
























HCM Signalized Intersection Capacity Analysis

1: Woodruff Road & Roper Mountain Road

2035 AM Woodruff Improvements

7/6/2011























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 192 | 614 | 339 | 348 | 362 | 59 | 420 | 1317 | 261 | 263 | 1386 | 149 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | 1.00 | 0.95 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3255 | | 1719 | 3438 | 1538 | 1719 | 3438 | 1538 | 3335 | 3438 | 1538 |
| Flt Permitted | 0.38 | 1.00 | | 0.24 | 1.00 | 1.00 | 0.10 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 696 | 3255 | | 426 | 3438 | 1538 | 182 | 3438 | 1538 | 3335 | 3438 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 213 | 682 | 377 | 387 | 402 | 66 | 467 | 1463 | 290 | 292 | 1540 | 166 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 0 | 55 | 0 | 0 | 111 | 0 | 0 | 71 |
| Lane Group Flow (vph) | 213 | 1034 | 0 | 387 | 402 | 11 | 467 | 1463 | 179 | 292 | 1540 | 95 |
| Turn Type | pm+pt | | | pm+pt | | Perm | Perm | | Perm | Prot | | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | 6 |
| Actuated Green, G (s) | 26.0 | 16.0 | | 28.0 | 17.0 | 17.0 | 46.0 | 46.0 | 46.0 | 6.0 | 57.0 | 57.0 |
| Effective Green, g (s) | 26.0 | 16.0 | | 28.0 | 17.0 | 17.0 | 46.0 | 46.0 | 46.0 | 6.0 | 57.0 | 57.0 |
| Actuated g/C Ratio | 0.26 | 0.16 | | 0.28 | 0.17 | 0.17 | 0.46 | 0.46 | 0.46 | 0.06 | 0.57 | 0.57 |
| Clearance Time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Vehicle Extension (s) | 4.3 | 5.5 | | 4.3 | 5.5 | 5.5 | 4.9 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 283 | 521 | | 262 | 584 | 261 | 84 | 1581 | 707 | 200 | 1960 | 877 |
| v/s Ratio Prot | 0.08 | c0.32 | | c0.16 | 0.12 | | | 0.43 | | c0.09 | 0.45 | |
| v/s Ratio Perm | 0.12 | | | 0.25 | | 0.01 | c2.57 | | 0.12 | | | 0.06 |
| v/c Ratio | 0.75 | 1.98 | | 1.48 | 0.69 | 0.04 | 5.56 | 0.93 | 0.25 | 1.46 | 0.79 | 0.11 |
| Uniform Delay, d1 | 31.5 | 42.0 | | 33.2 | 39.0 | 34.7 | 27.0 | 25.4 | 16.5 | 47.0 | 16.7 | 9.9 |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.05 | 0.76 | 0.72 |
| Incremental Delay, d2 | 11.8 | 449.8 | | 234.2 | 4.7 | 0.2 | 2077.6 | 10.7 | 0.9 | 213.5 | 0.8 | 0.1 |
| Delay (s) | 43.3 | 491.8 | | 267.4 | 43.7 | 34.9 | 2104.6 | 36.1 | 17.4 | 263.0 | 13.5 | 7.1 |
| Level of Service | D | F | | F | D | C | F | D | B | F | B | A |
| Approach Delay (s) | | 416.7 | | | 144.3 | | | 468.8 | | | 49.5 | |
| Approach LOS | | F | | | F | | | F | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 282.6 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 3.97 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 21.0 | | | |
| Intersection Capacity Utilization | | | 127.0% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

2: Woodruff Road & Costco Driveway

2035 AM Woodruff Improvements

7/6/2011





















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|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Volume (vph) | 29 | 1186 | 40 | 90 | 888 | 46 | 40 | 2 | 86 | 12 | 2 | 18 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3421 | | 1719 | 3438 | 1538 | 1719 | 1544 | | 1719 | 1810 | 1538 |
| Flt Permitted | 0.24 | 1.00 | | 0.20 | 1.00 | 1.00 | 0.76 | 1.00 | | 0.69 | 1.00 | 1.00 |
| Satd. Flow (perm) | 437 | 3421 | | 361 | 3438 | 1538 | 1369 | 1544 | | 1255 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 32 | 1318 | 44 | 100 | 987 | 51 | 44 | 2 | 96 | 13 | 2 | 20 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 0 | 16 | 0 | 87 | 0 | 0 | 0 | 17 |
| Lane Group Flow (vph) | 32 | 1360 | 0 | 100 | 987 | 35 | 44 | 11 | 0 | 13 | 2 | 3 |
| Turn Type | pm+pt | | | Perm | | Perm | Perm | | | Perm | | pm+ov |
| Protected Phases | 5 | 2 | | | 6 | | | 8 | | | 4 | 5 |
| Permitted Phases | 2 | | | 6 | | 6 | 8 | | | 4 | | 4 |
| Actuated Green, G (s) | 95.7 | 95.7 | | 82.8 | 82.8 | 82.8 | 11.3 | 11.3 | | 11.3 | 11.3 | 17.7 |
| Effective Green, g (s) | 95.7 | 95.7 | | 82.8 | 82.8 | 82.8 | 11.3 | 11.3 | | 11.3 | 11.3 | 17.7 |
| Actuated g/C Ratio | 0.80 | 0.80 | | 0.69 | 0.69 | 0.69 | 0.09 | 0.09 | | 0.09 | 0.09 | 0.15 |
| Clearance Time (s) | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 |
| Vehicle Extension (s) | 4.3 | 5.5 | | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | 4.3 |
| Lane Grp Cap (vph) | 417 | 2728 | | 249 | 2372 | 1061 | 129 | 145 | | 118 | 170 | 310 |
| v/s Ratio Prot | 0.00 | c0.40 | | | 0.29 | | | 0.01 | | | 0.00 | 0.00 |
| v/s Ratio Perm | 0.06 | | | 0.28 | | 0.02 | c0.03 | | | 0.01 | | 0.00 |
| v/c Ratio | 0.08 | 0.50 | | 0.40 | 0.42 | 0.03 | 0.34 | 0.08 | | 0.11 | 0.01 | 0.01 |
| Uniform Delay, d1 | 3.5 | 4.1 | | 8.0 | 8.1 | 5.9 | 50.9 | 49.6 | | 49.7 | 49.3 | 43.7 |
| Progression Factor | 1.00 | 1.00 | | 0.16 | 0.21 | 0.05 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.1 | 0.7 | | 4.2 | 0.5 | 0.1 | 3.9 | 0.6 | | 1.0 | 0.1 | 0.0 |
| Delay (s) | 3.6 | 4.7 | | 5.5 | 2.2 | 0.4 | 54.7 | 50.1 | | 50.8 | 49.4 | 43.7 |
| Level of Service | A | A | | A | A | A | D | D | | D | D | D |
| Approach Delay (s) | | 4.7 | | | 2.4 | | | 51.6 | | | 46.6 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 6.7 | | | HCM Level of Service | | | | A | | |
| HCM Volume to Capacity ratio | | | 0.48 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | | 13.0 | | |
| Intersection Capacity Utilization | | | 84.2% | | | ICU Level of Service | | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: Green Heron Road & Woodruff Road

2035 AM Woodruff Improvements

7/6/2011





















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|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations | |  | | |  |  |  |  | |  |  |  |
| Volume (vph) | 6 | 2 | 42 | 2 | 2 | 10 | 14 | 909 | 73 | 87 | 1267 | 6 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frt | | 0.89 | | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.99 | | | 0.98 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1595 | | | 1765 | 1538 | 1719 | 3400 | | 1719 | 3438 | 1538 |
| Flt Permitted | | 0.96 | | | 0.89 | 1.00 | 0.18 | 1.00 | | 0.25 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1539 | | | 1612 | 1538 | 319 | 3400 | | 460 | 3438 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 7 | 2 | 47 | 2 | 2 | 11 | 16 | 1010 | 81 | 97 | 1408 | 7 |
| RTOR Reduction (vph) | 0 | 44 | 0 | 0 | 0 | 10 | 0 | 4 | 0 | 0 | 0 | 1 |
| Lane Group Flow (vph) | 0 | 12 | 0 | 0 | 4 | 1 | 16 | 1087 | 0 | 97 | 1408 | 6 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | Perm |
| Protected Phases | | 8 | | | 4 | | | 2 | | | 6 | |
| Permitted Phases | 8 | | | 4 | | 4 | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | | 8.3 | | | 8.3 | 8.3 | 100.4 | 100.4 | | 100.4 | 100.4 | 100.4 |
| Effective Green, g (s) | | 8.3 | | | 8.3 | 8.3 | 100.4 | 100.4 | | 100.4 | 100.4 | 100.4 |
| Actuated g/C Ratio | | 0.07 | | | 0.07 | 0.07 | 0.84 | 0.84 | | 0.84 | 0.84 | 0.84 |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Vehicle Extension (s) | | 4.3 | | | 4.3 | 4.3 | 5.5 | 5.5 | | 5.5 | 5.5 | 5.5 |
| Lane Grp Cap (vph) | | 106 | | | 111 | 106 | 267 | 2845 | | 385 | 2876 | 1287 |
| v/s Ratio Prot | | | | | | | | 0.32 | | | c0.41 | |
| v/s Ratio Perm | | c0.01 | | | 0.00 | 0.00 | 0.05 | | | 0.21 | | 0.00 |
| v/c Ratio | | 0.12 | | | 0.04 | 0.01 | 0.06 | 0.38 | | 0.25 | 0.49 | 0.00 |
| Uniform Delay, d1 | | 52.4 | | | 52.1 | 52.0 | 1.7 | 2.4 | | 2.0 | 2.7 | 1.6 |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 0.98 | 0.98 | | 0.09 | 0.11 | 0.00 |
| Incremental Delay, d2 | | 0.8 | | | 0.2 | 0.0 | 0.4 | 0.3 | | 1.2 | 0.5 | 0.0 |
| Delay (s) | | 53.2 | | | 52.3 | 52.1 | 2.0 | 2.6 | | 1.4 | 0.8 | 0.0 |
| Level of Service | | D | | | D | D | A | A | | A | A | A |
| Approach Delay (s) | | 53.2 | | | 52.1 | | | 2.6 | | | 0.8 | |
| Approach LOS | | D | | | D | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 2.9 | | | HCM Level of Service | | | A | | | | |
| HCM Volume to Capacity ratio | | 0.46 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | Sum of lost time (s) | | | 11.3 | | | | |
| Intersection Capacity Utilization | | 83.1% | | | ICU Level of Service | | | E | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

4: Woodruff Industrial Lane & Woodruff Road

2035 AM Woodruff Improvements

7/6/2011




















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|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  | |
| Volume (vph) | 55 | 7 | 93 | 33 | 7 | 4 | 19 | 811 | 123 | 250 | 1301 | 56 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frt | 1.00 | 0.86 | | 1.00 | 0.95 | | 1.00 | 0.98 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 1558 | | 1719 | 1719 | | 1719 | 3370 | | 1719 | 3417 | |
| Flt Permitted | 0.69 | 1.00 | | 0.68 | 1.00 | | 0.14 | 1.00 | | 0.19 | 1.00 | |
| Satd. Flow (perm) | 1240 | 1558 | | 1226 | 1719 | | 246 | 3370 | | 336 | 3417 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 61 | 8 | 103 | 37 | 8 | 4 | 21 | 901 | 137 | 278 | 1446 | 62 |
| RTOR Reduction (vph) | 0 | 93 | 0 | 0 | 4 | 0 | 0 | 8 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 61 | 18 | 0 | 37 | 8 | 0 | 21 | 1030 | 0 | 278 | 1506 | 0 |
| Turn Type | pm+pt | | | pm+pt | | | pm+pt | | | pm+pt | | |
| Protected Phases | 3 | 8 | | 7 | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 8 | | | 4 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 15.6 | 11.6 | | 13.6 | 10.6 | | 68.6 | 65.9 | | 87.4 | 78.7 | |
| Effective Green, g (s) | 15.6 | 11.6 | | 13.6 | 10.6 | | 68.6 | 65.9 | | 87.4 | 78.7 | |
| Actuated g/C Ratio | 0.13 | 0.10 | | 0.11 | 0.09 | | 0.57 | 0.55 | | 0.73 | 0.66 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 5.5 | | 4.3 | 5.5 | |
| Lane Grp Cap (vph) | 177 | 151 | | 151 | 152 | | 174 | 1851 | | 423 | 2241 | |
| v/s Ratio Prot | c0.01 | 0.01 | | 0.01 | 0.00 | | 0.00 | 0.31 | | c0.08 | c0.44 | |
| v/s Ratio Perm | c0.03 | | | 0.02 | | | 0.07 | | | 0.39 | | |
| v/c Ratio | 0.34 | 0.12 | | 0.25 | 0.05 | | 0.12 | 0.56 | | 0.66 | 0.67 | |
| Uniform Delay, d1 | 47.1 | 49.5 | | 48.2 | 50.1 | | 12.0 | 17.6 | | 10.5 | 12.7 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.63 | 0.87 | | 0.95 | 0.83 | |
| Incremental Delay, d2 | 1.8 | 0.6 | | 1.3 | 0.2 | | 0.5 | 1.1 | | 3.5 | 1.3 | |
| Delay (s) | 48.9 | 50.1 | | 49.5 | 50.4 | | 8.1 | 16.4 | | 13.6 | 11.9 | |
| Level of Service | D | D | | D | D | | A | B | | B | B | |
| Approach Delay (s) | | 49.7 | | | 49.7 | | | 16.2 | | | 12.2 | |
| Approach LOS | | D | | | D | | | B | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 16.3 | | | HCM Level of Service | | | | B | | |
| HCM Volume to Capacity ratio | | | 0.61 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 18.0 | | | |
| Intersection Capacity Utilization | | | 67.7% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

5: I-85 SB Ramps & Woodruff Road

2035 AM Woodruff Improvements

7/6/2011












| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations | | | |  | |  | |  |  |  |  |  |
| Volume (vph) | 0 | 0 | 0 | 570 | 0 | 346 | 0 | 813 | 124 | 712 | 1261 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 5.0 | | 5.0 | | 6.3 | 6.3 | 6.5 | 6.1 | |
| Lane Util. Factor | | | | 0.97 | | 0.88 | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | | | | 1.00 | | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | | | 0.95 | | 1.00 | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | | | 3335 | | 2707 | | 3438 | 1538 | 1719 | 3438 | |
| Flt Permitted | | | | 0.95 | | 1.00 | | 1.00 | 1.00 | 0.10 | 1.00 | |
| Satd. Flow (perm) | | | | 3335 | | 2707 | | 3438 | 1538 | 186 | 3438 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 0 | 0 | 633 | 0 | 384 | 0 | 903 | 138 | 791 | 1401 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 120 | 0 | 0 | 96 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 633 | 0 | 264 | 0 | 903 | 42 | 791 | 1401 | 0 |
| Turn Type | | | | custom | | custom | | | Perm | pm+pt | | |
| Protected Phases | | | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | 4 | | 4 | | | 2 | 6 | | |
| Actuated Green, G (s) | | | | 22.0 | | 22.0 | | 32.2 | 32.2 | 86.9 | 86.9 | |
| Effective Green, g (s) | | | | 22.0 | | 22.0 | | 32.2 | 32.2 | 86.9 | 86.9 | |
| Actuated g/C Ratio | | | | 0.18 | | 0.18 | | 0.27 | 0.27 | 0.72 | 0.72 | |
| Clearance Time (s) | | | | 5.0 | | 5.0 | | 6.3 | 6.3 | 6.5 | 6.1 | |
| Vehicle Extension (s) | | | | 4.3 | | 4.3 | | 4.3 | 4.3 | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | | | | 611 | | 496 | | 923 | 413 | 748 | 2490 | |
| v/s Ratio Prot | | | | | | | | 0.26 | | c0.42 | 0.41 | |
| v/s Ratio Perm | | | | c0.19 | | 0.10 | | | 0.03 | c0.34 | | |
| v/c Ratio | | | | 1.04 | | 0.53 | | 0.98 | 0.10 | 1.06 | 0.56 | |
| Uniform Delay, d1 | | | | 49.0 | | 44.3 | | 43.6 | 33.0 | 31.1 | 7.7 | |
| Progression Factor | | | | 1.00 | | 1.00 | | 0.62 | 0.59 | 1.03 | 0.69 | |
| Incremental Delay, d2 | | | | 46.0 | | 1.6 | | 22.9 | 0.4 | 43.4 | 0.6 | |
| Delay (s) | | | | 95.0 | | 45.9 | | 49.8 | 20.1 | 75.6 | 5.9 | |
| Level of Service | | | | F | | D | | D | C | E | A | |
| Approach Delay (s) | | 0.0 | | | 76.5 | | | 45.9 | | | 31.1 | |
| Approach LOS | | A | | | E | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 45.6 | | | HCM Level of Service | | | D | | | |
| HCM Volume to Capacity ratio | | | 1.02 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 11.5 | | | |
| Intersection Capacity Utilization | | | 94.4% | | | ICU Level of Service | | | F | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: I-85 NB Ramps & Woodruff Road

2035 AM Woodruff Improvements

7/6/2011

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | NBL | NBR | SET | SER | NWL | NWT |
| Lane Configurations |  |  |  |  | |  |
| Volume (vph) | 489 | 816 | 1128 | 255 | 0 | 1484 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.6 | 5.6 | 6.5 | 6.5 | | 6.5 |
| Lane Util. Factor | 0.97 | 0.88 | 0.95 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (prot) | 3335 | 2707 | 3438 | 1538 | | 3438 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (perm) | 3335 | 2707 | 3438 | 1538 | | 3438 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 543 | 907 | 1253 | 283 | 0 | 1649 |
| RTOR Reduction (vph) | 0 | 279 | 0 | 117 | 0 | 0 |
| Lane Group Flow (vph) | 543 | 628 | 1253 | 166 | 0 | 1649 |
| Turn Type | | Prot | | Perm | | |
| Protected Phases | 3 | 3 | 2 | | | 2 4 |
| Permitted Phases | | | | 2 | | |
| Actuated Green, G (s) | 20.4 | 20.4 | 70.5 | 70.5 | | 87.5 |
| Effective Green, g (s) | 20.4 | 20.4 | 70.5 | 70.5 | | 80.5 |
| Actuated g/C Ratio | 0.17 | 0.17 | 0.59 | 0.59 | | 0.67 |
| Clearance Time (s) | 5.6 | 5.6 | 6.5 | 6.5 | | |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | | |
| Lane Grp Cap (vph) | 567 | 460 | 2020 | 904 | | 2306 |
| v/s Ratio Prot | 0.16 | c0.23 | 0.36 | | | c0.48 |
| v/s Ratio Perm | | | | 0.11 | | |
| v/c Ratio | 0.96 | 1.37 | 0.62 | 0.18 | | 0.72 |
| Uniform Delay, d1 | 49.4 | 49.8 | 16.1 | 11.4 | | 12.5 |
| Progression Factor | 1.00 | 1.00 | 0.02 | 0.02 | | 1.16 |
| Incremental Delay, d2 | 27.5 | 178.0 | 0.1 | 0.0 | | 0.5 |
| Delay (s) | 76.9 | 227.8 | 0.5 | 0.3 | | 15.0 |
| Level of Service | E | F | A | A | | B |
| Approach Delay (s) | 171.3 | | 0.4 | | | 15.0 |
| Approach LOS | F | | A | | | B |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 59.1 | | HCM Level of Service | E |
| HCM Volume to Capacity ratio | | | 0.84 | | | |
| Actuated Cycle Length (s) | | | 120.0 | | Sum of lost time (s) | 18.6 |
| Intersection Capacity Utilization | | | 69.8% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Carolina Point Pkwy & Woodruff Road

2035 AM Woodruff Improvements

7/6/2011



























| Movement | EBL | EBR | SET | SER | NWL | NWT |
|-----------------------------------|------|-------|-------|----------------------|-------|-------|
| Lane Configurations | ↰↱ | ↱ | ↰↱ | ↱ | ↰ | ↰↱ |
| Volume (vph) | 176 | 139 | 1683 | 261 | 196 | 2279 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.0 | 7.0 | 6.5 | 6.5 | 6.5 | 6.5 |
| Lane Util. Factor | 0.97 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 3335 | 1538 | 3438 | 1538 | 1719 | 3438 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.09 | 1.00 |
| Satd. Flow (perm) | 3335 | 1538 | 3438 | 1538 | 169 | 3438 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 196 | 154 | 1870 | 290 | 218 | 2532 |
| RTOR Reduction (vph) | 0 | 44 | 0 | 55 | 0 | 0 |
| Lane Group Flow (vph) | 196 | 110 | 1870 | 235 | 218 | 2532 |
| Turn Type | Perm | | Perm | | Perm | |
| Protected Phases | 4 | | 2 3 6 | | | 2 3 6 |
| Permitted Phases | 4 | 4 | | 2 3 6 | 2 3 6 | |
| Actuated Green, G (s) | 10.0 | 10.0 | 97.4 | 97.4 | 97.4 | 97.4 |
| Effective Green, g (s) | 10.0 | 10.0 | 97.4 | 97.4 | 97.4 | 97.4 |
| Actuated g/C Ratio | 0.08 | 0.08 | 0.81 | 0.81 | 0.81 | 0.81 |
| Clearance Time (s) | 7.0 | 7.0 | | | | |
| Vehicle Extension (s) | 4.3 | 4.3 | | | | |
| Lane Grp Cap (vph) | 278 | 128 | 2791 | 1248 | 137 | 2791 |
| v/s Ratio Prot | 0.06 | | 0.54 | | | 0.74 |
| v/s Ratio Perm | | c0.07 | | 0.15 | c1.29 | |
| v/c Ratio | 0.71 | 0.86 | 0.67 | 0.19 | 1.59 | 0.91 |
| Uniform Delay, d1 | 53.6 | 54.3 | 4.7 | 2.5 | 11.3 | 8.1 |
| Progression Factor | 1.00 | 1.00 | 0.65 | 1.30 | 1.21 | 1.03 |
| Incremental Delay, d2 | 8.8 | 41.8 | 0.3 | 0.1 | 269.2 | 0.5 |
| Delay (s) | 62.3 | 96.1 | 3.4 | 3.3 | 282.8 | 8.8 |
| Level of Service | E | F | A | A | F | A |
| Approach Delay (s) | 77.2 | | 3.4 | | | 30.5 |
| Approach LOS | E | | A | | | C |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 22.5 | HCM Level of Service | | C |
| HCM Volume to Capacity ratio | | | 1.53 | | | |
| Actuated Cycle Length (s) | | | 120.0 | Sum of lost time (s) | | 13.5 |
| Intersection Capacity Utilization | | | 79.3% | ICU Level of Service | | D |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

8: Woodruff Road & Market Point Drive

2035 AM Woodruff Improvements

7/6/2011

























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 258 | 1417 | 147 | 34 | 2178 | 86 | 100 | 2 | 48 | 39 | 2 | 197 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.1 | 6.1 | 5.8 | 6.1 | 6.1 | 6.1 | 5.8 | 5.8 | 6.1 | 5.8 | 5.8 | 5.8 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3335 | 3438 | 1538 | 1719 | 3438 | 1538 | 1719 | 1810 | 1538 | 3335 | 3438 | 1538 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3335 | 3438 | 1538 | 1719 | 3438 | 1538 | 1719 | 1810 | 1538 | 3335 | 3438 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 287 | 1574 | 163 | 38 | 2420 | 96 | 111 | 2 | 53 | 43 | 2 | 219 |
| RTOR Reduction (vph) | 0 | 0 | 52 | 0 | 0 | 25 | 0 | 0 | 41 | 0 | 0 | 122 |
| Lane Group Flow (vph) | 287 | 1574 | 111 | 38 | 2420 | 71 | 111 | 2 | 12 | 43 | 2 | 97 |
| Turn Type | Prot | pm+ov | | Prot | Perm | | Prot | pm+ov | | Prot | Perm | |
| Protected Phases | 5 | 2 | 3 | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Actuated Green, G (s) | 8.9 | 74.8 | 82.0 | 7.0 | 72.9 | 72.9 | 7.2 | 10.1 | 17.1 | 4.3 | 7.2 | 7.2 |
| Effective Green, g (s) | 8.9 | 74.8 | 82.0 | 7.0 | 72.9 | 72.9 | 7.2 | 10.1 | 17.1 | 4.3 | 7.2 | 7.2 |
| Actuated g/C Ratio | 0.07 | 0.62 | 0.68 | 0.06 | 0.61 | 0.61 | 0.06 | 0.08 | 0.14 | 0.04 | 0.06 | 0.06 |
| Clearance Time (s) | 6.1 | 6.1 | 5.8 | 6.1 | 6.1 | 6.1 | 5.8 | 5.8 | 6.1 | 5.8 | 5.8 | 5.8 |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 247 | 2143 | 1051 | 100 | 2089 | 934 | 103 | 152 | 219 | 120 | 206 | 92 |
| v/s Ratio Prot | c0.09 | 0.46 | 0.01 | 0.02 | c0.70 | | c0.06 | 0.00 | c0.00 | 0.01 | 0.00 | |
| v/s Ratio Perm | | | 0.07 | | | 0.05 | | | 0.00 | | | c0.06 |
| v/c Ratio | 1.16 | 0.73 | 0.11 | 0.38 | 1.16 | 0.08 | 1.08 | 0.01 | 0.05 | 0.36 | 0.01 | 1.05 |
| Uniform Delay, d1 | 55.5 | 15.7 | 6.5 | 54.4 | 23.5 | 9.7 | 56.4 | 50.4 | 44.5 | 56.5 | 53.0 | 56.4 |
| Progression Factor | 1.28 | 0.41 | 0.15 | 0.76 | 0.45 | 0.64 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 99.9 | 1.6 | 0.1 | 1.4 | 73.5 | 0.1 | 111.2 | 0.1 | 0.2 | 2.9 | 0.0 | 108.7 |
| Delay (s) | 170.8 | 8.0 | 1.0 | 42.7 | 84.0 | 6.2 | 167.6 | 50.4 | 44.6 | 59.4 | 53.1 | 165.1 |
| Level of Service | F | A | A | D | F | A | F | D | D | E | D | F |
| Approach Delay (s) | | 30.5 | | | 80.5 | | | 126.9 | | | 147.0 | |
| Approach LOS | | C | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 65.3 | | | HCM Level of Service | | | E | | | |
| HCM Volume to Capacity ratio | | | 1.22 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 29.9 | | | |
| Intersection Capacity Utilization | | | 94.8% | | | ICU Level of Service | | | F | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: Woodruff Road & Garlington Road

2035 AM Woodruff Improvements

7/6/2011


















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 314 | 1024 | 166 | 147 | 1539 | 661 | 360 | 346 | 94 | 199 | 160 | 399 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.2 | 6.1 | 6.1 | 5.2 | 6.1 | 6.1 | 5.2 | 5.2 | | 5.2 | 5.2 | 4.0 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 1.00 | | 0.97 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3335 | 3438 | 1538 | 1719 | 3438 | 1538 | 3335 | 1752 | | 3335 | 1810 | 1538 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.13 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3335 | 3438 | 1538 | 235 | 3438 | 1538 | 3335 | 1752 | | 3335 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 349 | 1138 | 184 | 163 | 1710 | 734 | 400 | 384 | 104 | 221 | 178 | 443 |
| RTOR Reduction (vph) | 0 | 0 | 101 | 0 | 0 | 157 | 0 | 8 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 349 | 1138 | 83 | 163 | 1710 | 577 | 400 | 480 | 0 | 221 | 178 | 443 |
| Turn Type | Prot | | Perm | pm+pt | | Perm | Prot | | | Prot | | Free |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | 6 | | 6 | | | | | | Free |
| Actuated Green, G (s) | 10.8 | 54.2 | 54.2 | 62.4 | 52.9 | 52.9 | 17.3 | 26.8 | | 7.8 | 17.3 | 120.0 |
| Effective Green, g (s) | 10.8 | 54.2 | 54.2 | 62.4 | 52.9 | 52.9 | 17.3 | 26.8 | | 7.8 | 17.3 | 120.0 |
| Actuated g/C Ratio | 0.09 | 0.45 | 0.45 | 0.52 | 0.44 | 0.44 | 0.14 | 0.22 | | 0.06 | 0.14 | 1.00 |
| Clearance Time (s) | 5.2 | 6.1 | 6.1 | 5.2 | 6.1 | 6.1 | 5.2 | 5.2 | | 5.2 | 5.2 | |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | 300 | 1553 | 695 | 240 | 1516 | 678 | 481 | 391 | | 217 | 261 | 1538 |
| v/s Ratio Prot | c0.10 | 0.33 | | 0.05 | c0.50 | | c0.12 | c0.27 | | 0.07 | 0.10 | |
| v/s Ratio Perm | | | 0.05 | 0.30 | | 0.38 | | | | | | c0.29 |
| v/c Ratio | 1.16 | 0.73 | 0.12 | 0.68 | 1.13 | 0.85 | 0.83 | 1.23 | | 1.02 | 0.68 | 0.29 |
| Uniform Delay, d1 | 54.6 | 27.0 | 19.1 | 19.5 | 33.5 | 30.0 | 49.9 | 46.6 | | 56.1 | 48.7 | 0.0 |
| Progression Factor | 1.43 | 0.67 | 0.44 | 1.51 | 0.60 | 0.39 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 96.1 | 2.2 | 0.2 | 4.0 | 62.1 | 6.4 | 12.4 | 123.3 | | 65.9 | 8.1 | 0.5 |
| Delay (s) | 174.1 | 20.3 | 8.7 | 33.5 | 82.3 | 18.0 | 62.4 | 169.9 | | 122.0 | 56.8 | 0.5 |
| Level of Service | F | C | A | C | F | B | E | F | | F | E | A |
| Approach Delay (s) | | 51.1 | | | 61.1 | | | 121.5 | | | 44.3 | |
| Approach LOS | | D | | | E | | | F | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 64.9 | | | | HCM Level of Service | | | E | | |
| HCM Volume to Capacity ratio | | | 1.16 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | | Sum of lost time (s) | | | 21.7 | | |
| Intersection Capacity Utilization | | | 99.2% | | | | ICU Level of Service | | | F | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

