



Whipple Consulting Engineers, Inc.

WCE No. 2013-1166

Revised
February 2, 2017

Washington State Department of Transportation
714 N Mayfair
Spokane WA 99207

Attn: Greg Figg

Re: Painted Hills TIA – Addendum Letter

Dear Greg;

This letter is intended to provide additional information requested within the email dated December 9, 2016. The email discussed that the signal timings at the intersections of 16th Avenue & SR 27 and 32nd Avenue & SR 27 were changed by WSDOT since the beginning of the study and that the intersections should be rerun and the results compared to the results of the study at these intersections. These changes were not transmitted to the consultant until after the previous submittal.

There was also the need for clarification as to the operation of the intersections of 16th Avenue & Pines Road and 16th Avenue & SR 27, with the proposed expansion of the signal over both intersections. Specifically, the timing of, and the operations of such a signal system. Therefore, a Simtraffic Queuing and Blocking report has been prepared to anticipate the queue lengths at each approach and a Figure 13A1 has been provided to show the anticipated Year 2025 and year 2030 queues.

Intersection Level of Service

As this is an addendum letter to the TIA, Table numbers shown match their TIA counterpart as do the reported delay and level of service reported within the TIA.

Table 2 – Year 2015 Existing Intersections Levels of Service – Due to change in timing

| INTERSECTION (S)ignalized (U)nsignalized | | AM Peak Hour | | | | PM Peak Hour | | | |
|--|---|--------------|-----|-------------|-----|--------------|-----|-------------|-----|
| | | TIA | | Addendum | | TIA | | Addendum | |
| | | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS |
| 16 th Ave & Pines Rd | U | 20.2 | C | 20.0 | C | 32.4 | D | 32.4 | D |
| 16 th Ave & SR 27 | S | 27.7 | C | 35.7 | D | 25.5 | C | 29.7 | C |
| 32 nd Ave & SR 27 | S | 19.6 | B | 26.9 | C | 23.0 | C | 32.4 | C |

Table 17 - Year 2025 Levels of Service, without the Project, with the Background Projects

| INTERSECTION (S)ignalized (U)nsignalized | | AM Peak Hour | | | | PM Peak Hour | | | |
|--|-----|--------------|-----|-------------|-----|--------------|-----|-------------|-----|
| | | TIA | | Addendum | | TIA | | Addendum | |
| | | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS |
| 16 th Ave & Pines Rd | U | 26.2 | D | 25.8 | D | 66.4 | F | 68.3 | F |
| • Signalized Intx, | (S) | (30.5) | (C) | (21.9) | (C) | (33.7) | (C) | (26.1) | (C) |
| 16 th Ave & SR 27 | S | 33.6 | C | 46.7 | D | 30.3 | C | 36.1 | D |
| • Signalized Intx. | | (42.3) | (D) | (24.2) | (C) | (28.4) | (C) | (20.3) | (C) |
| 32 nd Ave & SR 27 | U | 22.3 | C | 31.4 | C | 28.2 | C | 40.8 | D |

Table 19 - Year 2025 Levels of Service, with the Project, with the Background Projects

| INTERSECTION (S)ignalized (U)nsignalized | | AM Peak Hour | | | | PM Peak Hour | | | |
|--|-----|--------------|-----|-------------|-----|--------------|-----|-------------|-----|
| | | TIA | | Addendum | | TIA | | Addendum | |
| | | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS |
| 16 th Ave & Pines Rd | U | 27.3 | D | 26.9 | D | 99.2 | F | 132.0 | F |
| • Signalized Intx, | (S) | (31.1) | (C) | (22.5) | (C) | (34.8) | (C) | (27.1) | (C) |
| 16 th Ave & SR 27 | S | 35.9 | D | 50.3 | D | 31.3 | C | 37.5 | D |
| • Signalized Intx. | | (44.6) | (D) | (25.9) | (C) | (28.6) | (C) | (20.9) | (C) |
| 32 nd Ave & SR 27 | U | 23.2 | C | 32.8 | C | 29.8 | C | 43.9 | D |

Table 22 - Year 2030 Buildout Plus 5, Levels of Service, without the Project, with the Background Projects

| INTERSECTION (S)ignalized (U)nsignalized | | AM Peak Hour | | | | PM Peak Hour | | | |
|--|-----|--------------|-----|-------------|-----|--------------|-----|-------------|-----|
| | | TIA | | Addendum | | TIA | | Addendum | |
| | | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS |
| 16 th Ave & Pines Rd | U | 30.8 | D | 30.3 | D | 99.9 | F | 116.7 | F |
| • Signalized Intx, | (S) | (30.8) | (C) | (22.6) | (C) | (35.2) | (D) | (27.1) | (C) |
| 16 th Ave & SR 27 | S | 37.4 | D | 52.9 | D | 32.8 | C | 39.5 | D |
| • Signalized Intx. | | (46.7) | (D) | (27.1) | (C) | (28.7) | (C) | (21.3) | (C) |
| 32 nd Ave & SR 27 | U | 23.4 | C | 33.1 | C | 30.0 | C | 43.7 | D |

Table 23- Year 2030 Buildout Plus 5, Levels of Service, with the Project, with the Background Projects

| INTERSECTION (S)ignalized (U)nsignalized | | AM Peak Hour | | | | PM Peak Hour | | | |
|--|-----|--------------|-----|-------------|----------|--------------|-----|-------------|-----|
| | | TIA | | Addendum | | TIA | | Addendum | |
| | | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS |
| 16 th Ave & Pines Rd | U | 32.3 | D | 31.6 | D | 141.2 | F | 141.2 | F |
| • Signalized Intx, | (S) | (31.4) | (C) | (23.3) | (C) | (36.7) | (D) | (29.1) | (C) |
| 16 th Ave & SR 27 | S | 40.7 | D | 57.2 | E | 34.3 | C | 41.4 | D |
| • Signalized Intx. | | (49.3) | (D) | (41.2) | (D) | (29.0) | (C) | (21.8) | (C) |
| 32 nd Ave & SR 27 | U | 24.3 | C | 34.6 | C | 31.9 | C | 47.1 | D |

As observed in the above tables, Generally the change in Signal timing has lowered the intersection Level of Service reported in the TIA. Based on our analysis and reporting, it is clear that the new timing scheme may not be advantageous to the motoring public. However, this change in timing does not change the outcome or the recommendations of the TIA, but only reinforces the TIA findings.

Intersection Improvements

The improvements that will be needed for the expansion of the signal is anticipated to include the following elements and Lane configurations:

- 3 signal poles with light poles, with mast arms, and attached vehicle and pedestrian heads at 16th Avenue & Pines Road
- Replace SE signal pole at 16th Avenue & SR 27, with longer mast arm.
- 6 to 7 Junction Boxes wired to the control cabinet on the Southwest Corner of 16th Avenue & SR 27.
- Placement of detector loops and advanced loop detection wired to the control cabinet
- Add EB Right turn lane between Pines Road and SR 27, relocate curb and sidewalk
- Add SB Right turn lane to Pines Road Slip lane, relocate Curb and sidewalk.

This list of elements and lane improvements have been identified in the concept intersection configuration as shown in the attached Concept Intersection Figure 13A0.

Simtraffic Queue Analysis

With the proposed improvements, a Simtraffic model has been created for select scenarios and queuing and blocking reports have been printed from these models. These models followed the following standards: traffic seeded for 10 min, with recording for 60 minutes (peak hour). And the anti-peak hour factor was not applied. 5 runs were completed with 5 different random number generations. From these 5 runs a Queuing and Blocking report was created by averaging the five runs and reporting the limits as experienced within the model, so the limits included in the report do not necessarily follow a linear pattern, but is more representative of actual traffic.

One of the limits that is reported is the 95th Percentile, which is summarized for each intersection and movement in the following tables, and are shown graphically on Figure 13A1 (attached).

Table A - Intersection of 16th Avenue & Pines Road – 95th Percentile (SimTraffic)

| | EBT | EBTR | WBLT | NBLTR | NBR | SBT | SBR |
|-------------------------|-----|------|------|-------|-----|-----|-----|
| Year 2025 W-O Proj. IMP | 109 | 249 | 84 | 132 | 5 | 252 | 161 |
| Year 2025 W- Proj. IMP | 105 | 248 | 82 | 136 | 11 | 232 | 119 |
| Year 2030 W- Proj. IMP | 98 | 195 | 82 | 85 | 66 | 262 | 140 |

Table B - Intersection of 16th Avenue & State Route 27 – 95th Percentile (SimTraffic)

| | EBL | EBLT | EBR | WBLTR | NBL | NBT | NBTR | SBL | SBT | SBTR |
|-------------------------|-----|------|-----|-------|-----|-----|------|-----|-----|------|
| Year 2025 W-O Proj. IMP | 84 | 107 | 3 | 195 | 50 | 165 | 126 | 99 | 180 | 156 |
| Year 2025 W- Proj. IMP | 80 | 103 | 3 | 193 | 51 | 178 | 131 | 81 | 179 | 148 |
| Year 2030 W- Proj. IMP | 108 | 86 | 6 | 177 | 45 | 167 | 123 | 84 | 174 | 147 |

One of the concerns of WSDOT was that the southbound Queue of the intersection of 16th Avenue & Pines Road would spillback into the travel lanes of State Route 27. As shown on Figure 13A1 per the 95th percentile of the model runs, the queue length is not anticipated to spillback and interfere with the southbound through movements of State Route 27 in the PM peak hour.

City of Spokane Valley Review

Upon review by the City of Spokane Valley, an alternative timing and lane configuration for the intersection of 16th Avenue with Pines Road & Highway 27 was proposed by the City Traffic Engineer. The lane configuration includes the WB slip ramp as a part of the intersection. This configuration differs from the WSDOT model provided. We acknowledge that there are many ways and styles to code a traffic controller in the proposed clustered intersection configuration. As we understand the fundamental design of the software and the premise that all traffic impact analysis is predicated upon.

The City Engineer provided WCE with his signal timing analysis using SimTraffic to calculate the average delay of intersections under the following conditions.

Table C- Year 2025 Buildout, Levels of Service, with the Project & Background Projects

| INTERSECTION | (S)ignalized (U)nsignalized | PM Peak Hour | |
|---------------------------------|--------------------------------|-----------------------|-----|
| | | COV | |
| | | Avg. Stop Delay (sec) | LOS |
| 16 th Ave & Pines Rd | S | 49.2 | D |
| 16 th Ave & SR 27 | S | 34.9 | C |

Table D- Year 2030 Buildout Plus 5, Levels of Service, w/ the Project & Background Projects

| INTERSECTION (S)ignalized (U)nsignalized | | PM Peak Hour | |
|--|---|-----------------------|-----|
| | | COV | |
| | | Avg. Stop Delay (sec) | LOS |
| 16 th Ave & Pines Rd | S | 51.6 | D |
| 16 th Ave & SR 27 | S | 35.5 | D |

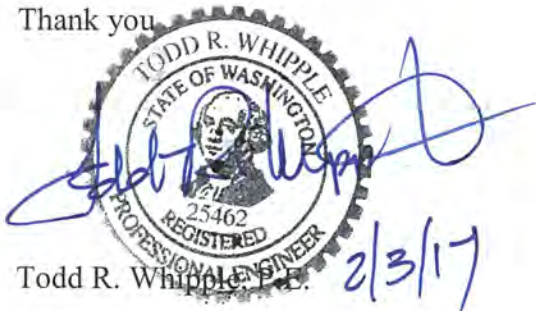
As shown in Tables C & D all intersections under the proposed timing and lane configuration are anticipated to function at an acceptable level of service. It is noted that the Simtraffic calculations are averaged from five sim traffic (5) history files at the City of Spokane Valley. The calculation sheets from these files were sent to WCE and marked with the corresponding Level of service for reference.

As documented in the TIA, the project is proposed to participate in the intersection improvements based upon the projects proportionate contribution to the intersections.

We anticipate that upon the implementation of the signal at a future date that WSDOT will create an acceptable Signal Timing Plan, for not just the PM peak hour but for all hours of operation.

If you have any questions or comments in regard to this letter, please feel free to contact us at (509) 893-2617

Thank you



Todd R. Whipple, P.E. 2/3/17

TRW/bng

Encl: (Raw Traffic Counts, Level of Service calculations, Queuing & Blocking reports. Figure 13A0, Figure 13A1, Figure 13A2, COV Sim Traffic Calculations)

PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 16th & Pines

Whipple Consulting Engineers, Inc
 TRAFFIC COUNT REDUCTION WORKSHEET

DATE OF COUNT: 1/28/2015
 Counter Analyst
 JDK BNG

AM PEAK HOURS

| APPROACH | MOVEMENT | 15 Minute Period Beginning @ | | | | | | | | | | | | | | | |
|---------------------------|------------|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|
| | | 6:30 | 6:45 | 7:00 | 7:15 | 7:30 | 7:45 | 8:00 | 8:15 | 8:30 | 8:45 | 9:00 | 9:15 | | | | |
| | | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | | | | |
| Eastbound | Left | | | | | | | | | | | | | | | | |
| | Through | | | 35 | 53 | 56 | 1 | 55 | 3 | 51 | 3 | 41 | 5 | 35 | 1 | 64 | 3 |
| | Right | | | 2 | 19 | 15 | 4 | 4 | 3 | 3 | 6 | 4 | 4 | 3 | 3 | 3 | 3 |
| | App. Total | 0 | 0 | 37 | 72 | 71 | 1 | 59 | 3 | 54 | 3 | 47 | 5 | 39 | 1 | 67 | 3 |
| | Pct Trucks | | | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.05 | 0.05 | 0.05 | 0.1 | 0.03 | 0.04 | 0.03 | 0.04 | 0 |
| Westbound | Left | | | 5 | 16 | 13 | 11 | 11 | 9 | 8 | 1 | 13 | | | | | |
| | Through | | | 29 | 54 | 50 | 3 | 51 | 4 | 34 | 2 | 31 | 29 | 38 | | | |
| | Right | | | | | | | | | | | | | | | | |
| | App. Total | 0 | 0 | 34 | 70 | 63 | 3 | 62 | 4 | 43 | 2 | 39 | 0 | 30 | 0 | 51 | 0 |
| | Pct Trucks | | | 0.03 | 0 | 0.05 | 0 | 0.06 | 0.04 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northbound | Left | | | 7 | 6 | 8 | 5 | 5 | 5 | 2 | 5 | 5 | 5 | | | | |
| | Through | | | 55 | 52 | 53 | 47 | 43 | 43 | 37 | 1 | 37 | 3 | 51 | | | |
| | Right | | | 62 | 58 | 61 | 0 | 52 | 0 | 48 | 0 | 39 | 1 | 42 | 3 | 56 | 0 |
| | App. Total | 0 | 0 | 62 | 58 | 61 | 0 | 52 | 0 | 48 | 0 | 39 | 1 | 42 | 3 | 56 | 0 |
| | Pct Trucks | | | | 0 | 0.05 | 0 | 0 | 0 | 0 | 0.03 | 0.07 | 0 | 0 | 0 | 0 | 0 |
| Southbound | Left | | | 1 | 2 | 4 | 1 | 24 | 1 | 28 | 13 | 28 | 2 | 35 | 1 | | |
| | Through | | | 21 | 41 | 38 | 1 | 4 | 1 | 5 | 9 | 1 | 9 | 14 | | | |
| | Right | | | 8 | 9 | 4 | 1 | 11 | 1 | 5 | 9 | 1 | 9 | 14 | | | |
| | App. Total | 0 | 0 | 30 | 50 | 42 | 1 | 35 | 2 | 33 | 0 | 22 | 1 | 37 | 2 | 49 | 1 |
| | Pct Trucks | | | 0.06 | 0.04 | 0.02 | 0.05 | 0 | 0 | 0.04 | 0.04 | 0.05 | 0.02 | 0 | 0 | 0 | 0 |
| Total Intersection Volume | | 0 | 0 | 163 | 4 | 250 | 6 | 237 | 5 | 208 | 9 | 178 | 5 | 147 | 7 | 148 | 6 |
| Intersection Pct Trucks | | | | 2.4% | 2.3% | 2.1% | 4.1% | 2.7% | 4.5% | 3.9% | 1.8% | 4.0% | 0 | 0 | 0 | 0 | 0 |

