# Appendix A

Transportation Impact Study

# Transportation Impact Study for the Los Amigos Cottages




Prepared for the Town of Windsor

Submitted by
**W-Trans**

July 10, 2025

**TRAFFIC ENGINEERING**
**TRANSPORTATION PLANNING**
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# Executive Summary

The proposed residential development would be located on the northwest corner of the eastern Arata Lane/ Los Amigos Road intersection in the Town of Windsor. The project would include 32 single-family homes consisting of 26 detached and six attached units. A new segment of Los Amigos Road would be constructed along the project's eastern frontage. It would include one travel lane in each direction, on-street parking, and a buffered bike lane on the west side of the street; the roadway would be further widened and extended in the future by other developments as part of the planned Los Amigos Road extension project. Onsite roadways would be private, with connections to both Los Amigos Road and Arata Lane.

Pedestrian, bicycle, and transit facilities along existing and future project frontages and near the project vicinity were reviewed. These facilities providing access to the project site are or will be adequate upon completion of the project. Project improvements include new sidewalks on project frontages and bicycle lanes on the new segment of Los Amigos Road. While the intersection at Arata Lane/Los Amigos Road is expected to be signalized in the near-term, the proposed project should be responsible for installing or funding the installation of a crosswalk with high-visibility signage and markings, as well as street lighting on the west leg of the intersection if signalization has not occurred prior to project occupancy in order to establish effective pedestrian connectivity to the south.

Based on standard trip generation rates, the project is anticipated to generate an average of 288 trips per day, including 21 trips during the a.m. peak hour and 27 during the p.m. peak hour. A review of the collision history indicates that all three study intersections had calculated collision rates below statewide averages, with no reported pedestrian or bicycle collisions occurring during the study period. The proposed plans for the onsite private roadway have been deemed consistent with the Town's *Complete Street Design Guidelines* criteria for a Narrow Residential Street, meeting CSDG parameters for roadway and sidewalk widths as well as daily traffic volumes. Upon completion of the proposed frontage improvements to be constructed by the project, as well as the proposed right-of-way dedication allowing the segment of Arata Lane along the project frontage to be widened to a Five-Lane Boulevard in the future, the project would be consistent with the *Complete Street Design Guidelines* and General Plan Policy M-3.25.

The project does not qualify for VMT screening so a full VMT assessment was performed. Unadjusted project VMT is higher than the threshold allowed by the Town with a VMT of 14.30 miles per capita. The Sonoma County Transportation and Climate Authorities (SCTCA) VMT Reduction Tool was used to adjust the VMT in consideration of the project's density and inclusion of affordable housing. The adjusted project VMT of 12.66 miles per capita is below the threshold and the project impact on VMT is therefore less than significant.

The project's accommodation of a potential future roundabout at the Arata Lane/Los Amigos Road intersection in was assessed. While the Los Amigos Cottages project has provided sufficient right-of-way dedication to accommodate a future roundabout, it was determined that an approximately 30-square foot triangular area on the southeastern corner of the site would need to remain free of fences or tall obstructions to meet upstream sight distance parameters. This condition should be reflected on the project's landscaping plans, and/or an easement to the Town of Windsor established if deemed necessary by the Public Works Department.

Sight distances at the proposed private street connections to Arata Lane and the Los Amigos Road extension would meet or exceed recommended minimums. The need for left-turn lanes was analyzed using project volumes at both private streets. A left-turn lane is not warranted at either street under Existing plus Project or Baseline plus Project Conditions. Restriping of the existing painted median centerline striping on Arata Lane is recommended to allow for legal left turns in and out of the driveway. Town policy requires projects not to cause queues to exceed available stacking lengths. Based on project volumes and calculated 95$^{th}$ percentile queues, the project would not individually cause any queues to exceed storage lengths at study intersections. Without planned improvements at the Arata Lane/Los Amigos Road intersection to be constructed by the proposed Quail Acres project, 95$^{th}$ percentile queues during the baseline a.m. peak hour are projected to exceed storage in the northbound left-turn pocket; the Los Amigos Cottages project would cause these queues to extend three feet, which is not considered to be a significant project-related impact per the Town's guidelines.

The project includes interconnected internal roadways with two access points. The design offers adequate emergency circulation and access from a transportation perspective, but final approval rests with the Town's Fire Marshal.

An analysis of Levels of Service (LOS) at the study intersections indicates that Arata Lane/Los Amigos Road currently has unacceptable LOS F operation on the northbound approach during the a.m. peak hour. Under Existing plus Project Conditions, the proposed Los Amigos Cottages project is expected to increase overall delay at the intersection by 0.2 seconds, which is not considered to be an adverse project effect on traffic operation per the Town's guidelines. Under Baseline Conditions, including traffic and improvements associated with pending developments in the vicinity, the intersection would be signalized, improving operation to an acceptable service level. If planned improvements to be constructed by the proposed Quail Acres development are not made at the intersection, LOS F operation on the northbound approach would continue to further deteriorate; under this condition the Los Amigos Cottages project would increase average delays by 0.6-seconds, which is not considered to be an adverse project effect. LOS at the remaining study intersections is anticipated to remain acceptable under all scenarios both without and with the project.

# Introduction

This report presents an analysis of the potential traffic impacts that would be associated with the development of 32 single-family homes at the northwest corner of the eastern Arata Lane/Los Amigos Road intersection in the Town of Windsor. The traffic study was completed in accordance with direction provided by the Town of Windsor and is consistent with standard traffic engineering techniques.

## Prelude

The purpose of a traffic impact study is to provide Town staff and policy makers with data that they can use to make an informed decision regarding the potential transportation impacts of a proposed project, and any associated improvements that would be required in order to mitigate these impacts to an acceptable level under CEQA, the *Town of Windsor 2040 General Plan*, or other policies. Impacts relative to access for pedestrians, bicyclists, and to transit are addressed in the context of the CEQA criteria. Consistent with SB 743, the project's transportation impacts were analyzed using VMT. While no longer a part of the CEQA review process, vehicular traffic service levels at key intersections were evaluated for consistency with General Plan policies by determining the number of new trips that the proposed project would be expected to generate, distributing these trips to the surrounding street system based on anticipated travel patterns specific to the proposed project, then analyzing the effect the new traffic would be expected to have on the study intersections.

## Applied Standards and Criteria

The report is organized to provide background data that supports the various aspects of the analysis, followed by the assessment of CEQA issues and then evaluation of policy-related issues. The CEQA criteria evaluated are as follows.

Would the project:

a. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?
b. Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
d. Result in inadequate emergency access?

The project was also evaluated against the Town of Windsor's policies, which provide guidance relative to traffic impacts for CEQA issues as well as the effects caused by traffic associated with new development.

## Project Profile

The proposed Los Amigos Cottages project would include 32 single-family homes comprised of 26 detached and six attached units, and is located at the northwest corner of the eastern Arata Lane/Los Amigos Road intersection. The project site plan and tentative map dated June 2025 include the following circulation improvements.

- Construction of a new segment of Los Amigos Road along the project's eastern frontage including two 11-foot vehicle travel lanes and a two-foot northbound shoulder, as well as an eight-foot wide on-street parking zone, a six-foot bike lane with three-foot buffer, and an 11-foot sidewalk along the project frontage.
- Improvements on Arata Lane that will result in a cross-section maintaining the current 10-foot wide eastbound through lane, 6-foot wide bike lane, and 10-foot wide center turn lane, as well as widening on

the project frontage to accommodate an 11-foot westbound through lane, six-foot bike lane with three-foot buffer, and 11-foot sidewalk with 4-foot tree wells.

- An onsite private street consisting of two 12-foot wide vehicle travel lanes with a six-foot sidewalk on one side, as well as provision of 16 clustered perpendicular parking spaces on the onsite street near the center of the development.

The Los Amigos Cottages development would not fully widen Los Amigos Road and Arata Lane, nor would it complete the full Los Amigos Road extension. These future improvements are anticipated to be constructed by other developments and the Town as follows.

- The east side of the Los Amigos Road extension near Los Amigos Cottages would be widened by another development project (Quail Acres) in the future to include a buffered bike lane and sidewalks.
- The Quail Acres project would also be responsible for constructing the full Los Amigos Road extension to the northern Town limits.
- The south side of Arata Lane near Los Amigos Cottages, as well as the segment of Arata Lane to the east toward US 101, would be widened in the future to accommodate a five-lane boulevard cross-section. This widening is consistent with that identified in the Town's General Plan and is anticipated to be constructed in tandem with future development activity on fronting parcels.

The location of the Los Amigos Cottages site is shown in Plate 1.

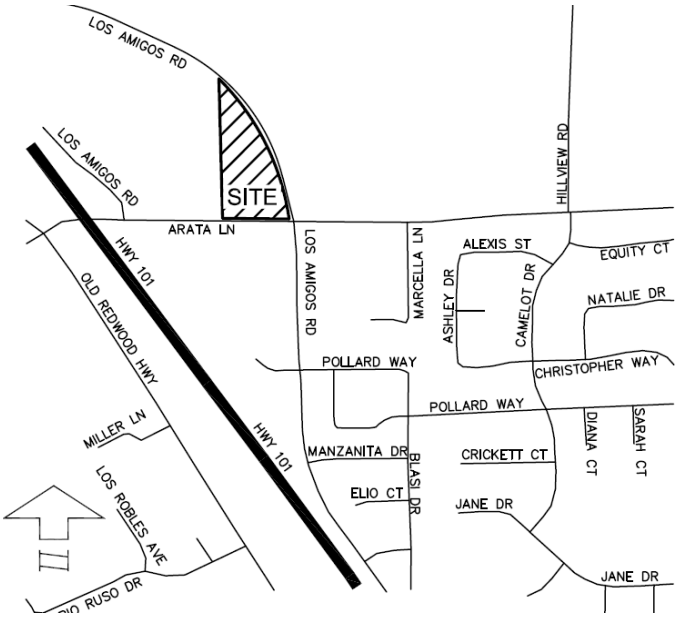



**Plate 1** Project Site Context
*(source: Civil Design Consultants, 2024)*

# Transportation Setting

## Study Area and Periods

The study area varies depending on the topic. For pedestrian trips it generally consists of all streets within a half mile of the project site that would lie along primary routes of pedestrian travel, or those leading to nearby generators or attractors. For bicycle trips it generally consists of all streets within one mile of the project site that would lie along primary routes of bicycle travel. For the safety and operational analyses, it consists of the project frontage and the following intersections:

1. Old Redwood Highway/Arata Lane
2. Arata Lane/Los Amigos Road-US 101 North Off-Ramp
3. Arata Lane/Los Amigos Road

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. Counts were obtained for the study intersections in October 2023 while area schools were in session.

### Study Intersections

**Old Redwood Highway/Arata Lane** is a signalized four-legged intersection with protected left-turn phasing on the northbound and southbound approaches of Old Redwood Highway. The eastbound and westbound approaches operate with split phasing, with the western leg being a private street to the Evergreen Mobile Home Park. A right-turn overlap phase exists on the westbound approach. Sidewalks are present on the northeast and southeast intersection corners, and crosswalks are marked on the north and east legs. Bicycle lanes are present on all approaches.

**Arata Lane/Los Amigos Road-US 101 North Off-Ramps** is a signalized four-legged intersection with split phasing on the US 101 North Off-Ramp and the southbound approach of Los Amigos Road. Sidewalks are present on the west leg of the intersection, and bicycle lanes are present on the east and west approaches. The intersection includes no marked crosswalks.

**Arata Lane/Los Amigos Road** is an unsignalized tee intersection that is stop-controlled on the northbound approach. Left-turn lanes are provided on the westbound and northbound approaches. There is a two-way left-turn lane on the west leg. Bicycle lanes are present on all approaches. Sidewalks are present only on the south leg and a segment on the east leg of the intersection. The intersection includes a crosswalk on the south leg.

The study intersections and existing lane configurations are shown in Figure 1.

## Existing Transportation Facilities

### Existing and Planned Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. Existing pedestrian facilities along the proposed project site frontages as well as within a quarter-mile distance of the project site were reviewed.




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Transportation Impact Study for Los Amigos Cottages

**Figure 1 – Study Area, Existing Lane Configurations, and Existing Traffic Volumes**

There are no existing pedestrian facilities along the project frontage on Arata Lane. Sidewalks are present on both the north and south sides of Arata Lane between the intersections of Old Redwood Highway/Arata Lane and Los Amigos Road-US 101 North Off-Ramp/Arata Lane, and on the north side along the frontage of Newsong Church. Continuous sidewalks exist on the south side of Arata Lane to the east of Los Amigos Road to Hembree Lane, except for an approximately 90-foot gap in front of 300 Arata Lane.

Sidewalks are present on the east and west sides of Los Amigos Road from its intersection with Arata Lane southward to Manzanita Drive, after which sidewalks are present only along the eastern side of the street. There are marked crosswalks on the north and east legs of Old Redwood Highway/Arata Lane and on the south leg of Los Amigos Road/Arata Lane.

As identified in the *Windsor Bicycle and Pedestrian Master Plan*, SCTCA, 2014, additional pedestrian crossings are planned in the future at the intersections of US 101 North Off-Ramp-Los Amigos Rd/Arata Lane. The Town of Windsor is also in the process of updating the 2014 Bicycle and Pedestrian Master Plan, with the new plan referred to the Windsor Active Transportation Plan (ATP). The ATP identifies filling sidewalk gaps in the project area on both the north and south sides of Arata Lane.

It is noted that another development project, Quail Acres, has been conditioned to construct a temporary pedestrian pathway along Los Amigos Cottage's frontage of Arata Lane. If the Quail Acres project completes this temporary path prior to construction of Los Amigos Cottages, the Los Amigos Cottages development would replace it with permanent sidewalks.

## Existing and Planned Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2020, classifies bikeways into four 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.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area Class II bike lanes exist on Old Redwood Highway between the north Town limit and Conde Lane, on Arata Lane between Old Redwood Highway and Foothill Drive, and on Los Amigos Road between Arata Lane and Lakewood Drive. According to the 2014 *Windsor Bicycle and Pedestrian Master Plan*, a bicycle route is planned along Camelot Drive between Arata Lane and Jane Drive. Bicyclists ride in the roadway and/or on sidewalks along all other streets within the project study area.

The Town of Windsor is in the process of updating the 2014 Bicycle and Pedestrian Master Plan, with the new plan referred to the Windsor Active Transportation Plan (ATP). The draft ATP identifies several additional improvements in the vicinity of the project site, including upgrading the current bike lanes on Arata Lane and Los Amigos Road to protected bikeways, as well as providing protected bikeways on the Los Amigos Road extension.

Table 1 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *Windsor Bicycle and Pedestrian Master Plan* and Draft Active Transportation Plan.

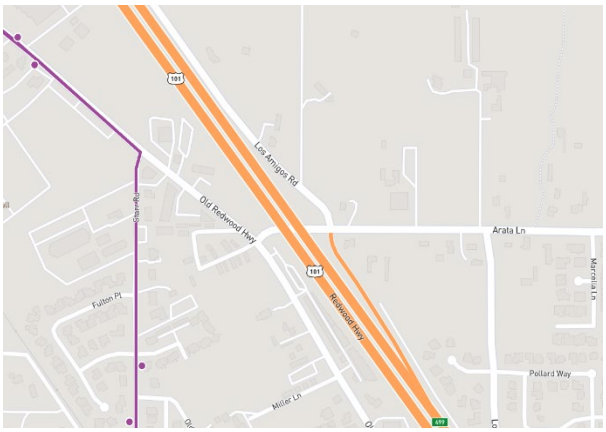
| Table 1 – Bicycle Facilities Summary | | | | |
|---|---|---|---|---|
| **Status**<br>**Location** | **Class** | **Length (miles)** | **Begin Point** | **End Point** |
| **Existing** | | | | |
| Arata Ln | II | 1.57 | Old Redwood Hwy | Foothill Dr |
| Los Amigos Rd | II | 1.30 | Arata Ln | Brooks Dr |
| Old Redwood Hwy | II | 1.95 | North Town Limit | Conde Ln |
| **Planned** | | | | |
| Camelot Dr | III | 0.33 | Arata Ln | Jane Dr |
| **Planned (2025 Draft ATP)** | | | | |
| Los Amigos Rd | IV | 0.50 | Town Limits | Arata Ln |
| Los Amigos Rd | IV | 1.21 | Arata Ln | Brooks Rd S |
| Arata Ln | IV | 0.89 | Old Redwood Hwy | Brooks Rd |

Source: *Windsor Bicycle and Pedestrian Master Plan*, Sonoma County Transportation Authority, 2014; *Draft Windsor Active Transportation Plan*, March 2025

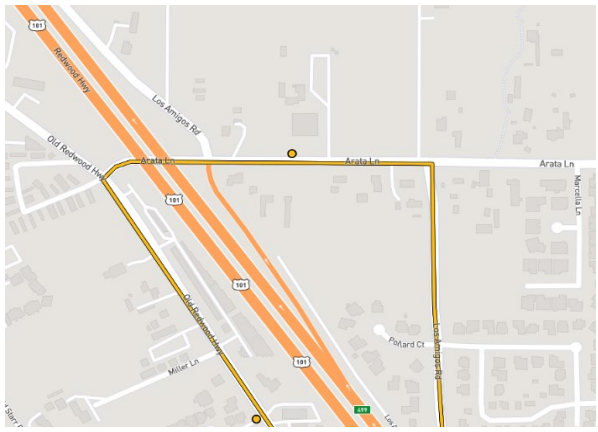
## Existing Transit Facilities

Sonoma County Transit (SCT) provides regional fixed route bus service in Sonoma County. Transit stops for Routes 60 and 66 are within a half mile of the project site. Route 60 runs between Cloverdale City Hall and the Santa Rosa Transit Mall, operating from 6:00 a.m. to 9:40 p.m. on weekdays and 6:45 a.m. to 9:40 p.m. on weekends with headways of 35 minutes to two hours. Route 66 runs from the Shiloh Center to the Windsor Transit Depot from 7:45 a.m. to 5:30 p.m. with headways of 45 minutes to one-and-a-half hours Monday through Saturday.

The two SCT routes and stops in the vicinity of the project area are shown in Plate 2.




*Route 60*




*Route 66 (Windsor Shuttle)*

**Plate 2** Sonoma County Transit Routes Near Project Site
*Source: https://sctransit.com/maps-schedules/*

Two bicycles can be carried on most SCT buses. Bike rack space is on a first-come, first-served basis. Additional bicycles are allowed on SCT 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. SCT Paratransit is designed to serve the needs of individuals with disabilities within the Town of Windsor and the greater Sonoma County area.

The Windsor Unified School District operates school bus service throughout the Town. The nearest WUSD bus stop to the project site is approximately one-quarter mile to the south at Los Amigos Road/Pollard Court.

## Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is October 1, 2019, through September 30, 2024.

As presented in Table 2, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2022 Crash Data on California State Highways*, California Department of Transportation (Caltrans). These average rates statewide are for intersections in the same environment (urban, suburban, or rural), with the same number of approaches (three or four), and the same controls (all-way stop, two-way stop, or traffic signal). All study intersection had a calculated collision rate below the statewide average, indicating there are no underlying issues with regards to collisions. The collision rate calculations are provided in Appendix A.

**Table 2 – Collision Rates for the Study Intersections**

| Study Intersection | Number of Collisions (2019-2024) | Calculated Collision Rate (c/mve) | Statewide Average Collision Rate (c/mve) |
|---|---|---|---|
| 1. Old Redwood Hwy/Arata Ln | 2 | 0.09 | 0.33 |
| 2. Arata Ln/Los Amigos Rd-US 101N Off-Ramp | 6 | 0.29 | 0.33 |
| 3. Arata Ln/Los Amigos Rd | 1 | 0.07 | 0.28 |

Note: c/mve = collisions per million vehicles entering

### Pedestrian Safety

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue for pedestrians. During the five-year study period described above there were no reported collisions involving pedestrians at the study intersections.

### Bicyclist Safety

Collision records for the study area were reviewed to determine if there had been any bicyclist-involved crashes. During the same five-year study period there were no reported collisions involving a bicyclist at any of the study intersections.

# Project Data

The proposed residential project site is located at the northwest corner of the eastern Arata Lane/Los Amigos Road intersection and would include a total of 32 single-family homes, with 26 detached units and six attached duet units. The project would include the construction of a new segment of Los Amigos Road along its eastern frontage between Arata Lane and the project driveway. The section of Los Amigos Road to be constructed by the project would include one travel lane in each direction as well as on-street parking and a buffered bike lane on the west (project) side of the street. Onsite roadways would be private and include connections to both Los Amigos Road and Arata Lane. The proposed project site plan is shown in Figure 2.

## Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 11th Edition, 2021 for "Single Family Detached Housing" (ITE LU #210) and "Single Family Attached Housing" (ITE LU #215). The proposed project is expected to generate an average of 288 trips per day, including 21 trips during the a.m. peak hour and 27 during the p.m. peak hour. The expected trip generation potential for the proposed project is indicated in Table 3.

**Table 3 – Trip Generation Summary**

| Land Use | Units | Daily | | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Rate | Trips | Rate | Trips | In | Out | Rate | Trips | In | Out |
| Detached Housing | 26 du | 9.43 | 245 | 0.70 | 18 | 5 | 13 | 0.94 | 24 | 15 | 9 |
| Attached Housing | 6 du | 7.20 | 43 | 0.48 | 3 | 1 | 2 | 0.57 | 3 | 2 | 1 |
| **Total** | | | 288 | | 21 | 6 | 15 | | 27 | 17 | 10 |

Note: du = dwelling unit

## Trip Distribution

The pattern used to allocate new project trips to the street network was based on a review of existing turning movements at the study intersections, knowledge of the area and surrounding region, and assessment of a "select zone" model run performed in the SCTCA travel demand model. The applied distribution assumptions and resulting trips are shown in Table 4.

**Table 4 – Trip Distribution Assumptions**

| Route | Percent |
|---|---|
| US 101 South | 42% |
| US 101 North | 12% |
| Old Redwood Highway (South of Arata Ln) | 12% |
| Arata Ln (East of Los Amigos Rd) | 12% |
| Los Amigos Rd (South of Arata Ln) | 10% |
| Starr Rd | 10% |
| Old Redwood Highway (North of US 101 South Ramps) | 2% |
| **TOTAL** | **100%** |




Source: Civil Design Consultants December 2024

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**Transportation Impact Study for Los Amigos Cottages**

**Figure 2 – Site Plan**

# Circulation System

This section addresses the first transportation bullet point on the CEQA checklist, which relates to the potential for a project to conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

## Relevant General Plan Policies

The *General Plan* contains the following policies that are relevant to assessment of transportation facilities provided by private development projects.

### *M-1.4 Multimodal System Additions.*

The Town shall require all new development that proposes or is required to construct or extend streets to develop a transportation network that complements and contributes to the town's multimodal system, maximizes connections, and minimizes barriers to connectivity.

### *M-2.1 Complete Streets Design Guidelines.*

The Town shall ensure that the concepts and design standards/guidelines in the adopted Complete Street Design Guidelines are considered during review of new development proposals, when constructing new streets, and when modifying existing corridors in order to ensure accessibility for all.

### *M-2.7 Complete Street Priority Areas.*

The Town shall prioritize complete streets improvements (e.g., bicycle, pedestrian, vehicle, and transit facilities) at and along U.S. Highway 101 interchanges, including Shiloh Road, Arata Lane, and Central Windsor.

### *M-2.8 Review Transportation Facilities for Development Proposals.*

The Town shall consider on-site and off-site transportation facility improvements during the review of development proposals to ensure that connected facilities are provided for all modes of transportation.

### *M-2.10 Bicycle and Pedestrian Connectivity.*

The Town shall ensure that commercial and residential development, including affordable housing projects, provides convenient and direct connections to the nearest existing bikeways, pedestrian ways, and public transit facilities.

### *M-3.2 Private Development Street Connections.*

The Town shall encourage private developments (e.g., office parks, single-family subdivisions apartment complexes, retail centers) to provide internal complete streets that connect to the existing public roadway system and provide a transition to existing and planned transportation facilities. Bicycle and pedestrian connectivity from the private street to the nearest public street(s) shall also be provided.

### *M-3.4 Street Design.*

The Town shall encourage streets to be designed or upgraded in ways that support walkable and bikeable environments and to be consistent with the Town's Complete Street Design Guidelines.

*M-3.7 Street Connections in New Developments.*

The Town shall promote street designs in new developments that provide convenient connections to local destinations and to adjacent neighborhoods. Travel should be dispersed among several streets rather than a few high-volume local streets that divide neighborhoods and discourage walking.

*M-3.25 Five-Lane Boulevards.*

Full build-out of five-lane boulevards will only occur when necessary to maintain acceptable levels of service along the Town's transportation network. In their interim condition prior to full build-out, the full width necessary to accommodate five-lane boulevards shall be dedicated to the Town; however, the fewest number of lanes necessary to maintain acceptable levels of service will be required and any excess right-of-way may be improved with pedestrian facilities, street parking, bicycle lanes, and parklets.

*M-5.1 Transit Oriented Development.*

The Town shall encourage higher density mixed land uses within walking distances of existing and future transit stops.

*M-5.5 Developer Constructed Transit Facilities.*

The Town shall require developers to construct, when appropriate, transit facilities including drop-off and parking facilities for ride-sharing and car-sharing services, bicycle parking, bus turnouts, shelters, and benches.

## Pedestrian Facilities

### Project Impacts on Pedestrian Facilities

Given the location of the site in northern Windsor adjacent to the urban growth boundary along with a lack of major pedestrian attractors in the vicinity, pedestrian trips are expected to be primarily related to recreation, transit, and schools in the surrounding neighborhood including Brooks Elementary School and Windsor Middle School. Some pedestrian travel to shopping may also occur if neighborhood commercial uses are built in the future on the east side of Los Amigos Road opposite the project site, as envisioned in the Town's *General Plan*.

Based on a review of the site plan, new sidewalks would be constructed along the project's frontage of the Los Amigos Road extension and along the project frontage on Arata Lane. Additional sidewalks on the Los Amigos Road extension beyond those to be constructed by the project would be built by other developments including Quail Acres in the future. An internal private roadway connecting to both Los Amigos Road and Arata Lane would include a sidewalk on one side of the street, establishing a new pedestrian route through the Los Amigos Cottages site.

With the proposed pedestrian improvements to be constructed by the project, effective pedestrian connectivity to the surrounding sidewalk network would be established. The project would build sidewalks on its Arata Lane and Los Amigos Road Extension frontages, connecting to the existing sidewalks on Arata Lane fronting Newsong Church, and establishing pedestrian connectivity to the Sonoma County Transit bus stop in front of the church.

To the south of Arata Lane, continuous sidewalks exist on the east side of Los Amigos Road all the way to existing shopping areas on Lakewood Drive. The intersection of Arata Lane/Los Amigos Road is planned to be signalized by the nearby Quail Acres development project in the same timeframe that Los Amigos Cottages would become occupied, though since Quail Acres has not yet been fully entitled, this timing cannot be assured in the near-term. Once constructed, the signal would include crosswalks connecting to the south side of Arata Lane as well as pedestrian phasing, establishing effective pedestrian connectivity to the south. Pedestrian linkages to Brooks Elementary School and Windsor Middle School would also exist. The surrounding pedestrian network is also anticipated to expand, including filling of gaps, as future development occurs in northern Windsor.

To ensure that adequate pedestrian circulation would exist in the near-term if signalization of Arata Lane/ Los Amigos Road has not been implemented prior to occupancy of the Los Amigos Cottages project, the Los Amigos Cottages project should be responsible for installing or funding the installation of a crosswalk with high-visibility signage and markings on the west leg of the intersection, as well as ensuring that adequate street lighting for the crosswalk is in place.

**Finding** – The project would have effective linkages to the surrounding pedestrian network including schools, recreation areas, and shopping areas.

**Recommendation** – The project should be responsible for installing or funding the installation of a crosswalk with high-visibility signage and markings as well as street lighting on the west leg of the Arata Lane/Los Amigos Road intersection if the planned signalization of the intersection has not occurred prior to project occupancy.

## Bicycle Facilities

### Project Impacts on Bicycle Facilities

Based on the site plan, six-foot bike lanes with a three-foot buffer would be constructed along the project frontages of both Arata Lane and Los Amigos Road. This configuration is consistent with the 2014 *Windsor Bicycle and Pedestrian Master Plan* and would also accommodate the Class IV bike facilities called for on both corridors in the Town's Draft *Active Transportation Plan*.

To access destinations such as the Town Green and the Windsor Sonoma-Marin Rail Transit (SMART) Station from the project site, bicyclists could use existing and planned bicycle facilities along Arata Lane and Old Redwood Highway. These bicycle facilities, including bicycle lanes on Arata Lane, together with shared use of minor streets including those constructed within the development, would effectively link the Los Amigos Cottages project to the surrounding bicycle network.

**Finding** – Bicycle facilities serving the project site would effectively link to the surrounding bicycle network.

## Transit Facilities

### Project Impact on Transit Facilities

Existing public transit routes and school bus routes are adequate to accommodate project-generated transit trips. The nearest bus stop served by Sonoma County Transit is located on the north side of Arata Lane near Newsong Church. The bus stop is served by Route 66, which provides local loop service throughout the Town of Windsor in a counterclockwise direction. With the new sidewalk on Arata Lane to be constructed as part of the Los Amigos Cottages project, continuous pedestrian facilities would link the project site to the existing Sonoma County Transit bus stop.

Upon completion of planned intersection improvements at the intersection of Los Amigos Road/Arata Lane, continuous pedestrian facilities would exist between the project site and the Windsor Unified School District bus stop at Los Amigos Road/Pollard Court, which is located within one-half mile of the proposed project's residential units. Note that if the planned improvements at Los Amigos Road/Arata Lane are not completed by the Quail Acres project prior to occupation of Los Amigos Cottages, Los Amigos Cottages will be required to construct an enhanced pedestrian crossing on the west leg of the intersection (see previous recommendation in "Project Impact on Pedestrian Facilities").

**Finding** – Transit facilities serving the project site are generally adequate and compliant with Town policy.

## Complete Streets Design Guidelines

Dimensions for the streets proposed to be constructed by the project were evaluated based on the Town's *Complete Street Design Guidelines* (CSDG), 2013. The private internal street serving the project's units would be 24 feet wide, consisting of 12-foot-wide travel lanes, as well as a six-foot wide sidewalk on one side. The lane and sidewalk widths are consistent with the criteria identified for a Narrow Residential Street in the CSDG. The CDSG indicates that this street type may be used where average daily traffic (ADT) volumes are up to 200 vehicles, which in a single-family detached housing product translates to approximately 20 residences (the Los Amigos Cottages project includes a mix of detached and attached units, generating less daily traffic per unit on average than a fully detached housing development). The proposed internal roadway includes two public street connections, effectively dispersing onsite traffic such that no specific point on the road would be expected to carry all of the site's daily traffic. Los Amigos Cottages is projected to generate an estimated 288 daily trips (see Table 3); the Los Amigos Road extension access is projected to serve about one-third of the ADT with the remaining two-thirds served by the Arata Lane access. On the internal roadway, this translates to approximately 96 ADT at the highest-volume point near Los Amigos Road and 192 ADT at the highest-volume point near Arata Lane. These volumes comply with the guidance for a Narrow Residential Street contained in the CSDG.

