Appendix J:
Traffic Supporting Information

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J.1 - Traffic Impact Study

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Trail Feasibility Study

PROPOSED ELNOKA CCRC PROJECT



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QUESTA ENGINEERING CORP.

CONTENTS

1. Introduction 3
2. Consistency with Applicable Plans 6
   2.1 Santa Rosa General Plan 2035 (2019) 6
   2.2 City of Santa Rosa Bicycle and Pedestrian Master Plan Update (2018) 7
   2.3 Santa Rosa Citywide Creek Master Plan (2013) 8
   2.4 Sonoma Valley Trail Feasibility Study (2016) 9
   2.5 Trione Annadel State Park (California State Parks) 9
   2.6 Other Area Trails 11
3. Site Issues 13
   3.1 Topography and Slope Stability 13
   3.2 Creeks 13
   3.3 Proposed Elnoka CCRC Design Concept 14
4. Trail Design Needs 16
   4.1 Trail Width and Surface 16
   4.2 Accessibility 17
   4.3 Emergency Access Considerations 18
5. Trail Options 19
   5.1 Option 1: Channel Drive Connection 20
   5.2 Option 2: Melita Road Connection 22
6. Conclusion and Recommendations 25
7. References 27

Figures:

1 Project Location
2 Site Plan Overview (from Project Description)
3 Trail Options Overview
4 Potential Trail Routes
5 Potential Site Plan/Trail Conflicts
6 Trail Route Existing Topography
7 Schematic Trail Plan (Portion of Option 1)
8 Schematic Longitudinal Profile (Portion of Option 1)

1. INTRODUCTION

The Elnoka Continuing Care Retirement Community (CCRC) is proposed a for a 68 acre site situated in the Oakmont area of Santa Rosa (**Figure 1**). The Project proposes development of 676 units in up to 92 separate buildings, as well as service facilities, circulation improvements and recreation/landscape improvements within a gated site. The Project proposes that all facilities be private, including gated streets and sidewalks. Public access is proposed on a sidewalk that would be located parallel to the SR12 property frontage (**Figure 2**).

The Elnoka site has been identified in both the City of Santa Rosa Bicycle and Pedestrian Master Plan Update 2018 and the 2016 Sonoma Valley Trail Feasibility Study as a potential location for implementation of a regional trail connecting SR12 with park facilities south of the site. As identified in these respective plans, this trail could potentially connect from SR12 to Trione Annadel State Park via Channel Drive, and/or connect to Melita Road for travel to adjacent parks via Melita Road and Montgomery Drive. No connection is currently proposed as part of the CCRC.

This Feasibility Study evaluates options for incorporating this regional trail connection into the Elnoka Project. This includes a discussion of applicable public plans, including site constraints and benefits associated with trail implementation, trail design, an assessment of potential trail routes, and potential modifications needed to the proposed Elnoka site plan in order to implement a trail, and complete the desired connection to Channel Drive.



Elnoka site south of Melita Creek

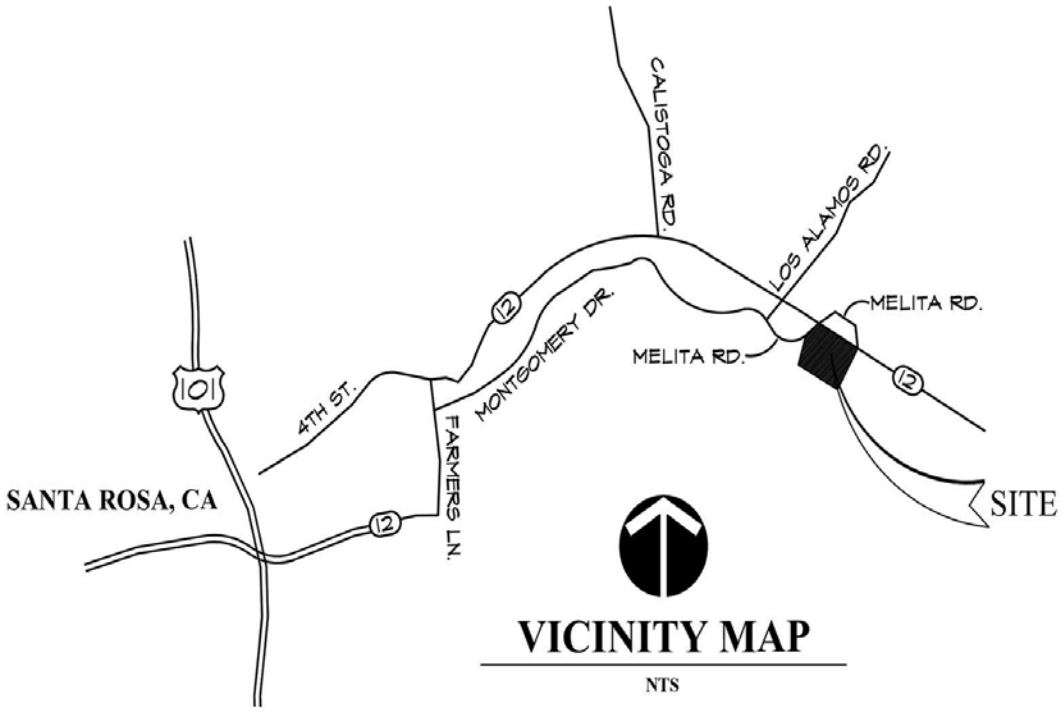


Figure 1: Vicinity Map



Figure 2: Proposed Site Plan

2. CONSISTENCY WITH APPLICABLE PLANS

Provision of a regional trail to connect Sonoma Valley, the City of Santa Rosa and local parks – including Trione Annadel State Park, Spring Lake Regional Park and Howarth Park - has been identified in planning documents, including the City of Santa Rosa Bicycle and Pedestrian Master Plan, and the Sonoma Valley Trail Feasibility Study completed by Sonoma County Regional Parks. This section reviews these plans and other trail connections that have been addressed in local planning efforts.

2.1 Santa Rosa General Plan 2035 (2019)

The City of Santa Rosa General Plan is the guiding document for orderly growth and development of the community for the next twenty years. The General Plan recognizes five criteria to prioritize pedestrian and bikeway projects: collision reduction, connectivity, comfort network, gap closure and equity. Applicable trail-related objectives, policies and programs include:

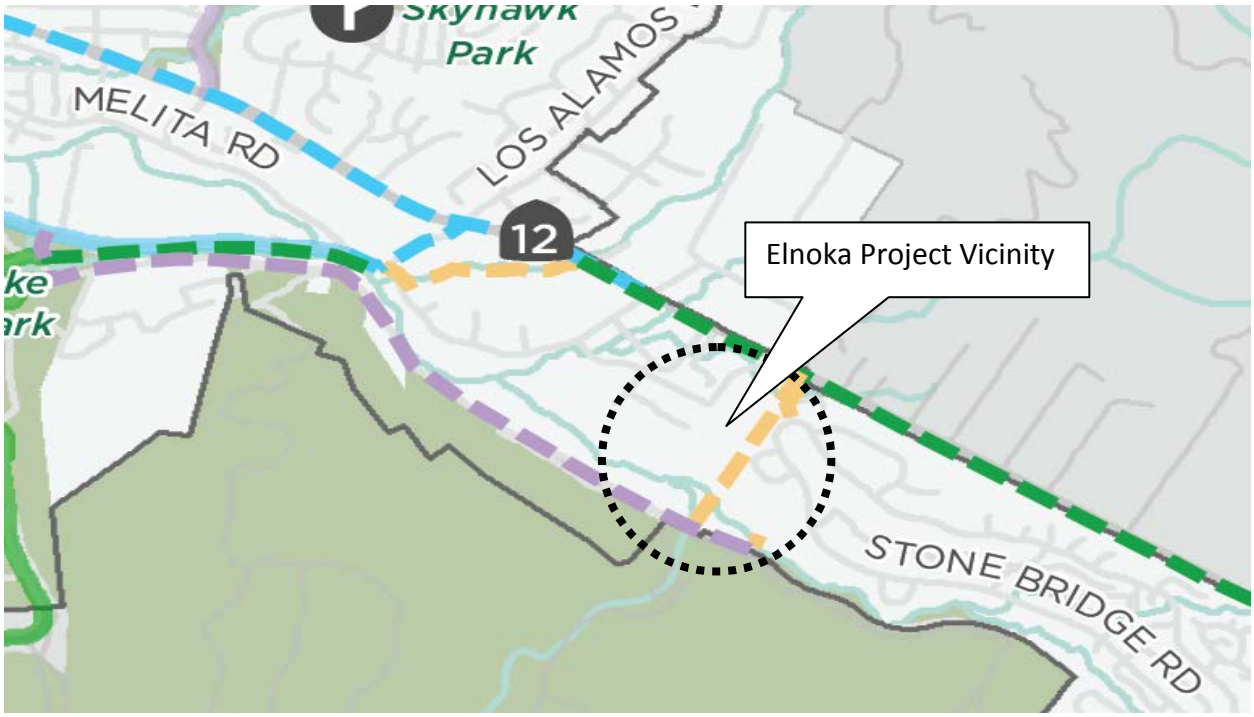
> ***T-G-7*** *Provide bikeways along scenic roads, where right-of-way exists or where its acquisition will not jeopardize roadway character.*
> ***T-K-6*** *Integrate multi-use paths into all creek corridors, railroad rights-of-way, and park designs.*
> ***T-L*** *Develop a citywide system of designated bikeways that serves both experienced and casual bicyclists, and which maximizes bicycle use for commuting, recreation, and local transport.*
> ***T-L-3*** *Improve bicycle networks by finishing incomplete or disconnected bicycle routes.*
> ***T-L-7*** *As part of the city's Capital Improvement Program, or street and intersection projects constructed by private developers, install and construct bicycle facilities, including:*
> • *Class I paths, Class II lanes, Class III route signs;*
> • *Signal detectors; and/or*
> • *Other facilities.*
> *Implementation shall occur as opportunities arise throughout the entire bikeway network.*
> ***T-L-8*** *Require new development to dedicate land and/or construct/install bicycle facilities, and provide bicycle parking as specified in the Zoning Code, where a rough proportionality to demand from the project is established. Facilities such as showers and bicycle storage shall also be considered.*
> ***PSF-A-8*** *Integrate the bicycle and pedestrian path networks envisioned in both the Citywide Creek Master Plan and updated Bicycle and Pedestrian Master Plan with regional park plans, so that users can safely and comfortably access the full range of public open spaces.*
> ***PSF-A-18*** *Develop multi-use pathways and linear parks along creeks designated by the Santa Rosa Citywide Creek Master Plan. Create a system of interconnected linear parks that provide access to parks used for active recreation as well as to open space preserve areas that are used primarily for more passive recreation such as hiking and wildlife viewing.*
> ***NS-G-6*** *Minimize single-access residential neighborhoods in development areas near open space, and provide adequate access for fire and other emergency response personnel.*

2.2 City of Santa Rosa Bicycle and Pedestrian Master Plan Update (2018)

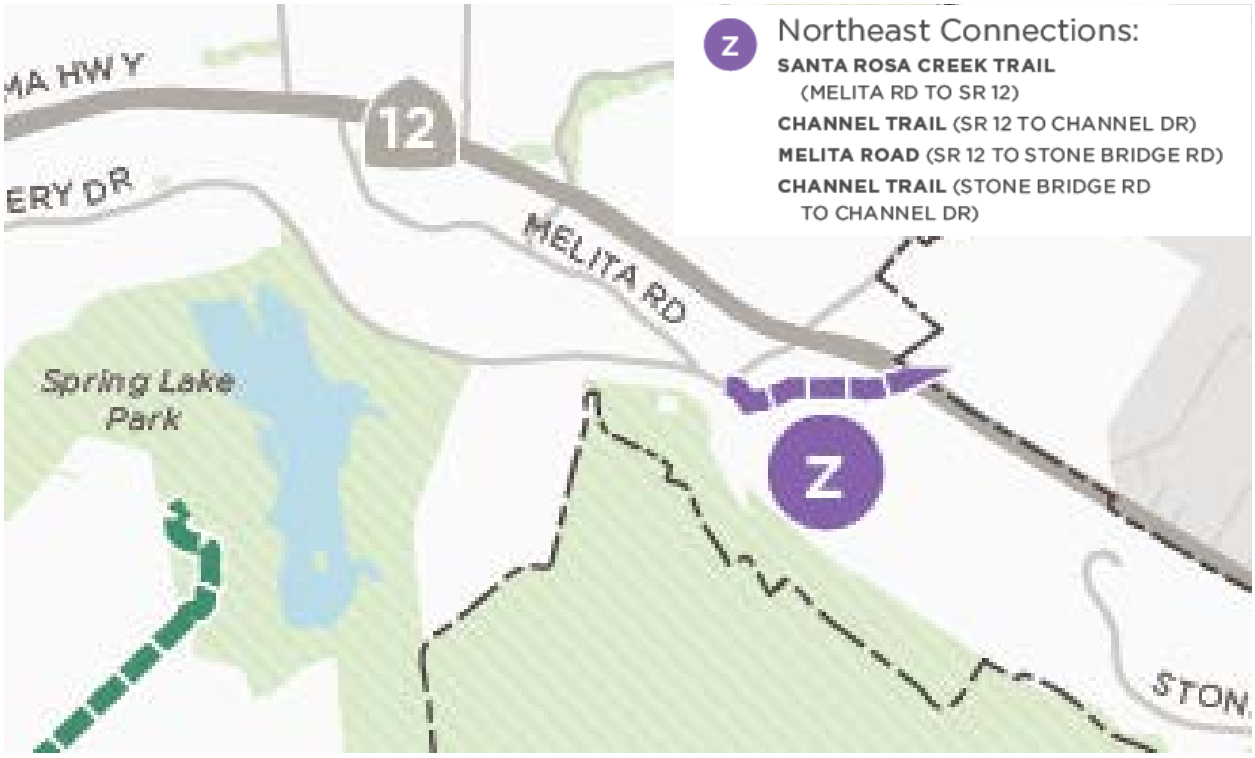
The Bicycle Plan identifies potential or proposed pedestrian and bicycle routes in the project area, including a route through the project area and a trail along Santa Rosa Creek. Section 5 of the Bicycle Plan states:

> *OAKMONT CONNECTION*
>
> *ALTERNATIVES After the removal of a portion of the designated Bicycle Route 231, multiple alternative routes are identified for study to create a new walking and bicycling connection to SR 12 and the planned Sonoma Valley Trail in northeast Santa Rosa. Community outreach produced differing opinions on acceptable locations for connections, suggesting a need for further study and more intensive engagement with neighborhood residents to identify a preferred route.*

The trail connection between SR 12 and Channel Drive is shown on *Figure 5-4, Bikeway Projects Northeast* and *Figure 6-5* of the Master Plan Update, and is generally described for further study in the Plan as part of the Northeast Connections.



Enlargement of Figure 5-4, Santa Rosa Bicycle and Pedestrian Master Plan Update 2018



Enlargement of Figure 6-5, Santa Rosa Bicycle and Pedestrian Master Plan Update 2018

2.3 Santa Rosa Citywide Creek Master Plan (2013)

The Citywide Creek Master Plan outlines creek-related policies and recommendations for site-specific improvements to the City's creek network. The overall concept for the creek trail system is to create a continuous system of access along the creeks with connections from the creeks to major generators and destinations of bicycle and pedestrian traffic, and is intended to support walking and bicycling as viable alternative modes of transportation to the automobile. The Plan calls for public access trails along Melita and Oakmont Creeks within the development area.

The Plan provides a comprehensive guide outlining programs, policies as well as specific techniques for trail design consistent with creek habitat and site design. The Plan contains guidelines for site planning and orientation to optimize proximity to the creek setting. The Plan also contains objectives and policies directing that discretionary projects should include trail improvements as part of projects:

> ***Objective PR-1.*** *Where discretionary land use approvals are sought, development shall, to the extent possible, be consistent with the Master Plan.*
> *To realize the Santa Rosa community's vision for healthy creeks and an integrated creekside trail network, public and private development projects should reflect the Master Plan's recommendations for each creek*

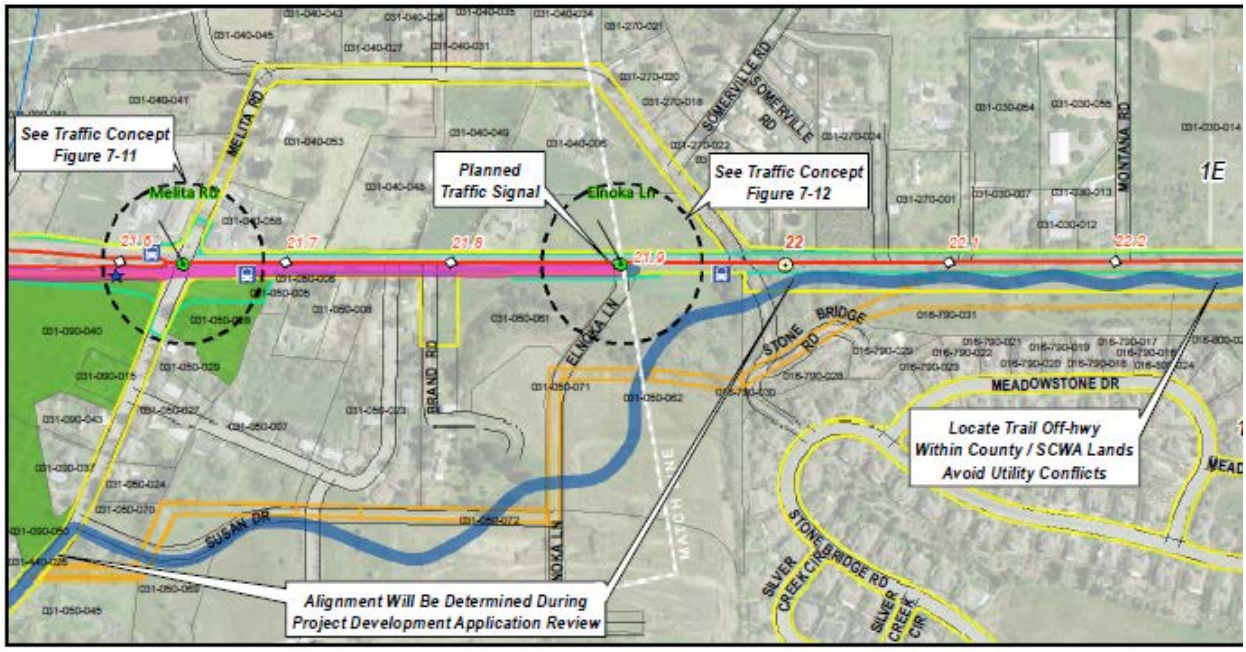
reach. Decision-making bodies should require that proposed improvements be consistent with the Master Plan.

Policy PR-1-1. *Proposed improvements associated with development projects should be consistent with the Master Plan.*

2.4 Sonoma Valley Trail Feasibility Study (2016)

The Sonoma Valley Trail is envisioned as a multi-modal trail in the Valley of the Moon to link Santa Rosa with Sonoma. This Study, completed by Sonoma County Regional Parks, examined the thirteen mile corridor would support bicycle, pedestrian and (where appropriate) equestrian use and provide recreational opportunities, serve local citizens and help connect schools, wineries, businesses and local shopping destinations without having to drive.

In the vicinity of the Elnoka project, the Preferred Alignment (shown in *Figure 7-2* of the Study) is located within the Elnoka project area, with the precise alignment to be determined as part of the project implementation. The Study evaluated a range of options to meet a goal of providing seamless connections to adjacent park facilities, including Trione Annadel State Park and Spring Lake Park.



Enlargement of Figure 7-2, Sonoma Valley Trail Feasibility Study 2016

2.5 Trione Annadel State Park (California State Parks)

Trione Annadel State Park abuts the project site on the south side. The Park has an estimated annual attendance (2014/15) of 174,000 and encompasses over 5,000 acres within Sonoma

County, near Santa Rosa, CA. It offers fishing, picnicking, nature observation, and 40 miles of trails for hiking, mountain biking and equestrian use.

The Park's Visitor Center and primary access is from Channel Drive, which directly abuts the Elnoka site on the south. Channel Drive is a low volume road that also serves bicycle and pedestrian use as well as providing access to the Park's staging areas and other Park trails.

The Park currently does not have a General Plan. In addition to completing a plan and program for interpretation, planned future facilities include an amphitheater and interpretive exhibits at the Visitor's Center, as well as deferred maintenance and restoration of historic sites.

Channel Drive Connection to Trione-Annadel State Park. Channel Drive is the entryway to Trione Annadel State Park and forms the southern boundary of Elnoka. The road is a logical regional trail connection point and destination; it is shown as such on the City of Santa Rosa and Sonoma County Bicycle Plans, as well as the Sonoma Valley Trail Plan. There are currently two graded driveways that connect the Elnoka site to Channel Drive. Channel Drive is a State Park facility and any trail connection to this facility would require a Right of Way agreement and engineering and environmental clearance by State Parks[1].

According to State Parks staff, they would need to do their due diligence with respect to protection of cultural and environmental resources and make a deliberative and discretionary decision regarding a new Channel Drive trail connection, making sure there is carrying capacity within the Park to handle the expected increase in visitors. This typically happens through a Park Master Plan/EIR process or through the development of a Road and Trail Management Plan (RTMP) and CEQA document for the Park. Currently there is no Master Plan/EIR or RTMP for this Park.



Existing driveway/access from site to Channel Drive

According to Ms. Wilson, State Parks typically would support such a connection if it were part of public Regional Trail facilities connecting communities and other Park and Open Space areas, and provided there were no significant environmental or capacity issues. State Parks would typically not support a trail connection to serve

[1] Laura Wilson, (Sr. Park & Recreation Specialist-Bay Area District of State Parks) pers comm.. 12/30/19

private property[2].

State Parks is an adjoining land owner and a Responsible Agency under CEQA and therefore will have an official opportunity to comment on the proposed Elnoka development proposal, including the potential trail connection issue through the project's EIR process with the City of Santa Rosa as the Lead Agency.

State Parks commented on the Elnoka EIR Notice of Preparation (NOP), dated August 11, 2017. That correspondence indicated that one way to achieve a more timely preparation of the required Park Master Plan/EIR or Road and/or Trail Plan was for the developer to pay an "Impact Fee" to State Parks to help cover the costs of Plan preparation. At this point, and until this has been completed, the connection to Trione Annadel is an unresolved issue that might be further evaluated during the comment/response to comment period on the Project's environmental document.

Other comments from State Parks during the Notice of Preparation for the Elnoka Environmental Impact Report noted the significance of the State Park as a regional recreational amenity, and requested analysis regarding provision of recreation facilities for residents, aesthetic impacts to park users, adequacy of open space, creek protection, and increased park use by future development residents.

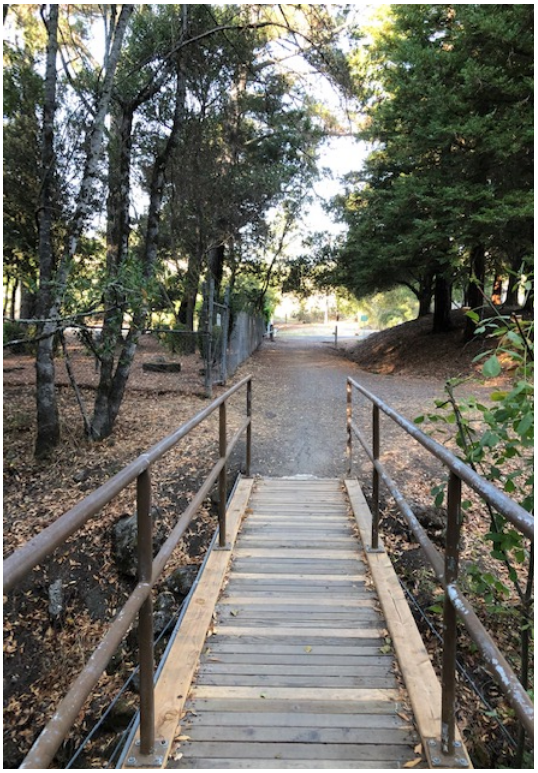
2.6 Other Area Trails

Channel Drive is utilized as a pedestrian and bicycle trail. Pedestrians and cyclists who wish to continue to the Oakmont area and Sonoma Valley currently utilize a footbridge crossing on the City's Water Treatment Plant site and path within Oakmont Village Association lands to connect to Stonebridge Drive. On Stonebridge Drive, there are sidewalks, but no dedicated off-street trail facilities. In addition to potential right of way/easement needs, improvements to the bridge and access ramps would be needed to make this existing route ADA accessible.



Existing Informal Trail Connection to Oakmont

[2] No formal connection from the proposed private facilities is currently shown, but access to Channel Drive via the existing driveway is not precluded in the current site plan.

City of Santa Rosa WTP Bridge and Path

3. SITE ISSUES

3.1 Topography and Slope Stability

As indicated in the Elnoka supporting documentation, the site has varied terrain, including an east-west ridge that bisects the site, as well as two large pads with steep side slopes that were rough graded in the 1990's as part of a previous development project. These slopes are proposed to be re-graded as part of the project and to conform to adjacent natural landforms.

Site slopes present constraints to making a fully ADA accessible pathway connection between SR12 and Channel Drive. Grading and the use of retaining walls and trail switchback segments may be needed. Based on available geologic mapping and site observations, there are no significant slope stability constraints to a trail alignment through the property.



Site topography and previously graded areas

3.2 Creeks

As describe in the Citywide Creek Master Plan, Oakmont Creek and Melita Creek flow through the project site and enter Santa Rosa Creek near Melita Road. These creeks contain some sensitive biological resources, including potentially the California and federally protected California Red Legged Frog (CRLF). However, the presence of CRLF and other sensitive features has not precluded the proposed CCRC from including several new bridge crossings, and there are ample opportunities to protect and enhance the creeks.

The Citywide Creek Master Plan describes the current Oakmont-Channel Drive trail connection that follows Oakmont Drive and Stone Bridge Drive, passing along the driveway to the City's Oakmont Treatment Plant to cross an existing trail bridge to Channel Drive.

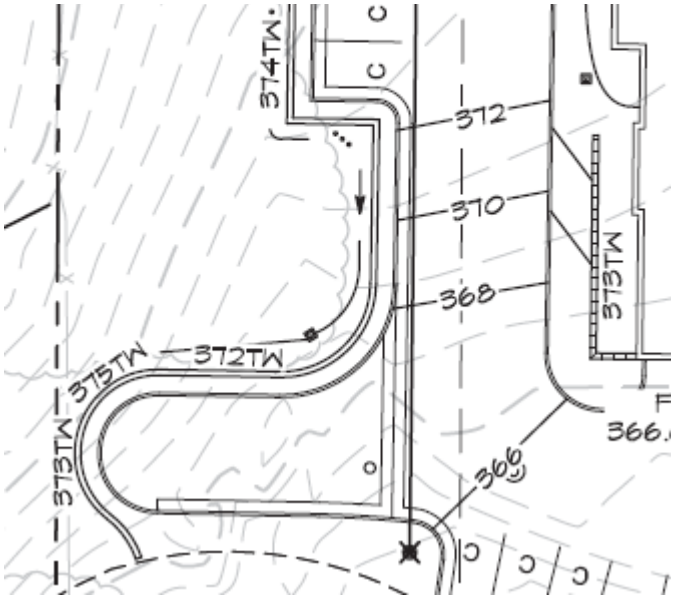
For Melita Creek, the Plan calls for revegetation with native species and incorporation of public areas within the development of the surrounding area. The current CCRC Site Plan does not address the issues of creek trails or creek restoration and enhancement, and proposes no public access or amenities.



Melita Creek Corridor

3.3 Proposed Elnoka CCRC Design Concept

The 2*017 Elnoka CCRC Policy Statement* states that the project is intended to be a gated facility with private streets, pedestrian circulation, recreation facilities and open space areas. Public facilities would consist of a sidewalk and bike path along the SR12 frontage. No public access improvements are proposed on Melita Road. No other public facilities are proposed. Site Open Space and recreation areas, including internal trails, would be for use by residents only.



Example of development infrastructure proposed within building setback area

The Project proposes all buildings to have a minimum 70 foot setback from the east, south and west property lines, and 35 feet from SR12. The site plan also shows development infrastructure including parking,

roads and other structures that are generally setback 10-20 feet from the property line, but as close as five feet in some areas. Retaining walls, stormwater swales and transition grading at the property line would also be located within this setback area.

Given these proposed Site Plan development constraints, it is not possible for a trail to be placed along the proposed perimeter of the development without modification to the proposed development plan. Site Plan modifications, including eliminating or relocating some east side access and perimeter roads, associated parking spaces, and modifying the footprint of some buildings would be necessary.

4. TRAIL DESIGN NEEDS

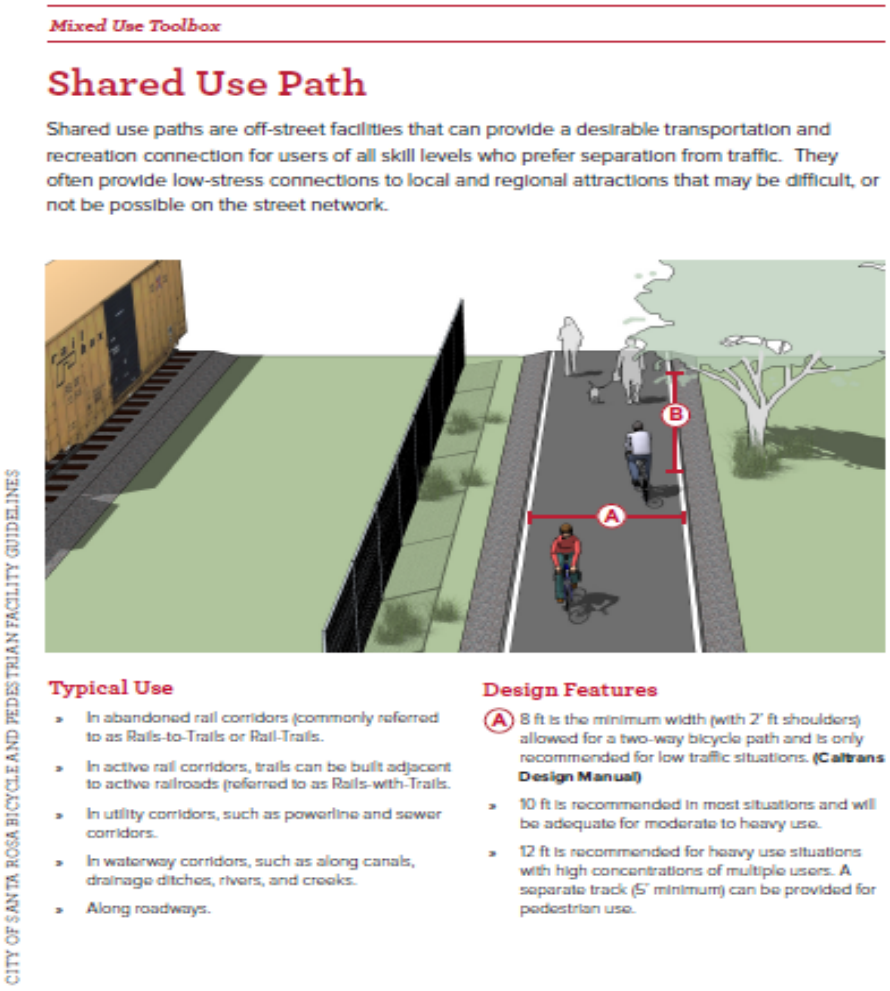
The City's Bicycle and Pedestrian Guidelines and Citywide Creek Master Plan provide comprehensive guidance regarding trail facilities.

4.1 Trail Width and Surface

A trail connection from SR12 through the project area would be considered a shared use path. As defined in the City of Santa Rosa General Plan, the trail would be considered a class I (bike paths):

> *…shared use paved paths completely separated from the street. These paths allow two-way travel by people walking and bicycling and are often considered the most comfortable facilities for the inexperienced riders as there are few potential conflicts between people bicycling and walking and people driving. Where there is a minimum of eight feet width (with two-foot shoulders) off -street public right-of-way (typically along utility and stream corridors)*

As illustrated in the City's Bicycle and Pedestrian Facility Guidelines, the trail would be a minimum of 8 feet wide with two foot shoulders (12 feet), with a potential width of twelve feet with two foot shoulders (16 feet), depending on anticipated trail use.To accommodate a trail corridor on the site, a minimum corridor width of 25 to 30 feet is recommended to accommodate the physical trail infrastructure. A wider easement corridor (50-100 feet or more) may be needed in sloping areas to accommodate trail grades, retaining



Mixed Use Toolbox

Shared Use Path

Shared use paths are off-street facilities that can provide a desirable transportation and recreation connection for users of all skill levels who prefer separation from traffic. They often provide low-stress connections to local and regional attractions that may be difficult, or not be possible on the street network.

Typical Use

- In abandoned rail corridors (commonly referred to as Rails-to-Trails or Rail-Trails.
- In active rail corridors, trails can be built adjacent to active railroads (referred to as Rails-with-Trails.
- In utility corridors, such as powerline and sewer corridors.
- In waterway corridors, such as along canals, drainage ditches, rivers, and creeks.
- Along roadways.

Design Features

- (A) 8 ft is the minimum width (with 2' ft shoulders) allowed for a two-way bicycle path and is only recommended for low traffic situations. **(Caltrans Design Manual)**
- 10 ft is recommended in most situations and will be adequate for moderate to heavy use.
- 12 ft is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

CITY OF SANTA ROSA BICYCLE AND PEDESTRIAN FACILITY GUIDELINES

structures and switchbacks as well as a larger corridor along the eastern perimeter to serve as a wildlife corridor connecting the creeks.

An additional temporary construction access agreement may also be needed. Precise dimensions of trail right of way should be formalized during precise development planning, based on follow up trail engineering design.

4.2 Accessibility

The goal of trail implementation is to accommodate as many users as possible in compliance with the Americans with Disabilities Act (ADA). As stated in the Citywide Creek Master Plan, new trails should comply with ADA and California Building Code (Title 24) regulations. Accessibility guidelines require a firm, stable surface for trails, and design accommodations for grade, cross-slope, width, etc. wherever feasible.

Americans with Disabilities Act

The United States Congress enacted the Americans with Disabilities Act (ADA) in 1990 to address discrimination against individuals with physical and mental disabilities. The ADA requires that all facilities and buildings open to the public be accessible to those with disabilities. Design and implementation of portions of the trail that connect to parking areas, restrooms, trailheads or other physical facilities might also need to comply with federal regulations outlined in the ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). These guidelines require a 36 inches minimum clear trail width, with passing space at minimum 200-foot intervals if the trail is less than 60 inches wide, depending upon the anticipated trail use. Since Trione Annadel State Park contains features built or altered with federal grants or loans, ADAAG standards may apply to make a Channel Drive connection.

Generally, for providing access to a range of potential trail users with differing degrees of mobility, the goal of a trail is to keep the majority of the trail running grade at less than 5%, where possible, with short segments of trail from 5% to 10% and with occasional resting or landing areas, and with the maximum running grade at 12%. Most of the site consists of relatively gentle slopes where meeting accessibility standards should be feasible. On steeper grades, and depending on the availability of open space areas, switchback or ramp segments may be needed. Typical trail design slope and distance regulations that may apply to this trail are contained in the federal Architectural Barriers Act (ABA) summarized below:

Maximum Trail Running Slope and Segment Length

Steeper than	But not Steeper than	Maximum Length of Segment
1:20 (5%)	1:12 (8.33%)	200 feet (61 m)
1:12 (8.33%)	1:10 (10%)	30 feet (9 m)
1:10 (10%)	1:8 (12%)	10 feet (3050 mm)

Source: https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/aba-standards/chapter-10-recreation-facilities

Title 24, California Building Code

The State of California has adopted a set of design guidelines for accessible facilities, incorporating accessibility guidelines. These requirements are contained in the California Code of Regulations, Title 24, Part II, California Building Code (CBC)3. CBC contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. Trails, paths and nature walk areas, or portions of them, are required to be constructed with gradients permitting at least partial use by wheelchair occupants. Buildings and other functional areas shall be served by paths or walks with firm and stable surfaces. The code also allows for exceptions by the enforcing agency if it finds that "in specific areas, the natural environment would be materially damaged by compliance with these regulations, and such areas would be subject to the regulations only to the extent that such material damage would not occur. "

The most recent Title 24 regulations were published in July 2019 and become effective January 1, 2020.

Accessibility Exceptions

The final trail design should be in compliance with all applicable regulations for accessibility, however it is possible that portions of the trail could not meet accessibility guidelines. Exceptions might apply for some steeper areas where there are topographic constraints, steep slopes and/or environmentally sensitive areas that must be avoided.

Segments with grades over 5% would need to be designed with ramps, structures or other design elements to comply with accessibility requirements. Documentation of exception conditions would be need to be included in the detailed design planning, including Caltrans Design exception for any non-compliant trail segments within Caltrans ROW (SR12). Exception conditions include:

Condition 1.*Compliance Would Cause Substantial Harm to Cultural, Historic, Religious, or Significant Natural Features or Characteristics*

Condition 2. *Compliance Would Substantially Alter the Nature of the Setting or the Purpose of the Facility, or Portion of the Facility*

Condition 3. *Compliance Would Require Construction Methods or Materials That Are Prohibited by Federal, State, or Local Regulations or Statutes*

Condition 4*. Compliance Would Not Be Feasible Due to Terrain or the Prevailing Construction Practices*

4.3 Emergency Access Considerations

Trails can be designed to also serve as secondary emergency access needs, such as site evacuation and emergency vehicle response, as well as to supplement planned site circulation. An emergency access connection to Channel Drive is not part of the current development proposal.

[3] California Code of Regulations, Title 24 Part 2, 2016.

5. TRAIL OPTIONS

This Study focuses on potential alignments to complete a trail connection from SR12 to adjacent park facilities, and consistent with City and County goals for a continuous trail network (**Figure 3**).

As previously discussed, the current site plan maximizes site development and use of the property, It is a proposed private, gated community with no public facilities. Proposed streets, parking areas, walls, drainage and other infrastructure are proposed within five to ten feet of the property line. This would preclude trail placement unless the development footprint is modified.

Two trail route options were identified along the perimeter of the site that would provide the most direct connections to parks and public facilities, utilize the site's creek corridors for public access and help connect the two creeks with a trail corridor (**Figure 4**). In addition, locating the trail along the site perimeter would allow consolidated development at the center of the site and in keeping with the Project intent to develop a private, gated community. Various options are discussed in this section.

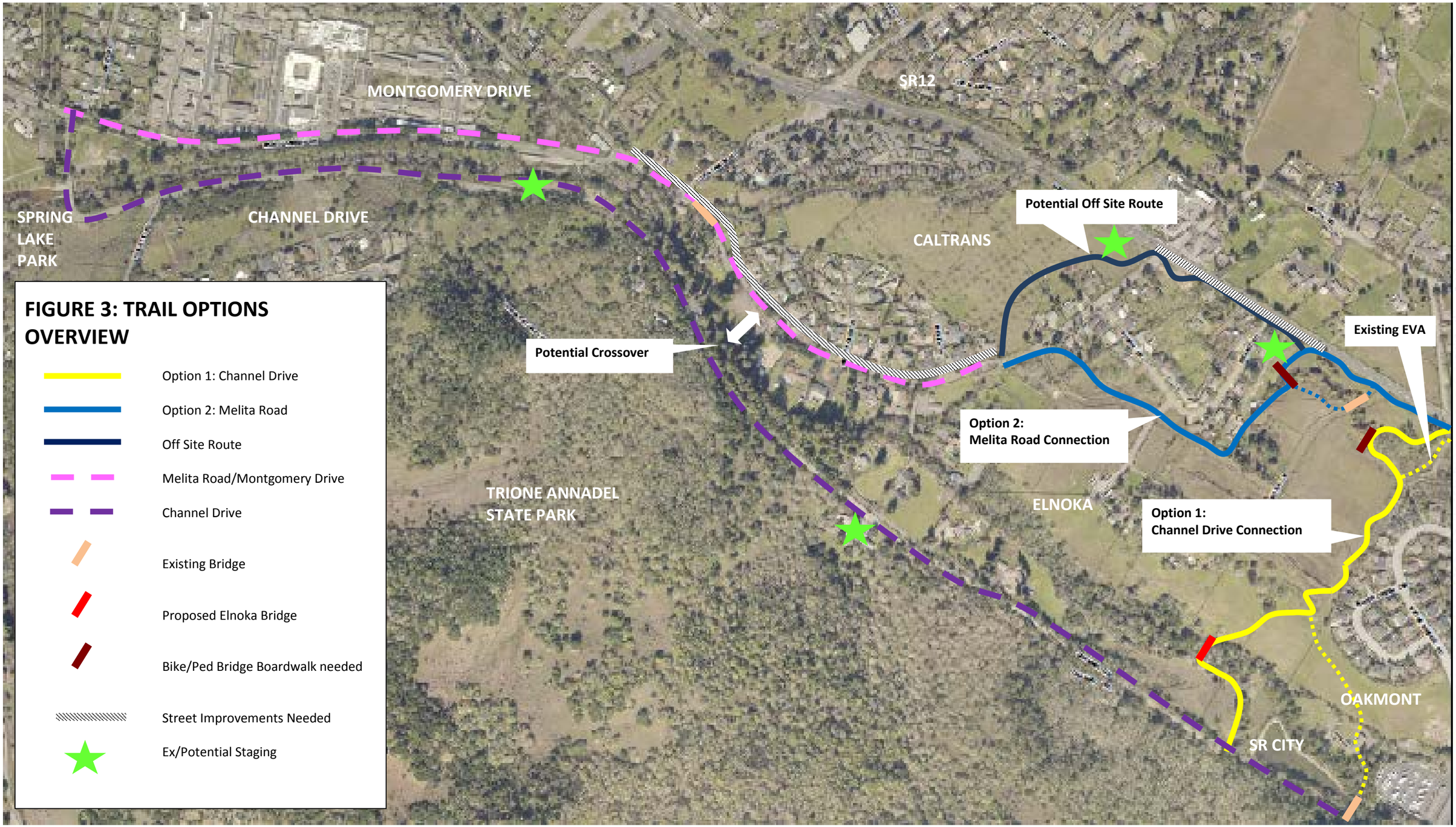
Onsite Trail Route Options

- **Option 1- Channel Drive Trail** connection. This route, along the east perimeter of the site, would provide a connection to Channel Drive and Trione Annadel State Park trails. Much of the route would be located within project setbacks, easements and/or proposed open space areas. A portion would be located on Oakmont Property and a portion would be located on City property.

- **Option 2- Melita Road** connection. This route would be located along the northeast perimeter of the site, and provide a connection from SR 12 to Melita Road. It would require access along Melita Road, which has no dedicated bike path.

Off Site Trail Route Options

If no public facilities are incorporated into the Project, then the trail would need to be located along SR12 with an on-street route along Melita Road and Montgomery Drive to provide linkage to the creek and park trail system, or utilize the existing (approximately six foot wide) footbridge and on-street route through City and Oakmont Village Association lands to provide a continuous trail network.


MONTGOMERY DRIVE
SR12
SPRING LAKE PARK
CHANNEL DRIVE
CALTRANS
Potential Off Site Route
Existing EVA
Potential Crossover
Option 2:
Melita Road Connection
TRIONE ANNADEL STATE PARK
ELNOKA
Option 1:
Channel Drive Connection
OAKMONT
SR CITY
FIGURE 3: TRAIL OPTIONS OVERVIEW
Option 1: Channel Drive
Option 2: Melita Road
Off Site Route
Melita Road/Montgomery Drive
Channel Drive
Existing Bridge
Proposed Elnoka Bridge
Bike/Ped Bridge Boardwalk needed
Street Improvements Needed
Ex/Potential Staging

0 150 300 600 900 1,200 Feet

N NE E SE S SW W NW

Legend

Existing Topography

5 ft contour

10 ft contour

Parcel Boundary

1A

1B

+/- 60' CROSSING

TRAIL STAIRS

TRAIL SWITCHBACKS (8% GRADE)

50-75' TYPICAL EASEMENT

25-50' TYPICAL EASEMENT

+/- 40' CROSSING

OPTION 1

OPTION 2

+/- 40' CROSSING

+/- 80' CROSSING

EVA ROUTE

CHANNEL TRL

CHANNEL DR

Oakmont Creek

South Fork Melita Creek

Melita Creek

BRAND RD

SUSAN DR

SONOMA HWY

MELITA GLEN PL

MELITA CT

LOS ALAMOS CT

MELITA RD

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FIGURE 4 - Route Options

5.1 Option 1: Channel Drive Connection

Description

This trail alignment would be located along the east perimeter of the site to connect SR12 near the future Sonoma Valley Trail at the northeastern property corner. The trail would cross Melita Creek with a separate bicycle/pedestrian bridge and continue south along the property line.

Where grades dictate, the trail would need to have switchbacks and/or 8% ramp sections to traverse the steeper slopes near the south end. The trail would cross Oakmont Creek, either as part of the proposed onsite vehicle crossing, or separate bicycle and pedestrian bridges would be constructed to cross the creek and connect to Channel Drive. Alternatively, the trail could be aligned to sweep in a southeasterly direction and continue into Oakmont Village Association lands to connect with the existing bridge and trail at the Santa Rosa Water Treatment Plant (**Section 2.6**). Such a connection would require an easement from the Oakmont Village Association through their open space lands.

To accommodate trail switchbacks, a minimum trail open space easement of 50-100 feet is recommended. Areas where switchbacks are needed to accommodate ADA grades may be wider, depending on trail engineering. The necessary easement width to accommodate slope, setbacks, turning radius, etc. should be confirmed in precise development planning.

Trail Option 1A would be located within the creek setback area of Melita Creek, crossing with a separate bicycle/pedestrian bridge and continuing southeast along the perimeter of the proposed development. The trail would generally follow the proposed project sidewalk south of the site's east-west ridge and cross Oakmont Creek as part of, or near the proposed vehicle bridge. The trail would continue to follow the creek corridor south of the creek, and connect to Channel Drive at the existing driveway. Stairs may be provided in some areas in addition to the accessible route.

Alternatives in this Option would be to combine the trail within the city's existing Emergency Vehicle Access from SR12.

Trail Option 1B would trend east at the base of the east-west ridge and cross lands owned by Oakmont Village Association to connect with the existing bridge at the SR Water Treatment Plant. This bridge and approach would need to be upgraded or replaced to meet accessibility needs. An easement or agreement with OVA would be needed for this trail connection to be implemented.

Option 1B has utility to provide a neighborhood connection to the trail for Oakmont residents, and could be considered in addition to a primary Channel Drive connection.



Slope looking southwest towards Channel Drive



Channel Drive Corridor on east perimeter

Conclusions

- Steep slope areas would require additional right of way and/or switchback sections, and/or retaining structures to meet accessibility regulations
- Requires one or more bridge crossings (may be combined with proposed vehicular creek crossings)
- Provides a direct connection between the future Sonoma Valley Trail and Trione Annadel State Park trails and beyond
- Avoids bisecting proposed development
- Provides a potential emergency vehicle access opportunity
- Consistent with General Plan, Citywide Creek Master Plan and Bicycle and Pedestrian Plan
- Trail links could be provided onsite to allow residents to access adjacent open space and park areas.
- Site plan/development footprint revisions would be needed to provide Right of Way and/or allow trail to meet ADA guidelines/accommodate slope conditions (**Figure 5**)
- One or more bicycle/pedestrian bridges (or EVA rated bridges) would be needed (or incorporate into vehicle bridge design)
- Fencing and circulation modifications needed to delineate public/private spaces



Source: ESRI Imagery

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FIGURE 5
Potential Site Plan/Trail Conflicts



Potential trail location near northeast corner (Oakmont is left of trees in photo))



County ROW /SVT connection at SR12 (Emergency Vehicle Access)



Future SVT alignment along SR12 (looking east)

5.2 Option 2: Melita Road Connection

Description

This route would be located along the northwest perimeter of the site, connect the proposed sidewalk on SR12 with a new trail crossing Melita Creek and trending southwest to Melita Road. Trail improvements should be provided along the Melita Road frontage (no improvements are proposed in the CCRC Site Plan). A mid-block crossing would be needed to connect with the

asphalt path continuing west on Melita Road, or future improvements would be needed along Melita and Montgomery Drive to provide a continuous trail to connect to the parks.

There is a potential opportunity to create a direct link to Channel Drive via a privately owned parcel on Melita Road, where a bicycle/pedestrian bridge could provide a direct connection to the parks. The status and feasibility of a trail connection on this undeveloped parcel is unknown.

To accommodate a Melita Road trail connection, a trail open space easement with a minimum width of 25-50 feet is recommended. Public access improvements along the Melita Road frontage would also be completed. The necessary easement width to accommodate slope, setbacks, turning radius, etc. should be confirmed in follow up precise development planning and engineering.



Melita connection looking west



Melita connection looking east

Conclusions

- Requires one or more bridge crossing of Melita Creek (may be combined with proposed vehicular creek crossings)
- Future street/trail improvements (Melita Road Bridge, property acquisition, infrastructure) may be needed to complete an off-street trail segment to connect to the parks; connection to Trione Annadel State Park is circuitous.
- Does not provide continuous off-street trail to nearby parks
- Provides a connection between the future Sonoma Valley Trail and Melita Road neighborhood
- Slope conditions are not as steep as Option 1 route
- A portion of the trail along Melita Creek would be consistent with Citywide Creek Master Plan
- Trail links could be provided onsite to allow residents to access open space areas

- County owned right of way adjacent to site northwest corner could provide potential trail staging area.
- One or more bicycle/pedestrian bridges would be needed (or incorporate into vehicle bridge design)
- Fencing and circulation modifications needed to delineate public/private spaces
- Potential site plan modifications to orient development toward creeks and provide opportunities for Project residents to access trails (**Figure 5**).

6. CONCLUSION AND RECOMMENDATIONS

There are no existing trails that currently connect the area's parks, open space and trails network with existing and planned regional bicycle and pedestrian facilities along SR12, including public transit. Public bicycle and pedestrian facilities are designated on applicable City and County Plans to connect through the Elnoka site.

The proposed Elnoka development plan does not include provision of public access facilities to connect the SR12 area (proposed alignment of the Sonoma Valley Trail) with trails and parks, including Trione Annadel State Park and Spring Lake Regional Park. Facilities on the site are proposed to be gated and private, with limited connections to surrounding streets and open space. This is inconsistent with approved City and County trail planning documents.

If no public facilities are incorporated into the Project, Trione Annadel and Spring Lake Park trail users would continue to informally use streets in the Oakmont area and points south via the pedestrian bridge crossing at the Santa Rosa WTP and private property including OVA open space lands, then surface streets (Stone Bridge Drive). This informal route does not provide an off street connection to SR12, and a public pedestrian and bicycle easement would be needed over private property. In addition, no off street route is available further southeast (through Oakmont) to connect to the future Sonoma Valley Trail.

A potential future trail connection along SR12 further northwest (through Caltrans or other lands) is not assured, and would be subject to land use planning, site development constraints, property ownership and other issues. In addition, construction of such a connection is not mutually exclusive, and would serve trail users and destinations further north and west of the Elnoka site, as indicated in the Santa Rosa Bicycle and Pedestrian Plan Update.

Elnoka Site

In order to provide a trail connection consistent with City and County plans, site plan modifications would be needed to allow a continuous trail that meets state and federal accessibility guidelines. To accommodate a Channel Drive connection, these plan modifications would primarily occur on the eastern perimeter of the property. Such a trail corridor could also function as a wildlife corridor to connect the sites' two creeks and the larger open space and parklands in the region.

Option 1 (Channel Drive) discussed in this Study provides a connection consistent with the City's planning efforts, and avoids bisecting the development site. It is the preferred option because it provides a complete off street connection to Channel Drive and avoids a circuitous route along city streets that have discontinuous sidewalks and bike lanes (Melita Road and Montgomery Drive) to reach adjacent park trails.

Of the two Channel Drive options, Option 1B would provide direct connectivity to the Oakmont community and could avoid a new creek crossing by utilizing the existing Oakmont Creek bridge connection to access Trione Annadel SP (although retrofit or replacement of the existing facilities would be needed). This route would also formalize the connection to the future Sonoma Valley Trail as an off-street route that avoids Oakmont streets.

Option 2 (Melita Road) also avoids bisecting the development site, however, it fails to facilitate designated bicycle and pedestrian use and puts cyclists and pedestrian onto Melita Road which does not contain facilities.

Topographic Issues

Figure 6 shows the existing topography in the vicinity of a schematic trail route within a typical 50 foot wide easement. Areas with slopes greater than 5% slopes indicate a need where more substantial grading, retaining walls, and/or use of switchbacks may be needed to meet accessibility needs.

Figures 7 and **8** illustrate a portion of Trail Option 1 in the area of steepest slopes and conceptually indicate where switchbacks and/or ramps might be needed to address accessibility issues. The schematic profile does not show any trail grading which can be used to flatten and make a more uniform running slope. These figures illustrate the trail alignment if it were to be located primarily within a 50 foot or 75 foot wide easement. It should be noted that proposed development grading, site improvements and actual easement width should be considered when determining the final trail alignment. More substantial grading and use of retaining walls can also be completed to result in a more uniform running slope with most sections less than 5% grade.

Trail grading and implementation is most efficiently completed at the same time as site development, considering site access, earthwork and grading equipment, and trail infrastructure such as walls and bridges.

Recommendations

1. Provide public access trail facilities as part of the development, consistent with the Santa Rosa General Plan 2035, Bicycle and Pedestrian Master Plan and Santa Rosa Citywide Creek Master Plan.

2. Consider trail construction access and infrastructure needs when evaluating Elnoka site development plan and easement needs, and incorporate trail construction components into project development plans where appropriate.

3. Consider emergency access needs and opportunities in trail design.

0 150 300 600 900 1,200 Feet

N E S W

Legend

Existing Grade

- 0.0- 4.9
- 5.0 - 8.4
- 8.5 - 11.9
- 11.9 - 15.4
- 15.5 - 18.9
- 19.0 - 45

Existing Topography

- 5 ft contour
- 10 ft contour

Parcel Boundary

1A

1B

+/- 60' CROSSING

+/- 40' CROSSING

+/- 40' CROSSING

+/- 80' CROSSING

OPTION 1

OPTION 2

CHANNEL TRL

CHANNEL DR

Oakmont Creek

South Fork Melita Creek

Melita Creek

MELITA GLEN PL

MELITA CT

SUSAN DR

BRAND RD

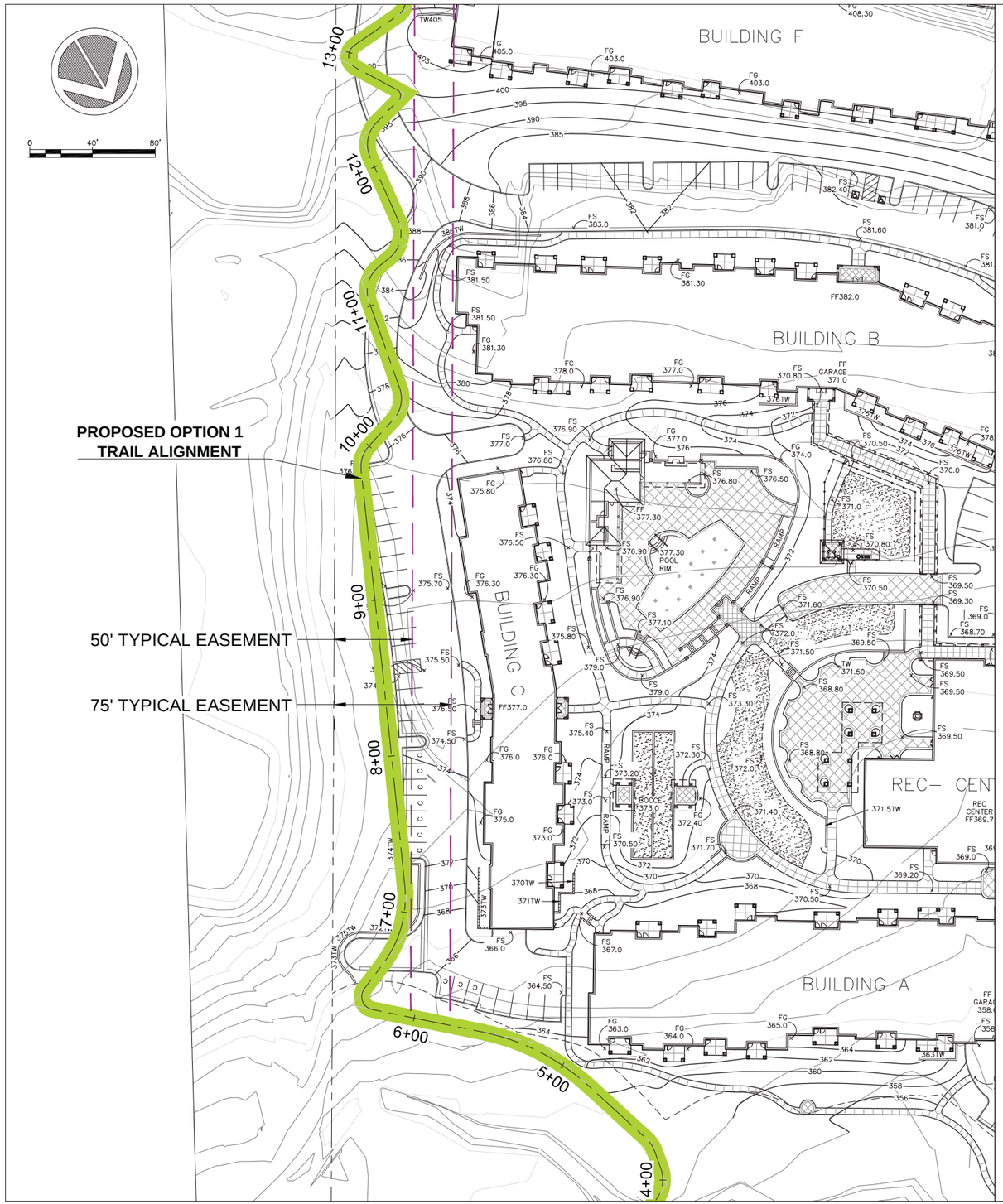
MELITA RD

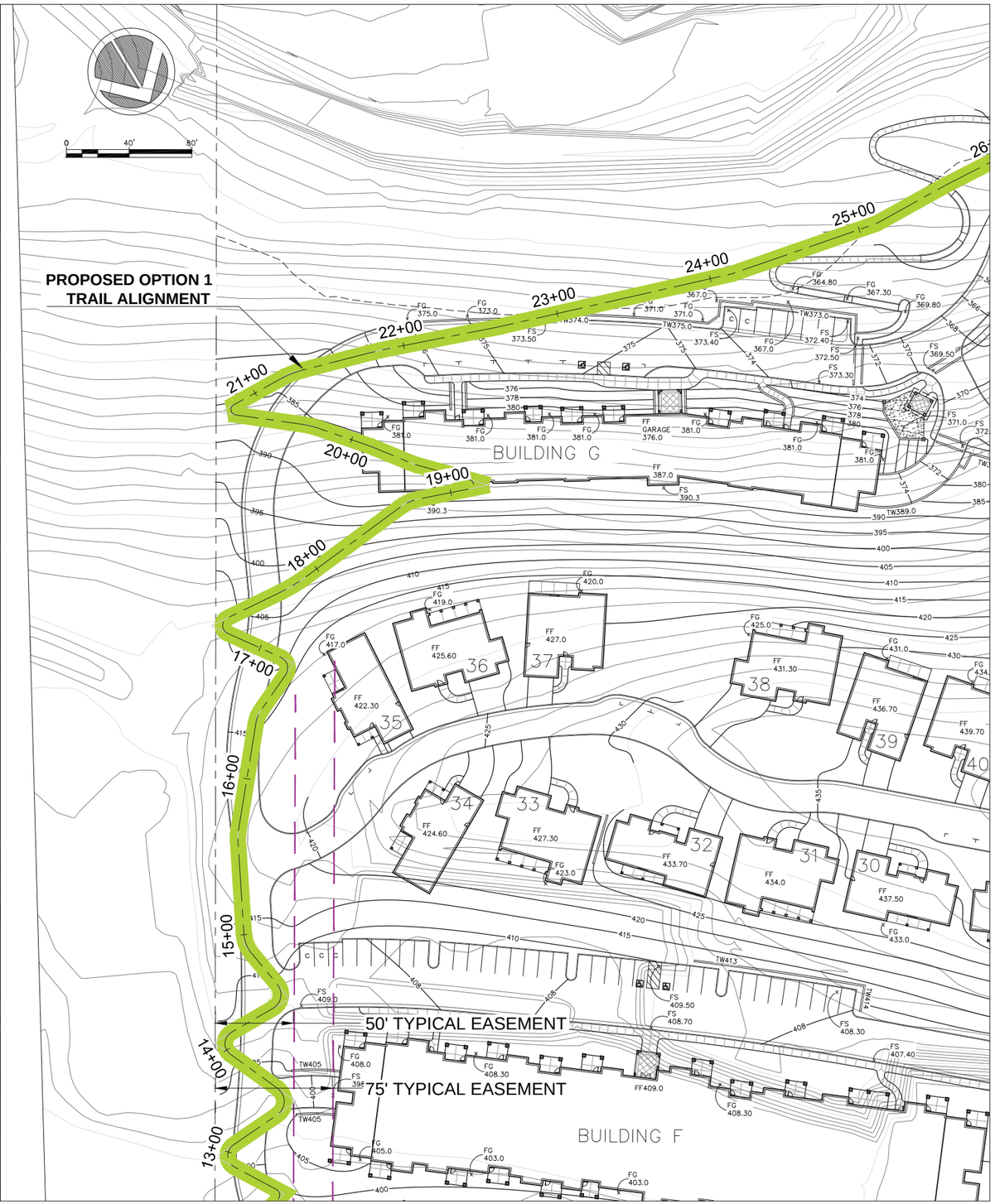
SONOMA HWY

LOS ALAMOS CT

QUESTA ENGINEERING CORP.

FIGURE 6





QUESTA ENGINEERING CORP.
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Design: JP
Drawn: OR
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Appr'd: XX

ELNOKA TRAIL PROJECT
TRAIL ANALYSIS - PORTION OF OPTION 1

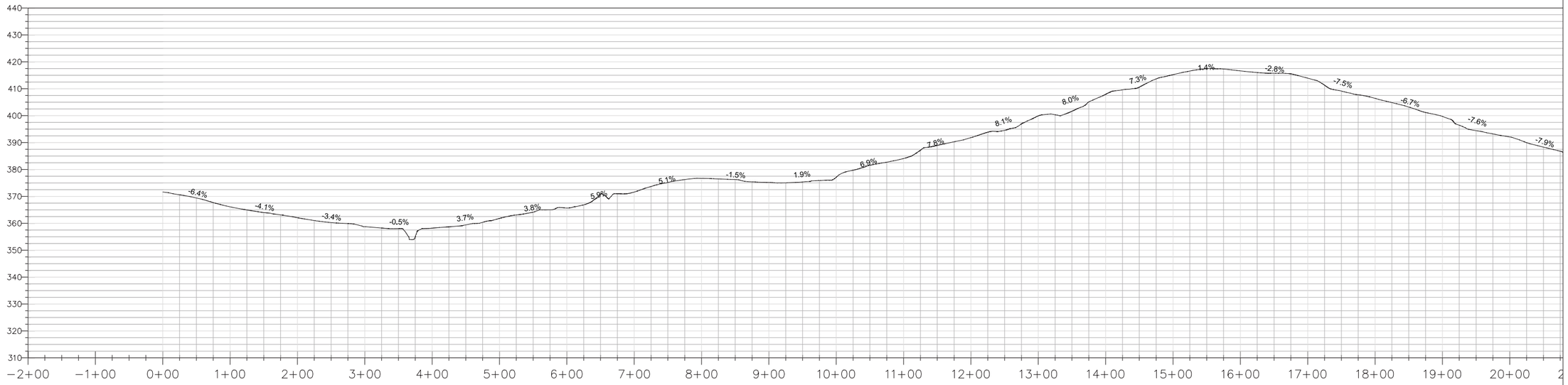
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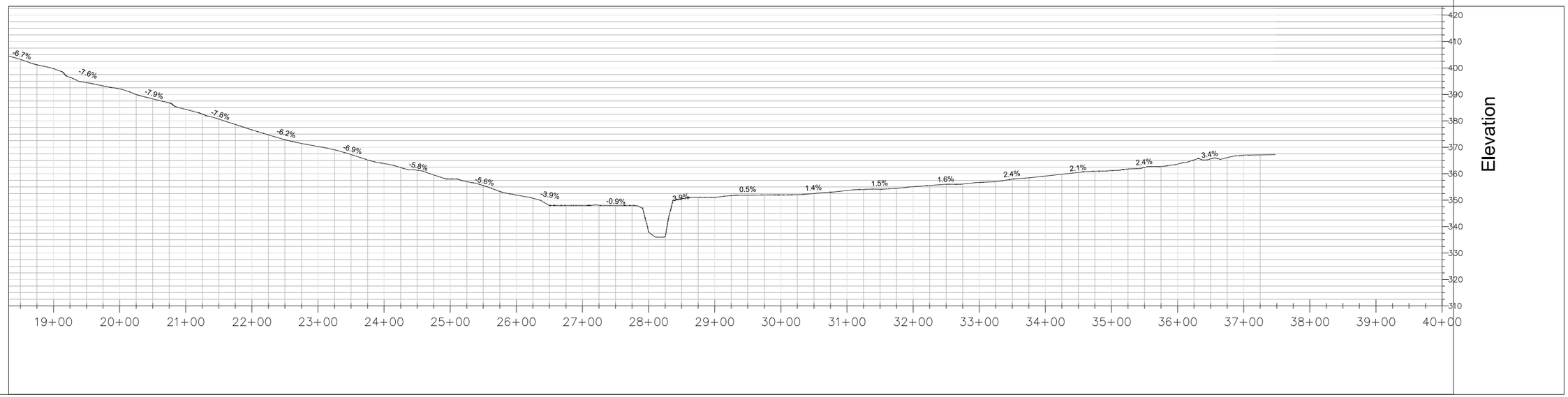
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FIGURE 7

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Profile View of Alignment - Option 1
Vertical Exaggeration: 4X





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ELNOKA TRAIL PROJECT
TRAIL ANALYSIS - OPTION 1 PROFILE

SANTA ROSA, CA

Size: D
Project: 1900130
Scale: AS NOTED
Date: 2-13-20

FIGURE 8

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Sonoma County Transportation Authority, 2014. SCTA Countywide Bicycle and Pedestrian Master Plan

J.2 - Trail Feasibility Study

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Traffic Impact Study for the Elnoka CCRC Project



Prepared for the City of Santa Rosa

Submitted by
W-Trans

October 15, 2020

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Table of Contents

Introduction 1

Transportation Setting 3

Significance Criteria 10

Capacity Analysis 12

Vehicle Miles Traveled Analysis 38

Alternative Modes 41

Access and Circulation 43

Parking 47

Conclusions and Recommendations 48

Study Participants and References 51

Figures

1. Study Area and Lane Configurations 2
2. Existing Traffic Volumes 15
3. Baseline Traffic Volumes 18
4. Future Traffic Volumes 21
5. Site Plan 23
6. Project Traffic Volumes 25

Tables

1. Collision Rates at the Study Intersections 5
2. Collision Rates for the Study Segments 5
3. Bicycle Facility Summary 7
4. Intersection Level of Service Criteria 13
5. Automobile Level of Service Criteria 14
6. Existing Peak Hour Intersection Levels of Service 16
7. Existing Peak Hour Roadway Segment Levels of Service on Sonoma Highway 16
8. Baseline Peak Hour Intersection Levels of Service 17
9. Baseline Peak Hour Roadway Segment Levels of Service on Sonoma Highway 19
10. Future Peak Hour Intersection Levels of Service 20
11. Future Peak Hour Roadway Segment Levels of Service on Sonoma Highway 20
12. Trip Generation Summary 24
13. Trip Distribution Assumptions 24
14. Existing and Existing plus Project Peak Hour Intersection Levels of Service 26
15. Existing and Existing plus Project Roadway Segment Levels of Service on Sonoma Highway 26
16. Baseline and Baseline plus Project Peak Hour Intersection Levels of Service 27
17. Baseline and Baseline plus Project Roadway Segment Levels of Service on Sonoma Highway 28

18. Future and Future plus Project Peak Hour Intersection Levels of Service 29
19. Future and Future plus Project Roadway Segment Levels of Service on Sonoma Highway 31
20. 95th Percentile Queues 35
21. Vehicle Miles Traveled Analysis Summary 39
22. Parking Requirements per City of Santa Rosa Municipal Code 47

Appendices

A. 72-Hour Traffic Count Data
B. Collision Rate Calculations
C. Intersection Level of Service Calculations
D. Roadway Segment Level of Service Calculations
E. Rough Proportionality Study
F. Draft Intersection Control Evaluation (ICE) Report
G. Signal Warrant Worksheets
H. Queuing Calculations
I. VMT Worksheet
J. Trail Feasibility Study

Introduction

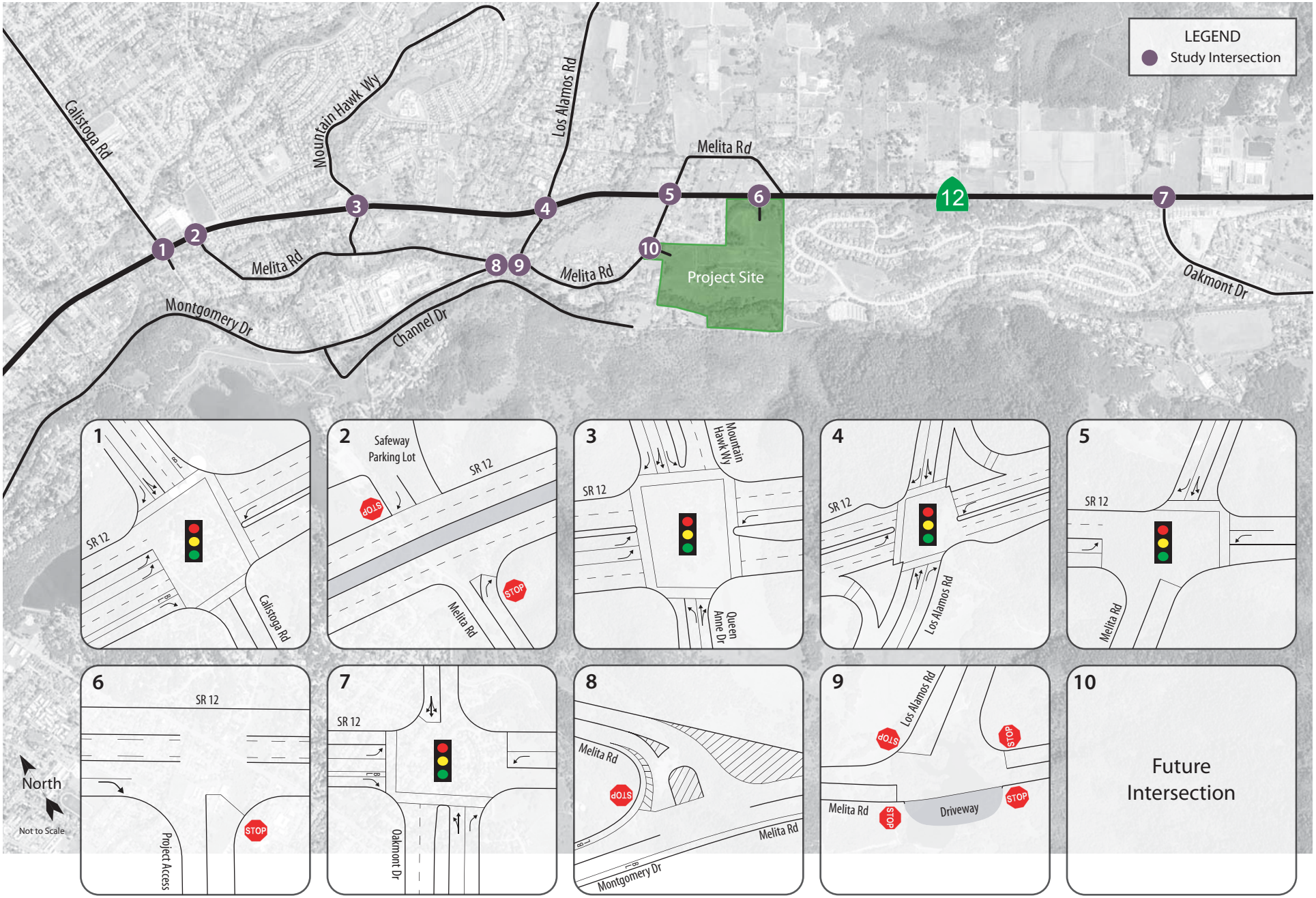
This report presents an analysis of the potential traffic impacts that would be associated with development of the proposed Elnoka Continuing Care Retirement Community (CCRC) to be located at 6160 Highway 12 (Sonoma Highway) at Elnoka Lane. The traffic study was completed in accordance with the criteria established by the City of Santa Rosa and is consistent with standard traffic engineering techniques.

Prelude

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

Project Profile

The proposed Continuing Care Retirement Community (CCRC) project includes 74 detached cottages, 528 apartment units, a 62-unit assisted living facility, and 12 multifamily housing units identified as employee housing. The project would also provide onsite amenities for the exclusive use of residents including dining rooms, a café, salon, banking services, business center, fitness center, swimming pool, sports courts, and walking paths. The project site is located on Sonoma Highway immediately northwest of the existing Oakmont retirement community. The project site is shown in Figure 1.



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Traffic Impact Study for the Elnoka CCRC Project

Figure 1 – Study Area and Lane Configurations

W-Trans

Transportation Setting

Operational Analysis

Study Area and Periods

In addition to the project access point, the study area consists of the following intersections:

1. Sonoma Highway/Calistoga Road
2. Sonoma Highway/Melita Road (west)
3. Sonoma Highway/Mountain Hawk Drive
4. Sonoma Highway/Los Alamos Road
5. Sonoma Highway/Melita Road (east)
6. Sonoma Highway/Project Access
7. Sonoma Highway/Oakmont Drive
8. Melita Road/Montgomery Drive
9. Melita Road/Los Alamos Road
10. Melita Road/Project Access

Operating conditions during the weekday a.m. and p.m. peak periods, as well as the Saturday midday peak period, were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The weekday 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. The Saturday midday peak period was found to occur between 12:30 and 2:30 p.m. in the study area, and reflects a peak weekend activity period for residential, retail, and visitor/tourism related uses.

Study Intersections

Sonoma Highway/Calistoga Road is a signalized, four-legged intersection, with protected left-turn phasing on Sonoma Highway and split phasing on Calistoga Road. The southbound approach includes a right-turn overlap phase. Marked crosswalks are provided on the north, south, and east legs.

Sonoma Highway/Melita Road (west) is an unsignalized intersection with stop controls on the northbound approach. The north leg serves as a private driveway to the St. Francis shopping center. Sonoma Highway includes a raised median through the intersection, restricting traffic movements to and from the minor approaches to right turns.

Sonoma Highway/Mountain Hawk Drive is a signalized four-legged intersection with protected left-turn phasing on Sonoma Highway, and permitted phasing on Mountain Hawk Drive. Marked pedestrian crosswalks are provided across each leg.

Sonoma Highway/Los Alamos Road is a four-legged, signalized intersection with protected left-turn phasing on Sonoma Highway and permitted phasing on Los Alamos Road. The eastbound and westbound Sonoma Highway approaches have raised medians and channelized right-turn lanes. Crosswalks are provided on the north, south, and west legs.

Sonoma Highway/Melita Road (east) is a signalized four-legged intersection with protected left-turn phasing on Sonoma Highway and permitted phasing on Melita Road. Westbound Sonoma Highway widens to two through

lanes on the west side of the intersection, and eastbound Sonoma Highway merges to a single through lane just upstream of the intersection. Crosswalks are provided on the north and east legs.

Sonoma Highway/Oakmont Drive is a signalized four-legged intersection with protected left-turn phasing on Sonoma Highway and split phasing on Oakmont Drive. The north leg was recently constructed and serves as the driveway entrance to Annadel Estate Winery. Crosswalks are provided on the south and west intersection legs.

Melita Road/Montgomery Drive is an unsignalized, stop-controlled tee intersection. The southbound Melita Road approach is controlled by a stop sign and Montgomery Drive is free-flowing.

Melita Road/Los Alamos Road is an unsignalized intersection with stop controls on all three legs.

Study Roadways

Sonoma Highway runs east-west and has a posted speed limited of 45 miles per hour between Calistoga Road and St. Francis Road, 55 mph between St. Francis Road and Los Alamos Road, and 50 mph between Los Alamos Road and Oakmont Drive. Along the project frontage Sonoma Highway carries an average daily volume of 24,800 vehicles. Sonoma Highway includes four lanes (two in each direction) plus turn pockets between Farmers Lane in Santa Rosa and the Melita Road (east) signal near the project site. To the east of the Melita Road (east) signal, Sonoma Highway reduces to one through lane in each direction, including a two-way left-turn lane on the 0.3-mile segment to the east of the Melita Road signal.

Melita Road is a two-lane street that passes through a combination of rural residential and suburban contexts. The street is identified as a scenic roadway in the City's General Plan. Melita Road has three distinct sections including an eastern segment between Sonoma Highway and Montgomery Drive that is identified as a collector street, a central segment that includes the secondary project access between Los Alamos Drive and Sonoma Highway that is identified as a local street, and an eastern "loop" segment that exists north of Sonoma Highway and the project site, connecting at both ends to the highway and also identified as a local street. Near the project site, the posted speed limit is 30 mph. Speed samples in this area indicate an average speed of 33 miles per hour and an 85th percentile speed of 38 mph.

Traffic volume and speed data were obtained on Sonoma Highway and Melita Road for a 72-hour period between a Thursday and Saturday in April 2017. The data was used in the traffic analysis, and is provided in Appendix A.

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 five-year period evaluated includes January 1, 2012 through December 31, 2016.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2013 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The calculated collision rates for the three intersections at Sonoma Highway/Mountain Hawk Drive, Sonoma Highway/Los Alamos Road, and Sonoma Highway/Oakmont Drive were calculated to be slightly higher than the statewide average. The collision rate calculations are provided in Appendix B.

Table 1 – Collision Rates at the Study Intersections			
Study Intersection	**Number of Collisions (2012-2016)**	**Calculated Collision Rate (c/mve)**	**Statewide Average Collision Rate (c/mve)**
1. Sonoma Hwy/Calistoga Rd	15	0.27	0.27
2. Sonoma Hwy/Melita Rd (west)	5	0.12	0.15
3. Sonoma Hwy/Mountain Hawk Dr	11	**0.28**	0.27
4. Sonoma Hwy/Los Alamos Rd	14	**0.34**	0.27
5. Sonoma Hwy/Melita Rd (east)	6	0.14	0.27
6. Sonoma Hwy/Project Access	0	0.00	-
7. Sonoma Hwy/Oakmont Dr	14	**0.35**	0.27
8. Melita Road/Montgomery Dr	1	0.07	0.18
9. Melita Rd/Los Alamos Rd	2	0.16	0.18
10. Melita Rd/Project Access	0	0.00	-

Note: c/mve = collisions per million vehicles entering; **bold** = calculated collision rate larger than the statewide average

Of the eleven collisions that occurred at Sonoma Highway/Mountain Hawk Drive, the majority of crashes were caused by drivers traveling at unsafe speeds and primarily resulted in rear-end and broadside collisions. The majority of rear-end collisions were caused by drivers traveling eastbound or westbound and following too closely behind other vehicles as they approached the intersection. The majority of collisions that occurred at Sonoma Highway/Los Alamos road were caused by unsafe speeding, improper turning movements, or drivers making right-of-way violations. The type of crashes that occurred were primarily rear-end or broadside collisions. Observations indicate that these types of collisions were primarily caused by drivers making left-turns or unsafe lane changes on Sonoma Highway. At the intersection of Sonoma Highway/Oakmont Drive, unsafe speeding was the primary causes of collisions resulting in rear-end crashes.

The collision rate for the segment of Sonoma Highway between Calistoga Road and Oakmont Drive is compared to the statewide average for similar facilities in Table 2. As seen in the table, the study segment experienced a collision rate that is lower than the statewide average for similar facilities.

Table 2 – Collision Rates for the Study Segments			
Study Roadway Segments	**Number of Collisions (2012-2016)**	**Calculated Collision Rate (c/mvm)**	**Statewide Average Collision Rate (c/mvm)**
1. Sonoma Hwy between Calistoga Rd and Oakmont Dr	47	0.31	1.45

Note: c/mvm = collisions per million vehicles miles

At all three intersections that experienced collision rates higher than the statewide average, speeding and unsafe maneuvers were the primary causes. However, given that the calculated collision rates at all three locations were only nominally higher than the statewide averages and the rate for the segment of SR 12 was well below average, no remedial action appears warranted.

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, sidewalk coverage along Sonoma Highway is limited and piecemeal with large gaps between existing segments. Sidewalks are available on the north side of Sonoma Highway from Calistoga Road to Melita Road (west) and on the south side of Sonoma Highway from Melita Road (west) to Saint Francis Road. Sidewalk coverage on the south side of Sonoma Highway begins again 350 feet west of Queen Ann Drive and extends east to Feliz Road. Sidewalk coverage on the north side of Sonoma Highway then begins again approximately 370 feet west of Saint Francis Road and continues east to Mountain Hawk Way. There is an additional segment of sidewalk on the north side of Sonoma Highway from Fisher Road to a point approximately 260 feet east. There is also another 310-foot segment of sidewalk on the south side of Sonoma Highway, bordering Hope Chapel Santa Rosa, across from Fairway Drive. There are no additional sidewalks between the existing sidewalk bordering Hope Chapel and Oakmont Drive, with no sidewalks bordering the project site.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2012, classifies bikeways into three categories:

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

In the project area, Class II bike lanes exist on Calistoga Road from Badger Road to Sonoma Highway, a Class II bike lane exists on Montgomery Road between Melita Road and Spring Lake Court, and a Class IIIB bicycle boulevard exists on Mountain Hawk Drive from Sonoma Highway to San Ramon Way. Future plans include a Class II bike lane on Sonoma Highway from Calistoga Road to the Santa Rosa City Limits, a distance of approximately three miles. An additional Class II bike lane is also planned for Los Alamos Road between Melita Road and Sonoma Highway.

As indicated in the City of Santa Rosa Bicycle and Pedestrian Master Plan Update 2018, future plans include a Class II bike lane on Sonoma Highway from Calistoga Road to the Melita Road (east) signalized intersection and a Class II bicycle route directly adjacent to the project along Channel Drive. The 2018 Plan also identifies a "study" bicycle trail west of the project site along Santa Rosa Creek between Sonoma Highway and Melita Road (near the Los Alamos Road intersection); the Channel Trail, a proposed 0.50-mile study route along the eastern edge of the Elnoka project site extending from State Route 12 to Channel Drive/Channel Trail, and a Class I Shared-Use Path along the project's frontage on Sonoma Highway.

A Class I multi-use path called the Sonoma Valley Trail is planned to generally parallel Sonoma Highway between Los Alamos Road and Agua Caliente Road. The approximately 13-mile long trail would serve as a key bicycle linkage in a larger cross-county network that would connect Sebastopol to Sonoma and beyond. A preferred alignment for the trail is identified in the *Sonoma Valley Trail Feasibility Study,* January 2016, Sonoma County Regional Parks. In the project area, the trail would run along the south side of Sonoma Highway between Oakmont Drive and the Elnoka project's intersection (which is identified as "Elnoka Lane" and having a future traffic signal). To the west of Elnoka Lane, the preferred alignment enters and traverses the project site, meeting Melita Road at Susan Road, and then running alongside Melita Road to the vicinity of Los Alamos where the trail would end. The feasibility study also shows an Alternate alignment that does not enter the project site, instead continuing along Sonoma Highway slightly further to Santa Rosa Creek, where it would divert from the highway and run along the side of the creek to meet the preferred alignment at Melita Road.

Table 3 summarizes the existing and planned bicycle facilities in the project vicinity, and a map excerpt from the City's bicycle plan showing these facilities is provided in Plate 1.

Table 3 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Calistoga Rd	II	1.43	Badger Rd	Sonoma Hwy
Montgomery Rd	II	0.77	Melita Rd	Spring Lake Ct
Mountain Hawk Dr	III	0.55	Sonoma Hwy	San Ramon Wy
Planned				
Sonoma Hwy	II	3.00	Calistoga Rd	City Limits
Los Alamos Rd	II	0.19	Melita Rd	Sonoma Hwy
Chanel Rd	I/III	3.00	Montgomery Dr	Oakmont Dr
Sonoma Valley Trail	I	13.0	Los Alamos Rd	Agua Caliente Rd
Planned (Study)				
Channel Trail	I	0.50	Sonoma Hwy	Channel Dr
Santa Rosa Creek Trail	I	0.39	Melita Rd	Sonoma Hwy

Source: *Santa Rosa Bicycle and Pedestrian Master Plan Update 2018*, City of Santa Rosa, 2018, and *Sonoma Valley Trail Feasibility Study*, Sonoma County Regional Parks, 2016

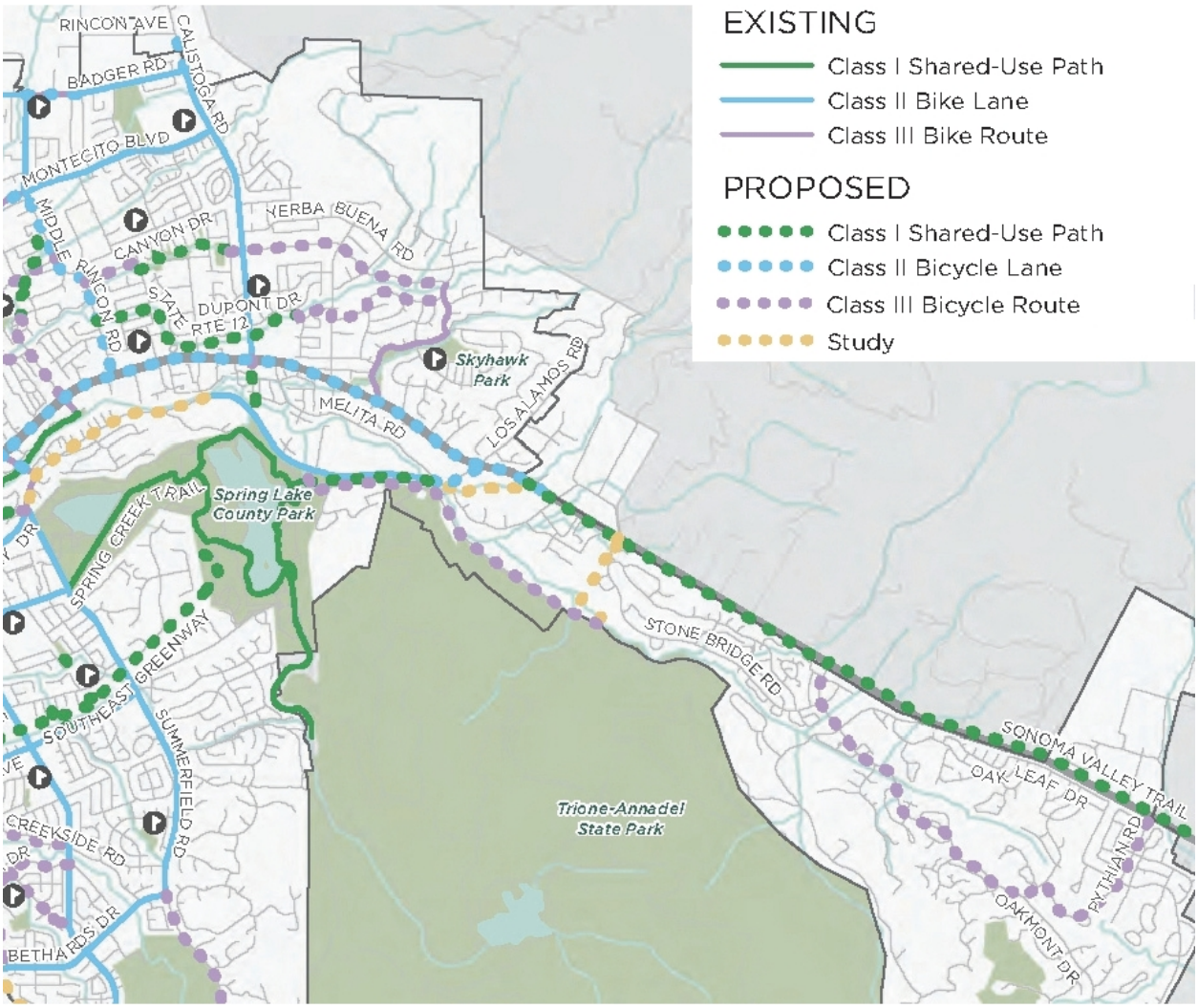


Plate 1 Existing and Planned Bike Facilities (excerpt from *Santa Rosa Bicycle and Pedestrian Master Plan Update 2018)*

Transit Facilities

Santa Rosa CityBus provides local bus service within the City of Santa Rosa. However, there are no CityBus routes that serve the project area. Sonoma County Transit (SCT) provides regional bus service in Santa Rosa and surrounding communities, with multiple routes and stops located within the study area, including several that connect to Santa Rosa CityBus routes. Local Routes 30 and 34 provide regional bus service to the project site. Bus stops serving these routes are located along Sonoma Highway at Calistoga Road, Melita Road (west), Mountain Hawk Drive, Fairway Drive, Los Alamos Road, Melita Road (east end), and Oakmont Drive. The bus stop at the east end of Melita Road is adjacent to the project access (Elnoka Lane) for eastbound bus routes, and approximately 220 feet east of the project access in the westbound direction. Route 38, which provides service from Oakmont to Sonoma and on to San Rafael, is also served by the bus stops at Oakmont Drive.

Route 30 provides service from Santa Rosa to Sonoma, with stops at Kaiser and Memorial Hospitals, the downtown transit mall, and shopping centers in Santa Rosa. The route operates Monday through Friday with approximately two-hour headways from 6:00 a.m. to 9:30 p.m. On weekends, service is provided with approximately three-hour headways from 6:00 a.m. to 8:30 p.m.

Route 34 provides commuter service from the Santa Rosa downtown transit mall to Sonoma. The route operates Monday through Friday with one stop during the a.m. peak hour at 7:00 a.m. and one in the p.m. in the p.m. peak hour at 5:30 p.m.

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. Santa Rosa Paratransit and Sonoma County Paratransit is designed to serve the needs of individuals with disabilities within Santa Rosa and the greater Santa Rosa area.

Significance Criteria

The following standards of significance are based on the CEQA Guidelines in effect as of the project's notice of preparation issued in 2017, as well as criteria established by the City of Santa Rosa and Caltrans. Under these applied standards, the project would result in a significant impact on transportation if it would:

1. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and transit. The City of Santa Rosa establishes measures of effectiveness and significance thresholds in Guidance for the Preparation of Traffic Operational Analysis, July 2019.

    a. **Roadway Segment**: For the purposes of this analysis, criteria established by the City of Santa Rosa were applied to the Sonoma Highway roadway segment, since the roadway essentially functions as an arterial street serving local City uses in addition to regional highway traffic. Policy T-D-1 of the General Plan states that the City will maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting this standard are allowed:

    - Within downtown;
    - Where attainment would result in significant environmental degradation;
    - Where topography or environmental impacts makes the improvement impossible; or
    - Where attainment would ensure loss of an area's unique character.

    b. **Intersections:** For the purposes of this analysis, the City's LOS D criterion for roadway segments was also applied to intersections. At unsignalized intersections, operation below LOS D on stop-controlled approaches was considered acceptable if 1) the intersection's overall LOS is acceptable, and 2) warrants for the installation of a traffic signal from the *California Manual on Uniform Traffic Control Devices* (CAMUTCD) are unmet.

    With respect to significance thresholds for intersections that are already operating unacceptably before the addition of project traffic, an increase in average vehicle delay of greater than 5 seconds is considered significant and cumulatively considerable. A similar logic was applied to corridors, where a reduction of one mile per hour or greater on a roadway that is already projected to be operating unacceptably is considered to be a significant impact.

2. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.

3. Substantially increase hazards due to a design feature.

4. Result in inadequate emergency access.

5. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

    a. **Consistency with alternative transportation policies**: A significant impact would occur if the project violates alternative transportation policies set forth in the City of Santa Rosa General Plan.

b. **Consistency with the Bicycle and Pedestrian Master Plan**: A significant impact would occur if the project precludes pedestrian and bicycle improvements identified in the *Santa Rosa Bicycle and Pedestrian Master Plan* from being successfully implemented.

c. **Bicycle/Pedestrian Facilities**: The project would have a significant impact if it would violate applicable design guidelines and standards for facilities that serve bicyclists and/or pedestrians.

d. **Transit:** The project would have a significant impact if it would cause a substantial delay in transit service, increase demand for transit beyond existing or planned service capacity, or create barriers to travel for pedestrians walking to transit terminals and bus stops.

Vehicle Miles Traveled Significance Criteria

Since the time that the project's notice of preparation was released, the CEQA Guidelines have been revised to include assessment of the vehicle miles traveled (VMT) that would be generated by a project. VMT analysis became a mandatory component of CEQA transportation analyses on July 1, 2020. VMT thresholds for this analysis were established based on guidance provided by the California Office of Planning and Research publication *Technical Advisory on Evaluating Transportation Impacts in CEQA*, December 2018, as well as the *Vehicle Miles Traveled (VMT) Guidelines Final Draft* issued by the City of Santa Rosa in June 2020. These criteria are consistent with those applied by Caltrans as outlined in the *Vehicle Miles Traveled-Focused Transportation Impact Study Guide*, California Department of Transportation, May 2020.

The Sonoma County Transportation Authority (SCTA) operates and maintains the regional travel demand model that is capable of producing VMT estimates. The VMT thresholds and projections applied in this analysis reflect refinements made by SCTA in the summer of 2020 as produced in a model version released in September 2020. Based on output from the SCTA model, the existing residential VMT per capita in the County of Sonoma is 16.53 miles. Reducing this number by 15 percent establishes a VMT per capita significance threshold of 14.05 miles. Similarly, the existing VMT per employee at the Countywide level is 12.53 miles, which when reduced by 15 percent establishes a VMT per employee significance threshold of 10.65 miles. Accordingly, the applied VMT significance thresholds are as follows.

A significant VMT impact would occur if:

- The project's residential VMT per Capita would exceed a level of 15 percent below the existing Countywide average residential VMT per Capita, or 14.05 miles; or
- The project's employment VMT per Employee would exceed a level of 15 percent below the existing Countywide average VMT per Employee, or 10.65 miles.

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 methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2010. 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 intersections with side-street stop controls, or those which are unsignalized and have one or two approaches stop controlled, were 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 intersection at Melita Rosa/Los Alamos Road includes stop signs on all approaches and was analyzed using the "All-Way Stop-Controlled" Intersection methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average vehicle delay is computed for the intersection as a whole and is then related to a Level of Service.

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, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. Signal timing sheets for the signalized intersections along Sonoma Highway were obtained from Caltrans for use in the analysis.

The ranges of delay associated with the various levels of service are indicated in Table 4.

Table 4 – Intersection Level of Service Criteria			
LOS	**Two-Way Stop-Controlled**	**All-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. Upon stopping, drivers are immediately able to proceed.	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 queuing occurs on the minor street.	Delay of 10 to 15 seconds. Drivers may wait for one or two vehicles to clear the intersection before proceeding from a stop.	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 15 to 25 seconds. Drivers will enter a queue of one or two vehicles on the same approach and wait for vehicle to clear from one or more approaches prior to entering the intersection.	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 25 to 35 seconds. Queues of more than two vehicles are encountered on one or more approaches.	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 35 to 50 seconds. Longer queues are encountered on more than one approach to the intersection.	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 50 seconds. Drivers enter long queues on all approaches.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual,* Transportation Research Board, 2010

Arterial Segment Level of Service Methodology

The roadway segment Level of Service methodology found in Chapter 17, "Urban Street Segments," of the *Highway Capacity Manual* (HCM), Transportation Research Board, 2010, is the basis of the automobile LOS analysis. This method does not address the capacity of a facility, but rather determines a Level of Service based the calculated percentage of the street's base free-flow speed. In essence, congestion occurs as traffic volumes increase, and the overall travel speed is reduced due to increased delay. Therefore, the slower the speed, the lower that speed is as a percentage of free-flow speed, and the lower the Level of Service. Corridor levels of service were assessed using the software applications Synchro and SimTraffic. Synchro is used to analyze operation at each of the signalized intersections along a segment, which is where the majority of delay is encountered. SimTraffic is an extension of Synchro that simulates vehicle progression along a corridor, considering the operation of individual signals as well as influences such as interactions among signals, queue spillback, and merging activity. Given the stochastic nature of traffic simulation models, the average speeds of ten randomly-seeded SimTraffic runs were used to normalize the results and determine average travel speeds along the study corridor.

The relationships between Level of Service and percentages of free-flow speed, where free-flow speed is assumed to be the speed limit, are presented in Table 5.

Table 5 – Automobile Level of Service Criteria	
Level of Service	**Travel Speed as a Percentage of Base Free-Flow Speed (%)**
A	>85
B	>67-85
C	>50-67
D	>40-50
E	>30-40
F	≤30

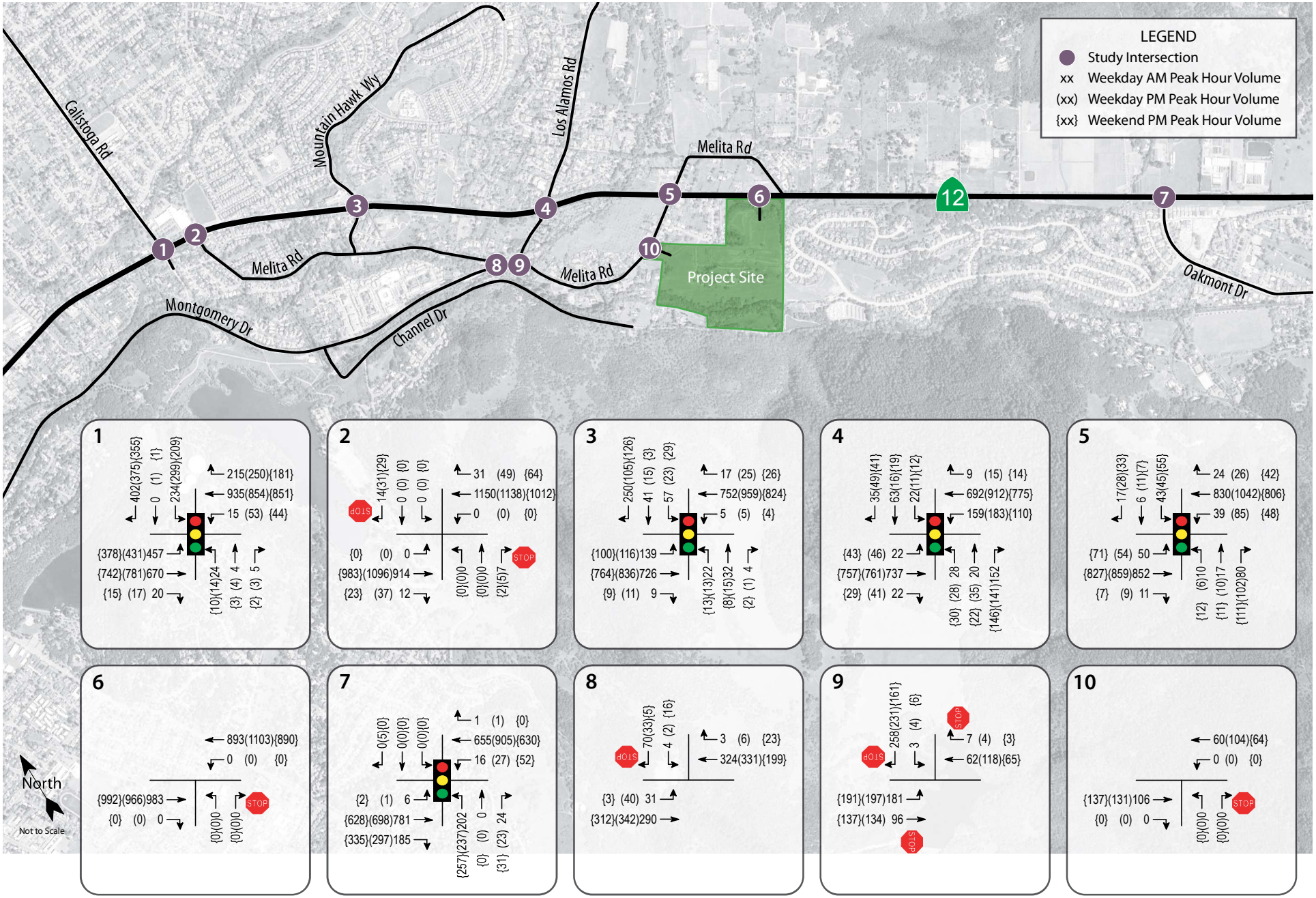
Reference: *Highway Capacity Manual*, Transportation Research Board, 2010

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the weekday a.m. and p.m. peak periods, which capture traffic conditions during peak morning and evening commute hours, as well as the Saturday midday peak period, which captures the highest hour of traffic occurring during the weekend midday (which in the study area reflects the highest one-hour volumes between 12:30 and 2:30 p.m.). This condition does not include project-generated traffic volumes. Volume data was collected in April 2017 while local schools were in session. Note that the volumes were obtained prior to the catastrophic Tubbs and Nuns fires in the fall of 2017, which resulted in a significant destruction of homes along the Sonoma Highway corridor. The applied 2017 volumes provide a more accurate representation of "typical" operation than volumes collected subsequent to the fires.

Intersection Levels of Service

Under existing conditions, all ten study intersections are operating acceptably. The existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 6, and copies of the Level of Service calculations are provided in Appendix C.



sro408.ai 10/17

Traffic Impact Study for the Elnoka CCRC Project

Figure 2 – Existing Traffic Volumes

W-Trans

Table 6 – Existing Peak Hour Intersection Levels of Service						
Study Intersection *Approach*	**AM Peak**		**PM Peak**		**MD Peak**	
	Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1. Sonoma Hwy/Calistoga Rd	43.6	D	37.1	D	26.4	C
2. Sonoma Hwy/Melita Rd (west)	0.1	A	0.2	A	0.2	A
Northbound (Melita Rd) Approach	*12.0*	*B*	*13.2*	*B*	*12.4*	*B*
3. Sonoma Hwy/Mountain Hawk Dr	14.2	B	13.5	B	12.6	B
4. Sonoma Hwy/Los Alamos Rd	14.0	B	14.8	B	12.3	B
5. Sonoma Hwy/Melita Rd (east)	16.4	B	25.7	C	18.4	B
7. Sonoma Hwy/Oakmont Dr	18.1	B	32.2	C	20.7	C
8. Melita Rd/Montgomery Dr	1.5	A	1.0	A	0.5	A
Southbound (Melita Rd) Approach	*11.2*	*B*	*11.0*	*B*	*12.5*	*B*
9. Melita Rd/Los Alamos Rd	9.9	A	11.2	B	10.3	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*; intersections 6 and 10 do not exist without project

Roadway Segment Levels of Service

Under existing conditions, both the eastbound and westbound directions of the Sonoma Highway roadway segment between Oakmont Drive and Calistoga Road are operating acceptably. A summary of the roadway segment level of service calculations is shown in Table 7, and copies of the Level of Service calculations are provided in Appendix D.

Table 7 – Existing Peak Hour Roadway Segment Levels of Service on Sonoma Highway									
Direction	**AM Peak**			**PM Peak**			**Saturday Midday Peak**		
	Speed	**%FFS**	**LOS**	**Speed**	**%FFS**	**LOS**	**Speed**	**%FFS**	**LOS**
Eastbound	38	69%	B	37	67%	B	37	67%	B
Westbound	33	60%	C	29	53%	C	36	65%	C

Notes: Speed is measured in miles per hour; %FFS=percent of free-flow speed; LOS = Level of Service

Baseline Conditions

Baseline Traffic Conditions

Baseline operating conditions were assessed to reflect the addition of traffic associated with approved projects in both the City of Santa Rosa and the County of Sonoma that are anticipated to be constructed and/or become operational in the study area in the next two to three years. In the City of Santa Rosa, projects used in the Baseline scenario were obtained from the City's "Permit Santa Rosa" portal (http://santarosa.civicinsight.com) and the City of Santa Rosa June 2017 Pending Development Report (https://srcity.org/354/Planning-Division) on July 14, 2017, and confirmed with City Staff in August 2017. The following City projects are included in the Baseline scenario.

- **Park Lane Apartments II** – 7 single-family homes at 660 Acacia Lane
- **Saraceni Village** – 8 single-family homes at 705 Acacia Lane

- **Prospect Village II** – 14 single-family homes at 807 Acacia Lane
- **Los Indios Subdivision** – 12 single-family homes at 225 Indian Creek Circle
- **Middle Rincon Subdivision** – 6 single-family homes at 117 Middle Rincon Road
- **Prospect Oaks** – 32 apartments at 4599 Sonoma Highway
- **Vista Gabrielle** – 6 single-family homes at 5150 Sonoma Highway
- **The Shops at Austin Creek** – 43,200 square feet of retail development at 5173 Sonoma Highway
- **Montgomery Park Apartments** – 14 apartments at 4527 Montgomery Drive

The County of Sonoma Permit and Resource Management Department (PRMD) supplied a list of approved development in the project area on August 7, 2017. The following County projects are included in the Baseline scenario.

- **Annadel Vineyards** – winery with 50,000 case production and tasting by appointment 6545 Highway 12
- **Bordigioni Winery** – winery with 60,000 case production plus tasting and events at 6687 Highway 12
- **Sugar Loaf Winery** – winery with 125,000 case production plus tasting and events at 6705 Highway 12
- **Sonoma Country Inn** – 50-room resort hotel with 125-seat restaurant; winery with 10,000 case production and events; 11 single-family homes at 7915 and 7977 Highway 12
- **Kenwood Winery** – expand existing winery tasting room by 3,100 square feet at 9592 Highway 12
- **Beltane Winery** – winery with 15,000 case production at 11621 Highway 12
- **Ledson Winery** – winery with 50,000 case production plus tasting and events at 7950 Highway 12

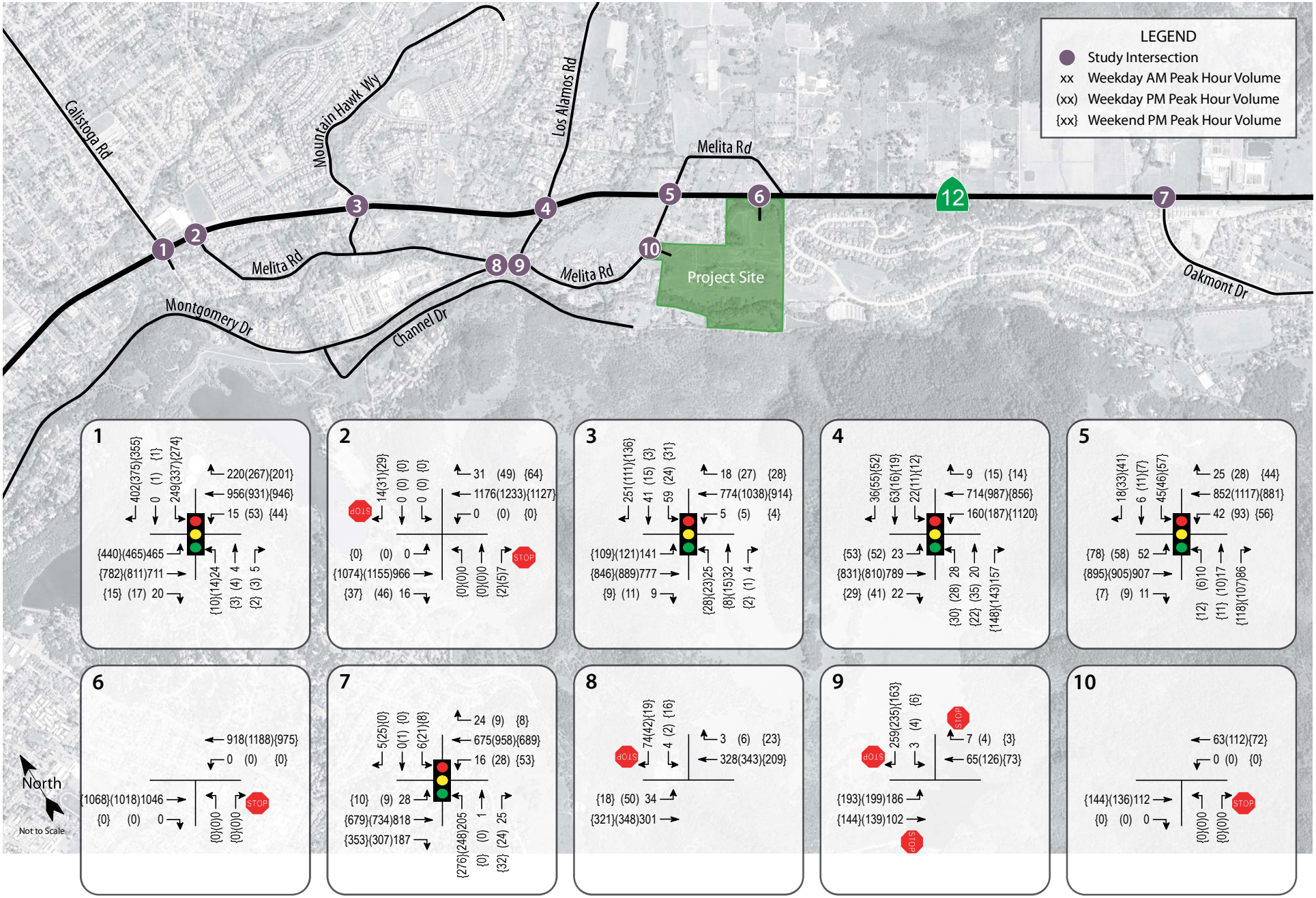
Trip generation and distribution assumptions for the baseline projects were based on the traffic studies completed for each project, as available, or standard ITE rates and distribution assumptions based on existing traffic patterns and census data. The associated trips were then added to existing volumes in order to derive the traffic volumes used in the Baseline scenario.