Notes:

| Intersection Total | Pct |
|--------------------|----------|
| One Hour Volumes | Trucks |
| 6:30 AM | 423 2.4% |
| 6:45 AM | 665 2.3% |
| 7:00 AM | 862 2.7% |
| 7:15 AM | 898 2.8% |
| 7:30 AM | 796 3.3% |
| 7:45 AM | 708 3.8% |

| Intersection Total | Pct |
|--------------------|----------|
| One Hour Volumes | Trucks |
| 8:00 AM | 718 3.1% |
| 8:15 AM | 535 3.2% |
| 8:30 AM | 381 2.6% |

PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 16th & Pines

DATE OF COUNT 1/28/2015
 Counter Analyst
 JDK BNG

| APPROACH | MOVEMENT | 7:15 | | 7:30 | | 7:45 | | 8:00 | | TOTAL | P.H.F. | Pct Trucks |
|---------------------------|------------|----------|-----|----------|-----|----------|-----|----------|-----|-------|--------|------------|
| | | pass | trk | pass | trk | pass | trk | pass | trk | | | |
| Eastbound | Left | | | | | | | | | 0 | | |
| | Through | 53 | 1 | 56 | 1 | 55 | 3 | 51 | 3 | 223 | 0.96 | 4% |
| | Right | 19 | | 15 | | 4 | | 3 | | 41 | 0.54 | 0% |
| | App.Total | 72 | 1 | 71 | 1 | 59 | 3 | 54 | 3 | 264 | 0.90 | |
| | Pct Trucks | 0.013699 | | 0.013889 | | 0.048387 | | 0.052632 | | | | |
| Westbound | Left | 16 | | 13 | | 11 | | 9 | | 49 | 0.77 | 0% |
| | Through | 54 | | 50 | | 51 | | 34 | | 198 | 0.90 | 5% |
| | Right | | | | | | | | | 0 | | |
| | App.Total | 70 | 0 | 63 | 0 | 62 | 4 | 43 | 2 | 247 | 0.88 | |
| | Pct Trucks | 0 | | 0.045455 | | 0.060606 | | 0.044444 | | | | |
| Northbound | Left | 6 | | 8 | | 5 | | 5 | | 24 | 0.75 | 0% |
| | Through | 52 | | 53 | | 47 | | 43 | | 198 | 0.90 | 2% |
| | Right | 58 | 3 | 61 | 0 | 52 | 0 | 48 | 0 | 222 | 0.91 | |
| | App.Total | 114 | 3 | 122 | 0 | 104 | 0 | 96 | 0 | 444 | | |
| | Pct Trucks | 0.04918 | | 0 | | 0 | | 0 | | | | |
| Southbound | Left | | | | | | | | | 0 | | |
| | Through | 41 | 1 | 38 | 1 | 24 | 1 | 28 | | 134 | 0.80 | 2% |
| | Right | 9 | | 4 | | 11 | | 5 | | 31 | 0.65 | 6% |
| | App.Total | 50 | 2 | 42 | 2 | 35 | 2 | 33 | 0 | 165 | 0.79 | |
| | Pct Trucks | 0.038462 | | 0.023256 | | 0.054054 | | 0 | | | | |
| Total Intersection Volume | | 250 | | 237 | | 208 | | 178 | | 898 | | 0.88 |
| Intersection Pct Trucks | | 2.3% | | 2.1% | | 4.1% | | 2.7% | | | | |

| APPROACH | MOVEMENT | 7:15 | | 7:30 | | 7:45 | | 8:00 | | TOTAL |
|-----------|-----------|------|------|------|------|------|------|------|------|-------|
| | | ped | bike | ped | bike | ped | bike | ped | bike | |
| Eastbound | Through | | | | | | | | | 0 |
| | Through | | | | | 2 | | | | 2 |
| | Through | | | | | | | | | 0 |
| | Through | | | | | | | | | 0 |
| | App.Total | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |

PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 16th Avenue & Pines Road

Whipple Consulting Engineers, Inc
 TRAFFIC COUNT REDUCTION WORKSHEET

DATE OF COUNT: 10/6/2015
 Counter: Judy
 Analyst: BNG

PM PEAK HOURS
 15 Minute Period Beginning @

| APPROACH | MOVEMENT | 3:30 PM | | 3:45 PM | | 4:00 PM | | 4:15 PM | | 4:30 PM | | 4:45 PM | | 5:00 PM | | 5:15 PM | | 5:30 PM | | 5:45 PM | | 6:00 PM | | 6:15 PM | |
|---------------------------|-----------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|
| | | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk |
| Eastbound | Left | | | | | | | | | | | | | | | | | | | | | | | | |
| | Through | | | 52 | 2 | 73 | 1 | 75 | 1 | 59 | 1 | 92 | 1 | 81 | | | | | | | | | | | |
| | Right | | | 9 | | 12 | | 11 | | 6 | | | | 17 | | | | | | | | | | | |
| | App Total | 0 | 0 | 61 | 2 | 85 | 1 | 86 | 1 | 65 | 0 | 106 | 1 | 98 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pct Trucks | | | 0.032 | | 0.012 | | 0.011 | | 0.009 | | 0.009 | | 0.009 | | | | | | | | | | | | |
| Westbound | Left | | | 13 | 1 | 13 | | 19 | | 12 | | 15 | | 16 | | | | | | | | | | | |
| | Through | | | 31 | 2 | 28 | | 25 | | 37 | | 41 | | 35 | | | | | | | | | | | |
| | Right | | | | | | | | | | | | | | | | | | | | | | | | |
| | App Total | 0 | 0 | 44 | 3 | 41 | 0 | 44 | 0 | 49 | 0 | 56 | 0 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pct Trucks | | | 0.064 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | | | | | | | | |
| Northbound | Left | | | 5 | | 2 | | 4 | | 8 | | 2 | | 6 | | | | | | | | | | | |
| | Through | | | | | | | | | | | | | | | | | | | | | | | | |
| | Right | | | 31 | | 34 | | 38 | | 44 | | 36 | | 44 | | | | | | | | | | | |
| | App Total | 0 | 0 | 36 | 0 | 36 | 0 | 42 | 0 | 52 | 0 | 38 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pct Trucks | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | | | | | | | | | | | |
| Southbound | Left | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| | Through | | | 27 | 1 | 51 | | 40 | | 55 | | 52 | | 54 | | | | | | | | | | | |
| | Right | | | 14 | | 16 | 1 | 29 | | 20 | 1 | 24 | 1 | 27 | 1 | | | | | | | | | | |
| | App Total | 0 | 0 | 41 | 1 | 68 | 1 | 69 | 0 | 75 | 1 | 76 | 1 | 81 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pct Trucks | | | 0.024 | | 0.014 | | 0.013 | | 0.013 | | 0.013 | | 0.012 | | | | | | | | | | | | |
| Total Intersection Volume | | 0 | 0 | 182 | 6 | 230 | 2 | 241 | 1 | 241 | 1 | 276 | 2 | 280 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Intersection Pct Trucks | | | | 3.2% | | 0.9% | | 0.4% | | 0.4% | | 0.7% | | 0.4% | | | | | | | | | | | |

| Intersection Total | | Pct |
|--------------------|--------|------|
| One Hour Volumes | Trucks | |
| 3:30 PM | 662 | 1.4% |
| 3:45 PM | 904 | 1.1% |
| 4:00 PM | 994 | 0.6% |
| 4:15 PM | 1043 | 0.5% |
| 4:30 PM | 801 | 0.5% |
| 4:45 PM | 559 | 0.5% |

| Intersection Total | | Pct |
|--------------------|--------|------|
| One Hour Volumes | Trucks | |
| 5:00 PM | 281 | 0.4% |
| 5:15 PM | 0 | |
| 5:30 PM | 0 | |

Notes:

PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 16th Avenue & Pines Road

Data Transfer
 Intersection No. 1

DATE OF COUNT: 10/6/2015
 Counter Analyst
 Judy BNG

Whipple Consulting Engineers, Inc
 PM PEAK HOUR BREAKDOWN

| APPROACH | MOVEMENT | 4:15 PM | | 4:30 PM | | 4:45 PM | | 5:00 PM | | TOTAL | P.H.F. | Pct Trucks |
|---------------------------|------------|----------|------|----------|------|----------|----------|----------|------|-------|--------|------------|
| | | pass | trk | pass | trk | pass | trk | pass | trk | | | |
| Eastbound | Left | | | | | | | | | 0 | | |
| | Through | 75 | 1 | 59 | | 92 | 1 | 81 | | 309 | 0.83 | 1% |
| | Right | 11 | | 6 | | 14 | | 17 | | 48 | 0.71 | 0% |
| | App Total | 86 | 1 | 65 | 0 | 106 | 1 | 98 | 0 | 357 | 0.83 | |
| | Pct Trucks | 0.011494 | | | | 0 | 0.009346 | | 0 | | | |
| Westbound | Left | 19 | | 12 | | 15 | | 16 | | 62 | 0.82 | 0% |
| | Through | 25 | | 37 | | 41 | | 35 | | 138 | 0.84 | 0% |
| | Right | | | | | | | | | 0 | | |
| | App Total | 44 | 0 | 49 | 0 | 56 | 0 | 51 | 0 | 200 | 0.89 | |
| | Pct Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| Northbound | Left | 4 | | 8 | | 2 | | 6 | | 20 | 0.63 | 0% |
| | Through | | | | | | | | | 0 | | |
| | Right | 38 | | 44 | | 36 | | 44 | | 162 | 0.92 | 0% |
| | App Total | 42 | 0 | 52 | 0 | 38 | 0 | 50 | 0 | 182 | 0.88 | |
| | Pct Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| Southbound | Left | | | | | | | | | 0 | | |
| | Through | 40 | | 55 | | 52 | | 54 | | 201 | 0.91 | 0% |
| | Right | 29 | 1 | 20 | 1 | 24 | 1 | 27 | 1 | 103 | 0.89 | 3% |
| | App Total | 69 | 1 | 75 | 1 | 76 | 1 | 81 | 1 | 304 | 0.93 | |
| | Pct Trucks | 0 | 0 | 0.013158 | 0 | 0.012987 | 0 | 0.012195 | 0 | | | |
| Total Intersection Volume | | 241 | 1 | 241 | 1 | 276 | 2 | 280 | 1 | 1043 | 0.93 | |
| Intersection Pct Trucks | | | 0.4% | | 0.4% | | 0.7% | | 0.4% | | | |

Pedestrian Calls

| APPROACH | MOVEMENT | 4:15 PM | | 4:30 PM | | 4:45 PM | | 5:00 PM | | TOTAL |
|------------|-----------|---------|------|---------|------|---------|------|---------|------|-------|
| | | ped | bike | ped | bike | ped | bike | ped | bike | |
| Eastbound | Through | | | | | | | | | 0 |
| Westbound | Through | | | | | | | | | 0 |
| Northbound | Through | | | | | | | | | 0 |
| Southbound | Through | | | | | | | | | 0 |
| | App Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 16th & SR27

Whipple Consulting Engineers, Inc
 TRAFFIC COUNT REDUCTION WORKSHEET

DATE OF COUNT: 1/28/2015
 Counter Analyst
 BNG BNG

AM PEAK HOURS

| APPROACH | MOVEMENT | 15 Minute Period Beginning @ | | | | | | | | | | | | | |
|---------------------------|------------|------------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|------|-------|------|-----|
| | | 6:30 | 6:45 | 7:00 | 7:15 | 7:30 | 7:45 | 8:00 | 8:15 | 8:30 | 8:45 | 9:00 | 9:15 | | |
| | | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk |
| Eastbound | Left | | | 51 | 2 | 68 | 47 | 55 | 1 | 35 | 1 | 34 | 81 | 1 | |
| | Through | | | 28 | 41 | 48 | 52 | 41 | 1 | 32 | 24 | 24 | 53 | 1 | |
| | Right | | | 4 | 2 | 6 | 6 | 6 | 7 | 1 | 2 | 5 | 5 | | |
| | App. Total | 0 | 0 | 83 | 0 | 122 | 0 | 102 | 2 | 74 | 2 | 60 | 0 | 139 | 2 |
| Pct Trucks | | | 0 | 0 | 0.022 | 0 | 0 | 0.019 | 0 | 0.026 | 0 | 0 | 0.014 | | |
| Westbound | Left | | | 2 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | | |
| | Through | | | 20 | 1 | 52 | 3 | 45 | 1 | 36 | 24 | 24 | 44 | | |
| | Right | | | 10 | 21 | 17 | 16 | 14 | 14 | 14 | 27 | 17 | 17 | | |
| | App. Total | 0 | 0 | 32 | 1 | 75 | 0 | 61 | 1 | 51 | 0 | 53 | 0 | 62 | 1 |
| Pct Trucks | | | 0 | 0.03 | 0 | 0.041 | 0 | 0.016 | 0 | 0 | 0 | 0 | 0.016 | | |
| Northbound | Left | | | 17 | 14 | 15 | 12 | 8 | 7 | 7 | 16 | 9 | 9 | | |
| | Through | | | 80 | 1 | 100 | 1 | 92 | 81 | 1 | 74 | 1 | 69 | 4 | |
| | Right | | | 2 | 7 | 1 | 7 | 3 | 3 | 3 | 4 | 4 | 4 | | |
| | App. Total | 0 | 0 | 99 | 1 | 121 | 1 | 111 | 0 | 92 | 1 | 64 | 1 | 78 | 4 |
| Pct Trucks | | | 0 | 0.01 | 0.008 | 0.007 | 0 | 0.011 | 0.012 | 0.015 | 0.049 | | | | |
| Southbound | Left | | | 5 | 8 | 8 | 16 | 7 | 8 | 8 | 8 | 10 | | | |
| | Through | | | 11 | 4 | 27 | 2 | 21 | 1 | 16 | 26 | 27 | 3 | | |
| | Right | | | | | | | | 1 | | | | | | |
| | App. Total | 0 | 0 | 16 | 4 | 35 | 2 | 37 | 1 | 35 | 1 | 34 | 0 | 37 | 3 |
| Pct Trucks | | | 0 | 0.2 | 0.054 | 0 | 0.026 | 0 | 0.028 | 0 | 0 | 0 | 0.075 | | |
| Total Intersection Volume | | 0 | 0 | 230 | 6 | 276 | 4 | 314 | 2 | 280 | 4 | 221 | 3 | 316 | 10 |
| Intersection Pct Trucks | | | | 2.5% | 1.4% | 1.1% | 0.6% | 1.4% | 1.3% | 0.5% | 3.1% | | | | |

| Intersection Total | Pct Trucks |
|--------------------|------------|
| One Hour Volumes | |
| 8:00 AM | 1046 1.7% |
| 8:15 AM | 762 1.8% |
| 8:30 AM | 538 2.0% |

| Intersection Total | Pct Trucks |
|--------------------|------------|
| One Hour Volumes | |
| 6:30 AM | 516 1.9% |
| 6:45 AM | 881 1.6% |
| 7:00 AM | 1197 1.3% |
| 7:15 AM | 1245 1.1% |
| 7:30 AM | 1189 1.1% |
| 7:45 AM | 1036 1.0% |