10: Woodruff Road & I-385 SB Ramps

2035 AM Woodruff Improvements

7/6/2011



















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | |  |  | | | | |  | |  |
| Volume (vph) | 0 | 1105 | 212 | 91 | 1642 | 0 | 0 | 0 | 0 | 1184 | 0 | 705 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.6 | | 6.6 | 6.6 | | | | | 5.7 | | 4.0 |
| Lane Util. Factor | | 0.95 | | 1.00 | 0.95 | | | | | 0.97 | | 1.00 |
| Frt | | 0.98 | | 1.00 | 1.00 | | | | | 1.00 | | 0.85 |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | 0.95 | | 1.00 |
| Satd. Flow (prot) | | 3355 | | 1719 | 3438 | | | | | 3335 | | 1538 |
| Flt Permitted | | 1.00 | | 0.07 | 1.00 | | | | | 0.95 | | 1.00 |
| Satd. Flow (perm) | | 3355 | | 127 | 3438 | | | | | 3335 | | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1228 | 236 | 101 | 1824 | 0 | 0 | 0 | 0 | 1316 | 0 | 783 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1451 | 0 | 101 | 1824 | 0 | 0 | 0 | 0 | 1316 | 0 | 783 |
| Turn Type | | | | pm+pt | | | | | | Prot | | Free |
| Protected Phases | | 2 | | 1 | 6 | | | | | 4 | | |
| Permitted Phases | | | | 6 | | | | | | | | Free |
| Actuated Green, G (s) | | 50.4 | | 62.0 | 62.0 | | | | | 45.7 | | 120.0 |
| Effective Green, g (s) | | 50.4 | | 62.0 | 62.0 | | | | | 45.7 | | 120.0 |
| Actuated g/C Ratio | | 0.42 | | 0.52 | 0.52 | | | | | 0.38 | | 1.00 |
| Clearance Time (s) | | 6.6 | | 6.6 | 6.6 | | | | | 5.7 | | |
| Vehicle Extension (s) | | 4.3 | | 4.3 | 4.3 | | | | | 4.3 | | |
| Lane Grp Cap (vph) | | 1409 | | 132 | 1776 | | | | | 1270 | | 1538 |
| v/s Ratio Prot | | 0.43 | | 0.03 | c0.53 | | | | | c0.39 | | |
| v/s Ratio Perm | | | | 0.36 | | | | | | | | 0.51 |
| v/c Ratio | | 1.03 | | 0.77 | 1.03 | | | | | 1.04 | | 0.51 |
| Uniform Delay, d1 | | 34.8 | | 27.0 | 29.0 | | | | | 37.1 | | 0.0 |
| Progression Factor | | 0.64 | | 2.13 | 0.76 | | | | | 1.01 | | 1.00 |
| Incremental Delay, d2 | | 26.0 | | 2.7 | 15.0 | | | | | 35.1 | | 1.2 |
| Delay (s) | | 48.3 | | 60.4 | 36.9 | | | | | 72.5 | | 1.2 |
| Level of Service | | D | | E | D | | | | | E | | A |
| Approach Delay (s) | | 48.3 | | | 38.1 | | | 0.0 | | | 45.9 | |
| Approach LOS | | D | | | D | | | A | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 43.8 | | | HCM Level of Service | | | | D | | |
| HCM Volume to Capacity ratio | | | 1.03 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | | 12.3 | | |
| Intersection Capacity Utilization | | | 171.4% | | | ICU Level of Service | | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

11: Woodruff Road & I-385 NB Ramps

2035 AM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  |  |  | |  | | | |
| Volume (vph) | 861 | 1428 | 0 | 0 | 989 | 903 | 744 | 0 | 361 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.1 | 6.1 | | | 6.1 | 6.1 | 5.0 | | 5.0 | | | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | | 1.00 | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | 1.00 | | 0.85 | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | |
| Satd. Flow (prot) | 1719 | 3438 | | | 3438 | 1538 | 1719 | | 1538 | | | |
| Flt Permitted | 0.10 | 1.00 | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | |
| Satd. Flow (perm) | 172 | 3438 | | | 3438 | 1538 | 1719 | | 1538 | | | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 957 | 1587 | 0 | 0 | 1099 | 1003 | 827 | 0 | 401 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 383 | 0 | 0 | 27 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 957 | 1587 | 0 | 0 | 1099 | 620 | 827 | 0 | 374 | 0 | 0 | 0 |
| Turn Type | pm+pt | | | | Perm | | Prot | custom | | | | |
| Protected Phases | 5 | 2 | | | 6 | | 8 | | | | | |
| Permitted Phases | 2 | | | | | 6 | | | 8 | | | |
| Actuated Green, G (s) | 75.9 | 75.9 | | | 35.9 | 35.9 | 33.0 | | 33.0 | | | |
| Effective Green, g (s) | 75.9 | 75.9 | | | 35.9 | 35.9 | 33.0 | | 33.0 | | | |
| Actuated g/C Ratio | 0.63 | 0.63 | | | 0.30 | 0.30 | 0.28 | | 0.28 | | | |
| Clearance Time (s) | 6.1 | 6.1 | | | 6.1 | 6.1 | 5.0 | | 5.0 | | | |
| Vehicle Extension (s) | 4.3 | 4.3 | | | 4.3 | 4.3 | 4.3 | | 4.3 | | | |
| Lane Grp Cap (vph) | 546 | 2175 | | | 1029 | 460 | 473 | | 423 | | | |
| v/s Ratio Prot | c0.50 | 0.46 | | | 0.32 | | c0.48 | | | | | |
| v/s Ratio Perm | c0.61 | | | | | 0.40 | | | 0.24 | | | |
| v/c Ratio | 1.75 | 0.73 | | | 1.07 | 1.35 | 1.75 | | 0.88 | | | |
| Uniform Delay, d1 | 36.1 | 15.0 | | | 42.0 | 42.0 | 43.5 | | 41.7 | | | |
| Progression Factor | 1.00 | 1.13 | | | 0.60 | 1.19 | 1.00 | | 1.00 | | | |
| Incremental Delay, d2 | 339.4 | 0.2 | | | 38.1 | 161.2 | 345.5 | | 19.9 | | | |
| Delay (s) | 375.6 | 17.2 | | | 63.2 | 211.2 | 389.0 | | 61.6 | | | |
| Level of Service | F | B | | | E | F | F | | E | | | |
| Approach Delay (s) | | 152.0 | | | 133.8 | | | 282.1 | | | 0.0 | |
| Approach LOS | | F | | | F | | | F | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 172.7 | | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | 1.70 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | Sum of lost time (s) | | | 11.1 | | | | |
| Intersection Capacity Utilization | | 171.4% | | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

12: Woodruff Road & Commercial Drive

2035 AM Woodruff Improvements

7/6/2011



















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|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  | |
| Volume (vph) | 165 | 1492 | 132 | 31 | 1683 | 62 | 121 | 7 | 10 | 111 | 29 | 88 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.3 | 5.5 | | 5.5 | 5.5 | | 5.3 | 5.4 | | 5.4 | 5.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.99 | | 1.00 | 0.91 | | 1.00 | 0.89 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 3396 | | 1719 | 3420 | | 1719 | 1652 | | 1719 | 1605 | |
| Flt Permitted | 0.05 | 1.00 | | 0.09 | 1.00 | | 0.36 | 1.00 | | 0.75 | 1.00 | |
| Satd. Flow (perm) | 97 | 3396 | | 171 | 3420 | | 649 | 1652 | | 1348 | 1605 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 183 | 1658 | 147 | 34 | 1870 | 69 | 134 | 8 | 11 | 123 | 32 | 98 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 2 | 0 | 0 | 9 | 0 | 0 | 88 | 0 |
| Lane Group Flow (vph) | 183 | 1799 | 0 | 34 | 1937 | 0 | 134 | 10 | 0 | 123 | 42 | 0 |
| Turn Type | pm+pt | | | Perm | | | pm+pt | | | Perm | | |
| Protected Phases | 5 | 2 | | | 6 | | 3 | 8 | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 85.1 | 85.1 | | 69.3 | 69.3 | | 24.0 | 24.0 | | 12.4 | 12.4 | |
| Effective Green, g (s) | 85.1 | 85.1 | | 69.3 | 69.3 | | 24.0 | 24.0 | | 12.4 | 12.4 | |
| Actuated g/C Ratio | 0.71 | 0.71 | | 0.58 | 0.58 | | 0.20 | 0.20 | | 0.10 | 0.10 | |
| Clearance Time (s) | 5.3 | 5.5 | | 5.5 | 5.5 | | 5.3 | 5.4 | | 5.4 | 5.4 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | 211 | 2408 | | 99 | 1975 | | 186 | 330 | | 139 | 166 | |
| v/s Ratio Prot | 0.08 | c0.53 | | | c0.57 | | c0.04 | 0.01 | | | 0.03 | |
| v/s Ratio Perm | 0.54 | | | 0.20 | | | 0.11 | | | c0.09 | | |
| v/c Ratio | 0.87 | 0.75 | | 0.34 | 0.98 | | 0.72 | 0.03 | | 0.88 | 0.25 | |
| Uniform Delay, d1 | 39.5 | 10.8 | | 13.4 | 24.7 | | 43.7 | 38.6 | | 53.1 | 49.5 | |
| Progression Factor | 1.19 | 0.68 | | 0.17 | 0.26 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 21.1 | 1.4 | | 6.3 | 12.8 | | 14.2 | 0.1 | | 45.1 | 1.3 | |
| Delay (s) | 68.2 | 8.7 | | 8.6 | 19.1 | | 57.9 | 38.7 | | 98.2 | 50.8 | |
| Level of Service | E | A | | A | B | | E | D | | F | D | |
| Approach Delay (s) | | 14.1 | | | 18.9 | | | 55.5 | | | 73.8 | |
| Approach LOS | | B | | | B | | | E | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 21.2 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.96 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 21.7 | | | |
| Intersection Capacity Utilization | | | 85.8% | | | ICU Level of Service | | | E | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

13: Woodruff Road & Smith Hines Road

2035 AM Woodruff Improvements

7/6/2011




















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|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| Volume (vph) | 8 | 1371 | 234 | 177 | 1667 | 2 | 105 | 2 | 148 | 2 | 2 | 4 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | | 6.0 | 6.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.98 | | 1.00 | 1.00 | | | 0.92 | | | 0.93 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.98 | | | 0.99 | |
| Satd. Flow (prot) | 1719 | 3363 | | 1719 | 3438 | | | 1634 | | | 1667 | |
| Flt Permitted | 0.09 | 1.00 | | 0.10 | 1.00 | | | 0.86 | | | 0.89 | |
| Satd. Flow (perm) | 170 | 3363 | | 189 | 3438 | | | 1438 | | | 1495 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 9 | 1523 | 260 | 197 | 1852 | 2 | 117 | 2 | 164 | 2 | 2 | 4 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 9 | 1772 | 0 | 197 | 1854 | 0 | 0 | 242 | 0 | 0 | 4 | 0 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 96.7 | 96.7 | | 97.0 | 97.0 | | | 12.0 | | | 12.0 | |
| Effective Green, g (s) | 96.7 | 96.7 | | 97.0 | 97.0 | | | 12.0 | | | 12.0 | |
| Actuated g/C Ratio | 0.81 | 0.81 | | 0.81 | 0.81 | | | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.3 | 6.3 | | 6.0 | 6.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | | 4.3 | | | 4.3 | |
| Lane Grp Cap (vph) | 137 | 2710 | | 153 | 2779 | | | 144 | | | 150 | |
| v/s Ratio Prot | 0.53 | | | 0.54 | | | | | | | | |
| v/s Ratio Perm | 0.05 | | | c1.04 | | | | c0.17 | | | 0.00 | |
| v/c Ratio | 0.07 | 0.65 | | 1.29 | 0.67 | | | 1.68 | | | 0.03 | |
| Uniform Delay, d1 | 2.4 | 4.8 | | 11.5 | 4.8 | | | 54.0 | | | 48.7 | |
| Progression Factor | 0.05 | 0.05 | | 1.43 | 0.63 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.6 | 0.8 | | 134.0 | 0.1 | | | 333.3 | | | 0.1 | |
| Delay (s) | 0.7 | 1.1 | | 150.4 | 3.1 | | | 387.3 | | | 48.9 | |
| Level of Service | A | A | | F | A | | | F | | | D | |
| Approach Delay (s) | 1.1 | | | 17.3 | | | | 387.3 | | | 48.9 | |
| Approach LOS | A | | | B | | | | F | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 35.6 | | | HCM Level of Service | | | D | | | | | |
| HCM Volume to Capacity ratio | 1.33 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 120.0 | | | Sum of lost time (s) | | | 11.0 | | | | | |
| Intersection Capacity Utilization | 107.2% | | | ICU Level of Service | | | G | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

14: Woodruff Road & Walmart Driveway

2035 AM Woodruff Improvements

7/6/2011























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|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | | |  | |
| Volume (vph) | 31 | 2055 | 24 | 20 | 4623 | 118 | 70 | 4 | 35 | 120 | 2 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.0 | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.86 | | | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.96 | |
| Satd. Flow (prot) | 1719 | 3432 | | 1719 | 3425 | | 1719 | 1563 | | | 1711 | |
| Flt Permitted | 0.05 | 1.00 | | 0.05 | 1.00 | | 0.77 | 1.00 | | | 0.72 | |
| Satd. Flow (perm) | 85 | 3432 | | 92 | 3425 | | 1389 | 1563 | | | 1281 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 34 | 2283 | 27 | 22 | 5137 | 131 | 78 | 4 | 39 | 133 | 2 | 13 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 9 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 34 | 2309 | 0 | 22 | 5267 | 0 | 78 | 34 | 0 | 0 | 145 | 0 |
| Turn Type | pm+pt | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | 5 | 2 | | | 6 | | | 8 | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 88.9 | 88.9 | | 78.8 | 78.8 | | 19.8 | 19.8 | | | 19.8 | |
| Effective Green, g (s) | 88.9 | 88.9 | | 78.8 | 78.8 | | 19.8 | 19.8 | | | 19.8 | |
| Actuated g/C Ratio | 0.74 | 0.74 | | 0.66 | 0.66 | | 0.17 | 0.17 | | | 0.17 | |
| Clearance Time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.0 | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | | | 4.3 | |
| Lane Grp Cap (vph) | 115 | 2543 | | 60 | 2249 | | 229 | 258 | | | 211 | |
| v/s Ratio Prot | 0.01 | c0.67 | | | c1.54 | | | 0.02 | | | | |
| v/s Ratio Perm | 0.21 | | | 0.24 | | | 0.06 | | | | c0.11 | |
| v/c Ratio | 0.30 | 0.91 | | 0.37 | 2.34 | | 0.34 | 0.13 | | | 0.69 | |
| Uniform Delay, d1 | 32.0 | 12.3 | | 9.3 | 20.6 | | 44.3 | 42.8 | | | 47.2 | |
| Progression Factor | 1.05 | 1.00 | | 0.57 | 0.50 | | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 1.9 | 5.3 | | 1.6 | 603.9 | | 1.4 | 0.4 | | | 10.0 | |
| Delay (s) | 35.5 | 17.6 | | 6.8 | 614.2 | | 45.7 | 43.1 | | | 57.2 | |
| Level of Service | D | B | | A | F | | D | D | | | E | |
| Approach Delay (s) | | 17.9 | | | 611.7 | | | 44.8 | | | 57.2 | |
| Approach LOS | | B | | | F | | | D | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 416.5 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 2.00 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 17.6 | | | |
| Intersection Capacity Utilization | | | 155.1% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

15: Woodruff Road & Verdin Road

2035 AM Woodruff Improvements

7/6/2011




















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|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  |  |  |  |  |
| Volume (vph) | 58 | 1061 | 29 | 134 | 2960 | 77 | 479 | 352 | 39 | 67 | 285 | 101 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.2 | 5.0 | 5.0 | 5.2 | 5.2 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 3424 | | 1719 | 3425 | | 1719 | 1810 | 1538 | 1719 | 1739 | |
| Flt Permitted | 0.06 | 1.00 | | 0.17 | 1.00 | | 0.19 | 1.00 | 1.00 | 0.53 | 1.00 | |
| Satd. Flow (perm) | 101 | 3424 | | 302 | 3425 | | 341 | 1810 | 1538 | 961 | 1739 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 64 | 1179 | 32 | 149 | 3289 | 86 | 532 | 391 | 43 | 74 | 317 | 112 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 30 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 64 | 1209 | 0 | 149 | 3373 | 0 | 532 | 391 | 13 | 74 | 426 | 0 |
| Turn Type | Perm | | | Perm | | | pm+pt | | | Perm | Perm | |
| Protected Phases | 2 | | | 6 | | | 3 | | 8 | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 8 | 4 | |
| Actuated Green, G (s) | 71.7 | 71.7 | | 71.7 | 71.7 | | 37.0 | 37.0 | 37.0 | 15.8 | 15.8 | |
| Effective Green, g (s) | 71.7 | 71.7 | | 71.7 | 71.7 | | 37.0 | 37.0 | 37.0 | 15.8 | 15.8 | |
| Actuated g/C Ratio | 0.60 | 0.60 | | 0.60 | 0.60 | | 0.31 | 0.31 | 0.31 | 0.13 | 0.13 | |
| Clearance Time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.2 | 5.0 | 5.0 | 5.2 | 5.2 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | 60 | 2046 | | 180 | 2046 | | 287 | 558 | 474 | 127 | 229 | |
| v/s Ratio Prot | | 0.35 | | | c0.98 | | c0.24 | 0.22 | | | 0.25 | |
| v/s Ratio Perm | 0.63 | | | 0.49 | | | c0.33 | | 0.01 | 0.08 | | |
| v/c Ratio | 1.07 | 0.59 | | 0.83 | 1.65 | | 1.85 | 0.70 | 0.03 | 0.58 | 1.86 | |
| Uniform Delay, d1 | 24.1 | 15.0 | | 19.2 | 24.1 | | 36.6 | 36.6 | 29.0 | 49.0 | 52.1 | |
| Progression Factor | 1.02 | 1.11 | | 0.75 | 0.76 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 97.6 | 0.6 | | 4.1 | 292.1 | | 397.3 | 4.4 | 0.0 | 8.5 | 404.2 | |
| Delay (s) | 122.2 | 17.3 | | 18.5 | 310.5 | | 433.9 | 41.0 | 29.0 | 57.5 | 456.3 | |
| Level of Service | F | B | | B | F | | F | D | C | E | F | |
| Approach Delay (s) | | 22.6 | | | 298.1 | | | 256.9 | | | 397.6 | |
| Approach LOS | | C | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 243.7 | | HCM Level of Service | | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.69 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | Sum of lost time (s) | | | | 11.5 | | | |
| Intersection Capacity Utilization | | | 172.8% | | ICU Level of Service | | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

16: Woodruff Road & Butler Road

2035 AM Woodruff Improvements

7/6/2011



















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | |  |  | | |  |  |  |  | |
| Volume (vph) | 7 | 1007 | 74 | 759 | 2693 | 2 | 231 | 40 | 555 | 32 | 42 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.3 | | 6.3 | 6.3 | | | 5.0 | 6.3 | 5.0 | 5.0 | |
| Lane Util. Factor | | 0.95 | | 1.00 | 0.95 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | 0.96 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3402 | | 1719 | 3438 | | | 1735 | 1538 | 1719 | 1751 | |
| Flt Permitted | | 0.75 | | 0.08 | 1.00 | | | 0.72 | 1.00 | 0.21 | 1.00 | |
| Satd. Flow (perm) | | 2546 | | 141 | 3438 | | | 1294 | 1538 | 381 | 1751 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 8 | 1119 | 82 | 843 | 2992 | 2 | 257 | 44 | 617 | 36 | 47 | 13 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 1204 | 0 | 843 | 2994 | 0 | 0 | 301 | 600 | 36 | 57 | 0 |
| Turn Type | Perm | | | pm+pt | | | Perm | | | pm+ov | | Perm |
| Protected Phases | | 2 | | 1 | 6 | | | 8 | 1 | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | 8 | 4 | | |
| Actuated Green, G (s) | | 50.7 | | 89.7 | 89.7 | | | 19.0 | 51.7 | 19.0 | 19.0 | |
| Effective Green, g (s) | | 50.7 | | 89.7 | 89.7 | | | 19.0 | 51.7 | 19.0 | 19.0 | |
| Actuated g/C Ratio | | 0.42 | | 0.75 | 0.75 | | | 0.16 | 0.43 | 0.16 | 0.16 | |
| Clearance Time (s) | | 6.3 | | 6.3 | 6.3 | | | 5.0 | 6.3 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 4.3 | | 4.3 | 4.3 | | | 4.3 | 4.3 | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | | 1076 | | 535 | 2570 | | | 205 | 663 | 60 | 277 | |
| v/s Ratio Prot | | | | c0.43 | 0.87 | | | | 0.25 | | 0.03 | |
| v/s Ratio Perm | | 0.47 | | c0.75 | | | | c0.23 | 0.14 | 0.09 | | |
| v/c Ratio | | 1.12 | | 1.58 | 1.16 | | | 1.47 | 0.90 | 0.60 | 0.20 | |
| Uniform Delay, d1 | | 34.6 | | 36.6 | 15.1 | | | 50.5 | 31.9 | 47.0 | 43.9 | |
| Progression Factor | | 0.84 | | 1.13 | 0.95 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 64.5 | | 259.9 | 74.7 | | | 235.4 | 16.3 | 18.9 | 0.6 | |
| Delay (s) | | 93.4 | | 301.3 | 89.2 | | | 285.9 | 48.2 | 65.8 | 44.5 | |
| Level of Service | | F | | F | F | | | F | D | E | D | |
| Approach Delay (s) | | 93.4 | | | 135.8 | | | 126.1 | | | 52.5 | |
| Approach LOS | | F | | | F | | | F | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 124.5 | | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 1.51 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 11.3 | | | |
| Intersection Capacity Utilization | | | 141.1% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

17: Woodruff Road & Bell Road

2035 AM Woodruff Improvements

7/6/2011
























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| Volume (vph) | 35 | 1572 | 128 | 40 | 3801 | 24 | 198 | 2 | 48 | 20 | 2 | 85 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.2 | 6.2 | | 6.2 | 6.2 | | | 5.4 | | | 5.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | | | 0.97 | | | 0.89 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.96 | | | 0.99 | |
| Satd. Flow (prot) | 1719 | 3399 | | 1719 | 3435 | | | 1695 | | | 1600 | |
| Flt Permitted | 0.05 | 1.00 | | 0.07 | 1.00 | | | 0.61 | | | 0.95 | |
| Satd. Flow (perm) | 82 | 3399 | | 134 | 3435 | | | 1082 | | | 1537 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 39 | 1747 | 142 | 44 | 4223 | 27 | 220 | 2 | 53 | 22 | 2 | 94 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 39 | 1884 | 0 | 44 | 4250 | 0 | 0 | 267 | 0 | 0 | 118 | 0 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 88.8 | 88.8 | | 88.8 | 88.8 | | | 19.6 | | | 19.6 | |
| Effective Green, g (s) | 88.8 | 88.8 | | 88.8 | 88.8 | | | 19.6 | | | 19.6 | |
| Actuated g/C Ratio | 0.74 | 0.74 | | 0.74 | 0.74 | | | 0.16 | | | 0.16 | |
| Clearance Time (s) | 6.2 | 6.2 | | 6.2 | 6.2 | | | 5.4 | | | 5.4 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | | 4.3 | | | 4.3 | |
| Lane Grp Cap (vph) | 61 | 2515 | | 99 | 2542 | | | 177 | | | 251 | |
| v/s Ratio Prot | 0.55 | | | c1.24 | | | | | | | | |
| v/s Ratio Perm | 0.48 | | | 0.33 | | | | c0.25 | | | 0.08 | |
| v/c Ratio | 0.64 | 0.75 | | 0.44 | 1.67 | | | 1.51 | | | 0.47 | |
| Uniform Delay, d1 | 7.7 | 9.1 | | 6.0 | 15.6 | | | 50.2 | | | 45.5 | |
| Progression Factor | 0.72 | 0.65 | | 0.58 | 0.69 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 17.3 | 0.8 | | 1.3 | 302.5 | | | 256.9 | | | 2.2 | |
| Delay (s) | 22.9 | 6.6 | | 4.8 | 313.3 | | | 307.1 | | | 47.7 | |
| Level of Service | C | A | | A | F | | | F | | | D | |
| Approach Delay (s) | 7.0 | | | 310.1 | | | | 307.1 | | | 47.7 | |
| Approach LOS | A | | | F | | | | F | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 217.0 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.64 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 120.0 | | | Sum of lost time (s) | | | 11.6 | | | | | |
| Intersection Capacity Utilization | 136.2% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: Woodruff Road & SC 14

2035 AM Woodruff Improvements

7/6/2011
























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  | |  |  |  |  |  |  |
| Volume (vph) | 215 | 851 | 131 | 72 | 2101 | 284 | 525 | 546 | 188 | 188 | 326 | 454 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | 5.0 | 6.3 | 6.3 | | 5.0 | 5.0 | 6.3 | 5.0 | 5.0 | 6.3 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3438 | 1538 | 1719 | 3377 | | 1719 | 1810 | 1538 | 1719 | 1810 | 1538 |
| Flt Permitted | 0.08 | 1.00 | 1.00 | 0.19 | 1.00 | | 0.17 | 1.00 | 1.00 | 0.22 | 1.00 | 1.00 |
| Satd. Flow (perm) | 140 | 3438 | 1538 | 344 | 3377 | | 315 | 1810 | 1538 | 402 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 239 | 946 | 146 | 80 | 2334 | 316 | 583 | 607 | 209 | 209 | 362 | 504 |
| RTOR Reduction (vph) | 0 | 0 | 60 | 0 | 9 | 0 | 0 | 0 | 34 | 0 | 0 | 3 |
| Lane Group Flow (vph) | 239 | 946 | 86 | 80 | 2641 | 0 | 583 | 607 | 175 | 209 | 362 | 501 |
| Turn Type | pm+pt | | pm+ov | pm+pt | | | pm+pt | | pm+ov | pm+pt | | pm+ov |
| Protected Phases | 5 | 2 | 3 | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | 6 | | | 8 | | 8 | 4 | | 4 |
| Actuated Green, G (s) | 61.4 | 51.7 | 70.7 | 59.4 | 50.7 | | 42.0 | 29.0 | 37.7 | 26.0 | 18.0 | 27.7 |
| Effective Green, g (s) | 61.4 | 51.7 | 70.7 | 59.4 | 50.7 | | 42.0 | 29.0 | 37.7 | 26.0 | 18.0 | 27.7 |
| Actuated g/C Ratio | 0.51 | 0.43 | 0.59 | 0.49 | 0.42 | | 0.35 | 0.24 | 0.31 | 0.22 | 0.15 | 0.23 |
| Clearance Time (s) | 6.3 | 6.3 | 5.0 | 6.3 | 6.3 | | 5.0 | 5.0 | 6.3 | 5.0 | 5.0 | 6.3 |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 199 | 1481 | 906 | 270 | 1427 | | 333 | 437 | 483 | 175 | 272 | 355 |
| v/s Ratio Prot | 0.10 | 0.28 | 0.02 | 0.02 | c0.78 | | c0.28 | 0.34 | 0.03 | 0.08 | 0.20 | c0.11 |
| v/s Ratio Perm | 0.52 | | 0.04 | 0.13 | | | c0.34 | | 0.09 | 0.18 | | 0.21 |
| v/c Ratio | 1.20 | 0.64 | 0.09 | 0.30 | 1.85 | | 1.75 | 1.39 | 0.36 | 1.19 | 1.33 | 1.41 |
| Uniform Delay, d1 | 35.3 | 26.8 | 10.7 | 17.8 | 34.6 | | 34.3 | 45.5 | 31.8 | 44.9 | 51.0 | 46.1 |
| Progression Factor | 1.11 | 1.05 | 1.85 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 116.4 | 1.3 | 0.0 | 1.0 | 385.7 | | 350.0 | 188.7 | 0.7 | 130.0 | 171.9 | 201.0 |
| Delay (s) | 155.4 | 29.5 | 19.8 | 18.8 | 420.3 | | 384.3 | 234.2 | 32.6 | 174.9 | 222.9 | 247.1 |
| Level of Service | F | C | B | B | F | | F | F | C | F | F | F |
| Approach Delay (s) | | 51.0 | | | 408.5 | | | 266.6 | | | 224.9 | |
| Approach LOS | | D | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 275.1 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.73 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 17.6 | | | |
| Intersection Capacity Utilization | | | 144.1% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