Under Baseline conditions, nine of the ten study intersections are projected to operate acceptably. The intersection at Sonoma Highway/Oakmont Drive is projected to operate unacceptably at LOS E during the p.m. peak hour. These results are summarized in Table 8 and Baseline volumes are shown in Figure 3.

Table 8 – Baseline Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak		MD Peak	
	Delay	LOS	Delay	LOS	Delay	LOS
1. Sonoma Hwy/Calistoga Rd	49.1	D	52.0	D	37.1	D
2. Sonoma Hwy/Melita Rd (west)	0.1	A	0.2	A	0.2	A
Northbound (Melita Rd) Approach	*12.3*	*B*	*13.6*	*B*	*13.0*	*B*
3. Sonoma Hwy/Mountain Hawk Dr	14.3	B	14.5	B	13.6	B
4. Sonoma Hwy/Los Alamos Rd	14.3	B	15.5	B	13.1	B
5. Sonoma Hwy/Melita Rd (east)	18.0	B	38.1	D	21.9	C
7. Sonoma Hwy/Oakmont Dr	33.9	C	**68.7**	**E**	42.0	D
8. Melita Rd/Montgomery Dr	1.5	A	1.1	A	0.9	A
Southbound (Melita Rd) Approach	*11.3*	*B*	*11.2*	*B*	*12.0*	*B*
9. Melita Rd/Los Alamos Rd	10.1	B	11.5	B	10.4	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; intersections 6 and 10 do not exist without project



sro408.ai 10/17

Traffic Impact Study for the Elnoka CCRC Project

Figure 3 – Baseline Traffic Volumes

W-Trans

The Sonoma Highway roadway segment is projected to continue operating acceptably at LOS D or better in the eastbound and westbound directions under Baseline conditions. The results are shown in Table 9.

Table 9 – Baseline Peak Hour Roadway Segment Levels of Service on Sonoma Highway

Direction	AM Peak			PM Peak			Saturday Midday Peak		
	Speed	%FFS	LOS	Speed	%FFS	LOS	Speed	%FFS	LOS
Eastbound	37	67%	B	33	60%	C	36	65%	C
Westbound	31	56%	C	25	45%	D	32	58%	C

Notes: Speed is measured in miles per hour; %FFS=percent of free-flow speed; LOS = Level of Service

Future Conditions

Caltrans Highway 12 Transportation Concept Report

The *State Route 12 (West) Transportation Concept Report* (TCR), Caltrans, 2014, provides an evaluation of the current and projected operating conditions along SR 12 and a vision for future development on the highway. The TCR was developed with goals of increasing safety, improving mobility, providing stewardship, and meeting community and environmental needs along the corridor. Unlike Caltrans planning documents of the past that placed a heavy emphasis on the need for vehicular capacity, this plan has a strong multimodal focus and recognizes the different community and "place" types that the highway traverses.

The route concept and strategy for the highway through Sonoma Valley, including in the vicinity of the project site, is to "maximize Smart Mobility benefits over vehicle throughput," pursuing the planned Sonoma Valley Trail parallel to the highway as well as future enhanced transit service. The report recommends that the corridor be maintained as a scenic highway. With respect to traffic capacity, the plan indicates that Highway 12 along with Arnold Drive are expected to provide sufficient capacity into the future.

Future Projections and Traffic Operation

Future traffic volumes for conditions without the Elnoka project were based on data contained in the Sonoma County Transportation Authority's (SCTA) SCTM\15 travel demand model. The year 2040 projections include traffic growth from future development within Santa Rosa and the region and assume buildout of the City's and County's General Plans. The model includes a "financially constrained" set of future transportation improvements, meaning only transportation projects with identified funding sources are assumed to be constructed. Within the traffic analysis's study area, no roadway expansion or widening projects are included in the model for Highway 12.

Segment volumes from the model were translated to turning movement volumes at intersections using existing traffic counts and the "Furness" procedure. This procedure is an iterative process that employs existing turn movement data, model-obtained baseline link volumes, and model-obtained future link volumes to project likely future turning movement volumes at intersections. The incremental increase in intersection turning movements projected by the model was then added to the volumes developed for the baseline scenario described above. Adding the incremental growth to baseline rather than existing volumes is a somewhat conservative approach, though ensures that traffic associated with pending development projects (many of which are wineries with varying operational characteristics) are clearly reflected in the applied future volumes.

The SCTA travel demand model does not include weekend projections. In order to estimate future Saturday midday peak hour volumes, growth factors were determined for each intersection by comparing the model's projected future p.m. peak hour volumes to the existing p.m. peak hour volumes. The resulting factors were then

applied to baseline volumes to mimic the conservative approach used in the weekday a.m. and p.m. peak hour scenarios.

Under the projected Future volumes, seven of the 10 study intersections are expected to operate acceptably. The intersection at Sonoma Highway/Calistoga Road is projected to operate unacceptably at LOS F during the a.m. peak hour and LOS E during the p.m. peak hour; the signalized intersection at Sonoma Highway/Melita Road (east) is projected to operate unacceptably at LOS E during the p.m. peak hour; and the intersection at Sonoma Highway/Oakmont Drive is projected to operate unacceptably at LOS E during the a.m. peak hour and LOS F during the p.m. peak hour. Operating conditions are summarized in Table 10 and Future volumes are shown in Figure 4.

Table 10 – Future Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak		MD Peak	
	Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1. Sonoma Hwy/Calistoga Rd	**81.0**	**F**	**69.0**	**E**	48.7	D
2. Sonoma Hwy/Melita Rd (west)	0.3	A	0.3	A	0.2	A
Northbound (Melita Rd) Approach	*13.0*	*B*	*14.7*	*B*	*13.7*	*B*
3. Sonoma Hwy/Mountain Hawk Dr	15.7	B	15.7	B	14.5	B
4. Sonoma Hwy/Los Alamos Rd	30.6	C	17.1	B	14.1	B
5. Sonoma Hwy/Melita Rd (east)	34.6	C	**57.3**	**E**	27.2	C
7. Sonoma Hwy/Oakmont Dr	**72.9**	**E**	**103.0**	**F**	44.5	D
8. Melita Rd/Montgomery Dr	1.7	A	1.1	A	0.9	A
Southbound (Melita Rd) Approach	*12.2*	*B*	*11.6*	*B*	*12.8*	*B*
9. Melita Rd/Los Alamos Rd	11.0	B	12.7	B	11.2	B

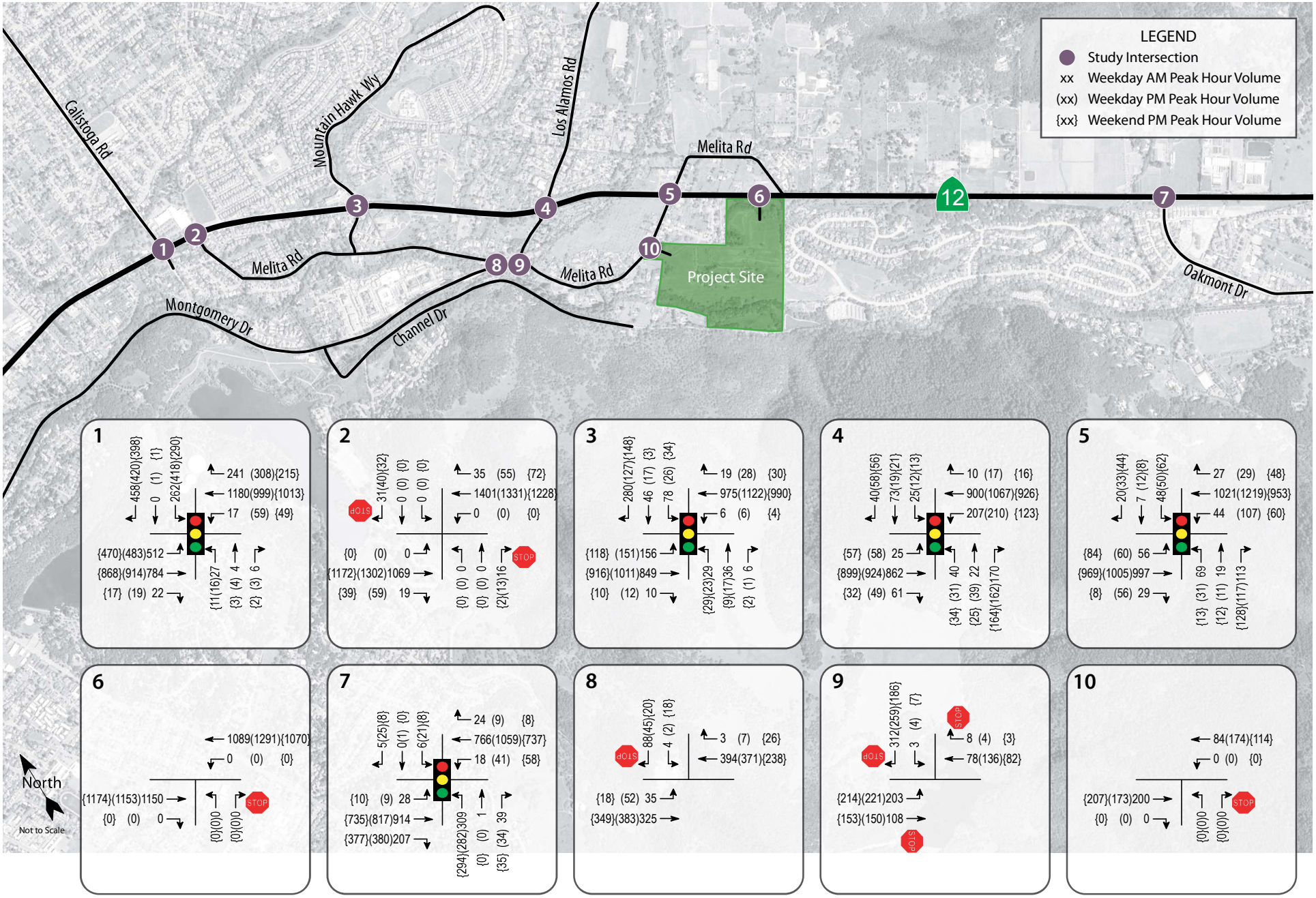
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; intersections 6 and 10 do not exist without project

Under projected future volumes, the Sonoma Highway roadway segment is projected to operate acceptably during the a.m. and Saturday midday peak hours, but unacceptably at LOS E in the westbound direction during the p.m. peak hour. These results are summarized in Table 11.

Table 11 – Future Peak Hour Roadway Segment Levels of Service on Sonoma Highway

Direction	AM Peak			PM Peak			Saturday Midday Peak		
	Speed	**%FFS**	**LOS**	**Speed**	**%FFS**	**LOS**	**Speed**	**%FFS**	**LOS**
Eastbound	31	56%	C	28	51%	C	33	60%	C
Westbound	23	42%	D	**22**	**40%**	**E**	26	47%	D

Notes: Speed is measured in miles per hour; %FFS=percent of free-flow speed; LOS = Level of Service; **Bold** text = deficient operation



sro408.ai 10/17

Traffic Impact Study for the Elnoka CCRC Project

Figure 4 – Future Traffic Volumes

W-Trans

Project Description

The proposed project is a community comprised of several different types of senior housing including 74 detached cottages, 528 apartments, and a 62-unit assisted living facility. The project would also include 12 multifamily residential units identified as employee housing. The development would provide onsite amenities for the exclusive use of residents including dining rooms, a café, salon, banking services, business center, fitness center, swimming pool, sports courts, and walking paths. Transportation services will be available to take residents to shops and appointments. The project site is located at 6160 Highway 12 (Sonoma Highway) at Elnoka Lane, immediately northwest of the existing Oakmont retirement community. Primary access to the project site would be via Sonoma Highway, and secondary access would be via Melita Road.

The proposed project site plan is shown in Figure 5.

Trip Generation

In reviewing the trip generation land use categories as published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 9th Edition, 2012, the "CCRC" land use (ITE land use #255) was determined to be a close match to the project description. The ITE land use description for the CCRC land use states "Continuing care retirement communities (CCRCs) are land uses that provide multiple elements of senior adult living. CCRCs combine aspects of independent living with increased care, as lifestyle needs change with time. Housing options may include various combinations of senior adult (detached), senior adult (attached), congregate care, assisted living and skilled nursing care—aimed at allowing the residents to live in one community as their medical needs change. The communities may also contain special services such as medical, dining, recreational and some limited, supporting retail facilities. CCRCs are usually self-contained villages."

ITE bases CCRC trip generation on the independent variable "occupied units," which, depending on the type of housing, may include dwelling units, rooms, or beds. The project's 74 detached cottages and 528 apartments would be considered 602 units. Assisted living uses differ in that their independent variable is defined by the number of beds. The 62 assisted living units are anticipated to have an average occupancy of 1.18 persons per unit, which translates to 73 beds. Combined, the 602 senior housing units and 73 assisted living beds result in a total unit count of 675 CCRC units as described by ITE. Note that this is slightly higher than the 664 senior care units referred to in the project description due to the distinction in how ITE counts the assisted living units.

ITE trip generation rates for CCRC's were carefully reviewed to ensure that the resulting trip projections are conservative, capturing the anticipated worst-case traffic levels. First, ITE rates based on the number of "occupied units" were applied, capturing the impacts associated with a development where all units and beds are 100 percent full. Second, for some land use categories including CCRC's, ITE provides both the average trip generation rates as well as fitted-curve formula-based rates that vary according to the number of units. Depending on the size of the project, sometimes the average rate will result in a higher projection of trips while other times the formula-based rate will result in higher projections. In the case of the proposed project, the formula-based rates result in higher estimates of trips than the average rates and were therefore conservatively chosen for use in the analysis.

With respect to the 12 proposed onsite employee housing units, ITE rates for the "Apartment" land use (land use #220) were applied. No deductions were taken to account for the internal commute trips made by employees living and working onsite, though such trips would be expected to have a beneficial effect on trips generated.

As shown in Table 12, the proposed project is expected to generate 1,822 trips per weekday including 115 during the a.m. peak hour and 154 during the p.m. peak hour, and 1,783 trips on Saturdays including 205 during the midday peak hour.



Source: First Carbon Solutions 7/17

sro408.ai 10/17

Traffic Impact Study for the Elnoka CCRC Project

Figure 5 – Site Plan

Table 12 – Trip Generation Summary											
Land Use	**Units**	**Weekday**						**Saturday**			
		Daily		**AM Peak**		**PM Peak**		**Daily**		**Midday Peak**	
		Rate	**Trips**	**Rate**	**Trips (In:Out)**	**Rate**	**Trips (In:Out)**	**Rate**	**Trips**	**Rate**	**Trips (In:Out)**
CCRC	675 occ. units	2.58	1,742	0.16	109 (71:38)	0.22	147 (59:88)	2.53	1,706	0.30	199 (108:91)
Employee Apartments	12 du	6.65	80	0.51	6 (1:5)	0.62	7 (5:2)	6.39	77	0.52	6 (3:3)
TOTAL			**1,822**		**115 (72:43)**		**154 (64:90)**		**1,783**		**205 (111:94)**

Note: occ. units = occupied units; du = dwelling unit

Trip Distribution

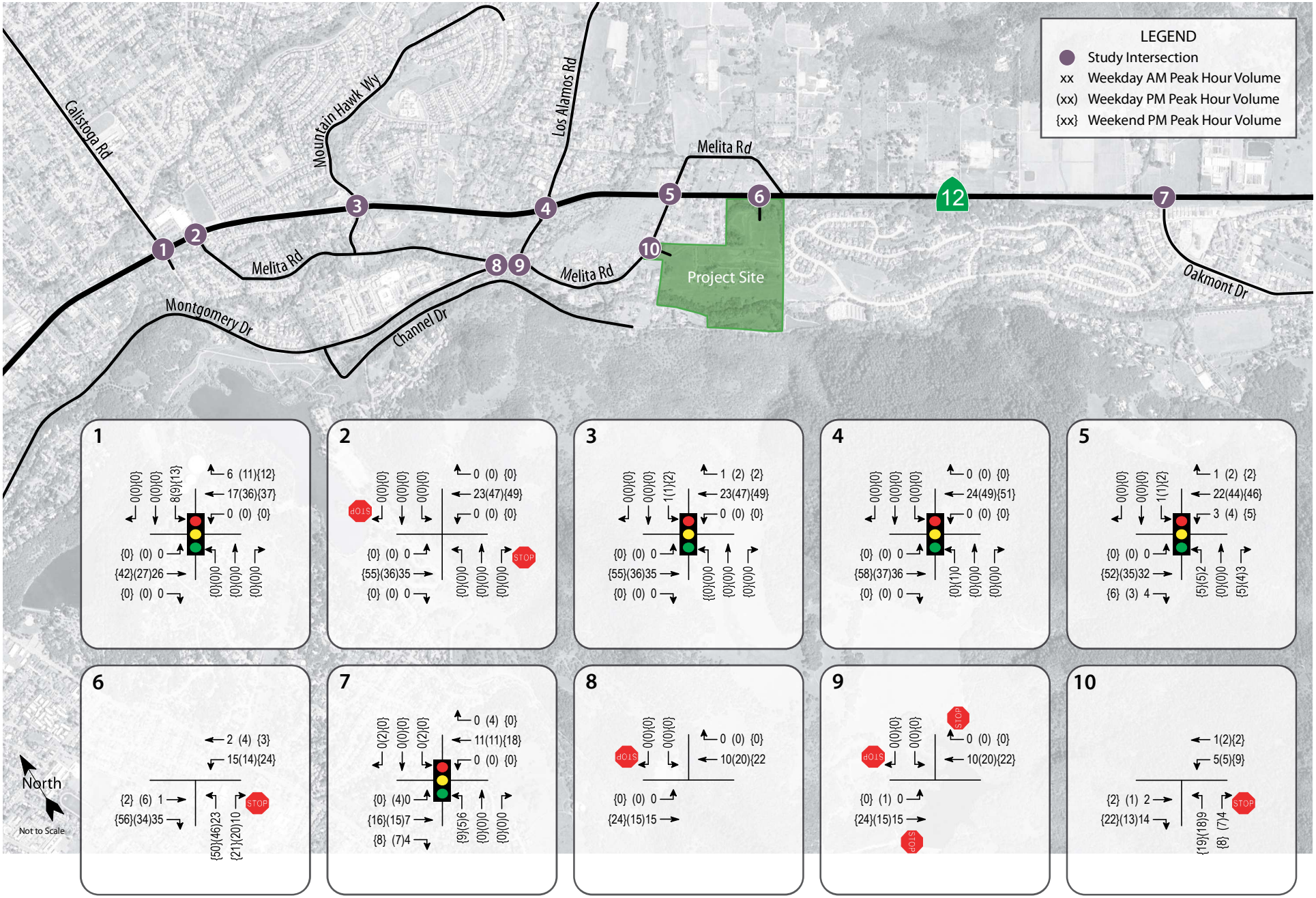
The pattern used to allocate new project trips to the street network was determined by reviewing traffic patterns at the study intersections as well as at the two intersections serving the adjacent Oakmont senior community, census data, testing of predicted travel times along various travel routes using online mapping services, and knowledge of the study area. The proximity of nearby shopping and services was also considered, including those in Oakmont, a store and gas station on Melita Road, a small retail complex on Mountain Hawk Drive, and the Safeway grocery store in the St. Francis center near Calistoga Road. Based on this data, the trip distribution assumptions shown in Table 13 were developed, then confirmed with City staff and applied.

Table 13 – Trip Distribution Assumptions	
Route	**Distribution Percent**
To/From SR 12 west of Calistoga Rd	38%
To/From Montgomery Dr west of Melita Rd	22%
To/From SR 12 east of Oakmont Dr	16%
To/From Calistoga Rd north of SR 12	12%
To/From Oakmont Dr south of SR 12	8%
To/From Melita Rd north of SR 12	2%
To/From Mountain Hawk Dr north of SR 12	2%
TOTAL	**100%**

Traffic Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to operate acceptably, with the exception of the project access on Sonoma Highway. The project access intersection is projected to encounter LOS F delays on the northbound approach during the a.m. and p.m. peak hours. Project traffic volumes are shown in Figure 6. These results are summarized in Table 14.



sro408.ai 10/17

Traffic Impact Study for the Elnoka CCRC Project

Figure 6 – Project Traffic Volumes

Table 14 – Existing and Existing plus Project Peak Hour Intersection Levels of Service							
Study Intersection ***Approach***		**Existing Conditions**			**Existing plus Project**		
		AM Peak	**PM Peak**	**MD Peak**	**AM Peak**	**PM Peak**	**MD Peak**
1.	Sonoma Hwy/Calistoga Rd	43.6/D	37.1/D	26.4/C	47.1/D	41.4/D	28.1/C
2.	Sonoma Hwy/Melita Rd (west)	0.1/A	0.2/A	0.2/A	0.1/A	0.2/A	0.2/A
	Northbound (Melita Rd) Approach	*12.0/B*	*13.2/B*	*12.4/B*	*12.2/B*	*13.4/B*	*12.7/B*
3.	Sonoma Hwy/Mountain Hawk Dr	14.2/B	13.5/B	12.6/B	14.3/B	13.9/B	12.8/B
4.	Sonoma Hwy/Los Alamos Rd	14.0/B	14.8/B	12.3/B	14.1/B	15.0/B	12.5/B
5.	Sonoma Hwy/Melita Rd (east)	16.4/B	25.7/C	18.4/B	17.5/B	30.5/C	20.5/C
6.	Sonoma Hwy/Project Access	-	-	-	1.0/A	3.2/A	1.3/A
	Northbound (Project) Approach	-	-	-	***51.0/F***[1]	***102.8/F***[1]	*33.3/D*
	Mitigation A: signalize	-	-	-	6.2/A	8.0/A	8.3/A
7.	Sonoma Hwy/Oakmont Dr	18.1/B	32.2/C	20.7/C	18.9/B	34.5/C	22.7/C
8.	Melita Rd/Montgomery Dr	1.5/A	1.0/A	0.5/A	1.5/A	1.0/A	0.5/A
	Southbound (Melita Rd) Approach	*11.2/B*	*11.0/B*	*12.5/B*	*11.4/B*	*11.2/B*	*13.1/B*
9.	Melita Rd/Los Alamos Rd	9.9/A	11.2/B	10.3/B	10.2/B	11.7/B	10.7/B
10.	Melita Rd/Project Access	-	-	-	0.8/A	1.0/A	1.3/A
	Westbound (Project) Approach	-	-	-	*9.6/A*	*10.1/B*	*10.1/B*

Notes: Results are shown as Delay/LOS; 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; Shaded cells = conditions with recommended improvements; [1]Signal warrant met so operation considered deficient

A signal warrant analysis was completed to determine if a traffic signal would be an appropriate mitigation at the Sonoma Highway/Project Access intersection. It was determined that Warrant 2 from the *California Manual on Uniform Traffic Control Devices* (CA-MUTCD), the Four-Hour Vehicular Volume Warrant, would be met under Existing plus Project Conditions. It is therefore recommended that the applicant be responsible for installing a signal at the intersection, including obtaining all necessary approvals from Caltrans. The City of Santa Rosa has received feedback from Caltrans that this is a viable mitigation since signal warrants are met.

Under Existing plus Project volumes, the Sonoma Highway roadway segment is expected to operate acceptably at LOS D or better under all analyzed peak hours. These results are summarized in Table 15.

Table 15 – Existing and Existing plus Project Roadway Segment Levels of Service on Sonoma Highway						
Direction	**AM Peak**		**PM Peak**		**Saturday Midday Peak**	
	Existing	**Existing +Project**	**Existing**	**Existing +Project**	**Existing**	**Existing +Project**
Eastbound	38/69% B	37/67% B	37/67% B	35/64% C	37/67% B	35/64% C
Westbound	33/60% C	31/53% C	29/53% C	27/49% D	36/65% C	33/60% C

Notes: Results are shown as Speed/%FFS/LOS; Speed is measured in miles per hour; %FFS=percent of free-flow speed; LOS = Level of Service

Finding – The study intersections are expected to operate acceptably under Existing plus Project conditions, except for the project access on Sonoma Highway which would encounter LOS F operation during the a.m. and p.m. peak hours.

Finding – The Sonoma Highway roadway segment is expected to continue operating acceptably under Existing plus Project conditions.

Mitigation A – The project applicant should be responsible for installing a traffic signal at the project access on Sonoma Highway, including obtaining all necessary approvals from Caltrans.

Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, seven of the ten study intersections are expected to operate acceptably. The intersection at Sonoma Highway/Calistoga Road is projected to operate at LOS E, with a 7.4-second increase in average delay attributable to the project. As in Existing Conditions, the project access intersection on Sonoma Highway is projected to operate at LOS F on the northbound approach during the a.m. and p.m. peak hours and LOS E during the Saturday midday peak hour. The intersection at Sonoma Highway/Oakmont Drive is projected to continue operating unacceptably at LOS E during the p.m. peak hour, though the 4.6-second increase in delay attributable to the project is less than 5.0 seconds so would not be considered significant. These results are summarized in Table 16.

Table 16 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service

	Study Intersection *Approach*	**Baseline Conditions**			**Baseline plus Project**		
		AM Peak	**PM Peak**	**MD Peak**	**AM Peak**	**PM Peak**	**MD Peak**
1.	Sonoma Hwy/Calistoga Rd	49.1/D	52.0/D	37.1/D	52.9/D	**59.4/E**	42.9/D
	Mitigation B: optimize signal timing	-	-	-	40.0/D	47.9/D	36.5/D
2.	Sonoma Hwy/Melita Rd (west)	0.1/A	0.2/A	0.2/A	0.1/A	0.2/A	0.2/A
	Northbound (Melita Rd) Approach	*12.3/B*	*13.6/B*	*13.0/B*	*12.5/B*	*15.4/C*	*13.4/B*
3.	Sonoma Hwy/Mountain Hawk Dr	14.3/B	14.5/B	13.6/B	14.4/B	15.0/B	13.9/B
4.	Sonoma Hwy/Los Alamos Rd	14.3/B	15.5/B	13.1/B	14.4/B	15.7/B	13.2/B
5.	Sonoma Hwy/Melita Rd (east)	18.0/B	38.1/D	21.9/C	19.4/B	44.9/D	25.2/C
6.	Sonoma Hwy/Project Access	-	-	-	1.0/A	3.8/A	1.4/A
	Northbound (Project) Approach	-	-	-	***56.1/F***[1]	***131.1/F***[1]	***39.0/E***[1]
	Mitigation A: signalize	-	-	-	6.7/A	9.5/A	9.5/A
7.	Sonoma Hwy/Oakmont Dr	33.9/C	**68.7/E**	42.0/D	35.9/D	**73.3/E**	46.2/D
8.	Melita Rd/Montgomery Dr	1.5/A	1.1/A	0.9/A	1.5/A	1.1/A	0.9/A
	Southbound (Melita Rd) Approach	*11.3/B*	*11.2/B*	*12.0/B*	*11.4/B*	*11.4/B*	*12.5/B*
9.	Melita Rd/Los Alamos Rd	10.1/B	11.5/B	10.4/B	10.3/B	11.9/B	10.9/B
10.	Melita Rd/Project Access	-	-	-	0.8/A	1.0/A	1.2/A
	Westbound (Project) Approach	-	-	-	*9.6/A*	*10.2/B*	*10.2/B*

Notes: Results are shown as Delay/LOS; 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; Shaded cells = conditions with recommended improvements; 1Signal warrant met so operation considered deficient

As with Existing plus Project conditions, a traffic signal would be warranted at the project access on Sonoma Highway, and should be fully funded by the project applicant. At Sonoma Highway/Calistoga Road, traffic volumes associated with the project and other near-term development would alter traffic patterns enough that the signal timing should be analyzed and re-optimized in order to improve operation. The project impact to delay at the intersection would be considered significant as it exceeds five seconds, so the project applicant should be responsible for funding the signal optimizing evaluation and implementation. The optimization should take place once the project begins generating traffic (at which time other approved projects will also likely be generating traffic). While this mitigation would require consultation with and approval from Caltrans, it is routine in nature and typical of changes made to signal timing in response to changes in traffic flow over time, so is considered to be achievable. With improved timing, operation is anticipated to improve to LOS D during all peak periods, offsetting the additional delay created by the project and reducing the project's impact to a level of less than significant.

Upon the addition of project-related traffic to Baseline volumes, the Sonoma Highway roadway segment is expected to operate acceptably at LOS D or better. The results are summarized in Table 17.

Table 17 – Baseline and Baseline plus Project Roadway Segment Levels of Service on Sonoma Highway

Direction	AM Peak		PM Peak		Saturday Midday Peak	
	Baseline	Baseline +Project	Baseline	Baseline +Project	Baseline	Baseline +Project
Eastbound	37/67% B	36/65% C	33/60% C	33/60% C	36/65%/C	33/60% C
Westbound	31/56% C	31/56% C	25/45% D	23/42% D	32/58%/C	29/53% C

Notes: Results are shown as Speed/%FFS/LOS; Speed is measured in miles per hour; %FFS=percent of free-flow speed; LOS = Level of Service

Finding – The study intersections on Sonoma Highway at Calistoga Road and Oakmont Drive are expected to operate unacceptably under Baseline plus Project conditions, though the increase in average vehicle delay attributable to the project would exceed five seconds and be considered significant only at the Calistoga Road intersection.

Finding – The project access intersection on Sonoma Highway is projected to operate unacceptably with LOS E or F delays on the northbound approach.

Finding – The Sonoma Highway roadway segment is expected to continue operating acceptably under Baseline plus Project conditions.

Mitigation B – The applicant should be responsible for updating and optimizing the signal timing at Sonoma Highway/Calistoga Road, including obtaining all necessary approvals from Caltrans. The optimization should be implemented once residents begin occupying the project site and generating traffic.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, six of the ten study intersections are expected to operate acceptably. The intersection at Sonoma Highway/Calistoga Road is projected to operate unacceptably at LOS E or F during all three peak hours, with increases in delay attributable to the project of 4.0 to 7.8 seconds. The signalized intersection at Sonoma Highway/Melita Road (east) is projected to continue operating unacceptably at LOS E during the p.m. peak hour, with an increase in delay of 10.1 seconds attributable to the project. The project access intersection on Sonoma Highway would operate with delays indicative of LOS F conditions on the northbound approach during all three peak periods. The intersection at Sonoma Highway/Oakmont Drive is expected to continue operating unacceptably at LOS E during the a.m. peak hour and

LOS F during the p.m. peak hour, with the increase in delay attributable to the project being 5.8 seconds during the p.m. peak hour, which is considered significant. These results are summarized in Table 18.

Table 18 – Future and Future plus Project Peak Hour Intersection Levels of Service

	Study Intersection *Approach*	Future Conditions			Future plus Project		
		AM Peak	PM Peak	MD Peak	AM Peak	PM Peak	MD Peak
1.	Sonoma Hwy/Calistoga Rd	**81.0/F**	**69.0/E**	48.7/D	**85.0/F**	**76.8/E**	**56.5/E**
	Mitigation D: add 100-ft west-bound right-turn lane with overlap	-	-	-	45.6/D	43.8/D	34.5/C
2.	Sonoma Hwy/Melita Rd (west)	0.3/A	0.3/A	0.2/A	0.3/A	0.3/A	0.2/A
	Northbound (Melita Rd) Approach	13.0/B	14.7/B	13.7/B	13.2/B	15.0/C	14.1/B
3.	Sonoma Hwy/Mountain Hawk Dr	15.7/B	15.7/B	14.5/B	15.8/B	16.3/B	15.0/B
4.	Sonoma Hwy/Los Alamos Rd	30.6/C	17.1/B	14.1/B	32.0/C	17.4/B	14.4/B
5.	Sonoma Hwy/Melita Rd (east)	34.6/C	**57.3/E**	27.2/C	40.9/D	**67.4/E**	33.4/C
	Mitigation C (infeasible): widen highway to 2 lanes each direction	-	-	-	13.7/B	14.9/B	14.1/B
	Mitigation E: add second WB thru lane (approx. 400 ft long) and 50 ft NB right-turn pocket	-	-	-	26.4/C	26.0/C	22.2/C
6.	Sonoma Hwy/Project Access	-	-	-	1.2/A	4.4/A	2.2/A
	Northbound (Project) Approach	-	-	-	***74.8/F[1]***	***166.6/F[1]***	***70.3/F[1]***
	Mitigation A: signalize	-	-	-	8.3/A	11.8/B	13.2/B
7.	Sonoma Hwy/Oakmont Dr	**72.9/E**	**103.0/F**	44.5/D	**77.0/E**	**108.8/F**	49.3/D
	Mitigation C (infeasible): widen highway to 2 lanes each direction	-	-	-	23.2/C	27.3/C	24.2/C
	Mitigation F: add EB right-turn overlap and move pedestrian crossing from west leg to east leg	-	-	-	**56.5/E**	**78.9/E**	42.0/D
8.	Melita Rd/Montgomery Dr	1.7/A	1.1/A	0.9/A	1.7/A	1.1/A	0.9/A
	Southbound (Melita Rd) Approach	*12.2/B*	*11.6/B*	*12.8/B*	*12.3/B*	*11.7/B*	*13.3/B*
9.	Melita Rd/Los Alamos Rd	11.0/B	12.7/B	11.2/B	11.2/B	13.5/B	11.9/B
10.	Melita Rd/Project Access	-	-	-	0.5/A	0.8/A	1.0/A
	Westbound (Project) Approach	-	-	-	*10.5/B*	*11.0/B*	*11.1/B*

Notes: Results are shown as Delay/LOS; 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; Shaded cells = conditions with recommended improvements; [1]Signal warrant met so operation considered deficient; EB=Eastbound; WB=Westbound; NB=Northbound

A traffic signal would continue to be warranted at the project access on Sonoma Highway. At Sonoma Highway/Calistoga Road, additional measures will need to be taken to achieve LOS D operation in the future both without and with the project. The addition of a 100-foot long westbound right-turn lane with an overlap signal phase would result in acceptable operation. Because the project impact to delay at the intersection exceeds five

seconds and would be considered significant, the project applicant should contribute a proportional share of the cost to construct the right-turn lane and right-turn overlap signal phase. With the mitigation, future operation is anticipated to improve to LOS D during the a.m. and p.m. peak periods, and LOS C during the Saturday midday peak period, offsetting the additional delay created by the project and reducing the project's impact to a level of less than significant. The City of Santa Rosa intends to add this project to the Capital Improvement Program (CIP), serving as lead agency and coordinating with Caltrans to ensure its future implementation. This allows the City to collect a proportional share of the cost from the Elnoka applicant as well as other future development projects, using the proceeds to help fund the design, construction, and implementation of the improvements.

The Sonoma Highway/Melita Road (east) signalized intersection is projected to operate unacceptably at LOS E in the future both without and with the project. The approximately 10-second increase in average intersection delay associated with the project would be considered a significant impact. Operation could be improved to an acceptable LOS B by widening Sonoma Highway to include two through lanes in each direction, as envisioned in the City of Santa Rosa General Plan. The General Plan indicates that the highway should ultimately be widened between the signal at Melita Road and Pythian Road (east of Oakmont Drive). For the purposes of this report, this highway widening is referred to as Mitigation C. However, because of the complexity and cost of the widening project and its lack of identified funding, it is very unlikely to be implemented within the timeframe of the Future Conditions analyses presented in this report. As a result, the widening is considered infeasible.

In order to reduce the project's impact to a level of less than significant at Sonoma Highway/Melita Road (east), an alternative intersection-focused mitigation would be to widen westbound Sonoma Highway in advance of the signalized intersection by at least 400 feet to provide a second westbound through lane, and add a 50-foot right-turn pocket on the northbound approach. This mitigation option is referred to herein as Mitigation E. Regarding the dual westbound through lanes, the highway already includes dual westbound receiving lanes on the opposite (west) side of the intersection and would require no further widening on that side of the intersection. Note that this mitigation is needed not only to improve intersection operation, but to improve operation on the Sonoma Highway corridor as discussed below. With provision of this alternative mitigation, the signal would operate more efficiently, and acceptable LOS C operation would be expected during all three analyzed peak hours, reducing the project's impact to a level of less–than-significant.

At the Sonoma Highway/Oakmont Drive intersection, operation could be improved by widening Sonoma Highway to include two through lanes in each direction as envisioned in the City of Santa Rosa General Plan (Mitigation C). However, as noted above, this option lacks funding and is very unlikely to be implemented within the timeframe of the Future Conditions analyses presented in this report, so is therefore considered to be infeasible.

An alternative mitigation that would offset the project's added delay at the Sonoma Highway/Oakmont Drive intersection under Future Conditions is referred to herein as Mitigation F, and includes adding an eastbound right-turn overlap signal phase and relocating the Sonoma Highway pedestrian crossing from the west side of the intersection to the east side of the intersection. With these modifications, the intersection would be expected to operate acceptably during the Saturday midday peak hour but would still operate unacceptably at LOS E during the a.m. and p.m. peak hours (albeit much improved from "no project" conditions). Because the project would increase delay by more than five seconds without mitigation, its impact would be considered significant, and the project applicant should be responsible for funding the intersection modifications. The resulting operation would be better than the "no project" condition and effectively reduce the project's impact to a level of less than significant. The City of Santa Rosa has received feedback from Caltrans that this appears to be a viable mitigation, so it is considered to be implementable.

With project-generated traffic added to the anticipated Future volumes, the Sonoma Highway roadway segment is projected to operate unacceptably at LOS E in the westbound direction during the a.m. and p.m. peak hours. The change in average corridor speed attributable to the project would be one mile per hour during both affected peaks. The Future plus Project operating conditions are summarized in Table 19.

Table 19 – Future and Future plus Project Roadway Segment Levels of Service on Sonoma Highway						
Intersection	**AM Peak**		**PM Peak**		**Saturday Midday Peak**	
	Future	**Future +Project**	**Future**	**Future +Project**	**Future**	**Future +Project**
Eastbound	31/56% C	29/53% C	28/51% C	28/51% C	33/60% C	32/58% C
Westbound	23/42% D	**22/40% E**	**22/40% E**	**21/38% E**	26/47% D	26/47% D
Mitigation C (Widened Highway)						
Eastbound	-	38/69% B	-	36/65% C	-	38/69% B
Westbound	-	32/58% C	-	33/60% C	-	35/64% C
Intersection Mitigations Only (A, B, D, E, and F)						
Eastbound	-	31/56% C	-	28/51% C	-	30/55% C
Westbound	-	31/56% C	-	27/49% D	-	33/60% C

Notes: Results are shown as Speed/%FFS/LOS; Speed is measured in miles per hour; %FFS=percent of free-flow speed; LOS = Level of Service; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements

The level of service along the Sonoma Highway roadway segment would be expected to be LOS C or better if the highway were widened in the future to include two through lanes in each direction to Pythian Road, per the City's General Plan. If only the intersection-related improvements identified in the Future plus Project intersection analysis are completed, however, operation would still be expected to be an acceptable LOS D or better. Therefore, as long as the intersection mitigations are either constructed by the project applicant, or in the case of Mitigation D (at Calistoga Road) and Mitigation E (at Melita Road east) the applicant pays a proportionate share of the mitigation costs, the project's resulting impacts to the Sonoma Highway roadway segment would be less than significant.

Finding – The signalized study intersections on Sonoma Highway at Calistoga Road, Melita Road (east), and Oakmont Drive are expected to operate unacceptably under Future plus Project conditions, with the increases in average vehicle delay attributable to the project exceeding five seconds at all three locations.

Finding – The project access intersection on Sonoma Highway is projected to operate unacceptably with LOS F delays on the northbound approach under Future plus Project conditions.

Finding – The Sonoma Highway roadway segment is expected to operate unacceptably at LOS E in the westbound direction under Future plus Project conditions.

Finding – The LOS E and LOS F operation occurring in the future at Sonoma Highway/Melita Road (east), Sonoma Highway/Oakmont Drive, and the Sonoma Highway roadway segment could be mitigated by widening the highway to two through lanes in each direction between the Melita Road signal and Pythian Road as envisioned in the City's General Plan; this mitigation is, however, considered infeasible and alternative mitigation measures should be completed by the project to offset its traffic impacts.

Mitigation D – The applicant should be responsible for contributing a proportionate share of the costs associated with constructing a 100-foot long westbound right-turn lane with right-turn overlap signal phase at the Sonoma Highway/Calistoga Road intersection.

Mitigation E – The applicant should be responsible for contributing a proportionate share of the costs associated with widening the westbound approach at the Sonoma Highway/Melita Road (east) signalized intersection to include a minimum 400-foot long second through lane and 50-foot long northbound right-turn pocket.

Mitigation F – The applicant should be responsible for modifying the signal at Sonoma Highway/Oakmont Drive to add an eastbound right-turn overlap phase and moving the Sonoma Highway pedestrian crossing from the west to the east intersection leg, including obtaining all necessary approvals from Caltrans.

Information related to the establishment of appropriate proportional-share fees at the Calistoga Road and Melita Road (east) intersections is contained in Appendix E.

It should also be noted that Caltrans requires the preparation of an "Intersection Control Evaluation" (ICE) for any intersection on the State highway system where new traffic controls are proposed or substantial alteration is proposed. For the Elnoka CCRC Project, this includes the intersections at Sonoma Highway/Calistoga Road, Sonoma Highway/Melita Road (east), and Sonoma Highway/Project Access. The draft ICE report submitted to Caltrans is provided in Appendix F.

Traffic Signal Warrants

A signal warrant analysis was performed to determine the potential need for a traffic signal at the project access on Sonoma Highway.

Chapter 4C of the *California Manual on Uniform Traffic Control Devices* (CA-MUTCD) provides guidance on when a traffic signal should be considered. There are nine different warrants, or criteria, presented, as follows:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour Volume
- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a Grade Crossing

Warrant 1 bases the need for a traffic control signal if an engineering study finds that one of the following conditions exist for each of any eight hours of an average day:

- The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
- The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.
- In applying each condition, the major-street and minor-street volumes shall be for the same eight hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these eight hours.

Traffic volumes over a 24-hour period were obtained on Sonoma Highway at the project intersection. There are currently no volumes on the project leg of the intersection since the site is vacant. Once the project begins generating traffic, a minimum of 53 vehicles per hour entering the intersection from the minor approach would need to occur for at least eight hours of the day in order to meet Warrant 1. The amount of hourly traffic exiting the project at the intersection was estimated by allocating the project's daily trip generation over a 24-hour period, assuming the same 24-hour traffic patterns occurring on Oakmont Drive near Sonoma Highway (which also serves

a senior community), and accounting for the projected split of traffic exiting onto Sonoma Highway via Melita Road. Based on the resulting 24-hour volume projections, the amount of hourly traffic exiting the project is only expected to exceed 53 vehicles per hour during six hours of the day. Because the criteria would not be met for eight hours of the day, this warrant would not be satisfied under Existing plus Project conditions. Since the project volume exiting the site would not change under Baseline or Future conditions, the warrant would also be expected to remain unmet during those timeframes.

Warrant 2 is met when an engineering study finds that, for each of any four hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these four hours.

The same approach as described under the Warrant 1 evaluation was used to assess the hourly volume criteria set forth in Warrant 2. Based on the evaluation, the combinations of traffic volumes on Sonoma Highway and those exiting the project site under Existing plus Project conditions would be met during four hours of the day, including the hours beginning at noon, 2:00 p.m., 3:00 p.m., and 4:00 p.m. Warrant 2 would therefore be met.

Warrant 3 has a notice that this signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time. Under the Peak Hour Warrant the need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

A. If all three of the following conditions exist for the same one hour (any four consecutive 15-minute periods) of an average day:

    1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: four vehicle-hours for a one-lane approach; or five vehicle-hours for a two-lane approach, and

    2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and

    3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Based on the LOS analysis completed for the project, Future plus Project conditions during the p.m. peak hour are anticipated to reflect both the highest potential analyzed volumes and the highest level of delay on the project approach to Sonoma Highway. During this period, a total of 3.1 vehicle-hours of delay are projected to occur, falling short of the 4 vehicle-hours required by Warrant 3. The Category A criteria would therefore be unsatisfied. The plotted data point for the Category B criteria would also be unsatisfied. Because neither Category A nor Category B would be satisfied, Warrant 3 is projected to be unmet under all peak hours and scenarios.

Warrant 4 is the Pedestrian Volume warrant. Given the surrounding land use context of the intersection, it was determined that this warrant would be unmet, so was not quantitatively analyzed.

Warrant 5 is the School Crossing warrant. No schools currently exist or are anticipated to exist near the intersection, so a quantitative analysis of this warrant was not performed.

Warrant 6 is used when consideration is being given to adding a signal within a coordinated system. The signal would not be located within a coordinated signal network, so detailed analysis of this warrant was not performed.

Warrant 7 addresses the collision history of a location. Because the intersection does not currently encounter any side-street traffic, there is no historical collision data or basis for installing a signal to alleviate a demonstrated safety condition, so no further analysis of this warrant was conducted.

Warrant 8 looks at the circulation system. Under this warrant the need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets certain criteria. Because the intersection is the intersection of one major route and a local access street, the location would not qualify for this warrant.

Warrant 9 is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal. Neither of these conditions would exist at the subject intersection, and so this warrant would not apply.

Appendix G provides summary sheets showing the results of the Warrant 1, Warrant 2, and Warrant 3 analyses.

Signal Warrant Summary

Based on analysis of the nine signal warrants it was determined that Warrant 2, the Four-Hour Vehicular Volume warrant, would be met at the project access intersection on Sonoma Highway under Existing, Baseline, and Future conditions. It should also be noted that while the CA-MUTCD does not include signal warrant criteria that consider the driver population, the fact remains that the proposed project will serve a senior community. Research indicates that senior drivers usually have different driving characteristics than the general population, typically including longer perception-reaction times and greater difficulty in discerning acceptable gaps in bidirectional traffic, such as that which would be required when turning onto Sonoma Highway. Given this condition, the satisfaction of Warrant 2, and the LOS F delays projected to occur on the project approach, it is recommended that a traffic signal be installed at the intersection.

Finding – The project's intersection on Sonoma Highway is projected to satisfy Warrant 2 (Four-Hour Vehicular Volume) of the CA-MUTCD for installation of a traffic signal.

Finding – While driver characteristics are not considered in the CA-MUTCD signal warrant criteria, installation of a traffic signal would be expected to result in a safety benefit to the project's senior population.

Finding – As required by Mitigation A, the project applicant should be responsible for installing a traffic signal at the project access intersection on Sonoma Highway.

Queuing

Under each scenario, the projected 95th percentile queues in left-turn pockets at the signalized study intersections were determined using the SIMTRAFFIC application of Synchro and averaging the results of ten simulation runs. Summarized in Table 20 are the predicted 95th percentile queue lengths for all "plus project" scenarios. In several cases where left-turn queues are expected to exceed the available storage, queues in the adjacent lane where spillover would occur are also shown. Where intersection mitigations have been identified in the intersection analysis above, the 95th percentile queues associated with those mitigated conditions are also shown. Copies of

the queuing calculations including results for all intersections and individual turning movements are contained in Appendix H.

Table 20 – 95th Percentile Queues

Study Intersection	Storage	Existing + Project			Baseline + Project			Future + Project		
Movement		AM	PM	WMD	AM	PM	WMD	AM	PM	WMD
1. Sonoma Hwy/Calistoga Rd										
SB left-turn/through	260	221	280	196	216	**327**	249	**273**	**365**	**290**
SB right-turn	730	176	249	160	193	311	174	289	540	296
EB left-turn	345	181	182	175	199	240	193	242	220	227
WB left-turn	150	119	140	**160**	110	150	**169**	117	**160**	**197**
Mitigation G: extend WB left-turn pocket to 175 ft										
SB left-turn/through[1]	260	221	280	196	247	354	292	250	364	278
SB right-turn	730	176	249	160	202	403	272	255	511	270
EB left-turn	345	181	182	175	252	258	226	252	272	247
WB left-turn (extended to 175 ft)	175	119	140	160	86	150	150	58	150	164
3. Sonoma Hwy/Mtn Hawk Dr										
NB left-turn	70	45	32	30	49	39	53	54	42	51
SB left-turn	90	70	47	49	90	53	56	109	55	54
SB through/right-turn	590	136	80	66	143	86	66	159	92	64
EB left-turn	300	69	54	42	65	60	49	91	81	81
WB left-turn	100	14	15	19	13	19	25	44	12	13
4. Sonoma Hwy/Los Alamos Rd										
NB left-turn/through	110	46	65	50	42	68	63	64	66	64
SB left-turn/through	105	80	40	39	88	39	43	89	48	47
EB left-turn	325	44	63	61	43	72	64	47	122	73
WB left-turn	280	151	160	124	145	142	109	182	160	123
5. Sonoma Hwy/Melita Rd (east)										
SB left-turn/through	135	68	93	96	78	90	106	87	82	103
EB left-turn	150	138	**159**	147	134	**156**	**188**	**206**	**209**	**232**
WB left-turn[2]	50	84	119	83	88	109	95	89	106	102
Mitigation H: extend EB left-turn pocket to 200 ft										
SB left-turn/through	135	68	93	96	79	86	123	89	96	100
EB left-turn (extended to 200 ft)	200	138	159	147	189	181	195	173	180	195
WB left-turn[2]	50	84	119	83	89	116	104	78	124	100

Table 20 – 95th Percentile Queues											
Study Intersection		**Storage**	**Existing + Project**			**Baseline + Project**			**Future + Project**		
	Movement		**AM**	**PM**	**WMD**	**AM**	**PM**	**WMD**	**AM**	**PM**	**WMD**
6.	Sonoma Hwy/Project Access										
	WB left-turn	100	33	27	39	29	58	36	27	56	56
7.	Sonoma Hwy/Oakmont Dr										
	NB left-turn/through	300	211	215	209	216	264	278	333[3]	302[3]	296
	EB left-turn	200	17	82	9	55	31	62	166	29	28
	WB left-turn	200	35	119	79	83	138	134	57	152	153
	Mitigation F: add EB right-turn overlap and move Hwy 12 ped crossing to east leg										
	NB left-turn/through	300	-	-	-	-	-	-	336[3]	387[3]	305[3]
	EB left-turn	200	-	-	-	-	-	-	116	22	83
	WB left-turn	200	-	-	-	-	-	-	71	149	135

Notes: 95th percentile queue based on the average of ten SIMTRAFFIC runs; all distances are measured in feet; WMD=Weekend Midday; NB=Northbound; SB=Southbound; EB=Eastbound; WB=Westbound; **Bold** text = queue length exceeds available storage; [1]queues exceeding storage considered acceptable since queue spillover into adjacent right-turn lane is not projected to create adverse conditions; [2] queues exceeding striped left-turn pocket length considered acceptable since they would extend into an existing two-way left-turn lane and not block through traffic; [3] queue not considered an adverse impact since side street (Pine Valley Dr) restricted to right-turns and terminus of Oakmont Drive is just upstream

The 95th percentile left-turn queues are expected to exceed the existing available storage on one or more movements at the following study intersections.

At Sonoma Highway/Calistoga Road, southbound left-turn/through lane queues are projected to exceed storage under Baseline plus Project and Future plus Project conditions. Queue spillover into the adjacent right-turn lane (which is the southbound through lane on Calistoga Road north of the St. Francis Shopping Center) is projected to extend no greater than 540 feet, however, not reaching the next intersection to the north (Marit Drive). Because nearly all southbound traffic on Calistoga Road turns left or right at Sonoma Highway and is therefore moving at relatively low speeds, the projected queuing is not anticipated to create an adverse operational or safety issue. Queues are also projected to exceed the available storage in the westbound left-turn pocket under all scenarios. Given the high through volumes and speeds on westbound Sonoma Highway, queue spillover from the left-turn pocket could create an adverse condition, and it is recommended that the project be responsible for increasing the left-turn lane by one vehicle length (25 feet) in order to provide approximately 175 feet of storage, which is projected to accommodate future 95th percentile queues under all peak hours.

At Sonoma Highway/Melita Road (east), 95th percentile queues in both the eastbound and westbound left-turn pockets are projected to exceed the available storage under Existing plus Project, Baseline plus Project, and Future plus Project conditions during one or more peak hours, creating potentially adverse conditions. It is recommended that the project be responsible for extending the eastbound left-turn lane by two vehicle lengths (50 feet) to provide approximately 200 feet of storage. On the westbound approach, queues would extend into an adjacent two-way left-turn lane when they exceed the striped left-turn pocket length, which is a typical condition during peak hours and would not be considered an adverse effect since through traffic would not be blocked. With the recommended lengthened eastbound turn pocket, future 95th percentile queues are projected to be accommodated during all peak hours.

At Sonoma Highway/Oakmont Drive, northbound 95th percentile queues on Oakmont Drive are projected to extend to the adjacent intersection (Pine Valley Drive) during peak hours under Future plus Project conditions, though this is not considered to be an adverse safety impact since the right turn in/out configuration of Pine Valley Drive limits conflicting movements. Further, since Oakmont Drive terminates just to the north at Highway 12 and drivers are already accustomed to slowing/stopping in this area (prior to turning left or right), driver expectation would not be violated as a result of the queue length.

Finding – Under "plus project" conditions, 95th percentile queues are projected to exceed available storage in one or more turn pockets at the intersections of Sonoma Highway/Calistoga Road, Sonoma Highway/Melita Road (east), and Sonoma Highway/Oakmont Drive.

Finding – The 95th percentile queues in the left-turn/through lane on southbound Calistoga Road at Sonoma Highway would exceed the available storage, though because queue spillover would not cause queues in the adjacent lane to extend to the next intersection, and because nearly all southbound traffic turns at Sonoma Highway and is traveling at relatively low speeds, the queuing is not anticipated to create adverse safety or operational impacts.

Mitigation G – The project should be responsible for increasing the westbound left-turn lane at Sonoma Highway/Calistoga Road by 25 feet in order to provide approximately 175 feet of storage.

Mitigation H – The project should be responsible for extending the eastbound left-turn lane at Sonoma Highway/ Melita Road (east) by 50 feet to provide approximately 200 feet of storage.

Construction Impacts

Construction of the project would require regular deliveries of equipment and materials to the project site, as well as daily trips by construction workers. Given the location of the project site, nearly all construction traffic would be expected to travel via Sonoma Highway. This routing would generally avoid residential streets in the vicinity.

Project construction activities, including the extension of utility infrastructure, may result in some temporary lane closures in the area. The combination of these temporary closures and addition of construction-related traffic may create changes in traffic patterns at nearby intersections. The resulting peak hour traffic volumes during the construction period are likely to be less than those anticipated upon completion of the project. Intersection levels of service are anticipated to remain within acceptable parameters during construction, though depending on the construction staging, a traffic control plan should be implemented to ensure that detours are clearly indicated and traffic flow is maintained. Given the potential level of construction activity that could occur at the project site, this is considered a potentially significant impact.

Finding – Construction traffic associated with the project is anticipated to result in fewer trips than the project itself will generate upon completion, though may entail activities that temporarily disrupt traffic patterns in the area.

Mitigation I – As part of the City's entitlement process, the City should review site development plans to determine whether staging and/or construction activities could disrupt circulation, and if necessary, require the applicants to submit a traffic control plan prior to the commencement of construction. Elements of this plan should identify construction staging areas, designate detour routes, and develop and implement procedures for notifying property owners within a surrounding distance set by the City of activities that will affect traffic in the vicinity of the development.

Vehicle Miles Traveled Analysis

Methodology

The SCTM/15 model maintained by SCTA was used to establish VMT significance thresholds, and a custom run of the SCTA model was used to produce project-specific VMT data. The model estimates the VMT associated with the aggregate land uses in each "traffic analysis zone" (TAZ). The project site is located within TAZ 614 of the SCTA model. An assessment of both the project's VMT per capita and VMT per employee was chosen in accordance with the City's draft VMT guidelines, guidance provided in the OPR Technical Advisory, and criteria applied by Caltrans.

The SCTA model includes a limited number of land use categories. Since a CCRC land use is not available in the model, the proposed Elnoka project was input to the model using the following land use types.

- The 74 senior cottage units and 528 senior apartments were input as senior housing units.
- The 12 employee apartments were input as multifamily residential units.
- The assisted living facility was input as 10,210 square feet of institutional uses based on the factor of 3.33 employees per 1,000 square feet applied in the SCTA model, which is equivalent to the 34 assisted living center employees projected by the Elnoka project applicant to be onsite daily. The institutional land use also generates visitor travel in the SCTA model, capturing VMT associated with visitors of the residents in the assisted living facility.
- Travel associated with the project's employees was also input as institutional square footage using the SCTA model equivalency factor of 3.33 employees per 1,000 square feet. A total of 88 daily employees are anticipated to be onsite working at the project. Excluding the 34 assisted living facility employees whose travel is already accounted for in that use, a total of 54 additional employees on average are projected to be onsite daily, which is equivalent to 16,216 square feet of institutional building space.

It should be noted that a CCRC captures some travel internally, in contrast to that which would be generated by the above list of individual land uses. The total incremental increase in regional VMT associated with the project as calculated in the SCTA model should accordingly be considered conservative. While the effects of CCRC components including onsite dining, onsite recreation and social amenities, and a resident shuttle are not directly accounted for in the modeling of the project's VMT per capita, an informational discussion of these influences is provided at the end of this section.

VMT Analysis

Residential VMT per capita represents the VMT associated with home-based trips divided by the number of residents, while VMT per employee represents the VMT associated with home-based employment trips (commute trips) divided by the number of employees. A project's VMT per capita and VMT per employee are compared to the countywide average per the City of Santa Rosa's VMT guidance. A project would be considered to have a less-than-significant impact if its VMT per capita and VMT per employee are 15 percent or more below the countywide average.

Based on output from a dedicated run of the SCTA travel demand model, the proposed project's residents are anticipated to generate 12,481 daily vehicle miles of travel. Translated to a per capita metric, the project's 975 residents are projected to generate 12.80 VMT per capita. Since this is below the applied significance threshold of 14.05 VMT per capita, the resulting impact would be considered less than significant.

With respect to employee VMT, the proposed project would be the only employment-based use in the TAZ and is projected to produce an average VMT per employee of 11.95 VMT, which multiplied by the 88 total daily employees translates to 1,052 daily vehicle miles of travel. These projections do not, however, account for the project's provision of 12 onsite employee apartments and therefore require adjustment. Each employee living onsite would generate no commute-based VMT and would produce an average of 11.95 fewer daily VMT than if they lived offsite. Conservatively assuming that each employee apartment houses one onsite employee (i.e., there would be no employee apartments with two or more residents working onsite), total employee VMT would be reduced by 143 daily vehicle miles of travel, resulting in an adjusted employee VMT of 909 daily miles and a corresponding performance metric of 10.33 VMT per employee. Since this is below the applied significance threshold of 10.65 VMT per employee, the resulting impact would be considered less than significant.

A summary of the VMT findings is provided in Table 21, and a worksheet showing additional details on the VMT analysis is provided in Appendix I.

Table 21 – Vehicle Miles Traveled Analysis Summary

VMT Metric	Countywide Baseline VMT Rate	Significance Threshold	Project VMT Rate	Resulting Significance
Residential VMT per Capita	16.53	14.05	12.80	Less than significant
Employment VMT per Employee	12.53	10.65	10.33	Less than significant

Note: Residential VMT is measured in home-based VMT per Capita, or the number of daily miles driven per resident; Employment VMT is measured in VMT per Employee, or the number of daily commute-based miles driven per employee; Countywide averages and significance thresholds based on SCTA model version released in September 2020

Finding – The proposed project is anticipated to generate VMT per capita and VMT per employee performance measures that are more than 15 percent below Countywide averages and would thereby result in a less-than-significant VMT impact.

Potential for Additional Reductions in Residential VMT

As noted above, the VMT modeling completed for the project uses the "senior housing" land use in the SCTM\15 travel demand model. As a continuing care retirement community, the proposed project does, however, contain components that will help to further reduce VMT compared to conventional senior housing. The project would provide onsite dining services as well as onsite recreational and social activities, reducing both the need and frequency of offsite resident travel. The project would also provide a shuttle service for residents to complete errands including medical appointments and shopping, further reducing the need and frequency of residents driving their own vehicles compared to a conventional senior housing use. While the applied residential VMT analysis conservatively does not include deductions to account for these specific CCRC characteristics, the following estimates of potential reductions are provided for informational purposes.

The 2017 *National Household Travel Survey* (NHTS) conducted by the Federal Highway Administration (FHWA) was used to estimate the portion of daily travel that is attributable to meals, social/recreational functions, medical/dental services, and shopping/errands. Database query tools provided on the NHTS website (https://nhts.ornl.gov/) were used to filter typical trip purpose types for home-based trips made by persons that are age 55 or older. Following is an estimation of the additional VMT reductions associated with these CCRC characteristics.

Onsite Dining - NHTS data indicates that approximately 10 percent of daily trips are related to traveling for meals. Conservatively assuming that the provision of onsite dining services would reduce Elnoka resident travel for meals by half, the projected residential VMT would be reduced by 624 miles per day.

Social and Recreational – For persons of age 55 or older, the NHTS data indicates that approximately 18 percent of daily travel is related to social and recreational functions. Given that the proposed CCRC would include recreational facilities and support social activities onsite, and assuming that offsite social/recreational auto travel would be reduced by half, the projected residential VMT would be reduced by 1,123 miles per day.

Shuttle Service – The proposed project would operate a shuttle that could be used by residents for trips to appointments and shopping. The NHTS data indicates that five percent of daily travel is typically related to medical/dental appointments with 31 percent related to shopping and errands. Because there is some level of inconvenience and added time in using a shared shuttle, it is assumed that only 20 percent of the medical/dental/shopping trips made by Elnoka residents would be made via the shuttle. The resulting projected reduction in residential VMT is 899 miles per day.

Combined, the above CCRC characteristics may effectively reduce the project's residential VMT from 12,481 daily vehicle miles of travel to 9,835 daily vehicle miles of travel, which translates to 10.09 VMT per capita. This is approximately 21 percent lower than the VMT per capita projected by the SCTA model using a conventional senior housing land use, and as applied in the VMT analysis for the purposes of determining significance.

Alternative Modes

Pedestrian and Bicycle Facilities

The project site is approximately 68 acres in size and would be developed with a network of onsite roadways with sidewalks that would accommodate those walking or biking between their residences and onsite services, as well as walking or biking for exercise and recreation. Sidewalk connections to Sonoma Highway and Melita Road, including to a new bus stop at the project intersection on Sonoma Highway, would be provided along the project's roadways.

The area surrounding the project site is generally rural in nature, primarily composed of a mix of rural residential and passive agricultural land. There are no schools in the vicinity of the project site, and few school-aged children are anticipated to live within the Elnoka CCRC development. Other than a gas station at Melita Road (east), the nearest retail and service opportunities for project residents would be in the Oakmont retirement community development approximately 1.5 miles to the east, which is expected to be beyond the comfortable walking distance for project residents. The project would also include a shuttle service to transport residents to shopping, services, and appointments, reducing reliance on not only private auto use but also the need for non-drivers to walk or bicycle lengthy distances.

In the future, the planned Sonoma Valley Trail will traverse a portion of the project site, creating a walking and biking facility that project residents and employees can use while also serving regional walking and biking users. The project site plan depicts a bike trail along its Sonoma Highway frontage, generally conforming to the "alternate" alignment depicted in the *Sonoma Valley Trail Feasibility Study*, 2016. The dimensions of the trail are unclear, though to be consistent with the trail feasibility study, the paved width of the trail should be 12 feet with a minimum five-foot buffer from Sonoma Highway.

With respect to the project's Melita Road frontage, there are generally no existing sidewalks along the street in the vicinity. Melita Road is also identified in the City's General Plan as a "Scenic Road" on which the scenic and rural character of the roadway is to be preserved. General Plan Policy T-G-9 also indicates that curbs and gutters (which would typically be constructed with sidewalks) should generally be avoided on designated scenic roads. Given the scenic roads designation and lack of anticipated pedestrian demand generated on Melita Road as a result of the project, the lack of sidewalk on the project frontage is considered acceptable.

Existing and planned bicycle facilities depicted in the City's *Bicycle & Pedestrian Master Plan Update 2018* include future bicycle lanes on Sonoma Highway. Sonoma Highway currently includes 8-foot shoulders in the vicinity of the project site and along the project frontage that could be converted to bike lanes as part of a larger-scale bike lane project. The project would not preclude implementation of these future bike lanes, and the combination of existing and planned bike facilities in the vicinity of the project (including the Sonoma Valley Trail) would be expected to provide adequate access for bicyclists.

The *Bicycle & Pedestrian Master Plan* Update 2018 also includes a "study" walking and bicycling path through the project site, referred to as the Channel Trail, connecting Sonoma Highway to Channel Drive and Annadel State Park. The *Bicycle & Pedestrian Master Plan* notes that "study" segments are those locations that need further study to determine the feasibility of bicycling or walking facilities, or that reflect a preferred facility that has been identified but needs further study or outreach to develop a detailed design. The Elnoka project as proposed includes no publicly-accessible trail or pathway connections through the site.

In order to determine the viability of a path linkage between Sonoma Highway and Channel Drive, the City of Santa Rosa required the project applicant to fund the preparation of a feasibility study. The resulting *Trail Feasibility Study – Proposed Elnoka CCRC Project*, Questa, 2020, was prepared for the City of Santa Rosa, and is

contained in Appendix J. The study found that a pathway connection through the Elnoka site consistent with the Channel Trail as shown in *the Bicycle & Pedestrian Master Plan* would be feasible to construct, though would require modification of the current site plan's layout and dedication of easements.

With respect to assessing compliance with adopted multimodal circulation plans, the proposed project funded the preparation of a trail feasibility study, consistent with the "study" segment designation for the Channel Trail as shown in the City's *Bicycle & Pedestrian Master Plan*. As such, the project has effectively satisfied its obligation to help the City advance the vision outlined in the bike plan.

Finding – Pedestrian and roadway facilities within the 68-acre project site would effectively accommodate walking and bicycling trips made by project residents, employees, and visitors.

Finding – The project would construct a portion of the Sonoma Valley Trail along its Sonoma Highway frontage, helping to implement the regional trail facility in the future; it is unclear, however, if the dimensions of the trail meet those established in the trail's feasibility study.

Finding – The project would generally provide effective connections to the existing and planned bicycle facilities depicted in the City's *Bicycle & Pedestrian Master Plan* and to the Sonoma Valley Trail, but would not accommodate a planned pathway segment referred to as the Channel Trail through the project site between Sonoma Highway and Channel Drive.

Finding – By funding the preparation of a feasibility study for the Channel Trail, the project has effectively achieved consistency with the *Bicycle & Pedestrian Master Plan*, which depicts a "study" designation on the Channel Trail.

Mitigation J – The applicant should be responsible for constructing a segment of the Sonoma Valley Trail along the project's Sonoma Highway frontage, consistent with the dimensions and standards set forth by Sonoma County Regional Parks in the *Sonoma Valley Trail Feasibility Study*.

Transit

The project would include provision of a dedicated shuttle service for project residents, reducing reliance on public transportation or travel by private automobile. Some project residents would still be expected to use the Sonoma County Transit routes that run along Sonoma Highway, however, as would some employees and visitors. The project site plans show a new bus pullout at the project's Sonoma Highway intersection, which would serve eastbound buses. The bus stop serving westbound routes is on the opposite side of the highway, approximately 220 feet east of the project site. Pedestrians attempting to cross Sonoma Highway to access the westbound bus stop currently have no marked facilities or safety accommodations, though with implementation of a new traffic signal at the project access (described in Mitigation A), the stop could be more safely accessed. Once the signal is installed, the existing westbound bus stop should be relocated adjacent to the signal in order to improve pedestrian accessibility to transit. The configuration and amenities provided at both the eastbound and westbound bus stops should be specified by Sonoma County Transit.

Finding – In addition to the private shuttle service to be provided by the project, Sonoma County Transit facilities serving the project site are expected to adequately accommodate project residents, employees, and visitors.

Finding – The project would construct a new bus pullout and have adequate connections to eastbound transit routes, but no facilities currently exist for pedestrians to cross Sonoma Highway to reach westbound routes. Access would be improved upon installation of a signal at the project access (Mitigation A).

Mitigation K – The applicant should be responsible for relocating the existing westbound bus stop near the project site to be adjacent to the new traffic signal required by Mitigation A, and configuring both the eastbound and westbound bus stops in accordance with criteria established by Sonoma County Transit.

Access and Circulation

Site Access

The proposed project will be primarily accessed via an existing driveway on Sonoma Highway. A secondary access point will be provided via a new driveway on Melita Road.

Sonoma Highway Frontage

As indicated above, the City's General Plan identifies future widening of Sonoma Highway to include two through lanes in each direction between the Melita Road signal and Pythian Road. The project frontage comprises one portion of this segment. It is unclear from the project's site and development plans whether sufficient right-of-way would exist for the highway to be widened in the future along the project's frontage. At a minimum, the project should dedicate to Caltrans a sufficient amount of land along its frontage to accommodate one-half of the highway's ultimate right-of-way (as determined by Caltrans).

Sight Distance

At driveways a substantially clear line of sight should be maintained between the driver of a vehicle waiting on the driveway and the driver of an approaching vehicle. Sight distances along Melita Road at the project driveway were evaluated in consideration of stopping sight distance criteria contained in the *Highway Design Manual* published by Caltrans. Speed surveys obtained near the project driveway indicated that the 85th percentile speed of approaching vehicles was 38 mph, so although Melita Road has a posted speed limit of 30 mph, sight distance at the private project driveway was evaluated based on a speed of 40 mph for a more conservative analysis. At 40 mph, a minimum stopping sight distance of 300 feet is needed. Based on a field review and evaluation of the project site plan showing where the new driveway would be located, it appears that sight distance exceeding 500 feet in both directions on Melita Road could be achieved if the existing overgrowth of trees and brush at the driveway is removed.

At both driveways, any plans for new landscaping or signage should ensure that plantings at the project driveway do not exceed three feet in height to maximize sight lines.

Sight distances along Sonoma Highway at the project street were not evaluated as this location will need to be signalized per Mitigation Measure A.

Finding –With clearing of brush and vegetation at the project's secondary access, sight distance would be adequate at the driveway on Melita Road.

Mitigation L – The project applicants should coordinate with Caltrans to determine the ultimate right-of-way width needed to accommodate the widening of Sonoma Highway in the future; if insufficient space exists along the project frontage to accommodate one-half of the ultimate right-of-way (as measured from centerline), the applicant should dedicate the additional frontage width to Caltrans.

Mitigation M – As part of the construction of the secondary project access on Melita Road, brush and vegetation should be cleared in order to achieve sight lines of at least 300 feet in each direction. Landscaping and signage should be less than three feet in height within the required sight lines.

Melita Road Traffic Impacts

While the majority of project-generated traffic is anticipated to directly access Sonoma Highway from the project site, some project traffic is also anticipated to use the project's secondary access on Melita Road. During the scoping process for the project EIR, several residents expressed concerns about the potential for the project to adversely affect various portions of Melita Road. These sections include the segment between Sonoma Highway and Montgomery Drive, the section that includes the secondary project access between Los Alamos Drive and Sonoma Highway, and the "loop" section that exists north of Sonoma Highway and the project site, connecting at both ends to the highway. Following is an evaluation of the project's potential impacts on each of these segments.

Western Segment - Sonoma Highway to Montgomery Drive

The western segment of Melita Road currently carries approximately 860 vehicles per day. Of the three peak hour periods analyzed (weekday a.m., weekday p.m., and Saturday midday), the p.m. peak hour carries the highest volume of approximately 70 vehicles. In the future, the segment is projected to carry approximately 1,175 vehicles per weekday including 95 during the p.m. peak hour. The posted speed limit is 25 mph. Speed samples indicate an average speed of 27 miles per hour and an 85th percentile speed of 32 mph. The roadway is designated as a collector street in the City's General Plan.

In determining the trip distribution and routing assumptions for the Elnoka project, sample travel times between Calistoga Road and the project site were recorded both in person and using online mapping tools showing real-time traffic. In all cases, travel to the site via Sonoma Highway resulted in a one- to three-minute faster travel time than by using Melita Road (or in the westbound direction, Melita Road to Queen Anne Drive and the Sonoma Highway signal at Mountain Hawk Way). As a result, the analysis assigns no project-related traffic to this segment of Melita Road.

A sensitivity analysis was conducted to determine the maximum amount of project traffic that would be assigned to this segment of Melita Road if Sonoma Highway were closed or encountering severe delays. In such a circumstance, during the highest-volume p.m. peak hour, approximately 81 vehicles associated with the Elnoka project could use the street. With these volumes added to those projected to be present under future conditions, the street would carry approximately 174 vehicles during the p.m. peak hour, or approximately 1,740 daily trips. This is substantially below typical volumes seen on residential collectors, which are often in the range of 5,000 vehicles per day. As a result, it has been determined that even under the most unlikely condition with no project traffic using Sonoma Highway, the project would not be expected to create an adverse condition on this segment of Melita Road. A diagram depicting the p.m. peak hour volumes under various conditions is provided in Plate 2.

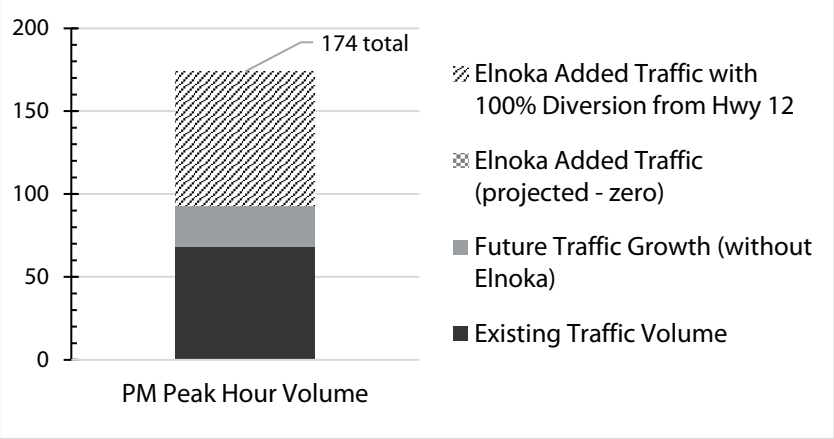


Plate 2 PM Peak Hour Volumes on Melita Road Western Segment

Central Segment - Los Alamos Drive to Sonoma Highway

The central segment of Melita Road includes the proposed secondary access to the Elnoka project and is anticipated to encounter traffic growth as a result of the project. This segment currently carries approximately 2,410 vehicles per day, including 235 during the highest-volume p.m. peak hour. In the future without the Elnoka project, the segment is projected to carry approximately 3,550 vehicles per weekday including 350 during the p.m. peak hour. The posted speed limit is 30 mph. Speed samples indicate an average speed of 33 miles per hour and an 85th percentile speed of 38 mph. The roadway is designated as a local street in the City's General Plan.

This segment of Melita Road west of the project driveway is anticipated to carry approximately 35 additional vehicles during the p.m. peak hour that are attributable to the Elnoka project, or about 414 vehicles per weekday. Total future volumes including the project as analyzed are projected to be approximately 385 vehicles during the p.m. peak hour and 3,960 vehicles per day. If the same sensitivity analysis is applied assuming no use of Sonoma Highway west of the Elnoka site, the project-related volume on the central segment of Melita Road would increase by 116 vehicles during the p.m. peak hour and 1,372 vehicles per weekday. The resulting future volumes in this hypothetical circumstance would then be approximately 462 p.m. peak hour vehicles and 4,900 vehicles per day. A diagram showing the p.m. peak hour volumes under various conditions is shown in Plate 3.

This segment of Melita Road already carries volumes that are at the upper end of what would typically be expected on a local street, and also appears to have vehicle speeds in the 33 to 38 mph range that are higher than typical local streets. The project is anticipated to increase volumes on this segment by 15 to 18 percent. It is therefore recommended that traffic calming measures or other traffic calming elements to be specified by the City be considered on this segment to help reduce the potential for the street to be used as a cut-through route, and to help regulate vehicle speeds. The City of Santa Rosa has established criteria for the potential installation of road undulations (sometimes referred to as speed humps), and this segment would not qualify as volumes exceed 3,000 vehicles per day. Consequently, other traffic calming measures such as adding edge line striping may be more appropriate. It is recommended that the project be responsible for funding the installation of traffic calming elements as directed by the City on the central segment of Melita Road.

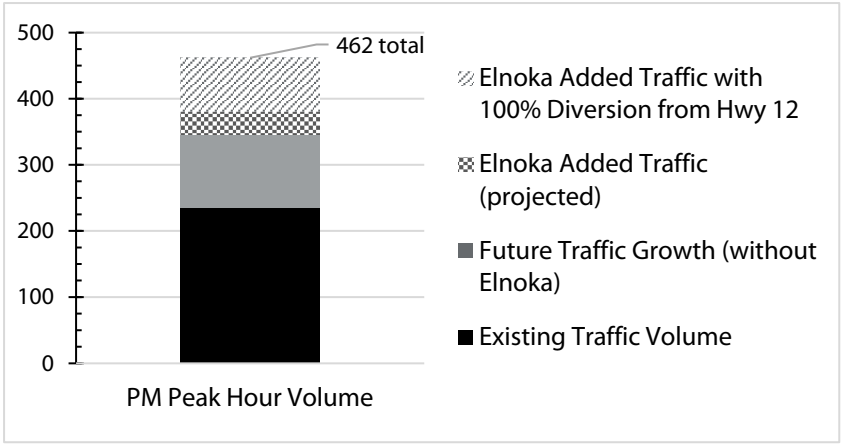


Plate 3 PM Peak Hour Volumes on Melita Road Central Segment

Eastern Segment - Loop Section North of Sonoma Highway

The eastern segment of Melita Road lies north of Sonoma Highway. The western end intersects the highway at a signalized intersection and the eastern end terminates at the highway at an unsignalized intersection with stop-controls on the Melita Road approach. The segment differs from the western and central segments of Melita Road in that there is little to no potential for the Elnoka project to add traffic volumes to the street, since any such use would require a circuitous driving route that would result in longer travel times. The project would, however, affect travel times along the highway corridor by installing (as a mitigation measure) a new traffic signal at its project entrance, adding to westbound travel times on Sonoma Highway. The potential for this added delay to

potentially encourage westbound drivers on the highway to divert to Melita Road in the hopes of avoiding congestion at the Sonoma Highway/Melita Road (east) intersection was therefore evaluated.

Based on field observations and evaluation using online mapping tools with travel time data, drivers proceeding westbound on Sonoma Highway would generally be expected to encounter a one- to three-minute delay if they diverted to this segment of Melita Road. However, it was noted that during the p.m. peak hour, westbound drivers turning left from Sonoma Highway at the Melita Road signal may have comparable travel times by diverting to the loop section of Melita Road (at the signal, these drivers would make a southbound through movement on Melita Road instead of a westbound left-turn movement from Sonoma Highway). The project's influences on delays along westbound Sonoma Highway may therefore play a role in the use of the eastern segment of Melita Road as a diversion route.

A comparison was made to determine if the Elnoka project would change p.m. peak hour delays on westbound Sonoma Highway such that drivers would be incentivized to use the eastern loop segment of Melita Road instead of remaining on Sonoma Highway and turning left at the Melita Road (east) signal. For the purposes of this analysis an additional time savings of 30 seconds or greater was assumed to be a substantial enough time saving to cause some drivers to divert. It was determined that under "plus project" conditions, the changes in delay associated with the Elnoka project (including those encountered at the project entrance's new traffic signal) would translate to a six- to nine-second benefit for drivers diverting to the eastern segment of Melita Road prior to continuing south on Melita Road south of the highway. This level of time benefit would be imperceptible to most drivers, and unlikely to attract a meaningful amount of diversion traffic. As a result, the project is not anticipated to cause impacts to this segment of Melita Road.

It is important to distinguish that some drivers on westbound Sonoma Highway may indeed choose to use this portion of Melita Road as a bypass route, both now and in the future. The purpose of the above analysis is not to determine whether such bypass traffic may occur but is instead to determine if the Elnoka project specifically would be expected to cause additional diversion to the route, thereby creating a potential impact. It is also noted that Mitigation E requires the project to help fund the addition of a second westbound through lane at the Sonoma Highway/Melita Road signalized intersection, reducing delays on the westbound approach and the intersection overall, and potentially lessening the incentive for drivers to divert.

Finding – The project is not anticipated to adversely affect operations or safety on the western segment of Melita Road between Sonoma Highway and Montgomery Drive, or the eastern loop segment of Melita Road north of Sonoma Highway.

Finding – The project is anticipated to increase traffic volumes on the central segment of Melita Road between Los Alamos Drive and Sonoma Highway by 15 to 18 percent, in an area where Melita Road is designated as a local street but currently encounters traffic volumes and speeds that are generally more reflective of a collector street.

Mitigation N – The project should be responsible for installing traffic calming elements as directed by the City on the central segment of Melita Road.

Parking

The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated parking demand. The project site as proposed would provide a total of 1,407 standard parking spaces for the development with 724 covered spaces and 683 open parking spaces.

Jurisdiction parking supply requirements are based on the City of Santa Rosa's Municipal Code, Chapter 20-36; Parking and Loading Standards. The City's code requires one space per unit for senior housing plus one space per ten units for guests. For the multifamily units identified as employee housing, the City's code requires 1.5 spaces per unit. Although the proposed project also includes onsite uses such as a café, salon, and banking services, these are for the exclusive use of residents and will not generate additional customer parking demand. However, employees of these planned commercial uses and services would generate parking demand. The proposed project is expected to have an average of 88 employees onsite daily. Assuming one space per employee, an additional 88 spaces would be required. Therefore, the proposed project would be required to provide 748 spaces for the planned housing based on City standards and 88 for employees (which does not take into account the 12 employee apartments), totaling 830 spaces. With plans to provide 1,407 spaces, the parking supply would meet the City's standards and fully accommodate the project's anticipated parking demand.

To provide a comparison, parking demand was also determined using ITE's *Parking Generation 4th Edition* for CCRC's. Based on data collected by ITE, the maximum parking demand experienced by one of the study sites was 0.83 spaces per dwelling unit. With 664 units, this equates to a demand of 551 spaces. The ITE parking generation rate for apartments is 1.94 spaces per unit, which would result in a demand of 23 spaces, for a total demand of 574 spaces. Therefore, based on City and ITE rates, the proposed project is providing adequate parking with a substantial surplus.

A summary of the parking requirements and anticipated demand is shown in Table 22.

Table 22 – Parking Requirements per City of Santa Rosa Municipal Code

Land Use	Units	City Requirements		ITE Parking Generation	
		Rate	Spaces Required	Rate	Parking Demand
Senior Housing	664 du	1.0 per unit + 1.0 guest space per 10 units	730	0.83	551
Apartments	12 du	1.5 per unit	18	1.94	23
Total Parking Required			**748**		**574**

Notes: du = dwelling unit

Finding – The project is anticipated to have an adequate parking supply.

Conclusions and Recommendations

Conclusions

- The proposed project is expected to generate 1,822 vehicle trips per weekday including 115 during the a.m. peak hour and 154 during the p.m. peak hour, and 1,783 trips on Saturdays including 205 during the midday peak hour.
- The study intersections are expected to operate acceptably under Existing plus Project conditions, except for the project access on Sonoma Highway which would encounter LOS F operation during the a.m. and p.m. peak hours. The project access intersection would also operate unacceptably under "plus project" volumes during one or more peak hours evaluated in the Baseline and Future scenarios.
- The Sonoma Highway roadway segment is expected to operate acceptably under Existing and Baseline Conditions both without and with the project.
- The study intersections on Sonoma Highway at Calistoga Road and Oakmont Drive are expected to operate unacceptably under Baseline plus Project conditions, though the increase in average vehicle delay attributable to the project would exceed five seconds only at the Calistoga Road intersection.
- The signalized study intersections on Sonoma Highway at Calistoga Road, Melita Road (east), and Oakmont Drive are expected to operate unacceptably under Future plus Project conditions, with the increases in average vehicle delay attributable to the project exceeding five seconds at these intersections.
- The Sonoma Highway roadway segment is expected to operate unacceptably at LOS E in the westbound direction under Future conditions both without and with the project, with the project resulting in a one mile-per-hour decrease in speed.
- The LOS E and LOS F operation occurring under Baseline conditions at the Sonoma Highway/Oakmont Drive intersection, as well as under Future conditions at Sonoma Highway/Melita Road (east), Sonoma Highway/ Oakmont Drive, and the Sonoma Highway roadway segment, could be mitigated by widening the highway to two through lanes in each direction between the Melita Road signal and Pythian Road as envisioned in the City's General Plan. This mitigation (referred to as Mitigation C) is, however, considered infeasible and alternative mitigations should be implemented by the project to offset its traffic impacts.
- Under "plus project" conditions, 95th percentile queues are projected to exceed available storage in one or more turn pockets at the intersections of Sonoma Highway/Calistoga Road, Sonoma Highway/Melita Road (east), and Sonoma Highway/Oakmont Drive.
- The 95th percentile queues in the left-turn/through lane on southbound Calistoga Road at Sonoma Highway would exceed the available storage, though because queue spillover would not cause queues in the adjacent lane to extend to the next intersection, and because nearly all southbound traffic turns at Sonoma Highway and is traveling at relatively low speeds, the queuing is not anticipated to create adverse safety or operational impacts.
- Construction traffic associated with the project is anticipated to result in fewer trips than the project itself will generate upon completion, though may entail activities that temporarily disrupt traffic patterns in the area.
- The proposed project is anticipated to generate VMT per capita and VMT per employee performance measures that are more than 15 percent below Countywide averages, resulting in a less-than-significant VMT impact.

- Pedestrian and roadway facilities within the 68-acre project site would effectively accommodate walking and bicycling trips made by project residents, employees, and visitors.
- The project would construct a portion of the Sonoma Valley Trail along its Sonoma Highway frontage, helping to implement the regional trail facility in the future; it is unclear, however, if the dimensions of the trail meet those established in the trail's feasibility study.
- The project would generally provide effective connections to the existing and planned bicycle facilities depicted in the City's Bicycle & Pedestrian Master Plan and to the Sonoma Valley Trail, but would not accommodate a planned pathway segment referred to as the Channel Trail through the project site between Sonoma Highway and Channel Drive.
- By funding the preparation of a feasibility study for the Channel Trail, the project has effectively achieved consistency with the Bicycle & Pedestrian Master Plan, which depicts a "study" designation on the Channel Trail.
- Sight distance would be adequate at the project's secondary access on Melita Road with clearing of brush and vegetation.
- In addition to the private shuttle service to be provided by the project, Sonoma County Transit facilities serving the project site are expected to adequately accommodate project residents, employees, and visitors.
- The project would construct a new bus pullout and have adequate connections to eastbound transit routes, but no facilities currently exist for pedestrians to cross Sonoma Highway to reach westbound routes. Access would be improved upon installation of a signal at the project access (Mitigation A).
- The new intersection on Sonoma Highway to be created by the project is expected to satisfy Warrant 2 (Four-Hour Vehicular Volume) of the CA-MUTCD for installation of a traffic signal.
- While driver characteristics are not considered in the CA-MUTCD signal warrant criteria, installation of a traffic signal would be expected to result in a safety benefit to the project's senior population.
- Installation of a traffic signal at the project access intersection on Sonoma Highway would also be necessary to accommodate pedestrian access between the project and the westbound Sonoma County Transit stop on Sonoma Highway.
- The project is not anticipated to adversely affect operations or safety on the western segment of Melita Road between Sonoma Highway and Montgomery Drive, or the eastern loop segment of Melita Road north of Sonoma Highway.
- The project is anticipated to increase traffic volumes on the central segment of Melita Road between Los Alamos Drive and Sonoma Highway by 15 to 18 percent, in an area where Melita Road is designated as a local street but currently encounters traffic volumes and speeds that are generally more reflective of a collector street.
- The project is anticipated to have an adequate parking supply.

Recommendations

- **Mitigation A** – The project applicant should be responsible for installing a traffic signal at the project access on Sonoma Highway, including obtaining all necessary approvals from Caltrans.

- **Mitigation B** – The applicant should be responsible for updating and optimizing the signal timing at Sonoma Highway/Calistoga Road, including obtaining all necessary approvals from Caltrans. The optimization should be implemented prior to residents occupying the project site and generating traffic.

- **Mitigation D** – The applicant should be responsible for contributing a proportionate share of the costs associated with constructing a 100-foot long westbound right-turn lane with right-turn overlap signal phase at the Sonoma Highway/Calistoga Road intersection.

- **Mitigation E** – The applicant should be responsible for contributing a proportionate share of the costs associated with widening the westbound approach at the Sonoma Highway/Melita Road (east) signalized intersection to include a minimum 400-foot long second through lane and 50-foot long northbound right-turn pocket.

- **Mitigation F** – The applicant should be responsible for modifying the signal at Sonoma Highway/Oakmont Drive to add an eastbound right-turn overlap phase and moving the Sonoma Highway pedestrian crossing from the west to the east intersection leg, including obtaining all necessary approvals from Caltrans.

- **Mitigation G** – The project should be responsible for increasing the westbound left-turn lane at Sonoma Highway/Calistoga Road by 25 feet in order to provide approximately 175 feet of storage.

- **Mitigation H** – The project should be responsible for extending the eastbound left-turn lane at Sonoma Highway/Melita Road (east) by 50 feet to provide approximately 200 feet of storage.

- **Mitigation I** – As part of the City's entitlement process, the City should review site development plans to determine whether staging and/or construction activities could disrupt circulation, and if necessary, require the applicants to submit a traffic control plan prior to the commencement of construction. Elements of this plan should identify construction staging areas; designate detour routes; and develop and implement procedures for notifying property owners within a surrounding distance set by the City of activities that will affect traffic in the vicinity of the development.

- **Mitigation J** – The applicant should be responsible for constructing a segment of the Sonoma Valley Trail along the project's Sonoma Highway frontage, consistent with the dimensions and standards set forth by Sonoma County Regional Parks in the Sonoma Valley Trail Feasibility Study.

- **Mitigation K** – The applicant should be responsible for relocating the existing westbound bus stop near the project site to be adjacent to the new traffic signal required by Mitigation A, and configuring both the eastbound and westbound bus stops in accordance with criteria established by Sonoma County Transit.

- **Mitigation L** – The project applicants should coordinate with Caltrans to determine the ultimate right-of-way width needed to accommodate the widening of Sonoma Highway in the future; if insufficient space exists along the project frontage to accommodate one-half of the ultimate right-of-way (as measured from centerline), the applicant should dedicate the additional frontage width to Caltrans.

- **Mitigation M** – As part of the construction of the secondary project access on Melita Road, brush and vegetation should be cleared in order to achieve sight lines of at least 300 feet in each direction. Landscaping and signage at both project driveways should be less than three feet in height within the required sight lines.

- **Mitigation N** – The project should be responsible for installing traffic calming elements as directed by the City on the central segment of Melita Road.

Study Participants and References

Study Participants

Principal in Charge	Zachary Matley, AICP
Project Manager	Zachary Matley, AICP
Assistant Planner	Shannon Baker
Graphics	Katia Wolfe
Editing/Formatting	Alex Scrobonia, Hannah Yung-Boxdell
Quality Control	Dalene J. Whitlock, PE, PTOE

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SRO408





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Appendix A

72-Hour Traffic Count Data



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SPEED

Melita Rd Bet. Montgomery Dr & Queen Anne Dr

Day: Thursday
Date: 4/27/2017

City: Santa Rosa
Project #: CA17_7320_002

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
05:00	0	0	0	1	1	1	0	0	0	0	0	0	0	3
06:00	0	0	3	7	3	2	0	0	0	0	0	0	0	15
07:00	0	3	13	27	19	3	0	0	0	0	0	0	0	65
08:00	3	8	17	36	11	3	0	0	0	0	0	0	0	78
09:00	5	4	11	11	8	1	0	0	0	0	0	0	0	40
10:00	1	2	14	18	7	0	0	0	0	0	0	0	0	42
11:00	0	5	17	27	6	0	0	0	0	0	0	0	0	55
12:00 PM	1	2	10	22	6	0	0	0	0	0	0	0	0	41
13:00	2	9	17	25	11	2	1	0	0	0	0	0	0	67
14:00	1	7	27	23	11	2	0	0	0	0	0	0	0	71
15:00	0	3	17	53	22	0	0	0	0	0	0	0	0	95
16:00	0	6	12	28	14	1	0	0	0	0	0	0	0	61
17:00	0	3	15	31	14	2	0	0	0	0	0	0	0	65
18:00	1	4	10	35	12	1	0	0	0	0	0	0	0	63
19:00	0	3	11	23	2	1	0	0	0	0	0	0	0	40
20:00	0	3	14	8	6	2	0	0	0	0	0	0	0	33
21:00	0	0	6	4	0	1	0	0	0	0	0	0	0	11
22:00	0	0	2	2	1	0	1	0	0	0	0	0	0	6
23:00	0	0	2	3	0	0	0	0	0	0	0	0	0	5
Totals	14	63	218	384	155	22	2							858
% of Totals	2%	7%	25%	45%	18%	3%	0%							100%

AM Volumes	9	23	75	127	56	10	0	0	0	0	0	0	0	300
% AM	1%	3%	9%	15%	7%	1%								35%
AM Peak Hour	09:00	08:00	08:00	08:00	07:00	07:00								08:00
Volume	5	8	17	36	19	3								78
PM Volumes	5	40	143	257	99	12	2	0	0	0	0	0	0	558
% PM	1%	5%	17%	30%	12%	1%	0%							65%
PM Peak Hour	13:00	13:00	14:00	15:00	15:00	13:00	13:00							15:00
Volume	2	9	27	53	22	2	1							95

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds	Volume		%	Volume		%	Volume		%	Volume		%
	143	⟷	17%	108	⟷	13%	126	⟷	15%	481	⟷	56%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Melita Rd	Summary	21	27	26	32	34	858

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Melita Rd Bet. Montgomery Dr & Queen Anne Dr

Day: Thursday
Date: 4/27/2017

City: Santa Rosa
Project #: CA17_7320_002

DAILY TOTALS	NB	SB	EB	WB	Total
	379	479	0	0	858

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	0		0		0	0			12:00	3		4		0	0	7	
00:15	0		0		0	0			12:15	3		5		0	0	8	
00:30	0		0		0	0			12:30	5		7		0	0	12	
00:45	0		1	1	0	0	1	1	12:45	8	19	6	22	0	0	14	41
01:00	0		0		0	0			13:00	7		6		0	0	13	
01:15	0		0		0	0			13:15	6		6		0	0	12	
01:30	0		0		0	0			13:30	8		10		0	0	18	
01:45	0		0		0	0			13:45	9	30	15	37	0	0	24	67
02:00	0		0		0	0			14:00	6		10		0	0	16	
02:15	0		0		0	0			14:15	8		10		0	0	18	
02:30	0		0		0	0			14:30	11		9		0	0	20	
02:45	0		0		0	0			14:45	11	36	6	35	0	0	17	71
03:00	0		0		0	0			15:00	8		23		0	0	31	
03:15	0		0		0	0			15:15	8		15		0	0	23	
03:30	0		0		0	0			15:30	7		14		0	0	21	
03:45	0		0		0	0			15:45	9	32	11	63	0	0	20	95
04:00	0		0		0	0			16:00	7		1		0	0	8	
04:15	0		0		0	0			16:15	10		8		0	0	18	
04:30	0		0		0	0			16:30	8		9		0	0	17	
04:45	0		1	1	0	0	1	1	16:45	7	32	11	29	0	0	18	61
05:00	0		0		0	0			17:00	9		6		0	0	15	
05:15	1		0		0	0	1		17:15	10		7		0	0	17	
05:30	0		0		0	0			17:30	10		8		0	0	18	
05:45	1	2	1	1	0	0	2	3	17:45	9	38	6	27	0	0	15	65
06:00	0		2		0	0	2		18:00	10		4		0	0	14	
06:15	0		2		0	0	2		18:15	7		8		0	0	15	
06:30	1		4		0	0	5		18:30	7		8		0	0	15	
06:45	1	2	5	13	0	0	6	15	18:45	11	35	8	28	0	0	19	63
07:00	2		7		0	0	9		19:00	12		8		0	0	20	
07:15	4		9		0	0	13		19:15	2		1		0	0	3	
07:30	3		17		0	0	20		19:30	8		2		0	0	10	
07:45	6	15	17	50	0	0	23	65	19:45	5	27	2	13	0	0	7	40
08:00	5		15		0	0	20		20:00	9		5		0	0	14	
08:15	9		15		0	0	24		20:15	9		3		0	0	12	
08:30	4		13		0	0	17		20:30	1		3		0	0	4	
08:45	6	24	11	54	0	0	17	78	20:45	2	21	1	12	0	0	3	33
09:00	5		7		0	0	12		21:00	3		3		0	0	6	
09:15	2		6		0	0	8		21:15	1		1		0	0	2	
09:30	5		5		0	0	10		21:30	1		0		0	0	1	
09:45	5	17	5	23	0	0	10	40	21:45	0	5	2	6	0	0	2	11
10:00	4		6		0	0	10		22:00	0		1		0	0	1	
10:15	6		8		0	0	14		22:15	1		1		0	0	2	
10:30	1		7		0	0	8		22:30	0		1		0	0	1	
10:45	3	14	7	28	0	0	10	42	22:45	1	2	1	4	0	0	2	6
11:00	7		10		0	0	17		23:00	3		0		0	0	3	
11:15	8		8		0	0	16		23:15	0		0		0	0		
11:30	6		9		0	0	15		23:30	1		0		0	0	1	
11:45	3	24	4	31	0	0	7	55	23:45	0	4	1	1	0	0	1	5
TOTALS		98		202				300	TOTALS		281		277				558
SPLIT %		32.7%		67.3%				35.0%	SPLIT %		50.4%		49.6%				65.0%

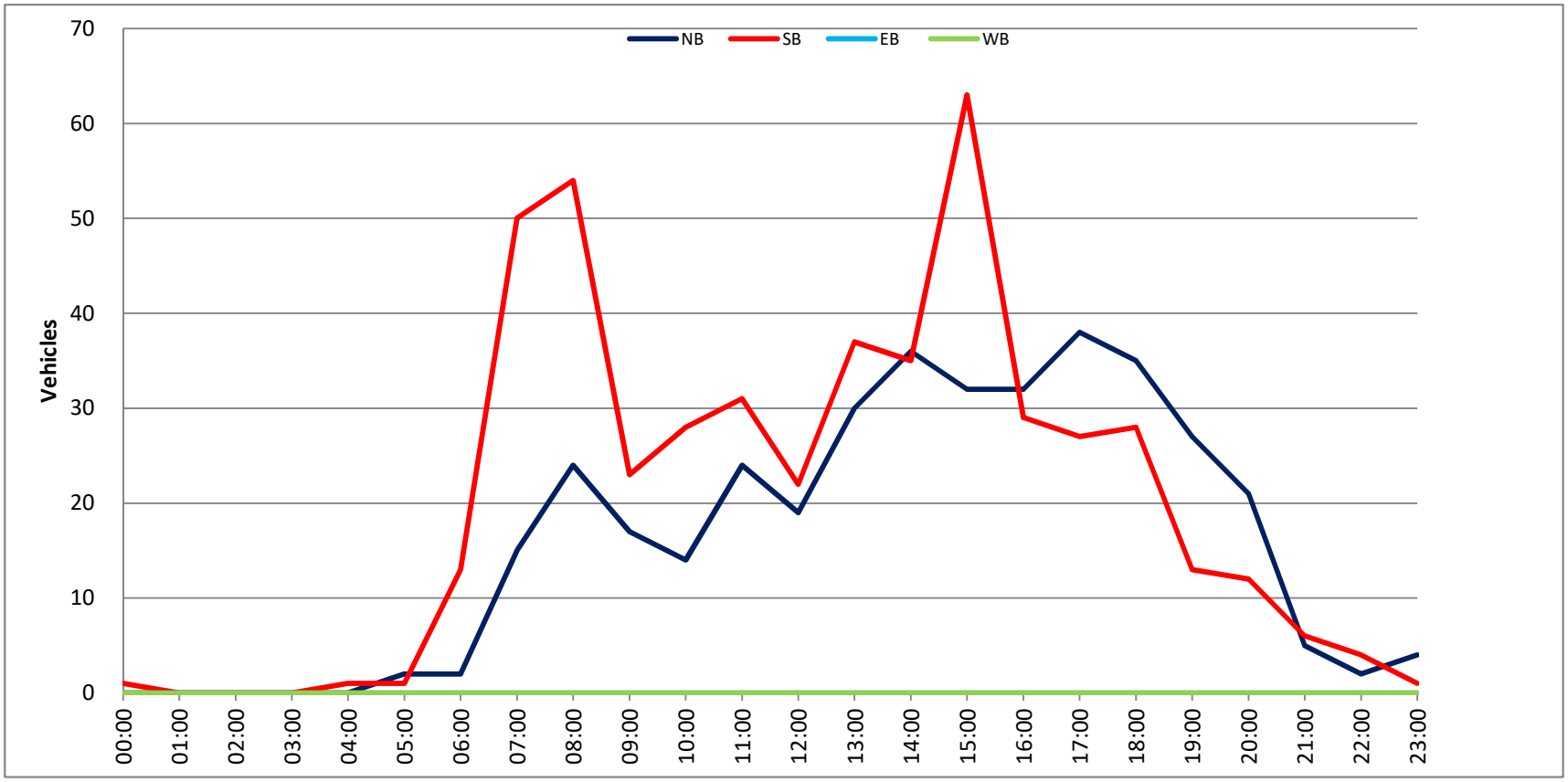
DAILY TOTALS	NB	SB	EB	WB	Total
	379	479	0	0	858

AM Peak Hour	07:45	07:30				07:30	PM Peak Hour	17:15	15:00				15:00
AM Pk Volume	24	64				87	PM Pk Volume	39	63				95
Pk Hr Factor	0.667	0.941				0.906	Pk Hr Factor	0.825	0.607				0.766
7 - 9 Volume	39	104	0	0		143	4 - 6 Volume	70	56	0	0		126
7 - 9 Peak Hour	07:45	07:30				07:30	4 - 6 Peak Hour	17:00	16:15				16:15
7 - 9 Pk Volume	24	64	0	0		87	4 - 6 Pk Volume	38	34	0	0		68
Pk Hr Factor	0.667	0.941	0.000	0.000		0.906	Pk Hr Factor	0.950	0.773	0.000	0.000		0.944

Prepared by NDS/ATD

Project #: CA17_7320_002 **City:** Santa Rosa

Location: Melita Rd Bet. Montgomery Dr & Queen **Date:** 4/27/2017



Prepared by National Data & Surveying Services

SPEED

Melita Rd Bet. Montgomery Dr & Queen Anne Dr

Day: Friday
Date: 4/28/2017

City: Santa Rosa
Project #: CA17_7320_002

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	2	0	0	0	0	0	0	0	0	2
02:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	1	2	0	0	0	0	0	0	0	0	3
06:00	0	1	1	7	3	0	0	0	0	0	0	0	0	12
07:00	0	4	13	16	12	3	0	0	0	0	0	0	0	48
08:00	1	4	31	27	13	0	0	0	0	0	0	0	0	76
09:00	0	3	18	16	4	1	0	0	0	0	0	0	0	42
10:00	0	5	18	22	9	1	0	0	0	0	0	0	0	55
11:00	0	3	8	9	8	2	0	0	0	0	0	0	0	30
12:00 PM	3	5	15	20	10	1	0	0	0	0	0	0	0	54
13:00	5	5	12	41	8	2	0	0	0	0	0	0	0	73
14:00	0	5	19	42	17	2	0	0	0	0	0	0	0	85
15:00	0	5	19	39	18	1	0	0	0	0	0	0	0	82
16:00	0	4	15	25	16	1	0	0	0	0	0	0	0	61
17:00	1	3	24	34	10	3	1	0	0	0	0	0	0	76
18:00	1	2	13	17	6	1	0	0	0	0	0	0	0	40
19:00	0	0	6	12	5	1	0	0	0	0	0	0	0	24
20:00	0	2	6	12	5	1	1	0	0	0	0	0	0	27
21:00	0	0	6	7	3	2	0	0	0	0	0	0	0	18
22:00	0	0	1	3	0	0	0	0	0	0	0	0	0	4
23:00	0	0	0	1	1	0	0	0	0	0	0	0	0	2
Totals	11	51	225	351	153	22	2							815
% of Totals	1%	6%	28%	43%	19%	3%	0%							100%

AM Volumes	1	20	89	98	54	7	0	0	0	0	0	0	0	269
% AM	0%	2%	11%	12%	7%	1%								33%
AM Peak Hour	08:00	10:00	08:00	08:00	08:00	07:00								08:00
Volume	1	5	31	27	13	3								76
PM Volumes	10	31	136	253	99	15	2	0	0	0	0	0	0	546
% PM	1%	4%	17%	31%	12%	2%	0%							67%
PM Peak Hour	13:00	12:00	17:00	14:00	15:00	17:00	17:00							14:00
Volume	5	5	24	42	18	3	1							85

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds	Volume	↔	%	Volume	↔	%	Volume	↔	%	Volume	↔	%
	124		15%	127		16%	137		17%	427		52%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Melita Rd	Summary	21	27	27	32	34	815

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Melita Rd Bet. Montgomery Dr & Queen Anne Dr

Day: Friday
Date: 4/28/2017

City: Santa Rosa
Project #: CA17_7320_002

DAILY TOTALS	NB	SB	EB	WB	Total
	366	449	0	0	815

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	0		0		0	0			12:00	3		6		0	0	9	
00:15	0		0		0	0			12:15	5		7		0	0	12	
00:30	0		0		0	0			12:30	7		8		0	0	15	
00:45	0		0		0	0			12:45	10	25	8	29	0	0	18	54
01:00	0		0		0	0			13:00	6		7		0	0	13	
01:15	1		0		0	0	1		13:15	7		15		0	0	22	
01:30	0		1		0	0	1		13:30	11		10		0	0	21	
01:45	0	1	0	1	0	0		2	13:45	6	30	11	43	0	0	17	73
02:00	0		0		0	0			14:00	9		8		0	0	17	
02:15	0		1		0	0	1		14:15	16		10		0	0	26	
02:30	0		0		0	0			14:30	13		8		0	0	21	
02:45	0		0	1	0	0		1	14:45	13	51	8	34	0	0	21	85
03:00	0		0		0	0			15:00	8		13		0	0	21	
03:15	0		0		0	0			15:15	7		18		0	0	25	
03:30	0		0		0	0			15:30	6		14		0	0	20	
03:45	0		0		0	0			15:45	3	24	13	58	0	0	16	82
04:00	0		0		0	0			16:00	6		9		0	0	15	
04:15	0		0		0	0			16:15	11		9		0	0	20	
04:30	0		0		0	0			16:30	9		4		0	0	13	
04:45	0		0		0	0			16:45	7	33	6	28	0	0	13	61
05:00	0		0		0	0			17:00	7		12		0	0	19	
05:15	0		0		0	0			17:15	8		6		0	0	14	
05:30	1		0		0	0	1		17:30	11		6		0	0	17	
05:45	0	1	2	2	0	0	2	3	17:45	13	39	13	37	0	0	26	76
06:00	0		3		0	0	3		18:00	12		7		0	0	19	
06:15	0		0		0	0			18:15	6		3		0	0	9	
06:30	2		3		0	0	5		18:30	4		5		0	0	9	
06:45	3	5	1	7	0	0	4	12	18:45	2	24	1	16	0	0	3	40
07:00	2		7		0	0	9		19:00	2		3		0	0	5	
07:15	2		6		0	0	8		19:15	3		3		0	0	6	
07:30	2		6		0	0	8		19:30	3		1		0	0	4	
07:45	7	13	16	35	0	0	23	48	19:45	7	15	2	9	0	0	9	24
08:00	2		18		0	0	20		20:00	7		4		0	0	11	
08:15	7		18		0	0	25		20:15	5		5		0	0	10	
08:30	5		7		0	0	12		20:30	2		0		0	0	2	
08:45	4	18	15	58	0	0	19	76	20:45	2	16	2	11	0	0	4	27
09:00	1		8		0	0	9		21:00	7		0		0	0	7	
09:15	6		7		0	0	13		21:15	3		0		0	0	3	
09:30	7		5		0	0	12		21:30	4		1		0	0	5	
09:45	1	15	7	27	0	0	8	42	21:45	3	17	0	1	0	0	3	18
10:00	4		5		0	0	9		22:00	0		0		0	0		
10:15	3		10		0	0	13		22:15	0		0		0	0		
10:30	6		11		0	0	17		22:30	1		1		0	0	2	
10:45	7	20	9	35	0	0	16	55	22:45	2	3	0	1	0	0	2	4
11:00	4		6		0	0	10		23:00	0		0		0	0		
11:15	2		2		0	0	4		23:15	0		1		0	0	1	
11:30	4		2		0	0	6		23:30	1		0		0	0	1	
11:45	5	15	5	15	0	0	10	30	23:45	0	1	0	1	0	0		2
TOTALS		88		181				269	TOTALS		278		268				546
SPLIT %		32.7%		67.3%				33.0%	SPLIT %		50.9%		49.1%				67.0%