Notes:

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PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 16th & SR27
 DATE OF COUNT: 1/28/2015
 Counter Analyst
 BNG

Whipple Consulting Engineers, Inc
 AM PEAK HOUR BREAKDOWN

Data Transfer
 Intersection No. 1

| APPROACH | MOVEMENT | 7:15 | | 7:30 | | 7:45 | | 8:00 | | TOTAL | P.H.F. | Pct Trucks |
|---------------------------|------------|----------|-----|----------|-----|----------|-----|----------|-----|-------|--------|------------|
| | | pass | lrk | pass | lrk | pass | lrk | pass | lrk | | | |
| Eastbound | Left | 2 | | 68 | | 47 | | 55 | | 173 | 0.64 | 1% |
| | Through | 41 | 1 | 48 | | 52 | | 41 | | 184 | 0.88 | 1% |
| | Right | 2 | | 6 | | 6 | | 6 | | 20 | 0.83 | 0% |
| | App Total | 45 | 1 | 122 | 0 | 105 | 0 | 102 | 0 | 372 | 0.77 | |
| | Pct Trucks | 0.021739 | | 0 | | 0 | | 0.019231 | | | | |
| Westbound | Left | 3 | | 1 | | 1 | | 1 | | 5 | 0.42 | 0% |
| | Through | 51 | | 52 | 3 | 45 | 1 | 36 | | 188 | 0.85 | 2% |
| | Right | 21 | | 17 | | 16 | | 14 | | 68 | 0.81 | 0% |
| | App Total | 75 | 0 | 70 | 3 | 61 | 1 | 51 | 0 | 261 | 0.87 | |
| | Pct Trucks | 0 | | 0.041096 | | 0.016129 | | 0 | | | | |
| Northbound | Left | 14 | | 15 | | 12 | | 8 | | 49 | 0.82 | 0% |
| | Through | 100 | 1 | 125 | 1 | 92 | | 81 | 1 | 401 | 0.80 | 1% |
| | Right | 7 | | 1 | | 7 | | 3 | | 18 | 0.64 | 0% |
| | App Total | 121 | 1 | 141 | 1 | 111 | 0 | 92 | 1 | 468 | 0.82 | |
| | Pct Trucks | 0.008197 | | 0.007042 | | 0 | | 0.010753 | | | | |
| Southbound | Left | 8 | | 8 | | 16 | | 7 | | 39 | 0.61 | 0% |
| | Through | 27 | 2 | 20 | | 21 | 1 | 27 | 1 | 99 | 0.85 | 4% |
| | Right | 1 | | 1 | | 1 | | 1 | | 4 | 0.25 | 0% |
| | App Total | 35 | 2 | 28 | 0 | 37 | 1 | 35 | 1 | 139 | 0.91 | |
| | Pct Trucks | 0.054054 | | 0 | | 0.026316 | | 0.027778 | | | | |
| Total Intersection Volume | | 276 | 4 | 361 | 4 | 314 | 2 | 280 | 4 | 1245 | | |
| Intersection Pct Trucks | | 1.4% | | 1.1% | | 0.6% | | 1.4% | | | | |

Pedestrian Calls

| APPROACH | MOVEMENT | 7:15 | | 7:30 | | 7:45 | | 8:00 | | TOTAL |
|-----------|-----------|------|------|------|------|------|------|------|------|-------|
| | | ped | bike | ped | bike | ped | bike | ped | bike | |
| Eastbound | Through | | | | | 3 | | | | 3 |
| | Through | | | | | | | | | 0 |
| | Through | | | | | | | | | 0 |
| | Through | | | | | | | | | 0 |
| | App Total | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |

PROJECT: Painted Hills GC
 JOB NO.: 13-1166
 INTERSECTION: 16th Avenue & SR 27

Whipple Consulting Engineers, Inc
 TRAFFIC COUNT REDUCTION WORKSHEET

DATE OF COUNT: 10/7/2015
 Counter BNG
 Analyst BNG

PM PEAK HOURS

| APPROACH | MOVEMENT | 15 Minute Period Beginning @ | | | | | | | | | | | | | |
|---------------------------|-----------|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|-----|
| | | 3:30 PM | 3:45 PM | 4:00 PM | 4:15 PM | 4:30 PM | 4:45 PM | 5:00 PM | 5:15 PM | 5:30 PM | 5:45 PM | 6:00 PM | 6:15 PM | | |
| | | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk |
| Eastbound | Left | | | | | 42 | 1 | 40 | 1 | 37 | 1 | 39 | | | |
| | Through | | | 60 | | 63 | 3 | 64 | | 64 | 1 | 52 | | | 1 |
| | Right | | | 10 | | 13 | | 9 | | 15 | | 15 | | | 9 |
| | App Total | 0 | 0 | 0 | 0 | 112 | 1 | 116 | 4 | 115 | 0 | 106 | 0 | 107 | 0 |
| Pct Trucks | | | | | 0.009 | 0.009 | 0.033 | 0 | 0.017 | 0 | 0.009 | | | 0.009 | |
| Westbound | Left | | | | | 2 | | 1 | | 5 | | 4 | | | 2 |
| | Through | | | 59 | | 39 | 1 | 42 | | 48 | | 56 | | | 41 |
| | Right | | | 1 | | 1 | | 4 | | 1 | | 0 | | | 1 |
| | App Total | 0 | 0 | 0 | 0 | 62 | 0 | 49 | 1 | 54 | 0 | 60 | 0 | 44 | 0 |
| Pct Trucks | | | | | 0 | 0 | 0.024 | 0 | 0 | 0 | 0 | | | 0 | |
| Northbound | Left | | | | | 4 | | 2 | | 5 | | 8 | | | 7 |
| | Through | | | 59 | | 59 | 1 | 59 | | 51 | 1 | 52 | 1 | 55 | |
| | Right | | | 1 | | 1 | | 1 | | 4 | | 3 | | 0 | |
| | App Total | 0 | 0 | 0 | 0 | 64 | 1 | 62 | 0 | 60 | 1 | 60 | 4 | 62 | 0 |
| Pct Trucks | | | | | 0.015 | 0 | 0 | 0 | 0.011 | 0 | 0.016 | | 0.063 | | |
| Southbound | Left | | | | | 13 | | 27 | | 14 | | 17 | | | 16 |
| | Through | | | 48 | | 55 | | 55 | | 79 | | 71 | | 67 | |
| | Right | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | App Total | 0 | 0 | 0 | 0 | 61 | 0 | 82 | 0 | 93 | 0 | 88 | 0 | 83 | 0 |
| Pct Trucks | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | |
| Total Intersection Volume | | 0 | 0 | 0 | 0 | 299 | 2 | 301 | 5 | 365 | 1 | 323 | 3 | 314 | 4 |
| Intersection Pct Trucks | | | | | | 0.7% | | 1.6% | | 0.3% | | 0.9% | | 1.3% | |

Notes:

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| Intersection Total | Pct |
|--------------------|--------|
| One Hour Volumes | Trucks |
| 5:00 PM | 1307 |
| 5:15 PM | 941 |
| 5:30 PM | 615 |

| Intersection Total | Pct |
|--------------------|--------|
| One Hour Volumes | Trucks |
| 3:30 PM | 0 |
| 3:45 PM | 301 |
| 4:00 PM | 607 |
| 4:15 PM | 973 |
| 4:30 PM | 1299 |
| 4:45 PM | 1316 |

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PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 16th Avenue & SR 27

DATE OF COUNT: 10/7/2015
 Counter Analyst
 RMA/JDK BNG

Whipple Consulting Engineers, Inc
 PM PEAK HOUR BREAKDOWN

Data Transfer
 Intersection No. 1

| APPROACH | MOVEMENT | 4:45 PM | | 5:00 PM | | 5:15 PM | | 5:30 PM | | TOTAL | P.H.F. | Pct Trucks |
|---------------------------|------------|---------|-----|----------|-----|----------|-----|---------|------|-------|--------|------------|
| | | pass | trk | pass | trk | pass | trk | pass | trk | | | |
| Eastbound | Left | 40 | 1 | 42 | 37 | 1 | 39 | 160 | 0.95 | 1% | | |
| | Through | 63 | 3 | 64 | 64 | 1 | 52 | 247 | 0.94 | 2% | | |
| | Right | 13 | 9 | 15 | 15 | 15 | 15 | 52 | 0.87 | 0% | | |
| | App Total | 116 | 4 | 115 | 116 | 2 | 106 | 459 | 0.96 | | | |
| | Pct Trucks | 0.03333 | | 0 | | 0.016949 | | 0 | | | | |
| Westbound | Left | 1 | 3 | 4 | 5 | 4 | 4 | 13 | 0.65 | 0% | | |
| | Through | 39 | 1 | 42 | 48 | 56 | 56 | 186 | 0.83 | 1% | | |
| | Right | 1 | 4 | 1 | 1 | 6 | 6 | 13 | 0.38 | 0% | | |
| | App Total | 41 | 8 | 49 | 54 | 60 | 60 | 205 | 0.85 | | | |
| | Pct Trucks | 0.02381 | | 0 | | 0 | | 0 | | | | |
| Northbound | Left | 2 | 6 | 8 | 5 | 8 | 8 | 21 | 0.66 | 0% | | |
| | Through | 59 | 1 | 60 | 51 | 1 | 52 | 247 | 0.74 | 1% | | |
| | Right | 1 | 1 | 4 | 4 | 3 | 3 | 9 | 0.56 | 33% | | |
| | App Total | 62 | 8 | 69 | 60 | 11 | 60 | 277 | 0.77 | | | |
| | Pct Trucks | 0 | | 0.011111 | | 0.016393 | | 0.0625 | | | | |
| Southbound | Left | 27 | 24 | 88 | 14 | 17 | 17 | 82 | 0.76 | 0% | | |
| | Through | 55 | 88 | 79 | 79 | 71 | 71 | 293 | 0.83 | 0% | | |
| | Right | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| | App Total | 82 | 112 | 112 | 93 | 88 | 88 | 375 | 0.84 | | | |
| | Pct Trucks | 0 | | 0 | | 0 | | 0 | | | | |
| Total Intersection Volume | | 301 | | 365 | | 323 | | 314 | | 1316 | | 0.90 |
| Intersection Pct Trucks | | 1.6% | | 0.3% | | 0.9% | | 1.3% | | | | |

Pedestrian Calls

| APPROACH | MOVEMENT | 4:45 | | 5:00 | | 5:15 | | 5:30 | | TOTAL |
|-----------|------------|------|------|------|------|------|------|------|------|-------|
| | | ped | bike | ped | bike | ped | bike | ped | bike | |
| Eastbound | Through | | | | | | | | | 0 |
| | Westbound | | | | | | | | | 0 |
| | Northbound | | | | | | | 1 | | 1 |
| | Southbound | | | | | | | | | 0 |
| | App Total | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |

DATE OF COUNT: 10/8/2015
 Counter BNG
 Analyst BNG
 AM PEAK HOURS

| APPROACH | MOVEMENT | 15 Minute Period Beginning @ | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|------------|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|---|---|---|---|--|--|--|--|--|--|--|--|
| | | 6:30 | 6:45 | 7:00 | 7:15 | 7:30 | 7:45 | 8:00 | 8:15 | 8:30 | 8:45 | 9:00 | 9:15 | | | | | | | | | | | | |
| Eastbound | Left | | | 9 | 28 | 31 | 56 | 28 | 1 | 25 | 1 | | | | | | | | | | | | | | |
| | Through | | | 37 | 45 | 55 | 52 | 59 | 3 | 44 | | | | | | | | | | | | | | | |
| | Right | | | 13 | 13 | 12 | 6 | 2 | 21 | 18 | | | | | | | | | | | | | | | |
| | App. Total | 0 | 0 | 59 | 86 | 98 | 97 | 108 | 4 | 87 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| Pct Trucks | | | | 0.017 | 0.011 | 0.03 | 0.04 | 0.036 | | 0.022 | | | | | | | | | | | | | | | |
| Westbound | Left | | | 7 | 17 | 13 | 21 | 5 | | 10 | 2 | | | | | | | | | | | | | | |
| | Through | | | 37 | 48 | 36 | 48 | 2 | 54 | 30 | 1 | | | | | | | | | | | | | | |
| | Right | | | 5 | 11 | 20 | 22 | 12 | 16 | | | | | | | | | | | | | | | | |
| | App. Total | 0 | 0 | 49 | 76 | 69 | 91 | 2 | 71 | 0 | 56 | 3 | 0 | 0 | 0 | 0 | | | | | | | | | |
| Pct Trucks | | | 0 | 0 | 0.05 | 0.042 | 0.022 | 0 | 0.051 | | | | | | | | | | | | | | | | |
| Northbound | Left | | | 16 | 35 | 21 | 24 | 31 | | 22 | | | | | | | | | | | | | | | |
| | Through | | | 38 | 67 | 82 | 46 | 56 | 1 | 46 | 2 | | | | | | | | | | | | | | |
| | Right | | | 25 | 23 | 48 | 24 | 30 | 31 | | | | | | | | | | | | | | | | |
| | App. Total | 0 | 0 | 79 | 125 | 151 | 94 | 117 | 1 | 99 | 2 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | |
| Pct Trucks | | | 0 | 0 | 0.008 | 0.026 | 0.051 | 0.008 | 0.02 | | | | | | | | | | | | | | | | |
| Southbound | Left | | | 1 | 3 | 7 | 8 | 4 | | 5 | | | | | | | | | | | | | | | |
| | Through | | | 20 | 22 | 18 | 15 | 19 | | 21 | 2 | | | | | | | | | | | | | | |
| | Right | | | 4 | 14 | 15 | 16 | 22 | | 8 | | | | | | | | | | | | | | | |
| | App. Total | 0 | 0 | 25 | 39 | 40 | 39 | 45 | 0 | 34 | 2 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | |
| Pct Trucks | | | 0.038 | 0.049 | 0.07 | 0.093 | 0 | | 0.056 | | | | | | | | | | | | | | | | |
| Total Intersection Volume | | 0 | 0 | 212 | 326 | 358 | 321 | 341 | 5 | 276 | 9 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | |
| Intersection Pct Trucks | | | | 0.9% | 2.4% | 3.5% | 4.5% | 1.4% | | 3.2% | | | | | | | | | | | | | | | |

| Intersection Total | Pct |
|--------------------|-----------|
| One Hour Volumes | Trucks |
| 6:30 AM | 548 1.8% |
| 6:45 AM | 919 2.5% |
| 7:00 AM | 1255 3.0% |
| 7:15 AM | 1387 3.0% |
| 7:30 AM | 1338 3.1% |
| 7:45 AM | 967 3.0% |

| Intersection Total | Pct |
|--------------------|----------|
| One Hour Volumes | Trucks |
| 8:00 AM | 631 2.2% |
| 8:15 AM | 285 3.2% |
| 8:30 AM | 0 |