The internal roadway would also include areas with perpendicular parking near the center of the site. This configuration is not directly addressed by the CSDG but would be expected to perform acceptably given the low volumes and is consistent with CSDG language pertaining to the provision of common parking lots when the Narrow Residential Street type is used, as needed to ensure a sufficient parking supply. The configuration of this private onsite roadway has also reviewed extensively by Town Public Works, Planning, and Public Safety Staff, and adjusted by the developer to achieve an acceptable balance given the constraints of the parcel size and compact development pattern. Given these findings along with the roadway's compliance with Narrow Residential Street width and ADT parameters, the proposed configuration is deemed consistent with the CSDG.

The General Plan designates the Los Amigos Road extension as a two-lane crosstown street. The portion of the roadway to be constructed by the project would constitute a portion of the ultimate cross-section and would include a northbound 11-foot-wide northbound travel lane with interim two-foot shoulder, an 11-foot wide southbound travel lane, a six-foot wide bike lane with three-foot buffer, and an eight-foot-wide parking lane. The project would also include construction of an 11-foot-wide sidewalk with a planter strip along its Los Amigos Road frontage. This configuration differs slightly from the CSDG, which was developed prior to common use of buffered and Class IV bike lanes, but has been approved by the Town of Windsor for application along the project's Los Amigos Road frontage, and will allow planned Class IV lanes (identified in the Draft Active Transportation Plan) to be implemented in the future with no additional widening. As the nearby Quail Acres project develops and the Los Amigos Road extension is fully constructed, additional widening would occur on the eastern portion of the street. Both the proposed interim configuration to be constructed by the project as well as the ultimate cross-section are therefore deemed consistent with the 2-Lane Boulevard Crosstown Street type in the CSDG.

The General Plan designates Arata Lane as a Five-Lane Boulevard crosstown street. The project would improve Arata Lane along its frontage to accommodate a 10-foot-wide center turn lane, an 11-foot-wide westbound travel lane, a six-foot-wide bike lane with three-foot buffer, and an 11-foot-wide sidewalk with four-foot tree wells. Future development projects on the south side of the street would also require widening as part of frontage improvements. The proposed configuration along the Los Amigos Cottages project is consistent with the three-lane crosstown street type in the CSDG, with adjustments to accommodate buffered bike lanes and future Class IV bike lanes (which add a raised element in the buffer area). Because the configuration includes only one westbound vehicle travel lane, however, it does not include the full widening necessary to accommodate a five-lane crosstown street. Justification for this modification has been requested based on the results of a traffic analysis, *Evaluation of the Long-Range Configuration for Arata Lane Between US 101 and Los Amigos Road*, W-Trans, 2024, which indicated that only a single westbound vehicle travel lane would be necessary to accommodate future traffic along the Los Amigos Cottages frontage. A copy of the letter is included in Appendix B.

It is understood that while the project would include construction of frontage improvements with a single westbound travel lane, the applicant has been required by the Town's Public Works Department to dedicate right-

of-way along the Arata Lane frontage to accommodate a five-lane crosstown street in the future, allowing roadway widening to occur at a later date if and when the Town should deem it necessary. This approach is consistent with General Plan Policy M-3.25, which states, "Full build-out of five-lane boulevards will only occur when necessary to maintain acceptable levels of service along the Town's transportation network. In their interim condition prior to full build-out, the full width necessary to accommodate five-lane boulevards shall be dedicated to the Town…"

With the proposed frontage improvements to be constructed by the Los Amigos Cottages project and the proposed dedication of additional right-of-way, the project is considered to be consistent with both the CSDG and General Plan Policy M-3.25.

**Finding** – The proposed configurations of private onsite roadways and Los Amigos Road frontage improvements to be constructed by the Los Amigos Cottages developer are consistent with the Town's *Complete Street Design Guidelines*.

**Finding** – The proposed configuration of the project's Arata Lane frontage including one westbound vehicle travel lane as well as right-of-way dedication to the Town of Windsor allowing the Five-Lane Boulevard cross-section to be constructed in the future is consistent with the CSDG and General Plan Policy M-3.25.

## Compatibility with Potential Future Roundabout

The Town of Windsor is considering conversion of the Arata Lane/Los Amigos Road intersection to a single-lane roundabout in the future. Implementation of a roundabout would be feasible in the future but may not be achievable in the near-term since it would require right-of-way from parcels on the intersection corners that are outside control of the Town of Windsor or Los Amigos Cottages developer. The Town has developed a planning-level footprint of the potential future roundabout, including its peripheral bicycle and pedestrian facilities, and has provided the concept to potential developers including the Los Amigos Cottages applicant for site planning purposes. A diagram depicting how the potential future roundabout would interface with the Los Amigos Cottages site plan is shown in Plate 3.

Review of the project site plan and overlaid conceptual roundabout footprint indicates that the Los Amigos Cottages has provided sufficient right-of-way dedication to accommodate the roundabout. In evaluating roundabout-specific intersection sight distance criteria, however, it was determined that an approximately 30-square foot triangular area on the southeastern corner of the site would need to remain free of fences or tall obstructions to meet upstream sight distance parameters for drivers approaching the roundabout on eastbound Arata Lane. This condition should be reflected on the project's landscaping plans, and/or an easement to the Town of Windsor established if deemed necessary by the Public Works Department.

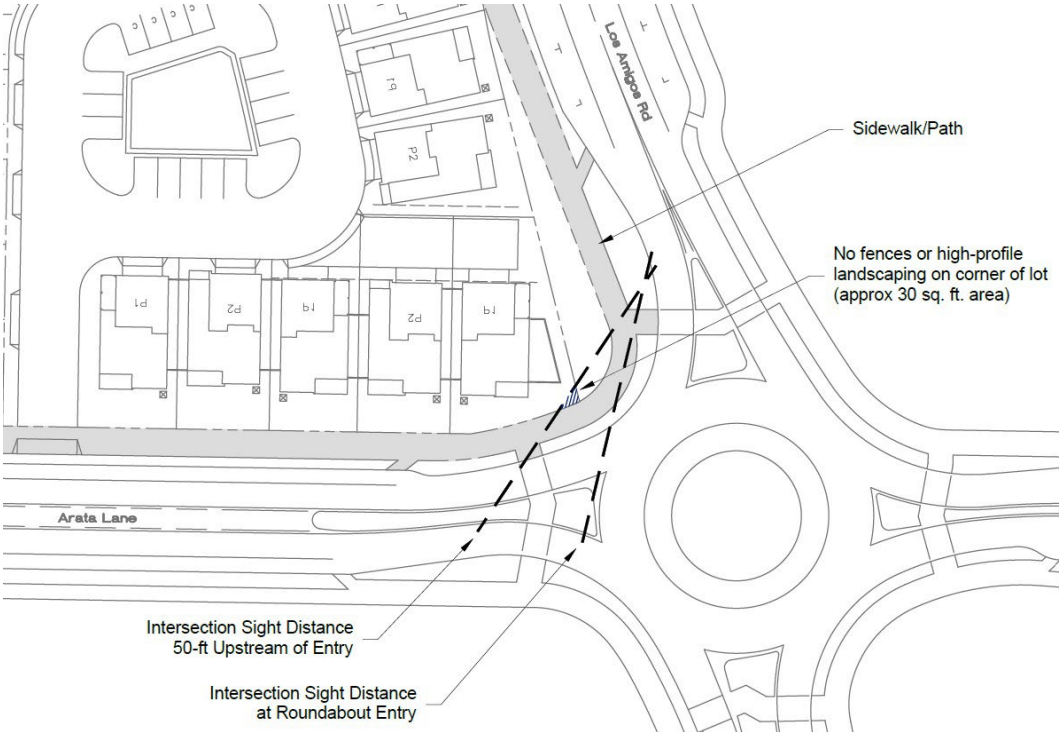



**Plate 3** Upstream Sight Distance with Roundabout

Site access and circulation characteristics were also considered with a future roundabout. The need for left-turn lanes at the project's two access points would remain the same regardless of intersection type at Arata Lane/Los Amigos Road, though a roundabout would offer additional ingress and egress options by facilitating U-turn movements.

**Finding** – The proposed Los Amigos Cottages site layout and frontage improvements would accommodate future construction of a roundabout at the Arata Lane/Los Amigos Road intersection.

**Recommendation** – Landscaping plans should ensure that an approximately 30-square foot triangular-shaped area on the southeastern corner of the project site near the Arata Lane/Los Amigos Road intersection will remain free of fences or landscaping exceeding two feet in height to maintain acceptable upstream sight distance if a future roundabout is installed at the intersection. Alternatively, an easement to the Town of Windsor could be established for this area if deemed necessary by the Public Works Department.

# Vehicle Miles Traveled (VMT)

The potential for the project to conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b) was evaluated based the project's anticipated Vehicle Miles Traveled (VMT).

## Significance Threshold

The Town of Windsor passed a resolution in April 2023 adopting a VMT policy that identifies significance thresholds and screening criteria for CEQA environmental review. Residential development projects are assessed using a home-based VMT per capita metric, with VMT significance thresholds set at a level of 15 percent below the existing countywide average. The Sonoma County Transportation and Climate Authorities (SCTCA) operates and maintains the regional travel demand model that produces VMT estimates. The VMT data applied in this analysis were obtained from the SCTM19 model version released in December 2021, which is the most current version of the model available from SCTCA.

Based on output from the SCTCA model, the existing residential VMT per capita in the County of Sonoma is 16.60 miles. VMT significance thresholds are set at 15 percent below this level, or 14.11 miles. Accordingly, the applied VMT significance threshold applied to the project is as follows.

- The project would have a potentially significant impact on VMT if its projected residential VMT per capita exceeds 14.11 miles.

## VMT Screening

The Town's VMT policy includes provisions allowing certain projects to be "screened" from needing to complete VMT analyses. This screening applies to specified land use and transportation projects that the Town has found would result in less-than-significant VMT impacts. Following is an assessment of the project's likelihood of qualifying for one or more of the screening criteria that pertain to residential development projects.

### Small Project

The small project screening criteria applies to residential development projects consisting of 23 or fewer units. The proposed project would not qualify for this screening parameter.

### Map-Based Screening

Areas identified on the Town's Residential VMT Screening Map are considered to be low-VMT areas that qualify for screening. The project is not located in a designated low-VMT area so would not qualify for this screening parameter.

### Transit Screening

Projects that are located within one-half mile of the downtown SMART station and meet certain criteria qualify for VMT screening. The project is located just over a mile from the SMART station, so would not qualify for this screening parameter.

### Affordable Residential Development

Residential development that is 100-percent deed-restricted affordable housing qualifies for VMT screening. The project includes some affordable housing but is predominantly market rate, so would not qualify for this screening parameter.

### Residential Multiple-Criteria Screening

Residential projects that meet all four of the following criteria may be screened from VMT analysis:

- Within one-half mile of a Neighborhood Center/Mixed Use (NCMU) land use designated property;
- Within one-half mile of an existing or designated school site as confirmed in writing by WUSD;
- Within one-half mile of a park;
- Within one mile of a Sonoma County Transit stop, with a pedestrian connection, running at least six days per week and average service intervals not exceeding 60 minutes.

The project would satisfy three of the four criteria. The criteria pertaining to the project being within one-half mile of an existing or designated school site would not currently apply, since it is understood that WUSD has not formally designated a site for a future school in the project area and cannot provide such confirmation at this time. Accordingly, the project would not qualify for this screening parameter.

### VMT Screening Conclusion

The project would not qualify for small project, map-based, transit, or affordable development screening criteria specified by the Town. The project would meet three of the Town's four criteria for residential multiple-criteria screening given its proximity to parks, transit stops, and neighborhood commercial designated land, but would not meet the fourth parameter related to school proximity. As such, the project does not qualify for VMT screening.

**Finding** – The project would not qualify for any of the VMT screening parameters identified by the Town of Windsor.

## Project VMT Assessment

### No Project and Unadjusted Project VMT

The SCTCA model includes traffic analysis zones (TAZ) covering geographic areas throughout Sonoma County. The project site is located within TAZ 876, which currently has a baseline "no project" VMT per capita of 16.52 miles. Because the model's TAZ land use assumptions reflect the existing limited rural residential and agricultural uses in the zone, a custom run of the SCTCA model was performed, adding conventional residential uses to the TAZ to provide a refined estimate of the projected per capita VMT that would be generated by residents in this area of Windsor. The resulting projected residential VMT for the TAZ as output by the custom SCTCA model run is 14.30 VMT per capita.

### Adjusted Project VMT

Consideration was given to whether adjustments to the baseline per-capita VMT estimates produced by the SCTCA model are warranted to reflect the project's density and inclusion of affordable housing. SCTCA has developed and made available a VMT Reduction Tool to assist in making project-specific VMT adjustments as well as quantify VMT mitigation measures.

#### *Residential Density*

The residential density of the proposed Los Amigos Cottages project is 11.8 units per acre. Methodologies contained in the SCTCA VMT Reduction Tool were used to estimate how the project's density would affect VMT rates. These methodologies were developed from research showing an elastic relationship between per capita VMT and residential density, with increased density translating to decreased VMT rates. The SCTCA VMT Reduction Tool indicates that the proposed project's density of 11.8 units per acre corresponds to a reduction in per capita VMT of 6.4 percent.

### *Provision of Affordable Housing*

With respect to affordable housing, the project would designate 7 of the 32 homes as deed-restricted affordable units for low-income households. Affordable housing has been shown to produce lower per capita VMT than market rate housing; the level of reduction is based on the percentage of a project's overall units that are affordable. Based on output from the SCTCA VMT Reduction Tool, the estimated reduction in the project's residential per capita VMT due to provision of affordable units is 5.4 percent.

## Project VMT Findings

Combining the "raw" VMT reduction percentages described above, the project's proposed density and provision of on-site affordable housing would reduce its per capita VMT by 11.8 percent. This number is dampened to 11.5 percent to reflect the diminishing effects of multiple VMT reduction measures. Upon applying this deduction, the project is anticipated to generate 12.66 VMT per capita, which is below the applicable significance threshold of 14.11 VMT per capita. Accordingly, the proposed Los Amigos Cottages project would be considered to have a less-than-significant impact on VMT. A summary of the VMT findings is shown in Table 5.

**Table 5– Vehicle Miles Traveled Analysis Summary**

| Countywide VMT per Capita | | Project VMT per Capita | | |
|---|---|---|---|---|
| **Average** | **Threshold** | **Unadjusted** | **Adjusted** | **Threshold Met?** |
| 16.60 | 14.11 | 14.30 | 12.66 | Yes |

Notes: VMT is measured in VMT per Capita, or the number of daily miles driven per resident; Threshold is the applicable VMT significance threshold of 15 percent below the existing countywide average; Adjusted values reflect effects of project density and provision of onsite affordable housing

**Significance Finding** – The project would be expected to result in a less-than-significant VMT impact.

# Safety Issues

The potential for the project to impact safety was evaluated in terms of the adequacy of sight distance and need for turn lanes at the project accesses as well as the adequacy of stacking space in dedicated turn lanes at the study intersections to accommodate additional queuing due to adding project-generated trips and need for additional right-of-way controls. This section addresses the third transportation bullet on the CEQA checklist which is whether or not the project would substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

## Site Access

There are currently no fully-improved access points to the project site. The location where the new segment of Los Amigos Road would be built is currently occupied by an unpaved private driveway. The project site plan includes private roads that would connect to the existing roadway network on Arata Lane west of the intersection of Arata Lane/Los Amigos Road and on the new segment of Los Amigos Road north of the intersection of Arata Lane/Los Amigos Road.

### Sight Distance

Sight distances along Arata Lane and Los Amigos Road at the proposed project's access points were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. Recommendations for private streets are based on corner sight distance criteria in consideration of approach travel speeds.

Based on an assumed design speed of 30 mph on the Los Amigos Extension near the project driveway, the recommended minimum corner sight distance is 330 feet. The project access is located opposite a planned intersection serving the Quail Acres development and is located on the inside of a broad sweeping curve. While the Los Amigos Road Extension does not currently exist so sight distance cannot be field measured, measurements obtained using the project site plan and available materials indicates that the available sight distance from the project street to the north would be equivalent to the recommended 330-foot corner sight distance. Los Amigos Extension has a straighter alignment to the south of the project access with sight distance exceeding the recommended 330 feet.

Based on the posted 40 mph speed limit on Arata Lane, the minimum recommended corner sight distance is 440 feet. Arata Lane has a straight alignment in the vicinity of the project access, with available sight distance exceeding the recommended 440 feet in both directions.

### Access Analysis

The need for left-turn lanes at the private project street intersections on Los Amigos Road and Arata Lane were evaluated based on criteria contained in the *Intersection Channelization Design Guide*, National Cooperative Highway Research Program (NCHRP) Report No. 279, Transportation Research Board, 1985, as well as an update of the methodology developed by the Washington State Department of Transportation and published in the *Method For Prioritizing Intersection Improvements*, 1997. The NCHRP report references a methodology developed by M. D. Harmelink that includes equations that can be applied to expected or actual traffic volumes to determine the need for a left-turn pocket based on safety issues.

Currently, the portion of Arata Lane at the proposed driveway includes a lateral transition where the roadway widens to the east to accommodate a two-way left-turn lane. The transition area is striped with dual double-yellow lines constituting a painted median that drivers may not legally cross, effectively prohibiting left-turn movements. Arata Lane is planned to be widened in the future consistent with the Town's General Plan as parcels to the west develop or redevelop, including provision of a two-way left-turn lane at the project street, but such widening is not anticipated in the near-term.

Under Existing plus Project volumes, which include traffic associated with current conditions and project generated trips, a left-turn lane is not warranted on Arata Lane at the project street during either of the peak periods evaluated. Similarly, left-turn lane warrants are unmet at this location under Baseline plus Project volumes. In order to accommodate left-turn access to the project site, it is recommended that the current centerline striping be modified to include a break in the painted median, thereby allowing left turns to be legally made by drivers. Copies of the turn lane warrant worksheets are provided in Appendix C.

**Finding** – Sight distance at both of the project driveways would equal or exceed the recommended minimum in both directions. Left-turn lanes are not warranted at the project street connections on Arata Lane and Los Amigos Road under Existing plus Project and Baseline plus Project volumes during either peak period.

**Recommendation** – The existing striping on Arata Lane at the project street should be modified to provide a break in the painted median, allowing drivers to legally turn left into and out of the project site.

## Queuing

The *Town of Windsor 2040 General Plan* contains the following policy applicable to queuing.

> **Policy M-3.17 - Queuing**. *Intersection queuing shall be evaluated in tandem with LOS. Projected 95th percentile queues in left-turn pockets do not exceed the available stacking length. A queuing impact shall be considered significant if:*
>
> *a) The 95th percentile queue length can be contained within the available stacking length without the project, and the project causes the queue to exceed the stacking length; or*
>
> *b) The queue length exceeds the available stacking length without the project and the project increases the 95th percentile queue by more than 10 feet, or approximately one-half a car-length.*
>
> *Exceptions to this policy may be granted by the Town Engineer, where there is sufficient block length to accommodate projected queuing or physical constraints that make it infeasible to construct the improvement that would be necessary to achieve adequate stacking length, such as geometrics, a lack of right-of-way, adjacent slopes or hills, and soil conditions.*

Queues were determined using Synchro for key left-turn lanes and approaches. Under Existing conditions, the projected 95$^{th}$ percentile queues remain within the available storage. Under Baseline conditions, two separate sets of improvements at the Arata Lane/Los Amigos Road intersection were assessed. The first assumes the current two-way stop-controlled intersection configuration without the planned signalization that would be constructed by the Quail Acres development project. The second includes the planned signal as well as added southbound right-turn pocket that Quail Acres would be responsible for constructing.

Under Baseline conditions without Quail Acres improvements, queues would remain within available storage at all locations except the northbound left-turn pocket at Arata Lane/Los Amigos Road during the a.m. peak hour. Under Baseline conditions with the Quail Acres improvements, queues would remain within available storage at all locations.

Summarized in Table 6 are the predicted 95$^{th}$ percentile queue lengths at the study intersections for all analysis scenarios. Copies of the queuing calculations are contained in Appendix D.

**Table 6 – 95th Percentile Queues in Select Lanes**

| Study Intersection<br>Movement | Storage | 95th Percentile Left-Turn Queues | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | AM Peak Hour | | | | PM Peak Hour | | | |
| | | E | E+P | B | B+P | E | E+P | B | B+P |
| **1. ORH/Arata Ln** | | | | | | | | | |
| Northbound ORH Left Turn | 135 | 13 | 13 | 14 | 14 | 9 | 9 | 10 | 10 |
| Southbound ORH Left Turn | 300 | 232 | 233 | 261 | 262 | 164 | 167 | 207 | 210 |
| Westbound Arata Left Turn | 330 | 212 | 214 | 249 | 254 | 99 | 101 | 127 | 128 |
| **2. US 101 N Ramps/Arata Ln** | | | | | | | | | |
| Off-Ramp Approach | 1,050 | 90 | 90 | 90 | 90 | 80 | 81 | 82 | 82 |
| Eastbound Arata Left Turn | 330 | 200 | 201 | 215 | 216 | 157 | 159 | 185 | 189 |
| **3. Los Amigos Road/Arata Ln** | | | | | | | | | |
| *Without QA Improvements*[1] | | | | | | | | | |
| NB Los Amigos Left Turn | 110 | 108 | 110 | 160 | 163 | 25 | 25 | 43 | 45 |
| SB Los Amigos Approach | 420 | 0 | 1.5 | 43 | 45 | 0 | 0 | 20 | 20 |
| Eastbound Arata Left Turn | 150 | 0 | 0 | 3 | 3 | 0 | 0 | 5 | 5 |
| Westbound Arata Left Turn | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *With QA Improvements*[2] | | | | | | | | | |
| NB Los Amigos Left Turn | 110 | - | - | 95 | 95 | - | - | 60 | 61 |
| SB Los Amigos Approach | 420 | - | - | 46 | 48 | - | - | 37 | 39 |
| Eastbound Arata Left Turn | 150 | - | - | 49 | 50 | - | - | 91 | 94 |
| Westbound Arata Left Turn | 75 | - | - | 27 | 27 | - | - | 23 | 23 |

Notes: [1] Includes no improvements planned to be constructed by the Quail Acres development but does include the partial section of the Los Amigos Road extension to be built as part of Los Amigos Cottages frontage improvements under plus project conditions; [2] Includes signalization of intersection of Arata Lane/Los Amigos Road and added southbound right-turn pocket to be constructed by Quail Acres development; Reported queues are measured in feet; E = existing conditions; E+P = existing plus project conditions; B = baseline conditions; B+P = baseline plus project conditions; NB = Northbound; SB = Southbound

Based on Town policy, the project would have a significant impact if it would cause any queue to exceed existing storage lengths. Left-turn queues would remain within the available storage upon the addition of project volumes under Existing conditions and Baseline conditions, assuming that the planned improvements to be constructed by Quail Acres at the Los Amigos Road/Arata Lane intersection are constructed. Without the improvements made by Quail Acres at Los Amigos Road/Arata Lane, the projected 95th percentile queues in the northbound left-turn lane exceed the available storage during the a.m. peak hour, with the Los Amigos Cottages development expected to increase queue lengths by three feet. This increase in queues is less than the 10 feet considered to be a significant project-related impact per the Town's guidelines.

**Finding** – 95th percentile queues would remain within the available storage at all intersections, with the exception of the northbound left-turn lane at Arata Lane/Los Amigos Road, which would exceed storage both with and without the Los Amigos Project during the a.m. peak hour if the planned improvements to be made by the proposed Quail Acres development are not constructed. Los Amigos Cottages would increase these 95th percentile queues by three feet, which is not considered to be a significant project-related impact per the Town's guidelines.

**Significance Finding** – The project would not introduce any hazardous design elements and would therefore have a less-than-significant impact on safety.

# Emergency Access

The final transportation bullet on the CEQA checklist requires an evaluation as to whether the project would result in inadequate emergency access.

The site plans for the Los Amigos Cottages project depict an interconnected internal roadway network with no dead-end streets, and two connections to the surrounding roadway network: one on the Los Amigos Road extension and one on Arata Lane. While improvement plans for the project will remain subject to approval by the Town's Fire Marshal, from a transportation perspective the proposed street configuration and connectivity would provide adequate emergency vehicle circulation and access.

The adequacy of emergency evacuation routes was assessed in consideration of potential fire threats approaching from the north, south, east, and west. The primary evacuation route for Windsor leading to designated evacuation centers is US 101; evacuation staging schemes established by emergency responders would in most circumstances focus on moving traffic along arterial streets to the freeway. For the Los Amigos Cottages project, emergency evacuation staging for fire threats from the north would focus on directing drivers to Arata Lane, to which the project has direct access. For fire threats from the east, which may be the most likely scenario (and similar to the Kincade fire), evacuation routes would also focus on directing residents to Arata Lane. While fire threats from the south and west may be less likely than threats from the north and east, evacuation staging would likely direct drivers to Arata Lane or north on Los Amigos Road (either in its current alignment near US 101 or, once realigned and extended, to the Los Amigos Road extension).

It is important to reiterate that the Town's Fire Marshal has final authority over the adequacy of the project's emergency access and compliance with applicable codes and requirements.

**Findings** – The proposed roadway network, including connectivity to existing and future roads, would provide adequate emergency circulation and access. The proposed project, including all future improvement plans, when submitted will be subject to review and approval by the Town's Fire Marshal; any requirements imposed by the Fire Marshal shall take precedence over the emergency access and circulation findings contained herein.

**Significance Finding** – Assuming that the project is designed to meet the Town's requirements, it would be expected to have a less-than-significant impact on emergency access and response.

# 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 intersections were analyzed using the "Two-Way Stop-Controlled" and "Signalized" intersection capacity methodologies published in the *Highway Capacity Manual* (HCM), 6th Edition, Transportation Research Board, 2016. 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 Levels of Service for the intersection of Arata Lane/Los Amigos Road with existing side-street stop controls was analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The study intersections that are currently controlled by a traffic signal, or may be in the future, were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. For purposes of this study, delays were calculated using signal timing obtained from the Town of Windsor and Caltrans.

The ranges of delay associated with the various levels of service are indicated in Table 7.

**Table 7 – Intersection Level of Service Criteria**

| LOS | Two-Way Stop-Controlled | Signalized |
|---|---|---|
| A | Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street. | Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all. |
| B | Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queueing occurs on the minor street. | Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop. |
| C | Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street. | Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping. |
| D | Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street. | Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop. |
| E | Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street. | Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive. |
| F | Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues. | Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection. |

Reference: *Highway Capacity Manual,* 6th Edition, Transportation Research Board, 2018

## Traffic Operation Standards

The Town of Windsor has the following adopted policy regarding traffic operation standards.

**Policy M-3.16 – Level of Service Application.** The Town shall maintain Level of Service standards that define the minimum acceptable operating characteristics for intersections and streets. A Level of Service D (LOS D) is defined as the minimum acceptable level of congestion during the weekday morning and evening peak periods for high-volume facilities such as freeways, crosstown streets, and signalized or all-way stop-controlled intersections. This standard should apply at all these locations except the following intersections, which are regional gateways to the Town's commercial and civic areas, and where a Level of Service E is tolerated by the Town and considered acceptable:

- Old Redwood Highway/U.S. Highway 101 Northbound offramps/Lakewood Drive
- Old Redwood Highway/U.S. Highway 101 Southbound ramps
- Old Redwood Highway/Conde Lane/Windsor River Road

At side-street stop-controlled unsignalized intersections, Levels of Service shall be determined for both controlled movements and for the overall intersection. Controlled movements operating at LOS E or LOS F are allowable if: 1) the intersection is projected to operate at LOS C or better overall, and 2) the projected traffic volume on the controlled movement is 30 vehicles or less per hour on approaches with single lanes, or on multilane approaches, 30 vehicles or less per hour per lane. If an intersection is operating at LOS E or F without project-generated traffic added, the project's impact shall be considered less-than-significant if it does not cause operation to fall from LOS E to LOS F and it increases average delay for the intersection as a whole by 5 seconds or less. Level of Service standards shall not apply to minor intersections comprised of only local streets.

## 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 periods. This condition does not include project-generated traffic volumes. Volume data was collected in September 2023.

Under Existing Conditions, all study intersections operate at acceptable Levels of Service during both peak hours except for the stop-controlled approach at Los Amigos Road/Arata Lane during the a.m. peak hour. While this intersection is operating acceptably overall at LOS A, because the northbound approach is operating below LOS D during the a.m. peak period and serves more than 30 vehicles per lane, according to the Town's guidelines, this is unacceptable and therefore warrants additional considerations when evaluating project impacts.

The existing traffic volumes are shown in Figure 2. A summary of the intersection Level of Service calculations is contained in Table 8, and copies of the Level of Service calculations are provided in Appendix E.

**Table 8 – Existing Peak Hour Intersection Levels of Service**

| **Study Intersection** ***Approach*** | **AM Peak** | | **PM Peak** | |
|---|---|---|---|---|
| | **Delay** | **LOS** | **Delay** | **LOS** |
| 1. Old Redwood Hwy/Arata Ln | 18.7 | B | 12.1 | B |
| 2. Arata Ln/Los Amigos Rd-US 101 N Off-Ramp | 8.6 | A | 8.8 | A |
| 3. Arata Ln/Los Amigos Rd | 6.2 | A | 1.9 | A |
| *Northbound Los Amigos Rd* | ***61.8*** | ***F*** | *19.8* | *C* |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation

## Baseline Conditions

Baseline operating conditions include traffic from reasonably-foreseeable development projects in and near the study area, representing a near-term cumulative condition within an approximately three to five-year period.

### Baseline Development Projects

Town Staff provided a list of projects and assumptions to include in this scenario, as follows.

- Kashia Mixed Use, 10221 Old Redwood Highway, 54 affordable apartments and a building containing Tribal offices and community spaces
- Windsor Hotel, 160 Arata Lane, 115 hotel rooms
- Arata North Subdivision, 115 Arata Lane, 55 single-family homes
- Sherlock Homes, 260 Arata Lane, seven new single-family homes
- Quail Acres, northeast of Los Amigos Road/Arata Lane intersection, ultimately 301 new residential units; it was assumed that approximately 100 single-family homes would be built within the timeframe included in the Baseline scenario
- Estates at Ross Ranch, 1295 Jensen Lane, 31 single-family homes
- Sonoma County Resource Recovery, 10611 Redwood Court, expansion of existing industrial uses
- Town Well Site, 10011 Los Amigos Road, new wells on Town-owned parcel

### Baseline Roadway Assumptions

The Quail Acres development will be responsible for completing several roadway projects, with timing for completion tied to the number of residential units that have been built. With occupation of the 100 residential

units included in the Baseline traffic analysis scenario, the Quail Acres development will have been required by the Town to construct the full Los Amigos Road extension and install a traffic signal at the intersection of Arata Lane/Los Amigos Road. Los Amigos Road along the Los Amigos Cottages project would also be improved to its full width and include a short southbound right-turn pocket at the new Arata Lane signal. For the purposes of this transportation impact study, baseline traffic conditions at the Arata Lane/Los Amigos Road intersection have been evaluated both with and without these planned roadway improvements.

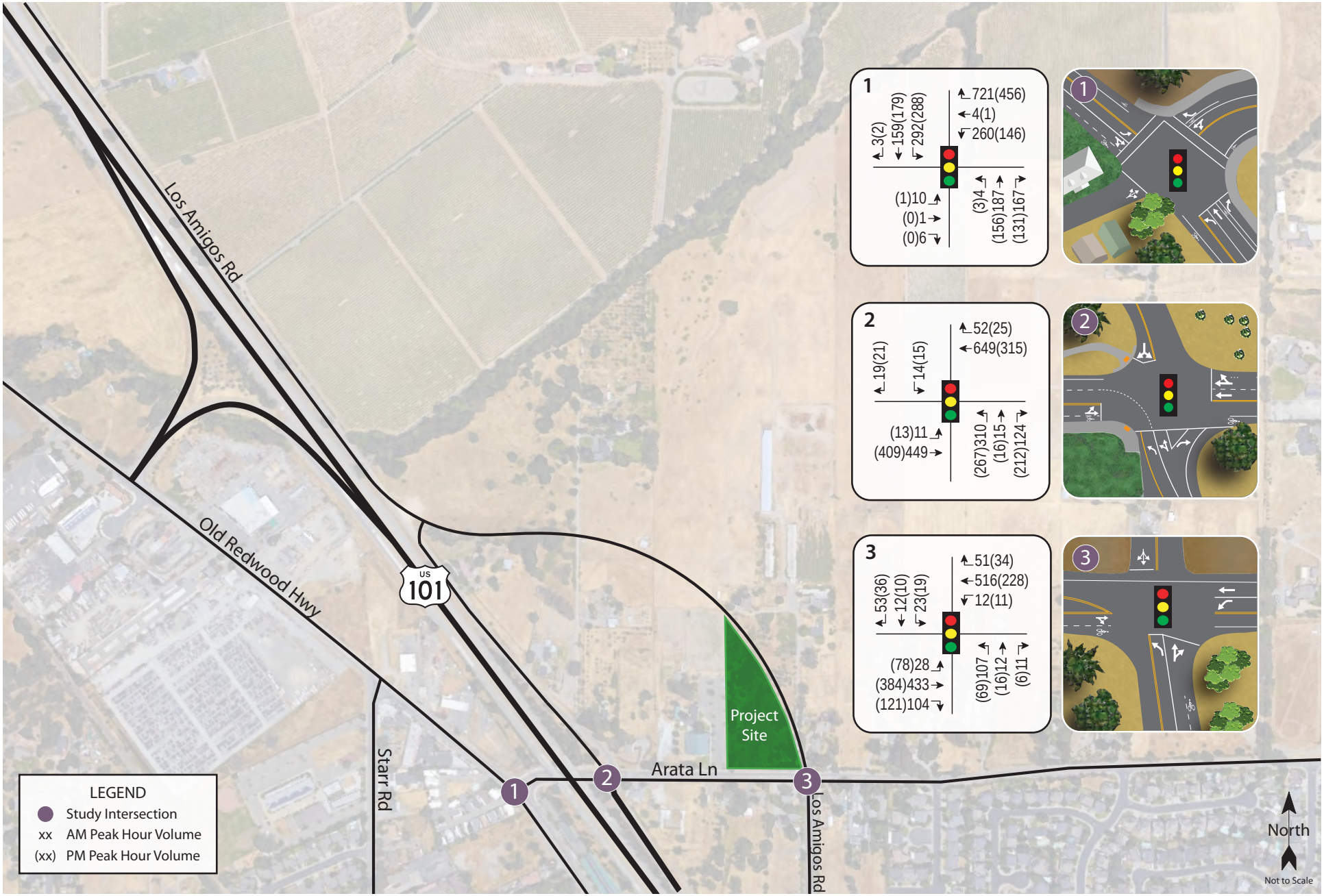
### Baseline Intersection Operation

Under Baseline conditions, all three study intersections are projected to operate acceptably. These results are summarized in Table 9. Baseline volumes are shown in Figure 3, and copies of the Level of Service calculations are provided in Appendix E.

**Table 9 – Baseline Peak Hour Intersection Levels of Service**

| Study Intersection | AM Peak | | PM Peak | |
|---|---|---|---|---|
| | Delay | LOS | Delay | LOS |
| 1. Old Redwood Hwy/Arata Ln | 21.0 | C | 13.0 | B |
| 2. Arata Ln/Los Amigos Rd-US 101 N Off-Ramp | 8.5 | A | 9.5 | A |
| 3. Arata Ln/Los Amigos Rd | 13.6 | B | 4.6 | A |
| *Northbound Los Amigos Rd* | ***121.2*** | *F* | *30.6* | *D* |
| With Planned Signalization[1] | 13.3 | B | 12.2 | B |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; [1] intersection is anticipated to be signalized by Quail Acres project under Baseline conditions




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Transportation Impact Study for Los Amigos Cottages

**Figure 3 – Baseline Traffic Volumes and Lane Configurations**

# Project Conditions

## Existing plus Project Conditions

Upon the addition of project-related traffic to the existing volumes two of the three study intersections are expected to operate acceptably. The northbound approach of the intersection at Arata Lane/Los Amigos Road would continue to operate unacceptably at LOS F, with delays increasing by 0.2 seconds overall upon the addition of Los Amigos Cottages traffic. Since the project would increase delays by less than five seconds, this would not be considered an adverse project-related effect.

The Existing plus Project results are summarized in Table 10. Project traffic volumes are shown in Figure 4, and Existing plus Project volumes are shown in Figure 5. Copies of the Level of Service calculations are provided in Appendix E.

**Table 10 – Existing and Existing plus Project Peak Hour Intersection Levels of Service**

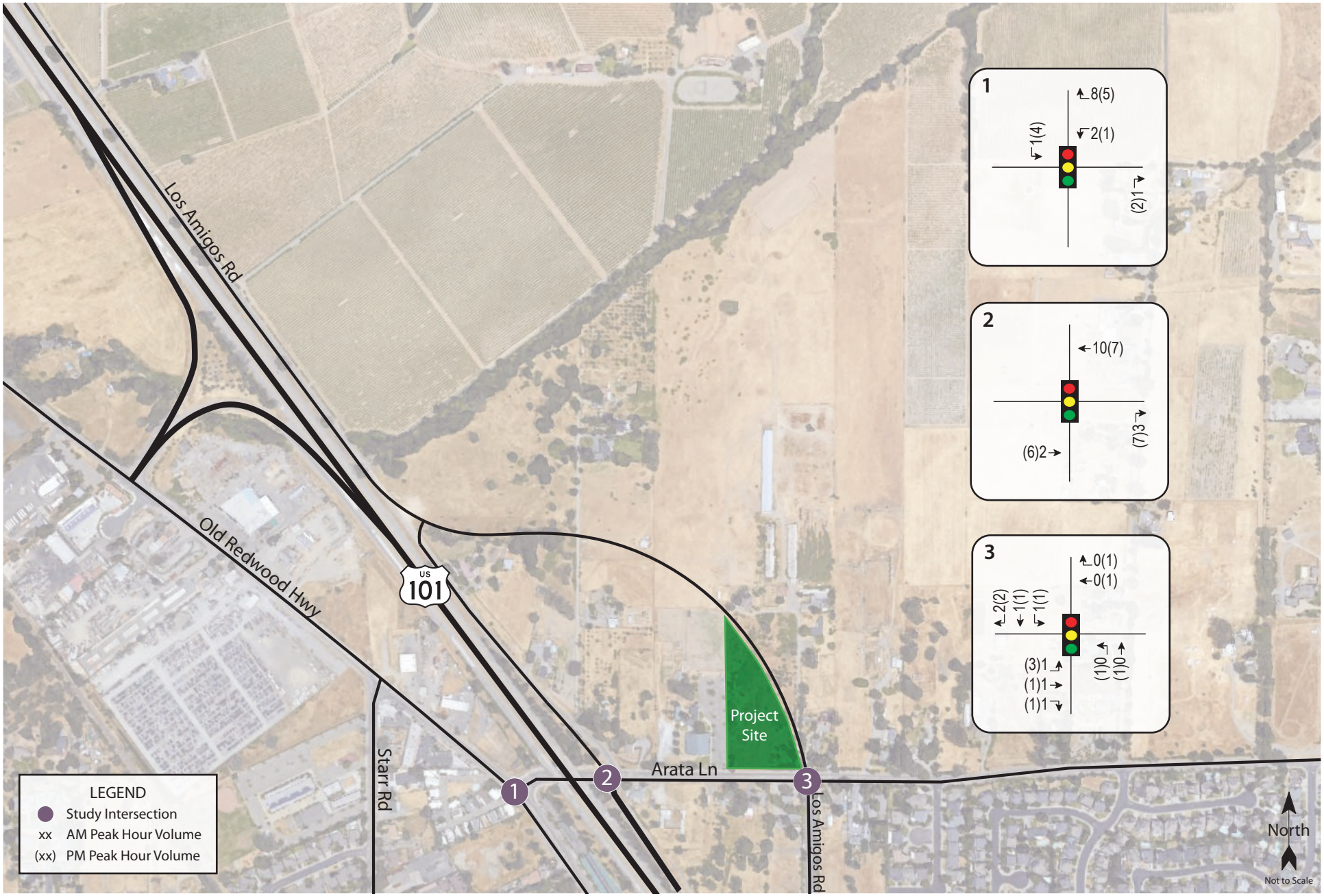
| | **Study Intersection** ***Approach*** | **Existing Conditions** | | | | **Existing plus Project** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **AM Peak** | | **PM Peak** | | **AM Peak** | | **PM Peak** | |
| | | **Delay** | **LOS** | **Delay** | **LOS** | **Delay** | **LOS** | **Delay** | **LOS** |
| 1. | Old Redwood Hwy/Arata Ln | 18.7 | B | 12.1 | B | 19.0 | B | 12.1 | B |
| 2. | Arata Ln/Los Amigos Rd-US 101 N Off-Ramp | 8.6 | A | 8.8 | A | 8.6 | A | 8.8 | B |
| 3. | Arata Ln/Los Amigos Rd | 6.2 | A | 1.9 | A | 6.4 | A | 2.0 | A |
| | *Northbound Los Amigos Rd* | ***61.8*** | ***F*** | *19.8* | *C* | ***64.3*** | ***F*** | *20.3* | *C* |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* **Bold** text = deficient operation

**Finding** – Under Existing plus Project Conditions two of three study intersections would continue operating acceptably. The Los Amigos Cottages would increase average delays at the intersection of Arata Lane/Los Amigos Road intersection by 0.2 seconds, and would further increase delays on the northbound approach that is already operating at LOS F. Because average delays would increase by less than five seconds, however, this is not considered to be an adverse project effect on traffic operation per the Town's guidelines.

## Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, two of the three study intersections are expected to operate acceptably. Arata Lane/Los Amigos Road would continue to operate at LOS F on the northbound Los Amigos Road approach if the planned signal is not yet installed, with delays increasing by 0.6 seconds overall upon the addition of Los Amigos Cottages traffic. Since the project would increase delays by less than five seconds under this condition, this would not be considered an adverse project-related effect per General Plan policy M-3.16. With completion of the planned traffic signal to be constructed as part of the Quail Acres project, the intersection would operate acceptably at LOS B or better. These results are summarized in Table 11, and Baseline plus Project volumes are shown in Figure 6. Copies of the Level of Service calculations are provided in Appendix E.

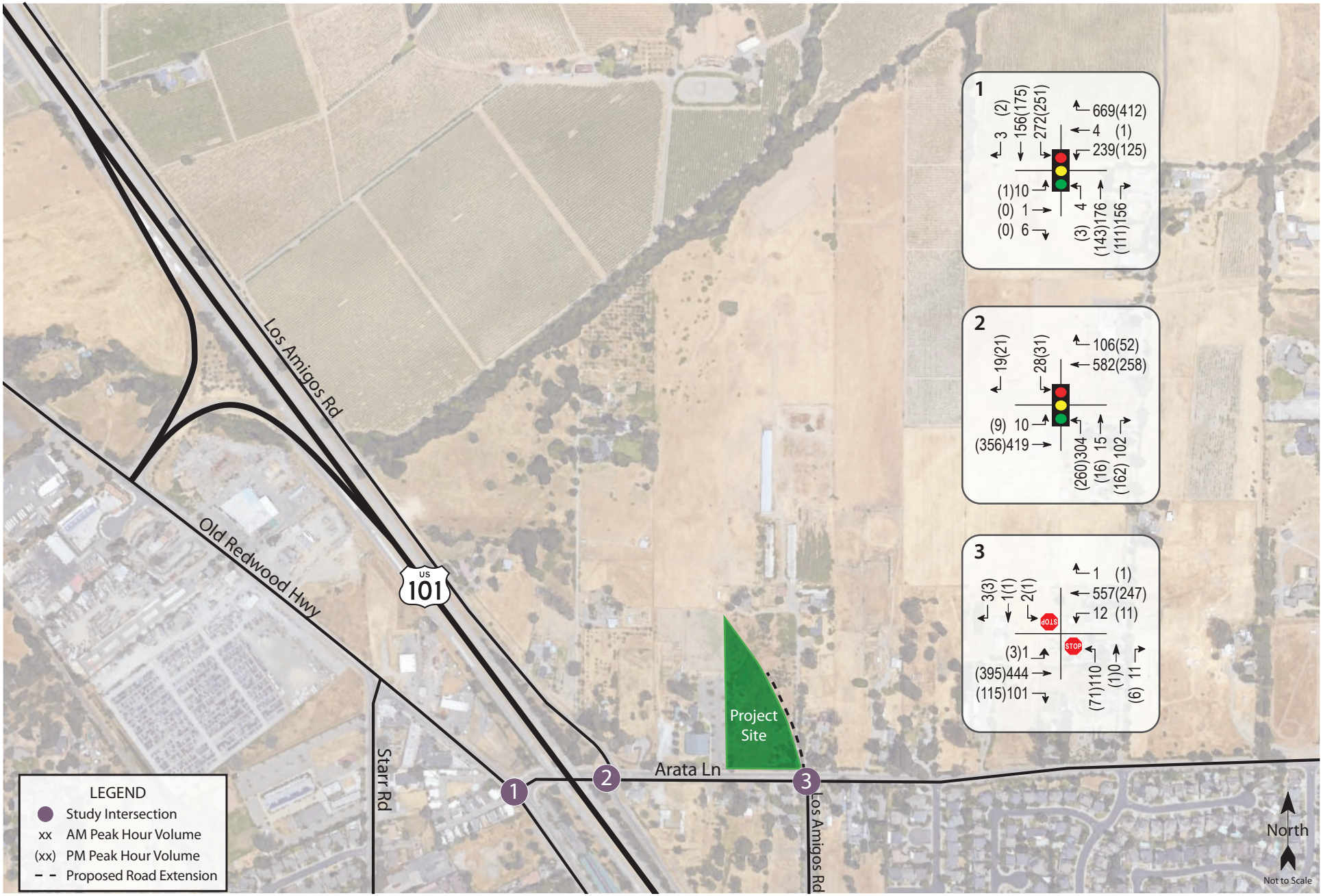



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**Transportation Impact Study for Los Amigos Cottages**

**Figure 4 – Project Traffic Volumes**

W-Trans

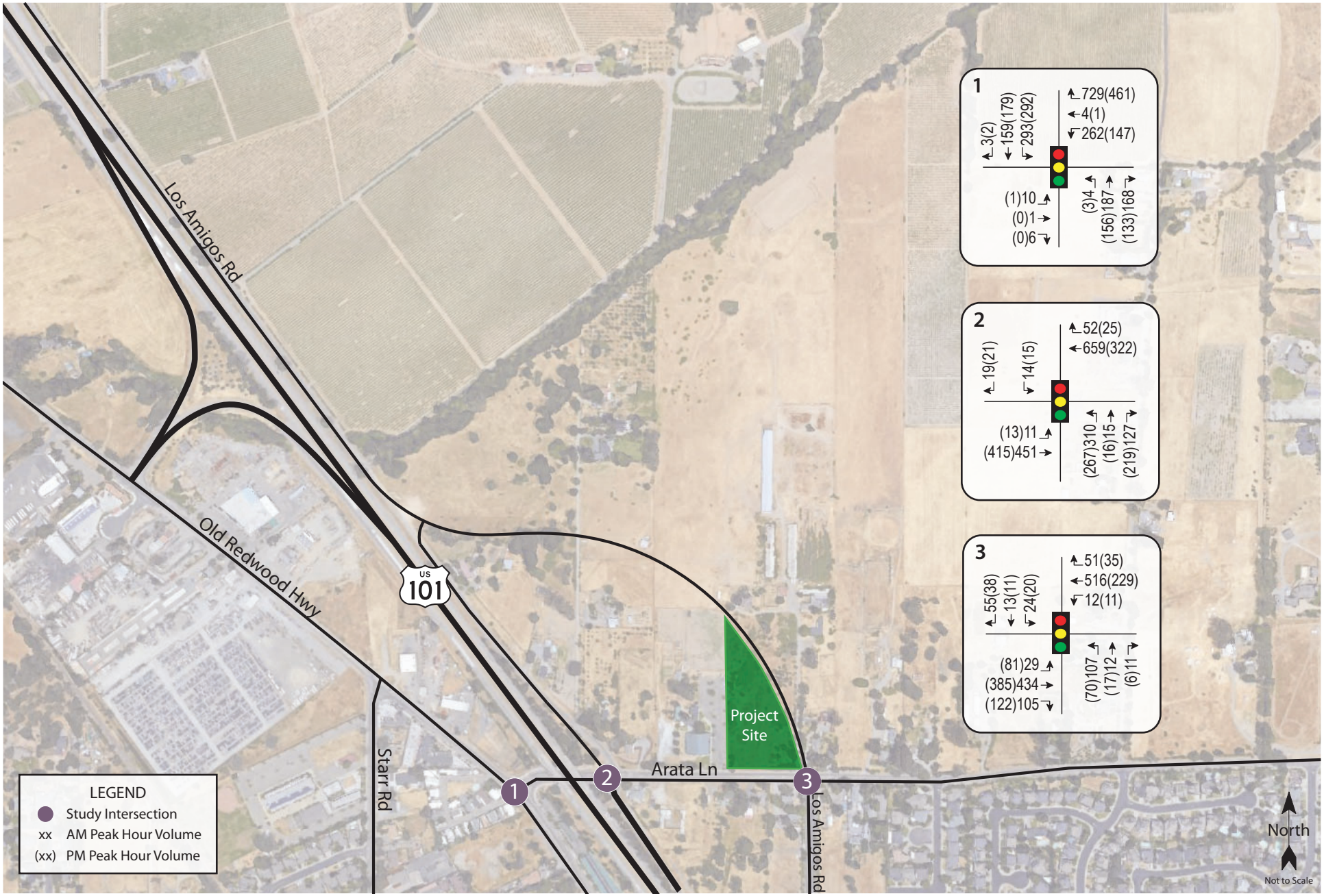



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**Transportation Impact Study for Los Amigos Cottages**

**Figure 5 – Existing plus Project Traffic Volumes**

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Transportation Impact Study for Los Amigos Cottages

**Figure 6 – Baseline plus Project Traffic Volumes**

W-Trans

**Table 11 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service**

| Study Intersection | | Baseline Conditions | | | | Baseline plus Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1. | Old Redwood Hwy/Arata Ln | 21.0 | C | 13.0 | B | 21.2 | C | 13.1 | B |
| 2. | Arata Ln/Los Amigos Rd-US 101 N Off-Ramp | 8.5 | A | 9.5 | A | 8.5 | A | 10.0 | A |
| 3. | Arata Ln/Los Amigos Rd[1] | 13.6 | B | 4.6 | A | 14.2 | B | 4.9 | A |
| | *Northbound Los Amigos Rd* | ***121.2*** | *F* | *30.6* | *D* | ***126.0*** | ***F*** | *32.0* | *D* |
| | With Planned Signalization[1] | 13.3 | B | 12.2 | B | 13.4 | B | 12.4 | B |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; [1] intersection is anticipated to be signalized by Quail Acres project under Baseline conditions

Consideration was given to whether installation of all-way stop-controls at the Arata Lane/Los Amigos Road would be an effective interim strategy to improve operation if the planned signal is not constructed under Baseline conditions. It was determined that all-way stop-controls would operate at LOS F overall during the a.m. peak hour; while operation on the individual northbound Los Amigos Road approach would improve from LOS F to LOS B, conditions would deteriorate substantially from LOS A to LOS F on the eastbound and westbound Arata Lane approaches. This finding reinforces the importance of signalizing the intersection in the coming years, and ensuring that the intersection can be further improved through conversion to a modern roundabout in the future.

**Finding** – Upon the addition of project-generated traffic to Baseline Conditions and without the planned signal to be constructed by the proposed Quail Acres development project, the northbound approach at Arata Lane/Los Amigos Road would continue to encounter LOS F conditions. The Los Amigos Cottages development would increase overall intersection delays by 0.6-seconds, which is not considered to be an adverse project-related effect per the Town's guidelines. The intersection would operate acceptably upon completion of the planned signalization included as part of the Quail Acres project.

# Conclusions and Recommendations

## Conclusions

- An analysis of the collision history indicates no safety concerns at any of the study intersections, and during the five-year study period there were no reported collisions involving pedestrians or bicyclists.
- The proposed project is anticipated to generate an average of 288 trips per day, including 21 trips during the a.m. peak hour and 27 during the p.m. peak hour.
- The project would provide effective linkages to the surrounding pedestrian network, including schools, recreation areas, and shopping areas, and are compliant with Town policy.
- Bicycle facilities serving the project site would effectively link to the surrounding bicycle network. Facilities proposed as part of the project comply with Town policy.
- Transit facilities serving the project site are generally adequate. No changes are proposed as part of the project that would conflict with Town policy.
- The proposed configurations of private onsite roadways and Los Amigos Road frontage improvements to be constructed by the Los Amigos Cottages developer are consistent with the Town's *Complete Street Design Guidelines*.
- The proposed configuration of the project's Arata Lane frontage including one westbound vehicle travel lane as well as right-of-way dedication to the Town of Windsor allowing the Five-Lane Boulevard cross-section to be constructed in the future, is consistent with the CSDG and General Plan Policy M-3.25.
- The proposed Los Amigos Cottages site layout and frontage improvements would accommodate future construction of a roundabout at the Arata Lane/Los Amigos Road intersection, though a small area near the southeast corner of the site would need to remain free of fences or taller landscaping to ensure adequate upstream sight distance with a roundabout.
- The project would not qualify for any of the VMT screening parameters identified by the Town of Windsor.
- After accounting for the proposed density and provision of onsite affordable housing units, the project as proposed would be expected to result in a less-than-significant impact on VMT.
- Sight distances at both of the project street connections would equal or exceed the recommended minimum in both directions. Left-turn lanes are not warranted on Arata Lane and Los Amigos Road at the project streets under Existing plus Project and Baseline plus Project volumes during either peak period.
- 95$^{th}$ percentile queues would remain within the available storage at all intersections, with the exception of the northbound left-turn lane at Arata Lane/Los Amigos Road, which would exceed storage both with and without the Los Amigos Project during the a.m. peak hour if the planned improvements to be made by the proposed Quail Acres development are not constructed. Los Amigos Cottages would increase these 95$^{th}$ percentile queues by three feet, which is not considered to be a significant project-related impact per the Town's guidelines.
- The project would not introduce any hazardous design elements and would therefore have a less-than-significant impact on safety.

- The proposed roadway network, including connectivity to existing and future roads, would provide adequate emergency circulation and access. The project, including all future improvement plans, will be subject to review and approval by the Town's Fire Marshal.

- Under Existing plus Project Conditions, the Los Amigos Cottages would increase average delays at the intersection of Arata Lane/Los Amigos Road intersection by 0.2 seconds, and would further increase delays on the northbound approach that is already operating at LOS F. Because average delays would increase by less than five seconds, however, this is not considered to be an adverse project effect on traffic operation per the Town's guidelines.

- Upon the addition of project-generated traffic to Baseline Conditions and without the planned signal to be constructed by the proposed Quail Acres development project, the northbound approach at Arata Lane/Los Amigos Road would continue to encounter LOS F conditions. The Los Amigos Cottages development would increase overall intersection delays by 0.6-seconds, which is not considered to be an adverse project-related effect per the Town's guidelines. The intersection would operate acceptably upon completion of the planned signalization to be completed by the Quail Acres project.

## Recommendations

- The project should be responsible for installing or funding the installation of a crosswalk with high-visibility signage and markings as well as street lighting on the west leg of the Arata Lane/Los Amigos Road intersection if the planned signalization of the intersection has not occurred prior to project occupancy.

- The existing striping on Arata Lane at the project street should be modified to provide a break in the painted median, allowing drivers to legally turn left into and out of the project site.

- Landscaping plans should ensure that an approximately 30-square foot triangular-shaped area on the southeastern corner of the project site near the Arata Lane/Los Amigos Road intersection will remain free of fences or landscaping exceeding two feet in height to maintain acceptable upstream sight distance if a future roundabout is installed at the intersection. Alternatively, an easement to the Town of Windsor could be established for this area if deemed necessary by the Public Works Department.

## Summary of Circulation Improvement Responsibilities

The Los Amigos Cottages development should be responsible for the following circulation improvements.

- Construct a new segment of Los Amigos Road along the project's eastern frontage including two 11-foot vehicle travel lanes and a two-foot northbound shoulder, as well as an eight-foot wide on-street parking zone, a six-foot bike lane with three-foot buffer, and an 11-foot sidewalk along the project frontage.
- Construct frontage improvements on Arata Lane that will result in a cross-section maintaining the current 10-foot wide eastbound through lane, 6-foot wide bike lane, and 10-foot wide center turn lane, as well as widening on the project frontage to accommodate an 11-foot westbound through lane, six-foot bike lane with three-foot buffer, and 11-foot sidewalk with 4-foot tree wells.
- Construct or fund the installation of a crosswalk with high-visibility signage and markings as well as street lighting on the west leg of the Arata Lane/Los Amigos Road intersection if the planned signalization of the intersection has not occurred prior to project occupancy.
- Dedicate right-of-way along the site's Arata Lane frontage, allowing the Town to widen Arata Lane to accommodate a Five-Lane Boulevard cross section in the future.
- Modify the existing striping on Arata Lane at the project street to provide a break in the painted median.
- Ensure that an approximately 30-square foot triangular-shaped area on the southeastern corner of the project site near the Arata Lane/Los Amigos Road intersection will remain free of fences or landscaping exceeding two feet in height, or if required by the Town's Public Works Department, establish an easement to the Town in this area.

Other Proposed Developments on Los Amigos Road Extension (including Quail Acres) will be responsible for the following improvements.

- Construct additional widening on the east side of the Los Amigos Road extension near Los Amigos Cottages to include a buffered bike lane and sidewalks.
- Construct the full Los Amigos Road extension to the northern Town limits including auto, pedestrian, and bicycle facilities.
- Install a traffic signal at the Arata Lane/Los Amigos Road intersection. For proposed developments abutting the intersection, continue to ensure that sufficient right-of-way will be dedicated to the Town for future construction of a roundabout.

Other Proposed Developments on Arata Lane and the Town of Windsor will be responsible for the following improvements.

- As part of frontage improvements to be constructed by other future private development projects, construct additional widening on the south side of Arata Lane near Los Amigos Cottages as well as the segment of Arata Lane to the east toward US 101 to include Class IV separated bikeways and sidewalks.
- Private development projects will also be required to dedicate sufficient right-of-way to allow the Town of Windsor to further widen Arata Lane, if and when it is deemed necessary, to the five-lane boulevard cross-section identified in the Town's General Plan between Old Redwood Highway and Los Amigos Road.

# Study Participants and References

## Study Participants

| | |
|---|---|
| **Principal in Charge** | Zachary Matley, AICP |
| **Assistant Engineer** | Gabriel Ramos, EIT |
| **Graphics** | Jessica Bender |
| **Editing/Formatting** | Rebecca Mansour, Jessica Bender |
| **Quality Control** | Dalene J. Whitlock, PE (Civil, Traffic), PTOE |

## References


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# Appendix A

## Collision Rate Calculations

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## Intersection Collision Rate Worksheet

**Los Amigos Cottages**

**Intersection # 1:** Old Redwood Hwy & Arata Ln
**Date of Count:** Wednesday, September 27, 2023

**Number of Collisions:** 2
**Number of Injuries:** 0
**Number of Fatalities:** 0
**Average Daily Traffic (ADT):** 12100
**Start Date:** October 1, 2019
**End Date:** September 30, 2024
**Number of Years:** 5

**Intersection Type:** Four-Legged
**Control Type:** Signals
**Area:** Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{2 \times 1{,}000{,}000}{12{,}100 \times 365 \times 5}$$

| | Collision Rate | Fatality Rate | Injury Rate |
|---|---|---|---|
| **Study Intersection** | **0.09 c/mve** | **0.0%** | **0.0%** |
| **Statewide Average*** | **0.33 c/mve** | **0.6%** | **47.7%** |

**Notes**
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2022 Collision Data on California State Highways, Caltrans

**Intersection # 2:** Arata Ln & Los Amigos Rd-US 101 North Off-Ramp
**Date of Count:** Wednesday, September 27, 2023

**Number of Collisions:** 6
**Number of Injuries:** 3
**Number of Fatalities:** 0
**Average Daily Traffic (ADT):** 11400
**Start Date:** October 1, 2019
**End Date:** September 30, 2024
**Number of Years:** 5

**Intersection Type:** Four-Legged
**Control Type:** Signals
**Area:** Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{6 \times 1{,}000{,}000}{11{,}400 \times 365 \times 5}$$

| | Collision Rate | Fatality Rate | Injury Rate |
|---|---|---|---|
| **Study Intersection** | **0.29 c/mve** | **0.0%** | **50.0%** |
| **Statewide Average*** | **0.33 c/mve** | **0.6%** | **47.7%** |

**Notes**
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2022 Collision Data on California State Highways, Caltrans

## Intersection Collision Rate Worksheet

**Los Amigos Cottages**

**Intersection # 3:** Arata Ln & Los Amigos Rd
**Date of Count:** Sunday, September 27, 2020

**Number of Collisions:** 1
**Number of Injuries:** 0
**Number of Fatalities:** 0
**Average Daily Traffic (ADT):** 8400
**Start Date:** October 1, 2019
**End Date:** September 30, 2024
**Number of Years:** 5

**Intersection Type:** Tee
**Control Type:** Signals
**Area:** Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{1 \times 1{,}000{,}000}{8{,}400 \times 365 \times 5}$$

| | Collision Rate | Fatality Rate | Injury Rate |
|---|---|---|---|
| **Study Intersection** | **0.07 c/mve** | **0.0%** | **0.0%** |
| **Statewide Average*** | **0.28 c/mve** | **0.9%** | **49.1%** |

**Notes**
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2022 Collision Data on California State Highways, Caltrans

# Appendix B

## Arata Lane Operational Study Letter Report

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March 18, 2024

Mr. Ben VanZutphen
Willowglen Homes
P.O. Box 2357
Healdsburg, CA 95448

# Evaluation of the Long-Range Configuration for Arata Lane Between US 101 and Los Amigos Road

Dear Mr. VanZutphen;

As requested, W-Trans has prepared a focused assessment of the roadway configuration needed to accommodate volumes anticipated in the long-term on Arata Lane between US 101 and Los Amigos Road. This information has been requested by the Town to determine the appropriate ultimate configuration of Arata Lane along the frontage of the proposed Los Amigos Cottages development, including consideration of both signal and roundabout options at the Arata Lane/Los Amigos Road intersection.

## Study Parameters

### Analysis Scenarios

The analysis scenarios reflect future conditions during the weekday a.m. and p.m. peak hours.

### Future Interchange Modifications

Future infrastructure improvements at the Arata Lane/US 101 interchange include a new northbound on-ramp as well as widening of the underpass to accommodate five vehicle travel lanes on Arata Lane, consistent with the Town's General Plan. Lane configurations at the interchange were chosen to best manage traffic flow and queues for the purposes of this analysis.

### Future Traffic Projections

Future traffic projections for the study area were developed using the SCTA travel demand model, which has a forecast year of 2040, consistent with the Town of Windsor General Plan. The SCTA model was recently used to establish updated 2040 traffic projections that reflect current development proposals for the proposed Quail Acres project. For the purposes of this analysis, the "Quail Acres 2" project, including a new school, was included in the future projections since this potential development scheme for the Quail Acres site results in higher traffic volumes than other potential development scenarios. The future traffic projections were further refined to include traffic associated with the proposed Los Amigos Cottages development. This site was previously assumed in the General Plan and SCTA modeling to include retail uses but would instead include 32 single family homes if the Los Amigos Cottages project is approved and built. This land use modification results in modest changes to future volumes from those applied in the Quail Acres traffic studies. In addition to Quail Acres and Los Amigos Cottages, the future traffic projections account for anticipated growth throughout Windsor and the County, including potential traffic that could be generated by other nearby projects such as the Arata Lane Hotel and continued residential development in the North of Arata area.

## Queuing and Operational Analysis

### Study Design

The long-range configuration needed on the Arata Lane study segment is influenced by traffic volumes, the need to maintain acceptable Levels of Service (LOS) at intersections, and the need to provide adequate traffic flow. Understanding traffic flow characteristics involving multiple intersections – particularly with respect to queuing and driver lane choices near freeway interchanges – may be accomplished through simulation of the corridor. Review of simulations, in tandem with the outputs produced by simulation software and accompanying traffic

analysis software, reveals how corridors are likely to be used by drivers. It also helps identify where lane capacity is and is not needed, which is the key question for the subject segment of Arata Lane.

This analysis was performed using Synchro to assess signalized intersection LOS and 95th percentile queues, SIDRA to assess roundabout LOS and 95th percentile queues, and Simtraffic to conduct simulations demonstrating how the network and lanes function as a system. Simtraffic relies on the inputs entered in Synchro and randomly "seeds" vehicle arrivals to capture the typical day-to-day variations in traffic flow, therefor resulting in different results for every iteration of the analysis. The maximum observed queues on the study segment of Arata Lane were calculated by averaging the results of ten Simtraffic runs for each scenario. This includes the eastbound queues created by the signal or roundabout at Arata Lane/Los Amigos Road, as well as the westbound queues created by the signal at the Arata Lane/US 101 North Ramps intersection.

Through testing of the scenarios, it was determined that two slightly different roundabout configurations at Arata Lane/Los Amigos Road needed to be simulated. The first consists of a single-lane roundabout. The second is a single-lane roundabout with an eastbound right-turn "slip" lane. Screenshots of the three Synchro/Simtraffic networks developed for this analysis are enclosed for reference.

## Analysis Results

The operational and simulation results indicate that Arata Lane requires a five-lane cross section (generally consisting to two lanes in each direction plus a center median or turn lanes) between Old Redwood Highway and approximately 350-feet east of the US 101 North Ramps intersection, regardless of the traffic control used at Arata Lane/Los Amigos Road. Between approximately 350-feet east of the US 101 North Ramps intersection and Los Amigos Road, Arata Lane would need one lane in each direction plus a center median or turn lanes if the intersection at Arata Lane/Los Amigos Road is signalized. If a roundabout is constructed at Arata Lane/Los Amigos Road, a second lane in the eastbound direction (on the south side of Arata Lane) would be needed. Details of the necessary configuration follow below.

### Signal at Arata Lane/Los Amigos Road

The five-lane Arata Lane cross section should extend approximately 350 feet to the east of the US 101 North Ramps intersection, roughly corresponding to the frontage of the proposed Arata Hotel project. At that point, eastbound Arata Lane could merge to a single through lane as it approaches Los Amigos Road, with the center two-way left-turn lane striped as a left-turn pocket at the Los Amigos Road signal. Heading westbound from Los Amigos Road, Arata Lane would require a single lane until just west of the Newsong Church driveway (approximately 350 feet east of the US 101 North Ramps intersection) before widening to two lanes. Arata Lane should include one eastbound through lane, one eastbound left-turn lane, and one westbound lane along the Los Amigos Cottage frontage.

With this signalized configuration, westbound traffic departing the Arata Lane/Los Amigos Road intersection would originate from single through or turn lanes on each of the intersection's approaches, and Arata Lane would require one westbound lane along the Los Amigos Cottage frontage.

### Roundabout at Arata Lane/Los Amigos Road

A single-lane roundabout was tested using the same transition point between a five- and three-lane cross section as described above for the signal (approximately 350 feet east of the US 101 North Ramps intersection). With this configuration, both Simtraffic and SIDRA indicate that the eastbound queue approaching the roundabout would extend approximately 800 to 850 feet during the p.m. peak hour, through the upstream intersection at Arata Lane/US 101 North ramps. To alleviate this queuing condition, the second roundabout configuration including an eastbound right-turn "slip" lane onto southbound Los Amigos Road was developed. With the added slip lane and maintaining two eastbound lanes the entire length of Arata Lane between US 101 and Los Amigos Road, peak hour queues are projected to remain well within the available storage.

With either roundabout configuration, westbound traffic departing the Arata Lane/Los Amigos Road intersection would originate from single lanes on each of the roundabout approaches, and Arata Lane would require one westbound lane along the Los Amigos Cottage frontage.

The positioning of the potential roundabout was evaluated to optimize operation and safety, and to minimize the amount of potential realignment and right-of-way acquisition needed on the approaches. Provision of an eastbound right-turn slip lane at the roundabout would require additional right-of-way on the south side of Arata Lane. The slip lane would not necessitate additional right-of-way acquisition on the Los Amigos Cottages frontage on the north side of the street.

A summary of the future queue lengths on the Arata Lane study segment as projected using simulation are summarized in Table 1.

**Table 1 – Future Queue Lengths on Arata Lane between US 101 and Los Amigos Road (Simulation)**

| **Arata Ln Approach** | **Storage** | **Control Type at Arata Ln/Los Amigos Rd** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Traffic Signal** | | **Single-Lane Roundabout** | | **Roundabout with EB Slip Lane** | |
| | | **AM** | **PM** | **AM** | **PM** | **AM** | **PM** |
| Eastbound Queue at Los Amigos Rd | 770 | 451 | 509 | 340 | **852** | 330 | 197 |
| *Lane and Median Configuration on Los Amigos Cottages Frontage* | | *1 EB Through/Right turn<br>1 EB Left turn<br>1 WB Lane* | | *1 EB Lane<br>Raised Median<br>1 WB Lane* | | *1 EB Through/Left turn<br>1 EB Right turn<br>Raised Median<br>1 WB Lane* | |
| Westbound Queue at US 101N Ramps | 770 | 501 | 306 | 501 | 306 | 501 | 306 |
| *Lane and Median Configuration on Proposed Arata Hotel Frontage* | | *2 EB Lanes<br>Center Turn Lane<br>2 WB Lanes* | | *2 EB Lanes<br>Center Turn Lane<br>2 WB Lanes* | | *2 EB Lanes<br>Center Turn Lane<br>2 WB Lanes* | |

Notes: Queues measured in feet; Simulation results based on 10 randomly-seeded runs and reflect the average of maximum observed queues; **Bold**=maximum queues exceed available storage; EB=Eastbound; WB=Westbound

For the purposes of comparing simulation results to calculated values and to provide additional information on how queuing and performance at the Arata Lane/Los Amigos Road intersection would vary for different types of traffic control, the calculated 95$^{th}$ percentile queues on all four approaches as well as overall LOS grades were obtained from Synchro and SIDRA. These results are summarized in Table 2.

**Table 2 – Future 95th Percentile Queue Lengths and LOS at Arata Lane/Los Amigos Road (Calculated)**

| Arata Ln Approach | Storage | Control Type at Arata Ln/Los Amigos Rd | | | | | |
|---|---|---|---|---|---|---|---|
| | | Traffic Signal | | Single-Lane Roundabout | | Roundabout with EB Slip Lane | |
| | | AM | PM | AM | PM | AM | PM |
| Northbound Los Amigos Rd | 700 | 115 | 96 | 36 | 42 | 35 | 42 |
| Southbound Los Amigos Rd | 420 | 221 | 117 | 316 | 89 | 316 | 89 |
| Eastbound Arata Ln | 770 | 445 | 592 | 244 | **813** | 244 | 325 |
| Westbound Arata Ln | 500 | **769** | 463 | 475 | 130 | 475 | 131 |
| Overall Intersection LOS | - | D | C | C | B | C | B |
| Lane and Median Configuration on Los Amigos Cottages Frontage | - | 1 EB Through/Right turn<br>1 EB Left turn<br>1 WB Lane | | 1 EB Lane<br>Raised Median<br>1 WB Lane | | 1 EB Through/Left turn<br>1 EB Right turn<br>Raised Median<br>1 WB Lane | |

Notes: Queues are 95th percentile measured in feet; Results based on calculations obtained from Synchro (signalized) and SIDRA (roundabout); **Bold**=95% queues exceed available storage; LOS=Level of Service; EB=Eastbound; WB=Westbound

While not directly relevant to the Arata Lane study segment that is the subject of this analysis, it is noted that with a traffic signal, 95th percentile queues on westbound Arata Lane approaching the Los Amigos Road intersection would extend approximately 769 feet during the a.m. peak hour, exceeding the 500-foot distance to the upstream unsignalized intersection at Marcela Lane. Such queues, if they do develop, are likely to occur primarily during peak school traffic periods in the morning. Marking "KEEP CLEAR" legends at the Marcela Lane intersection could address this issue. These westbound queues are not projected to extend to Marcela Lane with a roundabout.

Finally, with respect to intersection LOS at Arata Lane/Los Amigos Road, operation is expected to comply with the Town's LOS D standard with a signal or either of the roundabout options. For the Arata Lane study segment, decisions about the roadway cross-section appear to be tied more to corridor operation and queuing than LOS.

### Findings

Because the Town is considering implementation of a roundabout at Arata Lane/Los Amigos Road in the future, and because the analysis contained herein indicates that two eastbound lanes on Arata Lane should be provided with a roundabout, it is recommended that the Town continue to condition development projects on the south side of Arata Lane between Old Redwood Highway and Los Amigos Road to accommodate two eastbound lanes. Similarly, future development projects on the north side of Arata Lane should accommodate two westbound lanes between Old Redwood Highway and approximately 350-feet east of the US 101 North Ramps intersection (just west of the Newsong Church driveway). On the remaining segment of Arata Lane between the Newsong Church driveway and Los Amigos Road, including the proposed Los Amigos Cottages project frontage, a single westbound lane would effectively accommodate future traffic volumes.

## Comparison to General Plan and the General Plan EIR

### Traffic Forecasts

The future traffic projections used in this analysis were obtained using the most recent SCTA travel demand model, as adjusted to reflect the proposed Quail Acres and Los Amigos Cottages developments. The proposed Quail Acres development includes no retail/commercial uses, and future retail/commercial development to the northeast of

the Arata Lane/Los Amigos Road intersection would be limited to what is referred to as the Hindmarsh parcel. The combined Quail Acres and Hindmarsh parcels would have less commercial development than envisioned in the General Plan. Additionally, the Los Amigos Cottages site on the northwest corner of Arata Lane/Los Amigos Road is proposed to be developed with residential uses rather than commercial uses as envisioned in the General Plan. The effects of converting some of the potential commercial uses to residential uses in this area of Windsor result in a modest reduction to future traffic volume forecasts.

The SCTA travel demand model used to develop future volume estimates has also undergone two major updates since being used for the General Plan 2040 EIR. Each model update incorporates numerous factors, including but not limited to calibration to real-world traffic volumes, updates to existing and long-range land use inventory data, refinement of network (road, transit, and bike) configurations to improve accuracy, and updates to align the model with regional and economic growth projections used by ABAG and MTC. With each major model update, future traffic projections have tended to trend downward slightly from the prior model in most areas including northern Windsor.

In comparing the future traffic projections applied in this focused Arata Lane analysis to those applied in the General Plan EIR, the current projections were found to be approximately eight to 10 percent lower, which is remarkably similar considering the time elapsed and influences described above. While the current forecasts are slightly lower, they would still be considered generally equivalent to those used in the General Plan to identify future roadway capacity needs.

### Roadway Classification

The General Plan identifies the segment of Arata Lane between Old Redwood Highway and Los Amigos Road as a "5 Lane Crosstown" street, which includes two lanes in each direction plus center median or turn lanes. In determining the appropriate roadway classification during the General Plan update process, projected daily traffic volumes on roadway segments between arterial and/or major collector intersections are typically used. The use of daily projections on longer segments (rather than block-by-block) is commensurate with the high-level nature of a General Plan. Most General Plan circulation elements, including Windsor's Transportation and Mobility Element, intentionally do not address block- or intersection-level details such as the number and configurations of turn lanes or where lane additions and drops occur since such components are beyond the inherent breadth of a General Plan.

The focused Arata Lane evaluation summarized in this letter constitutes a "micro" level of analysis that provides a far finer-grained level of detail than was performed for the General Plan and General Plan EIR, examining specific details including turn pocket lengths and specific areas where the transitions between one and two through lanes should occur. Based on the results of the analysis, the "5 Lane Crosstown" street designation identified in the General Plan for Arata Lane between Old Redwood Highway and Los Amigos Road remains appropriate, and represents the cross-section needed to accommodate future traffic on the majority of this segment. The entirety of the segment would include two eastbound lanes and a center median or turn lanes, and all but the easternmost portion of the segment would include two westbound lanes. The provision of a single westbound lane just east of Los Amigos Road is a function of the Arata Lane/Los Amigos Road's configuration with either a signal or roundabout and would not constitute an inconsistency with the 5 Lane Crosstown street designation.

## Conclusions

Following are the key findings of the analysis.

- As identified in the Town's General Plan, Arata Lane should ultimately consist of a five-lane cross-section through and near the US 101 freeway interchange.

- For approximately 350 feet east of the US 101 North ramps intersection, Arata Lane should include two through lanes in each direction plus a center turn lane. This includes the segment along the frontage of the proposed Arata Hotel development.

- Between the eastern boundary of the proposed Arata Hotel development and Los Amigos Road, the necessary roadway cross-section on Arata Lane would vary based on the traffic control implemented at the Arata Lane/Los Amigos Road intersection.

    - With a traffic signal at Los Amigos Road, eastbound Arata Lane could merge to a single through lane approximately 350 feet east of the US 101 North Ramps intersection. The segment would include a center turn lane that becomes an eastbound left-turn lane at Los Amigos Road.

    - With a roundabout at Los Amigos Road, Arata Lane should include two eastbound lanes, with the outer lane becoming a right-turn only "slip" lane at the Los Amigos Road intersection. The segment would include a center turn lane that becomes a raised splitter island (median) near the roundabout.

    - Because the Town is considering implementation of a roundabout at Arata Lane/Los Amigos Road in the future, development projects on the south side of Arata Lane between Old Redwood Highway and Los Amigos Road should continue to be conditioned to accommodate two eastbound lanes.

    - With either a traffic signal or roundabout, westbound Arata Lane would function acceptably with a single lane between Los Amigos Road and just west of the Newsong Church driveway (approximately 350 feet east of the US 101 North Ramps intersection) before widening to two westbound lanes.

- The Arata Lane frontage of the Los Amigos Cottages development would require a single westbound lane with either a signal or roundabout at the Arata Lane/Los Amigos Road intersection. Provision of an eastbound right-turn slip lane at the roundabout as recommended is anticipated to require additional right-of-way on the south side of Arata Lane but would not affect the Los Amigos Cottages frontage.

- Intersection LOS at Arata Lane/Los Amigos Road is projected to be acceptable with a traffic signal, a single-lane roundabout, and a single-lane roundabout with an eastbound slip lane.

- The 5 Lane Crosstown street classification identified for Arata Lane between Old Redwood Highway and Los Amigos Road remains appropriate; the provision of a single westbound lane between Los Amigos Road and just west of the Newsong Church driveway is a function of the Arata Lane/Los Amigos Road's configuration and would not constitute an inconsistency with the 5 Lane Crosstown street designation.

Thank you for giving W-Trans the opportunity to provide these services. Please call if you have any questions.

Sincerely,

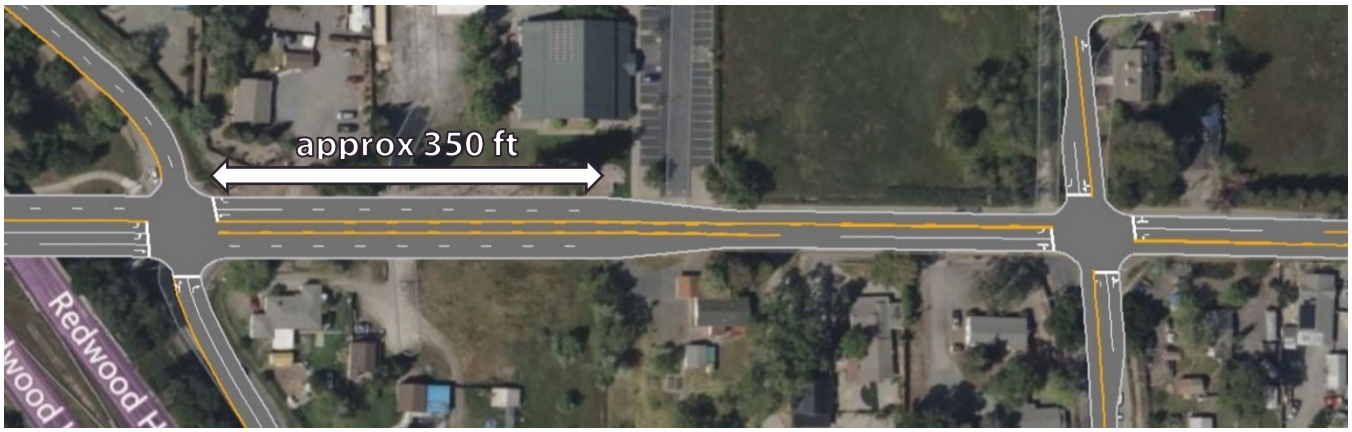
Zachary Matley, AICP
Principal

JZM/WIN168.L1

Enclosure: Synchro Network Screenshots

# Synchro Network Screenshots

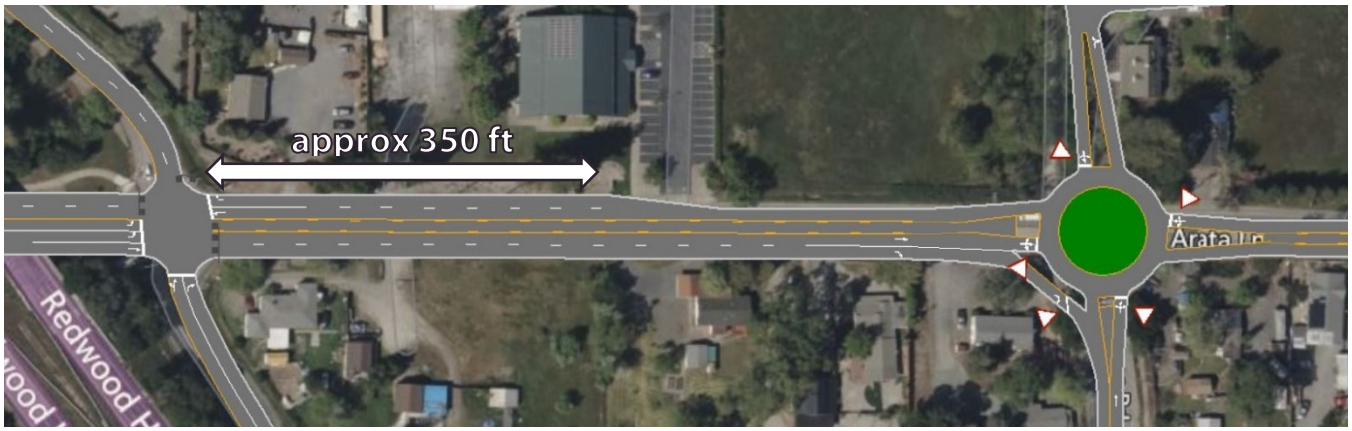
### Traffic Signal at Arata Lane/Los Amigos Road




### Single-Lane Roundabout at Arata Lane/Los Amigos Road




### Roundabout with Eastbound Slip Lane at Arata Lane/Los Amigos Road



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# Appendix C

## Turn Lane Warrants

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# Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Arata Lane/LAC Driveway
Study Scenario: AM Peak Hour - Existing plus Project

Direction of Analysis Street: East/West
Cross Street Intersects: From the North

**Arata Lane**

Westbound Volumes (veh/hr)
Through Volume = 670
Right Turn Volume = 1

Westbound Speed Limit: 40 mph
Westbound Configuration: 2 Lanes - Undivided

**LAC Driveway**

**Arata Lane**

Eastbound Volumes (veh/hr)
544 = Through Volume
4 = Left Turn Volume

Eastbound Speed Limit: 40 mph
Eastbound Configuration: 2 Lanes - Undivided

---

### Westbound Right Turn Lane Warrants

1. Check for right turn volume criteria

**Thresholds not met, continue to next step**

2. Check advance volume threshold criteria for turn lane

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | 1042.6 |
| Advancing Volume | Va = | 671 |
| If AV<Va then warrant is met | | No |

Right Turn Lane Warranted: **NO**

### Westbound Right Turn Taper Warrants
**(evaluate if right turn lane is unwarranted)**

1. Check taper volume criteria

**NOT WARRANTED - Less than 20 vehicles**

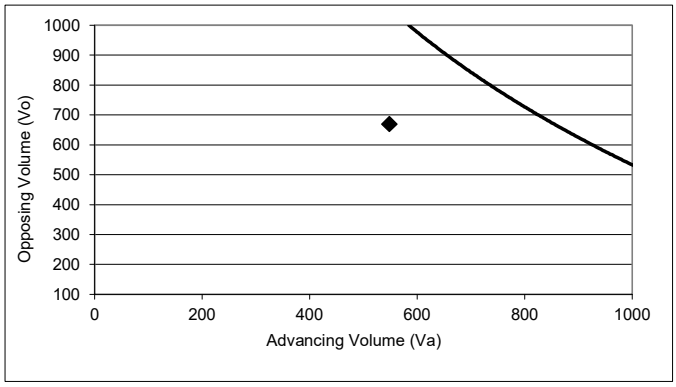
2. Check advance volume threshold criteria for taper

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | - |
| Advancing Volume | Va = | 671 |
| If AV<Va then warrant is met | | - |

Right Turn Taper Warranted: **NO**

### Eastbound Left Turn Lane Warrants

Percentage Left Turns %lt 0.7 %
Advancing Volume Threshold AV 854 veh/hr
If AV<Va then warrant is met




◆ Study Intersection
Two lane roadway warrant threshold for: 40 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements* , January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

# Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Arata Lane/LAC Driveway
Study Scenario: PM Peak Hour - Existing plus Project

Direction of Analysis Street: East/West
Cross Street Intersects: From the North

**Arata Lane**

Westbound Volumes (veh/hr)
Through Volume = 319
Right Turn Volume = 2

Westbound Speed Limit: 40 mph
Westbound Configuration: 2 Lanes - Undivided

**LAC Driveway**

**Arata Lane**

Eastbound Volumes (veh/hr)
511 = Through Volume
10 = Left Turn Volume

Eastbound Speed Limit: 40 mph
Eastbound Configuration: 2 Lanes - Undivided

---

**Westbound Right Turn Lane Warrants**

1. Check for right turn volume criteria

**Thresholds not met, continue to next step**

2. Check advance volume threshold criteria for turn lane

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | 1035.1 |
| Advancing Volume | Va = | 321 |
| If AV<Va then warrant is met | | No |

Right Turn Lane Warranted: **NO**

**Westbound Right Turn Taper Warrants**
**(evaluate if right turn lane is unwarranted)**

1. Check taper volume criteria

**NOT WARRANTED - Less than 20 vehicles**

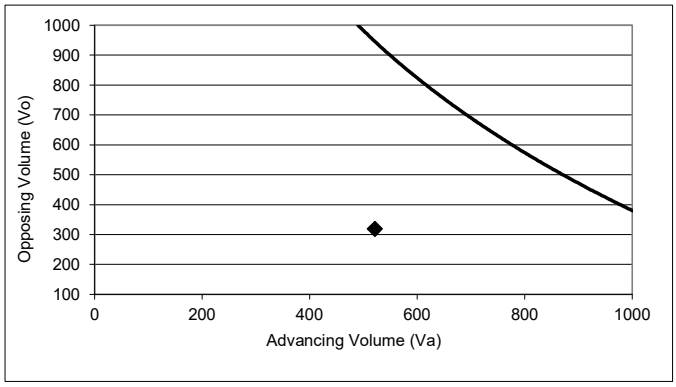
2. Check advance volume threshold criteria for taper

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | - |
| Advancing Volume | Va = | 321 |
| If AV<Va then warrant is met | | - |

Right Turn Taper Warranted: **NO**

**Eastbound Left Turn Lane Warrants**

Percentage Left Turns %lt 1.9 %
Advancing Volume Threshold AV 1072 veh/hr
If AV<Va then warrant is met




◆ Study Intersection
Two lane roadway warrant threshold for: 40 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

# Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Arata Lane/LAC Driveway
Study Scenario: AM Peak Hour - Baseline plus Project

Direction of Analysis Street: East/West
Cross Street Intersects: From the North

**Arata Lane**

Westbound Volumes (veh/hr)
Through Volume = 681
Right Turn Volume = 1

Westbound Speed Limit: 40 mph
Westbound Configuration: 2 Lanes - Undivided

**LAC Driveway**

**Arata Lane**

Eastbound Volumes (veh/hr)
566 = Through Volume
4 = Left Turn Volume

Eastbound Speed Limit: 40 mph
Eastbound Configuration: 2 Lanes - Undivided

---

**Westbound Right Turn Lane Warrants**

1. Check for right turn volume criteria

**Thresholds not met, continue to next step**

2. Check advance volume threshold criteria for turn lane

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | 1042.6 |
| Advancing Volume | Va = | 682 |
| If AV<Va then warrant is met | | No |

Right Turn Lane Warranted: **NO**

**Westbound Right Turn Taper Warrants**
**(evaluate if right turn lane is unwarranted)**

1. Check taper volume criteria

**NOT WARRANTED - Less than 20 vehicles**

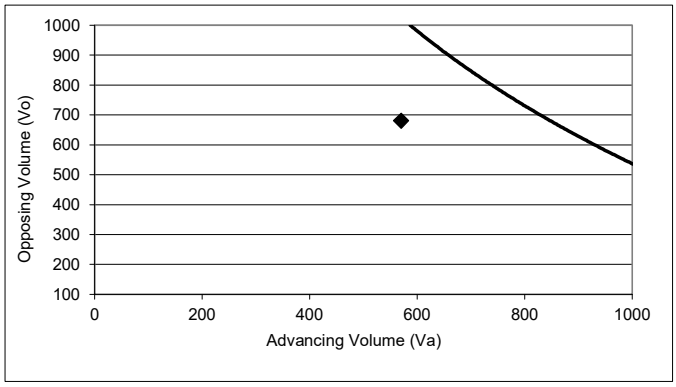
2. Check advance volume threshold criteria for taper

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | - |
| Advancing Volume | Va = | 682 |
| If AV<Va then warrant is met | | - |

Right Turn Taper Warranted: **NO**

**Eastbound Left Turn Lane Warrants**

Percentage Left Turns %lt 0.7 %
Advancing Volume Threshold AV 847 veh/hr
If AV<Va then warrant is met




◆ Study Intersection
Two lane roadway warrant threshold for: 40 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

# Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Arata Lane/LAC Driveway
Study Scenario: PM Peak Hour - Baseline plus Project

Direction of Analysis Street: East/West
Cross Street Intersects: From the North

**Arata Lane**

Westbound Volumes (veh/hr)
Through Volume = 338
Right Turn Volume = 2

Westbound Speed Limit: 40 mph
Westbound Configuration: 2 Lanes - Undivided

**LAC Driveway**

**Arata Lane**

Eastbound Volumes (veh/hr)
589 = Through Volume
10 = Left Turn Volume

Eastbound Speed Limit: 40 mph
Eastbound Configuration: 2 Lanes - Undivided

---

**Westbound Right Turn Lane Warrants**

1. Check for right turn volume criteria

**Thresholds not met, continue to next step**

2. Check advance volume threshold criteria for turn lane

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | 1035.1 |
| Advancing Volume | Va = | 340 |
| If AV<Va then warrant is met | | No |

Right Turn Lane Warranted: **NO**

**Westbound Right Turn Taper Warrants**
**(evaluate if right turn lane is unwarranted)**

1. Check taper volume criteria

**NOT WARRANTED - Less than 20 vehicles**

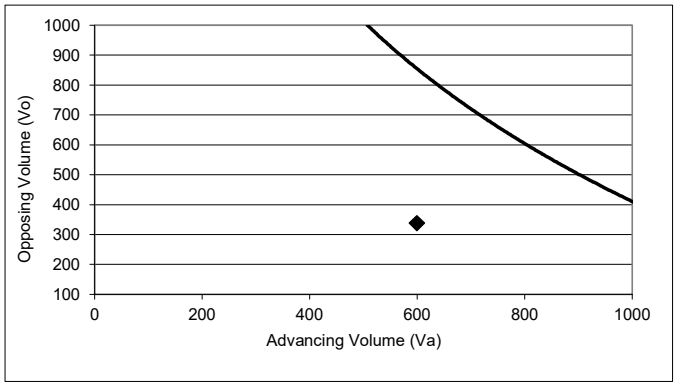
2. Check advance volume threshold criteria for taper

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | - |
| Advancing Volume | Va = | 340 |
| If AV<Va then warrant is met | | - |

Right Turn Taper Warranted: **NO**

**Eastbound Left Turn Lane Warrants**

Percentage Left Turns %lt 1.7 %
Advancing Volume Threshold AV 1087 veh/hr
If AV<Va then warrant is met




◆ Study Intersection
Two lane roadway warrant threshold for: 40 mph
Turn lane warranted if point falls to right of warrant threshold line

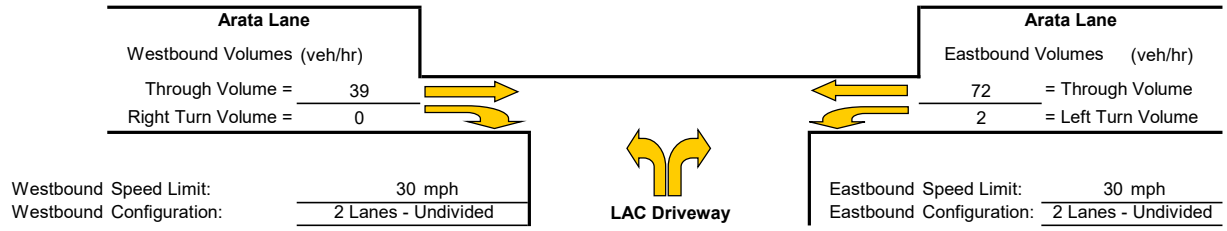
Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements* , January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

# Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Los Amigos Road/LAC Driveway
Study Scenario: AM Peak Hour - Baseline plus Project

Direction of Analysis Street: East/West
Cross Street Intersects: From the North




Westbound Speed Limit: 30 mph
Westbound Configuration: 2 Lanes - Undivided

Eastbound Speed Limit: 30 mph
Eastbound Configuration: 2 Lanes - Undivided

---

**Westbound Right Turn Lane Warrants**

1. Check for right turn volume criteria

**Thresholds not met, continue to next step**

2. Check advance volume threshold criteria for turn lane

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | 1050.1 |
| Advancing Volume | Va = | 39 |
| If AV<Va then warrant is met | | No |

Right Turn Lane Warranted: **NO**

**Westbound Right Turn Taper Warrants**
**(evaluate if right turn lane is unwarranted)**

1. Check taper volume criteria

**NOT WARRANTED - Less than 20 vehicles**

2. Check advance volume threshold criteria for taper

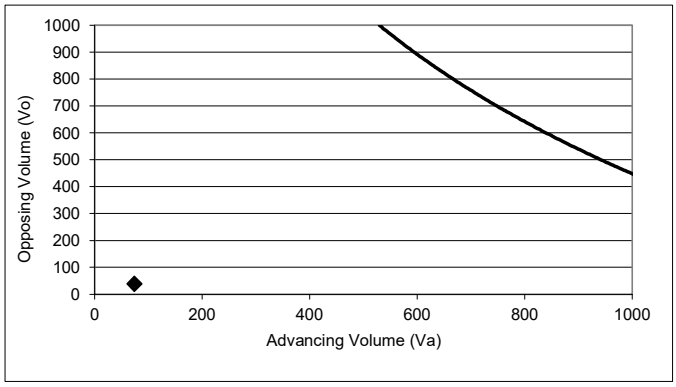
| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | - |
| Advancing Volume | Va = | 39 |
| If AV<Va then warrant is met | | - |

Right Turn Taper Warranted: **NO**

**Eastbound Left Turn Lane Warrants**

| | | |
|---|---|---|
| Percentage Left Turns | %lt | 2.7 % |
| Advancing Volume Threshold | AV | 1601 veh/hr |

If AV<Va then warrant is met




◆ Study Intersection
——— Two lane roadway warrant threshold for: 30 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements* , January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

# Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Los Amigos Road/LAC Driveway
Study Scenario: PM Peak Hour - Baseline plus Project

Direction of Analysis Street: East/West
Cross Street Intersects: From the North

**Arata Lane**

Westbound Volumes (veh/hr)
Through Volume = 33
Right Turn Volume = 0

Westbound Speed Limit: 40 mph
Westbound Configuration: 2 Lanes - Undivided

**LAC Driveway**

**Arata Lane**

Eastbound Volumes (veh/hr)
67 = Through Volume
5 = Left Turn Volume

Eastbound Speed Limit: 40 mph
Eastbound Configuration: 2 Lanes - Undivided

---

### Westbound Right Turn Lane Warrants

1. Check for right turn volume criteria

**Thresholds not met, continue to next step**

2. Check advance volume threshold criteria for turn lane

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | 1050.1 |
| Advancing Volume | Va = | 33 |
| If AV<Va then warrant is met | | No |

Right Turn Lane Warranted: **NO**

### Westbound Right Turn Taper Warrants
**(evaluate if right turn lane is unwarranted)**

1. Check taper volume criteria

**NOT WARRANTED - Less than 20 vehicles**

2. Check advance volume threshold criteria for taper

| | | |
|---|---|---|
| Advancing Volume Threshold | AV = | - |
| Advancing Volume | Va = | 33 |
| If AV<Va then warrant is met | | - |

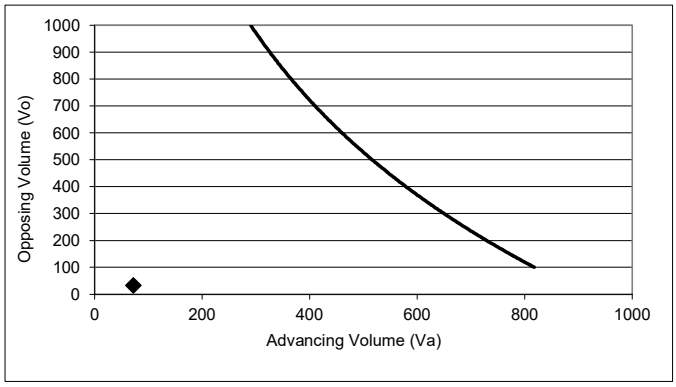
Right Turn Taper Warranted: **NO**

### Eastbound Left Turn Lane Warrants

Percentage Left Turns %lt 6.9 %

Advancing Volume Threshold AV 883 veh/hr

If AV<Va then warrant is met




◆ Study Intersection

Two lane roadway warrant threshold for: 40 mph

Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements* , January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

# Appendix D

## Queueing Calculations

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Queues
1: Old Redwood Hwy & Arata Ln

W-Trans
01/07/2025



| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 19 | 262 | 718 | 4 | 191 | 168 | 295 | 173 |
| v/c Ratio | 0.09 | 0.59 | 0.64 | 0.03 | 0.50 | 0.38 | 0.60 | 0.18 |
| Control Delay | 29.5 | 28.8 | 4.9 | 37.0 | 30.4 | 8.2 | 27.0 | 10.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.5 | 28.8 | 4.9 | 37.0 | 30.4 | 8.2 | 27.0 | 10.9 |
| Queue Length 50th (ft) | 3 | 69 | 15 | 1 | 51 | 0 | 74 | 21 |
| Queue Length 95th (ft) | 29 | 212 | 106 | 13 | 169 | 52 | 232 | 104 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 434 | 885 | 1434 | 237 | 1055 | 945 | 1229 | 1643 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.04 | 0.30 | 0.50 | 0.02 | 0.18 | 0.18 | 0.24 | 0.11 |

Intersection Summary



Queues
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
01/07/2025



| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 464 | 735 | 172 | 174 | 108 | 51 |
| v/c Ratio | 0.56 | 0.46 | 0.41 | 0.41 | 0.23 | 0.17 |
| Control Delay | 12.7 | 9.4 | 16.7 | 16.7 | 5.8 | 5.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 12.7 | 9.4 | 16.7 | 16.7 | 5.8 | 5.8 |
| Queue Length 50th (ft) | 47 | 35 | 25 | 26 | 1 | 0 |
| Queue Length 95th (ft) | 200 | 130 | 90 | 91 | 29 | 17 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1077 | 2043 | 1253 | 1262 | 1206 | 599 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.43 | 0.36 | 0.14 | 0.14 | 0.09 | 0.09 |

Intersection Summary

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 443 | 100 | 12 | 557 | 1 | 110 | 0 | 11 | 1 | 0 | 0 |
| Future Vol, veh/h | 0 | 443 | 100 | 12 | 557 | 1 | 110 | 0 | 11 | 1 | 0 | 0 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 482 | 109 | 13 | 605 | 1 | 120 | 0 | 12 | 1 | 0 | 0 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 607 | 0 | 0 | 591 | 0 | 0 | 1169 | 1170 | 538 | 1177 | 1224 | 607 |
| Stage 1 | - | - | - | - | - | - | 537 | 537 | - | 633 | 633 | - |
| Stage 2 | - | - | - | - | - | - | 632 | 633 | - | 544 | 591 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 971 | - | - | 985 | - | - | 170 | 193 | 543 | 168 | 179 | 496 |
| Stage 1 | - | - | - | - | - | - | 528 | 523 | - | 468 | 473 | - |
| Stage 2 | - | - | - | - | - | - | 468 | 473 | - | 523 | 494 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 970 | - | - | 985 | - | - | 168 | 190 | 543 | 162 | 176 | 496 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 168 | 190 | - | 162 | 176 | - |
| Stage 1 | - | - | - | - | - | - | 528 | 523 | - | 468 | 466 | - |
| Stage 2 | - | - | - | - | - | - | 462 | 466 | - | 511 | 494 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.2 | 61.8 | 27.4 |
| HCM LOS | | | F | D |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 168 | 543 | 970 | - | - | 985 | - | - | 162 |
| HCM Lane V/C Ratio | 0.712 | 0.022 | - | - | - | 0.013 | - | - | 0.007 |
| HCM Control Delay (s) | 66.8 | 11.8 | 0 | - | - | 8.7 | - | - | 27.4 |
| HCM Lane LOS | F | B | A | - | - | A | - | - | D |
| HCM 95th %tile Q(veh) | 4.3 | 0.1 | 0 | - | - | 0 | - | - | 0 |





| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 1 | 136 | 442 | 3 | 155 | 118 | 268 | 192 |
| v/c Ratio | 0.00 | 0.34 | 0.42 | 0.01 | 0.36 | 0.27 | 0.50 | 0.16 |
| Control Delay | 24.0 | 20.9 | 2.2 | 25.3 | 20.6 | 6.9 | 18.7 | 7.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 24.0 | 20.9 | 2.2 | 25.3 | 20.6 | 6.9 | 18.7 | 7.6 |
| Queue Length 50th (ft) | 0 | 26 | 0 | 1 | 30 | 0 | 49 | 16 |
| Queue Length 95th (ft) | 5 | 99 | 35 | 9 | 109 | 38 | 164 | 91 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 634 | 1181 | 1517 | 341 | 1356 | 1144 | 1508 | 1802 |
| Starvation Cap Reductn | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.00 | 0.12 | 0.30 | 0.01 | 0.11 | 0.10 | 0.18 | 0.11 |

| Intersection Summary |
|---|

| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 390 | 328 | 150 | 150 | 168 | 57 |
| v/c Ratio | 0.49 | 0.22 | 0.36 | 0.35 | 0.32 | 0.18 |
| Control Delay | 11.8 | 7.6 | 15.1 | 15.0 | 5.2 | 6.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.8 | 7.6 | 15.1 | 15.0 | 5.2 | 6.4 |
| Queue Length 50th (ft) | 34 | 11 | 16 | 16 | 0 | 0 |
| Queue Length 95th (ft) | 157 | 53 | 80 | 80 | 35 | 20 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1187 | 2227 | 1339 | 1350 | 1295 | 648 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.33 | 0.15 | 0.11 | 0.11 | 0.13 | 0.09 |

Intersection Summary





| Intersection | |
|---|---|
| Int Delay, s/veh | 1.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 394 | 114 | 11 | 246 | 0 | 70 | 0 | 6 | 0 | 0 | 1 |
| Future Vol, veh/h | 0 | 394 | 114 | 11 | 246 | 0 | 70 | 0 | 6 | 0 | 0 | 1 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 428 | 124 | 12 | 267 | 0 | 76 | 0 | 7 | 0 | 0 | 1 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 267 | 0 | 0 | 552 | 0 | 0 | 783 | 781 | 490 | 785 | 843 | 268 |
| Stage 1 | - | - | - | - | - | - | 490 | 490 | - | 291 | 291 | - |
| Stage 2 | - | - | - | - | - | - | 293 | 291 | - | 494 | 552 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1297 | - | - | 1018 | - | - | 311 | 326 | 578 | 310 | 300 | 771 |
| Stage 1 | - | - | - | - | - | - | 560 | 549 | - | 717 | 672 | - |
| Stage 2 | - | - | - | - | - | - | 715 | 672 | - | 557 | 515 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1297 | - | - | 1018 | - | - | 308 | 322 | 578 | 304 | 296 | 770 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 308 | 322 | - | 304 | 296 | - |
| Stage 1 | - | - | - | - | - | - | 560 | 549 | - | 717 | 664 | - |
| Stage 2 | - | - | - | - | - | - | 705 | 664 | - | 551 | 515 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.4 | 19.8 | 9.7 |
| HCM LOS | | | C | A |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 308 | 578 | 1297 | - | - | 1018 | - | - | 770 |
| HCM Lane V/C Ratio | 0.247 | 0.011 | - | - | - | 0.012 | - | - | 0.001 |
| HCM Control Delay (s) | 20.5 | 11.3 | 0 | - | - | 8.6 | - | - | 9.7 |
| HCM Lane LOS | C | B | A | - | - | A | - | - | A |
| HCM 95th %tile Q(veh) | 1 | 0 | 0 | - | - | 0 | - | - | 0 |

Queues
1: Old Redwood Hwy & Arata Ln

W-Trans
01/07/2025



| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 19 | 264 | 727 | 4 | 191 | 170 | 296 | 173 |
| v/c Ratio | 0.09 | 0.59 | 0.65 | 0.03 | 0.50 | 0.38 | 0.60 | 0.18 |
| Control Delay | 29.6 | 28.9 | 5.1 | 37.2 | 30.5 | 8.1 | 27.1 | 10.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.6 | 28.9 | 5.1 | 37.2 | 30.5 | 8.1 | 27.1 | 10.9 |
| Queue Length 50th (ft) | 3 | 69 | 16 | 1 | 51 | 0 | 74 | 21 |
| Queue Length 95th (ft) | 29 | 214 | 112 | 13 | 169 | 53 | 233 | 104 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 432 | 882 | 1434 | 236 | 1050 | 943 | 1226 | 1641 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.04 | 0.30 | 0.51 | 0.02 | 0.18 | 0.18 | 0.24 | 0.11 |

Intersection Summary



Queues
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
01/07/2025



| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 466 | 748 | 172 | 174 | 111 | 51 |
| v/c Ratio | 0.56 | 0.47 | 0.41 | 0.41 | 0.23 | 0.17 |
| Control Delay | 12.7 | 9.5 | 16.7 | 16.7 | 5.8 | 5.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 12.7 | 9.5 | 16.7 | 16.7 | 5.8 | 5.8 |
| Queue Length 50th (ft) | 47 | 36 | 25 | 26 | 1 | 0 |
| Queue Length 95th (ft) | 201 | 132 | 90 | 91 | 30 | 17 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1077 | 2044 | 1255 | 1264 | 1208 | 599 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.43 | 0.37 | 0.14 | 0.14 | 0.09 | 0.09 |

Intersection Summary

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 1 | 444 | 101 | 12 | 557 | 1 | 110 | 0 | 11 | 2 | 1 | 3 |
| Future Vol, veh/h | 1 | 444 | 101 | 12 | 557 | 1 | 110 | 0 | 11 | 2 | 1 | 3 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1 | 483 | 110 | 13 | 605 | 1 | 120 | 0 | 12 | 2 | 1 | 3 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 607 | 0 | 0 | 593 | 0 | 0 | 1174 | 1173 | 539 | 1180 | 1228 | 607 |
| Stage 1 | - | - | - | - | - | - | 540 | 540 | - | 633 | 633 | - |
| Stage 2 | - | - | - | - | - | - | 634 | 633 | - | 547 | 595 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 971 | - | - | 983 | - | - | 169 | 192 | 542 | 167 | 178 | 496 |
| Stage 1 | - | - | - | - | - | - | 526 | 521 | - | 468 | 473 | - |
| Stage 2 | - | - | - | - | - | - | 467 | 473 | - | 521 | 492 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 970 | - | - | 983 | - | - | 165 | 189 | 542 | 161 | 175 | 496 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 165 | 189 | - | 161 | 175 | - |
| Stage 1 | - | - | - | - | - | - | 525 | 520 | - | 467 | 466 | - |
| Stage 2 | - | - | - | - | - | - | 457 | 466 | - | 509 | 492 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.2 | 64.3 | 19.9 |
| HCM LOS | | | F | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 165 | 542 | 970 | - | - | 983 | - | - | 248 |
| HCM Lane V/C Ratio | 0.725 | 0.022 | 0.001 | - | - | 0.013 | - | - | 0.026 |
| HCM Control Delay (s) | 69.5 | 11.8 | 8.7 | - | - | 8.7 | - | - | 19.9 |
| HCM Lane LOS | F | B | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 4.4 | 0.1 | 0 | - | - | 0 | - | - | 0.1 |





| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 1 | 137 | 448 | 3 | 155 | 121 | 273 | 192 |
| v/c Ratio | 0.00 | 0.35 | 0.42 | 0.01 | 0.36 | 0.27 | 0.51 | 0.16 |
| Control Delay | 25.0 | 21.1 | 2.1 | 25.3 | 20.7 | 6.9 | 18.8 | 7.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 25.0 | 21.1 | 2.2 | 25.3 | 20.7 | 6.9 | 18.8 | 7.5 |
| Queue Length 50th (ft) | 0 | 27 | 0 | 1 | 30 | 0 | 51 | 16 |
| Queue Length 95th (ft) | 5 | 101 | 35 | 9 | 110 | 39 | 167 | 91 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 630 | 1176 | 1533 | 339 | 1350 | 1140 | 1503 | 1800 |
| Starvation Cap Reductn | 0 | 0 | 44 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.00 | 0.12 | 0.30 | 0.01 | 0.11 | 0.11 | 0.18 | 0.11 |

| Intersection Summary |
|---|



| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 397 | 337 | 150 | 150 | 176 | 57 |
| v/c Ratio | 0.50 | 0.23 | 0.36 | 0.36 | 0.33 | 0.18 |
| Control Delay | 11.9 | 7.6 | 15.2 | 15.1 | 5.2 | 6.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.9 | 7.6 | 15.2 | 15.1 | 5.2 | 6.5 |
| Queue Length 50th (ft) | 35 | 12 | 16 | 16 | 0 | 0 |
| Queue Length 95th (ft) | 159 | 54 | 81 | 81 | 36 | 20 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1190 | 2234 | 1343 | 1354 | 1300 | 649 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.33 | 0.15 | 0.11 | 0.11 | 0.14 | 0.09 |

Intersection Summary





| Intersection | |
|---|---|
| Int Delay, s/veh | 2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 3 | 395 | 115 | 11 | 247 | 1 | 71 | 1 | 6 | 1 | 1 | 3 |
| Future Vol, veh/h | 3 | 395 | 115 | 11 | 247 | 1 | 71 | 1 | 6 | 1 | 1 | 3 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 3 | 429 | 125 | 12 | 268 | 1 | 77 | 1 | 7 | 1 | 1 | 3 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 269 | 0 | 0 | 554 | 0 | 0 | 794 | 791 | 492 | 795 | 853 | 270 |
| Stage 1 | - | - | - | - | - | - | 498 | 498 | - | 293 | 293 | - |
| Stage 2 | - | - | - | - | - | - | 296 | 293 | - | 502 | 560 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1295 | - | - | 1016 | - | - | 306 | 322 | 577 | 305 | 296 | 769 |
| Stage 1 | - | - | - | - | - | - | 554 | 544 | - | 715 | 670 | - |
| Stage 2 | - | - | - | - | - | - | 712 | 670 | - | 552 | 511 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1295 | - | - | 1016 | - | - | 300 | 317 | 577 | 298 | 292 | 768 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 300 | 317 | - | 298 | 292 | - |
| Stage 1 | - | - | - | - | - | - | 553 | 543 | - | 714 | 662 | - |
| Stage 2 | - | - | - | - | - | - | 699 | 662 | - | 543 | 510 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.4 | 20.3 | 12.8 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 300 | 516 | 1295 | - | - | 1016 | - | - | 468 |
| HCM Lane V/C Ratio | 0.257 | 0.015 | 0.003 | - | - | 0.012 | - | - | 0.012 |
| HCM Control Delay (s) | 21.1 | 12.1 | 7.8 | - | - | 8.6 | - | - | 12.8 |
| HCM Lane LOS | C | B | A | - | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 1 | 0 | 0 | - | - | 0 | - | - | 0 |



| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 19 | 287 | 784 | 4 | 203 | 182 | 317 | 176 |
| v/c Ratio | 0.10 | 0.62 | 0.70 | 0.03 | 0.53 | 0.39 | 0.63 | 0.18 |
| Control Delay | 31.6 | 30.9 | 6.6 | 39.8 | 32.3 | 8.1 | 28.9 | 11.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 31.6 | 30.9 | 6.6 | 39.8 | 32.3 | 8.1 | 28.9 | 11.0 |
| Queue Length 50th (ft) | 4 | 82 | 26 | 1 | 60 | 0 | 88 | 24 |
| Queue Length 95th (ft) | 30 | 249 | 179 | 14 | 185 | 54 | 261 | 106 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 405 | 825 | 1422 | 221 | 983 | 899 | 1167 | 1609 |
| Starvation Cap Reductn | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.35 | 0.55 | 0.02 | 0.21 | 0.20 | 0.27 | 0.11 |

Intersection Summary



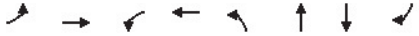




| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 500 | 762 | 175 | 178 | 135 | 36 |
| v/c Ratio | 0.59 | 0.46 | 0.43 | 0.43 | 0.28 | 0.13 |
| Control Delay | 13.1 | 9.4 | 17.2 | 17.2 | 6.0 | 3.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 13.1 | 9.4 | 17.2 | 17.2 | 6.0 | 3.5 |
| Queue Length 50th (ft) | 48 | 34 | 25 | 26 | 1 | 0 |
| Queue Length 95th (ft) | #215 | 133 | 90 | 91 | 33 | 9 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1067 | 2049 | 1244 | 1252 | 1204 | 586 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.37 | 0.14 | 0.14 | 0.11 | 0.06 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 32 | 584 | 13 | 616 | 116 | 25 | 38 | 61 |
| v/c Ratio | 0.10 | 0.54 | 0.04 | 0.60 | 0.26 | 0.04 | 0.11 | 0.14 |
| Control Delay | 33.5 | 13.5 | 33.8 | 16.6 | 19.9 | 14.5 | 27.4 | 3.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.5 | 13.5 | 33.8 | 16.6 | 19.9 | 14.5 | 27.4 | 3.1 |
| Queue Length 50th (ft) | 8 | 110 | 3 | 121 | 23 | 2 | 10 | 0 |
| Queue Length 95th (ft) | 49 | 386 | 27 | 417 | 95 | 24 | 46 | 13 |
| Internal Link Dist (ft) | | 235 | | 521 | | 315 | 357 | |
| Turn Bay Length (ft) | 150 | | 120 | | 165 | | | 50 |
| Base Capacity (vph) | 332 | 1497 | 332 | 1523 | 465 | 1162 | 795 | 896 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.39 | 0.04 | 0.40 | 0.25 | 0.02 | 0.05 | 0.07 |

Intersection Summary







| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 1 | 160 | 496 | 3 | 170 | 142 | 313 | 197 |
| v/c Ratio | 0.00 | 0.43 | 0.43 | 0.02 | 0.43 | 0.33 | 0.59 | 0.19 |
| Control Delay | 29.0 | 24.2 | 2.0 | 29.0 | 23.9 | 7.4 | 21.5 | 7.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.0 | 24.2 | 2.1 | 29.0 | 23.9 | 7.4 | 21.5 | 7.8 |
| Queue Length 50th (ft) | 0 | 35 | 0 | 1 | 37 | 0 | 65 | 18 |
| Queue Length 95th (ft) | 5 | 127 | 37 | 10 | 133 | 45 | 207 | 96 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 517 | 1037 | 1515 | 278 | 1235 | 1061 | 1414 | 1762 |
| Starvation Cap Reductn | 0 | 0 | 64 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.00 | 0.15 | 0.34 | 0.01 | 0.14 | 0.13 | 0.22 | 0.11 |

Intersection Summary

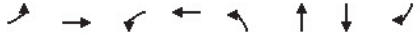


| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 459 | 369 | 154 | 153 | 230 | 39 |
| v/c Ratio | 0.59 | 0.25 | 0.36 | 0.36 | 0.40 | 0.13 |
| Control Delay | 12.8 | 7.9 | 15.7 | 15.6 | 5.2 | 3.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 12.8 | 7.9 | 15.7 | 15.6 | 5.2 | 3.7 |
| Queue Length 50th (ft) | 41 | 13 | 17 | 17 | 0 | 0 |
| Queue Length 95th (ft) | 185 | 60 | 82 | 81 | 40 | 11 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1214 | 2320 | 1350 | 1361 | 1317 | 653 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.38 | 0.16 | 0.11 | 0.11 | 0.17 | 0.06 |

Intersection Summary







| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 89 | 549 | 12 | 285 | 75 | 24 | 32 | 41 |
| v/c Ratio | 0.14 | 0.44 | 0.02 | 0.27 | 0.18 | 0.03 | 0.06 | 0.06 |
| Control Delay | 23.8 | 11.0 | 28.2 | 14.6 | 15.9 | 13.4 | 21.7 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 23.8 | 11.0 | 28.2 | 14.6 | 15.9 | 13.4 | 21.7 | 0.2 |
| Queue Length 50th (ft) | 21 | 89 | 3 | 64 | 13 | 3 | 7 | 0 |
| Queue Length 95th (ft) | 91 | 344 | 23 | 179 | 60 | 23 | 37 | 0 |
| Internal Link Dist (ft) | | 235 | | 521 | | 315 | 357 | |
| Turn Bay Length (ft) | 150 | | 120 | | 165 | | | 50 |
| Base Capacity (vph) | 980 | 1619 | 588 | 1456 | 418 | 1338 | 982 | 1082 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.09 | 0.34 | 0.02 | 0.20 | 0.18 | 0.02 | 0.03 | 0.04 |

Intersection Summary



| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 19 | 289 | 792 | 4 | 203 | 183 | 318 | 176 |
| v/c Ratio | 0.10 | 0.62 | 0.71 | 0.03 | 0.53 | 0.40 | 0.63 | 0.18 |
| Control Delay | 31.8 | 31.2 | 6.8 | 40.2 | 32.6 | 8.2 | 28.8 | 10.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 31.8 | 31.2 | 6.8 | 40.2 | 32.6 | 8.2 | 28.8 | 10.9 |
| Queue Length 50th (ft) | 4 | 83 | 27 | 1 | 60 | 0 | 89 | 24 |
| Queue Length 95th (ft) | 31 | 254 | 187 | 14 | 187 | 55 | 262 | 105 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 402 | 820 | 1420 | 220 | 977 | 895 | 1161 | 1605 |
| Starvation Cap Reductn | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.35 | 0.56 | 0.02 | 0.21 | 0.20 | 0.27 | 0.11 |

Intersection Summary



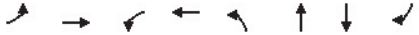




| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 502 | 773 | 175 | 178 | 138 | 36 |
| v/c Ratio | 0.59 | 0.47 | 0.43 | 0.43 | 0.29 | 0.13 |
| Control Delay | 13.1 | 9.4 | 17.2 | 17.3 | 6.0 | 3.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 13.1 | 9.4 | 17.2 | 17.3 | 6.0 | 3.5 |
| Queue Length 50th (ft) | 48 | 35 | 25 | 26 | 1 | 0 |
| Queue Length 95th (ft) | #216 | 135 | 90 | 91 | 33 | 9 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1065 | 2046 | 1242 | 1250 | 1203 | 585 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.38 | 0.14 | 0.14 | 0.11 | 0.06 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 33 | 586 | 13 | 616 | 116 | 25 | 40 | 63 |
| v/c Ratio | 0.10 | 0.54 | 0.04 | 0.60 | 0.26 | 0.04 | 0.12 | 0.14 |
| Control Delay | 33.5 | 13.6 | 33.9 | 16.6 | 19.9 | 14.5 | 27.4 | 3.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.5 | 13.6 | 33.9 | 16.6 | 19.9 | 14.5 | 27.4 | 3.3 |
| Queue Length 50th (ft) | 9 | 111 | 3 | 121 | 23 | 2 | 10 | 0 |
| Queue Length 95th (ft) | 50 | 387 | 27 | 417 | 95 | 24 | 48 | 15 |
| Internal Link Dist (ft) | | 235 | | 521 | | 315 | 357 | |
| Turn Bay Length (ft) | 150 | | 120 | | 165 | | | 50 |
| Base Capacity (vph) | 332 | 1496 | 332 | 1522 | 465 | 1161 | 794 | 895 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.39 | 0.04 | 0.40 | 0.25 | 0.02 | 0.05 | 0.07 |

Intersection Summary







| Lane Group | EBT | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 1 | 161 | 501 | 3 | 170 | 145 | 317 | 197 |
| v/c Ratio | 0.00 | 0.44 | 0.44 | 0.02 | 0.43 | 0.33 | 0.60 | 0.19 |
| Control Delay | 29.0 | 24.4 | 2.0 | 29.3 | 24.0 | 7.5 | 21.6 | 7.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.0 | 24.4 | 2.1 | 29.3 | 24.0 | 7.5 | 21.6 | 7.8 |
| Queue Length 50th (ft) | 0 | 35 | 0 | 1 | 37 | 0 | 66 | 18 |
| Queue Length 95th (ft) | 5 | 128 | 37 | 10 | 134 | 45 | 210 | 97 |
| Internal Link Dist (ft) | 242 | 339 | | | 419 | | | 716 |
| Turn Bay Length (ft) | | | | 80 | | 200 | 265 | |
| Base Capacity (vph) | 515 | 1032 | 1513 | 277 | 1230 | 1058 | 1408 | 1760 |
| Starvation Cap Reductn | 0 | 0 | 65 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.00 | 0.16 | 0.35 | 0.01 | 0.14 | 0.14 | 0.23 | 0.11 |

Intersection Summary

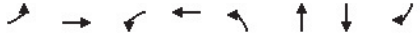


| Lane Group | EBT | WBT | NBL | NBT | NBR | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 465 | 377 | 154 | 153 | 238 | 39 |
| v/c Ratio | 0.59 | 0.25 | 0.37 | 0.36 | 0.41 | 0.13 |
| Control Delay | 12.9 | 7.9 | 15.8 | 15.7 | 5.3 | 3.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 12.9 | 7.9 | 15.8 | 15.7 | 5.3 | 3.7 |
| Queue Length 50th (ft) | 41 | 14 | 18 | 17 | 0 | 0 |
| Queue Length 95th (ft) | 189 | 61 | 82 | 81 | 41 | 11 |
| Internal Link Dist (ft) | 339 | 490 | | 421 | | 371 |
| Turn Bay Length (ft) | | | | | 25 | |
| Base Capacity (vph) | 1210 | 2311 | 1346 | 1356 | 1315 | 651 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.38 | 0.16 | 0.11 | 0.11 | 0.18 | 0.06 |

Intersection Summary







| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 92 | 551 | 12 | 287 | 76 | 25 | 34 | 43 |
| v/c Ratio | 0.16 | 0.44 | 0.02 | 0.34 | 0.19 | 0.03 | 0.06 | 0.07 |
| Control Delay | 24.2 | 11.0 | 28.3 | 15.9 | 16.5 | 13.6 | 21.9 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 24.2 | 11.0 | 28.3 | 15.9 | 16.5 | 13.6 | 21.9 | 0.2 |
| Queue Length 50th (ft) | 22 | 89 | 3 | 64 | 14 | 3 | 8 | 0 |
| Queue Length 95th (ft) | 94 | 344 | 23 | 182 | 61 | 24 | 39 | 0 |
| Internal Link Dist (ft) | | 235 | | 521 | | 315 | 357 | |
| Turn Bay Length (ft) | 150 | | 120 | | 165 | | | 50 |
| Base Capacity (vph) | 889 | 1617 | 548 | 1451 | 390 | 1338 | 981 | 1081 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.34 | 0.02 | 0.20 | 0.19 | 0.02 | 0.03 | 0.04 |

Intersection Summary

| Intersection | |
|---|---|
| Int Delay, s/veh | 13.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 29 | 433 | 104 | 12 | 516 | 51 | 107 | 12 | 11 | 23 | 12 | 56 |
| Future Vol, veh/h | 29 | 433 | 104 | 12 | 516 | 51 | 107 | 12 | 11 | 23 | 12 | 56 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 32 | 471 | 113 | 13 | 561 | 55 | 116 | 13 | 12 | 25 | 13 | 61 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 617 | 0 | 0 | 584 | 0 | 0 | 1244 | 1235 | 529 | 1221 | 1264 | 590 |
| Stage 1 | - | - | - | - | - | - | 592 | 592 | - | 616 | 616 | - |
| Stage 2 | - | - | - | - | - | - | 652 | 643 | - | 605 | 648 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 963 | - | - | 991 | - | - | 151 | 176 | 550 | 157 | 169 | 508 |
| Stage 1 | - | - | - | - | - | - | 493 | 494 | - | 478 | 482 | - |
| Stage 2 | - | - | - | - | - | - | 457 | 468 | - | 485 | 466 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 962 | - | - | 991 | - | - | 120 | 168 | 550 | 139 | 161 | 508 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 120 | 168 | - | 139 | 161 | - |
| Stage 1 | - | - | - | - | - | - | 477 | 478 | - | 462 | 475 | - |
| Stage 2 | - | - | - | - | - | - | 386 | 461 | - | 446 | 451 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.5 | 0.2 | 121.2 | 27.1 |
| HCM LOS | | | F | D |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 120 | 252 | 962 | - | - | 991 | - | - | 260 |
| HCM Lane V/C Ratio | 0.969 | 0.099 | 0.033 | - | - | 0.013 | - | - | 0.38 |
| HCM Control Delay (s) | 142.7 | 20.9 | 8.9 | - | - | 8.7 | - | - | 27.1 |
| HCM Lane LOS | F | C | A | - | - | A | - | - | D |
| HCM 95th %tile Q(veh) | 6.4 | 0.3 | 0.1 | - | - | 0 | - | - | 1.7 |





| Intersection | |
|---|---|
| Int Delay, s/veh | 4.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 82 | 384 | 121 | 11 | 228 | 34 | 69 | 16 | 6 | 19 | 10 | 38 |
| Future Vol, veh/h | 82 | 384 | 121 | 11 | 228 | 34 | 69 | 16 | 6 | 19 | 10 | 38 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 89 | 417 | 132 | 12 | 248 | 37 | 75 | 17 | 7 | 21 | 11 | 41 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 285 | 0 | 0 | 549 | 0 | 0 | 979 | 970 | 483 | 964 | 1018 | 268 |
| Stage 1 | - | - | - | - | - | - | 661 | 661 | - | 291 | 291 | - |
| Stage 2 | - | - | - | - | - | - | 318 | 309 | - | 673 | 727 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1277 | - | - | 1021 | - | - | 229 | 253 | 584 | 235 | 237 | 771 |
| Stage 1 | - | - | - | - | - | - | 452 | 460 | - | 717 | 672 | - |
| Stage 2 | - | - | - | - | - | - | 693 | 660 | - | 445 | 429 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1277 | - | - | 1021 | - | - | 196 | 233 | 584 | 206 | 218 | 770 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 196 | 233 | - | 206 | 218 | - |
| Stage 1 | - | - | - | - | - | - | 420 | 428 | - | 667 | 664 | - |
| Stage 2 | - | - | - | - | - | - | 637 | 652 | - | 393 | 399 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 1.1 | 0.3 | 30.6 | 17.7 |
| HCM LOS | | | D | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 196 | 279 | 1277 | - | - | 1021 | - | - | 357 |
| HCM Lane V/C Ratio | 0.383 | 0.086 | 0.07 | - | - | 0.012 | - | - | 0.204 |
| HCM Control Delay (s) | 34.3 | 19.1 | 8 | - | - | 8.6 | - | - | 17.7 |
| HCM Lane LOS | D | C | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 1.7 | 0.3 | 0.2 | - | - | 0 | - | - | 0.8 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 14.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 30 | 434 | 105 | 12 | 516 | 51 | 107 | 12 | 11 | 24 | 13 | 58 |
| Future Vol, veh/h | 30 | 434 | 105 | 12 | 516 | 51 | 107 | 12 | 11 | 24 | 13 | 58 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 33 | 472 | 114 | 13 | 561 | 55 | 116 | 13 | 12 | 26 | 14 | 63 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 617 | 0 | 0 | 586 | 0 | 0 | 1248 | 1238 | 530 | 1225 | 1268 | 590 |
| Stage 1 | - | - | - | - | - | - | 595 | 595 | - | 616 | 616 | - |
| Stage 2 | - | - | - | - | - | - | 653 | 643 | - | 609 | 652 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 963 | - | - | 989 | - | - | 150 | 176 | 549 | 156 | 168 | 508 |
| Stage 1 | - | - | - | - | - | - | 491 | 492 | - | 478 | 482 | - |
| Stage 2 | - | - | - | - | - | - | 456 | 468 | - | 482 | 464 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 962 | - | - | 989 | - | - | 118 | 168 | 549 | 138 | 160 | 508 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 118 | 168 | - | 138 | 160 | - |
| Stage 1 | - | - | - | - | - | - | 474 | 475 | - | 461 | 475 | - |
| Stage 2 | - | - | - | - | - | - | 382 | 461 | - | 442 | 448 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.5 | 0.2 | 126 | 28.1 |
| HCM LOS | | | F | D |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 118 | 251 | 962 | - | - | 989 | - | - | 257 |
| HCM Lane V/C Ratio | 0.986 | 0.1 | 0.034 | - | - | 0.013 | - | - | 0.402 |
| HCM Control Delay (s) | 148.6 | 20.9 | 8.9 | - | - | 8.7 | - | - | 28.1 |
| HCM Lane LOS | F | C | A | - | - | A | - | - | D |
| HCM 95th %tile Q(veh) | 6.5 | 0.3 | 0.1 | - | - | 0 | - | - | 1.8 |





| Intersection | |
|---|---|
| Int Delay, s/veh | 4.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 85 | 385 | 122 | 11 | 229 | 35 | 70 | 17 | 6 | 20 | 11 | 40 |
| Future Vol, veh/h | 85 | 385 | 122 | 11 | 229 | 35 | 70 | 17 | 6 | 20 | 11 | 40 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 92 | 418 | 133 | 12 | 249 | 38 | 76 | 18 | 7 | 22 | 12 | 43 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 287 | 0 | 0 | 551 | 0 | 0 | 990 | 980 | 485 | 973 | 1027 | 269 |
| Stage 1 | - | - | - | - | - | - | 669 | 669 | - | 292 | 292 | - |
| Stage 2 | - | - | - | - | - | - | 321 | 311 | - | 681 | 735 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1275 | - | - | 1019 | - | - | 225 | 250 | 582 | 231 | 234 | 770 |
| Stage 1 | - | - | - | - | - | - | 447 | 456 | - | 716 | 671 | - |
| Stage 2 | - | - | - | - | - | - | 691 | 658 | - | 440 | 425 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1275 | - | - | 1019 | - | - | 190 | 229 | 582 | 201 | 215 | 769 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 190 | 229 | - | 201 | 215 | - |
| Stage 1 | - | - | - | - | - | - | 415 | 423 | - | 664 | 663 | - |
| Stage 2 | - | - | - | - | - | - | 632 | 650 | - | 386 | 394 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 1.2 | 0.3 | 32 | 18.2 |
| HCM LOS | | | D | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 190 | 272 | 1275 | - | - | 1019 | - | - | 350 |
| HCM Lane V/C Ratio | 0.4 | 0.092 | 0.072 | - | - | 0.012 | - | - | 0.22 |
| HCM Control Delay (s) | 36.1 | 19.6 | 8 | - | - | 8.6 | - | - | 18.2 |
| HCM Lane LOS | E | C | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 1.8 | 0.3 | 0.2 | - | - | 0 | - | - | 0.8 |

# Appendix E

## Intersection Level of Service Calculations

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HCM 6th Signalized Intersection Summary
1: Old Redwood Hwy & Arata Ln

W-Trans
12/26/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 1 | 6 | 237 | 4 | 661 | 4 | 176 | 155 | 271 | 156 | 3 |
| Future Volume (veh/h) | 10 | 1 | 6 | 237 | 4 | 661 | 4 | 176 | 155 | 271 | 156 | 3 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 0.97 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 11 | 1 | 7 | 258 | 4 | 718 | 4 | 191 | 168 | 295 | 170 | 3 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 27 | 2 | 17 | 694 | 11 | 923 | 6 | 283 | 233 | 350 | 632 | 11 |
| Arrive On Green | 0.03 | 0.03 | 0.03 | 0.40 | 0.40 | 0.40 | 0.00 | 0.15 | 0.15 | 0.20 | 0.34 | 0.34 |
| Sat Flow, veh/h | 989 | 90 | 629 | 1755 | 27 | 1544 | 1781 | 1870 | 1541 | 1781 | 1831 | 32 |
| Grp Volume(v), veh/h | 19 | 0 | 0 | 262 | 0 | 718 | 4 | 191 | 168 | 295 | 0 | 173 |
| Grp Sat Flow(s),veh/h/ln | 1708 | 0 | 0 | 1783 | 0 | 1544 | 1781 | 1870 | 1541 | 1781 | 0 | 1864 |
| Q Serve(g_s), s | 0.7 | 0.0 | 0.0 | 6.6 | 0.0 | 22.4 | 0.1 | 6.1 | 6.6 | 10.1 | 0.0 | 4.2 |
| Cycle Q Clear(g_c), s | 0.7 | 0.0 | 0.0 | 6.6 | 0.0 | 22.4 | 0.1 | 6.1 | 6.6 | 10.1 | 0.0 | 4.2 |
| Prop In Lane | 0.58 | | 0.37 | 0.98 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.02 |
| Lane Grp Cap(c), veh/h | 46 | 0 | 0 | 705 | 0 | 923 | 6 | 283 | 233 | 350 | 0 | 643 |
| V/C Ratio(X) | 0.41 | 0.00 | 0.00 | 0.37 | 0.00 | 0.78 | 0.70 | 0.67 | 0.72 | 0.84 | 0.00 | 0.27 |
| Avail Cap(c_a), veh/h | 351 | 0 | 0 | 733 | 0 | 947 | 197 | 873 | 719 | 1043 | 0 | 1754 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 30.3 | 0.0 | 0.0 | 13.5 | 0.0 | 9.8 | 31.5 | 25.3 | 25.5 | 24.4 | 0.0 | 15.0 |
| Incr Delay (d2), s/veh | 2.2 | 0.0 | 0.0 | 0.1 | 0.0 | 3.7 | 43.9 | 1.0 | 1.6 | 2.1 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.3 | 0.0 | 0.0 | 2.4 | 0.0 | 6.7 | 0.1 | 2.6 | 2.4 | 4.2 | 0.0 | 1.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 32.5 | 0.0 | 0.0 | 13.7 | 0.0 | 13.5 | 75.4 | 26.4 | 27.1 | 26.6 | 0.0 | 15.0 |
| LnGrp LOS | C | A | A | B | A | B | E | C | C | C | A | B |
| Approach Vol, veh/h | | 19 | | | 980 | | | 363 | | | 468 | |
| Approach Delay, s/veh | | 32.5 | | | 13.5 | | | 27.3 | | | 22.3 | |
| Approach LOS | | C | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.4 | 14.1 | | 4.7 | 3.2 | 26.3 | | 29.0 | | | | |
| Change Period (Y+Rc), s | 3.0 | 4.5 | | 3.0 | 3.0 | 4.5 | | 4.0 | | | | |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | | 13.0 | 7.0 | 59.5 | | 26.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 12.1 | 8.6 | | 2.7 | 2.1 | 6.2 | | 24.4 | | | | |
| Green Ext Time (p_c), s | 0.4 | 1.0 | | 0.0 | 0.0 | 0.7 | | 0.6 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | | 18.7 |
| HCM 6th LOS | | | B |



HCM 6th Signalized Intersection Summary
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
12/26/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 417 | 0 | 0 | 572 | 104 | 304 | 15 | 99 | 28 | 0 | 19 |
| Future Volume (veh/h) | 10 | 417 | 0 | 0 | 572 | 104 | 304 | 15 | 99 | 28 | 0 | 19 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 11 | 453 | 0 | 0 | 622 | 113 | 341 | 0 | 108 | 30 | 0 | 21 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 139 | 664 | 0 | 0 | 1084 | 196 | 605 | 0 | 269 | 47 | 0 | 33 |
| Arrive On Green | 0.36 | 0.36 | 0.00 | 0.00 | 0.36 | 0.36 | 0.17 | 0.00 | 0.17 | 0.05 | 0.00 | 0.05 |
| Sat Flow, veh/h | 16 | 1830 | 0 | 0 | 3083 | 542 | 3563 | 0 | 1585 | 997 | 0 | 698 |
| Grp Volume(v), veh/h | 464 | 0 | 0 | 0 | 369 | 366 | 341 | 0 | 108 | 51 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1845 | 0 | 0 | 0 | 1777 | 1754 | 1781 | 0 | 1585 | 1695 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 4.6 | 4.6 | 2.4 | 0.0 | 1.7 | 0.8 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 5.8 | 0.0 | 0.0 | 0.0 | 4.6 | 4.6 | 2.4 | 0.0 | 1.7 | 0.8 | 0.0 | 0.0 |
| Prop In Lane | 0.02 | | 0.00 | 0.00 | | 0.31 | 1.00 | | 1.00 | 0.59 | | 0.41 |
| Lane Grp Cap(c), veh/h | 803 | 0 | 0 | 0 | 644 | 636 | 605 | 0 | 269 | 80 | 0 | 0 |
| V/C Ratio(X) | 0.58 | 0.00 | 0.00 | 0.00 | 0.57 | 0.58 | 0.56 | 0.00 | 0.40 | 0.64 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1509 | 0 | 0 | 0 | 1340 | 1323 | 3397 | 0 | 1512 | 694 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 7.5 | 0.0 | 0.0 | 0.0 | 7.1 | 7.1 | 10.5 | 0.0 | 10.2 | 12.9 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | 0.0 | 0.4 | 3.2 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.7 | 0.0 | 0.4 | 0.3 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.7 | 0.0 | 0.0 | 0.0 | 7.4 | 7.4 | 10.8 | 0.0 | 10.6 | 16.1 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 464 | | | 735 | | | 449 | | | 51 | |
| Approach Delay, s/veh | | 7.7 | | | 7.4 | | | 10.8 | | | 16.1 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 14.2 | | 5.0 | | 14.2 | | 8.4 | | | | |
| Change Period (Y+Rc), s | | * 4.2 | | 3.7 | | * 4.2 | | 3.7 | | | | |
| Max Green Setting (Gmax), s | | * 21 | | 11.3 | | * 21 | | 26.3 | | | | |
| Max Q Clear Time (g_c+I1), s | | 7.8 | | 2.8 | | 6.6 | | 4.4 | | | | |
| Green Ext Time (p_c), s | | 1.6 | | 0.1 | | 2.7 | | 0.4 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | | 8.6 |
| HCM 6th LOS | | | A |

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 443 | 100 | 12 | 557 | 1 | 110 | 0 | 11 | 1 | 0 | 0 |
| Future Vol, veh/h | 0 | 443 | 100 | 12 | 557 | 1 | 110 | 0 | 11 | 1 | 0 | 0 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 482 | 109 | 13 | 605 | 1 | 120 | 0 | 12 | 1 | 0 | 0 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 607 | 0 | 0 | 591 | 0 | 0 | 1169 | 1170 | 538 | 1177 | 1224 | 607 |
| Stage 1 | - | - | - | - | - | - | 537 | 537 | - | 633 | 633 | - |
| Stage 2 | - | - | - | - | - | - | 632 | 633 | - | 544 | 591 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 971 | - | - | 985 | - | - | 170 | 193 | 543 | 168 | 179 | 496 |
| Stage 1 | - | - | - | - | - | - | 528 | 523 | - | 468 | 473 | - |
| Stage 2 | - | - | - | - | - | - | 468 | 473 | - | 523 | 494 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 970 | - | - | 985 | - | - | 168 | 190 | 543 | 162 | 176 | 496 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 168 | 190 | - | 162 | 176 | - |
| Stage 1 | - | - | - | - | - | - | 528 | 523 | - | 468 | 466 | - |
| Stage 2 | - | - | - | - | - | - | 462 | 466 | - | 511 | 494 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.2 | 61.8 | 27.4 |
| HCM LOS | | | F | D |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 168 | 543 | 970 | - | - | 985 | - | - | 162 |
| HCM Lane V/C Ratio | 0.712 | 0.022 | - | - | - | 0.013 | - | - | 0.007 |
| HCM Control Delay (s) | 66.8 | 11.8 | 0 | - | - | 8.7 | - | - | 27.4 |
| HCM Lane LOS | F | B | A | - | - | A | - | - | D |
| HCM 95th %tile Q(veh) | 4.3 | 0.1 | 0 | - | - | 0 | - | - | 0 |





| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 1 | 0 | 0 | 124 | 1 | 407 | 3 | 143 | 109 | 247 | 175 | 2 |
| Future Volume (veh/h) | 1 | 0 | 0 | 124 | 1 | 407 | 3 | 143 | 109 | 247 | 175 | 2 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 1 | 0 | 0 | 135 | 1 | 442 | 3 | 155 | 118 | 268 | 190 | 2 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 4 | 0 | 0 | 502 | 4 | 755 | 4 | 295 | 247 | 343 | 642 | 7 |
| Arrive On Green | 0.00 | 0.00 | 0.00 | 0.28 | 0.28 | 0.28 | 0.00 | 0.16 | 0.16 | 0.19 | 0.35 | 0.35 |
| Sat Flow, veh/h | 1781 | 0 | 0 | 1769 | 13 | 1585 | 1781 | 1870 | 1565 | 1781 | 1847 | 19 |
| Grp Volume(v), veh/h | 1 | 0 | 0 | 136 | 0 | 442 | 3 | 155 | 118 | 268 | 0 | 192 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 0 | 1782 | 0 | 1585 | 1781 | 1870 | 1565 | 1781 | 0 | 1867 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 8.1 | 0.1 | 3.0 | 2.7 | 5.7 | 0.0 | 3.0 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 8.1 | 0.1 | 3.0 | 2.7 | 5.7 | 0.0 | 3.0 |
| Prop In Lane | 1.00 | | 0.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.01 |
| Lane Grp Cap(c), veh/h | 4 | 0 | 0 | 506 | 0 | 755 | 4 | 295 | 247 | 343 | 0 | 649 |
| V/C Ratio(X) | 0.22 | 0.00 | 0.00 | 0.27 | 0.00 | 0.59 | 0.67 | 0.53 | 0.48 | 0.78 | 0.00 | 0.30 |
| Avail Cap(c_a), veh/h | 582 | 0 | 0 | 1164 | 0 | 1340 | 313 | 1386 | 1160 | 1656 | 0 | 2791 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 19.8 | 0.0 | 0.0 | 11.0 | 0.0 | 7.6 | 19.8 | 15.4 | 15.3 | 15.3 | 0.0 | 9.4 |
| Incr Delay (d2), s/veh | 9.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 49.2 | 0.5 | 0.5 | 1.5 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 1.8 | 0.1 | 1.1 | 0.9 | 2.0 | 0.0 | 0.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 28.9 | 0.0 | 0.0 | 11.2 | 0.0 | 7.8 | 69.1 | 15.9 | 15.8 | 16.8 | 0.0 | 9.5 |
| LnGrp LOS | C | A | A | B | A | A | E | B | B | B | A | A |
| Approach Vol, veh/h | | 1 | | | 578 | | | 276 | | | 460 | |
| Approach Delay, s/veh | | 28.9 | | | 8.6 | | | 16.5 | | | 13.7 | |
| Approach LOS | | C | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 10.7 | 10.8 | | 3.1 | 3.1 | 18.3 | | 15.3 | | | | |
| Change Period (Y+Rc), s | 3.0 | 4.5 | | 3.0 | 3.0 | 4.5 | | 4.0 | | | | |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | | 13.0 | 7.0 | 59.5 | | 26.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 7.7 | 5.0 | | 2.0 | 2.1 | 5.0 | | 10.1 | | | | |
| Green Ext Time (p_c), s | 0.4 | 0.7 | | 0.0 | 0.0 | 0.7 | | 1.3 | | | | |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 12.1 |
| HCM 6th LOS | B |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 9 | 350 | 0 | 0 | 251 | 51 | 260 | 16 | 155 | 31 | 0 | 21 |
| Future Volume (veh/h) | 9 | 350 | 0 | 0 | 251 | 51 | 260 | 16 | 155 | 31 | 0 | 21 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.98 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 10 | 380 | 0 | 0 | 273 | 55 | 295 | 0 | 168 | 34 | 0 | 23 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 142 | 677 | 0 | 0 | 1082 | 214 | 551 | 0 | 245 | 52 | 0 | 35 |
| Arrive On Green | 0.37 | 0.37 | 0.00 | 0.00 | 0.37 | 0.37 | 0.15 | 0.00 | 0.15 | 0.05 | 0.00 | 0.05 |
| Sat Flow, veh/h | 17 | 1841 | 0 | 0 | 3038 | 583 | 3563 | 0 | 1585 | 1012 | 0 | 685 |
| Grp Volume(v), veh/h | 390 | 0 | 0 | 0 | 163 | 165 | 295 | 0 | 168 | 57 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1857 | 0 | 0 | 0 | 1777 | 1751 | 1781 | 0 | 1585 | 1697 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 1.8 | 2.1 | 0.0 | 2.7 | 0.9 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 4.5 | 0.0 | 0.0 | 0.0 | 1.7 | 1.8 | 2.1 | 0.0 | 2.7 | 0.9 | 0.0 | 0.0 |
| Prop In Lane | 0.03 | | 0.00 | 0.00 | | 0.33 | 1.00 | | 1.00 | 0.60 | | 0.40 |
| Lane Grp Cap(c), veh/h | 818 | 0 | 0 | 0 | 653 | 643 | 551 | 0 | 245 | 87 | 0 | 0 |
| V/C Ratio(X) | 0.48 | 0.00 | 0.00 | 0.00 | 0.25 | 0.26 | 0.54 | 0.00 | 0.69 | 0.65 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1546 | 0 | 0 | 0 | 1358 | 1338 | 3444 | 0 | 1532 | 705 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 6.9 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 10.6 | 0.0 | 10.9 | 12.7 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.0 | 1.3 | 3.1 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 | 0.6 | 0.0 | 0.7 | 0.3 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.0 | 0.0 | 0.0 | 0.0 | 6.1 | 6.1 | 10.9 | 0.0 | 12.1 | 15.7 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 390 | | | 328 | | | 463 | | | 57 | |
| Approach Delay, s/veh | | 7.0 | | | 6.1 | | | 11.4 | | | 15.7 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Timer - Assigned Phs | 2 | 4 | 6 | 8 |
|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.2 | 5.1 | 14.2 | 7.9 |
| Change Period (Y+Rc), s | * 4.2 | 3.7 | * 4.2 | 3.7 |
| Max Green Setting (Gmax), s | * 21 | 11.3 | * 21 | 26.3 |
| Max Q Clear Time (g_c+I1), s | 6.5 | 2.9 | 3.8 | 4.1 |
| Green Ext Time (p_c), s | 1.3 | 0.1 | 1.1 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 8.8 |
| HCM 6th LOS | A |

**Notes**

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.





| Intersection | |
|---|---|
| Int Delay, s/veh | 1.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 394 | 114 | 11 | 246 | 0 | 70 | 0 | 6 | 0 | 0 | 1 |
| Future Vol, veh/h | 0 | 394 | 114 | 11 | 246 | 0 | 70 | 0 | 6 | 0 | 0 | 1 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 428 | 124 | 12 | 267 | 0 | 76 | 0 | 7 | 0 | 0 | 1 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 267 | 0 | 0 | 552 | 0 | 0 | 783 | 781 | 490 | 785 | 843 | 268 |
| Stage 1 | - | - | - | - | - | - | 490 | 490 | - | 291 | 291 | - |
| Stage 2 | - | - | - | - | - | - | 293 | 291 | - | 494 | 552 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1297 | - | - | 1018 | - | - | 311 | 326 | 578 | 310 | 300 | 771 |
| Stage 1 | - | - | - | - | - | - | 560 | 549 | - | 717 | 672 | - |
| Stage 2 | - | - | - | - | - | - | 715 | 672 | - | 557 | 515 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1297 | - | - | 1018 | - | - | 308 | 322 | 578 | 304 | 296 | 770 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 308 | 322 | - | 304 | 296 | - |
| Stage 1 | - | - | - | - | - | - | 560 | 549 | - | 717 | 664 | - |
| Stage 2 | - | - | - | - | - | - | 705 | 664 | - | 551 | 515 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.4 | 19.8 | 9.7 |
| HCM LOS | | | C | A |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 308 | 578 | 1297 | - | - | 1018 | - | - | 770 |
| HCM Lane V/C Ratio | 0.247 | 0.011 | - | - | - | 0.012 | - | - | 0.001 |
| HCM Control Delay (s) | 20.5 | 11.3 | 0 | - | - | 8.6 | - | - | 9.7 |
| HCM Lane LOS | C | B | A | - | - | A | - | - | A |
| HCM 95th %tile Q(veh) | 1 | 0 | 0 | - | - | 0 | - | - | 0 |

HCM 6th Signalized Intersection Summary
1: Old Redwood Hwy & Arata Ln

W-Trans
01/03/2025



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 1 | 6 | 239 | 4 | 669 | 4 | 176 | 156 | 272 | 156 | 3 |
| Future Volume (veh/h) | 10 | 1 | 6 | 239 | 4 | 669 | 4 | 176 | 156 | 272 | 156 | 3 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 0.97 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 11 | 1 | 7 | 260 | 4 | 727 | 4 | 191 | 170 | 296 | 170 | 3 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 27 | 2 | 17 | 698 | 11 | 926 | 6 | 285 | 235 | 351 | 633 | 11 |
| Arrive On Green | 0.03 | 0.03 | 0.03 | 0.40 | 0.40 | 0.40 | 0.00 | 0.15 | 0.15 | 0.20 | 0.35 | 0.35 |
| Sat Flow, veh/h | 989 | 90 | 629 | 1756 | 27 | 1544 | 1781 | 1870 | 1541 | 1781 | 1831 | 32 |
| Grp Volume(v), veh/h | 19 | 0 | 0 | 264 | 0 | 727 | 4 | 191 | 170 | 296 | 0 | 173 |
| Grp Sat Flow(s),veh/h/ln | 1708 | 0 | 0 | 1783 | 0 | 1544 | 1781 | 1870 | 1541 | 1781 | 0 | 1864 |
| Q Serve(g_s), s | 0.7 | 0.0 | 0.0 | 6.7 | 0.0 | 23.1 | 0.1 | 6.2 | 6.7 | 10.2 | 0.0 | 4.3 |
| Cycle Q Clear(g_c), s | 0.7 | 0.0 | 0.0 | 6.7 | 0.0 | 23.1 | 0.1 | 6.2 | 6.7 | 10.2 | 0.0 | 4.3 |
| Prop In Lane | 0.58 | | 0.37 | 0.98 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.02 |
| Lane Grp Cap(c), veh/h | 46 | 0 | 0 | 709 | 0 | 926 | 6 | 285 | 235 | 351 | 0 | 645 |
| V/C Ratio(X) | 0.41 | 0.00 | 0.00 | 0.37 | 0.00 | 0.79 | 0.70 | 0.67 | 0.72 | 0.84 | 0.00 | 0.27 |
| Avail Cap(c_a), veh/h | 347 | 0 | 0 | 724 | 0 | 939 | 195 | 862 | 710 | 1029 | 0 | 1732 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 30.7 | 0.0 | 0.0 | 13.6 | 0.0 | 9.9 | 31.9 | 25.6 | 25.9 | 24.8 | 0.0 | 15.1 |
| Incr Delay (d2), s/veh | 2.2 | 0.0 | 0.0 | 0.1 | 0.0 | 4.0 | 44.0 | 1.0 | 1.6 | 2.2 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.3 | 0.0 | 0.0 | 2.5 | 0.0 | 7.0 | 0.1 | 2.7 | 2.4 | 4.3 | 0.0 | 1.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 32.9 | 0.0 | 0.0 | 13.8 | 0.0 | 13.9 | 75.9 | 26.7 | 27.5 | 26.9 | 0.0 | 15.2 |
| LnGrp LOS | C | A | A | B | A | B | E | C | C | C | A | B |
| Approach Vol, veh/h | | 19 | | | 991 | | | 365 | | | 469 | |
| Approach Delay, s/veh | | 32.9 | | | 13.9 | | | 27.6 | | | 22.6 | |
| Approach LOS | | C | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.6 | 14.2 | | 4.7 | 3.2 | 26.6 | | 29.5 | | | | |
| Change Period (Y+Rc), s | 3.0 | 4.5 | | 3.0 | 3.0 | 4.5 | | 4.0 | | | | |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | | 13.0 | 7.0 | 59.5 | | 26.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 12.2 | 8.7 | | 2.7 | 2.1 | 6.3 | | 25.1 | | | | |
| Green Ext Time (p_c), s | 0.4 | 1.0 | | 0.0 | 0.0 | 0.7 | | 0.4 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 19.0 | |
| HCM 6th LOS | | B | |



HCM 6th Signalized Intersection Summary
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
01/03/2025



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 419 | 0 | 0 | 582 | 106 | 304 | 15 | 102 | 28 | 0 | 19 |
| Future Volume (veh/h) | 10 | 419 | 0 | 0 | 582 | 106 | 304 | 15 | 102 | 28 | 0 | 19 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 11 | 455 | 0 | 0 | 633 | 115 | 341 | 0 | 111 | 30 | 0 | 21 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 139 | 663 | 0 | 0 | 1084 | 197 | 605 | 0 | 269 | 47 | 0 | 33 |
| Arrive On Green | 0.36 | 0.36 | 0.00 | 0.00 | 0.36 | 0.36 | 0.17 | 0.00 | 0.17 | 0.05 | 0.00 | 0.05 |
| Sat Flow, veh/h | 16 | 1830 | 0 | 0 | 3082 | 542 | 3563 | 0 | 1585 | 997 | 0 | 698 |
| Grp Volume(v), veh/h | 466 | 0 | 0 | 0 | 376 | 372 | 341 | 0 | 111 | 51 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1845 | 0 | 0 | 0 | 1777 | 1754 | 1781 | 0 | 1585 | 1695 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 4.7 | 2.4 | 0.0 | 1.7 | 0.8 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 5.8 | 0.0 | 0.0 | 0.0 | 4.7 | 4.7 | 2.4 | 0.0 | 1.7 | 0.8 | 0.0 | 0.0 |
| Prop In Lane | 0.02 | | 0.00 | 0.00 | | 0.31 | 1.00 | | 1.00 | 0.59 | | 0.41 |
| Lane Grp Cap(c), veh/h | 803 | 0 | 0 | 0 | 644 | 636 | 605 | 0 | 269 | 80 | 0 | 0 |
| V/C Ratio(X) | 0.58 | 0.00 | 0.00 | 0.00 | 0.58 | 0.59 | 0.56 | 0.00 | 0.41 | 0.64 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1508 | 0 | 0 | 0 | 1340 | 1323 | 3398 | 0 | 1512 | 694 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 7.5 | 0.0 | 0.0 | 0.0 | 7.1 | 7.1 | 10.5 | 0.0 | 10.2 | 12.9 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | 0.0 | 0.4 | 3.2 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.3 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.7 | 0.0 | 0.4 | 0.3 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.7 | 0.0 | 0.0 | 0.0 | 7.4 | 7.4 | 10.8 | 0.0 | 10.6 | 16.1 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 466 | | | 748 | | | 452 | | | 51 | |
| Approach Delay, s/veh | | 7.7 | | | 7.4 | | | 10.8 | | | 16.1 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 14.2 | | 5.0 | | 14.2 | | 8.4 | | | | |
| Change Period (Y+Rc), s | | * 4.2 | | 3.7 | | * 4.2 | | 3.7 | | | | |
| Max Green Setting (Gmax), s | | * 21 | | 11.3 | | * 21 | | 26.3 | | | | |
| Max Q Clear Time (g_c+I1), s | | 7.8 | | 2.8 | | 6.7 | | 4.4 | | | | |
| Green Ext Time (p_c), s | | 1.6 | | 0.1 | | 2.8 | | 0.4 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 8.6 | |
| HCM 6th LOS | | A | |

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 1 | 444 | 101 | 12 | 557 | 1 | 110 | 0 | 11 | 2 | 1 | 3 |
| Future Vol, veh/h | 1 | 444 | 101 | 12 | 557 | 1 | 110 | 0 | 11 | 2 | 1 | 3 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1 | 483 | 110 | 13 | 605 | 1 | 120 | 0 | 12 | 2 | 1 | 3 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 607 | 0 | 0 | 593 | 0 | 0 | 1174 | 1173 | 539 | 1180 | 1228 | 607 |
| Stage 1 | - | - | - | - | - | - | 540 | 540 | - | 633 | 633 | - |
| Stage 2 | - | - | - | - | - | - | 634 | 633 | - | 547 | 595 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 971 | - | - | 983 | - | - | 169 | 192 | 542 | 167 | 178 | 496 |
| Stage 1 | - | - | - | - | - | - | 526 | 521 | - | 468 | 473 | - |
| Stage 2 | - | - | - | - | - | - | 467 | 473 | - | 521 | 492 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 970 | - | - | 983 | - | - | 165 | 189 | 542 | 161 | 175 | 496 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 165 | 189 | - | 161 | 175 | - |
| Stage 1 | - | - | - | - | - | - | 525 | 520 | - | 467 | 466 | - |
| Stage 2 | - | - | - | - | - | - | 457 | 466 | - | 509 | 492 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.2 | 64.3 | 19.9 |
| HCM LOS | | | F | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 165 | 542 | 970 | - | - | 983 | - | - | 248 |
| HCM Lane V/C Ratio | 0.725 | 0.022 | 0.001 | - | - | 0.013 | - | - | 0.026 |
| HCM Control Delay (s) | 69.5 | 11.8 | 8.7 | - | - | 8.7 | - | - | 19.9 |
| HCM Lane LOS | F | B | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 4.4 | 0.1 | 0 | - | - | 0 | - | - | 0.1 |





| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 1 | 0 | 0 | 125 | 1 | 412 | 3 | 143 | 111 | 251 | 175 | 2 |
| Future Volume (veh/h) | 1 | 0 | 0 | 125 | 1 | 412 | 3 | 143 | 111 | 251 | 175 | 2 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 1 | 0 | 0 | 136 | 1 | 448 | 3 | 155 | 121 | 273 | 190 | 2 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 4 | 0 | 0 | 505 | 4 | 762 | 4 | 293 | 245 | 348 | 645 | 7 |
| Arrive On Green | 0.00 | 0.00 | 0.00 | 0.29 | 0.29 | 0.29 | 0.00 | 0.16 | 0.16 | 0.20 | 0.35 | 0.35 |
| Sat Flow, veh/h | 1781 | 0 | 0 | 1769 | 13 | 1585 | 1781 | 1870 | 1565 | 1781 | 1847 | 19 |
| Grp Volume(v), veh/h | 1 | 0 | 0 | 137 | 0 | 448 | 3 | 155 | 121 | 273 | 0 | 192 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 0 | 1782 | 0 | 1585 | 1781 | 1870 | 1565 | 1781 | 0 | 1867 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 8.2 | 0.1 | 3.1 | 2.8 | 5.8 | 0.0 | 3.0 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 8.2 | 0.1 | 3.1 | 2.8 | 5.8 | 0.0 | 3.0 |
| Prop In Lane | 1.00 | | 0.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.01 |
| Lane Grp Cap(c), veh/h | 4 | 0 | 0 | 509 | 0 | 762 | 4 | 293 | 245 | 348 | 0 | 652 |
| V/C Ratio(X) | 0.23 | 0.00 | 0.00 | 0.27 | 0.00 | 0.59 | 0.68 | 0.53 | 0.49 | 0.78 | 0.00 | 0.29 |
| Avail Cap(c_a), veh/h | 577 | 0 | 0 | 1154 | 0 | 1336 | 310 | 1374 | 1149 | 1641 | 0 | 2766 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 20.0 | 0.0 | 0.0 | 11.1 | 0.0 | 7.5 | 20.0 | 15.6 | 15.5 | 15.4 | 0.0 | 9.5 |
| Incr Delay (d2), s/veh | 9.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 50.5 | 0.6 | 0.6 | 1.5 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 1.9 | 0.1 | 1.1 | 0.9 | 2.1 | 0.0 | 1.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 29.2 | 0.0 | 0.0 | 11.2 | 0.0 | 7.8 | 70.5 | 16.1 | 16.1 | 16.8 | 0.0 | 9.6 |
| LnGrp LOS | C | A | A | B | A | A | E | B | B | B | A | A |
| Approach Vol, veh/h | | 1 | | | 585 | | | 279 | | | 465 | |
| Approach Delay, s/veh | | 29.2 | | | 8.6 | | | 16.7 | | | 13.8 | |
| Approach LOS | | C | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 10.8 | 10.8 | | 3.1 | 3.1 | 18.5 | | 15.5 | | | | |
| Change Period (Y+Rc), s | 3.0 | 4.5 | | 3.0 | 3.0 | 4.5 | | 4.0 | | | | |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | | 13.0 | 7.0 | 59.5 | | 26.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 7.8 | 5.1 | | 2.0 | 2.1 | 5.0 | | 10.2 | | | | |
| Green Ext Time (p_c), s | 0.4 | 0.7 | | 0.0 | 0.0 | 0.7 | | 1.3 | | | | |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 12.1 |
| HCM 6th LOS | B |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 9 | 356 | 0 | 0 | 258 | 52 | 260 | 16 | 162 | 31 | 0 | 21 |
| Future Volume (veh/h) | 9 | 356 | 0 | 0 | 258 | 52 | 260 | 16 | 162 | 31 | 0 | 21 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.98 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 10 | 387 | 0 | 0 | 280 | 57 | 295 | 0 | 176 | 34 | 0 | 23 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 142 | 677 | 0 | 0 | 1080 | 216 | 551 | 0 | 245 | 52 | 0 | 35 |
| Arrive On Green | 0.37 | 0.37 | 0.00 | 0.00 | 0.37 | 0.37 | 0.15 | 0.00 | 0.15 | 0.05 | 0.00 | 0.05 |
| Sat Flow, veh/h | 16 | 1841 | 0 | 0 | 3032 | 588 | 3563 | 0 | 1585 | 1012 | 0 | 685 |
| Grp Volume(v), veh/h | 397 | 0 | 0 | 0 | 167 | 170 | 295 | 0 | 176 | 57 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1857 | 0 | 0 | 0 | 1777 | 1750 | 1781 | 0 | 1585 | 1697 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 1.8 | 2.1 | 0.0 | 2.9 | 0.9 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 4.6 | 0.0 | 0.0 | 0.0 | 1.8 | 1.8 | 2.1 | 0.0 | 2.9 | 0.9 | 0.0 | 0.0 |
| Prop In Lane | 0.03 | | 0.00 | 0.00 | | 0.34 | 1.00 | | 1.00 | 0.60 | | 0.40 |
| Lane Grp Cap(c), veh/h | 818 | 0 | 0 | 0 | 653 | 643 | 551 | 0 | 245 | 87 | 0 | 0 |
| V/C Ratio(X) | 0.49 | 0.00 | 0.00 | 0.00 | 0.26 | 0.26 | 0.54 | 0.00 | 0.72 | 0.65 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1546 | 0 | 0 | 0 | 1358 | 1338 | 3444 | 0 | 1532 | 705 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 6.9 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 10.6 | 0.0 | 10.9 | 12.7 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.0 | 1.5 | 3.1 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 | 0.6 | 0.0 | 0.8 | 0.3 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.1 | 0.0 | 0.0 | 0.0 | 6.1 | 6.1 | 10.9 | 0.0 | 12.4 | 15.7 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 397 | | | 337 | | | 471 | | | 57 | |
| Approach Delay, s/veh | | 7.1 | | | 6.1 | | | 11.5 | | | 15.7 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Timer - Assigned Phs | 2 | 4 | 6 | 8 |
|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.2 | 5.1 | 14.2 | 7.9 |
| Change Period (Y+Rc), s | * 4.2 | 3.7 | * 4.2 | 3.7 |
| Max Green Setting (Gmax), s | * 21 | 11.3 | * 21 | 26.3 |
| Max Q Clear Time (g_c+I1), s | 6.6 | 2.9 | 3.8 | 4.1 |
| Green Ext Time (p_c), s | 1.4 | 0.1 | 1.2 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 8.8 |
| HCM 6th LOS | A |

**Notes**

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.





| Intersection | |
|---|---|
| Int Delay, s/veh | 2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 3 | 395 | 115 | 11 | 247 | 1 | 71 | 1 | 6 | 1 | 1 | 3 |
| Future Vol, veh/h | 3 | 395 | 115 | 11 | 247 | 1 | 71 | 1 | 6 | 1 | 1 | 3 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 3 | 429 | 125 | 12 | 268 | 1 | 77 | 1 | 7 | 1 | 1 | 3 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 269 | 0 | 0 | 554 | 0 | 0 | 794 | 791 | 492 | 795 | 853 | 270 |
| Stage 1 | - | - | - | - | - | - | 498 | 498 | - | 293 | 293 | - |
| Stage 2 | - | - | - | - | - | - | 296 | 293 | - | 502 | 560 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1295 | - | - | 1016 | - | - | 306 | 322 | 577 | 305 | 296 | 769 |
| Stage 1 | - | - | - | - | - | - | 554 | 544 | - | 715 | 670 | - |
| Stage 2 | - | - | - | - | - | - | 712 | 670 | - | 552 | 511 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1295 | - | - | 1016 | - | - | 300 | 317 | 577 | 298 | 292 | 768 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 300 | 317 | - | 298 | 292 | - |
| Stage 1 | - | - | - | - | - | - | 553 | 543 | - | 714 | 662 | - |
| Stage 2 | - | - | - | - | - | - | 699 | 662 | - | 543 | 510 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.4 | 20.3 | 12.8 |
| HCM LOS | | | C | B |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 300 | 516 | 1295 | - | - | 1016 | - | - | 468 |
| HCM Lane V/C Ratio | 0.257 | 0.015 | 0.003 | - | - | 0.012 | - | - | 0.012 |
| HCM Control Delay (s) | 21.1 | 12.1 | 7.8 | - | - | 8.6 | - | - | 12.8 |
| HCM Lane LOS | C | B | A | - | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 1 | 0 | 0 | - | - | 0 | - | - | 0 |

HCM 6th Signalized Intersection Summary
1: Old Redwood Hwy & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 1 | 6 | 260 | 4 | 721 | 4 | 187 | 167 | 292 | 159 | 3 |
| Future Volume (veh/h) | 10 | 1 | 6 | 260 | 4 | 721 | 4 | 187 | 167 | 292 | 159 | 3 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 0.97 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 11 | 1 | 7 | 283 | 4 | 784 | 4 | 203 | 182 | 317 | 173 | 3 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 26 | 2 | 17 | 685 | 10 | 931 | 6 | 297 | 245 | 370 | 665 | 12 |
| Arrive On Green | 0.03 | 0.03 | 0.03 | 0.39 | 0.39 | 0.39 | 0.00 | 0.16 | 0.16 | 0.21 | 0.36 | 0.36 |
| Sat Flow, veh/h | 989 | 90 | 629 | 1758 | 25 | 1544 | 1781 | 1870 | 1541 | 1781 | 1832 | 32 |
| Grp Volume(v), veh/h | 19 | 0 | 0 | 287 | 0 | 784 | 4 | 203 | 182 | 317 | 0 | 176 |
| Grp Sat Flow(s),veh/h/ln | 1708 | 0 | 0 | 1782 | 0 | 1544 | 1781 | 1870 | 1541 | 1781 | 0 | 1864 |
| Q Serve(g_s), s | 0.7 | 0.0 | 0.0 | 7.8 | 0.0 | 26.0 | 0.1 | 6.8 | 7.5 | 11.4 | 0.0 | 4.4 |
| Cycle Q Clear(g_c), s | 0.7 | 0.0 | 0.0 | 7.8 | 0.0 | 26.0 | 0.1 | 6.8 | 7.5 | 11.4 | 0.0 | 4.4 |
| Prop In Lane | 0.58 | | 0.37 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.02 |
| Lane Grp Cap(c), veh/h | 46 | 0 | 0 | 695 | 0 | 931 | 6 | 297 | 245 | 370 | 0 | 677 |
| V/C Ratio(X) | 0.42 | 0.00 | 0.00 | 0.41 | 0.00 | 0.84 | 0.70 | 0.68 | 0.74 | 0.86 | 0.00 | 0.26 |
| Avail Cap(c_a), veh/h | 333 | 0 | 0 | 695 | 0 | 931 | 187 | 827 | 681 | 988 | 0 | 1662 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 32.0 | 0.0 | 0.0 | 14.8 | 0.0 | 11.0 | 33.2 | 26.5 | 26.8 | 25.5 | 0.0 | 14.9 |
| Incr Delay (d2), s/veh | 2.2 | 0.0 | 0.0 | 0.1 | 0.0 | 6.7 | 44.2 | 1.0 | 1.7 | 2.3 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.3 | 0.0 | 0.0 | 2.9 | 0.0 | 9.0 | 0.1 | 3.0 | 2.7 | 4.8 | 0.0 | 1.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 34.2 | 0.0 | 0.0 | 15.0 | 0.0 | 17.7 | 77.4 | 27.5 | 28.5 | 27.7 | 0.0 | 15.0 |
| LnGrp LOS | C | A | A | B | A | B | E | C | C | C | A | B |
| Approach Vol, veh/h | | 19 | | | 1071 | | | 389 | | | 493 | |
| Approach Delay, s/veh | | 34.2 | | | 17.0 | | | 28.5 | | | 23.2 | |
| Approach LOS | | C | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.9 | 15.1 | | 4.8 | 3.2 | 28.7 | | 30.0 | | | | |
| Change Period (Y+Rc), s | 3.0 | 4.5 | | 3.0 | 3.0 | 4.5 | | 4.0 | | | | |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | | 13.0 | 7.0 | 59.5 | | 26.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 13.4 | 9.5 | | 2.7 | 2.1 | 6.4 | | 28.0 | | | | |
| Green Ext Time (p_c), s | 0.5 | 1.0 | | 0.0 | 0.0 | 0.7 | | 0.0 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 21.0 | |
| HCM 6th LOS | | C | |



HCM 6th Signalized Intersection Summary
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 11 | 449 | 0 | 0 | 649 | 52 | 310 | 15 | 124 | 14 | 0 | 19 |
| Future Volume (veh/h) | 11 | 449 | 0 | 0 | 649 | 52 | 310 | 15 | 124 | 14 | 0 | 19 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 12 | 488 | 0 | 0 | 705 | 57 | 348 | 0 | 135 | 15 | 0 | 21 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 141 | 674 | 0 | 0 | 1224 | 99 | 614 | 0 | 273 | 24 | 0 | 34 |
| Arrive On Green | 0.37 | 0.37 | 0.00 | 0.00 | 0.37 | 0.37 | 0.17 | 0.00 | 0.17 | 0.03 | 0.00 | 0.03 |
| Sat Flow, veh/h | 16 | 1828 | 0 | 0 | 3415 | 268 | 3563 | 0 | 1585 | 692 | 0 | 969 |
| Grp Volume(v), veh/h | 500 | 0 | 0 | 0 | 377 | 385 | 348 | 0 | 135 | 36 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1844 | 0 | 0 | 0 | 1777 | 1813 | 1781 | 0 | 1585 | 1661 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 4.7 | 2.5 | 0.0 | 2.1 | 0.6 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 6.3 | 0.0 | 0.0 | 0.0 | 4.7 | 4.7 | 2.5 | 0.0 | 2.1 | 0.6 | 0.0 | 0.0 |
| Prop In Lane | 0.02 | | 0.00 | 0.00 | | 0.15 | 1.00 | | 1.00 | 0.42 | | 0.58 |
| Lane Grp Cap(c), veh/h | 814 | 0 | 0 | 0 | 655 | 668 | 614 | 0 | 273 | 58 | 0 | 0 |
| V/C Ratio(X) | 0.61 | 0.00 | 0.00 | 0.00 | 0.58 | 0.58 | 0.57 | 0.00 | 0.49 | 0.62 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1519 | 0 | 0 | 0 | 1351 | 1378 | 3425 | 0 | 1524 | 686 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 7.4 | 0.0 | 0.0 | 0.0 | 6.9 | 6.9 | 10.4 | 0.0 | 10.2 | 13.0 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | 0.0 | 0.5 | 3.9 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.4 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.7 | 0.0 | 0.5 | 0.2 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.7 | 0.0 | 0.0 | 0.0 | 7.2 | 7.2 | 10.7 | 0.0 | 10.8 | 17.0 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 500 | | | 762 | | | 483 | | | 36 | |
| Approach Delay, s/veh | | 7.7 | | | 7.2 | | | 10.7 | | | 17.0 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 14.3 | | 4.7 | | 14.3 | | 8.4 | | | | |
| Change Period (Y+Rc), s | | * 4.2 | | 3.7 | | * 4.2 | | 3.7 | | | | |
| Max Green Setting (Gmax), s | | * 21 | | 11.3 | | * 21 | | 26.3 | | | | |
| Max Q Clear Time (g_c+I1), s | | 8.3 | | 2.6 | | 6.7 | | 4.5 | | | | |
| Green Ext Time (p_c), s | | 1.8 | | 0.0 | | 2.8 | | 0.4 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 8.5 | |
| HCM 6th LOS | | A | |

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
3: Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 29 | 433 | 104 | 12 | 516 | 51 | 107 | 12 | 11 | 23 | 12 | 56 |
| Future Volume (veh/h) | 29 | 433 | 104 | 12 | 516 | 51 | 107 | 12 | 11 | 23 | 12 | 56 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.97 | 1.00 | | 0.98 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 32 | 471 | 113 | 13 | 561 | 55 | 116 | 13 | 12 | 25 | 13 | 61 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 91 | 629 | 151 | 41 | 679 | 67 | 428 | 252 | 233 | 231 | 93 | 197 |
| Arrive On Green | 0.05 | 0.43 | 0.43 | 0.02 | 0.41 | 0.41 | 0.07 | 0.29 | 0.29 | 0.12 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1781 | 1450 | 348 | 1781 | 1672 | 164 | 1781 | 884 | 816 | 827 | 750 | 1580 |
| Grp Volume(v), veh/h | 32 | 0 | 584 | 13 | 0 | 616 | 116 | 0 | 25 | 38 | 0 | 61 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1798 | 1781 | 0 | 1836 | 1781 | 0 | 1701 | 1577 | 0 | 1580 |
| Q Serve(g_s), s | 0.8 | 0.0 | 12.7 | 0.3 | 0.0 | 14.0 | 2.5 | 0.0 | 0.5 | 0.0 | 0.0 | 1.6 |
| Cycle Q Clear(g_c), s | 0.8 | 0.0 | 12.7 | 0.3 | 0.0 | 14.0 | 2.5 | 0.0 | 0.5 | 0.8 | 0.0 | 1.6 |
| Prop In Lane | 1.00 | | 0.19 | 1.00 | | 0.09 | 1.00 | | 0.48 | 0.66 | | 1.00 |
| Lane Grp Cap(c), veh/h | 91 | 0 | 780 | 41 | 0 | 746 | 428 | 0 | 485 | 325 | 0 | 197 |
| V/C Ratio(X) | 0.35 | 0.00 | 0.75 | 0.31 | 0.00 | 0.83 | 0.27 | 0.00 | 0.05 | 0.12 | 0.00 | 0.31 |
| Avail Cap(c_a), veh/h | 268 | 0 | 1814 | 268 | 0 | 1851 | 525 | 0 | 1241 | 917 | 0 | 814 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.4 | 0.0 | 11.1 | 22.4 | 0.0 | 12.4 | 14.4 | 0.0 | 12.1 | 18.2 | 0.0 | 18.6 |
| Incr Delay (d2), s/veh | 0.9 | 0.0 | 0.5 | 1.6 | 0.0 | 0.9 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.3 | 0.0 | 3.9 | 0.1 | 0.0 | 4.6 | 0.9 | 0.0 | 0.2 | 0.3 | 0.0 | 0.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 22.2 | 0.0 | 11.6 | 24.0 | 0.0 | 13.3 | 14.5 | 0.0 | 12.1 | 18.3 | 0.0 | 18.9 |
| LnGrp LOS | C | A | B | C | A | B | B | A | B | B | A | B |
| Approach Vol, veh/h | | 616 | | | 629 | | | 141 | | | 99 | |
| Approach Delay, s/veh | | 12.2 | | | 13.5 | | | 14.1 | | | 18.7 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Timer - Assigned Phs | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.3 | 5.1 | 24.2 | 7.5 | 9.8 | 6.4 | 22.9 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 34.0 | 7.0 | 47.0 | 6.0 | 24.0 | 7.0 | 47.0 |
| Max Q Clear Time (g_c+I1), s | 2.5 | 2.3 | 14.7 | 4.5 | 3.6 | 2.8 | 16.0 |
| Green Ext Time (p_c), s | 0.1 | 0.0 | 2.8 | 0.0 | 0.2 | 0.0 | 2.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 13.3 |
| HCM 6th LOS | B |



HCM 6th Signalized Intersection Summary
1: Old Redwood Hwy & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 1 | 0 | 0 | 146 | 1 | 456 | 3 | 156 | 131 | 288 | 179 | 2 |
| Future Volume (veh/h) | 1 | 0 | 0 | 146 | 1 | 456 | 3 | 156 | 131 | 288 | 179 | 2 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 1 | 0 | 0 | 159 | 1 | 496 | 3 | 170 | 142 | 313 | 195 | 2 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 4 | 0 | 0 | 528 | 3 | 817 | 4 | 290 | 243 | 387 | 684 | 7 |
| Arrive On Green | 0.00 | 0.00 | 0.00 | 0.30 | 0.30 | 0.30 | 0.00 | 0.16 | 0.16 | 0.22 | 0.37 | 0.37 |
| Sat Flow, veh/h | 1781 | 0 | 0 | 1771 | 11 | 1585 | 1781 | 1870 | 1565 | 1781 | 1848 | 19 |
| Grp Volume(v), veh/h | 1 | 0 | 0 | 160 | 0 | 496 | 3 | 170 | 142 | 313 | 0 | 197 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 0 | 1782 | 0 | 1585 | 1781 | 1870 | 1565 | 1781 | 0 | 1867 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 3.1 | 0.0 | 9.8 | 0.1 | 3.7 | 3.7 | 7.4 | 0.0 | 3.3 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 3.1 | 0.0 | 9.8 | 0.1 | 3.7 | 3.7 | 7.4 | 0.0 | 3.3 |
| Prop In Lane | 1.00 | | 0.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.01 |
| Lane Grp Cap(c), veh/h | 4 | 0 | 0 | 531 | 0 | 817 | 4 | 290 | 243 | 387 | 0 | 691 |
| V/C Ratio(X) | 0.25 | 0.00 | 0.00 | 0.30 | 0.00 | 0.61 | 0.69 | 0.59 | 0.59 | 0.81 | 0.00 | 0.29 |
| Avail Cap(c_a), veh/h | 523 | 0 | 0 | 1047 | 0 | 1276 | 282 | 1247 | 1043 | 1489 | 0 | 2510 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 22.1 | 0.0 | 0.0 | 12.0 | 0.0 | 7.6 | 22.1 | 17.4 | 17.4 | 16.4 | 0.0 | 9.8 |
| Incr Delay (d2), s/veh | 11.5 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 52.6 | 0.7 | 0.8 | 1.5 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 2.3 | 0.1 | 1.5 | 1.2 | 2.7 | 0.0 | 1.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 33.5 | 0.0 | 0.0 | 12.1 | 0.0 | 7.8 | 74.7 | 18.1 | 18.2 | 18.0 | 0.0 | 9.9 |
| LnGrp LOS | C | A | A | B | A | A | E | B | B | B | A | A |
| Approach Vol, veh/h | | 1 | | | 656 | | | 315 | | | 510 | |
| Approach Delay, s/veh | | 33.5 | | | 8.9 | | | 18.7 | | | 14.9 | |
| Approach LOS | | C | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.6 | 11.4 | 3.1 | 3.1 | 20.9 | 17.2 |
| Change Period (Y+Rc), s | 3.0 | 4.5 | 3.0 | 3.0 | 4.5 | 4.0 |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | 13.0 | 7.0 | 59.5 | 26.0 |
| Max Q Clear Time (g_c+I1), s | 9.4 | 5.7 | 2.0 | 2.1 | 5.3 | 11.8 |
| Green Ext Time (p_c), s | 0.5 | 0.8 | 0.0 | 0.0 | 0.8 | 1.4 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 13.0 |
| HCM 6th LOS | B |

HCM 6th Signalized Intersection Summary
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 13 | 409 | 0 | 0 | 315 | 25 | 267 | 16 | 212 | 15 | 0 | 21 |
| Future Volume (veh/h) | 13 | 409 | 0 | 0 | 315 | 25 | 267 | 16 | 212 | 15 | 0 | 21 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.98 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 14 | 445 | 0 | 0 | 342 | 27 | 302 | 0 | 230 | 16 | 0 | 23 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 146 | 682 | 0 | 0 | 1242 | 97 | 561 | 0 | 249 | 26 | 0 | 37 |
| Arrive On Green | 0.37 | 0.37 | 0.00 | 0.00 | 0.37 | 0.37 | 0.16 | 0.00 | 0.16 | 0.04 | 0.00 | 0.04 |
| Sat Flow, veh/h | 22 | 1831 | 0 | 0 | 3426 | 262 | 3563 | 0 | 1585 | 681 | 0 | 979 |
| Grp Volume(v), veh/h | 459 | 0 | 0 | 0 | 181 | 188 | 302 | 0 | 230 | 39 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1852 | 0 | 0 | 0 | 1777 | 1817 | 1781 | 0 | 1585 | 1660 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 1.9 | 2.1 | 0.0 | 3.8 | 0.6 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 5.5 | 0.0 | 0.0 | 0.0 | 1.9 | 1.9 | 2.1 | 0.0 | 3.8 | 0.6 | 0.0 | 0.0 |
| Prop In Lane | 0.03 | | 0.00 | 0.00 | | 0.14 | 1.00 | | 1.00 | 0.41 | | 0.59 |
| Lane Grp Cap(c), veh/h | 829 | 0 | 0 | 0 | 662 | 677 | 561 | 0 | 249 | 62 | 0 | 0 |
| V/C Ratio(X) | 0.55 | 0.00 | 0.00 | 0.00 | 0.27 | 0.28 | 0.54 | 0.00 | 0.92 | 0.62 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1562 | 0 | 0 | 0 | 1377 | 1408 | 3492 | 0 | 1554 | 699 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 7.0 | 0.0 | 0.0 | 0.0 | 5.9 | 5.9 | 10.4 | 0.0 | 11.1 | 12.7 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.0 | 5.9 | 3.8 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.1 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 | 0.6 | 0.0 | 1.3 | 0.2 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.2 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 10.7 | 0.0 | 17.0 | 16.5 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 459 | | | 369 | | | 532 | | | 39 | |
| Approach Delay, s/veh | | 7.2 | | | 6.0 | | | 13.4 | | | 16.5 | |
| Approach LOS | | A | | | A | | | B | | | B | |
| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | | 14.2 | | 4.7 | | 14.2 | | 7.9 | | | | |
| Change Period (Y+Rc), s | | * 4.2 | | 3.7 | | * 4.2 | | 3.7 | | | | |
| Max Green Setting (Gmax), s | | * 21 | | 11.3 | | * 21 | | 26.3 | | | | |
| Max Q Clear Time (g_c+I1), s | | 7.5 | | 2.6 | | 3.9 | | 4.1 | | | | |
| Green Ext Time (p_c), s | | 1.6 | | 0.0 | | 1.3 | | 0.2 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | 9.5 | | | | | | | | | |
| HCM 6th LOS | | | A | | | | | | | | | |

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



HCM 6th Signalized Intersection Summary
3: Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 82 | 384 | 121 | 11 | 228 | 34 | 69 | 16 | 6 | 19 | 10 | 38 |
| Future Volume (veh/h) | 82 | 384 | 121 | 11 | 228 | 34 | 69 | 16 | 6 | 19 | 10 | 38 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 89 | 417 | 132 | 12 | 248 | 37 | 75 | 17 | 7 | 21 | 11 | 41 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 198 | 527 | 167 | 39 | 477 | 71 | 429 | 351 | 145 | 249 | 97 | 192 |
| Arrive On Green | 0.11 | 0.39 | 0.39 | 0.02 | 0.30 | 0.30 | 0.06 | 0.28 | 0.28 | 0.12 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1781 | 1353 | 428 | 1781 | 1585 | 236 | 1781 | 1249 | 514 | 794 | 796 | 1581 |
| Grp Volume(v), veh/h | 89 | 0 | 549 | 12 | 0 | 285 | 75 | 0 | 24 | 32 | 0 | 41 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1781 | 1781 | 0 | 1821 | 1781 | 0 | 1763 | 1590 | 0 | 1581 |
| Q Serve(g_s), s | 1.8 | 0.0 | 10.6 | 0.3 | 0.0 | 5.1 | 1.3 | 0.0 | 0.4 | 0.0 | 0.0 | 0.9 |
| Cycle Q Clear(g_c), s | 1.8 | 0.0 | 10.6 | 0.3 | 0.0 | 5.1 | 1.3 | 0.0 | 0.4 | 0.6 | 0.0 | 0.9 |
| Prop In Lane | 1.00 | | 0.24 | 1.00 | | 0.13 | 1.00 | | 0.29 | 0.66 | | 1.00 |
| Lane Grp Cap(c), veh/h | 198 | 0 | 694 | 39 | 0 | 548 | 429 | 0 | 496 | 346 | 0 | 192 |
| V/C Ratio(X) | 0.45 | 0.00 | 0.79 | 0.31 | 0.00 | 0.52 | 0.17 | 0.00 | 0.05 | 0.09 | 0.00 | 0.21 |
| Avail Cap(c_a), veh/h | 821 | 0 | 2189 | 319 | 0 | 1725 | 510 | 0 | 1490 | 1133 | 0 | 1012 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.2 | 0.0 | 10.5 | 18.8 | 0.0 | 11.3 | 12.2 | 0.0 | 10.2 | 15.3 | 0.0 | 15.5 |
| Incr Delay (d2), s/veh | 0.6 | 0.0 | 0.8 | 1.6 | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.7 | 0.0 | 3.1 | 0.1 | 0.0 | 1.6 | 0.4 | 0.0 | 0.1 | 0.2 | 0.0 | 0.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 16.8 | 0.0 | 11.3 | 20.5 | 0.0 | 11.6 | 12.3 | 0.0 | 10.3 | 15.4 | 0.0 | 15.7 |
| LnGrp LOS | B | A | B | C | A | B | B | A | B | B | A | B |
| Approach Vol, veh/h | | 638 | | | 297 | | | 99 | | | 73 | |
| Approach Delay, s/veh | | 12.1 | | | 12.0 | | | 11.8 | | | 15.5 | |
| Approach LOS | | B | | | B | | | B | | | B | |
| Timer - Assigned Phs | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | | 15.0 | 4.9 | 19.2 | 6.2 | 8.7 | 8.3 | 15.8 | | | | |
| Change Period (Y+Rc), s | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | | |
| Max Green Setting (Gmax), s | | 33.0 | 7.0 | 48.0 | 4.0 | 25.0 | 18.0 | 37.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 2.4 | 2.3 | 12.6 | 3.3 | 2.9 | 3.8 | 7.1 | | | | |
| Green Ext Time (p_c), s | | 0.1 | 0.0 | 2.6 | 0.0 | 0.1 | 0.1 | 1.1 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | 12.2 | | | | | | | | | |
| HCM 6th LOS | | | B | | | | | | | | | |

HCM 6th Signalized Intersection Summary
1: Old Redwood Hwy & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 1 | 6 | 262 | 4 | 729 | 4 | 187 | 168 | 293 | 159 | 3 |
| Future Volume (veh/h) | 10 | 1 | 6 | 262 | 4 | 729 | 4 | 187 | 168 | 293 | 159 | 3 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 0.97 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 11 | 1 | 7 | 285 | 4 | 792 | 4 | 203 | 183 | 318 | 173 | 3 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 26 | 2 | 17 | 684 | 10 | 931 | 6 | 298 | 245 | 371 | 667 | 12 |
| Arrive On Green | 0.03 | 0.03 | 0.03 | 0.39 | 0.39 | 0.39 | 0.00 | 0.16 | 0.16 | 0.21 | 0.36 | 0.36 |
| Sat Flow, veh/h | 989 | 90 | 629 | 1758 | 25 | 1544 | 1781 | 1870 | 1541 | 1781 | 1832 | 32 |
| Grp Volume(v), veh/h | 19 | 0 | 0 | 289 | 0 | 792 | 4 | 203 | 183 | 318 | 0 | 176 |
| Grp Sat Flow(s),veh/h/ln | 1708 | 0 | 0 | 1782 | 0 | 1544 | 1781 | 1870 | 1541 | 1781 | 0 | 1864 |
| Q Serve(g_s), s | 0.7 | 0.0 | 0.0 | 7.9 | 0.0 | 26.0 | 0.1 | 6.8 | 7.6 | 11.5 | 0.0 | 4.4 |
| Cycle Q Clear(g_c), s | 0.7 | 0.0 | 0.0 | 7.9 | 0.0 | 26.0 | 0.1 | 6.8 | 7.6 | 11.5 | 0.0 | 4.4 |
| Prop In Lane | 0.58 | | 0.37 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.02 |
| Lane Grp Cap(c), veh/h | 46 | 0 | 0 | 693 | 0 | 931 | 6 | 298 | 245 | 371 | 0 | 679 |
| V/C Ratio(X) | 0.42 | 0.00 | 0.00 | 0.42 | 0.00 | 0.85 | 0.70 | 0.68 | 0.75 | 0.86 | 0.00 | 0.26 |
| Avail Cap(c_a), veh/h | 332 | 0 | 0 | 693 | 0 | 931 | 187 | 825 | 680 | 986 | 0 | 1659 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 32.0 | 0.0 | 0.0 | 14.9 | 0.0 | 11.1 | 33.3 | 26.5 | 26.8 | 25.5 | 0.0 | 14.9 |
| Incr Delay (d2), s/veh | 2.2 | 0.0 | 0.0 | 0.1 | 0.0 | 7.2 | 44.2 | 1.0 | 1.7 | 2.3 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.3 | 0.0 | 0.0 | 3.0 | 0.0 | 9.3 | 0.1 | 3.0 | 2.8 | 4.8 | 0.0 | 1.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 34.3 | 0.0 | 0.0 | 15.0 | 0.0 | 18.4 | 77.5 | 27.5 | 28.5 | 27.8 | 0.0 | 15.0 |
| LnGrp LOS | C | A | A | B | A | B | E | C | C | C | A | B |
| Approach Vol, veh/h | | 19 | | | 1081 | | | 390 | | | 494 | |
| Approach Delay, s/veh | | 34.3 | | | 17.5 | | | 28.5 | | | 23.2 | |
| Approach LOS | | C | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.9 | 15.1 | | 4.8 | 3.2 | 28.8 | | 30.0 | | | | |
| Change Period (Y+Rc), s | 3.0 | 4.5 | | 3.0 | 3.0 | 4.5 | | 4.0 | | | | |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | | 13.0 | 7.0 | 59.5 | | 26.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 13.5 | 9.6 | | 2.7 | 2.1 | 6.4 | | 28.0 | | | | |
| Green Ext Time (p_c), s | 0.5 | 1.0 | | 0.0 | 0.0 | 0.7 | | 0.0 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | | 21.2 |
| HCM 6th LOS | | | C |



HCM 6th Signalized Intersection Summary
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 11 | 451 | 0 | 0 | 659 | 52 | 310 | 15 | 127 | 14 | 0 | 19 |
| Future Volume (veh/h) | 11 | 451 | 0 | 0 | 659 | 52 | 310 | 15 | 127 | 14 | 0 | 19 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 12 | 490 | 0 | 0 | 716 | 57 | 348 | 0 | 138 | 15 | 0 | 21 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 140 | 675 | 0 | 0 | 1229 | 98 | 614 | 0 | 273 | 24 | 0 | 34 |
| Arrive On Green | 0.37 | 0.37 | 0.00 | 0.00 | 0.37 | 0.37 | 0.17 | 0.00 | 0.17 | 0.03 | 0.00 | 0.03 |
| Sat Flow, veh/h | 16 | 1828 | 0 | 0 | 3419 | 265 | 3563 | 0 | 1585 | 692 | 0 | 969 |
| Grp Volume(v), veh/h | 502 | 0 | 0 | 0 | 382 | 391 | 348 | 0 | 138 | 36 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1843 | 0 | 0 | 0 | 1777 | 1814 | 1781 | 0 | 1585 | 1661 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 4.7 | 2.5 | 0.0 | 2.2 | 0.6 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 6.3 | 0.0 | 0.0 | 0.0 | 4.7 | 4.7 | 2.5 | 0.0 | 2.2 | 0.6 | 0.0 | 0.0 |
| Prop In Lane | 0.02 | | 0.00 | 0.00 | | 0.15 | 1.00 | | 1.00 | 0.42 | | 0.58 |
| Lane Grp Cap(c), veh/h | 816 | 0 | 0 | 0 | 656 | 670 | 614 | 0 | 273 | 58 | 0 | 0 |
| V/C Ratio(X) | 0.62 | 0.00 | 0.00 | 0.00 | 0.58 | 0.58 | 0.57 | 0.00 | 0.51 | 0.62 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1516 | 0 | 0 | 0 | 1349 | 1377 | 3419 | 0 | 1521 | 685 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 7.4 | 0.0 | 0.0 | 0.0 | 6.9 | 6.9 | 10.4 | 0.0 | 10.3 | 13.0 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | 0.0 | 0.5 | 4.0 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.4 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.7 | 0.0 | 0.6 | 0.2 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.7 | 0.0 | 0.0 | 0.0 | 7.2 | 7.2 | 10.7 | 0.0 | 10.8 | 17.0 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 502 | | | 773 | | | 486 | | | 36 | |
| Approach Delay, s/veh | | 7.7 | | | 7.2 | | | 10.7 | | | 17.0 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 14.3 | | 4.7 | | 14.3 | | 8.4 | | | | |
| Change Period (Y+Rc), s | | * 4.2 | | 3.7 | | * 4.2 | | 3.7 | | | | |
| Max Green Setting (Gmax), s | | * 21 | | 11.3 | | * 21 | | 26.3 | | | | |
| Max Q Clear Time (g_c+I1), s | | 8.3 | | 2.6 | | 6.7 | | 4.5 | | | | |
| Green Ext Time (p_c), s | | 1.8 | | 0.0 | | 2.8 | | 0.4 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | | 8.5 |
| HCM 6th LOS | | | A |

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
3: Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 30 | 434 | 105 | 12 | 516 | 51 | 107 | 12 | 11 | 24 | 13 | 58 |
| Future Volume (veh/h) | 30 | 434 | 105 | 12 | 516 | 51 | 107 | 12 | 11 | 24 | 13 | 58 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.97 | 1.00 | | 0.98 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 33 | 472 | 114 | 13 | 561 | 55 | 116 | 13 | 12 | 26 | 14 | 63 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 93 | 630 | 152 | 41 | 679 | 67 | 427 | 253 | 233 | 229 | 96 | 199 |
| Arrive On Green | 0.05 | 0.43 | 0.43 | 0.02 | 0.41 | 0.41 | 0.07 | 0.29 | 0.29 | 0.13 | 0.13 | 0.13 |
| Sat Flow, veh/h | 1781 | 1448 | 350 | 1781 | 1672 | 164 | 1781 | 884 | 816 | 816 | 765 | 1580 |
| Grp Volume(v), veh/h | 33 | 0 | 586 | 13 | 0 | 616 | 116 | 0 | 25 | 40 | 0 | 63 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1798 | 1781 | 0 | 1836 | 1781 | 0 | 1701 | 1581 | 0 | 1580 |
| Q Serve(g_s), s | 0.8 | 0.0 | 12.8 | 0.3 | 0.0 | 14.1 | 2.5 | 0.0 | 0.5 | 0.0 | 0.0 | 1.7 |
| Cycle Q Clear(g_c), s | 0.8 | 0.0 | 12.8 | 0.3 | 0.0 | 14.1 | 2.5 | 0.0 | 0.5 | 0.9 | 0.0 | 1.7 |
| Prop In Lane | 1.00 | | 0.19 | 1.00 | | 0.09 | 1.00 | | 0.48 | 0.65 | | 1.00 |
| Lane Grp Cap(c), veh/h | 93 | 0 | 782 | 41 | 0 | 745 | 427 | 0 | 486 | 326 | 0 | 199 |
| V/C Ratio(X) | 0.36 | 0.00 | 0.75 | 0.31 | 0.00 | 0.83 | 0.27 | 0.00 | 0.05 | 0.12 | 0.00 | 0.32 |
| Avail Cap(c_a), veh/h | 266 | 0 | 1803 | 266 | 0 | 1841 | 523 | 0 | 1234 | 913 | 0 | 809 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.4 | 0.0 | 11.1 | 22.5 | 0.0 | 12.4 | 14.5 | 0.0 | 12.1 | 18.3 | 0.0 | 18.6 |
| Incr Delay (d2), s/veh | 0.9 | 0.0 | 0.6 | 1.6 | 0.0 | 0.9 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.3 | 0.0 | 4.0 | 0.1 | 0.0 | 4.7 | 0.9 | 0.0 | 0.2 | 0.4 | 0.0 | 0.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 22.3 | 0.0 | 11.7 | 24.1 | 0.0 | 13.4 | 14.6 | 0.0 | 12.1 | 18.4 | 0.0 | 19.0 |
| LnGrp LOS | C | A | B | C | A | B | B | A | B | B | A | B |
| Approach Vol, veh/h | | 619 | | | 629 | | | 141 | | | 103 | |
| Approach Delay, s/veh | | 12.2 | | | 13.6 | | | 14.1 | | | 18.7 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Timer - Assigned Phs | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.4 | 5.1 | 24.4 | 7.5 | 9.9 | 6.4 | 23.0 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 34.0 | 7.0 | 47.0 | 6.0 | 24.0 | 7.0 | 47.0 |
| Max Q Clear Time (g_c+I1), s | 2.5 | 2.3 | 14.8 | 4.5 | 3.7 | 2.8 | 16.1 |
| Green Ext Time (p_c), s | 0.1 | 0.0 | 2.8 | 0.0 | 0.2 | 0.0 | 2.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 13.4 |
| HCM 6th LOS | B |



HCM 6th Signalized Intersection Summary
1: Old Redwood Hwy & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 1 | 0 | 0 | 147 | 1 | 461 | 3 | 156 | 133 | 292 | 179 | 2 |
| Future Volume (veh/h) | 1 | 0 | 0 | 147 | 1 | 461 | 3 | 156 | 133 | 292 | 179 | 2 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 1 | 0 | 0 | 160 | 1 | 501 | 3 | 170 | 145 | 317 | 195 | 2 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 4 | 0 | 0 | 530 | 3 | 822 | 4 | 292 | 244 | 391 | 689 | 7 |
| Arrive On Green | 0.00 | 0.00 | 0.00 | 0.30 | 0.30 | 0.30 | 0.00 | 0.16 | 0.16 | 0.22 | 0.37 | 0.37 |
| Sat Flow, veh/h | 1781 | 0 | 0 | 1771 | 11 | 1585 | 1781 | 1870 | 1565 | 1781 | 1848 | 19 |
| Grp Volume(v), veh/h | 1 | 0 | 0 | 161 | 0 | 501 | 3 | 170 | 145 | 317 | 0 | 197 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 0 | 1782 | 0 | 1585 | 1781 | 1870 | 1565 | 1781 | 0 | 1867 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 3.1 | 0.0 | 10.0 | 0.1 | 3.8 | 3.9 | 7.6 | 0.0 | 3.3 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 3.1 | 0.0 | 10.0 | 0.1 | 3.8 | 3.9 | 7.6 | 0.0 | 3.3 |
| Prop In Lane | 1.00 | | 0.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.01 |
| Lane Grp Cap(c), veh/h | 4 | 0 | 0 | 533 | 0 | 822 | 4 | 292 | 244 | 391 | 0 | 697 |
| V/C Ratio(X) | 0.25 | 0.00 | 0.00 | 0.30 | 0.00 | 0.61 | 0.69 | 0.58 | 0.59 | 0.81 | 0.00 | 0.28 |
| Avail Cap(c_a), veh/h | 517 | 0 | 0 | 1034 | 0 | 1268 | 278 | 1231 | 1030 | 1471 | 0 | 2479 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 22.3 | 0.0 | 0.0 | 12.1 | 0.0 | 7.6 | 22.3 | 17.6 | 17.6 | 16.6 | 0.0 | 9.8 |
| Incr Delay (d2), s/veh | 11.8 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 52.7 | 0.7 | 0.9 | 1.6 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 2.3 | 0.1 | 1.5 | 1.3 | 2.8 | 0.0 | 1.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 34.1 | 0.0 | 0.0 | 12.2 | 0.0 | 7.9 | 75.0 | 18.2 | 18.4 | 18.2 | 0.0 | 9.9 |
| LnGrp LOS | C | A | A | B | A | A | E | B | B | B | A | A |
| Approach Vol, veh/h | | 1 | | | 662 | | | 318 | | | 514 | |
| Approach Delay, s/veh | | 34.1 | | | 8.9 | | | 18.9 | | | 15.0 | |
| Approach LOS | | C | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.8 | 11.5 | 3.1 | 3.1 | 21.2 | 17.4 |
| Change Period (Y+Rc), s | 3.0 | 4.5 | 3.0 | 3.0 | 4.5 | 4.0 |
| Max Green Setting (Gmax), s | 37.0 | 29.5 | 13.0 | 7.0 | 59.5 | 26.0 |
| Max Q Clear Time (g_c+I1), s | 9.6 | 5.9 | 2.0 | 2.1 | 5.3 | 12.0 |
| Green Ext Time (p_c), s | 0.5 | 0.8 | 0.0 | 0.0 | 0.8 | 1.4 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 13.1 |
| HCM 6th LOS | B |

HCM 6th Signalized Intersection Summary
2: US 101 NB Ramp/Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 13 | 415 | 0 | 0 | 322 | 25 | 267 | 16 | 219 | 15 | 0 | 21 |
| Future Volume (veh/h) | 13 | 415 | 0 | 0 | 322 | 25 | 267 | 16 | 219 | 15 | 0 | 21 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.98 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 0 | 0 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 14 | 451 | 0 | 0 | 350 | 27 | 302 | 0 | 238 | 16 | 0 | 23 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 146 | 682 | 0 | 0 | 1244 | 95 | 560 | 0 | 249 | 26 | 0 | 37 |
| Arrive On Green | 0.37 | 0.37 | 0.00 | 0.00 | 0.37 | 0.37 | 0.16 | 0.00 | 0.16 | 0.04 | 0.00 | 0.04 |
| Sat Flow, veh/h | 21 | 1831 | 0 | 0 | 3432 | 256 | 3563 | 0 | 1585 | 681 | 0 | 979 |
| Grp Volume(v), veh/h | 465 | 0 | 0 | 0 | 185 | 192 | 302 | 0 | 238 | 39 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1852 | 0 | 0 | 0 | 1777 | 1818 | 1781 | 0 | 1585 | 1660 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 2.1 | 0.0 | 4.0 | 0.6 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 5.6 | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 2.1 | 0.0 | 4.0 | 0.6 | 0.0 | 0.0 |
| Prop In Lane | 0.03 | | 0.00 | 0.00 | | 0.14 | 1.00 | | 1.00 | 0.41 | | 0.59 |
| Lane Grp Cap(c), veh/h | 829 | 0 | 0 | 0 | 662 | 678 | 560 | 0 | 249 | 62 | 0 | 0 |
| V/C Ratio(X) | 0.56 | 0.00 | 0.00 | 0.00 | 0.28 | 0.28 | 0.54 | 0.00 | 0.95 | 0.62 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1562 | 0 | 0 | 0 | 1378 | 1409 | 3492 | 0 | 1554 | 699 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 7.0 | 0.0 | 0.0 | 0.0 | 5.9 | 5.9 | 10.4 | 0.0 | 11.2 | 12.7 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.0 | 8.6 | 3.8 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.2 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 | 0.6 | 0.0 | 1.5 | 0.2 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 7.2 | 0.0 | 0.0 | 0.0 | 6.0 | 6.0 | 10.7 | 0.0 | 19.8 | 16.5 | 0.0 | 0.0 |
| LnGrp LOS | A | A | A | A | A | A | B | A | B | B | A | A |
| Approach Vol, veh/h | | 465 | | | 377 | | | 540 | | | 39 | |
| Approach Delay, s/veh | | 7.2 | | | 6.0 | | | 14.7 | | | 16.5 | |
| Approach LOS | | A | | | A | | | B | | | B | |
| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | | 14.2 | | 4.7 | | 14.2 | | 7.9 | | | | |
| Change Period (Y+Rc), s | | * 4.2 | | 3.7 | | * 4.2 | | 3.7 | | | | |
| Max Green Setting (Gmax), s | | * 21 | | 11.3 | | * 21 | | 26.3 | | | | |
| Max Q Clear Time (g_c+I1), s | | 7.6 | | 2.6 | | 4.0 | | 4.1 | | | | |
| Green Ext Time (p_c), s | | 1.6 | | 0.0 | | 1.3 | | 0.2 | | | | |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 10.0 |
| HCM 6th LOS | A |

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



HCM 6th Signalized Intersection Summary
3: Los Amigos Rd & Arata Ln

W-Trans
01/03/2025

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 85 | 385 | 122 | 11 | 229 | 35 | 70 | 17 | 6 | 20 | 11 | 40 |
| Future Volume (veh/h) | 85 | 385 | 122 | 11 | 229 | 35 | 70 | 17 | 6 | 20 | 11 | 40 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 92 | 418 | 133 | 12 | 249 | 38 | 76 | 18 | 7 | 22 | 12 | 43 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 201 | 527 | 168 | 39 | 473 | 72 | 430 | 360 | 140 | 248 | 101 | 197 |
| Arrive On Green | 0.11 | 0.39 | 0.39 | 0.02 | 0.30 | 0.30 | 0.06 | 0.28 | 0.28 | 0.12 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1781 | 1351 | 430 | 1781 | 1579 | 241 | 1781 | 1273 | 495 | 782 | 811 | 1581 |
| Grp Volume(v), veh/h | 92 | 0 | 551 | 12 | 0 | 287 | 76 | 0 | 25 | 34 | 0 | 43 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1781 | 1781 | 0 | 1820 | 1781 | 0 | 1768 | 1593 | 0 | 1581 |
| Q Serve(g_s), s | 1.9 | 0.0 | 10.8 | 0.3 | 0.0 | 5.2 | 1.3 | 0.0 | 0.4 | 0.0 | 0.0 | 1.0 |
| Cycle Q Clear(g_c), s | 1.9 | 0.0 | 10.8 | 0.3 | 0.0 | 5.2 | 1.3 | 0.0 | 0.4 | 0.6 | 0.0 | 1.0 |
| Prop In Lane | 1.00 | | 0.24 | 1.00 | | 0.13 | 1.00 | | 0.28 | 0.65 | | 1.00 |
| Lane Grp Cap(c), veh/h | 201 | 0 | 695 | 39 | 0 | 545 | 430 | 0 | 501 | 349 | 0 | 197 |
| V/C Ratio(X) | 0.46 | 0.00 | 0.79 | 0.31 | 0.00 | 0.53 | 0.18 | 0.00 | 0.05 | 0.10 | 0.00 | 0.22 |
| Avail Cap(c_a), veh/h | 814 | 0 | 2169 | 316 | 0 | 1709 | 509 | 0 | 1480 | 1124 | 0 | 1003 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.4 | 0.0 | 10.6 | 19.0 | 0.0 | 11.5 | 12.2 | 0.0 | 10.3 | 15.4 | 0.0 | 15.5 |
| Incr Delay (d2), s/veh | 0.6 | 0.0 | 0.8 | 1.6 | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.7 | 0.0 | 3.2 | 0.1 | 0.0 | 1.7 | 0.4 | 0.0 | 0.1 | 0.2 | 0.0 | 0.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 17.0 | 0.0 | 11.4 | 20.6 | 0.0 | 11.8 | 12.3 | 0.0 | 10.3 | 15.4 | 0.0 | 15.7 |
| LnGrp LOS | B | A | B | C | A | B | B | A | B | B | A | B |
| Approach Vol, veh/h | | 643 | | | 299 | | | 101 | | | 77 | |
| Approach Delay, s/veh | | 12.2 | | | 12.1 | | | 11.8 | | | 15.6 | |
| Approach LOS | | B | | | B | | | B | | | B | |
| Timer - Assigned Phs | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | | 15.2 | 4.9 | 19.4 | 6.3 | 8.9 | 8.4 | 15.8 | | | | |
| Change Period (Y+Rc), s | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | | |
| Max Green Setting (Gmax), s | | 33.0 | 7.0 | 48.0 | 4.0 | 25.0 | 18.0 | 37.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 2.4 | 2.3 | 12.8 | 3.3 | 3.0 | 3.9 | 7.2 | | | | |
| Green Ext Time (p_c), s | | 0.1 | 0.0 | 2.6 | 0.0 | 0.1 | 0.1 | 1.1 | | | | |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 12.4 |
| HCM 6th LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 13.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 29 | 433 | 104 | 12 | 516 | 51 | 107 | 12 | 11 | 23 | 12 | 56 |
| Future Vol, veh/h | 29 | 433 | 104 | 12 | 516 | 51 | 107 | 12 | 11 | 23 | 12 | 56 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 32 | 471 | 113 | 13 | 561 | 55 | 116 | 13 | 12 | 25 | 13 | 61 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 617 | 0 | 0 | 584 | 0 | 0 | 1244 | 1235 | 529 | 1221 | 1264 | 590 |
| Stage 1 | - | - | - | - | - | - | 592 | 592 | - | 616 | 616 | - |
| Stage 2 | - | - | - | - | - | - | 652 | 643 | - | 605 | 648 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 963 | - | - | 991 | - | - | 151 | 176 | 550 | 157 | 169 | 508 |
| Stage 1 | - | - | - | - | - | - | 493 | 494 | - | 478 | 482 | - |
| Stage 2 | - | - | - | - | - | - | 457 | 468 | - | 485 | 466 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 962 | - | - | 991 | - | - | 120 | 168 | 550 | 139 | 161 | 508 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 120 | 168 | - | 139 | 161 | - |
| Stage 1 | - | - | - | - | - | - | 477 | 478 | - | 462 | 475 | - |
| Stage 2 | - | - | - | - | - | - | 386 | 461 | - | 446 | 451 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.5 | 0.2 | 121.2 | 27.1 |
| HCM LOS | | | F | D |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 120 | 252 | 962 | - | - | 991 | - | - | 260 |
| HCM Lane V/C Ratio | 0.969 | 0.099 | 0.033 | - | - | 0.013 | - | - | 0.38 |
| HCM Control Delay (s) | 142.7 | 20.9 | 8.9 | - | - | 8.7 | - | - | 27.1 |
| HCM Lane LOS | F | C | A | - | - | A | - | - | D |
| HCM 95th %tile Q(veh) | 6.4 | 0.3 | 0.1 | - | - | 0 | - | - | 1.7 |





| Intersection | |
|---|---|
| Int Delay, s/veh | 4.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 82 | 384 | 121 | 11 | 228 | 34 | 69 | 16 | 6 | 19 | 10 | 38 |
| Future Vol, veh/h | 82 | 384 | 121 | 11 | 228 | 34 | 69 | 16 | 6 | 19 | 10 | 38 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 89 | 417 | 132 | 12 | 248 | 37 | 75 | 17 | 7 | 21 | 11 | 41 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 285 | 0 | 0 | 549 | 0 | 0 | 979 | 970 | 483 | 964 | 1018 | 268 |
| Stage 1 | - | - | - | - | - | - | 661 | 661 | - | 291 | 291 | - |
| Stage 2 | - | - | - | - | - | - | 318 | 309 | - | 673 | 727 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1277 | - | - | 1021 | - | - | 229 | 253 | 584 | 235 | 237 | 771 |
| Stage 1 | - | - | - | - | - | - | 452 | 460 | - | 717 | 672 | - |
| Stage 2 | - | - | - | - | - | - | 693 | 660 | - | 445 | 429 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1277 | - | - | 1021 | - | - | 196 | 233 | 584 | 206 | 218 | 770 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 196 | 233 | - | 206 | 218 | - |
| Stage 1 | - | - | - | - | - | - | 420 | 428 | - | 667 | 664 | - |
| Stage 2 | - | - | - | - | - | - | 637 | 652 | - | 393 | 399 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 1.1 | 0.3 | 30.6 | 17.7 |
| HCM LOS | | | D | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 196 | 279 | 1277 | - | - | 1021 | - | - | 357 |
| HCM Lane V/C Ratio | 0.383 | 0.086 | 0.07 | - | - | 0.012 | - | - | 0.204 |
| HCM Control Delay (s) | 34.3 | 19.1 | 8 | - | - | 8.6 | - | - | 17.7 |
| HCM Lane LOS | D | C | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 1.7 | 0.3 | 0.2 | - | - | 0 | - | - | 0.8 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 14.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 30 | 434 | 105 | 12 | 516 | 51 | 107 | 12 | 11 | 24 | 13 | 58 |
| Future Vol, veh/h | 30 | 434 | 105 | 12 | 516 | 51 | 107 | 12 | 11 | 24 | 13 | 58 |
| Conflicting Peds, #/hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 33 | 472 | 114 | 13 | 561 | 55 | 116 | 13 | 12 | 26 | 14 | 63 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 617 | 0 | 0 | 586 | 0 | 0 | 1248 | 1238 | 530 | 1225 | 1268 | 590 |
| Stage 1 | - | - | - | - | - | - | 595 | 595 | - | 616 | 616 | - |
| Stage 2 | - | - | - | - | - | - | 653 | 643 | - | 609 | 652 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 963 | - | - | 989 | - | - | 150 | 176 | 549 | 156 | 168 | 508 |
| Stage 1 | - | - | - | - | - | - | 491 | 492 | - | 478 | 482 | - |
| Stage 2 | - | - | - | - | - | - | 456 | 468 | - | 482 | 464 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 962 | - | - | 989 | - | - | 118 | 168 | 549 | 138 | 160 | 508 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 118 | 168 | - | 138 | 160 | - |
| Stage 1 | - | - | - | - | - | - | 474 | 475 | - | 461 | 475 | - |
| Stage 2 | - | - | - | - | - | - | 382 | 461 | - | 442 | 448 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.5 | 0.2 | 126 | 28.1 |
| HCM LOS | | | F | D |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 118 | 251 | 962 | - | - | 989 | - | - | 257 |
| HCM Lane V/C Ratio | 0.986 | 0.1 | 0.034 | - | - | 0.013 | - | - | 0.402 |
| HCM Control Delay (s) | 148.6 | 20.9 | 8.9 | - | - | 8.7 | - | - | 28.1 |
| HCM Lane LOS | F | C | A | - | - | A | - | - | D |
| HCM 95th %tile Q(veh) | 6.5 | 0.3 | 0.1 | - | - | 0 | - | - | 1.8 |





| Intersection | |
|---|---|
| Int Delay, s/veh | 4.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 85 | 385 | 122 | 11 | 229 | 35 | 70 | 17 | 6 | 20 | 11 | 40 |
| Future Vol, veh/h | 85 | 385 | 122 | 11 | 229 | 35 | 70 | 17 | 6 | 20 | 11 | 40 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 120 | - | - | 165 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 92 | 418 | 133 | 12 | 249 | 38 | 76 | 18 | 7 | 22 | 12 | 43 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 287 | 0 | 0 | 551 | 0 | 0 | 990 | 980 | 485 | 973 | 1027 | 269 |
| Stage 1 | - | - | - | - | - | - | 669 | 669 | - | 292 | 292 | - |
| Stage 2 | - | - | - | - | - | - | 321 | 311 | - | 681 | 735 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1275 | - | - | 1019 | - | - | 225 | 250 | 582 | 231 | 234 | 770 |
| Stage 1 | - | - | - | - | - | - | 447 | 456 | - | 716 | 671 | - |
| Stage 2 | - | - | - | - | - | - | 691 | 658 | - | 440 | 425 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1275 | - | - | 1019 | - | - | 190 | 229 | 582 | 201 | 215 | 769 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 190 | 229 | - | 201 | 215 | - |
| Stage 1 | - | - | - | - | - | - | 415 | 423 | - | 664 | 663 | - |
| Stage 2 | - | - | - | - | - | - | 632 | 650 | - | 386 | 394 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 1.2 | 0.3 | 32 | 18.2 |
| HCM LOS | | | D | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 190 | 272 | 1275 | - | - | 1019 | - | - | 350 |
| HCM Lane V/C Ratio | 0.4 | 0.092 | 0.072 | - | - | 0.012 | - | - | 0.22 |
| HCM Control Delay (s) | 36.1 | 19.6 | 8 | - | - | 8.6 | - | - | 18.2 |
| HCM Lane LOS | E | C | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 1.8 | 0.3 | 0.2 | - | - | 0 | - | - | 0.8 |