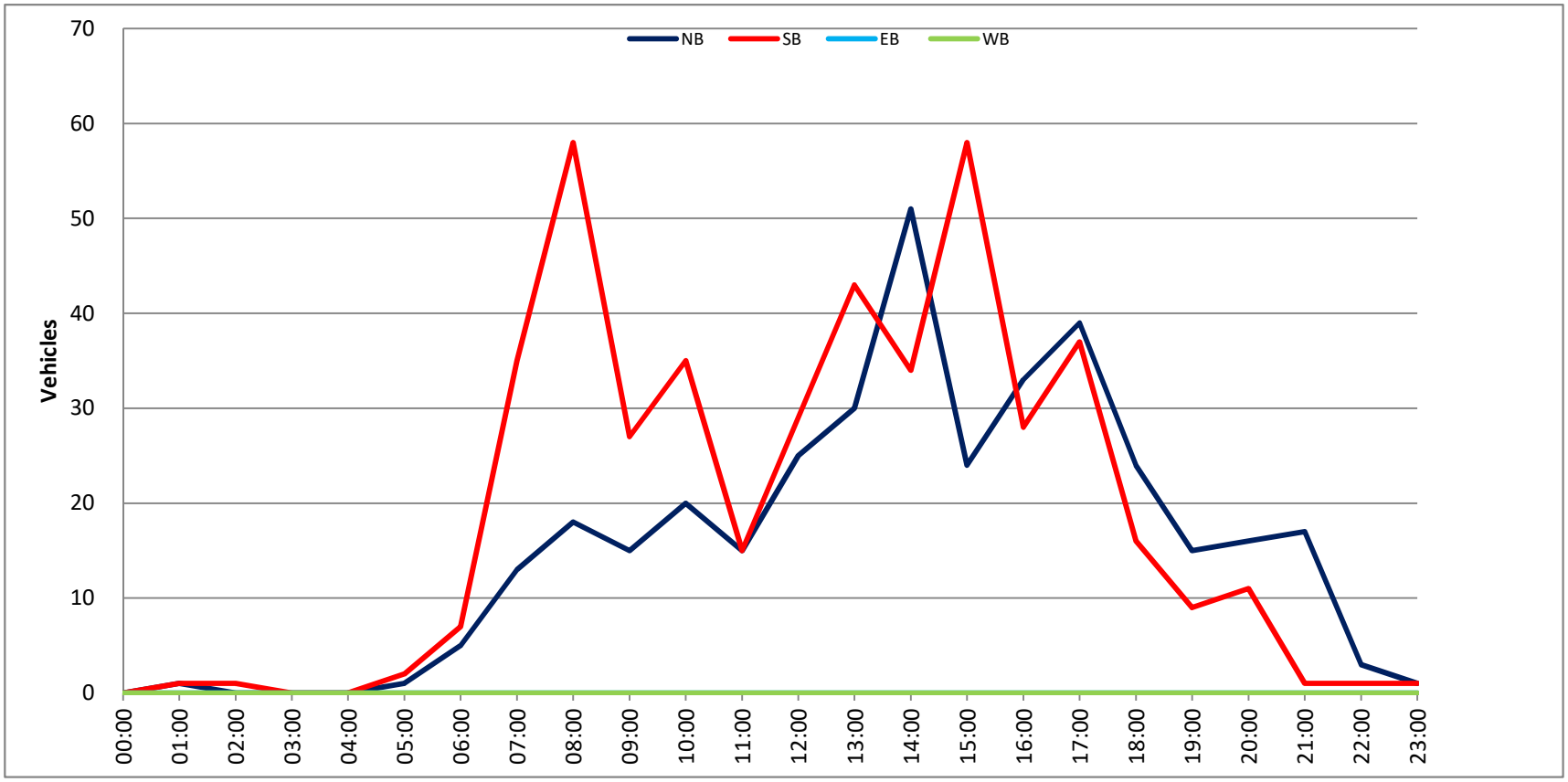
DAILY TOTALS	NB	SB	EB	WB	Total
	366	449	0	0	815

AM Peak Hour	07:45	07:45					07:45		PM Peak Hour	14:00	15:00					14:15		
AM Pk Volume	21	59					80		PM Pk Volume	51	58					89		
Pk Hr Factor	0.750	0.819					0.800		Pk Hr Factor	0.788	0.804					0.856		
7 - 9 Volume	31	93	0	0			124		4 - 6 Volume	72	65	0	0			137		
7 - 9 Peak Hour	07:45	07:45					07:45		4 - 6 Peak Hour	17:00	17:00					17:00		
7 - 9 Pk Volume	21	59	0	0			80		4 - 6 Pk Volume	39	37	0	0			76		
Pk Hr Factor	0.750	0.819	0.000	0.000			0.800		Pk Hr Factor	0.750	0.712	0.000	0.000			0.731		

Prepared by NDS/ATD

Project #: CA17_7320_002 **City:** Santa Rosa

Location: Melita Rd Bet. Montgomery Dr & Queen **Date:** 4/28/2017



Prepared by National Data & Surveying Services

SPEED

Melita Rd Bet. Montgomery Dr & Queen Anne Dr

Day: Saturday
Date: 4/29/2017

City: Santa Rosa
Project #: CA17_7320_002

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	1	2	0	1	0	0	0	0	0	0	4
01:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	1	0	0	0	0	0	0	0	0	0	1
05:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
06:00	0	0	1	0	3	2	0	0	0	0	0	0	0	6
07:00	0	1	3	5	5	0	0	0	0	0	0	0	0	14
08:00	0	0	13	15	7	0	0	0	0	0	0	0	0	35
09:00	1	2	14	25	10	0	0	0	0	0	0	0	0	52
10:00	0	2	15	20	6	1	2	0	0	0	0	0	0	46
11:00	2	10	19	18	9	0	1	0	0	0	0	0	0	59
12:00 PM	2	5	10	21	11	3	0	0	0	0	0	0	0	52
13:00	3	2	11	24	5	2	0	0	0	0	0	0	0	47
14:00	1	4	7	12	9	3	0	0	0	0	0	0	0	36
15:00	1	3	20	33	5	0	0	0	0	0	0	0	0	62
16:00	2	1	10	24	9	0	0	0	0	0	0	0	0	46
17:00	0	2	15	20	10	0	0	0	0	0	0	0	0	47
18:00	0	4	12	17	3	1	0	0	0	0	0	0	0	37
19:00	0	3	4	13	5	0	0	0	0	0	0	0	0	25
20:00	0	0	4	9	6	0	0	0	0	0	0	0	0	19
21:00	0	0	3	7	2	0	0	0	0	0	0	0	0	12
22:00	0	0	2	0	3	1	0	0	0	0	0	0	0	6
23:00	1	0	2	0	3	0	0	0	0	0	0	0	0	6
Totals	13	39	165	265	115	13	4							614
% of Totals	2%	6%	27%	43%	19%	2%	1%							100%

AM Volumes	3	15	65	85	44	3	4	0	0	0	0	0	0	219
% AM	0%	2%	11%	14%	7%	0%	1%							36%
AM Peak Hour	11:00	11:00	11:00	09:00	09:00	06:00	10:00							11:00
Volume	2	10	19	25	10	2	2							59
PM Volumes	10	24	100	180	71	10	0	0	0	0	0	0	0	395
% PM	2%	4%	16%	29%	12%	2%								64%
PM Peak Hour	13:00	12:00	15:00	15:00	12:00	12:00								15:00
Volume	3	5	20	33	11	3								62

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds	Volume	↔	%	Volume	↔	%	Volume	↔	%	Volume	↔	%
	49		8%	99		16%	93		15%	373		61%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Melita Rd	Summary	21	27	26	32	34	614

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Melita Rd Bet. Montgomery Dr & Queen Anne Dr

Day: Saturday
Date: 4/29/2017

City: Santa Rosa
Project #: CA17_7320_002

DAILY TOTALS	NB	SB	EB	WB	Total
	284	330	0	0	614

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	0		0		0	0			12:00	4		8		0	0	12	
00:15	0		3		0	0	3		12:15	5		11		0	0	16	
00:30	0		0		0	0			12:30	3		8		0	0	11	
00:45	1	1	0	3	0	0	1	4	12:45	7	19	6	33	0	0	13	52
01:00	1		0		0	0	1		13:00	6		5		0	0	11	
01:15	0		0		0	0			13:15	2		7		0	0	9	
01:30	0		0		0	0			13:30	13		3		0	0	16	
01:45	0	1	0		0	0		1	13:45	5	26	6	21	0	0	11	47
02:00	0		0		0	0			14:00	4		2		0	0	6	
02:15	0		0		0	0			14:15	4		4		0	0	8	
02:30	0		0		0	0			14:30	6		5		0	0	11	
02:45	0		0		0	0			14:45	3	17	8	19	0	0	11	36
03:00	0		0		0	0			15:00	6		10		0	0	16	
03:15	0		0		0	0			15:15	4		9		0	0	13	
03:30	0		0		0	0			15:30	9		7		0	0	16	
03:45	0		0		0	0			15:45	9	28	8	34	0	0	17	62
04:00	1		0		0	0	1		16:00	4		6		0	0	10	
04:15	0		0		0	0			16:15	8		4		0	0	12	
04:30	0		0		0	0			16:30	9		6		0	0	15	
04:45	0	1	0		0	0		1	16:45	5	26	4	20	0	0	9	46
05:00	0		0		0	0			17:00	7		4		0	0	11	
05:15	0		0		0	0			17:15	3		3		0	0	6	
05:30	1		0		0	0	1		17:30	4		7		0	0	11	
05:45	0	1	0		0	0		1	17:45	8	22	11	25	0	0	19	47
06:00	1		1		0	0	2		18:00	2		3		0	0	5	
06:15	0		1		0	0	1		18:15	3		4		0	0	7	
06:30	0		1		0	0	1		18:30	7		4		0	0	11	
06:45	0	1	2	5	0	0	2	6	18:45	9	21	5	16	0	0	14	37
07:00	1		0		0	0	1		19:00	3		5		0	0	8	
07:15	1		3		0	0	4		19:15	4		1		0	0	5	
07:30	2		4		0	0	6		19:30	5		3		0	0	8	
07:45	1	5	2	9	0	0	3	14	19:45	3	15	1	10	0	0	4	25
08:00	2		5		0	0	7		20:00	3		2		0	0	5	
08:15	2		6		0	0	8		20:15	3		1		0	0	4	
08:30	3		10		0	0	13		20:30	2		2		0	0	4	
08:45	2	9	5	26	0	0	7	35	20:45	4	12	2	7	0	0	6	19
09:00	5		7		0	0	12		21:00	2		1		0	0	3	
09:15	2		9		0	0	11		21:15	3		2		0	0	5	
09:30	5		10		0	0	15		21:30	2		1		0	0	3	
09:45	3	15	11	37	0	0	14	52	21:45	1	8	0	4	0	0	1	12
10:00	2		2		0	0	4		22:00	1		1		0	0	2	
10:15	4		7		0	0	11		22:15	0		0		0	0		
10:30	10		6		0	0	16		22:30	4		0		0	0	4	
10:45	8	24	7	22	0	0	15	46	22:45	0	5	0	1	0	0		6
11:00	5		7		0	0	12		23:00	1		1		0	0	2	
11:15	6		12		0	0	18		23:15	1		1		0	0	2	
11:30	7		8		0	0	15		23:30	1		0		0	0	1	
11:45	5	23	9	36	0	0	14	59	23:45	1	4	0	2	0	0	1	6
TOTALS		81		138				**219**	**TOTALS**		203		192				**395**
SPLIT %		37.0%		63.0%				**35.7%**	**SPLIT %**		51.4%		48.6%				**64.3%**

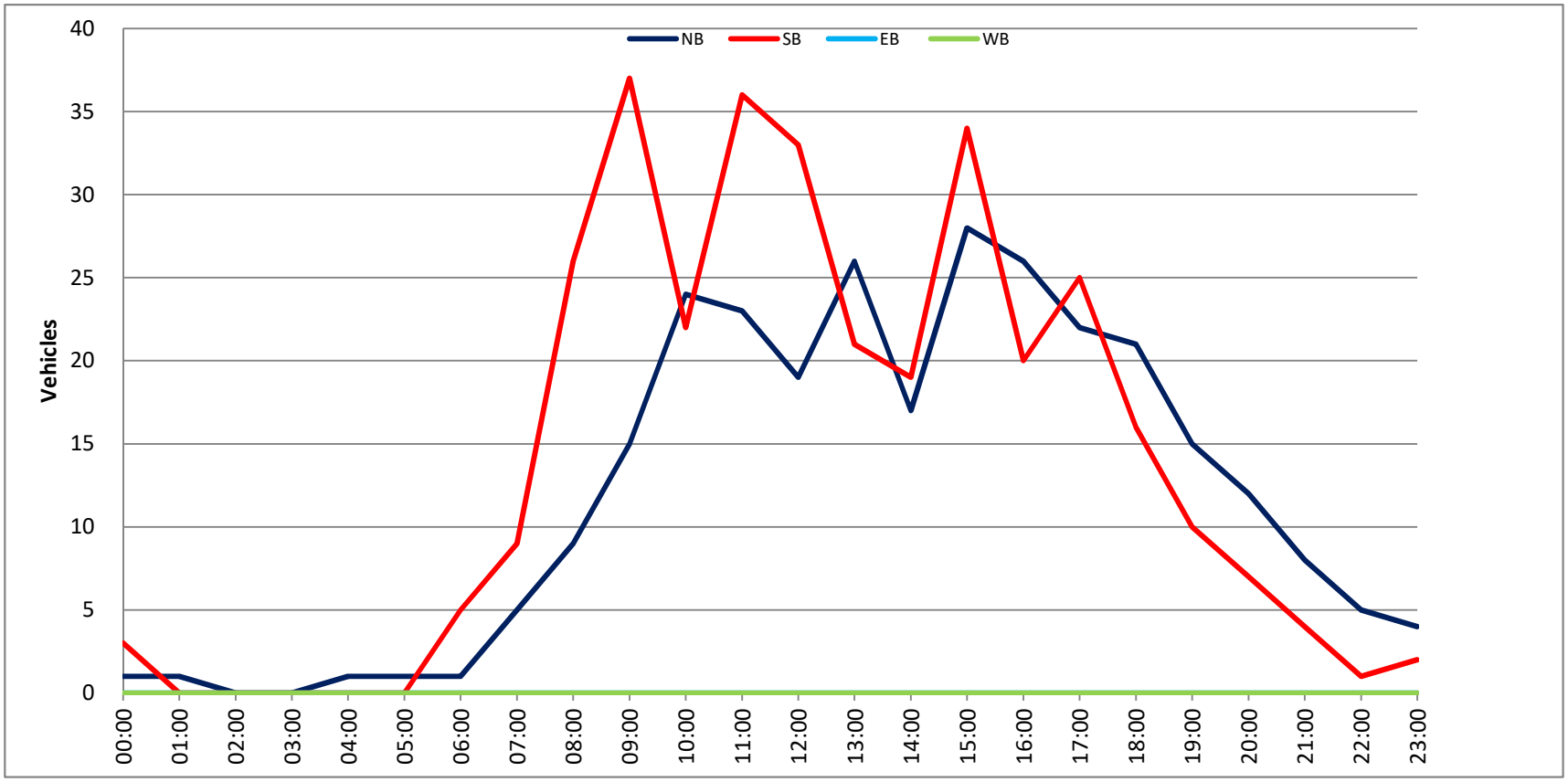
DAILY TOTALS	NB	SB	EB	WB	Total
	284	330	0	0	614

AM Peak Hour	10:30	09:00			**10:30**	**PM Peak Hour**	15:30	14:45			**15:00**
AM Pk Volume	29	37			**61**	**PM Pk Volume**	30	34			**62**
Pk Hr Factor	0.725	0.841			**0.847**	**Pk Hr Factor**	0.722	0.833			**0.912**
7 - 9 Volume	14	35	0	0	**49**	**4 - 6 Volume**	48	45	0	0	**93**
7 - 9 Peak Hour	08:00	08:00			**08:00**	**4 - 6 Peak Hour**	16:15	17:00			**16:15**
7 - 9 Pk Volume	9	26	0	0	**35**	**4 - 6 Pk Volume**	29	25	0	0	**47**
Pk Hr Factor	0.750	0.650	0.000	0.000	**0.673**	**Pk Hr Factor**	0.806	0.568	0.000	0.000	**0.783**

Prepared by NDS/ATD

Project #: CA17_7320_002 **City:** Santa Rosa

Location: Melita Rd Bet. Montgomery Dr & Queen **Date:** 4/29/2017



Prepared by National Data & Surveying Services

SPEED

Melita Rd Bet. Susan Rd & Melita Ct

Day: Thursday
Date: 4/27/2017

City: Santa Rosa
Project #: CA17_7320_001

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	1	1	0	3	0	0	0	0	0	0	0	5
01:00	0	0	0	0	1	1	0	0	0	0	0	0	0	2
02:00	0	0	0	0	3	2	0	0	0	0	0	0	0	5
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	1	2	2	0	0	0	0	0	0	0	5
05:00	0	1	0	3	7	5	0	0	0	0	0	0	0	16
06:00	0	0	1	15	20	18	4	3	0	0	0	0	0	61
07:00	1	2	2	26	43	41	3	0	1	0	0	0	0	119
08:00	1	0	0	39	70	43	8	0	0	0	0	0	0	161
09:00	0	0	5	41	62	32	1	0	0	0	0	0	0	141
10:00	0	0	1	43	102	23	3	1	0	0	0	0	0	173
11:00	1	0	5	35	82	22	5	1	0	0	0	0	0	151
12:00 PM	0	1	9	55	79	35	10	0	0	0	0	0	0	189
13:00	0	1	5	38	111	40	3	0	0	0	0	0	0	198
14:00	1	2	4	34	86	43	9	0	1	0	0	0	0	180
15:00	0	1	1	32	112	43	6	0	0	0	0	0	0	195
16:00	0	0	6	47	96	67	10	1	1	0	0	0	0	228
17:00	0	1	8	35	109	47	10	3	0	0	0	0	0	213
18:00	0	1	3	21	77	29	5	2	0	0	0	0	0	138
19:00	0	0	4	20	42	17	1	0	0	0	0	0	0	84
20:00	0	1	4	17	24	12	1	2	0	0	0	0	0	61
21:00	0	0	1	13	29	1	2	1	1	0	0	0	0	48
22:00	0	0	2	8	6	2	2	0	0	0	0	0	0	20
23:00	0	0	1	3	2	8	2	0	0	0	0	0	0	16
Totals	4	11	63	527	1165	536	85	14	4					2409
% of Totals	0%	0%	3%	22%	48%	22%	4%	1%	0%					100%

AM Volumes	3	3	15	204	392	192	24	5	1	0	0	0	0	839
% AM	0%	0%	1%	8%	16%	8%	1%	0%	0%					35%
AM Peak Hour	07:00	07:00	09:00	10:00	10:00	08:00	08:00	06:00	07:00					10:00
Volume	1	2	5	43	102	43	8	3	1					173
PM Volumes	1	8	48	323	773	344	61	9	3	0	0	0	0	1570
% PM	0%	0%	2%	13%	32%	14%	3%	0%	0%					65%
PM Peak Hour	14:00	14:00	12:00	12:00	15:00	16:00	12:00	17:00	14:00					16:00
Volume	1	2	9	55	112	67	10	3	1					228

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds	Volume	↔	%	Volume	↔	%	Volume	↔	%	Volume	↔	%
	280	↔	12%	387	↔	16%	441	↔	18%	1301	↔	54%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Melita Rd	Summary	28	33	33	38	40	2409

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Melita Rd Bet. Susan Rd & Melita Ct

Day: Thursday
Date: 4/27/2017

City: Santa Rosa
Project #: CA17_7320_001

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,465	944	2,409

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	0		0		1		0		1		12:00	0		0		28		13		41	
00:15	0		0		0		0				12:15	0		0		32		23		55	
00:30	0		0		2		1		3		12:30	0		0		28		16		44	
00:45	0		0		1	4	0	1	1	5	12:45	0		0		31	119	18	70	49	189
01:00	0		0		0		0				13:00	0		0		21		22		43	
01:15	0		0		0		0				13:15	0		0		38		22		60	
01:30	0		0		0		0				13:30	0		0		29		26		55	
01:45	0		0		2	2	0		2	2	13:45	0		0		20	108	20	90	40	198
02:00	0		0		0		0				14:00	0		0		28		13		41	
02:15	0		0		0		0				14:15	0		0		20		13		33	
02:30	0		0		2		2		4		14:30	0		0		25		24		49	
02:45	0		0		1	3	0	2	1	5	14:45	0		0		37	110	20	70	57	180
03:00	0		0		0		0				15:00	0		0		16		21		37	
03:15	0		0		0		0				15:15	0		0		30		20		50	
03:30	0		0		0		0				15:30	0		0		36		21		57	
03:45	0		0		0		0				15:45	0		0		33	115	18	80	51	195
04:00	0		0		0		1		1		16:00	0		0		28		27		55	
04:15	0		0		0		0				16:15	0		0		41		21		62	
04:30	0		0		3		0		3		16:30	0		0		34		30		64	
04:45	0		0		1	4	0	1	1	5	16:45	0		0		24	127	23	101	47	228
05:00	0		0		0		0				17:00	0		0		32		30		62	
05:15	0		0		3		1		4		17:15	0		0		28		25		53	
05:30	0		0		2		2		4		17:30	0		0		36		23		59	
05:45	0		0		6	11	2	5	8	16	17:45	0		0		29	125	10	88	39	213
06:00	0		0		6		0		6		18:00	0		0		32		12		44	
06:15	0		0		7		4		11		18:15	0		0		27		7		34	
06:30	0		0		10		6		16		18:30	0		0		21		8		29	
06:45	0		0		21	44	7	17	28	61	18:45	0		0		26	106	5	32	31	138
07:00	0		0		10		9		19		19:00	0		0		21		11		32	
07:15	0		0		9		10		19		19:15	0		0		12		4		16	
07:30	0		0		15		21		36		19:30	0		0		10		5		15	
07:45	0		0		26	60	19	59	45	119	19:45	0		0		15	58	6	26	21	84
08:00	0		0		31		11		42		20:00	0		0		13		3		16	
08:15	0		0		24		11		35		20:15	0		0		11		5		16	
08:30	0		0		25		19		44		20:30	0		0		13		4		17	
08:45	0		0		25	105	15	56	40	161	20:45	0		0		11	48	1	13	12	61
09:00	0		0		25		8		33		21:00	0		0		13		3		16	
09:15	0		0		15		15		30		21:15	0		0		8		5		13	
09:30	0		0		18		26		44		21:30	0		0		7		3		10	
09:45	0		0		17	75	17	66	34	141	21:45	0		0		7	35	2	13	9	48
10:00	0		0		23		21		44		22:00	0		0		2		3		5	
10:15	0		0		30		24		54		22:15	0		0		5		1		6	
10:30	0		0		20		23		43		22:30	0		0		4		2		6	
10:45	0		0		24	97	8	76	32	173	22:45	0		0		1	12	2	8	3	20
11:00	0		0		17		22		39		23:00	0		0		3		3		6	
11:15	0		0		21		11		32		23:15	0		0		4		1		5	
11:30	0		0		24		18		42		23:30	0		0		2		0		2	
11:45	0		0		23	85	15	66	38	151	23:45	0		0		3	12	0	4	3	16
TOTALS						490		349		839	TOTALS						975		595		1570
SPLIT %						58.4%		41.6%		34.8%	SPLIT %						62.1%		37.9%		65.2%

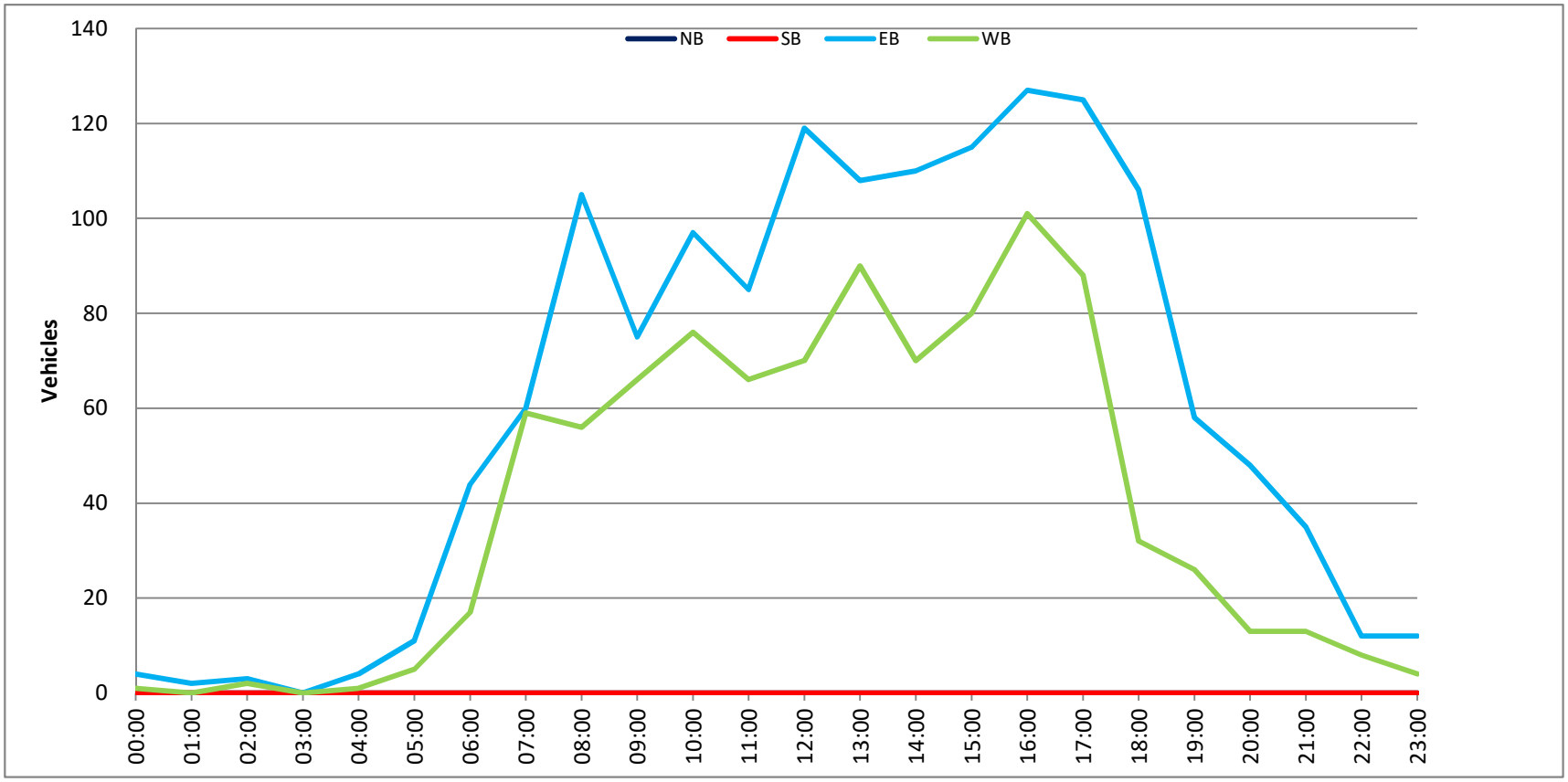
DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,465	944	2,409

AM Peak Hour			11:45	09:30	11:45	PM Peak Hour			15:30	16:30	16:15
AM Pk Volume			111	88	178	PM Pk Volume			127	108	235
Pk Hr Factor			0.455	0.846	0.482	Pk Hr Factor			0.774	0.733	0.918
7 - 9 Volume	0	0	165	115	280	4 - 6 Volume	0	0	252	189	441
7 - 9 Peak Hour			07:45	07:30	07:45	4 - 6 Peak Hour			16:15	16:30	16:15
7 - 9 Pk Volume	0	0	106	62	166	4 - 6 Pk Volume	0	0	131	108	235
Pk Hr Factor	0.000	0.000	0.855	0.738	0.922	Pk Hr Factor	0.000	0.000	0.799	0.900	0.918

Prepared by NDS/ATD

Project #: CA17_7320_001 **City:** Santa Rosa

Location: Melita Rd Bet. Susan Rd & Melita Ct **Date:** 4/27/2017



Prepared by National Data & Surveying Services

SPEED

Melita Rd Bet. Susan Rd & Melita Ct

Day: Friday
Date: 4/28/2017

City: Santa Rosa
Project #: CA17_7320_001

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1
01:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
02:00	0	0	0	1	1	1	0	0	1	0	0	0	0	4
03:00	0	0	0	0	1	1	0	0	0	0	0	0	0	2
04:00	1	0	0	1	0	0	0	0	0	0	0	0	0	2
05:00	0	0	1	1	6	7	1	0	0	0	0	0	0	16
06:00	0	0	1	9	24	22	6	3	0	0	0	0	0	65
07:00	0	1	1	11	44	27	9	0	0	0	0	0	0	93
08:00	0	0	3	25	65	42	10	2	0	0	0	0	0	147
09:00	0	0	4	30	67	24	4	1	0	0	0	0	0	130
10:00	0	1	6	41	72	26	3	0	1	0	0	0	0	150
11:00	0	0	5	50	81	29	3	0	0	0	0	0	0	168
12:00 PM	0	0	5	42	82	32	9	0	0	0	0	0	0	170
13:00	0	1	3	41	98	40	4	0	0	0	0	0	0	187
14:00	0	0	6	63	97	37	5	2	0	0	0	0	0	210
15:00	0	0	5	52	122	50	12	0	0	0	0	0	0	241
16:00	0	0	0	37	109	42	8	2	1	0	0	0	0	199
17:00	0	2	8	50	107	49	9	2	1	0	0	0	0	228
18:00	0	0	1	32	63	36	5	0	0	0	0	0	0	137
19:00	0	1	3	18	61	18	4	0	0	0	0	0	0	105
20:00	0	0	4	28	21	9	1	1	0	0	0	0	0	64
21:00	0	1	3	8	15	7	1	1	0	0	0	0	0	36
22:00	0	0	2	9	17	9	0	1	0	0	0	0	0	38
23:00	0	0	1	3	3	4	1	3	0	0	0	0	0	15
Totals	1	7	62	552	1157	512	96	18	4					2409
% of Totals	0%	0%	3%	23%	48%	21%	4%	1%	0%					100%

AM Volumes	1	2	21	169	362	179	37	6	2	0	0	0	0	779
% AM	0%	0%	1%	7%	15%	7%	2%	0%	0%					32%
AM Peak Hour	04:00	07:00	10:00	11:00	11:00	08:00	08:00	06:00	02:00					11:00
Volume	1	1	6	50	81	42	10	3	1					168
PM Volumes	0	5	41	383	795	333	59	12	2	0	0	0	0	1630
% PM		0%	2%	16%	33%	14%	2%	0%	0%					68%
PM Peak Hour		17:00	17:00	14:00	15:00	15:00	15:00	23:00	16:00					15:00
Volume		2	8	63	122	50	12	3	1					241

Directional Peak Periods All Speeds	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
	Volume	↔	%	Volume	↔	%	Volume	↔	%	Volume	↔	%
	240		10%	357		15%	427		18%	1385		57%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Melita Rd	Summary	28	33	33	38	40	2409

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Melita Rd Bet. Susan Rd & Melita Ct

Day: Friday
Date: 4/28/2017

City: Santa Rosa
Project #: CA17_7320_001

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,471	938	2,409

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00	0	0	0		0				12:00	0	0	29		13		42	
00:15	0	0	0		0				12:15	0	0	28		13		41	
00:30	0	0	0		0				12:30	0	0	26		17		43	
00:45	0	0	1	1	0		1	1	12:45	0	0	25	108	19	62	44	170
01:00	0	0	0		0				13:00	0	0	24		23		47	
01:15	0	0	1		0		1		13:15	0	0	30		17		47	
01:30	0	0	0		0				13:30	0	0	23		27		50	
01:45	0	0	0	1	0			1	13:45	0	0	25	102	18	85	43	187
02:00	0	0	0		0				14:00	0	0	37		14		51	
02:15	0	0	0		1		1		14:15	0	0	24		20		44	
02:30	0	0	1		0		1		14:30	0	0	34		24		58	
02:45	0	0	1	2	1	2	2	4	14:45	0	0	35	130	22	80	57	210
03:00	0	0	0		0				15:00	0	0	38		27		65	
03:15	0	0	0		0				15:15	0	0	37		21		58	
03:30	0	0	0		1		1		15:30	0	0	44		25		69	
03:45	0	0	1	1	0	1	1	2	15:45	0	0	26	145	23	96	49	241
04:00	0	0	0		0				16:00	0	0	37		17		54	
04:15	0	0	0		0				16:15	0	0	27		24		51	
04:30	0	0	1		0		1		16:30	0	0	35		17		52	
04:45	0	0	1	2	0		1	2	16:45	0	0	26	125	16	74	42	199
05:00	0	0	0		0				17:00	0	0	30		22		52	
05:15	0	0	2		0		2		17:15	0	0	37		21		58	
05:30	0	0	2		3		5		17:30	0	0	37		24		61	
05:45	0	0	8	12	1	4	9	16	17:45	0	0	30	134	27	94	57	228
06:00	0	0	6		0		6		18:00	0	0	24		22		46	
06:15	0	0	13		4		17		18:15	0	0	24		13		37	
06:30	0	0	11		8		19		18:30	0	0	14		10		24	
06:45	0	0	18	48	5	17	23	65	18:45	0	0	23	85	7	52	30	137
07:00	0	0	7		12		19		19:00	0	0	15		10		25	
07:15	0	0	7		4		11		19:15	0	0	17		11		28	
07:30	0	0	24		16		40		19:30	0	0	16		8		24	
07:45	0	0	15	53	8	40	23	93	19:45	0	0	19	67	9	38	28	105
08:00	0	0	24		16		40		20:00	0	0	10		4		14	
08:15	0	0	26		9		35		20:15	0	0	19		4		23	
08:30	0	0	16		19		35		20:30	0	0	12		1		13	
08:45	0	0	22	88	15	59	37	147	20:45	0	0	10	51	4	13	14	64
09:00	0	0	12		17		29		21:00	0	0	9		4		13	
09:15	0	0	15		10		25		21:15	0	0	6		2		8	
09:30	0	0	17		16		33		21:30	0	0	6		3		9	
09:45	0	0	22	66	21	64	43	130	21:45	0	0	4	25	2	11	6	36
10:00	0	0	25		17		42		22:00	0	0	7		3		10	
10:15	0	0	22		18		40		22:15	0	0	9		2		11	
10:30	0	0	11		13		24		22:30	0	0	7		2		9	
10:45	0	0	25	83	19	67	44	150	22:45	0	0	5	28	3	10	8	38
11:00	0	0	21		14		35		23:00	0	0	6		4		10	
11:15	0	0	29		16		45		23:15	0	0	1		2		3	
11:30	0	0	28		16		44		23:30	0	0	1		0		1	
11:45	0	0	27	105	17	63	44	168	23:45	0	0	1	9	0	6	1	15
TOTALS				462		317		779	TOTALS				1009		621		1630
SPLIT %				59.3%		40.7%		32.3%	SPLIT %				61.9%		38.1%		67.7%

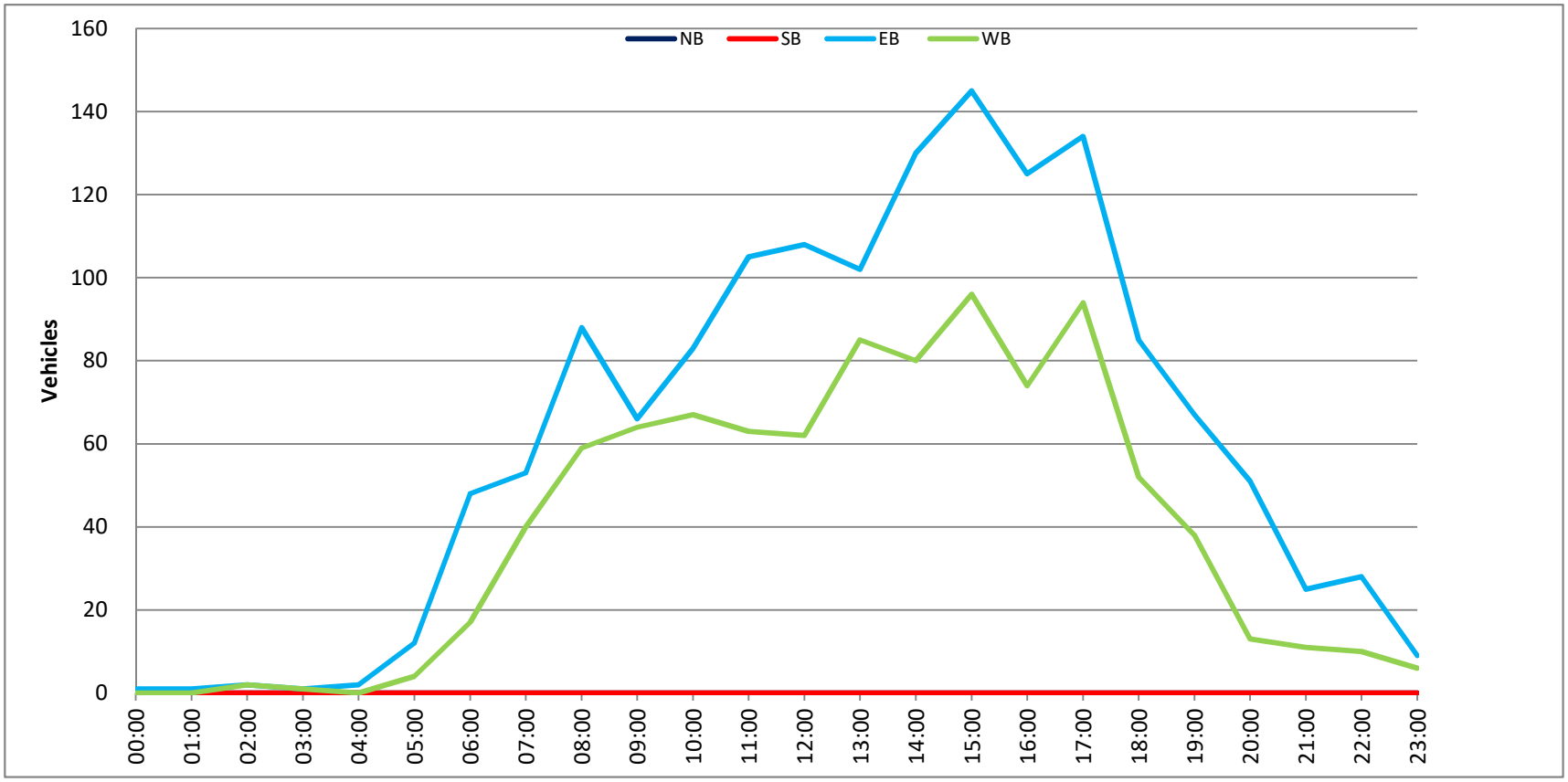
DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,471	938	2,409

AM Peak Hour			11:15	09:30	11:15	PM Peak Hour			14:45	15:00	14:45
AM Pk Volume			113	72	175	PM Pk Volume			144	96	249
Pk Hr Factor			0.974	0.857	0.972	Pk Hr Factor			0.818	0.890	0.902
7 - 9 Volume	0	0	141	99	240	4 - 6 Volume	0	0	259	168	427
7 - 9 Peak Hour			07:30	08:00	08:00	4 - 6 Peak Hour			17:00	17:00	17:00
7 - 9 Pk Volume	0	0	89	59	147	4 - 6 Pk Volume	0	0	134	94	228
Pk Hr Factor	0.000	0.000	0.856	0.776	0.919	Pk Hr Factor	0.000	0.000	0.905	0.870	0.934

Prepared by NDS/ATD

Project #: CA17_7320_001 **City:** Santa Rosa

Location: Melita Rd Bet. Susan Rd & Melita Ct **Date:** 4/28/2017



Prepared by National Data & Surveying Services

SPEED

Melita Rd Bet. Susan Rd & Melita Ct

Day: Saturday
Date: 4/29/2017

City: Santa Rosa
Project #: CA17_7320_001

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	2	0	1	0	0	0	0	0	0	3
01:00	0	1	0	0	0	1	0	1	0	0	0	0	0	3
02:00	0	0	0	0	2	1	0	0	0	0	0	0	0	3
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	1	1	3	0	0	0	0	0	0	0	5
05:00	0	0	0	1	5	2	0	0	0	0	0	0	0	8
06:00	0	0	0	6	15	3	1	2	0	0	0	0	0	27
07:00	0	0	0	11	11	11	3	0	0	0	0	0	0	36
08:00	0	0	0	19	47	22	6	1	0	0	0	0	0	95
09:00	0	0	7	24	43	26	6	0	0	0	0	0	0	106
10:00	0	0	4	55	60	24	0	0	0	0	0	0	0	143
11:00	0	0	6	41	81	27	3	1	0	0	0	0	0	159
12:00 PM	0	0	5	40	76	24	6	0	0	0	0	0	0	151
13:00	0	0	2	41	90	33	5	0	0	0	0	0	0	171
14:00	0	0	5	58	91	31	4	1	0	0	0	0	0	190
15:00	0	4	7	54	89	27	8	2	0	0	0	0	0	191
16:00	0	2	4	34	72	34	3	1	0	0	0	0	0	150
17:00	0	2	3	33	64	28	3	1	0	0	0	0	0	134
18:00	0	1	7	21	46	14	4	0	1	0	0	0	0	94
19:00	1	0	4	15	45	17	8	0	1	0	0	0	0	91
20:00	0	2	4	17	17	10	0	1	1	0	0	0	0	52
21:00	0	0	0	12	16	3	1	0	0	0	0	0	0	32
22:00	1	0	1	4	6	5	2	0	0	0	0	0	0	19
23:00	0	0	0	2	10	7	0	0	0	0	0	0	0	19
Totals	2	12	59	489	889	353	64	11	3					1882
% of Totals	0%	1%	3%	26%	47%	19%	3%	1%	0%					100%

AM Volumes	0	1	17	158	267	120	20	5	0	0	0	0	0	588
% AM		0%	1%	8%	14%	6%	1%	0%						31%
AM Peak Hour		01:00	09:00	10:00	11:00	11:00	08:00	06:00						11:00
Volume		1	7	55	81	27	6	2						159
PM Volumes	2	11	42	331	622	233	44	6	3	0	0	0	0	1294
% PM	0%	1%	2%	18%	33%	12%	2%	0%	0%					69%
PM Peak Hour	19:00	15:00	15:00	14:00	14:00	16:00	15:00	15:00	18:00					15:00
Volume	1	4	7	58	91	34	8	2	1					191

Directional Peak Periods All Speeds	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
	Volume	%	Volume	%	Volume	%	Volume	%
	131	7%	322	17%	284	15%	1145	61%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Melita Rd	Summary	27	32	32	37	40	1882

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Melita Rd Bet. Susan Rd & Melita Ct

Day: Saturday
Date: 4/29/2017

City: Santa Rosa
Project #: CA17_7320_001

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,173	709	1,882

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00	0	0	1		0		1		12:00	0	0	25		17		42	
00:15	0	0	0		0				12:15	0	0	23		20		43	
00:30	0	0	2		0		2		12:30	0	0	23		19		42	
00:45	0	0	0	3	0			3	12:45	0	0	19	90	5	61	24	151
01:00	0	0	2		0		2		13:00	0	0	20		20		40	
01:15	0	0	0		0				13:15	0	0	34		16		50	
01:30	0	0	0		0				13:30	0	0	32		11		43	
01:45	0	0	0	2	1	1	1	3	13:45	0	0	23	109	15	62	38	171
02:00	0	0	0		0				14:00	0	0	36		14		50	
02:15	0	0	0		1		1		14:15	0	0	26		15		41	
02:30	0	0	1		1		2		14:30	0	0	33		21		54	
02:45	0	0	0	1	0	2		3	14:45	0	0	36	131	9	59	45	190
03:00	0	0	0		0				15:00	0	0	42		19		61	
03:15	0	0	0		0				15:15	0	0	23		18		41	
03:30	0	0	0		0				15:30	0	0	29		22		51	
03:45	0	0	0		0				15:45	0	0	27	121	11	70	38	191
04:00	0	0	0		0				16:00	0	0	21		18		39	
04:15	0	0	1		0		1		16:15	0	0	22		15		37	
04:30	0	0	2		0		2		16:30	0	0	22		16		38	
04:45	0	0	2	5	0		2	5	16:45	0	0	23	88	13	62	36	150
05:00	0	0	1		0		1		17:00	0	0	21		17		38	
05:15	0	0	2		0		2		17:15	0	0	27		15		42	
05:30	0	0	1		0		1		17:30	0	0	18		13		31	
05:45	0	0	3	7	1	1	4	8	17:45	0	0	17	83	6	51	23	134
06:00	0	0	2		0		2		18:00	0	0	18		16		34	
06:15	0	0	10		1		11		18:15	0	0	16		9		25	
06:30	0	0	5		1		6		18:30	0	0	4		11		15	
06:45	0	0	6	23	2	4	8	27	18:45	0	0	11	49	9	45	20	94
07:00	0	0	7		1		8		19:00	0	0	15		8		23	
07:15	0	0	8		0		8		19:15	0	0	14		11		25	
07:30	0	0	4		2		6		19:30	0	0	18		6		24	
07:45	0	0	10	29	4	7	14	36	19:45	0	0	13	60	6	31	19	91
08:00	0	0	14		8		22		20:00	0	0	10		2		12	
08:15	0	0	7		3		10		20:15	0	0	13		1		14	
08:30	0	0	14		11		25		20:30	0	0	14		2		16	
08:45	0	0	18	53	20	42	38	95	20:45	0	0	9	46	1	6	10	52
09:00	0	0	15		13		28		21:00	0	0	7		0		7	
09:15	0	0	20		8		28		21:15	0	0	1		5		6	
09:30	0	0	13		16		29		21:30	0	0	6		3		9	
09:45	0	0	7	55	14	51	21	106	21:45	0	0	9	23	1	9	10	32
10:00	0	0	24		11		35		22:00	0	0	6		3		9	
10:15	0	0	14		19		33		22:15	0	0	4		2		6	
10:30	0	0	16		13		29		22:30	0	0	1		0		1	
10:45	0	0	20	74	26	69	46	143	22:45	0	0	3	14	0	5	3	19
11:00	0	0	18		18		36		23:00	0	0	2		0		2	
11:15	0	0	19		17		36		23:15	0	0	6		4		10	
11:30	0	0	33		15		48		23:30	0	0	2		2		4	
11:45	0	0	26	96	13	63	39	159	23:45	0	0	1	11	2	8	3	19
TOTALS				348		240		**588**	**TOTALS**				825		469		**1294**
SPLIT %				59.2%		40.8%		**31.2%**	**SPLIT %**				63.8%		36.2%		**68.8%**

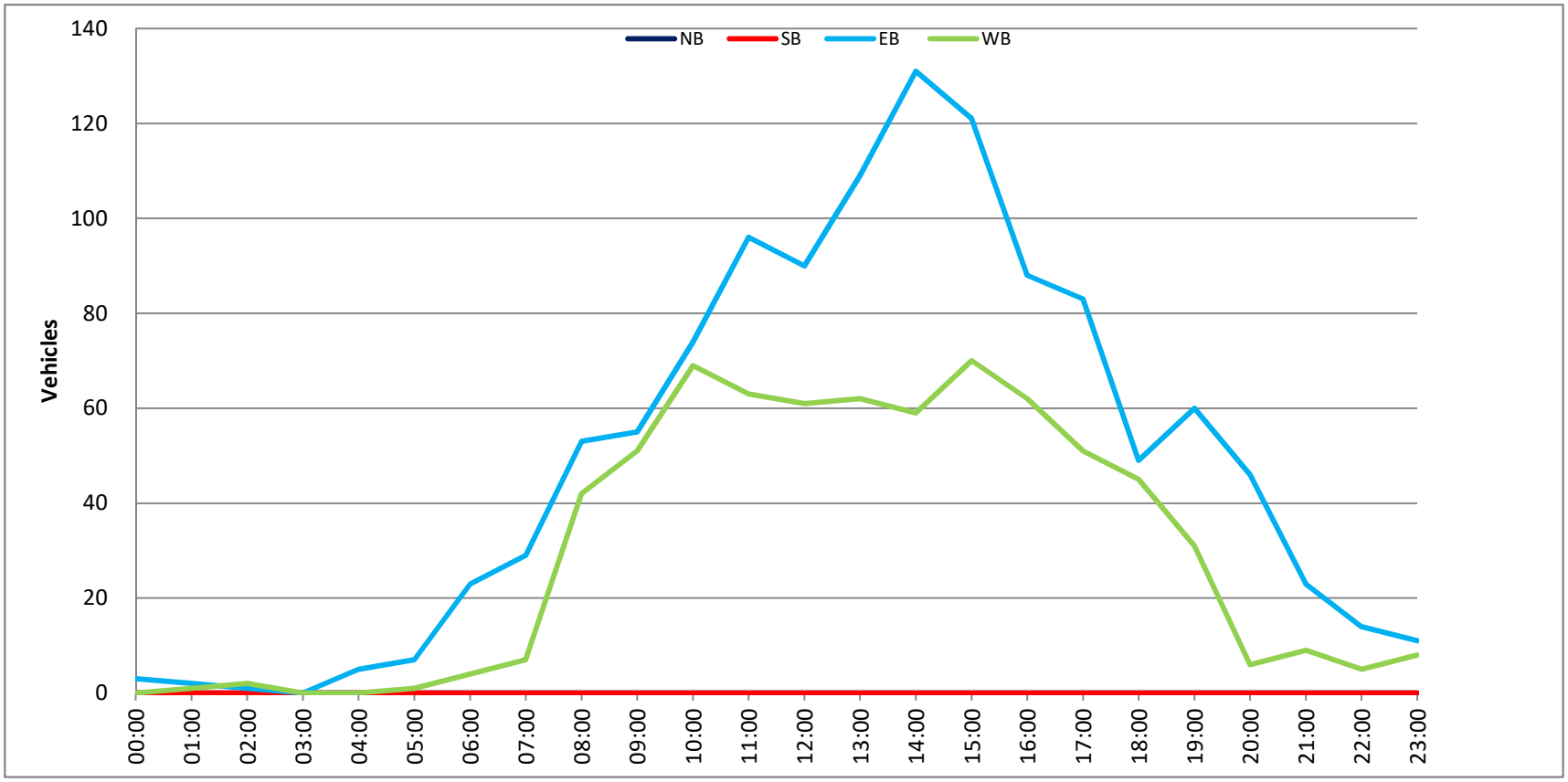
DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,173	709	1,882

AM Peak Hour				11:30	10:15	**11:30**		**PM Peak Hour**				14:15	15:00	**14:15**
AM Pk Volume				107	76	**172**		**PM Pk Volume**				130	70	**201**
Pk Hr Factor				0.636	0.731	**0.672**		**Pk Hr Factor**				0.774	0.750	**0.824**
7 - 9 Volume	0	0		82	49	**131**		**4 - 6 Volume**	0	0		171	113	**284**
7 - 9 Peak Hour				08:00	08:00	**08:00**		**4 - 6 Peak Hour**				16:30	16:00	**16:30**
7 - 9 Pk Volume	0	0		53	42	**95**		**4 - 6 Pk Volume**	0	0		93	62	**154**
Pk Hr Factor	0.000	0.000		0.736	0.525	**0.625**		**Pk Hr Factor**	0.000	0.000		0.861	0.861	**0.917**

Prepared by NDS/ATD

Project #: CA17_7320_001 **City:** Santa Rosa

Location: Melita Rd Bet. Susan Rd & Melita Ct **Date:** 4/29/2017



SPEED

Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy

Day: Thursday
Date: 4/27/2017

City: Santa Rosa
Project #: CA17_7320_003

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	1	2	8	14	26	20	5	0	**76**
01:00	0	0	0	0	1	0	2	8	20	14	9	1	2	**57**
02:00	0	0	0	0	1	1	2	8	10	15	7	1	0	**45**
03:00	0	0	0	0	0	0	1	6	8	13	7	1	2	**38**
04:00	0	0	1	0	0	3	8	15	24	38	18	9	2	**118**
05:00	0	0	0	0	3	0	20	55	129	120	56	14	5	**402**
06:00	0	0	0	0	1	27	84	261	310	203	57	7	2	**952**
07:00	0	0	0	2	35	116	408	624	356	115	22	0	0	**1678**
08:00	0	1	1	12	45	106	492	728	344	61	8	1	0	**1799**
09:00	0	0	1	2	35	163	493	657	225	44	4	0	0	**1624**
10:00	7	13	12	21	24	178	575	704	220	35	3	0	0	**1792**
11:00	0	0	1	7	28	175	551	683	277	30	2	0	0	**1754**
12:00 PM	1	0	1	4	36	191	565	653	272	31	8	0	0	**1762**
13:00	0	1	2	17	97	305	682	561	172	23	6	0	0	**1866**
14:00	2	2	4	11	56	336	699	623	166	21	3	0	0	**1923**
15:00	1	7	20	16	86	370	752	594	192	20	6	1	0	**2065**
16:00	114	175	154	93	86	304	568	375	144	22	2	1	0	**2038**
17:00	69	84	61	45	33	251	582	612	166	29	9	0	0	**1941**
18:00	0	0	2	8	27	102	296	488	385	107	20	3	0	**1438**
19:00	0	0	0	2	2	17	133	302	262	132	22	4	0	**876**
20:00	0	1	0	1	1	20	128	227	212	64	17	5	2	**678**
21:00	0	0	0	1	2	13	61	187	212	78	19	7	3	**583**
22:00	0	0	0	0	1	2	29	83	103	79	20	7	1	**325**
23:00	0	0	0	0	0	1	11	29	56	57	28	4	3	**189**
Totals	**194**	**284**	**260**	**242**	**600**	**2682**	**7144**	**8491**	**4279**	**1377**	**373**	**71**	**22**	**26019**
% of Totals	1%	1%	1%	1%	2%	10%	27%	33%	16%	5%	1%	0%	0%	100%

AM Volumes	7	14	16	44	173	770	2638	3757	1937	714	213	39	13	10335
% AM	0%	0%	0%	0%	1%	3%	10%	14%	7%	3%	1%	0%	0%	40%
AM Peak Hour	10:00	10:00	10:00	10:00	08:00	10:00	10:00	08:00	07:00	06:00	06:00	05:00	05:00	08:00
Volume	7	13	12	21	45	178	575	728	356	203	57	14	5	1799
PM Volumes	187	270	244	198	427	1912	4506	4734	2342	663	160	32	9	15684
% PM	1%	1%	1%	1%	2%	7%	17%	18%	9%	3%	1%	0%	0%	60%
PM Peak Hour	16:00	16:00	16:00	16:00	13:00	15:00	15:00	12:00	18:00	19:00	23:00	21:00	21:00	15:00
Volume	114	175	154	93	97	370	752	653	385	132	28	7	3	2065

Directional Peak Periods	**AM 7-9**			**NOON 12-2**			**PM 4-6**			**Off Peak Volumes**		
All Speeds	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%
	3477		13%	3628		14%	3979		15%	14935		57%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Sonoma Hwy (SR 12)	Summary	39	46	45	53	57	26019

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy

Day: Thursday
Date: 4/27/2017

City: Santa Rosa
Project #: CA17_7320_003

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	13,026	12,993	26,019

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00	0	0	9		14		23		12:00	0	0	234		233		467	
00:15	0	0	13		10		23		12:15	0	0	232		188		420	
00:30	0	0	7		11		18		12:30	0	0	206		210		416	
00:45	0	0	7	36	5	40	12	76	12:45	0	0	228	900	231	862	459	1762
01:00	0	0	8		11		19		13:00	0	0	214		220		434	
01:15	0	0	7		3		10		13:15	0	0	234		261		495	
01:30	0	0	11		5		16		13:30	0	0	213		239		452	
01:45	0	0	5	31	7	26	12	57	13:45	0	0	246	907	239	959	485	1866
02:00	0	0	3		2		5		14:00	0	0	233		240		473	
02:15	0	0	9		7		16		14:15	0	0	222		248		470	
02:30	0	0	8		7		15		14:30	0	0	206		279		485	
02:45	0	0	6	26	3	19	9	45	14:45	0	0	242	903	253	1020	495	1923
03:00	0	0	3		8		11		15:00	0	0	230		252		482	
03:15	0	0	4		4		8		15:15	0	0	248		258		506	
03:30	0	0	2		3		5		15:30	0	0	275		264		539	
03:45	0	0	8	17	6	21	14	38	15:45	0	0	279	1032	259	1033	538	2065
04:00	0	0	9		11		20		16:00	0	0	210		284		494	
04:15	0	0	14		9		23		16:15	0	0	233		281		514	
04:30	0	0	21		12		33		16:30	0	0	248		275		523	
04:45	0	0	32	76	10	42	42	118	16:45	0	0	246	937	261	1101	507	2038
05:00	0	0	23		16		39		17:00	0	0	239		285		524	
05:15	0	0	70		30		100		17:15	0	0	229		282		511	
05:30	0	0	82		38		120		17:30	0	0	222		250		472	
05:45	0	0	95	270	48	132	143	402	17:45	0	0	211	901	223	1040	434	1941
06:00	0	0	133		62		195		18:00	0	0	220		196		416	
06:15	0	0	134		78		212		18:15	0	0	195		178		373	
06:30	0	0	169		110		279		18:30	0	0	161		163		324	
06:45	0	0	156	592	110	360	266	952	18:45	0	0	188	764	137	674	325	1438
07:00	0	0	149		168		317		19:00	0	0	123		121		244	
07:15	0	0	192		174		366		19:15	0	0	115		116		231	
07:30	0	0	260		251		511		19:30	0	0	109		97		206	
07:45	0	0	257	858	227	820	484	1678	19:45	0	0	102	449	93	427	195	876
08:00	0	0	248		203		451		20:00	0	0	98		71		169	
08:15	0	0	218		212		430		20:15	0	0	97		77		174	
08:30	0	0	218		249		467		20:30	0	0	105		71		176	
08:45	0	0	235	919	216	880	451	1799	20:45	0	0	105	405	54	273	159	678
09:00	0	0	206		165		371		21:00	0	0	96		74		170	
09:15	0	0	228		226		454		21:15	0	0	94		69		163	
09:30	0	0	155		246		401		21:30	0	0	81		77		158	
09:45	0	0	180	769	218	855	398	1624	21:45	0	0	50	321	42	262	92	583
10:00	0	0	183		249		432		22:00	0	0	50		43		93	
10:15	0	0	194		250		444		22:15	0	0	43		39		82	
10:30	0	0	206		276		482		22:30	0	0	43		36		79	
10:45	0	0	203	786	231	1006	434	1792	22:45	0	0	33	169	38	156	71	325
11:00	0	0	195		226		421		23:00	0	0	38		43		81	
11:15	0	0	255		225		480		23:15	0	0	21		21		42	
11:30	0	0	194		232		426		23:30	0	0	19		13		32	
11:45	0	0	216	860	211	894	427	1754	23:45	0	0	20	98	14	91	34	189
TOTALS				5240		5095		10335	TOTALS				7786		7898		15684
SPLIT %				50.7%		49.3%		39.7%	SPLIT %				49.6%		50.4%		60.3%

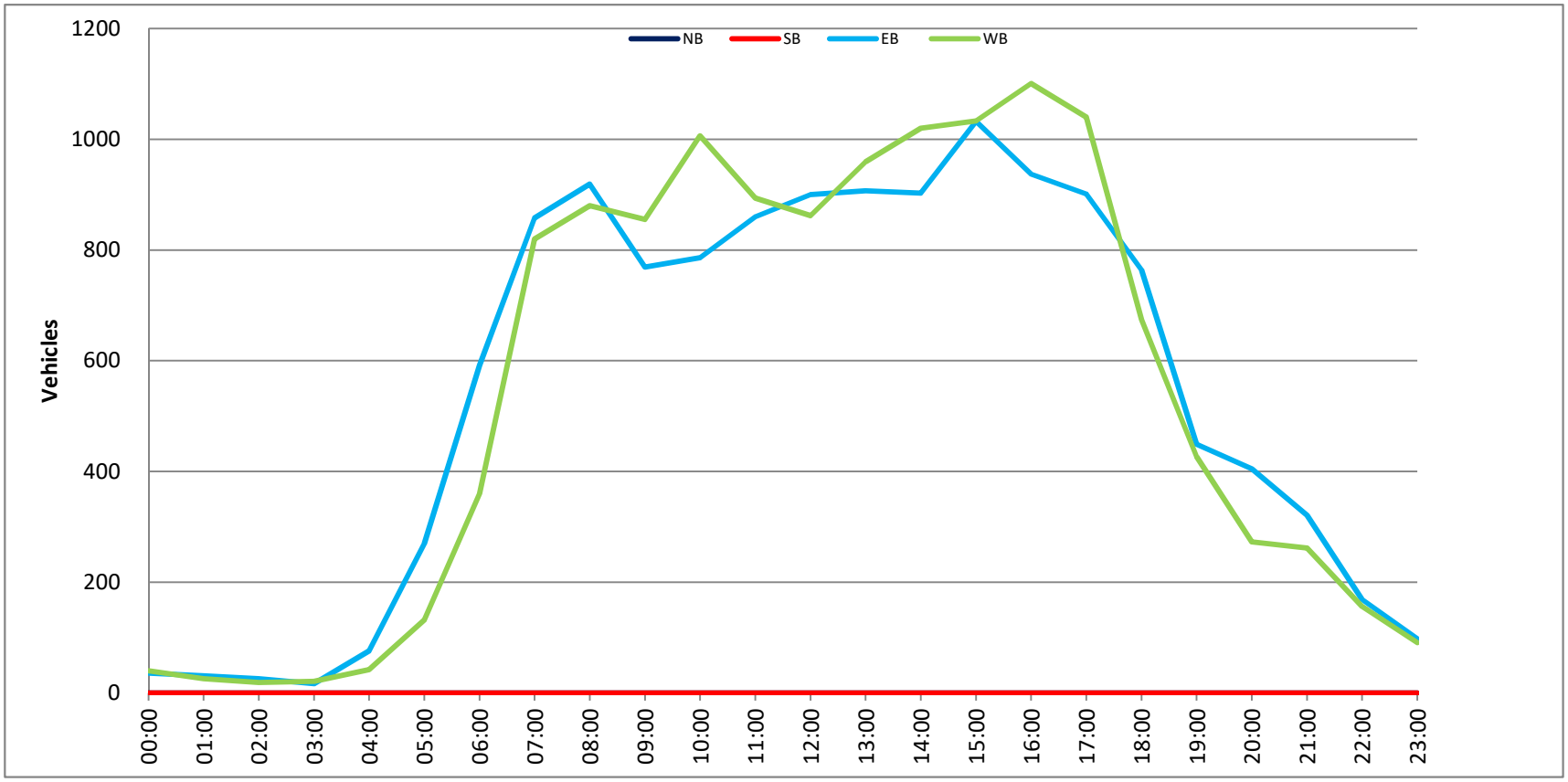
DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	13,026	12,993	26,019

AM Peak Hour				07:30		10:00		07:30	PM Peak Hour				15:00		16:30		15:30	
AM Pk Volume				983		1006		1876	PM Pk Volume				997		1103		2085	
Pk Hr Factor				0.945		0.911		0.918	Pk Hr Factor				0.893		0.912		0.967	
7 - 9 Volume	0	0		1777		1700		3477	4 - 6 Volume	0	0		1838		2141		3979	
7 - 9 Peak Hour				07:30		07:30		07:30	4 - 6 Peak Hour				16:15		16:30		16:15	
7 - 9 Pk Volume	0	0		983		893		1876	4 - 6 Pk Volume	0	0		966		1103		2068	
Pk Hr Factor	0.000	0.000		0.945		0.889		0.918	Pk Hr Factor	0.000	0.000		0.974		0.968		0.987	

Prepared by NDS/ATD

Project #: CA17_7320_003 **City:** Santa Rosa

Location: Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy **Date:** 4/27/2017



SPEED

Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy

Day: Friday
Date: 4/28/2017

City: Santa Rosa
Project #: CA17_7320_003

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	0	3	7	32	22	11	1	2	**78**
01:00	0	0	0	0	0	1	5	3	17	19	5	4	0	**54**
02:00	0	0	0	0	0	1	1	6	2	8	5	3	1	**27**
03:00	0	0	0	0	0	1	2	6	19	15	10	1	1	**55**
04:00	0	0	0	0	0	2	4	14	22	33	19	8	1	**103**
05:00	0	0	0	0	2	2	22	80	142	105	47	13	6	**419**
06:00	0	0	1	1	2	27	130	219	339	183	41	12	2	**957**
07:00	0	0	0	0	16	114	315	507	420	123	14	1	1	**1511**
08:00	0	0	3	10	38	137	475	646	366	93	8	1	0	**1777**
09:00	0	0	2	3	23	131	486	690	271	58	3	2	2	**1671**
10:00	0	0	0	3	33	156	507	700	249	47	4	3	0	**1702**
11:00	0	0	0	6	21	227	655	633	228	34	4	0	0	**1808**
12:00 PM	8	8	8	16	50	284	661	602	234	39	6	0	0	**1916**
13:00	6	2	9	12	17	205	701	612	197	28	3	0	0	**1792**
14:00	77	86	40	40	80	282	571	556	132	26	2	0	0	**1892**
15:00	35	25	29	36	99	289	716	563	169	36	3	0	1	**2001**
16:00	25	29	36	29	97	376	742	561	156	39	3	1	0	**2094**
17:00	195	202	178	119	138	213	397	300	115	28	1	0	0	**1886**
18:00	0	1	0	0	8	64	281	528	408	112	16	3	0	**1421**
19:00	0	0	0	0	3	23	138	344	302	90	23	0	0	**923**
20:00	0	0	5	1	5	18	97	235	262	65	9	2	0	**699**
21:00	0	0	0	0	6	17	81	164	178	75	15	2	1	**539**
22:00	0	0	0	1	0	3	27	133	140	73	21	4	2	**404**
23:00	0	0	0	0	3	21	27	73	84	51	16	2	1	**278**
Totals	**346**	**353**	**311**	**277**	**641**	**2594**	**7044**	**8182**	**4484**	**1402**	**289**	**63**	**21**	**26007**
% of Totals	1%	1%	1%	1%	2%	10%	27%	31%	17%	5%	1%	0%	0%	100%

AM Volumes	0	0	6	23	135	799	2605	3511	2107	740	171	49	16	10162
% AM			0%	0%	1%	3%	10%	14%	8%	3%	1%	0%	0%	39%
AM Peak Hour			08:00	08:00	08:00	11:00	11:00	10:00	07:00	06:00	05:00	05:00	05:00	11:00
Volume			3	10	38	227	655	700	420	183	47	13	6	1808
PM Volumes	346	353	305	254	506	1795	4439	4671	2377	662	118	14	5	15845
% PM	1%	1%	1%	1%	2%	7%	17%	18%	9%	3%	0%	0%	0%	61%
PM Peak Hour	17:00	17:00	17:00	17:00	17:00	16:00	16:00	13:00	18:00	18:00	19:00	22:00	22:00	16:00
Volume	195	202	178	119	138	376	742	612	408	112	23	4	2	2094

Directional Peak Periods	**AM 7-9**			**NOON 12-2**			**PM 4-6**			**Off Peak Volumes**		
All Speeds	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%
	3288		13%	3708		14%	3980		15%	15031		58%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Sonoma Hwy (SR 12)	Summary	39	46	45	53	57	26007

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy

Day: Friday
Date: 4/28/2017

City: Santa Rosa
Project #: CA17_7320_003

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	13,191	12,816	26,007

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00	0	0	22		13		35		12:00	0	0	256		196		452	
00:15	0	0	7		14		21		12:15	0	0	260		223		483	
00:30	0	0	4		7		11		12:30	0	0	222		260		482	
00:45	0	0	9	42	2	36	11	78	12:45	0	0	241	979	258	937	499	1916
01:00	0	0	9		7		16		13:00	0	0	192		234		426	
01:15	0	0	8		8		16		13:15	0	0	234		196		430	
01:30	0	0	8		3		11		13:30	0	0	214		271		485	
01:45	0	0	7	32	4	22	11	54	13:45	0	0	218	858	233	934	451	1792
02:00	0	0	1		3		4		14:00	0	0	242		241		483	
02:15	0	0	2		6		8		14:15	0	0	240		248		488	
02:30	0	0	7		2		9		14:30	0	0	219		301		520	
02:45	0	0	4	14	2	13	6	27	14:45	0	0	261	962	140	930	401	1892
03:00	0	0	2		3		5		15:00	0	0	215		194		409	
03:15	0	0	9		10		19		15:15	0	0	265		292		557	
03:30	0	0	11		5		16		15:30	0	0	274		245		519	
03:45	0	0	8	30	7	25	15	55	15:45	0	0	258	1012	258	989	516	2001
04:00	0	0	6		5		11		16:00	0	0	274		272		546	
04:15	0	0	9		8		17		16:15	0	0	256		262		518	
04:30	0	0	25		9		34		16:30	0	0	232		298		530	
04:45	0	0	28	68	13	35	41	103	16:45	0	0	234	996	266	1098	500	2094
05:00	0	0	31		19		50		17:00	0	0	241		264		505	
05:15	0	0	44		38		82		17:15	0	0	263		215		478	
05:30	0	0	89		31		120		17:30	0	0	256		223		479	
05:45	0	0	117	281	50	138	167	419	17:45	0	0	224	984	200	902	424	1886
06:00	0	0	148		52		200		18:00	0	0	208		194		402	
06:15	0	0	161		82		243		18:15	0	0	172		204		376	
06:30	0	0	139		110		249		18:30	0	0	176		163		339	
06:45	0	0	172	620	93	337	265	957	18:45	0	0	149	705	155	716	304	1421
07:00	0	0	153		166		319		19:00	0	0	146		141		287	
07:15	0	0	167		174		341		19:15	0	0	129		112		241	
07:30	0	0	214		215		429		19:30	0	0	115		96		211	
07:45	0	0	219	753	203	758	422	1511	19:45	0	0	103	493	81	430	184	923
08:00	0	0	235		207		442		20:00	0	0	86		101		187	
08:15	0	0	238		207		445		20:15	0	0	98		82		180	
08:30	0	0	201		221		422		20:30	0	0	100		74		174	
08:45	0	0	247	921	221	856	468	1777	20:45	0	0	90	374	68	325	158	699
09:00	0	0	205		204		409		21:00	0	0	83		66		149	
09:15	0	0	209		203		412		21:15	0	0	77		66		143	
09:30	0	0	169		251		420		21:30	0	0	75		56		131	
09:45	0	0	205	788	225	883	430	1671	21:45	0	0	68	303	48	236	116	539
10:00	0	0	186		237		423		22:00	0	0	75		46		121	
10:15	0	0	190		242		432		22:15	0	0	54		40		94	
10:30	0	0	177		246		423		22:30	0	0	48		52		100	
10:45	0	0	189	742	235	960	424	1702	22:45	0	0	51	228	38	176	89	404
11:00	0	0	218		251		469		23:00	0	0	37		38		75	
11:15	0	0	237		201		438		23:15	0	0	37		41		78	
11:30	0	0	222		225		447		23:30	0	0	24		30		54	
11:45	0	0	203	880	251	928	454	1808	23:45	0	0	28	126	43	152	71	278
TOTALS				5171		4991		10162	TOTALS				8020		7825		15845
SPLIT %				50.9%		49.1%		39.1%	SPLIT %				50.6%		49.4%		60.9%

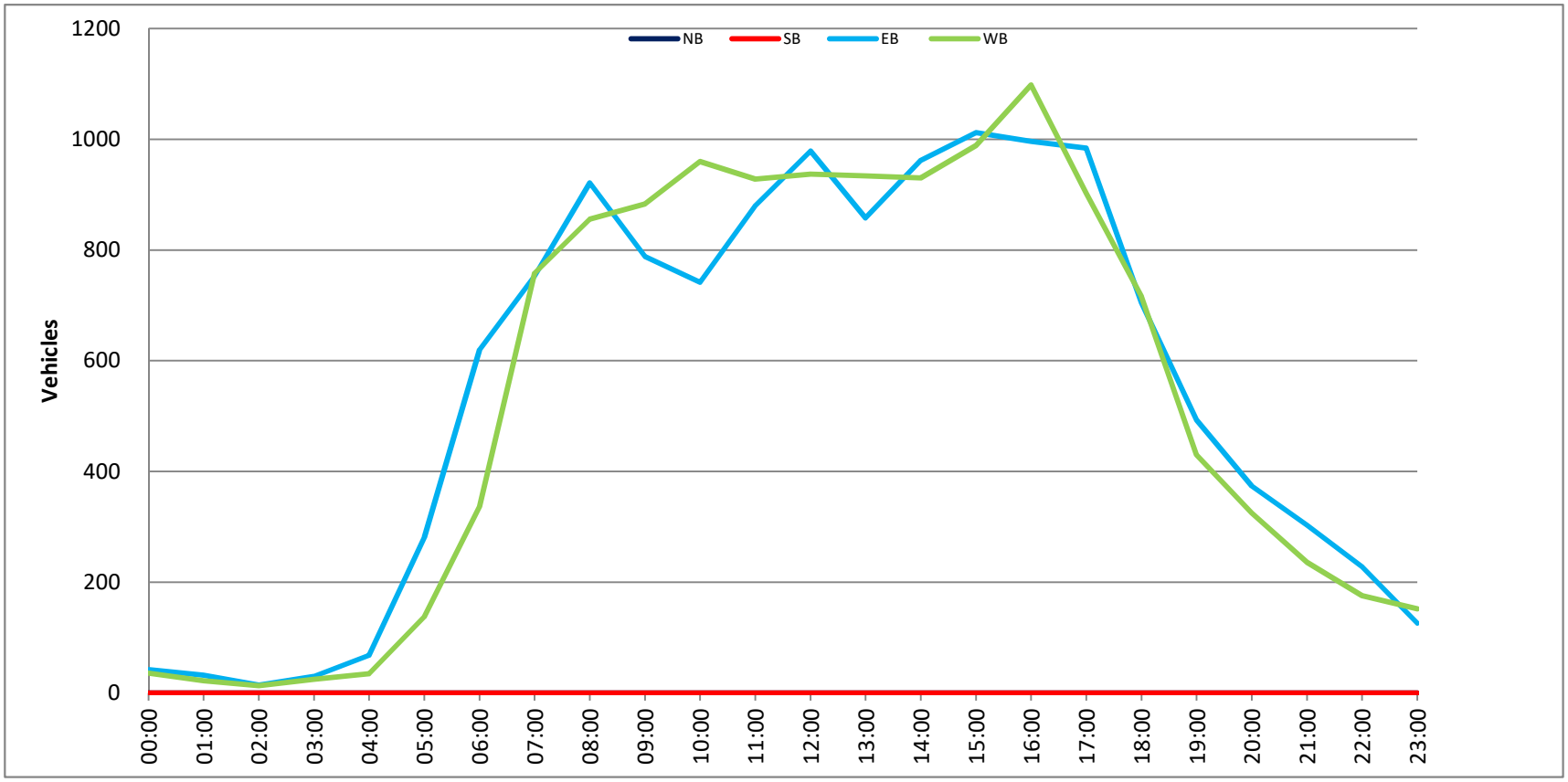
DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	13,191	12,816	26,007

AM Peak Hour			11:30	10:15	11:45	PM Peak Hour		15:15	16:00	15:15
AM Pk Volume			941	974	1871	PM Pk Volume		1020	1098	2138
Pk Hr Factor			0.665	0.970	0.499	Pk Hr Factor		0.931	0.875	0.960
7 - 9 Volume	0	0	1674	1614	3288	4 - 6 Volume	0	1980	2000	3980
7 - 9 Peak Hour			08:00	08:00	08:00	4 - 6 Peak Hour		16:00	16:00	16:00
7 - 9 Pk Volume	0	0	921	856	1777	4 - 6 Pk Volume	0	996	1098	2094
Pk Hr Factor	0.000	0.000	0.932	0.968	0.949	Pk Hr Factor	0.000	0.909	0.921	0.959

Prepared by NDS/ATD

Project #: CA17_7320_003 **City:** Santa Rosa

Location: Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy **Date:** 4/28/2017



SPEED

Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy

Day: Saturday
Date: 4/29/2017

City: Santa Rosa
Project #: CA17_7320_003

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	1	0	1	9	37	35	22	15	3	1	124
01:00	0	0	0	0	0	0	1	18	26	17	5	3	1	71
02:00	0	0	0	0	0	2	10	5	14	16	5	0	3	55
03:00	0	0	0	0	0	0	2	7	8	8	8	2	1	36
04:00	0	0	0	0	0	0	7	14	19	23	13	5	1	82
05:00	0	0	0	1	0	2	14	53	80	66	18	3	3	240
06:00	0	0	0	0	0	3	26	122	170	100	26	7	2	456
07:00	0	0	1	0	0	6	54	194	292	115	17	5	5	689
08:00	0	0	3	1	3	30	220	473	320	71	12	2	0	1135
09:00	0	0	0	1	4	107	393	616	266	54	7	0	0	1448
10:00	0	0	1	2	18	182	679	593	185	28	0	2	0	1690
11:00	3	1	3	13	44	219	652	634	153	33	3	1	1	1760
12:00 PM	1	5	7	10	39	234	667	649	199	26	5	0	0	1842
13:00	0	0	1	2	36	216	686	672	217	25	3	1	1	1860
14:00	0	0	0	1	29	176	574	652	242	36	4	2	0	1716
15:00	0	1	1	8	28	174	639	703	219	26	3	0	0	1802
16:00	0	0	0	5	18	167	558	625	277	63	5	0	0	1718
17:00	0	0	0	0	9	78	363	614	359	101	14	2	0	1540
18:00	0	0	0	0	8	33	211	459	349	107	9	3	0	1179
19:00	0	0	0	0	1	23	132	331	328	112	13	0	0	940
20:00	0	0	0	1	3	20	113	251	219	54	13	4	0	678
21:00	0	1	0	2	2	7	53	177	189	82	25	2	2	542
22:00	0	0	0	1	1	21	34	101	162	100	25	6	0	451
23:00	0	0	0	0	1	1	31	73	103	71	25	6	2	313
Totals	4	8	17	49	244	1702	6128	8073	4431	1356	273	59	23	22367
% of Totals	0%	0%	0%	0%	1%	8%	27%	36%	20%	6%	1%	0%	0%	100%

AM Volumes	3	1	8	19	69	552	2067	2766	1568	553	129	33	18	7786
% AM	0%	0%	0%	0%	0%	2%	9%	12%	7%	2%	1%	0%	0%	35%
AM Peak Hour	11:00	11:00	08:00	11:00	11:00	11:00	10:00	11:00	08:00	07:00	06:00	06:00	07:00	11:00
Volume	3	1	3	13	44	219	679	634	320	115	26	7	5	1760
PM Volumes	1	7	9	30	175	1150	4061	5307	2863	803	144	26	5	14581
% PM	0%	0%	0%	0%	1%	5%	18%	24%	13%	4%	1%	0%	0%	65%
PM Peak Hour	12:00	12:00	12:00	12:00	12:00	12:00	13:00	15:00	17:00	19:00	21:00	22:00	21:00	13:00
Volume	1	5	7	10	39	234	686	703	359	112	25	6	2	1860

Directional Peak Periods All Speeds	AM 7-9 Volume	AM 7-9 ↔	AM 7-9 %	NOON 12-2 Volume	NOON 12-2 ↔	NOON 12-2 %	PM 4-6 Volume	PM 4-6 ↔	PM 4-6 %	Off Peak Volumes Volume	Off Peak Volumes ↔	Off Peak Volumes %
	1824	↔	8%	3702	↔	17%	3258	↔	15%	13583	↔	61%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
Sonoma Hwy (SR 12)	Summary	41	47	47	53	57	22367

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy

Day: Saturday
Date: 4/29/2017

City: Santa Rosa
Project #: CA17_7320_003

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	11,037	11,330	22,367

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00	0	0	17		19		36		12:00	0	0	199		242		441	
00:15	0	0	16		20		36		12:15	0	0	235		230		465	
00:30	0	0	16		11		27		12:30	0	0	206		266		472	
00:45	0	0	17	66	8	58	25	124	12:45	0	0	243	883	221	959	464	1842
01:00	0	0	12		11		23		13:00	0	0	198		223		421	
01:15	0	0	10		7		17		13:15	0	0	229		210		439	
01:30	0	0	8		7		15		13:30	0	0	252		250		502	
01:45	0	0	11	41	5	30	16	71	13:45	0	0	283	962	215	898	498	1860
02:00	0	0	9		4		13		14:00	0	0	228		215		443	
02:15	0	0	12		2		14		14:15	0	0	206		208		414	
02:30	0	0	6		7		13		14:30	0	0	222		236		458	
02:45	0	0	6	33	9	22	15	55	14:45	0	0	196	852	205	864	401	1716
03:00	0	0	2		3		5		15:00	0	0	215		243		458	
03:15	0	0	3		4		7		15:15	0	0	227		207		434	
03:30	0	0	7		5		12		15:30	0	0	237		222		459	
03:45	0	0	7	19	5	17	12	36	15:45	0	0	215	894	236	908	451	1802
04:00	0	0	8		7		15		16:00	0	0	223		201		424	
04:15	0	0	5		4		9		16:15	0	0	210		228		438	
04:30	0	0	19		6		25		16:30	0	0	203		231		434	
04:45	0	0	25	57	8	25	33	82	16:45	0	0	228	864	194	854	422	1718
05:00	0	0	12		7		19		17:00	0	0	195		231		426	
05:15	0	0	37		18		55		17:15	0	0	197		203		400	
05:30	0	0	37		17		54		17:30	0	0	173		174		347	
05:45	0	0	79	165	33	75	112	240	17:45	0	0	149	714	218	826	367	1540
06:00	0	0	83		25		108		18:00	0	0	160		157		317	
06:15	0	0	78		39		117		18:15	0	0	156		164		320	
06:30	0	0	66		45		111		18:30	0	0	150		148		298	
06:45	0	0	74	301	46	155	120	456	18:45	0	0	114	580	130	599	244	1179
07:00	0	0	71		67		138		19:00	0	0	147		117		264	
07:15	0	0	93		73		166		19:15	0	0	117		140		257	
07:30	0	0	83		111		194		19:30	0	0	118		114		232	
07:45	0	0	92	339	99	350	191	689	19:45	0	0	99	481	88	459	187	940
08:00	0	0	136		105		241		20:00	0	0	91		90		181	
08:15	0	0	124		149		273		20:15	0	0	78		83		161	
08:30	0	0	148		171		319		20:30	0	0	96		93		189	
08:45	0	0	140	548	162	587	302	1135	20:45	0	0	75	340	72	338	147	678
09:00	0	0	148		188		336		21:00	0	0	70		68		138	
09:15	0	0	183		169		352		21:15	0	0	73		69		142	
09:30	0	0	170		207		377		21:30	0	0	70		64		134	
09:45	0	0	166	667	217	781	383	1448	21:45	0	0	66	279	62	263	128	542
10:00	0	0	179		227		406		22:00	0	0	67		66		133	
10:15	0	0	195		217		412		22:15	0	0	58		54		112	
10:30	0	0	191		257		448		22:30	0	0	52		63		115	
10:45	0	0	175	740	249	950	424	1690	22:45	0	0	47	224	44	227	91	451
11:00	0	0	179		256		435		23:00	0	0	57		57		114	
11:15	0	0	232		213		445		23:15	0	0	47		42		89	
11:30	0	0	216		248		464		23:30	0	0	23		40		63	
11:45	0	0	210	837	206	923	416	1760	23:45	0	0	24	151	23	162	47	313
TOTALS				3813		3973		7786	TOTALS				7224		7357		14581
SPLIT %				49.0%		51.0%		34.8%	SPLIT %				49.5%		50.5%		65.2%

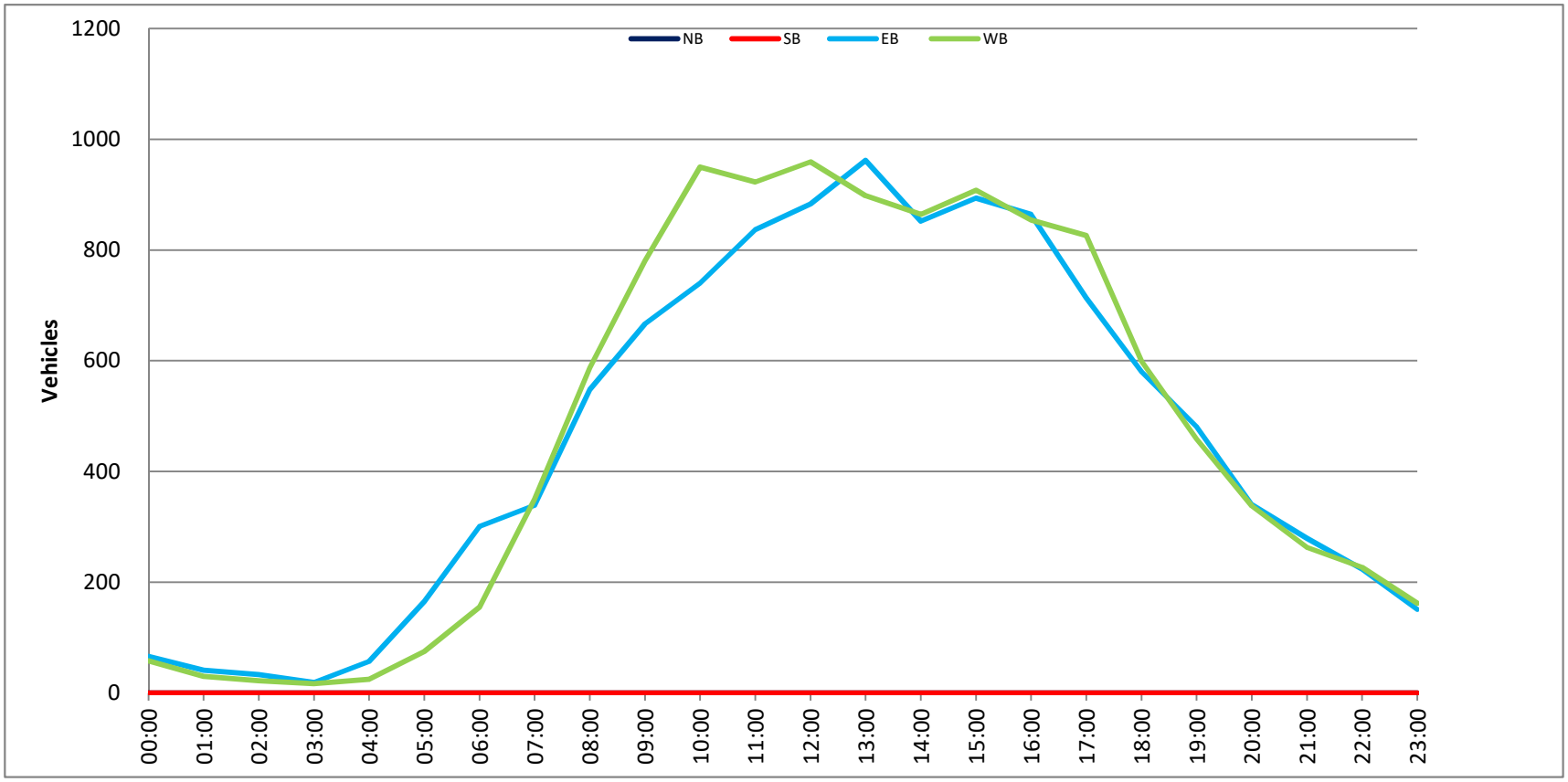
DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	11,037	11,330	22,367

AM Peak Hour			11:30	10:15	11:45	PM Peak Hour		13:15	12:00	13:15
AM Pk Volume			860	979	1794	PM Pk Volume		939	959	1882
Pk Hr Factor			0.723	0.952	0.486	Pk Hr Factor		0.830	0.901	0.937
7 - 9 Volume	0	0	887	937	1824	4 - 6 Volume	0	1578	1680	3258
7 - 9 Peak Hour			08:00	08:00	08:00	4 - 6 Peak Hour		16:00	16:15	16:15
7 - 9 Pk Volume	0	0	548	587	1135	4 - 6 Pk Volume	0	864	884	1720
Pk Hr Factor	0.000	0.000	0.926	0.858	0.889	Pk Hr Factor	0.000	0.947	0.957	0.982

Prepared by NDS/ATD

Project #: CA17_7320_003 **City:** Santa Rosa

Location: Sonoma Hwy (SR 12) E/O 6037 Sonoma Hwy **Date:** 4/29/2017





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Appendix B

Collision Rate Calculations



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Intersection Collision Rate Calculations

Elnoka CCRC Project

Intersection # 1: Sonoma Highway & Calistoga Road

Date of Count: Tuesday, August 01, 2017

Number of Collisions: 15
Number of Injuries: 8
Number of Fatalities: 1
ADT: 30800
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{15 \times 1{,}000{,}000}{30{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.27 c/mve**	**6.7%**	**53.3%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 2: Sonoma Highway & Melita Road(west)

Date of Count: Tuesday, August 01, 2017

Number of Collisions: 5
Number of Injuries: 2
Number of Fatalities: 0
ADT: 23600
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{5 \times 1{,}000{,}000}{23{,}600 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.12 c/mve**	**0.0%**	**40.0%**
Statewide Average*	**0.15 c/mve**	**1.0%**	**41.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Elnoka CCRC Project

Intersection # 3: Sonoma Highway & Mountain Hawk Drive

Date of Count: Tuesday, August 01, 2017

Number of Collisions: 11
Number of Injuries: 9
Number of Fatalities: 1
ADT: 21200
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{11 \times 1{,}000{,}000}{21{,}200 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.28 c/mve**	**9.1%**	**81.8%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 4: Sonoma Highway & Los Alamos Road

Date of Count: Tuesday, August 01, 2017

Number of Collisions: 14
Number of Injuries: 11
Number of Fatalities: 0
ADT: 22400
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{14 \times 1{,}000{,}000}{22{,}400 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.34 c/mve**	**0.0%**	**78.6%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Elnoka CCRC Project

Intersection # 5: Sonoma Highway & Melita Road(east)

Date of Count: 8//1/17

Number of Collisions: 6
Number of Injuries: 3
Number of Fatalities: 0
ADT: 22800
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{6 \times 1{,}000{,}000}{22{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.14 c/mve**	**0.0%**	**50.0%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 7: Sonoma Highwya & Oakmont Drive

Date of Count: Tuesday, August 01, 2017

Number of Collisions: 14
Number of Injuries: 1
Number of Fatalities: 0
ADT: 21900
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{14 \times 1{,}000{,}000}{21{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.35 c/mve**	**0.0%**	**7.1%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Elnoka CCRC Project

Intersection # 8: Melita Road & Montgomery Drive

Date of Count: Tuesday, August 01, 2017

Number of Collisions: 1
Number of Injuries: 0
Number of Fatalities: 0
ADT: 7500
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Tee
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{7{,}500 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.07 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.18 c/mve**	**0.7%**	**36.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 9: Melita Road & Los Alamos Road

Date of Count: Tuesday, August 01, 2017

Number of Collisions: 2
Number of Injuries: 0
Number of Fatalities: 0
ADT: 6900
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Tee
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{2 \times 1{,}000{,}000}{6{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.16 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.18 c/mve**	**0.7%**	**36.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

SEGMENT COLLISION RATE CALCULATIONS

Elnoka CCRC Project

Location: Sonoma Highway between Calistoga & Oakmont

Date of Count: Thursday, April 27, 2017
ADT: 26,000

Number of Collisions: 47
Number of Injuries: 23
Number of Fatalities: 0
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Highway Type: Divided 4 lanes
Area: Urban
Design Speed: >45

Segment Length: 3.2 miles
Direction: East/West

$$\frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times 365 \text{ Days per Year} \times \text{Segment Length} \times \text{Number of Years}}$$

$$\frac{47 \times 1{,}000{,}000}{26{,}000 \times 365 \times 3.2 \times 5}$$

	Collision Rate		Fatality Rate	Injury Rate
Study Segment	**0.31**	**c/mvm**	**0.0%**	**48.9%**
Statewide Average*	**1.45**	**c/mvm**	**0.7%**	**40.8%**

ADT = average daily traffic volume
c/mvm = collisions per million vehicle miles
* 2013 Collision Data on California State Highways, Caltrans



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Appendix C

Intersection Level of Service Calculations



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HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	457	670	20	15	935	215	24	4	5	234	0	402
Future Volume (veh/h)	457	670	20	15	935	215	24	4	5	234	0	402
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	502	736	13	16	1027	131	26	4	3	257	0	267
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	602	1642	739	58	1026	131	109	17	13	320	0	563
Arrive On Green	0.18	0.48	0.48	0.03	0.33	0.33	0.08	0.08	0.08	0.18	0.00	0.18
Sat Flow, veh/h	3408	3438	1548	1774	3074	392	1390	214	160	1757	0	1568
Grp Volume(v), veh/h	502	736	13	16	576	582	33	0	0	257	0	267
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1741	1764	0	0	1757	0	1568
Q Serve(g_s), s	12.9	12.9	0.4	0.8	30.2	30.2	1.6	0.0	0.0	12.7	0.0	11.9
Cycle Q Clear(g_c), s	12.9	12.9	0.4	0.8	30.2	30.2	1.6	0.0	0.0	12.7	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.23	0.79		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	602	1642	739	58	576	581	139	0	0	320	0	563
V/C Ratio(X)	0.83	0.45	0.02	0.27	1.00	1.00	0.24	0.00	0.00	0.80	0.00	0.47
Avail Cap(c_a), veh/h	840	1642	739	202	576	581	700	0	0	483	0	709
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	15.7	12.5	42.7	30.1	30.1	39.1	0.0	0.0	35.5	0.0	22.4
Incr Delay (d2), s/veh	5.2	0.3	0.0	2.5	37.6	37.8	0.9	0.0	0.0	5.7	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	6.1	0.2	0.4	20.3	20.5	0.8	0.0	0.0	6.6	0.0	5.2
LnGrp Delay(d),s/veh	41.1	16.0	12.5	45.2	67.8	68.0	40.0	0.0	0.0	41.2	0.0	23.0
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1251			1174			33			524	
Approach Delay, s/veh		26.0			67.6			40.0			31.9	
Approach LOS		C			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	49.0		21.6	20.7	36.0		12.2
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.8	14.9		14.7	14.9	32.2		3.6
Green Ext Time (p_c), s	0.0	19.0		1.8	1.1	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	43.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	914	12	0	1150	31	0	0	7	0	0	14
Future Vol, veh/h	0	914	12	0	1150	31	0	0	7	0	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	972	13	0	1223	33	0	0	7	0	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	493	-	-	631
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	522	0	0	424
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	522	-	-	423
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12	13.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	522	-	-	-	-	423
HCM Lane V/C Ratio	0.014	-	-	-	-	0.035
HCM Control Delay (s)	12	-	-	-	-	13.8
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.1

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	139	726	9	5	752	17	22	32	4	57	41	250
Future Volume (veh/h)	139	726	9	5	752	17	22	32	4	57	41	250
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	145	756	7	5	783	12	23	33	0	59	72	62
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	554	1896	18	28	1379	21	309	351	0	353	351	298
Arrive On Green	0.16	0.54	0.54	0.02	0.40	0.40	0.19	0.19	0.00	0.19	0.19	0.19
Sat Flow, veh/h	3442	3492	32	1774	3468	53	1250	1863	0	1370	1863	1583
Grp Volume(v), veh/h	145	372	391	5	388	407	23	33	0	59	72	62
Grp Sat Flow(s),veh/h/ln	1721	1720	1804	1774	1720	1801	1250	1863	0	1370	1863	1583
Q Serve(g_s), s	2.3	7.9	7.9	0.2	11.0	11.0	1.0	0.9	0.0	2.3	2.1	2.1
Cycle Q Clear(g_c), s	2.3	7.9	7.9	0.2	11.0	11.0	3.0	0.9	0.0	3.3	2.1	2.1
Prop In Lane	1.00		0.02	1.00		0.03	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	554	934	980	28	684	716	309	351	0	353	351	298
V/C Ratio(X)	0.26	0.40	0.40	0.18	0.57	0.57	0.07	0.09	0.00	0.17	0.21	0.21
Avail Cap(c_a), veh/h	673	971	1019	347	971	1016	736	986	0	820	986	838
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	8.4	8.4	30.5	14.7	14.7	22.8	21.1	0.0	22.4	21.5	21.6
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.1	0.7	0.7	0.0	0.0	0.0	0.1	0.1	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	1.1	3.8	4.0	0.1	5.3	5.6	0.3	0.5	0.0	0.9	1.1	0.9
LnGrp Delay(d),s/veh	23.2	8.7	8.7	31.6	15.5	15.4	22.9	21.1	0.0	22.5	21.7	21.7
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		908			800			56			193	
Approach Delay, s/veh		11.0			15.6			21.8			21.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	40.6		16.5	14.8	31.5		16.5
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	9.9		5.3	4.3	13.0		5.0
Green Ext Time (p_c), s	0.0	9.4		0.6	0.1	8.9		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	737	22	159	692	9	28	20	152	22	63	35
Future Volume (veh/h)	22	737	22	159	692	9	28	20	152	22	63	35
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	24	819	0	177	769	0	31	22	80	24	70	19
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	104	1435	0	266	1747	0	185	104	239	110	240	248
Arrive On Green	0.07	0.46	0.00	0.17	0.56	0.00	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1597	3178	0	1597	3177	0	551	603	1389	225	1393	1439
Grp Volume(v), veh/h	24	819	0	177	769	0	53	0	80	94	0	19
Grp Sat Flow(s),veh/h/ln	1597	1548	0	1597	1548	0	1154	0	1389	1618	0	1439
Q Serve(g_s), s	0.9	12.2	0.0	6.6	9.1	0.0	0.5	0.0	3.2	0.0	0.0	0.7
Cycle Q Clear(g_c), s	0.9	12.2	0.0	6.6	9.1	0.0	3.5	0.0	3.2	3.0	0.0	0.7
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.26		1.00
Lane Grp Cap(c), veh/h	104	1435	0	266	1747	0	289	0	239	350	0	248
V/C Ratio(X)	0.23	0.57	0.00	0.67	0.44	0.00	0.18	0.00	0.33	0.27	0.00	0.08
Avail Cap(c_a), veh/h	304	1964	0	304	1963	0	717	0	694	855	0	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.0	12.4	0.0	24.6	8.0	0.0	22.6	0.0	22.9	22.9	0.0	21.9
Incr Delay (d2), s/veh	1.1	0.5	0.0	4.5	0.2	0.0	0.3	0.0	0.8	0.4	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	0.4	5.2	0.0	3.2	3.9	0.0	0.8	0.0	1.3	1.5	0.0	0.3
LnGrp Delay(d),s/veh	29.1	12.9	0.0	29.2	8.2	0.0	22.9	0.0	23.8	23.3	0.0	22.0
LnGrp LOS	C	B		C	A		C		C	C		C
Approach Vol, veh/h		843			946			133			113	
Approach Delay, s/veh		13.3			12.1			23.4			23.1	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.5	35.2		14.4	7.1	41.6		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	13.6	14.2		5.0	2.9	11.1		5.5
Green Ext Time (p_c), s	0.1	15.0		1.1	0.0	16.1		1.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.0
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	852	11	39	830	24	10	17	80	43	6	17
Future Volume (veh/h)	50	852	11	39	830	24	10	17	80	43	6	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	52	888	8	41	865	22	10	18	19	45	6	8
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	208	1141	10	169	1081	27	72	100	82	232	26	189
Arrive On Green	0.12	0.64	0.64	0.10	0.61	0.61	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1791	16	1774	1757	45	170	834	681	1270	219	1583
Grp Volume(v), veh/h	52	0	896	41	0	887	47	0	0	51	0	8
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	0	1802	1685	0	0	1488	0	1583
Q Serve(g_s), s	2.2	0.0	30.1	1.8	0.0	31.4	0.0	0.0	0.0	0.1	0.0	0.4
Cycle Q Clear(g_c), s	2.2	0.0	30.1	1.8	0.0	31.4	2.1	0.0	0.0	2.2	0.0	0.4
Prop In Lane	1.00		0.01	1.00		0.02	0.21		0.40	0.88		1.00
Lane Grp Cap(c), veh/h	208	0	1151	169	0	1108	253	0	0	259	0	189
V/C Ratio(X)	0.25	0.00	0.78	0.24	0.00	0.80	0.19	0.00	0.00	0.20	0.00	0.04
Avail Cap(c_a), veh/h	295	0	1416	274	0	1390	552	0	0	517	0	479
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.8	0.0	11.0	35.3	0.0	12.3	33.5	0.0	0.0	33.6	0.0	32.8
Incr Delay (d2), s/veh	0.6	0.0	2.5	0.7	0.0	2.9	0.3	0.0	0.0	0.4	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	1.1	0.0	15.5	0.9	0.0	16.4	1.0	0.0	0.0	1.1	0.0	0.2
LnGrp Delay(d),s/veh	34.5	0.0	13.5	36.0	0.0	15.2	33.9	0.0	0.0	34.0	0.0	32.9
LnGrp LOS	C		B	D		B	C			C		C
Approach Vol, veh/h		948			928			47			59	
Approach Delay, s/veh		14.6			16.1			33.9			33.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.0	59.6		13.6	12.9	57.8		13.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	3.8	32.1		4.2	4.2	33.4		4.1
Green Ext Time (p_c), s	0.0	19.1		0.5	0.0	18.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	781	185	16	655	1	202	0	24	0	0	0
Future Volume (veh/h)	6	781	185	16	655	1	202	0	24	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	6	831	141	17	697	1	215	0	7	0	0	0
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	23	905	792	58	940	1	265	0	231	0	2	2
Arrive On Green	0.01	0.56	0.56	0.04	0.58	0.58	0.17	0.00	0.17	0.00	0.00	0.00
Sat Flow, veh/h	1597	1629	1425	1597	1626	2	1597	0	1393	0	1676	1425
Grp Volume(v), veh/h	6	831	141	17	0	698	215	0	7	0	0	0
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1628	1597	0	1393	0	1676	1425
Q Serve(g_s), s	0.3	31.4	3.3	0.7	0.0	21.5	8.8	0.0	0.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	31.4	3.3	0.7	0.0	21.5	8.8	0.0	0.3	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	23	905	792	58	0	941	265	0	231	0	2	2
V/C Ratio(X)	0.26	0.92	0.18	0.29	0.00	0.74	0.81	0.00	0.03	0.00	0.00	0.00
Avail Cap(c_a), veh/h	384	1248	1092	384	0	1248	595	0	520	0	625	531
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	33.1	13.7	7.4	31.8	0.0	10.6	27.3	0.0	23.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	2.3	8.0	0.1	1.0	0.0	1.4	2.3	0.0	0.0	0.0	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	0.1	15.9	1.3	0.3	0.0	9.9	4.0	0.0	0.1	0.0	0.0	0.0
LnGrp Delay(d),s/veh	35.4	21.7	7.5	32.9	0.0	12.0	29.6	0.0	23.7	0.0	0.0	0.0
LnGrp LOS	D	C	A	C		B	C		C			
Approach Vol, veh/h		978			715			222			0	
Approach Delay, s/veh		19.7			12.5			29.4			0.0	
Approach LOS		B			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.2	44.7		0.0	5.7	46.2		16.0
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	2.7	33.4		0.0	2.3	23.5		10.8
Green Ext Time (p_c), s	0.0	4.3		0.0	0.0	3.4		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	18.1
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	290	324	3	4	70
Future Vol, veh/h	31	290	324	3	4	70
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	309	345	3	4	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	352	0	-	0	724	352
Stage 1	-	-	-	-	350	-
Stage 2	-	-	-	-	374	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1207	-	-	-	393	692
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	696	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1205	-	-	-	377	688
Mov Cap-2 Maneuver	-	-	-	-	377	-
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	670	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1205	-	-	-	659
HCM Lane V/C Ratio	0.027	-	-	-	0.119
HCM Control Delay (s)	8.1	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	181	96	0	62	7	0	3	258
Future Vol, veh/h	0	181	96	0	62	7	0	3	258
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	193	102	0	66	7	0	3	274
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	10.8	8.4	9.3
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	0%	1%
Vol Thru, %	35%	90%	0%
Vol Right, %	0%	10%	99%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	277	69	261
LT Vol	181	0	3
Through Vol	96	62	0
RT Vol	0	7	258
Lane Flow Rate	295	73	278
Geometry Grp	1	1	1
Degree of Util (X)	0.39	0.099	0.327
Departure Headway (Hd)	4.76	4.84	4.237
Convergence, Y/N	Yes	Yes	Yes
Cap	754	736	847
Service Time	2.807	2.897	2.268
HCM Lane V/C Ratio	0.391	0.099	0.328
HCM Control Delay	10.8	8.4	9.3
HCM Lane LOS	B	A	A
HCM 95th-tile Q	1.9	0.3	1.4

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	431	781	17	53	854	250	14	4	3	299	1	375
Future Volume (veh/h)	431	781	17	53	854	250	14	4	3	299	1	375
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1817	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	459	831	15	56	909	137	15	4	1	318	1	270
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	559	1440	648	133	990	149	87	23	6	376	1	594
Arrive On Green	0.16	0.42	0.42	0.07	0.33	0.33	0.06	0.06	0.06	0.21	0.21	0.21
Sat Flow, veh/h	3408	3438	1547	1774	3004	453	1335	356	89	1752	6	1568
Grp Volume(v), veh/h	459	831	15	56	522	524	20	0	0	319	0	270
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1726	1730	1780	0	0	1757	0	1568
Q Serve(g_s), s	11.9	16.9	0.5	2.8	26.5	26.5	1.0	0.0	0.0	15.9	0.0	11.8
Cycle Q Clear(g_c), s	11.9	16.9	0.5	2.8	26.5	26.5	1.0	0.0	0.0	15.9	0.0	11.8
Prop In Lane	1.00		1.00	1.00		0.26	0.75		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	559	1440	648	133	569	570	115	0	0	377	0	594
V/C Ratio(X)	0.82	0.58	0.02	0.42	0.92	0.92	0.17	0.00	0.00	0.85	0.00	0.45
Avail Cap(c_a), veh/h	833	1591	716	200	572	573	700	0	0	480	0	685
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.8	20.3	15.6	40.3	29.4	29.4	40.3	0.0	0.0	34.4	0.0	21.3
Incr Delay (d2), s/veh	4.2	0.6	0.0	2.1	20.2	20.2	0.7	0.0	0.0	10.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	8.1	0.2	1.4	15.8	15.9	0.5	0.0	0.0	8.8	0.0	5.2
LnGrp Delay(d),s/veh	41.0	20.9	15.6	42.4	49.6	49.6	41.0	0.0	0.0	45.1	0.0	21.8
LnGrp LOS	D	C	B	D	D	D	D			D		C
Approach Vol, veh/h		1305			1102			20			589	
Approach Delay, s/veh		27.9			49.2			41.0			34.5	
Approach LOS		C			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	44.0		24.7	19.7	35.9		11.0
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.8	18.9		17.9	13.9	28.5		3.0
Green Ext Time (p_c), s	0.0	16.7		1.7	1.1	1.5		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	37.1
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1096	37	0	1138	49	0	0	5	0	0	31
Future Vol, veh/h	0	1096	37	0	1138	49	0	0	5	0	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1154	39	0	1198	52	0	0	5	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	596	-	-	628
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	447	0	0	426
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	447	-	-	425
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.2	14.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	447	-	-	-	-	425
HCM Lane V/C Ratio	0.012	-	-	-	-	0.077
HCM Control Delay (s)	13.2	-	-	-	-	14.2
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.2

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	836	11	5	959	25	13	15	1	23	15	105
Future Volume (veh/h)	116	836	11	5	959	25	13	15	1	23	15	105
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	121	871	8	5	999	25	14	16	0	24	36	29
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	528	1975	18	28	1468	37	314	310	0	336	310	264
Arrive On Green	0.15	0.57	0.57	0.02	0.43	0.43	0.17	0.17	0.00	0.17	0.17	0.17
Sat Flow, veh/h	3442	3492	32	1774	3429	86	1331	1863	0	1392	1863	1583
Grp Volume(v), veh/h	121	429	450	5	501	523	14	16	0	24	36	29
Grp Sat Flow(s),veh/h/ln	1721	1720	1804	1774	1720	1794	1331	1863	0	1392	1863	1583
Q Serve(g_s), s	1.9	9.1	9.1	0.2	14.8	14.8	0.6	0.5	0.0	0.9	1.0	1.0
Cycle Q Clear(g_c), s	1.9	9.1	9.1	0.2	14.8	14.8	1.6	0.5	0.0	1.4	1.0	1.0
Prop In Lane	1.00		0.02	1.00		0.05	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	528	973	1021	28	737	768	314	310	0	336	310	264
V/C Ratio(X)	0.23	0.44	0.44	0.18	0.68	0.68	0.04	0.05	0.00	0.07	0.12	0.11
Avail Cap(c_a), veh/h	671	973	1021	346	968	1009	795	983	0	838	983	835
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	7.9	7.9	30.6	14.6	14.6	23.0	22.1	0.0	22.7	22.4	22.3
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.1	1.3	1.2	0.0	0.0	0.0	0.0	0.1	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	0.9	4.4	4.6	0.1	7.2	7.5	0.2	0.2	0.0	0.4	0.5	0.4
LnGrp Delay(d),s/veh	23.5	8.2	8.2	31.7	15.8	15.8	23.1	22.1	0.0	22.7	22.4	22.4
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		1000			1029			30			89	
Approach Delay, s/veh		10.1			15.9			22.6			22.5	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	42.2		15.2	14.4	33.5		15.2
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	11.1		3.4	3.9	16.8		3.6
Green Ext Time (p_c), s	0.0	12.0		0.3	0.1	10.2		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	761	41	183	912	15	28	35	141	11	16	49
Future Volume (veh/h)	46	761	41	183	912	15	28	35	141	11	16	49
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1631	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	48	793	0	191	950	0	29	36	73	11	17	41
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	172	1467	0	264	1645	0	162	161	232	148	185	240
Arrive On Green	0.11	0.47	0.00	0.17	0.53	0.00	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1597	3180	0	1597	3177	0	483	962	1389	419	1108	1439
Grp Volume(v), veh/h	48	793	0	191	950	0	65	0	73	28	0	41
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1446	0	1389	1527	0	1439
Q Serve(g_s), s	1.8	11.6	0.0	7.3	13.3	0.0	0.0	0.0	3.0	0.0	0.0	1.6
Cycle Q Clear(g_c), s	1.8	11.6	0.0	7.3	13.3	0.0	2.2	0.0	3.0	0.9	0.0	1.6
Prop In Lane	1.00		0.00	1.00		0.00	0.45		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	172	1467	0	264	1645	0	322	0	232	333	0	240
V/C Ratio(X)	0.28	0.54	0.00	0.72	0.58	0.00	0.20	0.00	0.31	0.08	0.00	0.17
Avail Cap(c_a), veh/h	298	1928	0	298	1926	0	772	0	681	804	0	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.4	12.0	0.0	25.4	10.2	0.0	23.2	0.0	23.6	22.7	0.0	23.0
Incr Delay (d2), s/veh	0.9	0.4	0.0	7.3	0.5	0.0	0.3	0.0	0.8	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	0.8	5.0	0.0	3.7	5.8	0.0	1.0	0.0	1.2	0.4	0.0	0.6
LnGrp Delay(d),s/veh	27.3	12.4	0.0	32.8	10.6	0.0	23.5	0.0	24.3	22.8	0.0	23.3
LnGrp LOS	C	B		C	B		C		C	C		C
Approach Vol, veh/h		841			1141			138			69	
Approach Delay, s/veh		13.3			14.4			24.0			23.1	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.6	36.4		14.2	9.9	40.2		14.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.6	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	9.3	13.6		3.6	3.8	15.3		5.0
Green Ext Time (p_c), s	0.1	16.8		0.8	0.0	16.1		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	859	9	85	1042	26	6	10	102	45	11	28
Future Volume (veh/h)	54	859	9	85	1042	26	6	10	102	45	11	28
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	55	877	9	87	1063	25	6	10	31	46	11	18
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	196	1141	12	212	1142	25	51	54	124	199	41	183
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1788	18	1774	1761	41	84	468	1070	1147	353	1583
Grp Volume(v), veh/h	55	0	886	87	0	1088	47	0	0	57	0	18
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	0	1802	1622	0	0	1500	0	1583
Q Serve(g_s), s	2.8	0.0	34.3	4.5	0.0	52.9	0.0	0.0	0.0	0.4	0.0	1.0
Cycle Q Clear(g_c), s	2.8	0.0	34.3	4.5	0.0	52.9	2.5	0.0	0.0	2.9	0.0	1.0
Prop In Lane	1.00		0.01	1.00		0.02	0.13		0.66	0.81		1.00
Lane Grp Cap(c), veh/h	196	0	1152	212	0	1167	229	0	0	239	0	183
V/C Ratio(X)	0.28	0.00	0.77	0.41	0.00	0.93	0.21	0.00	0.00	0.24	0.00	0.10
Avail Cap(c_a), veh/h	253	0	1214	235	0	1193	457	0	0	444	0	411
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.2	0.0	12.7	40.2	0.0	15.9	39.7	0.0	0.0	39.8	0.0	39.0
Incr Delay (d2), s/veh	0.8	0.0	3.0	1.3	0.0	13.0	0.4	0.0	0.0	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	18.0	2.3	0.0	31.7	1.2	0.0	0.0	1.4	0.0	0.4
LnGrp Delay(d),s/veh	41.0	0.0	15.7	41.4	0.0	30.1	40.1	0.0	0.0	40.3	0.0	39.2
LnGrp LOS	D		B	D		C	D			D		D
Approach Vol, veh/h		941			1175			47			75	
Approach Delay, s/veh		17.2			31.0			40.1			40.1	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.8	68.5		14.9	13.9	69.4		14.9
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	6.5	36.3		4.9	4.8	54.9		4.5
Green Ext Time (p_c), s	0.1	20.6		0.5	0.1	8.5		0.5