Notes:

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PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 32nd & HWY 27
 Counter
 DATE OF COUNT: 10/8/2015
 Analyst
 BNG

Whipple Consulting Engineers, Inc
 AM PEAK HOUR BREAKDOWN

Data Transfer
 Intersection No. 1

| APPROACH | MOVEMENT | 7:15 | | 7:30 | | 7:45 | | 8:00 | | TOTAL | P.H.F. | Pct Trucks |
|---------------------------|------------|----------|-----|----------|-----|----------|-----|----------|------|-------|--------|------------|
| | | pass | trk | pass | trk | pass | trk | pass | trk | | | |
| Eastbound | Left | 28 | 1 | 31 | 36 | 36 | 28 | 1 | 125 | 0.87 | 2% | |
| | Through | 45 | 55 | 2 | 55 | 2 | 59 | 3 | 221 | 0.89 | 3% | |
| | Right | 13 | 12 | 1 | 6 | 2 | 21 | 55 | 401 | 0.65 | 5% | |
| | App. Total | 86 | 1 | 98 | 97 | 4 | 108 | 4 | 401 | 0.90 | | |
| | Pct Trucks | 0.011494 | | 0.029703 | | 0.039604 | | 0.035714 | | | | |
| Westbound | Left | 17 | 1 | 13 | 21 | 2 | 5 | 59 | 191 | 0.70 | 5% | |
| | Through | 48 | 3 | 36 | 48 | 2 | 54 | 191 | 66 | 0.88 | 3% | |
| | Right | 11 | 20 | 1 | 22 | 12 | 71 | 0 | 316 | 0.75 | 2% | |
| | App. Total | 76 | 4 | 69 | 91 | 2 | 71 | 0 | 316 | 0.85 | | |
| | Pct Trucks | 0.05 | | 0.041667 | | 0.021505 | | 0 | | | | |
| Northbound | Left | 35 | 1 | 21 | 24 | 2 | 31 | 114 | 258 | 0.79 | 3% | |
| | Through | 67 | 82 | 1 | 46 | 5 | 56 | 1 | 126 | 0.78 | 3% | |
| | Right | 23 | 48 | 1 | 24 | 30 | 30 | 1 | 498 | 0.64 | 1% | |
| | App. Total | 125 | 1 | 151 | 94 | 5 | 117 | 1 | 498 | 0.80 | | |
| | Pct Trucks | 0.007937 | | 0.025806 | | 0.060505 | | 0.008475 | | | | |
| Southbound | Left | 3 | 7 | 1 | 8 | 1 | 4 | 22 | 78 | 0.69 | 0% | |
| | Through | 22 | 18 | 1 | 15 | 1 | 19 | 72 | 172 | 0.81 | 5% | |
| | Right | 14 | 15 | 2 | 16 | 3 | 22 | 0 | 45 | 0.82 | 7% | |
| | App. Total | 39 | 2 | 40 | 39 | 4 | 45 | 0 | 172 | 0.96 | | |
| | Pct Trucks | 0.04878 | | 0.069767 | | 0.093023 | | 0 | | | | |
| Total Intersection Volume | | 326 | 8 | 358 | 321 | 15 | 341 | 5 | 1387 | 0.93 | | |
| Intersection Pct Trucks | | 2.4% | | 3.5% | | 4.5% | | 1.4% | | | | |

Pedestrian Calls

| APPROACH | MOVEMENT | 7:15 | | 7:30 | | 7:45 | | 8:00 | | TOTAL |
|-----------|------------|------|------|------|------|------|------|------|------|-------|
| | | ped | bike | ped | bike | ped | bike | ped | bike | |
| Eastbound | Through | | | | | | | | | 0 |
| | Through | | | | | | | | | 0 |
| | Through | 1 | | 3 | | | | | | 4 |
| | Through | | | | | | | | | 0 |
| | App. Total | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |

PROJECT: Painted Hills GC
 JOB NO. 13-1166
 INTERSECTION: 32nd & HWY 27

Whipple Consulting Engineers, Inc
 TRAFFIC COUNT REDUCTION WORKSHEET

DATE OF COUNT: 10/6/2015
 Counter: RMA/JDK
 Analyst: BNG

PM PEAK HOURS

| APPROACH | MOVEMENT | 15 Minute Period Beginning @ | | | | | | | | | | | | 5:00 PM | 5:15 PM | 5:30 PM | 5:45 PM | 6:00 PM | 6:15 PM |
|---------------------------|------------|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | 3:30 PM | 3:45 PM | 4:00 PM | 4:15 PM | 4:30 PM | 4:45 PM | 4:50 PM | 4:55 PM | 5:00 PM | 5:15 PM | 5:30 PM | 5:45 PM | | | | | | |
| | | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk | pass | trk |
| Eastbound | Left | | 11 | 9 | 20 | 19 | 21 | 19 | 21 | 19 | 21 | 19 | 21 | 19 | 21 | | | | |
| | Through | | 66 | 3 | 70 | 2 | 69 | 1 | 60 | 2 | 61 | 2 | 61 | 1 | | | | | |
| | Right | | 33 | 20 | 35 | 33 | 54 | 46 | | | | | | | | | | | |
| | App Total | 0 | 110 | 23 | 124 | 112 | 156 | 2 | 146 | 2 | 146 | 2 | 146 | 1 | 0 | 0 | 0 | 0 | 0 |
| | Pct Trucks | | 0.027 | 0.02 | 0.008 | 0.018 | 0.013 | 0.007 | | | | | | 0.007 | | | | | |
| Westbound | Left | | 30 | 30 | 1 | 31 | 1 | 31 | 1 | 31 | 1 | 31 | 1 | 36 | 1 | | | | |
| | Through | | 65 | 2 | 69 | 2 | 50 | 1 | 71 | 1 | 92 | 1 | 90 | 1 | | | | | |
| | Right | | 7 | 8 | 10 | 6 | 14 | 10 | | | | | | | | | | | |
| | App Total | 0 | 102 | 42 | 107 | 33 | 91 | 22 | 108 | 31 | 149 | 0 | 136 | 2 | 0 | 0 | 0 | 0 | 0 |
| | Pct Trucks | | 0.019 | 0.027 | 0.022 | 0.009 | 0.014 | | | | | | | 0.014 | | | | | |
| Northbound | Left | | 21 | 18 | 1 | 23 | 1 | 23 | 1 | 28 | 1 | 31 | 1 | 31 | | | | | |
| | Through | | 39 | 1 | 32 | 25 | 2 | 39 | 1 | 45 | 2 | 41 | 1 | | | | | | |
| | Right | | 26 | 19 | 1 | 22 | 2 | 15 | 2 | 37 | 2 | 16 | | | | | | | |
| | App Total | 0 | 86 | 38 | 69 | 27 | 74 | 2 | 82 | 33 | 113 | 2 | 88 | 1 | 0 | 0 | 0 | 0 | 0 |
| | Pct Trucks | | 0.011 | 0.028 | 0.054 | 0.035 | 0.017 | 0.011 | | | | | | 0.011 | | | | | |
| Southbound | Left | | 9 | 9 | 9 | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 11 | | | | | | |
| | Through | | 48 | 2 | 51 | 44 | 1 | 51 | 48 | 52 | 1 | | | | | | | | |
| | Right | | 7 | 20 | 11 | 20 | 17 | 15 | | | | | | | | | | | |
| | App Total | 0 | 64 | 31 | 64 | 64 | 75 | 26 | 75 | 75 | 75 | 26 | 78 | 1 | 0 | 0 | 0 | 0 | 0 |
| | Pct Trucks | | 0.03 | 0 | 0.015 | 0 | 0.013 | | | | | | 0.013 | | | | | | |
| Total Intersection Volume | | 0 | 862 | 8 | 355 | 7 | 349 | 8 | 383 | 6 | 493 | 4 | 448 | 5 | 0 | 0 | 0 | 0 | 0 |
| Intersection Pct Trucks | | | 2.2% | 1.9% | 2.2% | 1.5% | 0.8% | 1.1% | | | | | 1.1% | | | | | | |

| Intersection Total | | Pct |
|--------------------|------|--------|
| One Hour Volumes | | Trucks |
| 3:30 PM | 1089 | 2.1% |
| 3:45 PM | 1478 | 2.0% |
| 4:00 PM | 1605 | 1.6% |
| 4:15 PM | 1696 | 1.4% |
| 4:30 PM | 1339 | 1.1% |
| 4:45 PM | 950 | 0.9% |

| Intersection Total | | Pct |
|--------------------|-----|--------|
| One Hour Volumes | | Trucks |
| 5:00 PM | 453 | 1.1% |
| 5:15 PM | 0 | |
| 5:30 PM | 0 | |

Notes:

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PROJECT: Painted Hills GC
 JOB NO. 13-1166 32nd & HWY 27
 INTERSECTION: 32nd & HWY 27

DATE OF COUNT: 10/6/2015
 Counter Analyst
 RMA/JDK BNG

Whipple Consulting Engineers, Inc
 PM PEAK HOUR BREAKDOWN

Data Transfer
 Intersection No. 1

| APPROACH | MOVEMENT | 4:15 PM | | 4:30 PM | | 4:45 PM | | 5:00 PM | | TOTAL | P.H.F. | Pct Trucks |
|---------------------------|------------|---------|----------|---------|----------|---------|----------|---------|----------|-------|--------|------------|
| | | pass | trk | pass | trk | pass | trk | pass | trk | | | |
| Eastbound | Left | 20 | | 19 | | 21 | | 19 | | 79 | 0.94 | 0% |
| | Through | 69 | 1 | 60 | 2 | 81 | 2 | 81 | 1 | 297 | 0.89 | 2% |
| | Right | 35 | | 33 | | 54 | | 46 | | 168 | 0.78 | 0% |
| | App Total | 124 | 1 | 112 | 2 | 156 | 2 | 146 | 1 | 544 | 0.86 | |
| | Pct Trucks | | 0.008 | | 0.017544 | | 0.012658 | | 0.006803 | | | |
| Westbound | Left | 31 | | 31 | | 43 | | 36 | | 143 | 0.83 | 1% |
| | Through | 50 | 1 | 71 | 1 | 92 | | 90 | 1 | 306 | 0.83 | 1% |
| | Right | 10 | | 6 | | 14 | | 10 | | 40 | 0.71 | 0% |
| | App Total | 91 | 1 | 108 | 1 | 149 | 0 | 136 | 2 | 489 | 0.82 | |
| | Pct Trucks | | 0.021505 | | 0.009174 | | 0 | | 0.014493 | | | |
| Northbound | Left | 23 | | 28 | | 31 | | 31 | | 113 | 0.91 | 0% |
| | Through | 25 | 2 | 39 | 1 | 45 | 41 | 41 | 1 | 154 | 0.86 | 3% |
| | Right | 22 | | 15 | 2 | 37 | 2 | 16 | | 96 | 0.62 | 6% |
| | App Total | 70 | 2 | 82 | 3 | 113 | 43 | 88 | 1 | 363 | 0.79 | |
| | Pct Trucks | | 0.054054 | | 0.035294 | | 0.017391 | | 0.011236 | | | |
| Southbound | Left | 9 | | 10 | | 10 | | 11 | | 40 | 0.91 | 0% |
| | Through | 44 | 1 | 51 | | 48 | 52 | 52 | 1 | 197 | 0.93 | 1% |
| | Right | 11 | | 20 | | 17 | 15 | 15 | | 63 | 0.79 | 0% |
| | App Total | 64 | 1 | 81 | | 75 | 79 | 78 | 1 | 300 | 0.93 | |
| | Pct Trucks | | 0.015385 | | 0 | | 0 | | 0.012658 | | | |
| Total Intersection Volume | | 349 | 8 | 383 | 6 | 493 | 4 | 448 | 5 | 1696 | 0.85 | |
| Intersection Pct Trucks | | | 2.2% | | 1.5% | | 0.8% | | 1.1% | | | |

Pedestrian Calls

| APPROACH | MOVEMENT | 4:15 PM | | 4:30 PM | | 4:45 PM | | 5:00 PM | | TOTAL |
|-----------|-----------|---------|------|---------|------|---------|------|---------|------|-------|
| | | ped | bike | ped | bike | ped | bike | ped | bike | |
| Eastbound | Through | 1 | | 1 | | 2 | | 2 | | 6 |
| | Through | | | | | | | | | 0 |
| | Through | | | | | | | | | 0 |
| | Through | | | 1 | | 1 | | 1 | | 3 |
| | App Total | 1 | | 2 | | 3 | | 3 | | 9 |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 7.9 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↵ | | | ↶ | | | ↷ | | | ↷ | |
| Traffic Vol, veh/h | 0 | 223 | 41 | 47 | 191 | 0 | 24 | 0 | 198 | 0 | 134 | 31 |
| Future Vol, veh/h | 0 | 223 | 41 | 47 | 191 | 0 | 24 | 0 | 198 | 0 | 134 | 31 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| Heavy Vehicles, % | 0 | 4 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 10 |
| Mvmt Flow | 0 | 253 | 47 | 53 | 217 | 0 | 27 | 0 | 225 | 0 | 152 | 35 |




















| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-----|-------|--------|-------|------|
| Conflicting Flow All | - | 0 | 0 | 300 | 0 | 0 | 695 | 601 | 277 | 713 | 624 | 217 |
| Stage 1 | - | - | - | - | - | - | 277 | 277 | - | 324 | 324 | - |
| Stage 2 | - | - | - | - | - | - | 418 | 324 | - | 389 | 300 | - |
| Critical Hdwy | - | - | - | 4.12 | - | - | 7.1 | 6.5 | 6.21 | 7.1 | 6.52 | 6.3 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.52 | - |
| Follow-up Hdwy | - | - | - | 2.218 | - | - | 3.5 | 4 | 3.309 | 3.5 | 4.018 | 3.39 |
| Pot Cap-1 Maneuver | 0 | - | - | 1261 | - | 0 | 359 | 417 | 764 | 349 | 402 | 803 |
| Stage 1 | 0 | - | - | - | - | 0 | 734 | 685 | - | 692 | 650 | - |
| Stage 2 | 0 | - | - | - | - | 0 | 616 | 653 | - | 639 | 666 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | 1261 | - | - | 229 | 397 | 764 | 237 | 383 | 803 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 229 | 397 | - | 237 | 383 | - |
| Stage 1 | - | - | - | - | - | - | 734 | 685 | - | 692 | 619 | - |
| Stage 2 | - | - | - | - | - | - | 423 | 622 | - | 451 | 666 | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|-----|----|----|
| HCM Control Delay, s | 0 | 1.6 | 15 | 20 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT | SBLn1 |
|-----------------------|-------|-----|-----|-------|-----|-------|
| Capacity (veh/h) | 610 | - | - | 1261 | - | 425 |
| HCM Lane V/C Ratio | 0.414 | - | - | 0.042 | - | 0.441 |
| HCM Control Delay (s) | 15 | - | - | 8 | 0 | 20 |
| HCM Lane LOS | C | - | - | A | A | C |
| HCM 95th %tile Q(veh) | 2 | - | - | 0.1 | - | 2.2 |

HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

AM Existing
01/06/2017

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | |  |  | |  |  | |
| Traffic Volume (veh/h) | 193 | 206 | 22 | 5 | 188 | 68 | 49 | 401 | 18 | 39 | 99 | 1 |
| Future Volume (veh/h) | 193 | 206 | 22 | 5 | 188 | 68 | 49 | 401 | 18 | 39 | 99 | 1 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1881 | 1900 | 1900 | 1873 | 1900 | 1890 | 1873 | 1890 | 1910 | 1837 | 1910 |
| Adj Flow Rate, veh/h | 227 | 242 | 26 | 6 | 221 | 80 | 58 | 472 | 21 | 46 | 116 | 1 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 1 | 1 | 0 | 4 | 4 |
| Cap, veh/h | 270 | 288 | 490 | 7 | 254 | 92 | 77 | 841 | 37 | 69 | 842 | 7 |
| Arrive On Green | 0.30 | 0.30 | 0.30 | 0.20 | 0.20 | 0.20 | 0.04 | 0.24 | 0.24 | 0.04 | 0.24 | 0.24 |
| Sat Flow, veh/h | 889 | 948 | 1615 | 35 | 1288 | 466 | 1800 | 3470 | 154 | 1819 | 3546 | 31 |
| Grp Volume(v), veh/h | 469 | 0 | 26 | 307 | 0 | 0 | 58 | 242 | 251 | 46 | 57 | 60 |
| Grp Sat Flow(s),veh/h/ln | 1837 | 0 | 1615 | 1789 | 0 | 0 | 1800 | 1779 | 1845 | 1819 | 1745 | 1831 |
| Q Serve(g_s), s | 21.8 | 0.0 | 1.0 | 15.2 | 0.0 | 0.0 | 2.9 | 10.9 | 10.9 | 2.3 | 2.4 | 2.4 |
| Cycle Q Clear(g_c), s | 21.8 | 0.0 | 1.0 | 15.2 | 0.0 | 0.0 | 2.9 | 10.9 | 10.9 | 2.3 | 2.4 | 2.4 |
| Prop In Lane | 0.48 | | 1.00 | 0.02 | | 0.26 | 1.00 | | 0.08 | 1.00 | | 0.02 |
| Lane Grp Cap(c), veh/h | 558 | 0 | 490 | 353 | 0 | 0 | 77 | 431 | 447 | 69 | 414 | 435 |
| V/C Ratio(X) | 0.84 | 0.00 | 0.05 | 0.87 | 0.00 | 0.00 | 0.76 | 0.56 | 0.56 | 0.67 | 0.14 | 0.14 |
| Avail Cap(c_a), veh/h | 1006 | 0 | 884 | 588 | 0 | 0 | 592 | 584 | 606 | 597 | 573 | 602 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 29.7 | 0.0 | 22.5 | 35.5 | 0.0 | 0.0 | 43.2 | 30.3 | 30.3 | 43.4 | 27.4 | 27.5 |
| Incr Delay (d2), s/veh | 3.5 | 0.0 | 0.0 | 7.5 | 0.0 | 0.0 | 14.0 | 1.6 | 1.6 | 10.8 | 0.2 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 11.6 | 0.0 | 0.5 | 8.2 | 0.0 | 0.0 | 1.7 | 5.5 | 5.7 | 1.4 | 1.2 | 1.2 |
| LnGrp Delay(d),s/veh | 33.3 | 0.0 | 22.5 | 43.1 | 0.0 | 0.0 | 57.2 | 32.0 | 31.9 | 54.1 | 27.6 | 27.6 |
| LnGrp LOS | C | | C | D | | | E | C | C | D | C | C |
| Approach Vol, veh/h | | 495 | | | 307 | | | 551 | | | 163 | |
| Approach Delay, s/veh | | 32.7 | | | 43.1 | | | 34.6 | | | 35.1 | |
| Approach LOS | | C | | | D | | | C | | | D | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 8.9 | 26.7 | | 23.0 | 8.4 | 27.1 | | 32.7 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 30.0 | | 30.0 | 30.0 | 30.0 | | 50.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 4.9 | 4.4 | | 17.2 | 4.3 | 12.9 | | 23.8 | | | | |
| Green Ext Time (p_c), s | 0.1 | 12.1 | | 0.8 | 0.1 | 9.2 | | 3.9 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 35.7 | | | | | | | | | |
| HCM 2010 LOS | | | D | | | | | | | | | |

HCM 2010 Signalized Intersection Summary
19: SR 27 & 32nd Avenue

AM Existing
01/06/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↖ | ↕ | | ↖ | ↕ | | ↖ | ↕ | | ↖ | ↕ | |
| Traffic Volume (veh/h) | 125 | 221 | 55 | 59 | 191 | 66 | 114 | 258 | 126 | 22 | 78 | 72 |
| Future Volume (veh/h) | 125 | 221 | 55 | 59 | 191 | 66 | 114 | 258 | 126 | 22 | 78 | 72 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1765 | 1810 | 1872 | 1714 | 1752 | 1800 | 1748 | 1759 | 1800 | 1800 | 1699 | 1800 |
| Adj Flow Rate, veh/h | 134 | 238 | 59 | 63 | 205 | 71 | 123 | 277 | 135 | 24 | 84 | 77 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 0 | 5 | 5 |
| Cap, veh/h | 173 | 719 | 175 | 79 | 259 | 90 | 159 | 874 | 415 | 45 | 550 | 455 |
| Arrive On Green | 0.10 | 0.26 | 0.26 | 0.05 | 0.21 | 0.21 | 0.10 | 0.40 | 0.40 | 0.03 | 0.33 | 0.33 |
| Sat Flow, veh/h | 1681 | 2745 | 667 | 1633 | 1245 | 431 | 1664 | 2201 | 1044 | 1714 | 1678 | 1389 |
| Grp Volume(v), veh/h | 134 | 147 | 150 | 63 | 0 | 276 | 123 | 208 | 204 | 24 | 80 | 81 |
| Grp Sat Flow(s), veh/h/ln | 1681 | 1720 | 1693 | 1633 | 0 | 1676 | 1664 | 1671 | 1574 | 1714 | 1614 | 1454 |
| Q Serve(g_s), s | 5.8 | 5.2 | 5.4 | 2.9 | 0.0 | 11.7 | 5.4 | 6.5 | 6.7 | 1.0 | 2.7 | 3.0 |
| Cycle Q Clear(g_c), s | 5.8 | 5.2 | 5.4 | 2.9 | 0.0 | 11.7 | 5.4 | 6.5 | 6.7 | 1.0 | 2.7 | 3.0 |
| Prop In Lane | 1.00 | | 0.39 | 1.00 | | 0.26 | 1.00 | | 0.66 | 1.00 | | 0.96 |
| Lane Grp Cap(c), veh/h | 173 | 450 | 443 | 79 | 0 | 348 | 159 | 664 | 625 | 45 | 529 | 476 |
| V/C Ratio(X) | 0.78 | 0.33 | 0.34 | 0.79 | 0.00 | 0.79 | 0.77 | 0.31 | 0.33 | 0.53 | 0.15 | 0.17 |
| Avail Cap(c_a), veh/h | 559 | 938 | 923 | 543 | 0 | 914 | 664 | 889 | 838 | 684 | 859 | 774 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 32.9 | 22.4 | 22.5 | 35.4 | 0.0 | 28.2 | 33.2 | 15.6 | 15.7 | 36.1 | 17.9 | 18.0 |
| Incr Delay (d2), s/veh | 7.3 | 0.4 | 0.4 | 16.0 | 0.0 | 4.1 | 7.7 | 0.7 | 0.7 | 9.5 | 0.4 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3.1 | 2.5 | 2.5 | 1.6 | 0.0 | 5.8 | 2.8 | 3.1 | 3.0 | 0.6 | 1.2 | 1.2 |
| LnGrp Delay(d),s/veh | 40.1 | 22.8 | 22.9 | 51.4 | 0.0 | 32.3 | 40.9 | 16.3 | 16.4 | 45.6 | 18.2 | 18.4 |
| LnGrp LOS | D | C | C | D | | C | D | B | B | D | B | B |
| Approach Vol, veh/h | | 431 | | | 339 | | | 535 | | | 185 | |
| Approach Delay, s/veh | | 28.2 | | | 35.9 | | | 22.0 | | | 21.9 | |
| Approach LOS | | C | | | D | | | C | | | C | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 7.5 | 35.4 | 8.2 | 24.2 | 12.7 | 30.1 | 12.2 | 20.1 | | | | |
| Change Period (Y+Rc), s | 5.5 | 5.5 | 4.5 | 4.5 | 5.5 | 5.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | 25.0 | 41.0 | 30.0 | 40.0 | 25.0 | 41.0 | | | | |
| Max Q Clear Time (g_c+I), s | 13.0 | 8.7 | 4.9 | 7.4 | 7.4 | 5.0 | 7.8 | 13.7 | | | | |
| Green Ext Time (p_c), s | 0.0 | 18.2 | 0.1 | 1.9 | 0.4 | 19.7 | 0.4 | 1.9 | | | | |

Intersection Summary

| | |
|---------------------|------|
| HCM 2010 Ctrl Delay | 26.9 |
| HCM 2010 LOS | C |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 13 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↔ | | | ↕ | | | ↔ | | | ↕ | |
| Traffic Vol, veh/h | 0 | 309 | 48 | 64 | 143 | 0 | 20 | 0 | 162 | 0 | 201 | 103 |
| Future Vol, veh/h | 0 | 309 | 48 | 64 | 143 | 0 | 20 | 0 | 162 | 0 | 201 | 103 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Mvmt Flow | 0 | 332 | 52 | 69 | 154 | 0 | 22 | 0 | 174 | 0 | 216 | 111 |




















| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-----|-----|--------|-----|-------|
| Conflicting Flow All | - | 0 | 0 | 384 | 0 | 0 | 813 | 649 | 358 | 736 | 675 | 154 |
| Stage 1 | - | - | - | - | - | - | 358 | 358 | - | 291 | 291 | - |
| Stage 2 | - | - | - | - | - | - | 455 | 291 | - | 445 | 384 | - |
| Critical Hdwy | - | - | - | 4.1 | - | - | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.23 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.5 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.5 | - |
| Follow-up Hdwy | - | - | - | 2.2 | - | - | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.327 |
| Pot Cap-1 Maneuver | 0 | - | - | 1186 | - | 0 | 299 | 391 | 691 | 337 | 378 | 889 |
| Stage 1 | 0 | - | - | - | - | 0 | 664 | 631 | - | 721 | 675 | - |
| Stage 2 | 0 | - | - | - | - | 0 | 589 | 675 | - | 596 | 615 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | 1186 | - | - | 128 | 366 | 691 | 240 | 354 | 889 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 128 | 366 | - | 240 | 354 | - |
| Stage 1 | - | - | - | - | - | - | 664 | 631 | - | 721 | 632 | - |
| Stage 2 | - | - | - | - | - | - | 318 | 632 | - | 446 | 615 | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|-----|------|------|
| HCM Control Delay, s | 0 | 2.5 | 18.2 | 32.4 |
| HCM LOS | | | C | D |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT | SBLn1 |
|-----------------------|-------|-----|-----|-------|-----|-------|
| Capacity (veh/h) | 466 | - | - | 1186 | - | 445 |
| HCM Lane V/C Ratio | 0.42 | - | - | 0.058 | - | 0.735 |
| HCM Control Delay (s) | 18.2 | - | - | 8.2 | 0 | 32.4 |
| HCM Lane LOS | C | - | - | A | A | D |
| HCM 95th %tile Q(veh) | 2 | - | - | 0.2 | - | 5.9 |

HCM 2010 Signalized Intersection Summary
 12: SR 27 & 16th Ave

PM Existing
 01/06/2017

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | |  |  | |  |  | |
| Traffic Volume (veh/h) | 164 | 254 | 53 | 13 | 186 | 6 | 21 | 247 | 9 | 82 | 293 | 0 |
| Future Volume (veh/h) | 164 | 254 | 53 | 13 | 186 | 6 | 21 | 247 | 9 | 82 | 293 | 0 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1870 | 1900 | 1900 | 1883 | 1900 | 1890 | 1851 | 1890 | 1910 | 1910 | 0 |
| Adj Flow Rate, veh/h | 182 | 282 | 59 | 14 | 207 | 7 | 23 | 274 | 10 | 91 | 326 | 0 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 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 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| Cap, veh/h | 224 | 346 | 502 | 17 | 255 | 9 | 45 | 767 | 28 | 122 | 956 | 0 |
| Arrive On Green | 0.31 | 0.31 | 0.31 | 0.15 | 0.15 | 0.15 | 0.03 | 0.22 | 0.22 | 0.07 | 0.26 | 0.00 |
| Sat Flow, veh/h | 719 | 1115 | 1615 | 115 | 1695 | 57 | 1800 | 3462 | 126 | 1819 | 3724 | 0 |
| Grp Volume(v), veh/h | 464 | 0 | 59 | 228 | 0 | 0 | 23 | 139 | 145 | 91 | 326 | 0 |
| Grp Sat Flow(s), veh/h/ln | 1834 | 0 | 1615 | 1867 | 0 | 0 | 1800 | 1759 | 1829 | 1819 | 1814 | 0 |
| Q Serve(g_s), s | 18.7 | 0.0 | 2.1 | 9.4 | 0.0 | 0.0 | 1.0 | 5.3 | 5.4 | 3.9 | 5.8 | 0.0 |
| Cycle Q Clear(g_c), s | 18.7 | 0.0 | 2.1 | 9.4 | 0.0 | 0.0 | 1.0 | 5.3 | 5.4 | 3.9 | 5.8 | 0.0 |
| Prop In Lane | 0.39 | | 1.00 | 0.06 | | 0.03 | 1.00 | | 0.07 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 570 | 0 | 502 | 281 | 0 | 0 | 45 | 390 | 405 | 122 | 956 | 0 |
| V/C Ratio(X) | 0.81 | 0.00 | 0.12 | 0.81 | 0.00 | 0.00 | 0.51 | 0.36 | 0.36 | 0.75 | 0.34 | 0.00 |
| Avail Cap(c_a), veh/h | 1147 | 0 | 1010 | 701 | 0 | 0 | 676 | 660 | 686 | 683 | 1362 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh | 25.4 | 0.0 | 19.7 | 32.9 | 0.0 | 0.0 | 38.5 | 26.3 | 26.3 | 36.6 | 23.8 | 0.0 |
| Incr Delay (d2), s/veh | 2.9 | 0.0 | 0.1 | 5.6 | 0.0 | 0.0 | 8.7 | 0.8 | 0.8 | 8.7 | 0.2 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 9.9 | 0.0 | 0.9 | 5.3 | 0.0 | 0.0 | 0.6 | 2.7 | 2.8 | 2.3 | 2.9 | 0.0 |
| LnGrp Delay(d),s/veh | 28.3 | 0.0 | 19.8 | 38.5 | 0.0 | 0.0 | 47.2 | 27.1 | 27.1 | 45.3 | 24.1 | 0.0 |
| LnGrp LOS | C | | B | D | | | D | C | C | D | C | |
| Approach Vol, veh/h | | 523 | | | 228 | | | 307 | | | 417 | |
| Approach Delay, s/veh | | 27.3 | | | 38.5 | | | 28.6 | | | 28.7 | |
| Approach LOS | | C | | | D | | | C | | | C | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 7.0 | 26.1 | | 17.0 | 10.4 | 22.7 | | 29.8 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 30.0 | | 30.0 | 30.0 | 30.0 | | 50.0 | | | | |
| Max Q Clear Time (g_c+1), s | 3.0 | 7.8 | | 11.4 | 5.9 | 7.4 | | 20.7 | | | | |
| Green Ext Time (p_c), s | 0.0 | 10.2 | | 0.6 | 0.2 | 10.3 | | 4.2 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 29.7 | | | | | | | | | |
| HCM 2010 LOS | | | C | | | | | | | | | |

HCM 2010 Signalized Intersection Summary
19: SR 27 & 32nd Avenue

PM Existing
01/06/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↖ | ↕ | | ↖ | ↕ | | ↖ | ↕ | | ↖ | ↕ | |
| Traffic Volume (veh/h) | 79 | 297 | 168 | 143 | 306 | 40 | 113 | 154 | 96 | 40 | 197 | 63 |
| Future Volume (veh/h) | 79 | 297 | 168 | 143 | 306 | 40 | 113 | 154 | 96 | 40 | 197 | 63 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1800 | 1848 | 1872 | 1782 | 1784 | 1800 | 1800 | 1728 | 1800 | 1800 | 1786 | 1800 |
| Adj Flow Rate, veh/h | 93 | 349 | 198 | 168 | 360 | 47 | 133 | 181 | 113 | 47 | 232 | 74 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 0 | 2 | 2 | 1 | 1 | 1 | 0 | 3 | 3 | 0 | 1 | 1 |
| Cap, veh/h | 121 | 500 | 278 | 207 | 435 | 57 | 170 | 750 | 445 | 67 | 811 | 252 |
| Arrive On Green | 0.07 | 0.23 | 0.23 | 0.12 | 0.28 | 0.28 | 0.10 | 0.38 | 0.38 | 0.04 | 0.32 | 0.32 |
| Sat Flow, veh/h | 1714 | 2173 | 1210 | 1697 | 1546 | 202 | 1714 | 1983 | 1178 | 1714 | 2550 | 793 |
| Grp Volume(v), veh/h | 93 | 281 | 266 | 168 | 0 | 407 | 133 | 148 | 146 | 47 | 152 | 154 |
| Grp Sat Flow(s),veh/h/ln | 1714 | 1756 | 1627 | 1697 | 0 | 1748 | 1714 | 1642 | 1519 | 1714 | 1697 | 1646 |
| Q Serve(g_s), s | 4.6 | 12.7 | 13.1 | 8.4 | 0.0 | 18.9 | 6.6 | 5.4 | 5.7 | 2.3 | 5.8 | 6.1 |
| Cycle Q Clear(g_c), s | 4.6 | 12.7 | 13.1 | 8.4 | 0.0 | 18.9 | 6.6 | 5.4 | 5.7 | 2.3 | 5.8 | 6.1 |
| Prop In Lane | 1.00 | | 0.74 | 1.00 | | 0.12 | 1.00 | | 0.78 | 1.00 | | 0.48 |
| Lane Grp Cap(c), veh/h | 121 | 404 | 374 | 207 | 0 | 492 | 170 | 621 | 574 | 67 | 540 | 524 |
| V/C Ratio(X) | 0.77 | 0.69 | 0.71 | 0.81 | 0.00 | 0.83 | 0.78 | 0.24 | 0.25 | 0.70 | 0.28 | 0.29 |
| Avail Cap(c_a), veh/h | 494 | 831 | 770 | 490 | 0 | 827 | 593 | 758 | 701 | 593 | 783 | 760 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.6 | 30.6 | 30.7 | 37.1 | 0.0 | 29.2 | 38.1 | 18.4 | 18.5 | 41.1 | 22.1 | 22.2 |
| Incr Delay (d2), s/veh | 9.6 | 2.2 | 2.5 | 7.4 | 0.0 | 3.6 | 7.6 | 0.5 | 0.6 | 12.5 | 0.8 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.5 | 6.4 | 6.1 | 4.3 | 0.0 | 9.5 | 3.5 | 2.5 | 2.5 | 1.3 | 2.8 | 2.9 |
| LnGrp Delay(d),s/veh | 49.2 | 32.7 | 33.2 | 44.5 | 0.0 | 32.8 | 45.7 | 18.9 | 19.1 | 53.6 | 22.9 | 23.1 |
| LnGrp LOS | D | C | C | D | | C | D | B | B | D | C | C |
| Approach Vol, veh/h | | 640 | | | 575 | | | 427 | | | 353 | |
| Approach Delay, s/veh | | 35.3 | | | 36.2 | | | 27.3 | | | 27.1 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 8.9 | 38.3 | 15.1 | 24.4 | 14.1 | 33.1 | 10.6 | 28.9 | | | | |
| Change Period (Y+Rc), s | 5.5 | 5.5 | 4.5 | 4.5 | 5.5 | 5.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | 25.0 | 41.0 | 30.0 | 40.0 | 25.0 | 41.0 | | | | |
| Max Q Clear Time (g_c+14), s | 14.3 | 7.7 | 10.4 | 15.1 | 8.6 | 8.1 | 6.6 | 20.9 | | | | |
| Green Ext Time (p_c), s | 0.1 | 19.6 | 0.4 | 3.5 | 0.4 | 19.5 | 0.2 | 3.3 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | | 32.4 | | | | | | | | |
| HCM 2010 LOS | | | | C | | | | | | | | |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 10.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↔ | | | ↕ | | | ↕↔ | | | ↕↔ | |
| Traffic Vol, veh/h | 0 | 251 | 46 | 53 | 218 | 0 | 29 | 0 | 229 | 0 | 152 | 35 |
| Future Vol, veh/h | 0 | 251 | 46 | 53 | 218 | 0 | 29 | 0 | 229 | 0 | 152 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| Heavy Vehicles, % | 0 | 4 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 10 |
| Mvmt Flow | 0 | 285 | 52 | 60 | 248 | 0 | 33 | 0 | 260 | 0 | 173 | 40 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-----|-------|--------|-------|------|
| Conflicting Flow All | - | 0 | 0 | 338 | 0 | 0 | 785 | 679 | 311 | 809 | 706 | 248 |
| Stage 1 | - | - | - | - | - | - | 311 | 311 | - | 368 | 368 | - |
| Stage 2 | - | - | - | - | - | - | 474 | 368 | - | 441 | 338 | - |
| Critical Hdwy | - | - | - | 4.12 | - | - | 7.1 | 6.5 | 6.21 | 7.1 | 6.52 | 6.3 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.52 | - |
| Follow-up Hdwy | - | - | - | 2.218 | - | - | 3.5 | 4 | 3.309 | 3.5 | 4.018 | 3.39 |
| Pot Cap-1 Maneuver | 0 | - | - | 1221 | - | 0 | 313 | 376 | 731 | 301 | 361 | 772 |
| Stage 1 | 0 | - | - | - | - | 0 | 704 | 662 | - | 656 | 621 | - |
| Stage 2 | 0 | - | - | - | - | 0 | 575 | 625 | - | 599 | 641 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | 1221 | - | - | 171 | 355 | 731 | 185 | 340 | 772 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 171 | 355 | - | 185 | 340 | - |
| Stage 1 | - | - | - | - | - | - | 704 | 662 | - | 656 | 586 | - |
| Stage 2 | - | - | - | - | - | - | 363 | 589 | - | 386 | 641 | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|-----|------|------|
| HCM Control Delay, s | 0 | 1.6 | 19.6 | 25.8 |
| HCM LOS | | | C | D |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT | SBLn1 |
|-----------------------|-------|-----|-----|-------|-----|-------|
| Capacity (veh/h) | 534 | - | - | 1221 | - | 380 |
| HCM Lane V/C Ratio | 0.549 | - | - | 0.049 | - | 0.559 |
| HCM Control Delay (s) | 19.6 | - | - | 8.1 | 0 | 25.8 |
| HCM Lane LOS | C | - | - | A | A | D |
| HCM 95th %tile Q(veh) | 3.3 | - | - | 0.2 | - | 3.3 |

HCM Signalized Intersection Capacity Analysis
11: Pines Rd & 16th Ave

2025 AM W-O Proj IMP
01/11/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|-------|------|------|-------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↑ | | | ↑ | ↑ | | ↑ | ↑ |
| Traffic Volume (vph) | 0 | 251 | 46 | 53 | 218 | 0 | 29 | 0 | 229 | 0 | 152 | 35 |
| Future Volume (vph) | 0 | 251 | 46 | 53 | 218 | 0 | 29 | 0 | 229 | 0 | 152 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | | | 4.5 | 4.5 | | 4.5 | 4.5 |
| Lane Util. Factor | | 0.95 | | | 1.00 | | | 0.95 | 0.95 | | 1.00 | 1.00 |
| Fr _t | | 0.98 | | | 1.00 | | | 0.88 | 0.85 | | 1.00 | 0.85 |
| Fl _t Protected | | 1.00 | | | 0.99 | | | 0.99 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | | 3411 | | | 1859 | | | 1566 | 1519 | | 1863 | 1468 |
| Fl _t Permitted | | 1.00 | | | 0.62 | | | 0.87 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | | 3411 | | | 1173 | | | 1379 | 1519 | | 1863 | 1468 |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 0 | 285 | 52 | 60 | 248 | 0 | 33 | 0 | 260 | 0 | 173 | 40 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 130 | 133 | 0 | 0 | 34 |
| Lane Group Flow (vph) | 0 | 323 | 0 | 0 | 308 | 0 | 0 | 15 | 15 | 0 | 173 | 6 |
| Heavy Vehicles (%) | 0% | 4% | 0% | 2% | 1% | 0% | 0% | 0% | 1% | 0% | 2% | 10% |
| Turn Type | | NA | | Perm | NA | | Perm | NA | Perm | | NA | Perm |
| Protected Phases | | 18 | | | 14 24 | | | 12 | | | 16 | |
| Permitted Phases | | | | 14 24 | | | 12 | | 12 | | | 16 |
| Actuated Green, G (s) | | 19.5 | | | 43.7 | | | 7.7 | 7.7 | | 11.7 | 11.7 |
| Effective Green, g (s) | | 19.5 | | | 43.7 | | | 7.7 | 7.7 | | 11.7 | 11.7 |
| Actuated g/C Ratio | | 0.26 | | | 0.57 | | | 0.10 | 0.10 | | 0.15 | 0.15 |
| Clearance Time (s) | | 5.0 | | | | | | 4.5 | 4.5 | | 4.5 | 4.5 |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 874 | | | 673 | | | 139 | 153 | | 286 | 225 |
| v/s Ratio Prot | | 0.09 | | | | | | | | | c0.09 | |
| v/s Ratio Perm | | | | | c0.26 | | | c0.01 | 0.01 | | | 0.00 |
| v/c Ratio | | 0.37 | | | 0.46 | | | 0.11 | 0.10 | | 0.60 | 0.03 |
| Uniform Delay, d ₁ | | 23.2 | | | 9.4 | | | 31.1 | 31.0 | | 30.0 | 27.4 |
| Progression Factor | | 1.00 | | | 0.40 | | | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d ₂ | | 0.3 | | | 0.2 | | | 0.3 | 0.3 | | 3.6 | 0.0 |
| Delay (s) | | 23.5 | | | 3.9 | | | 31.4 | 31.3 | | 33.6 | 27.4 |
| Level of Service | | C | | | A | | | C | C | | C | C |
| Approach Delay (s) | | 23.5 | | | 3.9 | | | 31.4 | | | 32.5 | |
| Approach LOS | | C | | | A | | | C | | | C | |

| Intersection Summary | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 21.9 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.49 | | |
| Actuated Cycle Length (s) | 76.1 | Sum of lost time (s) | 19.0 |
| Intersection Capacity Utilization | 52.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

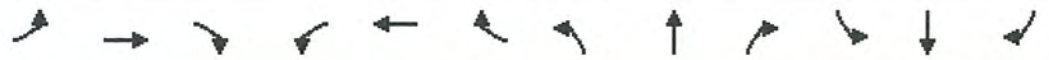
2025 AM W-O Proj
01/06/2017

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 221 | 232 | 27 | 6 | 211 | 76 | 60 | 488 | 20 | 44 | 122 | 1 |
| Future Volume (veh/h) | 221 | 232 | 27 | 6 | 211 | 76 | 60 | 488 | 20 | 44 | 122 | 1 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1881 | 1900 | 1900 | 1873 | 1900 | 1890 | 1873 | 1890 | 1910 | 1837 | 1910 |
| Adj Flow Rate, veh/h | 260 | 273 | 32 | 7 | 248 | 89 | 71 | 574 | 24 | 52 | 144 | 1 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 1 | 1 | 0 | 4 | 4 |
| Cap, veh/h | 295 | 310 | 532 | 8 | 274 | 98 | 94 | 834 | 35 | 69 | 801 | 6 |
| Arrive On Green | 0.33 | 0.33 | 0.33 | 0.21 | 0.21 | 0.21 | 0.05 | 0.24 | 0.24 | 0.04 | 0.23 | 0.23 |
| Sat Flow, veh/h | 896 | 941 | 1615 | 36 | 1290 | 463 | 1800 | 3480 | 145 | 1819 | 3552 | 25 |
| Grp Volume(v), veh/h | 533 | 0 | 32 | 344 | 0 | 0 | 71 | 293 | 305 | 52 | 71 | 74 |
| Grp Sat Flow(s), veh/h/ln | 1836 | 0 | 1615 | 1789 | 0 | 0 | 1800 | 1779 | 1847 | 1819 | 1745 | 1832 |
| Q Serve(g_s), s | 30.3 | 0.0 | 1.5 | 20.7 | 0.0 | 0.0 | 4.3 | 16.5 | 16.6 | 3.1 | 3.6 | 3.6 |
| Cycle Q Clear(g_c), s | 30.3 | 0.0 | 1.5 | 20.7 | 0.0 | 0.0 | 4.3 | 16.5 | 16.6 | 3.1 | 3.6 | 3.6 |
| Prop In Lane | 0.49 | | 1.00 | 0.02 | | 0.26 | 1.00 | | 0.08 | 1.00 | | 0.01 |
| Lane Grp Cap(c), veh/h | 604 | 0 | 532 | 380 | 0 | 0 | 94 | 426 | 442 | 69 | 393 | 413 |
| V/C Ratio(X) | 0.88 | 0.00 | 0.06 | 0.91 | 0.00 | 0.00 | 0.76 | 0.69 | 0.69 | 0.75 | 0.18 | 0.18 |
| Avail Cap(c_a), veh/h | 832 | 0 | 732 | 487 | 0 | 0 | 490 | 484 | 502 | 495 | 475 | 498 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 35.0 | 0.0 | 25.3 | 42.4 | 0.0 | 0.0 | 51.6 | 38.2 | 38.2 | 52.6 | 34.5 | 34.5 |
| Incr Delay (d2), s/veh | 8.4 | 0.0 | 0.0 | 17.5 | 0.0 | 0.0 | 11.8 | 4.1 | 4.0 | 15.3 | 0.3 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 16.7 | 0.0 | 0.7 | 12.1 | 0.0 | 0.0 | 2.4 | 8.6 | 9.0 | 1.9 | 1.8 | 1.9 |
| LnGrp Delay(d),s/veh | 43.4 | 0.0 | 25.4 | 59.8 | 0.0 | 0.0 | 63.4 | 42.3 | 42.2 | 67.8 | 34.7 | 34.7 |
| LnGrp LOS | D | | C | E | | | E | D | D | E | C | C |
| Approach Vol, veh/h | | 565 | | | 344 | | | 669 | | | 197 | |
| Approach Delay, s/veh | | 42.3 | | | 59.8 | | | 44.5 | | | 43.5 | |
| Approach LOS | | D | | | E | | | D | | | D | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 10.7 | 29.9 | | 28.4 | 9.2 | 31.4 | | 41.3 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 30.0 | | 30.0 | 30.0 | 30.0 | | 50.0 | | | | |
| Max Q Clear Time (g_c+11), s | 6.3 | 5.6 | | 22.7 | 5.1 | 18.6 | | 32.3 | | | | |
| Green Ext Time (p_c), s | 0.2 | 14.1 | | 0.7 | 0.1 | 7.8 | | 4.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 46.7 | | | | | | | | | |
| HCM 2010 LOS | | | D | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2025 AM W-O Proj IMP

01/11/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|------|------|-------|-------|------|-------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 221 | 232 | 27 | 6 | 211 | 8 | 60 | 488 | 20 | 44 | 122 | 1 |
| Future Volume (vph) | 221 | 232 | 27 | 6 | 211 | 8 | 60 | 488 | 20 | 44 | 122 | 1 |
| 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 | | 5.0 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 1.00 | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Fr _t | 1.00 | 1.00 | 0.85 | | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Fl _t Protected | 0.95 | 0.99 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1698 | 1777 | 1615 | | 1854 | | 1805 | 3554 | | 1805 | 3468 | |
| Fl _t Permitted | 0.51 | 0.94 | 1.00 | | 0.99 | | 0.00 | 1.00 | | 0.28 | 1.00 | |
| Satd. Flow (perm) | 907 | 1684 | 1615 | | 1835 | | 0 | 3554 | | 539 | 3468 | |
| Peak-hour factor, PHF | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Adj. Flow (vph) | 260 | 273 | 32 | 7 | 248 | 9 | 71 | 574 | 24 | 52 | 144 | 1 |
| RTOR Reduction (vph) | 0 | 0 | 18 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 224 | 309 | 14 | 0 | 263 | 0 | 71 | 596 | 0 | 52 | 144 | 0 |
| Heavy Vehicles (%) | 1% | 1% | 0% | 0% | 2% | 0% | 0% | 1% | 0% | 0% | 4% | 0% |
| Turn Type | Perm | NA | Perm | Perm | NA | | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 8 28 | | | 4 | | 5! | 2! | | 1! | 6! | |
| Permitted Phases | 8 28 | | 8 28 | 4 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 32.7 | 32.7 | 32.7 | | 19.5 | | 30.3 | 15.2 | | 15.2 | 15.2 | |
| Effective Green, g (s) | 32.7 | 32.7 | 32.7 | | 19.5 | | 30.3 | 15.2 | | 15.2 | 15.2 | |
| Actuated g/C Ratio | 0.43 | 0.43 | 0.43 | | 0.26 | | 0.40 | 0.20 | | 0.20 | 0.20 | |
| Clearance Time (s) | | | | | 5.0 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Vehicle Extension (s) | | | | | 1.9 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 389 | 723 | 693 | | 470 | | 718 | 709 | | 125 | 692 | |
| v/s Ratio Prot | | | | | | | c0.04 | c0.17 | | c0.01 | 0.04 | |
| v/s Ratio Perm | c0.25 | 0.18 | 0.01 | | 0.14 | | | | | c0.08 | | |
| v/c Ratio | 0.58 | 0.43 | 0.02 | | 0.56 | | 0.10 | 0.84 | | 0.42 | 0.21 | |
| Uniform Delay, d ₁ | 16.4 | 15.2 | 12.5 | | 24.6 | | 14.3 | 29.3 | | 29.0 | 25.4 | |
| Progression Factor | 0.52 | 0.48 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d ₂ | 1.7 | 0.3 | 0.0 | | 0.8 | | 0.1 | 8.8 | | 2.2 | 0.7 | |
| Delay (s) | 10.2 | 7.6 | 12.5 | | 25.4 | | 14.4 | 38.1 | | 31.3 | 26.1 | |
| Level of Service | B | A | B | | C | | B | D | | C | C | |
| Approach Delay (s) | | 8.9 | | | 25.4 | | | 35.6 | | | 27.5 | |
| Approach LOS | | A | | | C | | | D | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 24.2 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 76.1 | Sum of lost time (s) | 19.0 |
| Intersection Capacity Utilization | 57.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

Description: 1/28/15 count

! Phase conflict between lane groups.

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
 19: SR 27 & 32nd Avenue

2025 AM W-O Proj
 01/06/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↔ | ↕ | | ↔ | ↕ | | ↔ | ↕ | | ↔ | ↕ | |
| Traffic Volume (veh/h) | 139 | 255 | 66 | 72 | 219 | 85 | 142 | 323 | 158 | 28 | 98 | 80 |
| Future Volume (veh/h) | 139 | 255 | 66 | 72 | 219 | 85 | 142 | 323 | 158 | 28 | 98 | 80 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1765 | 1810 | 1872 | 1714 | 1752 | 1800 | 1748 | 1759 | 1800 | 1800 | 1700 | 1800 |
| Adj Flow Rate, veh/h | 149 | 274 | 71 | 77 | 235 | 91 | 153 | 347 | 170 | 30 | 105 | 86 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 0 | 5 | 5 |
| Cap, veh/h | 186 | 769 | 196 | 98 | 280 | 109 | 190 | 891 | 429 | 50 | 566 | 426 |
| Arrive On Green | 0.11 | 0.28 | 0.28 | 0.06 | 0.23 | 0.23 | 0.11 | 0.41 | 0.41 | 0.03 | 0.32 | 0.32 |
| Sat Flow, veh/h | 1681 | 2717 | 691 | 1633 | 1204 | 466 | 1664 | 2190 | 1054 | 1714 | 1758 | 1323 |
| Grp Volume(v), veh/h | 149 | 172 | 173 | 77 | 0 | 326 | 153 | 263 | 254 | 30 | 96 | 95 |
| Grp Sat Flow(s), veh/h/ln | 1681 | 1720 | 1688 | 1633 | 0 | 1670 | 1664 | 1671 | 1573 | 1714 | 1615 | 1466 |
| Q Serve(g_s), s | 7.8 | 7.2 | 7.4 | 4.2 | 0.0 | 16.9 | 8.1 | 10.1 | 10.3 | 1.6 | 3.9 | 4.3 |
| Cycle Q Clear(g_c), s | 7.8 | 7.2 | 7.4 | 4.2 | 0.0 | 16.9 | 8.1 | 10.1 | 10.3 | 1.6 | 3.9 | 4.3 |
| Prop In Lane | 1.00 | | 0.41 | 1.00 | | 0.28 | 1.00 | | 0.67 | 1.00 | | 0.90 |
| Lane Grp Cap(c), veh/h | 186 | 487 | 478 | 98 | 0 | 389 | 190 | 680 | 640 | 50 | 519 | 472 |
| V/C Ratio(X) | 0.80 | 0.35 | 0.36 | 0.78 | 0.00 | 0.84 | 0.80 | 0.39 | 0.40 | 0.60 | 0.18 | 0.20 |
| Avail Cap(c_a), veh/h | 463 | 778 | 763 | 450 | 0 | 755 | 551 | 737 | 694 | 567 | 712 | 647 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.4 | 25.9 | 26.0 | 42.0 | 0.0 | 33.1 | 39.2 | 18.9 | 19.0 | 43.5 | 22.2 | 22.3 |
| Incr Delay (d2), s/veh | 7.8 | 0.4 | 0.5 | 12.6 | 0.0 | 4.9 | 7.7 | 0.9 | 1.0 | 10.9 | 0.5 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 4.0 | 3.5 | 3.5 | 2.2 | 0.0 | 8.3 | 4.1 | 4.8 | 4.6 | 0.9 | 1.8 | 1.8 |
| LnGrp Delay(d),s/veh | 47.2 | 26.3 | 26.4 | 54.6 | 0.0 | 38.0 | 46.9 | 19.8 | 20.0 | 54.4 | 22.6 | 22.9 |
| LnGrp LOS | D | C | C | D | | D | D | B | C | D | C | C |
| Approach Vol, veh/h | | 494 | | | 403 | | | 670 | | | 221 | |
| Approach Delay, s/veh | | 32.6 | | | 41.2 | | | 26.1 | | | 27.1 | |
| Approach LOS | | C | | | D | | | C | | | C | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 8.2 | 42.4 | 10.0 | 30.2 | 15.9 | 34.7 | 14.5 | 25.6 | | | | |
| Change Period (Y+Rc), s | 5.5 | 5.5 | 4.5 | 4.5 | 5.5 | 5.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | 25.0 | 41.0 | 30.0 | 40.0 | 25.0 | 41.0 | | | | |
| Max Q Clear Time (g_c+13), s | 13.6 | 12.3 | 6.2 | 9.4 | 10.1 | 6.3 | 9.8 | 18.9 | | | | |
| Green Ext Time (p_c), s | 0.1 | 19.6 | 0.2 | 2.3 | 0.5 | 22.9 | 0.4 | 2.2 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | | 31.4 | | | | | | | | |
| HCM 2010 LOS | | | | C | | | | | | | | |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 26.8 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↔ | | | ↔ | | | ↔ | | | ↔ | |
| Traffic Vol, veh/h | 0 | 350 | 55 | 76 | 163 | 0 | 23 | 0 | 187 | 0 | 231 | 115 |
| Future Vol, veh/h | 0 | 350 | 55 | 76 | 163 | 0 | 23 | 0 | 187 | 0 | 231 | 115 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Mvmt Flow | 0 | 376 | 59 | 82 | 175 | 0 | 25 | 0 | 201 | 0 | 248 | 124 |

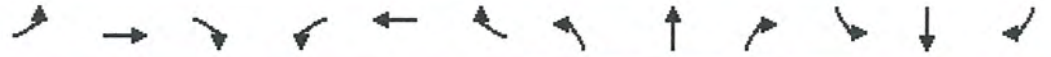
| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-----|-----|--------|-----|-------|
| Conflicting Flow All | - | 0 | 0 | 435 | 0 | 0 | 931 | 745 | 406 | 845 | 774 | 175 |
| Stage 1 | - | - | - | - | - | - | 406 | 406 | - | 339 | 339 | - |
| Stage 2 | - | - | - | - | - | - | 525 | 339 | - | 506 | 435 | - |
| Critical Hdwy | - | - | - | 4.1 | - | - | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.23 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.5 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.1 | 5.5 | - |
| Follow-up Hdwy | - | - | - | 2.2 | - | - | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.327 |
| Pot Cap-1 Maneuver | 0 | - | - | 1135 | - | 0 | 249 | 345 | 649 | 285 | 332 | 866 |
| Stage 1 | 0 | - | - | - | - | 0 | 626 | 601 | - | 680 | 643 | - |
| Stage 2 | 0 | - | - | - | - | 0 | 540 | 643 | - | 552 | 584 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | - | 1135 | - | - | 65 | 317 | 649 | 185 | 305 | 866 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 65 | 317 | - | 185 | 305 | - |
| Stage 1 | - | - | - | - | - | - | 626 | 601 | - | 680 | 592 | - |
| Stage 2 | - | - | - | - | - | - | 247 | 592 | - | 381 | 584 | - |

| Approach | EB | WB | NB | SB |
|----------------------|----|-----|------|------|
| HCM Control Delay, s | 0 | 2.7 | 37.3 | 68.3 |
| HCM LOS | | | E | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT | SBLn1 |
|-----------------------|-------|-----|-----|-------|-----|-------|
| Capacity (veh/h) | 327 | - | - | 1135 | - | 389 |
| HCM Lane V/C Ratio | 0.691 | - | - | 0.072 | - | 0.956 |
| HCM Control Delay (s) | 37.3 | - | - | 8.4 | 0 | 68.3 |
| HCM Lane LOS | E | - | - | A | A | F |
| HCM 95th %tile Q(veh) | 4.8 | - | - | 0.2 | - | 10.8 |

HCM Signalized Intersection Capacity Analysis
11: Pines Rd & 16th Ave

2025 PM W-O Proj.IMP
01/11/2017






















| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|-------|------|------|-------|------|------|-------|------|
| Lane Configurations | | ↑↑ | | | ↕ | | | ↕ | ↗ | | ↑ | ↗ |
| Traffic Volume (vph) | 0 | 350 | 55 | 76 | 163 | 0 | 23 | 0 | 187 | 0 | 231 | 115 |
| Future Volume (vph) | 0 | 350 | 55 | 76 | 163 | 0 | 23 | 0 | 187 | 0 | 231 | 115 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | | | 5.0 | | | 4.5 | 4.5 | | 4.5 | 4.5 |
| Lane Util. Factor | | 0.95 | | | 1.00 | | | 0.95 | 0.95 | | 1.00 | 1.00 |
| Fr _t | | 0.98 | | | 1.00 | | | 0.88 | 0.85 | | 1.00 | 0.85 |
| Fl _t Protected | | 1.00 | | | 0.98 | | | 0.99 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (prot) | | 3506 | | | 1870 | | | 1578 | 1534 | | 1900 | 1568 |
| Fl _t Permitted | | 1.00 | | | 0.44 | | | 0.85 | 1.00 | | 1.00 | 1.00 |
| Satd. Flow (perm) | | 3506 | | | 831 | | | 1353 | 1534 | | 1900 | 1568 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 376 | 59 | 82 | 175 | 0 | 25 | 0 | 201 | 0 | 248 | 124 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 98 | 105 | 0 | 0 | 100 |
| Lane Group Flow (vph) | 0 | 423 | 0 | 0 | 257 | 0 | 0 | 11 | 12 | 0 | 248 | 24 |
| Heavy Vehicles (%) | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 3% |
| Turn Type | | NA | | Perm | NA | | Perm | NA | Perm | | NA | Perm |
| Protected Phases | | 18 | | | 14 24 | | | 12 | | | 16 | |
| Permitted Phases | | | | 14 24 | | | 12 | | 12 | | | 16 |
| Actuated Green, G (s) | | 17.4 | | | 40.7 | | | 7.8 | 7.8 | | 14.6 | 14.6 |
| Effective Green, g (s) | | 17.4 | | | 40.7 | | | 7.8 | 7.8 | | 14.6 | 14.6 |
| Actuated g/C Ratio | | 0.23 | | | 0.53 | | | 0.10 | 0.10 | | 0.19 | 0.19 |
| Clearance Time (s) | | 5.0 | | | | | | 4.5 | 4.5 | | 4.5 | 4.5 |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 801 | | | 444 | | | 138 | 157 | | 364 | 300 |
| v/s Ratio Prot | | 0.12 | | | | | | | | | c0.13 | |
| v/s Ratio Perm | | | | | c0.31 | | | c0.01 | 0.01 | | | 0.02 |
| v/c Ratio | | 0.53 | | | 0.58 | | | 0.08 | 0.08 | | 0.68 | 0.08 |
| Uniform Delay, d ₁ | | 25.7 | | | 11.9 | | | 30.9 | 30.9 | | 28.6 | 25.2 |
| Progression Factor | | 1.00 | | | 1.08 | | | 1.00 | 1.00 | | 1.00 | 1.00 |
| Incremental Delay, d ₂ | | 0.6 | | | 1.1 | | | 0.3 | 0.2 | | 5.2 | 0.1 |
| Delay (s) | | 26.4 | | | 14.0 | | | 31.2 | 31.1 | | 33.8 | 25.3 |
| Level of Service | | C | | | B | | | C | C | | C | C |
| Approach Delay (s) | | 26.4 | | | 14.0 | | | 31.1 | | | 31.0 | |
| Approach LOS | | C | | | B | | | C | | | C | |

| Intersection Summary | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 26.1 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.60 | | |
| Actuated Cycle Length (s) | 76.1 | Sum of lost time (s) | 19.0 |
| Intersection Capacity Utilization | 57.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

2025 PM W-O Proj.
01/06/2017

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  |  | |  | |  |  | |  |  | |
| Traffic Volume (veh/h) | 187 | 285 | 64 | 15 | 213 | 7 | 26 | 301 | 10 | 91 | 373 | 0 |
| Future Volume (veh/h) | 187 | 285 | 64 | 15 | 213 | 7 | 26 | 301 | 10 | 91 | 373 | 0 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1870 | 1900 | 1900 | 1883 | 1900 | 1890 | 1853 | 1890 | 1910 | 1910 | 0 |
| Adj Flow Rate, veh/h | 208 | 317 | 71 | 17 | 237 | 8 | 29 | 334 | 11 | 101 | 414 | 0 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 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 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| Cap, veh/h | 243 | 370 | 540 | 20 | 277 | 9 | 50 | 774 | 25 | 132 | 970 | 0 |
| Arrive On Green | 0.33 | 0.33 | 0.33 | 0.16 | 0.16 | 0.16 | 0.03 | 0.22 | 0.22 | 0.07 | 0.27 | 0.00 |
| Sat Flow, veh/h | 726 | 1107 | 1615 | 121 | 1689 | 57 | 1800 | 3479 | 114 | 1819 | 3724 | 0 |
| Grp Volume(v), veh/h | 525 | 0 | 71 | 262 | 0 | 0 | 29 | 169 | 176 | 101 | 414 | 0 |
| Grp Sat Flow(s), veh/h/ln | 1834 | 0 | 1615 | 1867 | 0 | 0 | 1800 | 1760 | 1833 | 1819 | 1814 | 0 |
| Q Serve(g_s), s | 25.9 | 0.0 | 3.0 | 13.3 | 0.0 | 0.0 | 1.5 | 8.0 | 8.0 | 5.3 | 9.2 | 0.0 |
| Cycle Q Clear(g_c), s | 25.9 | 0.0 | 3.0 | 13.3 | 0.0 | 0.0 | 1.5 | 8.0 | 8.0 | 5.3 | 9.2 | 0.0 |
| Prop In Lane | 0.40 | | 1.00 | 0.06 | | 0.03 | 1.00 | | 0.06 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 613 | 0 | 540 | 307 | 0 | 0 | 50 | 392 | 408 | 132 | 970 | 0 |
| V/C Ratio(X) | 0.86 | 0.00 | 0.13 | 0.85 | 0.00 | 0.00 | 0.58 | 0.43 | 0.43 | 0.76 | 0.43 | 0.00 |
| Avail Cap(c_a), veh/h | 944 | 0 | 831 | 577 | 0 | 0 | 556 | 544 | 566 | 562 | 1120 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh | 30.1 | 0.0 | 22.5 | 39.5 | 0.0 | 0.0 | 46.6 | 32.5 | 32.5 | 44.2 | 29.4 | 0.0 |
| Incr Delay (d2), s/veh | 4.9 | 0.0 | 0.1 | 6.8 | 0.0 | 0.0 | 10.0 | 1.1 | 1.0 | 8.7 | 0.3 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 14.0 | 0.0 | 1.3 | 7.4 | 0.0 | 0.0 | 0.9 | 4.0 | 4.2 | 3.0 | 4.6 | 0.0 |
| LnGrp Delay(d),s/veh | 35.1 | 0.0 | 22.6 | 46.2 | 0.0 | 0.0 | 56.7 | 33.5 | 33.5 | 52.9 | 29.8 | 0.0 |
| LnGrp LOS | D | | C | D | | | E | C | C | D | C | |
| Approach Vol, veh/h | | 596 | | | 262 | | | 374 | | | 515 | |
| Approach Delay, s/veh | | 33.6 | | | 46.2 | | | 35.3 | | | 34.3 | |
| Approach LOS | | C | | | D | | | D | | | C | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 7.7 | 31.0 | | 21.0 | 12.1 | 26.6 | | 37.5 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 30.0 | | 30.0 | 30.0 | 30.0 | | 50.0 | | | | |
| Max Q Clear Time (g_c+11), s | 3.5 | 11.2 | | 15.3 | 7.3 | 10.0 | | 27.9 | | | | |
| Green Ext Time (p_c), s | 0.1 | 11.1 | | 0.7 | 0.3 | 11.6 | | 4.6 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 36.1 | | | | | | | | | |
| HCM 2010 LOS | | | D | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2025 PM W-O Proj.IMP
01/11/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|------|------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations | ↖ | ↖ | ↖ | | ↕ | | ↖ | ↕ | | ↖ | ↕ | |
| Traffic Volume (vph) | 187 | 285 | 64 | 15 | 213 | 7 | 26 | 301 | 10 | 91 | 373 | 0 |
| Future Volume (vph) | 187 | 285 | 64 | 15 | 213 | 7 | 26 | 301 | 10 | 91 | 373 | 0 |
| 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 | | 5.0 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Lane Util. Factor | 0.95 | 0.95 | 1.00 | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Fr _t | 1.00 | 1.00 | 0.85 | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Fl _t Protected | 0.95 | 1.00 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1698 | 1765 | 1615 | | 1869 | | 1805 | 3522 | | 1805 | 3610 | |
| Fl _t Permitted | 0.50 | 0.97 | 1.00 | | 0.95 | | 0.51 | 1.00 | | 0.00 | 1.00 | |
| Satd. Flow (perm) | 891 | 1723 | 1615 | | 1790 | | 968 | 3522 | | 0 | 3610 | |
| 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) | 208 | 317 | 71 | 17 | 237 | 8 | 29 | 334 | 11 | 101 | 414 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 42 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 187 | 338 | 29 | 0 | 261 | 0 | 29 | 343 | 0 | 101 | 414 | 0 |
| Heavy Vehicles (%) | 1% | 2% | 0% | 0% | 1% | 0% | 0% | 1% | 33% | 0% | 0% | 0% |
| Turn Type | Perm | NA | Perm | Perm | NA | | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 8 28 | | | 4 | | 5! | 2! | | 1! | 6! | |
| Permitted Phases | 8 28 | | 8 28 | 4 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 30.7 | 30.7 | 30.7 | | 17.4 | | 17.6 | 17.1 | | 28.6 | 15.3 | |
| Effective Green, g (s) | 30.7 | 30.7 | 30.7 | | 17.4 | | 17.6 | 17.1 | | 28.6 | 15.3 | |
| Actuated g/C Ratio | 0.40 | 0.40 | 0.40 | | 0.23 | | 0.23 | 0.22 | | 0.38 | 0.20 | |
| Clearance Time (s) | | | | | 5.0 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Vehicle Extension (s) | | | | | 1.9 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 359 | 695 | 651 | | 409 | | 276 | 791 | | 678 | 725 | |
| v/s Ratio Prot | | | | | | | 0.01 | c0.10 | | c0.06 | c0.11 | |
| v/s Ratio Perm | c0.21 | 0.20 | 0.02 | | c0.15 | | 0.02 | | | | | |
| v/c Ratio | 0.52 | 0.49 | 0.04 | | 0.64 | | 0.11 | 0.43 | | 0.15 | 0.57 | |
| Uniform Delay, d ₁ | 17.1 | 16.8 | 13.8 | | 26.5 | | 23.2 | 25.3 | | 15.7 | 27.4 | |
| Progression Factor | 0.43 | 0.41 | 0.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d ₂ | 1.0 | 0.4 | 0.0 | | 2.4 | | 0.2 | 0.4 | | 0.1 | 3.3 | |
| Delay (s) | 8.5 | 7.3 | 0.0 | | 28.9 | | 23.3 | 25.7 | | 15.8 | 30.7 | |
| Level of Service | A | A | A | | C | | C | C | | B | C | |
| Approach Delay (s) | | 6.8 | | | 28.9 | | | 25.5 | | | 27.8 | |
| Approach LOS | | A | | | C | | | C | | | C | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 20.3 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.58 | | |
| Actuated Cycle Length (s) | 76.1 | Sum of lost time (s) | 19.0 |
| Intersection Capacity Utilization | 57.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

Description: 10/7/16 counts
! Phase conflict between lane groups.
c Critical Lane Group

HCM 2010 Signalized Intersection Summary
19: SR 27 & 32nd Avenue

2025 PM W-O Proj.
01/06/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↖ | ↗ | | ↖ | ↗ | | ↖ | ↗ | | ↖ | ↗ | |
| Traffic Volume (veh/h) | 88 | 339 | 205 | 182 | 351 | 51 | 136 | 194 | 120 | 56 | 260 | 70 |
| Future Volume (veh/h) | 88 | 339 | 205 | 182 | 351 | 51 | 136 | 194 | 120 | 56 | 260 | 70 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1800 | 1849 | 1872 | 1782 | 1784 | 1800 | 1800 | 1728 | 1800 | 1800 | 1786 | 1800 |
| Adj Flow Rate, veh/h | 104 | 399 | 241 | 214 | 413 | 60 | 160 | 228 | 141 | 66 | 306 | 82 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Percent Heavy Veh, % | 0 | 2 | 2 | 1 | 1 | 1 | 0 | 3 | 3 | 0 | 1 | 1 |
| Cap, veh/h | 132 | 512 | 305 | 248 | 474 | 69 | 195 | 740 | 440 | 86 | 823 | 217 |
| Arrive On Green | 0.08 | 0.24 | 0.24 | 0.15 | 0.31 | 0.31 | 0.11 | 0.37 | 0.37 | 0.05 | 0.31 | 0.31 |
| Sat Flow, veh/h | 1714 | 2114 | 1261 | 1697 | 1524 | 221 | 1714 | 1982 | 1179 | 1714 | 2658 | 701 |
| Grp Volume(v), veh/h | 104 | 331 | 309 | 214 | 0 | 473 | 160 | 187 | 182 | 66 | 194 | 194 |
| Grp Sat Flow(s), veh/h/ln | 1714 | 1756 | 1619 | 1697 | 0 | 1745 | 1714 | 1642 | 1519 | 1714 | 1697 | 1662 |
| Q Serve(g_s), s | 6.3 | 18.6 | 19.0 | 13.1 | 0.0 | 27.2 | 9.7 | 8.6 | 9.0 | 4.0 | 9.4 | 9.7 |
| Cycle Q Clear(g_c), s | 6.3 | 18.6 | 19.0 | 13.1 | 0.0 | 27.2 | 9.7 | 8.6 | 9.0 | 4.0 | 9.4 | 9.7 |
| Prop In Lane | 1.00 | | 0.78 | 1.00 | | 0.13 | 1.00 | | 0.78 | 1.00 | | 0.42 |
| Lane Grp Cap(c), veh/h | 132 | 425 | 392 | 248 | 0 | 542 | 195 | 613 | 567 | 86 | 526 | 515 |
| V/C Ratio(X) | 0.79 | 0.78 | 0.79 | 0.86 | 0.00 | 0.87 | 0.82 | 0.31 | 0.32 | 0.77 | 0.37 | 0.38 |
| Avail Cap(c_a), veh/h | 404 | 679 | 626 | 400 | 0 | 675 | 485 | 620 | 573 | 485 | 640 | 627 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 48.0 | 37.5 | 37.6 | 44.2 | 0.0 | 34.5 | 45.9 | 23.5 | 23.7 | 49.7 | 28.5 | 28.6 |
| Incr Delay (d2), s/veh | 9.8 | 3.1 | 3.6 | 10.6 | 0.0 | 10.2 | 8.4 | 0.7 | 0.8 | 13.3 | 1.2 | 1.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3.4 | 9.4 | 8.9 | 6.9 | 0.0 | 14.5 | 5.0 | 4.0 | 3.9 | 2.2 | 4.6 | 4.6 |
| LnGrp Delay(d),s/veh | 57.8 | 40.6 | 41.2 | 54.8 | 0.0 | 44.7 | 54.3 | 24.2 | 24.5 | 63.1 | 29.7 | 29.9 |
| LnGrp LOS | E | D | D | D | | D | D | C | C | E | C | C |
| Approach Vol, veh/h | | 744 | | | 687 | | | 529 | | | 454 | |
| Approach Delay, s/veh | | 43.3 | | | 47.9 | | | 33.4 | | | 34.6 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 30.8 | 45.1 | 20.0 | 30.2 | 17.5 | 38.3 | 12.7 | 37.4 | | | | |
| Change Period (Y+Rc), s | 5.5 | 5.5 | 4.5 | 4.5 | 5.5 | 5.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 30.0 | 40.0 | 25.0 | 41.0 | 30.0 | 40.0 | 25.0 | 41.0 | | | | |
| Max Q Clear Time (g_c+10), s | 13.0 | 11.0 | 15.1 | 21.0 | 11.7 | 11.7 | 8.3 | 29.2 | | | | |
| Green Ext Time (p_c), s | 0.2 | 21.5 | 0.4 | 4.0 | 0.5 | 21.1 | 0.3 | 3.4 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | | 40.8 | | | | | | | | |
| HCM 2010 LOS | | | | D | | | | | | | | |