PRISM ENGINEERING

November 25, 2005

Dan Landon, Executive Director
Nevada County Transportation Commission
101 Providence Mine Road, Suite 102
Nevada City, CA 95959

## RE: SR 49 / COMBIE / WOLF INTERSECTION STUDY

Dear Dan:

This letter report summarizes our findings examining the SR 49/Combie/Wolf intersection. The purpose of this study was to collect new traffic data and update the calibration of the NCTC traffic model in the SR 49/Combie Road vicinity. One of the reasons that this is necessary is due to several traffic studies being completed in the study area recently that have recommended mitigations for this intersection that go beyond that previously planned by the NCTC and the County. As a result of these differing conclusions, the County has requested that the NCTC study this area further, and refine the NCTC traffic model and its assumptions for traffic assignment in the vicinity of this intersection, etc. This work effort will also provide data to be utilized in the future update of the NCTC regional traffic model.

The first task of this study was to collect traffic data at different times of the day to better understand the kind of traffic patterns that exist now. After the data was collected and analyzed, the NCTC traffic model was updated and calibrated to the field data existing conditions.

### Turning Movement Data Collection

PRISM Engineering conducted turning movement counts at the SR 49 / Combie Road intersection from 7-9 am, 2-4 midday, and 4-6 pm. Table 1 summarizes the count turning movement data for the am peak hour time period. Table 2 summarizes the afternoon count, and Table 3 summarizes the pm peak hour count data.

## Table 1
## Turning Count Summary for Combie Road at SR 49, 6AM to 8AM

| | SR 49 SB | | | Combie Road WB | | | SR 49 NB | | | Wolfe Road EB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | Right | Thru | Left | Right | Thru | Left | Right | Thru | Left |
| 6:00 AM | 4 | 167 | 12 | 14 | 2 | 57 | 21 | 41 | 0 | 27 | 3 | 0 |
| 6:15 AM | 10 | 200 | 42 | 19 | 0 | 72 | 16 | 50 | 5 | 26 | 10 | 2 |
| 6:30 AM | 9 | 191 | 39 | 25 | 5 | 68 | 23 | 81 | 2 | 38 | 4 | 3 |
| 6:45 AM | 5 | 215 | 55 | 21 | 6 | 78 | 48 | 87 | 6 | 24 | 29 | 1 |
| 7:00 AM | 4 | 179 | 131 | 47 | 14 | 115 | 66 | 80 | 11 | 26 | 71 | 2 |
| 7:15 AM | 7 | 201 | 79 | 61 | 26 | 146 | 39 | 91 | 11 | 53 | 19 | 4 |
| 7:30 AM | 12 | 242 | 59 | 67 | 21 | 157 | 44 | 113 | 11 | 30 | 23 | 8 |
| 7:45 AM | 18 | 220 | 72 | 32 | 14 | 120 | 63 | 123 | 13 | 33 | 31 | 11 |
| 8:00 AM | 14 | 178 | 48 | 57 | 20 | 132 | 41 | 116 | 16 | 31 | 33 | 10 |
| **TOTAL** | **41** | **842** | **341** | **207** | **75** | **538** | **212** | **407** | **46** | **142** | **144** | **25** |

*Source: PRISM Engineering*
*Note: yellow indicates peak hour*

## Table 2
## Turning Count Summary for Combie Road at SR 49, 2PM to 4PM

| | SR 49 SB | | | Combie Road WB | | | SR 49 NB | | | Wolfe Road EB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | Right | Thru | Left | Right | Thru | Left | Right | Thru | Left |
| 2:00 PM | 11 | 125 | 49 | 38 | 14 | 86 | 99 | 136 | 12 | 7 | 22 | 13 |
| 2:15 PM | 9 | 131 | 61 | 46 | 16 | 69 | 102 | 144 | 18 | 9 | 22 | 3 |
| 2:30 PM | 7 | 128 | 62 | 88 | 30 | 97 | 123 | 152 | 26 | 6 | 32 | 11 |
| 2:45 PM | 12 | 135 | 86 | 68 | 25 | 96 | 110 | 155 | 41 | 6 | 22 | 8 |
| 3:00 PM | 19 | 136 | 41 | 96 | 44 | 146 | 91 | 131 | 33 | 21 | 41 | 16 |
| 3:15 PM | 5 | 128 | 46 | 61 | 53 | 86 | 103 | 161 | 14 | 12 | 24 | 14 |
| 3:30 PM | 8 | 147 | 46 | 73 | 34 | 88 | 101 | 166 | 31 | 12 | 22 | 13 |
| 3:45 PM | 11 | 158 | 45 | 61 | 18 | 72 | 112 | 201 | 33 | 8 | 7 | 15 |
| | **43** | **527** | **235** | **313** | **152** | **425** | **427** | **599** | **114** | **45** | **119** | **49** |

*Source: PRISM Engineering*
*Note: yellow indicates peak hour*

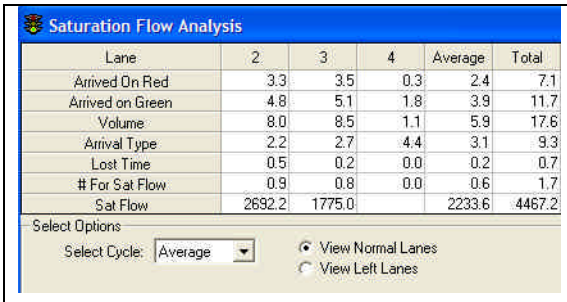
## Table 3
## Turning Count Summary for Combie Road / SR 49, 4PM to 6PM

| | SR 49 SB | | | Combie Road WB | | | SR 49 NB | | | Wolfe Road EB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | Right | Thru | Left | Right | Thru | Left | Right | Thru | Left |
| 4:00 PM | 7 | 117 | 41 | 47 | 26 | 62 | 101 | 194 | 32 | 12 | 26 | 5 |
| 4:15 PM | 8 | 146 | 47 | 48 | 24 | 69 | 105 | 203 | 44 | 9 | 18 | 15 |
| 4:30 PM | 8 | 149 | 67 | 50 | 17 | 78 | 127 | 222 | 61 | 17 | 16 | 10 |
| 4:45 PM | 9 | 121 | 57 | 52 | 19 | 67 | 130 | 246 | 62 | 8 | 19 | 12 |
| 5:00 PM | 6 | 107 | 53 | 51 | 29 | 72 | 160 | 240 | 55 | 3 | 19 | 13 |
| 5:15 PM | 16 | 142 | 68 | 87 | 27 | 68 | 155 | 251 | 39 | 9 | 21 | 8 |
| 5:30 PM | 7 | 128 | 58 | 63 | 10 | 71 | 114 | 221 | 53 | 5 | 26 | 11 |
| 5:45 PM | 12 | 135 | 51 | 47 | 29 | 62 | 130 | 216 | 37 | 6 | 25 | 2 |
| **TOTAL** | **38** | **498** | **236** | **253** | **85** | **278** | **559** | **958** | **209** | **25** | **85** | **44** |

*Source: PRISM Engineering*
*Note: yellow indicates peak hour*

## Saturation Flow Rate Surveys

PRISM Engineering conducted peak hour saturation flow studies at the busiest approaches to the SR 49 and Combie Road intersection. Saturation flow rate is defined as the flow rate per lane at which vehicles can pass through a signalized intersection in a stable moving queue. By definition, it is computed as: s = 3,600/h, where; s = saturation flow rate (vph), h = saturation headway (sec), 3,600 = number of seconds per hour. The survey locations and time periods are summarized in Figures 1, 2, 3, and 4 which follow. Only the southbound direction of SR 49 was surveyed due to visual limitations of viewing vehicles in the northbound direction while viewing the signal phase changes. The southbound direction provided a clear view of both signal changes and vehicles crossing the stop line.

