Appendix K: Traffic Impact Analysis
Traffic Impact Study for the Chick-fil-A Restaurant

Prepared for the
City of Santa Rosa

Submitted by
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A Intersection Level of Service Calculations
Introduction

This report presents an analysis of the potential traffic impacts that would be associated with development of the proposed Chick-fil-A restaurant to be located at 1452 Mendocino Avenue in the City of Santa Rosa. The traffic study was completed in accordance with the criteria established by the City of Santa Rosa, and is consistent with standard traffic engineering techniques.

Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data that they can use to make an informed decision regarding the potential traffic impacts of a proposed project, and any associated improvements that would be required in order to mitigate these impacts to a level of insignificance as defined by the City's General Plan or other policies. Traffic impacts are typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic would be expected to have on critical intersections.

Project Profile

The project as proposed is a 4,350 square foot Chick-fil-A restaurant with a drive-through. The project site is occupied by a vacant building which was formerly a fast food restaurant. The project site is shown in Figure 1.
Traffic Impact Study for the Chick-fil-A Restaurant
City of Santa Rosa

Figure 1
Lane Configurations and Traffic Volumes
Transportation Setting

Vehicular Operational Analysis

Study Area and Periods

The study area consists of the project frontage along Mendocino Avenue as well as the intersection of Mendocino Avenue/Pacific Avenue-Bear Cub Way.

Vehicle operating conditions during the a.m. and p.m. peak periods were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The morning peak hour occurs between 7:00 and 9:00 a.m. and reflects conditions during the home to work or school commute, while the p.m. peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion during the homeward bound commute.

Study Intersection

*Mendocino Avenue/Pacific Avenue-Bear Cub Way* is a signalized intersection with protected left-turn phasing on the northbound and southbound Mendocino Avenue approaches and permitted left-turn phasing on the westbound Pacific Avenue and eastbound Bear Cub Way approaches. Right-turn overlap (green arrow) phasing is also provided on the westbound and eastbound approaches. U-turn movements are prohibited at the intersection due to the tight geometrics. Crosswalks and pedestrian phasing are provided on all four approaches.

The location of the study intersection and the existing lane configurations and controls are shown in Figure 1.

Roadway Segment

*Mendocino Avenue* is designated as a regional arterial street in the City’s General Plan. It is a north-south arterial that runs from 4th Street to Industrial Drive. Along the project frontage, two through lanes are present for each direction of travel on Mendocino Avenue. A two-way left-turn lane, which transitions to left-turn lanes at signalized intersections, separates the directions of travel on Mendocino Avenue, and currently serves left-turn movements into and out of the project site. The speed limit is currently posted at 35 miles per hour (mph) in the vicinity of the project.

*Pacific Avenue* is a two-lane collector street providing access through the Junior College neighborhood.

*Bear Cub Way* provides access to the Santa Rosa Junior College campus and the parking garage on the northwest corner of the study intersection.

Mendocino Avenue Corridor Plan

Mendocino Avenue along the project frontage is subject to the *Mendocino Avenue Corridor Plan* which was adopted in 2009. The plan envisions a multi-modal arterial and prescribes streetscape and right-of-way improvements. Along the project frontage, the plan proposes a raised planted median with no left turn access. There is no discussion in the Plan document regarding a strategy to provide for left turn access to midblock properties in the corridor with the addition of the medians. However, the graphics do show a suggested “Common Parking Access” between the subject property and the adjacent property fronting on Pacific Avenue. Currently, there is a fence separating the project site from this adjacent property. With the future median, access to the project sites would be further restricted by the absence of locations to complete legal U-turn movements within a short proximity to the site.
**Alternative Modes**

**Pedestrian Facilities**

Pedestrian facilities in the study area include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a network of sidewalks, enhanced crosswalks, pedestrian signals, and curb ramps provide access for pedestrians crossing Mendocino Avenue as well as in the vicinity of the proposed project site.

- **Mendocino Avenue** – Continuous sidewalks are provided on both sides of Mendocino Avenue, with lighting provided by overhead street lights on both sides of the street. Crosswalks are provided on all four approaches of the intersection of Mendocino Avenue/Pacific Avenue-Bear Cub Way, which is located approximately 200 feet south of the project site. A crosswalk with zebra striping and an overhead flashing sign is also provided on Mendocino Avenue at McConnell Avenue, which is located approximately 100 feet north of the project site.

**Bicycle Facilities**

The *Highway Design Manual*, California Department of Transportation (Caltrans), 2006, classifies bikeways into three categories:

- **Class I Multi-Use Path**: a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane**: a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route**: signing only for shared use with motor vehicles within the same travel lane on a street or highway.

In the project area, Class II bike lanes currently exist along both sides of Mendocino Avenue.

**Transit Facilities**

The project site is served by Santa Rosa CityBus Routes 1, 4, 10 and 14, which operate on Mendocino Avenue with headways between 20 and 50 minutes. Sonoma County Transit Routes 20, 30, 44, 48, 60 and 62 also operate with stops along Mendocino Avenue. A bus turnout is located on the west side of Mendocino Avenue just north of Bear Cub Way and a bus stop is located on the east side of Mendocino Avenue just south of Pacific Avenue.

Two bicycles can be carried on most CityBus buses. Bike rack space is on a first come, first served basis. Additional bicycles are allowed on CityBus buses at the discretion of the driver.