19: E Parkins Mill Road & US 276

2035 AM Woodruff Improvements

7/6/2011

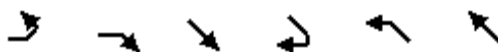
| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 142 | 135 | 67 | 182 | 31 | 139 | 131 | 1888 | 101 | 114 | 1648 | 120 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 4.0 | 7.0 | 7.0 | 4.0 | 7.0 | 7.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 0.97 | 1.00 | 1.00 | 1.00 | 0.91 | 1.00 | 0.97 | 0.91 | 1.00 |
| Frt | 1.00 | 0.95 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3268 | | 3335 | 1810 | 1538 | 1719 | 4940 | 1538 | 3335 | 4940 | 1538 |
| Flt Permitted | 0.73 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1330 | 3268 | | 3335 | 1810 | 1538 | 1719 | 4940 | 1538 | 3335 | 4940 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 158 | 150 | 74 | 202 | 34 | 154 | 146 | 2098 | 112 | 127 | 1831 | 133 |
| RTOR Reduction (vph) | 0 | 57 | 0 | 0 | 0 | 139 | 0 | 0 | 44 | 0 | 0 | 45 |
| Lane Group Flow (vph) | 158 | 167 | 0 | 202 | 34 | 15 | 146 | 2098 | 68 | 127 | 1831 | 88 |
| Turn Type | pm+pt | | | Prot | | Perm | Prot | | Perm | Prot | | Perm |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 8 | | | | | 4 | | | 6 | | | 2 |
| Actuated Green, G (s) | 19.8 | 9.8 | | 10.7 | 10.5 | 10.5 | 13.6 | 56.0 | 56.0 | 7.8 | 50.2 | 50.2 |
| Effective Green, g (s) | 19.8 | 9.8 | | 10.7 | 10.5 | 10.5 | 13.6 | 56.0 | 56.0 | 7.8 | 50.2 | 50.2 |
| Actuated g/C Ratio | 0.19 | 0.09 | | 0.10 | 0.10 | 0.10 | 0.13 | 0.53 | 0.53 | 0.07 | 0.48 | 0.48 |
| Clearance Time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 4.0 | 7.0 | 7.0 | 4.0 | 7.0 | 7.0 |
| Vehicle Extension (s) | 4.3 | 4.9 | | 4.3 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 287 | 304 | | 339 | 180 | 153 | 222 | 2627 | 818 | 247 | 2355 | 733 |
| v/s Ratio Prot | 0.05 | 0.05 | | c0.06 | 0.02 | | c0.08 | c0.42 | | 0.04 | 0.37 | |
| v/s Ratio Perm | c0.05 | | | | | 0.01 | | | 0.04 | | | 0.06 |
| v/c Ratio | 0.55 | 0.55 | | 0.60 | 0.19 | 0.10 | 0.66 | 0.80 | 0.08 | 0.51 | 0.78 | 0.12 |
| Uniform Delay, d1 | 38.2 | 45.6 | | 45.2 | 43.5 | 43.1 | 43.6 | 20.1 | 12.1 | 46.9 | 22.9 | 15.3 |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.1 | 3.4 | | 3.6 | 1.0 | 0.6 | 8.0 | 2.0 | 0.1 | 2.7 | 1.9 | 0.1 |
| Delay (s) | 41.3 | 49.1 | | 48.8 | 44.5 | 43.7 | 51.6 | 22.1 | 12.2 | 49.7 | 24.9 | 15.4 |
| Level of Service | D | D | | D | D | D | D | C | B | D | C | B |
| Approach Delay (s) | | 45.9 | | | 46.4 | | | 23.5 | | | 25.8 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 27.7 | | | HCM Level of Service | | | C | | | |
| HCM Volume to Capacity ratio | | | 0.67 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 105.3 | | | Sum of lost time (s) | | | 12.0 | | | |
| Intersection Capacity Utilization | | | 69.3% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

20: Duvall Drive & US 276

2035 AM Woodruff Improvements

7/6/2011


























| Movement | EBL | EBR | SET | SER | NWL | NWT |
|-----------------------------------|-------|------|-------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 459 | 129 | 1592 | 305 | 138 | 1661 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | 6.3 | | 6.3 | 6.3 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 |
| Frt | 1.00 | 0.85 | 0.98 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1719 | 1538 | 4821 | | 1719 | 4940 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.10 | 1.00 |
| Satd. Flow (perm) | 1719 | 1538 | 4821 | | 182 | 4940 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 510 | 143 | 1769 | 339 | 153 | 1846 |
| RTOR Reduction (vph) | 0 | 17 | 43 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 510 | 126 | 2065 | 0 | 153 | 1846 |
| Turn Type | Perm | | | | Perm | |
| Protected Phases | 8 | | 2 | | | 6 |
| Permitted Phases | | 8 | | | 6 | |
| Actuated Green, G (s) | 13.0 | 13.0 | 39.7 | | 39.7 | 39.7 |
| Effective Green, g (s) | 13.0 | 13.0 | 39.7 | | 39.7 | 39.7 |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.61 | | 0.61 | 0.61 |
| Clearance Time (s) | 6.0 | 6.0 | 6.3 | | 6.3 | 6.3 |
| Vehicle Extension (s) | 4.9 | 4.9 | 4.9 | | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 344 | 308 | 2945 | | 111 | 3017 |
| v/s Ratio Prot | c0.30 | | 0.43 | | | 0.37 |
| v/s Ratio Perm | | 0.08 | | | c0.84 | |
| v/c Ratio | 1.48 | 0.41 | 0.70 | | 1.38 | 0.61 |
| Uniform Delay, d1 | 26.0 | 22.7 | 8.6 | | 12.6 | 7.9 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 232.2 | 1.8 | 1.0 | | 216.7 | 0.5 |
| Delay (s) | 258.2 | 24.4 | 9.6 | | 229.3 | 8.4 |
| Level of Service | F | C | A | | F | A |
| Approach Delay (s) | 207.0 | | 9.6 | | | 25.3 |
| Approach LOS | F | | A | | | C |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 43.3 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | | 1.40 | | | |
| Actuated Cycle Length (s) | | | 65.0 | | Sum of lost time (s) | 12.3 |
| Intersection Capacity Utilization | | | 91.8% | | ICU Level of Service | F |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

23: US 276 & Millennium Blvd

2035 AM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations |  |  |  |  |  |  |  |  | |  |  |  |
| Volume (vph) | 137 | 1603 | 283 | 33 | 2233 | 77 | 96 | 101 | 83 | 6 | 20 | 52 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 6.5 | 6.5 | 4.5 | 6.5 | 6.5 | 6.0 | 6.0 | | 6.0 | 6.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | | 1.00 | 1.00 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.93 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3438 | 1538 | 1719 | 3438 | 1538 | 3335 | 3206 | | 1719 | 1810 | 2707 |
| Flt Permitted | 0.04 | 1.00 | 1.00 | 0.08 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.62 | 1.00 | 1.00 |
| Satd. Flow (perm) | 75 | 3438 | 1538 | 136 | 3438 | 1538 | 3335 | 3206 | | 1129 | 1810 | 2707 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 152 | 1781 | 314 | 37 | 2481 | 86 | 107 | 112 | 92 | 7 | 22 | 58 |
| RTOR Reduction (vph) | 0 | 0 | 100 | 0 | 0 | 23 | 0 | 81 | 0 | 0 | 0 | 16 |
| Lane Group Flow (vph) | 152 | 1781 | 214 | 37 | 2481 | 63 | 107 | 123 | 0 | 7 | 22 | 42 |
| Turn Type | pm+pt | | Perm | pm+pt | | Perm | Prot | | | pm+pt | | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | 6 | | 6 | | | | 4 | | 4 |
| Actuated Green, G (s) | 104.1 | 96.1 | 96.1 | 98.2 | 93.4 | 93.4 | 8.0 | 16.2 | | 9.4 | 8.8 | 16.8 |
| Effective Green, g (s) | 104.1 | 96.1 | 96.1 | 98.2 | 93.4 | 93.4 | 8.0 | 16.2 | | 9.4 | 8.8 | 16.8 |
| Actuated g/C Ratio | 0.74 | 0.68 | 0.68 | 0.70 | 0.66 | 0.66 | 0.06 | 0.12 | | 0.07 | 0.06 | 0.12 |
| Clearance Time (s) | 4.0 | 6.5 | 6.5 | 4.5 | 6.5 | 6.5 | 6.0 | 6.0 | | 6.0 | 6.0 | 4.0 |
| Vehicle Extension (s) | 4.3 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 | 4.3 | 6.4 | | 4.3 | 6.4 | 4.3 |
| Lane Grp Cap (vph) | 149 | 2348 | 1050 | 149 | 2282 | 1021 | 190 | 369 | | 78 | 113 | 323 |
| v/s Ratio Prot | c0.06 | 0.52 | | 0.01 | c0.72 | | c0.03 | c0.04 | | 0.00 | 0.01 | 0.01 |
| v/s Ratio Perm | 0.69 | | 0.14 | 0.16 | | 0.04 | | | | 0.01 | | 0.01 |
| v/c Ratio | 1.02 | 0.76 | 0.20 | 0.25 | 1.09 | 0.06 | 0.56 | 0.33 | | 0.09 | 0.19 | 0.13 |
| Uniform Delay, d1 | 51.6 | 14.7 | 8.2 | 13.1 | 23.6 | 8.3 | 64.6 | 57.3 | | 61.5 | 62.6 | 55.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 79.1 | 1.7 | 0.2 | 1.4 | 47.4 | 0.1 | 5.1 | 1.7 | | 0.8 | 2.6 | 0.3 |
| Delay (s) | 130.8 | 16.4 | 8.4 | 14.4 | 71.0 | 8.3 | 69.7 | 58.9 | | 62.3 | 65.2 | 55.7 |
| Level of Service | F | B | A | B | E | A | E | E | | E | E | E |
| Approach Delay (s) | | 23.0 | | | 68.2 | | | 62.6 | | | 58.6 | |
| Approach LOS | | C | | | E | | | E | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 48.3 | | | HCM Level of Service | | | | D | | |
| HCM Volume to Capacity ratio | | | 0.98 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 140.7 | | | Sum of lost time (s) | | | | 20.5 | | |
| Intersection Capacity Utilization | | | 92.5% | | | ICU Level of Service | | | | F | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: Pelham Road & The Parkway

2035 AM Woodruff Improvements

7/6/2011

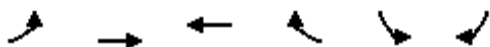
| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  | |  |  | | | |  |  |  |
| Volume (vph) | 275 | 1294 | 1254 | 0 | 2248 | 1068 | 0 | 0 | 0 | 379 | 695 | 199 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | | 5.8 | 5.3 | | | | 5.3 | 5.3 | 5.3 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | | 0.95 | 1.00 | | | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3335 | 3438 | 1538 | | 3438 | 1538 | | | | 1719 | 1810 | 1538 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3335 | 3438 | 1538 | | 3438 | 1538 | | | | 1719 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 306 | 1438 | 1393 | 0 | 2498 | 1187 | 0 | 0 | 0 | 421 | 772 | 221 |
| RTOR Reduction (vph) | 0 | 0 | 9 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 100 |
| Lane Group Flow (vph) | 306 | 1438 | 1384 | 0 | 2498 | 1186 | 0 | 0 | 0 | 421 | 772 | 121 |
| Turn Type | Prot | | Perm | Perm | | custom | | | | Perm | | Perm |
| Protected Phases | 5 | 2 | | | 6 | 4 | | | | | 4 | |
| Permitted Phases | | | 2 | 6 | | 6 | | | | 4 | | 4 |
| Actuated Green, G (s) | 9.2 | 79.2 | 79.2 | | 64.2 | 98.9 | | | | 34.7 | 34.7 | 34.7 |
| Effective Green, g (s) | 9.2 | 79.2 | 79.2 | | 64.2 | 98.9 | | | | 34.7 | 34.7 | 34.7 |
| Actuated g/C Ratio | 0.07 | 0.63 | 0.63 | | 0.51 | 0.79 | | | | 0.28 | 0.28 | 0.28 |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | | 5.8 | 5.3 | | | | 5.3 | 5.3 | 5.3 |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | | 4.3 | 4.3 | | | | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 245 | 2178 | 974 | | 1766 | 1217 | | | | 477 | 502 | 427 |
| v/s Ratio Prot | 0.09 | 0.42 | | | 0.73 | 0.27 | | | | | c0.43 | |
| v/s Ratio Perm | | | c0.90 | | | 0.50 | | | | 0.24 | | 0.08 |
| v/c Ratio | 1.25 | 0.66 | 1.42 | | 1.41 | 0.97 | | | | 0.88 | 1.54 | 0.28 |
| Uniform Delay, d1 | 57.9 | 14.4 | 22.9 | | 30.4 | 11.9 | | | | 43.2 | 45.1 | 35.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.94 | 1.07 | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 141.3 | 1.6 | 195.4 | | 186.8 | 3.7 | | | | 17.9 | 251.9 | 0.6 |
| Delay (s) | 199.2 | 16.0 | 218.3 | | 215.4 | 16.5 | | | | 61.1 | 297.0 | 36.0 |
| Level of Service | F | B | F | | F | B | | | | E | F | D |
| Approach Delay (s) | | 123.7 | | | 151.3 | | | 0.0 | | | 186.0 | |
| Approach LOS | | F | | | F | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 146.8 | | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 1.46 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 125.0 | | | Sum of lost time (s) | | | | 11.1 | | |
| Intersection Capacity Utilization | | | 190.4% | | | ICU Level of Service | | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

25: Pelham Road & I-85 SB off ramp

2035 AM Woodruff Improvements

7/6/2011



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|--------|-------|----------------------|-------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑↑ |
| Volume (vph) | 0 | 1673 | 1531 | 0 | 998 | 1785 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.6 | 5.6 | | 5.3 | 5.3 |
| Lane Util. Factor | | 0.95 | 0.95 | | 1.00 | 0.88 |
| Frt | | 1.00 | 1.00 | | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | | 3438 | 3438 | | 1719 | 2707 |
| Flt Permitted | | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | | 3438 | 3438 | | 1719 | 2707 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1859 | 1701 | 0 | 1109 | 1983 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 3 |
| Lane Group Flow (vph) | 0 | 1859 | 1701 | 0 | 1109 | 1980 |
| Turn Type | | | | | Perm | |
| Protected Phases | | 2 | 6 | | 4 | |
| Permitted Phases | | | | | | 4 |
| Actuated Green, G (s) | | 51.4 | 51.4 | | 62.7 | 62.7 |
| Effective Green, g (s) | | 51.4 | 51.4 | | 62.7 | 62.7 |
| Actuated g/C Ratio | | 0.41 | 0.41 | | 0.50 | 0.50 |
| Clearance Time (s) | | 5.6 | 5.6 | | 5.3 | 5.3 |
| Vehicle Extension (s) | | 4.3 | 4.3 | | 4.3 | 4.3 |
| Lane Grp Cap (vph) | | 1414 | 1414 | | 862 | 1358 |
| v/s Ratio Prot | | c0.54 | 0.49 | | 0.65 | |
| v/s Ratio Perm | | | | | | c0.73 |
| v/c Ratio | | 1.31 | 1.20 | | 1.29 | 1.46 |
| Uniform Delay, d1 | | 36.8 | 36.8 | | 31.1 | 31.1 |
| Progression Factor | | 0.96 | 0.88 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | 145.2 | 96.3 | | 137.7 | 210.3 |
| Delay (s) | | 180.4 | 128.7 | | 168.9 | 241.4 |
| Level of Service | | F | F | | F | F |
| Approach Delay (s) | | 180.4 | 128.7 | | 215.4 | |
| Approach LOS | | F | F | | F | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 183.4 | | HCM Level of Service | | F |
| HCM Volume to Capacity ratio | | 1.39 | | | | |
| Actuated Cycle Length (s) | | 125.0 | | Sum of lost time (s) | | 10.9 |
| Intersection Capacity Utilization | | 163.4% | | ICU Level of Service | | H |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: Pelham Road & I-85 NB off ramp

2035 AM Woodruff Improvements

7/6/2011




















| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|-------|--------|------|----------------------|-------|-------|
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | ↑ |
| Volume (vph) | 1540 | 0 | 0 | 782 | 1192 | 1268 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | | | 5.8 | 5.0 | 5.0 |
| Lane Util. Factor | 0.95 | | | 0.95 | 0.97 | 1.00 |
| Frt | 1.00 | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 1.00 | | | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 3438 | | | 3438 | 3335 | 1538 |
| Flt Permitted | 1.00 | | | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 3438 | | | 3438 | 3335 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 1711 | 0 | 0 | 869 | 1324 | 1409 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 1711 | 0 | 0 | 869 | 1324 | 1409 |
| Turn Type | | | | | | Perm |
| Protected Phases | 2 | | | 6 | 8 | |
| Permitted Phases | | | | | | 8 |
| Actuated Green, G (s) | 44.2 | | | 44.2 | 70.0 | 70.0 |
| Effective Green, g (s) | 44.2 | | | 44.2 | 70.0 | 70.0 |
| Actuated g/C Ratio | 0.35 | | | 0.35 | 0.56 | 0.56 |
| Clearance Time (s) | 5.8 | | | 5.8 | 5.0 | 5.0 |
| Vehicle Extension (s) | 4.3 | | | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 1216 | | | 1216 | 1868 | 861 |
| v/s Ratio Prot | c0.50 | | | 0.25 | 0.40 | |
| v/s Ratio Perm | | | | | | c0.92 |
| v/c Ratio | 1.41 | | | 0.71 | 0.71 | 1.64 |
| Uniform Delay, d1 | 40.4 | | | 34.9 | 20.1 | 27.5 |
| Progression Factor | 0.69 | | | 1.19 | 1.00 | 1.00 |
| Incremental Delay, d2 | 183.6 | | | 1.8 | 1.4 | 291.5 |
| Delay (s) | 211.5 | | | 43.4 | 21.5 | 319.0 |
| Level of Service | F | | | D | C | F |
| Approach Delay (s) | 211.5 | | | 43.4 | 174.8 | |
| Approach LOS | F | | | D | F | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | 165.1 | | HCM Level of Service | | F |
| HCM Volume to Capacity ratio | | 1.55 | | | | |
| Actuated Cycle Length (s) | | 125.0 | | Sum of lost time (s) | | 10.8 |
| Intersection Capacity Utilization | | 182.5% | | ICU Level of Service | | H |
| Analysis Period (min) | | 15 | | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

27: Pelham Road & Boland Court

2035 AM Woodruff Improvements

7/6/2011






















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  |  | |  | |
| Volume (vph) | 45 | 1933 | 830 | 157 | 1185 | 10 | 438 | 2 | 164 | 35 | 3 | 16 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.7 | 6.7 | | 6.7 | 6.7 | | | 6.3 | 6.3 | | 6.3 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 0.95 | | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.95 | 1.00 | | 0.97 | |
| Satd. Flow (prot) | 1719 | 3283 | | 1719 | 3434 | | | 1724 | 1538 | | 1682 | |
| Flt Permitted | 0.20 | 1.00 | | 0.06 | 1.00 | | | 0.72 | 1.00 | | 0.15 | |
| Satd. Flow (perm) | 353 | 3283 | | 100 | 3434 | | | 1305 | 1538 | | 259 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 50 | 2148 | 922 | 174 | 1317 | 11 | 487 | 2 | 182 | 39 | 3 | 18 |
| RTOR Reduction (vph) | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 50 | 3032 | 0 | 174 | 1328 | 0 | 0 | 489 | 94 | 0 | 48 | 0 |
| Turn Type | Perm | | | pm+pt | | | Perm | | | Perm | Perm | |
| Protected Phases | 2 | | | 1 | | 6 | 8 | | | 8 | | 4 |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 8 | 4 | |
| Actuated Green, G (s) | 65.4 | 65.4 | | 82.3 | 82.3 | | | 29.7 | 29.7 | | 29.7 | |
| Effective Green, g (s) | 65.4 | 65.4 | | 82.3 | 82.3 | | | 29.7 | 29.7 | | 29.7 | |
| Actuated g/C Ratio | 0.52 | 0.52 | | 0.66 | 0.66 | | | 0.24 | 0.24 | | 0.24 | |
| Clearance Time (s) | 6.7 | 6.7 | | 6.7 | 6.7 | | | 6.3 | 6.3 | | 6.3 | |
| Vehicle Extension (s) | 4.9 | 4.9 | | 4.3 | 4.9 | | | 4.3 | 4.3 | | 4.3 | |
| Lane Grp Cap (vph) | 185 | 1718 | | 198 | 2261 | | | 310 | 365 | | 62 | |
| v/s Ratio Prot | c0.92 | | | c0.07 | | 0.39 | | | | | | |
| v/s Ratio Perm | 0.14 | | | 0.51 | | | c0.37 | | 0.06 | | 0.18 | |
| v/c Ratio | 0.27 | 1.76 | | 0.88 | 0.59 | | 1.58 | | 0.26 | | 0.77 | |
| Uniform Delay, d1 | 16.5 | 29.8 | | 40.3 | 11.9 | | 47.6 | | 38.7 | | 44.5 | |
| Progression Factor | 1.30 | 1.26 | | 1.00 | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.3 | 344.4 | | 33.9 | 1.1 | | 274.8 | | 0.6 | | 47.1 | |
| Delay (s) | 21.8 | 382.0 | | 74.1 | 13.0 | | 322.5 | | 39.3 | | 91.6 | |
| Level of Service | C | F | | E | B | | F | | D | | F | |
| Approach Delay (s) | 376.2 | | | 20.1 | | | 245.7 | | | 91.6 | | |
| Approach LOS | F | | | C | | | F | | | F | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 256.7 | | HCM Level of Service | | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.63 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 125.0 | | Sum of lost time (s) | | | | 19.7 | | | |
| Intersection Capacity Utilization | | | 136.1% | | ICU Level of Service | | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

28: Forsythia Dr & E Butler Road

2035 AM Woodruff Improvements

7/6/2011


















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | |  |  |  |  |  |  |
| Volume (vph) | 27 | 0 | 22 | 22 | 0 | 166 | 3 | 1372 | 16 | 58 | 1240 | 14 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.0 | 6.0 | | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frt | | 1.00 | 0.85 | | 0.88 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flt Protected | | 0.95 | 1.00 | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1719 | 1538 | | 1584 | | 1719 | 3432 | | 1719 | 3432 | |
| Flt Permitted | | 0.77 | 1.00 | | 0.96 | | 0.25 | 1.00 | | 0.25 | 1.00 | |
| Satd. Flow (perm) | | 1393 | 1538 | | 1532 | | 450 | 3432 | | 450 | 3432 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 30 | 0 | 24 | 24 | 0 | 184 | 3 | 1524 | 18 | 64 | 1378 | 16 |
| RTOR Reduction (vph) | 0 | 0 | 4 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 30 | 20 | 0 | 206 | 0 | 3 | 1540 | 0 | 64 | 1392 | 0 |
| Turn Type | Perm | | Perm | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 11.4 | 11.4 | | 11.4 | | 16.1 | 16.1 | | 16.1 | 16.1 | |
| Effective Green, g (s) | | 11.4 | 11.4 | | 11.4 | | 16.1 | 16.1 | | 16.1 | 16.1 | |
| Actuated g/C Ratio | | 0.29 | 0.29 | | 0.29 | | 0.41 | 0.41 | | 0.41 | 0.41 | |
| Clearance Time (s) | | 6.0 | 6.0 | | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | | 4.3 | 4.3 | | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | | 402 | 444 | | 442 | | 183 | 1399 | | 183 | 1399 | |
| v/s Ratio Prot | | | | | | | | c0.45 | | | | 0.41 |
| v/s Ratio Perm | | 0.02 | 0.01 | | c0.13 | | 0.01 | | | 0.14 | | |
| v/c Ratio | | 0.07 | 0.04 | | 0.47 | | 0.02 | 1.10 | | 0.35 | 1.00 | |
| Uniform Delay, d1 | | 10.2 | 10.1 | | 11.5 | | 7.0 | 11.7 | | 8.1 | 11.7 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | 0.1 | | 1.2 | | 0.1 | 56.7 | | 1.8 | 22.8 | |
| Delay (s) | | 10.3 | 10.2 | | 12.8 | | 7.0 | 68.4 | | 9.9 | 34.4 | |
| Level of Service | | B | B | | B | | A | E | | A | C | |
| Approach Delay (s) | | 10.3 | | | 12.8 | | | 68.3 | | | 33.4 | |
| Approach LOS | | B | | | B | | | E | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 48.2 | | | HCM Level of Service | | | | D | | |
| HCM Volume to Capacity ratio | | | 0.84 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 39.5 | | | Sum of lost time (s) | | | 12.0 | | | |
| Intersection Capacity Utilization | | | 74.9% | | | ICU Level of Service | | | | D | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: E Butler Road & I-385 SB Ramps

2035 AM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations | |  | |  |  | | |  |  | | | |
| Volume (vph) | 0 | 1476 | 91 | 251 | 1003 | 0 | 783 | 0 | 344 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.0 | | 6.0 | 6.0 | | | 6.0 | 6.0 | | | |
| Lane Util. Factor | | 0.95 | | 1.00 | 0.95 | | | 1.00 | 1.00 | | | |
| Flt | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | 0.95 | 1.00 | | | |
| Satd. Flow (prot) | | 3408 | | 1719 | 3438 | | | 1719 | 1538 | | | |
| Flt Permitted | | 1.00 | | 0.07 | 1.00 | | | 0.95 | 1.00 | | | |
| Satd. Flow (perm) | | 3408 | | 134 | 3438 | | | 1719 | 1538 | | | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1640 | 101 | 279 | 1114 | 0 | 870 | 0 | 382 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1738 | 0 | 279 | 1114 | 0 | 0 | 870 | 338 | 0 | 0 | 0 |
| Turn Type | | | | pm+pt | | | Perm | | Perm | | | |
| Protected Phases | | | | 1 | 6 | | | 4 | | | | |
| Permitted Phases | | 2 | | 6 | | | 4 | | 4 | | | |
| Actuated Green, G (s) | | 48.0 | | 70.0 | 70.0 | | | 48.0 | 48.0 | | | |
| Effective Green, g (s) | | 48.0 | | 70.0 | 70.0 | | | 48.0 | 48.0 | | | |
| Actuated g/C Ratio | | 0.37 | | 0.54 | 0.54 | | | 0.37 | 0.37 | | | |
| Clearance Time (s) | | 6.0 | | 6.0 | 6.0 | | | 6.0 | 6.0 | | | |
| Vehicle Extension (s) | | 4.3 | | 4.3 | 4.3 | | | 4.3 | 4.3 | | | |
| Lane Grp Cap (vph) | | 1258 | | 267 | 1851 | | | 635 | 568 | | | |
| v/s Ratio Prot | | | | c0.13 | 0.32 | | | | | | | |
| v/s Ratio Perm | | c0.51 | | 0.43 | | | | 0.51 | 0.22 | | | |
| v/c Ratio | | 1.38 | | 1.04 | 0.60 | | | 1.37 | 0.60 | | | |
| Uniform Delay, d1 | | 41.0 | | 42.4 | 20.5 | | | 41.0 | 33.2 | | | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 176.7 | | 67.3 | 0.7 | | | 176.4 | 2.1 | | | |
| Delay (s) | | 217.7 | | 109.7 | 21.2 | | | 217.4 | 35.3 | | | |
| Level of Service | | F | | F | C | | | F | D | | | |
| Approach Delay (s) | | 217.7 | | | 38.9 | | | 161.9 | | | 0.0 | |
| Approach LOS | | F | | | D | | | F | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 145.0 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.33 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 130.0 | | | Sum of lost time (s) | | | 18.0 | | | |
| Intersection Capacity Utilization | | | 116.0% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: E Butler Road & I-385 NB Ramps