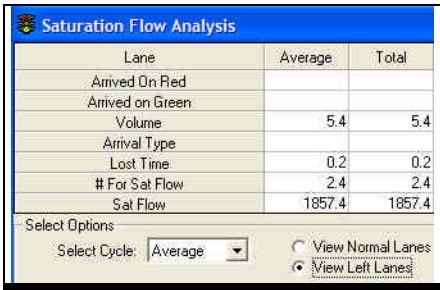

Saturation Flow Analysis

| Lane | 2 | 3 | 4 | Average | Total |
|---|---|---|---|---|---|
| Arrived On Red | 3.3 | 3.5 | 0.3 | 2.4 | 7.1 |
| Arrived on Green | 4.8 | 5.1 | 1.8 | 3.9 | 11.7 |
| Volume | 8.0 | 8.5 | 1.1 | 5.9 | 17.6 |
| Arrival Type | 2.2 | 2.7 | 4.4 | 3.1 | 9.3 |
| Lost Time | 0.5 | 0.2 | 0.0 | 0.2 | 0.7 |
| # For Sat Flow | 0.9 | 0.8 | 0.0 | 0.6 | 1.7 |
| Sat Flow | 2692.2 | 1775.0 | | 2233.6 | 4467.2 |

Select Options
Select Cycle: Average
View Normal Lanes
View Left Lanes

*PM Peak Hour*
*THRU LANES: 2,234 vph*
*Lane 2 is inside through lane, SB direction, PM Peak Hour.*
*Lane 3 is outside through lane, SB direction, PM Peak Hour.*
*Average through lane saturation flow for both lanes was 2,234 vph.*

*Figure 1 SR 49 SB approach at Combie Road for* the **pm** peak hour


Saturation Flow Analysis

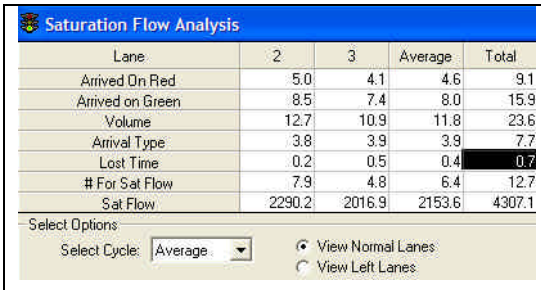
| Lane | Average | Total |
|---|---|---|
| Arrived On Red | | |
| Arrived on Green | | |
| Volume | 5.4 | 5.4 |
| Arrival Type | | |
| Lost Time | 0.2 | 0.2 |
| # For Sat Flow | 2.4 | 2.4 |
| Sat Flow | 1857.4 | 1857.4 |

Select Options
Select Cycle: Average
View Normal Lanes
View Left Lanes

*PM Peak Hour*
*LEFT TURN LANE: 1,857 vph*

*Average left lane saturation flow for the SR 49 southbound left turn lane to Combie Road was 1,857 vph.*

Figure 2 SR 49 SB approach at Combie Road for *the **pm** peak hour*

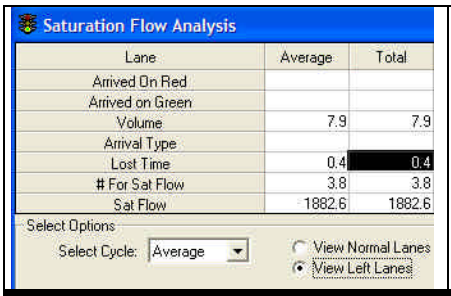

Saturation Flow Analysis

| Lane | 2 | 3 | Average | Total |
|---|---|---|---|---|
| Arrived On Red | 5.0 | 4.1 | 4.6 | 9.1 |
| Arrived on Green | 8.5 | 7.4 | 8.0 | 15.9 |
| Volume | 12.7 | 10.9 | 11.8 | 23.6 |
| Arrival Type | 3.8 | 3.9 | 3.9 | 7.7 |
| Lost Time | 0.2 | 0.5 | 0.4 | 0.7 |
| # For Sat Flow | 7.9 | 4.8 | 6.4 | 12.7 |
| Sat Flow | 2290.2 | 2016.9 | 2153.6 | 4307.1 |

Select Options
Select Cycle: Average
View Normal Lanes
View Left Lanes

*AM Peak Hour*
*THRU LANES: 2,154 vph*
*Lane 2 is inside through lane, SB direction, PM Peak Hour.*
*Lane 3 is outside through lane, SB direction, PM Peak Hour.*
*Average through lane saturation flow for both lanes was 2,154 vph.*

*Figure 3 SR 49 SB approach at Combie Road for* the **am** peak hour




*AM Peak Hour*
*LEFT TURN LANE*
*(includes school traffic): 1,883 vph*

*Average left lane saturation flow for the SR 49 southbound left turn lane to Combie Road was 1,883 vph.*

Figure 4 Saturation Flow Survey Results for SR 49 southbound approach at Combie Road for *the **am** peak hour*

In the screen shot shown in Figure 5, each downward arrow represents a single vehicle at a certain point of time in the survey. The top row in yellow represents the left turn lane and each green arrow the time when a vehicle crosses the stop bar entering into the intersection. The number next to the arrow represents the headway between vehicles (in seconds). There are numerous samples along the timeline, one for each signal cycle. The second pink row represents the inside through lane, and the third purple row represents the outside through lane. As can be seen from the screen shot, the inside lane has more vehicles and in a greater hurry, typical of the left-most lane of two through lanes.

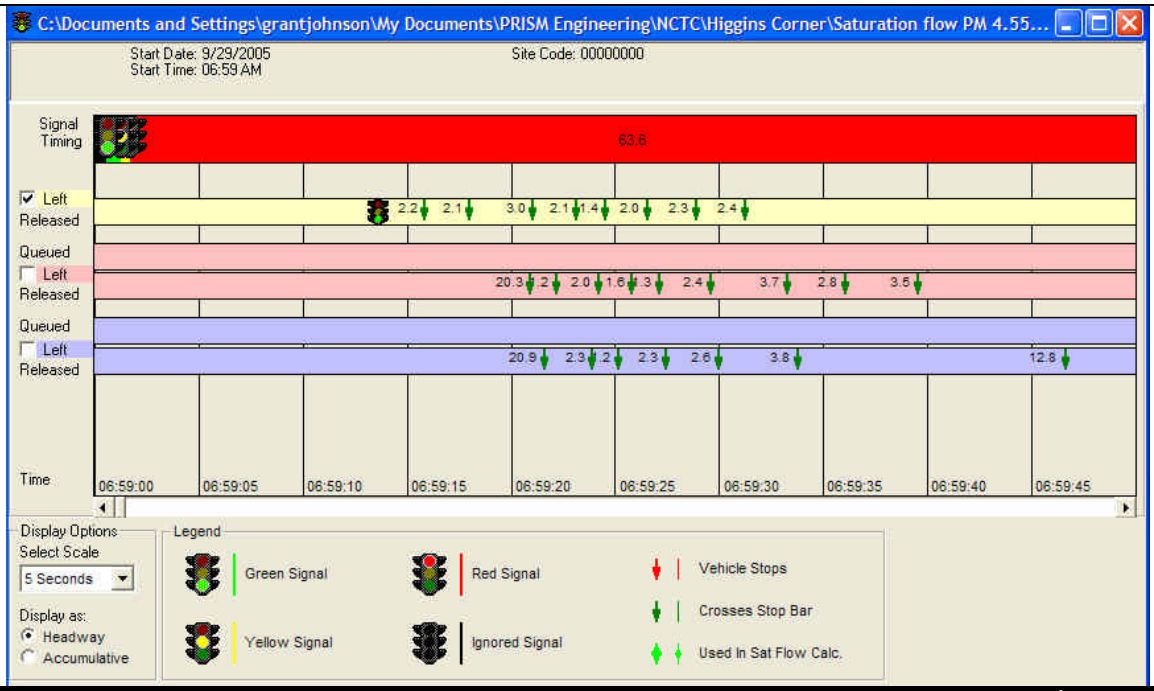



Figure 5 Sample view of actual saturation flow data in PetraPro[1]

[1] PetraPro is a software application by Jamar that works with Jamar electronic counter boards.