Intersection Summary			
HCM 2010 Ctrl Delay	25.7		
HCM 2010 LOS	C		

HCM Signalized Intersection Capacity Analysis
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	698	297	27	905	1	237	0	23	0	0	5
Future Volume (vph)	1	698	297	27	905	1	237	0	23	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	10	10	10
Total Lost time (s)	4.7	7.0	7.0	4.7	7.0			4.7	4.7			4.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	0.98			1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00			1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85			0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00			1.00
Satd. Flow (prot)	1593	1629	1425	1593	1628			1593	1394			1330
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00			1.00
Satd. Flow (perm)	1593	1629	1425	1593	1628			1593	1394			1330
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1	712	303	28	923	1	242	0	23	0	0	5
RTOR Reduction (vph)	0	0	73	0	0	0	0	0	19	0	0	5
Lane Group Flow (vph)	1	712	230	28	924	0	0	242	4	0	0	0
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm			Perm
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases			2						8	4		4
Actuated Green, G (s)	1.3	56.0	56.0	4.9	59.6			19.1	19.1			3.7
Effective Green, g (s)	1.3	56.0	56.0	4.9	59.6			19.1	19.1			3.7
Actuated g/C Ratio	0.01	0.53	0.53	0.05	0.57			0.18	0.18			0.04
Clearance Time (s)	4.7	7.0	7.0	4.7	7.0			4.7	4.7			4.7
Vehicle Extension (s)	2.0	2.5	2.5	2.0	2.5			1.7	1.7			1.7
Lane Grp Cap (vph)	19	870	761	74	925			290	254			46
v/s Ratio Prot	0.00	0.44		c0.02	c0.57			c0.15				
v/s Ratio Perm			0.16						0.00			c0.00
v/c Ratio	0.05	0.82	0.30	0.38	1.00			0.83	0.02			0.00
Uniform Delay, d1	51.1	20.2	13.5	48.5	22.6			41.3	35.1			48.8
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00			1.00
Incremental Delay, d2	0.4	5.9	0.2	1.2	29.1			17.6	0.0			0.0
Delay (s)	51.6	26.1	13.7	49.7	51.7			58.9	35.2			48.8
Level of Service	D	C	B	D	D			E	D			D
Approach Delay (s)		22.4			51.6			56.8			48.8	
Approach LOS		C			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	104.8	Sum of lost time (s)	21.1
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	698	297	27	905	1	237	0	23	0	0	5
Future Volume (veh/h)	1	698	297	27	905	1	237	0	23	0	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	1	712	183	28	923	1	242	0	4	0	0	1
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	4	867	759	81	944	1	281	0	246	0	4	4
Arrive On Green	0.00	0.53	0.53	0.05	0.58	0.58	0.18	0.00	0.18	0.00	0.00	0.00
Sat Flow, veh/h	1597	1629	1425	1597	1627	2	1597	0	1394	0	1676	1425
Grp Volume(v), veh/h	1	712	183	28	0	924	242	0	4	0	0	1
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1628	1597	0	1394	0	1676	1425
Q Serve(g_s), s	0.1	32.2	6.1	1.5	0.0	48.7	13.0	0.0	0.2	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	32.2	6.1	1.5	0.0	48.7	13.0	0.0	0.2	0.0	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	4	867	759	81	0	945	281	0	246	0	4	4
V/C Ratio(X)	0.25	0.82	0.24	0.35	0.00	0.98	0.86	0.00	0.02	0.00	0.00	0.28
Avail Cap(c_a), veh/h	294	957	837	294	0	957	456	0	398	0	479	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	44.1	17.2	11.1	40.6	0.0	18.0	35.4	0.0	30.1	0.0	0.0	44.1
Incr Delay (d2), s/veh	12.0	5.1	0.1	0.9	0.0	23.5	5.0	0.0	0.0	0.0	0.0	15.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	15.5	2.4	0.7	0.0	27.7	6.1	0.0	0.1	0.0	0.0	0.0
LnGrp Delay(d),s/veh	56.1	22.3	11.2	41.6	0.0	41.5	40.4	0.0	30.1	0.0	0.0	59.6
LnGrp LOS	E	C	B	D		D	D		C			E
Approach Vol, veh/h		896			952			246			1	
Approach Delay, s/veh		20.1			41.5			40.2			59.6	
Approach LOS		C			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.2	54.1		4.9	4.9	58.4		20.3
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.5	34.2		2.1	2.1	50.7		15.0
Green Ext Time (p_c), s	0.0	3.6		0.0	0.0	0.7		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Notes

HCM 2010 TWSC
8: Montgomery Dr & Melita Rd

08/22/2017

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	342	331	6	2	33
Future Vol, veh/h	40	342	331	6	2	33
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	368	356	6	2	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	366	0	-	0	817	365
Stage 1	-	-	-	-	363	-
Stage 2	-	-	-	-	454	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1193	-	-	-	346	680
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	640	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1191	-	-	-	328	676
Mov Cap-2 Maneuver	-	-	-	-	328	-
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	609	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1191	-	-	-	637
HCM Lane V/C Ratio	0.036	-	-	-	0.059
HCM Control Delay (s)	8.1	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	197	134	0	118	4	0	4	231
Future Vol, veh/h	0	197	134	0	118	4	0	4	231
Peak Hour Factor	0.92	0.88	0.88	0.92	0.88	0.88	0.92	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	224	152	0	134	5	0	5	263
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	12.8	9.3	10
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	60%	0%	2%
Vol Thru, %	40%	97%	0%
Vol Right, %	0%	3%	98%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	331	122	235
LT Vol	197	0	4
Through Vol	134	118	0
RT Vol	0	4	231
Lane Flow Rate	376	139	267
Geometry Grp	1	1	1
Degree of Util (X)	0.506	0.192	0.34
Departure Headway (Hd)	4.844	4.997	4.581
Convergence, Y/N	Yes	Yes	Yes
Cap	737	711	780
Service Time	2.913	3.08	2.638
HCM Lane V/C Ratio	0.51	0.195	0.342
HCM Control Delay	12.8	9.3	10
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.9	0.7	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	378	742	15	44	851	181	10	3	2	209	1	355
Future Volume (veh/h)	378	742	15	44	851	181	10	3	2	209	1	355
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	390	765	7	45	877	118	10	3	0	215	1	182
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	506	1519	680	127	1112	150	88	26	0	283	1	487
Arrive On Green	0.15	0.44	0.44	0.07	0.36	0.36	0.06	0.06	0.00	0.16	0.16	0.16
Sat Flow, veh/h	3408	3438	1539	1774	3051	410	1380	414	0	1749	8	1568
Grp Volume(v), veh/h	390	765	7	45	496	499	13	0	0	216	0	182
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1736	1794	0	0	1757	0	1568
Q Serve(g_s), s	8.7	12.7	0.2	1.9	20.3	20.3	0.5	0.0	0.0	9.3	0.0	7.2
Cycle Q Clear(g_c), s	8.7	12.7	0.2	1.9	20.3	20.3	0.5	0.0	0.0	9.3	0.0	7.2
Prop In Lane	1.00		1.00	1.00		0.24	0.77		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	506	1519	680	127	629	633	115	0	0	285	0	487
V/C Ratio(X)	0.77	0.50	0.01	0.36	0.79	0.79	0.11	0.00	0.00	0.76	0.00	0.37
Avail Cap(c_a), veh/h	958	1830	819	230	657	661	812	0	0	552	0	725
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.5	15.9	12.4	35.1	22.5	22.5	35.0	0.0	0.0	31.8	0.0	21.3
Incr Delay (d2), s/veh	2.5	0.4	0.0	1.7	6.6	6.6	0.4	0.0	0.0	4.2	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	6.0	0.1	1.0	10.8	10.9	0.3	0.0	0.0	4.8	0.0	3.2
LnGrp Delay(d),s/veh	35.0	16.3	12.4	36.8	29.1	29.0	35.4	0.0	0.0	35.9	0.0	21.8
LnGrp LOS	C	B	B	D	C	C	D			D		C
Approach Vol, veh/h		1162			1040			13			398	
Approach Delay, s/veh		22.5			29.4			35.4			29.5	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.4	40.8		17.9	16.5	34.7		10.2
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	3.9	14.7		11.3	10.7	22.3		2.5
Green Ext Time (p_c), s	0.0	17.7		1.5	1.1	6.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	26.4
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Traffic Vol, veh/h	0	983	23	0	1012	64	0	0	2	0	0	29
Future Vol, veh/h	0	983	23	0	1012	64	0	0	2	0	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1046	24	0	1077	68	0	0	2	0	0	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	535	-	-	575
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	490	0	0	461
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	490	-	-	460
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.4	13.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	490	-	-	-	-	460
HCM Lane V/C Ratio	0.004	-	-	-	-	0.067
HCM Control Delay (s)	12.4	-	-	-	-	13.4
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑		↰	↑↱		↰	↑		↰	↑	↱
Traffic Volume (veh/h)	100	764	9	4	824	26	13	8	2	29	3	126
Future Volume (veh/h)	100	764	9	4	824	26	13	8	2	29	3	126
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	106	813	10	4	877	28	14	9	2	31	0	40
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	0	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	523	1934	24	23	1418	45	346	245	55	345	0	524
Arrive On Green	0.15	0.56	0.56	0.01	0.42	0.42	0.17	0.17	0.17	0.17	0.00	0.17
Sat Flow, veh/h	3442	3479	43	1774	3402	109	1357	1477	328	1398	0	3151
Grp Volume(v), veh/h	106	402	421	4	443	462	14	0	11	31	0	40
Grp Sat Flow(s),veh/h/ln	1721	1720	1803	1774	1721	1790	1357	0	1805	1398	0	1575
Q Serve(g_s), s	1.6	8.1	8.1	0.1	12.2	12.2	0.5	0.0	0.3	1.1	0.0	0.6
Cycle Q Clear(g_c), s	1.6	8.1	8.1	0.1	12.2	12.2	0.5	0.0	0.3	1.4	0.0	0.6
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	523	956	1002	23	717	746	346	0	300	345	0	524
V/C Ratio(X)	0.20	0.42	0.42	0.17	0.62	0.62	0.04	0.00	0.04	0.09	0.00	0.08
Avail Cap(c_a), veh/h	706	1017	1066	364	1018	1059	873	0	1002	889	0	1749
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.3	7.7	7.7	29.3	13.7	13.7	21.1	0.0	21.0	21.6	0.0	21.1
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.3	0.9	0.8	0.0	0.0	0.0	0.0	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	0.8	3.9	4.1	0.1	5.8	6.1	0.2	0.0	0.2	0.4	0.0	0.3
LnGrp Delay(d),s/veh	22.3	8.0	8.0	30.6	14.6	14.6	21.1	0.0	21.0	21.6	0.0	21.1
LnGrp LOS	C	A	A	C	B	B	C		C	C		C
Approach Vol, veh/h		929			909			25			71	
Approach Delay, s/veh		9.6			14.7			21.1			21.4	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	39.9		14.7	13.8	31.5		14.7
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.1	10.1		3.4	3.6	14.2		2.5
Green Ext Time (p_c), s	0.0	10.8		0.2	0.1	9.9		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	12.6
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	757	29	110	775	14	30	22	146	12	19	41
Future Volume (veh/h)	43	757	29	110	775	14	30	22	146	12	19	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	46	805	0	117	824	0	32	23	14	13	20	7
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	171	1485	0	250	1639	0	199	114	217	148	180	224
Arrive On Green	0.11	0.48	0.00	0.16	0.53	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3179	0	1597	3177	0	670	727	1389	417	1150	1437
Grp Volume(v), veh/h	46	805	0	117	824	0	55	0	14	33	0	7
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1397	0	1389	1567	0	1437
Q Serve(g_s), s	1.6	11.0	0.0	4.0	10.3	0.0	0.4	0.0	0.5	0.0	0.0	0.2
Cycle Q Clear(g_c), s	1.6	11.0	0.0	4.0	10.3	0.0	1.8	0.0	0.5	1.0	0.0	0.2
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	171	1485	0	250	1639	0	313	0	217	328	0	224
V/C Ratio(X)	0.27	0.54	0.00	0.47	0.50	0.00	0.18	0.00	0.06	0.10	0.00	0.03
Avail Cap(c_a), veh/h	318	2056	0	318	2055	0	810	0	726	879	0	751
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.7	11.0	0.0	23.1	9.1	0.0	22.2	0.0	21.7	21.9	0.0	21.6
Incr Delay (d2), s/veh	0.8	0.4	0.0	1.4	0.3	0.0	0.3	0.0	0.1	0.1	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	0.7	4.8	0.0	1.8	4.4	0.0	0.8	0.0	0.2	0.5	0.0	0.1
LnGrp Delay(d),s/veh	25.6	11.5	0.0	24.5	9.4	0.0	22.5	0.0	21.8	22.0	0.0	21.6
LnGrp LOS	C	B		C	A		C		C	C		C
Approach Vol, veh/h		851			941			69			40	
Approach Delay, s/veh		12.2			11.3			22.3			21.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.4	34.9		12.9	9.4	37.9		12.9
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	6.0	13.0		3.0	3.6	12.3		3.8
Green Ext Time (p_c), s	0.1	15.9		0.5	0.0	16.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.3
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	827	7	48	806	42	12	11	111	55	7	33
Future Volume (veh/h)	71	827	7	48	806	42	12	11	111	55	7	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	76	880	5	51	857	39	13	12	25	59	7	4
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	237	1142	6	186	1042	47	79	70	98	231	23	186
Arrive On Green	0.13	0.64	0.64	0.10	0.61	0.61	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1798	10	1774	1718	78	235	583	818	1291	195	1561
Grp Volume(v), veh/h	76	0	885	51	0	896	50	0	0	66	0	4
Grp Sat Flow(s),veh/h/ln	1774	0	1808	1774	0	1796	1636	0	0	1486	0	1561
Q Serve(g_s), s	3.4	0.0	31.1	2.4	0.0	34.8	0.0	0.0	0.0	0.8	0.0	0.2
Cycle Q Clear(g_c), s	3.4	0.0	31.1	2.4	0.0	34.8	2.4	0.0	0.0	3.2	0.0	0.2
Prop In Lane	1.00		0.01	1.00		0.04	0.26		0.50	0.89		1.00
Lane Grp Cap(c), veh/h	237	0	1149	186	0	1090	246	0	0	254	0	186
V/C Ratio(X)	0.32	0.00	0.77	0.27	0.00	0.82	0.20	0.00	0.00	0.26	0.00	0.02
Avail Cap(c_a), veh/h	279	0	1342	259	0	1313	511	0	0	489	0	448
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.9	0.0	11.6	36.7	0.0	13.7	35.5	0.0	0.0	35.8	0.0	34.6
Incr Delay (d2), s/veh	0.8	0.0	2.6	0.8	0.0	3.9	0.4	0.0	0.0	0.5	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	1.7	0.0	16.1	1.2	0.0	18.1	1.1	0.0	0.0	1.5	0.0	0.1
LnGrp Delay(d),s/veh	35.7	0.0	14.1	37.5	0.0	17.6	35.9	0.0	0.0	36.3	0.0	34.6
LnGrp LOS	D		B	D		B	D			D		C
Approach Vol, veh/h		961			947			50			70	
Approach Delay, s/veh		15.8			18.7			35.9			36.2	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.3	62.5		14.1	14.9	59.9		14.1
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	4.4	33.1		5.2	5.4	36.8		4.4
Green Ext Time (p_c), s	0.0	18.8		0.6	0.1	17.1		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	18.4
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	628	335	52	630	0	257	0	31	0	0	0
Future Volume (veh/h)	2	628	335	52	630	0	257	0	31	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	2	706	250	58	708	0	289	0	11	0	0	0
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	8	780	673	136	911	0	338	0	295	0	2	2
Arrive On Green	0.00	0.48	0.48	0.09	0.56	0.00	0.21	0.00	0.21	0.00	0.00	0.00
Sat Flow, veh/h	1597	1629	1406	1597	1629	0	1597	0	1394	0	1676	1425
Grp Volume(v), veh/h	2	706	250	58	708	0	289	0	11	0	0	0
Grp Sat Flow(s),veh/h/ln	1597	1629	1406	1597	1629	0	1597	0	1394	0	1676	1425
Q Serve(g_s), s	0.1	29.2	8.2	2.5	24.8	0.0	12.8	0.0	0.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.1	29.2	8.2	2.5	24.8	0.0	12.8	0.0	0.5	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	8	780	673	136	911	0	338	0	295	0	2	2
V/C Ratio(X)	0.26	0.90	0.37	0.43	0.78	0.00	0.85	0.00	0.04	0.00	0.00	0.00
Avail Cap(c_a), veh/h	356	1157	999	356	1157	0	552	0	482	0	579	493
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	36.3	17.5	12.1	31.8	12.6	0.0	27.8	0.0	22.9	0.0	0.0	0.0
Incr Delay (d2), s/veh	6.2	6.6	0.3	0.8	2.3	0.0	3.7	0.0	0.0	0.0	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	0.1	14.4	3.2	1.1	11.6	0.0	6.0	0.0	0.2	0.0	0.0	0.0
LnGrp Delay(d),s/veh	42.5	24.1	12.3	32.6	14.9	0.0	31.4	0.0	22.9	0.0	0.0	0.0
LnGrp LOS	D	C	B	C	B		C		C			
Approach Vol, veh/h		958			766			300			0	
Approach Delay, s/veh		21.1			16.3			31.1			0.0	
Approach LOS		C			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.9	42.1		0.0	5.1	47.9		20.2
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	4.5	31.2		0.0	2.1	26.8		14.8
Green Ext Time (p_c), s	0.0	3.9		0.0	0.0	3.4		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	20.7
HCM 2010 LOS	C

Notes

HCM 2010 TWSC
8: Montgomery Dr & Melita Rd

08/22/2017

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	312	199	23	16	5
Future Vol, veh/h	3	312	199	23	16	5
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	359	229	26	18	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	259	0	-	0	612	248
Stage 1	-	-	-	-	246	-
Stage 2	-	-	-	-	366	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1306	-	-	-	456	791
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	702	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1304	-	-	-	451	786
Mov Cap-2 Maneuver	-	-	-	-	451	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	697	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1304	-	-	-	502
HCM Lane V/C Ratio	0.003	-	-	-	0.048
HCM Control Delay (s)	7.8	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 AWSC
9: Melita Rd & Los Alamos Rd 08/22/2017

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	191	137	0	65	3	0	6	161
Future Vol, veh/h	0	191	137	0	65	3	0	6	161
Peak Hour Factor	0.92	0.90	0.90	0.92	0.90	0.90	0.92	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	152	0	72	3	0	7	179
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	11.5	8.3	8.7
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	58%	0%	4%
Vol Thru, %	42%	96%	0%
Vol Right, %	0%	4%	96%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	328	68	167
LT Vol	191	0	6
Through Vol	137	65	0
RT Vol	0	3	161
Lane Flow Rate	364	76	186
Geometry Grp	1	1	1
Degree of Util (X)	0.461	0.099	0.226
Departure Headway (Hd)	4.557	4.74	4.391
Convergence, Y/N	Yes	Yes	Yes
Cap	791	754	816
Service Time	2.589	2.782	2.421
HCM Lane V/C Ratio	0.46	0.101	0.228
HCM Control Delay	11.5	8.3	8.7
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.5	0.3	0.9

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12) 08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	457	696	20	15	952	221	24	4	5	242	0	402
Future Volume (veh/h)	457	696	20	15	952	221	24	4	5	242	0	402
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	502	765	13	16	1046	138	26	4	3	266	0	267
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	601	1633	735	58	1014	134	109	17	13	328	0	569
Arrive On Green	0.18	0.47	0.47	0.03	0.33	0.33	0.08	0.08	0.08	0.19	0.00	0.19
Sat Flow, veh/h	3408	3438	1548	1774	3060	403	1390	214	160	1757	0	1568
Grp Volume(v), veh/h	502	765	13	16	589	595	33	0	0	266	0	267
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1738	1764	0	0	1757	0	1568
Q Serve(g_s), s	13.0	13.7	0.4	0.8	30.2	30.2	1.6	0.0	0.0	13.2	0.0	11.9
Cycle Q Clear(g_c), s	13.0	13.7	0.4	0.8	30.2	30.2	1.6	0.0	0.0	13.2	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.23	0.79		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	601	1633	735	58	572	576	139	0	0	328	0	569
V/C Ratio(X)	0.83	0.47	0.02	0.27	1.03	1.03	0.24	0.00	0.00	0.81	0.00	0.47
Avail Cap(c_a), veh/h	834	1633	735	200	572	576	695	0	0	480	0	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.3	16.2	12.7	43.0	30.5	30.5	39.4	0.0	0.0	35.5	0.0	22.3
Incr Delay (d2), s/veh	5.3	0.3	0.0	2.5	45.8	46.2	0.9	0.0	0.0	6.6	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	6.5	0.2	0.4	21.6	21.8	0.8	0.0	0.0	7.0	0.0	5.2
LnGrp Delay(d),s/veh	41.6	16.5	12.7	45.5	76.3	76.7	40.3	0.0	0.0	42.1	0.0	22.9
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1280			1200			33			533	
Approach Delay, s/veh		26.3			76.1			40.3			32.5	
Approach LOS		C			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	49.1		22.1	20.8	36.0		12.3
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.8	15.7		15.2	15.0	32.2		3.6
Green Ext Time (p_c), s	0.0	19.1		1.8	1.1	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	47.1
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12) 08/22/2017

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Traffic Vol, veh/h	0	949	12	0	1173	31	0	0	7	0	0	14
Future Vol, veh/h	0	949	12	0	1173	31	0	0	7	0	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1010	13	0	1248	33	0	0	7	0	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	511	-	-	643
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	508	0	0	416
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	508	-	-	415
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.2	14
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	508	-	-	-	-	415
HCM Lane V/C Ratio	0.015	-	-	-	-	0.036
HCM Control Delay (s)	12.2	-	-	-	-	14
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.1

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way 08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↱			↑			↑	
Traffic Volume (veh/h)	139	761	9	5	775	18	22	32	4	58	41	250
Future Volume (veh/h)	139	761	9	5	775	18	22	32	4	58	41	250
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	145	793	7	5	807	13	23	33	0	60	72	62
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	554	1896	17	28	1378	22	309	351	0	353	351	298
Arrive On Green	0.16	0.54	0.54	0.02	0.40	0.40	0.19	0.19	0.00	0.19	0.19	0.19
Sat Flow, veh/h	3442	3493	31	1774	3464	56	1250	1863	0	1370	1863	1583
Grp Volume(v), veh/h	145	390	410	5	401	419	23	33	0	60	72	62
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1800	1250	1863	0	1370	1863	1583
Q Serve(g_s), s	2.3	8.4	8.4	0.2	11.5	11.5	1.0	0.9	0.0	2.4	2.1	2.1
Cycle Q Clear(g_c), s	2.3	8.4	8.4	0.2	11.5	11.5	3.0	0.9	0.0	3.3	2.1	2.1
Prop In Lane	1.00		0.02	1.00		0.03	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	554	933	980	28	684	716	309	351	0	353	351	298
V/C Ratio(X)	0.26	0.42	0.42	0.18	0.59	0.59	0.07	0.09	0.00	0.17	0.21	0.21
Avail Cap(c_a), veh/h	673	971	1019	347	971	1016	736	986	0	820	986	838
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	8.5	8.5	30.5	14.9	14.9	22.8	21.1	0.0	22.5	21.5	21.6
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.1	0.8	0.8	0.0	0.0	0.0	0.1	0.1	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	1.1	4.0	4.2	0.1	5.6	5.9	0.3	0.5	0.0	0.9	1.1	0.9
LnGrp Delay(d),s/veh	23.2	8.8	8.8	31.6	15.7	15.6	22.9	21.1	0.0	22.5	21.7	21.7
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		945			825			56			194	
Approach Delay, s/veh		11.0			15.7			21.8			21.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	40.6		16.5	14.8	31.5		16.5
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	10.4		5.3	4.3	13.5		5.0
Green Ext Time (p_c), s	0.0	9.8		0.6	0.1	9.3		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	773	22	159	716	9	28	20	152	22	63	35
Future Volume (veh/h)	22	773	22	159	716	9	28	20	152	22	63	35
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	24	859	0	177	796	0	31	22	80	24	70	19
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	104	1464	0	262	1769	0	181	101	235	108	235	243
Arrive On Green	0.07	0.47	0.00	0.16	0.57	0.00	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1597	3178	0	1597	3177	0	547	600	1389	225	1393	1439
Grp Volume(v), veh/h	24	859	0	177	796	0	53	0	80	94	0	19
Grp Sat Flow(s),veh/h/ln	1597	1548	0	1597	1548	0	1146	0	1389	1618	0	1439
Q Serve(g_s), s	0.9	13.0	0.0	6.7	9.5	0.0	0.6	0.0	3.3	0.0	0.0	0.7
Cycle Q Clear(g_c), s	0.9	13.0	0.0	6.7	9.5	0.0	3.6	0.0	3.3	3.1	0.0	0.7
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.26		1.00
Lane Grp Cap(c), veh/h	104	1464	0	262	1769	0	282	0	235	344	0	243
V/C Ratio(X)	0.23	0.59	0.00	0.68	0.45	0.00	0.19	0.00	0.34	0.27	0.00	0.08
Avail Cap(c_a), veh/h	298	1927	0	298	1926	0	702	0	681	839	0	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.5	12.4	0.0	25.3	7.9	0.0	23.3	0.0	23.6	23.5	0.0	22.5
Incr Delay (d2), s/veh	1.1	0.5	0.0	5.1	0.3	0.0	0.3	0.0	0.9	0.4	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	0.4	5.6	0.0	3.3	4.0	0.0	0.9	0.0	1.3	1.5	0.0	0.3
LnGrp Delay(d),s/veh	29.6	12.9	0.0	30.3	8.2	0.0	23.6	0.0	24.4	23.9	0.0	22.6
LnGrp LOS	C	B		C	A		C		C	C		C
Approach Vol, veh/h		883			973			133			113	
Approach Delay, s/veh		13.4			12.2			24.1			23.7	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.5	36.4		14.4	7.2	42.7		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.5	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	8.7	15.0		5.1	2.9	11.5		5.6
Green Ext Time (p_c), s	0.1	15.4		1.1	0.0	16.7		1.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	884	15	42	852	25	12	17	83	44	6	17
Future Volume (veh/h)	50	884	15	42	852	25	12	17	83	44	6	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	52	921	13	44	888	23	12	18	22	46	6	8
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	204	1139	16	174	1093	28	74	91	84	230	25	187
Arrive On Green	0.12	0.64	0.64	0.10	0.62	0.62	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1781	25	1774	1756	45	194	771	708	1280	214	1583
Grp Volume(v), veh/h	52	0	934	44	0	911	52	0	0	52	0	8
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1802	1673	0	0	1495	0	1583
Q Serve(g_s), s	2.3	0.0	33.5	2.0	0.0	33.5	0.0	0.0	0.0	0.0	0.0	0.4
Cycle Q Clear(g_c), s	2.3	0.0	33.5	2.0	0.0	33.5	2.4	0.0	0.0	2.3	0.0	0.4
Prop In Lane	1.00		0.01	1.00		0.03	0.23		0.42	0.88		1.00
Lane Grp Cap(c), veh/h	204	0	1155	174	0	1122	249	0	0	255	0	187
V/C Ratio(X)	0.25	0.00	0.81	0.25	0.00	0.81	0.21	0.00	0.00	0.20	0.00	0.04
Avail Cap(c_a), veh/h	286	0	1373	266	0	1350	533	0	0	502	0	465
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.0	0.0	11.7	36.2	0.0	12.5	34.8	0.0	0.0	34.7	0.0	33.9
Incr Delay (d2), s/veh	0.6	0.0	3.3	0.8	0.0	3.5	0.4	0.0	0.0	0.4	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	1.2	0.0	17.4	1.0	0.0	17.5	1.2	0.0	0.0	1.2	0.0	0.2
LnGrp Delay(d),s/veh	35.6	0.0	15.0	37.0	0.0	16.0	35.2	0.0	0.0	35.1	0.0	34.0
LnGrp LOS	D		B	D		B	D			D		C
Approach Vol, veh/h		986			955			52			60	
Approach Delay, s/veh		16.1			16.9			35.2			35.0	
Approach LOS		B			B			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	61.5		13.8	13.0	60.0		13.8
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.5	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	4.3	35.5		4.3	4.3	35.5		4.4
Green Ext Time (p_c), s	0.0	18.9		0.5	0.0	18.5		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	984	35	15	895	23	10
Future Vol, veh/h	984	35	15	895	23	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1036	37	16	942	24	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1036	0	2010	1036
Stage 1	-	-	-	-	1036	-
Stage 2	-	-	-	-	974	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	419	-	~ 22	152
Stage 1	-	-	-	-	196	-
Stage 2	-	-	-	-	214	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	419	-	~ 21	152
Mov Cap-2 Maneuver	-	-	-	-	101	-
Stage 1	-	-	-	-	196	-
Stage 2	-	-	-	-	206	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	51
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	112	-	-	419	-
HCM Lane V/C Ratio	0.31	-	-	0.038	-
HCM Control Delay (s)	51	-	-	13.9	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	984	35	15	895	23	10
Future Volume (veh/h)	984	35	15	895	23	10
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1036	37	16	942	24	11
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1318	1153	34	1466	41	19
Arrive On Green	0.73	0.73	0.02	0.81	0.04	0.04
Sat Flow, veh/h	1810	1583	1774	1810	1142	523
Grp Volume(v), veh/h	1036	37	16	942	36	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1713	0
Q Serve(g_s), s	26.0	0.5	0.6	14.7	1.5	0.0
Cycle Q Clear(g_c), s	26.0	0.5	0.6	14.7	1.5	0.0
Prop In Lane		1.00	1.00		0.67	0.31
Lane Grp Cap(c), veh/h	1318	1153	34	1466	61	0
V/C Ratio(X)	0.79	0.03	0.47	0.64	0.59	0.00
Avail Cap(c_a), veh/h	2139	1871	124	2379	599	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.2	2.7	34.7	2.7	34.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	9.9	0.5	8.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.1	0.2	0.4	7.3	0.8	0.0
LnGrp Delay(d),s/veh	7.2	2.7	44.7	3.2	42.6	0.0
LnGrp LOS	A	A	D	A	D	
Approach Vol, veh/h	1073			958	36	
Approach Delay, s/veh	7.1			3.8	42.6	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	5.9	58.6				64.4		7.1
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.0	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.6	28.0				16.7		3.5
Green Ext Time (p_c), s	0.0	24.1				26.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	6.2
HCM 2010 LOS	A

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	788	189	16	666	1	208	0	24	0	0	0
Future Volume (veh/h)	6	788	189	16	666	1	208	0	24	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	6	838	145	17	709	1	221	0	7	0	0	0
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	23	910	796	58	944	1	270	0	236	0	2	2
Arrive On Green	0.01	0.56	0.56	0.04	0.58	0.58	0.17	0.00	0.17	0.00	0.00	0.00
Sat Flow, veh/h	1597	1629	1425	1597	1626	2	1597	0	1393	0	1676	1425
Grp Volume(v), veh/h	6	838	145	17	0	710	221	0	7	0	0	0
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1628	1597	0	1393	0	1676	1425
Q Serve(g_s), s	0.3	32.5	3.5	0.7	0.0	22.5	9.3	0.0	0.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	32.5	3.5	0.7	0.0	22.5	9.3	0.0	0.3	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	23	910	796	58	0	945	270	0	236	0	2	2
V/C Ratio(X)	0.27	0.92	0.18	0.29	0.00	0.75	0.82	0.00	0.03	0.00	0.00	0.00
Avail Cap(c_a), veh/h	374	1218	1066	374	0	1218	581	0	507	0	610	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	33.9	14.0	7.5	32.6	0.0	10.8	27.8	0.0	24.1	0.0	0.0	0.0
Incr Delay (d2), s/veh	2.3	8.8	0.1	1.0	0.0	1.7	2.3	0.0	0.0	0.0	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	0.1	16.7	1.4	0.3	0.0	10.5	4.2	0.0	0.1	0.0	0.0	0.0
LnGrp Delay(d),s/veh	36.2	22.8	7.6	33.7	0.0	12.5	30.2	0.0	24.1	0.0	0.0	0.0
LnGrp LOS	D	C	A	C		B	C		C			
Approach Vol, veh/h		989			727			228			0	
Approach Delay, s/veh		20.6			13.0			30.0			0.0	
Approach LOS		C			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.2	45.8		0.0	5.7	47.4		16.5
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	2.7	34.5		0.0	2.3	24.5		11.3
Green Ext Time (p_c), s	0.0	4.3		0.0	0.0	3.4		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	18.9
HCM 2010 LOS	B

Notes

HCM 2010 TWSC
8: Montgomery Dr & Melita Rd

08/22/2017

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	305	334	3	4	70
Future Vol, veh/h	31	305	334	3	4	70
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	324	355	3	4	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	363	0	-	0	751	363
Stage 1	-	-	-	-	361	-
Stage 2	-	-	-	-	390	-
Critical Hdwy	4.12	-	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1196	-	-	-	327	682
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	634	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1194	-	-	-	317	678
Mov Cap-2 Maneuver	-	-	-	-	317	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	612	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1194	-	-	-	639
HCM Lane V/C Ratio	0.028	-	-	-	0.123
HCM Control Delay (s)	8.1	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	181	111	0	72	7	0	3	258
Future Vol, veh/h	0	181	111	0	72	7	0	3	258
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	193	118	0	77	7	0	3	274
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	11.2	8.6	9.5
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	62%	0%	1%
Vol Thru, %	38%	91%	0%
Vol Right, %	0%	9%	99%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	292	79	261
LT Vol	181	0	3
Through Vol	111	72	0
RT Vol	0	7	258
Lane Flow Rate	311	84	278
Geometry Grp	1	1	1
Degree of Util (X)	0.412	0.114	0.331
Departure Headway (Hd)	4.773	4.874	4.298
Convergence, Y/N	Yes	Yes	Yes
Cap	752	730	836
Service Time	2.823	2.935	2.334
HCM Lane V/C Ratio	0.414	0.115	0.333
HCM Control Delay	11.2	8.6	9.5
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2	0.4	1.5

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	108	14	5	61	9	4
Future Vol, veh/h	108	14	5	61	9	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	17	6	73	11	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	145	0	222	137
Stage 1	-	-	-	-	137	-
Stage 2	-	-	-	-	85	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1437	-	766	911
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	938	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1437	-	763	911
Mov Cap-2 Maneuver	-	-	-	-	763	-
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	934	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	803	-	-	1437	-
HCM Lane V/C Ratio	0.019	-	-	0.004	-
HCM Control Delay (s)	9.6	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	431	808	17	53	890	261	14	4	3	308	1	375
Future Volume (veh/h)	431	808	17	53	890	261	14	4	3	308	1	375
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1817	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	459	860	15	56	947	149	15	4	1	328	1	270
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	558	1434	645	132	978	154	86	23	6	384	1	600
Arrive On Green	0.16	0.42	0.42	0.07	0.33	0.33	0.06	0.06	0.06	0.22	0.22	0.22
Sat Flow, veh/h	3408	3438	1547	1774	2984	469	1335	356	89	1752	5	1568
Grp Volume(v), veh/h	459	860	15	56	548	548	20	0	0	329	0	270
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1727	1726	1780	0	0	1757	0	1568
Q Serve(g_s), s	12.0	17.9	0.5	2.8	28.8	28.8	1.0	0.0	0.0	16.6	0.0	11.8
Cycle Q Clear(g_c), s	12.0	17.9	0.5	2.8	28.8	28.8	1.0	0.0	0.0	16.6	0.0	11.8
Prop In Lane	1.00		1.00	1.00		0.27	0.75		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	558	1434	645	132	566	566	115	0	0	385	0	600
V/C Ratio(X)	0.82	0.60	0.02	0.42	0.97	0.97	0.17	0.00	0.00	0.85	0.00	0.45
Avail Cap(c_a), veh/h	825	1575	709	198	566	566	694	0	0	475	0	680
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.2	20.9	15.8	40.7	30.5	30.5	40.7	0.0	0.0	34.6	0.0	21.2
Incr Delay (d2), s/veh	4.3	0.7	0.0	2.2	29.9	30.0	0.7	0.0	0.0	12.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	8.6	0.2	1.4	18.4	18.4	0.5	0.0	0.0	9.3	0.0	5.2
LnGrp Delay(d),s/veh	41.6	21.6	15.8	42.9	60.3	60.5	41.5	0.0	0.0	46.6	0.0	21.7
LnGrp LOS	D	C	B	D	E	E	D			D		C
Approach Vol, veh/h		1334			1152			20			599	
Approach Delay, s/veh		28.4			59.6			41.5			35.4	
Approach LOS		C			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.6	44.2		25.3	19.8	36.0		11.1
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.8	19.9		18.6	14.0	30.8		3.0
Green Ext Time (p_c), s	0.0	16.8		1.6	1.1	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	41.4
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1132	37	0	1185	49	0	0	5	0	0	31
Future Vol, veh/h	0	1132	37	0	1185	49	0	0	5	0	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1192	39	0	1247	52	0	0	5	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	615	-	-	652
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	434	0	0	411
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	434	-	-	410
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.4	14.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	434	-	-	-	-	410
HCM Lane V/C Ratio	0.012	-	-	-	-	0.08
HCM Control Delay (s)	13.4	-	-	-	-	14.5
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	872	11	5	1006	27	13	15	1	24	15	105
Future Volume (veh/h)	116	872	11	5	1006	27	13	15	1	24	15	105
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	121	908	8	5	1048	27	14	16	0	25	36	29
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	523	1990	18	28	1485	38	311	308	0	333	308	262
Arrive On Green	0.15	0.57	0.57	0.02	0.43	0.43	0.17	0.17	0.00	0.17	0.17	0.17
Sat Flow, veh/h	3442	3494	31	1774	3426	88	1331	1863	0	1392	1863	1583
Grp Volume(v), veh/h	121	447	469	5	526	549	14	16	0	25	36	29
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1794	1331	1863	0	1392	1863	1583
Q Serve(g_s), s	2.0	9.7	9.7	0.2	15.9	15.9	0.6	0.5	0.0	1.0	1.1	1.0
Cycle Q Clear(g_c), s	2.0	9.7	9.7	0.2	15.9	15.9	1.6	0.5	0.0	1.4	1.1	1.0
Prop In Lane	1.00		0.02	1.00		0.05	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	523	979	1028	28	746	778	311	308	0	333	308	262
V/C Ratio(X)	0.23	0.46	0.46	0.18	0.71	0.71	0.04	0.05	0.00	0.08	0.12	0.11
Avail Cap(c_a), veh/h	663	979	1028	342	956	997	785	971	0	828	971	825
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.8	8.0	8.0	31.0	14.8	14.8	23.4	22.4	0.0	23.0	22.7	22.7
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.1	1.7	1.6	0.0	0.0	0.0	0.0	0.1	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	0.9	4.6	4.8	0.1	7.8	8.1	0.2	0.2	0.0	0.4	0.5	0.4
LnGrp Delay(d),s/veh	23.9	8.3	8.3	32.1	16.5	16.4	23.4	22.5	0.0	23.1	22.7	22.7
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		1037			1080			30			90	
Approach Delay, s/veh		10.1			16.5			22.9			22.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	42.9		15.3	14.4	34.2		15.3
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	11.7		3.4	4.0	17.9		3.6
Green Ext Time (p_c), s	0.0	12.6		0.3	0.1	9.7		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.9
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	798	41	183	961	15	28	35	142	11	16	49
Future Volume (veh/h)	46	798	41	183	961	15	28	35	142	11	16	49
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1631	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	48	831	0	191	1001	0	29	36	74	11	17	41
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	170	1497	0	259	1668	0	159	158	228	145	182	236
Arrive On Green	0.11	0.48	0.00	0.16	0.54	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3180	0	1597	3177	0	484	962	1389	419	1108	1439
Grp Volume(v), veh/h	48	831	0	191	1001	0	65	0	74	28	0	41
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1446	0	1389	1527	0	1439
Q Serve(g_s), s	1.8	12.4	0.0	7.5	14.5	0.0	0.0	0.0	3.1	0.0	0.0	1.6
Cycle Q Clear(g_c), s	1.8	12.4	0.0	7.5	14.5	0.0	2.3	0.0	3.1	0.9	0.0	1.6
Prop In Lane	1.00		0.00	1.00		0.00	0.45		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	170	1497	0	259	1668	0	316	0	228	327	0	236
V/C Ratio(X)	0.28	0.56	0.00	0.74	0.60	0.00	0.21	0.00	0.33	0.09	0.00	0.17
Avail Cap(c_a), veh/h	292	1889	0	292	1887	0	756	0	667	787	0	691
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.0	12.0	0.0	26.1	10.3	0.0	23.9	0.0	24.2	23.3	0.0	23.6
Incr Delay (d2), s/veh	0.9	0.5	0.0	8.3	0.6	0.0	0.3	0.0	0.8	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	0.8	5.4	0.0	3.9	6.2	0.0	1.1	0.0	1.2	0.4	0.0	0.7
LnGrp Delay(d),s/veh	27.9	12.4	0.0	34.4	10.9	0.0	24.2	0.0	25.0	23.4	0.0	24.0
LnGrp LOS	C	B		C	B		C		C	C		C
Approach Vol, veh/h		879			1192			139			69	
Approach Delay, s/veh		13.3			14.6			24.7			23.7	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.7	37.7		14.3	10.0	41.4		14.3
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	9.5	14.4		3.6	3.8	16.5		5.1
Green Ext Time (p_c), s	0.1	17.3		0.8	0.0	16.3		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	15.0
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	894	12	89	1086	28	11	10	106	46	11	28
Future Volume (veh/h)	54	894	12	89	1086	28	11	10	106	46	11	28
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	55	912	12	91	1108	27	11	10	35	47	11	18
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	195	1141	15	212	1149	24	61	52	116	199	40	182
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1783	23	1774	1759	43	156	448	1006	1164	348	1583
Grp Volume(v), veh/h	55	0	924	91	0	1135	56	0	0	58	0	18
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1802	1609	0	0	1512	0	1583
Q Serve(g_s), s	2.8	0.0	37.7	4.7	0.0	59.4	0.0	0.0	0.0	0.0	0.0	1.0
Cycle Q Clear(g_c), s	2.8	0.0	37.7	4.7	0.0	59.4	3.1	0.0	0.0	3.0	0.0	1.0
Prop In Lane	1.00		0.01	1.00		0.02	0.20		0.62	0.81		1.00
Lane Grp Cap(c), veh/h	195	0	1156	212	0	1172	228	0	0	239	0	182
V/C Ratio(X)	0.28	0.00	0.80	0.43	0.00	0.97	0.25	0.00	0.00	0.24	0.00	0.10
Avail Cap(c_a), veh/h	249	0	1196	231	0	1175	448	0	0	438	0	405
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.9	0.0	13.3	40.8	0.0	16.9	40.5	0.0	0.0	40.4	0.0	39.6
Incr Delay (d2), s/veh	0.8	0.0	3.9	1.4	0.0	19.0	0.6	0.0	0.0	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	19.7	2.4	0.0	37.2	1.5	0.0	0.0	1.5	0.0	0.5
LnGrp Delay(d),s/veh	41.7	0.0	17.2	42.2	0.0	38.6	41.0	0.0	0.0	40.9	0.0	39.8
LnGrp LOS	D		B	D		D	D			D		D
Approach Vol, veh/h		979			1226			56			76	
Approach Delay, s/veh		18.6			38.8			41.0			40.7	
Approach LOS		B			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.0	69.7		15.0	13.9	70.7		15.0
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	6.7	39.7		5.0	4.8	61.4		5.1
Green Ext Time (p_c), s	0.1	19.8		0.6	0.1	3.3		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	30.5
HCM 2010 LOS	C

HCM 2010 TWSC
6: Project Access & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	972	34	14	1107	46	20
Future Vol, veh/h	972	34	14	1107	46	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1023	36	15	1165	48	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1023	0	2218	1023
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1195	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	425	-	~ 15	156
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	156	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	425	-	~ 14	156
Mov Cap-2 Maneuver	-	-	-	-	84	-
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	150	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	102.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	98	-	-	425	-
HCM Lane V/C Ratio	0.709	-	-	0.035	-
HCM Control Delay (s)	102.8	-	-	13.8	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	3.6	-	-	0.1	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 2010 Signalized Intersection Summary
6: Project Access & Sonoma Hwy (SR 12)

08/24/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	972	34	14	1107	46	20
Future Volume (veh/h)	972	34	14	1107	46	20
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1023	36	15	1165	48	21
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1335	1168	31	1468	62	27
Arrive On Green	0.74	0.74	0.02	0.81	0.05	0.05
Sat Flow, veh/h	1810	1583	1774	1810	1175	514
Grp Volume(v), veh/h	1023	36	15	1165	70	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1713	0
Q Serve(g_s), s	27.6	0.5	0.7	27.6	3.3	0.0
Cycle Q Clear(g_c), s	27.6	0.5	0.7	27.6	3.3	0.0
Prop In Lane		1.00	1.00		0.69	0.30
Lane Grp Cap(c), veh/h	1335	1168	31	1468	91	0
V/C Ratio(X)	0.77	0.03	0.48	0.79	0.77	0.00
Avail Cap(c_a), veh/h	1891	1655	110	2104	530	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.4	2.8	39.3	4.1	37.8	0.0
Incr Delay (d2), s/veh	1.2	0.0	10.9	1.4	12.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.8	0.2	0.4	13.8	1.9	0.0
LnGrp Delay(d),s/veh	7.6	2.9	50.2	5.5	50.7	0.0
LnGrp LOS	A	A	D	A	D	
Approach Vol, veh/h	1059			1180	70	
Approach Delay, s/veh	7.5			6.0	50.7	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	5.9	66.1				72.1		8.8
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.0	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.7	29.6				29.6		5.3
Green Ext Time (p_c), s	0.0	30.1				32.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	8.0
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	713	304	27	916	1	242	0	23	0	0	5
Future Volume (veh/h)	1	713	304	27	916	1	242	0	23	0	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	1	728	190	28	935	1	247	0	4	0	0	1
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	4	867	759	80	944	1	286	0	249	0	4	4
Arrive On Green	0.00	0.53	0.53	0.05	0.58	0.58	0.18	0.00	0.18	0.00	0.00	0.00
Sat Flow, veh/h	1597	1629	1425	1597	1627	2	1597	0	1394	0	1676	1425
Grp Volume(v), veh/h	1	728	190	28	0	936	247	0	4	0	0	1
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1628	1597	0	1394	0	1676	1425
Q Serve(g_s), s	0.1	33.8	6.4	1.5	0.0	50.8	13.5	0.0	0.2	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	33.8	6.4	1.5	0.0	50.8	13.5	0.0	0.2	0.0	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	4	867	759	80	0	945	286	0	249	0	4	4
V/C Ratio(X)	0.25	0.84	0.25	0.35	0.00	0.99	0.86	0.00	0.02	0.00	0.00	0.28
Avail Cap(c_a), veh/h	291	945	827	291	0	945	451	0	394	0	473	402
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	44.6	17.7	11.3	41.1	0.0	18.5	35.7	0.0	30.3	0.0	0.0	44.6
Incr Delay (d2), s/veh	12.0	6.1	0.1	1.0	0.0	26.8	6.1	0.0	0.0	0.0	0.0	15.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	16.4	2.6	0.7	0.0	29.6	6.4	0.0	0.1	0.0	0.0	0.0
LnGrp Delay(d),s/veh	56.6	23.8	11.4	42.1	0.0	45.3	41.8	0.0	30.3	0.0	0.0	60.1
LnGrp LOS	E	C	B	D		D	D		C			E
Approach Vol, veh/h		919			964			251			1	
Approach Delay, s/veh		21.3			45.2			41.6			60.1	
Approach LOS		C			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.2	54.7		4.9	4.9	59.0		20.7
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.5	35.8		2.1	2.1	52.8		15.5
Green Ext Time (p_c), s	0.0	3.6		0.0	0.0	0.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	34.5
HCM 2010 LOS	C

Notes

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	357	351	6	2	33
Future Vol, veh/h	40	357	351	6	2	33
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	384	377	6	2	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	388	0	-	0	855	387
Stage 1	-	-	-	-	385	-
Stage 2	-	-	-	-	470	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1170	-	-	-	329	661
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	629	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1168	-	-	-	311	657
Mov Cap-2 Maneuver	-	-	-	-	311	-
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	597	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1168	-	-	-	618
HCM Lane V/C Ratio	0.037	-	-	-	0.061
HCM Control Delay (s)	8.2	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	198	149	0	138	4	0	4	231
Future Vol, veh/h	0	198	149	0	138	4	0	4	231
Peak Hour Factor	0.92	0.88	0.88	0.92	0.88	0.88	0.92	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	225	169	0	157	5	0	5	263
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	13.5	9.6	10.2
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	57%	0%	2%
Vol Thru, %	43%	97%	0%
Vol Right, %	0%	3%	98%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	347	142	235
LT Vol	198	0	4
Through Vol	149	138	0
RT Vol	0	4	231
Lane Flow Rate	394	161	267
Geometry Grp	1	1	1
Degree of Util (X)	0.534	0.226	0.347
Departure Headway (Hd)	4.879	5.035	4.674
Convergence, Y/N	Yes	Yes	Yes
Cap	733	705	764
Service Time	2.955	3.125	2.743
HCM Lane V/C Ratio	0.538	0.228	0.349
HCM Control Delay	13.5	9.6	10.2
HCM Lane LOS	B	A	B
HCM 95th-tile Q	3.2	0.9	1.6

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	132	13	5	106	18	7
Future Vol, veh/h	132	13	5	106	18	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	157	15	6	126	21	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	173	0	303	165
Stage 1	-	-	-	-	165	-
Stage 2	-	-	-	-	138	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1404	-	689	879
Stage 1	-	-	-	-	864	-
Stage 2	-	-	-	-	889	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1404	-	686	879
Mov Cap-2 Maneuver	-	-	-	-	686	-
Stage 1	-	-	-	-	864	-
Stage 2	-	-	-	-	885	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	731	-	-	1404	-
HCM Lane V/C Ratio	0.041	-	-	0.004	-
HCM Control Delay (s)	10.1	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	378	784	15	44	888	193	10	3	2	222	1	355
Future Volume (veh/h)	378	784	15	44	888	193	10	3	2	222	1	355
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	390	808	7	45	915	130	10	3	0	229	1	182
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	503	1515	678	126	1101	156	88	26	0	296	1	497
Arrive On Green	0.15	0.44	0.44	0.07	0.36	0.36	0.06	0.06	0.00	0.17	0.17	0.17
Sat Flow, veh/h	3408	3438	1539	1774	3027	430	1380	414	0	1750	8	1568
Grp Volume(v), veh/h	390	808	7	45	521	524	13	0	0	230	0	182
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1733	1794	0	0	1757	0	1568
Q Serve(g_s), s	8.9	13.9	0.2	2.0	22.3	22.3	0.6	0.0	0.0	10.1	0.0	7.3
Cycle Q Clear(g_c), s	8.9	13.9	0.2	2.0	22.3	22.3	0.6	0.0	0.0	10.1	0.0	7.3
Prop In Lane	1.00		1.00	1.00		0.25	0.77		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	503	1515	678	126	628	630	114	0	0	297	0	497
V/C Ratio(X)	0.77	0.53	0.01	0.36	0.83	0.83	0.11	0.00	0.00	0.77	0.00	0.37
Avail Cap(c_a), veh/h	938	1792	802	226	643	646	795	0	0	540	0	714
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.2	16.6	12.7	35.9	23.5	23.5	35.7	0.0	0.0	32.2	0.0	21.4
Incr Delay (d2), s/veh	2.6	0.4	0.0	1.7	9.3	9.2	0.4	0.0	0.0	4.3	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	6.6	0.1	1.0	12.2	12.2	0.3	0.0	0.0	5.3	0.0	3.2
LnGrp Delay(d),s/veh	35.8	17.0	12.7	37.6	32.7	32.7	36.2	0.0	0.0	36.5	0.0	21.8
LnGrp LOS	D	B	B	D	C	C	D			D		C
Approach Vol, veh/h		1205			1090			13			412	
Approach Delay, s/veh		23.0			32.9			36.2			30.0	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.4	41.5		18.8	16.7	35.3		10.3
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.0	15.9		12.1	10.9	24.3		2.6
Green Ext Time (p_c), s	0.0	18.0		1.6	1.0	5.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1038	23	0	1061	64	0	0	2	0	0	29
Future Vol, veh/h	0	1038	23	0	1061	64	0	0	2	0	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1104	24	0	1129	68	0	0	2	0	0	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	564	-	-	601
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	469	0	0	443
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	469	-	-	442
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.7	13.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	469	-	-	-	-	442
HCM Lane V/C Ratio	0.005	-	-	-	-	0.07
HCM Control Delay (s)	12.7	-	-	-	-	13.8
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.2

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	819	9	4	873	28	13	8	2	31	3	126
Future Volume (veh/h)	100	819	9	4	873	28	13	8	2	31	3	126
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	106	871	10	4	929	30	14	9	2	33	0	40
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	0	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	519	1949	22	23	1435	46	344	245	55	343	0	523
Arrive On Green	0.15	0.56	0.56	0.01	0.42	0.42	0.17	0.17	0.17	0.17	0.00	0.17
Sat Flow, veh/h	3442	3483	40	1774	3401	110	1357	1477	328	1398	0	3151
Grp Volume(v), veh/h	106	430	451	4	470	489	14	0	11	33	0	40
Grp Sat Flow(s),veh/h/ln	1721	1720	1803	1774	1721	1790	1357	0	1805	1398	0	1575
Q Serve(g_s), s	1.6	8.9	8.9	0.1	13.2	13.2	0.5	0.0	0.3	1.2	0.0	0.7
Cycle Q Clear(g_c), s	1.6	8.9	8.9	0.1	13.2	13.2	0.5	0.0	0.3	1.5	0.0	0.7
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	519	962	1009	23	726	755	344	0	300	343	0	523
V/C Ratio(X)	0.20	0.45	0.45	0.17	0.65	0.65	0.04	0.00	0.04	0.10	0.00	0.08
Avail Cap(c_a), veh/h	696	1003	1052	359	1004	1045	861	0	988	876	0	1724
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.6	7.9	7.9	29.7	14.0	14.0	21.4	0.0	21.3	21.9	0.0	21.4
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.3	1.0	0.9	0.0	0.0	0.0	0.0	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	0.8	4.3	4.5	0.1	6.5	6.7	0.2	0.0	0.2	0.5	0.0	0.3
LnGrp Delay(d),s/veh	22.7	8.2	8.2	31.0	15.0	14.9	21.4	0.0	21.3	22.0	0.0	21.4
LnGrp LOS	C	A	A	C	B	B	C		C	C		C
Approach Vol, veh/h		987			963			25			73	
Approach Delay, s/veh		9.7			15.0			21.4			21.7	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	40.5		14.8	13.9	32.2		14.8
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.1	10.9		3.5	3.6	15.2		2.5
Green Ext Time (p_c), s	0.0	11.5		0.2	0.1	10.4		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	12.8
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	815	29	110	826	14	30	22	146	12	19	41
Future Volume (veh/h)	43	815	29	110	826	14	30	22	146	12	19	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	46	867	0	117	879	0	32	23	14	13	20	7
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	169	1530	0	244	1676	0	194	111	212	144	175	219
Arrive On Green	0.11	0.49	0.00	0.15	0.54	0.00	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1597	3179	0	1597	3177	0	671	725	1389	418	1148	1437
Grp Volume(v), veh/h	46	867	0	117	879	0	55	0	14	33	0	7
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1397	0	1389	1566	0	1437
Q Serve(g_s), s	1.7	12.3	0.0	4.2	11.3	0.0	0.5	0.0	0.5	0.0	0.0	0.3
Cycle Q Clear(g_c), s	1.7	12.3	0.0	4.2	11.3	0.0	1.9	0.0	0.5	1.0	0.0	0.3
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	169	1530	0	244	1676	0	305	0	212	320	0	219
V/C Ratio(X)	0.27	0.57	0.00	0.48	0.52	0.00	0.18	0.00	0.07	0.10	0.00	0.03
Avail Cap(c_a), veh/h	307	1986	0	307	1985	0	782	0	701	849	0	725
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.7	11.1	0.0	24.1	9.2	0.0	23.2	0.0	22.6	22.8	0.0	22.5
Incr Delay (d2), s/veh	0.9	0.5	0.0	1.5	0.4	0.0	0.3	0.0	0.1	0.1	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	0.8	5.3	0.0	2.0	4.8	0.0	0.8	0.0	0.2	0.5	0.0	0.1
LnGrp Delay(d),s/veh	26.6	11.6	0.0	25.6	9.5	0.0	23.5	0.0	22.8	23.0	0.0	22.6
LnGrp LOS	C	B		C	A		C		C	C		C
Approach Vol, veh/h		913			996			69			40	
Approach Delay, s/veh		12.3			11.4			23.3			22.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.6	36.8		13.0	9.6	39.8		13.0
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.6	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	3.7	14.3		3.0	3.7	13.3		3.9
Green Ext Time (p_c), s	0.1	16.5		0.5	0.0	16.9		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.5
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	879	13	53	852	44	17	11	116	57	7	33
Future Volume (veh/h)	71	879	13	53	852	44	17	11	116	57	7	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	76	935	12	56	906	41	18	12	30	61	7	4
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	229	1146	15	189	1067	48	85	59	94	226	22	181
Arrive On Green	0.13	0.64	0.64	0.11	0.62	0.62	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1783	23	1774	1719	78	296	512	809	1312	190	1561
Grp Volume(v), veh/h	76	0	947	56	0	947	60	0	0	68	0	4
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1796	1617	0	0	1502	0	1561
Q Serve(g_s), s	3.6	0.0	36.7	2.7	0.0	39.4	0.0	0.0	0.0	0.3	0.0	0.2
Cycle Q Clear(g_c), s	3.6	0.0	36.7	2.7	0.0	39.4	3.0	0.0	0.0	3.3	0.0	0.2
Prop In Lane	1.00		0.01	1.00		0.04	0.30		0.50	0.90		1.00
Lane Grp Cap(c), veh/h	229	0	1161	189	0	1115	238	0	0	248	0	181
V/C Ratio(X)	0.33	0.00	0.82	0.30	0.00	0.85	0.25	0.00	0.00	0.27	0.00	0.02
Avail Cap(c_a), veh/h	266	0	1278	247	0	1252	484	0	0	467	0	427
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.9	0.0	12.5	38.4	0.0	14.2	37.7	0.0	0.0	37.9	0.0	36.5
Incr Delay (d2), s/veh	0.8	0.0	4.0	0.9	0.0	5.4	0.5	0.0	0.0	0.6	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	1.8	0.0	19.2	1.4	0.0	20.9	1.5	0.0	0.0	1.6	0.0	0.1
LnGrp Delay(d),s/veh	37.8	0.0	16.5	39.3	0.0	19.6	38.3	0.0	0.0	38.5	0.0	36.6
LnGrp LOS	D		B	D		B	D			D		D
Approach Vol, veh/h		1023			1003			60			72	
Approach Delay, s/veh		18.1			20.7			38.3			38.4	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.0	66.0		14.3	15.0	63.9		14.3
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	10.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	14.7	38.7		5.3	5.6	41.4		5.0
Green Ext Time (p_c), s	0.0	18.2		0.6	0.1	16.4		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	20.5
HCM 2010 LOS	C

HCM 2010 TWSC
6: Project Access & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	994	56	24	893	50	21
Future Vol, veh/h	994	56	24	893	50	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1057	60	26	950	53	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1057	0	2058	1057
Stage 1	-	-	-	-	1057	-
Stage 2	-	-	-	-	1001	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	659	-	61	273
Stage 1	-	-	-	-	334	-
Stage 2	-	-	-	-	355	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	659	-	59	273
Mov Cap-2 Maneuver	-	-	-	-	181	-
Stage 1	-	-	-	-	334	-
Stage 2	-	-	-	-	341	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	33.3
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	201	-	-	659	-
HCM Lane V/C Ratio	0.376	-	-	0.039	-
HCM Control Delay (s)	33.3	-	-	10.7	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	1.6	-	-	0.1	-

HCM 2010 Signalized Intersection Summary
6: Project Access & Sonoma Hwy (SR 12)

09/20/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	994	56	24	893	50	21
Future Volume (veh/h)	994	56	24	893	50	21
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1046	59	25	940	53	22
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1298	1136	48	1451	69	29
Arrive On Green	0.72	0.72	0.03	0.80	0.06	0.06
Sat Flow, veh/h	1810	1583	1774	1810	1196	497
Grp Volume(v), veh/h	1046	59	25	940	76	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1715	0
Q Serve(g_s), s	30.3	0.9	1.1	16.8	3.4	0.0
Cycle Q Clear(g_c), s	30.3	0.9	1.1	16.8	3.4	0.0
Prop In Lane		1.00	1.00		0.70	0.29
Lane Grp Cap(c), veh/h	1298	1136	48	1451	99	0
V/C Ratio(X)	0.81	0.05	0.53	0.65	0.77	0.00
Avail Cap(c_a), veh/h	1956	1712	113	2176	549	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	7.4	3.2	37.5	3.2	36.3	0.0
Incr Delay (d2), s/veh	1.5	0.0	8.7	0.5	11.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.4	0.4	0.6	8.3	1.9	0.0
LnGrp Delay(d),s/veh	8.9	3.3	46.3	3.7	48.1	0.0
LnGrp LOS	A	A	D	A	D	
Approach Vol, veh/h	1105			965	76	
Approach Delay, s/veh	8.6			4.8	48.1	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.6	62.6				69.2		9.0
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.0	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	3.1	32.3				18.8		5.4
Green Ext Time (p_c), s	0.0	23.8				26.8		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	644	343	52	648	0	266	0	31	0	0	0
Future Volume (veh/h)	2	644	343	52	648	0	266	0	31	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	2	724	259	58	728	0	299	0	11	0	0	-4
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	8	794	685	133	921	0	345	0	302	0	2	2
Arrive On Green	0.00	0.49	0.49	0.08	0.57	0.00	0.22	0.00	0.22	0.00	0.00	0.00
Sat Flow, veh/h	1597	1629	1406	1597	1629	0	1597	0	1394	0	1676	1425
Grp Volume(v), veh/h	2	724	259	58	728	0	299	0	11	0	0	-4
Grp Sat Flow(s),veh/h/ln	1597	1629	1406	1597	1629	0	1597	0	1394	0	1676	1425
Q Serve(g_s), s	0.1	31.6	8.9	2.7	27.0	0.0	13.9	0.0	0.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.1	31.6	8.9	2.7	27.0	0.0	13.9	0.0	0.5	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	8	794	685	133	921	0	345	0	302	0	2	2
V/C Ratio(X)	0.26	0.91	0.38	0.44	0.79	0.00	0.87	0.00	0.04	0.00	0.00	-2.16
Avail Cap(c_a), veh/h	339	1101	951	339	1101	0	525	0	459	0	552	469
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	38.1	18.2	12.4	33.5	13.1	0.0	29.0	0.0	23.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	6.2	8.3	0.3	0.8	3.1	0.0	6.3	0.0	0.0	0.0	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	0.1	15.9	3.5	1.2	12.7	0.0	6.7	0.0	0.2	0.0	0.0	0.0
LnGrp Delay(d),s/veh	44.4	26.5	12.6	34.4	16.2	0.0	35.4	0.0	23.8	0.0	0.0	0.0
LnGrp LOS	D	C	B	C	B		D		C			
Approach Vol, veh/h		985			786			310			-4	
Approach Delay, s/veh		22.9			17.5			34.9			0.0	
Approach LOS		C			B			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.1	44.5		0.0	5.1	50.5		21.3
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	4.7	33.6		0.0	2.1	29.0		15.9
Green Ext Time (p_c), s	0.0	3.9		0.0	0.0	3.5		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	22.7
HCM 2010 LOS	C

Notes

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	336	221	23	16	5
Future Vol, veh/h	3	336	221	23	16	5
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	386	254	26	18	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	284	0	-	0	664	273
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	393	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1278	-	-	-	426	766
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	682	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1276	-	-	-	421	762
Mov Cap-2 Maneuver	-	-	-	-	421	-
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	677	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1276	-	-	-	471
HCM Lane V/C Ratio	0.003	-	-	-	0.051
HCM Control Delay (s)	7.8	0	-	-	13.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	10.7
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	191	161	0	87	3	0	6	161
Future Vol, veh/h	0	191	161	0	87	3	0	6	161
Peak Hour Factor	0.92	0.90	0.90	0.92	0.90	0.90	0.92	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	179	0	97	3	0	7	179
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	12.1	8.6	8.9
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	54%	0%	4%
Vol Thru, %	46%	97%	0%
Vol Right, %	0%	3%	96%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	352	90	167
LT Vol	191	0	6
Through Vol	161	87	0
RT Vol	0	3	161
Lane Flow Rate	391	100	186
Geometry Grp	1	1	1
Degree of Util (X)	0.498	0.133	0.232
Departure Headway (Hd)	4.587	4.787	4.507
Convergence, Y/N	Yes	Yes	Yes
Cap	786	746	794
Service Time	2.625	2.836	2.545
HCM Lane V/C Ratio	0.497	0.134	0.234
HCM Control Delay	12.1	8.6	8.9
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.8	0.5	0.9

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	139	22	9	66	19	8
Future Vol, veh/h	139	22	9	66	19	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	170	27	11	80	23	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	196	0	285	183
Stage 1	-	-	-	-	183	-
Stage 2	-	-	-	-	102	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1377	-	705	859
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	922	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1377	-	699	859
Mov Cap-2 Maneuver	-	-	-	-	699	-
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	915	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	740	-	-	1377	-
HCM Lane V/C Ratio	0.044	-	-	0.008	-
HCM Control Delay (s)	10.1	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	465	711	20	15	956	220	24	4	5	249	0	402
Future Volume (veh/h)	465	711	20	15	956	220	24	4	5	249	0	402
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	511	781	13	16	1051	137	26	4	3	274	0	267
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	609	1629	733	58	1005	131	109	17	13	335	0	579
Arrive On Green	0.18	0.47	0.47	0.03	0.33	0.33	0.08	0.08	0.08	0.19	0.00	0.19
Sat Flow, veh/h	3408	3438	1548	1774	3065	399	1390	214	160	1757	0	1568
Grp Volume(v), veh/h	511	781	13	16	591	597	33	0	0	274	0	267
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1739	1764	0	0	1757	0	1568
Q Serve(g_s), s	13.3	14.2	0.4	0.8	30.2	30.2	1.6	0.0	0.0	13.8	0.0	11.9
Cycle Q Clear(g_c), s	13.3	14.2	0.4	0.8	30.2	30.2	1.6	0.0	0.0	13.8	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.23	0.79		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	609	1629	733	58	566	570	138	0	0	335	0	579
V/C Ratio(X)	0.84	0.48	0.02	0.27	1.04	1.05	0.24	0.00	0.00	0.82	0.00	0.46
Avail Cap(c_a), veh/h	825	1629	733	198	566	570	688	0	0	475	0	704
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.5	16.5	12.9	43.5	30.9	30.9	39.9	0.0	0.0	35.8	0.0	22.1
Incr Delay (d2), s/veh	5.8	0.3	0.0	2.5	50.0	50.5	0.9	0.0	0.0	7.5	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	6.8	0.2	0.4	22.2	22.4	0.8	0.0	0.0	7.4	0.0	5.2
LnGrp Delay(d),s/veh	42.3	16.8	12.9	46.0	81.0	81.5	40.8	0.0	0.0	43.3	0.0	22.7
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1305			1204			33			541	
Approach Delay, s/veh		26.8			80.8			40.8			33.1	
Approach LOS		C			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	49.4		22.6	21.2	36.0		12.3
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.8	16.2		15.8	15.3	32.2		3.6
Green Ext Time (p_c), s	0.0	19.0		1.8	1.1	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	49.1
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	966	16	0	1176	31	0	0	7	0	0	14
Future Vol, veh/h	0	966	16	0	1176	31	0	0	7	0	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1028	17	0	1251	33	0	0	7	0	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	522	-	-	645
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	499	0	0	415
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	499	-	-	414
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.3	14
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	499	-	-	-	-	414
HCM Lane V/C Ratio	0.015	-	-	-	-	0.036
HCM Control Delay (s)	12.3	-	-	-	-	14
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.1

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	141	777	9	5	774	18	25	32	4	59	41	251
Future Volume (veh/h)	141	777	9	5	774	18	25	32	4	59	41	251
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	147	809	7	5	806	13	26	33	0	61	73	63
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	555	1897	16	28	1377	22	308	351	0	353	351	298
Arrive On Green	0.16	0.54	0.54	0.02	0.40	0.40	0.19	0.19	0.00	0.19	0.19	0.19
Sat Flow, veh/h	3442	3494	30	1774	3464	56	1248	1863	0	1370	1863	1583
Grp Volume(v), veh/h	147	398	418	5	400	419	26	33	0	61	73	63
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1800	1248	1863	0	1370	1863	1583
Q Serve(g_s), s	2.4	8.7	8.7	0.2	11.5	11.5	1.1	0.9	0.0	2.4	2.1	2.1
Cycle Q Clear(g_c), s	2.4	8.7	8.7	0.2	11.5	11.5	3.2	0.9	0.0	3.3	2.1	2.1
Prop In Lane	1.00		0.02	1.00		0.03	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	555	934	980	28	684	715	308	351	0	353	351	298
V/C Ratio(X)	0.26	0.43	0.43	0.18	0.59	0.59	0.08	0.09	0.00	0.17	0.21	0.21
Avail Cap(c_a), veh/h	673	970	1018	347	970	1015	733	986	0	819	986	838
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	8.6	8.6	30.6	14.9	14.9	22.9	21.1	0.0	22.5	21.6	21.6
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.1	0.8	0.8	0.0	0.0	0.0	0.1	0.1	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	1.1	4.2	4.4	0.1	5.6	5.9	0.4	0.5	0.0	0.9	1.1	0.9
LnGrp Delay(d),s/veh	23.2	8.9	8.9	31.7	15.7	15.7	23.0	21.1	0.0	22.6	21.7	21.7
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		963			824			59			197	
Approach Delay, s/veh		11.0			15.8			21.9			22.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	40.7		16.6	14.9	31.5		16.6
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	10.7		5.3	4.4	13.5		5.2
Green Ext Time (p_c), s	0.0	9.9		0.6	0.1	9.4		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	789	22	160	714	9	28	20	157	22	63	36
Future Volume (veh/h)	23	789	22	160	714	9	28	20	157	22	63	36
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	26	877	0	178	793	0	31	22	85	24	70	20
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	111	1473	0	260	1762	0	180	101	234	108	234	242
Arrive On Green	0.07	0.48	0.00	0.16	0.57	0.00	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1597	3178	0	1597	3177	0	545	598	1389	225	1392	1439
Grp Volume(v), veh/h	26	877	0	178	793	0	53	0	85	94	0	20
Grp Sat Flow(s),veh/h/ln	1597	1548	0	1597	1548	0	1143	0	1389	1616	0	1439
Q Serve(g_s), s	1.0	13.4	0.0	6.8	9.6	0.0	0.6	0.0	3.5	0.0	0.0	0.8
Cycle Q Clear(g_c), s	1.0	13.4	0.0	6.8	9.6	0.0	3.7	0.0	3.5	3.1	0.0	0.8
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.26		1.00
Lane Grp Cap(c), veh/h	111	1473	0	260	1762	0	280	0	234	342	0	242
V/C Ratio(X)	0.24	0.60	0.00	0.68	0.45	0.00	0.19	0.00	0.36	0.28	0.00	0.08
Avail Cap(c_a), veh/h	296	1914	0	296	1914	0	696	0	676	832	0	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.5	12.4	0.0	25.5	8.1	0.0	23.5	0.0	23.8	23.7	0.0	22.7
Incr Delay (d2), s/veh	1.1	0.6	0.0	5.4	0.3	0.0	0.3	0.0	0.9	0.4	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	0.5	5.8	0.0	3.4	4.1	0.0	0.9	0.0	1.4	1.5	0.0	0.3
LnGrp Delay(d),s/veh	29.6	13.0	0.0	30.9	8.3	0.0	23.8	0.0	24.8	24.1	0.0	22.8
LnGrp LOS	C	B		C	A		C		C	C		C
Approach Vol, veh/h		903			971			138			114	
Approach Delay, s/veh		13.4			12.5			24.4			23.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.6	36.8		14.4	7.5	42.8		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.6	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	3.8	15.4		5.1	3.0	11.6		5.7
Green Ext Time (p_c), s	0.1	15.4		1.1	0.0	16.8		1.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	907	11	42	852	25	10	17	86	45	6	18
Future Volume (veh/h)	52	907	11	42	852	25	10	17	86	45	6	18
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	54	945	8	44	888	23	10	18	26	47	6	9
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	207	1150	10	173	1093	28	66	85	95	229	25	187
Arrive On Green	0.12	0.64	0.64	0.10	0.62	0.62	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1792	15	1774	1756	45	148	719	805	1285	210	1583
Grp Volume(v), veh/h	54	0	953	44	0	911	54	0	0	53	0	9
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	0	1802	1671	0	0	1495	0	1583
Q Serve(g_s), s	2.4	0.0	35.0	2.0	0.0	33.8	0.0	0.0	0.0	0.0	0.0	0.4
Cycle Q Clear(g_c), s	2.4	0.0	35.0	2.0	0.0	33.8	2.5	0.0	0.0	2.4	0.0	0.4
Prop In Lane	1.00		0.01	1.00		0.03	0.19		0.48	0.89		1.00
Lane Grp Cap(c), veh/h	207	0	1160	173	0	1121	246	0	0	254	0	187
V/C Ratio(X)	0.26	0.00	0.82	0.25	0.00	0.81	0.22	0.00	0.00	0.21	0.00	0.05
Avail Cap(c_a), veh/h	284	0	1362	263	0	1338	527	0	0	496	0	461
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.2	0.0	11.9	36.6	0.0	12.6	35.1	0.0	0.0	35.1	0.0	34.2
Incr Delay (d2), s/veh	0.7	0.0	3.8	0.8	0.0	3.5	0.4	0.0	0.0	0.4	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	1.2	0.0	18.4	1.0	0.0	17.5	1.2	0.0	0.0	1.2	0.0	0.2
LnGrp Delay(d),s/veh	35.9	0.0	15.7	37.3	0.0	16.2	35.6	0.0	0.0	35.5	0.0	34.3
LnGrp LOS	D		B	D		B	D			D		C
Approach Vol, veh/h		1007			955			54			62	
Approach Delay, s/veh		16.8			17.1			35.6			35.3	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	62.2		13.8	13.2	60.5		13.8
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	4.0	37.0		4.4	4.4	35.8		4.5
Green Ext Time (p_c), s	0.0	18.6		0.5	0.1	18.6		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	18.0
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	818	187	16	675	24	205	1	25	6	0	5
Future Volume (veh/h)	28	818	187	16	675	24	205	1	25	6	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1630	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	30	870	143	17	718	26	218	1	8	6	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	84	898	785	55	834	30	256	1	224	38	0	34
Arrive On Green	0.05	0.55	0.55	0.03	0.53	0.53	0.16	0.16	0.16	0.02	0.00	0.02
Sat Flow, veh/h	1597	1629	1425	1597	1564	57	1590	7	1393	1597	0	1425
Grp Volume(v), veh/h	30	870	143	17	0	744	219	0	8	6	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1620	1597	0	1393	1597	0	1425
Q Serve(g_s), s	1.7	47.3	4.6	1.0	0.0	36.4	12.3	0.0	0.4	0.3	0.0	0.3
Cycle Q Clear(g_c), s	1.7	47.3	4.6	1.0	0.0	36.4	12.3	0.0	0.4	0.3	0.0	0.3
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	84	898	785	55	0	864	257	0	224	38	0	34
V/C Ratio(X)	0.36	0.97	0.18	0.31	0.00	0.86	0.85	0.00	0.04	0.16	0.00	0.15
Avail Cap(c_a), veh/h	283	922	807	283	0	917	440	0	384	440	0	392
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.0	19.9	10.3	43.3	0.0	18.5	37.5	0.0	32.5	43.9	0.0	43.9
Incr Delay (d2), s/veh	1.0	22.1	0.1	1.2	0.0	7.8	3.1	0.0	0.0	0.7	0.0	0.7
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	0.8	26.5	1.8	0.4	0.0	18.0	5.6	0.0	0.2	0.2	0.0	0.1
LnGrp Delay(d),s/veh	43.0	41.9	10.4	44.5	0.0	26.4	40.6	0.0	32.6	44.6	0.0	44.6
LnGrp LOS	D	D	B	D		C	D		C	D		D
Approach Vol, veh/h		1043			761			227			11	
Approach Delay, s/veh		37.6			26.8			40.3			44.6	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.9	57.6		6.9	9.5	56.0		19.5
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.0	49.3		2.3	3.7	38.4		14.3
Green Ext Time (p_c), s	0.0	1.3		0.0	0.0	3.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	33.9
HCM 2010 LOS	C

Notes

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	301	328	3	4	74
Future Vol, veh/h	34	301	328	3	4	74
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	320	349	3	4	79

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	356	0	-	0	748	357
Stage 1	-	-	-	-	355	-
Stage 2	-	-	-	-	393	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1203	-	-	-	380	687
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	682	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1201	-	-	-	364	683
Mov Cap-2 Maneuver	-	-	-	-	364	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	655	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1201	-	-	-	654
HCM Lane V/C Ratio	0.03	-	-	-	0.127
HCM Control Delay (s)	8.1	0	-	-	11.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	186	102	0	65	7	0	3	259
Future Vol, veh/h	0	186	102	0	65	7	0	3	259
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	198	109	0	69	7	0	3	276
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	11.1	8.5	9.4
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	0%	1%
Vol Thru, %	35%	90%	0%
Vol Right, %	0%	10%	99%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	288	72	262
LT Vol	186	0	3
Through Vol	102	65	0
RT Vol	0	7	259
Lane Flow Rate	306	77	279
Geometry Grp	1	1	1
Degree of Util (X)	0.406	0.103	0.331
Departure Headway (Hd)	4.768	4.864	4.272
Convergence, Y/N	Yes	Yes	Yes
Cap	751	732	842
Service Time	2.817	2.924	2.304
HCM Lane V/C Ratio	0.407	0.105	0.331
HCM Control Delay	11.1	8.5	9.4
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2	0.3	1.5

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	465	811	17	53	931	267	14	4	3	337	1	375
Future Volume (veh/h)	465	811	17	53	931	267	14	4	3	337	1	375
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1817	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	495	863	15	56	990	155	15	4	1	359	1	270
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	588	1427	642	129	942	147	86	23	6	406	1	634
Arrive On Green	0.17	0.42	0.42	0.07	0.32	0.32	0.06	0.06	0.06	0.23	0.23	0.23
Sat Flow, veh/h	3408	3438	1547	1774	2986	467	1335	356	89	1752	5	1568
Grp Volume(v), veh/h	495	863	15	56	572	573	20	0	0	360	0	270
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1726	1727	1780	0	0	1757	0	1568
Q Serve(g_s), s	13.5	18.8	0.5	2.9	30.2	30.2	1.0	0.0	0.0	19.0	0.0	11.9
Cycle Q Clear(g_c), s	13.5	18.8	0.5	2.9	30.2	30.2	1.0	0.0	0.0	19.0	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.27	0.75		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	588	1427	642	129	545	545	114	0	0	407	0	634
V/C Ratio(X)	0.84	0.60	0.02	0.43	1.05	1.05	0.18	0.00	0.00	0.88	0.00	0.43
Avail Cap(c_a), veh/h	794	1516	682	191	545	545	667	0	0	457	0	678
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.3	21.9	16.5	42.5	32.8	32.8	42.4	0.0	0.0	35.5	0.0	20.5
Incr Delay (d2), s/veh	6.1	0.8	0.0	2.3	52.4	52.9	0.7	0.0	0.0	17.1	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	9.0	0.2	1.5	22.2	22.2	0.5	0.0	0.0	11.1	0.0	5.2
LnGrp Delay(d),s/veh	44.5	22.6	16.6	44.8	85.2	85.7	43.1	0.0	0.0	52.6	0.0	21.0
LnGrp LOS	D	C	B	D	F	F	D			D		C
Approach Vol, veh/h		1373			1201			20			630	
Approach Delay, s/veh		30.4			83.5			43.1			39.1	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.7	45.5		27.3	21.2	36.0		11.2
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.9	20.8		21.0	15.5	32.2		3.0
Green Ext Time (p_c), s	0.0	16.6		1.2	1.1	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	52.0
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1155	46	0	1233	49	0	0	5	0	0	31
Future Vol, veh/h	0	1155	46	0	1233	49	0	0	5	0	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1216	48	0	1298	52	0	0	5	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	632	-	-	678
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	423	0	0	395
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	423	-	-	394
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.6	15
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	423	-	-	-	-	394
HCM Lane V/C Ratio	0.012	-	-	-	-	0.083
HCM Control Delay (s)	13.6	-	-	-	-	15
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	889	11	5	1038	27	23	15	1	24	15	111
Future Volume (veh/h)	121	889	11	5	1038	27	23	15	1	24	15	111
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	126	926	8	5	1081	27	24	16	0	25	41	33
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	523	1989	17	28	1485	37	311	316	0	337	316	269
Arrive On Green	0.15	0.57	0.57	0.02	0.43	0.43	0.17	0.17	0.00	0.17	0.17	0.17
Sat Flow, veh/h	3442	3494	30	1774	3429	86	1320	1863	0	1392	1863	1583
Grp Volume(v), veh/h	126	456	478	5	542	566	24	16	0	25	41	33
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1794	1320	1863	0	1392	1863	1583
Q Serve(g_s), s	2.1	10.1	10.1	0.2	16.9	16.9	1.0	0.5	0.0	1.0	1.2	1.1
Cycle Q Clear(g_c), s	2.1	10.1	10.1	0.2	16.9	16.9	2.2	0.5	0.0	1.5	1.2	1.1
Prop In Lane	1.00		0.02	1.00		0.05	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	523	979	1027	28	745	777	311	316	0	337	316	269
V/C Ratio(X)	0.24	0.47	0.47	0.18	0.73	0.73	0.08	0.05	0.00	0.07	0.13	0.12
Avail Cap(c_a), veh/h	652	979	1027	336	941	982	764	956	0	815	956	813
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.2	8.2	8.2	31.5	15.2	15.2	23.8	22.6	0.0	23.2	22.9	22.8
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.1	2.1	2.0	0.0	0.0	0.0	0.0	0.1	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	1.0	4.8	5.0	0.1	8.4	8.8	0.4	0.2	0.0	0.4	0.6	0.5
LnGrp Delay(d),s/veh	24.3	8.5	8.5	32.6	17.4	17.3	23.9	22.6	0.0	23.2	22.9	22.9
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		1060			1113			40			99	
Approach Delay, s/veh		10.4			17.4			23.3			23.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	43.4		15.7	14.6	34.6		15.7
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	12.1		3.5	4.1	18.9		4.2
Green Ext Time (p_c), s	0.0	12.8		0.3	0.1	9.2		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	14.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	810	41	187	987	15	28	35	143	11	16	55
Future Volume (veh/h)	52	810	41	187	987	15	28	35	143	11	16	55
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1631	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	54	844	0	195	1028	0	29	36	75	11	17	47
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	182	1508	0	258	1653	0	157	156	226	144	180	235
Arrive On Green	0.11	0.49	0.00	0.16	0.53	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3180	0	1597	3177	0	483	960	1389	419	1107	1439
Grp Volume(v), veh/h	54	844	0	195	1028	0	65	0	75	28	0	47
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1442	0	1389	1526	0	1439
Q Serve(g_s), s	2.1	12.7	0.0	7.7	15.3	0.0	0.0	0.0	3.2	0.0	0.0	1.9
Cycle Q Clear(g_c), s	2.1	12.7	0.0	7.7	15.3	0.0	2.3	0.0	3.2	0.9	0.0	1.9
Prop In Lane	1.00		0.00	1.00		0.00	0.45		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	182	1508	0	258	1653	0	314	0	226	325	0	235
V/C Ratio(X)	0.30	0.56	0.00	0.76	0.62	0.00	0.21	0.00	0.33	0.09	0.00	0.20
Avail Cap(c_a), veh/h	289	1873	0	289	1871	0	748	0	661	780	0	685
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.9	12.0	0.0	26.5	10.8	0.0	24.1	0.0	24.5	23.6	0.0	24.0
Incr Delay (d2), s/veh	0.9	0.5	0.0	9.7	0.7	0.0	0.3	0.0	0.8	0.1	0.0	0.4
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	0.9	5.5	0.0	4.1	6.6	0.0	1.1	0.0	1.3	0.4	0.0	0.8
LnGrp Delay(d),s/veh	27.8	12.5	0.0	36.2	11.4	0.0	24.5	0.0	25.4	23.7	0.0	24.4
LnGrp LOS	C	B		D	B		C		C	C		C
Approach Vol, veh/h		898			1223			140			75	
Approach Delay, s/veh		13.4			15.4			24.9			24.1	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.7	38.2		14.3	10.6	41.3		14.3
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	9.7	14.7		3.9	4.1	17.3		5.2
Green Ext Time (p_c), s	0.1	17.5		0.9	0.0	16.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	905	9	93	1117	28	6	10	107	46	11	33
Future Volume (veh/h)	58	905	9	93	1117	28	6	10	107	46	11	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	59	923	9	95	1140	27	6	10	36	47	11	23
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	199	1147	11	213	1154	17	49	48	128	197	40	181
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1789	17	1774	1761	42	76	421	1118	1158	347	1583
Grp Volume(v), veh/h	59	0	932	95	0	1167	52	0	0	58	0	23
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	0	1802	1615	0	0	1505	0	1583
Q Serve(g_s), s	3.1	0.0	38.5	5.0	0.0	64.9	0.0	0.0	0.0	0.1	0.0	1.3
Cycle Q Clear(g_c), s	3.1	0.0	38.5	5.0	0.0	64.9	2.9	0.0	0.0	3.0	0.0	1.3
Prop In Lane	1.00		0.01	1.00		0.02	0.12		0.69	0.81		1.00
Lane Grp Cap(c), veh/h	199	0	1159	213	0	1172	225	0	0	237	0	181
V/C Ratio(X)	0.30	0.00	0.80	0.45	0.00	1.00	0.23	0.00	0.00	0.24	0.00	0.13
Avail Cap(c_a), veh/h	248	0	1189	230	0	1168	446	0	0	434	0	402
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.0	0.0	13.4	41.2	0.0	17.7	40.7	0.0	0.0	40.8	0.0	40.0
Incr Delay (d2), s/veh	0.8	0.0	4.2	1.5	0.0	25.4	0.5	0.0	0.0	0.5	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	10.5	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	20.2	2.5	0.0	43.6	1.4	0.0	0.0	1.5	0.0	0.6
LnGrp Delay(d),s/veh	41.8	0.0	17.5	42.6	0.0	53.6	41.3	0.0	0.0	41.3	0.0	40.3
LnGrp LOS	D		B	D		D	D			D		D
Approach Vol, veh/h		991			1262			52			81	
Approach Delay, s/veh		19.0			52.8			41.3			41.0	
Approach LOS		B			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.1	70.2		15.0	14.3	71.0		15.0
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	7.0	40.5		5.0	5.1	66.9		4.9
Green Ext Time (p_c), s	0.1	19.8		0.6	0.1	0.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	38.1
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	734	307	28	958	9	248	0	24	21	1	25
Future Volume (veh/h)	9	734	307	28	958	9	248	0	24	21	1	25
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	9	749	193	29	978	9	253	0	5	21	1	22
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	32	804	704	80	844	8	287	0	251	97	5	91
Arrive On Green	0.02	0.49	0.49	0.05	0.52	0.52	0.18	0.00	0.18	0.06	0.06	0.06
Sat Flow, veh/h	1597	1629	1425	1597	1612	15	1597	0	1394	1527	73	1425
Grp Volume(v), veh/h	9	749	193	29	0	987	253	0	5	22	0	22
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1626	1597	0	1394	1600	0	1425
Q Serve(g_s), s	0.6	42.8	7.9	1.7	0.0	52.0	15.3	0.0	0.3	1.3	0.0	1.5
Cycle Q Clear(g_c), s	0.6	42.8	7.9	1.7	0.0	52.0	15.3	0.0	0.3	1.3	0.0	1.5
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.95		1.00
Lane Grp Cap(c), veh/h	32	804	704	80	0	852	287	0	251	102	0	91
V/C Ratio(X)	0.28	0.93	0.27	0.36	0.00	1.16	0.88	0.00	0.02	0.22	0.00	0.24
Avail Cap(c_a), veh/h	262	853	746	262	0	852	407	0	355	408	0	363
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	47.9	23.5	14.7	45.6	0.0	23.6	39.7	0.0	33.5	44.1	0.0	44.2
Incr Delay (d2), s/veh	1.8	15.9	0.2	1.0	0.0	84.4	11.5	0.0	0.0	0.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	22.7	3.1	0.8	0.0	43.2	7.7	0.0	0.1	0.6	0.0	0.6
LnGrp Delay(d),s/veh	49.7	39.5	14.9	46.7	0.0	108.0	51.2	0.0	33.5	44.5	0.0	44.7
LnGrp LOS	D	D	B	D		F	D		C	D		D
Approach Vol, veh/h		951			1016			258			44	
Approach Delay, s/veh		34.6			106.3			50.9			44.6	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.7	56.0		11.0	6.7	59.0		22.6
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.7	44.8		3.5	2.6	54.0		17.3
Green Ext Time (p_c), s	0.0	2.5		0.1	0.0	0.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	68.7
HCM 2010 LOS	E

Notes

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	348	343	6	2	42
Future Vol, veh/h	50	348	343	6	2	42
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	374	369	6	2	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	379	0	-	0	858	378
Stage 1	-	-	-	-	376	-
Stage 2	-	-	-	-	482	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1179	-	-	-	327	669
Stage 1	-	-	-	-	694	-
Stage 2	-	-	-	-	621	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1177	-	-	-	306	665
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	583	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1177	-	-	-	631
HCM Lane V/C Ratio	0.046	-	-	-	0.075
HCM Control Delay (s)	8.2	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	11.5
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	199	139	0	126	4	0	4	235
Future Vol, veh/h	0	199	139	0	126	4	0	4	235
Peak Hour Factor	0.92	0.88	0.88	0.92	0.88	0.88	0.92	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	226	158	0	143	5	0	5	267
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	13.2	9.4	10.2
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	59%	0%	2%
Vol Thru, %	41%	97%	0%
Vol Right, %	0%	3%	98%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	338	130	239
LT Vol	199	0	4
Through Vol	139	126	0
RT Vol	0	4	235
Lane Flow Rate	384	148	272
Geometry Grp	1	1	1
Degree of Util (X)	0.519	0.206	0.349
Departure Headway (Hd)	4.869	5.025	4.622
Convergence, Y/N	Yes	Yes	Yes
Cap	734	706	771
Service Time	2.944	3.113	2.684
HCM Lane V/C Ratio	0.523	0.21	0.353
HCM Control Delay	13.2	9.4	10.2
HCM Lane LOS	B	A	B
HCM 95th-tile Q	3	0.8	1.6

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	440	782	15	44	946	201	10	3	2	274	1	355
Future Volume (veh/h)	440	782	15	44	946	201	10	3	2	274	1	355
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	454	806	7	45	975	138	10	3	0	282	1	182
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	559	1507	674	121	1038	147	87	26	0	342	1	563
Arrive On Green	0.16	0.44	0.44	0.07	0.34	0.34	0.06	0.06	0.00	0.20	0.20	0.20
Sat Flow, veh/h	3408	3438	1539	1774	3029	428	1380	414	0	1751	6	1568
Grp Volume(v), veh/h	454	806	7	45	555	558	13	0	0	283	0	182
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1733	1794	0	0	1757	0	1568
Q Serve(g_s), s	11.3	15.1	0.2	2.1	27.4	27.5	0.6	0.0	0.0	13.6	0.0	7.4
Cycle Q Clear(g_c), s	11.3	15.1	0.2	2.1	27.4	27.5	0.6	0.0	0.0	13.6	0.0	7.4
Prop In Lane	1.00		1.00	1.00		0.25	0.77		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	559	1507	674	121	591	594	113	0	0	343	0	563
V/C Ratio(X)	0.81	0.53	0.01	0.37	0.94	0.94	0.11	0.00	0.00	0.83	0.00	0.32
Avail Cap(c_a), veh/h	864	1649	738	208	592	595	732	0	0	497	0	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.5	18.1	13.9	39.2	28.0	28.0	38.9	0.0	0.0	34.0	0.0	20.5
Incr Delay (d2), s/veh	3.4	0.4	0.0	1.9	23.2	23.3	0.4	0.0	0.0	7.4	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	5.6	7.3	0.1	1.1	16.8	16.9	0.3	0.0	0.0	7.3	0.0	3.3
LnGrp Delay(d),s/veh	38.9	18.6	14.0	41.1	51.2	51.3	39.3	0.0	0.0	41.3	0.0	20.8
LnGrp LOS	D	B	B	D	D	D	D			D		C
Approach Vol, veh/h		1267			1158			13			465	
Approach Delay, s/veh		25.8			50.9			39.3			33.3	
Approach LOS		C			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.7	44.4		22.3	19.1	36.0		10.7
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.1	17.1		15.6	13.3	29.5		2.6
Green Ext Time (p_c), s	0.0	18.0		1.6	1.1	0.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	37.1
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1074	37	0	1127	64	0	0	2	0	0	29
Future Vol, veh/h	0	1074	37	0	1127	64	0	0	2	0	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1143	39	0	1199	68	0	0	2	0	0	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	591	-	-	637
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	450	0	0	420
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	450	-	-	419
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13	14.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	450	-	-	-	-	419
HCM Lane V/C Ratio	0.005	-	-	-	-	0.074
HCM Control Delay (s)	13	-	-	-	-	14.3
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.2

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	109	846	9	4	914	28	28	8	2	31	3	136
Future Volume (veh/h)	109	846	9	4	914	28	28	8	2	31	3	136
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	116	900	10	4	972	30	30	9	2	33	0	51
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	0	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	519	1959	22	23	1445	45	348	258	57	350	0	550
Arrive On Green	0.15	0.56	0.56	0.01	0.42	0.42	0.17	0.17	0.17	0.17	0.00	0.17
Sat Flow, veh/h	3442	3484	39	1774	3406	105	1344	1477	328	1398	0	3150
Grp Volume(v), veh/h	116	444	466	4	491	511	30	0	11	33	0	51
Grp Sat Flow(s),veh/h/ln	1721	1720	1803	1774	1721	1791	1344	0	1805	1398	0	1575
Q Serve(g_s), s	1.9	9.7	9.7	0.1	14.6	14.6	1.2	0.0	0.3	1.3	0.0	0.9
Cycle Q Clear(g_c), s	1.9	9.7	9.7	0.1	14.6	14.6	1.2	0.0	0.3	1.6	0.0	0.9
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	519	967	1014	23	730	760	348	0	315	350	0	550
V/C Ratio(X)	0.22	0.46	0.46	0.18	0.67	0.67	0.09	0.00	0.03	0.09	0.00	0.09
Avail Cap(c_a), veh/h	667	967	1014	344	962	1002	818	0	947	840	0	1653
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.7	8.2	8.2	31.0	14.7	14.7	22.1	0.0	21.8	22.4	0.0	22.0
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.3	1.2	1.1	0.0	0.0	0.0	0.0	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	0.9	4.7	4.9	0.1	7.1	7.3	0.4	0.0	0.2	0.5	0.0	0.4
LnGrp Delay(d),s/veh	23.8	8.5	8.5	32.3	15.9	15.8	22.2	0.0	21.8	22.5	0.0	22.0
LnGrp LOS	C	A	A	C	B	B	C		C	C		C
Approach Vol, veh/h		1026			1006			41			84	
Approach Delay, s/veh		10.3			15.9			22.1			22.2	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	42.2		15.8	14.3	33.4		15.8
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.1	11.7		3.6	3.9	16.6		3.2
Green Ext Time (p_c), s	0.0	11.9		0.2	0.1	10.3		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	831	29	112	856	14	30	22	148	12	19	52
Future Volume (veh/h)	53	831	29	112	856	14	30	22	148	12	19	52
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	56	884	0	119	911	0	32	23	16	13	20	18
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	189	1536	0	242	1638	0	194	112	217	145	178	224
Arrive On Green	0.12	0.50	0.00	0.15	0.53	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3179	0	1597	3177	0	671	716	1389	423	1140	1437
Grp Volume(v), veh/h	56	884	0	119	911	0	55	0	16	33	0	18
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1388	0	1389	1563	0	1437
Q Serve(g_s), s	2.0	12.8	0.0	4.3	12.5	0.0	0.6	0.0	0.6	0.0	0.0	0.7
Cycle Q Clear(g_c), s	2.0	12.8	0.0	4.3	12.5	0.0	2.0	0.0	0.6	1.1	0.0	0.7
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	189	1536	0	242	1638	0	306	0	217	322	0	224
V/C Ratio(X)	0.30	0.58	0.00	0.49	0.56	0.00	0.18	0.00	0.07	0.10	0.00	0.08
Avail Cap(c_a), veh/h	301	1947	0	301	1946	0	762	0	688	832	0	711
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.6	11.3	0.0	24.7	10.0	0.0	23.5	0.0	22.9	23.1	0.0	23.0
Incr Delay (d2), s/veh	0.9	0.5	0.0	1.5	0.4	0.0	0.3	0.0	0.1	0.1	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	0.9	5.5	0.0	2.0	5.4	0.0	0.9	0.0	0.2	0.5	0.0	0.3
LnGrp Delay(d),s/veh	26.5	11.8	0.0	26.3	10.4	0.0	23.8	0.0	23.1	23.3	0.0	23.1
LnGrp LOS	C	B		C	B		C		C	C		C
Approach Vol, veh/h		940			1030			71			51	
Approach Delay, s/veh		12.7			12.2			23.6			23.2	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.7	37.6		13.4	10.5	39.7		13.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	6.3	14.8		3.1	4.0	14.5		4.0
Green Ext Time (p_c), s	0.1	16.7		0.5	0.0	16.9		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	895	7	56	881	44	12	11	118	57	7	41
Future Volume (veh/h)	78	895	7	56	881	44	12	11	118	57	7	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	83	952	5	60	937	41	13	12	33	61	7	13
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	231	1164	6	192	1076	47	68	58	106	221	22	178
Arrive On Green	0.13	0.65	0.65	0.11	0.63	0.63	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1799	9	1774	1721	75	191	511	927	1309	189	1561
Grp Volume(v), veh/h	83	0	957	60	0	978	58	0	0	68	0	13
Grp Sat Flow(s),veh/h/ln	1774	0	1808	1774	0	1797	1629	0	0	1499	0	1561
Q Serve(g_s), s	4.1	0.0	38.0	3.0	0.0	42.9	0.0	0.0	0.0	0.4	0.0	0.7
Cycle Q Clear(g_c), s	4.1	0.0	38.0	3.0	0.0	42.9	3.0	0.0	0.0	3.5	0.0	0.7
Prop In Lane	1.00		0.01	1.00		0.04	0.22		0.57	0.90		1.00
Lane Grp Cap(c), veh/h	231	0	1170	192	0	1123	232	0	0	242	0	178
V/C Ratio(X)	0.36	0.00	0.82	0.31	0.00	0.87	0.25	0.00	0.00	0.28	0.00	0.07
Avail Cap(c_a), veh/h	260	0	1247	241	0	1221	472	0	0	454	0	416
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.0	0.0	12.7	39.4	0.0	14.8	38.9	0.0	0.0	39.0	0.0	37.9
Incr Delay (d2), s/veh	0.9	0.0	4.3	0.9	0.0	6.8	0.6	0.0	0.0	0.6	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	2.1	0.0	20.0	1.5	0.0	23.0	1.4	0.0	0.0	1.7	0.0	0.3
LnGrp Delay(d),s/veh	38.9	0.0	17.0	40.3	0.0	21.6	39.4	0.0	0.0	39.7	0.0	38.0
LnGrp LOS	D		B	D		C	D			D		D
Approach Vol, veh/h		1040			1038			58			81	
Approach Delay, s/veh		18.7			22.7			39.4			39.4	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.4	67.9		14.4	15.5	65.8		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	5.0	40.0		5.5	6.1	44.9		5.0
Green Ext Time (p_c), s	0.1	18.1		0.6	0.1	14.9		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	21.9
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	679	353	53	689	8	276	0	32	8	0	8
Future Volume (veh/h)	10	679	353	53	689	8	276	0	32	8	0	8
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	11	763	271	60	774	9	310	0	12	9	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	38	790	682	114	856	10	340	0	297	46	0	41
Arrive On Green	0.02	0.49	0.49	0.07	0.53	0.53	0.21	0.00	0.21	0.03	0.00	0.03
Sat Flow, veh/h	1597	1629	1406	1597	1607	19	1597	0	1394	1597	0	1425
Grp Volume(v), veh/h	11	763	271	60	0	783	310	0	12	9	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1406	1597	0	1625	1597	0	1394	1597	0	1425
Q Serve(g_s), s	0.7	47.3	12.8	3.8	0.0	45.3	19.8	0.0	0.7	0.6	0.0	0.4
Cycle Q Clear(g_c), s	0.7	47.3	12.8	3.8	0.0	45.3	19.8	0.0	0.7	0.6	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	38	790	682	114	0	866	340	0	297	46	0	41
V/C Ratio(X)	0.29	0.97	0.40	0.53	0.00	0.90	0.91	0.00	0.04	0.20	0.00	0.12
Avail Cap(c_a), veh/h	250	812	701	250	0	866	387	0	338	387	0	346
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	50.1	26.0	17.1	46.8	0.0	22.0	40.1	0.0	32.6	49.5	0.0	49.4
Incr Delay (d2), s/veh	1.6	23.1	0.3	1.4	0.0	12.7	22.4	0.0	0.0	0.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	26.3	5.0	1.7	0.0	23.3	10.8	0.0	0.3	0.3	0.0	0.1
LnGrp Delay(d),s/veh	51.6	49.1	17.4	48.2	0.0	34.7	62.5	0.0	32.6	50.2	0.0	49.9
LnGrp LOS	D	D	B	D		C	E		C	D		D
Approach Vol, veh/h		1045			843			322			14	
Approach Delay, s/veh		40.9			35.7			61.4			50.1	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.1	57.6		7.7	7.2	62.6		26.9
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	5.8	49.3		2.6	2.7	47.3		21.8
Green Ext Time (p_c), s	0.0	1.3		0.0	0.0	1.7		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	42.0
HCM 2010 LOS	D

Notes

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	321	209	23	16	19
Future Vol, veh/h	18	321	209	23	16	19
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	369	240	26	18	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	271	0	-	0	667	259
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	410	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1292	-	-	-	424	780
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	670	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1290	-	-	-	412	776
Mov Cap-2 Maneuver	-	-	-	-	412	-
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	654	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	12
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1290	-	-	-	553
HCM Lane V/C Ratio	0.016	-	-	-	0.073
HCM Control Delay (s)	7.8	0	-	-	12
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	193	144	0	73	3	0	6	163
Future Vol, veh/h	0	193	144	0	73	3	0	6	163
Peak Hour Factor	0.92	0.90	0.90	0.92	0.90	0.90	0.92	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	214	160	0	81	3	0	7	181
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	11.7	8.4	8.8
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	57%	0%	4%
Vol Thru, %	43%	96%	0%
Vol Right, %	0%	4%	96%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	337	76	169
LT Vol	193	0	6
Through Vol	144	73	0
RT Vol	0	3	163
Lane Flow Rate	374	84	188
Geometry Grp	1	1	1
Degree of Util (X)	0.476	0.112	0.231
Departure Headway (Hd)	4.574	4.764	4.435
Convergence, Y/N	Yes	Yes	Yes
Cap	786	750	807
Service Time	2.609	2.809	2.469
HCM Lane V/C Ratio	0.476	0.112	0.233
HCM Control Delay	11.7	8.4	8.8
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.6	0.4	0.9

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	465	737	20	15	973	226	24	4	5	257	0	402
Future Volume (veh/h)	465	737	20	15	973	226	24	4	5	257	0	402
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	511	810	13	16	1069	143	26	4	3	282	0	267
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	608	1621	730	58	995	133	109	17	13	342	0	584
Arrive On Green	0.18	0.47	0.47	0.03	0.33	0.33	0.08	0.08	0.08	0.19	0.00	0.19
Sat Flow, veh/h	3408	3438	1548	1774	3055	408	1390	214	160	1757	0	1568
Grp Volume(v), veh/h	511	810	13	16	603	609	33	0	0	282	0	267
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1737	1764	0	0	1757	0	1568
Q Serve(g_s), s	13.4	15.1	0.4	0.8	30.2	30.2	1.6	0.0	0.0	14.3	0.0	11.9
Cycle Q Clear(g_c), s	13.4	15.1	0.4	0.8	30.2	30.2	1.6	0.0	0.0	14.3	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.23	0.79		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	608	1621	730	58	562	566	138	0	0	342	0	584
V/C Ratio(X)	0.84	0.50	0.02	0.28	1.07	1.08	0.24	0.00	0.00	0.83	0.00	0.46
Avail Cap(c_a), veh/h	820	1621	730	197	562	566	683	0	0	472	0	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.8	16.9	13.1	43.7	31.2	31.2	40.1	0.0	0.0	35.8	0.0	22.0
Incr Delay (d2), s/veh	5.9	0.3	0.0	2.5	59.0	59.8	0.9	0.0	0.0	8.3	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	7.2	0.2	0.4	23.4	23.7	0.8	0.0	0.0	7.7	0.0	5.2
LnGrp Delay(d),s/veh	42.7	17.3	13.1	46.3	90.2	91.0	41.0	0.0	0.0	44.2	0.0	22.5
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1334			1228			33			549	
Approach Delay, s/veh		27.0			90.1			41.0			33.6	
Approach LOS		C			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	49.5		23.1	21.2	36.0		12.3
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.8	17.1		16.3	15.4	32.2		3.6
Green Ext Time (p_c), s	0.0	18.9		1.7	1.1	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	52.9
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

09/20/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	465	737	20	15	973	226	24	4	5	257	0	402
Future Volume (veh/h)	465	737	20	15	973	226	24	4	5	257	0	402
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	495	784	18	16	1035	111	26	4	3	273	0	299
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	511	1712	771	57	1194	128	115	18	13	324	0	524
Arrive On Green	0.15	0.50	0.50	0.03	0.38	0.38	0.08	0.08	0.08	0.18	0.00	0.18
Sat Flow, veh/h	3408	3438	1548	1774	3140	337	1389	214	160	1757	0	1568
Grp Volume(v), veh/h	495	784	18	16	568	578	33	0	0	273	0	299
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1751	1764	0	0	1757	0	1568
Q Serve(g_s), s	14.7	15.1	0.6	0.9	31.1	31.1	1.8	0.0	0.0	15.3	0.0	16.0
Cycle Q Clear(g_c), s	14.7	15.1	0.6	0.9	31.1	31.1	1.8	0.0	0.0	15.3	0.0	16.0
Prop In Lane	1.00		1.00	1.00		0.19	0.79		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	511	1712	771	57	656	666	145	0	0	324	0	524
V/C Ratio(X)	0.97	0.46	0.02	0.28	0.87	0.87	0.23	0.00	0.00	0.84	0.00	0.57
Avail Cap(c_a), veh/h	511	1712	771	169	712	723	605	0	0	360	0	557
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.1	16.6	13.0	48.2	29.2	29.2	43.8	0.0	0.0	40.2	0.0	27.9
Incr Delay (d2), s/veh	31.7	0.3	0.0	2.6	10.9	10.8	0.8	0.0	0.0	15.2	0.0	1.2
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	9.2	7.3	0.3	0.5	16.7	16.9	0.9	0.0	0.0	8.8	0.0	7.1
LnGrp Delay(d),s/veh	74.8	16.9	13.0	50.8	40.1	40.1	44.5	0.0	0.0	55.4	0.0	29.2
LnGrp LOS	E	B	B	D	D	D	D			E		C
Approach Vol, veh/h		1297			1162			33			572	
Approach Delay, s/veh		38.9			40.2			44.5			41.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	56.6		23.9	20.0	44.6		13.5
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9.7	47.7		20.9	* 15	42.1		35.0
Max Q Clear Time (g_c+I1), s	2.9	17.1		18.0	16.7	33.1		3.8
Green Ext Time (p_c), s	0.0	21.0		0.8	0.0	5.7		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	40.0
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Traffic Vol, veh/h	0	1001	16	0	1199	31	0	0	7	0	0	14
Future Vol, veh/h	0	1001	16	0	1199	31	0	0	7	0	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1065	17	0	1276	33	0	0	7	0	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	541	-	-	657
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	485	0	0	407
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	485	-	-	406
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.5	14.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	485	-	-	-	-	406
HCM Lane V/C Ratio	0.015	-	-	-	-	0.037
HCM Control Delay (s)	12.5	-	-	-	-	14.2
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑		↰	↑↱		↰	↑		↰	↑	↱
Traffic Volume (veh/h)	141	812	9	5	797	19	25	32	4	60	41	251
Future Volume (veh/h)	141	812	9	5	797	19	25	32	4	60	41	251
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	147	846	7	5	830	14	26	33	0	62	73	63
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	555	1898	16	28	1376	23	308	351	0	353	351	298
Arrive On Green	0.16	0.54	0.54	0.02	0.40	0.40	0.19	0.19	0.00	0.19	0.19	0.19
Sat Flow, veh/h	3442	3496	29	1774	3461	58	1248	1863	0	1370	1863	1583
Grp Volume(v), veh/h	147	416	437	5	412	432	26	33	0	62	73	63
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1800	1248	1863	0	1370	1863	1583
Q Serve(g_s), s	2.4	9.2	9.2	0.2	12.0	12.0	1.1	0.9	0.0	2.5	2.1	2.1
Cycle Q Clear(g_c), s	2.4	9.2	9.2	0.2	12.0	12.0	3.2	0.9	0.0	3.4	2.1	2.1
Prop In Lane	1.00		0.02	1.00		0.03	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	555	934	980	28	684	715	308	351	0	353	351	298
V/C Ratio(X)	0.26	0.45	0.45	0.18	0.60	0.60	0.08	0.09	0.00	0.18	0.21	0.21
Avail Cap(c_a), veh/h	673	970	1018	347	970	1015	733	986	0	819	986	838
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	8.7	8.7	30.6	15.0	15.0	22.9	21.1	0.0	22.5	21.6	21.6
Incr Delay (d2), s/veh	0.1	0.3	0.3	1.1	0.9	0.8	0.0	0.0	0.0	0.1	0.1	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	1.1	4.4	4.6	0.1	5.8	6.0	0.4	0.5	0.0	0.9	1.1	0.9
LnGrp Delay(d),s/veh	23.2	9.0	9.0	31.7	15.9	15.9	23.0	21.1	0.0	22.6	21.7	21.7
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		1000			849			59			198	
Approach Delay, s/veh		11.1			16.0			21.9			22.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	40.7		16.6	14.9	31.5		16.6
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	11.2		5.4	4.4	14.0		5.2
Green Ext Time (p_c), s	0.0	10.3		0.6	0.1	9.8		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.4
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	825	22	160	738	9	28	20	157	22	63	36
Future Volume (veh/h)	23	825	22	160	738	9	28	20	157	22	63	36
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	26	917	0	178	820	0	31	22	85	24	70	20
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	110	1499	0	257	1782	0	176	98	230	106	230	238
Arrive On Green	0.07	0.48	0.00	0.16	0.58	0.00	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1597	3178	0	1597	3177	0	541	595	1389	225	1391	1439
Grp Volume(v), veh/h	26	917	0	178	820	0	53	0	85	94	0	20
Grp Sat Flow(s),veh/h/ln	1597	1548	0	1597	1548	0	1135	0	1389	1616	0	1439
Q Serve(g_s), s	1.0	14.3	0.0	6.9	10.1	0.0	0.6	0.0	3.6	0.0	0.0	0.8
Cycle Q Clear(g_c), s	1.0	14.3	0.0	6.9	10.1	0.0	3.8	0.0	3.6	3.2	0.0	0.8
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.26		1.00
Lane Grp Cap(c), veh/h	110	1499	0	257	1782	0	275	0	230	336	0	238
V/C Ratio(X)	0.24	0.61	0.00	0.69	0.46	0.00	0.19	0.00	0.37	0.28	0.00	0.08
Avail Cap(c_a), veh/h	291	1882	0	291	1881	0	683	0	665	818	0	689
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.0	12.4	0.0	26.1	8.1	0.0	24.1	0.0	24.4	24.3	0.0	23.2
Incr Delay (d2), s/veh	1.1	0.6	0.0	6.0	0.3	0.0	0.3	0.0	1.0	0.4	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	0.5	6.1	0.0	3.5	4.3	0.0	0.9	0.0	1.4	1.6	0.0	0.3
LnGrp Delay(d),s/veh	30.1	13.0	0.0	32.1	8.3	0.0	24.4	0.0	25.4	24.7	0.0	23.4
LnGrp LOS	C	B		C	A		C		C	C		C
Approach Vol, veh/h		943			998			138			114	
Approach Delay, s/veh		13.5			12.6			25.0			24.5	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.6	37.9		14.4	7.5	43.9		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.6	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	8.8	16.3		5.2	3.0	12.1		5.8
Green Ext Time (p_c), s	0.1	15.6		1.1	0.0	17.4		1.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.4
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	939	15	45	874	26	12	17	89	46	6	18
Future Volume (veh/h)	52	939	15	45	874	26	12	17	89	46	6	18
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	54	978	13	47	910	24	12	18	29	48	6	9
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	204	1152	15	177	1107	29	68	78	95	226	24	184
Arrive On Green	0.11	0.65	0.65	0.10	0.63	0.63	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1782	24	1774	1755	46	172	673	816	1296	206	1583
Grp Volume(v), veh/h	54	0	991	47	0	934	59	0	0	54	0	9
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1802	1661	0	0	1503	0	1583
Q Serve(g_s), s	2.5	0.0	38.9	2.2	0.0	35.9	0.0	0.0	0.0	0.0	0.0	0.5
Cycle Q Clear(g_c), s	2.5	0.0	38.9	2.2	0.0	35.9	2.8	0.0	0.0	2.5	0.0	0.5
Prop In Lane	1.00		0.01	1.00		0.03	0.20		0.49	0.89		1.00
Lane Grp Cap(c), veh/h	204	0	1167	177	0	1137	241	0	0	249	0	184
V/C Ratio(X)	0.26	0.00	0.85	0.27	0.00	0.82	0.25	0.00	0.00	0.22	0.00	0.05
Avail Cap(c_a), veh/h	275	0	1318	255	0	1295	508	0	0	481	0	447
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.5	0.0	12.5	37.7	0.0	12.8	36.6	0.0	0.0	36.4	0.0	35.5
Incr Delay (d2), s/veh	0.7	0.0	5.1	0.8	0.0	4.1	0.5	0.0	0.0	0.4	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	1.3	0.0	20.7	1.1	0.0	18.9	1.4	0.0	0.0	1.3	0.0	0.2
LnGrp Delay(d),s/veh	37.2	0.0	17.6	38.4	0.0	16.9	37.1	0.0	0.0	36.9	0.0	35.6
LnGrp LOS	D		B	D		B	D			D		D
Approach Vol, veh/h		1045			981			59			63	
Approach Delay, s/veh		18.7			17.9			37.1			36.7	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	64.4		14.0	13.4	63.0		14.0
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.6	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	14.2	40.9		4.5	4.5	37.9		4.8
Green Ext Time (p_c), s	0.0	17.5		0.6	0.1	18.5		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	19.4
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1047	35	15	920	23	10
Future Vol, veh/h	1047	35	15	920	23	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1102	37	16	968	24	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1102	0	2102	1102
Stage 1	-	-	-	-	1102	-
Stage 2	-	-	-	-	1000	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	390	-	~ 19	136
Stage 1	-	-	-	-	178	-
Stage 2	-	-	-	-	206	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	390	-	~ 18	136
Mov Cap-2 Maneuver	-	-	-	-	94	-
Stage 1	-	-	-	-	178	-
Stage 2	-	-	-	-	198	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	56.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	104	-	-	390	-
HCM Lane V/C Ratio	0.334	-	-	0.04	-
HCM Control Delay (s)	56.1	-	-	14.6	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	1.3	-	-	0.1	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1047	35	15	920	23	10
Future Volume (veh/h)	1047	35	15	920	23	10
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1102	37	16	968	24	11
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1354	1185	33	1492	40	18
Arrive On Green	0.75	0.75	0.02	0.82	0.03	0.03
Sat Flow, veh/h	1810	1583	1774	1810	1142	523
Grp Volume(v), veh/h	1102	37	16	968	36	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1713	0
Q Serve(g_s), s	30.7	0.5	0.7	15.8	1.6	0.0
Cycle Q Clear(g_c), s	30.7	0.5	0.7	15.8	1.6	0.0
Prop In Lane		1.00	1.00		0.67	0.31
Lane Grp Cap(c), veh/h	1354	1185	33	1492	59	0
V/C Ratio(X)	0.81	0.03	0.48	0.65	0.61	0.00
Avail Cap(c_a), veh/h	1956	1711	113	2176	548	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.3	2.5	38.0	2.6	37.2	0.0
Incr Delay (d2), s/veh	1.8	0.0	10.3	0.5	9.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.4	0.2	0.4	7.7	0.9	0.0
LnGrp Delay(d),s/veh	8.1	2.5	48.3	3.1	46.7	0.0
LnGrp LOS	A	A	D	A	D	
Approach Vol, veh/h	1139			984	36	
Approach Delay, s/veh	7.9			3.8	46.7	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.0	65.0				71.0		7.2
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.7	32.7				17.8		3.6
Green Ext Time (p_c), s	0.0	25.9				29.9		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	6.7
HCM 2010 LOS	A

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	825	191	16	686	24	211	1	25	6	0	5
Future Volume (veh/h)	28	825	191	16	686	24	211	1	25	6	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1630	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	30	878	147	17	730	26	224	1	8	6	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	83	898	786	55	835	30	261	1	229	38	0	34
Arrive On Green	0.05	0.55	0.55	0.03	0.53	0.53	0.16	0.16	0.16	0.02	0.00	0.02
Sat Flow, veh/h	1597	1629	1425	1597	1565	56	1590	7	1393	1597	0	1425
Grp Volume(v), veh/h	30	878	147	17	0	756	225	0	8	6	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1620	1597	0	1393	1597	0	1425
Q Serve(g_s), s	1.7	49.0	4.8	1.0	0.0	38.1	12.8	0.0	0.5	0.3	0.0	0.3
Cycle Q Clear(g_c), s	1.7	49.0	4.8	1.0	0.0	38.1	12.8	0.0	0.5	0.3	0.0	0.3
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	83	898	786	55	0	865	262	0	229	38	0	34
V/C Ratio(X)	0.36	0.98	0.19	0.31	0.00	0.87	0.86	0.00	0.03	0.16	0.00	0.15
Avail Cap(c_a), veh/h	279	907	793	279	0	902	433	0	377	432	0	386
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.8	20.4	10.5	44.0	0.0	19.0	38.0	0.0	32.8	44.7	0.0	44.7
Incr Delay (d2), s/veh	1.0	24.2	0.1	1.2	0.0	9.0	4.6	0.0	0.0	0.7	0.0	0.7
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	0.8	27.7	1.9	0.4	0.0	19.0	6.0	0.0	0.2	0.2	0.0	0.1
LnGrp Delay(d),s/veh	43.7	44.6	10.6	45.2	0.0	28.1	42.5	0.0	32.8	45.4	0.0	45.4
LnGrp LOS	D	D	B	D		C	D		C	D		D
Approach Vol, veh/h		1055			773			233			11	
Approach Delay, s/veh		39.8			28.4			42.2			45.4	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.9	58.5		6.9	9.6	56.9		20.0
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.0	51.0		2.3	3.7	40.1		14.8
Green Ext Time (p_c), s	0.0	0.6		0.0	0.0	2.9		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	35.9
HCM 2010 LOS	D

Notes

HCM 2010 TWSC
8: Montgomery Dr & Melita Rd

08/22/2017

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	316	338	3	4	74
Future Vol, veh/h	34	316	338	3	4	74
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	336	360	3	4	79

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	367	0	-	0	774	367
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	409	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1192	-	-	-	367	678
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	671	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1190	-	-	-	351	674
Mov Cap-2 Maneuver	-	-	-	-	351	-
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	644	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1190	-	-	-	644
HCM Lane V/C Ratio	0.03	-	-	-	0.129
HCM Control Delay (s)	8.1	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	186	117	0	75	7	0	3	259
Future Vol, veh/h	0	186	117	0	75	7	0	3	259
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	198	124	0	80	7	0	3	276
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	11.4	8.6	9.6
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	61%	0%	1%
Vol Thru, %	39%	91%	0%
Vol Right, %	0%	9%	99%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	303	82	262
LT Vol	186	0	3
Through Vol	117	75	0
RT Vol	0	7	259
Lane Flow Rate	322	87	279
Geometry Grp	1	1	1
Degree of Util (X)	0.428	0.119	0.336
Departure Headway (Hd)	4.783	4.9	4.334
Convergence, Y/N	Yes	Yes	Yes
Cap	748	727	828
Service Time	2.837	2.963	2.372
HCM Lane V/C Ratio	0.43	0.12	0.337
HCM Control Delay	11.4	8.6	9.6
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.2	0.4	1.5

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	114	14	5	64	9	4
Future Vol, veh/h	114	14	5	64	9	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	136	17	6	76	11	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	152	0	232	144
Stage 1	-	-	-	-	144	-
Stage 2	-	-	-	-	88	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1429	-	756	903
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	935	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1429	-	753	903
Mov Cap-2 Maneuver	-	-	-	-	753	-
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	931	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	794	-	-	1429	-
HCM Lane V/C Ratio	0.019	-	-	0.004	-
HCM Control Delay (s)	9.6	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	465	838	17	53	967	278	14	4	3	346	1	375
Future Volume (veh/h)	465	838	17	53	967	278	14	4	3	346	1	375
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1817	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	495	891	15	56	1029	167	15	4	1	368	1	270
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	587	1421	639	129	931	151	86	23	6	412	1	639
Arrive On Green	0.17	0.41	0.41	0.07	0.31	0.31	0.06	0.06	0.06	0.24	0.24	0.24
Sat Flow, veh/h	3408	3438	1547	1774	2969	481	1335	356	89	1752	5	1568
Grp Volume(v), veh/h	495	891	15	56	598	598	20	0	0	369	0	270
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1726	1724	1780	0	0	1757	0	1568
Q Serve(g_s), s	13.5	19.8	0.6	2.9	30.2	30.2	1.0	0.0	0.0	19.6	0.0	11.9
Cycle Q Clear(g_c), s	13.5	19.8	0.6	2.9	30.2	30.2	1.0	0.0	0.0	19.6	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.28	0.75		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	587	1421	639	129	541	540	114	0	0	413	0	639
V/C Ratio(X)	0.84	0.63	0.02	0.44	1.10	1.11	0.18	0.00	0.00	0.89	0.00	0.42
Avail Cap(c_a), veh/h	789	1506	678	190	541	540	663	0	0	454	0	675
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.6	22.4	16.7	42.8	33.1	33.1	42.7	0.0	0.0	35.7	0.0	20.4
Incr Delay (d2), s/veh	6.3	0.9	0.0	2.3	70.4	71.4	0.7	0.0	0.0	18.5	0.0	0.4
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	6.9	9.6	0.2	1.5	24.9	25.0	0.5	0.0	0.0	11.7	0.0	5.2
LnGrp Delay(d),s/veh	44.9	23.3	16.8	45.1	103.4	104.5	43.4	0.0	0.0	54.2	0.0	20.9
LnGrp LOS	D	C	B	D	F	F	D			D		C
Approach Vol, veh/h		1401			1252			20			639	
Approach Delay, s/veh		30.9			101.3			43.4			40.1	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.7	45.6		27.8	21.3	36.0		11.3
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.9	21.8		21.6	15.5	32.2		3.0
Green Ext Time (p_c), s	0.0	16.4		1.1	1.0	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	59.4
HCM 2010 LOS	E

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/24/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	465	838	17	53	967	278	14	4	3	346	1	375
Future Volume (veh/h)	465	838	17	53	967	278	14	4	3	346	1	375
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1817	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	495	891	15	56	1029	167	15	4	1	368	1	270
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	501	1611	725	123	1161	188	84	22	6	352	1	545
Arrive On Green	0.15	0.47	0.47	0.07	0.39	0.39	0.06	0.06	0.06	0.20	0.20	0.20
Sat Flow, veh/h	3408	3438	1548	1774	2969	481	1335	356	89	1752	5	1568
Grp Volume(v), veh/h	495	891	15	56	598	598	20	0	0	369	0	270
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1726	1724	1779	0	0	1757	0	1568
Q Serve(g_s), s	15.1	19.4	0.5	3.2	33.6	33.7	1.1	0.0	0.0	20.9	0.0	14.1
Cycle Q Clear(g_c), s	15.1	19.4	0.5	3.2	33.6	33.7	1.1	0.0	0.0	20.9	0.0	14.1
Prop In Lane	1.00		1.00	1.00		0.28	0.75		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	501	1611	725	123	675	674	111	0	0	353	0	545
V/C Ratio(X)	0.99	0.55	0.02	0.46	0.89	0.89	0.18	0.00	0.00	1.05	0.00	0.50
Avail Cap(c_a), veh/h	501	1611	725	165	698	697	598	0	0	353	0	545
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.3	19.8	14.8	46.6	29.5	29.6	46.3	0.0	0.0	41.6	0.0	26.8
Incr Delay (d2), s/veh	37.1	0.5	0.0	2.6	13.1	13.4	0.8	0.0	0.0	60.5	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	9.3	0.2	1.6	18.4	18.5	0.6	0.0	0.0	16.0	0.0	6.2
LnGrp Delay(d),s/veh	81.4	20.4	14.9	49.2	42.7	43.0	47.0	0.0	0.0	102.1	0.0	27.5
LnGrp LOS	F	C	B	D	D	D	D			F		C
Approach Vol, veh/h		1401			1252			20			639	
Approach Delay, s/veh		41.9			43.1			47.0			70.6	
Approach LOS		D			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.9	54.6		26.0	20.0	46.5		11.6
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9.7	47.7		20.9	* 15	42.1		35.0
Max Q Clear Time (g_c+I1), s	5.2	21.4		22.9	17.1	35.7		3.1
Green Ext Time (p_c), s	0.0	20.1		0.0	0.0	5.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	47.9
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Traffic Vol, veh/h	0	1191	46	0	1280	49	0	0	5	0	0	31
Future Vol, veh/h	0	1191	46	0	1280	49	0	0	5	0	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1254	48	0	1347	52	0	0	5	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	651	-	-	702
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	411	0	0	381
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	411	-	-	380
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.9	15.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	411	-	-	-	-	380
HCM Lane V/C Ratio	0.013	-	-	-	-	0.086
HCM Control Delay (s)	13.9	-	-	-	-	15.4
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	-	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑		↰	↑↱		↰	↑		↰	↑	↱
Traffic Volume (veh/h)	121	925	11	5	1085	29	23	15	1	25	15	111
Future Volume (veh/h)	121	925	11	5	1085	29	23	15	1	25	15	111
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	126	964	8	5	1130	29	24	16	0	26	41	33
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	519	2002	17	28	1500	38	308	314	0	335	314	267
Arrive On Green	0.15	0.57	0.57	0.02	0.44	0.44	0.17	0.17	0.00	0.17	0.17	0.17
Sat Flow, veh/h	3442	3496	29	1774	3426	88	1320	1863	0	1392	1863	1583
Grp Volume(v), veh/h	126	474	498	5	567	592	24	16	0	26	41	33
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1794	1320	1863	0	1392	1863	1583
Q Serve(g_s), s	2.1	10.7	10.7	0.2	18.1	18.1	1.0	0.5	0.0	1.0	1.2	1.2
Cycle Q Clear(g_c), s	2.1	10.7	10.7	0.2	18.1	18.1	2.3	0.5	0.0	1.5	1.2	1.2
Prop In Lane	1.00		0.02	1.00		0.05	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	519	985	1034	28	753	786	308	314	0	335	314	267
V/C Ratio(X)	0.24	0.48	0.48	0.18	0.75	0.75	0.08	0.05	0.00	0.08	0.13	0.12
Avail Cap(c_a), veh/h	646	985	1034	333	932	971	756	946	0	807	946	804
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.5	8.3	8.3	31.8	15.5	15.5	24.1	22.8	0.0	23.5	23.2	23.1
Incr Delay (d2), s/veh	0.1	0.4	0.3	1.1	2.8	2.6	0.0	0.0	0.0	0.0	0.1	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	1.0	5.1	5.4	0.1	9.1	9.5	0.4	0.2	0.0	0.4	0.6	0.5
LnGrp Delay(d),s/veh	24.6	8.6	8.6	32.9	18.2	18.1	24.2	22.9	0.0	23.5	23.2	23.2
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		1098			1164			40			100	
Approach Delay, s/veh		10.5			18.2			23.6			23.3	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	44.1		15.8	14.6	35.2		15.8
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	12.7		3.5	4.1	20.1		4.3
Green Ext Time (p_c), s	0.0	13.3		0.3	0.1	8.6		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	15.0
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	847	41	187	1036	15	28	35	144	11	16	55
Future Volume (veh/h)	52	847	41	187	1036	15	28	35	144	11	16	55
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1631	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	54	882	0	195	1079	0	29	36	76	11	17	47
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	181	1533	0	254	1673	0	155	154	223	142	178	231
Arrive On Green	0.11	0.49	0.00	0.16	0.54	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3180	0	1597	3177	0	483	960	1389	419	1106	1439
Grp Volume(v), veh/h	54	882	0	195	1079	0	65	0	76	28	0	47
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1442	0	1389	1525	0	1439
Q Serve(g_s), s	2.1	13.5	0.0	7.9	16.6	0.0	0.0	0.0	3.3	0.0	0.0	1.9
Cycle Q Clear(g_c), s	2.1	13.5	0.0	7.9	16.6	0.0	2.3	0.0	3.3	0.9	0.0	1.9
Prop In Lane	1.00		0.00	1.00		0.00	0.45		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	181	1533	0	254	1673	0	309	0	223	319	0	231
V/C Ratio(X)	0.30	0.58	0.00	0.77	0.64	0.00	0.21	0.00	0.34	0.09	0.00	0.20
Avail Cap(c_a), veh/h	285	1841	0	285	1839	0	735	0	650	767	0	673
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.4	12.0	0.0	27.1	10.9	0.0	24.7	0.0	25.1	24.1	0.0	24.5
Incr Delay (d2), s/veh	0.9	0.5	0.0	10.8	0.8	0.0	0.3	0.0	0.9	0.1	0.0	0.4
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	5.9	0.0	4.2	7.2	0.0	1.1	0.0	1.3	0.5	0.0	0.8
LnGrp Delay(d),s/veh	28.3	12.5	0.0	37.9	11.7	0.0	25.0	0.0	26.0	24.2	0.0	25.0
LnGrp LOS	C	B		D	B		C		C	C		C
Approach Vol, veh/h		936			1274			141			75	
Approach Delay, s/veh		13.4			15.7			25.6			24.7	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.7	39.3		14.3	10.6	42.4		14.3
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	9.9	15.5		3.9	4.1	18.6		5.3
Green Ext Time (p_c), s	0.1	17.8		0.9	0.0	16.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	940	12	97	1161	30	11	10	111	47	11	33
Future Volume (veh/h)	58	940	12	97	1161	30	11	10	111	47	11	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	59	959	12	99	1185	29	11	10	40	48	11	23
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	199	1142	14	215	1152	19	59	47	121	200	39	182
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1784	22	1774	1759	43	143	409	1052	1174	343	1583
Grp Volume(v), veh/h	59	0	971	99	0	1214	61	0	0	59	0	23
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1802	1604	0	0	1516	0	1583
Q Serve(g_s), s	3.1	0.0	42.2	5.2	0.0	65.0	0.0	0.0	0.0	0.0	0.0	1.3
Cycle Q Clear(g_c), s	3.1	0.0	42.2	5.2	0.0	65.0	3.4	0.0	0.0	3.0	0.0	1.3
Prop In Lane	1.00		0.01	1.00		0.02	0.18		0.66	0.81		1.00
Lane Grp Cap(c), veh/h	199	0	1156	215	0	1171	227	0	0	239	0	182
V/C Ratio(X)	0.30	0.00	0.84	0.46	0.00	1.04	0.27	0.00	0.00	0.25	0.00	0.13
Avail Cap(c_a), veh/h	247	0	1188	230	0	1167	444	0	0	435	0	402
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.1	0.0	14.1	41.2	0.0	17.7	41.0	0.0	0.0	40.8	0.0	40.0
Incr Delay (d2), s/veh	0.8	0.0	5.5	1.5	0.0	36.3	0.6	0.0	0.0	0.5	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	11.8	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	22.5	2.6	0.0	48.0	1.6	0.0	0.0	1.5	0.0	0.6
LnGrp Delay(d),s/veh	41.9	0.0	19.7	42.8	0.0	65.8	41.6	0.0	0.0	41.3	0.0	40.3
LnGrp LOS	D		B	D		F	D			D		D
Approach Vol, veh/h		1030			1313			61			82	
Approach Delay, s/veh		20.9			64.1			41.6			41.1	
Approach LOS		C			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.2	70.1		15.1	14.3	71.0		15.1
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	7.2	44.2		5.0	5.1	67.0		5.4
Green Ext Time (p_c), s	0.1	18.1		0.7	0.1	0.0		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	44.9
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	3.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1024	34	14	1192	46	20
Future Vol, veh/h	1024	34	14	1192	46	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1078	36	15	1255	48	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1078	0	2362	1078
Stage 1	-	-	-	-	1078	-
Stage 2	-	-	-	-	1284	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	400	-	~ 11	141
Stage 1	-	-	-	-	185	-
Stage 2	-	-	-	-	137	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	400	-	~ 11	141
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	185	-
Stage 2	-	-	-	-	132	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	131.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	87	-	-	400	-
HCM Lane V/C Ratio	0.799	-	-	0.037	-
HCM Control Delay (s)	131.1	-	-	14.3	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	4.1	-	-	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1024	34	14	1192	46	20
Future Volume (veh/h)	1024	34	14	1192	46	20
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1078	36	15	1255	48	21
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1366	1195	31	1489	62	27
Arrive On Green	0.75	0.75	0.02	0.82	0.05	0.05
Sat Flow, veh/h	1810	1583	1774	1810	1175	514
Grp Volume(v), veh/h	1078	36	15	1255	70	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1713	0
Q Serve(g_s), s	32.0	0.5	0.7	35.5	3.6	0.0
Cycle Q Clear(g_c), s	32.0	0.5	0.7	35.5	3.6	0.0
Prop In Lane		1.00	1.00		0.69	0.30
Lane Grp Cap(c), veh/h	1366	1195	31	1489	91	0
V/C Ratio(X)	0.79	0.03	0.49	0.84	0.77	0.00
Avail Cap(c_a), veh/h	1725	1509	100	1919	483	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.6	2.7	43.2	4.5	41.4	0.0
Incr Delay (d2), s/veh	2.0	0.0	11.3	2.9	12.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.3	0.2	0.5	17.9	2.0	0.0
LnGrp Delay(d),s/veh	8.6	2.7	54.5	7.4	54.3	0.0
LnGrp LOS	A	A	D	A	D	
Approach Vol, veh/h	1114			1270	70	
Approach Delay, s/veh	8.4			7.9	54.3	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.0	73.4				79.4		9.2
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.7	34.0				37.5		5.6
Green Ext Time (p_c), s	0.0	32.9				35.2		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	9.5
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	749	314	28	969	9	253	0	24	21	1	25
Future Volume (veh/h)	9	749	314	28	969	9	253	0	24	21	1	25
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	9	764	200	29	989	9	258	0	5	21	1	22
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	32	801	701	80	841	8	292	0	255	97	5	91
Arrive On Green	0.02	0.49	0.49	0.05	0.52	0.52	0.18	0.00	0.18	0.06	0.06	0.06
Sat Flow, veh/h	1597	1629	1425	1597	1612	15	1597	0	1394	1527	73	1425
Grp Volume(v), veh/h	9	764	200	29	0	998	258	0	5	22	0	22
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1626	1597	0	1394	1600	0	1425
Q Serve(g_s), s	0.6	44.7	8.3	1.8	0.0	52.0	15.7	0.0	0.3	1.3	0.0	1.5
Cycle Q Clear(g_c), s	0.6	44.7	8.3	1.8	0.0	52.0	15.7	0.0	0.3	1.3	0.0	1.5
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.95		1.00
Lane Grp Cap(c), veh/h	32	801	701	80	0	849	292	0	255	102	0	91
V/C Ratio(X)	0.28	0.95	0.29	0.36	0.00	1.18	0.88	0.00	0.02	0.22	0.00	0.24
Avail Cap(c_a), veh/h	261	850	744	261	0	849	405	0	354	406	0	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	48.1	24.2	15.0	45.8	0.0	23.8	39.7	0.0	33.4	44.3	0.0	44.4
Incr Delay (d2), s/veh	1.8	19.7	0.2	1.0	0.0	91.4	12.5	0.0	0.0	0.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	24.3	3.3	0.8	0.0	44.7	8.0	0.0	0.1	0.6	0.0	0.6
LnGrp Delay(d),s/veh	49.9	44.0	15.1	46.9	0.0	115.3	52.2	0.0	33.4	44.7	0.0	44.9
LnGrp LOS	D	D	B	D		F	D		C	D		D
Approach Vol, veh/h		973			1027			263			44	
Approach Delay, s/veh		38.1			113.3			51.8			44.8	
Approach LOS		D			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.7	56.0		11.0	6.7	59.0		22.9
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.8	46.7		3.5	2.6	54.0		17.7
Green Ext Time (p_c), s	0.0	2.1		0.1	0.0	0.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	73.3
HCM 2010 LOS	E

Notes

HCM 2010 TWSC
8: Montgomery Dr & Melita Rd

08/22/2017

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	363	363	6	2	42
Future Vol, veh/h	50	363	363	6	2	42
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	390	390	6	2	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	401	0	-	0	896	400
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	498	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1158	-	-	-	311	650
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	611	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1156	-	-	-	290	646
Mov Cap-2 Maneuver	-	-	-	-	290	-
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	572	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1156	-	-	-	612
HCM Lane V/C Ratio	0.047	-	-	-	0.077
HCM Control Delay (s)	8.3	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	200	154	0	146	4	0	4	235
Future Vol, veh/h	0	200	154	0	146	4	0	4	235
Peak Hour Factor	0.92	0.88	0.88	0.92	0.88	0.88	0.92	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	227	175	0	166	5	0	5	267
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	13.9	9.8	10.4
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	56%	0%	2%
Vol Thru, %	44%	97%	0%
Vol Right, %	0%	3%	98%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	354	150	239
LT Vol	200	0	4
Through Vol	154	146	0
RT Vol	0	4	235
Lane Flow Rate	402	170	272
Geometry Grp	1	1	1
Degree of Util (X)	0.548	0.24	0.356
Departure Headway (Hd)	4.907	5.065	4.716
Convergence, Y/N	Yes	Yes	Yes
Cap	728	701	755
Service Time	2.987	3.16	2.79
HCM Lane V/C Ratio	0.552	0.243	0.36
HCM Control Delay	13.9	9.8	10.4
HCM Lane LOS	B	A	B
HCM 95th-tile Q	3.4	0.9	1.6

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	137	13	5	114	18	7
Future Vol, veh/h	137	13	5	114	18	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	15	6	136	21	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	179	0	319	171
Stage 1	-	-	-	-	171	-
Stage 2	-	-	-	-	148	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1397	-	674	873
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	880	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1397	-	671	873
Mov Cap-2 Maneuver	-	-	-	-	671	-
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	876	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	717	-	-	1397	-
HCM Lane V/C Ratio	0.042	-	-	0.004	-
HCM Control Delay (s)	10.2	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	440	824	15	44	983	213	10	3	2	287	1	355
Future Volume (veh/h)	440	824	15	44	983	213	10	3	2	287	1	355
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	454	849	7	45	1013	151	10	3	0	296	1	182
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	557	1494	669	120	1019	152	87	26	0	354	1	573
Arrive On Green	0.16	0.43	0.43	0.07	0.34	0.34	0.06	0.06	0.00	0.20	0.20	0.20
Sat Flow, veh/h	3408	3438	1539	1774	3006	448	1380	414	0	1751	6	1568
Grp Volume(v), veh/h	454	849	7	45	581	583	13	0	0	297	0	182
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1729	1794	0	0	1757	0	1568
Q Serve(g_s), s	11.5	16.5	0.2	2.2	29.9	30.0	0.6	0.0	0.0	14.5	0.0	7.4
Cycle Q Clear(g_c), s	11.5	16.5	0.2	2.2	29.9	30.0	0.6	0.0	0.0	14.5	0.0	7.4
Prop In Lane	1.00		1.00	1.00		0.26	0.77		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	557	1494	669	120	585	586	113	0	0	355	0	573
V/C Ratio(X)	0.82	0.57	0.01	0.37	0.99	0.99	0.12	0.00	0.00	0.84	0.00	0.32
Avail Cap(c_a), veh/h	853	1629	729	205	585	586	723	0	0	491	0	695
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	18.9	14.3	39.7	29.3	29.4	39.4	0.0	0.0	34.1	0.0	20.3
Incr Delay (d2), s/veh	3.6	0.5	0.0	1.9	35.4	35.8	0.4	0.0	0.0	8.8	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	5.6	7.9	0.1	1.1	19.9	20.1	0.3	0.0	0.0	7.9	0.0	3.3
LnGrp Delay(d),s/veh	39.6	19.4	14.3	41.6	64.7	65.2	39.8	0.0	0.0	42.9	0.0	20.6
LnGrp LOS	D	B	B	D	E	E	D			D		C
Approach Vol, veh/h		1310			1209			13			479	
Approach Delay, s/veh		26.4			64.1			39.8			34.4	
Approach LOS		C			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.7	44.5		23.1	19.3	36.0		10.7
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.2	18.5		16.5	13.5	32.0		2.6
Green Ext Time (p_c), s	0.0	18.0		1.5	1.1	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	42.9
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

09/20/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	440	824	15	44	983	213	10	3	2	287	1	355
Future Volume (veh/h)	440	824	15	44	983	213	10	3	2	287	1	355
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	468	877	13	47	1046	98	11	3	0	305	1	249
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	518	1661	748	116	1263	118	72	20	0	341	1	544
Arrive On Green	0.15	0.48	0.48	0.07	0.40	0.40	0.05	0.05	0.00	0.19	0.19	0.19
Sat Flow, veh/h	3408	3438	1548	1774	3185	298	1408	384	0	1751	6	1568
Grp Volume(v), veh/h	468	877	13	47	566	578	14	0	0	306	0	249
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1758	1792	0	0	1757	0	1568
Q Serve(g_s), s	13.6	17.8	0.4	2.6	29.7	29.8	0.8	0.0	0.0	17.1	0.0	12.4
Cycle Q Clear(g_c), s	13.6	17.8	0.4	2.6	29.7	29.8	0.8	0.0	0.0	17.1	0.0	12.4
Prop In Lane	1.00		1.00	1.00		0.17	0.79		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	518	1661	748	116	684	697	92	0	0	342	0	544
V/C Ratio(X)	0.90	0.53	0.02	0.41	0.83	0.83	0.15	0.00	0.00	0.89	0.00	0.46
Avail Cap(c_a), veh/h	518	1661	748	171	721	735	623	0	0	365	0	563
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.0	18.1	13.6	45.2	27.3	27.3	45.7	0.0	0.0	39.5	0.0	25.6
Incr Delay (d2), s/veh	19.3	0.4	0.0	2.3	8.1	8.0	0.8	0.0	0.0	22.5	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	8.5	0.2	1.3	15.7	16.0	0.4	0.0	0.0	10.5	0.0	5.5
LnGrp Delay(d),s/veh	61.3	18.5	13.6	47.5	35.4	35.3	46.5	0.0	0.0	62.0	0.0	26.2
LnGrp LOS	E	B	B	D	D	D	D			E		C
Approach Vol, veh/h		1358			1191			14			555	
Approach Delay, s/veh		33.2			35.8			46.5			45.9	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.3	54.5		24.7	20.0	45.7		10.3
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9.7	47.7		20.9	* 15	42.1		35.0
Max Q Clear Time (g_c+I1), s	4.6	19.8		19.1	15.6	31.8		2.8
Green Ext Time (p_c), s	0.0	20.4		0.5	0.0	8.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.5
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Traffic Vol, veh/h	0	1129	37	0	1176	64	0	0	2	0	0	29
Future Vol, veh/h	0	1129	37	0	1176	64	0	0	2	0	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1201	39	0	1251	68	0	0	2	0	0	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	620	-	-	663
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	431	0	0	404
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	431	-	-	403
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.4	14.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	431	-	-	-	-	403
HCM Lane V/C Ratio	0.005	-	-	-	-	0.077
HCM Control Delay (s)	13.4	-	-	-	-	14.7
HCM Lane LOS	B	-	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	-	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	109	901	9	4	963	30	28	8	2	33	3	136
Future Volume (veh/h)	109	901	9	4	963	30	28	8	2	33	3	136
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	116	959	10	4	1024	32	30	9	2	35	0	51
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	0	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	514	1975	21	23	1464	46	345	256	57	347	0	546
Arrive On Green	0.15	0.57	0.57	0.01	0.43	0.43	0.17	0.17	0.17	0.17	0.00	0.17
Sat Flow, veh/h	3442	3487	36	1774	3405	106	1344	1477	328	1398	0	3150
Grp Volume(v), veh/h	116	473	496	4	517	539	30	0	11	35	0	51
Grp Sat Flow(s),veh/h/ln	1721	1720	1804	1774	1721	1791	1344	0	1805	1398	0	1575
Q Serve(g_s), s	1.9	10.6	10.6	0.1	15.8	15.8	1.2	0.0	0.3	1.4	0.0	0.9
Cycle Q Clear(g_c), s	1.9	10.6	10.6	0.1	15.8	15.8	1.2	0.0	0.3	1.7	0.0	0.9
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	514	974	1022	23	740	770	345	0	313	347	0	546
V/C Ratio(X)	0.23	0.49	0.49	0.18	0.70	0.70	0.09	0.00	0.04	0.10	0.00	0.09
Avail Cap(c_a), veh/h	658	974	1022	339	950	988	808	0	934	828	0	1631
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.1	8.3	8.3	31.4	15.0	15.0	22.5	0.0	22.1	22.8	0.0	22.3
Incr Delay (d2), s/veh	0.1	0.4	0.4	1.3	1.6	1.5	0.0	0.0	0.0	0.0	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	0.9	5.1	5.3	0.1	7.8	8.1	0.5	0.0	0.2	0.5	0.0	0.4
LnGrp Delay(d),s/veh	24.2	8.7	8.7	32.8	16.6	16.5	22.5	0.0	22.1	22.9	0.0	22.4
LnGrp LOS	C	A	A	C	B	B	C		C	C		C
Approach Vol, veh/h		1085			1060			41			86	
Approach Delay, s/veh		10.4			16.6			22.4			22.6	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	42.9		15.9	14.3	34.1		15.9
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.1	12.6		3.7	3.9	17.8		3.2
Green Ext Time (p_c), s	0.0	12.5		0.2	0.1	9.9		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	13.9
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	889	29	112	907	14	30	22	148	12	19	52
Future Volume (veh/h)	53	889	29	112	907	14	30	22	148	12	19	52
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	56	946	0	119	965	0	32	23	16	13	20	18
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	187	1572	0	238	1669	0	190	109	212	142	174	220
Arrive On Green	0.12	0.51	0.00	0.15	0.54	0.00	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1597	3179	0	1597	3177	0	672	715	1389	424	1138	1437
Grp Volume(v), veh/h	56	946	0	119	965	0	55	0	16	33	0	18
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1387	0	1389	1563	0	1437
Q Serve(g_s), s	2.1	14.2	0.0	4.5	13.7	0.0	0.6	0.0	0.6	0.0	0.0	0.7
Cycle Q Clear(g_c), s	2.1	14.2	0.0	4.5	13.7	0.0	2.0	0.0	0.6	1.1	0.0	0.7
Prop In Lane	1.00		0.00	1.00		0.00	0.58		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	187	1572	0	238	1669	0	299	0	212	315	0	220
V/C Ratio(X)	0.30	0.60	0.00	0.50	0.58	0.00	0.18	0.00	0.08	0.10	0.00	0.08
Avail Cap(c_a), veh/h	293	1893	0	293	1892	0	741	0	669	809	0	692
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.4	11.4	0.0	25.6	10.1	0.0	24.3	0.0	23.8	23.9	0.0	23.8
Incr Delay (d2), s/veh	0.9	0.5	0.0	1.6	0.5	0.0	0.3	0.0	0.1	0.1	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	1.0	6.2	0.0	2.1	5.9	0.0	0.9	0.0	0.3	0.5	0.0	0.3
LnGrp Delay(d),s/veh	27.3	12.0	0.0	27.3	10.6	0.0	24.6	0.0	23.9	24.1	0.0	23.9
LnGrp LOS	C	B		C	B		C		C	C		C
Approach Vol, veh/h		1002			1084			71			51	
Approach Delay, s/veh		12.8			12.4			24.5			24.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.7	39.2		13.5	10.7	41.3		13.5
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	6.5	16.2		3.1	4.1	15.7		4.0
Green Ext Time (p_c), s	0.1	17.0		0.5	0.0	17.3		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.2
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	947	13	61	927	46	17	11	123	59	7	41
Future Volume (veh/h)	78	947	13	61	927	46	17	11	123	59	7	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	83	1007	12	65	986	43	18	12	38	63	7	13
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	226	1163	14	195	1091	48	74	52	101	218	21	175
Arrive On Green	0.13	0.65	0.65	0.11	0.63	0.63	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1785	21	1774	1722	75	250	461	901	1331	185	1561
Grp Volume(v), veh/h	83	0	1019	65	0	1029	68	0	0	70	0	13
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1797	1613	0	0	1516	0	1561
Q Serve(g_s), s	4.2	0.0	44.4	3.3	0.0	48.4	0.0	0.0	0.0	0.0	0.0	0.7
Cycle Q Clear(g_c), s	4.2	0.0	44.4	3.3	0.0	48.4	3.7	0.0	0.0	3.6	0.0	0.7
Prop In Lane	1.00		0.01	1.00		0.04	0.26		0.56	0.90		1.00
Lane Grp Cap(c), veh/h	226	0	1177	195	0	1139	227	0	0	239	0	175
V/C Ratio(X)	0.37	0.00	0.87	0.33	0.00	0.90	0.30	0.00	0.00	0.29	0.00	0.07
Avail Cap(c_a), veh/h	252	0	1210	234	0	1185	456	0	0	442	0	404
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.4	0.0	13.7	40.5	0.0	15.5	40.5	0.0	0.0	40.4	0.0	39.2
Incr Delay (d2), s/veh	1.0	0.0	6.8	1.0	0.0	9.7	0.7	0.0	0.0	0.7	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	2.1	0.0	24.0	1.7	0.0	26.8	1.8	0.0	0.0	1.8	0.0	0.3
LnGrp Delay(d),s/veh	40.3	0.0	20.5	41.5	0.0	25.2	41.2	0.0	0.0	41.1	0.0	39.4
LnGrp LOS	D		C	D		C	D			D		D
Approach Vol, veh/h		1102			1094			68			83	
Approach Delay, s/veh		22.0			26.2			41.2			40.8	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.8	70.2		14.5	15.6	68.5		14.5
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	5.3	46.4		5.6	6.2	50.4		5.7
Green Ext Time (p_c), s	0.1	15.4		0.7	0.1	12.1		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	25.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1070	56	24	978	50	21
Future Vol, veh/h	1070	56	24	978	50	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1138	60	26	1040	53	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1138	0	2229	1138
Stage 1	-	-	-	-	1138	-
Stage 2	-	-	-	-	1091	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	614	-	~ 47	245
Stage 1	-	-	-	-	306	-
Stage 2	-	-	-	-	322	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	614	-	~ 45	245
Mov Cap-2 Maneuver	-	-	-	-	161	-
Stage 1	-	-	-	-	306	-
Stage 2	-	-	-	-	308	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	39
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	179	-	-	614	-
HCM Lane V/C Ratio	0.422	-	-	0.042	-
HCM Control Delay (s)	39	-	-	11.1	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	1.9	-	-	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1070	56	24	978	50	21
Future Volume (veh/h)	1070	56	24	978	50	21
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1126	59	25	1029	53	22
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1343	1175	46	1481	69	29
Arrive On Green	0.74	0.74	0.03	0.82	0.06	0.06
Sat Flow, veh/h	1810	1583	1774	1810	1196	497
Grp Volume(v), veh/h	1126	59	25	1029	76	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1715	0
Q Serve(g_s), s	37.7	0.9	1.2	21.2	3.9	0.0
Cycle Q Clear(g_c), s	37.7	0.9	1.2	21.2	3.9	0.0
Prop In Lane		1.00	1.00		0.70	0.29
Lane Grp Cap(c), veh/h	1343	1175	46	1481	99	0
V/C Ratio(X)	0.84	0.05	0.54	0.69	0.77	0.00
Avail Cap(c_a), veh/h	1721	1506	100	1915	483	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	7.8	3.1	42.7	3.4	41.3	0.0
Incr Delay (d2), s/veh	3.1	0.0	9.6	0.8	11.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.4	0.7	10.6	2.2	0.0
LnGrp Delay(d),s/veh	10.9	3.1	52.4	4.1	53.1	0.0
LnGrp LOS	B	A	D	A	D	
Approach Vol, veh/h	1185			1054	76	
Approach Delay, s/veh	10.5			5.3	53.1	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.8	72.4				79.2		9.6
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	3.2	39.7				23.2		5.9
Green Ext Time (p_c), s	0.0	26.2				32.6		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	9.5
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	695	361	53	707	8	285	0	32	8	0	8
Future Volume (veh/h)	10	695	361	53	707	8	285	0	32	8	0	8
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	11	781	280	60	794	9	320	0	12	9	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	37	792	684	112	857	10	347	0	303	46	0	41
Arrive On Green	0.02	0.49	0.49	0.07	0.53	0.53	0.22	0.00	0.22	0.03	0.00	0.03
Sat Flow, veh/h	1597	1629	1406	1597	1607	18	1597	0	1394	1597	0	1425
Grp Volume(v), veh/h	11	781	280	60	0	803	320	0	12	9	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1406	1597	0	1625	1597	0	1394	1597	0	1425
Q Serve(g_s), s	0.7	50.6	13.7	3.9	0.0	48.8	21.0	0.0	0.7	0.6	0.0	0.4
Cycle Q Clear(g_c), s	0.7	50.6	13.7	3.9	0.0	48.8	21.0	0.0	0.7	0.6	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	37	792	684	112	0	866	347	0	303	46	0	41
V/C Ratio(X)	0.29	0.99	0.41	0.54	0.00	0.93	0.92	0.00	0.04	0.20	0.00	0.12
Avail Cap(c_a), veh/h	243	792	684	243	0	866	378	0	330	378	0	337
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.3	27.1	17.6	48.0	0.0	23.0	40.9	0.0	33.0	50.7	0.0	50.6
Incr Delay (d2), s/veh	1.6	28.4	0.3	1.5	0.0	15.7	25.3	0.0	0.0	0.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	28.8	5.3	1.8	0.0	25.4	11.7	0.0	0.3	0.3	0.0	0.1
LnGrp Delay(d),s/veh	52.9	55.5	17.9	49.5	0.0	38.7	66.3	0.0	33.0	51.5	0.0	51.1
LnGrp LOS	D	E	B	D		D	E		C	D		D
Approach Vol, veh/h		1072			863			332			14	
Approach Delay, s/veh		45.6			39.5			65.1			51.4	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.2	59.0		7.8	7.2	64.0		28.0
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	5.9	52.6		2.6	2.7	50.8		23.0
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.6		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	46.2
HCM 2010 LOS	D

Notes

HCM 2010 TWSC
8: Montgomery Dr & Melita Rd

08/22/2017

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	345	231	23	16	19
Future Vol, veh/h	18	345	231	23	16	19
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	397	266	26	18	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	296	0	-	0	721	285
Stage 1	-	-	-	-	283	-
Stage 2	-	-	-	-	438	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1265	-	-	-	394	754
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	651	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1263	-	-	-	383	750
Mov Cap-2 Maneuver	-	-	-	-	383	-
Stage 1	-	-	-	-	762	-
Stage 2	-	-	-	-	635	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1263	-	-	-	522
HCM Lane V/C Ratio	0.016	-	-	-	0.077
HCM Control Delay (s)	7.9	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	193	168	0	95	3	0	6	163
Future Vol, veh/h	0	193	168	0	95	3	0	6	163
Peak Hour Factor	0.92	0.90	0.90	0.92	0.90	0.90	0.92	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	214	187	0	106	3	0	7	181
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	12.4	8.7	9
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	53%	0%	4%
Vol Thru, %	47%	97%	0%
Vol Right, %	0%	3%	96%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	361	98	169
LT Vol	193	0	6
Through Vol	168	95	0
RT Vol	0	3	163
Lane Flow Rate	401	109	188
Geometry Grp	1	1	1
Degree of Util (X)	0.513	0.145	0.237
Departure Headway (Hd)	4.603	4.81	4.55
Convergence, Y/N	Yes	Yes	Yes
Cap	782	742	787
Service Time	2.645	2.862	2.591
HCM Lane V/C Ratio	0.513	0.147	0.239
HCM Control Delay	12.4	8.7	9
HCM Lane LOS	B	A	A
HCM 95th-tile Q	3	0.5	0.9

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	146	22	9	74	19	8
Future Vol, veh/h	146	22	9	74	19	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	178	27	11	90	23	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	205	0	303	191
Stage 1	-	-	-	-	191	-
Stage 2	-	-	-	-	112	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1366	-	689	851
Stage 1	-	-	-	-	841	-
Stage 2	-	-	-	-	913	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1366	-	683	851
Mov Cap-2 Maneuver	-	-	-	-	683	-
Stage 1	-	-	-	-	841	-
Stage 2	-	-	-	-	906	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	725	-	-	1366	-
HCM Lane V/C Ratio	0.045	-	-	0.008	-
HCM Control Delay (s)	10.2	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	512	784	22	17	1180	241	27	4	6	262	0	458
Future Volume (veh/h)	512	784	22	17	1180	241	27	4	6	262	0	458
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1815	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	533	817	15	18	1229	151	28	4	4	273	0	311
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	627	1611	725	64	990	121	112	16	16	341	0	593
Arrive On Green	0.18	0.47	0.47	0.04	0.32	0.32	0.08	0.08	0.08	0.19	0.00	0.19
Sat Flow, veh/h	3408	3438	1548	1774	3089	378	1368	195	195	1757	0	1568
Grp Volume(v), veh/h	533	817	15	18	684	696	36	0	0	273	0	311
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1743	1759	0	0	1757	0	1568
Q Serve(g_s), s	14.3	15.6	0.5	0.9	30.2	30.2	1.8	0.0	0.0	14.0	0.0	14.5
Cycle Q Clear(g_c), s	14.3	15.6	0.5	0.9	30.2	30.2	1.8	0.0	0.0	14.0	0.0	14.5
Prop In Lane	1.00		1.00	1.00		0.22	0.78		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	627	1611	725	64	553	559	144	0	0	341	0	593
V/C Ratio(X)	0.85	0.51	0.02	0.28	1.24	1.25	0.25	0.00	0.00	0.80	0.00	0.52
Avail Cap(c_a), veh/h	807	1611	725	194	553	559	670	0	0	464	0	703
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.2	17.5	13.4	44.2	32.0	32.0	40.6	0.0	0.0	36.2	0.0	22.7
Incr Delay (d2), s/veh	6.9	0.4	0.0	2.4	121.7	125.1	0.9	0.0	0.0	6.9	0.0	0.7
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	7.3	7.5	0.2	0.5	33.0	33.8	0.9	0.0	0.0	7.4	0.0	6.4
LnGrp Delay(d),s/veh	44.1	17.8	13.5	46.6	153.7	157.1	41.5	0.0	0.0	43.1	0.0	23.4
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1365			1398			36			584	
Approach Delay, s/veh		28.0			154.0			41.5			32.7	
Approach LOS		C			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	49.9		23.4	22.0	36.0		12.8
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.9	17.6		16.5	16.3	32.2		3.8
Green Ext Time (p_c), s	0.0	19.9		1.8	1.1	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	81.0
HCM 2010 LOS	F

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1069	19	0	1401	35	0	0	16	0	0	31
Future Vol, veh/h	0	1069	19	0	1401	35	0	0	16	0	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1114	20	0	1459	36	0	0	17	0	0	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	567	-	-	751
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	467	0	0	353
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	467	-	-	352
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13	16.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	467	-	-	-	-	352
HCM Lane V/C Ratio	0.036	-	-	-	-	0.092
HCM Control Delay (s)	13	-	-	-	-	16.3
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	849	10	6	975	19	29	36	6	78	46	280
Future Volume (veh/h)	156	849	10	6	975	19	29	36	6	78	46	280
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	162	884	8	6	1016	14	30	38	2	81	97	81
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	548	1940	18	34	1443	20	276	321	17	334	340	289
Arrive On Green	0.16	0.56	0.56	0.02	0.42	0.42	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	3442	3492	32	1774	3473	48	1201	1754	92	1362	1863	1583
Grp Volume(v), veh/h	162	435	457	6	503	527	30	0	40	81	97	81
Grp Sat Flow(s),veh/h/ln	1721	1720	1804	1774	1720	1801	1201	0	1846	1362	1863	1583
Q Serve(g_s), s	2.7	9.9	9.9	0.2	15.8	15.8	1.4	0.0	1.2	3.5	2.9	2.9
Cycle Q Clear(g_c), s	2.7	9.9	9.9	0.2	15.8	15.8	4.4	0.0	1.2	4.6	2.9	2.9
Prop In Lane	1.00		0.02	1.00		0.03	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	548	955	1002	34	714	748	276	0	337	334	340	289
V/C Ratio(X)	0.30	0.46	0.46	0.18	0.70	0.70	0.11	0.00	0.12	0.24	0.28	0.28
Avail Cap(c_a), veh/h	646	955	1002	333	932	976	667	0	939	778	947	805
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.3	8.7	8.7	31.6	15.8	15.8	25.0	0.0	22.4	24.3	23.1	23.0
Incr Delay (d2), s/veh	0.1	0.3	0.3	0.9	1.6	1.6	0.1	0.0	0.1	0.1	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.7	4.9	0.1	7.7	8.1	0.5	0.0	0.6	1.3	1.5	1.3
LnGrp Delay(d),s/veh	24.4	9.0	9.0	32.6	17.5	17.4	25.0	0.0	22.4	24.4	23.2	23.2
LnGrp LOS	C	A	A	C	B	B	C		C	C	C	C
Approach Vol, veh/h		1054			1036			70			259	
Approach Delay, s/veh		11.4			17.5			23.5			23.6	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.9	42.9		16.7	15.1	33.7		16.7
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	11.9		6.6	4.7	17.8		6.4
Green Ext Time (p_c), s	0.0	11.9		0.8	0.1	9.4		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	862	61	207	900	10	40	22	170	25	73	40
Future Volume (veh/h)	25	862	61	207	900	10	40	22	170	25	73	40
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1632	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	26	898	0	216	938	0	42	23	94	26	76	23
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	100	1207	0	215	1428	0	77	26	466	56	125	483
Arrive On Green	0.06	0.39	0.00	0.13	0.46	0.00	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1597	3182	0	1597	3177	0	31	77	1389	14	374	1441
Grp Volume(v), veh/h	26	898	0	216	938	0	65	0	94	102	0	23
Grp Sat Flow(s),veh/h/ln	1597	1550	0	1597	1548	0	107	0	1389	388	0	1441
Q Serve(g_s), s	1.4	22.2	0.0	12.0	20.9	0.0	1.1	0.0	4.3	1.1	0.0	1.0
Cycle Q Clear(g_c), s	1.4	22.2	0.0	12.0	20.9	0.0	29.9	0.0	4.3	29.9	0.0	1.0
Prop In Lane	1.00		0.00	1.00		0.00	0.65		1.00	0.25		1.00
Lane Grp Cap(c), veh/h	100	1207	0	215	1428	0	103	0	466	181	0	483
V/C Ratio(X)	0.26	0.74	0.00	1.00	0.66	0.00	0.63	0.00	0.20	0.56	0.00	0.05
Avail Cap(c_a), veh/h	215	1392	0	215	1428	0	126	0	491	209	0	510
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	23.4	0.0	38.5	18.5	0.0	35.3	0.0	21.1	24.1	0.0	20.0
Incr Delay (d2), s/veh	1.4	2.2	0.0	62.4	1.3	0.0	7.1	0.0	0.2	2.7	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	0.6	9.8	0.0	9.0	9.1	0.0	1.8	0.0	1.7	1.9	0.0	0.4
LnGrp Delay(d),s/veh	41.1	25.5	0.0	100.9	19.8	0.0	42.4	0.0	21.3	26.8	0.0	20.0
LnGrp LOS	D	C		F	B		D		C	C		C
Approach Vol, veh/h		924			1154			159			125	
Approach Delay, s/veh		26.0			35.0			29.9			25.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.0	40.8		34.2	8.6	47.2		34.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	4.0	24.2		31.9	3.4	22.9		31.9
Green Ext Time (p_c), s	0.0	10.7		0.0	0.0	12.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	30.6
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	997	29	44	1021	27	69	19	113	48	7	20
Future Volume (veh/h)	56	997	29	44	1021	27	69	19	113	48	7	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1811	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	58	1039	27	46	1064	25	72	20	54	50	7	11
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	195	1127	29	164	1098	26	127	41	68	208	25	230
Arrive On Green	0.11	0.64	0.64	0.09	0.62	0.62	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1774	1757	46	1774	1761	41	513	279	465	981	172	1583
Grp Volume(v), veh/h	58	0	1066	46	0	1089	146	0	0	57	0	11
Grp Sat Flow(s),veh/h/ln	1774	0	1803	1774	0	1803	1257	0	0	1153	0	1583
Q Serve(g_s), s	3.1	0.0	53.6	2.5	0.0	59.4	7.6	0.0	0.0	0.0	0.0	0.6
Cycle Q Clear(g_c), s	3.1	0.0	53.6	2.5	0.0	59.4	12.2	0.0	0.0	4.7	0.0	0.6
Prop In Lane	1.00		0.03	1.00		0.02	0.49		0.37	0.88		1.00
Lane Grp Cap(c), veh/h	195	0	1156	164	0	1124	235	0	0	233	0	230
V/C Ratio(X)	0.30	0.00	0.92	0.28	0.00	0.97	0.62	0.00	0.00	0.24	0.00	0.05
Avail Cap(c_a), veh/h	240	0	1156	223	0	1133	388	0	0	372	0	391
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.3	0.0	16.3	43.7	0.0	18.5	43.6	0.0	0.0	39.7	0.0	38.0
Incr Delay (d2), s/veh	0.8	0.0	12.1	0.9	0.0	19.5	2.7	0.0	0.0	0.5	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	1.6	0.0	30.2	1.3	0.0	35.1	4.2	0.0	0.0	1.5	0.0	0.3
LnGrp Delay(d),s/veh	43.2	0.0	28.4	44.7	0.0	38.0	46.3	0.0	0.0	40.2	0.0	38.1
LnGrp LOS	D		C	D		D	D			D		D
Approach Vol, veh/h		1124			1135			146			68	
Approach Delay, s/veh		29.1			38.3			46.3			39.9	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.5	72.3		18.5	14.4	70.5		18.5
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	14.5	55.6		6.7	5.1	61.4		14.2
Green Ext Time (p_c), s	0.0	9.2		1.1	0.1	3.1		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	34.6
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	914	207	18	766	24	309	1	39	6	0	5
Future Volume (veh/h)	28	914	207	18	766	24	309	1	39	6	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1630	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	29	952	161	19	798	25	322	1	22	6	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	79	839	734	58	790	25	351	1	307	38	0	34
Arrive On Green	0.05	0.52	0.52	0.04	0.50	0.50	0.22	0.22	0.22	0.02	0.00	0.02
Sat Flow, veh/h	1597	1629	1425	1597	1572	49	1592	5	1394	1597	0	1425
Grp Volume(v), veh/h	29	952	161	19	0	823	323	0	22	6	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1621	1597	0	1394	1597	0	1425
Q Serve(g_s), s	1.8	53.3	6.4	1.2	0.0	52.0	20.4	0.0	1.3	0.4	0.0	0.4
Cycle Q Clear(g_c), s	1.8	53.3	6.4	1.2	0.0	52.0	20.4	0.0	1.3	0.4	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	79	839	734	58	0	815	352	0	307	38	0	34
V/C Ratio(X)	0.37	1.13	0.22	0.33	0.00	1.01	0.92	0.00	0.07	0.16	0.00	0.15
Avail Cap(c_a), veh/h	252	839	734	252	0	815	391	0	341	391	0	349
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	47.6	25.1	13.7	48.6	0.0	25.7	39.4	0.0	31.9	49.5	0.0	49.5
Incr Delay (d2), s/veh	1.1	75.1	0.1	1.2	0.0	33.9	23.6	0.0	0.0	0.7	0.0	0.7
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	0.8	41.3	2.5	0.5	0.0	30.8	11.3	0.0	0.5	0.2	0.0	0.1
LnGrp Delay(d),s/veh	48.7	100.1	13.8	49.8	0.0	59.7	63.0	0.0	32.0	50.2	0.0	50.2
LnGrp LOS	D	F	B	D		F	E		C	D		D
Approach Vol, veh/h		1142			842			345			11	
Approach Delay, s/veh		86.7			59.4			61.0			50.2	
Approach LOS		F			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.5	60.3		7.1	9.8	59.0		27.5
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.2	55.3		2.4	3.8	54.0		22.4
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	72.9
HCM 2010 LOS	E

Notes

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	35	325	394	3	4	88
Future Vol, veh/h	35	325	394	3	4	88
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	346	419	3	4	94

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	426	0	-	0	845	427
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	420	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1133	-	-	-	333	628
Stage 1	-	-	-	-	659	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1131	-	-	-	317	624
Mov Cap-2 Maneuver	-	-	-	-	317	-
Stage 1	-	-	-	-	656	-
Stage 2	-	-	-	-	634	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1131	-	-	-	599
HCM Lane V/C Ratio	0.033	-	-	-	0.163
HCM Control Delay (s)	8.3	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	203	108	0	78	8	0	3	312
Future Vol, veh/h	0	203	108	0	78	8	0	3	312
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	216	115	0	83	9	0	3	332
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	12.1	8.9	10.5
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	0%	1%
Vol Thru, %	35%	91%	0%
Vol Right, %	0%	9%	99%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	311	86	315
LT Vol	203	0	3
Through Vol	108	78	0
RT Vol	0	8	312
Lane Flow Rate	331	91	335
Geometry Grp	1	1	1
Degree of Util (X)	0.453	0.128	0.408
Departure Headway (Hd)	4.93	5.054	4.387
Convergence, Y/N	Yes	Yes	Yes
Cap	725	702	818
Service Time	3	3.139	2.432
HCM Lane V/C Ratio	0.457	0.13	0.41
HCM Control Delay	12.1	8.9	10.5
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.4	0.4	2

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	483	914	19	59	999	308	16	4	3	418	1	420
Future Volume (veh/h)	483	914	19	59	999	308	16	4	3	418	1	420
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1818	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	493	933	16	60	1019	191	16	4	1	427	1	306
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	581	1381	621	130	882	165	89	22	6	440	1	661
Arrive On Green	0.17	0.40	0.40	0.07	0.30	0.30	0.07	0.07	0.07	0.25	0.25	0.25
Sat Flow, veh/h	3408	3438	1547	1774	2897	542	1356	339	85	1753	4	1568
Grp Volume(v), veh/h	493	933	16	60	606	604	21	0	0	428	0	306
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1727	1713	1779	0	0	1757	0	1568
Q Serve(g_s), s	13.9	22.1	0.6	3.2	30.2	30.2	1.1	0.0	0.0	23.9	0.0	13.9
Cycle Q Clear(g_c), s	13.9	22.1	0.6	3.2	30.2	30.2	1.1	0.0	0.0	23.9	0.0	13.9
Prop In Lane	1.00		1.00	1.00		0.32	0.76		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	581	1381	621	130	526	521	117	0	0	441	0	661
V/C Ratio(X)	0.85	0.68	0.03	0.46	1.15	1.16	0.18	0.00	0.00	0.97	0.00	0.46
Avail Cap(c_a), veh/h	766	1462	658	184	526	521	644	0	0	441	0	661
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.9	24.4	18.0	44.1	34.5	34.5	43.8	0.0	0.0	36.8	0.0	20.6
Incr Delay (d2), s/veh	6.9	1.3	0.0	2.5	89.2	90.9	0.7	0.0	0.0	35.2	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	10.8	0.3	1.7	27.3	27.3	0.6	0.0	0.0	16.0	0.0	6.1
LnGrp Delay(d),s/veh	46.8	25.7	18.0	46.6	123.7	125.4	44.6	0.0	0.0	72.0	0.0	21.1
LnGrp LOS	D	C	B	D	F	F	D			E		C
Approach Vol, veh/h		1442			1270			21			734	
Approach Delay, s/veh		32.9			120.9			44.6			50.8	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	45.6		30.0	21.6	36.0		11.6
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	5.2	24.1		25.9	15.9	32.2		3.1
Green Ext Time (p_c), s	0.0	15.1		0.0	1.0	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	69.0
HCM 2010 LOS	E

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1302	59	0	1331	55	0	0	13	0	0	40
Future Vol, veh/h	0	1302	59	0	1331	55	0	0	13	0	0	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1329	60	0	1358	56	0	0	13	0	0	41

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	694	-	-	710
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	385	0	0	376
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	385	-	-	375
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.7	15.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	385	-	-	-	-	375
HCM Lane V/C Ratio	0.034	-	-	-	-	0.109
HCM Control Delay (s)	14.7	-	-	-	-	15.8
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.4

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	151	1011	12	6	1122	28	23	17	1	26	17	127
Future Volume (veh/h)	151	1011	12	6	1122	28	23	17	1	26	17	127
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	154	1032	9	6	1145	28	23	17	0	27	53	41
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	536	1995	17	34	1490	36	299	319	0	335	319	271
Arrive On Green	0.16	0.57	0.57	0.02	0.43	0.43	0.17	0.17	0.00	0.17	0.17	0.17
Sat Flow, veh/h	3442	3494	30	1774	3431	84	1297	1863	0	1390	1863	1583
Grp Volume(v), veh/h	154	508	533	6	574	599	23	17	0	27	53	41
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1795	1297	1863	0	1390	1863	1583
Q Serve(g_s), s	2.6	12.0	12.0	0.2	18.9	18.9	1.0	0.5	0.0	1.1	1.6	1.5
Cycle Q Clear(g_c), s	2.6	12.0	12.0	0.2	18.9	18.9	2.6	0.5	0.0	1.6	1.6	1.5
Prop In Lane	1.00		0.02	1.00		0.05	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	536	982	1031	34	747	779	299	319	0	335	319	271
V/C Ratio(X)	0.29	0.52	0.52	0.18	0.77	0.77	0.08	0.05	0.00	0.08	0.17	0.15
Avail Cap(c_a), veh/h	636	982	1031	328	918	957	725	932	0	793	932	792
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	8.7	8.7	32.1	16.0	16.0	24.7	23.1	0.0	23.7	23.5	23.5
Incr Delay (d2), s/veh	0.1	0.5	0.5	0.9	3.2	3.1	0.0	0.0	0.0	0.0	0.1	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	1.2	5.8	6.1	0.1	9.6	10.0	0.4	0.3	0.0	0.4	0.8	0.6
LnGrp Delay(d),s/veh	24.9	9.2	9.1	33.1	19.2	19.1	24.7	23.1	0.0	23.8	23.6	23.6
LnGrp LOS	C	A	A	C	B	B	C	C		C	C	C
Approach Vol, veh/h		1195			1179			40			121	
Approach Delay, s/veh		11.2			19.2			24.0			23.6	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	44.5		16.1	15.1	35.4		16.1
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	14.0		3.6	4.6	20.9		4.6
Green Ext Time (p_c), s	0.0	13.4		0.4	0.1	8.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	924	49	210	1067	17	31	39	162	12	19	58
Future Volume (veh/h)	58	924	49	210	1067	17	31	39	162	12	19	58
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1631	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	59	943	0	214	1089	0	32	40	93	12	19	49
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	188	1554	0	252	1675	0	152	152	221	138	176	228
Arrive On Green	0.12	0.50	0.00	0.16	0.54	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3180	0	1597	3177	0	480	960	1389	408	1111	1439
Grp Volume(v), veh/h	59	943	0	214	1089	0	72	0	93	31	0	49
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1441	0	1389	1519	0	1439
Q Serve(g_s), s	2.3	15.0	0.0	9.0	17.1	0.0	0.3	0.0	4.1	0.0	0.0	2.0
Cycle Q Clear(g_c), s	2.3	15.0	0.0	9.0	17.1	0.0	2.7	0.0	4.1	1.1	0.0	2.0
Prop In Lane	1.00		0.00	1.00		0.00	0.44		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	188	1554	0	252	1675	0	304	0	221	314	0	228
V/C Ratio(X)	0.31	0.61	0.00	0.85	0.65	0.00	0.24	0.00	0.42	0.10	0.00	0.21
Avail Cap(c_a), veh/h	279	1805	0	279	1804	0	720	0	637	748	0	660
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.7	12.3	0.0	28.1	11.1	0.0	25.4	0.0	26.0	24.7	0.0	25.2
Incr Delay (d2), s/veh	0.9	0.6	0.0	19.9	0.9	0.0	0.4	0.0	1.3	0.1	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	6.4	0.0	5.3	7.5	0.0	1.2	0.0	1.7	0.5	0.0	0.8
LnGrp Delay(d),s/veh	28.7	12.9	0.0	48.0	12.0	0.0	25.8	0.0	27.3	24.9	0.0	25.6
LnGrp LOS	C	B		D	B		C		C	C		C
Approach Vol, veh/h		1002			1303			165			80	
Approach Delay, s/veh		13.8			17.9			26.7			25.3	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.8	40.4		14.4	11.1	43.2		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.3	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	11.0	17.0		4.0	4.3	19.1		6.1
Green Ext Time (p_c), s	0.1	17.5		1.0	0.0	16.2		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1005	56	107	1219	29	31	11	117	50	12	33
Future Volume (veh/h)	60	1005	56	107	1219	29	31	11	117	50	12	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1812	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	1026	57	109	1244	28	32	11	46	51	12	23
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	201	1085	60	217	1150	18	90	40	87	191	38	183
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1701	95	1774	1763	40	355	348	752	1089	331	1583
Grp Volume(v), veh/h	61	0	1083	109	0	1272	89	0	0	63	0	23
Grp Sat Flow(s),veh/h/ln	1774	0	1796	1774	0	1803	1455	0	0	1420	0	1583
Q Serve(g_s), s	3.2	0.0	55.6	5.8	0.0	65.6	2.0	0.0	0.0	0.0	0.0	1.3
Cycle Q Clear(g_c), s	3.2	0.0	55.6	5.8	0.0	65.6	6.1	0.0	0.0	4.1	0.0	1.3
Prop In Lane	1.00		0.05	1.00		0.02	0.36		0.52	0.81		1.00
Lane Grp Cap(c), veh/h	201	0	1146	217	0	1168	217	0	0	229	0	183
V/C Ratio(X)	0.30	0.00	0.95	0.50	0.00	1.09	0.41	0.00	0.00	0.27	0.00	0.13
Avail Cap(c_a), veh/h	245	0	1170	228	0	1168	422	0	0	419	0	399
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.2	0.0	16.7	41.5	0.0	17.8	42.0	0.0	0.0	41.3	0.0	40.1
Incr Delay (d2), s/veh	0.8	0.0	15.0	1.8	0.0	54.0	1.2	0.0	0.0	0.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	11.2	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	31.8	3.0	0.0	53.6	2.4	0.0	0.0	1.7	0.0	0.6
LnGrp Delay(d),s/veh	42.0	0.0	31.7	43.3	0.0	83.0	43.3	0.0	0.0	41.9	0.0	40.4
LnGrp LOS	D		C	D		F	D			D		D
Approach Vol, veh/h		1144			1381			89			86	
Approach Delay, s/veh		32.2			79.9			43.3			41.5	
Approach LOS		C			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.4	70.7		15.2	14.5	71.6		15.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	7.8	57.6		6.1	5.2	67.6		8.1
Green Ext Time (p_c), s	0.1	7.1		0.8	0.1	0.0		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	57.3
HCM 2010 LOS	E

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	817	380	41	1059	9	282	0	34	21	1	25
Future Volume (veh/h)	9	817	380	41	1059	9	282	0	34	21	1	25
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	9	834	268	42	1081	9	288	0	16	21	1	22
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	32	788	689	96	845	7	318	0	277	94	4	87
Arrive On Green	0.02	0.48	0.48	0.06	0.52	0.52	0.20	0.00	0.20	0.06	0.06	0.06
Sat Flow, veh/h	1597	1629	1425	1597	1613	13	1597	0	1394	1527	73	1425
Grp Volume(v), veh/h	9	834	268	42	0	1090	288	0	16	22	0	22
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1627	1597	0	1394	1600	0	1425
Q Serve(g_s), s	0.6	52.0	12.9	2.7	0.0	56.3	19.0	0.0	1.0	1.4	0.0	1.6
Cycle Q Clear(g_c), s	0.6	52.0	12.9	2.7	0.0	56.3	19.0	0.0	1.0	1.4	0.0	1.6
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.95		1.00
Lane Grp Cap(c), veh/h	32	788	689	96	0	852	318	0	277	98	0	87
V/C Ratio(X)	0.29	1.06	0.39	0.44	0.00	1.28	0.91	0.00	0.06	0.22	0.00	0.25
Avail Cap(c_a), veh/h	242	788	689	242	0	852	376	0	328	377	0	335
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.9	27.7	17.6	48.8	0.0	25.6	42.1	0.0	34.9	48.0	0.0	48.1
Incr Delay (d2), s/veh	1.8	48.7	0.3	1.2	0.0	134.7	20.9	0.0	0.0	0.4	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	33.9	5.1	1.2	0.0	57.0	10.2	0.0	0.4	0.6	0.0	0.6
LnGrp Delay(d),s/veh	53.8	76.5	17.9	50.0	0.0	160.3	63.0	0.0	34.9	48.5	0.0	48.7
LnGrp LOS	D	F	B	D		F	E		C	D		D
Approach Vol, veh/h		1111			1132			304			44	
Approach Delay, s/veh		62.2			156.2			61.5			48.6	
Approach LOS		E			F			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.1	59.0		11.3	6.8	63.3		26.1
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	4.7	54.0		3.6	2.6	58.3		21.0
Green Ext Time (p_c), s	0.0	0.0		0.1	0.0	0.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	103.0
HCM 2010 LOS	F

Notes

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	383	371	7	2	45
Future Vol, veh/h	52	383	371	7	2	45
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	56	412	399	8	2	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	410	0	-	0	931	409
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	524	-
Critical Hdwy	4.12	-	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1149	-	-	-	247	642
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	537	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1147	-	-	-	234	638
Mov Cap-2 Maneuver	-	-	-	-	234	-
Stage 1	-	-	-	-	580	-
Stage 2	-	-	-	-	503	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1147	-	-	-	594
HCM Lane V/C Ratio	0.049	-	-	-	0.085
HCM Control Delay (s)	8.3	0	-	-	11.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	221	150	0	136	4	0	4	259
Future Vol, veh/h	0	221	150	0	136	4	0	4	259
Peak Hour Factor	0.92	0.88	0.88	0.92	0.88	0.88	0.92	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	251	170	0	155	5	0	5	294
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	14.9	9.9	11
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	60%	0%	2%
Vol Thru, %	40%	97%	0%
Vol Right, %	0%	3%	98%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	371	140	263
LT Vol	221	0	4
Through Vol	150	136	0
RT Vol	0	4	259
Lane Flow Rate	422	159	299
Geometry Grp	1	1	1
Degree of Util (X)	0.582	0.233	0.395
Departure Headway (Hd)	4.969	5.279	4.752
Convergence, Y/N	Yes	Yes	Yes
Cap	717	684	747
Service Time	3.067	3.279	2.838
HCM Lane V/C Ratio	0.589	0.232	0.4
HCM Control Delay	14.9	9.9	11
HCM Lane LOS	B	A	B
HCM 95th-tile Q	3.8	0.9	1.9

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	868	17	49	1013	215	11	3	2	290	1	398
Future Volume (veh/h)	470	868	17	49	1013	215	11	3	2	290	1	398
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	485	895	10	51	1044	153	11	3	0	299	1	226
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	585	1485	665	127	1001	146	92	25	0	357	1	589
Arrive On Green	0.17	0.43	0.43	0.07	0.33	0.33	0.07	0.07	0.00	0.20	0.20	0.20
Sat Flow, veh/h	3408	3438	1539	1774	3014	441	1408	384	0	1751	6	1568
Grp Volume(v), veh/h	485	895	10	51	597	600	14	0	0	300	0	226
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1730	1792	0	0	1757	0	1568
Q Serve(g_s), s	12.5	18.2	0.3	2.5	30.2	30.2	0.7	0.0	0.0	14.9	0.0	9.6
Cycle Q Clear(g_c), s	12.5	18.2	0.3	2.5	30.2	30.2	0.7	0.0	0.0	14.9	0.0	9.6
Prop In Lane	1.00		1.00	1.00		0.25	0.79		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	585	1485	665	127	573	574	117	0	0	358	0	589
V/C Ratio(X)	0.83	0.60	0.02	0.40	1.04	1.04	0.12	0.00	0.00	0.84	0.00	0.38
Avail Cap(c_a), veh/h	835	1595	714	201	573	574	707	0	0	481	0	698
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.4	19.8	14.8	40.4	30.4	30.4	40.1	0.0	0.0	34.8	0.0	20.7
Incr Delay (d2), s/veh	4.8	0.7	0.0	2.0	49.1	49.8	0.5	0.0	0.0	9.4	0.0	0.4
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	6.3	8.7	0.1	1.3	22.1	22.3	0.3	0.0	0.0	8.2	0.0	4.2
LnGrp Delay(d),s/veh	41.2	20.6	14.8	42.4	79.5	80.2	40.5	0.0	0.0	44.2	0.0	21.1
LnGrp LOS	D	C	B	D	F	F	D			D		C
Approach Vol, veh/h		1390			1248			14			526	
Approach Delay, s/veh		27.7			78.3			40.5			34.3	
Approach LOS		C			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.2	45.1		23.6	20.3	36.0		11.0
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.5	20.2		16.9	14.5	32.2		2.7
Green Ext Time (p_c), s	0.0	17.4		1.6	1.1	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	48.7
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1172	39	0	1228	72	0	0	2	0	0	32
Future Vol, veh/h	0	1172	39	0	1228	72	0	0	2	0	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1247	41	0	1306	77	0	0	2	0	0	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	644	-	-	694
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	416	0	0	385
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	416	-	-	384
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.7	15.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	416	-	-	-	-	384
HCM Lane V/C Ratio	0.005	-	-	-	-	0.089
HCM Control Delay (s)	13.7	-	-	-	-	15.3
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	916	10	4	990	30	29	9	2	34	3	148
Future Volume (veh/h)	118	916	10	4	990	30	29	9	2	34	3	148
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	126	974	11	4	1053	32	31	10	2	36	0	63
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	0	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	521	1976	22	23	1460	44	345	266	53	349	0	555
Arrive On Green	0.15	0.57	0.57	0.01	0.43	0.43	0.18	0.18	0.18	0.18	0.00	0.18
Sat Flow, veh/h	3442	3483	39	1774	3408	104	1329	1508	302	1397	0	3149
Grp Volume(v), veh/h	126	481	504	4	532	553	31	0	12	36	0	63
Grp Sat Flow(s),veh/h/ln	1721	1720	1803	1774	1720	1791	1329	0	1810	1397	0	1575
Q Serve(g_s), s	2.1	11.0	11.0	0.1	16.7	16.7	1.3	0.0	0.4	1.4	0.0	1.1
Cycle Q Clear(g_c), s	2.1	11.0	11.0	0.1	16.7	16.7	1.3	0.0	0.4	1.8	0.0	1.1
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.17	1.00		1.00
Lane Grp Cap(c), veh/h	521	975	1023	23	737	768	345	0	319	349	0	555
V/C Ratio(X)	0.24	0.49	0.49	0.18	0.72	0.72	0.09	0.00	0.04	0.10	0.00	0.11
Avail Cap(c_a), veh/h	649	975	1023	335	937	975	789	0	924	816	0	1608
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.4	8.5	8.5	31.8	15.4	15.4	22.7	0.0	22.3	23.0	0.0	22.6
Incr Delay (d2), s/veh	0.1	0.4	0.4	1.3	2.0	1.9	0.0	0.0	0.0	0.0	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	1.0	5.2	5.4	0.1	8.2	8.6	0.5	0.0	0.2	0.6	0.0	0.5
LnGrp Delay(d),s/veh	24.5	8.9	8.8	33.2	17.4	17.3	22.7	0.0	22.3	23.1	0.0	22.6
LnGrp LOS	C	A	A	C	B	B	C		C	C		C
Approach Vol, veh/h		1111			1089			43			99	
Approach Delay, s/veh		10.6			17.4			22.6			22.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	43.5		16.2	14.6	34.4		16.2
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.1	13.0		3.8	4.1	18.7		3.3
Green Ext Time (p_c), s	0.0	12.7		0.3	0.1	9.3		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	14.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	899	32	123	926	16	34	25	164	13	21	56
Future Volume (veh/h)	57	899	32	123	926	16	34	25	164	13	21	56
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	61	956	0	131	985	0	36	27	33	14	22	23
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	194	1563	0	240	1650	0	189	115	220	141	179	227
Arrive On Green	0.12	0.50	0.00	0.15	0.53	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3179	0	1597	3177	0	661	725	1389	420	1133	1437
Grp Volume(v), veh/h	61	956	0	131	985	0	63	0	33	36	0	23
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1386	0	1389	1553	0	1437
Q Serve(g_s), s	2.3	14.8	0.0	5.1	14.6	0.0	0.9	0.0	1.4	0.0	0.0	0.9
Cycle Q Clear(g_c), s	2.3	14.8	0.0	5.1	14.6	0.0	2.4	0.0	1.4	1.2	0.0	0.9
Prop In Lane	1.00		0.00	1.00		0.00	0.57		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	194	1563	0	240	1650	0	304	0	220	321	0	227
V/C Ratio(X)	0.31	0.61	0.00	0.55	0.60	0.00	0.21	0.00	0.15	0.11	0.00	0.10
Avail Cap(c_a), veh/h	287	1854	0	287	1853	0	725	0	655	787	0	677
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.8	11.9	0.0	26.3	10.7	0.0	24.6	0.0	24.2	24.2	0.0	24.1
Incr Delay (d2), s/veh	0.9	0.6	0.0	1.9	0.6	0.0	0.3	0.0	0.3	0.2	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	1.1	6.4	0.0	2.3	6.3	0.0	1.0	0.0	0.5	0.6	0.0	0.4
LnGrp Delay(d),s/veh	27.7	12.5	0.0	28.2	11.3	0.0	25.0	0.0	24.6	24.3	0.0	24.2
LnGrp LOS	C	B		C	B		C		C	C		C
Approach Vol, veh/h		1017			1116			96			59	
Approach Delay, s/veh		13.4			13.2			24.8			24.3	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.0	39.7		14.1	11.1	41.6		14.1
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	11.1	16.8		3.2	4.3	16.6		4.4
Green Ext Time (p_c), s	0.1	16.9		0.7	0.1	17.0		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	14.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	969	8	60	953	48	13	12	128	62	8	44
Future Volume (veh/h)	84	969	8	60	953	48	13	12	128	62	8	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	89	1031	7	64	1014	45	14	13	43	66	9	16
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	227	1178	8	192	1094	49	63	50	110	212	25	173
Arrive On Green	0.13	0.66	0.66	0.11	0.64	0.64	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1795	12	1774	1720	76	176	449	995	1301	223	1561
Grp Volume(v), veh/h	89	0	1038	64	0	1059	70	0	0	75	0	16
Grp Sat Flow(s),veh/h/ln	1774	0	1808	1774	0	1797	1620	0	0	1524	0	1561
Q Serve(g_s), s	4.6	0.0	46.4	3.3	0.0	52.3	0.0	0.0	0.0	0.0	0.0	0.9
Cycle Q Clear(g_c), s	4.6	0.0	46.4	3.3	0.0	52.3	3.9	0.0	0.0	3.9	0.0	0.9
Prop In Lane	1.00		0.01	1.00		0.04	0.20		0.61	0.88		1.00
Lane Grp Cap(c), veh/h	227	0	1186	192	0	1143	223	0	0	237	0	173
V/C Ratio(X)	0.39	0.00	0.88	0.33	0.00	0.93	0.31	0.00	0.00	0.32	0.00	0.09
Avail Cap(c_a), veh/h	248	0	1193	231	0	1168	450	0	0	436	0	398
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	0.0	13.9	41.3	0.0	16.1	41.3	0.0	0.0	41.3	0.0	39.9
Incr Delay (d2), s/veh	1.1	0.0	7.6	1.0	0.0	12.5	0.8	0.0	0.0	0.8	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	2.3	0.0	25.3	1.7	0.0	29.6	1.8	0.0	0.0	2.0	0.0	0.4
LnGrp Delay(d),s/veh	41.1	0.0	21.5	42.3	0.0	28.6	42.1	0.0	0.0	42.0	0.0	40.2
LnGrp LOS	D		C	D		C	D			D		D
Approach Vol, veh/h		1127			1123			70			91	
Approach Delay, s/veh		23.0			29.4			42.1			41.7	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.8	71.6		14.6	15.8	69.6		14.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	5.3	48.4		5.9	6.6	54.3		5.9
Green Ext Time (p_c), s	0.1	14.5		0.8	0.1	9.3		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	27.2
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	735	377	58	737	8	294	0	35	8	0	8
Future Volume (veh/h)	10	735	377	58	737	8	294	0	35	8	0	8
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	11	782	282	62	784	9	313	0	15	9	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	37	795	687	113	861	10	341	0	298	46	0	41
Arrive On Green	0.02	0.49	0.49	0.07	0.54	0.54	0.21	0.00	0.21	0.03	0.00	0.03
Sat Flow, veh/h	1597	1629	1406	1597	1607	18	1597	0	1394	1597	0	1425
Grp Volume(v), veh/h	11	782	282	62	0	793	313	0	15	9	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1406	1597	0	1625	1597	0	1394	1597	0	1425
Q Serve(g_s), s	0.7	50.3	13.7	4.0	0.0	47.1	20.4	0.0	0.9	0.6	0.0	0.4
Cycle Q Clear(g_c), s	0.7	50.3	13.7	4.0	0.0	47.1	20.4	0.0	0.9	0.6	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	37	795	687	113	0	871	341	0	298	46	0	41
V/C Ratio(X)	0.29	0.98	0.41	0.55	0.00	0.91	0.92	0.00	0.05	0.20	0.00	0.12
Avail Cap(c_a), veh/h	244	795	687	244	0	871	379	0	331	379	0	339
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.1	26.8	17.4	47.8	0.0	22.4	40.9	0.0	33.3	50.5	0.0	50.4
Incr Delay (d2), s/veh	1.6	27.6	0.3	1.5	0.0	13.4	24.0	0.0	0.0	0.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	28.5	5.3	1.8	0.0	24.2	11.2	0.0	0.4	0.3	0.0	0.1
LnGrp Delay(d),s/veh	52.7	54.4	17.7	49.3	0.0	35.8	65.0	0.0	33.3	51.3	0.0	50.9
LnGrp LOS	D	D	B	D		D	E		C	D		D
Approach Vol, veh/h		1075			855			328			14	
Approach Delay, s/veh		44.8			36.8			63.5			51.1	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.3	59.0		7.8	7.2	64.1		27.5
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	6.0	52.3		2.6	2.7	49.1		22.4
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	1.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	44.5
HCM 2010 LOS	D

Notes

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	349	238	26	18	20
Future Vol, veh/h	18	349	238	26	18	20
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	401	274	30	21	23

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	307	0	-	0	736	295
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	443	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1254	-	-	-	386	744
Stage 1	-	-	-	-	757	-
Stage 2	-	-	-	-	647	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1252	-	-	-	375	740
Mov Cap-2 Maneuver	-	-	-	-	375	-
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	630	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1252	-	-	-	506
HCM Lane V/C Ratio	0.017	-	-	-	0.086
HCM Control Delay (s)	7.9	0	-	-	12.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	214	153	0	82	3	0	7	186
Future Vol, veh/h	0	214	153	0	82	3	0	7	186
Peak Hour Factor	0.92	0.90	0.90	0.92	0.90	0.90	0.92	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	238	170	0	91	3	0	8	207
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	12.8	8.7	9.3
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	58%	0%	4%
Vol Thru, %	42%	96%	0%
Vol Right, %	0%	4%	96%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	367	85	193
LT Vol	214	0	7
Through Vol	153	82	0
RT Vol	0	3	186
Lane Flow Rate	408	94	214
Geometry Grp	1	1	1
Degree of Util (X)	0.528	0.128	0.271
Departure Headway (Hd)	4.66	4.887	4.548
Convergence, Y/N	Yes	Yes	Yes
Cap	771	729	787
Service Time	2.707	2.948	2.593
HCM Lane V/C Ratio	0.529	0.129	0.272
HCM Control Delay	12.8	8.7	9.3
HCM Lane LOS	B	A	A
HCM 95th-tile Q	3.1	0.4	1.1

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/24/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Future Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1815	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	533	844	15	18	1247	157	28	4	4	281	0	311
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	627	1610	725	64	987	124	112	16	16	342	0	593
Arrive On Green	0.18	0.47	0.47	0.04	0.32	0.32	0.08	0.08	0.08	0.19	0.00	0.19
Sat Flow, veh/h	3408	3438	1548	1774	3080	386	1368	195	195	1757	0	1568
Grp Volume(v), veh/h	533	844	15	18	696	708	36	0	0	281	0	311
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1741	1759	0	0	1757	0	1568
Q Serve(g_s), s	14.3	16.3	0.5	0.9	30.2	30.2	1.8	0.0	0.0	14.5	0.0	14.5
Cycle Q Clear(g_c), s	14.3	16.3	0.5	0.9	30.2	30.2	1.8	0.0	0.0	14.5	0.0	14.5
Prop In Lane	1.00		1.00	1.00		0.22	0.78		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	627	1610	725	64	553	558	144	0	0	342	0	593
V/C Ratio(X)	0.85	0.52	0.02	0.28	1.26	1.27	0.25	0.00	0.00	0.82	0.00	0.52
Avail Cap(c_a), veh/h	806	1610	725	194	553	558	670	0	0	464	0	702
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.2	17.7	13.5	44.3	32.0	32.0	40.6	0.0	0.0	36.4	0.0	22.7
Incr Delay (d2), s/veh	6.9	0.4	0.0	2.4	130.8	134.9	0.9	0.0	0.0	8.4	0.0	0.7
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	7.3	7.8	0.2	0.5	34.3	35.3	0.9	0.0	0.0	7.8	0.0	6.4
LnGrp Delay(d),s/veh	44.2	18.1	13.5	46.6	162.8	166.9	41.5	0.0	0.0	44.8	0.0	23.4
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1392			1422			36			592	
Approach Delay, s/veh		28.0			163.4			41.5			33.6	
Approach LOS		C			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	49.9		23.4	22.0	36.0		12.8
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.9	18.3		16.5	16.3	32.2		3.8
Green Ext Time (p_c), s	0.0	19.7		1.8	1.1	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	85.0
HCM 2010 LOS	F

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Future Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1810	1845	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	533	844	15	18	1247	157	28	4	4	281	0	311
Adj No. of Lanes	2	2	1	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	5	2	2	5	3	2	2	2	2	2	3
Cap, veh/h	550	1664	749	63	1230	861	109	16	16	345	0	561
Arrive On Green	0.16	0.48	0.48	0.04	0.36	0.36	0.08	0.08	0.08	0.20	0.00	0.20
Sat Flow, veh/h	3408	3438	1548	1774	3438	1547	1368	195	195	1757	0	1568
Grp Volume(v), veh/h	533	844	15	18	1247	157	36	0	0	281	0	311
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1719	1547	1759	0	0	1757	0	1568
Q Serve(g_s), s	15.7	16.9	0.5	1.0	36.1	5.1	1.9	0.0	0.0	15.4	0.0	16.0
Cycle Q Clear(g_c), s	15.7	16.9	0.5	1.0	36.1	5.1	1.9	0.0	0.0	15.4	0.0	16.0
Prop In Lane	1.00		1.00	1.00		1.00	0.78		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	550	1664	749	63	1230	861	140	0	0	345	0	561
V/C Ratio(X)	0.97	0.51	0.02	0.29	1.01	0.18	0.26	0.00	0.00	0.82	0.00	0.55
Avail Cap(c_a), veh/h	550	1664	749	158	1230	861	610	0	0	451	0	656
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.1	17.8	13.6	47.4	32.4	11.2	43.7	0.0	0.0	38.8	0.0	26.0
Incr Delay (d2), s/veh	30.3	0.4	0.0	2.5	29.2	0.1	1.0	0.0	0.0	8.5	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	8.1	0.2	0.5	22.1	3.2	1.0	0.0	0.0	8.3	0.0	7.0
LnGrp Delay(d),s/veh	72.4	18.2	13.6	49.9	61.6	11.3	44.6	0.0	0.0	47.3	0.0	26.8
LnGrp LOS	E	B	B	D	F	B	D			D		C
Approach Vol, veh/h		1392			1422			36			592	
Approach Delay, s/veh		38.9			55.9			44.6			36.6	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.3	54.6		24.9	21.0	41.9		13.1
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9	43.4		25.9	* 16	36.1		35.0
Max Q Clear Time (g_c+I1), s	3.0	18.9		18.0	17.7	38.1		3.9
Green Ext Time (p_c), s	0.0	19.9		1.8	0.0	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Traffic Vol, veh/h	0	1104	19	0	1424	35	0	0	16	0	0	31
Future Vol, veh/h	0	1104	19	0	1424	35	0	0	16	0	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1150	20	0	1483	36	0	0	17	0	0	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	585	-	-	763
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	454	0	0	347
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	454	-	-	346
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.2	16.5
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	454	-	-	-	-	346
HCM Lane V/C Ratio	0.037	-	-	-	-	0.093
HCM Control Delay (s)	13.2	-	-	-	-	16.5
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑		↰	↑↱		↰	↑		↰	↑	↱
Traffic Volume (veh/h)	156	884	10	6	998	20	29	36	6	79	46	280
Future Volume (veh/h)	156	884	10	6	998	20	29	36	6	79	46	280
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	162	921	8	6	1040	15	30	38	2	82	97	81
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	545	1949	17	34	1452	21	274	319	17	332	339	288
Arrive On Green	0.16	0.56	0.56	0.02	0.42	0.42	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	3442	3494	30	1774	3471	50	1201	1754	92	1362	1863	1583
Grp Volume(v), veh/h	162	453	476	6	515	540	30	0	40	82	97	81
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1801	1201	0	1846	1362	1863	1583
Q Serve(g_s), s	2.7	10.4	10.4	0.2	16.4	16.4	1.5	0.0	1.2	3.5	3.0	2.9
Cycle Q Clear(g_c), s	2.7	10.4	10.4	0.2	16.4	16.4	4.4	0.0	1.2	4.7	3.0	2.9
Prop In Lane	1.00		0.02	1.00		0.03	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	545	959	1007	34	720	754	274	0	336	332	339	288
V/C Ratio(X)	0.30	0.47	0.47	0.18	0.72	0.72	0.11	0.00	0.12	0.25	0.29	0.28
Avail Cap(c_a), veh/h	643	959	1007	331	927	971	663	0	934	773	942	800
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.5	8.7	8.7	31.8	15.9	15.9	25.2	0.0	22.5	24.5	23.3	23.2
Incr Delay (d2), s/veh	0.1	0.4	0.3	0.9	1.9	1.8	0.1	0.0	0.1	0.1	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	5.0	5.3	0.1	8.1	8.5	0.5	0.0	0.6	1.3	1.5	1.3
LnGrp Delay(d),s/veh	24.6	9.1	9.1	32.7	17.8	17.7	25.2	0.0	22.6	24.7	23.4	23.4
LnGrp LOS	C	A	A	C	B	B	C		C	C	C	C
Approach Vol, veh/h		1091			1061			70			260	
Approach Delay, s/veh		11.4			17.8			23.7			23.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.9	43.2		16.7	15.1	34.1		16.7
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	12.4		6.7	4.7	18.4		6.4
Green Ext Time (p_c), s	0.0	12.3		0.8	0.1	9.2		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	15.8
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/24/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	898	61	207	924	10	40	22	170	25	73	40
Future Volume (veh/h)	25	898	61	207	924	10	40	22	170	25	73	40
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1632	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	26	935	0	216	962	0	42	23	94	26	76	23
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	100	1206	0	212	1422	0	74	24	472	54	122	490
Arrive On Green	0.06	0.39	0.00	0.13	0.46	0.00	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1597	3182	0	1597	3177	0	25	72	1389	12	358	1441
Grp Volume(v), veh/h	26	935	0	216	962	0	65	0	94	102	0	23
Grp Sat Flow(s),veh/h/ln	1597	1550	0	1597	1548	0	97	0	1389	370	0	1441
Q Serve(g_s), s	1.4	23.9	0.0	12.0	22.0	0.0	0.9	0.0	4.3	0.9	0.0	1.0
Cycle Q Clear(g_c), s	1.4	23.9	0.0	12.0	22.0	0.0	30.7	0.0	4.3	30.7	0.0	1.0
Prop In Lane	1.00		0.00	1.00		0.00	0.65		1.00	0.25		1.00
Lane Grp Cap(c), veh/h	100	1206	0	212	1422	0	99	0	472	176	0	490
V/C Ratio(X)	0.26	0.77	0.00	1.02	0.68	0.00	0.66	0.00	0.20	0.58	0.00	0.05
Avail Cap(c_a), veh/h	212	1371	0	212	1422	0	109	0	484	189	0	502
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	24.1	0.0	39.2	19.2	0.0	35.9	0.0	21.1	24.3	0.0	20.0
Incr Delay (d2), s/veh	1.4	2.8	0.0	66.9	1.4	0.0	11.9	0.0	0.2	3.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	10.6	0.0	9.2	9.6	0.0	1.9	0.0	1.7	2.0	0.0	0.4
LnGrp Delay(d),s/veh	41.7	26.9	0.0	106.3	20.6	0.0	47.8	0.0	21.3	28.2	0.0	20.1
LnGrp LOS	D	C		F	C		D		C	C		C
Approach Vol, veh/h		961			1178			159			125	
Approach Delay, s/veh		27.3			36.3			32.2			26.7	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.0	41.3		34.6	8.7	47.6		34.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	2.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	4.0	25.9		32.7	3.4	24.0		32.7
Green Ext Time (p_c), s	0.0	9.5		0.0	0.0	12.4		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.0
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/24/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Future Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1811	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	58	1072	31	49	1086	26	74	20	57	51	7	11
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	193	1114	32	167	1094	26	128	40	71	210	25	237
Arrive On Green	0.11	0.64	0.64	0.09	0.62	0.62	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1774	1752	51	1774	1760	42	509	269	472	969	166	1583
Grp Volume(v), veh/h	58	0	1103	49	0	1112	151	0	0	58	0	11
Grp Sat Flow(s),veh/h/ln	1774	0	1802	1774	0	1802	1250	0	0	1135	0	1583
Q Serve(g_s), s	3.1	0.0	60.0	2.7	0.0	63.8	8.0	0.0	0.0	0.0	0.0	0.6
Cycle Q Clear(g_c), s	3.1	0.0	60.0	2.7	0.0	63.8	12.9	0.0	0.0	4.9	0.0	0.6
Prop In Lane	1.00		0.03	1.00		0.02	0.49		0.38	0.88		1.00
Lane Grp Cap(c), veh/h	193	0	1146	167	0	1120	239	0	0	235	0	237
V/C Ratio(X)	0.30	0.00	0.96	0.29	0.00	0.99	0.63	0.00	0.00	0.25	0.00	0.05
Avail Cap(c_a), veh/h	237	0	1146	221	0	1120	380	0	0	363	0	386
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.9	0.0	17.8	44.1	0.0	19.6	44.0	0.0	0.0	39.8	0.0	38.1
Incr Delay (d2), s/veh	0.9	0.0	18.2	1.0	0.0	25.1	2.8	0.0	0.0	0.5	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	1.6	0.0	35.2	1.4	0.0	39.0	4.4	0.0	0.0	1.5	0.0	0.3
LnGrp Delay(d),s/veh	43.8	0.0	36.0	45.1	0.0	44.6	46.7	0.0	0.0	40.3	0.0	38.1
LnGrp LOS	D		D	D		D	D			D		D
Approach Vol, veh/h		1161			1161			151			69	
Approach Delay, s/veh		36.4			44.6			46.7			40.0	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.9	72.5		19.2	14.4	71.0		19.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	14.7	62.0		6.9	5.1	65.8		14.9
Green Ext Time (p_c), s	0.0	3.7		1.1	0.1	0.0		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	40.9
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

09/27/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Future Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1811	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	58	1072	31	49	1086	26	74	20	57	51	7	11
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	229	1976	57	194	1918	46	150	45	76	248	29	237
Arrive On Green	0.13	0.58	0.58	0.11	0.56	0.56	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1774	3415	99	1774	3432	82	538	302	509	1073	192	1583
Grp Volume(v), veh/h	58	540	563	49	544	568	151	0	0	58	0	11
Grp Sat Flow(s),veh/h/ln	1774	1721	1794	1774	1720	1794	1349	0	0	1264	0	1583
Q Serve(g_s), s	2.3	14.9	14.9	1.9	15.7	15.7	5.5	0.0	0.0	0.0	0.0	0.5
Cycle Q Clear(g_c), s	2.3	14.9	14.9	1.9	15.7	15.7	8.6	0.0	0.0	3.1	0.0	0.5
Prop In Lane	1.00		0.06	1.00		0.05	0.49		0.38	0.88		1.00
Lane Grp Cap(c), veh/h	229	995	1038	194	961	1003	272	0	0	277	0	237
V/C Ratio(X)	0.25	0.54	0.54	0.25	0.57	0.57	0.56	0.00	0.00	0.21	0.00	0.05
Avail Cap(c_a), veh/h	322	1483	1546	299	1460	1523	537	0	0	517	0	516
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.2	10.0	10.0	31.4	11.0	11.0	31.8	0.0	0.0	29.1	0.0	28.0
Incr Delay (d2), s/veh	0.6	0.6	0.5	0.7	0.6	0.6	1.8	0.0	0.0	0.4	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	1.1	7.1	7.3	1.0	7.6	7.9	3.2	0.0	0.0	1.1	0.0	0.2
LnGrp Delay(d),s/veh	30.8	10.5	10.5	32.1	11.6	11.6	33.6	0.0	0.0	29.5	0.0	28.1
LnGrp LOS	C	B	B	C	B	B	C			C		C
Approach Vol, veh/h		1161			1161			151			69	
Approach Delay, s/veh		11.5			12.5			33.6			29.3	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.4	50.6		15.0	13.0	49.1		15.0
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	3.9	16.9		5.1	4.3	17.7		10.6
Green Ext Time (p_c), s	0.0	25.8		1.2	0.1	25.3		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.7
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Future Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1811	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	58	1072	31	49	1086	26	74	20	57	51	7	11
Adj No. of Lanes	1	1	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	194	1113	32	168	2129	51	128	40	71	211	25	237
Arrive On Green	0.11	0.64	0.64	0.09	0.62	0.62	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1774	1752	51	1774	3432	82	509	270	473	970	166	1583
Grp Volume(v), veh/h	58	0	1103	49	544	568	151	0	0	58	0	11
Grp Sat Flow(s),veh/h/ln	1774	0	1802	1774	1720	1794	1252	0	0	1136	0	1583
Q Serve(g_s), s	3.1	0.0	59.8	2.7	18.3	18.3	7.9	0.0	0.0	0.0	0.0	0.6
Cycle Q Clear(g_c), s	3.1	0.0	59.8	2.7	18.3	18.3	12.8	0.0	0.0	4.9	0.0	0.6
Prop In Lane	1.00		0.03	1.00		0.05	0.49		0.38	0.88		1.00
Lane Grp Cap(c), veh/h	194	0	1145	168	1067	1113	239	0	0	235	0	237
V/C Ratio(X)	0.30	0.00	0.96	0.29	0.51	0.51	0.63	0.00	0.00	0.25	0.00	0.05
Avail Cap(c_a), veh/h	239	0	1152	222	1083	1129	378	0	0	361	0	382
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	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.6	0.0	17.8	43.8	11.0	11.0	43.7	0.0	0.0	39.5	0.0	37.8
Incr Delay (d2), s/veh	0.9	0.0	18.4	1.0	0.5	0.4	2.7	0.0	0.0	0.5	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	1.6	0.0	35.3	1.4	8.8	9.1	4.4	0.0	0.0	1.5	0.0	0.3
LnGrp Delay(d),s/veh	43.4	0.0	36.2	44.7	11.4	11.4	46.4	0.0	0.0	40.1	0.0	37.9
LnGrp LOS	D		D	D	B	B	D			D		D
Approach Vol, veh/h		1161			1161			151			69	
Approach Delay, s/veh		36.6			12.8			46.4			39.7	
Approach LOS		D			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.8	72.0		19.1	14.4	70.5		19.1
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	14.7	61.8		6.9	5.1	20.3		14.8
Green Ext Time (p_c), s	0.0	4.2		1.1	0.1	28.7		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	26.4
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1151	35	15	1091	23	10
Future Vol, veh/h	1151	35	15	1091	23	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1199	36	16	1136	24	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1199	0	2367	1199
Stage 1	-	-	-	-	1199	-
Stage 2	-	-	-	-	1168	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	350	-	~ 11	115
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	162	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	350	-	~ 10	115
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	155	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	74.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	84	-	-	350	-
HCM Lane V/C Ratio	0.409	-	-	0.045	-
HCM Control Delay (s)	74.8	-	-	15.8	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	1.6	-	-	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1151	35	15	1091	23	10
Future Volume (veh/h)	1151	35	15	1091	23	10
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1199	36	16	1136	24	10
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1410	1234	32	1532	38	16
Arrive On Green	0.78	0.78	0.02	0.85	0.03	0.03
Sat Flow, veh/h	1810	1583	1774	1810	1178	491
Grp Volume(v), veh/h	1199	36	16	1136	35	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1717	0
Q Serve(g_s), s	39.5	0.5	0.8	23.5	1.8	0.0
Cycle Q Clear(g_c), s	39.5	0.5	0.8	23.5	1.8	0.0
Prop In Lane		1.00	1.00		0.69	0.29
Lane Grp Cap(c), veh/h	1410	1234	32	1532	55	0
V/C Ratio(X)	0.85	0.03	0.49	0.74	0.63	0.00
Avail Cap(c_a), veh/h	1681	1471	98	1870	472	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.6	2.3	44.2	2.9	43.5	0.0
Incr Delay (d2), s/veh	3.8	0.0	11.1	1.3	11.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.2	0.5	11.6	1.0	0.0
LnGrp Delay(d),s/veh	10.4	2.3	55.4	4.1	54.8	0.0
LnGrp LOS	B	A	E	A	D	
Approach Vol, veh/h	1235			1152	35	
Approach Delay, s/veh	10.1			4.9	54.8	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.2	77.4				83.5		7.4
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.8	41.5				25.5		3.8
Green Ext Time (p_c), s	0.0	29.4				39.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
6: Project Access & Sonoma Hwy (SR 12)

09/27/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1151	35	15	1091	23	10
Future Volume (veh/h)	1151	35	15	1091	23	10
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1199	36	16	1136	24	10
Adj No. of Lanes	2	1	1	2	0	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	2373	1093	35	2693	43	18
Arrive On Green	0.69	0.69	0.02	0.78	0.04	0.04
Sat Flow, veh/h	3529	1583	1774	3529	1178	491
Grp Volume(v), veh/h	1199	36	16	1136	35	0
Grp Sat Flow(s),veh/h/ln	1719	1583	1774	1719	1717	0
Q Serve(g_s), s	10.1	0.4	0.5	6.5	1.2	0.0
Cycle Q Clear(g_c), s	10.1	0.4	0.5	6.5	1.2	0.0
Prop In Lane		1.00	1.00		0.69	0.29
Lane Grp Cap(c), veh/h	2373	1093	35	2693	63	0
V/C Ratio(X)	0.51	0.03	0.46	0.42	0.56	0.00
Avail Cap(c_a), veh/h	4756	2190	145	5291	703	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	4.5	3.0	29.6	2.1	28.9	0.0
Incr Delay (d2), s/veh	0.2	0.0	9.4	0.1	7.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.2	0.4	3.0	0.7	0.0
LnGrp Delay(d),s/veh	4.7	3.0	39.0	2.2	36.4	0.0
LnGrp LOS	A	A	D	A	D	
Approach Vol, veh/h	1235			1152	35	
Approach Delay, s/veh	4.6			2.8	36.4	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	5.7	48.7				54.3		6.7
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.0	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.5	12.1				8.5		3.2
Green Ext Time (p_c), s	0.0	30.0				31.5		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	4.2
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	921	211	18	777	24	315	1	39	6	0	5
Future Volume (veh/h)	28	921	211	18	777	24	315	1	39	6	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1630	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	29	959	165	19	809	25	328	1	22	6	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	78	836	731	58	787	24	356	1	312	38	0	34
Arrive On Green	0.05	0.51	0.51	0.04	0.50	0.50	0.22	0.22	0.22	0.02	0.00	0.02
Sat Flow, veh/h	1597	1629	1425	1597	1573	49	1592	5	1394	1597	0	1425
Grp Volume(v), veh/h	29	959	165	19	0	834	329	0	22	6	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1621	1597	0	1394	1597	0	1425
Q Serve(g_s), s	1.8	53.3	6.6	1.2	0.0	52.0	20.9	0.0	1.3	0.4	0.0	0.4
Cycle Q Clear(g_c), s	1.8	53.3	6.6	1.2	0.0	52.0	20.9	0.0	1.3	0.4	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	78	836	731	58	0	811	357	0	312	38	0	34
V/C Ratio(X)	0.37	1.15	0.23	0.33	0.00	1.03	0.92	0.00	0.07	0.16	0.00	0.15
Avail Cap(c_a), veh/h	250	836	731	250	0	811	389	0	339	389	0	347
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	47.8	25.3	13.9	48.8	0.0	25.9	39.4	0.0	31.8	49.7	0.0	49.7
Incr Delay (d2), s/veh	1.1	80.4	0.1	1.2	0.0	38.9	24.8	0.0	0.0	0.7	0.0	0.7
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	0.8	42.3	2.6	0.6	0.0	31.8	11.7	0.0	0.5	0.2	0.0	0.1
LnGrp Delay(d),s/veh	48.9	105.7	14.0	50.0	0.0	64.8	64.2	0.0	31.8	50.4	0.0	50.5
LnGrp LOS	D	F	B	D		F	E		C	D		D
Approach Vol, veh/h		1153			853			351			11	
Approach Delay, s/veh		91.1			64.5			62.2			50.4	
Approach LOS		F			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.5	60.3		7.1	9.8	59.0		27.9
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	3.2	55.3		2.4	3.8	54.0		22.9
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	77.0
HCM 2010 LOS	E

Notes

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	921	211	18	777	24	315	1	39	6	0	5
Future Volume (veh/h)	28	921	211	18	777	24	315	1	39	6	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1630	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	29	959	165	19	809	25	328	1	22	6	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	72	932	816	55	884	27	327	1	286	36	0	32
Arrive On Green	0.05	0.57	0.57	0.03	0.56	0.56	0.21	0.21	0.21	0.02	0.00	0.02
Sat Flow, veh/h	1597	1629	1425	1597	1573	49	1592	5	1394	1597	0	1425
Grp Volume(v), veh/h	29	959	165	19	0	834	329	0	22	6	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1621	1597	0	1394	1597	0	1425
Q Serve(g_s), s	2.3	73.3	7.2	1.5	0.0	59.4	26.3	0.0	1.6	0.5	0.0	0.4
Cycle Q Clear(g_c), s	2.3	73.3	7.2	1.5	0.0	59.4	26.3	0.0	1.6	0.5	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	72	932	816	55	0	911	328	0	286	36	0	32
V/C Ratio(X)	0.40	1.03	0.20	0.34	0.00	0.92	1.00	0.00	0.08	0.17	0.00	0.15
Avail Cap(c_a), veh/h	112	932	816	112	0	928	328	0	286	128	0	115
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	59.4	27.4	13.2	60.4	0.0	25.3	50.9	0.0	41.1	61.4	0.0	61.4
Incr Delay (d2), s/veh	1.3	37.0	0.1	1.4	0.0	13.2	50.4	0.0	0.0	0.8	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	42.2	2.8	0.7	0.0	29.7	16.2	0.0	0.6	0.2	0.0	0.2
LnGrp Delay(d),s/veh	60.8	64.4	13.3	61.8	0.0	38.5	101.3	0.0	41.1	62.1	0.0	62.2
LnGrp LOS	E	F	B	E		D	F		D	E		E
Approach Vol, veh/h		1153			853			351			11	
Approach Delay, s/veh		57.0			39.0			97.5			62.2	
Approach LOS		E			D			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.1	80.3		7.6	10.5	78.9		31.0
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 9	73.3		* 10	* 9	73.3		26.3
Max Q Clear Time (g_c+I1), s	3.5	75.3		2.5	4.3	61.4		28.3
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	3.4		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	56.5
HCM 2010 LOS	E

Notes

HCM 2010 TWSC
8: Montgomery Dr & Melita Rd

08/24/2017

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	35	340	404	3	4	88
Future Vol, veh/h	35	340	404	3	4	88
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	362	430	3	4	94

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	437	0	-	0	871	437
Stage 1	-	-	-	-	435	-
Stage 2	-	-	-	-	436	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1123	-	-	-	322	620
Stage 1	-	-	-	-	653	-
Stage 2	-	-	-	-	652	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1121	-	-	-	306	616
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	623	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1121	-	-	-	590
HCM Lane V/C Ratio	0.033	-	-	-	0.166
HCM Control Delay (s)	8.3	0	-	-	12.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	203	123	0	88	8	0	3	312
Future Vol, veh/h	0	203	123	0	88	8	0	3	312
Peak Hour Factor	0.92	0.94	0.94	0.92	0.94	0.94	0.92	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	216	131	0	94	9	0	3	332
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	12.5	9.1	10.6
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	62%	0%	1%
Vol Thru, %	38%	92%	0%
Vol Right, %	0%	8%	99%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	326	96	315
LT Vol	203	0	3
Through Vol	123	88	0
RT Vol	0	8	312
Lane Flow Rate	347	102	335
Geometry Grp	1	1	1
Degree of Util (X)	0.476	0.144	0.414
Departure Headway (Hd)	4.946	5.089	4.449
Convergence, Y/N	Yes	Yes	Yes
Cap	721	697	804
Service Time	3.022	3.181	2.5
HCM Lane V/C Ratio	0.481	0.146	0.417
HCM Control Delay	12.5	9.1	10.6
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.6	0.5	2

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	202	14	5	85	9	4
Future Vol, veh/h	202	14	5	85	9	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	240	17	6	101	11	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	257	0	362	249
Stage 1	-	-	-	-	249	-
Stage 2	-	-	-	-	113	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1308	-	637	790
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	912	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1308	-	634	790
Mov Cap-2 Maneuver	-	-	-	-	634	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	907	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	675	-	-	1308	-
HCM Lane V/C Ratio	0.023	-	-	0.005	-
HCM Control Delay (s)	10.5	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Future Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1818	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	493	960	16	60	1056	203	16	4	1	436	1	306
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	581	1381	621	130	878	168	89	22	6	440	1	661
Arrive On Green	0.17	0.40	0.40	0.07	0.30	0.30	0.07	0.07	0.07	0.25	0.25	0.25
Sat Flow, veh/h	3408	3438	1547	1774	2884	553	1356	339	85	1753	4	1568
Grp Volume(v), veh/h	493	960	16	60	631	628	21	0	0	437	0	306
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1727	1710	1779	0	0	1757	0	1568
Q Serve(g_s), s	13.9	23.0	0.6	3.2	30.2	30.2	1.1	0.0	0.0	24.6	0.0	13.9
Cycle Q Clear(g_c), s	13.9	23.0	0.6	3.2	30.2	30.2	1.1	0.0	0.0	24.6	0.0	13.9
Prop In Lane	1.00		1.00	1.00		0.32	0.76		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	581	1381	621	130	526	521	117	0	0	441	0	661
V/C Ratio(X)	0.85	0.70	0.03	0.46	1.20	1.21	0.18	0.00	0.00	0.99	0.00	0.46
Avail Cap(c_a), veh/h	766	1462	658	184	526	521	644	0	0	441	0	661
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.9	24.6	18.0	44.1	34.5	34.5	43.8	0.0	0.0	37.1	0.0	20.6
Incr Delay (d2), s/veh	6.9	1.5	0.0	2.5	107.4	110.0	0.7	0.0	0.0	40.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	11.2	0.3	1.7	30.0	30.1	0.6	0.0	0.0	16.8	0.0	6.1
LnGrp Delay(d),s/veh	46.8	26.2	18.0	46.6	141.9	144.5	44.6	0.0	0.0	77.5	0.0	21.1
LnGrp LOS	D	C	B	D	F	F	D			E		C
Approach Vol, veh/h		1469			1319			21			743	
Approach Delay, s/veh		33.0			138.8			44.6			54.3	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	45.6		30.0	21.6	36.0		11.6
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	5.2	25.0		26.6	15.9	32.2		3.1
Green Ext Time (p_c), s	0.0	14.7		0.0	1.0	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	76.8
HCM 2010 LOS	E

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Future Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1810	1845	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	493	960	16	60	1056	203	16	4	1	436	1	306
Adj No. of Lanes	2	2	1	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	5	2	2	5	3	2	2	2	2	2	3
Cap, veh/h	529	1446	651	126	1156	906	88	22	5	432	1	630
Arrive On Green	0.16	0.42	0.42	0.07	0.34	0.34	0.06	0.06	0.06	0.25	0.25	0.25
Sat Flow, veh/h	3408	3438	1547	1774	3438	1545	1356	339	85	1753	4	1568
Grp Volume(v), veh/h	493	960	16	60	1056	203	21	0	0	437	0	306
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1719	1545	1779	0	0	1757	0	1568
Q Serve(g_s), s	15.0	23.6	0.6	3.4	30.9	6.6	1.2	0.0	0.0	25.9	0.0	15.2
Cycle Q Clear(g_c), s	15.0	23.6	0.6	3.4	30.9	6.6	1.2	0.0	0.0	25.9	0.0	15.2
Prop In Lane	1.00		1.00	1.00		1.00	0.76		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	529	1446	651	126	1156	906	115	0	0	433	0	630
V/C Ratio(X)	0.93	0.66	0.02	0.48	0.91	0.22	0.18	0.00	0.00	1.01	0.00	0.49
Avail Cap(c_a), veh/h	529	1446	651	152	1182	918	593	0	0	433	0	630
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.8	24.4	17.8	46.9	33.4	10.5	46.5	0.0	0.0	39.5	0.0	23.3
Incr Delay (d2), s/veh	23.5	1.3	0.0	2.8	10.9	0.2	0.8	0.0	0.0	45.3	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	11.5	0.3	1.8	16.4	4.6	0.6	0.0	0.0	18.0	0.0	6.6
LnGrp Delay(d),s/veh	67.3	25.7	17.8	49.7	44.3	10.7	47.2	0.0	0.0	84.9	0.0	23.9
LnGrp LOS	E	C	B	D	D	B	D			F		C
Approach Vol, veh/h		1469			1319			21			743	
Approach Delay, s/veh		39.6			39.4			47.2			59.8	
Approach LOS		D			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.1	50.0		31.0	21.0	41.1		11.9
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9	43.4		25.9	* 16	36.1		35.0
Max Q Clear Time (g_c+I1), s	5.4	25.6		27.9	17.0	32.9		3.2
Green Ext Time (p_c), s	0.0	15.0		0.0	0.0	2.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	43.8
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12) 08/22/2017

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Traffic Vol, veh/h	0	1338	59	0	1378	55	0	0	13	0	0	40
Future Vol, veh/h	0	1338	59	0	1378	55	0	0	13	0	0	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1365	60	0	1406	56	0	0	13	0	0	41

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	713	-	-	734
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	374	0	0	363
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	374	-	-	362
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	15	16.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	374	-	-	-	-	362
HCM Lane V/C Ratio	0.035	-	-	-	-	0.113
HCM Control Delay (s)	15	-	-	-	-	16.2
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.4

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way 08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑↱			↑			↑↱	
Traffic Volume (veh/h)	151	1047	12	6	1169	30	23	17	1	27	17	127
Future Volume (veh/h)	151	1047	12	6	1169	30	23	17	1	27	17	127
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	154	1068	9	6	1193	30	23	17	0	28	53	41
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	532	2006	17	34	1502	38	296	317	0	333	317	269
Arrive On Green	0.15	0.57	0.57	0.02	0.44	0.44	0.17	0.17	0.00	0.17	0.17	0.17
Sat Flow, veh/h	3442	3495	29	1774	3428	86	1297	1863	0	1390	1863	1583
Grp Volume(v), veh/h	154	525	552	6	598	625	23	17	0	28	53	41
Grp Sat Flow(s),veh/h/ln	1721	1720	1805	1774	1720	1794	1297	1863	0	1390	1863	1583
Q Serve(g_s), s	2.7	12.6	12.6	0.2	20.1	20.1	1.0	0.5	0.0	1.2	1.6	1.5
Cycle Q Clear(g_c), s	2.7	12.6	12.6	0.2	20.1	20.1	2.7	0.5	0.0	1.7	1.6	1.5
Prop In Lane	1.00		0.02	1.00		0.05	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	532	987	1036	34	754	786	296	317	0	333	317	269
V/C Ratio(X)	0.29	0.53	0.53	0.18	0.79	0.79	0.08	0.05	0.00	0.08	0.17	0.15
Avail Cap(c_a), veh/h	631	987	1036	325	910	950	719	925	0	787	925	786
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	8.8	8.8	32.4	16.2	16.2	24.9	23.3	0.0	24.0	23.8	23.7
Incr Delay (d2), s/veh	0.1	0.6	0.5	0.9	4.1	3.9	0.0	0.0	0.0	0.0	0.1	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	1.3	6.0	6.3	0.1	10.3	10.7	0.4	0.3	0.0	0.4	0.8	0.7
LnGrp Delay(d),s/veh	25.2	9.3	9.3	33.3	20.3	20.2	25.0	23.3	0.0	24.1	23.9	23.8
LnGrp LOS	C	A	A	C	C	C	C	C		C	C	C
Approach Vol, veh/h		1231			1229			40			122	
Approach Delay, s/veh		11.3			20.3			24.3			23.9	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	45.0		16.1	15.1	35.9		16.1
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.2	14.6		3.7	4.7	22.1		4.7
Green Ext Time (p_c), s	0.0	13.7		0.4	0.1	7.3		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.3
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	961	49	210	1116	17	31	39	163	12	19	58
Future Volume (veh/h)	58	961	49	210	1116	17	31	39	163	12	19	58
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1631	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	59	981	0	214	1139	0	32	40	94	12	19	49
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	187	1571	0	251	1694	0	150	150	217	135	174	225
Arrive On Green	0.12	0.51	0.00	0.16	0.55	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3180	0	1597	3177	0	481	960	1389	408	1110	1439
Grp Volume(v), veh/h	59	981	0	214	1139	0	72	0	94	31	0	49
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1441	0	1389	1519	0	1439
Q Serve(g_s), s	2.4	15.9	0.0	9.1	18.4	0.0	0.4	0.0	4.3	0.0	0.0	2.1
Cycle Q Clear(g_c), s	2.4	15.9	0.0	9.1	18.4	0.0	2.8	0.0	4.3	1.1	0.0	2.1
Prop In Lane	1.00		0.00	1.00		0.00	0.44		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	187	1571	0	251	1694	0	300	0	217	309	0	225
V/C Ratio(X)	0.32	0.62	0.00	0.85	0.67	0.00	0.24	0.00	0.43	0.10	0.00	0.22
Avail Cap(c_a), veh/h	275	1778	0	275	1776	0	709	0	628	736	0	650
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.2	12.4	0.0	28.6	11.3	0.0	26.0	0.0	26.6	25.3	0.0	25.7
Incr Delay (d2), s/veh	1.0	0.7	0.0	20.6	1.1	0.0	0.4	0.0	1.4	0.1	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	6.8	0.0	5.4	8.0	0.0	1.3	0.0	1.7	0.5	0.0	0.9
LnGrp Delay(d),s/veh	29.2	13.1	0.0	49.2	12.4	0.0	26.4	0.0	28.0	25.4	0.0	26.2
LnGrp LOS	C	B		D	B		C		C	C		C
Approach Vol, veh/h		1040			1353			166			80	
Approach Delay, s/veh		14.0			18.2			27.3			25.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.0	41.4		14.4	11.2	44.1		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	11.1	17.9		4.1	4.4	20.4		6.3
Green Ext Time (p_c), s	0.1	17.4		1.0	0.0	15.8		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.4
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Future Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1812	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	1061	60	113	1289	30	37	11	50	52	12	23
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	201	1083	61	218	1149	19	88	35	77	180	35	183
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1699	96	1774	1762	41	337	301	665	989	302	1583
Grp Volume(v), veh/h	61	0	1121	113	0	1319	98	0	0	64	0	23
Grp Sat Flow(s),veh/h/ln	1774	0	1795	1774	0	1803	1302	0	0	1291	0	1583
Q Serve(g_s), s	3.2	0.0	61.0	6.1	0.0	65.8	3.2	0.0	0.0	0.0	0.0	1.3
Cycle Q Clear(g_c), s	3.2	0.0	61.0	6.1	0.0	65.8	7.9	0.0	0.0	4.8	0.0	1.3
Prop In Lane	1.00		0.05	1.00		0.02	0.38		0.51	0.81		1.00
Lane Grp Cap(c), veh/h	201	0	1145	218	0	1168	201	0	0	215	0	183
V/C Ratio(X)	0.30	0.00	0.98	0.52	0.00	1.13	0.49	0.00	0.00	0.30	0.00	0.13
Avail Cap(c_a), veh/h	245	0	1167	227	0	1168	404	0	0	403	0	398
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.2	0.0	17.7	41.5	0.0	17.9	42.9	0.0	0.0	41.5	0.0	40.1
Incr Delay (d2), s/veh	0.8	0.0	21.3	1.9	0.0	69.4	1.8	0.0	0.0	0.8	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	10.8	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	36.7	3.1	0.0	58.7	2.7	0.0	0.0	1.7	0.0	0.6
LnGrp Delay(d),s/veh	42.0	0.0	39.0	43.4	0.0	98.1	44.8	0.0	0.0	42.3	0.0	40.4
LnGrp LOS	D		D	D		F	D			D		D
Approach Vol, veh/h		1182			1432			98			87	
Approach Delay, s/veh		39.2			93.8			44.8			41.8	
Approach LOS		D			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.5	70.8		15.2	14.5	71.8		15.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	8.1	63.0		6.8	5.2	67.8		9.9
Green Ext Time (p_c), s	0.1	1.8		0.9	0.1	0.0		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	67.4
HCM 2010 LOS	E

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

09/27/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Future Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1812	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	1061	60	113	1289	30	37	11	50	52	12	23
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	223	1909	108	252	2037	47	115	47	108	235	47	214
Arrive On Green	0.13	0.58	0.58	0.14	0.59	0.59	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1774	3314	187	1774	3435	80	418	347	797	1176	346	1583
Grp Volume(v), veh/h	61	551	570	113	645	674	98	0	0	64	0	23
Grp Sat Flow(s),veh/h/ln	1774	1722	1779	1774	1720	1795	1562	0	0	1521	0	1583
Q Serve(g_s), s	2.6	17.0	17.0	5.0	20.8	20.9	1.6	0.0	0.0	0.0	0.0	1.1
Cycle Q Clear(g_c), s	2.6	17.0	17.0	5.0	20.8	20.9	4.7	0.0	0.0	2.9	0.0	1.1
Prop In Lane	1.00		0.11	1.00		0.04	0.38		0.51	0.81		1.00
Lane Grp Cap(c), veh/h	223	992	1025	252	1020	1064	269	0	0	282	0	214
V/C Ratio(X)	0.27	0.56	0.56	0.45	0.63	0.63	0.36	0.00	0.00	0.23	0.00	0.11
Avail Cap(c_a), veh/h	292	1345	1390	271	1323	1380	512	0	0	507	0	467
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.8	11.3	11.3	33.5	11.4	11.5	33.9	0.0	0.0	33.1	0.0	32.4
Incr Delay (d2), s/veh	0.7	0.6	0.6	1.3	0.8	0.8	0.8	0.0	0.0	0.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	8.1	8.4	2.5	10.5	10.9	2.2	0.0	0.0	1.4	0.0	0.5
LnGrp Delay(d),s/veh	34.4	11.9	11.8	34.8	12.3	12.3	34.7	0.0	0.0	33.5	0.0	32.6
LnGrp LOS	C	B	B	C	B	B	C			C		C
Approach Vol, veh/h		1182			1432			98			87	
Approach Delay, s/veh		13.0			14.1			34.7			33.3	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.1	54.9		15.0	13.7	56.3		15.0
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	7.0	19.0		4.9	4.6	22.9		6.7
Green Ext Time (p_c), s	0.1	29.3		0.9	0.1	27.4		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	14.9
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Future Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1812	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	1061	60	113	1289	30	37	11	50	52	12	23
Adj No. of Lanes	1	1	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	200	1088	62	217	2232	51	87	34	76	177	34	182
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1699	96	1774	3435	80	333	300	659	983	300	1583
Grp Volume(v), veh/h	61	0	1121	113	645	674	98	0	0	64	0	23
Grp Sat Flow(s),veh/h/ln	1774	0	1795	1774	1720	1795	1292	0	0	1283	0	1583
Q Serve(g_s), s	3.2	0.0	61.0	6.1	21.5	21.5	3.2	0.0	0.0	0.0	0.0	1.3
Cycle Q Clear(g_c), s	3.2	0.0	61.0	6.1	21.5	21.5	8.1	0.0	0.0	4.9	0.0	1.3
Prop In Lane	1.00		0.05	1.00		0.04	0.38		0.51	0.81		1.00
Lane Grp Cap(c), veh/h	200	0	1150	217	1118	1166	197	0	0	211	0	182
V/C Ratio(X)	0.30	0.00	0.98	0.52	0.58	0.58	0.50	0.00	0.00	0.30	0.00	0.13
Avail Cap(c_a), veh/h	243	0	1168	226	1118	1166	394	0	0	395	0	389
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	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.6	0.0	17.6	42.0	10.2	10.2	43.4	0.0	0.0	42.0	0.0	40.6
Incr Delay (d2), s/veh	0.8	0.0	20.4	1.9	0.8	0.8	1.9	0.0	0.0	0.8	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	36.4	3.1	10.7	11.1	2.8	0.0	0.0	1.7	0.0	0.6
LnGrp Delay(d),s/veh	42.4	0.0	38.0	43.9	11.0	11.0	45.4	0.0	0.0	42.8	0.0	40.9
LnGrp LOS	D		D	D	B	B	D			D		D
Approach Vol, veh/h		1182			1432			98			87	
Approach Delay, s/veh		38.2			13.6			45.4			42.3	
Approach LOS		D			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.5	71.3		15.2	14.5	72.3		15.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	8.1	63.0		6.9	5.2	23.5		10.1
Green Ext Time (p_c), s	0.1	2.3		0.9	0.1	30.6		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	26.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1159	34	14	1295	46	20
Future Vol, veh/h	1159	34	14	1295	46	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1183	35	14	1321	47	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1183	0	2533	1183
Stage 1	-	-	-	-	1183	-
Stage 2	-	-	-	-	1350	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	356	-	~ 8	118
Stage 1	-	-	-	-	159	-
Stage 2	-	-	-	-	125	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	356	-	~ 8	118
Mov Cap-2 Maneuver	-	-	-	-	66	-
Stage 1	-	-	-	-	159	-
Stage 2	-	-	-	-	120	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	166.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	76	-	-	356	-
HCM Lane V/C Ratio	0.886	-	-	0.04	-
HCM Control Delay (s)	166.6	-	-	15.5	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	4.5	-	-	0.1	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1159	34	14	1295	46	20
Future Volume (veh/h)	1159	34	14	1295	46	20
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1183	35	14	1321	47	20
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1400	1225	29	1513	61	26
Arrive On Green	0.77	0.77	0.02	0.84	0.05	0.05
Sat Flow, veh/h	1810	1583	1774	1810	1185	504
Grp Volume(v), veh/h	1183	35	14	1321	68	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1715	0
Q Serve(g_s), s	41.7	0.5	0.8	43.3	3.8	0.0
Cycle Q Clear(g_c), s	41.7	0.5	0.8	43.3	3.8	0.0
Prop In Lane		1.00	1.00		0.69	0.29
Lane Grp Cap(c), veh/h	1400	1225	29	1513	88	0
V/C Ratio(X)	0.84	0.03	0.49	0.87	0.77	0.00
Avail Cap(c_a), veh/h	1566	1370	91	1742	439	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	7.2	2.6	47.6	4.9	45.7	0.0
Incr Delay (d2), s/veh	4.1	0.0	12.3	4.7	13.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.6	0.2	0.5	22.5	2.1	0.0
LnGrp Delay(d),s/veh	11.3	2.6	59.9	9.6	59.0	0.0
LnGrp LOS	B	A	E	A	E	
Approach Vol, veh/h	1218			1335	68	
Approach Delay, s/veh	11.1			10.1	59.0	
Approach LOS	B			B	E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.1	82.1				88.1		9.5
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.8	43.7				45.3		5.8
Green Ext Time (p_c), s	0.0	31.7				36.3		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	11.8
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	832	387	41	1070	9	287	0	34	21	1	25
Future Volume (veh/h)	9	832	387	41	1070	9	287	0	34	21	1	25
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	9	849	275	42	1092	9	293	0	16	21	1	22
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	31	785	687	95	842	7	322	0	281	93	4	87
Arrive On Green	0.02	0.48	0.48	0.06	0.52	0.52	0.20	0.00	0.20	0.06	0.06	0.06
Sat Flow, veh/h	1597	1629	1425	1597	1613	13	1597	0	1394	1527	73	1425
Grp Volume(v), veh/h	9	849	275	42	0	1101	293	0	16	22	0	22
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1627	1597	0	1394	1600	0	1425
Q Serve(g_s), s	0.6	52.0	13.4	2.7	0.0	56.3	19.4	0.0	1.0	1.4	0.0	1.6
Cycle Q Clear(g_c), s	0.6	52.0	13.4	2.7	0.0	56.3	19.4	0.0	1.0	1.4	0.0	1.6
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.95		1.00
Lane Grp Cap(c), veh/h	31	785	687	95	0	849	322	0	281	98	0	87
V/C Ratio(X)	0.29	1.08	0.40	0.44	0.00	1.30	0.91	0.00	0.06	0.23	0.00	0.25
Avail Cap(c_a), veh/h	241	785	687	241	0	849	374	0	327	375	0	334
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.1	28.0	17.9	49.0	0.0	25.8	42.1	0.0	34.8	48.2	0.0	48.3
Incr Delay (d2), s/veh	1.8	56.6	0.3	1.2	0.0	142.3	21.9	0.0	0.0	0.4	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	35.7	5.3	1.2	0.0	58.6	10.5	0.0	0.4	0.6	0.0	0.6
LnGrp Delay(d),s/veh	54.0	84.5	18.2	50.2	0.0	168.1	64.0	0.0	34.8	48.7	0.0	48.9
LnGrp LOS	D	F	B	D		F	E		C	D		D
Approach Vol, veh/h		1133			1143			309			44	
Approach Delay, s/veh		68.2			163.8			62.5			48.8	
Approach LOS		E			F			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.1	59.0		11.3	6.8	63.3		26.5
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	4.7	54.0		3.6	2.6	58.3		21.4
Green Ext Time (p_c), s	0.0	0.0		0.1	0.0	0.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	108.8
HCM 2010 LOS	F

Notes

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12) 07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	832	387	41	1070	9	287	0	34	21	1	25
Future Volume (veh/h)	9	832	387	41	1070	9	287	0	34	21	1	25
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.98	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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	9	849	275	42	1092	9	293	0	16	21	1	22
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	31	882	1042	86	930	8	303	0	265	83	4	78
Arrive On Green	0.02	0.54	0.54	0.05	0.58	0.58	0.19	0.00	0.19	0.05	0.05	0.05
Sat Flow, veh/h	1597	1629	1425	1597	1613	13	1597	0	1394	1527	73	1425
Grp Volume(v), veh/h	9	849	275	42	0	1101	293	0	16	22	0	22
Grp Sat Flow(s),veh/h/ln	1597	1629	1425	1597	0	1627	1597	0	1394	1600	0	1425
Q Serve(g_s), s	0.7	65.7	8.5	3.4	0.0	75.9	24.0	0.0	1.2	1.7	0.0	2.0
Cycle Q Clear(g_c), s	0.7	65.7	8.5	3.4	0.0	75.9	24.0	0.0	1.2	1.7	0.0	2.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.95		1.00
Lane Grp Cap(c), veh/h	31	882	1042	86	0	937	303	0	265	87	0	78
V/C Ratio(X)	0.29	0.96	0.26	0.49	0.00	1.17	0.97	0.00	0.06	0.25	0.00	0.28
Avail Cap(c_a), veh/h	109	938	1092	109	0	937	303	0	265	109	0	97
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	63.7	28.9	5.9	60.6	0.0	27.9	53.0	0.0	43.7	59.7	0.0	59.8
Incr Delay (d2), s/veh	2.0	20.1	0.1	1.6	0.0	89.9	42.4	0.0	0.0	0.6	0.0	0.7
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	34.4	5.7	1.5	0.0	57.3	14.1	0.0	0.5	0.8	0.0	0.8
LnGrp Delay(d),s/veh	65.7	48.9	6.0	62.2	0.0	117.8	95.3	0.0	43.8	60.2	0.0	60.5
LnGrp LOS	E	D	A	E		F	F		D	E		E
Approach Vol, veh/h		1133			1143			309			44	
Approach Delay, s/veh		38.7			115.8			92.7			60.4	
Approach LOS		D			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.8	78.4		11.9	7.2	82.9		29.7
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 9	75.9		* 9	* 9	75.9		25.0
Max Q Clear Time (g_c+I1), s	5.4	67.7		4.0	2.7	77.9		26.0
Green Ext Time (p_c), s	0.0	3.3		0.0	0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	78.9
HCM 2010 LOS	E

Notes

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	398	391	7	2	45
Future Vol, veh/h	52	398	391	7	2	45
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	56	428	420	8	2	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	432	0	-	0	968	430
Stage 1	-	-	-	-	428	-
Stage 2	-	-	-	-	540	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1128	-	-	-	282	625
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	584	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1126	-	-	-	262	621
Mov Cap-2 Maneuver	-	-	-	-	262	-
Stage 1	-	-	-	-	654	-
Stage 2	-	-	-	-	544	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1126	-	-	-	587
HCM Lane V/C Ratio	0.05	-	-	-	0.086
HCM Control Delay (s)	8.4	0	-	-	11.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Intersection	
Intersection Delay, s/veh	13.5
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	222	165	0	156	4	0	4	259
Future Vol, veh/h	0	222	165	0	156	4	0	4	259
Peak Hour Factor	0.92	0.88	0.88	0.92	0.88	0.88	0.92	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	252	188	0	177	5	0	5	294
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	16.3	10.3	11.4
HCM LOS	C	B	B

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	57%	0%	2%
Vol Thru, %	43%	97%	0%
Vol Right, %	0%	3%	98%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	387	160	263
LT Vol	222	0	4
Through Vol	165	156	0
RT Vol	0	4	259
Lane Flow Rate	440	182	299
Geometry Grp	1	1	1
Degree of Util (X)	0.624	0.269	0.412
Departure Headway (Hd)	5.107	5.327	4.968
Convergence, Y/N	Yes	Yes	Yes
Cap	708	675	729
Service Time	3.134	3.361	2.968
HCM Lane V/C Ratio	0.621	0.27	0.41
HCM Control Delay	16.3	10.3	11.4
HCM Lane LOS	C	B	B
HCM 95th-tile Q	4.4	1.1	2

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	174	13	5	176	18	7
Future Vol, veh/h	174	13	5	176	18	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	207	15	6	210	21	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	223	0	436	215
Stage 1	-	-	-	-	215	-
Stage 2	-	-	-	-	221	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1346	-	578	825
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	816	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1346	-	575	825
Mov Cap-2 Maneuver	-	-	-	-	575	-
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	812	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	628	-	-	1346	-
HCM Lane V/C Ratio	0.047	-	-	0.004	-
HCM Control Delay (s)	11	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Future Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	485	938	10	51	1082	165	11	3	0	312	1	226
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	584	1473	659	126	984	150	91	25	0	368	1	598
Arrive On Green	0.17	0.43	0.43	0.07	0.33	0.33	0.06	0.06	0.00	0.21	0.21	0.21
Sat Flow, veh/h	3408	3438	1539	1774	2996	456	1408	384	0	1752	6	1568
Grp Volume(v), veh/h	485	938	10	51	622	625	14	0	0	313	0	226
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1727	1792	0	0	1757	0	1568
Q Serve(g_s), s	12.6	19.7	0.3	2.5	30.2	30.2	0.7	0.0	0.0	15.7	0.0	9.6
Cycle Q Clear(g_c), s	12.6	19.7	0.3	2.5	30.2	30.2	0.7	0.0	0.0	15.7	0.0	9.6
Prop In Lane	1.00		1.00	1.00		0.26	0.79		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	584	1473	659	126	567	568	116	0	0	369	0	598
V/C Ratio(X)	0.83	0.64	0.02	0.40	1.10	1.10	0.12	0.00	0.00	0.85	0.00	0.38
Avail Cap(c_a), veh/h	827	1578	706	199	567	568	700	0	0	476	0	693
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.8	20.6	15.1	40.8	30.9	30.9	40.5	0.0	0.0	34.9	0.0	20.6
Incr Delay (d2), s/veh	5.0	0.9	0.0	2.1	67.1	68.6	0.5	0.0	0.0	10.9	0.0	0.4
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	6.3	9.4	0.1	1.3	24.9	25.2	0.3	0.0	0.0	8.8	0.0	4.2
LnGrp Delay(d),s/veh	41.8	21.6	15.1	42.9	98.0	99.4	41.0	0.0	0.0	45.8	0.0	20.9
LnGrp LOS	D	C	B	D	F	F	D			D		C
Approach Vol, veh/h		1433			1298			14			539	
Approach Delay, s/veh		28.4			96.5			41.0			35.4	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.3	45.2		24.4	20.4	36.0		11.1
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.5	21.7		17.7	14.6	32.2		2.7
Green Ext Time (p_c), s	0.0	16.9		1.6	1.1	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	56.5
HCM 2010 LOS	E

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Future Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1810	1845	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	485	938	10	51	1082	165	11	3	0	312	1	226
Adj No. of Lanes	2	2	1	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	3	2	2	2	2	2	3
Cap, veh/h	548	1544	691	122	1227	877	90	25	0	364	1	578
Arrive On Green	0.16	0.45	0.45	0.07	0.36	0.36	0.06	0.06	0.00	0.21	0.21	0.21
Sat Flow, veh/h	3408	3438	1539	1774	3438	1546	1408	384	0	1752	6	1568
Grp Volume(v), veh/h	485	938	10	51	1082	165	14	0	0	313	0	226
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1719	1546	1792	0	0	1757	0	1568
Q Serve(g_s), s	13.7	20.3	0.4	2.7	29.1	5.1	0.7	0.0	0.0	16.9	0.0	10.5
Cycle Q Clear(g_c), s	13.7	20.3	0.4	2.7	29.1	5.1	0.7	0.0	0.0	16.9	0.0	10.5
Prop In Lane	1.00		1.00	1.00		1.00	0.79		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	548	1544	691	122	1227	877	115	0	0	365	0	578
V/C Ratio(X)	0.88	0.61	0.01	0.42	0.88	0.19	0.12	0.00	0.00	0.86	0.00	0.39
Avail Cap(c_a), veh/h	564	1544	691	162	1261	893	637	0	0	462	0	665
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	20.5	15.0	43.9	29.7	10.4	43.4	0.0	0.0	37.6	0.0	22.9
Incr Delay (d2), s/veh	15.2	0.8	0.0	2.3	7.7	0.1	0.5	0.0	0.0	12.3	0.0	0.4
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	7.6	9.8	0.2	1.4	15.0	3.2	0.4	0.0	0.0	9.4	0.0	4.6
LnGrp Delay(d),s/veh	55.6	21.4	15.1	46.2	37.4	10.6	43.9	0.0	0.0	49.9	0.0	23.4
LnGrp LOS	E	C	B	D	D	B	D			D		C
Approach Vol, veh/h		1433			1298			14			539	
Approach Delay, s/veh		32.9			34.3			43.9			38.7	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	50.0		25.5	20.5	40.9		11.4
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9	43.4		25.9	* 16	36.1		35.0
Max Q Clear Time (g_c+I1), s	4.7	22.3		18.9	15.7	31.1		2.7
Green Ext Time (p_c), s	0.0	17.2		1.5	0.1	4.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	34.5
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 TWSC
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1227	39	0	1277	72	0	0	2	0	0	32
Future Vol, veh/h	0	1227	39	0	1277	72	0	0	2	0	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	0	1305	41	0	1359	77	0	0	2	0	0	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	673	-	-	721
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	398	0	0	370
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	398	-	-	369
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.1	15.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	398	-	-	-	-	369
HCM Lane V/C Ratio	0.005	-	-	-	-	0.092
HCM Control Delay (s)	14.1	-	-	-	-	15.7
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
3: Sonoma Hwy (SR 12) & Mountain Hawk Way

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	971	10	4	1039	32	29	9	2	36	3	148
Future Volume (veh/h)	118	971	10	4	1039	32	29	9	2	36	3	148
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	126	1033	11	4	1105	34	31	10	2	38	0	63
Adj No. of Lanes	2	2	0	1	2	0	1	1	0	1	0	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	517	1990	21	23	1477	45	342	264	53	346	0	552
Arrive On Green	0.15	0.57	0.57	0.01	0.43	0.43	0.18	0.18	0.18	0.18	0.00	0.18
Sat Flow, veh/h	3442	3486	37	1774	3407	105	1329	1508	302	1397	0	3149
Grp Volume(v), veh/h	126	510	534	4	558	581	31	0	12	38	0	63
Grp Sat Flow(s),veh/h/ln	1721	1720	1803	1774	1721	1791	1329	0	1810	1397	0	1575
Q Serve(g_s), s	2.1	11.9	11.9	0.1	17.9	17.9	1.3	0.0	0.4	1.5	0.0	1.1
Cycle Q Clear(g_c), s	2.1	11.9	11.9	0.1	17.9	17.9	1.3	0.0	0.4	1.9	0.0	1.1
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.17	1.00		1.00
Lane Grp Cap(c), veh/h	517	982	1029	23	746	776	342	0	317	346	0	552
V/C Ratio(X)	0.24	0.52	0.52	0.18	0.75	0.75	0.09	0.00	0.04	0.11	0.00	0.11
Avail Cap(c_a), veh/h	642	982	1029	331	926	964	781	0	914	807	0	1591
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.7	8.6	8.6	32.2	15.7	15.7	23.0	0.0	22.6	23.4	0.0	22.9
Incr Delay (d2), s/veh	0.1	0.5	0.5	1.3	2.6	2.5	0.0	0.0	0.0	0.1	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	5.7	5.9	0.1	8.9	9.3	0.5	0.0	0.2	0.6	0.0	0.5
LnGrp Delay(d),s/veh	24.8	9.1	9.1	33.5	18.3	18.2	23.0	0.0	22.6	23.4	0.0	22.9
LnGrp LOS	C	A	A	C	B	B	C		C	C		C
Approach Vol, veh/h		1170			1143			43			101	
Approach Delay, s/veh		10.8			18.3			22.9			23.1	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	44.1		16.2	14.6	35.1		16.2
Change Period (Y+Rc), s	* 4.7	6.5		* 4.7	* 4.7	6.5		* 4.7
Max Green Setting (Gmax), s	* 12	35.5		* 33	* 12	35.5		* 33
Max Q Clear Time (g_c+I1), s	2.1	13.9		3.9	4.1	19.9		3.3
Green Ext Time (p_c), s	0.0	13.2		0.3	0.1	8.6		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	15.0
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
4: Los Alamos Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	957	32	123	977	16	34	25	164	13	21	56
Future Volume (veh/h)	57	957	32	123	977	16	34	25	164	13	21	56
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		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
Adj Sat Flow, veh/h/ln	1676	1630	1710	1676	1629	1710	1667	1635	1635	1753	1718	1718
Adj Flow Rate, veh/h	61	1018	0	131	1039	0	36	27	33	14	22	23
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	192	1591	0	236	1675	0	186	113	216	139	176	223
Arrive On Green	0.12	0.51	0.00	0.15	0.54	0.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1597	3179	0	1597	3177	0	661	724	1389	421	1132	1436
Grp Volume(v), veh/h	61	1018	0	131	1039	0	63	0	33	36	0	23
Grp Sat Flow(s),veh/h/ln	1597	1549	0	1597	1548	0	1386	0	1389	1553	0	1436
Q Serve(g_s), s	2.4	16.3	0.0	5.2	15.8	0.0	1.0	0.0	1.4	0.0	0.0	0.9
Cycle Q Clear(g_c), s	2.4	16.3	0.0	5.2	15.8	0.0	2.5	0.0	1.4	1.2	0.0	0.9
Prop In Lane	1.00		0.00	1.00		0.00	0.57		1.00	0.39		1.00
Lane Grp Cap(c), veh/h	192	1591	0	236	1675	0	298	0	216	315	0	223
V/C Ratio(X)	0.32	0.64	0.00	0.56	0.62	0.00	0.21	0.00	0.15	0.11	0.00	0.10
Avail Cap(c_a), veh/h	281	1814	0	281	1813	0	710	0	641	771	0	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.5	12.0	0.0	27.0	10.8	0.0	25.4	0.0	24.9	24.9	0.0	24.7
Incr Delay (d2), s/veh	0.9	0.8	0.0	2.0	0.7	0.0	0.3	0.0	0.3	0.2	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	1.1	7.1	0.0	2.4	6.8	0.0	1.1	0.0	0.6	0.6	0.0	0.4
LnGrp Delay(d),s/veh	28.4	12.8	0.0	29.1	11.5	0.0	25.7	0.0	25.3	25.0	0.0	24.9
LnGrp LOS	C	B		C	B		C		C	C		C
Approach Vol, veh/h		1079			1170			96			59	
Approach Delay, s/veh		13.7			13.5			25.6			25.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.1	41.1		14.1	11.2	42.9		14.1
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	12.0	40.0		31.5	12.0	40.0		31.5
Max Q Clear Time (g_c+I1), s	11.2	18.3		3.2	4.4	17.8		4.5
Green Ext Time (p_c), s	0.1	16.8		0.7	0.1	17.1		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	14.4
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Future Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	89	1086	13	69	1063	47	19	13	48	68	9	16
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	226	1171	14	195	1099	49	67	44	100	202	23	172
Arrive On Green	0.13	0.66	0.66	0.11	0.64	0.64	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1785	21	1774	1720	76	209	398	911	1224	206	1561
Grp Volume(v), veh/h	89	0	1099	69	0	1110	80	0	0	77	0	16
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1797	1518	0	0	1430	0	1561
Q Serve(g_s), s	4.7	0.0	54.0	3.6	0.0	58.9	0.3	0.0	0.0	0.0	0.0	0.9
Cycle Q Clear(g_c), s	4.7	0.0	54.0	3.6	0.0	58.9	5.2	0.0	0.0	4.9	0.0	0.9
Prop In Lane	1.00		0.01	1.00		0.04	0.24		0.60	0.88		1.00
Lane Grp Cap(c), veh/h	226	0	1185	195	0	1148	211	0	0	225	0	172
V/C Ratio(X)	0.39	0.00	0.93	0.35	0.00	0.97	0.38	0.00	0.00	0.34	0.00	0.09
Avail Cap(c_a), veh/h	246	0	1185	228	0	1156	434	0	0	421	0	394
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.5	0.0	15.3	41.6	0.0	17.2	42.0	0.0	0.0	42.1	0.0	40.4
Incr Delay (d2), s/veh	1.1	0.0	12.6	1.1	0.0	19.0	1.1	0.0	0.0	0.9	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	2.3	0.0	30.7	1.8	0.0	34.7	2.2	0.0	0.0	2.1	0.0	0.4
LnGrp Delay(d),s/veh	41.6	0.0	27.8	42.7	0.0	36.2	43.1	0.0	0.0	43.0	0.0	40.6
LnGrp LOS	D		C	D		D	D			D		D
Approach Vol, veh/h		1188			1179			80			93	
Approach Delay, s/veh		28.9			36.6			43.1			42.6	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.1	72.2		14.6	15.8	70.5		14.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	6.6	56.0		6.9	6.7	60.9		7.2
Green Ext Time (p_c), s	0.1	9.0		0.8	0.1	3.6		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	33.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Future Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	89	1086	13	69	1063	47	19	13	48	68	9	16
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	270	2000	24	228	1849	82	86	60	134	264	30	216
Arrive On Green	0.15	0.57	0.57	0.13	0.55	0.55	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1774	3480	42	1774	3355	148	213	433	969	1291	216	1562
Grp Volume(v), veh/h	89	537	562	69	545	565	80	0	0	77	0	16
Grp Sat Flow(s),veh/h/ln	1774	1720	1802	1774	1721	1782	1615	0	0	1507	0	1562
Q Serve(g_s), s	3.5	15.2	15.2	2.8	16.4	16.4	0.0	0.0	0.0	0.0	0.0	0.7
Cycle Q Clear(g_c), s	3.5	15.2	15.2	2.8	16.4	16.4	3.4	0.0	0.0	3.1	0.0	0.7
Prop In Lane	1.00		0.02	1.00		0.08	0.24		0.60	0.88		1.00
Lane Grp Cap(c), veh/h	270	989	1036	228	949	982	280	0	0	294	0	216
V/C Ratio(X)	0.33	0.54	0.54	0.30	0.57	0.58	0.29	0.00	0.00	0.26	0.00	0.07
Avail Cap(c_a), veh/h	315	1447	1516	292	1427	1477	561	0	0	542	0	497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.9	10.4	10.4	31.2	11.6	11.6	30.8	0.0	0.0	30.6	0.0	29.6
Incr Delay (d2), s/veh	0.7	0.6	0.5	0.7	0.7	0.6	0.6	0.0	0.0	0.5	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	1.8	7.3	7.7	1.4	7.9	8.2	1.6	0.0	0.0	1.6	0.0	0.3
LnGrp Delay(d),s/veh	30.6	10.9	10.9	31.9	12.3	12.3	31.3	0.0	0.0	31.1	0.0	29.7
LnGrp LOS	C	B	B	C	B	B	C			C		C
Approach Vol, veh/h		1188			1179			80			93	
Approach Delay, s/veh		12.4			13.4			31.3			30.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.1	51.4		14.4	15.0	49.5		14.4
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	4.8	17.2		5.1	5.5	18.4		5.4
Green Ext Time (p_c), s	0.1	25.6		0.9	0.1	25.0		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	14.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
5: Melita Rd & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Future Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	89	1086	13	69	1063	47	19	13	48	68	9	16
Adj No. of Lanes	1	1	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	228	1163	14	197	2129	94	70	46	107	210	24	174
Arrive On Green	0.13	0.65	0.65	0.11	0.63	0.63	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1785	21	1774	3355	148	226	412	958	1274	213	1561
Grp Volume(v), veh/h	89	0	1099	69	545	565	80	0	0	77	0	16
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	1721	1782	1596	0	0	1487	0	1561
Q Serve(g_s), s	4.6	0.0	53.9	3.6	16.9	16.9	0.2	0.0	0.0	0.0	0.0	0.9
Cycle Q Clear(g_c), s	4.6	0.0	53.9	3.6	16.9	16.9	4.5	0.0	0.0	4.3	0.0	0.9
Prop In Lane	1.00		0.01	1.00		0.08	0.24		0.60	0.88		1.00
Lane Grp Cap(c), veh/h	228	0	1177	197	1092	1131	223	0	0	234	0	174
V/C Ratio(X)	0.39	0.00	0.93	0.35	0.50	0.50	0.36	0.00	0.00	0.33	0.00	0.09
Avail Cap(c_a), veh/h	249	0	1204	231	1130	1170	442	0	0	427	0	393
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	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	0.0	15.4	41.0	9.7	9.7	41.3	0.0	0.0	41.2	0.0	39.7
Incr Delay (d2), s/veh	1.1	0.0	13.0	1.1	0.4	0.4	1.0	0.0	0.0	0.8	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	2.3	0.0	30.8	1.8	8.0	8.3	2.1	0.0	0.0	2.0	0.0	0.4
LnGrp Delay(d),s/veh	40.9	0.0	28.4	42.0	10.2	10.2	42.3	0.0	0.0	42.1	0.0	40.0
LnGrp LOS	D		C	D	B	B	D			D		D
Approach Vol, veh/h		1188			1179			80			93	
Approach Delay, s/veh		29.4			12.0			42.3			41.7	
Approach LOS		C			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.1	71.0		14.6	15.8	69.2		14.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.6	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	6.6	55.9		6.3	6.6	18.9		6.5
Green Ext Time (p_c), s	0.1	9.0		0.8	0.1	29.1		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	22.2
HCM 2010 LOS	C

HCM 2010 TWSC
6: Project Access & Sonoma Hwy (SR 12)

08/22/2017

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1176	56	24	1073	50	21
Future Vol, veh/h	1176	56	24	1073	50	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1251	60	26	1141	53	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1251	0	2444	1251
Stage 1	-	-	-	-	1251	-
Stage 2	-	-	-	-	1193	-
Critical Hdwy	-	-	4.12	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	556	-	~ 21	211
Stage 1	-	-	-	-	211	-
Stage 2	-	-	-	-	228	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	556	-	~ 20	211
Mov Cap-2 Maneuver	-	-	-	-	107	-
Stage 1	-	-	-	-	211	-
Stage 2	-	-	-	-	217	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	70.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	125	-	-	556	-
HCM Lane V/C Ratio	0.604	-	-	0.046	-
HCM Control Delay (s)	70.3	-	-	11.8	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	3.1	-	-	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
6: Project Access & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1176	56	24	1073	50	21
Future Volume (veh/h)	1176	56	24	1073	50	21
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1251	60	26	1141	53	22
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1386	1187	45	1511	69	28
Arrive On Green	0.77	0.77	0.03	0.84	0.06	0.06
Sat Flow, veh/h	1810	1550	1774	1810	1196	497
Grp Volume(v), veh/h	1251	60	26	1141	76	0
Grp Sat Flow(s),veh/h/ln	1810	1550	1774	1810	1715	0
Q Serve(g_s), s	53.7	1.0	1.5	28.8	4.5	0.0
Cycle Q Clear(g_c), s	53.7	1.0	1.5	28.8	4.5	0.0
Prop In Lane		1.00	1.00		0.70	0.29
Lane Grp Cap(c), veh/h	1386	1187	45	1511	98	0
V/C Ratio(X)	0.90	0.05	0.57	0.75	0.77	0.00
Avail Cap(c_a), veh/h	1493	1279	87	1661	419	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	9.1	2.9	49.3	3.8	47.6	0.0
Incr Delay (d2), s/veh	7.7	0.0	11.0	1.8	12.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	29.0	0.4	0.9	14.7	2.5	0.0
LnGrp Delay(d),s/veh	16.7	2.9	60.3	5.6	59.7	0.0
LnGrp LOS	B	A	E	A	E	
Approach Vol, veh/h	1311			1167	76	
Approach Delay, s/veh	16.1			6.8	59.7	
Approach LOS	B			A	E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	7.1	84.9				92.0		10.4
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.0	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	3.5	55.7				30.8		6.5
Green Ext Time (p_c), s	0.0	22.7				39.8		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	13.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
6: Project Access & Sonoma Hwy (SR 12)

09/27/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1176	56	24	1073	50	21
Future Volume (veh/h)	1176	56	24	1073	50	21
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1251	60	26	1141	53	22
Adj No. of Lanes	2	1	1	2	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	2346	1057	51	2675	69	29
Arrive On Green	0.68	0.68	0.03	0.78	0.06	0.06
Sat Flow, veh/h	3529	1550	1774	3529	1196	497
Grp Volume(v), veh/h	1251	60	26	1141	76	0
Grp Sat Flow(s),veh/h/ln	1719	1550	1774	1719	1715	0
Q Serve(g_s), s	12.2	0.9	1.0	7.4	2.9	0.0
Cycle Q Clear(g_c), s	12.2	0.9	1.0	7.4	2.9	0.0
Prop In Lane		1.00	1.00		0.70	0.29
Lane Grp Cap(c), veh/h	2346	1057	51	2675	99	0
V/C Ratio(X)	0.53	0.06	0.51	0.43	0.77	0.00
Avail Cap(c_a), veh/h	4342	1957	133	4830	641	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	5.3	3.5	32.0	2.5	31.1	0.0
Incr Delay (d2), s/veh	0.2	0.0	7.8	0.1	11.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.4	0.6	3.4	1.7	0.0
LnGrp Delay(d),s/veh	5.5	3.5	39.8	2.6	43.0	0.0
LnGrp LOS	A	A	D	A	D	
Approach Vol, veh/h	1311			1167	76	
Approach Delay, s/veh	5.4			3.4	43.0	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.4	52.2				58.6		8.3
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.0	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	3.0	14.2				9.4		4.9
Green Ext Time (p_c), s	0.0	31.5				33.5		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	5.6
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	751	385	58	755	8	303	0	35	8	0	8
Future Volume (veh/h)	10	751	385	58	755	8	303	0	35	8	0	8
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	11	799	291	62	803	9	322	0	15	9	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	37	790	682	113	856	10	349	0	305	46	0	41
Arrive On Green	0.02	0.49	0.49	0.07	0.53	0.53	0.22	0.00	0.22	0.03	0.00	0.03
Sat Flow, veh/h	1597	1629	1406	1597	1607	18	1597	0	1394	1597	0	1425
Grp Volume(v), veh/h	11	799	291	62	0	812	322	0	15	9	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1406	1597	0	1625	1597	0	1394	1597	0	1425
Q Serve(g_s), s	0.7	52.0	14.4	4.0	0.0	50.0	21.2	0.0	0.9	0.6	0.0	0.4
Cycle Q Clear(g_c), s	0.7	52.0	14.4	4.0	0.0	50.0	21.2	0.0	0.9	0.6	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	37	790	682	113	0	865	349	0	305	46	0	41
V/C Ratio(X)	0.29	1.01	0.43	0.55	0.00	0.94	0.92	0.00	0.05	0.20	0.00	0.12
Avail Cap(c_a), veh/h	243	790	682	243	0	865	377	0	329	377	0	336
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.5	27.6	17.9	48.2	0.0	23.4	41.0	0.0	33.1	50.9	0.0	50.7
Incr Delay (d2), s/veh	1.6	34.8	0.3	1.5	0.0	17.4	25.8	0.0	0.0	0.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	30.9	5.6	1.8	0.0	26.5	11.8	0.0	0.4	0.3	0.0	0.2
LnGrp Delay(d),s/veh	53.1	62.4	18.2	49.7	0.0	40.8	66.8	0.0	33.1	51.6	0.0	51.2
LnGrp LOS	D	F	B	D		D	E		C	D		D
Approach Vol, veh/h		1101			874			337			14	
Approach Delay, s/veh		50.6			41.5			65.3			51.5	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.3	59.0		7.8	7.2	64.1		28.1
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 16	52.0		* 25	* 16	52.0		25.3
Max Q Clear Time (g_c+I1), s	6.0	54.0		2.6	2.7	52.0		23.2
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	49.3
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
7: Oakmont Dr & Sonoma Hwy (SR 12)

07/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	751	385	58	755	8	303	0	35	8	0	8
Future Volume (veh/h)	10	751	385	58	755	8	303	0	35	8	0	8
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		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
Adj Sat Flow, veh/h/ln	1676	1629	1676	1676	1629	1710	1710	1676	1676	1710	1676	1676
Adj Flow Rate, veh/h	11	799	291	62	803	9	322	0	15	9	0	5
Adj No. of Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	2	2	5	5	2	2	2	2	2	2
Cap, veh/h	37	840	725	104	896	10	347	0	303	45	0	40
Arrive On Green	0.02	0.52	0.52	0.07	0.56	0.56	0.22	0.00	0.22	0.03	0.00	0.03
Sat Flow, veh/h	1597	1629	1406	1597	1607	18	1597	0	1394	1597	0	1425
Grp Volume(v), veh/h	11	799	291	62	0	812	322	0	15	9	0	5
Grp Sat Flow(s),veh/h/ln	1597	1629	1406	1597	0	1625	1597	0	1394	1597	0	1425
Q Serve(g_s), s	0.8	56.6	15.3	4.6	0.0	53.6	24.0	0.0	1.0	0.7	0.0	0.4
Cycle Q Clear(g_c), s	0.8	56.6	15.3	4.6	0.0	53.6	24.0	0.0	1.0	0.7	0.0	0.4
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	37	840	725	104	0	906	347	0	303	45	0	40
V/C Ratio(X)	0.30	0.95	0.40	0.60	0.00	0.90	0.93	0.00	0.05	0.20	0.00	0.13
Avail Cap(c_a), veh/h	118	961	830	118	0	959	386	0	337	118	0	106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	58.3	27.9	17.9	55.2	0.0	23.7	46.5	0.0	37.5	57.6	0.0	57.5
Incr Delay (d2), s/veh	1.7	17.0	0.3	3.1	0.0	10.4	25.7	0.0	0.0	0.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	29.3	6.0	2.1	0.0	26.5	13.0	0.0	0.4	0.3	0.0	0.2
LnGrp Delay(d),s/veh	60.0	44.9	18.2	58.3	0.0	34.1	72.2	0.0	37.6	58.5	0.0	58.0
LnGrp LOS	E	D	B	E		C	E		D	E		E
Approach Vol, veh/h		1101			874			337			14	
Approach Delay, s/veh		38.0			35.8			70.7			58.3	
Approach LOS		D			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.6	69.5		8.1	7.5	74.6		31.1
Change Period (Y+Rc), s	* 4.7	7.0		* 4.7	* 4.7	7.0		4.7
Max Green Setting (Gmax), s	* 9	71.6		* 9	* 9	71.6		29.3
Max Q Clear Time (g_c+I1), s	6.6	58.6		2.7	2.8	55.6		26.0
Green Ext Time (p_c), s	0.0	4.0		0.0	0.0	3.7		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	42.0
HCM 2010 LOS	D

Notes

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	373	260	26	18	20
Future Vol, veh/h	18	373	260	26	18	20
Conflicting Peds, #/hr	4	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	429	299	30	21	23

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	333	0	-	0	788	320
Stage 1	-	-	-	-	318	-
Stage 2	-	-	-	-	470	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1226	-	-	-	360	721
Stage 1	-	-	-	-	738	-
Stage 2	-	-	-	-	629	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1224	-	-	-	349	717
Mov Cap-2 Maneuver	-	-	-	-	349	-
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	612	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1224	-	-	-	478
HCM Lane V/C Ratio	0.017	-	-	-	0.091
HCM Control Delay (s)	8	0	-	-	13.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	214	177	0	104	3	0	7	186
Future Vol, veh/h	0	214	177	0	104	3	0	7	186
Peak Hour Factor	0.92	0.90	0.90	0.92	0.90	0.90	0.92	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	238	197	0	116	3	0	8	207
Number of Lanes	0	0	1	0	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	13.8	9	9.5
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	55%	0%	4%
Vol Thru, %	45%	97%	0%
Vol Right, %	0%	3%	96%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	391	107	193
LT Vol	214	0	7
Through Vol	177	104	0
RT Vol	0	3	186
Lane Flow Rate	434	119	214
Geometry Grp	1	1	1
Degree of Util (X)	0.566	0.163	0.278
Departure Headway (Hd)	4.693	4.935	4.663
Convergence, Y/N	Yes	Yes	Yes
Cap	765	722	766
Service Time	2.748	3.004	2.718
HCM Lane V/C Ratio	0.567	0.165	0.279
HCM Control Delay	13.8	9	9.5
HCM Lane LOS	B	A	A
HCM 95th-tile Q	3.6	0.6	1.1

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	209	22	9	116	19	8
Future Vol, veh/h	209	22	9	116	19	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	255	27	11	141	23	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	282	0	431	268
Stage 1	-	-	-	-	268	-
Stage 2	-	-	-	-	163	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1280	-	581	771
Stage 1	-	-	-	-	777	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1280	-	576	771
Mov Cap-2 Maneuver	-	-	-	-	576	-
Stage 1	-	-	-	-	777	-
Stage 2	-	-	-	-	858	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	623	-	-	1280	-
HCM Lane V/C Ratio	0.053	-	-	0.009	-
HCM Control Delay (s)	11.1	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Appendix D

Roadway Segment Level of Service Calculations



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Arterial Level of Service
AM Existing 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	13.8	35.4	0.3	29
Melita Rd	2	3.2	11.8	0.1	32
	3	8.6	38.9	0.5	45
	28	3.5	21.7	0.3	46
Los Alamos Rd	4	14.4	31.8	0.3	32
	27	10.8	25.7	0.2	33
Melita Rd	5	15.5	24.8	0.1	22
Project Access	6	6.8	23.6	0.3	39
	32	0.6	6.5	0.1	51
	33	6.1	59.3	0.9	52
Oakmont Dr	7	18.0	33.0	0.2	27
	17	5.8	24.2	0.3	42
Total		107.0	336.8	3.5	38

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	9.8	27.7	0.3	37
	33	4.2	20.0	0.2	44
	32	5.3	57.6	0.9	53
Project Access	6	1.1	7.2	0.1	46
Melita Rd	5	18.7	34.7	0.3	27
	27	4.1	13.8	0.1	39
Los Alamos Rd	4	8.6	23.3	0.2	36
	28	3.7	22.0	0.3	45
Mountain Hawk Way	3	15.7	33.0	0.3	31
	2	15.2	43.4	0.5	40
Calistoga Road	1	66.1	73.8	0.1	5
	26	6.4	28.6	0.3	36
Total		158.8	385.2	3.5	33

Arterial Level of Service
PM Existing 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	16.6	38.1	0.3	27
Melita Rd	2	3.7	11.9	0.1	31
	3	7.7	36.6	0.5	48
	28	3.6	22.0	0.3	46
Los Alamos Rd	4	15.7	33.0	0.3	30
	27	10.9	25.7	0.2	32
Melita Rd	5	21.6	30.9	0.1	17
Project Access	6	7.4	24.0	0.3	39
	32	0.5	6.5	0.1	51
	33	6.2	59.4	0.9	52
Oakmont Dr	7	21.8	36.7	0.2	24
	17	6.1	24.7	0.3	41
Total		121.9	349.5	3.5	37

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	18.2	36.0	0.3	28
	33	6.0	21.7	0.2	40
	32	7.7	60.0	0.9	51
Project Access	6	6.7	12.9	0.1	26
Melita Rd	5	63.0	82.5	0.3	12
	27	5.0	14.9	0.1	36
Los Alamos Rd	4	11.4	25.9	0.2	32
	28	4.4	22.7	0.3	44
Mountain Hawk Way	3	16.4	34.0	0.3	30
	2	12.2	41.5	0.5	42
Calistoga Road	1	53.5	61.0	0.1	6
	26	6.1	28.5	0.3	36
Total		210.5	441.5	3.5	29

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	15.6	37.2	0.3	28
Melita Rd	2	3.5	11.8	0.1	32
	3	7.1	36.2	0.5	48
	28	3.3	21.8	0.3	46
Los Alamos Rd	4	11.7	28.8	0.3	35
	27	9.6	24.6	0.2	34
Melita Rd	5	19.8	29.2	0.1	18
Project Access	6	7.2	23.9	0.3	39
	32	0.5	6.5	0.1	52
	33	6.3	59.4	0.9	52
Oakmont Dr	7	24.0	38.6	0.2	23
	17	6.3	24.7	0.3	41
Total		115.0	342.6	3.5	37

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	10.4	28.5	0.3	36
	33	4.1	19.9	0.2	44
	32	5.2	57.6	0.9	53
Project Access	6	0.9	7.2	0.1	46
Melita Rd	5	21.6	37.4	0.3	25
	27	4.7	14.5	0.1	37
Los Alamos Rd	4	9.3	23.4	0.2	36
	28	4.0	22.3	0.3	45
Mountain Hawk Way	3	14.7	32.3	0.3	31
	2	9.5	38.5	0.5	46
Calistoga Road	1	39.9	47.5	0.1	8
	26	6.0	28.0	0.3	37
Total		130.3	357.2	3.5	36

Arterial Level of Service
AM Existing plus Project 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	13.4	35.0	0.3	29
Melita Rd	2	3.1	11.6	0.1	32
	3	8.4	38.3	0.5	46
	28	3.7	22.0	0.3	46
Los Alamos Rd	4	14.8	32.0	0.3	31
	27	11.3	26.3	0.2	32
Melita Rd	5	19.8	29.2	0.1	18
Project Access	6	7.7	24.5	0.3	38
	32	0.7	6.7	0.1	50
	33	6.3	59.3	0.9	52
Oakmont Dr	7	23.5	38.5	0.2	23
	17	6.4	25.1	0.3	41
Total		119.2	348.5	3.5	37

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	11.2	29.1	0.3	35
	33	4.5	20.2	0.2	43
	32	5.9	58.8	0.9	52
Project Access	6	2.0	8.2	0.1	41
Melita Rd	5	34.4	50.3	0.3	19
	27	4.8	14.7	0.1	36
Los Alamos Rd	4	9.2	23.9	0.2	35
	28	4.0	22.5	0.3	44
Mountain Hawk Way	3	17.4	34.8	0.3	29
	2	19.7	47.2	0.5	37
Calistoga Road	1	68.4	76.2	0.1	5
	26	6.7	28.9	0.3	36
Total		188.2	414.7	3.5	31

Arterial Level of Service
PM Existing plus Project 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	18.9	40.7	0.3	25
Melita Rd	2	4.3	12.6	0.1	30
	3	7.9	37.2	0.5	47
	28	3.7	22.1	0.3	46
Los Alamos Rd	4	15.3	32.6	0.3	31
	27	11.4	26.3	0.2	32
Melita Rd	5	23.4	32.6	0.1	16
Project Access	6	8.4	25.0	0.3	37
	32	0.8	6.7	0.1	50
	33	6.4	59.0	0.9	52
Oakmont Dr	7	25.9	40.7	0.2	22
	17	6.4	25.0	0.3	41
Total		132.7	360.5	3.5	35

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	26.9	44.7	0.3	23
	33	6.5	22.1	0.2	40
	32	7.6	60.1	0.9	51
Project Access	6	5.7	11.9	0.1	28
Melita Rd	5	74.6	97.4	0.3	10
	27	5.2	15.1	0.1	35
Los Alamos Rd	4	10.9	25.5	0.2	33
	28	4.2	22.4	0.3	45
Mountain Hawk Way	3	15.9	33.5	0.3	30
	2	14.0	43.5	0.5	40
Calistoga Road	1	60.3	67.8	0.1	5
	26	6.3	28.5	0.3	36
Total		238.0	472.5	3.5	27

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	19.3	40.8	0.3	25
Melita Rd	2	4.1	12.3	0.1	30
	3	7.8	37.0	0.5	47
	28	3.7	22.0	0.3	46
Los Alamos Rd	4	15.5	32.5	0.3	31
	27	13.3	28.2	0.2	30
Melita Rd	5	27.4	36.7	0.1	15
Project Access	6	8.3	25.1	0.3	37
	32	0.8	6.7	0.1	49
	33	6.3	58.7	0.9	52
Oakmont Dr	7	24.6	39.4	0.2	22
	17	6.5	25.3	0.3	40
Total		137.4	364.7	3.5	35

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	11.2	29.2	0.3	35
	33	4.1	19.6	0.2	45
	32	5.7	58.3	0.9	53
Project Access	6	1.7	8.0	0.1	42
Melita Rd	5	34.0	49.7	0.3	19
	27	5.2	15.1	0.1	35
Los Alamos Rd	4	10.0	24.4	0.2	34
	28	4.3	22.5	0.3	45
Mountain Hawk Way	3	13.5	30.9	0.3	33
	2	10.5	39.4	0.5	45
Calistoga Road	1	49.4	57.2	0.1	7
	26	6.4	28.8	0.3	36
Total		156.1	382.9	3.5	33

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	13.1	34.8	0.3	29
Melita Rd	2	2.9	11.4	0.1	33
	3	9.5	39.6	0.5	44
	28	4.0	22.4	0.3	45
Los Alamos Rd	4	14.7	32.1	0.3	31
	27	11.2	26.0	0.2	32
Melita Rd	5	22.0	31.4	0.1	17
Project Access	6	7.4	24.3	0.3	38
	32	0.6	6.5	0.1	51
	33	6.5	59.3	0.9	52
Oakmont Dr	7	21.9	36.9	0.2	24
	17	5.8	24.3	0.3	42
Total		119.7	349.1	3.5	37

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	16.8	34.7	0.3	29
	33	5.0	20.6	0.2	43
	32	5.3	58.2	0.9	53
Project Access	6	1.1	7.3	0.1	46
Melita Rd	5	22.1	38.0	0.3	25
	27	4.4	14.2	0.1	38
Los Alamos Rd	4	8.9	23.4	0.2	36
	28	3.8	22.1	0.3	45
Mountain Hawk Way	3	15.3	32.5	0.3	31
	2	26.5	54.2	0.5	32
Calistoga Road	1	74.8	82.5	0.1	5
	26	6.6	28.9	0.3	35
Total		190.6	416.5	3.5	31

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	18.5	40.0	0.3	26
Melita Rd	2	4.1	12.5	0.1	30
	3	8.3	37.1	0.5	47
	28	3.7	22.2	0.3	45
Los Alamos Rd	4	15.7	32.9	0.3	30
	27	13.6	28.5	0.2	29
Melita Rd	5	32.3	41.6	0.1	13
Project Access	6	8.4	24.9	0.3	37
	32	0.6	6.6	0.1	51
	33	7.1	60.6	0.9	51
Oakmont Dr	7	40.6	56.0	0.2	16
	17	6.7	25.1	0.3	41
Total		159.8	388.0	3.5	33

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	53.2	70.3	0.3	15
	33	6.8	22.3	0.2	39
	32	9.0	61.4	0.9	50
Project Access	6	8.2	14.4	0.1	23
Melita Rd	5	78.8	100.9	0.3	10
	27	5.1	14.9	0.1	36
Los Alamos Rd	4	12.1	26.4	0.2	32
	28	4.8	22.9	0.3	44
Mountain Hawk Way	3	17.2	34.9	0.3	29
	2	14.0	43.3	0.5	41
Calistoga Road	1	66.3	73.6	0.1	5
	26	6.2	28.2	0.3	36
Total		281.6	513.7	3.5	25

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	17.5	39.1	0.3	26
Melita Rd	2	3.9	12.1	0.1	31
	3	7.9	37.2	0.5	47
	28	3.6	21.8	0.3	46
Los Alamos Rd	4	13.4	30.6	0.3	33
	27	10.9	25.9	0.2	32
Melita Rd	5	23.0	32.2	0.1	17
Project Access	6	7.8	24.6	0.3	38
	32	0.6	6.5	0.1	51
	33	6.6	59.2	0.9	52
Oakmont Dr	7	29.4	44.2	0.2	20
	17	6.4	25.0	0.3	41
Total		130.8	358.4	3.5	36

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	16.0	33.9	0.3	30
	33	4.9	20.5	0.2	43
	32	5.4	57.7	0.9	53
Project Access	6	1.2	7.4	0.1	45
Melita Rd	5	28.8	44.5	0.3	21
	27	4.8	14.6	0.1	37
Los Alamos Rd	4	11.1	25.4	0.2	33
	28	4.4	22.8	0.3	44
Mountain Hawk Way	3	15.9	33.4	0.3	30
	2	12.9	41.6	0.5	42
Calistoga Road	1	65.4	74.7	0.1	5
	26	6.6	29.0	0.3	35
Total		177.4	405.6	3.5	32

Arterial Level of Service
AM Baseline plus Project 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	14.6	36.4	0.3	28
Melita Rd	2	3.5	12.0	0.1	31
	3	8.9	38.8	0.5	45
	28	3.7	21.9	0.3	46
Los Alamos Rd	4	15.3	32.6	0.3	31
	27	12.8	27.7	0.2	30
Melita Rd	5	24.6	33.8	0.1	16
Project Access	6	8.4	25.4	0.3	37
	32	0.8	6.8	0.1	49
	33	6.5	59.4	0.9	52
Oakmont Dr	7	22.5	37.5	0.2	23
	17	5.9	24.6	0.3	42
Total		127.5	356.9	3.5	36

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	20.5	38.2	0.3	27
	33	5.8	21.4	0.2	41
	32	5.7	58.4	0.9	52
Project Access	6	1.4	7.6	0.1	44
Melita Rd	5	24.8	40.7	0.3	23
	27	4.4	14.3	0.1	37
Los Alamos Rd	4	9.3	23.8	0.2	35
	28	3.8	22.1	0.3	45
Mountain Hawk Way	3	15.5	32.8	0.3	31
	2	19.8	47.2	0.5	37
Calistoga Road	1	75.3	82.9	0.1	5
	26	6.5	28.8	0.3	36
Total		193.0	418.2	3.5	31

Arterial Level of Service
PM Baseline plus Project 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	18.9	40.6	0.3	25
Melita Rd	2	4.3	12.6	0.1	30
	3	7.5	36.3	0.5	48
	28	3.6	21.9	0.3	46
Los Alamos Rd	4	16.9	34.4	0.3	29
	27	13.2	28.3	0.2	30
Melita Rd	5	29.9	39.3	0.1	14
Project Access	6	8.3	24.8	0.3	38
	32	0.7	6.6	0.1	50
	33	6.9	59.6	0.9	51
Oakmont Dr	7	39.3	54.4	0.2	16
	17	6.6	25.1	0.3	41
Total		156.2	383.9	3.5	33

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	91.8	108.2	0.3	9
	33	7.1	22.7	0.2	39
	32	13.6	66.1	0.9	46
Project Access	6	11.8	17.9	0.1	19
Melita Rd	5	87.8	114.0	0.3	9
	27	5.1	15.0	0.1	36
Los Alamos Rd	4	11.2	25.6	0.2	33
	28	4.3	22.6	0.3	44
Mountain Hawk Way	3	15.4	32.8	0.3	31
	2	13.9	43.2	0.5	41
Calistoga Road	1	58.7	66.2	0.1	6
	26	6.3	28.4	0.3	36
Total		327.1	562.6	3.5	23

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	18.8	40.3	0.3	25
Melita Rd	2	4.3	12.6	0.1	30
	3	8.4	37.9	0.5	46
	28	3.7	22.0	0.3	46
Los Alamos Rd	4	16.3	33.4	0.3	30
	27	14.5	29.4	0.2	28
Melita Rd	5	34.6	44.0	0.1	12
Project Access	6	8.8	25.5	0.3	37
	32	0.8	6.7	0.1	50
	33	6.7	59.3	0.9	52
Oakmont Dr	7	31.2	45.7	0.2	19
	17	6.6	25.1	0.3	41
Total		154.6	382.0	3.5	33

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	21.7	39.7	0.3	26
	33	5.6	21.3	0.2	41
	32	5.8	58.6	0.9	52
Project Access	6	2.0	8.2	0.1	41
Melita Rd	5	43.3	58.9	0.3	16
	27	5.2	15.0	0.1	36
Los Alamos Rd	4	11.2	25.5	0.2	33
	28	4.4	22.6	0.3	44
Mountain Hawk Way	3	16.4	33.8	0.3	30
	2	17.7	46.6	0.5	38
Calistoga Road	1	74.4	84.5	0.1	5
	26	6.4	28.8	0.3	36
Total		214.1	443.6	3.5	29

Arterial Level of Service
AM Future
08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	15.3	37.1	0.3	28
Melita Rd	2	3.7	12.2	0.1	31
	3	9.3	39.3	0.5	45
	28	3.9	22.2	0.3	46
Los Alamos Rd	4	18.7	36.0	0.3	28
	27	19.0	33.8	0.2	25
Melita Rd	5	41.1	54.2	0.1	11
Project Access	6	9.1	25.9	0.3	36
	32	0.7	6.6	0.1	50
	33	10.0	63.0	0.9	49
Oakmont Dr	7	48.4	63.5	0.2	14
	17	7.2	25.8	0.3	40
Total		186.6	419.6	3.5	31

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	34.8	52.2	0.3	20
	33	6.5	22.1	0.2	40
	32	7.2	60.0	0.9	51
Project Access	6	4.6	10.9	0.1	31
Melita Rd	5	61.2	76.5	0.3	12
	27	5.2	15.0	0.1	36
Los Alamos Rd	4	10.1	24.8	0.2	34
	28	4.0	22.1	0.3	45
Mountain Hawk Way	3	19.4	36.8	0.3	27
	2	69.4	95.7	0.5	18
Calistoga Road	1	106.9	117.4	0.1	3
	26	6.6	28.5	0.3	36
Total		336.0	562.1	3.5	23

Arterial Level of Service
PM Future
08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	20.2	41.8	0.3	25
Melita Rd	2	4.9	13.3	0.1	28
	3	9.1	38.4	0.5	46
	28	4.1	22.4	0.3	45
Los Alamos Rd	4	20.0	37.3	0.3	27
	27	42.0	56.2	0.2	15
Melita Rd	5	60.1	73.7	0.1	8
Project Access	6	8.9	25.6	0.3	36
	32	0.6	6.5	0.1	51
	33	8.9	61.4	0.9	50
Oakmont Dr	7	48.8	67.1	0.2	14
	17	6.9	25.6	0.3	40
Total		234.6	469.3	3.5	28

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	100.9	117.0	0.3	9
	33	7.6	23.3	0.2	38
	32	13.1	65.7	0.9	47
Project Access	6	14.0	20.2	0.1	17
Melita Rd	5	89.9	122.3	0.3	9
	27	5.1	15.0	0.1	35
Los Alamos Rd	4	11.7	26.2	0.2	32
	28	4.4	22.5	0.3	45
Mountain Hawk Way	3	15.8	33.3	0.3	30
	2	21.8	50.6	0.5	35
Calistoga Road	1	78.4	86.0	0.1	4
	26	6.5	28.9	0.3	36
Total		369.1	610.8	3.5	22

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	18.7	40.1	0.3	26
Melita Rd	2	4.5	12.8	0.1	29
	3	8.1	37.2	0.5	47
	28	3.7	22.2	0.3	46
Los Alamos Rd	4	16.2	33.3	0.3	30
	27	13.1	27.9	0.2	30
Melita Rd	5	30.9	40.1	0.1	13
Project Access	6	8.7	25.6	0.3	37
	32	0.6	6.6	0.1	51
	33	8.4	60.9	0.9	50
Oakmont Dr	7	42.3	56.8	0.2	15
	17	6.7	25.2	0.3	41
Total		162.0	388.8	3.5	33

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	21.6	39.3	0.3	26
	33	5.6	21.2	0.2	41
	32	7.3	59.4	0.9	52
Project Access	6	7.9	14.4	0.1	24
Melita Rd	5	68.8	83.8	0.3	11
	27	5.5	15.3	0.1	35
Los Alamos Rd	4	11.3	25.5	0.2	33
	28	4.5	22.6	0.3	44
Mountain Hawk Way	3	16.3	33.8	0.3	30
	2	31.9	60.7	0.5	29
Calistoga Road	1	84.6	93.5	0.1	4
	26	6.9	29.3	0.3	35
Total		272.0	498.9	3.5	26

Arterial Level of Service
AM Future plus Project 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	15.8	37.5	0.3	27
Melita Rd	2	3.6	12.1	0.1	31
	3	11.8	41.7	0.5	42
	28	5.0	23.5	0.3	43
Los Alamos Rd	4	19.6	36.7	0.3	27
	27	27.7	42.4	0.2	20
Melita Rd	5	53.6	66.4	0.1	9
Project Access	6	9.4	26.2	0.3	36
	32	0.8	6.7	0.1	50
	33	10.8	63.4	0.9	48
Oakmont Dr	7	41.7	56.4	0.2	16
	17	6.9	25.3	0.3	40
Total		206.9	438.4	3.5	29

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	51.1	68.4	0.3	15
	33	7.0	22.7	0.2	39
	32	7.2	59.2	0.9	52
Project Access	6	5.3	11.7	0.1	29
Melita Rd	5	57.2	73.1	0.3	13
	27	5.0	14.8	0.1	36
Los Alamos Rd	4	10.0	24.5	0.2	34
	28	4.0	22.2	0.3	45
Mountain Hawk Way	3	18.1	35.4	0.3	28
	2	81.5	107.5	0.5	16
Calistoga Road	1	110.4	119.9	0.1	3
	26	6.6	28.5	0.3	36
Total		363.5	588.0	3.5	22

Arterial Level of Service
AM Future plus Project MITIGATED 07/03/2019

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	16.1	37.7	0.3	27
Melita Rd	2	3.7	12.0	0.1	31
	3	10.3	40.0	0.5	44
	28	4.3	22.4	0.3	45
Los Alamos Rd	4	19.5	36.8	0.3	27
	27	22.6	37.2	0.2	22
Melita Rd	5	48.9	61.4	0.1	9
Project Access	6	14.0	30.6	0.3	30
	32	2.9	8.9	0.1	38
	33	8.3	61.1	0.9	50
Oakmont Dr	7	31.8	46.6	0.2	19
	17	6.7	25.3	0.3	40
Total		189.0	420.1	3.5	31

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	22.3	40.0	0.3	26
	33	6.0	21.6	0.2	41
	32	7.2	59.6	0.9	51
Project Access	6	4.4	10.7	0.1	31
Melita Rd	5	18.3	34.1	0.3	27
	27	5.0	14.8	0.1	36
Los Alamos Rd	4	12.4	26.8	0.2	31
	28	4.7	22.9	0.3	44
Mountain Hawk Way	3	22.3	39.6	0.3	25
	2	16.3	44.7	0.5	39
Calistoga Road	1	56.6	64.4	0.1	6
	26	7.7	29.8	0.3	34
Total		183.1	409.0	3.5	31

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	17.8	39.6	0.3	26
Melita Rd	2	3.8	12.1	0.1	31
	3	9.6	39.3	0.5	45
	28	4.1	22.5	0.3	45
Los Alamos Rd	4	17.1	34.5	0.3	29
	27	5.9	20.9	0.2	40
Melita Rd	5	12.7	21.9	0.1	24
Project Access	6	8.7	25.5	0.3	37
	32	1.9	7.8	0.1	43
	33	4.4	56.9	0.9	54
Oakmont Dr	7	15.8	31.0	0.2	28
	17	5.1	23.5	0.3	43
Total		106.8	335.5	3.5	38

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	12.9	30.8	0.3	33
	33	4.6	20.4	0.2	43
	32	3.8	56.3	0.9	54
Project Access	6	2.6	8.8	0.1	38
Melita Rd	5	14.6	30.5	0.3	31
	27	4.9	14.9	0.1	36
Los Alamos Rd	4	11.2	25.6	0.2	33
	28	4.5	22.5	0.3	45
Mountain Hawk Way	3	21.5	38.7	0.3	26
	2	26.4	54.4	0.5	32
Calistoga Road	1	64.4	72.1	0.1	5
	26	7.5	29.7	0.3	35
Total		178.9	404.7	3.5	32

Arterial Level of Service
PM Future plus Project 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	21.9	43.6	0.3	24
Melita Rd	2	5.0	13.5	0.1	28
	3	8.6	38.3	0.5	46
	28	4.1	22.4	0.3	45
Los Alamos Rd	4	18.8	36.0	0.3	28
	27	37.8	52.1	0.2	16
Melita Rd	5	61.0	74.6	0.1	8
Project Access	6	9.5	26.0	0.3	36
	32	0.8	6.7	0.1	50
	33	7.8	60.6	0.9	51
Oakmont Dr	7	46.1	61.3	0.2	15
	17	7.3	25.7	0.3	40
Total		228.5	460.7	3.5	28

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	131.9	147.7	0.3	7
	33	7.4	23.0	0.2	38
	32	10.6	63.2	0.9	49
Project Access	6	13.5	19.5	0.1	17
Melita Rd	5	93.8	129.9	0.3	9
	27	5.2	15.0	0.1	35
Los Alamos Rd	4	10.7	25.1	0.2	33
	28	4.4	22.8	0.3	44
Mountain Hawk Way	3	14.5	32.1	0.3	31
	2	17.4	46.8	0.5	37
Calistoga Road	1	73.7	81.0	0.1	5
	26	6.3	28.6	0.3	36
Total		389.2	634.7	3.5	21

Arterial Level of Service
PM Future plus Project MIT 07/03/2019

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	22.2	43.8	0.3	23
Melita Rd	2	5.6	14.0	0.1	27
	3	10.0	39.6	0.5	44
	28	4.2	22.5	0.3	45
Los Alamos Rd	4	21.6	38.9	0.3	26
	27	44.0	58.1	0.2	14
Melita Rd	5	56.8	70.1	0.1	8
Project Access	6	14.6	31.1	0.3	30
	32	3.4	9.3	0.1	36
	33	8.5	61.5	0.9	50
Oakmont Dr	7	32.1	46.8	0.2	19
	17	6.5	25.2	0.3	41
Total		229.5	461.0	3.5	28

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	91.3	107.5	0.3	10
	33	7.2	22.9	0.2	38
	32	8.2	60.7	0.9	50
Project Access	6	5.8	11.9	0.1	28
Melita Rd	5	20.4	36.1	0.3	26
	27	5.5	15.4	0.1	35
Los Alamos Rd	4	17.1	31.7	0.2	26
	28	5.7	24.0	0.3	42
Mountain Hawk Way	3	18.9	36.3	0.3	28
	2	12.2	41.6	0.5	42
Calistoga Road	1	39.3	47.1	0.1	8
	26	6.9	29.2	0.3	35
Total		238.4	464.4	3.5	27

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	21.4	43.2	0.3	24
Melita Rd	2	5.3	13.7	0.1	27
	3	9.6	38.7	0.5	45
	28	4.4	22.7	0.3	44
Los Alamos Rd	4	18.1	35.3	0.3	28
	27	6.4	21.6	0.2	39
Melita Rd	5	16.2	25.5	0.1	21
Project Access	6	10.0	26.5	0.3	35
	32	2.2	8.1	0.1	41
	33	5.3	58.2	0.9	53
	34	2.9	13.2	0.2	44
Oakmont Dr	7	16.9	22.0	0.1	14
	17	5.3	23.7	0.3	43
Total		124.1	352.3	3.5	36

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	15.2	33.0	0.3	31
	34	3.8	9.1	0.1	33
	33	1.6	12.4	0.2	47
	32	5.2	57.9	0.9	53
Project Access	6	3.2	9.3	0.1	36
Melita Rd	5	19.0	34.7	0.3	27
	27	5.4	15.1	0.1	35
Los Alamos Rd	4	15.8	30.3	0.2	28
	28	5.9	24.2	0.3	41
Mountain Hawk Way	3	21.7	39.2	0.3	26
	2	15.7	44.7	0.5	39
Calistoga Road	1	41.7	49.4	0.1	8
	26	6.7	28.8	0.3	36
Total		160.9	388.1	3.5	33

Arterial Level of Service
Saturday Midday Future + Project 08/22/2017

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	19.8	41.3	0.3	25
Melita Rd	2	4.6	13.1	0.1	29
	3	8.3	37.3	0.5	47
	28	4.0	22.2	0.3	45
Los Alamos Rd	4	15.9	33.3	0.3	30
	27	23.8	38.4	0.2	22
Melita Rd	5	38.5	47.6	0.1	11
Project Access	6	9.3	26.0	0.3	36
	32	0.8	6.8	0.1	49
	33	7.2	60.0	0.9	51
Oakmont Dr	7	31.5	46.1	0.2	19
	17	6.8	25.5	0.3	40
Total		170.7	397.4	3.5	32

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	19.7	37.6	0.3	27
	33	5.5	21.2	0.2	41
	32	7.7	60.0	0.9	51
Project Access	6	7.2	13.5	0.1	25
Melita Rd	5	78.6	93.3	0.3	10
	27	5.6	15.4	0.1	35
Los Alamos Rd	4	10.9	25.3	0.2	33
	28	4.4	22.4	0.3	45
Mountain Hawk Way	3	16.4	33.8	0.3	30
	2	25.2	53.8	0.5	33
Calistoga Road	1	83.1	93.1	0.1	4
	26	6.7	28.9	0.3	36
Total		271.1	498.3	3.5	26

Arterial Level of Service
Saturday Midday Future + Project MITIGATED 07/03/2019

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	21.0	42.7	0.3	24
Melita Rd	2	5.0	13.4	0.1	28
	3	8.1	37.3	0.5	47
	28	3.8	22.1	0.3	46
Los Alamos Rd	4	17.1	34.2	0.3	29
	27	26.1	40.7	0.2	21
Melita Rd	5	46.2	55.4	0.1	10
Project Access	6	17.0	33.6	0.3	28
	32	4.3	10.2	0.1	33
	33	8.9	61.5	0.9	50
Oakmont Dr	7	29.7	44.2	0.2	20
	17	6.3	24.6	0.3	42
Total		193.5	420.0	3.5	30

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	19.8	37.5	0.3	27
	33	5.5	21.0	0.2	42
	32	7.4	59.9	0.9	51
Project Access	6	6.0	12.3	0.1	27
Melita Rd	5	19.0	34.8	0.3	27
	27	4.9	14.8	0.1	36
Los Alamos Rd	4	13.5	27.8	0.2	30
	28	5.2	23.4	0.3	43
Mountain Hawk Way	3	17.5	35.1	0.3	29
	2	11.4	40.7	0.5	43
Calistoga Road	1	38.6	46.3	0.1	8
	26	6.7	28.8	0.3	36
Total		155.7	382.4	3.5	33

Arterial Level of Service: EB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Calistoga Road	1	20.1	41.7	0.3	25
Melita Rd	2	4.4	12.6	0.1	30
	3	9.8	39.1	0.5	45
	28	4.2	22.4	0.3	45
Los Alamos Rd	4	15.9	33.2	0.3	30
	27	5.6	20.6	0.2	40
Melita Rd	5	13.3	22.6	0.1	24
Project Access	6	9.3	26.0	0.3	36
	32	2.0	8.0	0.1	42
	33	5.2	58.4	0.9	53
Oakmont Dr	7	16.5	31.1	0.2	28
	17	5.1	23.7	0.3	43
Total		111.5	339.3	3.5	38

Arterial Level of Service: WB Sonoma Hwy (SR 12)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Oakmont Dr	7	11.4	29.3	0.3	35
	33	4.2	20.0	0.2	44
	32	3.7	56.3	0.9	54
Project Access	6	3.2	9.4	0.1	35
Melita Rd	5	15.9	32.0	0.3	29
	27	4.9	14.7	0.1	36
Los Alamos Rd	4	13.7	27.9	0.2	30
	28	4.9	23.1	0.3	43
Mountain Hawk Way	3	18.6	36.3	0.3	28
	2	12.2	41.4	0.5	42
Calistoga Road	1	39.9	47.7	0.1	8
	26	7.0	29.2	0.3	35
Total		139.8	367.2	3.5	35

Appendix E

Rough Proportionality Study



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November 27, 2019

Ms. Susie Murray
City of Santa Rosa Planning Division
100 Santa Rosa Avenue, Room 3
Santa Rosa, CA 95404

Rough Proportionality Study for the Elnoka CCRC Project

Dear Ms. Murray;

As requested, W-Trans has prepared a rough proportionality study for the Elnoka Continuing Care Retirement Community (CCRC) project proposed to be developed at 6160 Sonoma Highway (SR 12). The intent of the study is to assist the City in determining the proportionate traffic impacts of the CCRC as related to the mitigations to be required of the project applicant.

Background and Purpose

The project EIR identifies traffic-related mitigation measures at four intersections along Sonoma Highway (SR 12). Of these, mitigations at the project access and Oakmont Drive intersections can be completed within the public right-of-way or land controlled by the applicant. Mitigations at the Calistoga Road and Melita Road signalized intersections, however, would require acquisition of additional private right-of-way and there is uncertainty as to whether the applicant would be able to ensure their implementation. Further, improvements at these two intersections are needed to accommodate regional traffic growth in addition to the traffic growth generated by the Elnoka CCRC project. For these reasons, the City of Santa Rosa is considering adding the improvements to the Capital Improvement Program (CIP), serving as lead agency and coordinating with Caltrans to ensure their future implementation. This approach would also allow the City to collect proportional share fees from the Elnoka applicant (as well as other future development projects), using the proceeds to help fund the design, construction, and implementation of the improvements.

The U.S. Supreme Court cases *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987) and *Dolan v. City of Tigard*, 512 U.S. 374 (1994) establish that the improvements or exactions required of a development project by a public agency must be roughly proportionate to the project's impact, and that a nexus exists between the project's impact and the required improvement. With respect to the proposed Elnoka CCRC project, the traffic impact analysis contained in the EIR establishes a clear nexus between development of the project and its associated traffic impacts. The purpose of this letter is to provide additional analysis and consideration of the rough proportionality between the project's traffic impacts and the contributions it will be required to make toward alleviating them.

DEIR Mitigations

Following is a summary of the mitigation measures identified in the DEIR for the two intersections on Sonoma Highway involving proportionate share fees for mitigation. These mitigation measures would be required under Future plus Project conditions.

- Sonoma Highway/Calistoga Road – Install a 100-foot long westbound right-turn lane with right-turn overlap signal phase. The mitigation is anticipated to require minor acquisition of right-of-way. This project would be added to the City of Santa Rosa Capital Improvement Program and the applicant would pay a proportional share of the cost.

- Sonoma Highway/Melita Road (east) – Widen the westbound Sonoma Highway approach to include a minimum 400-foot-long second through lane and add a 50-foot long right-turn pocket on the northbound Melita Road approach. Alternatively, install a modern roundabout at the intersection. Either mitigation option is anticipated to require right-of-way acquisition. This project would be added to the City of Santa Rosa Capital Improvement Program and the applicant would pay a proportional share of the cost.

Approach to Establishing Rough Proportionality

For the purposes of this evaluation, rough proportionality was evaluated by considering the overall added traffic delay resulting from the project at the two intersections and determining whether the proposed mitigation measures and proportional share fees to be required of the project would be sufficient to generally offset that added delay.

Mitigation measures for the intersections are identified in the "Future plus Project" analysis completed for the project's traffic study and DEIR. At both intersections the projected delays, unacceptable levels of service, and project contributions to added delays are most pronounced during the p.m. peak hour analysis period. Accordingly, the rough proportionality assessment focuses on data from the future p.m. peak hour analysis scenario.

Following is a summary of the steps taken to confirm that a rough proportionality exists between the Elnoka CCRC project's traffic impacts and the mitigations for which it would be responsible.

1. Calculate the proportion of future traffic growth that is attributable to the Elnoka CCRC project at the Sonoma Highway/Calistoga Road and Sonoma Highway/Melita Road (east) intersections.

2. Using the intersection delay results and intersection volumes from the project's traffic study and EIR, determine the total hours of delay that drivers would encounter at the two intersections under each of the following future p.m. peak hour scenarios:
    a. No Project – Without the project and without mitigation
    b. Plus Project – With project and without mitigation
    c. Plus Project with Mitigation – With project and implementation of the mitigation measures contained in the DEIR

3. Calculate a "Proportionally-Adjusted Plus Project with Mitigation" total hourly delay that accounts for the proportion of each intersection's mitigation that would be funded by the Elnoka CCRC project. The mitigations and associated changes in delay at the Calistoga Road and Melita Drive (east) intersections are adjusted by the project's proportional share funding contributions at each location.

4. Confirm that the "Proportionally-Adjusted Plus Project with Mitigation" total hours of delay are roughly equivalent the No Project total hours of delay, with rough equivalency defined as a difference of plus or minus five percent. As long as this is the case, the project will have effectively offset its traffic impacts to the intersections through a combination of constructing improvements and payment of proportional share fees, confirming that rough proportionality has been achieved.

Proportional Share Calculation

The formula used to determine the project's proportional share responsibility for future improvements at the Sonoma Highway/Calistoga Road and Sonoma Highway/Melita Road (east) intersections was obtained from the *Guide for the Preparation of Traffic Impact Studies*, California Department of Transportation, 2002.

The formula is expressed as $P = T / (T_B - T_E)$, where:

- P = The equitable share for the proposed project's traffic impact as a percentage.
- T = The vehicle trips generated by the project during the peak hour of adjacent State highway facility in vehicles per hour (vph). For the proposed project this is the total project trips entering each intersection during the weekday p.m. peak hour.
- T_B = The forecasted traffic volume on an impacted State highway facility at the time of general plan build-out (vph). For the Elnoka CCRC project this is the total number of vehicles entering each intersection during the p.m. peak hour in the "Future plus Project" scenario.
- T_E = The traffic volume existing on the impacted State highway facility plus other approved projects that will generate traffic that has yet to be constructed/opened (vph). For the Elnoka CCRC project this is the total number of vehicles entering each intersection during the p.m. peak hour in the "Baseline" scenario.

Caltrans does not specify which peak hours to be included in the proportional share calculations, leaving this to the City's discretion. As noted above, for the purposes of the Elnoka CCRC project, the p.m. peak hour was applied as this is the period during which the traffic impact study identifies the worst-case conditions at the two subject intersections. The input values and results for each intersection are shown in Table 1.

Table 1 – PM Peak Hour Proportional Share Calculation

Intersection	Project Volume (T)	Future + Project Volume (T_B)	Baseline Volume (T_E)	Proportional Share (P)
Sonoma Highway/Calistoga Road	83	3,727	3,278	18.5%
Sonoma Highway/Melita Road (east)	98	2,828	2,423	24.2%

Rough Proportionality Assessment

The two subject intersections on Sonoma Highway are, in total, expected to encounter approximately 113.3 vehicle hours of delay during the future p.m. peak hour without mitigation and without the proposed Elnoka project. Upon the addition of project-generated traffic to this scenario, the total combined delay is projected to increase to 132.5 hours, which translates to an increase of 16.9 percent.

With implementation of the identified mitigation measures at the intersections under future plus project conditions, vehicle delay would decrease to 65.8 total hours. This represents a nearly 42 percent decrease in delays compared to future (no project) conditions without mitigation.

The Elnoka CCRC project would only be responsible for funding the portions of the mitigations identified in the "Proportional Share" column of Table 1. At Calistoga Road, the project would be responsible for funding 18.5 percent of the mitigation cost, and for the purposes of the rough proportionality assessment would therefore receive "credit" for 18.5 percent of the reductions in delay resulting from full mitigation. Similarly, at Melita Road (east), the project would be responsible for 24.2 percent of the mitigation cost and be credited for 24.2 percent of the reduced delays.

After adjusting the mitigated hours of delay to reflect only the share of mitigation to be funded by the project, the combined intersections were calculated to have 118.3 total hours of delay under future plus project conditions, which is an increase of 5.0 hours over the 113.3 total hours of delay occurring without the project. The corresponding increase in delay of 4.4 percent attributable to the project falls within the applied five percent threshold considered to achieve roughly proportionality. In order for the project to *fully* offset its added delays,

higher proportional share contributions of 25.0 percent at Calistoga Road and 32.7 percent at Melita Road (east) would be required.

Based on this assessment, the City appears to be justified in requiring the applicant to make proportional share contributions related to intersection mitigations of 18.5 to 25.0 percent at Sonoma Highway/Calistoga Road, and 24.2 to 32.7 percent at Sonoma Highway/Melita Road (east).

A summary of the applied variables and findings from the rough proportionality assessment is shown in Table 2.

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/SRO408.L2

Table 2 – PM Peak Hour Future plus Project Rough Proportionality Assessment

Sonoma Highway Intersection	Hourly Volume (vehicles)		Ave Delay/ Vehicle (sec)		Total Delay (hours)		Mitigation Required of the Project	Project Share of Cost	Delay with Full Mitigation			Delay Adjusted by Project Contribution	
	No Project	Plus Project	No Project	Plus Project	No Project	Plus Project			Ave Delay/ Vehicle	Total Hours of Delay	Compared to Project Unmitigated	Project Share of Delay Changes	Adjusted Total Hours of Delay
Using Proportional Share Values Shown in Table 1													
Calistoga Road	3,644	3,727	69.0	76.8	69.8	79.5	Pay Fee	**18.5%**	43.8	45.3	-34.2	-6.3	73.2
Melita Road (east)	2,730	2,828	57.3	67.4	43.5	52.9	Pay Fee	**24.2%**	26.0	20.4	-32.5	-7.9	45.1
Total Hours of Delay at the Intersections					113.3	132.5				65.8			118.3
Delay Change Compared to No Project						+19.2				-47.5			+5.0
Percentage Change Compared to No Project						+16.9%				-41.9%			**+4.4%**
Using Proportional Share Values Needed to Fully Offset Project Delays													
Calistoga Road	3,644	3,727	69.0	76.8	69.8	79.5	Pay Fee	**25.0%**	43.8	45.3	-34.2	-8.5	71.0
Melita Road (east)	2,730	2,828	57.3	67.4	43.5	52.9	Pay Fee	**32.7%**	26.0	20.4	-32.5	-10.6	42.3
Total Hours of Delay at the Intersections					113.3	132.5				65.8			113.3
Delay Change Compared to No Project						+19.2				-47.5			0.0
Percentage Change Compared to No Project						+16.9%				-41.9%			**0.0%**

Note: sec = seconds



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Appendix F

Draft Intersection Control Evaluation (ICE) Report



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Intersection Control Evaluation for the Elnoka CCRC Project



DRAFT

Submitted by
W-Trans

December 10, 2019

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This Intersection Control Evaluation has been prepared under the direction of the following registered traffic engineer. The registered traffic engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

Engineer's Seal

Dalene J. Whitlock, PE, PTOE Date
W-Trans

Recommended for Approval By

Whitney Lawrence III, PE Date
Caltrans District 4 ICE Coordinator

Approved By

Evelyn Gestuvo, PE Date
Caltrans District 4 Highway Operations

DRAFT

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1 Introduction and Setting

The following Intersection Control Evaluation (ICE) has been prepared for three intersections on State Route 12 in the western portion of Santa Rosa, referred to in the project area as Sonoma Highway. The study area extends from post mile SON 20.1 to SON 21.9 on Route 12. The ICE process has been initiated in response to a traffic analysis prepared for the "Elnoka CCRC" project, a continuing care retirement community to be located on Sonoma Highway near the eastern segment of Melita Road (referred to herein as the "Elnoka project"). The traffic analysis prepared for the project's environmental impact report identified the need for mitigations entailing either widening or new traffic controls at the three intersections that are the subject of this evaluation.

The contents of this ICE have been based on guidance contained in the *Traffic Operations Policy Directive 13-02, Intersection Control Evaluation*, Caltrans, 2013 as well as the *ICE Process Informational Guide 1.0*, Caltrans, 2013. The evaluation considers both traffic signal and roundabout intersection control alternatives for each location.

Study Area

The study area includes the intersections at Sonoma Highway/Calistoga Road, Sonoma Highway/Melita Road (East), and Sonoma Highway/Elnoka Project Access. The study area and intersection locations are shown in Figure 1.

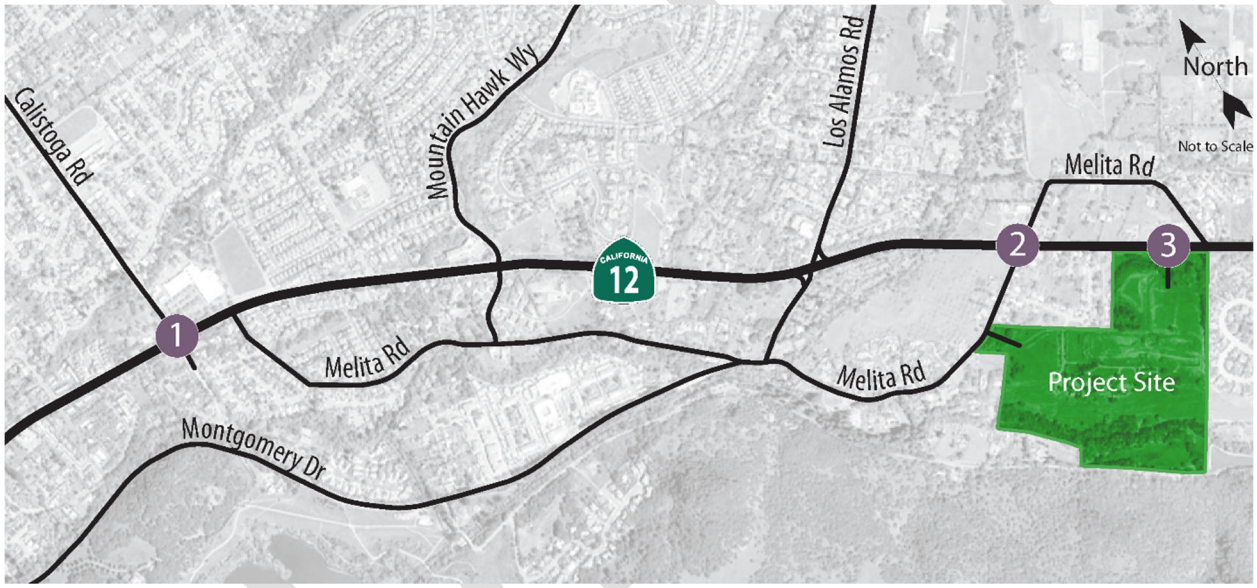


Figure 1 – Study Area

Intersection Characteristics

The three study intersections have distinct land use contexts and characteristics. Sonoma Highway/ Calistoga Road is an existing major signalized intersection in an urban setting with existing development on three of the four intersection corners. Sonoma Highway/Melita Road (East) is also signalized but located in a rural/suburban area with abutting development only on the north side of the highway. Sonoma Highway/Elnoka Project Access is currently only a paved driveway apron but would be converted to a public "tee" intersection in the future, with the south leg being the primary access to the proposed Elnoka project. The intersection is in a currently-undeveloped area.

A summary of the three intersections' contextual, traffic, roadway, and multimodal characteristics is shown in Table 1. Intersection turning movements for the weekday a.m., weekday p.m., and weekend midday peak hours are shown in Figure 2 for both existing and future conditions.

Table 1 – Study Intersection Characteristics

Category	Intersection 1 - Sonoma Highway/Calistoga Road		Intersection 2 - Sonoma Highway/Melita Road		Intersection 3 - Sonoma Highway/Project Access	
	Sonoma Highway	**Calistoga Road**	**Sonoma Highway**	**Melita Road**	**Sonoma Highway**	**Project Access**
Land Use Context	Urban residential, shopping center on northeast intersection corner		Rural suburban residential area, gas station and service commercial on north side		Rural suburban residential area, mostly undeveloped near intersection	
Natural Context	Generally flat to north, hillside to south		Generally flat, Melita Creek crossing 200 feet east of intersection		Generally flat to rolling; south fork of Melita Creek 150 feet south of intersection	
Existing Control	Signalized		Signalized		STOP on northbound project access approach	
Year 2040 Volume	37,300 Average Daily Entering Vehicles		28,300 Average Daily Entering Vehicles		25,700 Average Daily Entering Vehicles	
Lane Cross Section	4-lane highway	NB 2-lane local street; SB 3-lane arterial	East leg: 3-lane highway; West leg: 1-lane approach w/ 2-lane departure	NB and SB 2-lane local street	3-lane highway	NB 2-lane local street
Speed Limit	45 mph	35 mph	50 mph	30 mph	50 mph	25 mph
Pedestrian Facilities	West leg: sidewalks on south side; East leg: sidewalks on north side	North leg: sidewalks on east side; South leg: sidewalks on west side	None; off-street path planned on south side of highway in future	None	None; off-street path planned on south side of highway in future	None; future development would construct in tandem with street extension
Bicycle Facilities	Existing shoulders; bike lanes planned in future	Bike lanes north of Sonoma Hwy	Existing shoulders; off-street path planned in future	None Designated in Bike Plan	Existing shoulders; off-street path planned in future	None Designated in Bike Plan
Transit	SCT Routes 30 and 34; stops at intersection	CityBus Routes 4 and 4B; stops at intersection	SCT Routes 30 and 34; stops at intersection	None	SCT Routes 30 and 34; stops 220 feet east	None

Notes: NB=northbound; SB=southbound; SCT=Sonoma County Transit

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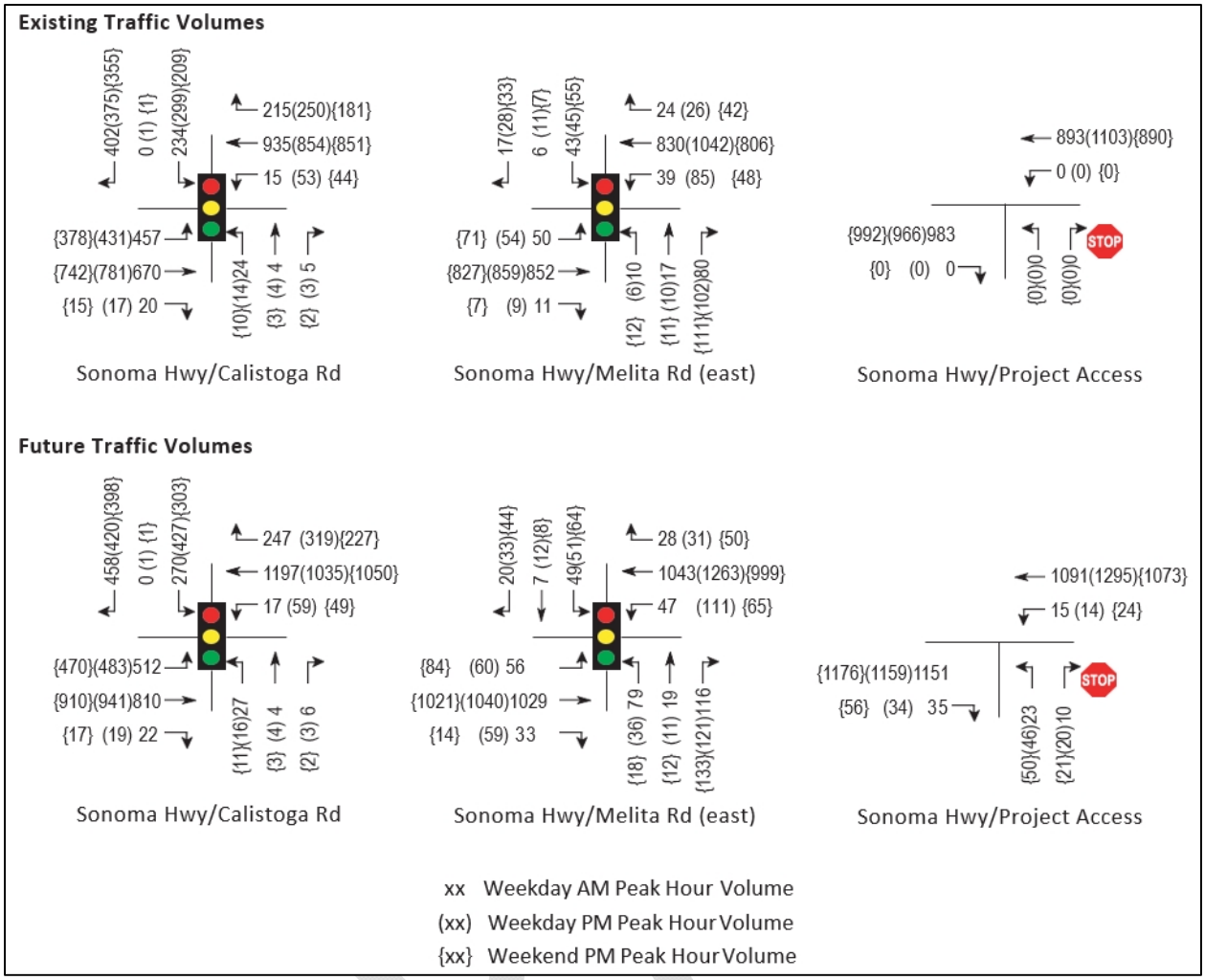
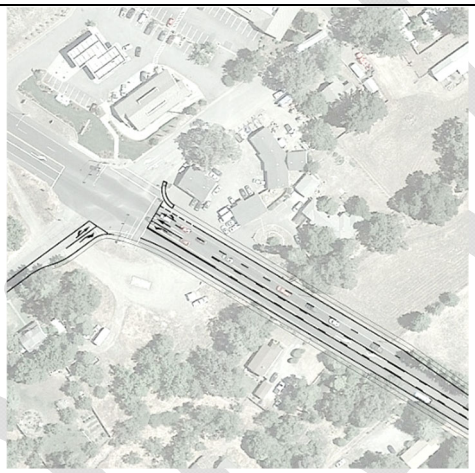
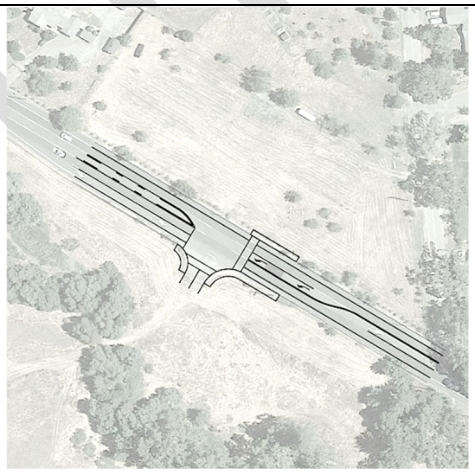


Figure 2 – Peak Hour Traffic Volumes

2 Intersection Control Alternatives

Conceptual geometric footprints were developed for each of the three intersections assuming signalized control and roundabout control. The inscribed circle diameter (ICD) dimensions of the roundabouts range from 140 to 160 feet as shown. All of the alternatives are projected to achieve the City of Santa Rosa's LOS D operational threshold under year 2040 conditions including development of the Elnoka project. The intersection control alternatives are summarized in Table 2, and larger-format exhibits are included in Appendix A.

Table 2 – Intersection Control Alternatives

Intersection	Widened/New Signalized Intersection	Roundabout Intersection
Sonoma Hwy/ Calistoga Rd	 Widen highway to add 100-ft westbound right-turn lane and overlap signal phase	 160-ft ICD roundabout with dual lane entries/ exits on highway and southbound bypass
Sonoma Hwy/ Melita Rd E	 Widen highway to two westbound lanes 400-ft upstream; add northbound right-turn lane	 160-ft ICD roundabout with highway realignment and 2-lane transition to east
Sonoma Hwy/ Elnoka Project Access	 Install new traffic signal	 140-ft ICD roundabout with highway realignment and flared entries/exits

Physical Footprints and Potential Constraints

Following is a summary of how each alternative would physically alter the intersection footprint. Any known physical constraints and areas where right-of-way would need to be acquired are also identified.

Sonoma Highway/Calistoga Road

The signalized alternative entails adding a 100-foot long westbound right-turn lane to the intersection. This modification would require some minor land acquisition from the abutting shopping center though no impacts to buildings or the shopping center's onsite parking or circulation are anticipated.

The roundabout alternative would include reconfiguration of the intersection and its approaches. A roundabout with an approximate 160-foot ICD would be needed to achieve adequate deflection and large vehicle maneuverability. Both Sonoma Highway approaches would include dual-lane entries and exits, and a southbound-to westbound continuous bypass lane with downstream merge would be needed. The roundabout would require right-of-way acquisition on the northwest, southwest, and southeast corners, though no structures would be affected. The hillside on the south side of Sonoma Highway as well as on the northwest intersection corner present a challenge, and substantial grading may be required both to construct the intersection and achieve adequate intersection sight distance. A utility pole on the southwest intersection corner would need to be relocated. Access to a single-family home on the southeast intersection corner, and potentially to future development on the northwest corner, would be affected.



Hillside and Utility Constraints on south side of Sonoma Highway/Calistoga Road



Area of minor widening for Signal Alternative at Sonoma Highway/Calistoga Road

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Sonoma Highway/Melita Road (East)

The signalized alternative includes widening on the westbound and northbound approaches. The westbound approach would be widened to provide dual through lanes of approximately 400 feet in length plus transitions. The northbound approach would require minor widening to create a 50-foot long right-turn pocket. Right-of-way would need to be obtained from privately-held parcels abutting the north side of the highway to obtain space for the second westbound through lane. Access and onsite circulation at the two service commercial parcels on the northeast intersection corner would be affected. The existing culvert at Melita Creek to the east of the intersection would need to be widened.



Gas Transmission Line Infrastructure on southeast corner of Sonoma Highway/Melita Road (East)

The roundabout alternative would need to include dual entry and exit lanes on the Sonoma Highway legs while the Melita Road legs would include single-lane entry and exit lanes. The roundabout would need an approximate ICD of 160 feet to achieve adequate deflection and large vehicle maneuverability. Sonoma Highway would transition from two through lanes in each direction to one through lane in each direction approximately 150 feet east of the roundabout. Right-of-way acquisition would be needed on the southeast and southwest corners. Most of this land is publicly-owned by the State of California though one privately-held parcel at 6016 Sonoma Highway would also be affected; while no structures would be affected on this parcel, the widening would position highway lanes much closer to the residence than they currently are. As with the signalized alternative, the Melita Creek culvert east of the intersection would need to be widened. An existing PG&E gas transmission line runs along the south side of Sonoma Highway including infrastructure on the southeast intersection corner that would likely require relocation, potentially at substantial cost.

Sonoma Highway/Elnoka Project Access

The traffic analysis for the Elnoka project determined that signal warrants would be met at the intersection. Signalization of the intersection would be relatively straightforward as no new lanes would be required. In tandem with signalization, nearby transit stops on Sonoma Highway would be relocated closer to the signal per recommendations in the traffic analysis, and a pedestrian crossing would be added on the east intersection leg. No additional right-of-way would be needed.

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The roundabout alternative entails realigning Sonoma Highway southward into the Elnoka project site since land on the north side of the highway is not publicly-owned or controlled by the developer. A 140-foot ICD roundabout would be needed to achieve adequate deflection and vehicle maneuverability. A single power pole on the southeast intersection corner would require a relatively straightforward relocation. Sonoma Highway would flare to dual entering lanes in each direction and merge back to single lanes on the exits. While this configuration provides capacity, in practice it has been found to facilitate passing movements by aggressive drivers during non-peak traffic conditions, particularly on higher-speed two-lane corridors like Sonoma Highway. Because neither Caltrans nor the City of Santa Rosa plan to widen Sonoma Highway to four lanes through this area in the next 20 years, the flared dual lane roundabout configuration could also be considered incompatible with the highway's design. The alternative would also necessitate a substantial right-of-way acquisition, though this could potentially come in the form of a dedication required of the Elnoka project developer.



Project Access looking west on Sonoma Highway

3 Capacity Assessment

The traffic impact analysis completed for the Elnoka project evaluated operating conditions during the weekday a.m., weekday p.m., and weekend midday peak hours. Analysis scenarios include Existing, Baseline (constituting existing plus approved projects), and Future conditions both with and without the Elnoka project. A summary of key intersection level of service calculations is contained in Table 3, and copies of the calculations are included in Appendix B.

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Table 3 – Levels of Service by Intersection Control Alternative						
Study Intersection Condition	**Weekday AM Peak**		**Weekday PM Peak**		**Weekend Midday Peak**	
	Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
Sonoma Highway/Calistoga Road						
Existing - Signal	43.6	D	37.1	D	26.4	C
Future with Elnoka – Without Mitigation	85.0	F	76.8	E	56.5	E
Future with Elnoka – Signal Alternative	45.6	D	43.8	D	34.5	C
Future with Elnoka - Roundabout Alternative	26.5	D	29.0	D	18.6	C
Sonoma Highway/Melita Road (East)						
Existing - Signal	16.4	B	25.7	C	18.4	B
Future with Elnoka – Without Mitigation	40.9	D	67.4	E	33.4	C
Future with Elnoka - Signal Alternative	26.4	C	26.0	C	22.2	C
Future with Elnoka - Roundabout Alternative	10.8	B	12.5	B	10.7	B
Sonoma Highway/Elnoka Access						
Existing – No Intersection	-	-	-	-	-	-
Future with Elnoka – Without Mitigation	74.8	F	166.6	F	70.3	F
Future with Elnoka - Signal Alternative	8.3	A	11.8	B	13.2	B
Future with Elnoka - Roundabout Alternative	12.6	B	19.1	C	13.3	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Roundabout LOS designations are based on HCM delay breakpoints for unsignalized intersections, which differ from those used for signals

Installation of either the signal or roundabout alternative at each intersection would result in acceptable LOS D or better operation in the future. At Sonoma Highway/Calistoga Road, both alternatives are projected to operate at LOS D. At Sonoma Highway/Melita Road (East), the roundabout alternative would operate somewhat better than the signal alternative, while at Sonoma Highway/Elnoka Project Access the service level would be better with the signalized alternative during the a.m. peak hour and with a roundabout during the p.m. peak hour.

4 Queueing Assessment

The projected 95th percentile queues on the approaches to each of the study intersections were determined under future plus project conditions using the SIMTRAFFIC application of Synchro for non-roundabout options and from SIDRA for roundabout options. The results are summarized in Table 4. Copies of the queuing calculations for roundabout conditions are included in Appendix B, and copies of the SIMTRAFFIC output for non-roundabout conditions are contained in Appendix C.

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Table 4 – 95th Percentile Approach Queues by Intersection Control Alternative										
Study Intersection	**Storage**	**Future + Project w/o Mitigation**			**Future + Project Signal Alt**			**Future + Project Roundabout Alt**		
Approach		**AM**	**PM**	**WMD**	**AM**	**PM**	**WMD**	**AM**	**PM**	**WMD**
Sonoma Hwy/Calistoga Rd										
Northbound Calistoga Rd	220	47	49	39	60	43	32	9	7	4
Southbound Calistoga Rd	730	289	540	296	255	511	278	95	244	97
Eastbound Sonoma Hwy	1,200	242	280	283	281	286	344	249	471	320
Westbound Sonoma Hwy	1,070	598	630	651	551	468	574	679	443	347
Sonoma Hwy/Melita Rd (East)										
Northbound Melita Rd	375	205	165	164	196	153	158	51	36	39
Southbound Melita Rd	590	87	82	103	83	96	100	14	22	21
Eastbound Sonoma Hwy	1,920	1,520	1,703	1,434	1,310	1,636	1,598	184	475	208
Westbound Sonoma Hwy	1,260	1,248	**1,516**	**1,385**	349	910	376	80	113	75
Sonoma Hwy/Project Access										
Northbound Melita Rd	300	220	275	211	54	87	74	6	12	13
Eastbound Sonoma Hwy	540	0	0	0	212	212	298	204	197	214
Westbound Sonoma Hwy	320	27	56	56	189	302	206	177	261	169

Notes: 95th percentile queue based on the average of ten SIMTRAFFIC runs; all distances are measured in feet; WMD=Weekend Midday; NB=Northbound; SB=Southbound; EB=Eastbound; WB=Westbound; **Bold** text = queue length extends beyond upstream intersection

The 95th percentile queues on westbound Sonoma Highway at Melita Road (East) are expected to exceed available storage without mitigation. Under mitigated conditions with either signals or roundabouts, queues are projected to be acceptable. The projected queues with roundabout controls are generally much shorter than those with signals.

5 Multimodal Considerations

The three subject intersections are located in a suburban context with relatively low levels of pedestrian activity, though all three are adjacent to Sonoma County Transit bus stops and play an important role in pedestrian accessibility to transit. The Sonoma Highway/Project Access intersection is anticipated to encounter increased pedestrian activity associated with the Elnoka CCRC project, particularly by senior residents of the development, as pedestrians will need to cross Sonoma Highway to reach the Sonoma County Transit bus stop serving westbound routes. Bicyclist activity is present on the corridor. A planned multi-use path along the highway will run adjacent to the Melita Road and Project Access intersections and serve pedestrian and bicycle travel in the future.

The signal alternatives would include crosswalks with pedestrian signal heads and push buttons. The roundabout alternatives would presumably be uncontrolled crosswalks though driver attention to crossing pedestrians could be enhanced by installing pedestrian-activated crosswalk warning lights. Pedestrians would cross between three and seven lanes of traffic with the signal alternatives, and one to two lanes at a time with the roundabout alternatives. The roundabout alternatives would be designed with peripheral multi-use pathways designed to allow less-confident bicyclists to avoid riding through the roundabout's circulating lanes.

Multi-lane roundabouts can present a greater challenge to pedestrians (including those with impaired vision) and bicyclists than single-lane roundabouts or signals, particularly in higher-speed locations such as the three

intersections. While many of these challenges can be alleviated through careful design, making multi-lane roundabouts comfortable to use for all pedestrians and bicyclists remains challenging.

6 Safety Considerations

The collision histories for the three intersections were evaluated in the Elnoka project's traffic analysis. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports for the five-year period between January 1, 2012 and December 31, 2016.

As shown in Table 5, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2014 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The collision rates at the two existing intersections is equivalent to or lower than the statewide average for similar facilities.

Table 5 – Collision History

Study Intersection	Number of Collisions (2007-2016)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
Sonoma Highway/Calistoga Road	15	0.27	0.27
Sonoma Highway/Melita Road (East)	6	0.14	0.27
Sonoma Highway/Elnoka Project Access[1]	n/a	-	-

Note: c/mve = collisions per million vehicles entering; [1] intersection does not currently exist

The Caltrans *Local Roadway Safety Manual* (LRSM) helps quantify the potential safety benefits of various safety applications. The LRSM estimates that converting a signalized intersection to a roundabout has the potential to reduce the rate of crashes by 35 to 67 percent. The wide range stems from a variety of factors including traffic volume, location (urban versus rural), and roundabout type. Studies have generally found that single-lane roundabout have lower crash rates than multi-lane roundabouts. One study[1] of conversions from signalized intersections to multi-lane roundabouts found an average collision reduction of approximately five percent overall, with a reduction in collisions involving fatalities and injuries of approximately 63 percent.

While none of the intersections are currently encountering higher-than-average collision rates, conversion to roundabouts would be expected to reduce collision frequency, particularly with respect to collisions involving fatalities and injuries.

7 Screening Evaluation

Seven screening criteria were applied to the no-build, signalized, and roundabout alternatives. A summary of the applied criteria is shown in Table 6, followed by a discussion of each criterion.

[1] http://www.cmfclearinghouse.org/cmfpdf.cfm?facid=4934

Table 6 – Screening Evaluation Summary									
Criteria	**Sonoma Hwy/ Calistoga Rd**			**Sonoma Hwy/ Melita Rd (E)**			**Sonoma Hwy/ Project Access**		
	No-Build	Signal Alt	RB Alt	No-Build	Signal Alt	RB Alt	No-Build	Signal Alt	RB Alt
Traffic Operation	▼	▲	▲	▼	▲	▲	▼	▲	▲
Multimodal Circulation	□	□	□	□	▲	▲	▼	▲	▼
Relative Safety	□	□	▲	□	□	▲	▼	□	▲
Access Impacts	□	□	▼	□	▼	▼	□	□	□
Right of Way Impacts	□	▼	▼	□	▼	▼	□	□	▼
Utility Impacts	□	□	▼	□	□	▼	□	□	□
Community Support	▼	▲	▼	▼	▲	▼	▼	▲	▼
Planning Level Cost	□	$	$$$	□	$$$	$$$$	□	$	$$$

Notes: ▲ Positive Effect; □ Minimal/No Effect; ▼ Negative Effect; $ = under 1 million dollars; $$ = 1 to 3 million dollars; $$$ = 3 to 5 million dollars; $$$$ = over 5 million dollars

Screening Criteria Discussion

Traffic Operation

Either the signal-based alternatives or roundabout alternatives would result in acceptable traffic operation, while the no-project condition would result in deficient operation at all three locations. Roundabout alternatives would generally operate equivalent to or better than signals at the Calistoga Road and Melita Road (East) intersections, while a signal would operate better at the Project Access intersection.

Multimodal Circulation

Both the signal and roundabout alternatives could be designed to accommodate multimodal circulation. Multi-lane roundabouts can present challenges to vision-impaired and senior pedestrians, as well as bicyclists, though there are also safety benefits associated with the geometrically-regulated vehicle speeds inherent with roundabout intersections. The Sonoma Highway/Project Access intersection is anticipated to accommodate a higher proportion of senior-aged pedestrians than most locations, and a signal with dedicated pedestrian walk phases would likely be preferred over a multi-lane roundabout for this user group.

Safety

The frequency and severity of collisions at each of the intersections would likely be lower with roundabouts versus signals, based on available research. At the project access, installation of either a signal or roundabout would be expected to result in superior safety compared to the no-build condition.

Access Impacts

The signalized alternative at Calistoga Road would not affect access; the roundabout alternative would modestly affect access to a home on the southeast intersection corner and would potentially affect access to a future development site on the northwest corner. At Melita Road, both the signal and roundabout alternatives would affect access to businesses on the northeast intersection corner, and the widening associated with the signal alternative may also affect onsite circulation at these properties. The roundabout alternative would also modestly affect access to a home on the southeast intersection corner. Neither alternative would affect access at the project access intersection.

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Right of Way Impacts

At the Calistoga Road intersection, the signal alternative would require modest right-of-way acquisition on the northeast intersection corner, with no repercussions to the existing onsite parking at the abutting shopping center. The roundabout alternative would require substantial right-of-way acquisition on the northeast, southwest, and southeast intersection corners. At the Melita Road intersection, the signalized alternative would likely require right-of-way acquisition from several properties along the north side of Sonoma Highway on the northeast intersection quadrant. The roundabout alternative would not affect these properties but would require substantial land on the southwest and southeast intersection corners; however, nearly all of this land is owned by Caltrans, except for a small area along the frontage of a home on the southeast corner near Melita Creek. At the project access intersection, a signal would require no right-of-way while a roundabout would require substantial right-of-way from the proposed Elnoka CCRC project including reconfiguration of proposed circulation and parking areas.

Utility Impacts

None of the signalized alternatives appear to result in any impacts to utilities. The roundabout alternative at Calistoga Road would require relocation of a utility pole, which could be somewhat complex since the pole forms the junction of two electricity distribution lines. The roundabout alternative at Melita Road is likely to have significant utility impacts given the presence of a PG&E gas transmission line on the south side of Sonoma Highway, including utility vaults and infrastructure related to the gas line on the southeast intersection corner that would be within the roundabout's relocated roadway. At the project access intersection, the roundabout alternative would likely require relocation of a single power pole, though this appears to be a relatively routine modification.

Community Support

In general, the community in the study area is sensitive to traffic congestion and would not be supportive of increased delays without mitigation (the "no build" scenarios). The community is familiar with traffic signals and most would be expected to favor signal-based improvements over roundabouts. There is a single-lane roundabout in lower Sonoma Valley on Arnold Drive at Agua Caliente Road, though no multi-lane roundabouts currently exist in the region. The study area also has a substantial senior population, which is a user group that in some communities has been reluctant to embrace roundabouts, at least initially.

Planning-Level Cost

The report *Roundabout Practices: A Synthesis of Highway Practice (NCHRP Synthesis 488)*, NCHRP, 2016, includes planning-level estimates for roundabout costs that are based on input from state transportation agencies throughout the United States. The report indicates that the average surveyed construction cost for a multi-lane roundabout was approximately $2.0 million, ranging up to a maximum of $6.0 million. Based on the concept roundabout layout footprint, topography, potential utility impacts, and right-of-way acquisitions, a roundabout at the Calistoga Road intersection is estimated to fall in the range of $3.0 to 5.0 million. The signalized alternative is estimated to have a substantially lower cost of less than $1 million.

At the Melita Road intersection, the roundabout option is estimated to have a cost of over $5 million given the substantial amount of roadway realignment required as well as significant costs associated with relocating gas transmission line infrastructure. The signalized option is estimated to have a lower cost in the $3.0 to 5.0 million range; the costs of both the roundabout and signal would be affected by the need to widen the Melita Creek culvert east of the intersection.

Installation of a traffic signal at the project access intersection is anticipated to have a cost of well below $1.0 million. A roundabout would be expected to have a substantially higher cost in the $3.0 to $5.0 million range given the extent of roadway realignment required.

9 Recommendations

Sonoma Highway/Calistoga Road

The signalized option entails a minor intersection modification with relatively low risk and cost, in contrast to the roundabout option which requires major reconstruction, right-of-way acquisition from multiple parcels, utility impacts, and a significantly higher cost. It is recommended that the roundabout option be eliminated from further consideration.

Sonoma Highway/Melita Road (East)

Both the signal and roundabout options would be major projects with anticipated costs exceeding $3 million, would have implications on access to private properties, and would require right-of-way acquisition. Either option would result in acceptable operation and could be designed to effectively accommodate multimodal circulation. The potential costs and implications associated with relocation of gas transmission line infrastructure is a considerable risk factor for the roundabout alternative. Because these repercussions will require further study to determine actual impacts, however, it is recommended that both the signal and roundabout alternatives be retained for further consideration at this time.

Sonoma Highway/Project Access

Both the signal and roundabout alternatives at the project access intersection appear to be physically feasible and would result in acceptable operation. The roundabout alternative would, however, require "flaring" the Sonoma Highway entry, circulating, and exit lanes to dual lanes, while adjacent highway segments would remain one lane in each direction. This configuration can result in undesirable driver behavior, particularly during off-peak periods when the widened section through the roundabout can be used by aggressive drivers as a passing opportunity. Because neither Caltrans nor the City have plans to widen this segment in the foreseeable future, a multi-lane roundabout could be considered incompatible with the highway. The roundabout alternative would also have slightly higher delays than the signal option, would require right-of-way from the Elnoka project including site reconfiguration, and would be substantially more expensive than a signal. Finally, the intersection is anticipated to routinely encounter seniors walking across Sonoma Highway to reach a bus stop, and this user group is likely to be more comfortable in using a signalized intersection with dedicated pedestrian crossing phase than a multi-lane roundabout. For these reasons, it is recommended that the roundabout alternative be eliminated from further consideration.

10 Persons Consulted and Study Participants

Persons Consulted

Caltrans District 4

ICE Coordinator	Whitney Lawrence III, PE
Highway Operations	Evelyn Gestuvo, PE
Regional PM Sonoma County	Betcy Joseph, PE
Assoc. Transportation Planner	Michael McHenry

City of Santa Rosa

Deputy Director Public Works	Robert Sprinkle, PE
Assistant City Attorney	Molly Maclean
Senior Planner	Susie Murray

Study Participants

W-Trans

Project Manager	Zachary Matley, AICP
Editing/Formatting	Alex Scrobonia
Project Oversight	Dalene J. Whitlock, PE, PTOE

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11 Appendices

Appendix A – Roundabout Footprint Exhibits
Appendix B – Intersection Level of Service Calculations
Appendix C – SIMTRAFFIC Queuing Output

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Appendix A

Roundabout Footprint Exhibits

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1" = 100'

N

Potential Right of Way Acquisition

Note: Preliminary concept is intended to show approximate roundabout configuration and footprint only; concept does not depict pedestrian/bicyclist facilities or medians and has not undergone detailed performance testing (fastest-path speeds, vehicle overlap, design vehicle maneuverability)

Sonoma Highway/Calistoga Road Approximate Roundabout Footprint

10/2019

For Discussion Purposes Only

W-Trans

1" = 100'

N

Potential Right of Way Acquisition

Note: Preliminary concept is intended to show approximate roundabout configuration and footprint only; concept does not depict pedestrian/bicyclist facilities or medians and has not undergone detailed performance testing (fastest-path speeds, vehicle overlap, design vehicle maneuverability)

Sonoma Highway/Project Access Approximate Roundabout Footprint

10/2019

For Discussion Purposes Only

W-Trans

1" = 100'

N

Potential Right of Way Acquisition

Note: Preliminary concept is intended to show approximate roundabout configuration and footprint only; concept does not depict pedestrian/bicyclist facilities or medians and has not undergone detailed performance testing (fastest-path speeds, vehicle overlap, design vehicle maneuverability)

Sonoma Highway/Melita Road Approximate Roundabout Footprint

10/2019

For Discussion Purposes Only

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Appendix B

Intersection Level of Service Calculations

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HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	457	670	20	15	935	215	24	4	5	234	0	402
Future Volume (veh/h)	457	670	20	15	935	215	24	4	5	234	0	402
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	502	736	13	16	1027	131	26	4	3	257	0	267
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	602	1642	739	58	1026	131	109	17	13	320	0	563
Arrive On Green	0.18	0.48	0.48	0.03	0.33	0.33	0.08	0.08	0.08	0.18	0.00	0.18
Sat Flow, veh/h	3408	3438	1548	1774	3074	392	1390	214	160	1757	0	1568
Grp Volume(v), veh/h	502	736	13	16	576	582	33	0	0	257	0	267
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1741	1764	0	0	1757	0	1568
Q Serve(g_s), s	12.9	12.9	0.4	0.8	30.2	30.2	1.6	0.0	0.0	12.7	0.0	11.9
Cycle Q Clear(g_c), s	12.9	12.9	0.4	0.8	30.2	30.2	1.6	0.0	0.0	12.7	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.23	0.79		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	602	1642	739	58	576	581	139	0	0	320	0	563
V/C Ratio(X)	0.83	0.45	0.02	0.27	1.00	1.00	0.24	0.00	0.00	0.80	0.00	0.47
Avail Cap(c_a), veh/h	840	1642	739	202	576	581	700	0	0	483	0	709
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	15.7	12.5	42.7	30.1	30.1	39.1	0.0	0.0	35.5	0.0	22.4
Incr Delay (d2), s/veh	5.2	0.3	0.0	2.5	37.6	37.8	0.9	0.0	0.0	5.7	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	6.1	0.2	0.4	20.3	20.5	0.8	0.0	0.0	6.6	0.0	5.2
LnGrp Delay(d),s/veh	41.1	16.0	12.5	45.2	67.8	68.0	40.0	0.0	0.0	41.2	0.0	23.0
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1251			1174			33			524	
Approach Delay, s/veh		26.0			67.6			40.0			31.9	
Approach LOS		C			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	49.0		21.6	20.7	36.0		12.2
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.8	14.9		14.7	14.9	32.2		3.6
Green Ext Time (p_c), s	0.0	19.0		1.8	1.1	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	43.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	852	11	39	830	24	10	17	80	43	6	17
Future Volume (veh/h)	50	852	11	39	830	24	10	17	80	43	6	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	52	888	8	41	865	22	10	18	19	45	6	8
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	208	1141	10	169	1081	27	72	100	82	232	26	189
Arrive On Green	0.12	0.64	0.64	0.10	0.61	0.61	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1791	16	1774	1757	45	170	834	681	1270	219	1583
Grp Volume(v), veh/h	52	0	896	41	0	887	47	0	0	51	0	8
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	0	1802	1685	0	0	1488	0	1583
Q Serve(g_s), s	2.2	0.0	30.1	1.8	0.0	31.4	0.0	0.0	0.0	0.1	0.0	0.4
Cycle Q Clear(g_c), s	2.2	0.0	30.1	1.8	0.0	31.4	2.1	0.0	0.0	2.2	0.0	0.4
Prop In Lane	1.00		0.01	1.00		0.02	0.21		0.40	0.88		1.00
Lane Grp Cap(c), veh/h	208	0	1151	169	0	1108	253	0	0	259	0	189
V/C Ratio(X)	0.25	0.00	0.78	0.24	0.00	0.80	0.19	0.00	0.00	0.20	0.00	0.04
Avail Cap(c_a), veh/h	295	0	1416	274	0	1390	552	0	0	517	0	479
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.8	0.0	11.0	35.3	0.0	12.3	33.5	0.0	0.0	33.6	0.0	32.8
Incr Delay (d2), s/veh	0.6	0.0	2.5	0.7	0.0	2.9	0.3	0.0	0.0	0.4	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	1.1	0.0	15.5	0.9	0.0	16.4	1.0	0.0	0.0	1.1	0.0	0.2
LnGrp Delay(d),s/veh	34.5	0.0	13.5	36.0	0.0	15.2	33.9	0.0	0.0	34.0	0.0	32.9
LnGrp LOS	C		B	D		B	C			C		C
Approach Vol, veh/h		948			928			47			59	
Approach Delay, s/veh		14.6			16.1			33.9			33.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.0	59.6		13.6	12.9	57.8		13.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	3.8	32.1		4.2	4.2	33.4		4.1
Green Ext Time (p_c), s	0.0	19.1		0.5	0.0	18.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	431	781	17	53	854	250	14	4	3	299	1	375
Future Volume (veh/h)	431	781	17	53	854	250	14	4	3	299	1	375
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1817	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	459	831	15	56	909	137	15	4	1	318	1	270
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	559	1440	648	133	990	149	87	23	6	376	1	594
Arrive On Green	0.16	0.42	0.42	0.07	0.33	0.33	0.06	0.06	0.06	0.21	0.21	0.21
Sat Flow, veh/h	3408	3438	1547	1774	3004	453	1335	356	89	1752	6	1568
Grp Volume(v), veh/h	459	831	15	56	522	524	20	0	0	319	0	270
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1726	1730	1780	0	0	1757	0	1568
Q Serve(g_s), s	11.9	16.9	0.5	2.8	26.5	26.5	1.0	0.0	0.0	15.9	0.0	11.8
Cycle Q Clear(g_c), s	11.9	16.9	0.5	2.8	26.5	26.5	1.0	0.0	0.0	15.9	0.0	11.8
Prop In Lane	1.00		1.00	1.00		0.26	0.75		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	559	1440	648	133	569	570	115	0	0	377	0	594
V/C Ratio(X)	0.82	0.58	0.02	0.42	0.92	0.92	0.17	0.00	0.00	0.85	0.00	0.45
Avail Cap(c_a), veh/h	833	1591	716	200	572	573	700	0	0	480	0	685
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.8	20.3	15.6	40.3	29.4	29.4	40.3	0.0	0.0	34.4	0.0	21.3
Incr Delay (d2), s/veh	4.2	0.6	0.0	2.1	20.2	20.2	0.7	0.0	0.0	10.8	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	8.1	0.2	1.4	15.8	15.9	0.5	0.0	0.0	8.8	0.0	5.2
LnGrp Delay(d),s/veh	41.0	20.9	15.6	42.4	49.6	49.6	41.0	0.0	0.0	45.1	0.0	21.8
LnGrp LOS	D	C	B	D	D	D	D			D		C
Approach Vol, veh/h		1305			1102			20			589	
Approach Delay, s/veh		27.9			49.2			41.0			34.5	
Approach LOS		C			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	44.0		24.7	19.7	35.9		11.0
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.8	18.9		17.9	13.9	28.5		3.0
Green Ext Time (p_c), s	0.0	16.7		1.7	1.1	1.5		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	37.1
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	859	9	85	1042	26	6	10	102	45	11	28
Future Volume (veh/h)	54	859	9	85	1042	26	6	10	102	45	11	28
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	55	877	9	87	1063	25	6	10	31	46	11	18
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	196	1141	12	212	1142	25	51	54	124	199	41	183
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1788	18	1774	1761	41	84	468	1070	1147	353	1583
Grp Volume(v), veh/h	55	0	886	87	0	1088	47	0	0	57	0	18
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	0	1802	1622	0	0	1500	0	1583
Q Serve(g_s), s	2.8	0.0	34.3	4.5	0.0	52.9	0.0	0.0	0.0	0.4	0.0	1.0
Cycle Q Clear(g_c), s	2.8	0.0	34.3	4.5	0.0	52.9	2.5	0.0	0.0	2.9	0.0	1.0
Prop In Lane	1.00		0.01	1.00		0.02	0.13		0.66	0.81		1.00
Lane Grp Cap(c), veh/h	196	0	1152	212	0	1167	229	0	0	239	0	183
V/C Ratio(X)	0.28	0.00	0.77	0.41	0.00	0.93	0.21	0.00	0.00	0.24	0.00	0.10
Avail Cap(c_a), veh/h	253	0	1214	235	0	1193	457	0	0	444	0	411
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.2	0.0	12.7	40.2	0.0	15.9	39.7	0.0	0.0	39.8	0.0	39.0
Incr Delay (d2), s/veh	0.8	0.0	3.0	1.3	0.0	13.0	0.4	0.0	0.0	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	18.0	2.3	0.0	31.7	1.2	0.0	0.0	1.4	0.0	0.4
LnGrp Delay(d),s/veh	41.0	0.0	15.7	41.4	0.0	30.1	40.1	0.0	0.0	40.3	0.0	39.2
LnGrp LOS	D		B	D		C	D			D		D
Approach Vol, veh/h		941			1175			47			75	
Approach Delay, s/veh		17.2			31.0			40.1			40.1	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.8	68.5		14.9	13.9	69.4		14.9
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.3	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	6.5	36.3		4.9	4.8	54.9		4.5
Green Ext Time (p_c), s	0.1	20.6		0.5	0.1	8.5		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	25.7
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	378	742	15	44	851	181	10	3	2	209	1	355
Future Volume (veh/h)	378	742	15	44	851	181	10	3	2	209	1	355
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	390	765	7	45	877	118	10	3	0	215	1	182
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	506	1519	680	127	1112	150	88	26	0	283	1	487
Arrive On Green	0.15	0.44	0.44	0.07	0.36	0.36	0.06	0.06	0.00	0.16	0.16	0.16
Sat Flow, veh/h	3408	3438	1539	1774	3051	410	1380	414	0	1749	8	1568
Grp Volume(v), veh/h	390	765	7	45	496	499	13	0	0	216	0	182
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1736	1794	0	0	1757	0	1568
Q Serve(g_s), s	8.7	12.7	0.2	1.9	20.3	20.3	0.5	0.0	0.0	9.3	0.0	7.2
Cycle Q Clear(g_c), s	8.7	12.7	0.2	1.9	20.3	20.3	0.5	0.0	0.0	9.3	0.0	7.2
Prop In Lane	1.00		1.00	1.00		0.24	0.77		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	506	1519	680	127	629	633	115	0	0	285	0	487
V/C Ratio(X)	0.77	0.50	0.01	0.36	0.79	0.79	0.11	0.00	0.00	0.76	0.00	0.37
Avail Cap(c_a), veh/h	958	1830	819	230	657	661	812	0	0	552	0	725
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.5	15.9	12.4	35.1	22.5	22.5	35.0	0.0	0.0	31.8	0.0	21.3
Incr Delay (d2), s/veh	2.5	0.4	0.0	1.7	6.6	6.6	0.4	0.0	0.0	4.2	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	6.0	0.1	1.0	10.8	10.9	0.3	0.0	0.0	4.8	0.0	3.2
LnGrp Delay(d),s/veh	35.0	16.3	12.4	36.8	29.1	29.0	35.4	0.0	0.0	35.9	0.0	21.8
LnGrp LOS	C	B	B	D	C	C	D			D		C
Approach Vol, veh/h		1162			1040			13			398	
Approach Delay, s/veh		22.5			29.4			35.4			29.5	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.4	40.8		17.9	16.5	34.7		10.2
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	3.9	14.7		11.3	10.7	22.3		2.5
Green Ext Time (p_c), s	0.0	17.7		1.5	1.1	6.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	26.4
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	827	7	48	806	42	12	11	111	55	7	33
Future Volume (veh/h)	71	827	7	48	806	42	12	11	111	55	7	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	76	880	5	51	857	39	13	12	25	59	7	4
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	237	1142	6	186	1042	47	79	70	98	231	23	186
Arrive On Green	0.13	0.64	0.64	0.10	0.61	0.61	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1798	10	1774	1718	78	235	583	818	1291	195	1561
Grp Volume(v), veh/h	76	0	885	51	0	896	50	0	0	66	0	4
Grp Sat Flow(s),veh/h/ln	1774	0	1808	1774	0	1796	1636	0	0	1486	0	1561
Q Serve(g_s), s	3.4	0.0	31.1	2.4	0.0	34.8	0.0	0.0	0.0	0.8	0.0	0.2
Cycle Q Clear(g_c), s	3.4	0.0	31.1	2.4	0.0	34.8	2.4	0.0	0.0	3.2	0.0	0.2
Prop In Lane	1.00		0.01	1.00		0.04	0.26		0.50	0.89		1.00
Lane Grp Cap(c), veh/h	237	0	1149	186	0	1090	246	0	0	254	0	186
V/C Ratio(X)	0.32	0.00	0.77	0.27	0.00	0.82	0.20	0.00	0.00	0.26	0.00	0.02
Avail Cap(c_a), veh/h	279	0	1342	259	0	1313	511	0	0	489	0	448
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.9	0.0	11.6	36.7	0.0	13.7	35.5	0.0	0.0	35.8	0.0	34.6
Incr Delay (d2), s/veh	0.8	0.0	2.6	0.8	0.0	3.9	0.4	0.0	0.0	0.5	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	1.7	0.0	16.1	1.2	0.0	18.1	1.1	0.0	0.0	1.5	0.0	0.1
LnGrp Delay(d),s/veh	35.7	0.0	14.1	37.5	0.0	17.6	35.9	0.0	0.0	36.3	0.0	34.6
LnGrp LOS	D		B	D		B	D			D		C
Approach Vol, veh/h		961			947			50			70	
Approach Delay, s/veh		15.8			18.7			35.9			36.2	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.3	62.5		14.1	14.9	59.9		14.1
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.3	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	14.8	33.1		5.2	5.4	36.8		4.4
Green Ext Time (p_c), s	0.0	18.8		0.6	0.1	17.1		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	18.4
HCM 2010 LOS	B

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HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/24/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Future Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1815	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	533	844	15	18	1247	157	28	4	4	281	0	311
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	627	1610	725	64	987	124	112	16	16	342	0	593
Arrive On Green	0.18	0.47	0.47	0.04	0.32	0.32	0.08	0.08	0.08	0.19	0.00	0.19
Sat Flow, veh/h	3408	3438	1548	1774	3080	386	1368	195	195	1757	0	1568
Grp Volume(v), veh/h	533	844	15	18	696	708	36	0	0	281	0	311
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1725	1741	1759	0	0	1757	0	1568
Q Serve(g_s), s	14.3	16.3	0.5	0.9	30.2	30.2	1.8	0.0	0.0	14.5	0.0	14.5
Cycle Q Clear(g_c), s	14.3	16.3	0.5	0.9	30.2	30.2	1.8	0.0	0.0	14.5	0.0	14.5
Prop In Lane	1.00		1.00	1.00		0.22	0.78		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	627	1610	725	64	553	558	144	0	0	342	0	593
V/C Ratio(X)	0.85	0.52	0.02	0.28	1.26	1.27	0.25	0.00	0.00	0.82	0.00	0.52
Avail Cap(c_a), veh/h	806	1610	725	194	553	558	670	0	0	464	0	702
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.2	17.7	13.5	44.3	32.0	32.0	40.6	0.0	0.0	36.4	0.0	22.7
Incr Delay (d2), s/veh	6.9	0.4	0.0	2.4	130.8	134.9	0.9	0.0	0.0	8.4	0.0	0.7
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	7.3	7.8	0.2	0.5	34.3	35.3	0.9	0.0	0.0	7.8	0.0	6.4
LnGrp Delay(d),s/veh	44.2	18.1	13.5	46.6	162.8	166.9	41.5	0.0	0.0	44.8	0.0	23.4
LnGrp LOS	D	B	B	D	F	F	D			D		C
Approach Vol, veh/h		1392			1422			36			592	
Approach Delay, s/veh		28.0			163.4			41.5			33.6	
Approach LOS		C			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	49.9		23.4	22.0	36.0		12.8
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	2.9	18.3		16.5	16.3	32.2		3.8
Green Ext Time (p_c), s	0.0	19.7		1.8	1.1	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	85.0
HCM 2010 LOS	F

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Future Volume (veh/h)	512	810	22	17	1197	247	27	4	6	270	0	458
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1810	1845	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	533	844	15	18	1247	157	28	4	4	281	0	311
Adj No. of Lanes	2	2	1	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	5	2	2	5	3	2	2	2	2	2	3
Cap, veh/h	550	1664	749	63	1230	861	109	16	16	345	0	561
Arrive On Green	0.16	0.48	0.48	0.04	0.36	0.36	0.08	0.08	0.08	0.20	0.00	0.20
Sat Flow, veh/h	3408	3438	1548	1774	3438	1547	1368	195	195	1757	0	1568
Grp Volume(v), veh/h	533	844	15	18	1247	157	36	0	0	281	0	311
Grp Sat Flow(s),veh/h/ln	1704	1719	1548	1774	1719	1547	1759	0	0	1757	0	1568
Q Serve(g_s), s	15.7	16.9	0.5	1.0	36.1	5.1	1.9	0.0	0.0	15.4	0.0	16.0
Cycle Q Clear(g_c), s	15.7	16.9	0.5	1.0	36.1	5.1	1.9	0.0	0.0	15.4	0.0	16.0
Prop In Lane	1.00		1.00	1.00		1.00	0.78		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	550	1664	749	63	1230	861	140	0	0	345	0	561
V/C Ratio(X)	0.97	0.51	0.02	0.29	1.01	0.18	0.26	0.00	0.00	0.82	0.00	0.55
Avail Cap(c_a), veh/h	550	1664	749	158	1230	861	610	0	0	451	0	656
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.1	17.8	13.6	47.4	32.4	11.2	43.7	0.0	0.0	38.8	0.0	26.0
Incr Delay (d2), s/veh	30.3	0.4	0.0	2.5	29.2	0.1	1.0	0.0	0.0	8.5	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	8.1	0.2	0.5	22.1	3.2	1.0	0.0	0.0	8.3	0.0	7.0
LnGrp Delay(d),s/veh	72.4	18.2	13.6	49.9	61.6	11.3	44.6	0.0	0.0	47.3	0.0	26.8
LnGrp LOS	E	B	B	D	F	B	D			D		C
Approach Vol, veh/h		1392			1422			36			592	
Approach Delay, s/veh		38.9			55.9			44.6			36.6	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.3	54.6		24.9	21.0	41.9		13.1
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9	43.4		25.9	* 16	36.1		35.0
Max Q Clear Time (g_c+I1), s	3.0	18.9		18.0	17.7	38.1		3.9
Green Ext Time (p_c), s	0.0	19.9		1.8	0.0	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

MOVEMENT SUMMARY

Site: 1 [Hwy 12/Calistoga Multi Lane RB AM Future plus Project with Bypass]

Highway 12/Calistoga Rd (2 lane approaches SB, EB, WB)
AM Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Calistoga												
3	L2	28	2.0	0.122	13.5	LOS B	0.4	9.4	0.79	0.79	0.79	29.4
8	T1	4	2.0	0.122	13.5	LOS B	0.4	9.4	0.79	0.79	0.79	29.4
18	R2	6	2.0	0.122	13.5	LOS B	0.4	9.4	0.79	0.79	0.79	28.7
Approach		39	2.0	0.122	13.5	LOS B	0.4	9.4	0.79	0.79	0.79	29.3
East: WB Hwy 12												
1	L2	18	4.0	0.963	46.4	LOS E	25.8	676.8	1.00	2.02	3.83	21.3
6	T1	1247	6.0	0.963	46.4	LOS E	26.2	678.9	1.00	2.02	3.82	21.3
16	R2	257	2.0	0.963	46.0	LOS E	26.2	678.9	1.00	2.01	3.81	21.0
Approach		1522	5.3	0.963	46.3	LOS E	26.2	678.9	1.00	2.02	3.82	21.3
North: SB Calistoga												
7	L2	281	4.0	0.662	26.8	LOS D	3.7	94.9	0.86	1.08	1.67	24.8
4	T1	1	2.0	0.662	26.6	LOS D	3.7	94.9	0.86	1.08	1.67	24.9
14	R2	477	4.0	0.296	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	36.9
Approach		759	4.0	0.662	10.0	LOS A	3.7	94.9	0.32	0.40	0.62	31.1
West: EB Hwy 12												
5	L2	533	4.0	0.689	14.3	LOS B	9.6	248.8	0.73	0.86	1.24	29.1
2	T1	844	6.0	0.689	14.5	LOS B	9.6	248.8	0.72	0.86	1.24	30.2
12	R2	23	2.0	0.689	14.4	LOS B	9.5	247.5	0.72	0.86	1.24	29.8
Approach		1400	5.2	0.689	14.4	LOS B	9.6	248.8	0.73	0.86	1.24	29.7
All Vehicles		3720	5.0	0.963	26.5	LOS D	26.2	678.9	0.76	1.24	2.16	25.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/24/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Future Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1811	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	58	1072	31	49	1086	26	74	20	57	51	7	11
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	193	1114	32	167	1094	26	128	40	71	210	25	237
Arrive On Green	0.11	0.64	0.64	0.09	0.62	0.62	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1774	1752	51	1774	1760	42	509	269	472	969	166	1583
Grp Volume(v), veh/h	58	0	1103	49	0	1112	151	0	0	58	0	11
Grp Sat Flow(s),veh/h/ln	1774	0	1802	1774	0	1802	1250	0	0	1135	0	1583
Q Serve(g_s), s	3.1	0.0	60.0	2.7	0.0	63.8	8.0	0.0	0.0	0.0	0.0	0.6
Cycle Q Clear(g_c), s	3.1	0.0	60.0	2.7	0.0	63.8	12.9	0.0	0.0	4.9	0.0	0.6
Prop In Lane	1.00		0.03	1.00		0.02	0.49		0.38	0.88		1.00
Lane Grp Cap(c), veh/h	193	0	1146	167	0	1120	239	0	0	235	0	237
V/C Ratio(X)	0.30	0.00	0.96	0.29	0.00	0.99	0.63	0.00	0.00	0.25	0.00	0.05
Avail Cap(c_a), veh/h	237	0	1146	221	0	1120	380	0	0	363	0	386
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.9	0.0	17.8	44.1	0.0	19.6	44.0	0.0	0.0	39.8	0.0	38.1
Incr Delay (d2), s/veh	0.9	0.0	18.2	1.0	0.0	25.1	2.8	0.0	0.0	0.5	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	1.6	0.0	35.2	1.4	0.0	39.0	4.4	0.0	0.0	1.5	0.0	0.3
LnGrp Delay(d),s/veh	43.8	0.0	36.0	45.1	0.0	44.6	46.7	0.0	0.0	40.3	0.0	38.1
LnGrp LOS	D		D	D		D	D			D		D
Approach Vol, veh/h		1161			1161			151			69	
Approach Delay, s/veh		36.4			44.6			46.7			40.0	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.9	72.5		19.2	14.4	71.0		19.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	14.7	62.0		6.9	5.1	65.8		14.9
Green Ext Time (p_c), s	0.0	3.7		1.1	0.1	0.0		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	40.9
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Future Volume (veh/h)	56	1029	33	47	1043	28	71	19	116	49	7	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1863	1811	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	58	1072	31	49	1086	26	74	20	57	51	7	11
Adj No. of Lanes	1	1	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	194	1113	32	168	2129	51	128	40	71	211	25	237
Arrive On Green	0.11	0.64	0.64	0.09	0.62	0.62	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1774	1752	51	1774	3432	82	509	270	473	970	166	1583
Grp Volume(v), veh/h	58	0	1103	49	544	568	151	0	0	58	0	11
Grp Sat Flow(s),veh/h/ln	1774	0	1802	1774	1720	1794	1252	0	0	1136	0	1583
Q Serve(g_s), s	3.1	0.0	59.8	2.7	18.3	18.3	7.9	0.0	0.0	0.0	0.0	0.6
Cycle Q Clear(g_c), s	3.1	0.0	59.8	2.7	18.3	18.3	12.8	0.0	0.0	4.9	0.0	0.6
Prop In Lane	1.00		0.03	1.00		0.05	0.49		0.38	0.88		1.00
Lane Grp Cap(c), veh/h	194	0	1145	168	1067	1113	239	0	0	235	0	237
V/C Ratio(X)	0.30	0.00	0.96	0.29	0.51	0.51	0.63	0.00	0.00	0.25	0.00	0.05
Avail Cap(c_a), veh/h	239	0	1152	222	1083	1129	378	0	0	361	0	382
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	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.6	0.0	17.8	43.8	11.0	11.0	43.7	0.0	0.0	39.5	0.0	37.8
Incr Delay (d2), s/veh	0.9	0.0	18.4	1.0	0.5	0.4	2.7	0.0	0.0	0.5	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	1.6	0.0	35.3	1.4	8.8	9.1	4.4	0.0	0.0	1.5	0.0	0.3
LnGrp Delay(d),s/veh	43.4	0.0	36.2	44.7	11.4	11.4	46.4	0.0	0.0	40.1	0.0	37.9
LnGrp LOS	D		D	D	B	B	D			D		D
Approach Vol, veh/h		1161			1161			151			69	
Approach Delay, s/veh		36.6			12.8			46.4			39.7	
Approach LOS		D			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.8	72.0		19.1	14.4	70.5		19.1
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.0	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	14.7	61.8		6.9	5.1	20.3		14.8
Green Ext Time (p_c), s	0.0	4.2		1.1	0.1	28.7		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	26.4
HCM 2010 LOS	C

MOVEMENT SUMMARY

Site: 2 [Hwy 12/Melita Multi Lane RB AM Future plus Project]

Highway 12/Melita (2 lanes EB and WB on Hwy 12)
PM Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Melita												
3	L2	74	3.0	0.450	15.8	LOS C	2.0	51.0	0.77	0.87	1.14	29.2
8	T1	20	3.0	0.450	15.8	LOS C	2.0	51.0	0.77	0.87	1.14	29.2
18	R2	121	3.0	0.450	15.8	LOS C	2.0	51.0	0.77	0.87	1.14	28.5
Approach		215	3.0	0.450	15.8	LOS C	2.0	51.0	0.77	0.87	1.14	28.8
East: WB Hwy 12												
1	L2	49	3.0	0.500	8.6	LOS A	3.0	79.5	0.43	0.28	0.43	33.0
6	T1	1086	6.0	0.500	8.7	LOS A	3.0	79.5	0.43	0.28	0.43	32.9
16	R2	29	3.0	0.500	8.6	LOS A	3.0	79.4	0.43	0.28	0.43	32.2
Approach		1165	5.8	0.500	8.7	LOS A	3.0	79.5	0.43	0.28	0.43	32.9
North: SB Melita												
7	L2	51	3.0	0.170	10.2	LOS B	0.6	14.3	0.70	0.70	0.70	30.9
4	T1	7	3.0	0.170	10.2	LOS B	0.6	14.3	0.70	0.70	0.70	30.9
14	R2	21	3.0	0.170	10.2	LOS B	0.6	14.3	0.70	0.70	0.70	30.1
Approach		79	3.0	0.170	10.2	LOS B	0.6	14.3	0.70	0.70	0.70	30.7
West: EB Hwy 12												
5	L2	58	3.0	0.732	14.2	LOS B	7.0	183.9	0.56	0.33	0.56	30.5
2	T1	1072	6.0	0.732	12.1	LOS B	7.0	183.9	0.49	0.29	0.49	31.3
12	R2	34	3.0	0.227	4.9	LOS A	1.0	26.6	0.26	0.14	0.26	34.0
Approach		1165	5.8	0.732	12.0	LOS B	7.0	183.9	0.49	0.29	0.49	31.4
All Vehicles		2623	5.5	0.732	10.8	LOS B	7.0	183.9	0.49	0.34	0.52	31.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1151	35	15	1091	23	10
Future Vol, veh/h	1151	35	15	1091	23	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1199	36	16	1136	24	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1199	0	2367	1199
Stage 1	-	-	-	-	1199	-
Stage 2	-	-	-	-	1168	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	350	-	~ 11	115
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	162	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	350	-	~ 10	115
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	155	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	74.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	84	-	-	350	-
HCM Lane V/C Ratio	0.409	-	-	0.045	-
HCM Control Delay (s)	74.8	-	-	15.8	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	1.6	-	-	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1151	35	15	1091	23	10
Future Volume (veh/h)	1151	35	15	1091	23	10
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1199	36	16	1136	24	10
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1410	1234	32	1532	38	16
Arrive On Green	0.78	0.78	0.02	0.85	0.03	0.03
Sat Flow, veh/h	1810	1583	1774	1810	1178	491
Grp Volume(v), veh/h	1199	36	16	1136	35	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1717	0
Q Serve(g_s), s	39.5	0.5	0.8	23.5	1.8	0.0
Cycle Q Clear(g_c), s	39.5	0.5	0.8	23.5	1.8	0.0
Prop In Lane		1.00	1.00		0.69	0.29
Lane Grp Cap(c), veh/h	1410	1234	32	1532	55	0
V/C Ratio(X)	0.85	0.03	0.49	0.74	0.63	0.00
Avail Cap(c_a), veh/h	1681	1471	98	1870	472	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.6	2.3	44.2	2.9	43.5	0.0
Incr Delay (d2), s/veh	3.8	0.0	11.1	1.3	11.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.2	0.5	11.6	1.0	0.0
LnGrp Delay(d),s/veh	10.4	2.3	55.4	4.1	54.8	0.0
LnGrp LOS	B	A	E	A	D	
Approach Vol, veh/h	1235			1152	35	
Approach Delay, s/veh	10.1			4.9	54.8	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.2	77.4				83.5		7.4
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.8	41.5				25.5		3.8
Green Ext Time (p_c), s	0.0	29.4				39.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

MOVEMENT SUMMARY

Site: 3 [AM Future + Project Flared on SR 12]

Highway 12/Project Access (flared approaches/exits on Hwy 12)
AM Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Elnoka Lane												
3	L2	24	1.0	0.072	8.5	LOS A	0.2	5.9	0.68	0.68	0.68	21.7
18	R2	10	1.0	0.072	8.5	LOS A	0.2	5.9	0.68	0.68	0.68	21.1
Approach		34	1.0	0.072	8.5	LOS A	0.2	5.9	0.68	0.68	0.68	21.5
East: WB SR 12												
1	L2	16	1.0	0.194	4.2	LOS A	0.9	22.4	0.11	0.03	0.11	35.2
6	T1	1136	6.0	0.715	11.3	LOS B	6.7	176.8	0.21	0.07	0.21	35.4
Approach		1152	5.9	0.715	11.2	LOS B	6.7	176.8	0.21	0.07	0.21	35.4
West: EB SR 12												
2	T1	1199	6.0	0.791	14.3	LOS B	7.8	204.4	0.18	0.05	0.18	33.2
12	R2	36	1.0	0.217	4.4	LOS A	1.0	26.0	0.08	0.02	0.08	33.1
Approach		1235	5.9	0.791	14.0	LOS B	7.8	204.4	0.17	0.05	0.17	33.2
All Vehicles		2422	5.8	0.791	12.6	LOS B	7.8	204.4	0.20	0.07	0.20	34.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Future Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1818	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	493	960	16	60	1056	203	16	4	1	436	1	306
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	581	1381	621	130	878	168	89	22	6	440	1	661
Arrive On Green	0.17	0.40	0.40	0.07	0.30	0.30	0.07	0.07	0.07	0.25	0.25	0.25
Sat Flow, veh/h	3408	3438	1547	1774	2884	553	1356	339	85	1753	4	1568
Grp Volume(v), veh/h	493	960	16	60	631	628	21	0	0	437	0	306
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1727	1710	1779	0	0	1757	0	1568
Q Serve(g_s), s	13.9	23.0	0.6	3.2	30.2	30.2	1.1	0.0	0.0	24.6	0.0	13.9
Cycle Q Clear(g_c), s	13.9	23.0	0.6	3.2	30.2	30.2	1.1	0.0	0.0	24.6	0.0	13.9
Prop In Lane	1.00		1.00	1.00		0.32	0.76		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	581	1381	621	130	526	521	117	0	0	441	0	661
V/C Ratio(X)	0.85	0.70	0.03	0.46	1.20	1.21	0.18	0.00	0.00	0.99	0.00	0.46
Avail Cap(c_a), veh/h	766	1462	658	184	526	521	644	0	0	441	0	661
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.9	24.6	18.0	44.1	34.5	34.5	43.8	0.0	0.0	37.1	0.0	20.6
Incr Delay (d2), s/veh	6.9	1.5	0.0	2.5	107.4	110.0	0.7	0.0	0.0	40.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	11.2	0.3	1.7	30.0	30.1	0.6	0.0	0.0	16.8	0.0	6.1
LnGrp Delay(d),s/veh	46.8	26.2	18.0	46.6	141.9	144.5	44.6	0.0	0.0	77.5	0.0	21.1
LnGrp LOS	D	C	B	D	F	F	D			E		C
Approach Vol, veh/h		1469			1319			21			743	
Approach Delay, s/veh		33.0			138.8			44.6			54.3	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	45.6		30.0	21.6	36.0		11.6
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	5.2	25.0		26.6	15.9	32.2		3.1
Green Ext Time (p_c), s	0.0	14.7		0.0	1.0	0.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	76.8
HCM 2010 LOS	E

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Future Volume (veh/h)	483	941	19	59	1035	319	16	4	3	427	1	420
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		0.99	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
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1810	1845	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	493	960	16	60	1056	203	16	4	1	436	1	306
Adj No. of Lanes	2	2	1	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	5	2	2	5	3	2	2	2	2	2	3
Cap, veh/h	529	1446	651	126	1156	906	88	22	5	432	1	630
Arrive On Green	0.16	0.42	0.42	0.07	0.34	0.34	0.06	0.06	0.06	0.25	0.25	0.25
Sat Flow, veh/h	3408	3438	1547	1774	3438	1545	1356	339	85	1753	4	1568
Grp Volume(v), veh/h	493	960	16	60	1056	203	21	0	0	437	0	306
Grp Sat Flow(s),veh/h/ln	1704	1719	1547	1774	1719	1545	1779	0	0	1757	0	1568
Q Serve(g_s), s	15.0	23.6	0.6	3.4	30.9	6.6	1.2	0.0	0.0	25.9	0.0	15.2
Cycle Q Clear(g_c), s	15.0	23.6	0.6	3.4	30.9	6.6	1.2	0.0	0.0	25.9	0.0	15.2
Prop In Lane	1.00		1.00	1.00		1.00	0.76		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	529	1446	651	126	1156	906	115	0	0	433	0	630
V/C Ratio(X)	0.93	0.66	0.02	0.48	0.91	0.22	0.18	0.00	0.00	1.01	0.00	0.49
Avail Cap(c_a), veh/h	529	1446	651	152	1182	918	593	0	0	433	0	630
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.8	24.4	17.8	46.9	33.4	10.5	46.5	0.0	0.0	39.5	0.0	23.3
Incr Delay (d2), s/veh	23.5	1.3	0.0	2.8	10.9	0.2	0.8	0.0	0.0	45.3	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	11.5	0.3	1.8	16.4	4.6	0.6	0.0	0.0	18.0	0.0	6.6
LnGrp Delay(d),s/veh	67.3	25.7	17.8	49.7	44.3	10.7	47.2	0.0	0.0	84.9	0.0	23.9
LnGrp LOS	E	C	B	D	D	B	D			F		C
Approach Vol, veh/h		1469			1319			21			743	
Approach Delay, s/veh		39.6			39.4			47.2			59.8	
Approach LOS		D			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.1	50.0		31.0	21.0	41.1		11.9
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9	43.4		25.9	* 16	36.1		35.0
Max Q Clear Time (g_c+I1), s	5.4	25.6		27.9	17.0	32.9		3.2
Green Ext Time (p_c), s	0.0	15.0		0.0	0.0	2.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	43.8
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

MOVEMENT SUMMARY

Site: 1 [Hwy 12/Calistoga Multi Lane RB PM Future plus Project with Bypass]

Highway 12/Calistoga Rd (2 lane approaches SB, EB, WB)
PM Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Calistoga												
3	L2	16	2.0	0.091	15.8	LOS C	0.3	6.8	0.83	0.83	0.83	28.7
8	T1	4	2.0	0.091	15.8	LOS C	0.3	6.8	0.83	0.83	0.83	28.7
18	R2	3	2.0	0.091	15.8	LOS C	0.3	6.8	0.83	0.83	0.83	28.0
Approach		23	2.0	0.091	15.8	LOS C	0.3	6.8	0.83	0.83	0.83	28.6
East: WB Hwy 12												
1	L2	60	4.0	0.866	29.6	LOS D	16.9	441.7	0.96	1.59	2.63	25.3
6	T1	1056	6.0	0.866	29.5	LOS D	17.2	443.4	0.96	1.59	2.63	25.3
16	R2	326	2.0	0.866	29.2	LOS D	17.2	443.4	0.97	1.59	2.63	24.8
Approach		1442	5.0	0.866	29.5	LOS D	17.2	443.4	0.97	1.59	2.63	25.2
North: SB Calistoga												
7	L2	436	4.0	0.886	45.8	LOS E	9.4	243.8	0.92	1.50	2.94	20.6
4	T1	1	2.0	0.886	45.7	LOS E	9.4	243.8	0.92	1.50	2.94	20.7
14	R2	429	4.0	0.499	7.2	LOS A	2.8	71.9	0.64	0.65	0.68	33.0
Approach		865	4.0	0.886	26.7	LOS D	9.4	243.8	0.78	1.08	1.82	25.2
West: EB Hwy 12												
5	L2	493	4.0	0.874	29.9	LOS D	18.2	471.2	0.98	1.62	2.69	24.4
2	T1	960	6.0	0.874	30.2	LOS D	18.2	471.2	0.97	1.62	2.69	25.0
12	R2	19	2.0	0.874	30.0	LOS D	17.9	469.8	0.97	1.62	2.69	24.7
Approach		1472	5.3	0.874	30.1	LOS D	18.2	471.2	0.97	1.62	2.69	24.8
All Vehicles		3803	4.9	0.886	29.0	LOS D	18.2	471.2	0.93	1.48	2.46	25.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Future Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1812	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	1061	60	113	1289	30	37	11	50	52	12	23
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	201	1083	61	218	1149	19	88	35	77	180	35	183
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	1699	96	1774	1762	41	337	301	665	989	302	1583
Grp Volume(v), veh/h	61	0	1121	113	0	1319	98	0	0	64	0	23
Grp Sat Flow(s),veh/h/ln	1774	0	1795	1774	0	1803	1302	0	0	1291	0	1583
Q Serve(g_s), s	3.2	0.0	61.0	6.1	0.0	65.8	3.2	0.0	0.0	0.0	0.0	1.3
Cycle Q Clear(g_c), s	3.2	0.0	61.0	6.1	0.0	65.8	7.9	0.0	0.0	4.8	0.0	1.3
Prop In Lane	1.00		0.05	1.00		0.02	0.38		0.51	0.81		1.00
Lane Grp Cap(c), veh/h	201	0	1145	218	0	1168	201	0	0	215	0	183
V/C Ratio(X)	0.30	0.00	0.98	0.52	0.00	1.13	0.49	0.00	0.00	0.30	0.00	0.13
Avail Cap(c_a), veh/h	245	0	1167	227	0	1168	404	0	0	403	0	398
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.2	0.0	17.7	41.5	0.0	17.9	42.9	0.0	0.0	41.5	0.0	40.1
Incr Delay (d2), s/veh	0.8	0.0	21.3	1.9	0.0	69.4	1.8	0.0	0.0	0.8	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	10.8	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	36.7	3.1	0.0	58.7	2.7	0.0	0.0	1.7	0.0	0.6
LnGrp Delay(d),s/veh	42.0	0.0	39.0	43.4	0.0	98.1	44.8	0.0	0.0	42.3	0.0	40.4
LnGrp LOS	D		D	D		F	D			D		D
Approach Vol, veh/h		1182			1432			98			87	
Approach Delay, s/veh		39.2			93.8			44.8			41.8	
Approach LOS		D			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	70.8		15.2	14.5	71.8		15.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	3.0	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	3.1	63.0		6.8	5.2	67.8		9.9
Green Ext Time (p_c), s	0.1	1.8		0.9	0.1	0.0		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	67.4
HCM 2010 LOS	E

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Future Volume (veh/h)	60	1040	59	111	1263	31	36	11	121	51	12	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	4	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1812	1900	1863	1811	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	1061	60	113	1289	30	37	11	50	52	12	23
Adj No. of Lanes	1	1	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	200	1088	62	217	2232	51	87	34	76	177	34	182
Arrive On Green	0.11	0.64	0.64	0.12	0.65	0.65	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1699	96	1774	3435	80	333	300	659	983	300	1583
Grp Volume(v), veh/h	61	0	1121	113	645	674	98	0	0	64	0	23
Grp Sat Flow(s),veh/h/ln	1774	0	1795	1774	1720	1795	1292	0	0	1283	0	1583
Q Serve(g_s), s	3.2	0.0	61.0	6.1	21.5	21.5	3.2	0.0	0.0	0.0	0.0	1.3
Cycle Q Clear(g_c), s	3.2	0.0	61.0	6.1	21.5	21.5	8.1	0.0	0.0	4.9	0.0	1.3
Prop In Lane	1.00		0.05	1.00		0.04	0.38		0.51	0.81		1.00
Lane Grp Cap(c), veh/h	200	0	1150	217	1118	1166	197	0	0	211	0	182
V/C Ratio(X)	0.30	0.00	0.98	0.52	0.58	0.58	0.50	0.00	0.00	0.30	0.00	0.13
Avail Cap(c_a), veh/h	243	0	1168	226	1118	1166	394	0	0	395	0	389
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	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.6	0.0	17.6	42.0	10.2	10.2	43.4	0.0	0.0	42.0	0.0	40.6
Incr Delay (d2), s/veh	0.8	0.0	20.4	1.9	0.8	0.8	1.9	0.0	0.0	0.8	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	36.4	3.1	10.7	11.1	2.8	0.0	0.0	1.7	0.0	0.6
LnGrp Delay(d),s/veh	42.4	0.0	38.0	43.9	11.0	11.0	45.4	0.0	0.0	42.8	0.0	40.9
LnGrp LOS	D		D	D	B	B	D			D		D
Approach Vol, veh/h		1182			1432			98			87	
Approach Delay, s/veh		38.2			13.6			45.4			42.3	
Approach LOS		D			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	71.3		15.2	14.5	72.3		15.2
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	3.0	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	3.1	63.0		6.9	5.2	23.5		10.1
Green Ext Time (p_c), s	0.1	2.3		0.9	0.1	30.6		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	26.0
HCM 2010 LOS	C

MOVEMENT SUMMARY

Site: 2 [Hwy 12/Melita Multi Lane RB PM Future plus Project]

Highway 12/Melita (2 lanes EB and WB on Hwy 12)
PM Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Melita												
3	L2	37	3.0	0.357	13.4	LOS B	1.4	36.2	0.74	0.80	0.96	30.4
8	T1	11	3.0	0.357	13.4	LOS B	1.4	36.2	0.74	0.80	0.96	30.4
18	R2	123	3.0	0.357	13.4	LOS B	1.4	36.2	0.74	0.80	0.96	29.6
Approach		171	3.0	0.357	13.4	LOS B	1.4	36.2	0.74	0.80	0.96	29.8
East: WB Hwy 12												
1	L2	113	3.0	0.591	10.0	LOS B	4.3	112.6	0.43	0.25	0.43	32.1
6	T1	1289	6.0	0.591	10.1	LOS B	4.3	112.6	0.43	0.25	0.43	32.2
16	R2	32	3.0	0.591	10.0	LOS B	4.3	112.2	0.43	0.25	0.43	31.5
Approach		1434	5.7	0.591	10.1	LOS B	4.3	112.6	0.43	0.25	0.43	32.2
North: SB Melita												
7	L2	52	3.0	0.259	14.1	LOS B	0.9	22.1	0.78	0.80	0.86	29.5
4	T1	12	3.0	0.259	14.1	LOS B	0.9	22.1	0.78	0.80	0.86	29.6
14	R2	34	3.0	0.259	14.1	LOS B	0.9	22.1	0.78	0.80	0.86	28.8
Approach		98	3.0	0.259	14.1	LOS B	0.9	22.1	0.78	0.80	0.86	29.3
West: EB Hwy 12												
5	L2	61	3.0	0.793	17.9	LOS C	18.1	474.5	0.76	0.83	1.26	29.1
2	T1	1061	6.0	0.793	15.4	LOS C	18.1	474.5	0.68	0.70	1.07	30.0
12	R2	60	3.0	0.247	5.3	LOS A	1.1	28.8	0.35	0.22	0.35	33.7
Approach		1183	5.7	0.793	15.0	LOS C	18.1	474.5	0.66	0.68	1.04	30.1
All Vehicles		2886	5.4	0.793	12.5	LOS B	18.1	474.5	0.56	0.48	0.73	31.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1159	34	14	1295	46	20
Future Vol, veh/h	1159	34	14	1295	46	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1183	35	14	1321	47	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1183	0	2533	1183
Stage 1	-	-	-	-	1183	-
Stage 2	-	-	-	-	1350	-
Critical Hdwy	-	-	5.2	-	8.2	7.9
Critical Hdwy Stg 1	-	-	-	-	6.9	-
Critical Hdwy Stg 2	-	-	-	-	6.9	-
Follow-up Hdwy	-	-	2.8	-	4.5	4.2
Pot Cap-1 Maneuver	-	-	356	-	~ 8	118
Stage 1	-	-	-	-	159	-
Stage 2	-	-	-	-	125	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	356	-	~ 8	118
Mov Cap-2 Maneuver	-	-	-	-	66	-
Stage 1	-	-	-	-	159	-
Stage 2	-	-	-	-	120	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	166.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	76	-	-	356	-
HCM Lane V/C Ratio	0.886	-	-	0.04	-
HCM Control Delay (s)	166.6	-	-	15.5	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	4.5	-	-	0.1	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1159	34	14	1295	46	20
Future Volume (veh/h)	1159	34	14	1295	46	20
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1183	35	14	1321	47	20
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1400	1225	29	1513	61	26
Arrive On Green	0.77	0.77	0.02	0.84	0.05	0.05
Sat Flow, veh/h	1810	1583	1774	1810	1185	504
Grp Volume(v), veh/h	1183	35	14	1321	68	0
Grp Sat Flow(s),veh/h/ln	1810	1583	1774	1810	1715	0
Q Serve(g_s), s	41.7	0.5	0.8	43.3	3.8	0.0
Cycle Q Clear(g_c), s	41.7	0.5	0.8	43.3	3.8	0.0
Prop In Lane		1.00	1.00		0.69	0.29
Lane Grp Cap(c), veh/h	1400	1225	29	1513	88	0
V/C Ratio(X)	0.84	0.03	0.49	0.87	0.77	0.00
Avail Cap(c_a), veh/h	1566	1370	91	1742	439	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	7.2	2.6	47.6	4.9	45.7	0.0
Incr Delay (d2), s/veh	4.1	0.0	12.3	4.7	13.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.6	0.2	0.5	22.5	2.1	0.0
LnGrp Delay(d),s/veh	11.3	2.6	59.9	9.6	59.0	0.0
LnGrp LOS	B	A	E	A	E	
Approach Vol, veh/h	1218			1335	68	
Approach Delay, s/veh	11.1			10.1	59.0	
Approach LOS	B			B	E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.1	82.1				88.1		9.5
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	2.8	43.7				45.3		5.8
Green Ext Time (p_c), s	0.0	31.7				36.3		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	11.8
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

MOVEMENT SUMMARY

Site: 3 [PM Future + Project Flared on SR 12]

Highway 12/Project Access (flared approaches/exits on Hwy 12)
PM Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Elnoka Lane												
3	L2	47	1.0	0.139	9.3	LOS A	0.5	11.6	0.69	0.69	0.69	21.4
18	R2	20	1.0	0.139	9.3	LOS A	0.5	11.6	0.69	0.69	0.69	20.9
Approach		67	1.0	0.139	9.3	LOS A	0.5	11.6	0.69	0.69	0.69	21.2
East: WB SR 12												
1	L2	14	1.0	0.251	4.9	LOS A	1.2	30.8	0.17	0.06	0.17	34.7
6	T1	1321	6.0	0.926	25.2	LOS D	10.0	261.1	0.38	0.16	0.38	28.4
Approach		1336	5.9	0.926	25.0	LOS D	10.0	261.1	0.38	0.16	0.38	28.4
West: EB SR 12												
2	T1	1183	6.0	0.771	13.4	LOS B	7.5	197.1	0.16	0.04	0.16	33.8
12	R2	35	1.0	0.212	4.4	LOS A	1.0	25.2	0.08	0.02	0.08	33.2
Approach		1217	5.9	0.771	13.1	LOS B	7.5	197.1	0.16	0.04	0.16	33.7
All Vehicles		2620	5.8	0.926	19.1	LOS C	10.0	261.1	0.29	0.12	0.29	30.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Future Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1816	1900	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	485	938	10	51	1082	165	11	3	0	312	1	226
Adj No. of Lanes	2	2	1	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	5	2	2	2	2	2	3
Cap, veh/h	584	1473	659	126	984	150	91	25	0	368	1	598
Arrive On Green	0.17	0.43	0.43	0.07	0.33	0.33	0.06	0.06	0.00	0.21	0.21	0.21
Sat Flow, veh/h	3408	3438	1539	1774	2996	456	1408	384	0	1752	6	1568
Grp Volume(v), veh/h	485	938	10	51	622	625	14	0	0	313	0	226
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1725	1727	1792	0	0	1757	0	1568
Q Serve(g_s), s	12.6	19.7	0.3	2.5	30.2	30.2	0.7	0.0	0.0	15.7	0.0	9.6
Cycle Q Clear(g_c), s	12.6	19.7	0.3	2.5	30.2	30.2	0.7	0.0	0.0	15.7	0.0	9.6
Prop In Lane	1.00		1.00	1.00		0.26	0.79		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	584	1473	659	126	567	568	116	0	0	369	0	598
V/C Ratio(X)	0.83	0.64	0.02	0.40	1.10	1.10	0.12	0.00	0.00	0.85	0.00	0.38
Avail Cap(c_a), veh/h	827	1578	706	199	567	568	700	0	0	476	0	693
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.8	20.6	15.1	40.8	30.9	30.9	40.5	0.0	0.0	34.9	0.0	20.6
Incr Delay (d2), s/veh	5.0	0.9	0.0	2.1	67.1	68.6	0.5	0.0	0.0	10.9	0.0	0.4
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	6.3	9.4	0.1	1.3	24.9	25.2	0.3	0.0	0.0	8.8	0.0	4.2
LnGrp Delay(d),s/veh	41.8	21.6	15.1	42.9	98.0	99.4	41.0	0.0	0.0	45.8	0.0	20.9
LnGrp LOS	D	C	B	D	F	F	D			D		C
Approach Vol, veh/h		1433			1298			14			539	
Approach Delay, s/veh		28.4			96.5			41.0			35.4	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.3	45.2		24.4	20.4	36.0		11.1
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 10	42.2		24.9	* 22	30.2		35.9
Max Q Clear Time (g_c+I1), s	4.5	21.7		17.7	14.6	32.2		2.7
Green Ext Time (p_c), s	0.0	16.9		1.6	1.1	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	56.5
HCM 2010 LOS	E

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
1: Calistoga Road & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Future Volume (veh/h)	470	910	17	49	1050	227	11	3	2	303	1	398
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1810	1863	1863	1810	1845	1900	1863	1900	1900	1845	1845
Adj Flow Rate, veh/h	485	938	10	51	1082	165	11	3	0	312	1	226
Adj No. of Lanes	2	2	1	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	5	2	2	5	3	2	2	2	2	2	3
Cap, veh/h	548	1544	691	122	1227	877	90	25	0	364	1	578
Arrive On Green	0.16	0.45	0.45	0.07	0.36	0.36	0.06	0.06	0.00	0.21	0.21	0.21
Sat Flow, veh/h	3408	3438	1539	1774	3438	1546	1408	384	0	1752	6	1568
Grp Volume(v), veh/h	485	938	10	51	1082	165	14	0	0	313	0	226
Grp Sat Flow(s),veh/h/ln	1704	1719	1539	1774	1719	1546	1792	0	0	1757	0	1568
Q Serve(g_s), s	13.7	20.3	0.4	2.7	29.1	5.1	0.7	0.0	0.0	16.9	0.0	10.5
Cycle Q Clear(g_c), s	13.7	20.3	0.4	2.7	29.1	5.1	0.7	0.0	0.0	16.9	0.0	10.5
Prop In Lane	1.00		1.00	1.00		1.00	0.79		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	548	1544	691	122	1227	877	115	0	0	365	0	578
V/C Ratio(X)	0.88	0.61	0.01	0.42	0.88	0.19	0.12	0.00	0.00	0.86	0.00	0.39
Avail Cap(c_a), veh/h	564	1544	691	162	1261	893	637	0	0	462	0	665
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	20.5	15.0	43.9	29.7	10.4	43.4	0.0	0.0	37.6	0.0	22.9
Incr Delay (d2), s/veh	15.2	0.8	0.0	2.3	7.7	0.1	0.5	0.0	0.0	12.3	0.0	0.4
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	7.6	9.8	0.2	1.4	15.0	3.2	0.4	0.0	0.0	9.4	0.0	4.6
LnGrp Delay(d),s/veh	55.6	21.4	15.1	46.2	37.4	10.6	43.9	0.0	0.0	49.9	0.0	23.4
LnGrp LOS	E	C	B	D	D	B	D			D		C
Approach Vol, veh/h		1433			1298			14			539	
Approach Delay, s/veh		32.9			34.3			43.9			38.7	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	50.0		25.5	20.5	40.9		11.4
Change Period (Y+Rc), s	* 4.7	5.8		5.1	* 4.7	5.8		5.1
Max Green Setting (Gmax), s	* 9	43.4		25.9	* 16	36.1		35.0
Max Q Clear Time (g_c+I1), s	4.7	22.3		18.9	15.7	31.1		2.7
Green Ext Time (p_c), s	0.0	17.2		1.5	0.1	4.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	34.5
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

MOVEMENT SUMMARY

Site: 1 [Hwy 12/Calistoga Multi Lane RB Saturday Midday Future plus Project with Bypass]

Highway 12/Calistoga Rd (2 lane approaches SB, EB, WB)
Saturday Midday Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Calistoga												
3	L2	11	2.0	0.056	13.2	LOS B	0.2	4.2	0.80	0.80	0.80	29.7
8	T1	3	2.0	0.056	13.2	LOS B	0.2	4.2	0.80	0.80	0.80	29.7
18	R2	2	2.0	0.056	13.2	LOS B	0.2	4.2	0.80	0.80	0.80	28.9
Approach		16	2.0	0.056	13.2	LOS B	0.2	4.2	0.80	0.80	0.80	29.6
East: WB Hwy 12												
1	L2	51	4.0	0.812	24.0	LOS C	13.2	345.9	0.90	1.38	2.18	26.9
6	T1	1082	6.0	0.812	24.0	LOS C	13.4	346.9	0.90	1.38	2.18	26.9
16	R2	234	2.0	0.812	23.7	LOS C	13.4	346.9	0.91	1.39	2.17	26.5
Approach		1367	5.2	0.812	23.9	LOS C	13.4	346.9	0.91	1.38	2.17	26.9
North: SB Calistoga												
7	L2	312	4.0	0.643	22.9	LOS C	3.8	96.9	0.83	1.04	1.58	25.9
4	T1	1	2.0	0.643	22.8	LOS C	3.8	96.9	0.83	1.04	1.58	25.9
14	R2	410	4.0	0.255	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	36.9
Approach		724	4.0	0.643	10.0	LOS A	3.8	96.9	0.36	0.45	0.68	31.0
West: EB Hwy 12												
5	L2	485	4.0	0.753	17.9	LOS C	12.4	320.4	0.83	1.13	1.66	28.0
2	T1	938	6.0	0.753	18.1	LOS C	12.4	320.4	0.82	1.13	1.66	28.8
12	R2	18	2.0	0.753	18.0	LOS C	12.2	319.2	0.82	1.13	1.66	28.4
Approach		1440	5.3	0.753	18.0	LOS C	12.4	320.4	0.82	1.13	1.66	28.5
All Vehicles		3547	5.0	0.812	18.6	LOS C	13.4	346.9	0.76	1.09	1.66	28.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Future Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	89	1086	13	69	1063	47	19	13	48	68	9	16
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	226	1171	14	195	1099	49	67	44	100	202	23	172
Arrive On Green	0.13	0.66	0.66	0.11	0.64	0.64	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1785	21	1774	1720	76	209	398	911	1224	206	1561
Grp Volume(v), veh/h	89	0	1099	69	0	1110	80	0	0	77	0	16
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	0	1797	1518	0	0	1430	0	1561
Q Serve(g_s), s	4.7	0.0	54.0	3.6	0.0	58.9	0.3	0.0	0.0	0.0	0.0	0.9
Cycle Q Clear(g_c), s	4.7	0.0	54.0	3.6	0.0	58.9	5.2	0.0	0.0	4.9	0.0	0.9
Prop In Lane	1.00		0.01	1.00		0.04	0.24		0.60	0.88		1.00
Lane Grp Cap(c), veh/h	226	0	1185	195	0	1148	211	0	0	225	0	172
V/C Ratio(X)	0.39	0.00	0.93	0.35	0.00	0.97	0.38	0.00	0.00	0.34	0.00	0.09
Avail Cap(c_a), veh/h	246	0	1185	228	0	1156	434	0	0	421	0	394
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	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.5	0.0	15.3	41.6	0.0	17.2	42.0	0.0	0.0	42.1	0.0	40.4
Incr Delay (d2), s/veh	1.1	0.0	12.6	1.1	0.0	19.0	1.1	0.0	0.0	0.9	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	2.3	0.0	30.7	1.8	0.0	34.7	2.2	0.0	0.0	2.1	0.0	0.4
LnGrp Delay(d),s/veh	41.6	0.0	27.8	42.7	0.0	36.2	43.1	0.0	0.0	43.0	0.0	40.6
LnGrp LOS	D		C	D		D	D			D		D
Approach Vol, veh/h		1188			1179			80			93	
Approach Delay, s/veh		28.9			36.6			43.1			42.6	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.1	72.2		14.6	15.8	70.5		14.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.6	66.0		25.5	14.0	65.0		25.5
Max Q Clear Time (g_c+I1), s	5.6	56.0		6.9	6.7	60.9		7.2
Green Ext Time (p_c), s	0.1	9.0		0.8	0.1	3.6		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	33.4
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
2: Melita Rd & Sonoma Hwy (SR 12)

08/29/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Future Volume (veh/h)	84	1021	14	65	999	50	18	12	133	64	8	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
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		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1810	1900	1863	1812	1900	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	89	1086	13	69	1063	47	19	13	48	68	9	16
Adj No. of Lanes	1	1	0	1	2	0	0	1	0	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	5	5	2	5	5	2	2	2	2	2	2
Cap, veh/h	228	1163	14	197	2129	94	70	46	107	210	24	174
Arrive On Green	0.13	0.65	0.65	0.11	0.63	0.63	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	1785	21	1774	3355	148	226	412	958	1274	213	1561
Grp Volume(v), veh/h	89	0	1099	69	545	565	80	0	0	77	0	16
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	1721	1782	1596	0	0	1487	0	1561
Q Serve(g_s), s	4.6	0.0	53.9	3.6	16.9	16.9	0.2	0.0	0.0	0.0	0.0	0.9
Cycle Q Clear(g_c), s	4.6	0.0	53.9	3.6	16.9	16.9	4.5	0.0	0.0	4.3	0.0	0.9
Prop In Lane	1.00		0.01	1.00		0.08	0.24		0.60	0.88		1.00
Lane Grp Cap(c), veh/h	228	0	1177	197	1092	1131	223	0	0	234	0	174
V/C Ratio(X)	0.39	0.00	0.93	0.35	0.50	0.50	0.36	0.00	0.00	0.33	0.00	0.09
Avail Cap(c_a), veh/h	249	0	1204	231	1130	1170	442	0	0	427	0	393
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	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	0.0	15.4	41.0	9.7	9.7	41.3	0.0	0.0	41.2	0.0	39.7
Incr Delay (d2), s/veh	1.1	0.0	13.0	1.1	0.4	0.4	1.0	0.0	0.0	0.8	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	2.3	0.0	30.8	1.8	8.0	8.3	2.1	0.0	0.0	2.0	0.0	0.4
LnGrp Delay(d),s/veh	40.9	0.0	28.4	42.0	10.2	10.2	42.3	0.0	0.0	42.1	0.0	40.0
LnGrp LOS	D		C	D	B	B	D			D		D
Approach Vol, veh/h		1188			1179			80			93	
Approach Delay, s/veh		29.4			12.0			42.3			41.7	
Approach LOS		C			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.1	71.0		14.6	15.8	69.2		14.6
Change Period (Y+Rc), s	3.0	6.0		3.5	3.0	6.0		3.5
Max Green Setting (Gmax), s	13.6	66.4		25.1	14.0	65.4		25.1
Max Q Clear Time (g_c+I1), s	5.6	55.9		6.3	6.6	18.9		6.5
Green Ext Time (p_c), s	0.1	9.0		0.8	0.1	29.1		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	22.2
HCM 2010 LOS	C

MOVEMENT SUMMARY

Site: 2 [Hwy 12/Melita Multi Lane RB Weekend Midday Future plus Project]

Highway 12/Melita (2 lanes EB and WB on Hwy 12)
PM Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Melita												
3	L2	28	3.0	0.379	14.2	LOS B	1.5	39.2	0.75	0.83	1.01	30.2
8	T1	13	3.0	0.379	14.2	LOS B	1.5	39.2	0.75	0.83	1.01	30.2
18	R2	137	3.0	0.379	14.2	LOS B	1.5	39.2	0.75	0.83	1.01	29.4
Approach		178	3.0	0.379	14.2	LOS B	1.5	39.2	0.75	0.83	1.01	29.6
East: WB Hwy 12												
1	L2	65	3.0	0.477	8.1	LOS A	2.9	74.6	0.39	0.24	0.39	33.1
6	T1	1018	6.0	0.477	8.1	LOS A	2.9	74.6	0.39	0.24	0.39	33.2
16	R2	51	3.0	0.477	8.1	LOS A	2.9	74.5	0.39	0.24	0.39	32.4
Approach		1134	5.7	0.477	8.1	LOS A	2.9	74.6	0.39	0.24	0.39	33.1
North: SB Melita												
7	L2	67	3.0	0.241	10.5	LOS B	0.8	21.1	0.69	0.69	0.69	30.9
4	T1	9	3.0	0.241	10.5	LOS B	0.8	21.1	0.69	0.69	0.69	30.9
14	R2	47	3.0	0.241	10.5	LOS B	0.8	21.1	0.69	0.69	0.69	30.1
Approach		122	3.0	0.241	10.5	LOS B	0.8	21.1	0.69	0.69	0.69	30.6
West: EB Hwy 12												
5	L2	89	3.0	0.742	14.9	LOS B	7.9	207.7	0.64	0.44	0.67	30.1
2	T1	1046	6.0	0.742	12.5	LOS B	7.9	207.7	0.55	0.38	0.58	31.1
12	R2	11	3.0	0.231	5.0	LOS A	1.0	26.8	0.30	0.18	0.30	33.9
Approach		1146	5.7	0.742	12.7	LOS B	7.9	207.7	0.56	0.38	0.59	31.1
All Vehicles		2580	5.4	0.742	10.7	LOS B	7.9	207.7	0.50	0.36	0.53	31.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1176	56	24	1073	50	21
Future Vol, veh/h	1176	56	24	1073	50	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	180	100	-	0	-
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	5	2	2	5	2	2
Mvmt Flow	1251	60	26	1141	53	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1251	0	2444	1251
Stage 1	-	-	-	-	1251	-
Stage 2	-	-	-	-	1193	-
Critical Hdwy	-	-	4.12	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	556	-	~ 21	211
Stage 1	-	-	-	-	211	-
Stage 2	-	-	-	-	228	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	556	-	~ 20	211
Mov Cap-2 Maneuver	-	-	-	-	107	-
Stage 1	-	-	-	-	211	-
Stage 2	-	-	-	-	217	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	70.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	125	-	-	556	-
HCM Lane V/C Ratio	0.604	-	-	0.046	-
HCM Control Delay (s)	70.3	-	-	11.8	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	3.1	-	-	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1176	56	24	1073	50	21
Future Volume (veh/h)	1176	56	24	1073	50	21
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1863	1863	1810	1863	1900
Adj Flow Rate, veh/h	1251	60	26	1141	53	22
Adj No. of Lanes	1	1	1	1	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	5	2	2	5	0	0
Cap, veh/h	1386	1187	45	1511	69	28
Arrive On Green	0.77	0.77	0.03	0.84	0.06	0.06
Sat Flow, veh/h	1810	1550	1774	1810	1196	497
Grp Volume(v), veh/h	1251	60	26	1141	76	0
Grp Sat Flow(s),veh/h/ln	1810	1550	1774	1810	1715	0
Q Serve(g_s), s	53.7	1.0	1.5	28.8	4.5	0.0
Cycle Q Clear(g_c), s	53.7	1.0	1.5	28.8	4.5	0.0
Prop In Lane		1.00	1.00		0.70	0.29
Lane Grp Cap(c), veh/h	1386	1187	45	1511	98	0
V/C Ratio(X)	0.90	0.05	0.57	0.75	0.77	0.00
Avail Cap(c_a), veh/h	1493	1279	87	1661	419	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	9.1	2.9	49.3	3.8	47.6	0.0
Incr Delay (d2), s/veh	7.7	0.0	11.0	1.8	12.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	29.0	0.4	0.9	14.7	2.5	0.0
LnGrp Delay(d),s/veh	16.7	2.9	60.3	5.6	59.7	0.0
LnGrp LOS	B	A	E	A	E	
Approach Vol, veh/h	1311			1167	76	
Approach Delay, s/veh	16.1			6.8	59.7	
Approach LOS	B			A	E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	7.1	84.9				92.0		10.4
Change Period (Y+Rc), s	4.5	6.5				6.5		4.5
Max Green Setting (Gmax), s	5.3	84.5				94.0		25.0
Max Q Clear Time (g_c+I1), s	3.5	55.7				30.8		6.5
Green Ext Time (p_c), s	0.0	22.7				39.8		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	13.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

MOVEMENT SUMMARY

Site: 3 [Sat Midday Future + Project Flared on SR 12]

Highway 12/Project Access (flared approaches/exits on Hwy 12)
Saturday Midday Future plus Project
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Elnoka Lane												
3	L2	51	1.0	0.152	9.7	LOS A	0.5	12.7	0.70	0.70	0.70	21.2
18	R2	21	1.0	0.152	9.7	LOS A	0.5	12.7	0.70	0.70	0.70	20.8
Approach		72	1.0	0.152	9.7	LOS A	0.5	12.7	0.70	0.70	0.70	21.1
East: WB SR 12												
1	L2	24	1.0	0.190	4.3	LOS A	0.8	21.8	0.16	0.06	0.16	35.0
6	T1	1095	6.0	0.702	11.1	LOS B	6.4	169.0	0.32	0.14	0.32	35.4
Approach		1119	5.9	0.702	11.0	LOS B	6.4	169.0	0.31	0.13	0.31	35.4
West: EB SR 12												
2	T1	1200	6.0	0.820	16.2	LOS C	8.2	214.2	0.24	0.08	0.24	32.2
12	R2	57	1.0	0.226	4.5	LOS A	1.0	27.2	0.11	0.03	0.11	33.0
Approach		1257	5.8	0.820	15.6	LOS C	8.2	214.2	0.23	0.08	0.23	32.3
All Vehicles		2449	5.7	0.820	13.3	LOS B	8.2	214.2	0.28	0.12	0.28	33.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Appendix C

SIMTRAFFIC Queuing Output

DRAFT

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Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	207	224	220	219	21	109	578	575	50	247	273
Average Queue (ft)	143	168	130	112	7	29	551	551	21	164	147
95th Queue (ft)	222	242	215	211	23	117	598	593	47	273	289
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							66	72			0
Queuing Penalty (veh)							482	525			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				9			70			3	1
Queuing Penalty (veh)				2			12			12	2

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	TR	LTR	LT	R
Maximum Queue (ft)	198	784	415	120	87	916	194	82	36
Average Queue (ft)	82	676	188	23	38	638	115	43	13
95th Queue (ft)	206	938	578	178	89	1248	205	87	40
Link Distance (ft)		683	1120	1120		1271	946	277	
Upstream Blk Time (%)		21				1			
Queuing Penalty (veh)		235				9			
Storage Bay Dist (ft)	150				50			135	
Storage Blk Time (%)		35			5	35			
Queuing Penalty (veh)		20			51	17			

Intersection: 3: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	30	85	9	70
Average Queue (ft)	7	31	2	35
95th Queue (ft)	27	221	25	121
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		2		
Queuing Penalty (veh)		22		
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		4		
Queuing Penalty (veh)		1		

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	T	R	LTR	LT	R
Maximum Queue (ft)	241	260	200	190	18	51	486	500	160	57	236	235
Average Queue (ft)	172	195	127	119	5	16	363	374	125	25	151	162
95th Queue (ft)	252	281	209	207	17	58	520	551	219	60	250	255
Link Distance (ft)			1416	1416			474	474		270		410
Upstream Blk Time (%)							2	3				
Queuing Penalty (veh)							14	24				
Storage Bay Dist (ft)	345	345			105	125			100		260	
Storage Blk Time (%)				9			50	50	1		1	0
Queuing Penalty (veh)				2			8	123	4		4	1

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	TR	LTR	LT	R
Maximum Queue (ft)	192	687	293	139	89	1212	160	95	60
Average Queue (ft)	108	489	129	58	46	885	96	56	26
95th Queue (ft)	232	878	556	315	102	1385	164	103	68
Link Distance (ft)		683	1120	1120		1271	946	277	
Upstream Blk Time (%)		12				1			
Queuing Penalty (veh)		135				13			
Storage Bay Dist (ft)	150				50				135
Storage Blk Time (%)	2	27			10	39		0	
Queuing Penalty (veh)	20	22			102	25		0	

Intersection: 3: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	63	165	4	271
Average Queue (ft)	18	38	1	175
95th Queue (ft)	56	211	9	374
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		1		2
Queuing Penalty (veh)		11		0
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		5		
Queuing Penalty (veh)		1		

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	186	214	264	257	74	168	530	542	43	319	433
Average Queue (ft)	129	156	175	173	12	66	415	430	19	282	277
95th Queue (ft)	190	220	275	280	74	160	629	630	49	365	540
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							20	24			15
Queuing Penalty (veh)							142	173			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				19		0	60			31	0
Queuing Penalty (veh)				4		3	36			130	1

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	TR	LTR	LT	R
Maximum Queue (ft)	184	799	670	441	101	1236	172	83	46
Average Queue (ft)	79	709	296	124	62	1063	90	44	18
95th Queue (ft)	209	957	746	448	106	1516	165	82	47
Link Distance (ft)		683	1120	1120		1271	946	277	
Upstream Blk Time (%)		29				4			
Queuing Penalty (veh)		333				52			
Storage Bay Dist (ft)	150				50			135	
Storage Blk Time (%)	0	38			22	36			
Queuing Penalty (veh)	5	23			284	40			

Intersection: 3: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	55	402	84	222
Average Queue (ft)	10	109	9	135
95th Queue (ft)	56	352	82	275
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		3		0
Queuing Penalty (veh)		42		0
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		16		
Queuing Penalty (veh)		2		

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	T	R	LTR	LT	R
Maximum Queue (ft)	235	266	280	259	60	146	417	445	160	41	319	431
Average Queue (ft)	160	187	176	163	10	61	278	296	136	16	271	272
95th Queue (ft)	242	272	286	273	65	150	431	468	213	43	364	511
Link Distance (ft)			1416	1416			474	474		270		410
Upstream Blk Time (%)							1	1				14
Queuing Penalty (veh)							5	9				0
Storage Bay Dist (ft)	345	345			105	125			100		260	
Storage Blk Time (%)		0	0	19		0	36	40	2		27	1
Queuing Penalty (veh)		2	0	4		2	21	127	9		112	3

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	T	TR	LTR	LT	R
Maximum Queue (ft)	165	810	734	518	109	714	160	150	94	21
Average Queue (ft)	72	704	382	213	69	438	153	91	46	9
95th Queue (ft)	180	977	956	659	124	910	187	153	96	23
Link Distance (ft)		683	1120	1120		1266		946	260	
Upstream Blk Time (%)		32								
Queuing Penalty (veh)		362								
Storage Bay Dist (ft)	150				50		100			135
Storage Blk Time (%)		38			25	27	17		0	
Queuing Penalty (veh)		23			325	205	129		0	

Intersection: 3: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB
Directions Served	T	R	L	T	LR
Maximum Queue (ft)	228	66	45	277	79
Average Queue (ft)	92	9	15	133	46
95th Queue (ft)	212	58	52	302	87
Link Distance (ft)	1266			422	431
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				3	
Storage Bay Dist (ft)		180	100		
Storage Blk Time (%)	2			7	
Queuing Penalty (veh)	1			1	

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	190	211	250	237	62	171	543	538	38	257	259
Average Queue (ft)	126	154	160	150	11	77	475	485	13	174	143
95th Queue (ft)	198	227	283	267	66	197	648	651	39	290	296
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							34	39			1
Queuing Penalty (veh)							224	256			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				17		1	65			5	0
Queuing Penalty (veh)				3		6	32			20	0

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	TR	LTR	LT	R
Maximum Queue (ft)	192	687	293	139	89	1212	160	95	60
Average Queue (ft)	108	489	129	58	46	885	96	56	26
95th Queue (ft)	232	878	556	315	102	1385	164	103	68
Link Distance (ft)		683	1120	1120		1271	946	277	
Upstream Blk Time (%)		12				1			
Queuing Penalty (veh)		135				13			
Storage Bay Dist (ft)	150				50				135
Storage Blk Time (%)	2	27			10	39		0	
Queuing Penalty (veh)	20	22			102	25		0	

Intersection: 3: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	63	165	4	271
Average Queue (ft)	18	38	1	175
95th Queue (ft)	56	211	9	374
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		1		2
Queuing Penalty (veh)		11		0
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		5		
Queuing Penalty (veh)		1		

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	B26	B26	WB	WB	WB	WB	NB
Directions Served	L	L	T	T	R	T	T	L	T	T	R	LTR
Maximum Queue (ft)	223	242	288	287	93	9	18	160	472	497	160	30
Average Queue (ft)	160	191	175	169	17	1	3	65	333	348	112	9
95th Queue (ft)	247	278	314	306	86	19	38	164	548	574	221	32
Link Distance (ft)			1416	1416		183	183		474	474		270
Upstream Blk Time (%)							0		5	7		
Queuing Penalty (veh)							0		33	45		
Storage Bay Dist (ft)	345	345			105			125			100	
Storage Blk Time (%)		0	1	18					42	42		
Queuing Penalty (veh)		1	3	3					20	96		

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	T	TR	LTR	LT	R
Maximum Queue (ft)	174	803	505	324	104	348	160	145	85	49
Average Queue (ft)	83	658	209	62	43	176	123	86	44	16
95th Queue (ft)	195	976	622	337	100	376	191	158	100	58
Link Distance (ft)		683	1120	1120		1266		946	260	
Upstream Blk Time (%)		22								
Queuing Penalty (veh)		251								
Storage Bay Dist (ft)	150				50		100			135
Storage Blk Time (%)	0	34			7	21	9		2	
Queuing Penalty (veh)	0	29			76	131	52		1	

Intersection: 3: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	B34	NB
Directions Served	T	R	L	T	T	LR
Maximum Queue (ft)	282	94	49	169	9	72
Average Queue (ft)	136	16	21	88	1	38
95th Queue (ft)	298	96	53	192	14	74
Link Distance (ft)	1266			422	333	431
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		180	100			
Storage Blk Time (%)	3			4		
Queuing Penalty (veh)	2			1		

Appendix G

Signal Warrant Worksheets



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Warrant 1: Eight-Hour Vehicular Volume

Sonoma Hwy (SR 12) & Elnoka Project Access
City of Santa Rosa

Elnoka CCRC EIR

	Major Street	Minor Street
Street Name:	Sonoma Hwy (SR 12)	Elnoka Project Access
Direction:	E-W	N-S
Number of Lanes:	1	1
Approach Speed:	55	25

Scenario:
Scenario: Existing + Project

Warrant 1 Met? **No**

Condition A — Minimum Vehicle Volume: No

Minimum Requirements

Both Approaches Major Street *350*
Highest Approach Minor Street *105*

Hour	Both Approaches Major Street	Highest Approach Minor Street
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-

Condition B — Minimum Vehicle Volume: No

Conditions A & B: No

Minimum Requirements

Both Approaches Major Street *525*
Highest Approach Minor Street *53*

Hour	Both Approaches Major Street	Highest Approach Minor Street	
12P-1P	1754	54	
1P-2P	1762	68	
2P-3P	1866	56	6 hours met
3P-4P	1923	66	
4P-5P	2065	65	
5P-6P	2038	66	
-	-	-	
-	-	-	

Warrant 2: Four-Hour Vehicular Volume

Sonoma Hwy (SR 12) & Elnoka Project Access
City of Santa Rosa

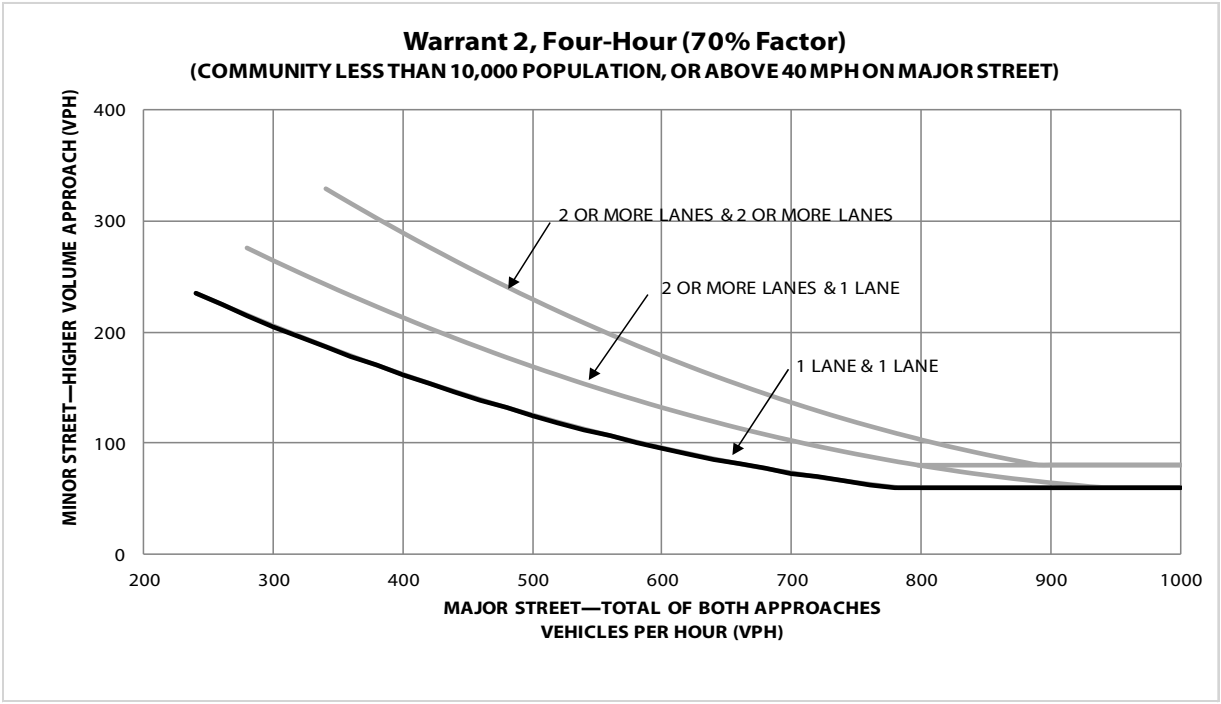
Elnoka CCRC EIR

	Major Street	Minor Street
Street Name	Sonoma Hwy (SR 12)	Elnoka Project Access
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	55	25

Scenario: Existing + Project

Warrant 2 Met? **Yes**

Hour	Both Approaches Major Street	Highest Approach Minor Street
12P-1P	1762	68
2P-3P	1923	66
3P-4P	2065	65
4P-5P	2038	66



Warrant 3: Peak-Hour Volumes and Delay

City of Santa Rosa — Elnoka CCRC EIR

Sonoma Hwy (SR 12) & Elnoka Project Access

	Major Street	Minor Street
Street Name	Sonoma Hwy (SR 12)	Elnoka Project Access
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	55	25

Population less than 10,000? No

Date of Count: Future

Scenario: PM Peak Hour Future + Project

Warrant 3 Met?: Met when either Condition A or B is met — **No**

Condition A: Met when conditions A1, A2, and A3 are met — Not Met

Condition A1 — Not Met

The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach

Minor Approach Delay: 3.1 vehicle-hours

Condition A2 — Not Met

The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes

Minor Approach Volume: 66 vph

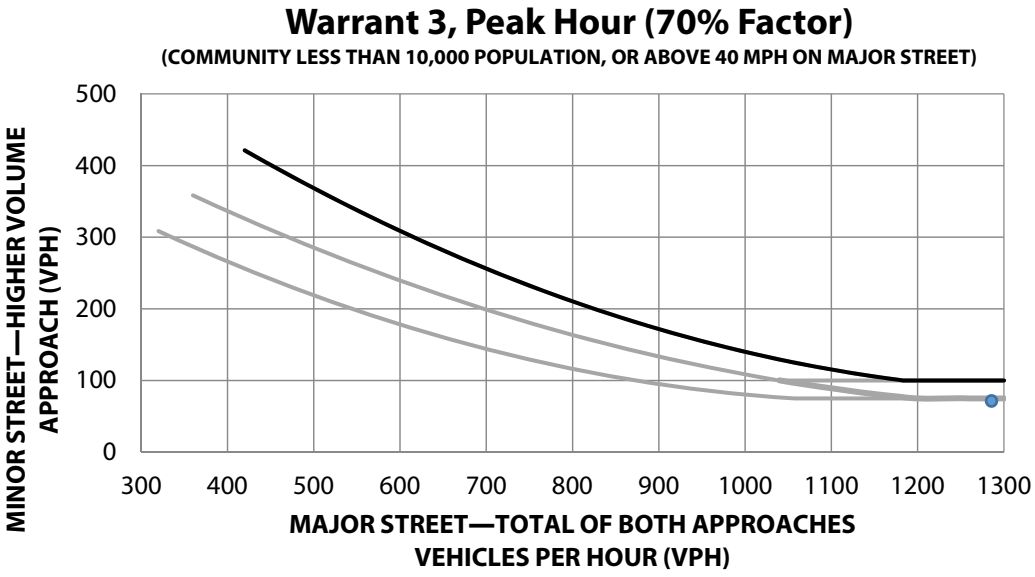
Condition A3 — Met

The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches

Total Entering Volume: 2568 vph

Condition B — Not Met

The plotted point falls above the curve





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Appendix H

Queuing Calculations



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Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	178	208	188	172	18	142	533	538	51	209	170
Average Queue (ft)	116	144	102	95	4	30	406	419	20	139	102
95th Queue (ft)	181	215	188	179	17	119	618	625	53	221	176
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							22	25			
Queuing Penalty (veh)							130	149			
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				5			58			0	0
Queuing Penalty (veh)				1			9			0	0

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	6	12	195	222	29	42
Average Queue (ft)	1	1	64	74	9	12
95th Queue (ft)	9	20	260	289	31	38
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	69	93	136	164	12	194	217	38	60	63	126	60
Average Queue (ft)	28	57	60	80	2	112	129	17	27	33	82	26
95th Queue (ft)	69	95	134	158	14	224	234	45	62	70	136	64
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						8			1	0	7	
Queuing Penalty (veh)						0			0	1	4	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	40	189	168	139	137	146	50	48	73	32
Average Queue (ft)	16	106	86	89	68	83	17	23	40	12
95th Queue (ft)	44	208	182	151	153	175	46	53	80	35
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0							0	
Queuing Penalty (veh)		0							0	

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	LT	R
Maximum Queue (ft)	127	430	81	642	81	62	32
Average Queue (ft)	54	243	33	384	50	29	11
95th Queue (ft)	138	521	84	813	87	68	35
Link Distance (ft)		683		1271	946	277	
Upstream Blk Time (%)		0		0			
Queuing Penalty (veh)		1		0			
Storage Bay Dist (ft)	150		50			135	
Storage Blk Time (%)		13	4	29			
Queuing Penalty (veh)		6	33	12			

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	NB
Directions Served	L	T	LR
Maximum Queue (ft)	30	14	39
Average Queue (ft)	9	2	19
95th Queue (ft)	33	30	42
Link Distance (ft)		422	431
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	100		
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	T	R	L	TR	LT	R
Maximum Queue (ft)	16	438	155	41	214	206	26
Average Queue (ft)	4	222	61	13	104	129	10
95th Queue (ft)	17	508	195	35	223	211	30
Link Distance (ft)		1194			1413	870	870
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200		200	140			
Storage Blk Time (%)		8			4		
Queuing Penalty (veh)		15			1		

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	38	56
Average Queue (ft)	8	35
95th Queue (ft)	32	59
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	68	59	62
Average Queue (ft)	49	39	43
95th Queue (ft)	73	62	68
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	3	27
Average Queue (ft)	0	9
95th Queue (ft)	6	30
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 363

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	176	204	228	223	18	149	498	505	41	274	262
Average Queue (ft)	115	142	136	126	4	56	358	380	14	178	118
95th Queue (ft)	182	210	224	229	18	140	568	580	41	280	249
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							11	14			
Queuing Penalty (veh)							67	86			
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				12			52			2	0
Queuing Penalty (veh)				2			28			6	1

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	6	5	90	117	26	57
Average Queue (ft)	1	1	25	30	4	25
95th Queue (ft)	9	7	123	133	20	62
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	46	70	128	153	14	209	235	33	37	44	79	26
Average Queue (ft)	21	47	56	72	3	111	141	9	11	18	41	10
95th Queue (ft)	54	78	130	156	15	214	246	32	38	47	80	30
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						8			0		1	
Queuing Penalty (veh)						0			0		0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	58	232	190	162	165	200	66	43	41	36
Average Queue (ft)	31	112	90	80	85	110	27	17	12	12
95th Queue (ft)	63	221	189	160	174	200	65	43	40	33
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)							0			
Queuing Penalty (veh)							0			

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	LT	R
Maximum Queue (ft)	139	485	107	1182	122	88	41
Average Queue (ft)	57	307	64	899	63	48	17
95th Queue (ft)	159	536	119	1308	122	93	47
Link Distance (ft)		683		1271	946	277	
Upstream Blk Time (%)				1			
Queuing Penalty (veh)				7			
Storage Bay Dist (ft)	150		50				135
Storage Blk Time (%)		19	18	34			
Queuing Penalty (veh)		10	197	31			

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	NB
Directions Served	L	T	LR
Maximum Queue (ft)	29	131	200
Average Queue (ft)	7	26	107
95th Queue (ft)	27	153	258
Link Distance (ft)		422	431
Upstream Blk Time (%)		0	1
Queuing Penalty (veh)		1	0
Storage Bay Dist (ft)	100		
Storage Blk Time (%)		3	
Queuing Penalty (veh)		0	

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	R	L	TR	LT	R	LTR
Maximum Queue (ft)	65	464	242	139	441	200	30	35
Average Queue (ft)	10	239	92	32	259	127	12	11
95th Queue (ft)	82	530	242	119	528	215	35	36
Link Distance (ft)		1194			1413	870	870	170
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	200		200	140				
Storage Blk Time (%)		10			17			
Queuing Penalty (veh)		31			5			

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	45	39
Average Queue (ft)	15	20
95th Queue (ft)	47	47
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	71	73	70
Average Queue (ft)	55	50	41
95th Queue (ft)	78	77	72
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	NB
Directions Served	LR
Maximum Queue (ft)	32
Average Queue (ft)	17
95th Queue (ft)	40
Link Distance (ft)	282
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 474

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	162	181	254	236	33	150	464	476	35	195	176
Average Queue (ft)	104	126	146	134	6	61	319	332	13	118	92
95th Queue (ft)	175	190	255	241	40	160	519	533	38	196	160
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							4	5			0
Queuing Penalty (veh)							22	29			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				12		0	46			0	
Queuing Penalty (veh)				2		0	20			2	

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	16	3	42	64	14	49
Average Queue (ft)	2	0	7	10	2	23
95th Queue (ft)	20	6	61	73	12	56
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	40	70	134	134	16	181	202	33	30	45	64	32
Average Queue (ft)	14	39	53	66	4	98	123	7	9	18	36	12
95th Queue (ft)	42	76	126	138	19	193	222	30	30	49	66	35
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						6				0	0	
Queuing Penalty (veh)						0				0	0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	56	237	196	112	141	152	46	44	39	23
Average Queue (ft)	27	125	94	65	67	84	19	19	14	9
95th Queue (ft)	61	234	195	124	135	157	50	47	39	27
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T	L	TR	LTR	LT	R
Maximum Queue (ft)	175	604	36	82	553	113	90	37
Average Queue (ft)	59	358	12	36	383	65	52	14
95th Queue (ft)	147	691	109	83	685	124	96	40
Link Distance (ft)		683	1120		1271	946	277	
Upstream Blk Time (%)		3						
Queuing Penalty (veh)		26						
Storage Bay Dist (ft)	150			50				135
Storage Blk Time (%)		20		7	32		0	
Queuing Penalty (veh)		14		62	17		0	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	35	96
Average Queue (ft)	14	55
95th Queue (ft)	39	106
Link Distance (ft)		431
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	T	R	L	TR	LT	R
Maximum Queue (ft)	9	352	220	69	228	193	44
Average Queue (ft)	1	216	106	30	113	126	18
95th Queue (ft)	9	401	257	79	255	209	46
Link Distance (ft)		1194			1413	870	870
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200		200	140			
Storage Blk Time (%)		8			4		
Queuing Penalty (veh)		28			2		

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	11	35
Average Queue (ft)	2	19
95th Queue (ft)	15	45
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	71	57	61
Average Queue (ft)	53	38	34
95th Queue (ft)	80	64	60
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	9	32
Average Queue (ft)	1	13
95th Queue (ft)	12	37
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 224

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	166	185	178	162	16	109	525	517	51	207	182
Average Queue (ft)	109	136	110	89	3	28	437	454	22	137	113
95th Queue (ft)	178	199	194	173	15	110	610	627	58	216	193
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							20	26			
Queuing Penalty (veh)							123	158			
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				7			63			0	0
Queuing Penalty (veh)				1			10			0	1

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	6	8	201	220	20	49
Average Queue (ft)	1	1	62	65	5	18
95th Queue (ft)	9	13	295	306	23	52
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	63	82	123	138	13	175	202	52	51	88	139	82
Average Queue (ft)	26	54	60	77	2	90	118	19	22	40	83	35
95th Queue (ft)	65	89	123	136	13	187	207	49	54	90	143	88
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						7		1	1	1	7	
Queuing Penalty (veh)						0		0	0	1	4	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	44	199	192	136	131	151	42	64	86	24
Average Queue (ft)	16	113	97	87	63	81	20	28	44	9
95th Queue (ft)	43	215	201	145	147	166	42	65	88	27
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)								0	0	
Queuing Penalty (veh)								0	0	

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	LT	R
Maximum Queue (ft)	140	509	71	484	122	79	25
Average Queue (ft)	52	324	37	292	65	39	8
95th Queue (ft)	134	614	88	537	126	78	28
Link Distance (ft)		683		1271	946	277	
Upstream Blk Time (%)		0					
Queuing Penalty (veh)		4					
Storage Bay Dist (ft)	150		50				135
Storage Blk Time (%)		20	5	27			
Queuing Penalty (veh)		10	47	12			

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	28	52
Average Queue (ft)	9	23
95th Queue (ft)	29	49
Link Distance (ft)		431
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	R	L	TR	LT	R	LTR
Maximum Queue (ft)	47	437	194	82	339	200	43	35
Average Queue (ft)	22	229	69	16	191	124	15	10
95th Queue (ft)	55	464	205	83	377	216	45	34
Link Distance (ft)		1194			1413	870	870	170
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	200		200	140				
Storage Blk Time (%)		9			13			
Queuing Penalty (veh)		19			2			

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	42	5	59
Average Queue (ft)	12	0	34
95th Queue (ft)	42	6	62
Link Distance (ft)	935	314	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	78	55	66
Average Queue (ft)	54	36	44
95th Queue (ft)	83	57	69
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	27
Average Queue (ft)	1	8
95th Queue (ft)	9	27
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 394

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	185	220	218	193	33	159	492	487	46	290	312
Average Queue (ft)	127	158	142	133	6	57	353	367	19	210	134
95th Queue (ft)	199	240	231	208	40	150	560	566	46	327	311
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							11	13			2
Queuing Penalty (veh)							70	84			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				15		0	53			8	
Queuing Penalty (veh)				2		0	28			29	

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	19	8	96	111	26	54
Average Queue (ft)	3	1	22	28	7	25
95th Queue (ft)	21	13	146	164	27	60
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	57	72	118	134	16	209	231	38	28	46	81	28
Average Queue (ft)	23	45	54	70	4	114	138	14	11	18	46	11
95th Queue (ft)	60	80	117	137	19	223	252	39	34	53	86	32
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						8		0		0	1	
Queuing Penalty (veh)						0		0		0	0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	68	240	204	133	162	187	65	43	35	37
Average Queue (ft)	34	130	104	82	88	110	29	22	15	16
95th Queue (ft)	72	246	212	142	176	197	68	49	39	39
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0					0			
Queuing Penalty (veh)		0					0			

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T	L	TR	LTR	LT	R
Maximum Queue (ft)	153	571	24	99	1240	124	85	39
Average Queue (ft)	58	360	4	61	1046	63	46	18
95th Queue (ft)	156	680	40	109	1484	131	90	42
Link Distance (ft)		683	1120		1271	946	277	
Upstream Blk Time (%)		2			2			
Queuing Penalty (veh)		25			23			
Storage Bay Dist (ft)	150			50				135
Storage Blk Time (%)		23		19	35		0	
Queuing Penalty (veh)		13		224	34		0	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	43	224	154	227
Average Queue (ft)	12	99	43	128
95th Queue (ft)	58	366	308	249
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		5		
Queuing Penalty (veh)		65		
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		10		
Queuing Penalty (veh)		1		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	B17	NB	NB	SB
Directions Served	L	T	R	L	TR	T	LT	R	LTR
Maximum Queue (ft)	28	568	241	140	1207	181	249	34	81
Average Queue (ft)	7	376	135	38	924	98	151	15	38
95th Queue (ft)	31	796	310	138	1764	375	264	40	80
Link Distance (ft)		1194			1413	443	870	870	170
Upstream Blk Time (%)					17	9			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (ft)	200		200	140					
Storage Blk Time (%)		22			39				
Queuing Penalty (veh)		72			11				

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	59	5	46
Average Queue (ft)	16	1	25
95th Queue (ft)	58	12	52
Link Distance (ft)	935	314	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	92	86	67
Average Queue (ft)	61	53	39
95th Queue (ft)	95	90	70
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	29
Average Queue (ft)	1	14
95th Queue (ft)	9	36
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 683

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	180	206	247	244	45	144	516	513	31	237	169
Average Queue (ft)	119	147	145	133	8	65	431	443	11	166	93
95th Queue (ft)	193	214	262	266	53	169	630	625	35	249	174
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							23	27			
Queuing Penalty (veh)							139	165			
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)			0	12		0	59			0	
Queuing Penalty (veh)			1	2		0	26			2	

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	37	14	151	161	12	71
Average Queue (ft)	6	2	51	62	2	36
95th Queue (ft)	39	15	176	213	15	88
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						2
Queuing Penalty (veh)						0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	42	75	138	148	21	218	252	42	28	54	60	40
Average Queue (ft)	19	45	56	70	4	117	143	20	7	23	40	14
95th Queue (ft)	49	79	143	155	25	228	265	53	29	56	66	41
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						9		1		0	0	
Queuing Penalty (veh)						0		0		0	0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	60	212	197	103	167	183	61	57	43	28
Average Queue (ft)	32	127	108	64	90	105	27	28	17	13
95th Queue (ft)	64	223	209	109	179	201	63	60	43	29
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T	L	TR	LTR	LT	R
Maximum Queue (ft)	180	653	68	87	766	146	103	39
Average Queue (ft)	82	470	14	43	471	81	49	20
95th Queue (ft)	188	807	114	95	856	154	106	45
Link Distance (ft)		683	1120		1271	946	277	
Upstream Blk Time (%)		5						
Queuing Penalty (veh)		56						
Storage Bay Dist (ft)	150			50				135
Storage Blk Time (%)	0	28		9	35		1	
Queuing Penalty (veh)	2	22		92	21		0	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	34	130
Average Queue (ft)	11	77
95th Queue (ft)	36	196
Link Distance (ft)		431
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	R	L	TR	LT	R	LTR
Maximum Queue (ft)	70	536	260	148	379	258	44	40
Average Queue (ft)	10	296	158	50	200	174	19	14
95th Queue (ft)	62	538	332	134	419	278	50	41
Link Distance (ft)		1194			1413	870	870	170
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	200		200	140				
Storage Blk Time (%)		18			13			
Queuing Penalty (veh)		66			7			

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	21	30
Average Queue (ft)	5	22
95th Queue (ft)	28	44
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	83	67	53
Average Queue (ft)	57	41	35
95th Queue (ft)	83	68	60
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	NB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	13
95th Queue (ft)	37
Link Distance (ft)	282
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 600

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	220	242	187	178	30	85	442	450	51	230	213
Average Queue (ft)	152	178	111	101	4	20	304	317	25	156	120
95th Queue (ft)	229	252	199	189	16	86	460	478	60	247	202
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							0	1			
Queuing Penalty (veh)							3	5			
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				8			37			0	0
Queuing Penalty (veh)				2			6			2	0

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	12	11	13	20	34
Average Queue (ft)	2	2	3	4	10
95th Queue (ft)	19	18	25	21	35
Link Distance (ft)	472	2475	2475	392	156
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	56	83	126	144	32	190	198	42	52	69	121	90
Average Queue (ft)	29	58	62	78	6	99	124	19	21	38	72	33
95th Queue (ft)	62	88	129	146	40	198	219	49	59	81	132	89
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						7		1	1	0	4	
Queuing Penalty (veh)						0		0	0	1	2	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	39	173	164	154	112	151	54	60	65	30
Average Queue (ft)	14	105	84	98	54	79	22	26	35	11
95th Queue (ft)	38	198	179	170	118	159	56	61	71	34
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)							0		0	
Queuing Penalty (veh)							0		0	

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T	L	TR	LTR	LT	R
Maximum Queue (ft)	208	562	6	86	567	127	76	30
Average Queue (ft)	74	309	1	37	335	65	40	13
95th Queue (ft)	189	600	12	89	646	126	79	36
Link Distance (ft)		683	1120		1271	946	277	
Upstream Blk Time (%)		1						
Queuing Penalty (veh)		7						
Storage Bay Dist (ft)	150			50			135	
Storage Blk Time (%)		19		5	29			
Queuing Penalty (veh)		10		47	13			

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB
Directions Served	T	R	L	T	LR
Maximum Queue (ft)	234	42	35	184	39
Average Queue (ft)	73	7	12	58	20
95th Queue (ft)	211	57	35	193	46
Link Distance (ft)	1271			422	431
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				1	
Storage Bay Dist (ft)		180	100		
Storage Blk Time (%)	1			2	
Queuing Penalty (veh)	0			0	

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	B36	WB	WB	NB	NB	SB
Directions Served	L	T	R	T	L	TR	LT	R	LTR
Maximum Queue (ft)	87	344	41	98	47	281	202	45	34
Average Queue (ft)	23	219	17	22	13	165	126	16	13
95th Queue (ft)	96	377	46	134	55	319	216	47	39
Link Distance (ft)		259	259	849		1413	870	870	170
Upstream Blk Time (%)	0	7							
Queuing Penalty (veh)	0	35							
Storage Bay Dist (ft)	200				140				
Storage Blk Time (%)		10				10			
Queuing Penalty (veh)		3				2			

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	48	5	59
Average Queue (ft)	15	1	33
95th Queue (ft)	49	9	63
Link Distance (ft)	935	314	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	85	68	68
Average Queue (ft)	53	39	46
95th Queue (ft)	84	72	76
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	27
Average Queue (ft)	1	9
95th Queue (ft)	9	31
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 141

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	238	260	220	222	45	164	358	374	27	304	363
Average Queue (ft)	162	191	137	133	10	58	245	267	12	237	178
95th Queue (ft)	258	281	229	233	65	150	399	437	32	354	403
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							0	1			3
Queuing Penalty (veh)							2	5			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)	0	0		11		0	29			14	0
Queuing Penalty (veh)	0	2		2		1	15			54	0

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	13	18	9	16	6	42
Average Queue (ft)	1	1	2	2	1	17
95th Queue (ft)	13	16	17	22	11	46
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	45	66	122	138	12	178	211	34	39	41	70	32
Average Queue (ft)	19	43	60	71	2	93	123	14	13	17	39	12
95th Queue (ft)	49	71	137	154	12	185	218	40	41	42	70	35
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						6			0		0	
Queuing Penalty (veh)						0			0		0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	71	226	186	139	157	178	64	58	38	48
Average Queue (ft)	34	127	97	79	84	97	27	26	16	17
95th Queue (ft)	79	226	195	142	164	183	65	63	40	46
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)							0	0		0
Queuing Penalty (veh)							0	0		0

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T	L	TR	LTR	LT	R
Maximum Queue (ft)	193	578	10	108	1244	111	80	37
Average Queue (ft)	71	373	2	63	926	61	42	17
95th Queue (ft)	181	630	18	116	1484	111	86	41
Link Distance (ft)		683	1120		1271	946	277	
Upstream Blk Time (%)		1			2			
Queuing Penalty (veh)		11			28			
Storage Bay Dist (ft)	150			50				135
Storage Blk Time (%)	0	25		19	35			
Queuing Penalty (veh)	3	15		222	34			

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	B32	NB
Directions Served	T	R	L	T	T	LR
Maximum Queue (ft)	256	26	62	452	309	84
Average Queue (ft)	92	6	13	229	71	43
95th Queue (ft)	235	29	61	537	346	86
Link Distance (ft)	1271			422	4428	431
Upstream Blk Time (%)				12		
Queuing Penalty (veh)				151		
Storage Bay Dist (ft)		180	100			
Storage Blk Time (%)	2			21		
Queuing Penalty (veh)	1			3		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	B36	WB	WB	B17	NB	NB	SB
Directions Served	L	T	R	T	L	TR	T	LT	R	LTR
Maximum Queue (ft)	55	349	60	156	114	1014	110	320	38	77
Average Queue (ft)	13	236	32	35	29	675	25	208	13	42
95th Queue (ft)	67	399	66	157	119	1390	182	343	42	88
Link Distance (ft)		259	259	849		1413	443	870	870	170
Upstream Blk Time (%)		8				6	2			
Queuing Penalty (veh)		41				0	0			
Storage Bay Dist (ft)	200				140					
Storage Blk Time (%)		14				33				
Queuing Penalty (veh)		2				9				

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	59	39
Average Queue (ft)	16	26
95th Queue (ft)	56	50
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	85	79	62
Average Queue (ft)	59	52	38
95th Queue (ft)	86	81	65
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	3	34
Average Queue (ft)	0	18
95th Queue (ft)	7	42
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 600

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	213	239	202	210	43	153	390	412	34	264	243
Average Queue (ft)	137	165	129	123	7	58	269	283	12	183	127
95th Queue (ft)	226	253	217	222	52	151	414	439	35	292	272
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							0	1			0
Queuing Penalty (veh)							2	5			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				11		0	32			4	0
Queuing Penalty (veh)				2		0	14			13	1

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	WB	WB	NB	SB
Directions Served	TR	T	TR	R	R
Maximum Queue (ft)	3	2	10	8	45
Average Queue (ft)	0	0	1	1	22
95th Queue (ft)	6	5	14	11	53
Link Distance (ft)	472	2475	2475	392	156
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	54	76	151	174	20	200	217	47	30	49	83	26
Average Queue (ft)	20	46	58	77	4	112	133	19	10	24	45	10
95th Queue (ft)	55	78	153	183	21	217	243	52	33	58	88	30
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)			0			8		1		1	1	
Queuing Penalty (veh)			0			0		0		0	0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	69	217	194	113	155	168	55	46	39	26
Average Queue (ft)	34	118	95	60	89	104	22	20	16	12
95th Queue (ft)	68	227	197	109	165	174	56	49	40	28
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0					0			
Queuing Penalty (veh)		0					0			

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T	L	TR	LTR	LT	R
Maximum Queue (ft)	198	564	22	86	879	126	104	49
Average Queue (ft)	86	336	5	42	633	71	56	21
95th Queue (ft)	195	598	53	104	1156	133	123	62
Link Distance (ft)		683	1120		1271	946	277	
Upstream Blk Time (%)		1			0			
Queuing Penalty (veh)		10			3			
Storage Bay Dist (ft)	150			50				135
Storage Blk Time (%)		21		8	38		2	
Queuing Penalty (veh)		17		81	23		1	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB
Directions Served	T	R	L	T	LR
Maximum Queue (ft)	216	49	69	188	83
Average Queue (ft)	100	10	31	102	45
95th Queue (ft)	224	59	92	247	84
Link Distance (ft)	1271			422	431
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)		180	100		
Storage Blk Time (%)	1			6	
Queuing Penalty (veh)	1			1	

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	B36	WB	WB	NB	NB	SB
Directions Served	L	T	R	T	L	TR	LT	R	LTR
Maximum Queue (ft)	75	329	82	80	111	269	308	36	35
Average Queue (ft)	19	218	41	15	37	153	184	15	12
95th Queue (ft)	106	358	81	91	107	294	314	41	38
Link Distance (ft)		259	259	849		1413	870	870	170
Upstream Blk Time (%)	0	5							
Queuing Penalty (veh)	0	27							
Storage Bay Dist (ft)	200				140				
Storage Blk Time (%)		11				7			
Queuing Penalty (veh)		1				4			

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	19	35
Average Queue (ft)	3	22
95th Queue (ft)	19	45
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	80	65	61
Average Queue (ft)	57	38	33
95th Queue (ft)	83	68	62
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	3	29
Average Queue (ft)	0	14
95th Queue (ft)	7	37
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 207

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	207	224	220	219	21	109	578	575	50	247	273
Average Queue (ft)	143	168	130	112	7	29	551	551	21	164	147
95th Queue (ft)	222	242	215	211	23	117	598	593	47	273	289
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							66	72			0
Queuing Penalty (veh)							482	525			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				9			70			3	1
Queuing Penalty (veh)				2			12			12	2

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	5	934	941	34	127
Average Queue (ft)	1	464	482	12	76
95th Queue (ft)	10	985	1006	36	150
Link Distance (ft)	472	2475	2475	392	156
Upstream Blk Time (%)					14
Queuing Penalty (veh)					0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	66	86	165	188	33	221	234	51	58	111	155	101
Average Queue (ft)	34	60	88	107	9	123	145	24	27	52	87	38
95th Queue (ft)	75	91	179	210	44	230	247	54	62	109	159	107
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						10		1	1	2	9	
Queuing Penalty (veh)						1		0	0	4	7	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	45	233	213	169	135	167	56	70	78	34
Average Queue (ft)	17	138	117	115	72	92	26	29	43	14
95th Queue (ft)	47	248	222	182	146	172	64	75	89	36
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0						0	1	
Queuing Penalty (veh)		0						0	0	

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	TR	LTR	LT	R
Maximum Queue (ft)	198	784	415	120	87	916	194	82	36
Average Queue (ft)	82	676	188	23	38	638	115	43	13
95th Queue (ft)	206	938	578	178	89	1248	205	87	40
Link Distance (ft)		683	1120	1120		1271	946	277	
Upstream Blk Time (%)		21				1			
Queuing Penalty (veh)		235				9			
Storage Bay Dist (ft)	150				50				135
Storage Blk Time (%)		35			5	35			
Queuing Penalty (veh)		20			51	17			

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	30	85	9	70
Average Queue (ft)	7	31	2	35
95th Queue (ft)	27	221	25	121
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		2		
Queuing Penalty (veh)		22		
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		4		
Queuing Penalty (veh)		1		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	B33	WB	WB	B17	NB	NB	SB
Directions Served	L	T	R	T	L	TR	T	LT	R	LTR
Maximum Queue (ft)	194	819	260	103	50	753	5	298	51	35
Average Queue (ft)	44	465	128	29	15	433	1	205	20	11
95th Queue (ft)	166	993	309	258	57	970	11	333	49	36
Link Distance (ft)		1194		4428		1413	443	870	870	170
Upstream Blk Time (%)		3				1				
Queuing Penalty (veh)		38				0				
Storage Bay Dist (ft)	200		200		140					
Storage Blk Time (%)		24				31				
Queuing Penalty (veh)		57				6				

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	52	3	61
Average Queue (ft)	14	0	38
95th Queue (ft)	56	6	68
Link Distance (ft)	935	314	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	78	59	83
Average Queue (ft)	55	38	50
95th Queue (ft)	86	61	80
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	9	27
Average Queue (ft)	1	8
95th Queue (ft)	11	28
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1502

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	186	214	264	257	74	168	530	542	43	319	433
Average Queue (ft)	129	156	175	173	12	66	415	430	19	282	277
95th Queue (ft)	190	220	275	280	74	160	629	630	49	365	540
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							20	24			15
Queuing Penalty (veh)							142	173			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				19		0	60			31	0
Queuing Penalty (veh)				4		3	36			130	1

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	16	10	149	178	31	83
Average Queue (ft)	2	1	46	54	12	43
95th Queue (ft)	20	17	189	209	36	111
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						4
Queuing Penalty (veh)						0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	58	80	135	149	13	175	204	41	36	49	92	34
Average Queue (ft)	25	54	61	77	2	108	126	16	13	23	48	15
95th Queue (ft)	59	81	137	153	12	212	232	42	39	55	92	39
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						8		0	0	0	1	
Queuing Penalty (veh)						1		0	0	0	0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	100	243	236	165	150	159	61	63	45	40
Average Queue (ft)	41	139	118	90	79	95	31	28	17	18
95th Queue (ft)	122	269	253	160	152	170	66	64	48	44
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0						0	0	
Queuing Penalty (veh)		0						0	0	

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	TR	LTR	LT	R
Maximum Queue (ft)	184	799	670	441	101	1236	172	83	46
Average Queue (ft)	79	709	296	124	62	1063	90	44	18
95th Queue (ft)	209	957	746	448	106	1516	165	82	47
Link Distance (ft)		683	1120	1120		1271	946	277	
Upstream Blk Time (%)		29				4			
Queuing Penalty (veh)		333				52			
Storage Bay Dist (ft)	150				50				135
Storage Blk Time (%)	0	38			22	36			
Queuing Penalty (veh)	5	23			284	40			

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	55	402	84	222
Average Queue (ft)	10	109	9	135
95th Queue (ft)	56	352	82	275
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		3		0
Queuing Penalty (veh)		42		0
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		16		
Queuing Penalty (veh)		2		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	B17	NB	NB	SB
Directions Served	L	T	R	L	TR	T	LT	R	LTR
Maximum Queue (ft)	31	792	260	170	1522	484	290	36	80
Average Queue (ft)	9	489	178	50	1358	263	189	15	46
95th Queue (ft)	29	931	343	152	1835	622	302	39	85
Link Distance (ft)		1194			1413	443	870	870	170
Upstream Blk Time (%)		0			44	34			
Queuing Penalty (veh)		5			0	0			
Storage Bay Dist (ft)	200		200	140					
Storage Blk Time (%)		28			44				
Queuing Penalty (veh)		111			18				

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	53	5	39
Average Queue (ft)	18	1	25
95th Queue (ft)	59	10	48
Link Distance (ft)	935	314	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	82	73	66
Average Queue (ft)	60	44	41
95th Queue (ft)	85	73	67
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	27
Average Queue (ft)	1	13
95th Queue (ft)	9	35
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1405

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	TR	LTR	LT	R
Maximum Queue (ft)	190	211	250	237	62	171	543	538	38	257	259
Average Queue (ft)	126	154	160	150	11	77	475	485	13	174	143
95th Queue (ft)	198	227	283	267	66	197	648	651	39	290	296
Link Distance (ft)			1416	1416			472	472	270		413
Upstream Blk Time (%)							34	39			1
Queuing Penalty (veh)							224	256			0
Storage Bay Dist (ft)	345	345			105	125				260	
Storage Blk Time (%)				17		1	65			5	0
Queuing Penalty (veh)				3		6	32			20	0

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	6	13	300	309	14	86
Average Queue (ft)	1	2	99	108	2	37
95th Queue (ft)	9	18	302	318	14	96
Link Distance (ft)	472	472	2475	2475	392	156
Upstream Blk Time (%)						1
Queuing Penalty (veh)						0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	58	73	122	133	11	202	246	51	22	49	66	34
Average Queue (ft)	21	47	59	76	2	115	144	20	6	24	38	12
95th Queue (ft)	59	81	133	150	13	227	256	51	25	54	64	36
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						10		0		0	0	
Queuing Penalty (veh)						0		0		0	0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	66	235	233	113	162	176	62	68	43	37
Average Queue (ft)	33	119	98	62	85	106	27	32	17	14
95th Queue (ft)	73	233	217	123	172	190	64	72	47	37
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0					0	0		
Queuing Penalty (veh)		0					0	0		

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	TR	LTR	LT	R
Maximum Queue (ft)	192	687	293	139	89	1212	160	95	60
Average Queue (ft)	108	489	129	58	46	885	96	56	26
95th Queue (ft)	232	878	556	315	102	1385	164	103	68
Link Distance (ft)		683	1120	1120		1271	946	277	
Upstream Blk Time (%)		12				1			
Queuing Penalty (veh)		135				13			
Storage Bay Dist (ft)	150				50				135
Storage Blk Time (%)	2	27			10	39		0	
Queuing Penalty (veh)	20	22			102	25		0	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	WB	WB	B32	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	63	165	4	271
Average Queue (ft)	18	38	1	175
95th Queue (ft)	56	211	9	374
Link Distance (ft)		422	4428	431
Upstream Blk Time (%)		1		2
Queuing Penalty (veh)		11		0
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		5		
Queuing Penalty (veh)		1		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	T	R	L	TR	LT	R	LTR
Maximum Queue (ft)	22	480	260	138	330	286	43	39
Average Queue (ft)	7	301	137	59	207	183	22	15
95th Queue (ft)	28	550	304	153	382	296	48	43
Link Distance (ft)		1194			1413	870	870	170
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	200		200	140				
Storage Blk Time (%)		15			13			
Queuing Penalty (veh)		61			7			

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	29	5	30
Average Queue (ft)	6	1	23
95th Queue (ft)	30	10	44
Link Distance (ft)	935	314	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	89	57	52
Average Queue (ft)	60	38	30
95th Queue (ft)	93	60	53
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	2	22	30
Average Queue (ft)	0	4	17
95th Queue (ft)	5	25	39
Link Distance (ft)	1183	946	282
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 940

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	T	R	LTR	LT	R
Maximum Queue (ft)	241	260	200	190	18	51	486	500	160	57	236	235
Average Queue (ft)	172	195	127	119	5	16	363	374	125	25	151	162
95th Queue (ft)	252	281	209	207	17	58	520	551	219	60	250	255
Link Distance (ft)			1416	1416			474	474		270		410
Upstream Blk Time (%)							2	3				
Queuing Penalty (veh)							14	24				
Storage Bay Dist (ft)	345	345			105	125			100		260	
Storage Blk Time (%)				9			50	50	1		1	0
Queuing Penalty (veh)				2			8	123	4		4	1

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	6	10	28	36	31	57
Average Queue (ft)	1	1	3	4	12	27
95th Queue (ft)	9	16	26	24	36	61
Link Distance (ft)	474	474	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	57	82	140	177	24	277	288	50	64	85	145	105
Average Queue (ft)	27	57	74	96	7	158	185	24	28	45	83	43
95th Queue (ft)	65	87	167	197	28	284	308	55	67	94	153	97
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)			0			15		0	1	1	9	
Queuing Penalty (veh)			0			1		0	0	1	7	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	35	259	231	189	202	228	59	66	91	32
Average Queue (ft)	13	151	127	125	84	113	25	29	47	13
95th Queue (ft)	37	271	239	225	192	221	63	65	89	34
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0		1	0		0	1	1	
Queuing Penalty (veh)		0		3	0		0	0	0	

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	T	TR	LTR	LT	R
Maximum Queue (ft)	181	761	231	64	76	324	159	179	78	19
Average Queue (ft)	64	559	82	27	30	174	127	112	34	8
95th Queue (ft)	173	911	399	215	78	349	194	196	83	22
Link Distance (ft)		683	1120	1120		1266		946	260	
Upstream Blk Time (%)		12								
Queuing Penalty (veh)		128								
Storage Bay Dist (ft)	150				50		100			135
Storage Blk Time (%)		33			5	21	10		0	
Queuing Penalty (veh)		18			49	123	57		0	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	B34	NB
Directions Served	T	R	L	T	T	LR
Maximum Queue (ft)	207	11	46	193	3	52
Average Queue (ft)	76	2	15	67	0	23
95th Queue (ft)	212	16	53	189	0	54
Link Distance (ft)	1266			422	333	431
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		180	100			
Storage Blk Time (%)	1			3		
Queuing Penalty (veh)	0			0		

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	52	56
Average Queue (ft)	17	36
95th Queue (ft)	52	55
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	79	63	76
Average Queue (ft)	54	39	49
95th Queue (ft)	83	66	77
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	9	27
Average Queue (ft)	1	11
95th Queue (ft)	12	33
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	86	614	260	78	386	301	44	20	20
Average Queue (ft)	34	364	95	17	226	225	21	4	4
95th Queue (ft)	116	669	268	71	412	336	50	21	19
Link Distance (ft)		1195			1414	870	870	162	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	200		200	140					50
Storage Blk Time (%)		19			16			0	
Queuing Penalty (veh)		46			3			0	

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB
Directions Served	L	L	T	T	R	L	T	T	R	LTR	LT	R
Maximum Queue (ft)	235	266	280	259	60	146	417	445	160	41	319	431
Average Queue (ft)	160	187	176	163	10	61	278	296	136	16	271	272
95th Queue (ft)	242	272	286	273	65	150	431	468	213	43	364	511
Link Distance (ft)			1416	1416			474	474		270		410
Upstream Blk Time (%)							1	1				14
Queuing Penalty (veh)							5	9				0
Storage Bay Dist (ft)	345	345			105	125			100		260	
Storage Blk Time (%)		0	0	19		0	36	40	2		27	1
Queuing Penalty (veh)		2	0	4		2	21	127	9		112	3

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	10	5	10	13	31	55
Average Queue (ft)	1	1	1	3	12	24
95th Queue (ft)	16	8	15	20	35	57
Link Distance (ft)	474	474	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	62	84	141	178	26	231	263	36	39	43	82	48
Average Queue (ft)	29	54	67	95	3	121	158	16	18	15	45	19
95th Queue (ft)	66	86	143	184	15	235	273	44	44	44	82	48
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						11		0			1	
Queuing Penalty (veh)						1		0			0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	62	246	222	202	237	246	75	78	42	33
Average Queue (ft)	31	158	128	126	105	127	34	34	16	14
95th Queue (ft)	66	259	234	214	227	247	75	80	43	32
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)					0		0	0		
Queuing Penalty (veh)					0		0	0		

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	T	TR	LTR	LT	R
Maximum Queue (ft)	165	810	734	518	109	714	160	150	94	21
Average Queue (ft)	72	704	382	213	69	438	153	91	46	9
95th Queue (ft)	180	977	956	659	124	910	187	153	96	23
Link Distance (ft)		683	1120	1120		1266		946	260	
Upstream Blk Time (%)		32								
Queuing Penalty (veh)		362								
Storage Bay Dist (ft)	150				50		100			135
Storage Blk Time (%)		38			25	27	17		0	
Queuing Penalty (veh)		23			325	205	129		0	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB
Directions Served	T	R	L	T	LR
Maximum Queue (ft)	228	66	45	277	79
Average Queue (ft)	92	9	15	133	46
95th Queue (ft)	212	58	52	302	87
Link Distance (ft)	1266			422	431
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				3	
Storage Bay Dist (ft)		180	100		
Storage Blk Time (%)	2			7	
Queuing Penalty (veh)	1			1	

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	67	39
Average Queue (ft)	23	23
95th Queue (ft)	66	48
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	87	76	89
Average Queue (ft)	64	50	50
95th Queue (ft)	91	82	90
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	3	30
Average Queue (ft)	0	13
95th Queue (ft)	7	36
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	B17	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T	LT	R	LT	R
Maximum Queue (ft)	21	573	260	161	1305	237	336	50	43	41
Average Queue (ft)	5	341	137	50	974	106	243	20	19	17
95th Queue (ft)	22	660	323	149	1679	422	387	56	49	42
Link Distance (ft)		1195			1414	443	870	870	162	
Upstream Blk Time (%)					14	11				
Queuing Penalty (veh)					0	0				
Storage Bay Dist (ft)	200		200	140						50
Storage Blk Time (%)		17			35				5	2
Queuing Penalty (veh)		69			14				1	1

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	EB	EB	B26	B26	WB	WB	WB	WB	NB
Directions Served	L	L	T	T	R	T	T	L	T	T	R	LTR
Maximum Queue (ft)	223	242	288	287	93	9	18	160	472	497	160	30
Average Queue (ft)	160	191	175	169	17	1	3	65	333	348	112	9
95th Queue (ft)	247	278	314	306	86	19	38	164	548	574	221	32
Link Distance (ft)			1416	1416		183	183		474	474		270
Upstream Blk Time (%)							0		5	7		
Queuing Penalty (veh)							0		33	45		
Storage Bay Dist (ft)	345	345			105			125			100	
Storage Blk Time (%)		0	1	18					42	42		
Queuing Penalty (veh)		1	3	3					20	96		

Intersection: 1: Calistoga Road & Sonoma Hwy (SR 12)

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	264	269
Average Queue (ft)	178	142
95th Queue (ft)	278	270
Link Distance (ft)		410
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)	260	
Storage Blk Time (%)	3	1
Queuing Penalty (veh)	10	2

Intersection: 2: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (ft)	6	6	46	54	18	56
Average Queue (ft)	1	1	13	15	3	29
95th Queue (ft)	10	9	75	89	17	66
Link Distance (ft)	474	474	2475	2475	392	156
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Sonoma Hwy (SR 12) & Mountain Hawk Way

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	T	TR	L	T	TR	L	TR	L	TR	R
Maximum Queue (ft)	55	74	154	157	13	265	286	53	35	59	71	36
Average Queue (ft)	22	49	72	83	2	143	169	24	11	28	40	18
95th Queue (ft)	56	80	168	168	14	289	313	61	37	62	75	43
Link Distance (ft)			2475	2475		1396	1396		236		374	374
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300	300			100			70		90		
Storage Blk Time (%)						11		1	0	0	0	
Queuing Penalty (veh)						0		0	0	0	0	

Intersection: 4: Los Alamos Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	63	277	254	108	212	230	48	62	50	39
Average Queue (ft)	32	159	141	56	108	129	20	31	20	16
95th Queue (ft)	70	292	270	111	223	255	50	66	49	42
Link Distance (ft)		1385	1385		1120	1120	864		711	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325			280				110		105
Storage Blk Time (%)		0			0					
Queuing Penalty (veh)		0			0					

Intersection: 5: Melita Rd & Sonoma Hwy (SR 12)

Movement	EB	EB	B27	B27	WB	WB	WB	NB	SB	SB
Directions Served	L	TR	T		L	T	TR	LTR	LT	R
Maximum Queue (ft)	174	803	505	324	104	348	160	145	85	49
Average Queue (ft)	83	658	209	62	43	176	123	86	44	16
95th Queue (ft)	195	976	622	337	100	376	191	158	100	58
Link Distance (ft)		683	1120	1120		1266		946	260	
Upstream Blk Time (%)		22								
Queuing Penalty (veh)		251								
Storage Bay Dist (ft)	150				50		100			135
Storage Blk Time (%)	0	34			7	21	9		2	
Queuing Penalty (veh)	0	29			76	131	52		1	

Intersection: 6: Project Access & Sonoma Hwy (SR 12)

Movement	EB	EB	WB	WB	B34	NB
Directions Served	T	R	L	T	T	LR
Maximum Queue (ft)	282	94	49	169	9	72
Average Queue (ft)	136	16	21	88	1	38
95th Queue (ft)	298	96	53	192	14	74
Link Distance (ft)	1266			422	333	431
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		180	100			
Storage Blk Time (%)	3			4		
Queuing Penalty (veh)	2			1		

Intersection: 8: Montgomery Dr & Melita Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	30	30
Average Queue (ft)	8	21
95th Queue (ft)	32	44
Link Distance (ft)	935	309
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Melita Rd & Los Alamos Rd

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	91	59	50
Average Queue (ft)	59	40	32
95th Queue (ft)	90	64	57
Link Distance (ft)	314	890	864
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Project Access & Melita Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	16	29
Average Queue (ft)	3	14
95th Queue (ft)	22	37
Link Distance (ft)	946	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 850

Intersection: 7: Oakmont Dr & Sonoma Hwy (SR 12)

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	68	574	260	108	319	276	40	20	26
Average Queue (ft)	14	317	152	51	170	194	15	6	6
95th Queue (ft)	83	611	323	135	309	305	41	23	24
Link Distance (ft)		1195			1414	870	870	163	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	200		200	140					50
Storage Blk Time (%)		16		0	10				0
Queuing Penalty (veh)		62		3	6				0



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Appendix I

VMT Worksheet



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Elnoka CCRC VMT Assessment

W-Trans October 2020

VMT Thresholds

September 2020 SCTM\15 Model Version

16.53	VMT per Capita Countywide Average	12.53	VMT per Employee Countywide Average
14.05	Threshold = 15% below Countywide Average	10.65	Threshold = 15% below Countywide Average

SCTM\15 Project Specific Model Run

TAZ 613 Project Traffic Analysis Zone

Residential VMT

12481	Elnoka project total home-based VMT productions (mi)
975	Elnoka residential population
12.80	VMT per Capita

Employment VMT

11.95	VMT per employee in TAZ with Elnoka project
88	Elnoka employees onsite per day (avg)
1052	Total Elnoka Employee VMT (unadjusted; see adjustments for onsite employee housing below)

VMT Adjustments

Residential VMT

- Model run is based on senior housing and institutional land uses, and does not take into account CCRC amenities including onsite dining, onsite social and recreational activities, and provision of shuttle service
- Without CCRC-specific adjustments, project's residential VMT would already fall below CEQA significance threshold
- The following residential VMT adjustments are therefore provided only for informational purposes

Onsite Dining Adjustment

10%	daily person trips related to traveling for meals (2017 NHTS data for persons 55 and older)
50%	assumed reduction in meal VMT given onsite dining facilities at CCRC
-624	daily residential VMT reduction

Onsite Recreational Activities Adjustment

18%	daily person trips related to traveling for social/recreational purposes (2017 NHTS data for persons 55 and older)
50%	assumed reduction in social/recreational VMT given onsite facilities at CCRC
-1123	daily residential VMT reduction

Shuttle Service Adjustment

36%	daily person trips related to traveling for medical/dental and shopping/errands (2017 NHTS data for persons 55 and older)
20%	assumed reduction in medical/dental and shopping/errands VMT due to CCRC shuttle service
-899	daily residential VMT reduction

Combined Estimated VMT Reductions Associated with CCRC Facilities

-2646	VMT reduction
9835	Adjusted project-specific home-based VMT productions
10.09	Adjusted VMT per capita for project
-21%	*below the VMT per capita metric applied in the analysis*

Employment VMT

Onsite Employee Housing Adjustment

12	onsite employee housing units
-11.95	mi VMT reduction per employee apartment (reduction in commute VMT, assumes only 1 Elnoka employee per apartment)
-143	reduction in employee VMT attributable to onsite employee housing
909	adjusted home-based work employee VMT
10.33	adjusted VMT per employee

VMT Significance Determination

Residential		**Employment**	
16.53	VMT per Capita Countywide Average	12.53	VMT per Employee Countywide Average
14.05	Threshold = 15% below Countywide Average	10.65	Threshold = 15% below Countywide Average
12.80	Elnoka Project VMT per Capita	10.33	Elnoka Project VMT per Employee
Yes	Below Threshold?	Yes	Below Threshold?
LTS	Significance Finding	LTS	Significance Finding



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Appendix J

Trail Feasibility Study



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Trail Feasibility Study

PROPOSED ELNOKA CCRC PROJECT



Prepared for:

City of Santa Rosa
Planning & Economic Development
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February 13, 2020

QUESTA ENGINEERING CORP.

CONTENTS

1. Introduction 3
2. Consistency with Applicable Plans 6
   2.1 Santa Rosa General Plan 2035 (2019) 6
   2.2 City of Santa Rosa Bicycle and Pedestrian Master Plan Update (2018) 7
   2.3 Santa Rosa Citywide Creek Master Plan (2013) 8
   2.4 Sonoma Valley Trail Feasibility Study (2016) 9
   2.5 Trione Annadel State Park (California State Parks) 9
   2.6 Other Area Trails 11
3. Site Issues 13
   3.1 Topography and Slope Stability 13
   3.2 Creeks 13
   3.3 Proposed Elnoka CCRC Design Concept 14
4. Trail Design Needs 16
   4.1 Trail Width and Surface 16
   4.2 Accessibility 17
   4.3 Emergency Access Considerations 18
5. Trail Options 19
   5.1 Option 1: Channel Drive Connection 20
   5.2 Option 2: Melita Road Connection 22
6. Conclusion and Recommendations 25
7. References 27

Figures:

1 Project Location
2 Site Plan Overview (from Project Description)
3 Trail Options Overview
4 Potential Trail Routes
5 Potential Site Plan/Trail Conflicts
6 Trail Route Existing Topography
7 Schematic Trail Plan (Portion of Option 1)
8 Schematic Longitudinal Profile (Portion of Option 1)

1. INTRODUCTION

The Elnoka Continuing Care Retirement Community (CCRC) is proposed a for a 68 acre site situated in the Oakmont area of Santa Rosa (**Figure 1**). The Project proposes development of 676 units in up to 92 separate buildings, as well as service facilities, circulation improvements and recreation/landscape improvements within a gated site. The Project proposes that all facilities be private, including gated streets and sidewalks. Public access is proposed on a sidewalk that would be located parallel to the SR12 property frontage (**Figure 2**).

The Elnoka site has been identified in both the City of Santa Rosa Bicycle and Pedestrian Master Plan Update 2018 and the 2016 Sonoma Valley Trail Feasibility Study as a potential location for implementation of a regional trail connecting SR12 with park facilities south of the site. As identified in these respective plans, this trail could potentially connect from SR12 to Trione Annadel State Park via Channel Drive, and/or connect to Melita Road for travel to adjacent parks via Melita Road and Montgomery Drive. No connection is currently proposed as part of the CCRC.

This Feasibility Study evaluates options for incorporating this regional trail connection into the Elnoka Project. This includes a discussion of applicable public plans, including site constraints and benefits associated with trail implementation, trail design, an assessment of potential trail routes, and potential modifications needed to the proposed Elnoka site plan in order to implement a trail, and complete the desired connection to Channel Drive.



Elnoka site south of Melita Creek

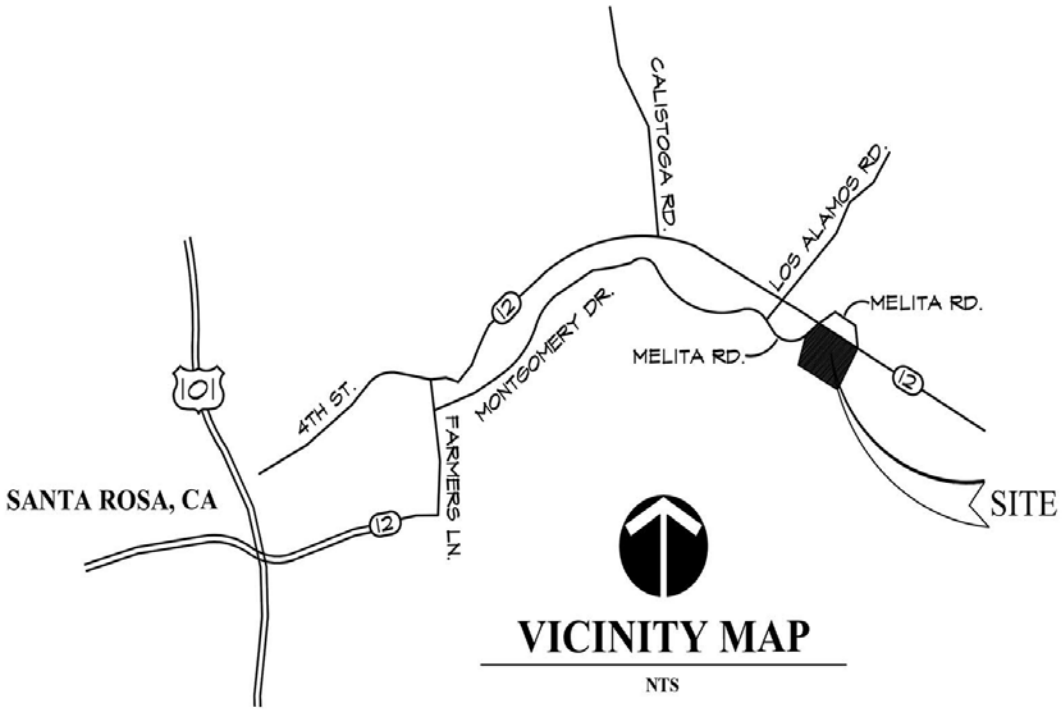


Figure 1: Vicinity Map



Figure 2: Proposed Site Plan

2. CONSISTENCY WITH APPLICABLE PLANS

Provision of a regional trail to connect Sonoma Valley, the City of Santa Rosa and local parks – including Trione Annadel State Park, Spring Lake Regional Park and Howarth Park - has been identified in planning documents, including the City of Santa Rosa Bicycle and Pedestrian Master Plan, and the Sonoma Valley Trail Feasibility Study completed by Sonoma County Regional Parks. This section reviews these plans and other trail connections that have been addressed in local planning efforts.

2.1 Santa Rosa General Plan 2035 (2019)

The City of Santa Rosa General Plan is the guiding document for orderly growth and development of the community for the next twenty years. The General Plan recognizes five criteria to prioritize pedestrian and bikeway projects: collision reduction, connectivity, comfort network, gap closure and equity. Applicable trail-related objectives, policies and programs include:

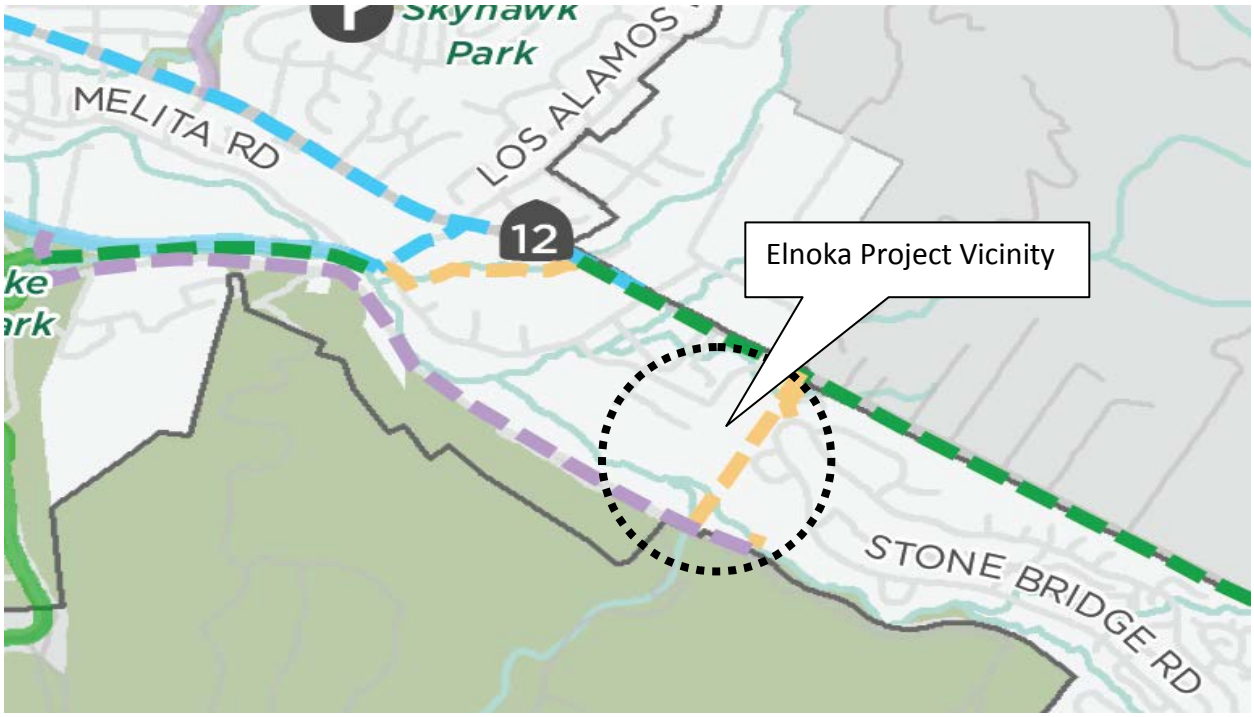
> ***T-G-7*** *Provide bikeways along scenic roads, where right-of-way exists or where its acquisition will not jeopardize roadway character.*
> ***T-K-6*** *Integrate multi-use paths into all creek corridors, railroad rights-of-way, and park designs.*
> ***T-L*** *Develop a citywide system of designated bikeways that serves both experienced and casual bicyclists, and which maximizes bicycle use for commuting, recreation, and local transport.*
> ***T-L-3*** *Improve bicycle networks by finishing incomplete or disconnected bicycle routes.*
> ***T-L-7*** *As part of the city's Capital Improvement Program, or street and intersection projects constructed by private developers, install and construct bicycle facilities, including:*
> • *Class I paths, Class II lanes, Class III route signs;*
> • *Signal detectors; and/or*
> • *Other facilities.*
> *Implementation shall occur as opportunities arise throughout the entire bikeway network.*
> ***T-L-8*** *Require new development to dedicate land and/or construct/install bicycle facilities, and provide bicycle parking as specified in the Zoning Code, where a rough proportionality to demand from the project is established. Facilities such as showers and bicycle storage shall also be considered.*
> ***PSF-A-8*** *Integrate the bicycle and pedestrian path networks envisioned in both the Citywide Creek Master Plan and updated Bicycle and Pedestrian Master Plan with regional park plans, so that users can safely and comfortably access the full range of public open spaces.*
> ***PSF-A-18*** *Develop multi-use pathways and linear parks along creeks designated by the Santa Rosa Citywide Creek Master Plan. Create a system of interconnected linear parks that provide access to parks used for active recreation as well as to open space preserve areas that are used primarily for more passive recreation such as hiking and wildlife viewing.*
> ***NS-G-6*** *Minimize single-access residential neighborhoods in development areas near open space, and provide adequate access for fire and other emergency response personnel.*

2.2 City of Santa Rosa Bicycle and Pedestrian Master Plan Update (2018)

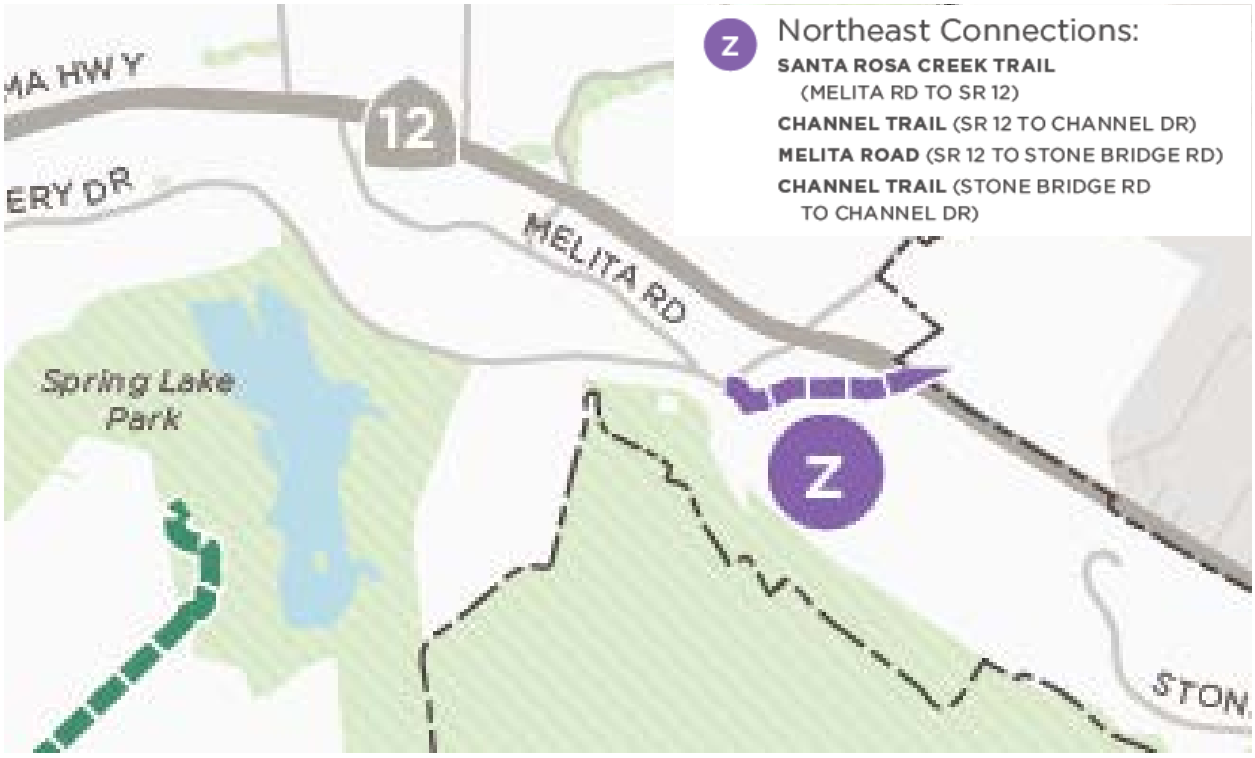
The Bicycle Plan identifies potential or proposed pedestrian and bicycle routes in the project area, including a route through the project area and a trail along Santa Rosa Creek. Section 5 of the Bicycle Plan states:

> *OAKMONT CONNECTION*
>
> *ALTERNATIVES After the removal of a portion of the designated Bicycle Route 231, multiple alternative routes are identified for study to create a new walking and bicycling connection to SR 12 and the planned Sonoma Valley Trail in northeast Santa Rosa. Community outreach produced differing opinions on acceptable locations for connections, suggesting a need for further study and more intensive engagement with neighborhood residents to identify a preferred route.*

The trail connection between SR 12 and Channel Drive is shown on *Figure 5-4, Bikeway Projects Northeast* and *Figure 6-5* of the Master Plan Update, and is generally described for further study in the Plan as part of the Northeast Connections.



Enlargement of Figure 5-4, Santa Rosa Bicycle and Pedestrian Master Plan Update 2018



Enlargement of Figure 6-5, Santa Rosa Bicycle and Pedestrian Master Plan Update 2018

2.3 Santa Rosa Citywide Creek Master Plan (2013)

The Citywide Creek Master Plan outlines creek-related policies and recommendations for site-specific improvements to the City's creek network. The overall concept for the creek trail system is to create a continuous system of access along the creeks with connections from the creeks to major generators and destinations of bicycle and pedestrian traffic, and is intended to support walking and bicycling as viable alternative modes of transportation to the automobile. The Plan calls for public access trails along Melita and Oakmont Creeks within the development area.

The Plan provides a comprehensive guide outlining programs, policies as well as specific techniques for trail design consistent with creek habitat and site design. The Plan contains guidelines for site planning and orientation to optimize proximity to the creek setting. The Plan also contains objectives and policies directing that discretionary projects should include trail improvements as part of projects:

> ***Objective PR-1.*** *Where discretionary land use approvals are sought, development shall, to the extent possible, be consistent with the Master Plan.*
> *To realize the Santa Rosa community's vision for healthy creeks and an integrated creekside trail network, public and private development projects should reflect the Master Plan's recommendations for each creek*

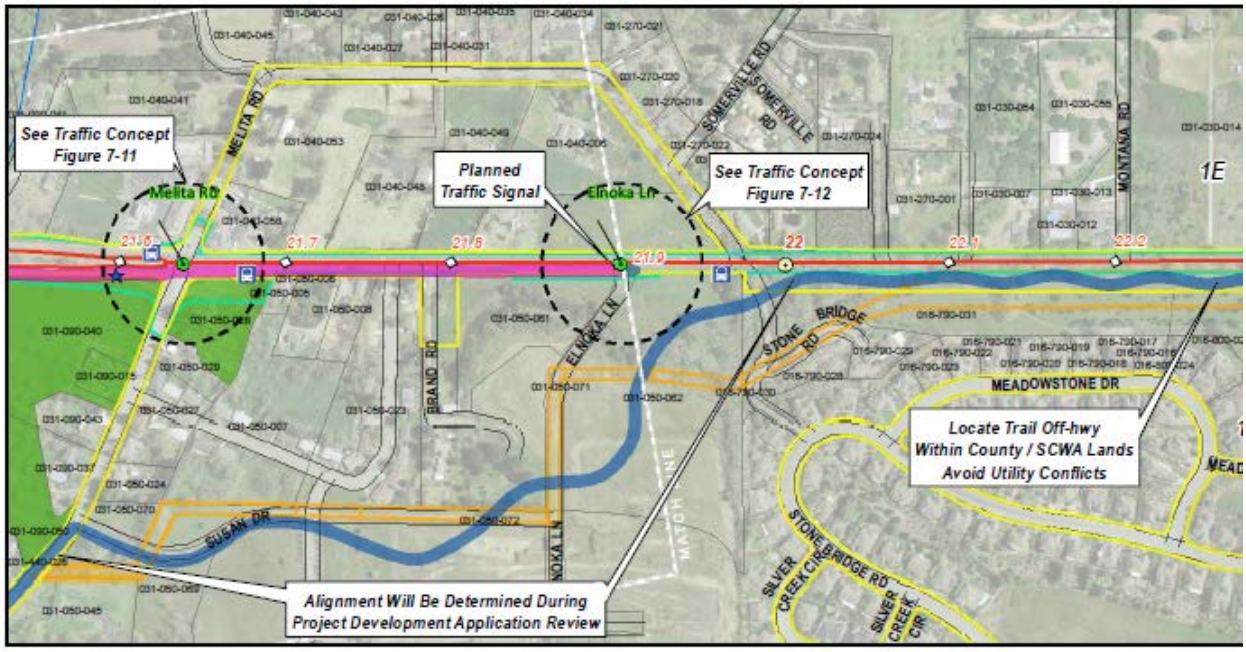
reach. Decision-making bodies should require that proposed improvements be consistent with the Master Plan.

Policy PR-1-1. *Proposed improvements associated with development projects should be consistent with the Master Plan.*

2.4 Sonoma Valley Trail Feasibility Study (2016)

The Sonoma Valley Trail is envisioned as a multi-modal trail in the Valley of the Moon to link Santa Rosa with Sonoma. This Study, completed by Sonoma County Regional Parks, examined the thirteen mile corridor would support bicycle, pedestrian and (where appropriate) equestrian use and provide recreational opportunities, serve local citizens and help connect schools, wineries, businesses and local shopping destinations without having to drive.

In the vicinity of the Elnoka project, the Preferred Alignment (shown in *Figure 7-2* of the Study) is located within the Elnoka project area, with the precise alignment to be determined as part of the project implementation. The Study evaluated a range of options to meet a goal of providing seamless connections to adjacent park facilities, including Trione Annadel State Park and Spring Lake Park.



Enlargement of Figure 7-2, Sonoma Valley Trail Feasibility Study 2016

2.5 Trione Annadel State Park (California State Parks)

Trione Annadel State Park abuts the project site on the south side. The Park has an estimated annual attendance (2014/15) of 174,000 and encompasses over 5,000 acres within Sonoma

County, near Santa Rosa, CA. It offers fishing, picnicking, nature observation, and 40 miles of trails for hiking, mountain biking and equestrian use.

The Park's Visitor Center and primary access is from Channel Drive, which directly abuts the Elnoka site on the south. Channel Drive is a low volume road that also serves bicycle and pedestrian use as well as providing access to the Park's staging areas and other Park trails.

The Park currently does not have a General Plan. In addition to completing a plan and program for interpretation, planned future facilities include an amphitheater and interpretive exhibits at the Visitor's Center, as well as deferred maintenance and restoration of historic sites.

Channel Drive Connection to Trione-Annadel State Park. Channel Drive is the entryway to Trione Annadel State Park and forms the southern boundary of Elnoka. The road is a logical regional trail connection point and destination; it is shown as such on the City of Santa Rosa and Sonoma County Bicycle Plans, as well as the Sonoma Valley Trail Plan. There are currently two graded driveways that connect the Elnoka site to Channel Drive. Channel Drive is a State Park facility and any trail connection to this facility would require a Right of Way agreement and engineering and environmental clearance by State Parks[1].

According to State Parks staff, they would need to do their due diligence with respect to protection of cultural and environmental resources and make a deliberative and discretionary decision regarding a new Channel Drive trail connection, making sure there is carrying capacity within the Park to handle the expected increase in visitors. This typically happens through a Park Master Plan/EIR process or through the development of a Road and Trail Management Plan (RTMP) and CEQA document for the Park. Currently there is no Master Plan/EIR or RTMP for this Park.



Existing driveway/access from site to Channel Drive

According to Ms. Wilson, State Parks typically would support such a connection if it were part of public Regional Trail facilities connecting communities and other Park and Open Space areas, and provided there were no significant environmental or capacity issues. State Parks would typically not support a trail connection to serve

[1] Laura Wilson, (Sr. Park & Recreation Specialist-Bay Area District of State Parks) pers comm.. 12/30/19

private property[2].

State Parks is an adjoining land owner and a Responsible Agency under CEQA and therefore will have an official opportunity to comment on the proposed Elnoka development proposal, including the potential trail connection issue through the project's EIR process with the City of Santa Rosa as the Lead Agency.

State Parks commented on the Elnoka EIR Notice of Preparation (NOP), dated August 11, 2017. That correspondence indicated that one way to achieve a more timely preparation of the required Park Master Plan/EIR or Road and/or Trail Plan was for the developer to pay an "Impact Fee" to State Parks to help cover the costs of Plan preparation. At this point, and until this has been completed, the connection to Trione Annadel is an unresolved issue that might be further evaluated during the comment/response to comment period on the Project's environmental document.

Other comments from State Parks during the Notice of Preparation for the Elnoka Environmental Impact Report noted the significance of the State Park as a regional recreational amenity, and requested analysis regarding provision of recreation facilities for residents, aesthetic impacts to park users, adequacy of open space, creek protection, and increased park use by future development residents.

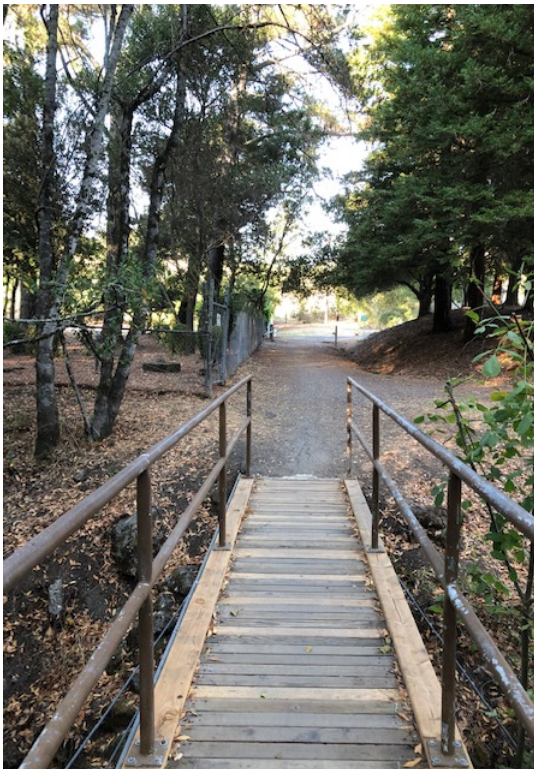
2.6 Other Area Trails

Channel Drive is utilized as a pedestrian and bicycle trail. Pedestrians and cyclists who wish to continue to the Oakmont area and Sonoma Valley currently utilize a footbridge crossing on the City's Water Treatment Plant site and path within Oakmont Village Association lands to connect to Stonebridge Drive. On Stonebridge Drive, there are sidewalks, but no dedicated off-street trail facilities. In addition to potential right of way/easement needs, improvements to the bridge and access ramps would be needed to make this existing route ADA accessible.



Existing Informal Trail Connection to Oakmont

[2] No formal connection from the proposed private facilities is currently shown, but access to Channel Drive via the existing driveway is not precluded in the current site plan.

City of Santa Rosa WTP Bridge and Path

3. SITE ISSUES

3.1 Topography and Slope Stability

As indicated in the Elnoka supporting documentation, the site has varied terrain, including an east-west ridge that bisects the site, as well as two large pads with steep side slopes that were rough graded in the 1990's as part of a previous development project. These slopes are proposed to be re-graded as part of the project and to conform to adjacent natural landforms.

Site slopes present constraints to making a fully ADA accessible pathway connection between SR12 and Channel Drive. Grading and the use of retaining walls and trail switchback segments may be needed. Based on available geologic mapping and site observations, there are no significant slope stability constraints to a trail alignment through the property.



Site topography and previously graded areas

3.2 Creeks

As describe in the Citywide Creek Master Plan, Oakmont Creek and Melita Creek flow through the project site and enter Santa Rosa Creek near Melita Road. These creeks contain some sensitive biological resources, including potentially the California and federally protected California Red Legged Frog (CRLF). However, the presence of CRLF and other sensitive features has not precluded the proposed CCRC from including several new bridge crossings, and there are ample opportunities to protect and enhance the creeks.

The Citywide Creek Master Plan describes the current Oakmont-Channel Drive trail connection that follows Oakmont Drive and Stone Bridge Drive, passing along the driveway to the City's Oakmont Treatment Plant to cross an existing trail bridge to Channel Drive.

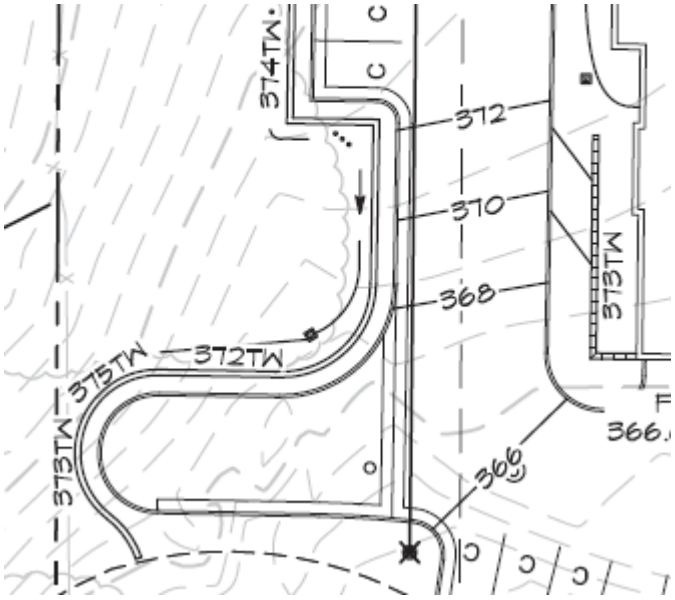
For Melita Creek, the Plan calls for revegetation with native species and incorporation of public areas within the development of the surrounding area. The current CCRC Site Plan does not address the issues of creek trails or creek restoration and enhancement, and proposes no public access or amenities.



Melita Creek Corridor

3.3 Proposed Elnoka CCRC Design Concept

The 2*017 Elnoka CCRC Policy Statement* states that the project is intended to be a gated facility with private streets, pedestrian circulation, recreation facilities and open space areas. Public facilities would consist of a sidewalk and bike path along the SR12 frontage. No public access improvements are proposed on Melita Road. No other public facilities are proposed. Site Open Space and recreation areas, including internal trails, would be for use by residents only.



Example of development infrastructure proposed within building setback area

The Project proposes all buildings to have a minimum 70 foot setback from the east, south and west property lines, and 35 feet from SR12. The site plan also shows development infrastructure including parking,

roads and other structures that are generally setback 10-20 feet from the property line, but as close as five feet in some areas. Retaining walls, stormwater swales and transition grading at the property line would also be located within this setback area.

Given these proposed Site Plan development constraints, it is not possible for a trail to be placed along the proposed perimeter of the development without modification to the proposed development plan. Site Plan modifications, including eliminating or relocating some east side access and perimeter roads, associated parking spaces, and modifying the footprint of some buildings would be necessary.

4. TRAIL DESIGN NEEDS

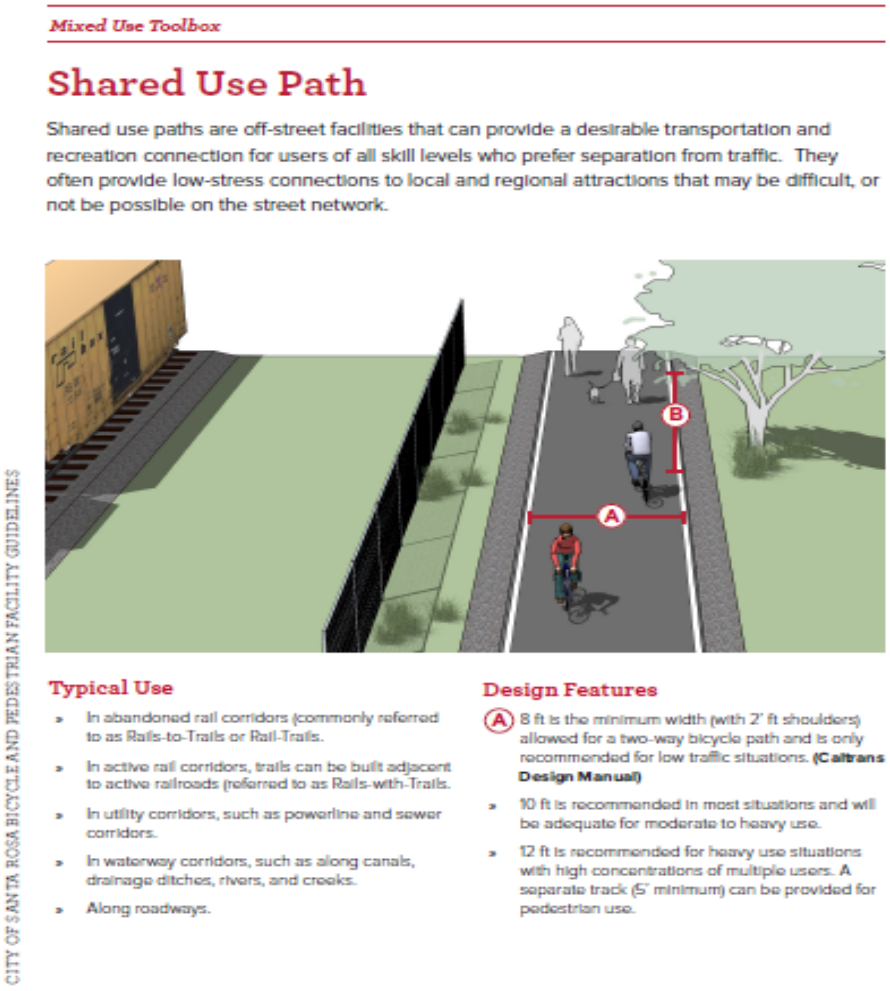
The City's Bicycle and Pedestrian Guidelines and Citywide Creek Master Plan provide comprehensive guidance regarding trail facilities.

4.1 Trail Width and Surface

A trail connection from SR12 through the project area would be considered a shared use path. As defined in the City of Santa Rosa General Plan, the trail would be considered a class I (bike paths):

> *…shared use paved paths completely separated from the street. These paths allow two-way travel by people walking and bicycling and are often considered the most comfortable facilities for the inexperienced riders as there are few potential conflicts between people bicycling and walking and people driving. Where there is a minimum of eight feet width (with two-foot shoulders) off -street public right-of-way (typically along utility and stream corridors)*

As illustrated in the City's Bicycle and Pedestrian Facility Guidelines, the trail would be a minimum of 8 feet wide with two foot shoulders (12 feet), with a potential width of twelve feet with two foot shoulders (16 feet), depending on anticipated trail use.To accommodate a trail corridor on the site, a minimum corridor width of 25 to 30 feet is recommended to accommodate the physical trail infrastructure. A wider easement corridor (50-100 feet or more) may be needed in sloping areas to accommodate trail grades, retaining



Mixed Use Toolbox

Shared Use Path

Shared use paths are off-street facilities that can provide a desirable transportation and recreation connection for users of all skill levels who prefer separation from traffic. They often provide low-stress connections to local and regional attractions that may be difficult, or not be possible on the street network.

Typical Use

- In abandoned rail corridors (commonly referred to as Rails-to-Trails or Rail-Trails.
- In active rail corridors, trails can be built adjacent to active railroads (referred to as Rails-with-Trails.
- In utility corridors, such as powerline and sewer corridors.
- In waterway corridors, such as along canals, drainage ditches, rivers, and creeks.
- Along roadways.

Design Features

- (A) 8 ft is the minimum width (with 2' ft shoulders) allowed for a two-way bicycle path and is only recommended for low traffic situations. **(Caltrans Design Manual)**
- 10 ft is recommended in most situations and will be adequate for moderate to heavy use.
- 12 ft is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

CITY OF SANTA ROSA BICYCLE AND PEDESTRIAN FACILITY GUIDELINES

structures and switchbacks as well as a larger corridor along the eastern perimeter to serve as a wildlife corridor connecting the creeks.

An additional temporary construction access agreement may also be needed. Precise dimensions of trail right of way should be formalized during precise development planning, based on follow up trail engineering design.

4.2 Accessibility

The goal of trail implementation is to accommodate as many users as possible in compliance with the Americans with Disabilities Act (ADA). As stated in the Citywide Creek Master Plan, new trails should comply with ADA and California Building Code (Title 24) regulations. Accessibility guidelines require a firm, stable surface for trails, and design accommodations for grade, cross-slope, width, etc. wherever feasible.

Americans with Disabilities Act

The United States Congress enacted the Americans with Disabilities Act (ADA) in 1990 to address discrimination against individuals with physical and mental disabilities. The ADA requires that all facilities and buildings open to the public be accessible to those with disabilities. Design and implementation of portions of the trail that connect to parking areas, restrooms, trailheads or other physical facilities might also need to comply with federal regulations outlined in the ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). These guidelines require a 36 inches minimum clear trail width, with passing space at minimum 200-foot intervals if the trail is less than 60 inches wide, depending upon the anticipated trail use. Since Trione Annadel State Park contains features built or altered with federal grants or loans, ADAAG standards may apply to make a Channel Drive connection.

Generally, for providing access to a range of potential trail users with differing degrees of mobility, the goal of a trail is to keep the majority of the trail running grade at less than 5%, where possible, with short segments of trail from 5% to 10% and with occasional resting or landing areas, and with the maximum running grade at 12%. Most of the site consists of relatively gentle slopes where meeting accessibility standards should be feasible. On steeper grades, and depending on the availability of open space areas, switchback or ramp segments may be needed. Typical trail design slope and distance regulations that may apply to this trail are contained in the federal Architectural Barriers Act (ABA) summarized below:

Maximum Trail Running Slope and Segment Length

Steeper than	But not Steeper than	Maximum Length of Segment
1:20 (5%)	1:12 (8.33%)	200 feet (61 m)
1:12 (8.33%)	1:10 (10%)	30 feet (9 m)
1:10 (10%)	1:8 (12%)	10 feet (3050 mm)

Source: https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/aba-standards/chapter-10-recreation-facilities

Title 24, California Building Code

The State of California has adopted a set of design guidelines for accessible facilities, incorporating accessibility guidelines. These requirements are contained in the California Code of Regulations, Title 24, Part II, California Building Code (CBC)3. CBC contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. Trails, paths and nature walk areas, or portions of them, are required to be constructed with gradients permitting at least partial use by wheelchair occupants. Buildings and other functional areas shall be served by paths or walks with firm and stable surfaces. The code also allows for exceptions by the enforcing agency if it finds that "in specific areas, the natural environment would be materially damaged by compliance with these regulations, and such areas would be subject to the regulations only to the extent that such material damage would not occur. "

The most recent Title 24 regulations were published in July 2019 and become effective January 1, 2020.

Accessibility Exceptions

The final trail design should be in compliance with all applicable regulations for accessibility, however it is possible that portions of the trail could not meet accessibility guidelines. Exceptions might apply for some steeper areas where there are topographic constraints, steep slopes and/or environmentally sensitive areas that must be avoided.

Segments with grades over 5% would need to be designed with ramps, structures or other design elements to comply with accessibility requirements. Documentation of exception conditions would be need to be included in the detailed design planning, including Caltrans Design exception for any non-compliant trail segments within Caltrans ROW (SR12). Exception conditions include:

Condition 1.*Compliance Would Cause Substantial Harm to Cultural, Historic, Religious, or Significant Natural Features or Characteristics*

Condition 2. *Compliance Would Substantially Alter the Nature of the Setting or the Purpose of the Facility, or Portion of the Facility*

Condition 3. *Compliance Would Require Construction Methods or Materials That Are Prohibited by Federal, State, or Local Regulations or Statutes*

Condition 4*. Compliance Would Not Be Feasible Due to Terrain or the Prevailing Construction Practices*

4.3 Emergency Access Considerations

Trails can be designed to also serve as secondary emergency access needs, such as site evacuation and emergency vehicle response, as well as to supplement planned site circulation. An emergency access connection to Channel Drive is not part of the current development proposal.

[3] California Code of Regulations, Title 24 Part 2, 2016.

5. TRAIL OPTIONS

This Study focuses on potential alignments to complete a trail connection from SR12 to adjacent park facilities, and consistent with City and County goals for a continuous trail network (**Figure 3**).

As previously discussed, the current site plan maximizes site development and use of the property, It is a proposed private, gated community with no public facilities. Proposed streets, parking areas, walls, drainage and other infrastructure are proposed within five to ten feet of the property line. This would preclude trail placement unless the development footprint is modified.

Two trail route options were identified along the perimeter of the site that would provide the most direct connections to parks and public facilities, utilize the site's creek corridors for public access and help connect the two creeks with a trail corridor (**Figure 4**). In addition, locating the trail along the site perimeter would allow consolidated development at the center of the site and in keeping with the Project intent to develop a private, gated community. Various options are discussed in this section.

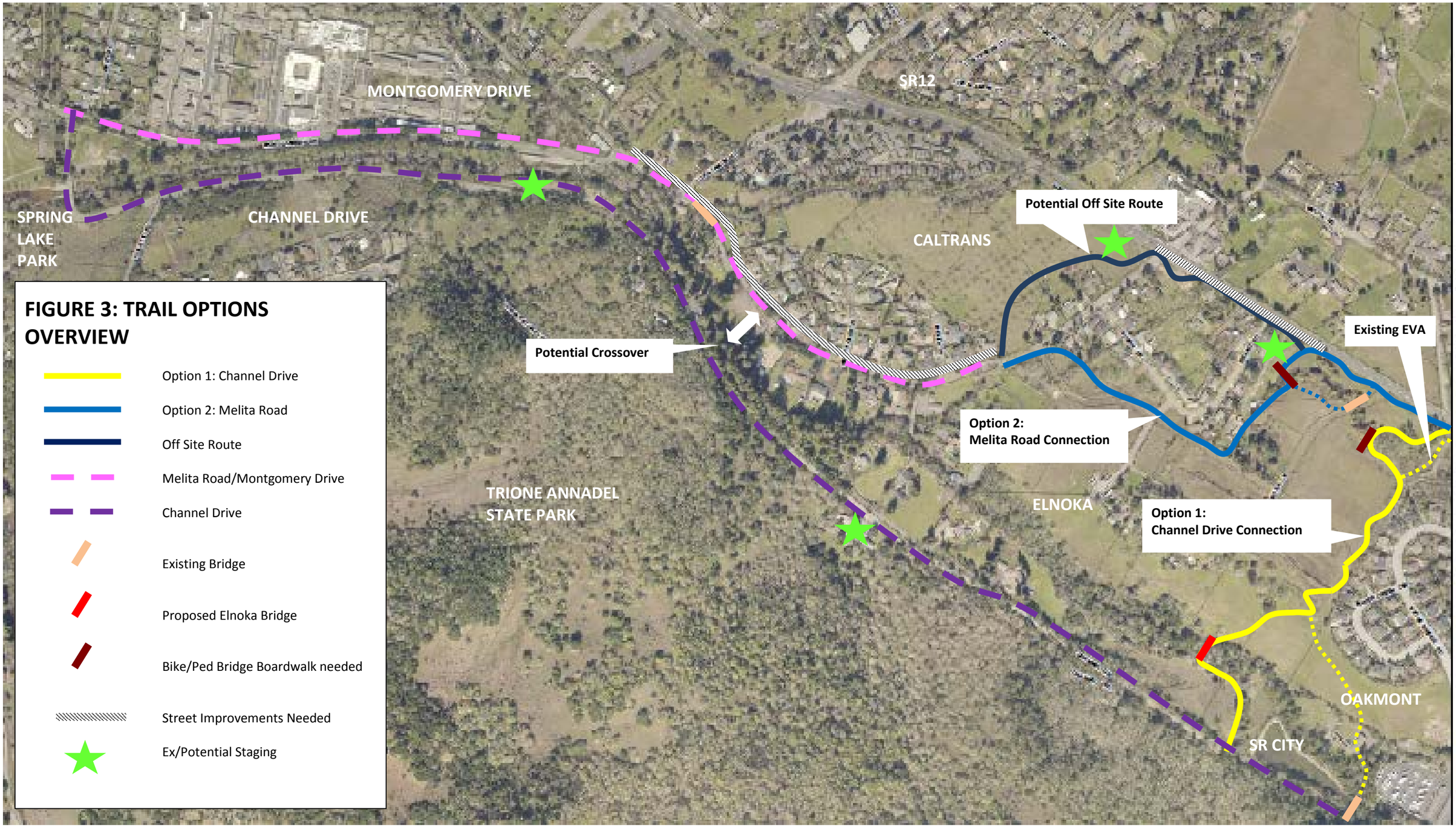
Onsite Trail Route Options

- **Option 1- Channel Drive Trail** connection. This route, along the east perimeter of the site, would provide a connection to Channel Drive and Trione Annadel State Park trails. Much of the route would be located within project setbacks, easements and/or proposed open space areas. A portion would be located on Oakmont Property and a portion would be located on City property.

- **Option 2- Melita Road** connection. This route would be located along the northeast perimeter of the site, and provide a connection from SR 12 to Melita Road. It would require access along Melita Road, which has no dedicated bike path.

Off Site Trail Route Options

If no public facilities are incorporated into the Project, then the trail would need to be located along SR12 with an on-street route along Melita Road and Montgomery Drive to provide linkage to the creek and park trail system, or utilize the existing (approximately six foot wide) footbridge and on-street route through City and Oakmont Village Association lands to provide a continuous trail network.


MONTGOMERY DRIVE
SR12
SPRING LAKE PARK
CHANNEL DRIVE
CALTRANS
Potential Off Site Route
Existing EVA
Potential Crossover
Option 2:
Melita Road Connection
TRIONE ANNADEL STATE PARK
ELNOKA
Option 1:
Channel Drive Connection
OAKMONT
SR CITY
FIGURE 3: TRAIL OPTIONS OVERVIEW
Option 1: Channel Drive
Option 2: Melita Road
Off Site Route
Melita Road/Montgomery Drive
Channel Drive
Existing Bridge
Proposed Elnoka Bridge
Bike/Ped Bridge Boardwalk needed
Street Improvements Needed
Ex/Potential Staging

0 150 300 600 900 1,200 Feet

N NE E SE S SW W NW

Legend

Existing Topography

5 ft contour

10 ft contour

Parcel Boundary

1A

1B

+/- 60' CROSSING

TRAIL STAIRS

TRAIL SWITCHBACKS (8% GRADE)

50-75' TYPICAL EASEMENT

25-50' TYPICAL EASEMENT

+/- 40' CROSSING

OPTION 1

OPTION 2

+/- 40' CROSSING

+/- 80' CROSSING

EVA ROUTE

CHANNEL TRL

CHANNEL DR

Oakmont Creek

South Fork Melita Creek

Melita Creek

BRAND RD

SUSAN DR

SONOMA HWY

MELITA GLEN PL

MELITA CT

LOS ALAMOS CT

MELITA RD

QUESTA ENGINEERING CORP.

FIGURE 4 - Route Options

5.1 Option 1: Channel Drive Connection

Description

This trail alignment would be located along the east perimeter of the site to connect SR12 near the future Sonoma Valley Trail at the northeastern property corner. The trail would cross Melita Creek with a separate bicycle/pedestrian bridge and continue south along the property line.

Where grades dictate, the trail would need to have switchbacks and/or 8% ramp sections to traverse the steeper slopes near the south end. The trail would cross Oakmont Creek, either as part of the proposed onsite vehicle crossing, or separate bicycle and pedestrian bridges would be constructed to cross the creek and connect to Channel Drive. Alternatively, the trail could be aligned to sweep in a southeasterly direction and continue into Oakmont Village Association lands to connect with the existing bridge and trail at the Santa Rosa Water Treatment Plant (**Section 2.6**). Such a connection would require an easement from the Oakmont Village Association through their open space lands.

To accommodate trail switchbacks, a minimum trail open space easement of 50-100 feet is recommended. Areas where switchbacks are needed to accommodate ADA grades may be wider, depending on trail engineering. The necessary easement width to accommodate slope, setbacks, turning radius, etc. should be confirmed in precise development planning.

Trail Option 1A would be located within the creek setback area of Melita Creek, crossing with a separate bicycle/pedestrian bridge and continuing southeast along the perimeter of the proposed development. The trail would generally follow the proposed project sidewalk south of the site's east-west ridge and cross Oakmont Creek as part of, or near the proposed vehicle bridge. The trail would continue to follow the creek corridor south of the creek, and connect to Channel Drive at the existing driveway. Stairs may be provided in some areas in addition to the accessible route.

Alternatives in this Option would be to combine the trail within the city's existing Emergency Vehicle Access from SR12.

Trail Option 1B would trend east at the base of the east-west ridge and cross lands owned by Oakmont Village Association to connect with the existing bridge at the SR Water Treatment Plant. This bridge and approach would need to be upgraded or replaced to meet accessibility needs. An easement or agreement with OVA would be needed for this trail connection to be implemented.

Option 1B has utility to provide a neighborhood connection to the trail for Oakmont residents, and could be considered in addition to a primary Channel Drive connection.



Slope looking southwest towards Channel Drive



Channel Drive Corridor on east perimeter

Conclusions

- Steep slope areas would require additional right of way and/or switchback sections, and/or retaining structures to meet accessibility regulations
- Requires one or more bridge crossings (may be combined with proposed vehicular creek crossings)
- Provides a direct connection between the future Sonoma Valley Trail and Trione Annadel State Park trails and beyond
- Avoids bisecting proposed development
- Provides a potential emergency vehicle access opportunity
- Consistent with General Plan, Citywide Creek Master Plan and Bicycle and Pedestrian Plan
- Trail links could be provided onsite to allow residents to access adjacent open space and park areas.
- Site plan/development footprint revisions would be needed to provide Right of Way and/or allow trail to meet ADA guidelines/accommodate slope conditions (**Figure 5**)
- One or more bicycle/pedestrian bridges (or EVA rated bridges) would be needed (or incorporate into vehicle bridge design)
- Fencing and circulation modifications needed to delineate public/private spaces



Source: ESRI Imagery

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FIGURE 5
Potential Site Plan/Trail Conflicts



Potential trail location near northeast corner (Oakmont is left of trees in photo))



County ROW /SVT connection at SR12 (Emergency Vehicle Access)



Future SVT alignment along SR12 (looking east)

5.2 Option 2: Melita Road Connection

Description

This route would be located along the northwest perimeter of the site, connect the proposed sidewalk on SR12 with a new trail crossing Melita Creek and trending southwest to Melita Road. Trail improvements should be provided along the Melita Road frontage (no improvements are proposed in the CCRC Site Plan). A mid-block crossing would be needed to connect with the

asphalt path continuing west on Melita Road, or future improvements would be needed along Melita and Montgomery Drive to provide a continuous trail to connect to the parks.

There is a potential opportunity to create a direct link to Channel Drive via a privately owned parcel on Melita Road, where a bicycle/pedestrian bridge could provide a direct connection to the parks. The status and feasibility of a trail connection on this undeveloped parcel is unknown.

To accommodate a Melita Road trail connection, a trail open space easement with a minimum width of 25-50 feet is recommended. Public access improvements along the Melita Road frontage would also be completed. The necessary easement width to accommodate slope, setbacks, turning radius, etc. should be confirmed in follow up precise development planning and engineering.



Melita connection looking west



Melita connection looking east

Conclusions

- Requires one or more bridge crossing of Melita Creek (may be combined with proposed vehicular creek crossings)
- Future street/trail improvements (Melita Road Bridge, property acquisition, infrastructure) may be needed to complete an off-street trail segment to connect to the parks; connection to Trione Annadel State Park is circuitous.
- Does not provide continuous off-street trail to nearby parks
- Provides a connection between the future Sonoma Valley Trail and Melita Road neighborhood
- Slope conditions are not as steep as Option 1 route
- A portion of the trail along Melita Creek would be consistent with Citywide Creek Master Plan
- Trail links could be provided onsite to allow residents to access open space areas

- County owned right of way adjacent to site northwest corner could provide potential trail staging area.
- One or more bicycle/pedestrian bridges would be needed (or incorporate into vehicle bridge design)
- Fencing and circulation modifications needed to delineate public/private spaces
- Potential site plan modifications to orient development toward creeks and provide opportunities for Project residents to access trails (**Figure 5**).

6. CONCLUSION AND RECOMMENDATIONS

There are no existing trails that currently connect the area's parks, open space and trails network with existing and planned regional bicycle and pedestrian facilities along SR12, including public transit. Public bicycle and pedestrian facilities are designated on applicable City and County Plans to connect through the Elnoka site.

The proposed Elnoka development plan does not include provision of public access facilities to connect the SR12 area (proposed alignment of the Sonoma Valley Trail) with trails and parks, including Trione Annadel State Park and Spring Lake Regional Park. Facilities on the site are proposed to be gated and private, with limited connections to surrounding streets and open space. This is inconsistent with approved City and County trail planning documents.

If no public facilities are incorporated into the Project, Trione Annadel and Spring Lake Park trail users would continue to informally use streets in the Oakmont area and points south via the pedestrian bridge crossing at the Santa Rosa WTP and private property including OVA open space lands, then surface streets (Stone Bridge Drive). This informal route does not provide an off street connection to SR12, and a public pedestrian and bicycle easement would be needed over private property. In addition, no off street route is available further southeast (through Oakmont) to connect to the future Sonoma Valley Trail.

A potential future trail connection along SR12 further northwest (through Caltrans or other lands) is not assured, and would be subject to land use planning, site development constraints, property ownership and other issues. In addition, construction of such a connection is not mutually exclusive, and would serve trail users and destinations further north and west of the Elnoka site, as indicated in the Santa Rosa Bicycle and Pedestrian Plan Update.

Elnoka Site

In order to provide a trail connection consistent with City and County plans, site plan modifications would be needed to allow a continuous trail that meets state and federal accessibility guidelines. To accommodate a Channel Drive connection, these plan modifications would primarily occur on the eastern perimeter of the property. Such a trail corridor could also function as a wildlife corridor to connect the sites' two creeks and the larger open space and parklands in the region.

Option 1 (Channel Drive) discussed in this Study provides a connection consistent with the City's planning efforts, and avoids bisecting the development site. It is the preferred option because it provides a complete off street connection to Channel Drive and avoids a circuitous route along city streets that have discontinuous sidewalks and bike lanes (Melita Road and Montgomery Drive) to reach adjacent park trails.

Of the two Channel Drive options, Option 1B would provide direct connectivity to the Oakmont community and could avoid a new creek crossing by utilizing the existing Oakmont Creek bridge connection to access Trione Annadel SP (although retrofit or replacement of the existing facilities would be needed). This route would also formalize the connection to the future Sonoma Valley Trail as an off-street route that avoids Oakmont streets.

Option 2 (Melita Road) also avoids bisecting the development site, however, it fails to facilitate designated bicycle and pedestrian use and puts cyclists and pedestrian onto Melita Road which does not contain facilities.

Topographic Issues

Figure 6 shows the existing topography in the vicinity of a schematic trail route within a typical 50 foot wide easement. Areas with slopes greater than 5% slopes indicate a need where more substantial grading, retaining walls, and/or use of switchbacks may be needed to meet accessibility needs.

Figures 7 and **8** illustrate a portion of Trail Option 1 in the area of steepest slopes and conceptually indicate where switchbacks and/or ramps might be needed to address accessibility issues. The schematic profile does not show any trail grading which can be used to flatten and make a more uniform running slope. These figures illustrate the trail alignment if it were to be located primarily within a 50 foot or 75 foot wide easement. It should be noted that proposed development grading, site improvements and actual easement width should be considered when determining the final trail alignment. More substantial grading and use of retaining walls can also be completed to result in a more uniform running slope with most sections less than 5% grade.

Trail grading and implementation is most efficiently completed at the same time as site development, considering site access, earthwork and grading equipment, and trail infrastructure such as walls and bridges.

Recommendations

1. Provide public access trail facilities as part of the development, consistent with the Santa Rosa General Plan 2035, Bicycle and Pedestrian Master Plan and Santa Rosa Citywide Creek Master Plan.

2. Consider trail construction access and infrastructure needs when evaluating Elnoka site development plan and easement needs, and incorporate trail construction components into project development plans where appropriate.

3. Consider emergency access needs and opportunities in trail design.

0 150 300 600 900 1,200 Feet

N E S W

Legend

Existing Grade

- 0.0- 4.9
- 5.0 - 8.4
- 8.5 - 11.9
- 11.9 - 15.4
- 15.5 - 18.9
- 19.0 - 45

Existing Topography

- 5 ft contour
- 10 ft contour

Parcel Boundary

1A

1B

+/- 60' CROSSING

+/- 40' CROSSING

+/- 40' CROSSING

+/- 80' CROSSING

OPTION 1

OPTION 2

CHANNEL TRL

CHANNEL DR

Oakmont Creek

South Fork Melita Creek

Melita Creek

MELITA GLEN PL

MELITA CT

SUSAN DR

BRAND RD

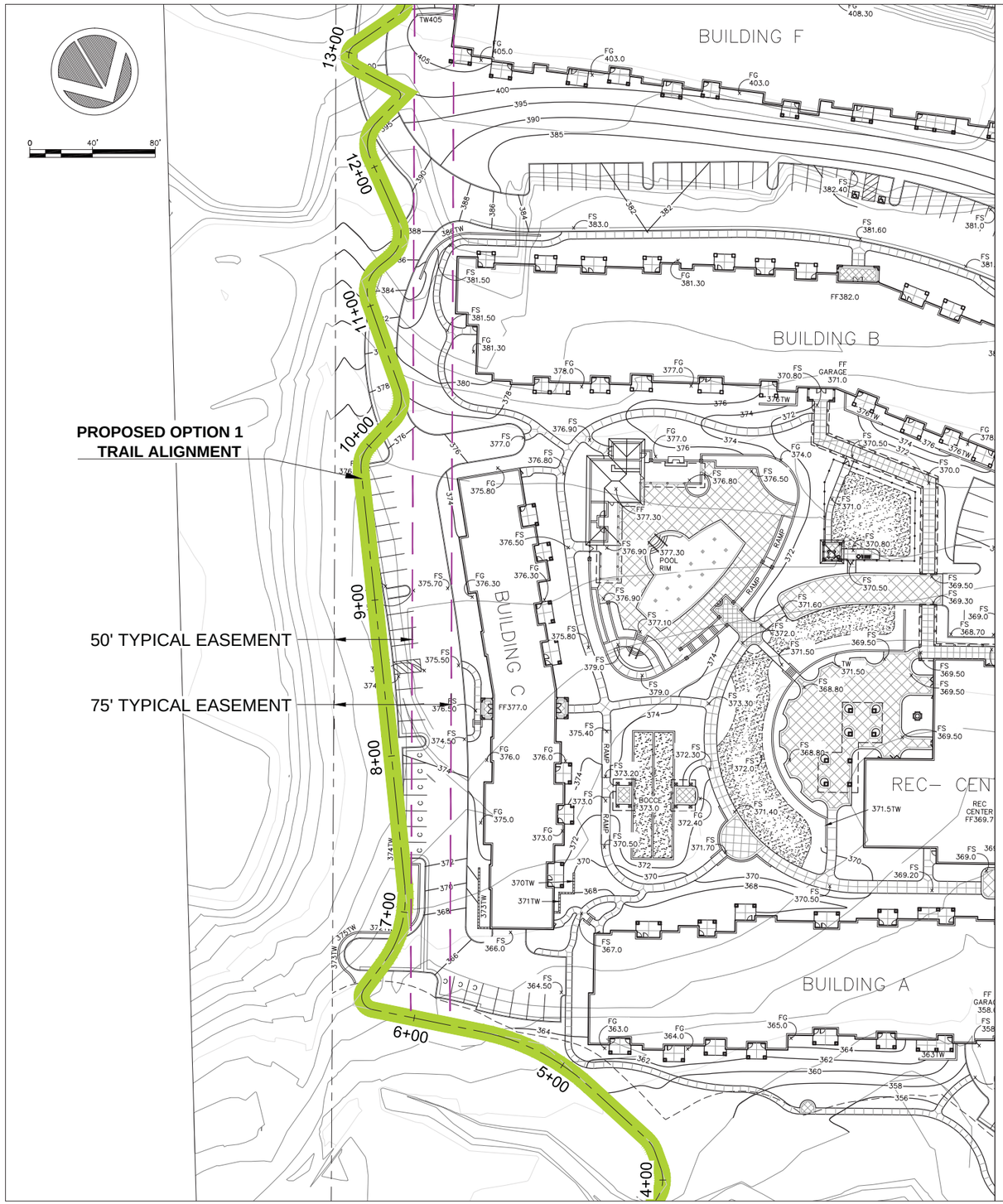
MELITA RD

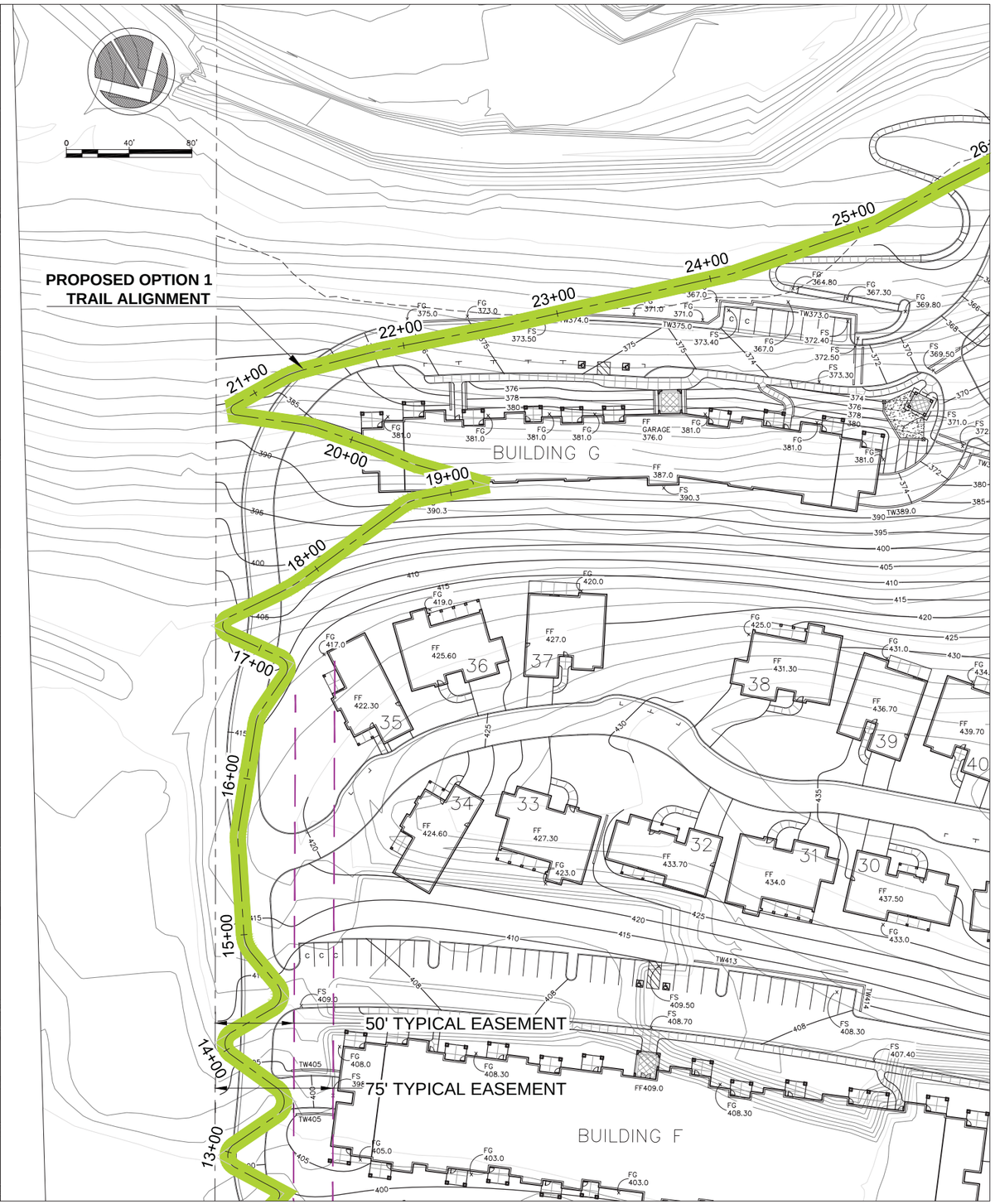
SONOMA HWY

LOS ALAMOS CT

QUESTA ENGINEERING CORP.

FIGURE 6





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& Water Resources
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FAX (510) 236-2423
questa@questaec.com
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Sht:	Rev:	Date:	By:	Description:	App'd:

Design: JP
Drawn: OR
Checked: XX
Appr'd: XX

ELNOKA TRAIL PROJECT
TRAIL ANALYSIS - PORTION OF OPTION 1

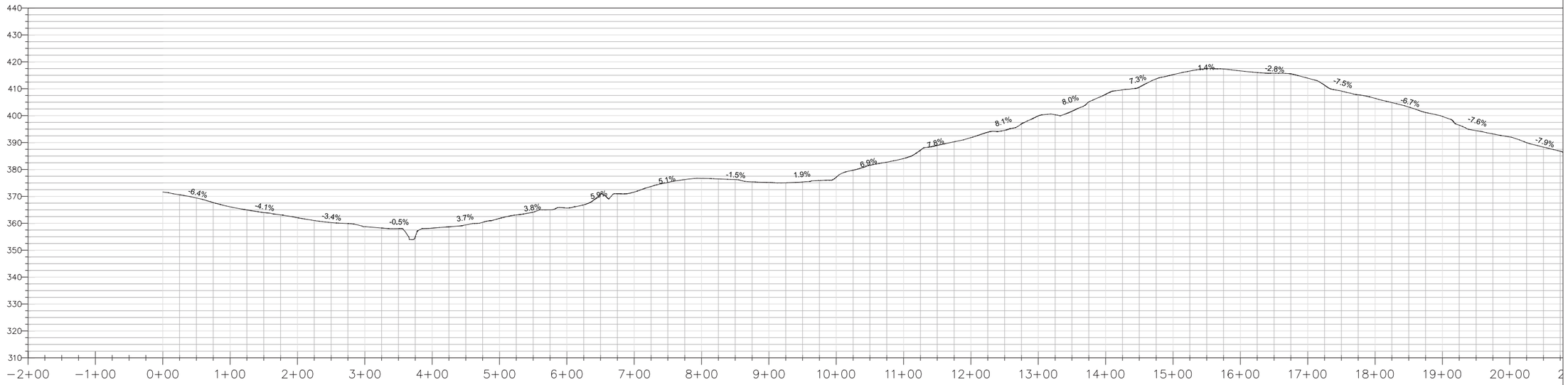
SANTA ROSA, CA

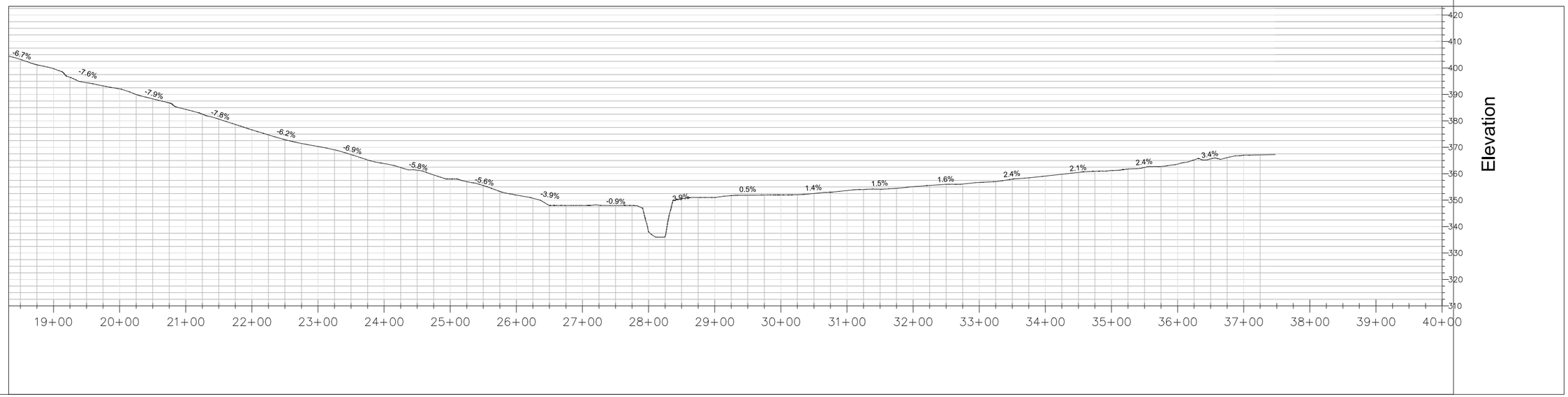
Size: D | Project: 1900130
Scale: AS NOTED
Date: 2-13-20

FIGURE 7

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY
PLOT DATE: 2/13/2020 PLOT STYLE: ----
LAST SAVED: 2/13/2020
P:\2019\1900130_ELNOKA_BIKE_PLAN\CAD\MODEL\1900130_ELNOKA_BIKE_PLAN – BASE_1_1_2789.DWG

Profile View of Alignment - Option 1
Vertical Exaggeration: 4X





IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY
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Design: XX
Drawn: OR
Checked: XX
Appr'd: XX

ELNOKA TRAIL PROJECT
TRAIL ANALYSIS - OPTION 1 PROFILE

SANTA ROSA, CA

Size: D
Project: 1900130
Scale: AS NOTED
Date: 2-13-20

FIGURE 8

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