2035 AM Woodruff Improvements

7/6/2011
























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |   | | |   |  | | | |  | |  |
| Volume (vph) | 580 | 1679 | 0 | 0 | 1229 | 719 | 0 | 0 | 0 | 25 | 0 | 426 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | | 6.0 | 6.0 | | | | 6.0 | | 6.0 |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | 1.00 | | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | 1.00 | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | 0.95 | | 1.00 |
| Satd. Flow (prot) | 1719 | 3438 | | | 3438 | 1538 | | | | 1719 | | 1538 |
| Flt Permitted | 0.08 | 1.00 | | | 1.00 | 1.00 | | | | 0.95 | | 1.00 |
| Satd. Flow (perm) | 142 | 3438 | | | 3438 | 1538 | | | | 1719 | | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 644 | 1866 | 0 | 0 | 1366 | 799 | 0 | 0 | 0 | 28 | 0 | 473 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 339 | 0 | 0 | 0 | 0 | 0 | 18 |
| Lane Group Flow (vph) | 644 | 1866 | 0 | 0 | 1366 | 460 | 0 | 0 | 0 | 28 | 0 | 455 |
| Turn Type | pm+pt | | | | custom | | | | custom | | | custom |
| Protected Phases | 5 | 2 | | | | | | | | | | 8 |
| Permitted Phases | 2 | | | | 6 | 6 | | | | 8 | | |
| Actuated Green, G (s) | 86.0 | 86.0 | | | 45.0 | 45.0 | | | | 32.0 | | 32.0 |
| Effective Green, g (s) | 86.0 | 86.0 | | | 45.0 | 45.0 | | | | 32.0 | | 32.0 |
| Actuated g/C Ratio | 0.66 | 0.66 | | | 0.35 | 0.35 | | | | 0.25 | | 0.25 |
| Clearance Time (s) | 6.0 | 6.0 | | | 6.0 | 6.0 | | | | 6.0 | | 6.0 |
| Vehicle Extension (s) | 4.3 | 4.3 | | | 4.3 | 4.3 | | | | 4.3 | | 4.3 |
| Lane Grp Cap (vph) | 519 | 2274 | | | 1190 | 532 | | | | 423 | | 379 |
| v/s Ratio Prot | c0.33 | 0.54 | | | | | | | | | | c0.30 |
| v/s Ratio Perm | c0.49 | | | | 0.40 | 0.30 | | | | 0.02 | | |
| v/c Ratio | 1.24 | 0.82 | | | 1.15 | 0.87 | | | | 0.07 | | 1.20 |
| Uniform Delay, d1 | 40.7 | 16.3 | | | 42.5 | 39.7 | | | | 37.6 | | 49.0 |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | | | 1.00 | | 1.00 |
| Incremental Delay, d2 | 124.0 | 2.7 | | | 76.7 | 14.4 | | | | 0.1 | | 112.9 |
| Delay (s) | 164.7 | 19.0 | | | 119.2 | 54.1 | | | | 37.7 | | 161.9 |
| Level of Service | F | B | | | F | D | | | | D | | F |
| Approach Delay (s) | | 56.4 | | | 95.2 | | | 0.0 | | | 154.9 | |
| Approach LOS | | E | | | F | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 82.1 | | HCM Level of Service | | | | | F | | |
| HCM Volume to Capacity ratio | | | 1.20 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 130.0 | | Sum of lost time (s) | | | | | 12.0 | | |
| Intersection Capacity Utilization | | | 116.0% | | ICU Level of Service | | | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

34: Frontage Road & Roper Mountain Road

2035 AM Woodruff Improvements

7/6/2011




















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 4 | 99 | 151 | 111 | 23 | 18 | 848 | 1234 | 1042 | 99 | 1751 | 37 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 0.95 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | 1.00 | 0.91 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 0.97 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 1645 | | 1633 | 1665 | 1538 | 1719 | 3438 | 1538 | 1719 | 3427 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 0.97 | 1.00 | 0.09 | 1.00 | 1.00 | 0.20 | 1.00 | |
| Satd. Flow (perm) | 1719 | 1645 | | 1633 | 1665 | 1538 | 157 | 3438 | 1538 | 358 | 3427 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 4 | 110 | 168 | 123 | 26 | 20 | 942 | 1371 | 1158 | 110 | 1946 | 41 |
| RTOR Reduction (vph) | 0 | 55 | 0 | 0 | 0 | 19 | 0 | 0 | 140 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 4 | 223 | 0 | 74 | 75 | 1 | 942 | 1371 | 1018 | 110 | 1986 | 0 |
| Turn Type | Split | | | Split | | Perm | pm+pt | | Perm | Perm | | |
| Protected Phases | 4 | 4 | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 7.0 | 7.0 | | 4.0 | 4.0 | 4.0 | 71.0 | 71.0 | 71.0 | 40.0 | 40.0 | |
| Effective Green, g (s) | 7.0 | 7.0 | | 4.0 | 4.0 | 4.0 | 71.0 | 71.0 | 71.0 | 40.0 | 40.0 | |
| Actuated g/C Ratio | 0.07 | 0.07 | | 0.04 | 0.04 | 0.04 | 0.71 | 0.71 | 0.71 | 0.40 | 0.40 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| Vehicle Extension (s) | 4.9 | 4.9 | | 4.9 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 | 4.9 | 4.9 | |
| Lane Grp Cap (vph) | 120 | 115 | | 65 | 67 | 62 | 502 | 2441 | 1092 | 143 | 1371 | |
| v/s Ratio Prot | 0.00 | c0.14 | | c0.05 | 0.05 | | c0.47 | 0.40 | | | 0.58 | |
| v/s Ratio Perm | | | | | | 0.00 | c0.86 | | 0.66 | 0.31 | | |
| v/c Ratio | 0.03 | 1.94 | | 1.14 | 1.12 | 0.01 | 1.88 | 0.56 | 0.93 | 0.77 | 1.45 | |
| Uniform Delay, d1 | 43.3 | 46.5 | | 48.0 | 48.0 | 46.1 | 31.2 | 7.0 | 12.4 | 26.0 | 30.0 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.99 | 0.99 | 1.26 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 453.3 | | 154.3 | 146.3 | 0.2 | 395.1 | 0.1 | 1.9 | 32.1 | 205.9 | |
| Delay (s) | 43.6 | 499.8 | | 202.3 | 194.3 | 46.3 | 426.0 | 7.0 | 17.6 | 58.1 | 235.9 | |
| Level of Service | D | F | | F | F | D | F | A | B | E | F | |
| Approach Delay (s) | | 493.3 | | | 180.3 | | | 124.3 | | | 226.6 | |
| Approach LOS | | F | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 178.8 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.77 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 18.0 | | | |
| Intersection Capacity Utilization | | | 134.7% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

35: I-385 NB Ramps & Roper Mountain Road

2035 AM Woodruff Improvements

7/6/2011
























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | |  |  |  |  |  | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 1061 | 0 | 1506 | 265 | 1618 | 0 | 0 | 1551 | 462 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | 6.0 | 6.0 |
| Lane Util. Factor | | | | 0.95 | 0.95 | 0.88 | 0.97 | 0.95 | | | 0.95 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1633 | 1633 | 2707 | 3335 | 3438 | | | 3438 | 1538 |
| Flt Permitted | | | | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1633 | 1633 | 2707 | 3335 | 3438 | | | 3438 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 0 | 0 | 1179 | 0 | 1673 | 294 | 1798 | 0 | 0 | 1723 | 513 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 224 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 589 | 590 | 1663 | 294 | 1798 | 0 | 0 | 1723 | 289 |
| Turn Type | | | | Perm | | Perm | Prot | | | | | Perm |
| Protected Phases | | | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | 8 | | 8 | | | | | | 6 |
| Actuated Green, G (s) | | | | 36.0 | 36.0 | 36.0 | 7.0 | 52.0 | | | 39.0 | 39.0 |
| Effective Green, g (s) | | | | 36.0 | 36.0 | 36.0 | 7.0 | 52.0 | | | 39.0 | 39.0 |
| Actuated g/C Ratio | | | | 0.36 | 0.36 | 0.36 | 0.07 | 0.52 | | | 0.39 | 0.39 |
| Clearance Time (s) | | | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | 6.0 | 6.0 |
| Vehicle Extension (s) | | | | 4.9 | 4.9 | 4.9 | 4.3 | 4.9 | | | 4.9 | 4.9 |
| Lane Grp Cap (vph) | | | | 588 | 588 | 975 | 233 | 1788 | | | 1341 | 600 |
| v/s Ratio Prot | | | | | | | 0.09 | c0.52 | | | c0.50 | |
| v/s Ratio Perm | | | | 0.36 | 0.36 | c0.61 | | | | | | 0.19 |
| v/c Ratio | | | | 1.00 | 1.00 | 1.71 | 1.26 | 1.01 | | | 1.28 | 0.48 |
| Uniform Delay, d1 | | | | 32.0 | 32.0 | 32.0 | 46.5 | 24.0 | | | 30.5 | 22.9 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | 1.45 | 0.59 | | | 0.67 | 0.64 |
| Incremental Delay, d2 | | | | 37.5 | 38.0 | 321.8 | 121.1 | 7.8 | | | 128.7 | 0.3 |
| Delay (s) | | | | 69.5 | 70.0 | 353.8 | 188.5 | 21.9 | | | 149.0 | 14.9 |
| Level of Service | | | | E | E | F | F | C | | | F | B |
| Approach Delay (s) | | 0.0 | | | 236.4 | | | 45.3 | | | 118.2 | |
| Approach LOS | | A | | | F | | | D | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 143.9 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.49 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 18.0 | | | |
| Intersection Capacity Utilization | | | 146.5% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

36: Roper Mountain Road & I-385 SB Ramps

2035 AM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations | |    |  |  |   | |  |  |   | | | |
| Volume (vph) | 0 | 1065 | 380 | 979 | 1633 | 0 | 818 | 0 | 458 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.4 | 6.4 | 5.8 | 6.4 | | 6.1 | 6.1 | 6.1 | | | |
| Lane Util. Factor | | 0.91 | 1.00 | 1.00 | 0.95 | | 0.95 | 0.95 | 0.88 | | | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 0.95 | 1.00 | | | |
| Satd. Flow (prot) | | 4940 | 1538 | 1719 | 3438 | | 1633 | 1633 | 2707 | | | |
| Flt Permitted | | 1.00 | 1.00 | 0.14 | 1.00 | | 0.95 | 0.95 | 1.00 | | | |
| Satd. Flow (perm) | | 4940 | 1538 | 245 | 3438 | | 1633 | 1633 | 2707 | | | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1183 | 422 | 1088 | 1814 | 0 | 909 | 0 | 509 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 279 | 0 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1183 | 143 | 1088 | 1814 | 0 | 454 | 455 | 462 | 0 | 0 | 0 |
| Turn Type | | Perm | | pm+pt | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | 1 | 6 | | | 4 | | | | |
| Permitted Phases | | | 2 | 6 | | | 4 | | 4 | | | |
| Actuated Green, G (s) | | 31.6 | 31.6 | 70.2 | 69.6 | | 17.9 | 17.9 | 17.9 | | | |
| Effective Green, g (s) | | 31.6 | 31.6 | 70.2 | 69.6 | | 17.9 | 17.9 | 17.9 | | | |
| Actuated g/C Ratio | | 0.32 | 0.32 | 0.70 | 0.70 | | 0.18 | 0.18 | 0.18 | | | |
| Clearance Time (s) | | 6.4 | 6.4 | 5.8 | 6.4 | | 6.1 | 6.1 | 6.1 | | | |
| Vehicle Extension (s) | | 4.9 | 4.9 | 4.3 | 4.9 | | 4.9 | 4.9 | 4.9 | | | |
| Lane Grp Cap (vph) | | 1561 | 486 | 647 | 2393 | | 292 | 292 | 485 | | | |
| v/s Ratio Prot | | 0.24 | | c0.54 | 0.53 | | | | | | | |
| v/s Ratio Perm | | | 0.09 | c0.64 | | | 0.28 | 0.28 | 0.17 | | | |
| v/c Ratio | | 0.76 | 0.29 | 1.68 | 0.76 | | 1.55 | 1.56 | 0.95 | | | |
| Uniform Delay, d1 | | 30.8 | 25.8 | 24.0 | 9.8 | | 41.0 | 41.0 | 40.6 | | | |
| Progression Factor | | 0.38 | 0.50 | 0.77 | 0.48 | | 1.00 | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 2.9 | 1.3 | 307.3 | 0.2 | | 265.9 | 267.4 | 29.7 | | | |
| Delay (s) | | 14.7 | 14.2 | 325.8 | 4.9 | | 306.9 | 308.4 | 70.3 | | | |
| Level of Service | | B | B | F | A | | F | F | E | | | |
| Approach Delay (s) | | 14.6 | | | 125.2 | | | 222.5 | | | 0.0 | |
| Approach LOS | | B | | | F | | | F | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 118.5 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.62 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 11.9 | | | |
| Intersection Capacity Utilization | | | 146.5% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

37: Roper Mountain Road & Congaree Road

2035 AM Woodruff Improvements

7/6/2011












| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | | |  |  |  |  | | |  |  |
| Volume (vph) | 439 | 1127 | 2 | 6 | 1471 | 614 | 316 | 4 | 325 | 2 | 4 | 2 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 6.4 | | | 6.4 | 6.4 | 6.1 | 6.1 | | | 6.1 | 6.1 |
| Lane Util. Factor | 1.00 | 0.91 | | | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | 1.00 | 0.85 | | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.98 | 1.00 |
| Satd. Flow (prot) | 1719 | 4939 | | | 3437 | 1538 | 1719 | 1541 | | | 1780 | 1538 |
| Flt Permitted | 0.07 | 1.00 | | | 0.95 | 1.00 | 0.75 | 1.00 | | | 0.72 | 1.00 |
| Satd. Flow (perm) | 136 | 4939 | | | 3257 | 1538 | 1364 | 1541 | | | 1303 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 488 | 1252 | 2 | 7 | 1634 | 682 | 351 | 4 | 361 | 2 | 4 | 2 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 313 | 0 | 220 | 0 | 0 | 0 | 2 |
| Lane Group Flow (vph) | 488 | 1254 | 0 | 0 | 1641 | 369 | 351 | 145 | 0 | 0 | 6 | 0 |
| Turn Type | pm+pt | | | Perm | | Perm | Perm | | | Perm | | Perm |
| Protected Phases | 5 | 2 | | | 6 | | | 4 | | | 8 | |
| Permitted Phases | 2 | | | 6 | | 6 | 4 | | | 8 | | 8 |
| Actuated Green, G (s) | 68.6 | 68.6 | | | 47.6 | 47.6 | 18.9 | 18.9 | | | 18.9 | 18.9 |
| Effective Green, g (s) | 68.6 | 68.6 | | | 47.6 | 47.6 | 18.9 | 18.9 | | | 18.9 | 18.9 |
| Actuated g/C Ratio | 0.69 | 0.69 | | | 0.48 | 0.48 | 0.19 | 0.19 | | | 0.19 | 0.19 |
| Clearance Time (s) | 5.8 | 6.4 | | | 6.4 | 6.4 | 6.1 | 6.1 | | | 6.1 | 6.1 |
| Vehicle Extension (s) | 4.3 | 4.9 | | | 4.9 | 4.9 | 4.9 | 4.9 | | | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 334 | 3388 | | | 1550 | 732 | 258 | 291 | | | 246 | 291 |
| v/s Ratio Prot | c0.22 | 0.25 | | | | | | 0.09 | | | | |
| v/s Ratio Perm | c0.78 | | | | 0.50 | 0.24 | c0.26 | | | | 0.00 | 0.00 |
| v/c Ratio | 1.46 | 0.37 | | | 1.06 | 0.50 | 1.36 | 0.50 | | | 0.02 | 0.00 |
| Uniform Delay, d1 | 33.3 | 6.6 | | | 26.2 | 18.1 | 40.5 | 36.3 | | | 33.0 | 32.9 |
| Progression Factor | 0.55 | 2.23 | | | 0.89 | 0.42 | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 215.1 | 0.1 | | | 35.3 | 1.4 | 185.3 | 2.7 | | | 0.1 | 0.0 |
| Delay (s) | 233.3 | 14.9 | | | 58.7 | 8.9 | 225.8 | 39.0 | | | 33.1 | 32.9 |
| Level of Service | F | B | | | E | A | F | D | | | C | C |
| Approach Delay (s) | | 76.1 | | | 44.1 | | | 130.6 | | | 33.1 | |
| Approach LOS | | E | | | D | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 68.6 | | | HCM Level of Service | | | E | | | | |
| HCM Volume to Capacity ratio | | 1.38 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 100.0 | | | Sum of lost time (s) | | | 11.9 | | | | |
| Intersection Capacity Utilization | | 105.8% | | | ICU Level of Service | | | G | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

21: Frontage Rd & US 276

2035 AM Woodruff Improvements

7/6/2011










| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | WBL | WBR | SEL | SET | NWT | NWR |
| Lane Configurations |  | |  |  |  |  |
| Volume (veh/h) | 166 | 27 | 103 | 2092 | 2557 | 92 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 184 | 30 | 114 | 2324 | 2841 | 102 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | 1010 | |
| pX, platoon unblocked | 0.44 | 0.44 | 0.44 | | | |
| vC, conflicting volume | 4283 | 1472 | 2943 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 5918 | 0 | 2871 | | | |
| tC, single (s) | 6.9 | 7.0 | 4.2 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 94 | 0 | | | |
| cM capacity (veh/h) | 0 | 473 | 53 | | | |
| Direction, Lane # | WB 1 | SE 1 | SE 2 | SE 3 | NW 1 | NW 2 |
| Volume Total | 214 | 114 | 1162 | 1162 | 1894 | 1049 |
| Volume Left | 184 | 114 | 0 | 0 | 0 | 0 |
| Volume Right | 30 | 0 | 0 | 0 | 0 | 102 |
| cSH | 0 | 53 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | Err | 2.15 | 0.68 | 0.68 | 1.11 | 0.62 |
| Queue Length 95th (ft) | Err | 285 | 0 | 0 | 0 | 0 |
| Control Delay (s) | Err | 696.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | F | F | | | | |
| Approach Delay (s) | Err | 32.7 | | | 0.0 | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | Err | | | |
| Intersection Capacity Utilization | | | 100.2% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

22: US 276 & St Josephs Dr

2035 AM Woodruff Improvements

7/6/2011












| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | SET | SER | NWL | NWT | NEL | NER |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 1899 | 359 | 342 | 1397 | 610 | 124 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 2110 | 399 | 380 | 1552 | 678 | 138 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 862 | | |
| pX, platoon unblocked | | | | | 0.37 | |
| vC, conflicting volume | | | 2509 | | 3846 | 1254 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 2509 | | 5256 | 1254 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 0 | | 0 | 13 |
| cM capacity (veh/h) | | | 170 | | 0 | 159 |
| Direction, Lane # | SE 1 | SE 2 | NW 1 | NW 2 | NE 1 | |
| Volume Total | 1407 | 1102 | 897 | 1035 | 816 | |
| Volume Left | 0 | 0 | 380 | 0 | 678 | |
| Volume Right | 0 | 399 | 0 | 0 | 138 | |
| cSH | 1700 | 1700 | 170 | 1700 | 0 | |
| Volume to Capacity | 0.83 | 0.65 | 2.24 | 0.61 | Err | |
| Queue Length 95th (ft) | 0 | 0 | 772 | 0 | Err | |
| Control Delay (s) | 0.0 | 0.0 | 619.6 | 0.0 | Err | |
| Lane LOS | | | F | | F | |
| Approach Delay (s) | 0.0 | | 287.8 | | Err | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | Err | | | |
| Intersection Capacity Utilization | | | 163.8% | | ICU Level of Service | H |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

29: Rothwell Dr & E Butler Road

2035 AM Woodruff Improvements

7/6/2011











| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  | |
| Volume (veh/h) | 8 | 2 | 6 | 1559 | 1310 | 37 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 9 | 2 | 7 | 1732 | 1456 | 41 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | 5 | | | | |
| Median type | | | | TWLTL | TWLTL | |
| Median storage (veh) | | | | 2 | 2 | |
| Upstream signal (ft) | | | | 1175 | 379 | |
| pX, platoon unblocked | 0.77 | 0.78 | 0.78 | | | |
| vC, conflicting volume | 2356 | 748 | 1497 | | | |
| vC1, stage 1 conf vol | 1476 | | | | | |
| vC2, stage 2 conf vol | 879 | | | | | |
| vCu, unblocked vol | 855 | 104 | 1066 | | | |
| tC, single (s) | 6.9 | 7.0 | 4.2 | | | |
| tC, 2 stage (s) | 5.9 | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 96 | 100 | 99 | | | |
| cM capacity (veh/h) | 224 | 716 | 491 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 |
| Volume Total | 11 | 7 | 866 | 866 | 970 | 526 |
| Volume Left | 9 | 7 | 0 | 0 | 0 | 0 |
| Volume Right | 2 | 0 | 0 | 0 | 0 | 41 |
| cSH | 280 | 491 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.04 | 0.01 | 0.51 | 0.51 | 0.57 | 0.31 |
| Queue Length 95th (ft) | 3 | 1 | 0 | 0 | 0 | 0 |
| Control Delay (s) | 19.4 | 12.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | C | B | | | | |
| Approach Delay (s) | 19.4 | 0.0 | | | 0.0 | |
| Approach LOS | C | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.1 | | | |
| Intersection Capacity Utilization | | | 53.1% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

32: New Commerce Ct & E Butler Road

2035 AM Woodruff Improvements

7/6/2011




















| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  | |  | |  |  |
| Volume (veh/h) | 75 | 81 | 2075 | 30 | 50 | 1873 |
| Sign Control | Stop | | Free | | Free | Free |
| Grade | 0% | | 0% | | 0% | 0% |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 83 | 90 | 2306 | 33 | 56 | 2081 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | 371 | | | |
| pX, platoon unblocked | 0.56 | 0.56 | | | 0.56 | |
| vC, conflicting volume | 3474 | 1169 | | | 2339 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 3849 | 0 | | | 1816 | |
| tC, single (s) | 6.9 | 7.0 | | | 4.2 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 0 | 85 | | | 69 | |
| cM capacity (veh/h) | 1 | 600 | | | 180 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 173 | 1537 | 802 | 56 | 1041 | 1041 |
| Volume Left | 83 | 0 | 0 | 56 | 0 | 0 |
| Volume Right | 90 | 0 | 33 | 0 | 0 | 0 |
| cSH | 2 | 1700 | 1700 | 180 | 1700 | 1700 |
| Volume to Capacity | 87.94 | 0.90 | 0.47 | 0.31 | 0.61 | 0.61 |
| Queue Length 95th (ft) | Err | 0 | 0 | 31 | 0 | 0 |
| Control Delay (s) | Err | 0.0 | 0.0 | 33.8 | 0.0 | 0.0 |
| Lane LOS | F | | | D | | |
| Approach Delay (s) | Err | 0.0 | | 0.9 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 373.2 | | | | |
| Intersection Capacity Utilization | | 74.1% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

33: E Butler Road & Brookfield Pkwy

2035 AM Woodruff Improvements

7/6/2011
























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | | |  | | |  |  | |  |  |
| Volume (veh/h) | 134 | 1992 | 30 | 23 | 1876 | 25 | 2 | 0 | 19 | 28 | 0 | 14 |
| Sign Control | Free | | | | Free | | | Stop | | | Stop | |
| Grade | 0% | | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 149 | 2213 | 33 | 26 | 2084 | 28 | 2 | 0 | 21 | 31 | 0 | 16 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | None | | | | None | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (ft) | 939 | | | | | | | | | | | |
| pX, platoon unblocked | | | | 0.56 | | | 0.56 | | | 0.56 | | |
| vC, conflicting volume | 2112 | | | 2247 | | | 3569 | | | 4694 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 2112 | | | 1653 | | | 4018 | | | 6029 | | |
| tC, single (s) | 4.2 | | | 4.2 | | | 7.6 | | | 6.6 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | | | 4.0 | | |
| p0 queue free % | 39 | | | 88 | | | 0 | | | 100 | | |
| cM capacity (veh/h) | 245 | | | 209 | | | 0 | | | 0 | | |
| | | | | | | | | | | | | |
| Direction, Lane # | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | SE 1 | SE 2 | NW 1 | NW 2 | | | |
| Volume Total | 149 | 1476 | 771 | 1068 | 1070 | 2 | 21 | 31 | 16 | | | |
| Volume Left | 149 | 0 | 0 | 26 | 0 | 2 | 0 | 31 | 0 | | | |
| Volume Right | 0 | 0 | 33 | 0 | 28 | 0 | 21 | 0 | 16 | | | |
| cSH | 245 | 1700 | 1700 | 209 | 1700 | 0 | 217 | 0 | 601 | | | |
| Volume to Capacity | 0.61 | 0.87 | 0.45 | 0.12 | 0.63 | 10.17 | 0.10 | 196.32 | 0.03 | | | |
| Queue Length 95th (ft) | 89 | 0 | 0 | 10 | 0 | Err | 8 | Err | 2 | | | |
| Control Delay (s) | 40.0 | 0.0 | 0.0 | 8.2 | 0.0 | Err | 23.4 | Err | 11.1 | | | |
| Lane LOS | E | | | A | | F | C | F | B | | | |
| Approach Delay (s) | 2.5 | | | 4.1 | | | 973.5 | | | 6669.7 | | |
| Approach LOS | | | | | | | F | | | F | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | 75.7 | | | | | | | | | | | |
| Intersection Capacity Utilization | 126.2% | | | ICU Level of Service | | | | | H | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

1: Woodruff Road & Roper Mountain Road

2035 PM Woodruff Improvements

7/6/2011























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 458 | 515 | 77 | 202 | 889 | 633 | 58 | 755 | 177 | 726 | 755 | 105 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Flt Protected | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3371 | | 1719 | 3438 | 1538 | 1719 | 3438 | 1538 | 3335 | 3438 | 1538 |
| Satd. Flow (perm) | 0.15 | 1.00 | | 0.29 | 1.00 | 1.00 | 0.34 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Peak-hour factor, PHF | 278 | 3371 | | 532 | 3438 | 1538 | 608 | 3438 | 1538 | 3335 | 3438 | 1538 |
| Adj. Flow (vph) | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| RTOR Reduction (vph) | 509 | 572 | 86 | 224 | 988 | 703 | 64 | 839 | 197 | 807 | 839 | 117 |
| Lane Group Flow (vph) | 0 | 12 | 0 | 0 | 0 | 300 | 0 | 0 | 132 | 0 | 0 | 64 |
| Turn Type | pm+pt | | | pm+pt | | Perm | Perm | | Perm | Prot | | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | | | 6 |
| Actuated Green, G (s) | 43.0 | 27.4 | | 33.6 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 18.0 | 45.0 | 45.0 |
| Effective Green, g (s) | 43.0 | 27.4 | | 33.6 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 18.0 | 45.0 | 45.0 |
| Actuated g/C Ratio | 0.43 | 0.27 | | 0.34 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.18 | 0.45 | 0.45 |
| Clearance Time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Vehicle Extension (s) | 4.3 | 5.5 | | 4.3 | 5.5 | 5.5 | 4.9 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 365 | 924 | | 316 | 756 | 338 | 134 | 756 | 338 | 600 | 1547 | 692 |
| v/s Ratio Prot | c0.24 | 0.19 | | 0.08 | 0.29 | | | c0.24 | | c0.24 | 0.24 | |
| v/s Ratio Perm | c0.36 | | | 0.16 | | 0.26 | 0.11 | | 0.04 | | | 0.03 |
| v/c Ratio | 1.39 | 0.70 | | 0.71 | 1.31 | 1.19 | 0.48 | 1.11 | 0.19 | 1.34 | 0.54 | 0.08 |
| Uniform Delay, d1 | 28.1 | 32.6 | | 25.6 | 39.0 | 39.0 | 34.0 | 39.0 | 31.8 | 41.0 | 20.0 | 15.7 |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.77 | 0.58 | 0.22 |
| Incremental Delay, d2 | 193.5 | 3.2 | | 7.9 | 147.6 | 112.6 | 11.7 | 67.1 | 1.3 | 156.3 | 0.1 | 0.0 |
| Delay (s) | 221.6 | 35.8 | | 33.5 | 186.6 | 151.6 | 45.7 | 106.1 | 33.0 | 187.9 | 11.8 | 3.4 |
| Level of Service | F | D | | C | F | F | D | F | C | F | B | A |
| Approach Delay (s) | | 116.9 | | | 155.8 | | | 89.5 | | | 91.8 | |
| Approach LOS | | F | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 116.9 | | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | 1.26 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 100.0 | | | Sum of lost time (s) | | | 15.0 | | | | |
| Intersection Capacity Utilization | | 109.0% | | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

2: Woodruff Road & Costco Driveway

2035 PM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Volume (vph) | 21 | 1239 | 137 | 305 | 1811 | 65 | 151 | 6 | 324 | 59 | 4 | 48 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3387 | | 1719 | 3438 | 1538 | 1719 | 1543 | | 1719 | 1810 | 1538 |
| Flt Permitted | 0.04 | 1.00 | | 0.17 | 1.00 | 1.00 | 0.76 | 1.00 | | 0.35 | 1.00 | 1.00 |
| Satd. Flow (perm) | 81 | 3387 | | 303 | 3438 | 1538 | 1366 | 1543 | | 629 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 23 | 1377 | 152 | 339 | 2012 | 72 | 168 | 7 | 360 | 66 | 4 | 53 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 14 | 0 | 99 | 0 | 0 | 0 | 16 |
| Lane Group Flow (vph) | 23 | 1522 | 0 | 339 | 2012 | 58 | 168 | 268 | 0 | 66 | 4 | 37 |
| Turn Type | pm+pt | | | Perm | | Perm | Perm | | | Perm | | pm+ov |
| Protected Phases | 5 | 2 | | | 6 | | | 8 | | | 4 | 5 |
| Permitted Phases | 2 | | | 6 | | 6 | 8 | | | 4 | | 4 |
| Actuated Green, G (s) | 95.5 | 95.5 | | 82.6 | 82.6 | 82.6 | 11.5 | 11.5 | | 11.5 | 11.5 | 17.9 |
| Effective Green, g (s) | 95.5 | 95.5 | | 82.6 | 82.6 | 82.6 | 11.5 | 11.5 | | 11.5 | 11.5 | 17.9 |
| Actuated g/C Ratio | 0.80 | 0.80 | | 0.69 | 0.69 | 0.69 | 0.10 | 0.10 | | 0.10 | 0.10 | 0.15 |
| Clearance Time (s) | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | | 6.5 | 6.5 | 6.5 |
| Vehicle Extension (s) | 4.3 | 5.5 | | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | | 5.5 | 5.5 | 4.3 |
| Lane Grp Cap (vph) | 152 | 2695 | | 209 | 2366 | 1059 | 131 | 148 | | 60 | 173 | 313 |
| v/s Ratio Prot | 0.01 | c0.45 | | | 0.59 | | | c0.17 | | | 0.00 | 0.01 |
| v/s Ratio Perm | 0.11 | | | c1.12 | | 0.04 | 0.12 | | | 0.10 | | 0.02 |
| v/c Ratio | 0.15 | 0.56 | | 1.62 | 0.85 | 0.06 | 1.28 | 1.81 | | 1.10 | 0.02 | 0.12 |
| Uniform Delay, d1 | 16.0 | 4.5 | | 18.7 | 14.1 | 6.1 | 54.2 | 54.2 | | 54.2 | 49.2 | 44.2 |
| Progression Factor | 1.00 | 1.00 | | 0.53 | 0.42 | 0.29 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.7 | 0.9 | | 297.5 | 3.4 | 0.1 | 172.9 | 388.9 | | 146.4 | 0.1 | 0.3 |
| Delay (s) | 16.7 | 5.4 | | 307.4 | 9.4 | 1.9 | 227.2 | 443.2 | | 200.7 | 49.3 | 44.5 |
| Level of Service | B | A | | F | A | A | F | F | | F | D | D |
| Approach Delay (s) | | 5.6 | | | 50.9 | | | 375.3 | | | 128.4 | |
| Approach LOS | | A | | | D | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 75.2 | | | HCM Level of Service | | | E | | | |
| HCM Volume to Capacity ratio | | | 1.60 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 19.5 | | | |
| Intersection Capacity Utilization | | | 112.3% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: Green Heron Road & Woodruff Road

2035 PM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations | |  | | |  |  |  |  | |  |  |  |
| Volume (vph) | 35 | 2 | 97 | 20 | 4 | 135 | 113 | 2125 | 18 | 4 | 1656 | 4 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | 5.0 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frt | | 0.90 | | | 1.00 | 0.85 | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.99 | | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1611 | | | 1736 | 1538 | 1719 | 3434 | | 1719 | 3438 | 1538 |
| Flt Permitted | | 0.90 | | | 0.42 | 1.00 | 0.10 | 1.00 | | 0.04 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1473 | | | 767 | 1538 | 177 | 3434 | | 74 | 3438 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 39 | 2 | 108 | 22 | 4 | 150 | 126 | 2361 | 20 | 4 | 1840 | 4 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 48 | 0 | 1 | 0 | 0 | 0 | 1 |
| Lane Group Flow (vph) | 0 | 130 | 0 | 0 | 26 | 102 | 126 | 2380 | 0 | 4 | 1840 | 3 |
| Turn Type | Perm | | | Perm | | Perm | Perm | | | Perm | | Perm |
| Protected Phases | | 8 | | | 4 | | | 2 | | | 6 | |
| Permitted Phases | 8 | | | 4 | | 4 | 2 | | | 6 | | 6 |
| Actuated Green, G (s) | | 11.0 | | | 11.0 | 11.0 | 97.7 | 97.7 | | 97.7 | 97.7 | 97.7 |
| Effective Green, g (s) | | 11.0 | | | 11.0 | 11.0 | 97.7 | 97.7 | | 97.7 | 97.7 | 97.7 |
| Actuated g/C Ratio | | 0.09 | | | 0.09 | 0.09 | 0.81 | 0.81 | | 0.81 | 0.81 | 0.81 |
| Clearance Time (s) | | 5.0 | | | 5.0 | 5.0 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Vehicle Extension (s) | | 4.3 | | | 4.3 | 4.3 | 5.5 | 5.5 | | 5.5 | 5.5 | 5.5 |
| Lane Grp Cap (vph) | | 135 | | | 70 | 141 | 144 | 2796 | | 60 | 2799 | 1252 |
| v/s Ratio Prot | | | | | | | | 0.69 | | | 0.54 | |
| v/s Ratio Perm | | c0.09 | | | 0.03 | 0.07 | c0.71 | | | 0.05 | | 0.00 |
| v/c Ratio | | 0.96 | | | 0.37 | 0.72 | 0.88 | 0.85 | | 0.07 | 0.66 | 0.00 |
| Uniform Delay, d1 | | 54.3 | | | 51.2 | 53.0 | 7.2 | 6.8 | | 2.2 | 4.5 | 2.1 |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 0.97 | 0.95 | | 1.99 | 2.62 | 1.92 |
| Incremental Delay, d2 | | 66.0 | | | 5.2 | 18.3 | 42.1 | 3.0 | | 0.2 | 0.1 | 0.0 |
| Delay (s) | | 120.3 | | | 56.4 | 71.3 | 49.1 | 9.4 | | 4.5 | 11.8 | 4.0 |
| Level of Service | | F | | | E | E | D | A | | A | B | A |
| Approach Delay (s) | | 120.3 | | | 69.1 | | | 11.4 | | | 11.8 | |
| Approach LOS | | F | | | E | | | B | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 17.2 | | | | HCM Level of Service | | | B | | |
| HCM Volume to Capacity ratio | | | 0.88 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | | Sum of lost time (s) | | | 11.3 | | |
| Intersection Capacity Utilization | | | 113.7% | | | | ICU Level of Service | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

4: Woodruff Industrial Lane & Woodruff Road

2035 PM Woodruff Improvements

7/6/2011


















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  | |
| Volume (vph) | 232 | 52 | 427 | 313 | 47 | 45 | 85 | 2037 | 120 | 346 | 1387 | 374 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frt | 1.00 | 0.87 | | 1.00 | 0.93 | | 1.00 | 0.99 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 1568 | | 1719 | 1676 | | 1719 | 3409 | | 1719 | 3328 | |
| Flt Permitted | 0.59 | 1.00 | | 0.22 | 1.00 | | 0.07 | 1.00 | | 0.07 | 1.00 | |
| Satd. Flow (perm) | 1064 | 1568 | | 402 | 1676 | | 132 | 3409 | | 121 | 3328 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 258 | 58 | 474 | 348 | 52 | 50 | 94 | 2263 | 133 | 384 | 1541 | 416 |
| RTOR Reduction (vph) | 0 | 68 | 0 | 0 | 29 | 0 | 0 | 4 | 0 | 0 | 21 | 0 |
| Lane Group Flow (vph) | 258 | 464 | 0 | 348 | 73 | 0 | 94 | 2392 | 0 | 384 | 1937 | 0 |
| Turn Type | pm+pt | | | pm+pt | | | pm+pt | | | pm+pt | | |
| Protected Phases | 3 | 8 | | 7 | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 8 | | | 4 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 34.0 | 21.0 | | 28.0 | 18.0 | | 60.0 | 55.0 | | 70.0 | 60.0 | |
| Effective Green, g (s) | 34.0 | 21.0 | | 28.0 | 18.0 | | 60.0 | 55.0 | | 70.0 | 60.0 | |
| Actuated g/C Ratio | 0.28 | 0.18 | | 0.23 | 0.15 | | 0.50 | 0.46 | | 0.58 | 0.50 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 5.5 | | 4.3 | 5.5 | |
| Lane Grp Cap (vph) | 372 | 274 | | 204 | 251 | | 132 | 1562 | | 204 | 1664 | |
| v/s Ratio Prot | 0.08 | c0.30 | | c0.14 | 0.04 | | 0.03 | 0.70 | | c0.16 | 0.58 | |
| v/s Ratio Perm | 0.12 | | | 0.26 | | | 0.33 | | | c0.95 | | |
| v/c Ratio | 0.69 | 1.69 | | 1.71 | 0.29 | | 0.71 | 1.53 | | 1.88 | 1.16 | |
| Uniform Delay, d1 | 36.8 | 49.5 | | 43.3 | 45.3 | | 27.3 | 32.5 | | 38.2 | 30.0 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.17 | 0.83 | | 0.92 | 0.98 | |
| Incremental Delay, d2 | 6.2 | 327.9 | | 337.7 | 1.0 | | 9.7 | 240.8 | | 408.1 | 78.1 | |
| Delay (s) | 43.0 | 377.4 | | 381.0 | 46.4 | | 41.6 | 267.8 | | 443.3 | 107.6 | |
| Level of Service | D | F | | F | D | | D | F | | F | F | |
| Approach Delay (s) | | 268.2 | | | 305.1 | | | 259.2 | | | 162.6 | |
| Approach LOS | | F | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 226.5 | | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | 1.88 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | Sum of lost time (s) | | | 24.0 | | | | |
| Intersection Capacity Utilization | | 145.7% | | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

5: I-85 SB Ramps & Woodruff Road

2035 PM Woodruff Improvements

7/6/2011












| |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| Movement | WBL2 | WBL | WBR | SEL | SET | SER | NWL | NWT | NWR | NEL | NER |
| Lane Configurations |  | |  | |  |  |  |  | | | |
| Volume (vph) | 541 | 0 | 340 | 0 | 2366 | 411 | 1007 | 1767 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | | 5.0 | | 6.3 | 6.3 | 6.5 | 6.1 | | | |
| Lane Util. Factor | 0.97 | | 0.88 | | 0.95 | 1.00 | 1.00 | 0.95 | | | |
| Frt | 1.00 | | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | | | |
| Flt Protected | 0.95 | | 1.00 | | 1.00 | 1.00 | 0.95 | 1.00 | | | |
| Satd. Flow (prot) | 3335 | | 2707 | | 3438 | 1538 | 1719 | 3438 | | | |
| Flt Permitted | 0.95 | | 1.00 | | 1.00 | 1.00 | 0.07 | 1.00 | | | |
| Satd. Flow (perm) | 3335 | | 2707 | | 3438 | 1538 | 118 | 3438 | | | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 601 | 0 | 378 | 0 | 2629 | 457 | 1119 | 1963 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 68 | 0 | 0 | 109 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 601 | 0 | 310 | 0 | 2629 | 348 | 1119 | 1963 | 0 | 0 | 0 |
| Turn Type | custom | | custom | | | Perm | pm+pt | | | | |
| Protected Phases | | | | | 2 | | 1 | 6 | | | |
| Permitted Phases | 4 | | 4 | | | 2 | 6 | | | | |
| Actuated Green, G (s) | 11.0 | | 11.0 | | 54.7 | 54.7 | 97.9 | 97.9 | | | |
| Effective Green, g (s) | 11.0 | | 11.0 | | 54.7 | 54.7 | 97.9 | 97.9 | | | |
| Actuated g/C Ratio | 0.09 | | 0.09 | | 0.46 | 0.46 | 0.82 | 0.82 | | | |
| Clearance Time (s) | 5.0 | | 5.0 | | 6.3 | 6.3 | 6.5 | 6.1 | | | |
| Vehicle Extension (s) | 4.3 | | 4.3 | | 4.3 | 4.3 | 4.3 | 4.3 | | | |
| Lane Grp Cap (vph) | 306 | | 248 | | 1567 | 701 | 583 | 2805 | | | |
| v/s Ratio Prot | | | | | 0.76 | | c0.58 | 0.57 | | | |
| v/s Ratio Perm | c0.18 | | 0.11 | | | 0.23 | c0.98 | | | | |
| v/c Ratio | 1.96 | | 1.25 | | 1.68 | 0.50 | 1.92 | 0.70 | | | |
| Uniform Delay, d1 | 54.5 | | 54.5 | | 32.6 | 23.0 | 37.4 | 4.7 | | | |
| Progression Factor | 1.00 | | 1.00 | | 0.52 | 0.28 | 1.01 | 0.78 | | | |
| Incremental Delay, d2 | 445.5 | | 141.2 | | 305.2 | 0.2 | 414.3 | 0.1 | | | |
| Delay (s) | 500.0 | | 195.7 | | 322.3 | 6.6 | 452.0 | 3.8 | | | |
| Level of Service | F | | F | | F | A | F | A | | | |
| Approach Delay (s) | | 382.5 | | | 275.6 | | | 166.5 | | 0.0 | |
| Approach LOS | | F | | | F | | | F | | A | |
| Intersection Summary | | | | | | | | | | | |
| HCM Average Control Delay | | | 243.2 | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 1.86 | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | Sum of lost time (s) | | | | 11.5 | | |
| Intersection Capacity Utilization | | | 150.3% | | ICU Level of Service | | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: I-85 NB Ramps & Woodruff Road

2035 PM Woodruff Improvements

7/6/2011

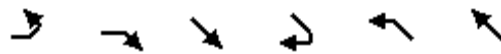
| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | NBL | NBR | SET | SER | NWL | NWT |
| Lane Configurations |  |  |  |  | |  |
| Volume (vph) | 753 | 823 | 1359 | 1548 | 0 | 2021 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.6 | 5.6 | 6.5 | 6.5 | | 6.5 |
| Lane Util. Factor | 0.97 | 0.88 | 0.95 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (prot) | 3335 | 2707 | 3438 | 1538 | | 3438 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (perm) | 3335 | 2707 | 3438 | 1538 | | 3438 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 837 | 914 | 1510 | 1720 | 0 | 2246 |
| RTOR Reduction (vph) | 0 | 268 | 0 | 505 | 0 | 0 |
| Lane Group Flow (vph) | 837 | 646 | 1510 | 1215 | 0 | 2246 |
| Turn Type | | Prot | | Perm | | |
| Protected Phases | 3 | 3 | 2 | | | 2 4 |
| Permitted Phases | | | | 2 | | |
| Actuated Green, G (s) | 24.4 | 24.4 | 64.5 | 64.5 | | 83.5 |
| Effective Green, g (s) | 24.4 | 24.4 | 64.5 | 64.5 | | 76.5 |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.54 | 0.54 | | 0.64 |
| Clearance Time (s) | 5.6 | 5.6 | 6.5 | 6.5 | | |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | | |
| Lane Grp Cap (vph) | 678 | 550 | 1848 | 827 | | 2192 |
| v/s Ratio Prot | c0.25 | 0.24 | 0.44 | | | c0.65 |
| v/s Ratio Perm | | | | c0.79 | | |
| v/c Ratio | 1.23 | 1.17 | 0.82 | 1.47 | | 1.02 |
| Uniform Delay, d1 | 47.8 | 47.8 | 22.9 | 27.8 | | 21.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 4.96 | | 0.93 |
| Incremental Delay, d2 | 118.0 | 96.1 | 0.4 | 212.0 | | 13.6 |
| Delay (s) | 165.8 | 143.9 | 23.2 | 349.7 | | 33.9 |
| Level of Service | F | F | C | F | | C |
| Approach Delay (s) | 154.4 | | 197.1 | | | 33.9 |
| Approach LOS | F | | F | | | C |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 136.0 | | HCM Level of Service | F |
| HCM Volume to Capacity ratio | | | 1.35 | | | |
| Actuated Cycle Length (s) | | | 120.0 | | Sum of lost time (s) | 18.6 |
| Intersection Capacity Utilization | | | 101.3% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Carolina Point Pkwy & Woodruff Road

2035 PM Woodruff Improvements

7/6/2011



| Movement | EBL | EBR | SET | SER | NWL | NWT |
|------------------------|-------|------|-------|-------|-------|-------|
| Lane Configurations | ↰↱ | ↱ | ↰↱ | ↱ | ↰ | ↰↱ |
| Volume (vph) | 324 | 119 | 2035 | 147 | 30 | 3362 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.0 | 7.0 | 6.5 | 6.5 | 6.5 | 6.5 |
| Lane Util. Factor | 0.97 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 3335 | 1538 | 3438 | 1538 | 1719 | 3438 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.04 | 1.00 |
| Satd. Flow (perm) | 3335 | 1538 | 3438 | 1538 | 81 | 3438 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 360 | 132 | 2261 | 163 | 33 | 3736 |
| RTOR Reduction (vph) | 0 | 20 | 0 | 33 | 0 | 0 |
| Lane Group Flow (vph) | 360 | 112 | 2261 | 130 | 33 | 3736 |
| Turn Type | Perm | | Perm | | Perm | |
| Protected Phases | 4 | | 2 3 6 | | | 2 3 6 |
| Permitted Phases | 4 | 4 | | 2 3 6 | 2 3 6 | |
| Actuated Green, G (s) | 12.0 | 12.0 | 95.4 | 95.4 | 95.4 | 95.4 |
| Effective Green, g (s) | 12.0 | 12.0 | 95.4 | 95.4 | 95.4 | 95.4 |
| Actuated g/C Ratio | 0.10 | 0.10 | 0.80 | 0.80 | 0.80 | 0.80 |
| Clearance Time (s) | 7.0 | 7.0 | | | | |
| Vehicle Extension (s) | 4.3 | 4.3 | | | | |
| Lane Grp Cap (vph) | 334 | 154 | 2733 | 1223 | 64 | 2733 |
| v/s Ratio Prot | c0.11 | | 0.66 | | | c1.09 |
| v/s Ratio Perm | | 0.07 | | 0.08 | 0.41 | |
| v/c Ratio | 1.08 | 0.73 | 0.83 | 0.11 | 0.52 | 1.37 |
| Uniform Delay, d1 | 54.0 | 52.4 | 7.4 | 2.8 | 4.3 | 12.3 |
| Progression Factor | 1.00 | 1.00 | 0.42 | 0.47 | 0.97 | 1.29 |
| Incremental Delay, d2 | 71.6 | 17.4 | 0.9 | 0.0 | 1.0 | 165.4 |
| Delay (s) | 125.6 | 69.8 | 4.0 | 1.3 | 5.1 | 181.2 |
| Level of Service | F | E | A | A | A | F |
| Approach Delay (s) | 110.6 | | 3.8 | | | 179.7 |
| Approach LOS | F | | A | | | F |

Intersection Summary

























| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 110.8 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.35 | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 113.4% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

8: Woodruff Road & Market Point Drive

2035 PM Woodruff Improvements

7/6/2011

























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 742 | 1260 | 152 | 109 | 2612 | 233 | 239 | 42 | 107 | 336 | 42 | 541 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.1 | 6.1 | 5.8 | 6.1 | 6.1 | 6.1 | 5.8 | 5.8 | 6.1 | 5.8 | 5.8 | 5.8 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3335 | 3438 | 1538 | 1719 | 3438 | 1538 | 1719 | 1810 | 1538 | 3335 | 3438 | 1538 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3335 | 3438 | 1538 | 1719 | 3438 | 1538 | 1719 | 1810 | 1538 | 3335 | 3438 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 824 | 1400 | 169 | 121 | 2902 | 259 | 266 | 47 | 119 | 373 | 47 | 601 |
| RTOR Reduction (vph) | 0 | 0 | 62 | 0 | 0 | 56 | 0 | 0 | 23 | 0 | 0 | 201 |
| Lane Group Flow (vph) | 824 | 1400 | 107 | 121 | 2902 | 203 | 266 | 47 | 96 | 373 | 47 | 400 |
| Turn Type | Prot | pm+ov | | Prot | Perm | | Prot | pm+ov | | Prot | Perm | |
| Protected Phases | 5 | 2 | 3 | 1 | 6 | 3 | | 8 | 1 | 7 | 4 | |
| Permitted Phases | 2 | | | 6 | | | | 8 | | | 4 | |
| Actuated Green, G (s) | 15.9 | 62.8 | 73.0 | 12.0 | 58.9 | 58.9 | 10.2 | 6.8 | 18.8 | 14.6 | 11.2 | 11.2 |
| Effective Green, g (s) | 15.9 | 62.8 | 73.0 | 12.0 | 58.9 | 58.9 | 10.2 | 6.8 | 18.8 | 14.6 | 11.2 | 11.2 |
| Actuated g/C Ratio | 0.13 | 0.52 | 0.61 | 0.10 | 0.49 | 0.49 | 0.08 | 0.06 | 0.16 | 0.12 | 0.09 | 0.09 |
| Clearance Time (s) | 6.1 | 6.1 | 5.8 | 6.1 | 6.1 | 6.1 | 5.8 | 5.8 | 6.1 | 5.8 | 5.8 | 5.8 |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 442 | 1799 | 936 | 172 | 1687 | 755 | 146 | 103 | 241 | 406 | 321 | 144 |
| v/s Ratio Prot | c0.25 | 0.41 | 0.01 | 0.07 | c0.84 | c0.15 | | 0.03 | 0.04 | 0.11 | 0.01 | |
| v/s Ratio Perm | 0.06 | | | 0.13 | | | | 0.02 | | | c0.26 | |
| v/c Ratio | 1.86 | 0.78 | 0.11 | 0.70 | 1.72 | 0.27 | 1.82 | 0.46 | 0.40 | 0.92 | 0.15 | 2.78 |
| Uniform Delay, d1 | 52.0 | 23.0 | 9.9 | 52.3 | 30.6 | 17.9 | 54.9 | 54.8 | 45.5 | 52.1 | 50.0 | 54.4 |
| Progression Factor | 1.21 | 0.94 | 1.62 | 0.66 | 0.41 | 0.19 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 393.5 | 1.8 | 0.0 | 1.3 | 324.3 | 0.1 | 395.4 | 5.0 | 1.7 | 25.9 | 0.3 | 818.2 |
| Delay (s) | 456.6 | 23.5 | 16.1 | 35.7 | 336.8 | 3.4 | 450.3 | 59.8 | 47.2 | 78.1 | 50.3 | 872.6 |
| Level of Service | F | C | B | D | F | A | F | E | D | E | D | F |
| Approach Delay (s) | 172.1 | | 299.4 | | 296.8 | | 544.5 | | | | | |
| Approach LOS | F | | F | | F | | F | | F | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 291.6 | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | | 1.88 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | Sum of lost time (s) | | | 23.8 | | | | |
| Intersection Capacity Utilization | | | 133.7% | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

9: Woodruff Road & Garlington Road

2035 PM Woodruff Improvements

7/6/2011


















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 259 | 1184 | 260 | 238 | 2315 | 234 | 379 | 214 | 169 | 478 | 395 | 260 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.2 | 6.1 | 6.1 | 5.2 | 6.1 | 6.1 | 5.2 | 5.2 | | 5.2 | 5.2 | 4.0 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 1.00 | | 0.97 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.93 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3335 | 3438 | 1538 | 1719 | 3438 | 1538 | 3335 | 1690 | | 3335 | 1810 | 1538 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.07 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3335 | 3438 | 1538 | 127 | 3438 | 1538 | 3335 | 1690 | | 3335 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 288 | 1316 | 289 | 264 | 2572 | 260 | 421 | 238 | 188 | 531 | 439 | 289 |
| RTOR Reduction (vph) | 0 | 0 | 140 | 0 | 0 | 63 | 0 | 24 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 288 | 1316 | 149 | 264 | 2572 | 197 | 421 | 402 | 0 | 531 | 439 | 289 |
| Turn Type | Prot | | Perm | pm+pt | | Perm | Prot | | | Prot | | Free |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | 6 | | 6 | | | | | | Free |
| Actuated Green, G (s) | 7.8 | 51.7 | 51.7 | 71.9 | 58.9 | 58.9 | 9.8 | 18.8 | | 12.8 | 21.8 | 120.0 |
| Effective Green, g (s) | 7.8 | 51.7 | 51.7 | 71.9 | 58.9 | 58.9 | 9.8 | 18.8 | | 12.8 | 21.8 | 120.0 |
| Actuated g/C Ratio | 0.06 | 0.43 | 0.43 | 0.60 | 0.49 | 0.49 | 0.08 | 0.16 | | 0.11 | 0.18 | 1.00 |
| Clearance Time (s) | 5.2 | 6.1 | 6.1 | 5.2 | 6.1 | 6.1 | 5.2 | 5.2 | | 5.2 | 5.2 | |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | 217 | 1481 | 663 | 275 | 1687 | 755 | 272 | 265 | | 356 | 329 | 1538 |
| v/s Ratio Prot | c0.09 | 0.38 | | 0.12 | c0.75 | | 0.13 | c0.24 | | c0.16 | c0.24 | |
| v/s Ratio Perm | | | 0.10 | 0.45 | | 0.13 | | | | | | 0.19 |
| v/c Ratio | 1.33 | 0.89 | 0.22 | 0.96 | 1.52 | 0.26 | 1.55 | 1.52 | | 1.49 | 1.33 | 0.19 |
| Uniform Delay, d1 | 56.1 | 31.5 | 21.5 | 37.8 | 30.6 | 17.8 | 55.1 | 50.6 | | 53.6 | 49.1 | 0.0 |
| Progression Factor | 1.11 | 0.74 | 0.85 | 1.22 | 0.59 | 0.26 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 165.1 | 5.2 | 0.5 | 23.1 | 237.2 | 0.3 | 264.0 | 251.7 | | 235.6 | 169.8 | 0.3 |
| Delay (s) | 227.1 | 28.6 | 18.8 | 69.0 | 255.1 | 5.0 | 319.1 | 302.3 | | 289.2 | 218.9 | 0.3 |
| Level of Service | F | C | B | E | F | A | F | F | | F | F | A |
| Approach Delay (s) | | 57.3 | | | 218.2 | | | 310.7 | | | 198.4 | |
| Approach LOS | | E | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 182.8 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.59 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 26.9 | | | |
| Intersection Capacity Utilization | | | 124.7% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

10: Woodruff Road & I-385 SB Ramps

2035 PM Woodruff Improvements

7/6/2011



















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | |  |  | | | | |  | |  |
| Volume (vph) | 0 | 1209 | 622 | 261 | 2060 | 0 | 0 | 0 | 0 | 1187 | 0 | 727 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.6 | | 6.6 | 6.6 | | | | | 5.7 | | 4.0 |
| Lane Util. Factor | | 0.95 | | 1.00 | 0.95 | | | | | 0.97 | | 1.00 |
| Frt | | 0.95 | | 1.00 | 1.00 | | | | | 1.00 | | 0.85 |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | | | 0.95 | | 1.00 |
| Satd. Flow (prot) | | 3263 | | 1719 | 3438 | | | | | 3335 | | 1538 |
| Flt Permitted | | 1.00 | | 0.06 | 1.00 | | | | | 0.95 | | 1.00 |
| Satd. Flow (perm) | | 3263 | | 113 | 3438 | | | | | 3335 | | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1343 | 691 | 290 | 2289 | 0 | 0 | 0 | 0 | 1319 | 0 | 808 |
| RTOR Reduction (vph) | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1979 | 0 | 290 | 2289 | 0 | 0 | 0 | 0 | 1319 | 0 | 808 |
| Turn Type | | | | pm+pt | | | | | | Prot | | Free |
| Protected Phases | | 2 | | 1 | 6 | | | | | 4 | | |
| Permitted Phases | | | | 6 | | | | | | | | Free |
| Actuated Green, G (s) | | 57.4 | | 74.4 | 74.4 | | | | | 33.3 | | 120.0 |
| Effective Green, g (s) | | 57.4 | | 74.4 | 74.4 | | | | | 33.3 | | 120.0 |
| Actuated g/C Ratio | | 0.48 | | 0.62 | 0.62 | | | | | 0.28 | | 1.00 |
| Clearance Time (s) | | 6.6 | | 6.6 | 6.6 | | | | | 5.7 | | |
| Vehicle Extension (s) | | 4.3 | | 4.3 | 4.3 | | | | | 4.3 | | |
| Lane Grp Cap (vph) | | 1561 | | 209 | 2132 | | | | | 925 | | 1538 |
| v/s Ratio Prot | | 0.61 | | 0.12 | c0.67 | | | | | c0.40 | | |
| v/s Ratio Perm | | | | c0.74 | | | | | | | | 0.53 |
| v/c Ratio | | 1.27 | | 1.39 | 1.07 | | | | | 1.43 | | 0.53 |
| Uniform Delay, d1 | | 31.3 | | 39.6 | 22.8 | | | | | 43.4 | | 0.0 |
| Progression Factor | | 1.31 | | 1.47 | 0.71 | | | | | 1.00 | | 1.00 |
| Incremental Delay, d2 | | 121.1 | | 177.1 | 34.2 | | | | | 197.9 | | 1.3 |
| Delay (s) | | 162.0 | | 235.3 | 50.4 | | | | | 241.3 | | 1.3 |
| Level of Service | | F | | F | D | | | | | F | | A |
| Approach Delay (s) | | 162.0 | | | 71.2 | | | 0.0 | | | 150.1 | |
| Approach LOS | | F | | | E | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 123.5 | | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 1.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | | 12.3 | | |
| Intersection Capacity Utilization | | | 192.2% | | | ICU Level of Service | | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

11: Woodruff Road & I-385 NB Ramps

2035 PM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | | |  |  |  | |  | | | |
| Volume (vph) | 686 | 1710 | 0 | 0 | 1559 | 963 | 762 | 0 | 361 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.1 | 6.1 | | | 6.1 | 6.1 | 5.0 | | 5.0 | | | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | 1.00 | | 1.00 | | | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | 1.00 | | 0.85 | | | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | |
| Satd. Flow (prot) | 1719 | 3438 | | | 3438 | 1538 | 1719 | | 1538 | | | |
| Flt Permitted | 0.08 | 1.00 | | | 1.00 | 1.00 | 0.95 | | 1.00 | | | |
| Satd. Flow (perm) | 139 | 3438 | | | 3438 | 1538 | 1719 | | 1538 | | | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 762 | 1900 | 0 | 0 | 1732 | 1070 | 847 | 0 | 401 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 383 | 0 | 0 | 14 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 762 | 1900 | 0 | 0 | 1732 | 687 | 847 | 0 | 387 | 0 | 0 | 0 |
| Turn Type | pm+pt | | | | | Perm | Prot | | custom | | | |
| Protected Phases | 5 | 2 | | | 6 | | 8 | | | | | |
| Permitted Phases | 2 | | | | | 6 | | | 8 | | | |
| Actuated Green, G (s) | 76.9 | 76.9 | | | 45.9 | 45.9 | 32.0 | | 32.0 | | | |
| Effective Green, g (s) | 76.9 | 76.9 | | | 45.9 | 45.9 | 32.0 | | 32.0 | | | |
| Actuated g/C Ratio | 0.64 | 0.64 | | | 0.38 | 0.38 | 0.27 | | 0.27 | | | |
| Clearance Time (s) | 6.1 | 6.1 | | | 6.1 | 6.1 | 5.0 | | 5.0 | | | |
| Vehicle Extension (s) | 4.3 | 4.3 | | | 4.3 | 4.3 | 4.3 | | 4.3 | | | |
| Lane Grp Cap (vph) | 417 | 2203 | | | 1315 | 588 | 458 | | 410 | | | |
| v/s Ratio Prot | c0.38 | 0.55 | | | 0.50 | | c0.49 | | | | | |
| v/s Ratio Perm | c0.79 | | | | | 0.45 | | | 0.25 | | | |
| v/c Ratio | 1.83 | 0.86 | | | 1.32 | 1.17 | 1.85 | | 0.94 | | | |
| Uniform Delay, d1 | 39.2 | 17.3 | | | 37.1 | 37.1 | 44.0 | | 43.1 | | | |
| Progression Factor | 0.86 | 1.22 | | | 0.77 | 0.57 | 1.00 | | 1.00 | | | |
| Incremental Delay, d2 | 373.2 | 0.5 | | | 143.2 | 77.7 | 390.6 | | 30.8 | | | |
| Delay (s) | 406.9 | 21.5 | | | 171.9 | 98.8 | 434.6 | | 73.9 | | | |
| Level of Service | F | C | | | F | F | F | | E | | | |
| Approach Delay (s) | | 131.8 | | | 144.0 | | 318.7 | | | | 0.0 | |
| Approach LOS | | F | | | F | | F | | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 171.6 | | | HCM Level of Service | | F | | | | | |
| HCM Volume to Capacity ratio | | 1.78 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | Sum of lost time (s) | | 11.1 | | | | | |
| Intersection Capacity Utilization | | 192.2% | | | ICU Level of Service | | H | | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

12: Woodruff Road & Commercial Drive

2035 PM Woodruff Improvements

7/6/2011


















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  | |
| Volume (vph) | 240 | 1767 | 64 | 15 | 2066 | 78 | 296 | 28 | 15 | 134 | 18 | 160 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.3 | 5.5 | | 5.5 | 5.5 | | 5.3 | 5.4 | | 5.4 | 5.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.99 | | 1.00 | 0.95 | | 1.00 | 0.87 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 3420 | | 1719 | 3419 | | 1719 | 1713 | | 1719 | 1566 | |
| Flt Permitted | 0.06 | 1.00 | | 0.06 | 1.00 | | 0.25 | 1.00 | | 0.73 | 1.00 | |
| Satd. Flow (perm) | 105 | 3420 | | 114 | 3419 | | 455 | 1713 | | 1313 | 1566 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 267 | 1963 | 71 | 17 | 2296 | 87 | 329 | 31 | 17 | 149 | 20 | 178 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 13 | 0 | 0 | 131 | 0 |
| Lane Group Flow (vph) | 267 | 2032 | 0 | 17 | 2381 | 0 | 329 | 35 | 0 | 149 | 67 | 0 |
| Turn Type | pm+pt | | | Perm | | | pm+pt | | | Perm | | |
| Protected Phases | 5 | 2 | | | 6 | | 3 | 8 | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 79.5 | 79.5 | | 63.5 | 63.5 | | 29.6 | 29.6 | | 10.6 | 10.6 | |
| Effective Green, g (s) | 79.5 | 79.5 | | 63.5 | 63.5 | | 29.6 | 29.6 | | 10.6 | 10.6 | |
| Actuated g/C Ratio | 0.66 | 0.66 | | 0.53 | 0.53 | | 0.25 | 0.25 | | 0.09 | 0.09 | |
| Clearance Time (s) | 5.3 | 5.5 | | 5.5 | 5.5 | | 5.3 | 5.4 | | 5.4 | 5.4 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | 213 | 2266 | | 60 | 1809 | | 257 | 423 | | 116 | 138 | |
| v/s Ratio Prot | c0.11 | 0.59 | | | c0.70 | | c0.15 | 0.02 | | | 0.04 | |
| v/s Ratio Perm | 0.72 | | | 0.15 | | | c0.17 | | | 0.11 | | |
| v/c Ratio | 1.25 | 0.90 | | 0.28 | 1.32 | | 1.28 | 0.08 | | 1.28 | 0.48 | |
| Uniform Delay, d1 | 41.1 | 16.8 | | 15.6 | 28.2 | | 42.2 | 34.8 | | 54.7 | 52.1 | |
| Progression Factor | 1.37 | 0.50 | | 0.78 | 0.69 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 130.6 | 2.9 | | 3.8 | 143.5 | | 152.5 | 0.1 | | 178.3 | 4.2 | |
| Delay (s) | 186.8 | 11.4 | | 16.1 | 163.0 | | 194.7 | 34.9 | | 233.0 | 56.3 | |
| Level of Service | F | B | | B | F | | F | C | | F | E | |
| Approach Delay (s) | | 31.7 | | | 162.0 | | | 174.3 | | | 132.2 | |
| Approach LOS | | C | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | 105.7 | | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | 1.28 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 120.0 | | | Sum of lost time (s) | | | 16.1 | | | | |
| Intersection Capacity Utilization | | 118.0% | | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

13: Woodruff Road & Smith Hines Road

2035 PM Woodruff Improvements

7/6/2011




















| |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| Volume (vph) | 15 | 1812 | 89 | 86 | 1904 | 2 | 240 | 2 | 190 | 7 | 2 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | | 6.0 | 6.0 | | | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | | | 0.94 | | | 0.92 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.97 | | | 0.99 | |
| Satd. Flow (prot) | 1719 | 3414 | | 1719 | 3438 | | | 1656 | | | 1632 | |
| Flt Permitted | 0.05 | 1.00 | | 0.05 | 1.00 | | | 0.81 | | | 0.90 | |
| Satd. Flow (perm) | 85 | 3414 | | 85 | 3438 | | | 1383 | | | 1493 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 17 | 2013 | 99 | 96 | 2116 | 2 | 267 | 2 | 211 | 8 | 2 | 17 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 17 | 2109 | 0 | 96 | 2118 | 0 | 0 | 462 | 0 | 0 | 13 | 0 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 84.7 | 84.7 | | 85.0 | 85.0 | | | 24.0 | | | 24.0 | |
| Effective Green, g (s) | 84.7 | 84.7 | | 85.0 | 85.0 | | | 24.0 | | | 24.0 | |
| Actuated g/C Ratio | 0.71 | 0.71 | | 0.71 | 0.71 | | | 0.20 | | | 0.20 | |
| Clearance Time (s) | 6.3 | 6.3 | | 6.0 | 6.0 | | | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | | 4.3 | | | 4.3 | |
| Lane Grp Cap (vph) | 60 | 2410 | | 60 | 2435 | | | 277 | | | 299 | |
| v/s Ratio Prot | 0.62 | | | 0.62 | | | | | | | | |
| v/s Ratio Perm | 0.20 | | | c1.13 | | | | c0.33 | | | 0.01 | |
| v/c Ratio | 0.28 | 0.88 | | 1.60 | 0.87 | | | 1.67 | | | 0.04 | |
| Uniform Delay, d1 | 6.5 | 13.6 | | 17.5 | 13.3 | | | 48.0 | | | 38.7 | |
| Progression Factor | 0.08 | 0.06 | | 0.49 | 0.37 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 4.5 | 1.9 | | 277.0 | 0.4 | | | 315.3 | | | 0.1 | |
| Delay (s) | 5.0 | 2.8 | | 285.5 | 5.4 | | | 363.3 | | | 38.8 | |
| Level of Service | A | A | | F | A | | | F | | | D | |
| Approach Delay (s) | 2.8 | | | 17.6 | | | 363.3 | | | 38.8 | | |
| Approach LOS | A | | | B | | | F | | | D | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 45.4 | | HCM Level of Service | | | | D | | | |
| HCM Volume to Capacity ratio | | | 1.61 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | Sum of lost time (s) | | | | 11.0 | | | |
| Intersection Capacity Utilization | | | 112.3% | | ICU Level of Service | | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

14: Woodruff Road & Walmart Driveway

2035 PM Woodruff Improvements

7/6/2011























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | | |  | |
| Volume (vph) | 32 | 2216 | 195 | 32 | 3306 | 61 | 530 | 10 | 8 | 56 | 2 | 53 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.0 | 5.0 | | | 5.0 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.93 | | | 0.94 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.98 | |
| Satd. Flow (prot) | 1719 | 3396 | | 1719 | 3429 | | 1719 | 1687 | | | 1651 | |
| Flt Permitted | 0.06 | 1.00 | | 0.06 | 1.00 | | 0.67 | 1.00 | | | 0.85 | |
| Satd. Flow (perm) | 100 | 3396 | | 110 | 3429 | | 1203 | 1687 | | | 1436 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 36 | 2462 | 217 | 36 | 3673 | 68 | 589 | 11 | 9 | 62 | 2 | 59 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 28 | 0 |
| Lane Group Flow (vph) | 36 | 2673 | 0 | 36 | 3740 | 0 | 589 | 16 | 0 | 0 | 95 | 0 |
| Turn Type | pm+pt | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | 5 | 2 | | | 6 | | | 8 | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 75.7 | 75.7 | | 65.8 | 65.8 | | 33.0 | 33.0 | | | 33.0 | |
| Effective Green, g (s) | 75.7 | 75.7 | | 65.8 | 65.8 | | 33.0 | 33.0 | | | 33.0 | |
| Actuated g/C Ratio | 0.63 | 0.63 | | 0.55 | 0.55 | | 0.28 | 0.28 | | | 0.28 | |
| Clearance Time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.0 | 5.0 | | | 5.0 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | | | 4.3 | |
| Lane Grp Cap (vph) | 112 | 2142 | | 60 | 1880 | | 331 | 464 | | | 395 | |
| v/s Ratio Prot | 0.01 | c0.79 | | | c1.09 | | | 0.01 | | | | |
| v/s Ratio Perm | 0.19 | | | 0.33 | | | c0.49 | | | | 0.07 | |
| v/c Ratio | 0.32 | 1.25 | | 0.60 | 1.99 | | 1.78 | 0.04 | | | 0.24 | |
| Uniform Delay, d1 | 28.1 | 22.1 | | 18.2 | 27.1 | | 43.5 | 31.8 | | | 33.8 | |
| Progression Factor | 1.24 | 0.94 | | 1.10 | 1.09 | | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 1.6 | 114.2 | | 19.8 | 446.2 | | 362.8 | 0.0 | | | 0.5 | |
| Delay (s) | 36.4 | 135.0 | | 39.8 | 475.6 | | 406.3 | 31.9 | | | 34.3 | |
| Level of Service | D | F | | D | F | | F | C | | | C | |
| Approach Delay (s) | | 133.7 | | | 471.5 | | | 394.0 | | | 34.3 | |
| Approach LOS | | F | | | F | | | F | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 330.5 | | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 1.94 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 17.6 | | | |
| Intersection Capacity Utilization | | | 138.8% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

15: Woodruff Road & Verdin Road

2035 PM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  |  |  |  |  |
| Volume (vph) | 144 | 2702 | 61 | 90 | 1748 | 105 | 363 | 292 | 179 | 77 | 311 | 239 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.2 | 5.0 | 5.0 | 5.2 | 5.2 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.93 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 3427 | | 1719 | 3409 | | 1719 | 1810 | 1538 | 1719 | 1692 | |
| Flt Permitted | 0.06 | 1.00 | | 0.06 | 1.00 | | 0.15 | 1.00 | 1.00 | 0.56 | 1.00 | |
| Satd. Flow (perm) | 102 | 3427 | | 102 | 3409 | | 276 | 1810 | 1538 | 1021 | 1692 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 160 | 3002 | 68 | 100 | 1942 | 117 | 403 | 324 | 199 | 86 | 346 | 266 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 160 | 3069 | 0 | 100 | 2055 | 0 | 403 | 324 | 198 | 86 | 601 | 0 |
| Turn Type | Perm | | | Perm | | | pm+pt | | | Perm | Perm | |
| Protected Phases | 2 | | | 6 | | | 3 | | 8 | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | 8 | | 4 | |
| Actuated Green, G (s) | 70.7 | 70.7 | | 70.7 | 70.7 | | 38.0 | 38.0 | 38.0 | 20.8 | 20.8 | |
| Effective Green, g (s) | 70.7 | 70.7 | | 70.7 | 70.7 | | 38.0 | 38.0 | 38.0 | 20.8 | 20.8 | |
| Actuated g/C Ratio | 0.59 | 0.59 | | 0.59 | 0.59 | | 0.32 | 0.32 | 0.32 | 0.17 | 0.17 | |
| Clearance Time (s) | 6.3 | 6.3 | | 6.3 | 6.3 | | 5.2 | 5.0 | 5.0 | 5.2 | 5.2 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | 60 | 2019 | | 60 | 2008 | | 229 | 573 | 487 | 177 | 293 | |
| v/s Ratio Prot | 0.90 | | | 0.60 | | | c0.17 | 0.18 | | c0.36 | | |
| v/s Ratio Perm | c1.56 | | | 0.98 | | | 0.38 | | 0.13 | 0.08 | | |
| v/c Ratio | 2.67 | 1.52 | | 1.67 | 1.02 | | 1.76 | 0.57 | 0.41 | 0.49 | 2.05 | |
| Uniform Delay, d1 | 24.6 | 24.6 | | 24.6 | 24.6 | | 35.8 | 34.1 | 32.2 | 44.8 | 49.6 | |
| Progression Factor | 0.35 | 0.34 | | 0.67 | 0.66 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 764.6 | 234.8 | | 306.6 | 13.4 | | 359.2 | 1.7 | 0.9 | 3.3 | 485.1 | |
| Delay (s) | 773.3 | 243.3 | | 323.1 | 29.6 | | 395.0 | 35.8 | 33.0 | 48.1 | 534.7 | |
| Level of Service | F | F | | F | C | | F | D | C | D | F | |
| Approach Delay (s) | 269.5 | | | 43.2 | | | 191.6 | | | 474.8 | | |
| Approach LOS | F | | | D | | | F | | | F | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 210.0 | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | | 2.44 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | Sum of lost time (s) | | | 16.7 | | | | |
| Intersection Capacity Utilization | | | 171.7% | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

16: Woodruff Road & Butler Road

2035 PM Woodruff Improvements

7/6/2011



















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | |  |  | | |  |  |  |  |  |
| Volume (vph) | 29 | 2394 | 167 | 528 | 1677 | 26 | 264 | 28 | 652 | 443 | 552 | 144 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.3 | | 6.3 | 6.3 | | | 5.0 | 6.3 | 5.0 | 5.0 | |
| Lane Util. Factor | | 0.95 | | 1.00 | 0.95 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 | 1.00 | 0.97 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | 0.96 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 3403 | | 1719 | 3430 | | | 1731 | 1538 | 1719 | 1753 | |
| Flt Permitted | | 0.73 | | 0.06 | 1.00 | | | 0.11 | 1.00 | 0.35 | 1.00 | |
| Satd. Flow (perm) | | 2501 | | 117 | 3430 | | | 191 | 1538 | 640 | 1753 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 32 | 2660 | 186 | 587 | 1863 | 29 | 293 | 31 | 724 | 492 | 613 | 160 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 2874 | 0 | 587 | 1891 | 0 | 0 | 324 | 724 | 492 | 765 | 0 |
| Turn Type | Perm | | | pm+pt | | | Perm | | pm+ov | | Perm | |
| Protected Phases | | 2 | | 1 | 6 | | | 8 | 1 | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | 8 | 4 | | |
| Actuated Green, G (s) | | 55.7 | | 72.7 | 72.7 | | | 36.0 | 46.7 | 36.0 | 36.0 | |
| Effective Green, g (s) | | 55.7 | | 72.7 | 72.7 | | | 36.0 | 46.7 | 36.0 | 36.0 | |
| Actuated g/C Ratio | | 0.46 | | 0.61 | 0.61 | | | 0.30 | 0.39 | 0.30 | 0.30 | |
| Clearance Time (s) | | 6.3 | | 6.3 | 6.3 | | | 5.0 | 6.3 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 4.3 | | 4.3 | 4.3 | | | 4.3 | 4.3 | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | | 1161 | | 214 | 2078 | | | 57 | 599 | 192 | 526 | |
| v/s Ratio Prot | | | | c0.24 | 0.55 | | | | 0.11 | | 0.44 | |
| v/s Ratio Perm | | 1.15 | | c1.42 | | | | c1.69 | 0.36 | 0.77 | | |
| v/c Ratio | | 2.48 | | 2.74 | 0.91 | | | 5.68 | 1.21 | 2.56 | 1.45 | |
| Uniform Delay, d1 | | 32.1 | | 39.3 | 20.8 | | | 42.0 | 36.6 | 42.0 | 42.0 | |
| Progression Factor | | 1.21 | | 1.00 | 1.07 | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 664.1 | | 785.5 | 0.8 | | | 2145.5 | 108.9 | 718.2 | 215.1 | |
| Delay (s) | | 702.9 | | 824.9 | 23.0 | | | 2187.5 | 145.6 | 760.2 | 257.1 | |
| Level of Service | | F | | F | C | | | F | F | F | F | |
| Approach Delay (s) | | 702.9 | | | 212.9 | | | 776.9 | | | 452.8 | |
| Approach LOS | | F | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 513.4 | | | HCM Level of Service | | | | F | | |
| HCM Volume to Capacity ratio | | | 3.62 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 11.3 | | | |
| Intersection Capacity Utilization | | | 192.3% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

17: Woodruff Road & Bell Road

2035 PM Woodruff Improvements

7/6/2011
























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  | | |  | |
| Volume (vph) | 96 | 3418 | 156 | 53 | 2464 | 16 | 209 | 2 | 58 | 21 | 2 | 88 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.2 | 6.2 | | 6.2 | 6.2 | | | 5.4 | | | 5.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | | | 0.97 | | | 0.89 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.96 | | | 0.99 | |
| Satd. Flow (prot) | 1719 | 3416 | | 1719 | 3435 | | | 1691 | | | 1600 | |
| Flt Permitted | 0.05 | 1.00 | | 0.05 | 1.00 | | | 0.62 | | | 0.95 | |
| Satd. Flow (perm) | 82 | 3416 | | 82 | 3435 | | | 1081 | | | 1532 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 107 | 3798 | 173 | 59 | 2738 | 18 | 232 | 2 | 64 | 23 | 2 | 98 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 107 | 3968 | 0 | 59 | 2756 | 0 | 0 | 297 | 0 | 0 | 118 | 0 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | 87.8 | 87.8 | | 87.8 | 87.8 | | | 20.6 | | | 20.6 | |
| Effective Green, g (s) | 87.8 | 87.8 | | 87.8 | 87.8 | | | 20.6 | | | 20.6 | |
| Actuated g/C Ratio | 0.73 | 0.73 | | 0.73 | 0.73 | | | 0.17 | | | 0.17 | |
| Clearance Time (s) | 6.2 | 6.2 | | 6.2 | 6.2 | | | 5.4 | | | 5.4 | |
| Vehicle Extension (s) | 4.3 | 4.3 | | 4.3 | 4.3 | | | 4.3 | | | 4.3 | |
| Lane Grp Cap (vph) | 60 | 2499 | | 60 | 2513 | | | 186 | | | 263 | |
| v/s Ratio Prot | 1.16 | | | 0.80 | | | | | | | | |
| v/s Ratio Perm | c1.30 | | | 0.72 | | | | c0.27 | | | 0.08 | |
| v/c Ratio | 1.78 | 1.59 | | 0.98 | 1.10 | | | 1.60 | | | 0.45 | |
| Uniform Delay, d1 | 16.1 | 16.1 | | 15.4 | 16.1 | | | 49.7 | | | 44.6 | |
| Progression Factor | 0.52 | 0.50 | | 0.89 | 0.97 | | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 358.5 | 264.8 | | 94.7 | 48.8 | | | 292.7 | | | 1.9 | |
| Delay (s) | 366.9 | 272.9 | | 108.4 | 64.3 | | | 342.4 | | | 46.5 | |
| Level of Service | F | F | | F | E | | | F | | | D | |
| Approach Delay (s) | 275.3 | | | 65.3 | | | | 342.4 | | | 46.5 | |
| Approach LOS | F | | | E | | | | F | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | 193.4 | | | HCM Level of Service | | | F | | | | | |
| HCM Volume to Capacity ratio | 1.75 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 120.0 | | | Sum of lost time (s) | | | 11.6 | | | | | |
| Intersection Capacity Utilization | 131.0% | | | ICU Level of Service | | | H | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

18: Woodruff Road & SC 14

2035 PM Woodruff Improvements

7/6/2011

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  | |  |  |  |  |  |  |
| Volume (vph) | 223 | 1837 | 517 | 142 | 1214 | 105 | 264 | 393 | 77 | 288 | 586 | 167 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.3 | 6.3 | 5.0 | 6.3 | 6.3 | | 5.0 | 5.0 | 6.3 | 5.0 | 5.0 | 6.3 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | | 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 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3438 | 1538 | 1719 | 3397 | | 1719 | 1810 | 1538 | 1719 | 1810 | 1538 |
| Flt Permitted | 0.08 | 1.00 | 1.00 | 0.09 | 1.00 | | 0.15 | 1.00 | 1.00 | 0.15 | 1.00 | 1.00 |
| Satd. Flow (perm) | 146 | 3438 | 1538 | 155 | 3397 | | 278 | 1810 | 1538 | 268 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 248 | 2041 | 574 | 158 | 1349 | 117 | 293 | 437 | 86 | 320 | 651 | 186 |
| RTOR Reduction (vph) | 0 | 0 | 22 | 0 | 5 | 0 | 0 | 0 | 11 | 0 | 0 | 16 |
| Lane Group Flow (vph) | 248 | 2041 | 552 | 158 | 1461 | 0 | 293 | 437 | 75 | 320 | 651 | 170 |
| Turn Type | pm+pt | | pm+ov | pm+pt | | | pm+pt | | pm+ov | pm+pt | | pm+ov |
| Protected Phases | 5 | 2 | 3 | 1 | 6 | | 3 | 8 | 1 | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | 6 | | | 8 | | 8 | 4 | | 4 |
| Actuated Green, G (s) | 60.4 | 49.7 | 62.7 | 54.4 | 46.7 | | 39.0 | 26.0 | 33.7 | 41.0 | 27.0 | 37.7 |
| Effective Green, g (s) | 60.4 | 49.7 | 62.7 | 54.4 | 46.7 | | 39.0 | 26.0 | 33.7 | 41.0 | 27.0 | 37.7 |
| Actuated g/C Ratio | 0.50 | 0.41 | 0.52 | 0.45 | 0.39 | | 0.32 | 0.22 | 0.28 | 0.34 | 0.22 | 0.31 |
| Clearance Time (s) | 6.3 | 6.3 | 5.0 | 6.3 | 6.3 | | 5.0 | 5.0 | 6.3 | 5.0 | 5.0 | 6.3 |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 214 | 1424 | 804 | 171 | 1322 | | 246 | 392 | 432 | 261 | 407 | 483 |
| v/s Ratio Prot | c0.10 | c0.59 | 0.07 | 0.06 | 0.43 | | 0.13 | 0.24 | 0.01 | c0.14 | c0.36 | 0.03 |
| v/s Ratio Perm | 0.48 | | 0.28 | 0.36 | | | 0.26 | | 0.04 | 0.28 | | 0.08 |
| v/c Ratio | 1.16 | 1.43 | 0.69 | 0.92 | 1.10 | | 1.19 | 1.11 | 0.17 | 1.23 | 1.60 | 0.35 |
| Uniform Delay, d1 | 35.8 | 35.1 | 21.3 | 28.6 | 36.6 | | 34.9 | 47.0 | 32.6 | 33.4 | 46.5 | 31.7 |
| Progression Factor | 1.11 | 0.59 | 1.02 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 76.6 | 195.4 | 0.3 | 47.9 | 58.7 | | 118.9 | 80.3 | 0.3 | 130.8 | 281.1 | 0.7 |
| Delay (s) | 116.3 | 215.9 | 21.9 | 76.5 | 95.3 | | 153.9 | 127.3 | 32.9 | 164.2 | 327.6 | 32.4 |
| Level of Service | F | F | C | E | F | | F | F | C | F | F | C |
| Approach Delay (s) | | 168.4 | | | 93.5 | | | 126.9 | | | 235.0 | |
| Approach LOS | | F | | | F | | | F | | | F | |

Intersection Summary
























| | | | |
|-----------------------------------|--------|----------------------|------|
| HCM Average Control Delay | 156.3 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.41 | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 17.6 |
| Intersection Capacity Utilization | 122.9% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

19: E Parkins Mill Road & US 276

2035 PM Woodruff Improvements

7/6/2011

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 146 | 162 | 90 | 137 | 98 | 112 | 210 | 1553 | 266 | 115 | 1940 | 316 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 4.0 | 7.0 | 7.0 | 4.0 | 7.0 | 7.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 0.97 | 1.00 | 1.00 | 1.00 | 0.91 | 1.00 | 0.97 | 0.91 | 1.00 |
| Frt | 1.00 | 0.95 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3254 | | 3335 | 1810 | 1538 | 1719 | 4940 | 1538 | 3335 | 4940 | 1538 |
| Flt Permitted | 0.67 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1213 | 3254 | | 3335 | 1810 | 1538 | 1719 | 4940 | 1538 | 3335 | 4940 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 162 | 180 | 100 | 152 | 109 | 124 | 233 | 1726 | 296 | 128 | 2156 | 351 |
| RTOR Reduction (vph) | 0 | 72 | 0 | 0 | 0 | 113 | 0 | 0 | 126 | 0 | 0 | 105 |
| Lane Group Flow (vph) | 162 | 208 | 0 | 152 | 109 | 11 | 233 | 1726 | 170 | 128 | 2156 | 246 |
| Turn Type | pm+pt | | | Prot | | Perm | Prot | | Perm | Prot | | Perm |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 8 | | | | | 4 | | | 6 | | | 2 |
| Actuated Green, G (s) | 16.0 | 9.0 | | 7.0 | 9.0 | 9.0 | 17.1 | 60.6 | 60.6 | 7.8 | 51.3 | 51.3 |
| Effective Green, g (s) | 16.0 | 9.0 | | 7.0 | 9.0 | 9.0 | 17.1 | 60.6 | 60.6 | 7.8 | 51.3 | 51.3 |
| Actuated g/C Ratio | 0.15 | 0.09 | | 0.07 | 0.09 | 0.09 | 0.16 | 0.57 | 0.57 | 0.07 | 0.49 | 0.49 |
| Clearance Time (s) | 4.0 | 6.0 | | 4.0 | 6.0 | 6.0 | 4.0 | 7.0 | 7.0 | 4.0 | 7.0 | 7.0 |
| Vehicle Extension (s) | 4.3 | 4.9 | | 4.3 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 218 | 278 | | 221 | 155 | 131 | 279 | 2840 | 884 | 247 | 2404 | 749 |
| v/s Ratio Prot | c0.05 | c0.06 | | 0.05 | 0.06 | | c0.14 | 0.35 | | 0.04 | c0.44 | |
| v/s Ratio Perm | 0.06 | | | | | 0.01 | | | 0.11 | | | 0.16 |
| v/c Ratio | 0.74 | 0.75 | | 0.69 | 0.70 | 0.08 | 0.84 | 0.61 | 0.19 | 0.52 | 0.90 | 0.33 |
| Uniform Delay, d1 | 42.0 | 47.1 | | 48.1 | 46.9 | 44.4 | 42.8 | 14.6 | 10.7 | 47.0 | 24.6 | 16.5 |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 14.1 | 12.3 | | 9.7 | 16.4 | 0.5 | 20.1 | 0.5 | 0.2 | 2.8 | 5.2 | 0.5 |
| Delay (s) | 56.1 | 59.4 | | 57.8 | 63.3 | 44.9 | 62.9 | 15.2 | 10.9 | 49.8 | 29.8 | 17.1 |
| Level of Service | E | E | | E | E | D | E | B | B | D | C | B |
| Approach Delay (s) | | 58.2 | | | 55.2 | | | 19.5 | | | 29.1 | |
| Approach LOS | | E | | | E | | | B | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 29.3 | | | HCM Level of Service | | | | C | | |
| HCM Volume to Capacity ratio | | | 0.86 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 105.4 | | | Sum of lost time (s) | | | 21.0 | | | |
| Intersection Capacity Utilization | | | 79.9% | | | ICU Level of Service | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

20: Duvall Drive & US 276

2035 PM Woodruff Improvements

7/6/2011



























| Movement | EBL | EBR | SET | SER | NWL | NWT |
|-----------------------------------|-------|------|--------|------|----------------------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 520 | 205 | 1668 | 499 | 190 | 1509 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | 6.3 | | 6.3 | 6.3 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 |
| Frt | 1.00 | 0.85 | 0.97 | | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1719 | 1538 | 4769 | | 1719 | 4940 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 0.10 | 1.00 |
| Satd. Flow (perm) | 1719 | 1538 | 4769 | | 178 | 4940 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 578 | 228 | 1853 | 554 | 211 | 1677 |
| RTOR Reduction (vph) | 0 | 15 | 83 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 578 | 213 | 2324 | 0 | 211 | 1677 |
| Turn Type | Perm | | | | Perm | |
| Protected Phases | 8 | | 2 | | | 6 |
| Permitted Phases | | 8 | | | 6 | |
| Actuated Green, G (s) | 12.0 | 12.0 | 40.7 | | 40.7 | 40.7 |
| Effective Green, g (s) | 12.0 | 12.0 | 40.7 | | 40.7 | 40.7 |
| Actuated g/C Ratio | 0.18 | 0.18 | 0.63 | | 0.63 | 0.63 |
| Clearance Time (s) | 6.0 | 6.0 | 6.3 | | 6.3 | 6.3 |
| Vehicle Extension (s) | 4.9 | 4.9 | 4.9 | | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 317 | 284 | 2986 | | 111 | 3093 |
| v/s Ratio Prot | c0.34 | | 0.49 | | | 0.34 |
| v/s Ratio Perm | | 0.14 | | | c1.19 | |
| v/c Ratio | 1.82 | 0.75 | 0.78 | | 1.90 | 0.54 |
| Uniform Delay, d1 | 26.5 | 25.1 | 8.9 | | 12.1 | 6.9 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 382.7 | 12.1 | 1.5 | | 437.1 | 0.3 |
| Delay (s) | 409.2 | 37.2 | 10.4 | | 449.3 | 7.2 |
| Level of Service | F | D | B | | F | A |
| Approach Delay (s) | 303.9 | | 10.4 | | | 56.6 |
| Approach LOS | F | | B | | | E |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 73.9 | | HCM Level of Service | E |
| HCM Volume to Capacity ratio | | | 1.88 | | | |
| Actuated Cycle Length (s) | | | 65.0 | | Sum of lost time (s) | 12.3 |
| Intersection Capacity Utilization | | | 101.0% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

23: US 276 & Millennium Blvd

2035 PM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 126 | 2355 | 157 | 33 | 1711 | 14 | 118 | 71 | 92 | 84 | 28 | 68 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 6.5 | 6.5 | 4.5 | 6.5 | 6.5 | 6.0 | 6.0 | | 6.0 | 6.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | | 1.00 | 1.00 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.92 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1719 | 3438 | 1538 | 1719 | 3438 | 1538 | 3335 | 3147 | | 1719 | 1810 | 2707 |
| Flt Permitted | 0.05 | 1.00 | 1.00 | 0.04 | 1.00 | 1.00 | 0.95 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 99 | 3438 | 1538 | 79 | 3438 | 1538 | 3335 | 3147 | | 1810 | 1810 | 2707 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 140 | 2617 | 174 | 37 | 1901 | 16 | 131 | 79 | 102 | 93 | 31 | 76 |
| RTOR Reduction (vph) | 0 | 0 | 36 | 0 | 0 | 5 | 0 | 77 | 0 | 0 | 0 | 44 |
| Lane Group Flow (vph) | 140 | 2617 | 138 | 37 | 1901 | 11 | 131 | 104 | 0 | 93 | 31 | 32 |
| Turn Type | pm+pt | | Perm | pm+pt | | Perm | Prot | | | pm+pt | | pm+ov |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | 5 |
| Permitted Phases | 2 | | 2 | 6 | | 6 | | | | 4 | | 4 |
| Actuated Green, G (s) | 102.1 | 94.1 | 94.1 | 96.0 | 91.3 | 91.3 | 8.0 | 6.0 | | 10.0 | 4.0 | 12.0 |
| Effective Green, g (s) | 102.1 | 94.1 | 94.1 | 96.0 | 91.3 | 91.3 | 8.0 | 6.0 | | 10.0 | 4.0 | 12.0 |
| Actuated g/C Ratio | 0.76 | 0.70 | 0.70 | 0.72 | 0.68 | 0.68 | 0.06 | 0.04 | | 0.07 | 0.03 | 0.09 |
| Clearance Time (s) | 4.0 | 6.5 | 6.5 | 4.5 | 6.5 | 6.5 | 6.0 | 6.0 | | 6.0 | 6.0 | 4.0 |
| Vehicle Extension (s) | 4.3 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 | 4.3 | 6.4 | | 4.3 | 6.4 | 4.3 |
| Lane Grp Cap (vph) | 172 | 2418 | 1082 | 114 | 2346 | 1049 | 199 | 141 | | 131 | 54 | 243 |
| v/s Ratio Prot | c0.05 | c0.76 | | 0.01 | 0.55 | | c0.04 | c0.03 | | 0.03 | 0.02 | 0.01 |
| v/s Ratio Perm | 0.57 | | 0.09 | 0.22 | | 0.01 | | | | 0.02 | | 0.00 |
| v/c Ratio | 0.81 | 1.08 | 0.13 | 0.32 | 0.81 | 0.01 | 0.66 | 0.73 | | 0.71 | 0.57 | 0.13 |
| Uniform Delay, d1 | 33.5 | 19.9 | 6.5 | 34.5 | 15.1 | 6.8 | 61.6 | 63.1 | | 60.5 | 64.1 | 56.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 26.4 | 45.1 | 0.1 | 2.6 | 2.5 | 0.0 | 8.9 | 24.8 | | 17.9 | 28.0 | 0.4 |
| Delay (s) | 59.9 | 64.9 | 6.6 | 37.1 | 17.6 | 6.8 | 70.5 | 87.9 | | 78.4 | 92.1 | 56.5 |
| Level of Service | E | E | A | D | B | A | E | F | | E | F | E |
| Approach Delay (s) | | 61.2 | | | 17.9 | | | 80.6 | | | 72.2 | |
| Approach LOS | | E | | | B | | | F | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 47.1 | | | HCM Level of Service | | | | D | | |
| HCM Volume to Capacity ratio | | | 0.98 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 133.8 | | | Sum of lost time (s) | | | | 14.0 | | |
| Intersection Capacity Utilization | | | 98.8% | | | ICU Level of Service | | | | F | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

24: Pelham Road & The Parkway

2035 PM Woodruff Improvements

7/6/2011

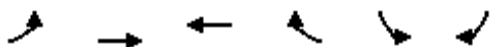
| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  | |  |  | | | |  |  |  |
| Volume (vph) | 240 | 1117 | 877 | 0 | 1264 | 1009 | 0 | 0 | 0 | 395 | 643 | 355 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | | 5.8 | 5.3 | | | | 5.3 | 5.3 | 5.3 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | | 0.95 | 1.00 | | | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3335 | 3438 | 1538 | | 3438 | 1538 | | | | 1719 | 1810 | 1538 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | | | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3335 | 3438 | 1538 | | 3438 | 1538 | | | | 1719 | 1810 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 267 | 1241 | 974 | 0 | 1404 | 1121 | 0 | 0 | 0 | 439 | 714 | 394 |
| RTOR Reduction (vph) | 0 | 0 | 34 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 122 |
| Lane Group Flow (vph) | 267 | 1241 | 940 | 0 | 1404 | 1118 | 0 | 0 | 0 | 439 | 714 | 272 |
| Turn Type | Prot | | Perm | Perm | | custom | | | | Perm | | Perm |
| Protected Phases | 5 | 2 | | | 6 | 4 | | | | | 4 | |
| Permitted Phases | | | 2 | 6 | | 6 | | | | 4 | | 4 |
| Actuated Green, G (s) | 10.5 | 69.2 | 69.2 | | 52.9 | 97.6 | | | | 44.7 | 44.7 | 44.7 |
| Effective Green, g (s) | 10.5 | 69.2 | 69.2 | | 52.9 | 97.6 | | | | 44.7 | 44.7 | 44.7 |
| Actuated g/C Ratio | 0.08 | 0.55 | 0.55 | | 0.42 | 0.78 | | | | 0.36 | 0.36 | 0.36 |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | | 5.8 | 5.3 | | | | 5.3 | 5.3 | 5.3 |
| Vehicle Extension (s) | 4.3 | 4.3 | 4.3 | | 4.3 | 4.3 | | | | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 280 | 1903 | 851 | | 1455 | 1201 | | | | 615 | 647 | 550 |
| v/s Ratio Prot | 0.08 | 0.36 | | | 0.41 | 0.33 | | | | | c0.39 | |
| v/s Ratio Perm | | | c0.61 | | | 0.39 | | | | 0.26 | | 0.18 |
| v/c Ratio | 0.95 | 0.65 | 1.10 | | 0.96 | 0.93 | | | | 0.71 | 1.10 | 0.49 |
| Uniform Delay, d1 | 57.0 | 19.5 | 27.9 | | 35.1 | 11.0 | | | | 34.6 | 40.1 | 31.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | | 0.74 | 0.81 | | | | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 41.4 | 1.8 | 63.6 | | 5.9 | 3.9 | | | | 4.4 | 67.2 | 1.1 |
| Delay (s) | 98.4 | 21.2 | 91.5 | | 31.8 | 12.8 | | | | 39.0 | 107.3 | 32.4 |
| Level of Service | F | C | F | | C | B | | | | D | F | C |
| Approach Delay (s) | | 57.1 | | | 23.4 | | | 0.0 | | | 68.9 | |
| Approach LOS | | E | | | C | | | A | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 46.9 | | HCM Level of Service | | | | | D | | |
| HCM Volume to Capacity ratio | | | 1.10 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 125.0 | | Sum of lost time (s) | | | | | 11.1 | | |
| Intersection Capacity Utilization | | | 137.2% | | ICU Level of Service | | | | | H | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

25: Pelham Road & I-85 SB off ramp

2035 PM Woodruff Improvements

7/6/2011









| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|--------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑↑ |
| Volume (vph) | 0 | 1512 | 1816 | 0 | 681 | 457 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.6 | 5.6 | | 5.3 | 5.3 |
| Lane Util. Factor | | 0.95 | 0.95 | | 1.00 | 0.88 |
| Frt | | 1.00 | 1.00 | | 1.00 | 0.85 |
| Flt Protected | | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | | 3438 | 3438 | | 1719 | 2707 |
| Flt Permitted | | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | | 3438 | 3438 | | 1719 | 2707 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1680 | 2018 | 0 | 757 | 508 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 5 |
| Lane Group Flow (vph) | 0 | 1680 | 2018 | 0 | 757 | 503 |
| Turn Type | | | | | Perm | |
| Protected Phases | | 2 | 6 | | 4 | |
| Permitted Phases | | | | | | 4 |
| Actuated Green, G (s) | | 65.4 | 65.4 | | 48.7 | 48.7 |
| Effective Green, g (s) | | 65.4 | 65.4 | | 48.7 | 48.7 |
| Actuated g/C Ratio | | 0.52 | 0.52 | | 0.39 | 0.39 |
| Clearance Time (s) | | 5.6 | 5.6 | | 5.3 | 5.3 |
| Vehicle Extension (s) | | 4.3 | 4.3 | | 4.3 | 4.3 |
| Lane Grp Cap (vph) | | 1799 | 1799 | | 670 | 1055 |
| v/s Ratio Prot | | 0.49 | c0.59 | | c0.44 | |
| v/s Ratio Perm | | | | | | 0.19 |
| v/c Ratio | | 0.93 | 1.12 | | 1.13 | 0.48 |
| Uniform Delay, d1 | | 27.8 | 29.8 | | 38.1 | 28.6 |
| Progression Factor | | 0.88 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d2 | | 8.2 | 57.7 | | 76.3 | 0.5 |
| Delay (s) | | 32.7 | 87.6 | | 114.5 | 29.1 |
| Level of Service | | C | F | | F | C |
| Approach Delay (s) | | 32.7 | 87.6 | | 80.2 | |
| Approach LOS | | C | F | | F | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 67.1 | | HCM Level of Service | E |
| HCM Volume to Capacity ratio | | | 1.13 | | | |
| Actuated Cycle Length (s) | | | 125.0 | | Sum of lost time (s) | 10.9 |
| Intersection Capacity Utilization | | | 142.1% | | ICU Level of Service | H |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

26: Pelham Road & I-85 NB off ramp

2035 PM Woodruff Improvements

7/6/2011




















| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↔ | ↔ |
| Volume (vph) | 812 | 0 | 0 | 815 | 1791 | 983 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | | | 5.8 | 5.0 | 5.0 |
| Lane Util. Factor | 0.95 | | | 0.95 | 0.97 | 1.00 |
| Frt | 1.00 | | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 1.00 | | | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 3438 | | | 3438 | 3335 | 1538 |
| Flt Permitted | 1.00 | | | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 3438 | | | 3438 | 3335 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 902 | 0 | 0 | 906 | 1990 | 1092 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 4 |
| Lane Group Flow (vph) | 902 | 0 | 0 | 906 | 1990 | 1088 |
| Turn Type | | | | | Perm | |
| Protected Phases | 2 | | | 6 | 8 | |
| Permitted Phases | | | | | | 8 |
| Actuated Green, G (s) | 33.2 | | | 33.2 | 81.0 | 81.0 |
| Effective Green, g (s) | 33.2 | | | 33.2 | 81.0 | 81.0 |
| Actuated g/C Ratio | 0.27 | | | 0.27 | 0.65 | 0.65 |
| Clearance Time (s) | 5.8 | | | 5.8 | 5.0 | 5.0 |
| Vehicle Extension (s) | 4.3 | | | 4.3 | 4.3 | 4.3 |
| Lane Grp Cap (vph) | 913 | | | 913 | 2161 | 997 |
| v/s Ratio Prot | 0.26 | | | c0.26 | 0.60 | |
| v/s Ratio Perm | | | | | | c0.71 |
| v/c Ratio | 0.99 | | | 0.99 | 0.92 | 1.09 |
| Uniform Delay, d1 | 45.7 | | | 45.8 | 19.2 | 22.0 |
| Progression Factor | 1.17 | | | 0.80 | 1.00 | 1.00 |
| Incremental Delay, d2 | 11.9 | | | 18.5 | 7.2 | 56.9 |
| Delay (s) | 65.3 | | | 54.9 | 26.4 | 78.9 |
| Level of Service | E | | | D | C | E |
| Approach Delay (s) | 65.3 | | | 54.9 | 45.0 | |
| Approach LOS | E | | | D | D | |
| Intersection Summary | | | | | | |
| HCM Average Control Delay | | | 50.6 | | HCM Level of Service | D |
| HCM Volume to Capacity ratio | | | 1.06 | | | |
| Actuated Cycle Length (s) | | | 125.0 | | Sum of lost time (s) | 10.8 |
| Intersection Capacity Utilization | | | 181.2% | | ICU Level of Service | H |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |

HCM Signalized Intersection Capacity Analysis

27: Pelham Road & Boland Court

2035 PM Woodruff Improvements

7/6/2011




















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | | |  |  | |  | |
| Volume (vph) | 77 | 1169 | 549 | 368 | 1580 | 26 | 321 | 23 | 362 | 36 | 16 | 40 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.7 | 6.7 | | 6.7 | 6.7 | | | 6.3 | 6.3 | | 6.3 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | 1.00 | | 1.00 | |
| Flt | 1.00 | 0.95 | | 1.00 | 1.00 | | | 1.00 | 0.85 | | 0.94 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 0.96 | 1.00 | | 0.98 | |
| Satd. Flow (prot) | 1719 | 3273 | | 1719 | 3430 | | | 1729 | 1538 | | 1671 | |
| Flt Permitted | 0.10 | 1.00 | | 0.07 | 1.00 | | | 0.67 | 1.00 | | 0.41 | |
| Satd. Flow (perm) | 174 | 3273 | | 119 | 3430 | | | 1218 | 1538 | | 695 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 86 | 1299 | 610 | 409 | 1756 | 29 | 357 | 26 | 402 | 40 | 18 | 44 |
| RTOR Reduction (vph) | 0 | 45 | 0 | 0 | 1 | 0 | 0 | 0 | 234 | 0 | 21 | 0 |
| Lane Group Flow (vph) | 86 | 1864 | 0 | 409 | 1784 | 0 | 0 | 383 | 168 | 0 | 81 | 0 |
| Turn Type | Perm | | | pm+pt | | | Perm | | | Perm | | Perm |
| Protected Phases | | 2 | | 1 | 6 | | | 8 | | | | 4 |
| Permitted Phases | 2 | | | 6 | | | 8 | | 8 | 4 | | |
| Actuated Green, G (s) | 54.3 | 54.3 | | 81.3 | 81.3 | | | 30.7 | 30.7 | | 30.7 | |
| Effective Green, g (s) | 54.3 | 54.3 | | 81.3 | 81.3 | | | 30.7 | 30.7 | | 30.7 | |
| Actuated g/C Ratio | 0.43 | 0.43 | | 0.65 | 0.65 | | | 0.25 | 0.25 | | 0.25 | |
| Clearance Time (s) | 6.7 | 6.7 | | 6.7 | 6.7 | | | 6.3 | 6.3 | | 6.3 | |
| Vehicle Extension (s) | 4.9 | 4.9 | | 4.3 | 4.9 | | | 4.3 | 4.3 | | 4.3 | |
| Lane Grp Cap (vph) | 76 | 1422 | | 337 | 2231 | | | 299 | 378 | | 171 | |
| v/s Ratio Prot | | c0.57 | | c0.20 | 0.52 | | | | | | | |
| v/s Ratio Perm | 0.49 | | | 0.59 | | | | c0.31 | 0.11 | | 0.12 | |
| v/c Ratio | 1.13 | 1.31 | | 1.21 | 0.80 | | | 1.28 | 0.44 | | 0.47 | |
| Uniform Delay, d1 | 35.4 | 35.4 | | 42.8 | 15.9 | | | 47.1 | 39.9 | | 40.2 | |
| Progression Factor | 0.67 | 0.68 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 73.9 | 140.5 | | 120.4 | 3.1 | | | 149.6 | 1.3 | | 3.2 | |
| Delay (s) | 97.5 | 164.4 | | 163.1 | 19.0 | | | 196.8 | 41.3 | | 43.5 | |
| Level of Service | F | F | | F | B | | | F | D | | D | |
| Approach Delay (s) | | 161.5 | | | 45.9 | | | 117.1 | | | 43.5 | |
| Approach LOS | | F | | | D | | | F | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 102.3 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.29 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 125.0 | | | Sum of lost time (s) | | | 19.7 | | | |
| Intersection Capacity Utilization | | | 112.3% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

28: Forsythia Dr & E Butler Road

2035 PM Woodruff Improvements

7/6/2011


















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | |  |  | |  |  | |
| Volume (vph) | 17 | 0 | 6 | 48 | 0 | 139 | 9 | 947 | 23 | 111 | 1392 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.0 | 6.0 | | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frt | | 1.00 | 0.85 | | 0.90 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flt Protected | | 0.95 | 1.00 | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1719 | 1538 | | 1607 | | 1719 | 3426 | | 1719 | 3430 | |
| Flt Permitted | | 0.76 | 1.00 | | 0.91 | | 0.25 | 1.00 | | 0.25 | 1.00 | |
| Satd. Flow (perm) | | 1381 | 1538 | | 1477 | | 450 | 3426 | | 450 | 3430 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 19 | 0 | 7 | 53 | 0 | 154 | 10 | 1052 | 26 | 123 | 1547 | 26 |
| RTOR Reduction (vph) | 0 | 0 | 2 | 0 | 15 | 0 | 0 | 4 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 19 | 5 | 0 | 192 | 0 | 10 | 1074 | 0 | 123 | 1571 | 0 |
| Turn Type | Perm | | Perm | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 11.2 | 11.2 | | 11.2 | | 16.1 | 16.1 | | 16.1 | 16.1 | |
| Effective Green, g (s) | | 11.2 | 11.2 | | 11.2 | | 16.1 | 16.1 | | 16.1 | 16.1 | |
| Actuated g/C Ratio | | 0.28 | 0.28 | | 0.28 | | 0.41 | 0.41 | | 0.41 | 0.41 | |
| Clearance Time (s) | | 6.0 | 6.0 | | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | |
| Vehicle Extension (s) | | 4.3 | 4.3 | | 4.3 | | 4.3 | 4.3 | | 4.3 | 4.3 | |
| Lane Grp Cap (vph) | | 394 | 438 | | 421 | | 184 | 1404 | | 184 | 1405 | |
| v/s Ratio Prot | | | | | | | | 0.31 | | | c0.46 | |
| v/s Ratio Perm | | 0.01 | 0.00 | | c0.13 | | 0.02 | | | 0.27 | | |
| v/c Ratio | | 0.05 | 0.01 | | 0.46 | | 0.05 | 0.77 | | 0.67 | 1.12 | |
| Uniform Delay, d1 | | 10.2 | 10.1 | | 11.5 | | 7.0 | 10.0 | | 9.4 | 11.6 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | 0.0 | | 1.2 | | 0.2 | 2.8 | | 10.2 | 63.2 | |
| Delay (s) | | 10.3 | 10.1 | | 12.8 | | 7.2 | 12.8 | | 19.6 | 74.8 | |
| Level of Service | | B | B | | B | | A | B | | B | E | |
| Approach Delay (s) | | 10.2 | | | 12.8 | | | 12.7 | | | 70.8 | |
| Approach LOS | | B | | | B | | | B | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 45.4 | | | HCM Level of Service | | | | D | | |
| HCM Volume to Capacity ratio | | | 0.85 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 39.3 | | | Sum of lost time (s) | | | 12.0 | | | |
| Intersection Capacity Utilization | | | 75.4% | | | ICU Level of Service | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

30: E Butler Road & I-385 SB Ramps

2035 PM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations | |  | |  |  | | |  |  | | | |
| Volume (vph) | 0 | 1026 | 105 | 545 | 931 | 0 | 578 | 0 | 589 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.0 | | 6.0 | 6.0 | | | 6.0 | 6.0 | | | |
| Lane Util. Factor | | 0.95 | | 1.00 | 0.95 | | | 1.00 | 1.00 | | | |
| Frt | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | | 0.95 | 1.00 | | | |
| Satd. Flow (prot) | | 3390 | | 1719 | 3438 | | | 1719 | 1538 | | | |
| Flt Permitted | | 1.00 | | 0.10 | 1.00 | | | 0.95 | 1.00 | | | |
| Satd. Flow (perm) | | 3390 | | 181 | 3438 | | | 1719 | 1538 | | | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1140 | 117 | 606 | 1034 | 0 | 642 | 0 | 654 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 76 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1250 | 0 | 606 | 1034 | 0 | 0 | 642 | 578 | 0 | 0 | 0 |
| Turn Type | | | | pm+pt | | | Perm | | Perm | | | |
| Protected Phases | | | | 1 | 6 | | | 4 | | | | |
| Permitted Phases | | 2 | | 6 | | | 4 | | 4 | | | |
| Actuated Green, G (s) | | 34.0 | | 65.0 | 65.0 | | | 33.0 | 33.0 | | | |
| Effective Green, g (s) | | 34.0 | | 65.0 | 65.0 | | | 33.0 | 33.0 | | | |
| Actuated g/C Ratio | | 0.31 | | 0.59 | 0.59 | | | 0.30 | 0.30 | | | |
| Clearance Time (s) | | 6.0 | | 6.0 | 6.0 | | | 6.0 | 6.0 | | | |
| Vehicle Extension (s) | | 4.3 | | 4.3 | 4.3 | | | 4.3 | 4.3 | | | |
| Lane Grp Cap (vph) | | 1048 | | 457 | 2032 | | | 516 | 461 | | | |
| v/s Ratio Prot | | | | c0.30 | 0.30 | | | | | | | |
| v/s Ratio Perm | | 0.37 | | c0.48 | | | | 0.37 | c0.38 | | | |
| v/c Ratio | | 1.19 | | 1.33 | 0.51 | | | 1.24 | 1.25 | | | |
| Uniform Delay, d1 | | 38.0 | | 33.9 | 13.2 | | | 38.5 | 38.5 | | | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 96.3 | | 161.3 | 0.3 | | | 125.5 | 131.4 | | | |
| Delay (s) | | 134.3 | | 195.2 | 13.5 | | | 164.0 | 169.9 | | | |
| Level of Service | | F | | F | B | | | F | F | | | |
| Approach Delay (s) | | 134.3 | | | 80.6 | | | 166.9 | | | 0.0 | |
| Approach LOS | | F | | | F | | | F | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 123.4 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.26 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 110.0 | | | Sum of lost time (s) | | | 12.0 | | | |
| Intersection Capacity Utilization | | | 108.9% | | | ICU Level of Service | | | G | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

31: E Butler Road & I-385 NB Ramps

2035 PM Woodruff Improvements

7/6/2011
























| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |   | | |   |  | | | |  | |  |
| Volume (vph) | 376 | 1228 | 0 | 0 | 1417 | 1062 | 0 | 0 | 0 | 59 | 0 | 309 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | | 6.0 | 6.0 | | | | 6.0 | | 6.0 |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | 1.00 | | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | 1.00 | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | 0.95 | | 1.00 |
| Satd. Flow (prot) | 1719 | 3438 | | | 3438 | 1538 | | | | 1719 | | 1538 |
| Flt Permitted | 0.06 | 1.00 | | | 1.00 | 1.00 | | | | 0.95 | | 1.00 |
| Satd. Flow (perm) | 113 | 3438 | | | 3438 | 1538 | | | | 1719 | | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 418 | 1364 | 0 | 0 | 1574 | 1180 | 0 | 0 | 0 | 66 | 0 | 343 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 260 | 0 | 0 | 0 | 0 | 0 | 82 |
| Lane Group Flow (vph) | 418 | 1364 | 0 | 0 | 1574 | 920 | 0 | 0 | 0 | 66 | 0 | 261 |
| Turn Type | pm+pt | | | | custom | | | | custom | | | custom |
| Protected Phases | 5 | 2 | | | | | | | | | | 8 |
| Permitted Phases | 2 | | | | 6 | 6 | | | | 8 | | |
| Actuated Green, G (s) | 82.0 | 82.0 | | | 58.0 | 58.0 | | | | 16.0 | | 16.0 |
| Effective Green, g (s) | 82.0 | 82.0 | | | 58.0 | 58.0 | | | | 16.0 | | 16.0 |
| Actuated g/C Ratio | 0.75 | 0.75 | | | 0.53 | 0.53 | | | | 0.15 | | 0.15 |
| Clearance Time (s) | 6.0 | 6.0 | | | 6.0 | 6.0 | | | | 6.0 | | 6.0 |
| Vehicle Extension (s) | 4.3 | 4.3 | | | 4.3 | 4.3 | | | | 4.3 | | 4.3 |
| Lane Grp Cap (vph) | 347 | 2563 | | | 1813 | 811 | | | | 250 | | 224 |
| v/s Ratio Prot | c0.20 | 0.40 | | | | | | | | | | c0.17 |
| v/s Ratio Perm | c0.70 | | | | 0.46 | 0.60 | | | | 0.04 | | |
| v/c Ratio | 1.20 | 0.53 | | | 0.87 | 1.13 | | | | 0.26 | | 1.17 |
| Uniform Delay, d1 | 37.1 | 5.9 | | | 22.7 | 26.0 | | | | 41.8 | | 47.0 |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | 1.00 | | | | 1.00 | | 1.00 |
| Incremental Delay, d2 | 116.3 | 0.3 | | | 5.0 | 75.7 | | | | 0.9 | | 111.9 |
| Delay (s) | 153.4 | 6.2 | | | 27.6 | 101.7 | | | | 42.7 | | 158.9 |
| Level of Service | F | A | | | C | F | | | | D | | F |
| Approach Delay (s) | | 40.7 | | | 59.4 | | | 0.0 | | | 140.1 | |
| Approach LOS | | D | | | E | | | A | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 59.3 | | HCM Level of Service | | | | | E | | |
| HCM Volume to Capacity ratio | | | 1.16 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 110.0 | | Sum of lost time (s) | | | | | 12.0 | | |
| Intersection Capacity Utilization | | | 108.9% | | ICU Level of Service | | | | | G | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

34: Frontage Road & Roper Mountain Road

2035 PM Woodruff Improvements

7/6/2011




















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 40 | 20 | 590 | 954 | 80 | 88 | 280 | 1973 | 304 | 21 | 1530 | 40 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 0.95 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | 1.00 | 0.85 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1719 | 1547 | | 1633 | 1649 | 1538 | 1719 | 3438 | 1538 | 1719 | 3425 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 0.96 | 1.00 | 0.09 | 1.00 | 1.00 | 0.11 | 1.00 | |
| Satd. Flow (perm) | 1719 | 1547 | | 1633 | 1649 | 1538 | 168 | 3438 | 1538 | 196 | 3425 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 44 | 22 | 656 | 1060 | 89 | 98 | 311 | 2192 | 338 | 23 | 1700 | 44 |
| RTOR Reduction (vph) | 0 | 122 | 0 | 0 | 0 | 22 | 0 | 0 | 116 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 44 | 556 | 0 | 572 | 577 | 76 | 311 | 2192 | 222 | 23 | 1742 | 0 |
| Turn Type | Split | | | Split | | Perm | pm+pt | | Perm | Perm | | |
| Protected Phases | 4 | 4 | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 14.0 | 14.0 | | 17.0 | 17.0 | 17.0 | 51.0 | 51.0 | 51.0 | 37.0 | 37.0 | |
| Effective Green, g (s) | 14.0 | 14.0 | | 17.0 | 17.0 | 17.0 | 51.0 | 51.0 | 51.0 | 37.0 | 37.0 | |
| Actuated g/C Ratio | 0.14 | 0.14 | | 0.17 | 0.17 | 0.17 | 0.51 | 0.51 | 0.51 | 0.37 | 0.37 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| Vehicle Extension (s) | 4.9 | 4.9 | | 4.9 | 4.9 | 4.9 | 4.3 | 4.9 | 4.9 | 4.9 | 4.9 | |
| Lane Grp Cap (vph) | 241 | 217 | | 278 | 280 | 261 | 210 | 1753 | 784 | 73 | 1267 | |
| v/s Ratio Prot | 0.03 | c0.36 | | c0.35 | 0.35 | | 0.12 | c0.64 | | | 0.51 | |
| v/s Ratio Perm | | | | | | 0.05 | c0.64 | | 0.14 | 0.12 | | |
| v/c Ratio | 0.18 | 2.56 | | 2.06 | 2.06 | 0.29 | 1.48 | 1.25 | 0.28 | 0.32 | 1.37 | |
| Uniform Delay, d1 | 38.0 | 43.0 | | 41.5 | 41.5 | 36.2 | 27.0 | 24.5 | 14.0 | 22.5 | 31.5 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.14 | 1.01 | 1.10 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 716.1 | | 488.2 | 489.5 | 1.2 | 218.8 | 113.2 | 0.1 | 11.0 | 173.8 | |
| Delay (s) | 38.7 | 759.1 | | 529.7 | 531.0 | 37.5 | 249.5 | 137.9 | 15.5 | 33.4 | 205.3 | |
| Level of Service | D | F | | F | F | D | F | F | B | C | F | |
| Approach Delay (s) | | 715.2 | | | 491.6 | | | 135.5 | | | 203.1 | |
| Approach LOS | | F | | | F | | | F | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 284.8 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.75 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 18.0 | | | |
| Intersection Capacity Utilization | | | 161.5% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

35: I-385 NB Ramps & Roper Mountain Road

2035 PM Woodruff Improvements

7/6/2011













| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | |  |  |  |  |  | | |  |  |
| Volume (vph) | 0 | 0 | 0 | 687 | 0 | 757 | 536 | 1800 | 0 | 0 | 2281 | 793 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | 6.0 | 6.0 |
| Lane Util. Factor | | | | 0.95 | 0.95 | 0.88 | 0.97 | 0.95 | | | 0.95 | 1.00 |
| Frt | | | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1633 | 1633 | 2707 | 3335 | 3438 | | | 3438 | 1538 |
| Flt Permitted | | | | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1633 | 1633 | 2707 | 3335 | 3438 | | | 3438 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 0 | 0 | 763 | 0 | 841 | 596 | 2000 | 0 | 0 | 2534 | 881 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 262 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 381 | 382 | 808 | 596 | 2000 | 0 | 0 | 2534 | 619 |
| Turn Type | | | | Perm | | Perm | Prot | | | | | Perm |
| Protected Phases | | | | | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | 8 | | 8 | | | | | | 6 |
| Actuated Green, G (s) | | | | 18.0 | 18.0 | 18.0 | 12.0 | 70.0 | | | 52.0 | 52.0 |
| Effective Green, g (s) | | | | 18.0 | 18.0 | 18.0 | 12.0 | 70.0 | | | 52.0 | 52.0 |
| Actuated g/C Ratio | | | | 0.18 | 0.18 | 0.18 | 0.12 | 0.70 | | | 0.52 | 0.52 |
| Clearance Time (s) | | | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | 6.0 | 6.0 |
| Vehicle Extension (s) | | | | 4.9 | 4.9 | 4.9 | 4.3 | 4.9 | | | 4.9 | 4.9 |
| Lane Grp Cap (vph) | | | | 294 | 294 | 487 | 400 | 2407 | | | 1788 | 800 |
| v/s Ratio Prot | | | | | | | c0.18 | 0.58 | | | c0.74 | |
| v/s Ratio Perm | | | | 0.23 | 0.23 | c0.30 | | | | | | 0.40 |
| v/c Ratio | | | | 1.30 | 1.30 | 1.66 | 1.49 | 0.83 | | | 1.42 | 0.77 |
| Uniform Delay, d1 | | | | 41.0 | 41.0 | 41.0 | 44.0 | 10.8 | | | 24.0 | 19.3 |
| Progression Factor | | | | 1.00 | 1.00 | 1.00 | 0.94 | 1.59 | | | 0.80 | 0.64 |
| Incremental Delay, d2 | | | | 156.0 | 157.4 | 305.8 | 221.7 | 0.3 | | | 188.1 | 0.7 |
| Delay (s) | | | | 197.0 | 198.4 | 346.8 | 263.1 | 17.5 | | | 207.2 | 13.1 |
| Level of Service | | | | F | F | F | F | B | | | F | B |
| Approach Delay (s) | | 0.0 | | | 275.9 | | | 73.9 | | | 157.1 | |
| Approach LOS | | A | | | F | | | E | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 153.8 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 1.48 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 18.0 | | | |
| Intersection Capacity Utilization | | | 178.6% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

36: Roper Mountain Road & I-385 SB Ramps

2035 PM Woodruff Improvements

7/6/2011





















| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations | | ↑↑↑ | ↑ | ↑ | ↑↑ | | ↑ | ↑ | ↑↑ | | | |
| Volume (vph) | 0 | 1627 | 1068 | 1825 | 1143 | 0 | 709 | 0 | 533 | 0 | 0 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.4 | 6.4 | 5.8 | 6.4 | | 6.1 | 6.1 | 6.1 | | | |
| Lane Util. Factor | | 0.91 | 1.00 | 1.00 | 0.95 | | 0.95 | 0.95 | 0.88 | | | |
| Frt | | 1.00 | 0.85 | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | | | |
| Flt Protected | | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 0.95 | 1.00 | | | |
| Satd. Flow (prot) | | 4940 | 1538 | 1719 | 3438 | | 1633 | 1633 | 2707 | | | |
| Flt Permitted | | 1.00 | 1.00 | 0.09 | 1.00 | | 0.95 | 0.95 | 1.00 | | | |
| Satd. Flow (perm) | | 4940 | 1538 | 161 | 3438 | | 1633 | 1633 | 2707 | | | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 0 | 1808 | 1187 | 2028 | 1270 | 0 | 788 | 0 | 592 | 0 | 0 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 172 | 0 | 0 | 0 | 0 | 0 | 192 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1808 | 1015 | 2028 | 1270 | 0 | 394 | 394 | 400 | 0 | 0 | 0 |
| Turn Type | | Perm | | pm+pt | | | Perm | | Perm | | | |
| Protected Phases | | 2 | | 1 | 6 | | | 4 | | | | |
| Permitted Phases | | | 2 | 6 | | | 4 | | 4 | | | |
| Actuated Green, G (s) | | 38.6 | 38.6 | 77.2 | 76.6 | | 10.9 | 10.9 | 10.9 | | | |
| Effective Green, g (s) | | 38.6 | 38.6 | 77.2 | 76.6 | | 10.9 | 10.9 | 10.9 | | | |
| Actuated g/C Ratio | | 0.39 | 0.39 | 0.77 | 0.77 | | 0.11 | 0.11 | 0.11 | | | |
| Clearance Time (s) | | 6.4 | 6.4 | 5.8 | 6.4 | | 6.1 | 6.1 | 6.1 | | | |
| Vehicle Extension (s) | | 4.9 | 4.9 | 4.3 | 4.9 | | 4.9 | 4.9 | 4.9 | | | |
| Lane Grp Cap (vph) | | 1907 | 594 | 626 | 2634 | | 178 | 178 | 295 | | | |
| v/s Ratio Prot | | 0.37 | | c1.04 | 0.37 | | | | | | | |
| v/s Ratio Perm | | | 0.66 | c1.46 | | | c0.24 | 0.24 | 0.15 | | | |
| v/c Ratio | | 0.95 | 1.71 | 3.24 | 0.48 | | 2.21 | 2.21 | 1.36 | | | |
| Uniform Delay, d1 | | 29.7 | 30.7 | 26.8 | 4.3 | | 44.5 | 44.5 | 44.5 | | | |
| Progression Factor | | 0.66 | 0.60 | 1.30 | 1.14 | | 1.00 | 1.00 | 1.00 | | | |
| Incremental Delay, d2 | | 1.5 | 319.7 | 1008.2 | 0.1 | | 563.9 | 563.9 | 181.4 | | | |
| Delay (s) | | 21.0 | 338.0 | 1043.1 | 5.0 | | 608.5 | 608.5 | 225.9 | | | |
| Level of Service | | C | F | F | A | | F | F | F | | | |
| Approach Delay (s) | | 146.6 | | | 643.4 | | | 444.4 | | | 0.0 | |
| Approach LOS | | F | | | F | | | F | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 413.7 | | | HCM Level of Service | | | F | | | |
| HCM Volume to Capacity ratio | | | 3.03 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 11.9 | | | |
| Intersection Capacity Utilization | | | 178.6% | | | ICU Level of Service | | | H | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

37: Roper Mountain Road & Congaree Road

2035 PM Woodruff Improvements

7/6/2011












| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | | |  |  |  |  | | |  |  |
| Volume (vph) | 167 | 1677 | 2 | 10 | 1061 | 605 | 1006 | 2 | 519 | 6 | 2 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 6.4 | | | 6.4 | 6.4 | 6.1 | 6.1 | | | 6.1 | 6.1 |
| Lane Util. Factor | 1.00 | 0.91 | | | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | 1.00 | 0.85 | | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.96 | 1.00 |
| Satd. Flow (prot) | 1719 | 4939 | | | 3437 | 1538 | 1719 | 1539 | | | 1742 | 1538 |
| Flt Permitted | 0.10 | 1.00 | | | 0.89 | 1.00 | 0.75 | 1.00 | | | 0.78 | 1.00 |
| Satd. Flow (perm) | 184 | 4939 | | | 3072 | 1538 | 1360 | 1539 | | | 1418 | 1538 |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 186 | 1863 | 2 | 11 | 1179 | 672 | 1118 | 2 | 577 | 7 | 2 | 13 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 425 | 0 | 72 | 0 | 0 | 0 | 2 |
| Lane Group Flow (vph) | 186 | 1865 | 0 | 0 | 1190 | 247 | 1118 | 507 | 0 | 0 | 9 | 11 |
| Turn Type | pm+pt | | | Perm | | Perm | Perm | | | Perm | | Perm |
| Protected Phases | 5 | 2 | | | 6 | | | 4 | | | 8 | |
| Permitted Phases | 2 | | | 6 | | 6 | 4 | | | 8 | | 8 |
| Actuated Green, G (s) | 43.6 | 43.6 | | | 33.6 | 33.6 | 43.9 | 43.9 | | | 43.9 | 43.9 |
| Effective Green, g (s) | 43.6 | 43.6 | | | 33.6 | 33.6 | 43.9 | 43.9 | | | 43.9 | 43.9 |
| Actuated g/C Ratio | 0.44 | 0.44 | | | 0.34 | 0.34 | 0.44 | 0.44 | | | 0.44 | 0.44 |
| Clearance Time (s) | 5.8 | 6.4 | | | 6.4 | 6.4 | 6.1 | 6.1 | | | 6.1 | 6.1 |
| Vehicle Extension (s) | 4.3 | 4.9 | | | 4.9 | 4.9 | 4.9 | 4.9 | | | 4.9 | 4.9 |
| Lane Grp Cap (vph) | 145 | 2153 | | | 1032 | 517 | 597 | 676 | | | 623 | 675 |
| v/s Ratio Prot | 0.05 | c0.38 | | | | | | 0.33 | | | | |
| v/s Ratio Perm | c0.51 | | | | 0.39 | 0.16 | c0.82 | | | | 0.01 | 0.01 |
| v/c Ratio | 1.28 | 0.87 | | | 1.15 | 0.48 | 1.87 | 0.75 | | | 0.01 | 0.02 |
| Uniform Delay, d1 | 28.2 | 25.6 | | | 33.2 | 26.3 | 28.1 | 23.5 | | | 15.8 | 15.9 |
| Progression Factor | 0.91 | 0.93 | | | 0.70 | 0.46 | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | 132.1 | 0.5 | | | 76.9 | 2.2 | 399.1 | 5.4 | | | 0.0 | 0.0 |
| Delay (s) | 157.9 | 24.3 | | | 100.3 | 14.3 | 427.1 | 28.9 | | | 15.9 | 15.9 |
| Level of Service | F | C | | | F | B | F | C | | | B | B |
| Approach Delay (s) | | 36.4 | | | 69.3 | | | 291.2 | | | 15.9 | |
| Approach LOS | | D | | | E | | | F | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 124.0 | | HCM Level of Service | | | F | | | | |
| HCM Volume to Capacity ratio | | | 1.54 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | Sum of lost time (s) | | | 12.5 | | | | |
| Intersection Capacity Utilization | | | 140.2% | | ICU Level of Service | | | H | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

21: Frontage Rd & US 276

2035 PM Woodruff Improvements

7/6/2011










| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | WBL | WBR | SEL | SET | NWT | NWR |
| Lane Configurations |  | |  |  |  |  |
| Volume (veh/h) | 69 | 160 | 50 | 2770 | 2206 | 71 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 77 | 178 | 56 | 3078 | 2451 | 79 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | 1009 | |
| pX, platoon unblocked | 0.56 | 0.56 | 0.56 | | | |
| vC, conflicting volume | 4141 | 1265 | 2530 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 5026 | 0 | 2165 | | | |
| tC, single (s) | 6.9 | 7.0 | 4.2 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 71 | 58 | | | |
| cM capacity (veh/h) | 0 | 605 | 131 | | | |
| Direction, Lane # | WB 1 | SE 1 | SE 2 | SE 3 | NW 1 | NW 2 |
| Volume Total | 254 | 56 | 1539 | 1539 | 1634 | 896 |
| Volume Left | 77 | 56 | 0 | 0 | 0 | 0 |
| Volume Right | 178 | 0 | 0 | 0 | 0 | 79 |
| cSH | 0 | 131 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 712.03 | 0.42 | 0.91 | 0.91 | 0.96 | 0.53 |
| Queue Length 95th (ft) | Err | 46 | 0 | 0 | 0 | 0 |
| Control Delay (s) | Err | 51.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | F | F | | | | |
| Approach Delay (s) | Err | 0.9 | | | 0.0 | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 430.4 | | | | |
| Intersection Capacity Utilization | | 96.9% | | ICU Level of Service | | F |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

22: US 276 & St Josephs Dr

2035 PM Woodruff Improvements

7/6/2011












| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | SET | SER | NWL | NWT | NEL | NER |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 2290 | 549 | 113 | 1784 | 493 | 348 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 2544 | 610 | 126 | 1982 | 548 | 387 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | 861 | | |
| pX, platoon unblocked | | | | | 0.53 | |
| vC, conflicting volume | | | 3154 | | 4092 | 1577 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 3154 | | 5053 | 1577 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 0 | | 0 | 0 |
| cM capacity (veh/h) | | | 92 | | 0 | 95 |
| Direction, Lane # | SE 1 | SE 2 | NW 1 | NW 2 | NE 1 | |
| Volume Total | 1696 | 1458 | 786 | 1321 | 934 | |
| Volume Left | 0 | 0 | 126 | 0 | 548 | |
| Volume Right | 0 | 610 | 0 | 0 | 387 | |
| cSH | 1700 | 1700 | 92 | 1700 | 0 | |
| Volume to Capacity | 1.00 | 0.86 | 1.36 | 0.78 | Err | |
| Queue Length 95th (ft) | 0 | 0 | 231 | 0 | Err | |
| Control Delay (s) | 0.0 | 0.0 | 298.8 | 0.0 | Err | |
| Lane LOS | | | F | | F | |
| Approach Delay (s) | 0.0 | | 111.5 | | Err | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | Err | | | |
| Intersection Capacity Utilization | | | 189.5% | | ICU Level of Service | H |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis

29: Rothwell Dr & E Butler Road

2035 PM Woodruff Improvements

7/6/2011











| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  |  |  |  | |
| Volume (veh/h) | 30 | 8 | 2 | 1101 | 1518 | 2 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 33 | 9 | 2 | 1223 | 1687 | 2 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | 5 | | | | |
| Median type | | | | TWLTL | TWLTL | |
| Median storage (veh) | | | | 2 | 2 | |
| Upstream signal (ft) | | | | 1175 | 377 | |
| pX, platoon unblocked | 0.87 | 0.82 | 0.82 | | | |
| vC, conflicting volume | 2304 | 844 | 1689 | | | |
| vC1, stage 1 conf vol | 1688 | | | | | |
| vC2, stage 2 conf vol | 616 | | | | | |
| vCu, unblocked vol | 1285 | 382 | 1408 | | | |
| tC, single (s) | 6.9 | 7.0 | 4.2 | | | |
| tC, 2 stage (s) | 5.9 | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 78 | 98 | 99 | | | |
| cM capacity (veh/h) | 150 | 500 | 383 | | | |
| Direction, Lane # | EB 1 | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 |
| Volume Total | 42 | 2 | 612 | 612 | 1124 | 564 |
| Volume Left | 33 | 2 | 0 | 0 | 0 | 0 |
| Volume Right | 9 | 0 | 0 | 0 | 0 | 2 |
| cSH | 190 | 383 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.22 | 0.01 | 0.36 | 0.36 | 0.66 | 0.33 |
| Queue Length 95th (ft) | 20 | 0 | 0 | 0 | 0 | 0 |
| Control Delay (s) | 30.7 | 14.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | D | B | | | | |
| Approach Delay (s) | 30.7 | 0.0 | | | 0.0 | |
| Approach LOS | D | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 0.4 | | | | |
| Intersection Capacity Utilization | | 52.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

32: New Commerce Ct & E Butler Road

2035 PM Woodruff Improvements

7/6/2011




















| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations |  | |  | |  |  |
| Volume (veh/h) | 80 | 91 | 1531 | 6 | 80 | 2399 |
| Sign Control | Stop | | Free | | Free | Free |
| Grade | 0% | | 0% | | 0% | 0% |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 89 | 101 | 1701 | 7 | 89 | 2666 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | 369 | | | |
| pX, platoon unblocked | 0.83 | 0.83 | | | 0.83 | |
| vC, conflicting volume | 3215 | 854 | | | 1708 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 3260 | 402 | | | 1436 | |
| tC, single (s) | 6.9 | 7.0 | | | 4.2 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 0 | 79 | | | 76 | |
| cM capacity (veh/h) | 4 | 487 | | | 375 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 190 | 1134 | 574 | 89 | 1333 | 1333 |
| Volume Left | 89 | 0 | 0 | 89 | 0 | 0 |
| Volume Right | 101 | 0 | 7 | 0 | 0 | 0 |
| cSH | 9 | 1700 | 1700 | 375 | 1700 | 1700 |
| Volume to Capacity | 21.69 | 0.67 | 0.34 | 0.24 | 0.78 | 0.78 |
| Queue Length 95th (ft) | Err | 0 | 0 | 23 | 0 | 0 |
| Control Delay (s) | Err | 0.0 | 0.0 | 17.6 | 0.0 | 0.0 |
| Lane LOS | F | | | C | | |
| Approach Delay (s) | Err | 0.0 | | 0.6 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 408.7 | | | | |
| Intersection Capacity Utilization | | 83.0% | | ICU Level of Service | | E |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

33: E Butler Road & Brookfield Pkwy

2035 PM Woodruff Improvements

7/6/2011

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | | |  | | |  |  | |  |  |
| Volume (veh/h) | 23 | 1593 | 6 | 2 | 2187 | 14 | 3 | 0 | 267 | 25 | 0 | 6 |
| Sign Control | Free | | | | Free | | | | Stop | | Stop | |
| Grade | 0% | | | | 0% | | | | 0% | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 26 | 1770 | 7 | 2 | 2430 | 16 | 3 | 0 | 297 | 28 | 0 | 7 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | None | | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (ft) | 939 | | | | | | | | | | | |
| pX, platoon unblocked | | | | 0.83 | | | 0.83 | | | 0.83 | | |
| vC, conflicting volume | 2446 | | | 1777 | | | 3385 | | | 4270 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 2446 | | | 1518 | | | 3466 | | | 4538 | | |
| tC, single (s) | 4.2 | | | 4.2 | | | 7.6 | | | 6.6 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | | | 4.0 | | |
| p0 queue free % | 86 | | | 99 | | | 0 | | | 100 | | |
| cM capacity (veh/h) | 180 | | | 348 | | | 2 | | | 1 | | |
| Direction, Lane # | NB 1 | NB 2 | NB 3 | SB 1 | SB 2 | SE 1 | SE 2 | NW 1 | NW 2 | | | |
| Volume Total | 26 | 1180 | 597 | 1217 | 1231 | 3 | 297 | 28 | 7 | | | |
| Volume Left | 26 | 0 | 0 | 2 | 0 | 3 | 0 | 28 | 0 | | | |
| Volume Right | 0 | 0 | 7 | 0 | 16 | 0 | 297 | 0 | 7 | | | |
| cSH | 180 | 1700 | 1700 | 348 | 1700 | 2 | 167 | 0 | 458 | | | |
| Volume to Capacity | 0.14 | 0.69 | 0.35 | 0.01 | 0.72 | 1.94 | 1.78 | Err | 0.01 | | | |
| Queue Length 95th (ft) | 12 | 0 | 0 | 0 | 0 | 31 | 535 | Err | 1 | | | |
| Control Delay (s) | 28.3 | 0.0 | 0.0 | 0.4 | 0.0 | 3685.3 | 420.1 | Err | 13.0 | | | |
| Lane LOS | D | | | A | | F | F | F | B | | | |
| Approach Delay (s) | 0.4 | | | 0.2 | | 456.3 | | Err | | | | |
| Approach LOS | | | | | | F | | F | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | Err | | | | | | | | | | | |
| Intersection Capacity Utilization | 90.8% | | | ICU Level of Service | | | | E | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| | | | | | | | | | | | | |