## Capacity Analysis

The HCM 2000 methodology built into the SynchroPro software was utilized in this capacity analysis section. The level of service and delay for the four study area intersections along Combie Road, for each of the three peak time periods, was calculated and the results detailed in the appendix of this report. Figure 6 illustrates the turning movements for each of the three time periods studied, and shows an aerial photo of the SR 49/Combie Road intersection. Table 4 sets forth the HCM 2000 criteria for determining levels of service from the delay values. Table 5 summarizes the capacity analysis results showing side-by-side LOS and delay for each intersection, for each scenario.

In addition to the HCM methodology, we also utilized the SimTraffic micro-simulation tool to determine any queuing issues, etc., and to validate the traffic flow conditions observed in the field. Signal timing for the intersections was set up in the same manner as observed in the field, including split phasing and protected left turn pocket phasing, etc. The SimTraffic micro-simulation tool is has significant strengths over the static HCM 2000 methodology. It helps identify locations where closely spaced intersections will have traffic operations issues, and can better serve to validate mitigation concepts from a traffic operations standpoint. The SimTraffic model showed that during the am peak hour, traffic in the SR 49 SB left turn pocket backed up slightly, extending over 12 vehicles in the pocket (similar to conditions observed in the field). The model also showed long lines of vehicles waiting more than one signal cycle to get through the signalized intersections on Magnolia Road in the eastbound direction (towards the high school). Table 4 reports the average level of service at the Combie/Magnolia intersection to be LOS D (see appendix calculation sheets for details of each approach).

**Table 4**
**Delay Level of Service Criteria**

| LOS | Unsignalized | Signalized |
|---|---|---|
| A | 1-10 seconds | 1-10 seconds |
| B | 11-15 seconds | 11-20 seconds |
| C | 16-25 seconds | 21-35 seconds |
| D | 26-35 seconds | 36-55 seconds |
| E | 36-50 seconds | 56-80 seconds |
| F | 51+ seconds | 81+ seconds |

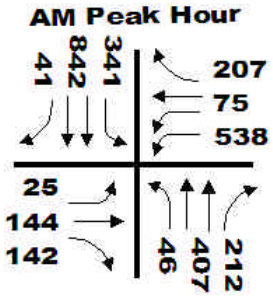
*Source: PRISM Engineering, Synchro Pro, and HCM*

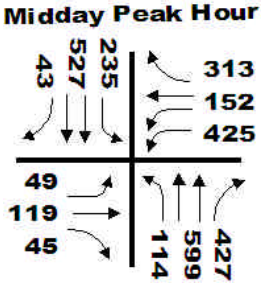
**Table 5**
**Peak Hour Level of Service Summaries**

| | | AM Peak Hour | | Afternoon Peak | | PM Peak Hour | |
|---|---|---|---|---|---|---|---|
| E/W Street | N/S Street | Delay | LOS | Delay | LOS | Delay | LOS |
| Combie Road | SR 49 | 29.6 | C | 22.9 | C | 23.1 | C |
| Combie Road | Long's Driveway | 0.1 | A | 0.1 | A | 0.2 | A |
| Combie Road | Hacienda Drive | 44.0 | D | 40.9 | D | 41.3 | D |
| Magnolia Road | Lakeshore Drive | 20.9 | C | 15.5 | B | 16.6 | B |

*Source: PRISM Engineering and County DOT (detailed calculations in appendix)*

The intersection of Combie Road and SR 49 is currently at LOS C conditions for Year 2005 scenarios in the am, midday, and pm peak hours. The threshold for LOS C/D is 35 seconds of delay as shown in Table 4. The upper threshold for LOS D/E is 55 seconds. In other words, the current average delay at this intersection can nearly double before LOS D is exceeded.



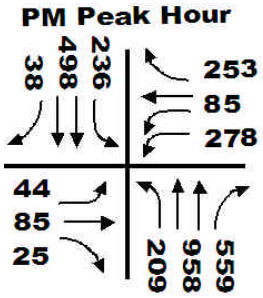




Figure 6 SR 49 at Combie Road Aerial and Turning Movement Summaries

## Travel Patterns for Commuters

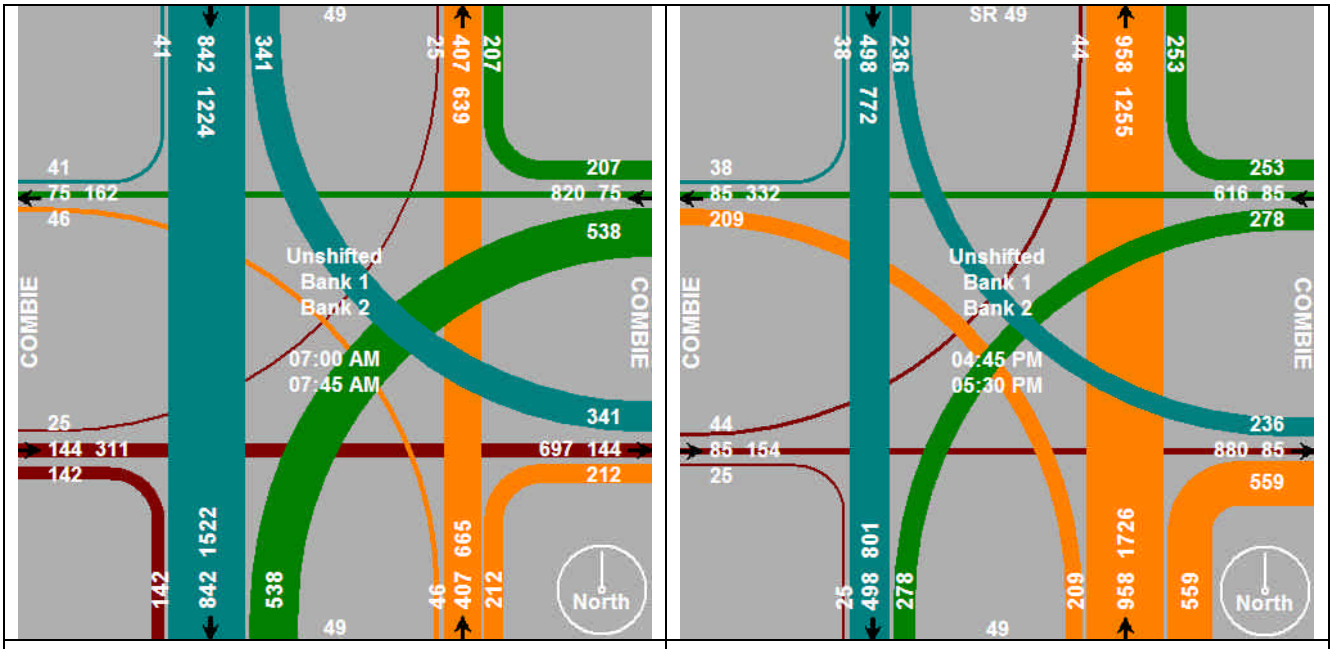
SR 49 is a significant commuter route serving Nevada County. Commuter patterns along SR 49 in Placer and Nevada Counties have been identified with a license plate Origin and Destination (O&D) survey in a report entitled *SR 49 Corridor Study, Alternatives Analysis, 2001.* In that study the license plates of vehicles traveling along different sections of SR 49 were observed to get some ideas of where drivers are heading, and where they came from.