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. CityBus paratransit is designed to serve the needs of individuals with disabilities within the City of Santa Rosa.
Vehicle Capacity Analysis

Intersection Level of Service Methodologies

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation.

The study intersection was analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle. The study intersection, which is controlled by a traffic signal, was evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether or not the signals are coordinated, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology.

The ranges of delay associated with the various levels of service are indicated in Table 1.

<table>
<thead>
<tr>
<th>LOS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.</td>
</tr>
<tr>
<td>B</td>
<td>Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.</td>
</tr>
<tr>
<td>C</td>
<td>Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.</td>
</tr>
<tr>
<td>D</td>
<td>Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.</td>
</tr>
<tr>
<td>E</td>
<td>Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.</td>
</tr>
<tr>
<td>F</td>
<td>Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.</td>
</tr>
</tbody>
</table>


Traffic Operation Standards

The City of Santa Rosa’s adopted Level of Service (LOS) Standard is contained in *Santa Rosa General Plan 2035*. Standard TD-1 states that the City will try to maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting this standard are allowed where attainment would result in significant environmental degradation; where topography or environmental impacts make the improvement impossible; or where attainment would ensure loss of an area’s unique character.

Although the City’s standard does not specify criteria for intersections, for the purposes of this study a minimum operation of LOS D for the overall operation of the signalized study intersection was applied.
Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak period. This condition does not include project-generated traffic volumes. Volume data for the a.m. peak hour was collected on November 30, 2011, while local schools were in session. Volume data for the p.m. peak hour was collected on April 12, 2006; however, this data was appropriately factored to account for the increase in traffic on Bear Cub Way associated with the SRJC parking garage that was added after the counts were taken. Throughout the City of Santa Rosa, comparisons of 2006 traffic volumes to current volumes have consistently shown that traffic has not significantly increased as there has been little new development, and in fact, volumes are often lower now than in 2006 due to the high unemployment rate and cost of fuel.

Under existing conditions, the signalized study intersection operates acceptably at LOS C overall during both peak periods evaluated. The existing traffic volumes are shown in Figure 1. A summary of the intersection level of service calculations is contained in Table 2, and copies of the Level of Service calculations for all scenarios evaluated are provided in Appendix A.

<table>
<thead>
<tr>
<th>Study Intersection Approach</th>
<th>Existing Conditions AM Peak Delay</th>
<th>Existing Conditions PM Peak Delay</th>
<th>Existing plus Project AM Peak Delay</th>
<th>Existing plus Project PM Peak Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mendocino Ave/Pacific Ave</td>
<td>23.4 C</td>
<td>20.5 C</td>
<td>23.5 C</td>
<td>20.6 C</td>
</tr>
</tbody>
</table>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

Future Conditions

Segment volumes for the horizon year of 2035 were obtained from the Sonoma County Transportation Authority (SCTA) gravity demand model and translated to turning movement volumes at the study intersection using the “Furness” method. The Furness method is an iterative process that employs existing turn movement data, existing link volumes and future link volumes to project likely future turning movement volumes at intersections.

Under the anticipated Future volumes, the study intersection is expected to continue to operate acceptably at LOS C overall during both peak periods evaluated. Operating conditions are summarized in Table 3 and Future volumes are shown in Figure 1.

<table>
<thead>
<tr>
<th>Study Intersection Approach</th>
<th>Future Conditions AM Peak Delay</th>
<th>Future Conditions PM Peak Delay</th>
<th>Future plus Project AM Peak Delay</th>
<th>Future plus Project PM Peak Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mendocino Ave/Pacific Ave (with SB U-turns)</td>
<td>31.4 C</td>
<td>21.4 C</td>
<td>32.0 C</td>
<td>21.5 C</td>
</tr>
<tr>
<td></td>
<td>35.4 D</td>
<td>24.7 C</td>
<td>35.4 C</td>
<td>24.7 C</td>
</tr>
</tbody>
</table>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service
Project Description

The project as proposed is a 4,350 square foot Chick-fil-A fast-food restaurant with a drive-through at 1452 Mendocino Avenue in the City of Santa Rosa. The project site has a vacant building on it which used to house the Burger King fast-food restaurant. Two alternatives were assumed for vehicular access to the site. Under short-term conditions, prior to the implementation of the medians proposed in the Mendocino Avenue Corridor Plan, access to the project will be via a full access driveway. After installation of the medians, the project driveway would be limited to right turn in and out movements. Drivers desiring to make left turns to and from the site would have to seek out locations to complete U-turn movements or other alternative routes. The proposed project site plan is shown in Figure 2.

Trip Generation

The anticipated vehicle trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in Trip Generation, 8th Edition, 2008. The trip generation potential of the project as planned was developed using the published standard rates for “Fast Food with Drive Thru” (ITE LU 934).

Pass-by Trips

Some portion of traffic associated with fast food restaurants is drawn from existing traffic on nearby streets. These vehicle trips are not considered “new,” but are instead comprised of drivers who are already driving on the adjacent street system and choose to make an interim stop, and are referred to as “pass-by.” The percentage of these pass-by trips was developed based on information provided in the Trip Generation Handbook: An ITE Recommended Practice, ITE, 2004, which indicates that pass-by percentages for fast food restaurants with drive-through service typically average 49 percent during the a.m. peak hour and 50 percent during the p.m. peak hour. These rates were applied as a deduction to the overall trips generated by the project. At the proposed project, pass-by trips would in essence be “captured” from traffic on Mendocino Avenue.

Project Trip Generation

Based on application of these assumptions, the proposed project is expected to generate an average of 2,158 trips per day at the driveways, of which 110 a.m. and 73 p.m. peak hour trips would be primary trips. These results are summarized in the Table 4. Project related traffic volumes are shown in Figure 2.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Units</th>
<th>Daily Rate</th>
<th>Daily Trips</th>
<th>AM Peak Hour Rate</th>
<th>AM Peak Hour Trips</th>
<th>PM Peak Hour Rate</th>
<th>PM Peak Hour Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Food with Drive Thru</td>
<td>4.35 ksf</td>
<td>496.12</td>
<td>2,158</td>
<td>49.35</td>
<td>215</td>
<td>109</td>
<td>106</td>
</tr>
<tr>
<td>Pass-by Trips</td>
<td>n/a</td>
<td>-49%</td>
<td>-105</td>
<td>-53</td>
<td>-52</td>
<td>-50%</td>
<td>-74</td>
</tr>
<tr>
<td>Total Trips</td>
<td></td>
<td>2,158</td>
<td>110</td>
<td>56</td>
<td>54</td>
<td>73</td>
<td>38</td>
</tr>
</tbody>
</table>

Note: ksf = 1,000 square feet
**Trip Distribution**

The pattern used to allocate new project trips to the street network was based on a review of existing intersection turning movements. The applied distribution assumptions are shown in Table 5.

<table>
<thead>
<tr>
<th>Route</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mendocino Ave – north of the project site</td>
<td>46%</td>
</tr>
<tr>
<td>Mendocino Ave – south of the project site</td>
<td>46%</td>
</tr>
<tr>
<td>Pacific Ave – east of Mendocino Ave</td>
<td>8%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Intersection Operation**

**Existing plus Project Conditions**

Upon the addition of project-related traffic to the Existing volumes and assuming full access to the project driveway, the signalized study intersection is expected to continue to operate acceptably at LOS C overall during both peak periods evaluated. These results are summarized in Table 2.

Finding: The study intersection is expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic.

**Future plus Project Conditions**

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersection is expected to operate acceptably at LOS C overall during the a.m. and p.m. peak periods, assuming full access from Mendocino Avenue at the project driveway. With left-turn access restrictions due to added medians, the added U-turn movements at Pacific Avenue and associated elimination of the westbound right-turn overlap phasing will result in LOS D conditions during the a.m. peak hour and LOS C conditions during the p.m. peak. Both of these conditions are acceptable. The Future plus Project operating conditions are summarized in Table 3.

Finding: The study intersection will continue operating at acceptable Levels of Service with project traffic added to Future volumes.
Alternative Modes

Pedestrian Facilities

Given the proximity of other commercial uses as well as Santa Rosa High School (SRHS) and SRJC within the surrounding study area, it is reasonable to assume that some project patrons and employees will walk, bicycle, and/or utilize transit for trips to and from the project site. Sidewalks exist along the project frontage on Mendocino Avenue. Crosswalks are provided on all four approaches of the signalized intersection of Mendocino Avenue/Pacific Avenue-Bear Cub Way as well as on the south and east legs of the intersection of Mendocino Avenue/McConnell Avenue. The Mendocino Avenue crossing is enhanced with an overhead flashing beacon. The site plan shows a pedestrian pathway between the proposed restaurant entry point and Mendocino Avenue.

Finding: Since there are either protected or enhanced crosswalks on Mendocino Avenue within 200 feet in either direction of the project, these existing pedestrian facilities in the vicinity of the project are expected to adequately serve pedestrian travel to and from the project site.

Bicycle Facilities

Existing Class II bike lanes along both sides of Mendocino Avenue provide adequate access for bicyclists. Bicycle parking for 20 bikes is to be provided at the site by bike racks which are to be located near the restaurant’s entry point along Mendocino Avenue. It should be noted that the Zoning Code requires long term bicycle parking in addition to the short term bicycle parking.

Recommendation: A portion of the bicycle parking should be constructed for longer term use as suggested by the Zoning Code.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips. Existing transit stops are located within an acceptable walking distance of the site.

Finding: Existing transit services are expected to adequately serve the project site.
Access and Circulation

Site Access

Under short term conditions, vehicular access to the project site will be via a full access driveway located on the east side of Mendocino Avenue along the northern property line. Left-turn movements into and out of the project site will be served by an existing two-way left-turn lane on Mendocino Avenue. Ingress and egress to the proposed drive-through will connect internally within the project site. Under these conditions, the existing roadway geometrics on Mendocino Avenue will adequately serve the access into and out of the project site.

In the future with implementation of the medians as part of the Mendocino Avenue Corridor Plan, left-turn movements into and out of the site would need to be accommodated according to one of the following actions:

1. U-Turn movements should be allowed on Mendocino Avenue at Pacific Avenue (southbound U-turns) and at the intersection with the access immediately north of the SRJC parking garage (northbound U-turns). In order to facilitate these U-turn movements, the roadway geometrics may need to be shifted slightly and minor widening completed one side of the street. Due to existing buildings, the widening would most likely be required on the SRJC side of the street. At Pacific Avenue, the existing westbound right-turn overlap signal phasing would need to be eliminated if southbound U-turn movements are allowed. (These conditions were evaluated in the Level of Service analysis and were found to be acceptable with the overlap eliminated). These modifications should be determined and designed as part of the median project. Even with these modifications, it is likely that trucks and large vehicles may still not have enough room to complete U-turns at these locations, but most passenger cars will have that ability.

2. The median project should be designed to allow left-turn movements into and out of the project site.

Sight Distance

The applicable standard for sight distance at the site’s driveways was based on stopping sight distance criteria as published by Caltrans in the Highway Design Manual. For a 35-mph approach speed at least 250 feet of sight distance is needed. Sight distance along Mendocino Avenue is generally good due to the straight, flat alignment of the roadway. Care should be taken in planning signs and landscaping along the site’s frontage to ensure that adequate sight lines are maintained.

Finding: While acceptable sight lines currently exist, sight lines along Mendocino Avenue could be inhibited by signs and landscaping.

Recommendation: Signs and vegetation along the project frontages with Mendocino Avenue should be planned carefully and, with the exception of tree trunks, kept out of the area between two feet and seven feet above the sidewalk to provide clear sight lines.

Internal Circulation

On-site circulation was evaluated to determine if the facility would provide adequate circulation and room for turning movements. Based on a review of the site plan provided, the internal roadways, including the drive-through entry and exit points, are expected to provide an acceptable circulation system.
The proposed site plan shows two internal pedestrian walkways that cross the proposed drive-through lane. The plan includes low level pedestrian light bollards along the walkway to serve pedestrian travel between the parking lot and the store entrances. The light bollards would separate the parking from the walkway which would be at the same grade as the parking lot. The disabled parking spaces which would be located perpendicular to the walkway on the southern edge would include clear areas adjacent to the parking spaces. These clear disabled parking landings would also act as points of entry for pedestrians between the parking spaces and the walkway leading to the store entrances. To alert vehicle traffic of pedestrian activity, the site plan includes “Pedestrian Crossing” signs which would be strategically placed along the drive-through in advance of both walkways. Also, to clearly distinguish the internal pedestrian walkways from the on-site roadways, the internal pedestrian walkways would be stamped with a colored pattern.

Finding: The proposed on-site pedestrian walkways will be adequately marked with lighted bollards, pedestrian crossing signs and stamped colored paving in order to reduce conflict points between pedestrians entering or exiting the proposed restaurant building and vehicles in the drive through lane.

Drive-Through Operation

In order to assess the queuing dynamics and impacts of the drive-through at the proposed project, data from other fast-food restaurants was used. Based on this statistical data, approximately 80 percent of fast-food patrons use the drive-through with a service rate of approximately 60 vehicles per hour. It is important to note that due to the proximity of the SRHS and SRJC, the level of pedestrian patronage at the proposed Chick-fil-A project is expected to be higher than at a typical fast food restaurant. However, to provide a conservative analysis, the statistical data was used to determine the drive-through queue lengths. Based on this information it is anticipated that there will be an average of about three vehicles in the queue during peak conditions.

The drive-through has approximately 400 feet of stacking space for vehicles to queue beyond the pick-up window, not including any space on internal drive aisles. Assuming an average vehicle length of 25 feet, this would allow for 16 vehicles to be queued in the drive-through lane without overflowing to the site’s internal drive aisles. Based on a review of the site plan, it appears that the expected level of queuing could easily be accommodated in the drive-through.

Finding: The stacking space available for the proposed drive-through lane is expected to adequately accommodate the anticipated queue generated by peak hour project related trips.
Conclusions and Recommendations

Conclusions

• The proposed project is expected to generate an average of 2,158 daily vehicle trips, which includes 110 new primary a.m. peak hour trips and 73 new primary p.m. peak hour trips.

• The intersection of Mendocino Avenue/Pacific Avenue is expected to operate acceptably based on applicable standards under Existing and Future conditions without and with the project and also assuming additional U-turn movements bound for the site.

• The existing two-way left-turn lane on Mendocino Avenue will adequately serve the access into and out of the project site under short term conditions.

• With implementation of medians from the adopted Mendocino Avenue Corridor Plan, left-turn access to and from the site would be restricted and further impacted by the absence of locations to complete U-turn movements.

• The location of the proposed project access driveway provides adequate sight distance in both directions on Mendocino Avenue.

• Based on a review of the site plan it appears that the anticipated level of drive-through queuing could be accommodated within the available stacking space.

• With implementation of lighted bollards, colored stamped paving and appropriate signs, the internal pedestrian walkways will provide enhanced crossing points for pedestrians entering or exiting the Chick-fil-A building.

• Pedestrians, bicyclists and transit ridership are all expected to increase slightly due to the proposed project.

• Existing pedestrian facilities including signalized pedestrian crossings to the south and an enhanced overhead flashing crosswalk to the north will serve pedestrian trips to the restaurant from the SRHS and SRJC sites.

Recommendations

• In the future with implementation of the medians as part of the Mendocino Avenue Corridor Plan, left-turn movements into and out of the site would need to be accommodated either by allowing U-turns at Pacific Avenue and just north of the SRJC parking garage by completing roadway restriping and widening. Alternatively, the median project could be designed to allow left-turn movements into and out of the project site.

• Signs and landscaping along the project frontage with Mendocino Avenue should be well-planned to ensure that sight lines are not obstructed.

• Short and long term bicycle parking should be provided.
Study Participants and References

Study Participants

Principal in Charge: Steve Weinberger, PE, PTOE
Transportation Planner: Chris Helmer
Technician/Graphics: Deborah J. Mizell
Editing/Formatting: Angela McCoy
Report Review: Dalene J. Whitlock, PE, PTOE

References

Highway Capacity Manual, Transportation Research Board, 2000
Santa Rosa General Plan 2035 Final Environmental Impact Report, ESA Associates, 2009
Santa Rosa General Plan 2035, City of Santa Rosa, 2009
Santa Rosa CityBus, http://ci.santa-rosa.ca.us/departments/transit/CityBus/maps_schedules/

SRO312
Intersection Level of Service Calculations
## Chick-fil-A Restaurant Project
### City of Santa Rosa

#### Level of Service Computation Report

**Intersection #1 Mendocino Ave/Pacific Ave**

| Cycle (sec): | 100 |
| Critical Vol./Cap. (X): | 0.44 |
| Loss Time (sec): | 8 |
| Average Delay (sec/veh): | 29 |
| Optimal Cycle: | 29 |
| Level Of Service: | C |

| Street Name: | Mendocino Ave                      |
| Movement: | North Bound      South Bound       East Bound       West Bound |
| Rights: | Protected         Permitted        Permitted |
| Min. Green: | 0 0 0 0 |
| Growth Adj: | 1.00 1.00 1.00 1.00 |
| Initial Bse: | 109 567 104 68 |
| User Adj: | 0.00 0.00 0.00 0.00 |
| PHEF Adj: | 0.99 0.99 0.99 0.99 |
| PHF Vol: | 182 603 111 72 435 28 22 15 50 151 96 154 |
| Reduced Vol: | 182 603 111 72 435 28 22 15 50 151 96 154 |
| PCE Adj: | 0.99 0.99 0.99 0.99 |
| MF Adj: | 0.00 0.00 0.00 0.00 |
| Final Volume: | 182 603 111 72 435 28 22 15 50 151 96 154 |

| Volume Module: | >> Count Date: 30 Nov 2011 |
| Base Vol: | 171 567 104 68 409 26 |
| Growth Adj: | 1.00 1.00 1.00 1.00 |
| Initial Bse: | 109 730 116 175 |
| User Adj: | 0.00 0.00 0.00 0.00 |
| PHEF Adj: | 0.99 0.99 0.99 0.99 |
| PHF Vol: | 116 777 123 186 759 18 51 33 112 104 62 179 |
| Reduced Vol: | 116 777 123 186 759 18 51 33 112 104 62 179 |
| PCE Adj: | 0.99 0.99 0.99 0.99 |
| MF Adj: | 0.00 0.00 0.00 0.00 |
| Final Volume: | 116 777 123 186 759 18 51 33 112 104 62 179 |

| Volume Module: | >> Count Date: 30 Nov 2011 |
| Base Vol: | 171 567 104 68 409 26 |
| Growth Adj: | 1.00 1.00 1.00 1.00 |
| Initial Bse: | 109 730 116 175 |
| User Adj: | 0.00 0.00 0.00 0.00 |
| PHEF Adj: | 0.99 0.99 0.99 0.99 |
| PHF Vol: | 116 777 123 186 759 18 51 33 112 104 62 179 |
| Reduced Vol: | 116 777 123 186 759 18 51 33 112 104 62 179 |
| PCE Adj: | 0.99 0.99 0.99 0.99 |
| MF Adj: | 0.00 0.00 0.00 0.00 |
| Final Volume: | 116 777 123 186 759 18 51 33 112 104 62 179 |

**Capacity Analysis Module**

| Vol/Sat: | 0.06 0.25 0.25 0.10 0.22 0.22 0.05 0.02 0.02 0.07 0.11 0.11 |
| Crit Moves: | **** |
| Green/Cycle: | 0.16 0.50 0.50 0.20 0.54 0.54 0.22 0.22 0.38 0.22 0.22 0.42 |
| Volume/Cap: | 0.48 0.48 0.48 0.48 0.48 0.48 0.48 0.48 0.48 |
| Delay/Veh: | 32.7 18.5 18.5 44.9 27.7 27.7 20.4 20.0 7.8 24.3 24.3 16.2 |
| User Del/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 |
| LOS by Move: | B D C A C C C C B |
| HCM95thQu: | 10 15 15 5 12 12 1 1 1 11 11 |

**Note:** The number of lanes is reported in the number of cars per lane.

---

Traffic 8.0.0715 (c) 2008 Dowling Assoc. Licensed to W-TRANS, Santa Rosa, CA
### AM Peak Hour - Existing plus Project Conditions

**Chick-fil-A Restaurant Project**

**City of Santa Rosa**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Subzone</th>
<th>Amount</th>
<th>Units</th>
<th>Rate</th>
<th>Rate</th>
<th>Rate</th>
<th>Rate</th>
<th>Trips</th>
<th>Trips</th>
<th>Total % Of</th>
<th>#</th>
<th>Subzone</th>
<th>Amount</th>
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<th>Rate</th>
<th>Rate</th>
<th>Trips</th>
<th>Trips</th>
<th>Total % Of</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>1.00</td>
<td>Fast Food w/ D</td>
<td>57.00</td>
<td>54.00</td>
<td>57</td>
<td>54</td>
<td>111</td>
<td>100.0</td>
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</table>

**Zone 1 Subtotal** ..............................................

|        | 57   | 54   | 111   | 100.0 |

**TOTAL** ..................................................

|        | 57   | 54   | 111   | 100.0 |

---

### PM Peak Hour - Existing plus Project Conditions

**Chick-fil-A Restaurant Project**

**City of Santa Rosa**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Subzone</th>
<th>Amount</th>
<th>Units</th>
<th>Rate</th>
<th>Rate</th>
<th>Rate</th>
<th>Rate</th>
<th>Trips</th>
<th>Trips</th>
<th>Total % Of</th>
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<td>1</td>
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<td>1.00</td>
<td>Fast Food w/ D</td>
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<td>39</td>
<td>35</td>
<td>74</td>
<td>100.0</td>
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</table>

**Zone 1 Subtotal** ..............................................

|        | 39   | 35   | 74    | 100.0 |

**TOTAL** ..................................................

|        | 39   | 35   | 74    | 100.0 |

---

Traffix 8.0.0715 (c) 2008 Dowling Assoc. Licensed to W-TRANS, Santa Rosa, CA
### AM Existing plus Project

**Street Name:** Mendocino Ave, Pacific Ave  
**Approach:** North Bound, South Bound  
**Phase:** All, permissive  
**Control:** Protected, protected, permitted, permitted  
**Min. Green:** 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 4.0, 4.0, 4.0, 4.0, 4.0  
**Y+R:** 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0  
**User 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  
**PHF Adj:** 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94  
**PHF Volume:** 116, 796, 123, 189, 776, 18, 51, 33, 112, 104, 62, 182  
**Reduct Vol:** 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0  
**MLF 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  
**Final Volume:** 116, 796, 123, 189, 776, 18, 51, 33, 112, 104, 62, 182  

**Saturation Flow Module:**  
- Sat/Lane: 0.94, 0.47, 1.00, 0.85, 0.80, 0.80, 0.85  
- Lanes: 1.00, 1.70, 0.30, 1.00, 1.89, 0.11, 1.00, 1.00  
- Final Sat.: 1805, 3004, 527, 1805, 3375, 202, 901, 1900, 1615, 927, 587, 1615

**Capacity Analysis Module:**  
- Vol/Sat: 0.40, 0.52, 0.52, 0.52, 0.40, 0.40, 0.26, 0.08, 0.18, 0.52, 0.52, 0.27  
- Green/Cycle: 0.16, 0.50, 0.50, 0.20, 0.55, 0.55, 0.22, 0.22, 0.37, 0.22, 0.22, 0.42  
- Volume/Cap: 0.40, 0.52, 0.52, 0.52, 0.40, 0.40, 0.26, 0.08, 0.18, 0.52, 0.52, 0.27  
- User Del 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  
- B, C, C, C, D, D, B, HCM 2K95thQ: 7, 19, 19, 11, 14, 11, 4, 2, 5, 10, 11, 6  

### PM Existing plus Project

**Street Name:** Mendocino Ave, Pacific Ave  
**Approach:** North Bound, South Bound  
**Phase:** All, permissive  
**Control:** Protected, protected, permitted, permitted  
**Min. Green:** 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 4.0, 4.0, 4.0, 4.0, 4.0  
**Y+R:** 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0  
**User 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  
**PHF Adj:** 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94, 0.94  
**PHF Volume:** 182, 631, 111, 77, 462, 28, 22, 15, 50, 151, 96, 160  
**Reduct Vol:** 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0  
**MLF 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  
**Final Volume:** 182, 631, 111, 77, 462, 28, 22, 15, 50, 151, 96, 160  

**Saturation Flow Module:**  
- Sat/Lane: 0.94, 0.47, 1.00, 0.85, 0.80, 0.80, 0.85  
- Lanes: 1.00, 1.70, 0.30, 1.00, 1.89, 0.11, 1.00, 1.00  
- Final Sat.: 1805, 3004, 527, 1805, 3375, 202, 901, 1900, 1615, 927, 587, 1615

**Capacity Analysis Module:**  
- Vol/Sat: 0.40, 0.52, 0.52, 0.52, 0.40, 0.40, 0.26, 0.08, 0.18, 0.52, 0.52, 0.27  
- Green/Cycle: 0.16, 0.50, 0.50, 0.20, 0.55, 0.55, 0.22, 0.22, 0.37, 0.22, 0.22, 0.42  
- Volume/Cap: 0.40, 0.52, 0.52, 0.52, 0.40, 0.40, 0.26, 0.08, 0.18, 0.52, 0.52, 0.27  
- Delay/Veh: 33.0, 18.3, 18.3, 44.8, 26.9, 26.9, 21.0, 20.6, 8.4, 25.0, 25.0, 16.6  
- User Del 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  
- B, C, C, A, C, C, B, HCM 2K95thQ: 10, 15, 15, 6, 12, 12, 1, 1, 1, 12, 12, 6
### Intersection #1: Mendocino Ave/Pacific Ave

**Street Name:** Mendocino Ave / Pacific Ave  
**Approach:** North Bound / South Bound  
**Volume Module:** Base Vol: 171 1180 153 68 501 26 21 14 47 439 90 336

#### Critical Flow/Cap (K): 31.4

- **Optimal Cycle:** 32.5 sec
- **Average Delay (sec/veh):** 21.4 sec
- **Optimal Cycle:** 37 sec
- **Level of Service:** C

#### Rights

<table>
<thead>
<tr>
<th>Include</th>
<th>Ovl</th>
<th>Ovl</th>
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<tbody>
<tr>
<td>Min. Green</td>
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#### Volume Module

<table>
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<th>Growth Adj</th>
<th>Initial Base</th>
<th>Reduct Vol</th>
<th>PCE Adj</th>
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<tr>
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<td>1180</td>
<td>153</td>
<td>68</td>
<td>501</td>
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<td>1.00</td>
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#### Saturation Flow Module

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#### Capacity Analysis Module

<table>
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<tr>
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<th>Crit Moves</th>
<th>Green/Cycle</th>
<th>User DelAdj</th>
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<tbody>
<tr>
<td>0.09</td>
<td>****</td>
<td>0.19</td>
<td>1.00</td>
</tr>
<tr>
<td>0.38</td>
<td>****</td>
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#### LOS by Move

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<td>****</td>
</tr>
<tr>
<td>C</td>
<td>0.38</td>
<td>****</td>
</tr>
<tr>
<td>C</td>
<td>0.38</td>
<td>****</td>
</tr>
<tr>
<td>F</td>
<td>0.09</td>
<td>****</td>
</tr>
<tr>
<td>C</td>
<td>0.38</td>
<td>****</td>
</tr>
<tr>
<td>C</td>
<td>0.38</td>
<td>****</td>
</tr>
</tbody>
</table>

**HCM 2000: 95th Percentile**

- Reported is the number of cars per lane.

**Note:** Value reported is the number of cars per lane.
### PM Peak Hour - Future plus Project Conditions

**Intersection #1 Mendocino Ave/Pacific Ave**

- **Average Delay (sec/veh):** 21.5
- **Optimal Cycle:** 38
- **Level Of Service:** C

#### Street Name:
- Mendocino Ave
- Pacific Ave

#### Approach:
- North Bound
- South Bound

#### Control:
- Protected
- Protected
- Permitted
- Permitted

#### Rights:
- Include
- Include

#### Min. Green:
- North: 0
- South: 0

#### Y+R:
- North: 4.0
- South: 4.0

#### Volume Module:
- Base Vol: 109
- Growth Adj: 1.00
- PHF Adj: 1.00
- Initial Bse: 109
- User Adj: 1.00
- PHF Volume: 109

#### Saturation Flow Module:
- Sat/Lane: 0.95
- Lanes: 1.00

#### Capacity Analysis Module:
- Vol/Sat: 0.41
- Volume/Cap: 0.41
- Delay/Veh: 39.9

#### User DelAdj:
- North: 1.00
- South: 1.00
- West: 1.00

#### HCM2k95thQ:
- North: 7
- South: 21
- West: 21

---

### AM Peak Hour - Future plus Project Conditions

**Intersection #1 Mendocino Ave/Pacific Ave**

- **Average Delay (sec/veh):** 32.0
- **Optimal Cycle:** 85
- **Level Of Service:** C

#### Street Name:
- Mendocino Ave
- Pacific Ave

#### Approach:
- North Bound
- South Bound

#### Control:
- Protected
- Protected
- Permitted
- Permitted

#### Rights:
- Include
- Include

#### Min. Green:
- North: 0
- South: 0

#### Y+R:
- North: 4.0
- South: 4.0

#### Volume Module:
- Base Vol: 171
- Growth Adj: 1.00
- PHF Adj: 1.00
- Initial Bse: 171
- User Adj: 1.00
- PHF Volume: 171

#### Saturation Flow Module:
- Sat/Lane: 0.94
- Lanes: 1.00

#### Capacity Analysis Module:
- Vol/Sat: 0.51
- Volume/Cap: 0.51
- Delay/Veh: 38.0

#### User DelAdj:
- North: 1.00
- South: 1.00
- West: 1.00

#### HCM2k95thQ:
- North: 10
- South: 38
- West: 38

---

Traffic 8.0.0715 (c) 2008 Dowling Assoc. Licensed to W-TRANS, Santa Rosa, CA
# AM Peak Hour - Future plus Project Conditions (with SB U-Turns)

**Chik-fil-a Restaurant Project**

**City of Santa Rosa**

---

**Level Of Service Computation Report**

**2000 HCM Operations Method (Future Volume Alternative)**

### Intersection #1 Mendocino Ave/Pacific Ave

<table>
<thead>
<tr>
<th>Cycle (sec):</th>
<th>100</th>
<th>Loss Time (sec):</th>
<th>8</th>
<th>Optimal Cycle:</th>
<th>99</th>
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<tr>
<td>Critical Vol./Cap. (X):</td>
<td>0.898</td>
<td>Average Delay (sec/veh):</td>
<td>35.4</td>
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<tr>
<td>Level Of Service:</td>
<td>D</td>
<td></td>
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### Street Name: Mendocino Ave/Pacific Ave

<table>
<thead>
<tr>
<th>Approach:</th>
<th>North Bound</th>
<th>South Bound</th>
<th>East Bound</th>
<th>West Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement:</td>
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<td>L - T - R</td>
<td>L - T - R</td>
<td>L - T - R</td>
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<td>Control:</td>
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<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Rights:</td>
<td>Include</td>
<td>Include</td>
<td>Ovl</td>
<td>Include</td>
</tr>
<tr>
<td>Min. Green:</td>
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<tr>
<td>Y+R:</td>
<td>4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0</td>
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<tr>
<td>Lanes:</td>
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<td></td>
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</tr>
</tbody>
</table>

### Volume Module:

| Base Vol: | 171 1180 153 68 501 26 21 14 47 439 90 336 |
| Growth 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 |
| Initial Bse: | 171 1180 153 68 501 26 21 14 47 439 90 336 |
| Added Vol: | 0 26 0 4 25 0 0 0 0 0 0 5 |
| U-Turns: | 0 0 0 50 0 0 0 0 0 0 0 0 |
| Initial Fut: | 171 1206 153 122 526 26 21 14 47 439 90 341 |
| User 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 |
| PHF 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 |
| PHF Volume: | 171 1206 153 122 526 26 21 14 47 439 90 341 |
| Reduct Vol: | 0 0 0 0 0 0 0 0 0 0 0 0 |
| Reduced Vol: | 171 1206 153 122 526 26 21 14 47 439 90 341 |
| PCE 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 |
| MLF 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 |
| Final Volume: | 171 1206 153 122 526 26 21 14 47 439 90 341 |

### Saturation Flow Module:

| Sat/Lane: | 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 |
| Adjustment: | 0.95 0.93 0.94 0.94 0.94 0.94 0.94 0.94 0.94 0.94 0.94 0.94 |
| Lanes: | 1.00 1.77 0.23 1.00 1.91 0.09 1.00 1.00 1.00 0.83 0.17 1.00 |
| Final Sat.: | 1805 3149 400 1805 3416 169 428 1900 1615 1168 240 1615 |

### Capacity Analysis Module:

| Vol/Sat: | 0.09 0.38 0.38 0.07 0.15 0.15 0.05 0.01 0.03 0.38 0.38 0.21 |
| Crit Moves: | ****  ****  ****  ****  ****  ****  ****  ****  ****  ****  ****  **** |
| Green/Cycle: | 0.19 0.43 0.43 0.08 0.31 0.31 0.42 0.42 0.61 0.42 0.42 0.42 |
| Volume/Cap: | 0.50 0.90 0.90 0.90 0.50 0.50 0.12 0.02 0.05 0.90 0.90 0.50 |
| Delay/Veh: | 37.3 34.2 34.2 93.7 28.4 28.4 18.1 17.1 7.9 43.7 43.7 22.1 |
| User Del 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 Del/Veh: | 37.3 34.2 34.2 93.7 28.4 28.4 18.1 17.1 7.9 43.7 43.7 22.1 |
| LOS by Move: | D C C C B B A D D C |
| HCM2k95thQ: | 10 40 40 12 14 14 1 1 1 32 32 15 |
PM Peak Hour - Future plus Project Conditions (with SB U-Turns)
Chik-fil-a Restaurant Project
City of Santa Rosa

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #1 Mendocino Ave/Pacific Ave

<table>
<thead>
<tr>
<th>Cycle (sec):</th>
<th>100</th>
<th>Critical Vol./Cap.(X):</th>
<th>0.649</th>
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<tbody>
<tr>
<td>Loss Time (sec):</td>
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<td>Average Delay (sec/veh):</td>
<td>24.7</td>
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</table>

Optimal Cycle: 43
Level Of Service: C

Street Name: Mendocino Ave Pacific Ave
Approach: North Bound South Bound East Bound West Bound
Movement: L - T - R L - T - R L - T - R L - T - R
Control: Protected Include Protected Include
Rights: Include Ovl Include Include
Min. Green: 0 0 0 0 0 0 0 0 0 0 0 0
Y+R: 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0
Lanes: 1 0 1 1 0 1 0 1 1 0 1 0 1 0 1

Volume Module:
Base Vol: 109 778 116 325 855 20 52 31 105 98 58 220
Growth 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
Initial Bse: 109 778 116 325 855 20 52 31 105 98 58 220
Added Vol: 0 18 0 3 16 0 0 0 0 0 0 3
U-Turns: 0 0 0 35 0 0 0 0 0 0 0 0
Initial Fut: 109 796 116 363 871 20 52 31 105 98 58 223
User 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
PHF 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
PHF Volume: 109 796 116 363 871 20 52 31 105 98 58 223
Reduced Vol: 0 0 0 0 0 0 0 0 0 0 0 0
Reduced Vol: 109 796 116 363 871 20 52 31 105 98 58 223
PCF 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
MLF 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
Final Volume: 109 796 116 363 871 20 52 31 105 98 58 223

Saturation Flow Module:
Sat/Lane: 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900
Adjustment: 0.95 0.93 0.93 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95
Lanes: 1.00 1.75 0.25 1.00 1.96 0.04 1.00 1.00 1.00 0.63 0.37 1.00
Final Sat: 1805 3091 450 1805 3518 81 960 1900 1615 939 556 1615

Capacity Analysis Module:
Vol/Sat: 0.06 0.26 0.26 0.20 0.25 0.25 0.05 0.02 0.07 0.10 0.10 0.14
Crit Moves: **** **** ****
Green/Cycle: 0.14 0.40 0.40 0.31 0.57 0.57 0.21 0.21 0.35 0.21 0.21 0.21
Volume/Cap: 0.44 0.65 0.65 0.65 0.44 0.44 0.25 0.08 0.18 0.49 0.49 0.65
Delay/Veh: 40.7 25.6 25.6 32.5 12.5 12.5 33.4 31.6 22.6 35.8 35.8 40.2
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
AdjDel/Veh: 40.7 25.6 25.6 32.5 12.5 12.5 33.4 31.6 22.6 35.8 35.8 40.2
LOS by Move: D C C C B B C C C D D D
HCM2k95thQ: 7 23 23 19 15 15 3 2 5 9 9 14

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