9.1 | 7.5 |
| Level of Service | B | F | A | B | A | | B | B | | B | A | A |
| Approach Delay (s) | | 120.5 | | | 10.6 | | | 11.4 | | | 10.1 | |
| Approach LOS | | F | | | B | | | B | | | B | |

| Intersection Summary | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 53.5 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.96 | | |
| Actuated Cycle Length (s) | 40.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 93.7% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis
 1: Carnwith Drive W & Darius Harnes Drive/School

2016 Condition
 AM Peak Hour

























| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔ | | | ↔ | |
| Volume (veh/h) | 0 | 94 | 12 | 12 | 162 | 0 | 14 | 0 | 45 | 50 | 21 | 18 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 102 | 13 | 13 | 176 | 0 | 15 | 0 | 49 | 54 | 23 | 20 |
| Pedestrians | | 140 | | | 2 | | | 72 | | | 17 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 12 | | | 0 | | | 6 | | | 1 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 193 | | | 187 | | | 466 | 400 | 132 | 321 | 406 | 245 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 193 | | | 187 | | | 466 | 400 | 132 | 321 | 406 | 245 |
| tC, single (s) | 4.1 | | | 4.3 | | | 7.5 | 6.5 | 6.9 | 7.8 | 6.6 | 7.0 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.3 | | | 3.5 | 4.0 | 3.3 | 3.6 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 99 | | | 96 | 100 | 94 | 89 | 95 | 97 |
| cM capacity (veh/h) | 1372 | | | 1259 | | | 350 | 496 | 843 | 501 | 481 | 650 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | SB 1 |
|-----------------------|------|------|------|------|------|------|
| Volume Total | 51 | 64 | 101 | 88 | 64 | 97 |
| Volume Left | 0 | 0 | 13 | 0 | 15 | 54 |
| Volume Right | 0 | 13 | 0 | 0 | 49 | 20 |
| cSH | 1372 | 1700 | 1259 | 1700 | 632 | 520 |
| Volume to Capacity | 0.00 | 0.04 | 0.01 | 0.05 | 0.10 | 0.19 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.2 | 0.0 | 2.6 | 5.1 |
| Control Delay (s) | 0.0 | 0.0 | 1.1 | 0.0 | 11.3 | 13.5 |
| Lane LOS | | | A | | B | B |
| Approach Delay (s) | 0.0 | | 0.6 | | 11.3 | 13.5 |
| Approach LOS | | | | | B | B |

| Intersection Summary | | |
|-----------------------------------|-------|----------------------|
| Average Delay | | 4.6 |
| Intersection Capacity Utilization | 32.4% | ICU Level of Service |
| Analysis Period (min) | | 15 |
| | | A |

HCM Unsignalized Intersection Capacity Analysis
 2: Carnwith Drive W & Montgomery Avenue

2016 Condition
 AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations |  |  |  |  |  | |  |  | |  |  |  | |
| Sign Control | Stop | | | | | Stop | | | | | Stop | | |
| Volume (vph) | 28 | 107 | 29 | 23 | 104 | 31 | 31 | 28 | 54 | 63 | 68 | 56 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Hourly flow rate (vph) | 30 | 116 | 32 | 25 | 113 | 34 | 34 | 30 | 59 | 68 | 74 | 61 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | | | | |
| Volume Total (vph) | 30 | 116 | 32 | 25 | 147 | 34 | 89 | 68 | 135 | | | | |
| Volume Left (vph) | 30 | 0 | 0 | 25 | 0 | 34 | 0 | 68 | 0 | | | | |
| Volume Right (vph) | 0 | 0 | 32 | 0 | 34 | 0 | 59 | 0 | 61 | | | | |
| Hadj (s) | 0.57 | 0.15 | -0.70 | 0.50 | -0.05 | 0.57 | -0.31 | 0.50 | -0.27 | | | | |
| Departure Headway (s) | 6.1 | 5.7 | 3.2 | 6.0 | 5.5 | 6.2 | 5.3 | 6.0 | 5.2 | | | | |
| Degree Utilization, x | 0.05 | 0.18 | 0.03 | 0.04 | 0.22 | 0.06 | 0.13 | 0.11 | 0.20 | | | | |
| Capacity (veh/h) | 555 | 600 | 1121 | 568 | 626 | 553 | 642 | 569 | 653 | | | | |
| Control Delay (s) | 8.2 | 8.8 | 5.1 | 8.1 | 8.8 | 8.3 | 7.9 | 8.6 | 8.3 | | | | |
| Approach Delay (s) | 8.0 | | | 8.7 | | | 8.0 | | | 8.4 | | | |
| Approach LOS | A | | | A | | | A | | | A | | | |
| Intersection Summary | | | | | | | | | | | | | |
| Delay | | | 8.3 | | | | | | | | | | |
| HCM Level of Service | | | A | | | | | | | | | | |
| Intersection Capacity Utilization | | | 40.2% | | | | | ICU Level of Service | | | | | A |
| Analysis Period (min) | | | 15 | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

3: Holsted Road & Montgomery Avenue

2016 Condition
AM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 17 | 53 | 32 | 96 | 115 | 21 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 18 | 58 | 35 | 104 | 125 | 23 |
| Pedestrians | 38 | | | 35 | 4 | |
| Lane Width (m) | 3.7 | | | 3.7 | 3.7 | |
| Walking Speed (m/s) | 1.2 | | | 1.2 | 1.2 | |
| Percent Blockage | 3 | | | 3 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 352 | 209 | 186 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 352 | 209 | 186 | | | |
| tC, single (s) | 6.5 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.3 | 2.2 | | | |
| p0 queue free % | 97 | 93 | 97 | | | |
| cM capacity (veh/h) | 598 | 780 | 1338 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 76 | 139 | 148 | | | |
| Volume Left | 18 | 35 | 0 | | | |
| Volume Right | 58 | 0 | 23 | | | |
| cSH | 726 | 1338 | 1700 | | | |
| Volume to Capacity | 0.10 | 0.03 | 0.09 | | | |
| Queue Length 95th (m) | 2.7 | 0.6 | 0.0 | | | |
| Control Delay (s) | 10.5 | 2.1 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.5 | 2.1 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.0 | | | |
| Intersection Capacity Utilization | | | 39.8% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 4: Vipond Road & Montgomery Avenue

2016 Condition
 AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | ↔ | ↔ | ↔ |
| Sign Control | | Stop | | | Stop | | | Stop | | | Stop | Stop |
| Volume (vph) | 26 | 165 | 7 | 3 | 86 | 100 | 6 | 15 | 0 | 199 | 22 | 38 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 28 | 179 | 8 | 3 | 93 | 109 | 7 | 16 | 0 | 216 | 24 | 41 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | SB 2 | | | | | | | |
| Volume Total (vph) | 215 | 205 | 23 | 216 | 65 | | | | | | | |
| Volume Left (vph) | 28 | 3 | 7 | 216 | 0 | | | | | | | |
| Volume Right (vph) | 8 | 109 | 0 | 0 | 41 | | | | | | | |
| Hadj (s) | 0.12 | -0.18 | 0.24 | 0.53 | -0.28 | | | | | | | |
| Departure Headway (s) | 5.2 | 4.9 | 5.8 | 6.2 | 5.3 | | | | | | | |
| Degree Utilization, x | 0.31 | 0.28 | 0.04 | 0.37 | 0.10 | | | | | | | |
| Capacity (veh/h) | 656 | 689 | 553 | 555 | 637 | | | | | | | |
| Control Delay (s) | 10.5 | 9.8 | 9.1 | 11.5 | 7.7 | | | | | | | |
| Approach Delay (s) | 10.5 | 9.8 | 9.1 | 10.7 | | | | | | | | |
| Approach LOS | B | A | A | B | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 10.3 | | | | | | | | | |
| HCM Level of Service | | | B | | | | | | | | | |
| Intersection Capacity Utilization | | | 49.1% | ICU Level of Service | A | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
6: Campbell Street & Baldwin Street N

2016 Condition
AM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 5 | 293 | 150 | 392 | 666 | 34 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 0.96 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.99 | 1.00 | |
| Satd. Flow (prot) | 1825 | 1518 | | 1799 | 1811 | |
| Flt Permitted | 0.95 | 1.00 | | 0.57 | 1.00 | |
| Satd. Flow (perm) | 1825 | 1518 | | 1037 | 1811 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 5 | 318 | 163 | 426 | 724 | 37 |
| RTOR Reduction (vph) | 0 | 217 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 5 | 101 | 0 | 589 | 759 | 0 |
| Confl. Peds. (#/hr) | | 10 | 5 | | | 5 |
| Heavy Vehicles (%) | 0% | 3% | 6% | 5% | 5% | 9% |
| Turn Type | | Perm | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Actuated Green, G (s) | 9.7 | 9.7 | | 52.2 | 52.2 | |
| Effective Green, g (s) | 9.7 | 9.7 | | 52.2 | 52.2 | |
| Actuated g/C Ratio | 0.13 | 0.13 | | 0.71 | 0.71 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 240 | 199 | | 732 | 1279 | |
| v/s Ratio Prot | 0.00 | | | | 0.42 | |
| v/s Ratio Perm | | c0.07 | | c0.57 | | |
| v/c Ratio | 0.02 | 0.51 | | 0.80 | 0.59 | |
| Uniform Delay, d1 | 28.0 | 29.9 | | 7.4 | 5.5 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.0 | 2.0 | | 6.4 | 0.7 | |
| Delay (s) | 28.0 | 31.9 | | 13.8 | 6.2 | |
| Level of Service | C | C | | B | A | |
| Approach Delay (s) | 31.8 | | | 13.8 | 6.2 | |
| Approach LOS | C | | | B | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 13.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.76 | | |
| Actuated Cycle Length (s) | 73.9 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 87.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis
 8: Baldwin Street N & Roebuck Street

2016 Condition
 AM Peak Hour

| | ↑ | ↗ | ↘ | ↓ | ↙ | ↖ |
|-----------------------------------|-------------|-------------|-------------|------|----------------------|------|
| Movement | NBT | NBR | SBL | SBT | NWL | NWR |
| Lane Configurations | ↗ | | | ↖ | ↗ | ↘ |
| Volume (veh/h) | 414 | 1 | 47 | 852 | 0 | 51 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 450 | 1 | 51 | 926 | 0 | 55 |
| Pedestrians | | | | | 4 | |
| Lane Width (m) | | | | | 3.7 | |
| Walking Speed (m/s) | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | 144 | | |
| pX, platoon unblocked | | | | | 0.80 | |
| vC, conflicting volume | | | 455 | | 1483 | 455 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 455 | | 1478 | 455 |
| tC, single (s) | | | 4.2 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.3 | | 3.5 | 3.3 |
| p0 queue free % | | | 95 | | 100 | 91 |
| cM capacity (veh/h) | | | 1081 | | 106 | 599 |
| Direction, Lane # | NB 1 | SB 1 | NW 1 | | | |
| Volume Total | 451 | 977 | 55 | | | |
| Volume Left | 0 | 51 | 0 | | | |
| Volume Right | 1 | 0 | 55 | | | |
| cSH | 1700 | 1081 | 599 | | | |
| Volume to Capacity | 0.27 | 0.05 | 0.09 | | | |
| Queue Length 95th (m) | 0.0 | 1.1 | 2.3 | | | |
| Control Delay (s) | 0.0 | 1.3 | 11.6 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.3 | 11.6 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.3 | | | |
| Intersection Capacity Utilization | | | 82.6% | | ICU Level of Service | E |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 9: Cassels Road W & Baldwin Street N

2016 Condition
 AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↑ | ↗ | | ↑ | ↗ |
| Volume (veh/h) | 2 | 5 | 43 | 58 | 3 | 5 | 19 | 531 | 17 | 24 | 884 | 1 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 2 | 5 | 47 | 63 | 3 | 5 | 21 | 577 | 18 | 26 | 961 | 1 |
| Pedestrians | | 8 | | | 8 | | | | | | 2 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | | | | 1.2 | |
| Percent Blockage | | 1 | | | 1 | | | | | | 0 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | 328 | | | 237 | |
| pX, platoon unblocked | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 | | 0.86 | | | | | |
| vC, conflicting volume | 1643 | 1648 | 969 | 1642 | 1648 | 587 | 969 | | | 585 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 1667 | 1672 | 880 | 1666 | 1672 | 587 | 880 | | | 585 | | |
| tC, single (s) | 7.6 | 6.5 | 6.2 | 7.1 | 6.5 | 6.6 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 4.0 | 4.0 | 3.3 | 3.5 | 4.0 | 3.7 | 2.2 | | | 2.2 | | |
| p0 queue free % | 95 | 93 | 84 | 0 | 96 | 99 | 97 | | | 97 | | |
| cM capacity (veh/h) | 45 | 77 | 297 | 49 | 77 | 441 | 661 | | | 993 | | |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|-----------------------|------|-------|------|------|------|------|
| Volume Total | 54 | 72 | 598 | 18 | 987 | 1 |
| Volume Left | 2 | 63 | 21 | 0 | 26 | 0 |
| Volume Right | 47 | 5 | 0 | 18 | 0 | 1 |
| cSH | 197 | 53 | 661 | 1700 | 993 | 1700 |
| Volume to Capacity | 0.28 | 1.35 | 0.03 | 0.01 | 0.03 | 0.00 |
| Queue Length 95th (m) | 8.2 | 49.1 | 0.7 | 0.0 | 0.6 | 0.0 |
| Control Delay (s) | 30.1 | 366.9 | 0.9 | 0.0 | 0.7 | 0.0 |
| Lane LOS | D | F | A | | A | |
| Approach Delay (s) | 30.1 | 366.9 | 0.8 | | 0.7 | |
| Approach LOS | D | F | | | | |

| Intersection Summary | | |
|-----------------------------------|-------|------------------------|
| Average Delay | | 16.9 |
| Intersection Capacity Utilization | 83.1% | ICU Level of Service E |
| Analysis Period (min) | | 15 |

HCM Unsignalized Intersection Capacity Analysis
 11: Winchester Road W & Ferguson Avenue

2016 Condition
 AM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | ↕↔ | | ↔↔ | |
| Volume (veh/h) | 14 | 935 | 1064 | 28 | 33 | 32 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 15 | 1016 | 1157 | 30 | 36 | 35 |
| Pedestrians | | | | | 1 | |
| Lane Width (m) | | | | | 3.7 | |
| Walking Speed (m/s) | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1158 | | | | 1711 | 594 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1158 | | | | 1711 | 594 |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 98 | | | | 56 | 92 |
| cM capacity (veh/h) | 610 | | | | 81 | 452 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 |
|-----------------------|------|------|------|------|------|
| Volume Total | 354 | 678 | 771 | 416 | 71 |
| Volume Left | 15 | 0 | 0 | 0 | 36 |
| Volume Right | 0 | 0 | 0 | 30 | 35 |
| cSH | 610 | 1700 | 1700 | 1700 | 136 |
| Volume to Capacity | 0.02 | 0.40 | 0.45 | 0.24 | 0.52 |
| Queue Length 95th (m) | 0.6 | 0.0 | 0.0 | 0.0 | 18.9 |
| Control Delay (s) | 0.8 | 0.0 | 0.0 | 0.0 | 56.9 |
| Lane LOS | A | | | | F |
| Approach Delay (s) | 0.3 | | 0.0 | | 56.9 |
| Approach LOS | | | | | F |

| Intersection Summary | | | | | |
|-----------------------------------|--|-------|-----|----------------------|---|
| Average Delay | | | 1.9 | | |
| Intersection Capacity Utilization | | 46.2% | | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
7: Blackfriar Avenue/School & Watford Street

2016 Condition
AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Volume (veh/h) | 3 | 2 | 41 | 34 | 1 | 42 | 5 | 191 | 24 | 32 | 261 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 3 | 2 | 45 | 37 | 1 | 46 | 5 | 208 | 26 | 35 | 284 | 0 |
| Pedestrians | | 141 | | | 60 | | | 5 | | | 61 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 12 | | | 5 | | | 0 | | | 5 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 833 | 799 | 430 | 695 | 786 | 342 | 425 | | | 294 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 833 | 799 | 430 | 695 | 786 | 342 | 425 | | | 294 | | |
| tC, single (s) | 7.4 | 6.5 | 6.3 | 7.1 | 6.5 | 6.4 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.8 | 4.0 | 3.4 | 3.5 | 4.0 | 3.5 | 2.2 | | | 2.2 | | |
| p0 queue free % | 98 | 99 | 92 | 86 | 100 | 92 | 99 | | | 97 | | |
| cM capacity (veh/h) | 167 | 259 | 533 | 263 | 263 | 597 | 1007 | | | 1197 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 50 | 84 | 239 | 318 | | | | | | | | |
| Volume Left | 3 | 37 | 5 | 35 | | | | | | | | |
| Volume Right | 45 | 46 | 26 | 0 | | | | | | | | |
| cSH | 448 | 378 | 1007 | 1197 | | | | | | | | |
| Volume to Capacity | 0.11 | 0.22 | 0.01 | 0.03 | | | | | | | | |
| Queue Length 95th (m) | 2.8 | 6.3 | 0.1 | 0.7 | | | | | | | | |
| Control Delay (s) | 14.0 | 17.2 | 0.2 | 1.1 | | | | | | | | |
| Lane LOS | B | C | A | A | | | | | | | | |
| Approach Delay (s) | 14.0 | 17.2 | 0.2 | 1.1 | | | | | | | | |
| Approach LOS | B | C | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 3.7 | | | | | | | | | |
| Intersection Capacity Utilization | | | 50.7% | | ICU Level of Service | | | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
 10: Cassels Road E & Watford Street

2016 Condition
 AM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Volume (vph) | 61 | 76 | 47 | 163 | 287 | 96 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 66 | 83 | 51 | 177 | 312 | 104 |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total (vph) | 149 | 228 | 416 | | | |
| Volume Left (vph) | 66 | 51 | 0 | | | |
| Volume Right (vph) | 83 | 0 | 104 | | | |
| Hadj (s) | -0.11 | 0.15 | -0.08 | | | |
| Departure Headway (s) | 5.3 | 4.9 | 4.5 | | | |
| Degree Utilization, x | 0.22 | 0.31 | 0.52 | | | |
| Capacity (veh/h) | 615 | 696 | 768 | | | |
| Control Delay (s) | 9.8 | 10.2 | 12.4 | | | |
| Approach Delay (s) | 9.8 | 10.2 | 12.4 | | | |
| Approach LOS | A | B | B | | | |
| Intersection Summary | | | | | | |
| Delay | | | 11.3 | | | |
| HCM Level of Service | | | B | | | |
| Intersection Capacity Utilization | | | 52.3% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Signalized Intersection Capacity Analysis
12: Winchester Road W & Baldwin Street N

2016 Condition
AM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 84 | 365 | 273 | 261 | 1087 | 29 | 230 | 348 | 114 | 138 | 668 | 137 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | | 1.00 | 0.96 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1788 | 1883 | 1579 | 1788 | 3562 | | 1788 | 3424 | | 1784 | 3579 | 1579 |
| Flt Permitted | 0.25 | 1.00 | 1.00 | 0.44 | 1.00 | | 0.32 | 1.00 | | 0.46 | 1.00 | 1.00 |
| Satd. Flow (perm) | 471 | 1883 | 1579 | 820 | 3562 | | 598 | 3424 | | 871 | 3579 | 1579 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 91 | 397 | 297 | 284 | 1182 | 32 | 250 | 378 | 124 | 150 | 726 | 149 |
| RTOR Reduction (vph) | 0 | 0 | 58 | 0 | 5 | 0 | 0 | 74 | 0 | 0 | 0 | 11 |
| Lane Group Flow (vph) | 91 | 397 | 239 | 284 | 1209 | 0 | 250 | 428 | 0 | 150 | 726 | 138 |
| Confl. Peds. (#/hr) | 3 | | 2 | 2 | | 3 | 2 | | 5 | 5 | | 2 |
| Turn Type | Perm | | Perm | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Actuated g/C Ratio | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | | 0.40 | 0.40 | | 0.40 | 0.40 | 0.40 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | 188 | 753 | 632 | 328 | 1425 | | 239 | 1370 | | 348 | 1432 | 632 |
| v/s Ratio Prot | | 0.21 | | | 0.34 | | | 0.12 | | | 0.20 | |
| v/s Ratio Perm | 0.19 | | 0.15 | c0.35 | | | c0.42 | | | 0.17 | | 0.09 |
| v/c Ratio | 0.48 | 0.53 | 0.38 | 0.87 | 0.85 | | 1.05 | 0.31 | | 0.43 | 0.51 | 0.22 |
| Uniform Delay, d1 | 8.9 | 9.1 | 8.5 | 11.0 | 10.9 | | 12.0 | 8.2 | | 8.7 | 9.0 | 7.9 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 8.7 | 2.6 | 1.7 | 25.0 | 6.5 | | 70.8 | 0.6 | | 3.9 | 1.3 | 0.8 |
| Delay (s) | 17.6 | 11.8 | 10.2 | 36.1 | 17.4 | | 82.8 | 8.8 | | 12.6 | 10.3 | 8.7 |
| Level of Service | B | B | B | D | B | | F | A | | B | B | A |
| Approach Delay (s) | | 11.8 | | | 20.9 | | | 33.4 | | | 10.4 | |
| Approach LOS | | B | | | C | | | C | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|-----|
| HCM Average Control Delay | 18.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.96 | | |
| Actuated Cycle Length (s) | 40.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 80.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis
 1: Carnwith Drive W & Darius Harnes Drive/School

2016 Condition
 PM Peak Hour

























| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔↔ | | | ↔↔ | | | ↔ | | | ↔ | |
| Volume (veh/h) | 0 | 179 | 31 | 27 | 88 | 0 | 7 | 0 | 24 | 4 | 0 | 4 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 195 | 34 | 29 | 96 | 0 | 8 | 0 | 26 | 4 | 0 | 4 |
| Pedestrians | | 16 | | | 2 | | | 1 | | | 6 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 1 | | | 0 | | | 0 | | | 1 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 102 | | | 229 | | | 339 | 373 | 117 | 286 | 390 | 70 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 102 | | | 229 | | | 339 | 373 | 117 | 286 | 390 | 70 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 98 | | | 99 | 100 | 97 | 99 | 100 | 100 |
| cM capacity (veh/h) | 1495 | | | 1350 | | | 572 | 545 | 917 | 614 | 534 | 967 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | SB 1 |
|-----------------------|------|------|------|------|------|------|
| Volume Total | 97 | 131 | 77 | 48 | 34 | 9 |
| Volume Left | 0 | 0 | 29 | 0 | 8 | 4 |
| Volume Right | 0 | 34 | 0 | 0 | 26 | 4 |
| cSH | 1495 | 1700 | 1350 | 1700 | 807 | 751 |
| Volume to Capacity | 0.00 | 0.08 | 0.02 | 0.03 | 0.04 | 0.01 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.5 | 0.0 | 1.0 | 0.3 |
| Control Delay (s) | 0.0 | 0.0 | 3.0 | 0.0 | 9.7 | 9.9 |
| Lane LOS | | | A | | A | A |
| Approach Delay (s) | 0.0 | | 1.9 | | 9.7 | 9.9 |
| Approach LOS | | | | | A | A |

| Intersection Summary | | |
|-----------------------------------|-------|------------------------|
| Average Delay | | 1.6 |
| Intersection Capacity Utilization | 28.8% | ICU Level of Service A |
| Analysis Period (min) | | 15 |

HCM Unsignalized Intersection Capacity Analysis
 2: Carnwith Drive W & Montgomery Avenue

2016 Condition
 PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|--|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations |  |  |  |  |  | |  |  | |  |  |  | |
| Sign Control | Stop | | | Stop | | | Stop | | | Stop | | | |
| Volume (vph) | 31 | 129 | 32 | 43 | 74 | 42 | 19 | 53 | 36 | 36 | 63 | 20 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Hourly flow rate (vph) | 34 | 140 | 35 | 47 | 80 | 46 | 21 | 58 | 39 | 39 | 68 | 22 | |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | | | | |
| Volume Total (vph) | 34 | 140 | 35 | 47 | 126 | 21 | 97 | 39 | 90 | | | | |
| Volume Left (vph) | 34 | 0 | 0 | 47 | 0 | 21 | 0 | 39 | 0 | | | | |
| Volume Right (vph) | 0 | 0 | 35 | 0 | 46 | 0 | 39 | 0 | 22 | | | | |
| Hadj (s) | 0.50 | 0.03 | -0.63 | 0.50 | -0.20 | 0.50 | -0.26 | 0.50 | -0.12 | | | | |
| Departure Headway (s) | 5.8 | 5.4 | 3.2 | 5.8 | 5.1 | 6.0 | 5.3 | 6.0 | 5.4 | | | | |
| Degree Utilization, x | 0.05 | 0.21 | 0.03 | 0.08 | 0.18 | 0.03 | 0.14 | 0.07 | 0.14 | | | | |
| Capacity (veh/h) | 584 | 641 | 1121 | 589 | 668 | 564 | 643 | 564 | 629 | | | | |
| Control Delay (s) | 8.0 | 8.6 | 5.1 | 8.1 | 8.1 | 8.0 | 7.9 | 8.2 | 8.0 | | | | |
| Approach Delay (s) | 7.9 | | | 8.1 | | | 8.0 | | | 8.1 | | | |
| Approach LOS | A | | | A | | | A | | | A | | | |
| Intersection Summary | | | | | | | | | | | | | |
| Delay | | | 8.0 | | | | | | | | | | |
| HCM Level of Service | | | A | | | | | | | | | | |
| Intersection Capacity Utilization | | | 30.7% | ICU Level of Service | | | | | A | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

3: Holsted Road & Montgomery Avenue

2016 Condition
PM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 7 | 35 | 61 | 134 | 93 | 26 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 8 | 38 | 66 | 146 | 101 | 28 |
| Pedestrians | 20 | | | 9 | 1 | |
| Lane Width (m) | 3.7 | | | 3.7 | 3.7 | |
| Walking Speed (m/s) | 1.2 | | | 1.2 | 1.2 | |
| Percent Blockage | 2 | | | 1 | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 414 | 144 | 149 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 414 | 144 | 149 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 96 | 95 | | | |
| cM capacity (veh/h) | 560 | 878 | 1420 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 46 | 212 | 129 | | | |
| Volume Left | 8 | 66 | 0 | | | |
| Volume Right | 38 | 0 | 28 | | | |
| cSH | 802 | 1420 | 1700 | | | |
| Volume to Capacity | 0.06 | 0.05 | 0.08 | | | |
| Queue Length 95th (m) | 1.4 | 1.1 | 0.0 | | | |
| Control Delay (s) | 9.8 | 2.7 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.8 | 2.7 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.6 | | | |
| Intersection Capacity Utilization | | | 29.7% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

4: Vipond Road & Montgomery Avenue

2016 Condition
PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|-------|----------------------|-------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | ↔ | ↔ | ↔ |
| Sign Control | | Stop | | | Stop | | | Stop | | | Stop | |
| Volume (vph) | 26 | 153 | 7 | 2 | 101 | 174 | 2 | 29 | 2 | 131 | 8 | 19 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 28 | 166 | 8 | 2 | 110 | 189 | 2 | 32 | 2 | 142 | 9 | 21 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | SB 2 | | | | | | | |
| Volume Total (vph) | 202 | 301 | 36 | 142 | 29 | | | | | | | |
| Volume Left (vph) | 28 | 2 | 2 | 142 | 0 | | | | | | | |
| Volume Right (vph) | 8 | 189 | 2 | 0 | 21 | | | | | | | |
| Hadj (s) | 0.02 | -0.33 | -0.02 | 0.52 | -0.49 | | | | | | | |
| Departure Headway (s) | 4.9 | 4.5 | 5.5 | 6.3 | 5.3 | | | | | | | |
| Degree Utilization, x | 0.28 | 0.37 | 0.05 | 0.25 | 0.04 | | | | | | | |
| Capacity (veh/h) | 692 | 769 | 580 | 534 | 631 | | | | | | | |
| Control Delay (s) | 9.8 | 10.1 | 8.8 | 10.1 | 7.3 | | | | | | | |
| Approach Delay (s) | 9.8 | 10.1 | 8.8 | 9.6 | | | | | | | | |
| Approach LOS | A | B | A | A | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Delay | | | 9.8 | | | | | | | | | |
| HCM Level of Service | | | A | | | | | | | | | |
| Intersection Capacity Utilization | | | 47.7% | ICU Level of Service | A | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
6: Campbell Street & Baldwin Street N

2016 Condition
PM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 15 | 257 | 237 | 780 | 611 | 24 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 0.90 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.85 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.99 | 1.00 | |
| Satd. Flow (prot) | 1825 | 1458 | | 1834 | 1836 | |
| Flt Permitted | 0.95 | 1.00 | | 0.62 | 1.00 | |
| Satd. Flow (perm) | 1825 | 1458 | | 1153 | 1836 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 16 | 279 | 258 | 848 | 664 | 26 |
| RTOR Reduction (vph) | 0 | 238 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 16 | 41 | 0 | 1106 | 689 | 0 |
| Confl. Peds. (#/hr) | 1 | 35 | 13 | | | 13 |
| Heavy Vehicles (%) | 0% | 1% | 1% | 4% | 4% | 1% |
| Turn Type | | Perm | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Actuated Green, G (s) | 8.0 | 8.0 | | 52.8 | 52.8 | |
| Effective Green, g (s) | 8.0 | 8.0 | | 52.8 | 52.8 | |
| Actuated g/C Ratio | 0.11 | 0.11 | | 0.73 | 0.73 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 201 | 160 | | 836 | 1332 | |
| v/s Ratio Prot | 0.01 | | | | 0.37 | |
| v/s Ratio Perm | | c0.03 | | c0.96 | | |
| v/c Ratio | 0.08 | 0.26 | | 1.32 | 0.52 | |
| Uniform Delay, d1 | 29.1 | 29.7 | | 10.0 | 4.4 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.9 | | 153.7 | 0.3 | |
| Delay (s) | 29.3 | 30.5 | | 163.7 | 4.7 | |
| Level of Service | C | C | | F | A | |
| Approach Delay (s) | 30.5 | | | 163.7 | 4.7 | |
| Approach LOS | C | | | F | A | |

Intersection Summary

| | | | | |
|-----------------------------------|--|--------|----------------------|------|
| HCM Average Control Delay | | 92.4 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | 1.18 | | |
| Actuated Cycle Length (s) | | 72.8 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | | 113.0% | ICU Level of Service | H |
| Analysis Period (min) | | 15 | | |
| c Critical Lane Group | | | | |

HCM Unsignalized Intersection Capacity Analysis
 8: Baldwin Street N & Roebuck Street

2016 Condition
 PM Peak Hour



| Movement | NBT | NBR | SBL | SBT | NWL | NWR |
|------------------------|------|------|------|------|------|------|
| Lane Configurations | ↑ | | | ↓ | ↘ | ↙ |
| Volume (veh/h) | 757 | 2 | 52 | 658 | 2 | 62 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 823 | 2 | 57 | 715 | 2 | 67 |
| Pedestrians | 2 | | | 1 | 11 | |
| Lane Width (m) | 3.7 | | | 3.7 | 3.7 | |
| Walking Speed (m/s) | 1.2 | | | 1.2 | 1.2 | |
| Percent Blockage | 0 | | | 0 | 1 | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | 144 | | |
| pX, platoon unblocked | | | | | 0.91 | |
| vC, conflicting volume | | | 836 | | 1665 | 836 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 836 | | 1681 | 836 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 93 | | 98 | 81 |
| cM capacity (veh/h) | | | 790 | | 88 | 363 |

| Direction, Lane # | NB 1 | SB 1 | NW 1 |
|-----------------------|------|------|------|
| Volume Total | 825 | 772 | 70 |
| Volume Left | 0 | 57 | 2 |
| Volume Right | 2 | 0 | 67 |
| cSH | 1700 | 790 | 331 |
| Volume to Capacity | 0.49 | 0.07 | 0.21 |
| Queue Length 95th (m) | 0.0 | 1.8 | 5.9 |
| Control Delay (s) | 0.0 | 1.9 | 18.7 |
| Lane LOS | | A | C |
| Approach Delay (s) | 0.0 | 1.9 | 18.7 |
| Approach LOS | | | C |

| Intersection Summary | | | |
|-----------------------------------|-------|----------------------|---|
| Average Delay | | 1.6 | |
| Intersection Capacity Utilization | 88.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

HCM Unsignalized Intersection Capacity Analysis

9: Cassels Road W & Baldwin Street N

2016 Condition
PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↔ | | | ↔ | | | ↑ | ↗ | | ↑ | ↗ |
| Volume (veh/h) | 2 | 5 | 32 | 15 | 4 | 12 | 58 | 827 | 85 | 42 | 761 | 3 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 2 | 5 | 35 | 16 | 4 | 13 | 63 | 899 | 92 | 46 | 827 | 3 |
| Pedestrians | | 8 | | | 20 | | | | | | 5 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | | | | 1.2 | |
| Percent Blockage | | 1 | | | 2 | | | | | | 0 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | 328 | | | 237 | |
| pX, platoon unblocked | 0.65 | 0.65 | | 0.65 | 0.65 | 0.65 | | | | 0.65 | | |
| vC, conflicting volume | 1959 | 1971 | 835 | 1966 | 1971 | 924 | 835 | | | 919 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 2210 | 2229 | 835 | 2221 | 2229 | 609 | 835 | | | 601 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 85 | 77 | 91 | 0 | 81 | 96 | 92 | | | 93 | | |
| cM capacity (veh/h) | 15 | 23 | 368 | 13 | 23 | 316 | 793 | | | 620 | | |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|-----------------------|------|-------|------|------|------|------|
| Volume Total | 42 | 34 | 962 | 92 | 873 | 3 |
| Volume Left | 2 | 16 | 63 | 0 | 46 | 0 |
| Volume Right | 35 | 13 | 0 | 92 | 0 | 3 |
| cSH | 89 | 23 | 793 | 1700 | 620 | 1700 |
| Volume to Capacity | 0.47 | 1.48 | 0.08 | 0.05 | 0.07 | 0.00 |
| Queue Length 95th (m) | 15.3 | 32.7 | 2.0 | 0.0 | 1.8 | 0.0 |
| Control Delay (s) | 77.3 | 613.7 | 2.2 | 0.0 | 2.1 | 0.0 |
| Lane LOS | F | F | A | | A | |
| Approach Delay (s) | 77.3 | 613.7 | 2.0 | | 2.1 | |
| Approach LOS | F | F | | | | |

Intersection Summary

| | |
|-----------------------------------|--------|
| Average Delay | 13.9 |
| Intersection Capacity Utilization | 106.8% |
| ICU Level of Service | G |
| Analysis Period (min) | 15 |

HCM Unsignalized Intersection Capacity Analysis
 11: Winchester Road W & Ferguson Avenue

2016 Condition
 PM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|------|------|------|------|------|------|
| Lane Configurations | | ↕↕ | ↕↔ | | ↔↔ | |
| Volume (veh/h) | 29 | 1575 | 1093 | 106 | 18 | 19 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 32 | 1712 | 1188 | 115 | 20 | 21 |
| Pedestrians | | | | | 2 | |
| Lane Width (m) | | | | | 3.7 | |
| Walking Speed (m/s) | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1190 | | | | 2167 | 654 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1190 | | | | 2167 | 654 |
| tC, single (s) | 4.1 | | | | 6.8 | 7.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.5 |
| p0 queue free % | 95 | | | | 50 | 94 |
| cM capacity (veh/h) | 593 | | | | 39 | 375 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 |
|-----------------------|------|------|------|------|-------|
| Volume Total | 602 | 1141 | 792 | 511 | 40 |
| Volume Left | 32 | 0 | 0 | 0 | 20 |
| Volume Right | 0 | 0 | 0 | 115 | 21 |
| cSH | 593 | 1700 | 1700 | 1700 | 72 |
| Volume to Capacity | 0.05 | 0.67 | 0.47 | 0.30 | 0.56 |
| Queue Length 95th (m) | 1.3 | 0.0 | 0.0 | 0.0 | 18.0 |
| Control Delay (s) | 1.5 | 0.0 | 0.0 | 0.0 | 105.2 |
| Lane LOS | A | | | | F |
| Approach Delay (s) | 0.5 | | 0.0 | | 105.2 |
| Approach LOS | | | | | F |

| Intersection Summary | | | | | |
|-----------------------------------|--|--|-------|----------------------|---|
| Average Delay | | | 1.7 | | |
| Intersection Capacity Utilization | | | 74.2% | ICU Level of Service | D |
| Analysis Period (min) | | | 15 | | |

HCM Unsignalized Intersection Capacity Analysis
7: Blackfriar Avenue/School & Watford Street

2016 Condition
PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Volume (veh/h) | 0 | 2 | 1 | 46 | 0 | 22 | 0 | 256 | 63 | 13 | 206 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 2 | 1 | 50 | 0 | 24 | 0 | 278 | 68 | 14 | 224 | 0 |
| Pedestrians | | 16 | | | 10 | | | 2 | | | 5 | |
| Lane Width (m) | | 3.7 | | | 3.7 | | | 3.7 | | | 3.7 | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | 1.2 | |
| Percent Blockage | | 1 | | | 1 | | | 0 | | | 0 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 610 | 625 | 242 | 579 | 591 | 328 | 240 | | | 357 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 610 | 625 | 242 | 579 | 591 | 328 | 240 | | | 357 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 100 | 99 | 100 | 88 | 100 | 97 | 100 | | | 99 | | |
| cM capacity (veh/h) | 379 | 390 | 790 | 412 | 408 | 698 | 1320 | | | 1203 | | |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|-----------------------|------|------|------|------|
| Volume Total | 3 | 74 | 347 | 238 |
| Volume Left | 0 | 50 | 0 | 14 |
| Volume Right | 1 | 24 | 68 | 0 |
| cSH | 469 | 475 | 1320 | 1203 |
| Volume to Capacity | 0.01 | 0.16 | 0.00 | 0.01 |
| Queue Length 95th (m) | 0.2 | 4.2 | 0.0 | 0.3 |
| Control Delay (s) | 12.7 | 14.0 | 0.0 | 0.6 |
| Lane LOS | B | B | | A |
| Approach Delay (s) | 12.7 | 14.0 | 0.0 | 0.6 |
| Approach LOS | B | B | | |

| Intersection Summary | | | |
|-----------------------------------|-------|----------------------|---|
| Average Delay | | 1.8 | |
| Intersection Capacity Utilization | 39.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

HCM Unsignalized Intersection Capacity Analysis
 10: Cassels Road E & Watford Street

2016 Condition
 PM Peak Hour



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Volume (vph) | 114 | 116 | 66 | 205 | 197 | 61 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 124 | 126 | 72 | 223 | 214 | 66 |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total (vph) | 250 | 295 | 280 | | | |
| Volume Left (vph) | 124 | 72 | 0 | | | |
| Volume Right (vph) | 126 | 0 | 66 | | | |
| Hadj (s) | -0.16 | 0.07 | -0.12 | | | |
| Departure Headway (s) | 5.1 | 5.0 | 4.9 | | | |
| Degree Utilization, x | 0.36 | 0.41 | 0.38 | | | |
| Capacity (veh/h) | 645 | 683 | 700 | | | |
| Control Delay (s) | 11.0 | 11.5 | 10.8 | | | |
| Approach Delay (s) | 11.0 | 11.5 | 10.8 | | | |
| Approach LOS | B | B | B | | | |
| Intersection Summary | | | | | | |
| Delay | | | 11.1 | | | |
| HCM Level of Service | | | B | | | |
| Intersection Capacity Utilization | | | 52.1% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Signalized Intersection Capacity Analysis
12: Winchester Road W & Baldwin Street N

2016 Condition
PM Peak Hour



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|-------|------|------|------|-------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 137 | 1214 | 384 | 211 | 547 | 45 | 219 | 830 | 391 | 92 | 619 | 71 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | 0.99 |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.95 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1788 | 1883 | 1581 | 1789 | 3532 | | 1788 | 3357 | | 1784 | 3579 | 1579 |
| Flt Permitted | 0.37 | 1.00 | 1.00 | 0.25 | 1.00 | | 0.35 | 1.00 | | 0.25 | 1.00 | 1.00 |
| Satd. Flow (perm) | 691 | 1883 | 1581 | 471 | 3532 | | 658 | 3357 | | 470 | 3579 | 1579 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 149 | 1320 | 417 | 229 | 595 | 49 | 238 | 902 | 425 | 100 | 673 | 77 |
| RTOR Reduction (vph) | 0 | 0 | 70 | 0 | 15 | 0 | 0 | 7 | 0 | 0 | 0 | 46 |
| Lane Group Flow (vph) | 149 | 1320 | 347 | 229 | 629 | 0 | 238 | 1320 | 0 | 100 | 673 | 31 |
| Confl. Peds. (#/hr) | 1 | | 1 | 1 | | 1 | 2 | | 21 | 21 | | 2 |
| Turn Type | Perm | | Perm | Perm | | | Perm | | | Perm | | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Effective Green, g (s) | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | | 16.0 | 16.0 | | 16.0 | 16.0 | 16.0 |
| Actuated g/C Ratio | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | | 0.40 | 0.40 | | 0.40 | 0.40 | 0.40 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 |
| Lane Grp Cap (vph) | 276 | 753 | 632 | 188 | 1413 | | 263 | 1343 | | 188 | 1432 | 632 |
| v/s Ratio Prot | | c0.70 | | | 0.18 | | | c0.39 | | | | 0.19 |
| v/s Ratio Perm | 0.22 | | 0.22 | 0.49 | | | 0.36 | | | 0.21 | | 0.02 |
| v/c Ratio | 0.54 | 1.75 | 0.55 | 1.22 | 0.45 | | 0.90 | 0.98 | | 0.53 | 0.47 | 0.05 |
| Uniform Delay, d1 | 9.2 | 12.0 | 9.2 | 12.0 | 8.8 | | 11.3 | 11.9 | | 9.1 | 8.9 | 7.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 7.4 | 344.3 | 3.4 | 136.6 | 1.0 | | 35.6 | 20.8 | | 10.4 | 1.1 | 0.1 |
| Delay (s) | 16.6 | 356.3 | 12.6 | 148.6 | 9.8 | | 46.9 | 32.6 | | 19.5 | 10.0 | 7.5 |
| Level of Service | B | F | B | F | A | | D | C | | B | A | A |
| Approach Delay (s) | | 253.5 | | | 46.2 | | | 34.8 | | | 10.9 | |
| Approach LOS | | F | | | D | | | C | | | B | |

| Intersection Summary | | | |
|-----------------------------------|--------|----------------------|-----|
| HCM Average Control Delay | 112.5 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.37 | | |
| Actuated Cycle Length (s) | 40.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 130.1% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

MAJOR STREET:
MINOR STREET:

Baldwin Street N
Cassels Road



Cole Engineering

COMMENT:

NUMBER OF APPROACH LANES

1 2

TEE INTERSECTION CONFIGURATION

Yes No

FLOW CONDITIONS:

Free Flow (Rural)
Restricted Flow (Urban)

WARRANT 1 - MINIMUM VEHICULAR VOLUME

100% Satisfied Yes No

80% Satisfied Yes No

| APPROACH LANES | 1 | | 2 OR MORE | | HOUR PERIOD | | | | | | | | TOTAL | |
|-------------------------|-----------------------|-----------|-----------|-----------|--------------------|--------------------|---------------------|----------------------|---------------------|--------------------|--------------------|--------------------|-------|--------------|
| FLOW CONDITION | FREE FLOW | REST FLOW | FREE FLOW | REST FLOW | 7:00 AM to 8:00 AM | 8:00 AM to 9:00 AM | 9:00 AM to 10:00 AM | 11:00 AM to 12:00 PM | 12:00 PM to 1:00 PM | 1:00 PM to 2:00 PM | 4:00 PM to 5:00 PM | 5:00 PM to 6:00 PM | | |
| ALL APPROACHES | 480 | 720 | 600 | 900 | 971 | 1284 | 517 | 1129 | 1085 | 662 | 1357 | 1417 | 600 | |
| | 100% FULFILLED | | | | X | X | | X | X | | X | X | 80 | |
| | 80% FULFILLED | | | | | | | | | X | | | 72 | |
| | ACTUAL (IF BELOW 80%) | | | | | | 72% | | | | | | 752 | |
| Total | | | | | | | | | | | | | 752 | 94.0% |
| APPROACH LANES | 1 | | 2 OR MORE | | HOUR PERIOD | | | | | | | | TOTAL | |
| FLOW CONDITION | FREE FLOW | REST FLOW | FREE FLOW | REST FLOW | 7:00 AM to 8:00 AM | 8:00 AM to 9:00 AM | 9:00 AM to 10:00 AM | 11:00 AM to 12:00 PM | 12:00 PM to 1:00 PM | 1:00 PM to 2:00 PM | 4:00 PM to 5:00 PM | 5:00 PM to 6:00 PM | | |
| MINOR STREET APPROACHES | 120 | 170 | 120 | 170 | 112 | 116 | 33 | 52 | 40 | 29 | 43 | 55 | 0 | |
| | 100% FULFILLED | | | | | | | | | | | | 0 | |
| | 80% FULFILLED | | | | | | | | | | | | 282 | |
| | ACTUAL (IF BELOW 80%) | | | | 66% | 68% | 19% | 31% | 24% | 17% | 25% | 32% | 282 | |
| Total | | | | | | | | | | | | | 282 | 35.3% |

WARRANT 2 - DELAY TO CROSS TRAFFIC

100% Satisfied Yes No

80% Satisfied Yes No

| APPROACH LANES | 1 | | 2 OR MORE | | HOUR PERIOD | | | | | | | | TOTAL | |
|-------------------------------|-----------------------|-------|-----------|-------|--------------------|--------------------|---------------------|----------------------|---------------------|--------------------|--------------------|--------------------|-------|--------------|
| FLOW CONDITION | FREE | REST. | FREE | REST. | 7:00 AM to 8:00 AM | 8:00 AM to 9:00 AM | 9:00 AM to 10:00 AM | 11:00 AM to 12:00 PM | 12:00 PM to 1:00 PM | 1:00 PM to 2:00 PM | 4:00 PM to 5:00 PM | 5:00 PM to 6:00 PM | | |
| MINOR STREET APPROACHES | 480 | 720 | 600 | 900 | 859 | 1168 | 484 | 1077 | 1045 | 633 | 1314 | 1362 | 600 | |
| | 100% FULFILLED | | | | X | X | | X | X | | X | X | 80 | |
| | 80% FULFILLED | | | | | | | | | X | | | 67 | |
| | ACTUAL (IF BELOW 80%) | | | | | | 67% | | | | | | 747 | |
| Total | | | | | | | | | | | | | 747 | 93.4% |
| APPROACH LANES | 1 | | 2 OR MORE | | HOUR PERIOD | | | | | | | | TOTAL | |
| FLOW CONDITION | FREE | REST. | FREE | REST. | 7:00 AM to 8:00 AM | 8:00 AM to 9:00 AM | 9:00 AM to 10:00 AM | 11:00 AM to 12:00 PM | 12:00 PM to 1:00 PM | 1:00 PM to 2:00 PM | 4:00 PM to 5:00 PM | 5:00 PM to 6:00 PM | | |
| TRAFFIC CROSSING MAJOR STREET | 50 | 75 | 50 | 75 | 85 | 65 | 12 | 21 | 15 | 8 | 8 | 15 | 100 | |
| | 100% FULFILLED | | | | X | | | | | | | | 80 | |
| | 80% FULFILLED | | | | | X | | | | | | | 105 | |
| | ACTUAL (IF BELOW 80%) | | | | | | 16% | 28% | 20% | 11% | 11% | 20% | 285 | |
| Total | | | | | | | | | | | | | 285 | 35.7% |

WARRANT - OVERALL ASSESSMENT

Yes No

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day

1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets

2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day

2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street; comprising (1) lefts from both minor streets, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a) left turn volume >120 and (b) left turn volume plus opposing volume > 720, (4) pedestrians crossing the major street