Not all drivers who get on SR 49 and travel south from say, Alta Sierra, will travel all the way to Interstate 80. In fact, only 25% will go that far. The other 75% have a destination somewhere before they reach the I-80 freeway. 25% of drivers will turn off at Combie Road (many of which head to the Bear River High School in the morning). The other 50% have a destination along the SR 49 corridor in Auburn, either to a local job or to a local store, etc. The Combie Road traffic adds an additional 5% to the total that will travel all the way to I-80 (30% of all SB vehicles in the am peak hour crossing the county-line make it to the I-80 freeway).

In the pm peak hour when commuters are predominantly heading home, the O&D survey indicated that of the drivers traveling north on SR 49 north of I-80, only 10% of drivers getting off of I-80 made it all the way to Alta Sierra. The other 90% of off ramp traffic (getting off I-80 to the SR 49 corridor) had a destination in the City of Auburn or nearby Placer County (as accessed from SR 49). 3% of the I-80 off ramp drivers turned off at Combie/Wolf Road. What this means, is that most of the cars traveling north on SR 49 in the pm peak hour are NOT coming from the I-80 freeway, but are coming from origins within Auburn along that corridor in Placer County.

The conclusion of these surveys is that most of the vehicular trips projected in the traffic model have shorter-than-expected trip distance, most likely within a 5 to 10 mile range. What is also means is that SR 49 is used primarily as a local arterial roadway rather than a facility that carries “through traffic” any significant distances beyond the Nevada County line.

The recent traffic counts taken by PRISM Engineering give an accurate picture of what direction traffic is heading through the intersection of SR 49 and Combie Road. Figure 7 shows the band-width diagrams visually representing the magnitude of each turning movement, for the am and pm peak hour time periods.




AM Peak Hour (9/29/2005) | PM Peak Hour (9/28/2005)

Figure 7 Traffic Patterns for AM and PM Peak Hour Time Period at Combie/49

The traffic pattern shown in Figure 7 for the pm peak hour should be reflected in the NCTC traffic model for this intersection. Table 6 compares the new traffic count data turning movements and magnitudes with the NCTC traffic model data. Table 6 shows that there is a very good match on overall volumes (3138 compared with 3268 in right-most column), but the southbound SR 49 volumes are about 9% too high, and the northbound volumes are about 9% too low.

**Traffic Model Refinement**

The NCTC traffic model was refined in calibration to incorporate the traffic patterns discovered in the study process that differed from the traffic model. Specifically, a traffic pattern shift was implemented in the NCTC model to allow 9% of the SB traffic on SR 49 to shift to the northbound direction.

The County provided updated land uses for traffic analysis zones in the vicinity of the SR 49 and Combie Road intersection. These updated land use quantities are given in the Appendix. In addition to updating land uses in the area to accommodate growth that has taken place for the past three years (to bring conditions to a Year 2005 level), we also revised the trip assignment parameters in the model to increase the amount of trips going external to the County from the southern-most regions of the County.

## Table 6

## SR 49 / COMBIE ROAD TURNING MOVEMENTS COMPARISON

### *2002 NCTC Model compared to 2005 Traffic Count Data and 2005 and 2027 NCTC Models, Re-Calibrated*

| | SR 49 SB | | | Combie Road WB | | | SR 49 NB | | | Wolf Road EB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NCTC Model Data** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** |
| Traffic Model Turn Moves (2002) | 41 | 786 | 199 | 195 | 37 | 298 | 426 | 872 | 87 | 72 | 46 | 79 |
| Percent of Approach Vol. | *4%* | *77%* | *19%* | *37%* | *7%* | *56%* | *31%* | *63%* | *6%* | *37%* | *23%* | *40%* |
| Approach Totals | | 1026 | | | 530 | | | 1385 | | | 197 | |
| Approach Percentage of Total | | 33% | | | 17% | | | 44% | | | 6% | |
| | SR 49 SB | | | Combie Road WB | | | SR 49 NB | | | Wolf Road EB | | |
| **Actual Traffic Counts** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** |
| Actual Turn Moves (2005) | 38 | 498 | 236 | 253 | 85 | 278 | 559 | 958 | 209 | 25 | 85 | 44 |
| | *5%* | *65%* | *31%* | *41%* | *14%* | *45%* | *32%* | *56%* | *12%* | *16%* | *55%* | *29%* |
| Approach Totals | | 772 | | | 616 | | | 1726 | | | 154 | |
| Approach Percentage of Total | | 24% | | | 19% | | | 53% | | | 5% | |
| | SR 49 SB | | | Combie Road WB | | | SR 49 NB | | | Wolf Road EB | | |
| **NCTC 2005 Model Data revised** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** |
| Traffic Model Turn Moves (2005) | 40 | 766 | 218 | 295 | 24 | 227 | 600 | 979 | 168 | 62 | 29 | 105 |
| Percent of Approach Vol. | *4%* | *75%* | *21%* | *54%* | *4%* | *42%* | *34%* | *56%* | *10%* | *32%* | *15%* | *54%* |
| Approach Totals | | 1024 | | | 546 | | | 1747 | | | 196 | |
| Approach Percentage of Total | | 33% | | | 17% | | | 56% | | | 6% | |
| | SR 49 SB | | | Combie Road WB | | | SR 49 NB | | | Wolf Road EB | | |
| **NCTC 2027 Model Data revised** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** | **Right** | **Thru** | **Left** |
| Traffic Model Turn Moves | 47 | 1319 | 297 | 488 | 45 | 281 | 710 | 1675 | 326 | 120 | 50 | 131 |
| Percent of Approach Vol. | *3%* | *79%* | *18%* | *60%* | *6%* | *35%* | *26%* | *62%* | *12%* | *40%* | *17%* | *44%* |
| Approach Totals | | 1663 | | | 814 | | | 2711 | | | 301 | |
| Approach Percentage of Total | | 53% | | | 26% | | | 86% | | | 10% | |

*Source: PRISM Engineering and NCTC*

The level of service for the SR 49/Combie Road intersection will be LOS E without mitigation. If a dual left turn pocket is installed for the SB left turn movement in the future, then LOS D is possible (51.5 seconds average delay) with the Year 2027 projections from the model (unadjusted). If the SB through movement is adjusted downward by 20% (to account for it being 20% too high in the calibration), then the average delay drops to 48.3, but still remains in the LOS D range.

**Summary**

Traffic patterns on SR 49 at Combie Road for the Year 2005 are slightly different than what was originally calibrated in the Year 2002 NCTC traffic model. It was determined that the overall volume of traffic going through the intersection was about 4% higher for 2005 than the 2002 model. This is almost an exact match given background growth for three years. However, the southbound SR 49 approach was about 9% too high in volume, and the northbound SR 49 approach about 9% too low. By shifting some of the NCTC traffic model assignment of traffic to balance these differences, it was possible to better refine the calibration of the NCTC traffic model. The revised existing and future turning movements from the model are given in Table 6. The resulting level of service for future traffic model projections at the SR 49/Combie Road intersection will be LOS E.

LOS D conditions are possible at the intersection of SR 49 and Combie Road in the future Year 2027 if the following mitigation is completed:

- Add a left turn lane to the SB left turn pocket (making a dual left turn pocket)

If you have any questions, or if further information is needed, please do not hesitate to call.

Sincerely,
PRISM Engineering

Grant P. Johnson, PE, PTOE
Principal

# APPENDIX

## Year 2005 revised land use totals

| TAZ | R1_SF DU | RR_RUR DU | MOBILEHOME DU | R2_MF DU | RETIRE DU | AIRPORT Acres | BUSDIST Acres | BP Acres | CHURCH Acres | COMM Acres | COMM_HI Acres | COMM_HI2 Acres | CONVALESNT Acres | ELEMSCHOOL Acres | FASTFOOD Acres | EMPCEN Acres | FIRESTA Acres | GASFFOOD hoses | GASSTATION hoses | GOLFHOLES holes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | 122 | | 8 | | | | | | | | | | | | | | | | |
| 360 | | 37 | | 5 | | | | | | 7.00 | | | | 4.00 | | | | 8 | | |
| 362 | | 22 | 23 | | | | | | | | 5.00 | | | | | | | 12 | | |
| 366 | | 257 | | 20 | | | | | | | | | | | | | | | | 18 |
| 369 | | 15 | | 4 | | | | | | 3.00 | | | | | | | 4.11 | | | |
| 373 | | 56 | | 2 | | | | | | 4.05 | | | | 5.63 | | | | | | |

| HISCHOOL Acres | HOSPITAL Acres | INDUST Acres | LITEIND Acres | LODGING Acres | MINIWARE Acres | OFFICEGEN Acres | OFFICEPRO Acres | PARK Acres | POSTOFF Acres | PUBLIC Acres | QUIKSTOP Acres | RAQUETCLUB Acres | REC Acres | RESTAU_HI Acres | RESTAU_LOW Acres | SIERRACOL Acres | TOURIST Acres |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 6.16 | | | | | | | | | | | | 3.88 | | |
| | | | 10.52 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | 575.90 | | | | | | | | | |
| | | | | | | | 0.84 | | | | | | | | | | |
| | | | | | | | | | 1.00 | | | | | | | | |

## Year 2027 revised land use totals

| TAZ | R1_SF DU | RR_RUR DU | MOBILEHOME DU | R2_MF DU | RETIRE DU | AIRPORT Acres | BUSDIST Acres | BP Acres | CHURCH Acres | COMM Acres | COMM_HI Acres | COMM_HI2 Acres | CONVALESNT Acres | ELEMSCHOOL Acres | FASTFOOD Acres | EMPCEN Acres | FIRESTA Acres | GASFFOOD hoses | GASSTATION hoses | GOLFHOLES holes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | 225 | | 7 | | | | 15.05 | | | | | | | | | | | | |
| 360 | | 51 | | 5 | | | | | | 7.00 | | | | 4.00 | | | | 8 | | |
| 362 | | 50 | 23 | 100 | | | | | | | 6.00 | | | | | | | 12 | | |
| 369 | | 60 | | 24 | | | | | | 3.00 | | | | | | | 4.11 | | | |
| 373 | | 93 | | 8 | | | | | | 4.99 | | | | 7.00 | | | | | | |

| HISCHOOL Acres | HOSPITAL Acres | INDUST Acres | LITEIND Acres | LODGING Acres | MINIWARE Acres | OFFICEGEN Acres | OFFICEPRO Acres | PARK Acres | POSTOFF Acres | PUBLIC Acres | QUIKSTOP Acres | RAQUETCLUB Acres | REC Acres | RESTAU_HI Acres | RESTAU_LOW Acres | SIERRACOL Acres | TOURIST Acres |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| | | | 10.52 | | | | | | | | | | | | | | |
| | | | | | 6.16 | | | | | | | | | | | | |
| | | | | | | | 4.38 | | | | | | | | | | |
| | | | | | | | | | 1.00 | | | | | | | | |

*Source: Nevada County*

AM Peak Hour
3: Combie/Wolf Rd. & SR 49 11/10/2005

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 2002 | 4005 | 1792 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 2002 | 4005 | 1792 |
| Volume (vph) | 25 | 144 | 142 | 538 | 75 | 207 | 46 | 407 | 212 | 341 | 842 | 41 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 27 | 157 | 154 | 585 | 82 | 225 | 50 | 442 | 230 | 371 | 915 | 45 |
| RTOR Reduction (vph) | 0 | 0 | 128 | 0 | 0 | 153 | 0 | 0 | 174 | 0 | 0 | 26 |
| Lane Group Flow (vph) | 27 | 157 | 26 | 585 | 82 | 72 | 50 | 442 | 56 | 371 | 915 | 19 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 1.9 | 13.1 | 13.1 | 13.6 | 24.8 | 24.8 | 2.9 | 18.9 | 18.9 | 16.1 | 32.1 | 32.1 |
| Effective Green, g (s) | 1.9 | 13.1 | 13.1 | 13.6 | 24.8 | 24.8 | 2.9 | 18.9 | 18.9 | 16.1 | 32.1 | 32.1 |
| Actuated g/C Ratio | 0.02 | 0.17 | 0.17 | 0.18 | 0.32 | 0.32 | 0.04 | 0.24 | 0.24 | 0.21 | 0.41 | 0.41 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 49 | 355 | 302 | 680 | 673 | 572 | 75 | 974 | 436 | 415 | 1655 | 740 |
| v/s Ratio Prot | 0.01 | c0.07 | | c0.15 | 0.04 | | 0.02 | 0.11 | | c0.18 | c0.23 | |
| v/s Ratio Perm | | | 0.01 | | | 0.04 | | | 0.03 | | | 0.01 |
| v/c Ratio | 0.55 | 0.44 | 0.09 | 0.86 | 0.12 | 0.13 | 0.67 | 0.45 | 0.13 | 0.89 | 0.55 | 0.03 |
| Uniform Delay, d1 | 37.5 | 29.0 | 27.2 | 31.1 | 18.7 | 18.8 | 36.9 | 25.0 | 23.0 | 30.0 | 17.3 | 13.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 12.7 | 0.9 | 0.1 | 10.8 | 0.1 | 0.1 | 20.1 | 1.5 | 0.6 | 20.9 | 1.3 | 0.1 |
| Delay (s) | 50.2 | 29.9 | 27.4 | 41.8 | 18.8 | 18.9 | 57.1 | 26.5 | 23.6 | 50.9 | 18.7 | 13.6 |
| Level of Service | D | C | C | D | B | B | E | C | C | D | B | B |
| Approach Delay (s) | | 30.4 | | | 34.0 | | | 27.7 | | | 27.5 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 29.6 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.67 | | |
| Actuated Cycle Length (s) | 77.7 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 60.2% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

AM Peak Hour
6: Combie Road & Longs Shopping 11/10/2005

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Volume (veh/h) | 677 | 20 | 0 | 820 | 0 | 20 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 736 | 22 | 0 | 891 | 0 | 22 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | | None | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | 347 | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 758 | | 1192 | 379 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 758 | | 1192 | 379 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 96 |
| cM capacity (veh/h) | | | 849 | | 180 | 619 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 |
|---|---|---|---|---|---|
| Volume Total | 491 | 267 | 446 | 446 | 22 |
| Volume Left | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 22 | 0 | 0 | 22 |
| cSH | 1700 | 1700 | 1700 | 1700 | 619 |
| Volume to Capacity | 0.29 | 0.16 | 0.26 | 0.26 | 0.04 |
| Queue Length 95th (ft) | 0 | 0 | 0 | 0 | 3 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 11.0 |
| Lane LOS | | | | | B |
| Approach Delay (s) | 0.0 | | 0.0 | | 11.0 |
| Approach LOS | | | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.1 | | |
| Intersection Capacity Utilization | 27.1% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

AM Peak Hour
8: Magnolia Road & Lakeshore 11/10/2005

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 2108 | 1792 | 2002 | 2108 | 2002 | 1792 |
| Flt Permitted | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 2108 | 1792 | 2002 | 2108 | 2002 | 1792 |
| Volume (vph) | 742 | 64 | 97 | 425 | 299 | 396 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 807 | 69 | 105 | 462 | 325 | 430 |
| RTOR Reduction (vph) | 0 | 34 | 0 | 0 | 0 | 181 |
| Lane Group Flow (vph) | 807 | 25 | 105 | 462 | 325 | 249 |
| Turn Type | | Prot | Prot | | | Prot |
| Protected Phases | 4 | 4 | 3 | 8 | 2 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 23.9 | 23.9 | 3.7 | 31.6 | 16.5 | 16.5 |
| Effective Green, g (s) | 23.9 | 23.9 | 3.7 | 31.6 | 16.5 | 16.5 |
| Actuated g/C Ratio | 0.43 | 0.43 | 0.07 | 0.56 | 0.29 | 0.29 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 898 | 763 | 132 | 1187 | 589 | 527 |
| v/s Ratio Prot | c0.38 | 0.01 | c0.05 | 0.22 | c0.16 | 0.14 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.90 | 0.03 | 0.80 | 0.39 | 0.55 | 0.47 |
| Uniform Delay, d1 | 15.0 | 9.4 | 25.8 | 6.9 | 16.7 | 16.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 11.7 | 0.0 | 27.3 | 0.2 | 3.7 | 3.0 |
| Delay (s) | 26.6 | 9.4 | 53.1 | 7.1 | 20.4 | 19.3 |
| Level of Service | C | A | D | A | C | B |
| Approach Delay (s) | 25.5 | | | 15.6 | 19.7 | |
| Approach LOS | C | | | B | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 20.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.76 | | |
| Actuated Cycle Length (s) | 56.1 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 63.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

AM Peak Hour
10: Combie Road & Hacienda 11/10/2005

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | | 1.00 | 0.85 | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.96 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 2002 | 2108 | 1792 | 2002 | 2076 | | | 2025 | 1792 | | 2038 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.96 | 1.00 | | 1.00 | |
| Satd. Flow (perm) | 2002 | 2108 | 1792 | 2002 | 2076 | | | 2025 | 1792 | | 2038 | |
| Volume (vph) | 173 | 699 | 349 | 101 | 551 | 61 | 130 | 29 | 79 | 18 | 176 | 64 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 188 | 760 | 379 | 110 | 599 | 66 | 141 | 32 | 86 | 20 | 191 | 69 |
| RTOR Reduction (vph) | 0 | 0 | 222 | 0 | 5 | 0 | 0 | 0 | 70 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 188 | 760 | 157 | 110 | 660 | 0 | 0 | 173 | 16 | 0 | 269 | 0 |
| Turn Type | Prot | | Perm | Prot | | | Split | | Perm | Split | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | | | |
| Actuated Green, G (s) | 10.0 | 33.9 | 33.9 | 6.0 | 29.9 | | | 17.0 | 17.0 | | 16.0 | |
| Effective Green, g (s) | 10.0 | 33.9 | 33.9 | 6.0 | 29.9 | | | 17.0 | 17.0 | | 16.0 | |
| Actuated g/C Ratio | 0.11 | 0.38 | 0.38 | 0.07 | 0.34 | | | 0.19 | 0.19 | | 0.18 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 225 | 804 | 683 | 135 | 698 | | | 387 | 343 | | 367 | |
| v/s Ratio Prot | c0.09 | c0.36 | | 0.05 | 0.32 | | | c0.09 | | | c0.13 | |
| v/s Ratio Perm | | | 0.09 | | | | | | 0.01 | | | |
| v/c Ratio | 0.84 | 0.95 | 0.23 | 0.81 | 0.95 | | | 0.45 | 0.05 | | 0.70 | |
| Uniform Delay, d1 | 38.6 | 26.6 | 18.6 | 40.9 | 28.7 | | | 31.8 | 29.3 | | 34.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 22.7 | 19.5 | 0.2 | 30.0 | 21.6 | | | 3.7 | 0.3 | | 10.8 | |
| Delay (s) | 61.3 | 46.1 | 18.8 | 70.9 | 50.3 | | | 35.5 | 29.6 | | 45.0 | |
| Level of Service | E | D | B | E | D | | | D | C | | D | |
| Approach Delay (s) | | 40.5 | | | 53.3 | | | 33.5 | | | 45.0 | |
| Approach LOS | | D | | | D | | | C | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 44.0 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.78 | | |
| Actuated Cycle Length (s) | 88.9 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 70.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

Midday Peak Hour
3: Combie/Wolf Rd. & SR 49 11/10/2005

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 2002 | 4005 | 1792 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 2002 | 4005 | 1792 |
| Volume (vph) | 49 | 119 | 45 | 425 | 152 | 313 | 114 | 599 | 427 | 235 | 527 | 43 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 53 | 129 | 49 | 462 | 165 | 340 | 124 | 651 | 464 | 255 | 573 | 47 |
| RTOR Reduction (vph) | 0 | 0 | 43 | 0 | 0 | 257 | 0 | 0 | 328 | 0 | 0 | 30 |
| Lane Group Flow (vph) | 53 | 129 | 6 | 462 | 165 | 83 | 124 | 651 | 136 | 255 | 573 | 17 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 2.8 | 8.3 | 8.3 | 9.8 | 15.3 | 15.3 | 6.6 | 18.5 | 18.5 | 10.4 | 22.3 | 22.3 |
| Effective Green, g (s) | 2.8 | 8.3 | 8.3 | 9.8 | 15.3 | 15.3 | 6.6 | 18.5 | 18.5 | 10.4 | 22.3 | 22.3 |
| Actuated g/C Ratio | 0.04 | 0.13 | 0.13 | 0.16 | 0.24 | 0.24 | 0.10 | 0.29 | 0.29 | 0.17 | 0.35 | 0.35 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 89 | 278 | 236 | 604 | 512 | 435 | 210 | 1176 | 526 | 330 | 1418 | 634 |
| v/s Ratio Prot | 0.03 | c0.06 | | c0.12 | 0.08 | | 0.06 | c0.16 | | c0.13 | c0.14 | |
| v/s Ratio Perm | | | 0.00 | | | 0.05 | | | 0.08 | | | 0.01 |
| v/c Ratio | 0.60 | 0.46 | 0.03 | 0.76 | 0.32 | 0.19 | 0.59 | 0.55 | 0.26 | 0.77 | 0.40 | 0.03 |
| Uniform Delay, d1 | 29.5 | 25.3 | 23.8 | 25.5 | 19.6 | 18.9 | 26.9 | 18.8 | 17.0 | 25.2 | 15.3 | 13.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 10.3 | 1.2 | 0.0 | 5.7 | 0.4 | 0.2 | 4.4 | 1.9 | 1.2 | 10.7 | 0.9 | 0.1 |
| Delay (s) | 39.8 | 26.6 | 23.9 | 31.2 | 20.0 | 19.1 | 31.3 | 20.6 | 18.2 | 35.9 | 16.2 | 13.3 |
| Level of Service | D | C | C | C | B | B | C | C | B | D | B | B |
| Approach Delay (s) | | 29.0 | | | 25.1 | | | 20.8 | | | 21.8 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 22.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 63.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 55.7% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

Midday Peak Hour
6: Combie Road & Longs Shopping 11/10/2005

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Volume (veh/h) | 761 | 20 | 0 | 890 | 0 | 20 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 827 | 22 | 0 | 967 | 0 | 22 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | | None | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | 347 | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 849 | | 1322 | 424 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 849 | | 1322 | 424 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 96 |
| cM capacity (veh/h) | | | 785 | | 148 | 578 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 |
|---|---|---|---|---|---|
| Volume Total | 551 | 297 | 484 | 484 | 22 |
| Volume Left | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 22 | 0 | 0 | 22 |
| cSH | 1700 | 1700 | 1700 | 1700 | 578 |
| Volume to Capacity | 0.32 | 0.17 | 0.28 | 0.28 | 0.04 |
| Queue Length 95th (ft) | 0 | 0 | 0 | 0 | 3 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 11.5 |
| Lane LOS | | | | | B |
| Approach Delay (s) | 0.0 | | 0.0 | | 11.5 |
| Approach LOS | | | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.1 | | |
| Intersection Capacity Utilization | 29.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

Midday Peak Hour
8: Magnolia Road & Lakeshore 11/10/2005

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 2108 | 1792 | 2002 | 2108 | 2002 | 1792 |
| Flt Permitted | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 2108 | 1792 | 2002 | 2108 | 2002 | 1792 |
| Volume (vph) | 299 | 281 | 227 | 644 | 205 | 54 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 325 | 305 | 247 | 700 | 223 | 59 |
| RTOR Reduction (vph) | 0 | 222 | 0 | 0 | 0 | 40 |
| Lane Group Flow (vph) | 325 | 83 | 247 | 700 | 223 | 19 |
| Turn Type | | Prot | Prot | | | Prot |
| Protected Phases | 4 | 4 | 3 | 8 | 2 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 13.7 | 13.7 | 7.9 | 25.6 | 16.5 | 16.5 |
| Effective Green, g (s) | 13.7 | 13.7 | 7.9 | 25.6 | 16.5 | 16.5 |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.16 | 0.51 | 0.33 | 0.33 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 576 | 490 | 316 | 1077 | 659 | 590 |
| v/s Ratio Prot | 0.15 | 0.05 | c0.12 | c0.33 | c0.11 | 0.01 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.56 | 0.17 | 0.78 | 0.65 | 0.34 | 0.03 |
| Uniform Delay, d1 | 15.6 | 13.9 | 20.3 | 9.0 | 12.7 | 11.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.3 | 0.2 | 11.9 | 1.4 | 1.4 | 0.1 |
| Delay (s) | 16.9 | 14.0 | 32.1 | 10.3 | 14.1 | 11.5 |
| Level of Service | B | B | C | B | B | B |
| Approach Delay (s) | 15.5 | | | 16.0 | 13.5 | |
| Approach LOS | B | | | B | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 15.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 50.1 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 46.7% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

Midday Peak Hour
10: Combie Road & Hacienda 11/10/2005

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | | 1.00 | 0.85 | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.96 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | 2002 | 2108 | 1792 | 2002 | 2095 | | | 2033 | 1792 | | 1903 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.96 | 1.00 | | 0.99 | |
| Satd. Flow (perm) | 2002 | 2108 | 1792 | 2002 | 2095 | | | 2033 | 1792 | | 1903 | |
| Volume (vph) | 61 | 475 | 140 | 104 | 684 | 29 | 162 | 58 | 112 | 40 | 54 | 194 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 66 | 516 | 152 | 113 | 743 | 32 | 176 | 63 | 122 | 43 | 59 | 211 |
| RTOR Reduction (vph) | 0 | 0 | 96 | 0 | 2 | 0 | 0 | 0 | 98 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 66 | 516 | 56 | 113 | 773 | 0 | 0 | 239 | 24 | 0 | 231 | 0 |
| Turn Type | Prot | | Perm | Prot | | | Split | | Perm | Split | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | | | |
| Actuated Green, G (s) | 3.0 | 31.6 | 31.6 | 5.3 | 33.9 | | | 17.2 | 17.2 | | 16.2 | |
| Effective Green, g (s) | 3.0 | 31.6 | 31.6 | 5.3 | 33.9 | | | 17.2 | 17.2 | | 16.2 | |
| Actuated g/C Ratio | 0.03 | 0.37 | 0.37 | 0.06 | 0.39 | | | 0.20 | 0.20 | | 0.19 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 70 | 772 | 656 | 123 | 823 | | | 405 | 357 | | 357 | |
| v/s Ratio Prot | 0.03 | 0.24 | | c0.06 | c0.37 | | | c0.12 | | | c0.12 | |
| v/s Ratio Perm | | | 0.03 | | | | | | 0.01 | | | |
| v/c Ratio | 0.94 | 0.67 | 0.08 | 0.92 | 0.94 | | | 0.59 | 0.07 | | 0.65 | |
| Uniform Delay, d1 | 41.6 | 23.0 | 17.9 | 40.3 | 25.2 | | | 31.4 | 28.0 | | 32.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 87.3 | 2.2 | 0.1 | 56.0 | 18.1 | | | 6.2 | 0.4 | | 8.8 | |
| Delay (s) | 128.8 | 25.2 | 17.9 | 96.2 | 43.3 | | | 37.5 | 28.4 | | 41.2 | |
| Level of Service | F | C | B | F | D | | | D | C | | D | |
| Approach Delay (s) | | 33.0 | | | 50.1 | | | 34.6 | | | 41.2 | |
| Approach LOS | | C | | | D | | | C | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 40.9 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.76 | | |
| Actuated Cycle Length (s) | 86.3 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 75.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

PM Peak Hour
3: Combie/Wolf Rd. & SR 49 11/10/2005

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 2002 | 4005 | 1792 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 2002 | 4005 | 1792 |
| Volume (vph) | 44 | 85 | 25 | 278 | 85 | 253 | 209 | 958 | 559 | 236 | 498 | 38 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 48 | 92 | 27 | 302 | 92 | 275 | 227 | 1041 | 608 | 257 | 541 | 41 |
| RTOR Reduction (vph) | 0 | 0 | 24 | 0 | 0 | 226 | 0 | 0 | 328 | 0 | 0 | 26 |
| Lane Group Flow (vph) | 48 | 92 | 3 | 302 | 92 | 49 | 227 | 1041 | 280 | 257 | 541 | 15 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 2.8 | 7.6 | 7.6 | 7.1 | 11.9 | 11.9 | 11.8 | 24.3 | 24.3 | 11.2 | 23.7 | 23.7 |
| Effective Green, g (s) | 2.8 | 7.6 | 7.6 | 7.1 | 11.9 | 11.9 | 11.8 | 24.3 | 24.3 | 11.2 | 23.7 | 23.7 |
| Actuated g/C Ratio | 0.04 | 0.11 | 0.11 | 0.11 | 0.18 | 0.18 | 0.18 | 0.37 | 0.37 | 0.17 | 0.36 | 0.36 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 85 | 242 | 206 | 417 | 379 | 322 | 357 | 1470 | 658 | 339 | 1434 | 642 |
| v/s Ratio Prot | 0.02 | c0.04 | | c0.08 | 0.04 | | 0.11 | c0.26 | | c0.13 | 0.14 | |
| v/s Ratio Perm | | | 0.00 | | | 0.03 | | | 0.16 | | | 0.01 |
| v/c Ratio | 0.56 | 0.38 | 0.02 | 0.72 | 0.24 | 0.15 | 0.64 | 0.71 | 0.43 | 0.76 | 0.38 | 0.02 |
| Uniform Delay, d1 | 31.1 | 27.1 | 26.0 | 28.6 | 23.3 | 22.9 | 25.2 | 17.9 | 15.7 | 26.2 | 15.8 | 13.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 8.3 | 1.0 | 0.0 | 6.1 | 0.3 | 0.2 | 3.7 | 2.9 | 2.0 | 9.3 | 0.8 | 0.1 |
| Delay (s) | 39.4 | 28.1 | 26.0 | 34.7 | 23.6 | 23.1 | 28.9 | 20.8 | 17.7 | 35.6 | 16.5 | 13.8 |
| Level of Service | D | C | C | C | C | C | C | C | B | D | B | B |
| Approach Delay (s) | | 31.0 | | | 28.4 | | | 20.8 | | | 22.2 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 23.1 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 66.2 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 58.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

PM Peak Hour
6: Combie Road & Longs Shopping 11/10/2005

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Volume (veh/h) | 860 | 20 | 0 | 616 | 0 | 20 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 935 | 22 | 0 | 670 | 0 | 22 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | | None | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | 347 | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 957 | | 1280 | 478 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 957 | | 1280 | 478 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 96 |
| cM capacity (veh/h) | | | 716 | | 157 | 533 |

| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 |
|---|---|---|---|---|---|
| Volume Total | 623 | 333 | 335 | 335 | 22 |
| Volume Left | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 22 | 0 | 0 | 22 |
| cSH | 1700 | 1700 | 1700 | 1700 | 533 |
| Volume to Capacity | 0.37 | 0.20 | 0.20 | 0.20 | 0.04 |
| Queue Length 95th (ft) | 0 | 0 | 0 | 0 | 3 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 12.0 |
| Lane LOS | | | | | B |
| Approach Delay (s) | 0.0 | | 0.0 | | 12.0 |
| Approach LOS | | | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.2 | | |
| Intersection Capacity Utilization | 31.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

PM Peak Hour
8: Magnolia Road & Lakeshore 11/10/2005

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 2108 | 1792 | 2002 | 2108 | 2002 | 1792 |
| Flt Permitted | 1.00 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 2108 | 1792 | 2002 | 2108 | 2002 | 1792 |
| Volume (vph) | 299 | 512 | 227 | 154 | 205 | 64 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 325 | 557 | 247 | 167 | 223 | 69 |
| RTOR Reduction (vph) | 0 | 415 | 0 | 0 | 0 | 39 |
| Lane Group Flow (vph) | 325 | 142 | 247 | 167 | 223 | 30 |
| Turn Type | | Prot | Prot | | | Prot |
| Protected Phases | 4 | 4 | 3 | 8 | 2 | 2 |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | 13.2 | 13.2 | 9.4 | 26.6 | 17.1 | 17.1 |
| Effective Green, g (s) | 13.2 | 13.2 | 9.4 | 26.6 | 17.1 | 17.1 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.18 | 0.51 | 0.33 | 0.33 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 538 | 458 | 364 | 1085 | 662 | 593 |
| v/s Ratio Prot | c0.15 | 0.08 | c0.12 | 0.08 | c0.11 | 0.01 |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | 0.60 | 0.31 | 0.68 | 0.15 | 0.34 | 0.03 |
| Uniform Delay, d1 | 16.9 | 15.6 | 19.7 | 6.6 | 13.0 | 11.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.9 | 0.4 | 5.0 | 0.1 | 1.4 | 0.1 |
| Delay (s) | 18.9 | 16.0 | 24.7 | 6.7 | 14.4 | 11.8 |
| Level of Service | B | B | C | A | B | B |
| Approach Delay (s) | 17.0 | | | 17.4 | 13.9 | |
| Approach LOS | B | | | B | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 16.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 51.7 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 45.8% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

PM Peak Hour
10: Combie Road & Hacienda 11/10/2005

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 | 2160 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | | 1.00 | 0.85 | | 0.93 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.96 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | 2002 | 2108 | 1792 | 2002 | 2084 | | | 2033 | 1792 | | 1941 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 0.96 | 1.00 | | 0.99 | |
| Satd. Flow (perm) | 2002 | 2108 | 1792 | 2002 | 2084 | | | 2033 | 1792 | | 1941 | |
| Volume (vph) | 61 | 669 | 140 | 104 | 354 | 29 | 162 | 68 | 112 | 40 | 64 | 100 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 66 | 716 | 152 | 113 | 385 | 32 | 176 | 63 | 122 | 43 | 69 | 109 |
| RTOR Reduction (vph) | 0 | 0 | 100 | 0 | 4 | 0 | 0 | 0 | 98 | 0 | 48 | 0 |
| Lane Group Flow (vph) | 66 | 716 | 52 | 113 | 413 | 0 | 0 | 239 | 24 | 0 | 163 | 0 |
| Turn Type | Prot | | Perm | Prot | | | Split | | Perm | Split | | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | | | |
| Actuated Green, G (s) | 4.8 | 27.8 | 27.8 | 5.0 | 28.0 | | | 16.0 | 16.0 | | 16.0 | |
| Effective Green, g (s) | 4.8 | 27.8 | 27.8 | 5.0 | 28.0 | | | 16.0 | 16.0 | | 16.0 | |
| Actuated g/C Ratio | 0.06 | 0.34 | 0.34 | 0.06 | 0.35 | | | 0.20 | 0.20 | | 0.20 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | | 4.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 119 | 725 | 617 | 124 | 722 | | | 403 | 355 | | 384 | |
| v/s Ratio Prot | 0.03 | c0.34 | | c0.06 | 0.20 | | | c0.12 | | | c0.08 | |
| v/s Ratio Perm | | | 0.03 | | | | | | 0.01 | | | |
| v/c Ratio | 0.55 | 0.99 | 0.08 | 0.91 | 0.57 | | | 0.59 | 0.07 | | 0.42 | |
| Uniform Delay, d1 | 37.0 | 26.3 | 17.9 | 37.7 | 21.5 | | | 29.4 | 26.3 | | 28.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 5.5 | 30.0 | 0.1 | 54.2 | 1.1 | | | 6.3 | 0.4 | | 3.4 | |
| Delay (s) | 42.6 | 56.3 | 18.0 | 91.8 | 22.6 | | | 35.7 | 26.7 | | 31.8 | |
| Level of Service | D | E | B | F | C | | | D | C | | C | |
| Approach Delay (s) | | 49.1 | | | 37.4 | | | 32.7 | | | 31.8 | |
| Approach LOS | | D | | | D | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 41.3 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 80.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 69.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

## Year 2027 with Mitigations (Dual SB Left Turn Pocket)

PM Peak Hour
3: Combie/Wolf Rd. & SR 49

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 | 2150 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 3885 | 4005 | 1792 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 2002 | 2108 | 1792 | 3885 | 2108 | 1792 | 2002 | 4005 | 1792 | 3885 | 4005 | 1792 |
| Volume (vph) | 131 | 50 | 120 | 281 | 45 | 488 | 326 | 1675 | 710 | 297 | 1319 | 47 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 142 | 54 | 130 | 305 | 49 | 530 | 354 | 1821 | 772 | 323 | 1434 | 51 |
| RTOR Reduction (vph) | 0 | 0 | 107 | 0 | 0 | 147 | 0 | 0 | 343 | 0 | 0 | 30 |
| Lane Group Flow (vph) | 142 | 54 | 23 | 305 | 49 | 383 | 354 | 1821 | 429 | 323 | 1434 | 21 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 7.0 | 16.0 | 16.0 | 9.0 | 18.0 | 18.0 | 16.0 | 41.0 | 41.0 | 8.0 | 33.0 | 33.0 |
| Effective Green, g (s) | 7.0 | 16.0 | 16.0 | 9.0 | 18.0 | 18.0 | 16.0 | 41.0 | 41.0 | 8.0 | 33.0 | 33.0 |
| Actuated g/C Ratio | 0.08 | 0.18 | 0.18 | 0.10 | 0.20 | 0.20 | 0.18 | 0.46 | 0.46 | 0.09 | 0.37 | 0.37 |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 156 | 375 | 319 | 389 | 422 | 358 | 356 | 1825 | 816 | 345 | 1469 | 657 |
| v/s Ratio Prot | 0.07 | 0.03 | | c0.08 | 0.02 | | c0.18 | c0.45 | | 0.08 | 0.36 | |
| v/s Ratio Perm | | | 0.01 | | | c0.21 | | | 0.24 | | | 0.01 |
| v/c Ratio | 0.91 | 0.14 | 0.07 | 0.78 | 0.12 | 1.07 | 0.99 | 1.00 | 0.53 | 0.94 | 0.98 | 0.03 |
| Uniform Delay, d1 | 41.2 | 31.2 | 30.8 | 39.6 | 29.5 | 36.0 | 37.0 | 24.5 | 17.5 | 40.7 | 28.1 | 18.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 46.5 | 0.2 | 0.1 | 9.9 | 0.1 | 67.2 | 45.9 | 20.6 | 2.4 | 32.1 | 18.5 | 0.1 |
| Delay (s) | 87.7 | 31.4 | 30.9 | 49.5 | 29.6 | 103.2 | 82.9 | 45.0 | 20.0 | 72.9 | 46.6 | 18.4 |
| Level of Service | F | C | C | D | C | F | F | D | B | E | D | B |
| Approach Delay (s) | | 55.7 | | | 80.6 | | | 43.0 | | | 50.5 | |
| Approach LOS | | E | | | F | | | D | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 51.5 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.94 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 84.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |