Appendix A:
Traffic Impact Study

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Traffic Impact Study for the West College Avenue Apartments

Prepared for the City of Santa Rosa

Submitted by
W-Trans

August 6, 2020

TRAFFIC ENGINEERING
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Executive Summary

The project as proposed would replace approximately 37,250 square feet of general office space at 2150 West College Avenue in Santa Rosa with 168 multifamily residential units, including 70 one-bedroom units, 83 two-bedroom units and 15 three-bedroom units. Of the 168 units, 59 (35 percent) are to be designated as affordable housing units. The project site is accessed via two existing driveways on West College Avenue.

Under Existing and Future conditions, all five study intersections operate or are expected to operate at an acceptable Level of Service (LOS) of D or better during both the a.m. and p.m. peak hours. The unsignalized study intersection of West College Avenue/Navarro Street was evaluated to determine potential need for a traffic signal. Signalization is not warranted and is not recommended.

The project is expected to generate an average of 914 new daily trips, including 60 a.m. peak hour trips and 74 p.m. peak hour trips. No deductions were taken for existing office building as it is vacant. After adding trips from the proposed project to Existing and Future volumes, the study intersections are anticipated to continue operating at the same levels of service as under current and future conditions of LOS D or better.

The project is expected to have a less-than-significant impact on VMT due to its density, proposed pedestrian improvements, and allocation of affordable housing units.

Off-site facilities for pedestrians, bicycles and transit riders are generally adequate though it is recommended that the applicant construct an enhanced crosswalk including RRFBs at West College Avenue/Navarro Street to accommodate the anticipated increase in pedestrian trips associated with school-aged residents of the project.

Sight distance along West College Avenue is adequate from both driveways. A left-turn lane is warranted on West College Avenue at the western project driveway and, based on discussions with City staff, reconfiguration of the existing roadway geometry to provide a center turn lane in place of the second eastbound travel lane is proposed to meet this need.

The proposed project would provide 272 parking, spaces which is more than the 263 spaces that could be required under the Santa Rosa Municipal Code assuming a 25-percent reduction is allowed given the proximity to the transit hub on Stony Point Road at West College Avenue together with availability of bike lanes and off-street trails for other non-motorized uses and inclusion of affordable housing units. Additionally, facilities providing secure parking for 42 bicycles should be provided on-site.

Introduction

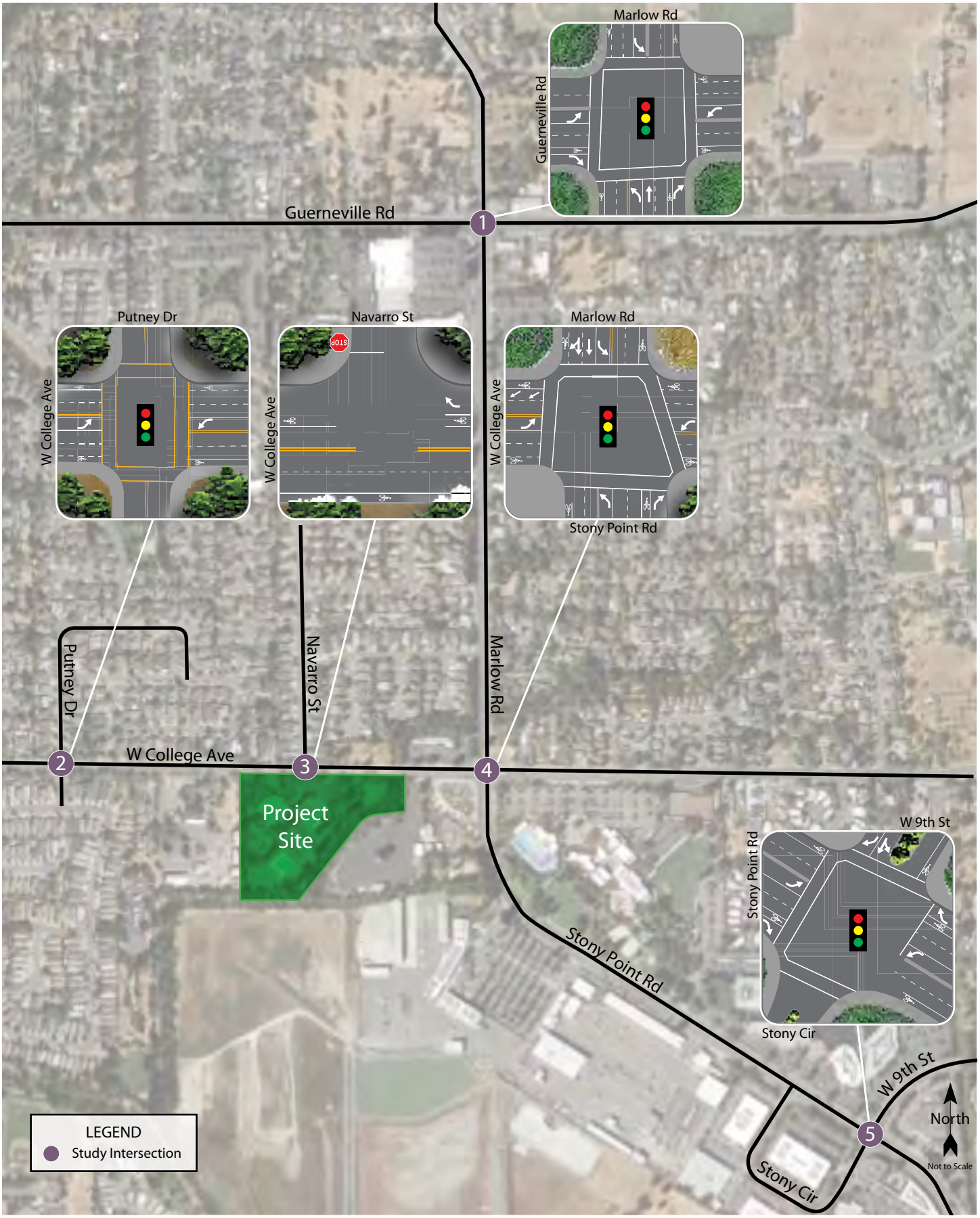
This report presents an analysis of the potential traffic impacts that would be associated with development of 168 multifamily apartment units at 2150 West College Avenue in the City of Santa Rosa. The traffic study was completed in accordance with the criteria established by the City of Santa Rosa and is consistent with standard traffic engineering techniques.

Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data 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 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 project as proposed would result in the construction of 168 multifamily apartment units at 2150 West College Avenue, including 59 "affordable" units. The existing on-site development consists of approximately 37,255 square feet of unoccupied office space previously used by the Sonoma County Water Agency. The project site is accessed by two existing driveways on West College Avenue and would also provide access to the Santa Rosa Creek Trail via a paved path. The location of the project site is shown in Figure 1.



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Traffic Impact Study for the West College Avenue Apartments Project

Figure 1 – Study Area and Existing Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Guerneville Road/Marlow Road
2. West College Avenue/Putney Drive
3. West College Avenue/Navarro Street
4. West College Avenue/Marlow Road-Stony Point Road
5. West 9th Street/Stony Point Road

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

Study Intersections

Guerneville Road/Marlow Road is a four-legged signalized intersection with marked crosswalks and bike lanes present on all legs. Protected left-turn phasing is provided at all approaches and pedestrian phasing exists on all legs.

West College Avenue/Putney Drive is a four-legged signalized intersection with marked crosswalks across all legs supported by pedestrian phasing. Class II bike lanes are present on both the east and west legs.

West College Avenue/Navarro Street is an unsignalized tee intersection including stop-control on the southbound approach.

West College Avenue/Marlow Road-Stony Point Road is a four-legged signalized intersection including crosswalks and bike lanes as well as protected left-turn phasing and pedestrian phasing on all legs.

West 9th Street/Stony Point Road is a four-legged signalized intersection including crosswalks on the north, east, and west legs. Split phasing controls the east-west traffic, and protected left-turn phasing is provided for north-south traveling vehicles. Pedestrian phasing is provided on the north, east, and west legs and Class II bike lanes are provided on the north, south, and east legs.

The locations of the study intersections and the existing lane configurations and controls are shown in Figure 1.

Study Roadways

Marlow Road-Stony Point Road is a north-south arterial with an approximate 76-foot width in the project vicinity that includes four travel lanes as well as a center median or a two-way left-turn lane in some locations. The roadway also includes thirteen-foot travel lanes, Class II bike lanes, and has posted speed limit of 35 miles per hour.

Guerneville Road is an arterial running east-west. Near the project site the roadway is approximately 70 feet wide, including four travel lanes, Class II bike lanes, and either a raised center median or a two-way left-turn lane.

The roadway is also characterized by twelve-foot wide travel lanes and has a posted speed limit of 40 miles per hour.

West College Avenue is an east-west arterial approximately 60 feet in width. The roadway is generally characterized by four eleven-foot wide travel lanes including two in each direction, together with a center two-way left-turn lane and Class II bike lanes, though there is currently only one westbound lane across from the project's frontage along the frontages of two parcels that are mostly undeveloped. The roadway has a posted speed limit of 40 miles per hour.

Putney Drive is a north-south local street with two travel lanes and parking on both sides of the street. The posted speed limit is 25 miles per hour.

Navarro Street is also a north-south local street with two travel lanes and parking on both sides of the street and a speed limit of 25 miles per hour.

West 9th Street is an east-west arterial characterized by two twelve-foot travel lanes, a raised median, Class II bike lanes and a posted speed limit of 30 miles per hour.

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is November 1, 2013 through September 30, 2018.

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 *2014 Collision Data on California State Highways*, California Department of Transportation (Caltrans). With the exception of Guerneville Road/Marlow Road, all the study intersections had collision rates below the statewide average for similar facilities. The collision rate calculations are summarized in Table 1 and copies of the spreadsheets are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2013-2018)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Guerneville Rd/Marlow Rd	17	**0.57**	0.43
2. W College Ave/Putney Dr	4	0.17	0.43
3. W College Ave/Navarro St	1	0.05	0.14
4. W College Ave/Marlow Rd-Stony Point Rd	11	0.16	0.43
5. W 9th St/Stony Point Rd	5	0.09	0.43

Note: c/mve = collisions per million vehicles entering; **bold text** indicates a collision rate that exceeds the statewide average for similar facilities

A total of 17 collisions were reported to have occurred at the intersection of Guerneville Road/Marlow Road, resulting in a rate of 0.57 collisions per million vehicles entering (c/mve) the intersection compared to the statewide average of 0.43c/mve. Of the 17 reported collisions, 10 were reported as including injuries to one or more parties involved, resulting in an injury rate of 58.8 percent compared to the statewide average of 37.9 percent. The most prevalent primary collision factors included signal violations (8 collisions) and unsafe speed (6 collisions). Further, all the signal violations resulted in broadside collisions while the unsafe speed violations resulted in rear-end collisions. Both of the primary collision types as well as the movements involved are indicative

of congested conditions. The broadsides likely resulted from drivers entering either late in the yellow clearance interval or even after the light changed to red and the rear-end crashes are common where drivers approach a signalized intersection and do not recognize that traffic is slowing or stopping. It is noted that the broadside collisions occurred primarily in 2014 and 2015, with only two of the eight crashes of this type since 2015. City staff may wish to consider implementing red-clearance timing at this location to address this type of crash.

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, etc. In general, a network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide adequate access for pedestrians in the vicinity of the proposed project site; however, sidewalk gaps can be found along some of the roadways connecting to the project site. Existing gaps and obstacles along the connecting roadways impact convenient and continuous access for pedestrians and present safety concerns in those locations where appropriate pedestrian infrastructure would address potential conflict points.

- **Marlow Road** – Continuous sidewalks are provided on both sides of Marlow Road between Guerneville Road and West Third Street. Curb ramps and crosswalks at side street approaches are present and lighting is provided by overhead streetlights near the project site.

- **Putney Drive** – Continuous sidewalks are present along both sides of Putney Drive for the entirety of the roadway supplemented by curb ramps and overhead streetlights.

- **Navarro Street** – There are continuous sidewalks along both sides of Navarro for the entirety of the roadway in addition to curb ramps and overhead streetlights.

- **West College Avenue** – Continuous sidewalk is provided on both sides of West College Avenue near the project. Rather than a paved concrete sidewalk, a gravel trail exists on the north side of the street for approximately 350 feet east and 100 feet west of the intersection at Navarro Street. Curb ramps and crosswalks at side street approaches are present, and lighting is provided by overhead streetlights. Crosswalks over West College Avenue are present only at the signalized intersections near the project site.

- **Stony Point Road** – Either continuous sidewalk or a path is provided along the two sides of Stony Point Road. The west side of the road includes sidewalk while the east side of the road is characterized by a mix of sidewalks and paved pedestrian paths. Curb ramps are provided at all driveways and intersections. Overhead streetlights are provided on the west side of the roadway and pedestrian scale lighting is provided on the east side.

- **Santa Rosa Creek Trail** – The Santa Rosa Creek trail exists south of the project site. The trail is a paved off-street path for use by pedestrians and cyclists. The trail includes access points to arterials and local streets within the project vicinity.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into four categories:

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

- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, the Santa Rosa Creek Trail runs along the south side of the project site. The trail includes access points to arterials and local streets within the project vicinity. Class II bike lanes exist on Marlow Road-Stony Point, Guerneville Road, West College Avenue, and West 9th Street. Bicyclists ride in the roadway and/or on sidewalks along all other streets in the study area. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018*, City of Santa Rosa, 2018.

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Santa Rosa Creek Trail	I	2.14	Willowside Rd	Prince Memorial Greenway
Marlow Rd-Stony Point Rd	II	3.14	Piner Rd	Rose Ave
Guerneville Rd	II	2.31	City Limits	Steele Wy
W College Ave	II	1.45	Fulton Rd	Kowell Rd
W 9th St	II	1.10	Stony Pont Rd	Wilson St
Planned				
W College Ave	II	1.61	Link Ln	4th St

Source: *City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018*, City of Santa Rosa, 2018

Transit Facilities

The Santa Rosa CityBus provides fixed route bus service in Santa Rosa. City Bus Route 9 provides loop service to destinations throughout the City and stops on Stony Point Road, Guerneville Road, and West College Avenue. Route 9 operates Monday through Friday with approximately one-half-hour headways between 6:00 a.m. and 8:00 p.m. Saturday service operates with approximately 60-minute headways between 6:45 a.m. and 7:45 p.m.

Route 15 serves stops along Stony Point Road, Marlow Road, and Guerneville Road near the project site. Route 15 operates Monday through Friday with approximately 60-minute headways between 6:00 a.m. and 8:00 p.m. The route operates with approximately 60-minute headways on weekends as well. On Saturdays the route operates between 8:00 a.m. and 8:30 p.m. while on Sundays between the hours of 10:00 a.m. and 5:30 p.m.

Route 19 provides service along Fulton Road, Guerneville Road, and West College Avenue within the project vicinity, terminating near the Fountaingrove Village Shopping Center. The route operates Monday through Friday between 8:00 a.m. and 5:30 p.m. with headways of approximately 60 minutes.

Two bicycles can be carried on most Santa Rosa CityBus vehicles. Bike rack space is available on a first come, first served basis. Additional bicycles are allowed on transit vehicles 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 CityBus Paratransit is designed to serve the needs of individuals with disabilities within Santa Rosa and the greater area.

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 West College Avenue/Navarro Street intersection has side-street stop controls and was analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The remaining intersections are controlled by traffic signals and were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. For purposes of this study, delays were calculated using signal timing obtained from the City of Santa Rosa. For those signals operating under an adaptive coordination scheme, delays were calculated using optimized signal timing as the cycle length varies depending on the demand of the intersection.

The ranges of delay associated with the various levels of service are indicated in Table 3.

Table 3 – Intersection Level of Service Criteria		
LOS	**Two-Way Stop-Controlled**	**Signalized**
A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

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

Traffic Operation Standards

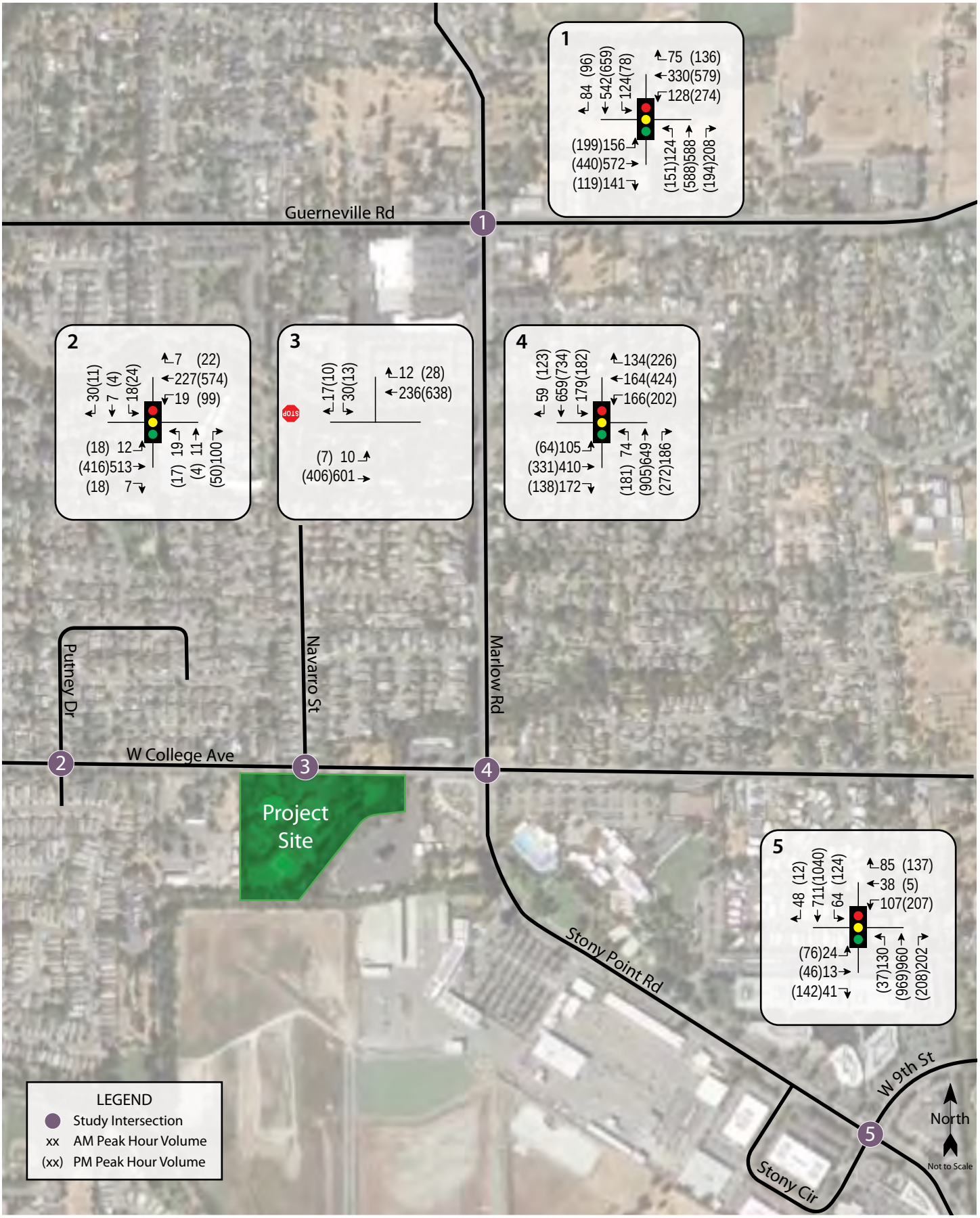
City of Santa Rosa

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

While a corridor level of service is applied by the City in its analysis of the entire City as part of the environmental documentation supporting the General Plan, this type of analysis only provides relevant data when performed on much longer segments than those included in the study area for this project. Therefore, although the City's standard does not specify criteria for intersections, for the purposes of this study a minimum operation of LOS D for the overall operation of signalized and unsignalized intersections was applied. As signalized intersections generally result in the greatest potential for conflict along a corridor and therefore the highest delay and lowest service level, where the signalized intersections are operating at LOS D or better it can typically be assumed the corridor Level of Service will similarly be D or better.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. Volume data was collected when while local schools were in session. Under these existing volumes, which are shown in Figure 2, all the study intersections are operating acceptably, as summarized in Table 4. Copies of the Level of Service calculations are provided in Appendix B.



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Traffic Impact Study for the West College Avenue Apartments Project

Figure 2 – Existing Traffic Volumes

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Table 4 – Existing Peak Hour Intersection Levels of Service					
Study Intersection ***Approach***		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**
1.	Guerneville Rd/Marlow Rd	43.8	D	44.6	D
2.	W College Ave/Putney Dr	6.4	A	4.8	A
3.	W College Ave/Navarro St	0.7	A	0.5	A
	Southbound (Navarro St) Approach	*12.4*	*B*	*16.6*	*C*
4.	W College Ave/Marlow Rd-Stony Point Rd	49.1	D	42.8	D
5.	W 9th St/Stony Point Rd	24.2	C	39.5	D

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*

Future Conditions

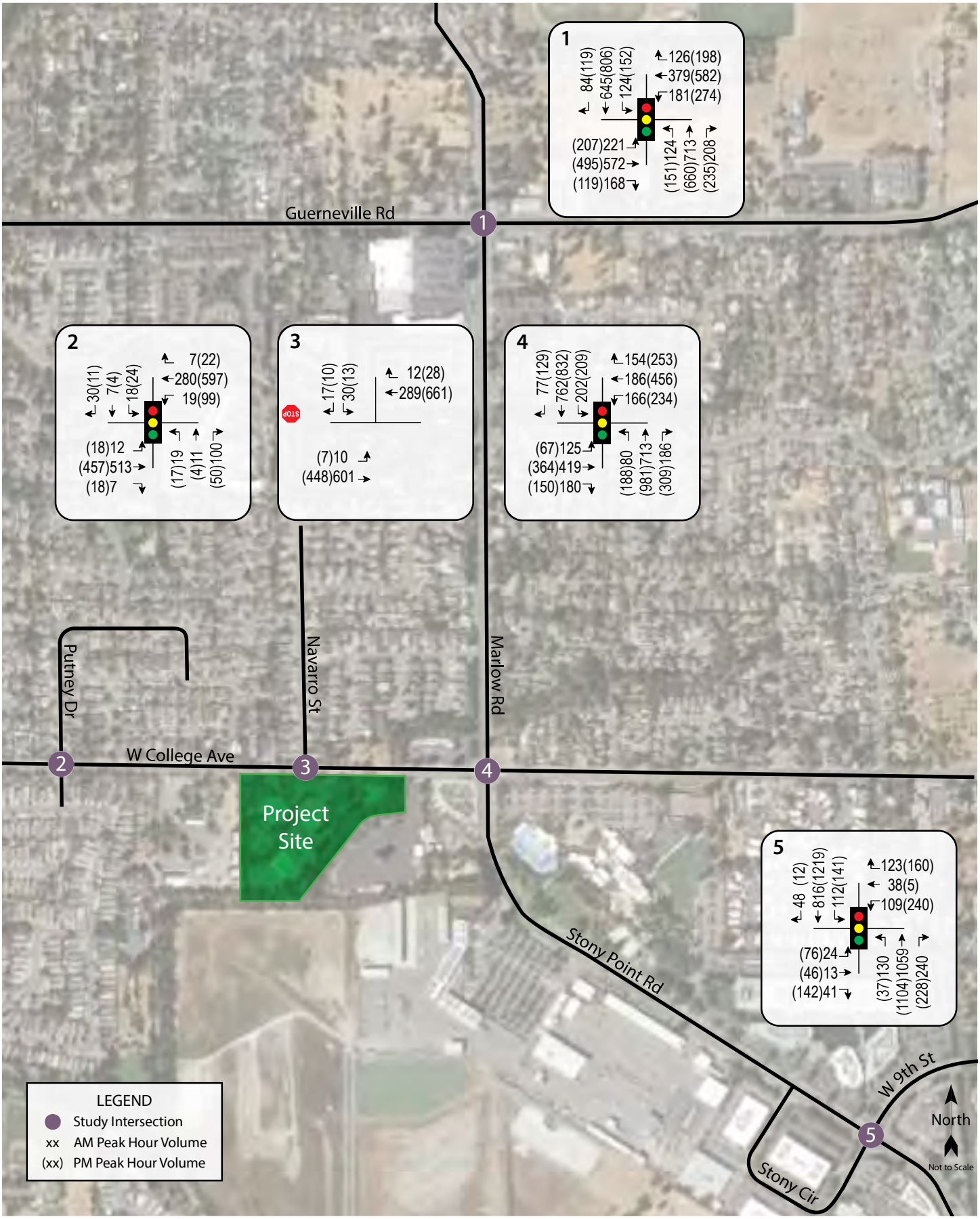
Segment volumes for the horizon year of 2040 were obtained from the County's gravity demand model, which is maintained by the Sonoma County Transportation Authority (SCTA) and translated to turning movement volumes at each of the study intersections using a combination of the "Furness" method and factoring, depending on how the model was configured at each intersection. The Furness method is an iterative process that employs existing turn movement data, existing link volumes and future link volumes to project likely turning future movement volumes at intersections.

In some instances, the model projected a traffic volume decrease. Decreases are attributable to assumed infrastructure improvements and forecast changes in demographic data throughout the region. Rather than assume volume decreases, existing counts were maintained as a "floor." This is a common technique used to ensure that the future projections are conservative.

Under the anticipated Future volumes, and with the addition of a second through lane on West College Avenue where there is currently only one, the study intersections are expected to operate acceptably. Future volumes are shown in Figure 3 and operating conditions are summarized in Table 5.

Table 5 – Future Peak Hour Intersection Levels of Service					
Study Intersection ***Approach***		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**
1.	Guerneville Rd/Marlow Rd	50.0	D	49.2	D
2.	W College Ave/Putney Dr	6.4	B	4.9	A
3.	W College Ave/Navarro St	0.8	A	0.4	A
	Southbound (Navarro St) Approach	*13.1*	*B*	*15.9*	*C*
4.	W College Ave/Marlow Rd-Stony Point Rd	50.4	D	49.8	D
5.	W 9th St/Stony Point Rd	27.8	C	42.2	D

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*



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Traffic Impact Study for the West College Avenue Apartments Project

Figure 3 – Future Traffic Volumes

Project Description

The project as proposed would result in the construction of 168 multifamily apartment units on the site previously occupied by the Sonoma County Water Agency. The project includes 70 one-bedroom units, 83 two-bedroom units and 15 three-bedroom units; 59 of the 168 units would be designated as affordable. Two driveways along West College Avenue would continue to provide access to the project site. Additionally, the project would provide direct access to the Santa Rosa Creek Trail via a pathway constructed of compacted gravel. The proposed project site plan is shown in Figure 4.

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017. Rates for "Multifamily Housing (Mid-Rise)" (ITE LU 221) were applied to the project. The proposed project is expected to generate an average of 914 trips per day, including 60 a.m. peak hour trips, and 74 p.m. peak hour trips, as show in Table 6. Because the existing office building has not been in use for some time, no deduction for trips associated with the building were considered.

Table 6 – Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Apartments	168 du	5.44	914	0.36	60	16	44	0.44	74	45	29

Note: du = dwelling unit

Trip Distribution

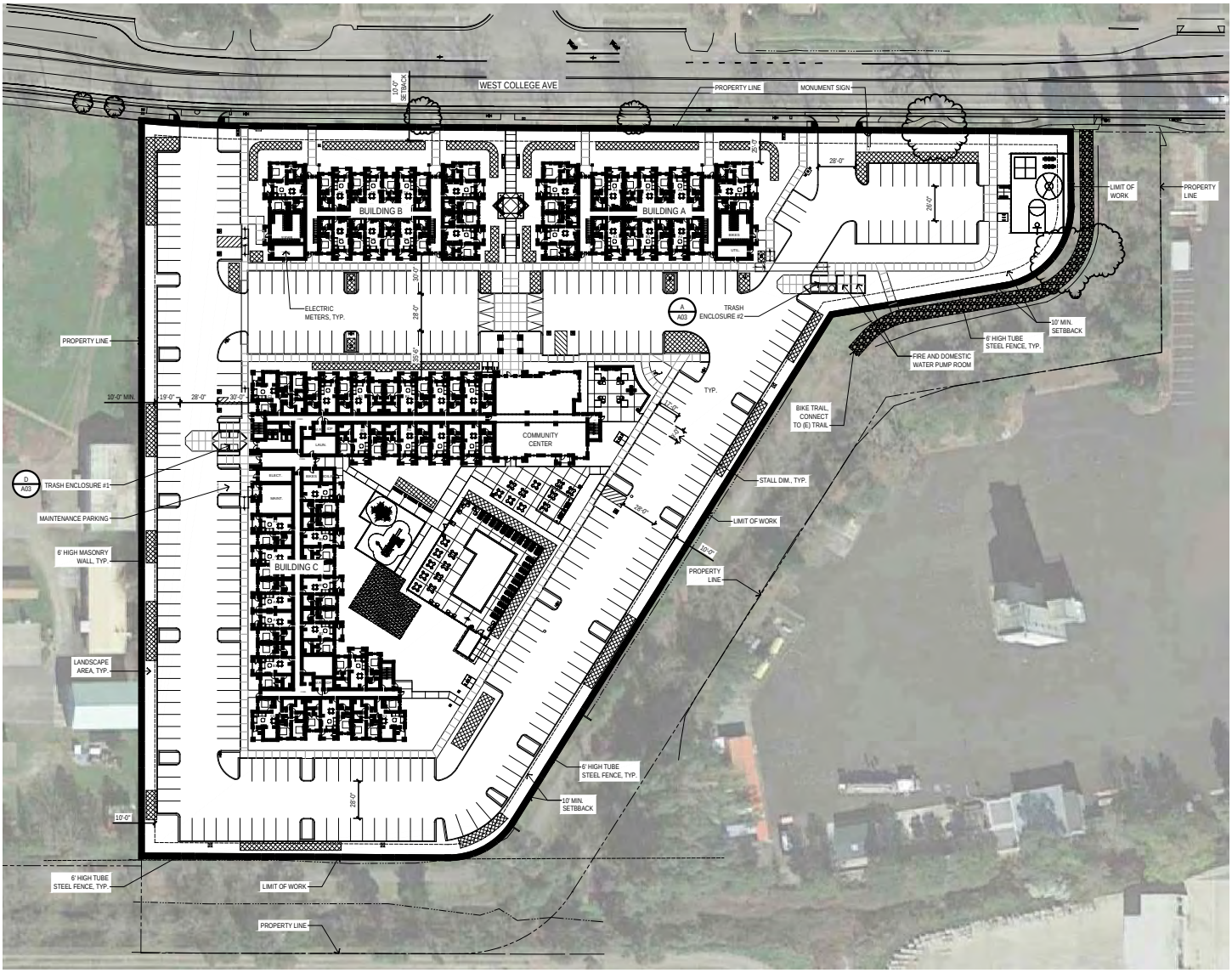
The pattern used to allocate new project trips to the street network was based on data from the 2010 Census for home-to-work trips. The applied distribution assumptions and resulting trips are shown in Table 7.

Table 7 – Trip Distribution Assumptions

Route	Percent	Daily Trips	AM Trips	PM Trips
Marlow Rd north of Guerneville Rd	25%	229	15	19
W College Ave west of Putney Dr	5%	46	3	4
W College Ave east of Stony Point Rd	50%	456	30	36
Stony Point Rd south of W 9th St	20%	183	12	15
TOTAL	**100%**	**914**	**60**	**74**

Vehicles Miles Traveled

Senate Bill (SB) 743 established a change in the metric to be applied to determining traffic impacts associated with development projects. Rather than the delay-based criteria associated with a Level of Service analysis, the change in Vehicle Miles Traveled (VMT) as a result of a project will be the basis for determining California Environmental Quality Act (CEQA) impacts with respect to transportation and traffic.



Source: LPAS Architecture + Design 02/2020 sro506.ai 7/20

Traffic Impact Study for the West College Avenue Apartments

Figure 4 – Proposed Site Plan

VMT significance thresholds for residential projects are based on total VMT. A residential project resulting in a total VMT that exceeds the region's average VMT may reflect a significant impact. The California Office of Planning and Research (OPR) guidance in its publication *Technical Advisory on Evaluation Transportation Impacts in CEQA*, December 2018, and the SCTA model use a metric of home-based VMT per capita for residential uses. A project exceeding a level of 15 percent below the existing regional VMT per capita may indicate a significant transportation impact. OPR encourages the use of screening maps to establish geographic areas that achieve the 15 percent below regional average thresholds, allowing jurisdictions to "screen" projects in those areas from quantitative VMT analysis since impacts can be presumed to be less than significant. SCTA prepared a draft screening map that shows the project site to be within a screened area.

Based on data from the recently updated Sonoma County Transportation Authority (SCTA) travel demand model, the County of Sonoma has a baseline average residential VMT of 15.56 miles per capita. Applying OPR's guidance, a residential project generating a VMT that is 15 percent or more below this value, or 13.23 miles per capita or less, would have a less-than-significant VMT impact. The SCTA model includes traffic analysis zones (TAZ) covering geographic areas throughout Sonoma County including the City of Santa Rosa. The project site is located within TAZ 470 which does not have residential land uses coded into the current model as the proposed project consists of a multifamily development at a site which was most recently occupied by the Sonoma County Water Agency (an office land use).

To establish a baseline VMT for the proposed project, data from the adjacent TAZ (TAZ 471, which is immediately west of TAZ 470) was used as it is the TAZ including the highest VMT per capita proximate to the TAZ in which the proposed project site is located. Based on the current SCTA travel demand model, TAZ 471 is characterized by a baseline VMT of 14.27 per capita. Because the VMT for TAZ 471 exceeds 13.23 miles per capita, the project would be expected to have a significant impact. However, this rate reflects the VMT for detached single-family dwellings, so to arrive at the VMT for the project as proposed reductions for density, pedestrian improvements, affordable housing, and proximity to transit would be applied.

It is estimated that the proposed project has a density of approximately 29.4 units per acre. Based on the CAPCOA methodology, this translates to a 20.1 percent reduction in per capita VMT. A methodology published in *Income, Location Efficiency, and VMT: Affordable Housing as a Climate Strategy*, The California Housing Partnership, 2015, was used to determine the VMT reductions associated with provision of on-site affordable housing (this method is also currently used by the City of San Jose). The project would include 59 such units and the corresponding anticipated reduction in the project's VMT would be 3.6 percent. Further, the project would include an enhanced crosswalk at the intersection of West College Avenue/ Navarro Street, which would be expected to reduce the VMT per capita by 2 percent.

Upon applying adjustments for the project's residential density, provision of affordable housing, and pedestrian enhancements, the project is anticipated to generate 10.77 VMT per capita, thereby having a less-than-significant impact on VMT. A summary of the VMT findings is shown in Table 8 and a summary sheet is included in Appendix C.

Table 8 – Vehicle Miles Traveled Analysis Summary					
VMT Metric	**Baseline VMT Rate (Citywide Avg)**	**Threshold (15% Below Citywide Avg)**	**Project VMT Rate**		
			Base Unadjusted (TAZ 471)	**With Adjustments**	**Significance Finding**
Residential VMT per Capita (Citywide Baseline)	15.56	13.23	14.27	10.77	Less than Significant

Note: VMT Rate is measured in VMT per Capita, or the number of daily miles driven per resident; TAZ=Traffic Analysis Zone

Finding – Based on State significance thresholds, the project is anticipated to result in a less-than-significant impact in terms of vehicle miles traveled.

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the existing volumes, the study intersections are expected to operate acceptably during both the a.m. and p.m. peak hours. These results are summarized in Table 9 and Existing plus Project volumes are shown on Figure 5.

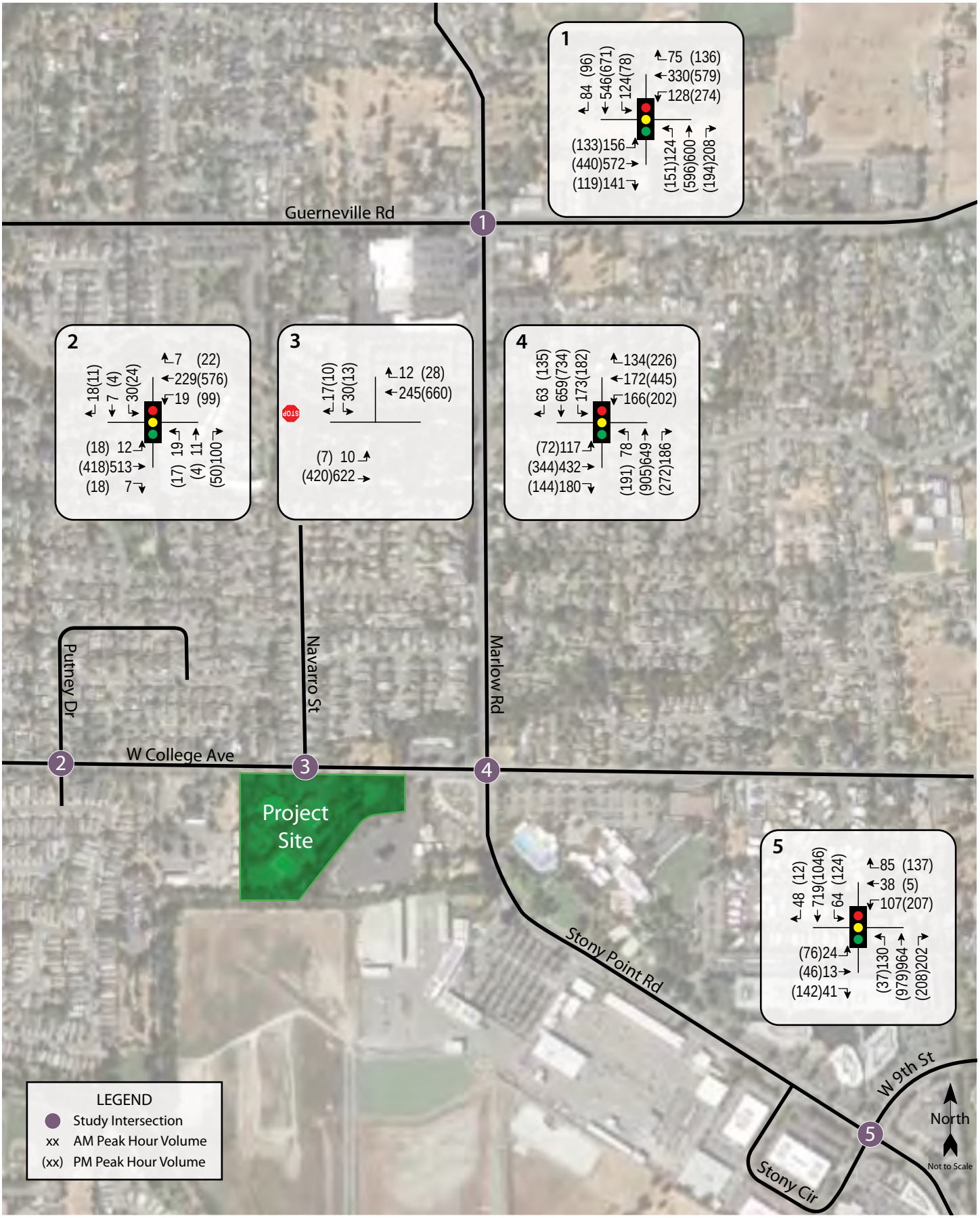
Table 9 – Existing and Existing plus Project Peak Hour Intersection Levels of Service									
Study Intersection ***Approach***		**Existing Conditions**				**Existing plus Project**			
		AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1.	Guerneville Rd/Marlow Rd	43.8	D	44.6	D	43.8	D	44.8	D
2.	W College Ave/Putney Dr	6.4	A	4.8	A	6.5	A	4.8	A
3.	W College Ave/Navarro	0.7	A	0.5	A	*0.7*	*A*	0.7	A
	Southbound (Navarro St) Approach	*12.4*	*B*	*16.6*	*C*	*12.7*	*B*	*17.1*	*C*
4.	W College Ave/Marlow Rd-Stony Point Rd	49.1	D	42.8	D	49.8	D	43.8	D
5.	W 9th St/Stony Point Rd	24.2	C	39.5	D	24.6	C	41.1	D

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*

Finding – The study intersections are expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic to existing volumes.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, and with the planned improvements including the additional westbound through-lane on West College Avenue, the study intersections are expected to operate acceptably. The Existing plus Project volumes are shown on Figure 6 and the Future plus Project operating conditions are summarized in Table 10.



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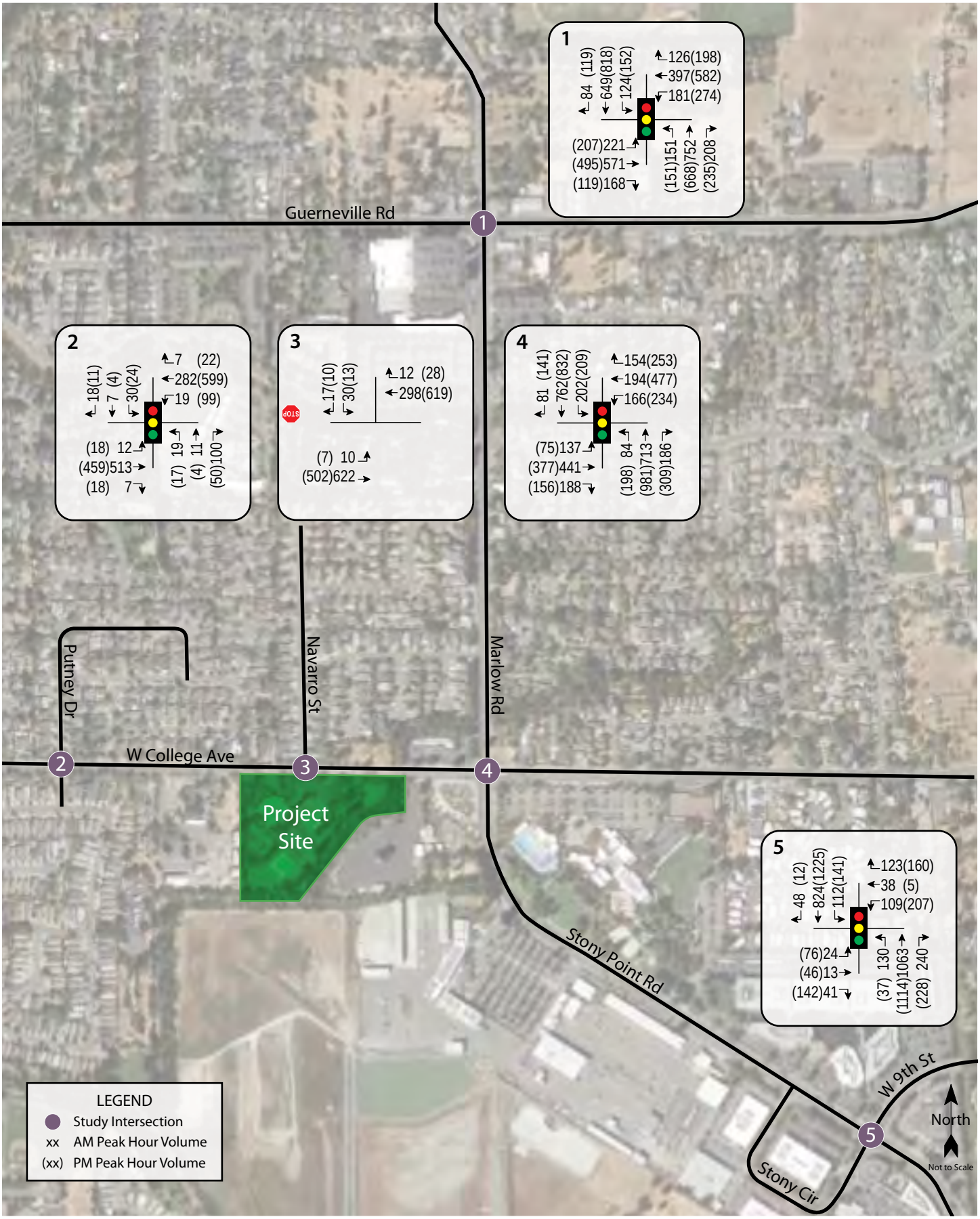
Traffic Impact Study for the West College Avenue Apartments Project

Figure 5 – Existing plus Project Traffic Volumes

W-Trans



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Traffic Impact Study for the West College Avenue Apartments Project

Figure 6 – Future plus Project Traffic Volumes

W-Trans

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

Study Intersection *Approach*		Future Conditions				Future plus Project			
		AM Peak		PM Peak		AM Peak		PM Peak	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1.	Guerneville Rd/Marlow Rd	50.0	D	49.2	D	50.0	D	49.4	D
2.	W College Ave/Putney Dr	6.4	B	4.9	A	6.4	A	4.9	A
3.	W College Ave/Navarro	0.8	A	0.4	A	0.8	A	0.4	A
	Southbound (Navarro St) Approach	*13.1*	*B*	*15.9*	*C*	*13.4*	*B*	*16.4*	*C*
4.	W College Ave/Marlow Rd-Stony Point Rd	50.4	D	49.8	D	51.2	D	51.1	D
5.	W 9th St/Stony Point Rd	27.8	C	42.2	D	27.8	C	42.3	D

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*

Finding – The study intersections will continue operating acceptably with project traffic added to Future volumes and at the same Levels of Service as without it.

Alternative Modes

Pedestrian Facilities

Given the proximity of the Finley Aquatic Center, Community Park, and Community Center to the east of the site, as well as a transit transfer station, it is reasonable to assume that some residents will want to walk and bicycle for trips from and to the proposed residential units. Additionally, school-age children residing at the project site would be expected to attend Albert F. Biella Elementary School located on Jennings Avenue approximately one-half mile north of College Avenue.

Project Site – A separated sidewalk exists along the entire project frontage. A new pedestrian path is proposed along the northeast portion of the project site providing access to the Santa Rosa Creek Trail.

Finding – Pedestrian facilities serving the project site are not adequate with respect to school-age children traveling to and from Albert F. Biella Elementary School as there is not a north-south crosswalk at the intersection of West College Avenue/Navarro Street.

Recommendations – The applicant should construct an enhanced crosswalk including Rectangular Rapid Flashing Beacons (RRFBs) at West College Avenue/Navarro Street to account for the increase in school-aged children expected to live at the project site. A figure reflecting the enhanced crosswalk is provided in Appendix D.

Bicycle Facilities

Existing bicycle facilities, including Class II bike lanes together with shared use of minor streets provide adequate access for bicyclists.

Finding – Bicycle facilities serving the project site are expected to be adequate with respect to on-street facilities which provide access to and from the project site.

Transit

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

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

Access to the project site is provided by two existing stop-controlled driveways on West College Avenue located east and west of the intersection at Navarro Street; no new driveways or relocations of existing driveways are proposed. The western driveway is approximately 28 feet wide and the eastern driveway is approximately 40 feet wide. Driveways of this width would be expected to provide ample space to allow an emergency vehicle to enter and exit the project site safely.

Sight Distance

Sight distance along West College Avenue at project driveways was evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for driveway approaches is based on stopping sight distance and uses the approach travel speed as the basis for determining the recommended sight distance. Additionally, the stopping sight distance needed for a following driver to stop if there is a vehicle waiting to turn into a side street or driveway is evaluated based on stopping sight distance criterion and the approach speed on the major street.

The stopping sight distance was field measured and the criterion for private street intersections applied to the driveway locations for evaluation purposes. During the site visit a speed survey of 50 data points was collected and resulted in an 85th percentile speed of 43 mph. As such, for the purposes of the sight distance review, a speed of 45 mph with a stopping sight distance of 360 feet was applied.

At the eastern driveway, sight distance to the east is about 400 feet. To the west, while the existing metal fencing obstructs sight lines, upon its removal for the project sight lines would be more than the recommended 360 feet.

Similarly, at the western driveway sight distance to both the east and west is also currently obstructed by the metal fencing which would be removed with the project. Without the fencing, sight lines are more than 360 feet in each direction.

Finding – Based on field observations and the most recent site plan, sight distances along West College Avenue at the project driveways are expected to be adequate for a design speed of 45 mph, more than the posted speed of 40 mph.

Access Analysis

Left-Turn Lane Warrants

The need for a left-turn lane on West College Avenue was evaluated based on criteria contained in the *Intersection Channelization Design Guide*, National Cooperative Highway Research Program (NCHRP) Report No. 279, Transportation Research Board, 1985, as well as an update of the methodology developed by the Washington State Department of Transportation and published in the *Method For Prioritizing Intersection Improvements*, January 1997. The NCHRP report references a methodology developed by M. D. Harmelink that includes equations that can be applied to expected or actual traffic volumes in order to determine the need for a left-turn pocket based on safety issues.

It was noted above that West College Avenue generally includes four travel lanes and a center two-way left-turn lane except that adjacent to the project frontage there are two eastbound travel lanes and one westbound travel lane and west of Putney Avenue there is only one eastbound travel lane. For the purposes of this study, project generated trips were split equally between the two driveways assuming that about half the residences would be

most conveniently accessed from each driveway location. Under Existing plus Project volumes, a left-turn lane is not warranted on West College Avenue at either project driveway during the a.m. peak hour. However, a left-turn lane would be warranted at the western project driveway during the p.m. peak hour under the assumption that inbound trips would be split between the two driveways.

As a turn lane would be warranted at the western project driveway during the p.m. peak hour, and based on direction from City staff, the applicant has proposed reconfiguration of the travel lanes along and west of the project frontage. Currently there are two eastbound travel lanes and one westbound travel lane. The reconfiguration would consist of converting one eastbound travel lane to a two-way left-turn lane, providing a continuous center turn lane from Putney Avenue to Stony Point Road. The reconfiguration would allow for less delay and queuing to occur at the project driveways, specifically for vehicles following drivers making left turns into the project site. A sketch of the roadway reconfiguration is included in Appendix D.

A future conditions analysis was not performed as it is assumed that either the properties on the north side of this section of West College Avenue will be developed and provide frontage improvements to accommodate a five-lane section or the City will undertake a project to complete the planned widening. With the planned widening a two-way left-turn lane would be included that would continue to accommodate project-generated turns. Copies of the left-turn lane warrant worksheets are provided in Appendix E.

Finding – A left-turn lane would be warranted at the western project driveway under Existing plus Project conditions during the p.m. peak hour based on the assumed distribution.

Recommendations – The project applicant should reconfigure the segment of West College Avenue starting west of Putney Drive to Stony Point Road to provide a continuous center left-turn lane and a single eastbound through lane.

Traffic Signal Warrants

Although expected to operate acceptably under all scenarios evaluated, a signal warrant analysis was performed to determine potential need for a traffic signal at the intersection of West College Avenue/Navarro Street.

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 3, which is often the first warrant to be met, was used for this review. 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 existing, existing plus project, future, and future plus project traffic volumes for both the a.m. and p.m. peak hours, the Peak Hour Volume traffic signal warrant is not satisfied for the unsignalized intersection at West College Avenue/Navarro Street. As a result, installation of a traffic signal at this intersection is not recommended. Copies of the Warrant 3 worksheets are provided in Appendix F.

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 272 parking spaces for the 168 units, a ratio of 1.68 parking spaces per unit.

Jurisdiction parking supply requirements are based on the City of Santa Rosa Municipal Code, Chapter 20-36.040; Number of Parking Spaces Required. The municipal code requires multifamily apartment buildings to provide parking at a rate of one covered space plus one-half a visitor space per unit for one-bedroom units, and one covered space plus 1.5 visitor spaces per unit for units with two or more bedrooms. Under the City's code, 350 spaces would be required for the 168-unit project. However, where residents have adequate access to transit and other facilities for walking and bicycling, and if a portion of the units are designated as affordable, a reduction of up to 25 percent can be applied to the on-site parking requirement. This project site is connected to the nearby transit hub by sidewalks, bike lanes, and a trail. Further, 35 percent (or 59 units) of the units proposed will be designated as affordable. With this allowed reduction applied, the project would be required to provide 263 on-site parking spaces.

The proposed parking supply exceeds the number of parking spaces required assuming the 25-percent reduction is allowed, with a surplus of nine spaces. The proposed parking supply and City of Santa Rosa requirements are shown in Table 11.

Table 11 – Parking Analysis Summary

Land Use	Units	Supply (spaces)	City Requirements	
			Rate	Spaces Required
Mid-Rise Apartment				
1 bedroom	70	272	1.5	350
2+ bedrooms	98		2.5	
			25% reduction	- 87
Total				**263**

Finding – The proposed parking supply for the 168 residential units exceed the 263 spaces required under the City's code.

Bicycle Parking

The project site plan includes 84 long-term and 14 short-term bicycle parking spaces for a total of 98 spaces.

The City of Santa Rosa's Municipal Code stipulates the City's bicycle parking requirements for new developments. According to the City of Santa Rosa Municipal Code, bicycle parking is required for multifamily residential developments at a ratio of one space per four residential units so long as the residential units do not have a private garage or private storage space for bicycles. For the proposed project, bicycle parking would be required for 42 bicycles.

Finding – The bicycle storage included within the proposed plan exceeds the City standards as there is a surplus of 56 spaces.

Conclusions and Recommendations

Conclusions

- The proposed project is expected to generate an average of 914 trips per day, including 60 a.m. peak hour trips and 74 p.m. peak hour trips.
- The study intersections operate acceptably overall during both peak hours under existing conditions.
- Under Future volumes the study intersections are expected to operate acceptably during the a.m. and p.m. peak hours at LOS D or better.
- Upon adding project-generated trips to Existing and Future volumes, the study intersections are expected to continue operating acceptably.
- The project would have a less-than-significant impact on VMT based on its density, affordable housing allocation, and the proposed pedestrian enhancements.
- Access to the project site via alternative modes, including public transit and biking, is adequate. Access to the site via walking is not adequate with respect to school-age children residing at the project site who would be expected to attend Albert F. Biella Elementary School.
- Sight distance at the project driveways would be adequate once existing fences are removed to accommodate construction of the project.
- A left-turn lane providing access to the western project driveway is warranted with the addition of project generated trips during the p.m. peak hour.
- A traffic signal is not warranted at the intersection of West College Avenue/Navarro Street.
- The parking supply exceeds the minimum number of spaces required under the City's code by nine spaces.
- The parking supply for bicycles exceeds the minimum number of spaces required under the City's code by 56 spaces.

Recommendations

- Signalization of West College Avenue/Navarro Street is not warranted, and therefore not recommended.
- An enhanced crosswalk should be installed at the intersection of West Collage Avenue/Navarro, including Rectangular Rapid Flashing Beacons.
- The section of West College Avenue from west of Putney Drive to Stony Point Road should be restriped to provide a single eastbound through lane and accommodate a center left-turn lane.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Associate Engineer	Briana Byrne, EIT
Assistant Planner	Andre Huff
Graphics Editing/Formatting	Hannah Yung-Boxdell
Quality Control	Dalene J. Whitlock, PE, PTOE

References

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Appendix A

Collision Rate Calculations

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Intersection Collision Rate Calculations

West College Avenue Apartments

Intersection # 1: Marlow Road & Guerneville Road

Date of Count: May 8th, 2018

Number of Collisions: 17
Number of Injuries: 10
Number of Fatalities: 0
ADT: 16400
Start Date: November 1, 2013
End Date: September 30, 2018
Number of Years: 5

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

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

$$\text{collision rate} = \frac{17 \times 1{,}000{,}000}{16{,}400 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.57 c/mve**	**0.0%**	**58.8%**
Statewide Average*	**0.43 c/mve**	**0.4%**	**37.9%**

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: West College Avenue & Putney Drive

Date of Count: May 10th, 2018

Number of Collisions: 4
Number of Injuries: 4
Number of Fatalities: 0
ADT: 12600
Start Date: November 1, 2013
End Date: September 30, 2018
Number of Years: 5

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

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

$$\text{collision rate} = \frac{4 \times 1{,}000{,}000}{12{,}600 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.17 c/mve**	**0.0%**	**100.0%**
Statewide Average*	**0.43 c/mve**	**0.4%**	**37.9%**

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

West College Avenue Apartments

Intersection # 3: West College & Putney Drive

Date of Count: May 10th, 2018

Number of Collisions: 1
Number of Injuries: 1
Number of Fatalities: 0
ADT: 11000
Start Date: November 1, 2013
End Date: September 30, 2018
Number of Years: 5

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

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

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

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.05 c/mve**	**0.0%**	**100.0%**
Statewide Average*	**0.14 c/mve**	**0.7%**	**38.0%**

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: Marlow Road-Stony Point Road & West College Avenue

Date of Count: May 10th, 2018

Number of Collisions: 11
Number of Injuries: 4
Number of Fatalities: 0
ADT: 37800
Start Date: November 1, 2013
End Date: September 30, 2018
Number of Years: 5

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

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

$$\text{collision rate} = \frac{11 \times 1{,}000{,}000}{37{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.16 c/mve**	**0.0%**	**36.4%**
Statewide Average*	**0.43 c/mve**	**0.4%**	**37.9%**

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

West College Avenue Apartments

Intersection # 5: Stony Point Road & West 9th Street

Date of Count: May 10th, 2018

Number of Collisions: 5
Number of Injuries: 3
Number of Fatalities: 0
ADT: 30000
Start Date: November 1, 2013
End Date: September 30, 2018
Number of Years: 5

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

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

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

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.09 c/mve**	**0.0%**	**60.0%**
Statewide Average*	**0.43 c/mve**	**0.4%**	**37.9%**

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

Intersection # 6: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
ADT: 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

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

$$\text{collision rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.30 c/mve**	**0.7%**	**40.3%**

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

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Appendix B

Intersection Level of Service Calculations

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HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	572	141	128	330	75	124	588	208	124	542	84
Future Volume (veh/h)	156	572	141	128	330	75	124	588	208	124	542	84
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		0.99	1.00		0.99	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	177	650	160	145	375	85	141	668	236	141	616	95
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	799	503	172	612	137	168	800	506	499	1266	195
Arrive On Green	0.12	0.23	0.23	0.10	0.21	0.21	0.09	0.23	0.23	0.28	0.41	0.41
Sat Flow, veh/h	1774	3539	1563	1774	2867	642	1774	3539	1560	1774	3070	472
Grp Volume(v), veh/h	177	650	160	145	230	230	141	668	236	141	355	356
Grp Sat Flow(s),veh/h/ln	1774	1770	1563	1774	1770	1739	1774	1770	1560	1774	1770	1772
Q Serve(g_s), s	11.8	20.9	9.3	9.6	14.1	14.4	9.4	21.6	5.6	7.4	17.7	17.7
Cycle Q Clear(g_c), s	11.8	20.9	9.3	9.6	14.1	14.4	9.4	21.6	5.6	7.4	17.7	17.7
Prop In Lane	1.00		1.00	1.00		0.37	1.00		1.00	1.00		0.27
Lane Grp Cap(c), veh/h	206	799	503	172	378	371	168	800	506	499	730	731
V/C Ratio(X)	0.86	0.81	0.32	0.84	0.61	0.62	0.84	0.84	0.47	0.28	0.49	0.49
Avail Cap(c_a), veh/h	259	1127	648	217	534	525	217	973	583	499	730	731
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	0.78	0.78	0.78	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.1	44.1	30.9	53.3	42.7	42.8	53.4	44.3	12.4	33.7	25.9	25.9
Incr Delay (d2), s/veh	20.6	3.2	0.4	20.7	1.6	1.7	16.1	8.1	2.4	0.3	2.3	2.3
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	6.9	10.6	4.1	5.7	7.1	7.1	5.3	11.5	3.2	3.7	9.0	9.1
LnGrp Delay(d),s/veh	72.7	47.3	31.2	73.9	44.2	44.5	69.5	52.4	14.8	34.0	28.2	28.2
LnGrp LOS	E	D	C	E	D	D	E	D	B	C	C	C
Approach Vol, veh/h		987			605			1045			852	
Approach Delay, s/veh		49.2			51.5			46.2			29.2	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.9	31.6	16.7	54.8	18.4	30.1	39.1	32.4
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	4.5	4.5	5.3	* 5.3
Max Green Setting (Gmax), s	14.7	38.2	14.7	32.0	17.5	36.2	14.5	* 33
Max Q Clear Time (g_c+I1), s	11.6	22.9	11.4	19.7	13.8	16.4	9.4	23.6
Green Ext Time (p_c), s	0.1	4.2	0.1	3.3	0.2	2.5	0.1	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	43.8
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	513	7	19	227	7	19	11	100	30	7	18
Future Volume (veh/h)	12	513	7	19	227	7	19	11	100	30	7	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		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	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	14	604	8	22	267	8	22	13	118	35	8	21
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	786	2122	28	582	2081	62	122	48	242	263	74	101
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1100	3575	47	806	3506	105	124	243	1235	671	380	513
Grp Volume(v), veh/h	14	299	313	22	134	141	153	0	0	64	0	0
Grp Sat Flow(s),veh/h/ln	1100	1770	1853	806	1770	1842	1601	0	0	1564	0	0
Q Serve(g_s), s	0.2	3.5	3.5	0.6	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.7	3.5	3.5	4.1	1.4	1.4	3.5	0.0	0.0	1.3	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.06	0.14		0.77	0.55		0.33
Lane Grp Cap(c), veh/h	786	1050	1100	582	1050	1093	411	0	0	438	0	0
V/C Ratio(X)	0.02	0.28	0.28	0.04	0.13	0.13	0.37	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	786	1050	1100	582	1050	1093	1254	0	0	1191	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.2	4.2	4.2	5.2	3.8	3.8	15.1	0.0	0.0	14.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	0.0	0.0	0.0	0.2	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	0.1	1.9	1.9	0.1	0.7	0.7	1.6	0.0	0.0	0.6	0.0	0.0
LnGrp Delay(d),s/veh	4.2	4.9	4.9	5.2	3.8	3.8	15.3	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		626			297			153			64	
Approach Delay, s/veh		4.9			3.9			15.3			14.2	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.0		12.3		30.0		12.3
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		25.1		31.0		25.1		31.0
Max Q Clear Time (g_c+I1), s		5.5		3.3		6.1		5.5
Green Ext Time (p_c), s		2.4		0.2		1.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.5
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street 03/27/2019

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	601	236	12	30	17
Future Vol, veh/h	10	601	236	12	30	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	90	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	633	248	13	32	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	261	0	-	0	587	248
Stage 1	-	-	-	-	248	-
Stage 2	-	-	-	-	339	-
Critical Hdwy	4.13	-	-	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	2.219	-	-	-	3.519	3.319
Pot Cap-1 Maneuver	1302	-	-	-	456	790
Stage 1	-	-	-	-	793	-
Stage 2	-	-	-	-	694	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1302	-	-	-	450	790
Mov Cap-2 Maneuver	-	-	-	-	450	-
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	694	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1302	-	-	-	533
HCM Lane V/C Ratio	0.008	-	-	-	0.093
HCM Control Delay (s)	7.8	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue 03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	410	172	166	164	134	74	649	186	179	659	59
Future Volume (veh/h)	105	410	172	166	164	134	74	649	186	179	659	59
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	112	436	183	177	174	143	79	690	198	190	701	63
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	138	514	213	205	473	363	101	806	538	476	1441	129
Arrive On Green	0.08	0.21	0.21	0.12	0.25	0.25	0.06	0.23	0.23	0.09	0.14	0.14
Sat Flow, veh/h	1774	2427	1008	1774	1893	1455	1774	3539	1558	1774	3281	295
Grp Volume(v), veh/h	112	317	302	177	162	155	79	690	198	190	378	386
Grp Sat Flow(s),veh/h/ln	1774	1770	1665	1774	1770	1579	1774	1770	1558	1774	1770	1806
Q Serve(g_s), s	7.5	20.6	21.0	11.8	9.1	9.8	5.3	22.4	4.5	12.1	23.6	23.6
Cycle Q Clear(g_c), s	7.5	20.6	21.0	11.8	9.1	9.8	5.3	22.4	4.5	12.1	23.6	23.6
Prop In Lane	1.00		0.61	1.00		0.92	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	138	375	353	205	442	394	101	806	538	476	777	793
V/C Ratio(X)	0.81	0.85	0.86	0.86	0.37	0.39	0.79	0.86	0.37	0.40	0.49	0.49
Avail Cap(c_a), veh/h	223	457	430	262	495	442	176	926	591	476	777	793
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.83	0.83
Uniform Delay (d), s/veh	54.5	45.4	45.6	52.1	37.2	37.5	55.9	44.5	11.2	45.5	38.8	38.9
Incr Delay (d2), s/veh	10.9	11.7	13.5	20.3	0.5	0.6	12.5	11.3	1.9	0.4	1.8	1.8
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	4.1	11.3	11.0	6.9	4.5	4.3	2.9	12.2	2.6	6.0	11.9	12.2
LnGrp Delay(d),s/veh	65.3	57.1	59.1	72.5	37.7	38.1	68.4	55.8	13.1	46.0	40.6	40.6
LnGrp LOS	E	E	E	E	D	D	E	E	B	D	D	D
Approach Vol, veh/h		731			494			967			954	
Approach Delay, s/veh		59.2			50.3			48.1			41.7	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.2	30.7	12.1	58.0	14.6	35.3	37.5	32.6
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	17.7	31.0	11.9	38.2	15.1	33.6	18.7	31.4
Max Q Clear Time (g_c+I1), s	13.8	23.0	7.3	25.6	9.5	11.8	14.1	24.4
Green Ext Time (p_c), s	0.2	2.4	0.1	3.6	0.1	1.9	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	49.1
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	13	41	107	38	85	130	960	202	64	711	48
Future Volume (veh/h)	24	13	41	107	38	85	130	960	202	64	711	48
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		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	26	14	44	114	40	90	138	1021	215	68	756	51
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	18	56	145	51	172	166	2150	940	87	1993	867
Arrive On Green	0.06	0.06	0.06	0.11	0.11	0.11	0.09	0.61	0.61	0.05	0.56	0.56
Sat Flow, veh/h	520	280	881	1330	467	1583	1774	3539	1548	1774	3539	1539
Grp Volume(v), veh/h	84	0	0	154	0	90	138	1021	215	68	756	51
Grp Sat Flow(s),veh/h/ln	1681	0	0	1796	0	1583	1774	1770	1548	1774	1770	1539
Q Serve(g_s), s	5.9	0.0	0.0	10.0	0.0	6.4	9.2	19.1	7.6	4.5	14.2	1.8
Cycle Q Clear(g_c), s	5.9	0.0	0.0	10.0	0.0	6.4	9.2	19.1	7.6	4.5	14.2	1.8
Prop In Lane	0.31		0.52	0.74		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	107	0	0	195	0	172	166	2150	940	87	1993	867
V/C Ratio(X)	0.78	0.00	0.00	0.79	0.00	0.52	0.83	0.47	0.23	0.78	0.38	0.06
Avail Cap(c_a), veh/h	251	0	0	419	0	369	247	2150	940	129	1993	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.4	0.0	0.0	52.1	0.0	50.5	53.5	13.0	10.7	56.4	14.6	11.8
Incr Delay (d2), s/veh	11.7	0.0	0.0	6.9	0.0	2.4	14.1	0.8	0.6	16.5	0.6	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	3.1	0.0	0.0	5.3	0.0	2.9	5.1	9.4	3.4	2.6	7.1	0.8
LnGrp Delay(d),s/veh	67.1	0.0	0.0	59.0	0.0	53.0	67.6	13.7	11.3	72.9	15.1	12.0
LnGrp LOS	E			E		D	E	B	B	E	B	B
Approach Vol, veh/h		84			244			1374			875	
Approach Delay, s/veh		67.1			56.8			18.8			19.4	
Approach LOS		E			E			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.3	16.5	72.9		18.4	11.2	78.2
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	16.7	36.9		28.0	8.7	44.9
Max Q Clear Time (g_c+I1), s		7.9	11.2	16.2		12.0	6.5	21.1
Green Ext Time (p_c), s		0.2	0.1	5.1		1.0	0.0	8.3

Intersection Summary	
HCM 2010 Ctrl Delay	24.2
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	199	440	119	274	579	136	151	588	194	78	659	96
Future Volume (veh/h)	199	440	119	274	579	136	151	588	194	78	659	96
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		0.99	1.00		0.98	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	207	458	124	285	603	142	157	612	202	81	686	100
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	240	587	425	364	668	157	187	910	725	322	1031	150
Arrive On Green	0.14	0.17	0.17	0.21	0.24	0.24	0.11	0.26	0.26	0.18	0.33	0.33
Sat Flow, veh/h	1774	3539	1560	1774	2837	667	1774	3539	1557	1774	3094	451
Grp Volume(v), veh/h	207	458	124	285	376	369	157	612	202	81	392	394
Grp Sat Flow(s),veh/h/ln	1774	1770	1560	1774	1770	1734	1774	1770	1557	1774	1770	1775
Q Serve(g_s), s	12.2	13.3	3.5	16.3	22.0	22.1	9.3	16.6	0.0	4.2	20.3	20.3
Cycle Q Clear(g_c), s	12.2	13.3	3.5	16.3	22.0	22.1	9.3	16.6	0.0	4.2	20.3	20.3
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	240	587	425	364	416	408	187	910	725	322	590	592
V/C Ratio(X)	0.86	0.78	0.29	0.78	0.90	0.91	0.84	0.67	0.28	0.25	0.66	0.67
Avail Cap(c_a), veh/h	335	877	553	364	438	429	227	910	725	322	590	592
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	0.54	0.54	0.54	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.3	42.8	12.3	40.3	39.7	39.8	47.0	35.7	17.7	37.6	30.6	30.6
Incr Delay (d2), s/veh	15.1	2.7	0.4	10.7	20.9	21.8	12.1	2.2	0.5	0.4	5.8	5.8
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	7.0	6.7	1.6	9.1	13.2	13.0	5.2	8.4	3.8	2.1	10.9	10.9
LnGrp Delay(d),s/veh	60.3	45.4	12.6	51.0	60.6	61.5	59.1	37.9	18.3	38.0	36.4	36.4
LnGrp LOS	E	D	B	D	E	E	E	D	B	D	D	D
Approach Vol, veh/h		789			1030			971			867	
Approach Delay, s/veh		44.2			58.3			37.2			36.5	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.2	22.2	16.6	41.0	19.8	29.7	24.7	32.8
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	5.3	* 4.5	5.3	* 5.3
Max Green Setting (Gmax), s	19.4	26.5	13.7	26.7	20.2	* 27	7.0	* 28
Max Q Clear Time (g_c+I1), s	18.3	15.3	11.3	22.3	14.2	24.1	6.2	18.6
Green Ext Time (p_c), s	0.1	2.5	0.1	1.8	0.3	1.0	0.0	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	44.5
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	416	18	99	574	22	17	4	50	24	4	11
Future Volume (veh/h)	18	416	18	99	574	22	17	4	50	24	4	11
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		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	20	462	20	110	638	24	19	4	56	27	4	12
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	588	2155	93	687	2169	82	138	36	164	267	54	70
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	770	3453	149	909	3475	131	191	222	1005	777	329	428
Grp Volume(v), veh/h	20	236	246	110	325	337	79	0	0	43	0	0
Grp Sat Flow(s),veh/h/ln	770	1770	1832	909	1770	1836	1418	0	0	1534	0	0
Q Serve(g_s), s	0.5	2.4	2.4	2.5	3.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.1	2.4	2.4	4.9	3.5	3.5	2.0	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.08	1.00		0.07	0.24		0.71	0.63		0.28
Lane Grp Cap(c), veh/h	588	1104	1144	687	1104	1146	338	0	0	390	0	0
V/C Ratio(X)	0.03	0.21	0.21	0.16	0.29	0.29	0.23	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	588	1104	1144	687	1104	1146	1101	0	0	1184	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.6	3.4	3.4	4.5	3.6	3.6	15.5	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.0	0.1	0.1	0.1	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	1.3	1.4	0.6	1.7	1.8	0.8	0.0	0.0	0.4	0.0	0.0
LnGrp Delay(d),s/veh	4.7	3.9	3.8	4.5	3.7	3.7	15.6	0.0	0.0	15.1	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		502			772			79			43	
Approach Delay, s/veh		3.9			3.8			15.6			15.1	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		31.0		10.8		31.0		10.8
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		26.1		30.0		26.1		30.0
Max Q Clear Time (g_c+I1), s		6.1		2.9		6.9		4.0
Green Ext Time (p_c), s		1.9		0.1		3.0		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street

03/27/2019

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	406	638	28	13	10
Future Vol, veh/h	7	406	638	28	13	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	-	-	-	90	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	8	437	686	30	14	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	716	0	-	0	921	686
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	235	-
Critical Hdwy	4.13	-	-	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	2.219	-	-	-	3.519	3.319
Pot Cap-1 Maneuver	883	-	-	-	285	447
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	783	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	883	-	-	-	282	447
Mov Cap-2 Maneuver	-	-	-	-	282	-
Stage 1	-	-	-	-	493	-
Stage 2	-	-	-	-	783	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	16.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	883	-	-	-	336
HCM Lane V/C Ratio	0.009	-	-	-	0.074
HCM Control Delay (s)	9.1	0.1	-	-	16.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	331	138	202	424	226	181	905	272	182	734	123
Future Volume (veh/h)	64	331	138	202	424	226	181	905	272	182	734	123
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	67	345	144	210	442	235	189	943	283	190	765	128
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	90	432	177	241	584	308	220	1016	662	334	1064	178
Arrive On Green	0.05	0.18	0.18	0.14	0.26	0.26	0.12	0.29	0.29	0.19	0.35	0.35
Sat Flow, veh/h	1774	2438	998	1774	2229	1174	1774	3539	1559	1774	3028	506
Grp Volume(v), veh/h	67	249	240	210	350	327	189	943	283	190	447	446
Grp Sat Flow(s),veh/h/ln	1774	1770	1666	1774	1770	1634	1774	1770	1559	1774	1770	1765
Q Serve(g_s), s	3.7	13.5	13.9	11.6	18.2	18.5	10.4	25.9	5.1	9.7	21.9	21.9
Cycle Q Clear(g_c), s	3.7	13.5	13.9	11.6	18.2	18.5	10.4	25.9	5.1	9.7	21.9	21.9
Prop In Lane	1.00		0.60	1.00		0.72	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	90	313	295	241	464	428	220	1016	662	334	622	620
V/C Ratio(X)	0.75	0.79	0.81	0.87	0.75	0.76	0.86	0.93	0.43	0.57	0.72	0.72
Avail Cap(c_a), veh/h	167	419	395	243	495	457	225	1016	662	334	622	620
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	1.00	0.64	0.64	0.64
Uniform Delay (d), s/veh	46.8	39.4	39.6	42.4	33.9	34.0	42.9	34.7	6.8	36.9	28.2	28.2
Incr Delay (d2), s/veh	11.5	7.4	9.3	27.3	6.1	7.0	26.4	15.5	2.0	1.5	4.6	4.6
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	2.1	7.2	7.2	7.5	9.6	9.2	6.8	14.8	2.6	4.9	11.5	11.4
LnGrp Delay(d),s/veh	58.3	46.8	48.9	69.6	40.1	41.1	69.4	50.2	8.8	38.4	32.8	32.8
LnGrp LOS	E	D	D	E	D	D	E	D	A	D	C	C
Approach Vol, veh/h		556			887			1415			1083	
Approach Delay, s/veh		49.1			47.4			44.4			33.7	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.9	23.0	17.7	40.4	10.4	31.5	24.1	34.0
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	13.7	23.7	12.7	28.7	9.4	28.0	12.7	28.7
Max Q Clear Time (g_c+I1), s	13.6	15.9	12.4	23.9	5.7	20.5	11.7	27.9
Green Ext Time (p_c), s	0.0	1.8	0.0	2.2	0.0	2.6	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	42.8
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	46	142	207	5	137	37	969	208	124	1040	12
Future Volume (veh/h)	76	46	142	207	5	137	37	969	208	124	1040	12
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		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	80	48	149	218	5	144	39	1020	219	131	1095	13
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	49	153	271	6	243	57	1433	622	130	1578	688
Arrive On Green	0.17	0.17	0.17	0.16	0.16	0.16	0.03	0.40	0.40	0.07	0.45	0.45
Sat Flow, veh/h	481	288	895	1736	40	1558	1774	3539	1537	1774	3539	1542
Grp Volume(v), veh/h	277	0	0	223	0	144	39	1020	219	131	1095	13
Grp Sat Flow(s),veh/h/ln	1664	0	0	1776	0	1558	1774	1770	1537	1774	1770	1542
Q Serve(g_s), s	17.4	0.0	0.0	12.7	0.0	9.0	2.3	25.3	10.4	7.7	26.1	0.5
Cycle Q Clear(g_c), s	17.4	0.0	0.0	12.7	0.0	9.0	2.3	25.3	10.4	7.7	26.1	0.5
Prop In Lane	0.29		0.54	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	284	0	0	277	0	243	57	1433	622	130	1578	688
V/C Ratio(X)	0.98	0.00	0.00	0.80	0.00	0.59	0.68	0.71	0.35	1.01	0.69	0.02
Avail Cap(c_a), veh/h	284	0	0	519	0	455	84	1433	622	130	1578	688
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	0.0	0.0	42.8	0.0	41.2	50.3	26.1	21.7	48.7	23.4	16.3
Incr Delay (d2), s/veh	46.8	0.0	0.0	5.4	0.0	2.3	13.2	3.0	1.6	80.8	2.5	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	11.7	0.0	0.0	6.7	0.0	4.0	1.3	12.9	4.7	6.7	13.2	0.2
LnGrp Delay(d),s/veh	90.2	0.0	0.0	48.2	0.0	43.5	63.4	29.2	23.3	129.4	25.9	16.3
LnGrp LOS	F			D		D	E	C	C	F	C	B
Approach Vol, veh/h		277			367			1278			1239	
Approach Delay, s/veh		90.2			46.3			29.2			36.7	
Approach LOS		F			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.5	8.7	52.1		21.7	13.0	47.8
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	5.0	30.9		30.7	7.7	28.2
Max Q Clear Time (g_c+I1), s		19.4	4.3	28.1		14.7	9.7	27.3
Green Ext Time (p_c), s		0.0	0.0	1.8		1.7	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	39.5
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	572	141	128	330	75	124	588	208	124	542	84
Future Volume (veh/h)	156	572	141	128	330	75	124	600	208	124	546	84
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		0.99	1.00		0.99	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	177	650	160	145	375	85	141	682	236	141	620	95
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	799	503	172	612	137	168	812	511	493	1268	194
Arrive On Green	0.12	0.23	0.23	0.10	0.21	0.21	0.09	0.23	0.23	0.28	0.41	0.41
Sat Flow, veh/h	1774	3539	1563	1774	2867	642	1774	3539	1560	1774	3073	470
Grp Volume(v), veh/h	177	650	160	145	230	230	141	682	236	141	357	358
Grp Sat Flow(s),veh/h/ln	1774	1770	1563	1774	1770	1739	1774	1770	1560	1774	1770	1773
Q Serve(g_s), s	11.8	20.9	9.3	9.6	14.1	14.4	9.4	22.1	5.6	7.5	17.8	17.9
Cycle Q Clear(g_c), s	11.8	20.9	9.3	9.6	14.1	14.4	9.4	22.1	5.6	7.5	17.8	17.9
Prop In Lane	1.00		1.00	1.00		0.37	1.00		1.00	1.00		0.27
Lane Grp Cap(c), veh/h	206	799	503	172	378	371	168	812	511	493	730	731
V/C Ratio(X)	0.86	0.81	0.32	0.84	0.61	0.62	0.84	0.84	0.46	0.29	0.49	0.49
Avail Cap(c_a), veh/h	259	1127	648	217	534	525	217	973	583	493	730	731
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	0.76	0.76	0.76	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.1	44.1	30.9	53.3	42.7	42.8	53.4	44.1	12.2	34.0	25.9	26.0
Incr Delay (d2), s/veh	20.6	3.2	0.4	20.7	1.6	1.7	15.7	8.0	2.3	0.3	2.3	2.3
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	6.9	10.6	4.1	5.7	7.1	7.1	5.3	11.7	3.2	3.7	9.2	9.2
LnGrp Delay(d),s/veh	72.7	47.3	31.2	73.9	44.2	44.5	69.1	52.1	14.5	34.3	28.3	28.3
LnGrp LOS	E	D	C	E	D	D	E	D	B	C	C	C
Approach Vol, veh/h		987			605			1059			856	
Approach Delay, s/veh		49.2			51.5			46.0			29.3	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.9	31.6	16.7	54.8	18.4	30.1	38.6	32.8
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	4.5	4.5	5.3	* 5.3
Max Green Setting (Gmax), s	14.7	38.2	14.7	32.0	17.5	36.2	14.5	* 33
Max Q Clear Time (g_c+I1), s	11.6	22.9	11.4	19.9	13.8	16.4	9.5	24.1
Green Ext Time (p_c), s	0.1	4.2	0.1	3.3	0.2	2.5	0.1	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	43.8
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	513	7	19	227	7	19	11	100	30	7	18
Future Volume (veh/h)	12	513	7	19	229	7	19	11	100	30	7	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		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	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	14	604	8	22	269	8	22	13	118	35	8	21
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	784	2122	28	582	2081	62	122	48	242	263	74	101
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1098	3575	47	806	3507	104	124	243	1235	671	380	513
Grp Volume(v), veh/h	14	299	313	22	135	142	153	0	0	64	0	0
Grp Sat Flow(s),veh/h/ln	1098	1770	1853	806	1770	1842	1601	0	0	1564	0	0
Q Serve(g_s), s	0.2	3.5	3.5	0.6	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.7	3.5	3.5	4.1	1.4	1.4	3.5	0.0	0.0	1.3	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.06	0.14		0.77	0.55		0.33
Lane Grp Cap(c), veh/h	784	1050	1100	582	1050	1093	411	0	0	438	0	0
V/C Ratio(X)	0.02	0.28	0.28	0.04	0.13	0.13	0.37	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	784	1050	1100	582	1050	1093	1254	0	0	1191	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.2	4.2	4.2	5.2	3.8	3.8	15.1	0.0	0.0	14.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	0.0	0.0	0.0	0.2	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	0.1	1.9	1.9	0.1	0.7	0.7	1.6	0.0	0.0	0.6	0.0	0.0
LnGrp Delay(d),s/veh	4.2	4.9	4.9	5.2	3.8	3.8	15.3	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		626			299			153			64	
Approach Delay, s/veh		4.9			3.9			15.3			14.2	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.0		12.3		30.0		12.3
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		25.1		31.0		25.1		31.0
Max Q Clear Time (g_c+I1), s		5.5		3.3		6.1		5.5
Green Ext Time (p_c), s		2.4		0.2		1.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.5
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street 03/27/2019

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	601	236	12	30	17
Future Vol, veh/h	10	622	245	12	30	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	90	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	655	258	13	32	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	271	0	-	0	608	258
Stage 1	-	-	-	-	258	-
Stage 2	-	-	-	-	350	-
Critical Hdwy	4.13	-	-	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	2.219	-	-	-	3.519	3.319
Pot Cap-1 Maneuver	1291	-	-	-	443	780
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	685	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1291	-	-	-	437	780
Mov Cap-2 Maneuver	-	-	-	-	437	-
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	685	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1291	-	-	-	520
HCM Lane V/C Ratio	0.008	-	-	-	0.095
HCM Control Delay (s)	7.8	0	-	-	12.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue 03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	410	172	166	164	134	74	649	186	179	659	59
Future Volume (veh/h)	117	432	180	166	172	134	78	649	186	179	659	63
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	124	460	191	177	183	143	83	690	198	190	701	67
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	151	535	220	205	485	356	105	806	538	462	1397	133
Arrive On Green	0.08	0.22	0.22	0.12	0.25	0.25	0.06	0.23	0.23	0.09	0.14	0.14
Sat Flow, veh/h	1774	2434	1002	1774	1935	1421	1774	3539	1558	1774	3261	311
Grp Volume(v), veh/h	124	333	318	177	166	160	83	690	198	190	380	388
Grp Sat Flow(s),veh/h/ln	1774	1770	1667	1774	1770	1586	1774	1770	1558	1774	1770	1803
Q Serve(g_s), s	8.3	21.7	22.0	11.8	9.3	10.1	5.5	22.4	4.6	12.2	23.8	23.9
Cycle Q Clear(g_c), s	8.3	21.7	22.0	11.8	9.3	10.1	5.5	22.4	4.6	12.2	23.8	23.9
Prop In Lane	1.00		0.60	1.00		0.90	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	151	389	366	205	443	397	105	806	538	462	758	773
V/C Ratio(X)	0.82	0.86	0.87	0.86	0.38	0.40	0.79	0.86	0.37	0.41	0.50	0.50
Avail Cap(c_a), veh/h	223	457	431	262	495	444	176	926	591	462	758	773
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	54.0	45.0	45.1	52.1	37.2	37.5	55.7	44.5	11.1	46.1	39.7	39.7
Incr Delay (d2), s/veh	14.2	13.3	15.1	20.3	0.5	0.7	12.2	11.3	1.9	0.5	1.9	1.9
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	4.7	12.1	11.7	6.9	4.6	4.5	3.1	12.2	2.5	6.0	12.1	12.3
LnGrp Delay(d),s/veh	68.2	58.3	60.2	72.5	37.7	38.1	67.9	55.8	13.1	46.6	41.6	41.6
LnGrp LOS	E	E	E	E	D	D	E	E	B	D	D	D
Approach Vol, veh/h		775			503			971			958	
Approach Delay, s/veh		60.7			50.1			48.1			42.6	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.2	31.7	12.4	56.7	15.5	35.4	36.5	32.6
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	17.7	31.0	11.9	38.2	15.1	33.6	18.7	31.4
Max Q Clear Time (g_c+I1), s	13.8	24.0	7.5	25.9	10.3	12.1	14.2	24.4
Green Ext Time (p_c), s	0.2	2.3	0.1	3.6	0.1	1.9	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	49.8
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	13	41	107	38	85	130	960	202	64	711	48
Future Volume (veh/h)	24	13	41	107	38	85	130	964	202	64	719	48
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		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	26	14	44	114	40	90	138	1026	215	68	765	51
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	18	56	145	51	173	165	2149	940	87	1993	867
Arrive On Green	0.06	0.06	0.06	0.11	0.11	0.11	0.09	0.61	0.61	0.05	0.56	0.56
Sat Flow, veh/h	520	280	881	1330	467	1583	1774	3539	1548	1774	3539	1539
Grp Volume(v), veh/h	84	0	0	154	0	90	138	1026	215	68	765	51
Grp Sat Flow(s),veh/h/ln	1681	0	0	1796	0	1583	1774	1770	1548	1774	1770	1539
Q Serve(g_s), s	5.9	0.0	0.0	10.0	0.0	6.4	9.2	19.2	7.6	4.5	14.5	1.8
Cycle Q Clear(g_c), s	5.9	0.0	0.0	10.0	0.0	6.4	9.2	19.2	7.6	4.5	14.5	1.8
Prop In Lane	0.31		0.52	0.74		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	107	0	0	196	0	173	165	2149	940	87	1993	867
V/C Ratio(X)	0.78	0.00	0.00	0.79	0.00	0.52	0.84	0.48	0.23	0.78	0.38	0.06
Avail Cap(c_a), veh/h	251	0	0	445	0	392	222	2149	940	103	1993	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.4	0.0	0.0	52.1	0.0	50.5	53.5	13.0	10.7	56.4	14.6	11.8
Incr Delay (d2), s/veh	11.7	0.0	0.0	6.8	0.0	2.4	18.1	0.8	0.6	27.1	0.6	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	3.1	0.0	0.0	5.3	0.0	2.9	5.4	9.6	3.4	2.9	7.2	0.8
LnGrp Delay(d),s/veh	67.1	0.0	0.0	58.9	0.0	52.9	71.6	13.8	11.3	83.5	15.2	12.0
LnGrp LOS	E			E		D	E	B	B	F	B	B
Approach Vol, veh/h		84			244			1379			884	
Approach Delay, s/veh		67.1			56.7			19.2			20.2	
Approach LOS		E			E			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.3	16.5	72.9		18.4	11.2	78.2
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	15.0	36.9		29.7	7.0	44.9
Max Q Clear Time (g_c+I1), s		7.9	11.2	16.5		12.0	6.5	21.2
Green Ext Time (p_c), s		0.2	0.1	5.1		1.1	0.0	8.4

Intersection Summary	
HCM 2010 Ctrl Delay	24.6
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	199	440	119	274	579	136	151	588	194	78	659	96
Future Volume (veh/h)	199	440	119	274	579	136	151	596	194	78	671	96
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		0.99	1.00		0.98	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	207	458	124	285	603	142	157	621	202	81	699	100
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	239	587	426	363	668	157	187	883	712	336	1035	148
Arrive On Green	0.13	0.17	0.17	0.20	0.24	0.24	0.11	0.25	0.25	0.19	0.33	0.33
Sat Flow, veh/h	1774	3539	1560	1774	2837	667	1774	3539	1557	1774	3103	444
Grp Volume(v), veh/h	207	458	124	285	376	369	157	621	202	81	398	401
Grp Sat Flow(s),veh/h/ln	1774	1770	1560	1774	1770	1734	1774	1770	1557	1774	1770	1777
Q Serve(g_s), s	12.2	13.3	3.5	16.3	22.0	22.1	9.3	17.1	0.0	4.1	20.7	20.8
Cycle Q Clear(g_c), s	12.2	13.3	3.5	16.3	22.0	22.1	9.3	17.1	0.0	4.1	20.7	20.8
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	239	587	426	363	416	408	187	883	712	336	590	592
V/C Ratio(X)	0.86	0.78	0.29	0.79	0.90	0.91	0.84	0.70	0.28	0.24	0.68	0.68
Avail Cap(c_a), veh/h	307	877	554	363	438	429	244	883	712	336	590	592
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	0.52	0.52	0.52	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.3	42.8	12.3	40.3	39.7	39.8	47.0	36.5	18.3	36.8	30.7	30.7
Incr Delay (d2), s/veh	18.1	2.7	0.4	10.9	20.9	21.8	10.0	2.5	0.5	0.4	6.1	6.1
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	7.2	6.7	1.6	9.1	13.2	13.0	5.1	8.7	3.8	2.1	11.1	11.1
LnGrp Delay(d),s/veh	63.5	45.4	12.6	51.2	60.6	61.5	57.0	39.0	18.8	37.2	36.8	36.8
LnGrp LOS	E	D	B	D	E	E	E	D	B	D	D	D
Approach Vol, veh/h		789			1030			980			880	
Approach Delay, s/veh		45.0			58.3			37.7			36.8	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.2	22.2	16.6	41.0	19.7	29.7	25.6	32.0
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	5.3	* 4.5	5.3	* 5.3
Max Green Setting (Gmax), s	17.7	26.5	14.7	27.4	18.5	* 27	7.0	* 27
Max Q Clear Time (g_c+I1), s	18.3	15.3	11.3	22.8	14.2	24.1	6.1	19.1
Green Ext Time (p_c), s	0.0	2.5	0.1	2.0	0.2	1.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	44.8
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	416	18	99	574	22	17	4	50	24	4	11
Future Volume (veh/h)	18	418	18	99	576	22	17	4	50	24	4	11
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		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	20	464	20	110	640	24	19	4	56	27	4	12
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	587	2155	93	686	2169	81	138	36	164	267	54	70
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	768	3454	149	908	3476	130	191	222	1005	777	329	428
Grp Volume(v), veh/h	20	237	247	110	326	338	79	0	0	43	0	0
Grp Sat Flow(s),veh/h/ln	768	1770	1833	908	1770	1836	1418	0	0	1534	0	0
Q Serve(g_s), s	0.5	2.4	2.4	2.5	3.5	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.1	2.4	2.4	5.0	3.5	3.6	2.0	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.08	1.00		0.07	0.24		0.71	0.63		0.28
Lane Grp Cap(c), veh/h	587	1104	1144	686	1104	1146	338	0	0	390	0	0
V/C Ratio(X)	0.03	0.21	0.22	0.16	0.29	0.30	0.23	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	587	1104	1144	686	1104	1146	1101	0	0	1184	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.6	3.4	3.4	4.5	3.6	3.6	15.5	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.0	0.1	0.1	0.1	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	1.3	1.4	0.6	1.7	1.8	0.8	0.0	0.0	0.4	0.0	0.0
LnGrp Delay(d),s/veh	4.7	3.9	3.8	4.5	3.7	3.7	15.6	0.0	0.0	15.1	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		504			774			79			43	
Approach Delay, s/veh		3.9			3.8			15.6			15.1	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		31.0		10.8		31.0		10.8
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		26.1		30.0		26.1		30.0
Max Q Clear Time (g_c+I1), s		6.1		2.9		7.0		4.0
Green Ext Time (p_c), s		1.9		0.1		3.0		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street

03/27/2019

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	406	638	28	13	10
Future Vol, veh/h	7	420	660	28	13	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	-	-	-	90	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	8	452	710	30	14	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	740	0	-	0	952	710
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	242	-
Critical Hdwy	4.13	-	-	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	2.219	-	-	-	3.519	3.319
Pot Cap-1 Maneuver	864	-	-	-	272	433
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	776	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	864	-	-	-	269	433
Mov Cap-2 Maneuver	-	-	-	-	269	-
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	776	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	17.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	864	-	-	-	322
HCM Lane V/C Ratio	0.009	-	-	-	0.077
HCM Control Delay (s)	9.2	0.1	-	-	17.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	331	138	202	424	226	181	905	272	182	734	123
Future Volume (veh/h)	72	344	144	202	445	226	191	905	272	182	734	135
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	75	358	150	210	464	235	199	943	283	190	765	141
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	96	444	183	241	598	301	225	1016	662	325	1021	188
Arrive On Green	0.05	0.18	0.18	0.14	0.26	0.26	0.13	0.29	0.29	0.18	0.34	0.34
Sat Flow, veh/h	1774	2434	1002	1774	2269	1141	1774	3539	1559	1774	2977	549
Grp Volume(v), veh/h	75	259	249	210	361	338	199	943	283	190	455	451
Grp Sat Flow(s),veh/h/ln	1774	1770	1666	1774	1770	1640	1774	1770	1559	1774	1770	1756
Q Serve(g_s), s	4.2	14.0	14.4	11.6	18.9	19.1	11.0	25.9	5.2	9.8	22.7	22.7
Cycle Q Clear(g_c), s	4.2	14.0	14.4	11.6	18.9	19.1	11.0	25.9	5.2	9.8	22.7	22.7
Prop In Lane	1.00		0.60	1.00		0.70	1.00		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	96	322	304	241	466	432	225	1016	662	325	607	603
V/C Ratio(X)	0.78	0.80	0.82	0.87	0.77	0.78	0.88	0.93	0.43	0.59	0.75	0.75
Avail Cap(c_a), veh/h	167	419	395	243	495	459	225	1016	662	325	607	603
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	1.00	0.63	0.63	0.63
Uniform Delay (d), s/veh	46.7	39.2	39.3	42.4	34.1	34.2	42.9	34.7	6.8	37.4	29.0	29.0
Incr Delay (d2), s/veh	12.5	8.2	10.2	27.3	7.1	8.1	31.0	15.5	2.0	1.7	5.3	5.4
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	2.4	7.6	7.5	7.5	10.1	9.6	7.4	14.8	2.6	5.0	12.0	11.9
LnGrp Delay(d),s/veh	59.2	47.4	49.6	69.6	41.2	42.2	74.0	50.2	8.8	39.1	34.4	34.4
LnGrp LOS	E	D	D	E	D	D	E	D	A	D	C	C
Approach Vol, veh/h		583			909			1425			1096	
Approach Delay, s/veh		49.8			48.1			45.3			35.2	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.9	23.5	18.0	39.6	10.7	31.7	23.6	34.0
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	13.7	23.7	12.7	28.7	9.4	28.0	12.7	28.7
Max Q Clear Time (g_c+I1), s	13.6	16.4	13.0	24.7	6.2	21.1	11.8	27.9
Green Ext Time (p_c), s	0.0	1.8	0.0	2.0	0.0	2.5	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	43.8
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	46	142	207	5	137	37	969	208	124	1040	12
Future Volume (veh/h)	76	46	142	207	5	137	37	979	208	124	1046	12
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		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	80	48	149	218	5	144	39	1031	219	131	1101	13
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	84	51	157	272	6	244	58	1435	623	110	1537	670
Arrive On Green	0.18	0.18	0.18	0.16	0.16	0.16	0.03	0.41	0.41	0.06	0.43	0.43
Sat Flow, veh/h	481	288	895	1736	40	1558	1774	3539	1537	1774	3539	1542
Grp Volume(v), veh/h	277	0	0	223	0	144	39	1031	219	131	1101	13
Grp Sat Flow(s),veh/h/ln	1664	0	0	1776	0	1558	1774	1770	1537	1774	1770	1542
Q Serve(g_s), s	16.8	0.0	0.0	12.4	0.0	8.8	2.2	24.9	10.1	6.3	26.1	0.5
Cycle Q Clear(g_c), s	16.8	0.0	0.0	12.4	0.0	8.8	2.2	24.9	10.1	6.3	26.1	0.5
Prop In Lane	0.29		0.54	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	292	0	0	278	0	244	58	1435	623	110	1537	670
V/C Ratio(X)	0.95	0.00	0.00	0.80	0.00	0.59	0.67	0.72	0.35	1.20	0.72	0.02
Avail Cap(c_a), veh/h	292	0	0	500	0	438	110	1435	623	110	1537	670
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.6	0.0	0.0	41.5	0.0	40.0	48.8	25.4	21.0	47.8	23.7	16.5
Incr Delay (d2), s/veh	39.0	0.0	0.0	5.4	0.0	2.3	12.5	3.1	1.6	147.8	2.9	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	10.9	0.0	0.0	6.5	0.0	3.9	1.3	12.8	4.5	7.6	13.3	0.2
LnGrp Delay(d),s/veh	80.6	0.0	0.0	46.9	0.0	42.3	61.3	28.6	22.6	195.6	26.6	16.5
LnGrp LOS	F			D		D	E	C	C	F	C	B
Approach Vol, veh/h		277			367			1289			1245	
Approach Delay, s/veh		80.6			45.1			28.5			44.3	
Approach LOS		F			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.5	8.6	49.6		21.3	11.6	46.6
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	6.3	28.6		28.7	6.3	28.6
Max Q Clear Time (g_c+I1), s		18.8	4.2	28.1		14.4	8.3	26.9
Green Ext Time (p_c), s		0.0	0.0	0.4		1.6	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	41.1
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	221	572	168	181	379	126	151	713	208	124	645	84
Future Volume (veh/h)	221	572	168	181	379	126	151	713	208	124	645	84
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		0.99	1.00		0.99	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	251	650	191	206	431	143	172	810	236	141	733	95
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	801	531	217	547	180	199	910	595	397	1161	150
Arrive On Green	0.15	0.23	0.23	0.12	0.21	0.21	0.11	0.26	0.26	0.22	0.37	0.37
Sat Flow, veh/h	1774	3539	1563	1774	2610	857	1774	3539	1560	1774	3147	408
Grp Volume(v), veh/h	251	650	191	206	291	283	172	810	236	141	412	416
Grp Sat Flow(s),veh/h/ln	1774	1770	1563	1774	1770	1698	1774	1770	1560	1774	1770	1785
Q Serve(g_s), s	16.9	20.9	11.1	13.8	18.6	19.0	11.4	26.5	5.6	8.0	23.0	23.0
Cycle Q Clear(g_c), s	16.9	20.9	11.1	13.8	18.6	19.0	11.4	26.5	5.6	8.0	23.0	23.0
Prop In Lane	1.00		1.00	1.00		0.50	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	259	801	531	217	371	356	199	910	595	397	653	659
V/C Ratio(X)	0.97	0.81	0.36	0.95	0.78	0.80	0.86	0.89	0.40	0.35	0.63	0.63
Avail Cap(c_a), veh/h	259	1127	675	217	534	512	217	973	623	397	653	659
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	0.69	0.69	0.69	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.0	44.0	29.9	52.3	44.8	45.0	52.4	42.9	10.0	39.3	31.1	31.1
Incr Delay (d2), s/veh	47.5	3.1	0.4	46.4	4.8	5.5	20.3	9.3	1.4	0.5	4.6	4.6
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	11.7	10.6	4.8	9.6	9.6	9.4	6.7	14.1	2.7	4.0	12.0	12.2
LnGrp Delay(d),s/veh	98.5	47.1	30.3	98.7	49.6	50.5	72.7	52.2	11.4	39.8	35.7	35.7
LnGrp LOS	F	D	C	F	D	D	E	D	B	D	D	D
Approach Vol, veh/h		1092			780			1218			969	
Approach Delay, s/veh		56.0			62.9			47.2			36.3	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	31.7	18.8	49.6	22.0	29.7	32.2	36.2
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	4.5	4.5	5.3	* 5.3
Max Green Setting (Gmax), s	14.7	38.2	14.7	32.0	17.5	36.2	14.5	* 33
Max Q Clear Time (g_c+I1), s	15.8	22.9	13.4	25.0	18.9	21.0	10.0	28.5
Green Ext Time (p_c), s	0.0	4.3	0.1	2.8	0.0	2.9	0.1	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	50.0
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	513	7	19	280	7	19	11	100	30	7	18
Future Volume (veh/h)	12	513	7	19	280	7	19	11	100	30	7	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		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	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	14	604	8	22	329	8	22	13	118	35	8	21
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	743	2122	28	582	2094	51	122	48	242	263	74	101
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1039	3575	47	806	3529	86	124	243	1235	671	380	513
Grp Volume(v), veh/h	14	299	313	22	165	172	153	0	0	64	0	0
Grp Sat Flow(s),veh/h/ln	1039	1770	1853	806	1770	1845	1601	0	0	1564	0	0
Q Serve(g_s), s	0.3	3.5	3.5	0.6	1.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.0	3.5	3.5	4.1	1.8	1.8	3.5	0.0	0.0	1.3	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.05	0.14		0.77	0.55		0.33
Lane Grp Cap(c), veh/h	743	1050	1100	582	1050	1095	411	0	0	438	0	0
V/C Ratio(X)	0.02	0.28	0.28	0.04	0.16	0.16	0.37	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	743	1050	1100	582	1050	1095	1254	0	0	1191	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.3	4.2	4.2	5.2	3.9	3.9	15.1	0.0	0.0	14.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	0.0	0.0	0.0	0.2	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	0.1	1.9	1.9	0.1	0.8	0.9	1.6	0.0	0.0	0.6	0.0	0.0
LnGrp Delay(d),s/veh	4.4	4.9	4.9	5.2	3.9	3.9	15.3	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		626			359			153			64	
Approach Delay, s/veh		4.9			4.0			15.3			14.2	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.0		12.3		30.0		12.3
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		25.1		31.0		25.1		31.0
Max Q Clear Time (g_c+I1), s		5.5		3.3		6.1		5.5
Green Ext Time (p_c), s		2.4		0.2		1.3		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street 03/27/2019

Intersection						
Int Delay, s/veh	0.8					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	601	289	12	30	17
Future Vol, veh/h	10	601	289	12	30	17
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	633	304	13	32	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	317	0	-	0	650	159
Stage 1	-	-	-	-	311	-
Stage 2	-	-	-	-	339	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1240	-	-	-	402	858
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	693	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1240	-	-	-	396	858
Mov Cap-2 Maneuver	-	-	-	-	396	-
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	693	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1240	-	-	-	492
HCM Lane V/C Ratio	0.008	-	-	-	0.101
HCM Control Delay (s)	7.9	0.1	-	-	13.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue 03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	419	180	166	186	154	80	713	186	202	762	77
Future Volume (veh/h)	125	419	180	166	186	154	80	713	186	202	762	77
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	133	446	191	177	198	164	85	759	198	215	811	82
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	160	522	221	205	454	355	108	858	561	441	1396	141
Arrive On Green	0.09	0.22	0.22	0.12	0.24	0.24	0.06	0.24	0.24	0.08	0.14	0.14
Sat Flow, veh/h	1774	2410	1022	1774	1879	1467	1774	3539	1559	1774	3241	328
Grp Volume(v), veh/h	133	326	311	177	186	176	85	759	198	215	443	450
Grp Sat Flow(s),veh/h/ln	1774	1770	1663	1774	1770	1576	1774	1770	1559	1774	1770	1799
Q Serve(g_s), s	8.8	21.3	21.6	11.8	10.7	11.4	5.7	24.8	4.6	13.9	28.1	28.1
Cycle Q Clear(g_c), s	8.8	21.3	21.6	11.8	10.7	11.4	5.7	24.8	4.6	13.9	28.1	28.1
Prop In Lane	1.00		0.61	1.00		0.93	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	160	383	360	205	428	381	108	858	561	441	762	775
V/C Ratio(X)	0.83	0.85	0.86	0.86	0.43	0.46	0.79	0.89	0.35	0.49	0.58	0.58
Avail Cap(c_a), veh/h	223	457	430	262	495	441	176	926	591	441	762	775
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Uniform Delay (d), s/veh	53.7	45.2	45.3	52.1	38.5	38.8	55.6	43.8	10.6	47.7	41.4	41.4
Incr Delay (d2), s/veh	16.6	12.6	14.5	20.3	0.7	0.9	12.1	12.9	1.7	0.6	2.2	2.1
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	5.1	11.8	11.4	6.9	5.3	5.1	3.1	13.7	2.4	6.9	14.2	14.5
LnGrp Delay(d),s/veh	70.3	57.7	59.8	72.5	39.2	39.7	67.7	56.8	12.3	48.3	43.5	43.5
LnGrp LOS	E	E	E	E	D	D	E	E	B	D	D	D
Approach Vol, veh/h		770			539			1042			1108	
Approach Delay, s/veh		60.7			50.3			49.2			44.4	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.2	31.3	12.6	57.0	16.1	34.3	35.2	34.4
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	17.7	31.0	11.9	38.2	15.1	33.6	18.7	31.4
Max Q Clear Time (g_c+I1), s	13.8	23.6	7.7	30.1	10.8	13.4	15.9	26.8
Green Ext Time (p_c), s	0.2	2.4	0.1	3.3	0.1	2.1	0.2	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	50.4
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	13	41	109	38	123	130	1059	240	112	816	48
Future Volume (veh/h)	24	13	41	109	38	123	130	1059	240	112	816	48
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		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	26	14	44	116	40	131	138	1127	255	119	868	51
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	18	56	148	51	176	166	2059	900	129	1985	863
Arrive On Green	0.06	0.06	0.06	0.11	0.11	0.11	0.09	0.58	0.58	0.07	0.56	0.56
Sat Flow, veh/h	520	280	881	1335	461	1583	1774	3539	1548	1774	3539	1539
Grp Volume(v), veh/h	84	0	0	156	0	131	138	1127	255	119	868	51
Grp Sat Flow(s),veh/h/ln	1681	0	0	1796	0	1583	1774	1770	1548	1774	1770	1539
Q Serve(g_s), s	5.9	0.0	0.0	10.1	0.0	9.6	9.2	23.4	9.9	8.0	17.1	1.8
Cycle Q Clear(g_c), s	5.9	0.0	0.0	10.1	0.0	9.6	9.2	23.4	9.9	8.0	17.1	1.8
Prop In Lane	0.31		0.52	0.74		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	107	0	0	200	0	176	166	2059	900	129	1985	863
V/C Ratio(X)	0.78	0.00	0.00	0.78	0.00	0.74	0.83	0.55	0.28	0.93	0.44	0.06
Avail Cap(c_a), veh/h	251	0	0	419	0	369	247	2059	900	129	1985	863
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.4	0.0	0.0	51.9	0.0	51.7	53.5	15.4	12.6	55.3	15.3	12.0
Incr Delay (d2), s/veh	11.7	0.0	0.0	6.5	0.0	6.1	14.1	1.1	0.8	56.8	0.7	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	3.1	0.0	0.0	5.4	0.0	4.5	5.1	11.7	4.4	6.0	8.5	0.8
LnGrp Delay(d),s/veh	67.1	0.0	0.0	58.5	0.0	57.8	67.6	16.4	13.4	112.2	16.0	12.1
LnGrp LOS	E			E		E	E	B	B	F	B	B
Approach Vol, veh/h		84			287			1520			1038	
Approach Delay, s/veh		67.1			58.2			20.6			26.9	
Approach LOS		E			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.3	16.5	72.6		18.6	14.0	75.1
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	16.7	36.9		28.0	8.7	44.9
Max Q Clear Time (g_c+I1), s		7.9	11.2	19.1		12.1	10.0	25.4
Green Ext Time (p_c), s		0.2	0.1	5.6		1.2	0.0	8.7

Intersection Summary	
HCM 2010 Ctrl Delay	27.8
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	207	495	119	274	582	198	151	660	235	152	806	119
Future Volume (veh/h)	207	495	119	274	582	198	151	660	235	152	806	119
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		0.99	1.00		0.98	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	216	516	124	285	606	206	157	688	245	158	840	124
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	644	451	366	640	217	187	910	727	291	976	144
Arrive On Green	0.14	0.18	0.18	0.21	0.25	0.25	0.11	0.26	0.26	0.16	0.32	0.32
Sat Flow, veh/h	1774	3539	1560	1774	2586	877	1774	3539	1557	1774	3088	456
Grp Volume(v), veh/h	216	516	124	285	414	398	157	688	245	158	481	483
Grp Sat Flow(s),veh/h/ln	1774	1770	1560	1774	1770	1693	1774	1770	1557	1774	1770	1774
Q Serve(g_s), s	12.8	14.9	3.4	16.3	24.6	24.7	9.3	19.2	0.0	8.7	27.4	27.4
Cycle Q Clear(g_c), s	12.8	14.9	3.4	16.3	24.6	24.7	9.3	19.2	0.0	8.7	27.4	27.4
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	249	644	451	366	438	419	187	910	727	291	559	561
V/C Ratio(X)	0.87	0.80	0.28	0.78	0.95	0.95	0.84	0.76	0.34	0.54	0.86	0.86
Avail Cap(c_a), veh/h	335	877	553	366	438	419	227	910	727	291	559	561
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	0.37	0.37	0.37	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.0	41.9	11.6	40.2	39.5	39.6	47.0	36.7	18.2	41.0	34.4	34.4
Incr Delay (d2), s/veh	16.4	3.8	0.3	10.3	29.6	30.9	8.6	2.2	0.5	2.0	15.9	15.9
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	7.4	7.7	1.5	9.0	15.6	15.1	5.0	9.6	4.7	4.5	15.8	15.9
LnGrp Delay(d),s/veh	61.4	45.7	11.9	50.5	69.1	70.5	55.5	38.9	18.7	43.1	50.3	50.3
LnGrp LOS	E	D	B	D	E	E	E	D	B	D	D	D
Approach Vol, veh/h		856			1097			1090			1122	
Approach Delay, s/veh		44.8			64.8			36.7			49.3	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.3	24.0	16.6	39.1	20.3	31.0	22.9	32.8
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	5.3	* 4.5	5.3	* 5.3
Max Green Setting (Gmax), s	19.4	26.5	13.7	26.7	20.2	* 27	7.0	* 28
Max Q Clear Time (g_c+I1), s	18.3	16.9	11.3	29.4	14.8	26.7	10.7	21.2
Green Ext Time (p_c), s	0.1	2.5	0.1	0.0	0.3	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	49.2
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	457	18	99	597	22	17	4	50	24	4	11
Future Volume (veh/h)	18	457	18	99	597	22	17	4	50	24	4	11
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		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	20	508	20	110	663	24	19	4	56	27	4	12
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	575	2165	85	660	2172	79	138	36	164	267	54	70
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	752	3468	136	872	3481	126	191	222	1005	777	329	428
Grp Volume(v), veh/h	20	259	269	110	337	350	79	0	0	43	0	0
Grp Sat Flow(s),veh/h/ln	752	1770	1835	872	1770	1837	1418	0	0	1534	0	0
Q Serve(g_s), s	0.5	2.7	2.7	2.7	3.7	3.7	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.2	2.7	2.7	5.4	3.7	3.7	2.0	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.07	1.00		0.07	0.24		0.71	0.63		0.28
Lane Grp Cap(c), veh/h	575	1104	1145	660	1104	1147	338	0	0	390	0	0
V/C Ratio(X)	0.03	0.23	0.24	0.17	0.31	0.31	0.23	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	575	1104	1145	660	1104	1147	1101	0	0	1184	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.6	3.5	3.5	4.6	3.6	3.6	15.5	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.5	0.0	0.1	0.1	0.1	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	1.4	1.5	0.6	1.8	1.9	0.8	0.0	0.0	0.4	0.0	0.0
LnGrp Delay(d),s/veh	4.7	4.0	3.9	4.7	3.7	3.7	15.6	0.0	0.0	15.1	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		548			797			79			43	
Approach Delay, s/veh		4.0			3.8			15.6			15.1	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		31.0		10.8		31.0		10.8
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		26.1		30.0		26.1		30.0
Max Q Clear Time (g_c+I1), s		6.2		2.9		7.4		4.0
Green Ext Time (p_c), s		2.1		0.1		3.1		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	4.9
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street

03/27/2019

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	488	597	28	13	10
Future Vol, veh/h	7	488	597	28	13	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	-	-	-	-	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	8	525	642	30	14	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	672	0	-	0	936	336
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	279	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	915	-	-	-	264	660
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	743	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	915	-	-	-	261	660
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	743	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	15.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	915	-	-	-	354
HCM Lane V/C Ratio	0.008	-	-	-	0.07
HCM Control Delay (s)	9	0.1	-	-	15.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	364	150	234	456	253	188	981	309	209	832	129
Future Volume (veh/h)	67	364	150	234	456	253	188	981	309	209	832	129
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	70	379	156	244	475	264	196	1022	322	218	867	134
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	91	463	188	243	601	332	225	1016	664	310	1026	159
Arrive On Green	0.05	0.19	0.19	0.14	0.27	0.27	0.13	0.29	0.29	0.17	0.33	0.33
Sat Flow, veh/h	1774	2446	991	1774	2188	1209	1774	3539	1559	1774	3066	474
Grp Volume(v), veh/h	70	273	262	244	384	355	196	1022	322	218	500	501
Grp Sat Flow(s),veh/h/ln	1774	1770	1668	1774	1770	1627	1774	1770	1559	1774	1770	1771
Q Serve(g_s), s	3.9	14.8	15.1	13.7	20.1	20.3	10.8	28.7	6.3	11.6	26.2	26.2
Cycle Q Clear(g_c), s	3.9	14.8	15.1	13.7	20.1	20.3	10.8	28.7	6.3	11.6	26.2	26.2
Prop In Lane	1.00		0.59	1.00		0.74	1.00		1.00	1.00		0.27
Lane Grp Cap(c), veh/h	91	335	316	243	486	447	225	1016	664	310	592	593
V/C Ratio(X)	0.77	0.81	0.83	1.00	0.79	0.79	0.87	1.01	0.48	0.70	0.84	0.84
Avail Cap(c_a), veh/h	167	419	395	243	495	456	225	1016	664	310	592	593
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	1.00	0.39	0.39	0.39
Uniform Delay (d), s/veh	46.8	38.8	39.0	43.2	33.6	33.6	42.8	35.7	7.0	38.8	30.9	30.9
Incr Delay (d2), s/veh	12.6	9.5	11.5	58.7	8.2	9.3	28.6	29.7	2.5	2.8	6.0	6.0
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	2.2	8.1	8.0	10.6	10.9	10.2	7.1	18.2	3.2	5.9	13.8	13.8
LnGrp Delay(d),s/veh	59.4	48.3	50.5	101.9	41.8	42.9	71.4	65.4	9.5	41.7	36.9	36.9
LnGrp LOS	E	D	D	F	D	D	E	F	A	D	D	D
Approach Vol, veh/h		605			983			1540			1219	
Approach Delay, s/veh		50.6			57.1			54.5			37.7	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	24.2	18.0	38.8	10.4	32.8	22.8	34.0
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	13.7	23.7	12.7	28.7	9.4	28.0	12.7	28.7
Max Q Clear Time (g_c+I1), s	15.7	17.1	12.8	28.2	5.9	22.3	13.6	30.7
Green Ext Time (p_c), s	0.0	1.8	0.0	0.3	0.0	2.3	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.8
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	46	142	207	5	160	37	1104	228	141	1219	12
Future Volume (veh/h)	76	46	142	207	5	160	37	1104	228	141	1219	12
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		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	80	48	149	218	5	168	39	1162	240	148	1283	13
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	47	146	268	6	240	56	1459	634	150	1646	718
Arrive On Green	0.16	0.16	0.16	0.15	0.15	0.15	0.03	0.41	0.41	0.08	0.47	0.47
Sat Flow, veh/h	480	288	895	1736	40	1557	1774	3539	1537	1774	3539	1543
Grp Volume(v), veh/h	277	0	0	223	0	168	39	1162	240	148	1283	13
Grp Sat Flow(s),veh/h/ln	1664	0	0	1776	0	1557	1774	1770	1537	1774	1770	1543
Q Serve(g_s), s	17.9	0.0	0.0	13.4	0.0	11.3	2.4	31.6	12.0	9.2	33.5	0.5
Cycle Q Clear(g_c), s	17.9	0.0	0.0	13.4	0.0	11.3	2.4	31.6	12.0	9.2	33.5	0.5
Prop In Lane	0.29		0.54	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	271	0	0	274	0	240	56	1459	634	150	1646	718
V/C Ratio(X)	1.02	0.00	0.00	0.81	0.00	0.70	0.69	0.80	0.38	0.99	0.78	0.02
Avail Cap(c_a), veh/h	271	0	0	452	0	396	81	1459	634	150	1646	718
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.1	0.0	0.0	45.0	0.0	44.1	52.7	28.3	22.5	50.3	24.7	15.9
Incr Delay (d2), s/veh	60.8	0.0	0.0	5.8	0.0	3.7	14.3	4.6	1.7	69.3	3.7	0.0
Initial Q Delay(d3),s/veh	0.1	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	12.8	0.0	0.0	7.0	0.0	5.1	1.4	16.3	5.4	7.4	17.1	0.2
LnGrp Delay(d),s/veh	106.9	0.0	0.0	50.8	0.0	47.8	67.0	32.9	24.2	119.6	28.4	15.9
LnGrp LOS	F			D		D	E	C	C	F	C	B
Approach Vol, veh/h		277			391			1441			1444	
Approach Delay, s/veh		106.9			49.5			32.4			37.6	
Approach LOS		F			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.5	8.8	56.5		22.3	14.6	50.6
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	5.0	38.6		28.0	9.3	34.3
Max Q Clear Time (g_c+I1), s		19.9	4.4	35.5		15.4	11.2	33.6
Green Ext Time (p_c), s		0.0	0.0	2.2		1.6	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	42.2
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	221	572	168	181	379	126	151	713	208	124	645	84
Future Volume (veh/h)	221	572	168	181	379	126	151	725	208	124	649	84
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		0.99	1.00		0.99	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	251	650	191	206	431	143	172	824	236	141	738	95
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	801	531	217	547	180	199	919	599	393	1162	150
Arrive On Green	0.15	0.23	0.23	0.12	0.21	0.21	0.11	0.26	0.26	0.22	0.37	0.37
Sat Flow, veh/h	1774	3539	1563	1774	2610	857	1774	3539	1560	1774	3150	405
Grp Volume(v), veh/h	251	650	191	206	291	283	172	824	236	141	414	419
Grp Sat Flow(s),veh/h/ln	1774	1770	1563	1774	1770	1698	1774	1770	1560	1774	1770	1785
Q Serve(g_s), s	16.9	20.9	11.1	13.8	18.6	19.0	11.4	27.0	5.6	8.1	23.2	23.2
Cycle Q Clear(g_c), s	16.9	20.9	11.1	13.8	18.6	19.0	11.4	27.0	5.6	8.1	23.2	23.2
Prop In Lane	1.00		1.00	1.00		0.50	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	259	801	531	217	371	356	199	919	599	393	653	659
V/C Ratio(X)	0.97	0.81	0.36	0.95	0.78	0.80	0.86	0.90	0.39	0.36	0.63	0.64
Avail Cap(c_a), veh/h	259	1127	675	217	534	512	217	973	623	393	653	659
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	0.67	0.67	0.67	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.0	44.0	29.9	52.3	44.8	45.0	52.4	42.9	9.9	39.5	31.2	31.2
Incr Delay (d2), s/veh	47.5	3.1	0.4	46.4	4.8	5.5	19.7	9.4	1.3	0.6	4.7	4.6
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	11.7	10.6	4.8	9.6	9.6	9.4	6.7	14.4	2.6	4.0	12.1	12.2
LnGrp Delay(d),s/veh	98.5	47.1	30.3	98.7	49.6	50.5	72.0	52.2	11.2	40.1	35.9	35.8
LnGrp LOS	F	D	C	F	D	D	E	D	B	D	D	D
Approach Vol, veh/h		1092			780			1232			974	
Approach Delay, s/veh		56.0			62.9			47.1			36.5	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	31.7	18.8	49.6	22.0	29.7	31.9	36.5
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	4.5	4.5	5.3	* 5.3
Max Green Setting (Gmax), s	14.7	38.2	14.7	32.0	17.5	36.2	14.5	* 33
Max Q Clear Time (g_c+I1), s	15.8	22.9	13.4	25.2	18.9	21.0	10.1	29.0
Green Ext Time (p_c), s	0.0	4.3	0.1	2.7	0.0	2.9	0.1	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	50.0
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	513	7	19	280	7	19	11	100	30	7	18
Future Volume (veh/h)	12	513	7	19	282	7	19	11	100	30	7	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		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	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	14	604	8	22	332	8	22	13	118	35	8	21
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	741	2122	28	582	2095	50	122	48	242	263	74	101
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1036	3575	47	806	3530	85	124	243	1235	671	380	513
Grp Volume(v), veh/h	14	299	313	22	166	174	153	0	0	64	0	0
Grp Sat Flow(s),veh/h/ln	1036	1770	1853	806	1770	1846	1601	0	0	1564	0	0
Q Serve(g_s), s	0.3	3.5	3.5	0.6	1.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.0	3.5	3.5	4.1	1.8	1.8	3.5	0.0	0.0	1.3	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.05	0.14		0.77	0.55		0.33
Lane Grp Cap(c), veh/h	741	1050	1100	582	1050	1095	411	0	0	438	0	0
V/C Ratio(X)	0.02	0.28	0.28	0.04	0.16	0.16	0.37	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	741	1050	1100	582	1050	1095	1254	0	0	1191	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.3	4.2	4.2	5.2	3.9	3.9	15.1	0.0	0.0	14.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	0.0	0.0	0.0	0.2	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	0.1	1.9	1.9	0.1	0.8	0.9	1.6	0.0	0.0	0.6	0.0	0.0
LnGrp Delay(d),s/veh	4.4	4.9	4.9	5.2	3.9	3.9	15.3	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		626			362			153			64	
Approach Delay, s/veh		4.9			4.0			15.3			14.2	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.0		12.3		30.0		12.3
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		25.1		31.0		25.1		31.0
Max Q Clear Time (g_c+I1), s		5.5		3.3		6.1		5.5
Green Ext Time (p_c), s		2.4		0.2		1.3		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street 03/27/2019

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	601	289	12	30	17
Future Vol, veh/h	10	622	298	12	30	17
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	655	314	13	32	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	327	0	-	0	671	164
Stage 1	-	-	-	-	321	-
Stage 2	-	-	-	-	350	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1229	-	-	-	390	852
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	684	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1229	-	-	-	385	852
Mov Cap-2 Maneuver	-	-	-	-	385	-
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	684	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1229	-	-	-	480
HCM Lane V/C Ratio	0.009	-	-	-	0.103
HCM Control Delay (s)	8	0.1	-	-	13.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue 03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	419	180	166	186	154	80	713	186	202	762	77
Future Volume (veh/h)	137	441	188	166	194	154	84	713	186	202	762	81
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	146	469	200	177	206	164	89	759	198	215	811	86
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	173	541	229	205	463	349	112	858	561	428	1355	144
Arrive On Green	0.10	0.22	0.22	0.12	0.24	0.24	0.06	0.24	0.24	0.08	0.14	0.14
Sat Flow, veh/h	1774	2412	1021	1774	1911	1440	1774	3539	1559	1774	3224	342
Grp Volume(v), veh/h	146	343	326	177	190	180	89	759	198	215	445	452
Grp Sat Flow(s),veh/h/ln	1774	1770	1663	1774	1770	1582	1774	1770	1559	1774	1770	1797
Q Serve(g_s), s	9.7	22.4	22.7	11.8	10.9	11.7	5.9	24.8	4.7	13.9	28.3	28.4
Cycle Q Clear(g_c), s	9.7	22.4	22.7	11.8	10.9	11.7	5.9	24.8	4.7	13.9	28.3	28.4
Prop In Lane	1.00		0.61	1.00		0.91	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	173	397	373	205	429	383	112	858	561	428	743	755
V/C Ratio(X)	0.84	0.86	0.87	0.86	0.44	0.47	0.79	0.89	0.35	0.50	0.60	0.60
Avail Cap(c_a), veh/h	223	457	430	262	495	443	176	926	591	428	743	755
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.66	0.66	0.66
Uniform Delay (d), s/veh	53.2	44.8	44.9	52.1	38.6	38.9	55.4	43.8	10.5	48.3	42.2	42.2
Incr Delay (d2), s/veh	19.8	14.3	16.1	20.3	0.7	0.9	12.3	12.9	1.7	0.6	2.4	2.3
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	5.7	12.5	12.1	6.9	5.4	5.2	3.3	13.7	2.4	6.9	14.4	14.6
LnGrp Delay(d),s/veh	73.0	59.1	61.0	72.5	39.3	39.8	67.8	56.8	12.3	49.0	44.5	44.5
LnGrp LOS	E	E	E	E	D	D	E	E	B	D	D	D
Approach Vol, veh/h		815			547			1046			1112	
Approach Delay, s/veh		62.4			50.2			49.3			45.4	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.2	32.2	12.9	55.7	17.0	34.4	34.2	34.4
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	17.7	31.0	11.9	38.2	15.1	33.6	18.7	31.4
Max Q Clear Time (g_c+I1), s	13.8	24.7	7.9	30.4	11.7	13.7	15.9	26.8
Green Ext Time (p_c), s	0.2	2.2	0.1	3.3	0.1	2.2	0.2	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	51.2
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	13	41	109	38	123	130	1059	240	112	816	48
Future Volume (veh/h)	24	13	41	109	38	123	130	1063	240	112	824	48
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		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	26	14	44	116	40	131	138	1131	255	119	877	51
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	18	56	148	51	176	166	2059	900	129	1985	863
Arrive On Green	0.06	0.06	0.06	0.11	0.11	0.11	0.09	0.58	0.58	0.07	0.56	0.56
Sat Flow, veh/h	520	280	881	1335	461	1583	1774	3539	1548	1774	3539	1539
Grp Volume(v), veh/h	84	0	0	156	0	131	138	1131	255	119	877	51
Grp Sat Flow(s),veh/h/ln	1681	0	0	1796	0	1583	1774	1770	1548	1774	1770	1539
Q Serve(g_s), s	5.9	0.0	0.0	10.1	0.0	9.6	9.2	23.6	9.9	8.0	17.4	1.8
Cycle Q Clear(g_c), s	5.9	0.0	0.0	10.1	0.0	9.6	9.2	23.6	9.9	8.0	17.4	1.8
Prop In Lane	0.31		0.52	0.74		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	107	0	0	200	0	176	166	2059	900	129	1985	863
V/C Ratio(X)	0.78	0.00	0.00	0.78	0.00	0.74	0.83	0.55	0.28	0.93	0.44	0.06
Avail Cap(c_a), veh/h	251	0	0	419	0	369	247	2059	900	129	1985	863
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.4	0.0	0.0	51.9	0.0	51.7	53.5	15.4	12.6	55.3	15.4	12.0
Incr Delay (d2), s/veh	11.7	0.0	0.0	6.5	0.0	6.1	14.1	1.1	0.8	56.8	0.7	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	3.1	0.0	0.0	5.4	0.0	4.5	5.1	11.8	4.4	6.0	8.6	0.8
LnGrp Delay(d),s/veh	67.1	0.0	0.0	58.5	0.0	57.8	67.6	16.5	13.4	112.2	16.1	12.1
LnGrp LOS	E			E		E	E	B	B	F	B	B
Approach Vol, veh/h		84			287			1524			1047	
Approach Delay, s/veh		67.1			58.2			20.6			26.8	
Approach LOS		E			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.3	16.5	72.6		18.6	14.0	75.1
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	16.7	36.9		28.0	8.7	44.9
Max Q Clear Time (g_c+I1), s		7.9	11.2	19.4		12.1	10.0	25.6
Green Ext Time (p_c), s		0.2	0.1	5.6		1.2	0.0	8.7

Intersection Summary	
HCM 2010 Ctrl Delay	27.8
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
1: Marlow Road & Guerneville Road

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	207	495	119	274	582	198	151	660	235	152	806	119
Future Volume (veh/h)	207	495	119	274	582	198	151	668	235	152	818	119
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		0.99	1.00		0.98	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	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	216	516	124	285	606	206	157	696	245	158	852	124
Adj No. of Lanes	1	2	1	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	644	451	366	640	217	187	910	727	291	978	142
Arrive On Green	0.14	0.18	0.18	0.21	0.25	0.25	0.11	0.26	0.26	0.16	0.32	0.32
Sat Flow, veh/h	1774	3539	1560	1774	2586	877	1774	3539	1557	1774	3095	450
Grp Volume(v), veh/h	216	516	124	285	414	398	157	696	245	158	487	489
Grp Sat Flow(s),veh/h/ln	1774	1770	1560	1774	1770	1693	1774	1770	1557	1774	1770	1775
Q Serve(g_s), s	12.8	14.9	3.4	16.3	24.6	24.7	9.3	19.5	0.0	8.7	27.8	27.8
Cycle Q Clear(g_c), s	12.8	14.9	3.4	16.3	24.6	24.7	9.3	19.5	0.0	8.7	27.8	27.8
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	249	644	451	366	438	419	187	910	727	291	559	561
V/C Ratio(X)	0.87	0.80	0.28	0.78	0.95	0.95	0.84	0.77	0.34	0.54	0.87	0.87
Avail Cap(c_a), veh/h	335	877	553	366	438	419	227	910	727	291	559	561
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	0.34	0.34	0.34	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.0	41.9	11.6	40.2	39.5	39.6	47.0	36.8	18.2	41.0	34.5	34.5
Incr Delay (d2), s/veh	16.4	3.8	0.3	10.3	29.6	30.9	8.0	2.2	0.4	2.0	16.9	16.9
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	7.4	7.7	1.5	9.0	15.6	15.1	5.0	9.7	4.6	4.5	16.2	16.2
LnGrp Delay(d),s/veh	61.4	45.7	11.9	50.5	69.1	70.5	55.0	38.9	18.7	43.1	51.4	51.4
LnGrp LOS	E	D	B	D	E	E	D	D	B	D	D	D
Approach Vol, veh/h		856			1097			1098			1134	
Approach Delay, s/veh		44.8			64.8			36.7			50.3	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.3	24.0	16.6	39.1	20.3	31.0	22.9	32.8
Change Period (Y+Rc), s	5.3	4.5	5.3	5.3	5.3	* 4.5	5.3	* 5.3
Max Green Setting (Gmax), s	19.4	26.5	13.7	26.7	20.2	* 27	7.0	* 28
Max Q Clear Time (g_c+I1), s	18.3	16.9	11.3	29.8	14.8	26.7	10.7	21.5
Green Ext Time (p_c), s	0.1	2.5	0.1	0.0	0.3	0.0	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	49.4
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Putney Drive & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	457	18	99	597	22	17	4	50	24	4	11
Future Volume (veh/h)	18	459	18	99	599	22	17	4	50	24	4	11
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		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	20	510	20	110	666	24	19	4	56	27	4	12
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	574	2165	85	659	2173	78	138	36	164	267	54	70
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	750	3469	136	870	3481	125	191	222	1005	777	329	428
Grp Volume(v), veh/h	20	260	270	110	338	352	79	0	0	43	0	0
Grp Sat Flow(s),veh/h/ln	750	1770	1835	870	1770	1837	1418	0	0	1534	0	0
Q Serve(g_s), s	0.5	2.7	2.7	2.7	3.7	3.7	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.3	2.7	2.7	5.4	3.7	3.7	2.0	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.07	1.00		0.07	0.24		0.71	0.63		0.28
Lane Grp Cap(c), veh/h	574	1104	1145	659	1104	1147	338	0	0	390	0	0
V/C Ratio(X)	0.03	0.24	0.24	0.17	0.31	0.31	0.23	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	574	1104	1145	659	1104	1147	1101	0	0	1184	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.6	3.5	3.5	4.7	3.7	3.7	15.5	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.5	0.0	0.1	0.1	0.1	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	1.5	1.5	0.6	1.8	1.9	0.8	0.0	0.0	0.4	0.0	0.0
LnGrp Delay(d),s/veh	4.8	4.0	3.9	4.7	3.7	3.7	15.6	0.0	0.0	15.1	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B			B		
Approach Vol, veh/h		550			800			79			43	
Approach Delay, s/veh		4.0			3.8			15.6			15.1	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		31.0		10.8		31.0		10.8
Change Period (Y+Rc), s		4.9		4.0		4.9		4.0
Max Green Setting (Gmax), s		26.1		30.0		26.1		30.0
Max Q Clear Time (g_c+I1), s		6.3		2.9		7.4		4.0
Green Ext Time (p_c), s		2.1		0.1		3.1		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	4.9
HCM 2010 LOS	A

HCM 2010 TWSC
3: West College Avenue & Navarro Street

03/27/2019

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	488	597	28	13	10
Future Vol, veh/h	7	502	619	28	13	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	-	-	-	-	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	8	540	666	30	14	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	696	0	-	0	967	348
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	286	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	896	-	-	-	252	648
Stage 1	-	-	-	-	464	-
Stage 2	-	-	-	-	737	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	896	-	-	-	249	648
Mov Cap-2 Maneuver	-	-	-	-	249	-
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	737	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	16.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	896	-	-	-	340
HCM Lane V/C Ratio	0.008	-	-	-	0.073
HCM Control Delay (s)	9.1	0.1	-	-	16.4
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 Signalized Intersection Summary
4: Stony Point Road/Marlow Road & West College Avenue

03/27/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	364	150	234	456	253	188	981	309	209	832	129
Future Volume (veh/h)	75	377	156	234	477	253	198	981	309	209	832	141
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		0.98	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	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	78	393	162	244	497	264	206	1022	322	218	867	147
Adj No. of Lanes	1	2	0	1	2	0	1	2	1	1	2	0
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	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	100	475	193	243	612	324	225	1016	664	301	995	169
Arrive On Green	0.06	0.19	0.19	0.14	0.28	0.28	0.13	0.29	0.29	0.17	0.33	0.33
Sat Flow, veh/h	1774	2444	993	1774	2226	1177	1774	3539	1559	1774	3021	512
Grp Volume(v), veh/h	78	283	272	244	395	366	206	1022	322	218	508	506
Grp Sat Flow(s),veh/h/ln	1774	1770	1668	1774	1770	1634	1774	1770	1559	1774	1770	1763
Q Serve(g_s), s	4.3	15.3	15.7	13.7	20.8	21.0	11.5	28.7	6.4	11.6	27.0	27.0
Cycle Q Clear(g_c), s	4.3	15.3	15.7	13.7	20.8	21.0	11.5	28.7	6.4	11.6	27.0	27.0
Prop In Lane	1.00		0.60	1.00		0.72	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	100	344	324	243	487	449	225	1016	664	301	583	581
V/C Ratio(X)	0.78	0.82	0.84	1.00	0.81	0.82	0.91	1.01	0.48	0.72	0.87	0.87
Avail Cap(c_a), veh/h	167	419	395	243	495	457	225	1016	664	301	583	581
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	1.00	0.38	0.38	0.38
Uniform Delay (d), s/veh	46.6	38.6	38.8	43.2	33.8	33.9	43.1	35.7	7.0	39.3	31.5	31.5
Incr Delay (d2), s/veh	12.2	10.5	12.6	58.7	9.7	10.8	37.4	29.7	2.5	3.3	7.0	7.0
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	2.5	8.5	8.4	10.6	11.5	10.8	8.0	18.2	3.2	6.0	14.3	14.2
LnGrp Delay(d),s/veh	58.7	49.1	51.3	101.9	43.5	44.7	80.6	65.4	9.5	42.6	38.5	38.6
LnGrp LOS	E	D	D	F	D	D	F	F	A	D	D	D
Approach Vol, veh/h		633			1005			1550			1232	
Approach Delay, s/veh		51.2			58.1			55.8			39.3	
Approach LOS		D			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	24.7	18.0	38.3	10.9	32.8	22.3	34.0
Change Period (Y+Rc), s	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Max Green Setting (Gmax), s	13.7	23.7	12.7	28.7	9.4	28.0	12.7	28.7
Max Q Clear Time (g_c+I1), s	15.7	17.7	13.5	29.0	6.3	23.0	13.6	30.7
Green Ext Time (p_c), s	0.0	1.8	0.0	0.0	0.0	2.2	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
5: Stony Point Road & Driveway/West Ninth Street

04/24/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	46	142	207	5	160	37	1104	228	141	1219	12
Future Volume (veh/h)	76	46	142	207	5	160	37	1114	228	141	1225	12
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		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	80	48	149	218	5	168	39	1173	240	148	1289	13
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	47	146	268	6	240	56	1459	634	150	1646	718
Arrive On Green	0.16	0.16	0.16	0.15	0.15	0.15	0.03	0.41	0.41	0.08	0.47	0.47
Sat Flow, veh/h	480	288	895	1736	40	1557	1774	3539	1537	1774	3539	1543
Grp Volume(v), veh/h	277	0	0	223	0	168	39	1173	240	148	1289	13
Grp Sat Flow(s),veh/h/ln	1664	0	0	1776	0	1557	1774	1770	1537	1774	1770	1543
Q Serve(g_s), s	17.9	0.0	0.0	13.4	0.0	11.3	2.4	32.1	12.0	9.2	33.7	0.5
Cycle Q Clear(g_c), s	17.9	0.0	0.0	13.4	0.0	11.3	2.4	32.1	12.0	9.2	33.7	0.5
Prop In Lane	0.29		0.54	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	271	0	0	274	0	240	56	1459	634	150	1646	718
V/C Ratio(X)	1.02	0.00	0.00	0.81	0.00	0.70	0.69	0.80	0.38	0.99	0.78	0.02
Avail Cap(c_a), veh/h	271	0	0	452	0	396	81	1459	634	150	1646	718
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.1	0.0	0.0	45.0	0.0	44.1	52.7	28.4	22.5	50.3	24.7	15.9
Incr Delay (d2), s/veh	60.8	0.0	0.0	5.8	0.0	3.7	14.3	4.8	1.7	69.3	3.8	0.0
Initial Q Delay(d3),s/veh	0.1	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	12.8	0.0	0.0	7.0	0.0	5.1	1.4	16.6	5.4	7.4	17.3	0.2
LnGrp Delay(d),s/veh	106.9	0.0	0.0	50.8	0.0	47.8	67.0	33.2	24.2	119.6	28.5	15.9
LnGrp LOS	F			D		D	E	C	C	F	C	B
Approach Vol, veh/h		277			391			1452			1450	
Approach Delay, s/veh		106.9			49.5			32.6			37.7	
Approach LOS		F			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.5	8.8	56.5		22.3	14.6	50.6
Change Period (Y+Rc), s		4.6	5.3	5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		17.9	5.0	38.6		28.0	9.3	34.3
Max Q Clear Time (g_c+I1), s		19.9	4.4	35.7		15.4	11.2	34.1
Green Ext Time (p_c), s		0.0	0.0	2.1		1.6	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	42.3
HCM 2010 LOS	D

Notes

Appendix C

Vehicle Miles Traveled Summary Sheet

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2150 West College Avenue Residential Development

W-Trans 8/3/2020

OPR Residential VMT Threshold

15.56 VMT/Capita Countywide Average - Sonoma County
13.23 City of Santa Rosa Threshold = 15% below Countywide Average

Base Unadjusted Project VMT

14.26 Base VMT/Capita from SCTA Model - Project in TAZ 471

168	Multifamily Units	2.34	Occupancy/Unit	393	Residents
5606	Base Unadjusted Project VMT (mi)			393	Residents ("capita")

VMT Adjustments and Potential Mitigation Measures

14.26 Base VMT/Capita from SCTA Model - Project in TAZ 471
13.23 City of Santa Rosa Threshold = 15% below Countywide Average
-7.2% Project VMT Reduction Required to meet OPR Threshold

A. Density Adjustment — *Source: CAPCOA*

168	Project Units including ADU	5.7	Project Acres	29.4	Project Density

-20.1% VMT Reduction (compared to ITE Single Family)
-2.86 Adjustment to Base Project VMT/Capita

B. Integrate Affordable Housing — *Source: California Housing Partnership*

59 units: 3 moderate income, 2 low income, 8 ADU (included in low income category for VMT purposes)
-3.6% VMT Reduction
-0.51 Adjustment to Base Project VMT/Capita

C. Pedestrian Network Improvements — *Source: San Jose VMT Evaluation Tool Methodology*

Install enhanced pedestrian crossing on West College Avenue at Navarro Street including rapid rectangular flashing beacon (RRFB)
-2.0% VMT Reduction
-0.29 Adjustment to Base Project VMT/Capita

Combined VMT Adjustments and Mitigation Measures (A through C)

-25.7% Combined Measures VMT Reduction (unadjusted)
-24.5% Adjusted for Dampening of Combined Measures (per CAPCOA)
-3.49 Adjustment to Base Project VMT/Capita

VMT Projections After Adjustments and Mitigation

14.26	Base VMT/Capita from SCTA Model	5606	Unadjusted Base Residential VMT (mi)
-3.49	Adjustment to Base Project VMT/Capita	-1372	VMT Reduction with Adjustments and Mitigation
10.77	Project VMT/Capita with Adjustments & Mitigation	4234	Project VMT (mi) with Adjustments and Mitigation
13.23	OPR Significance Threshold		
YES	Is threshold met with adjustments and mitigation?		

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Appendix D

Proposed Intersection and Roadway Improvements

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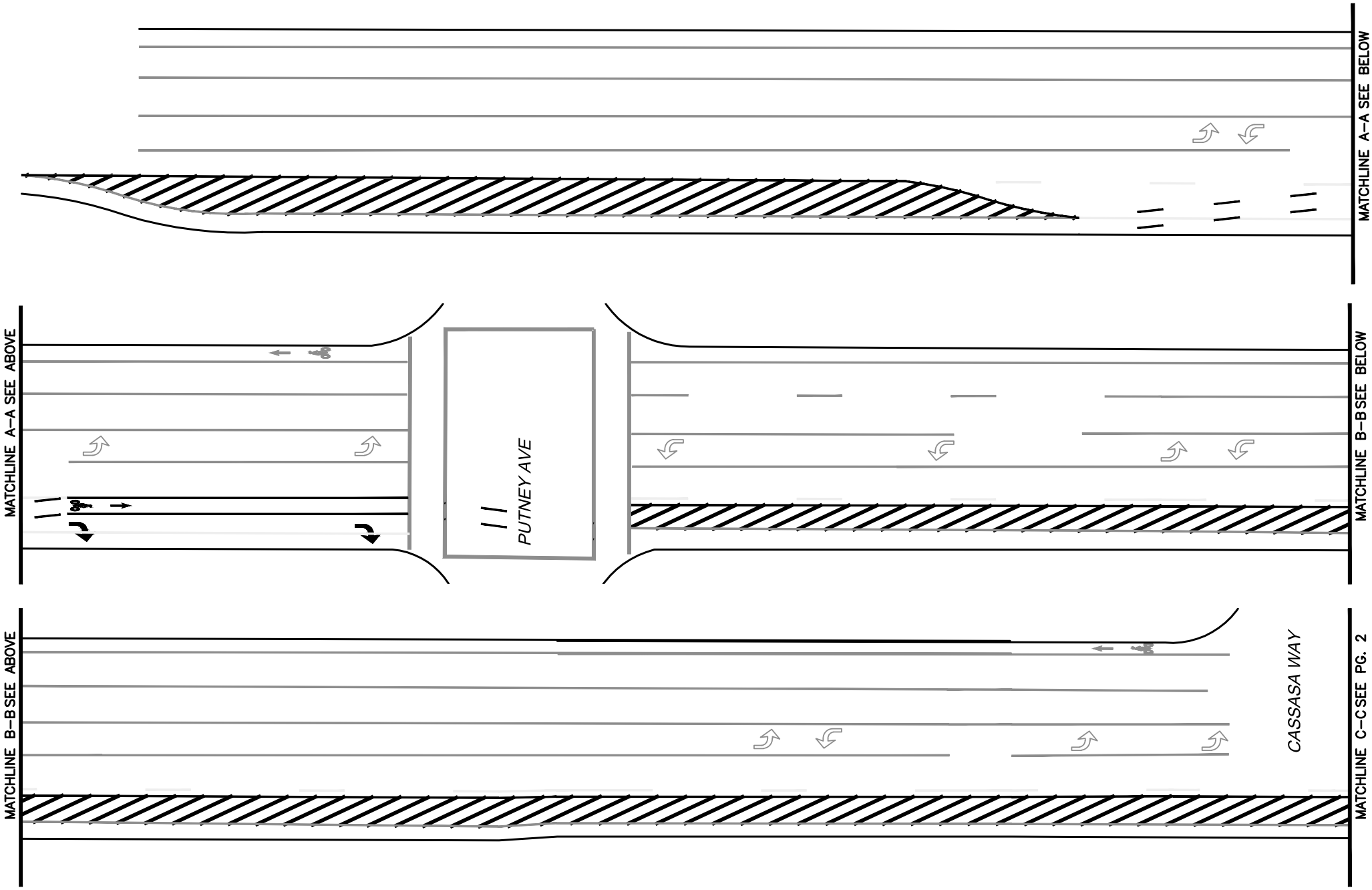
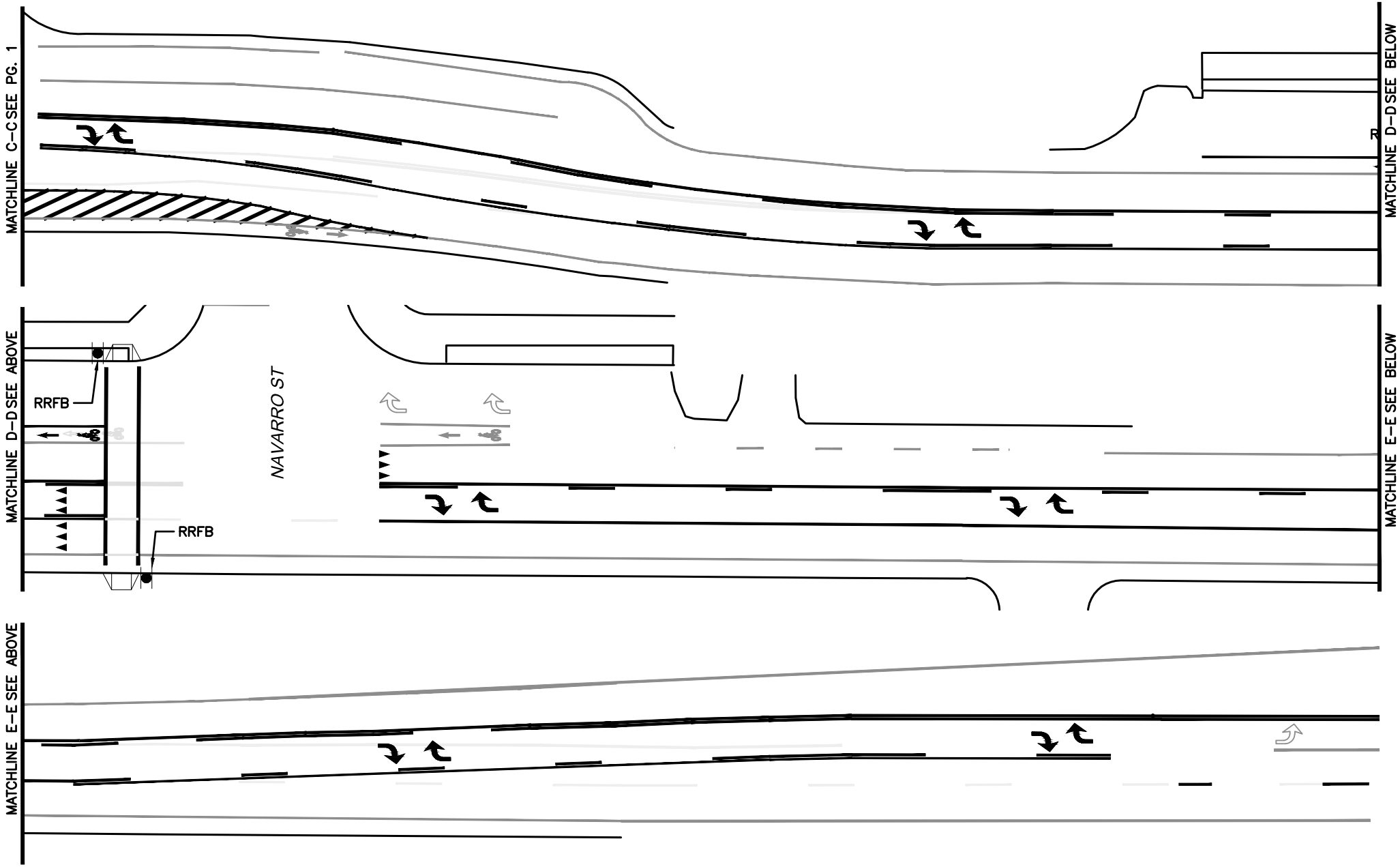


RRFB/STRIPING FIGURE

West College Avenue Apartemnts

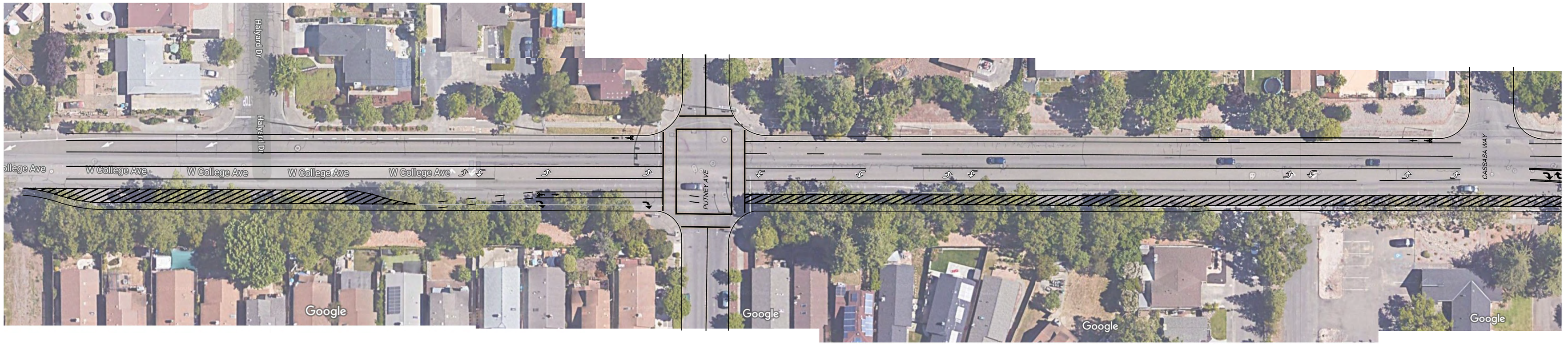
July 31, 2020



RRFB/STRIPING FIGURE

West College Avenue Apartemnts

July 31, 2020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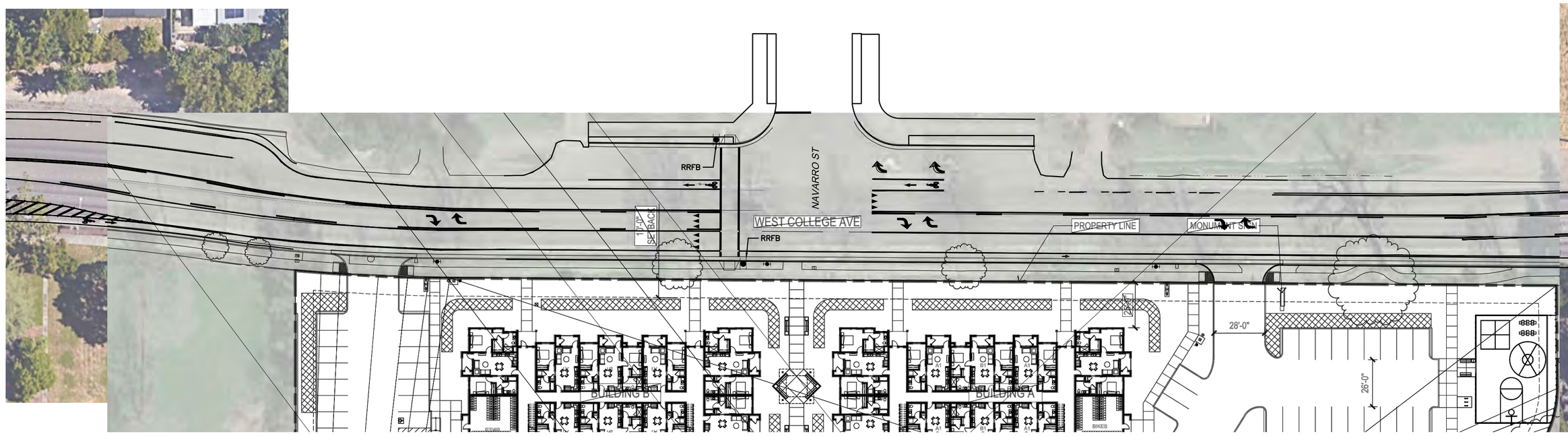
Halyard Dr
W College Ave
W College Ave
W College Ave
W College Ave
PUTNEY AVE
CASSASA WAY
Google
Google
Google
Google


RRFB
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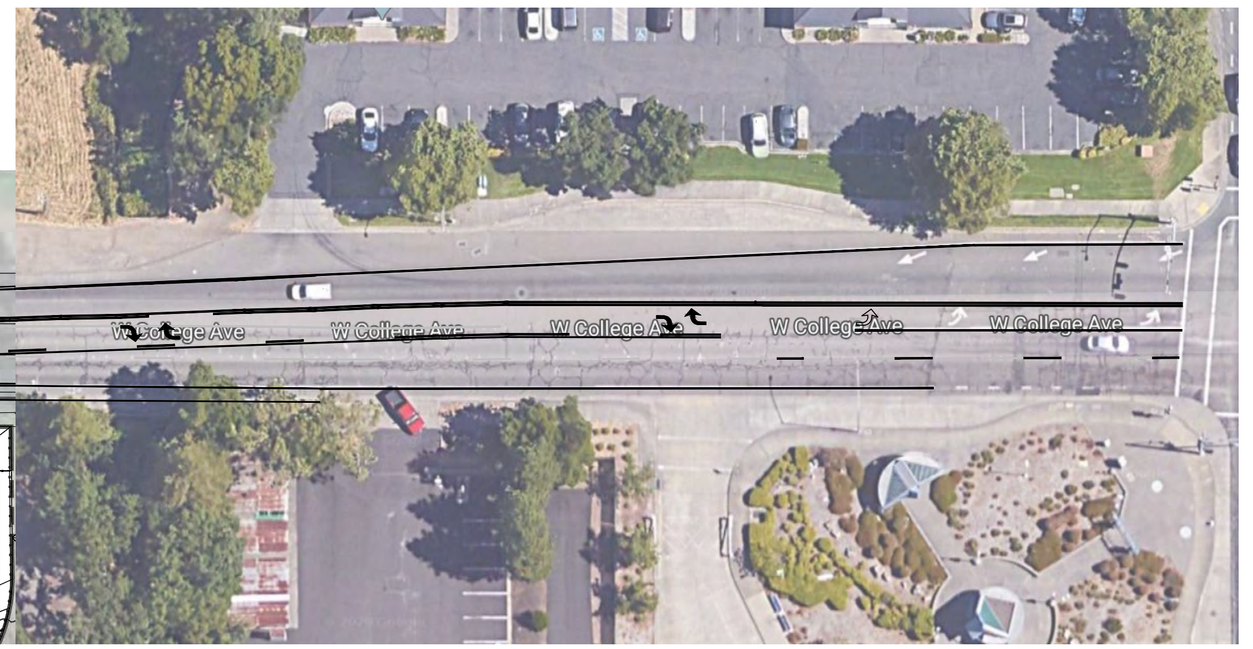
WEST COLLEGE AVE
RRFB
PROPERTY LINE
MONUMENT SIGN
28'-0"
26'-0"
BUILDING B
BUILDING A


W College Ave
W College Ave
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Appendix E

Left-Turn Lane Warrants

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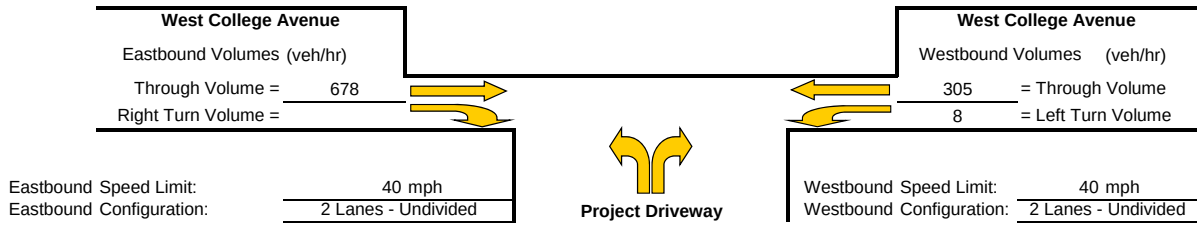
Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West College Avenue/Eastern Project Driveway
Study Scenario: AM Existing + Project

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



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

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

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	678
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

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

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

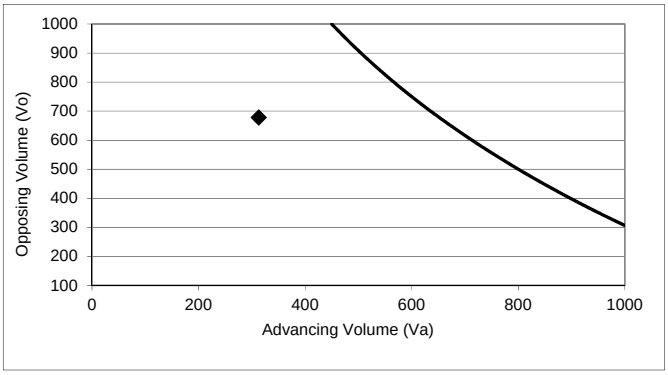
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	678
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	2.6 %
Advancing Volume Threshold	AV	652 veh/hr

If AV<Va then warrant is met



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

Left Turn Lane Warranted: **NO**

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

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West College Avenue/Eastern Project Driveway
Study Scenario: PM Existing + Project

Direction of Analysis Street: East/West

Cross Street Intersects: From the South

West College Avenue

Eastbound Volumes (veh/hr)

Through Volume = 700

Right Turn Volume = 1

Eastbound Speed Limit: 40 mph

Eastbound Configuration: 2 Lanes - Undivided

Project Driveway

West College Avenue

Westbound Volumes (veh/hr)

318 = Through Volume

23 = Left Turn Volume

Westbound Speed Limit: 40 mph

Westbound Configuration: 2 Lanes - Undivided

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1042.6
Advancing Volume	Va =	701
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

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

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

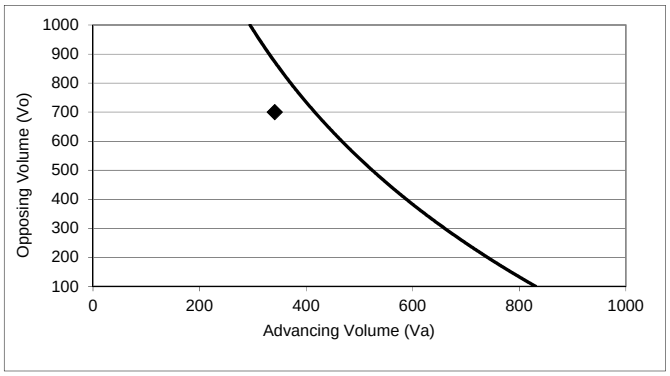
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	701
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	6.7 %
Advancing Volume Threshold	AV	416 veh/hr

If AV<Va then warrant is met



◆ Study Intersection

Two lane roadway warrant threshold for: 40 mph

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

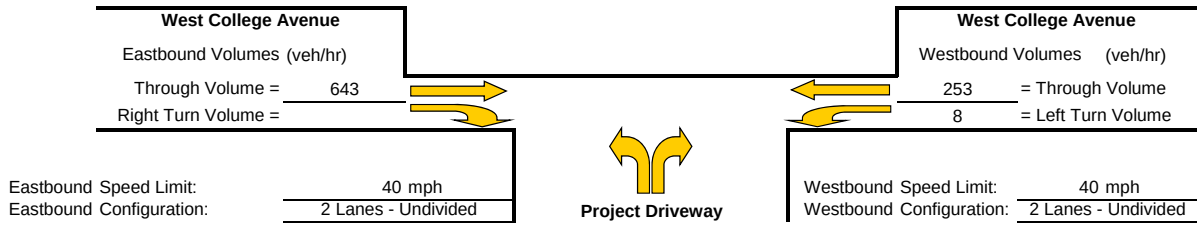
Left Turn Lane Warranted: **NO**

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

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West College Avenue/Western Project Driveway
Study Scenario: AM Existing + Project

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



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

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

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	643
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

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

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

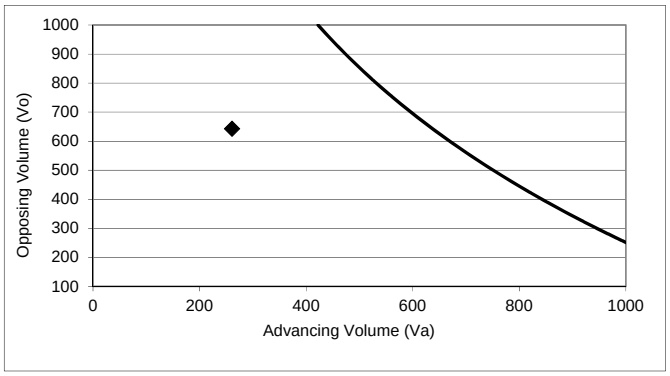
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	643
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	3.1 %
Advancing Volume Threshold	AV	637 veh/hr

If AV<Va then warrant is met



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

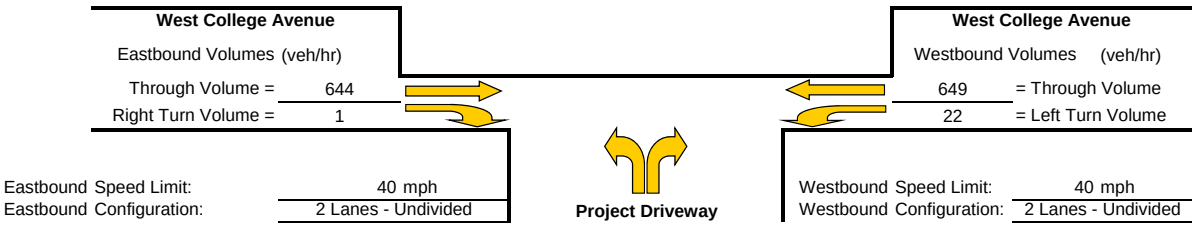
Left Turn Lane Warranted: **NO**

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

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: West College Avenue/Western Project Driveway
Study Scenario: PM Existing + Project

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



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

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

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1042.6
Advancing Volume	Va =	645
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

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

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

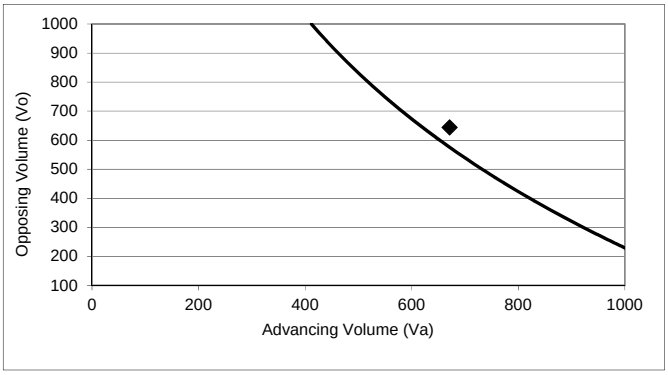
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	645
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	3.3 %
Advancing Volume Threshold	AV	620 veh/hr

If AV<Va then warrant is met



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

Left Turn Lane Warranted: **YES**

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

Appendix F

Traffic Signal Warrants

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Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 1

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	3	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: AM Existing

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: 0.16 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: 47 vph

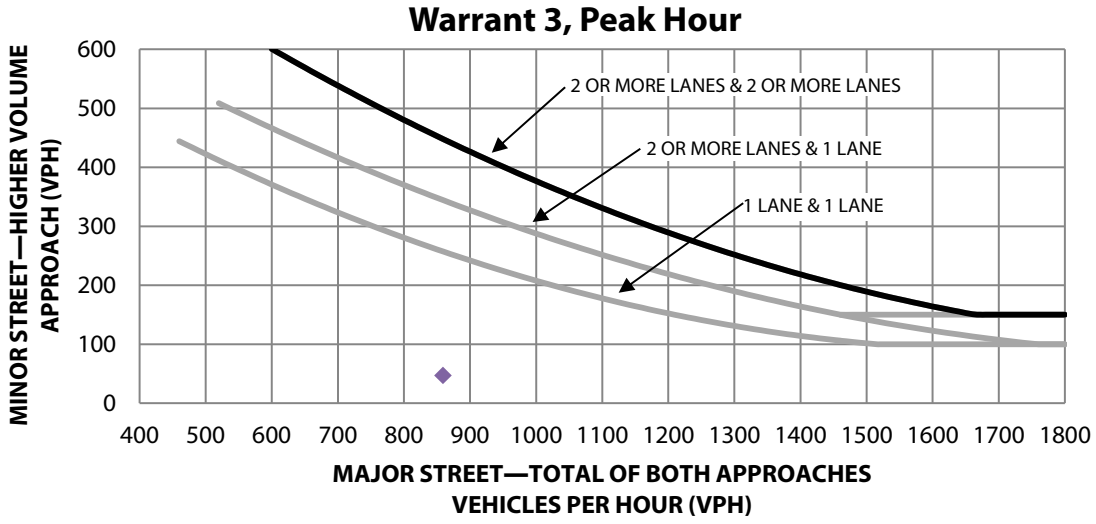
Condition A3 — Met

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: 906 vph

Condition B — Not Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 1

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	3	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: PM Existing

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: 0.11 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: 23 vph

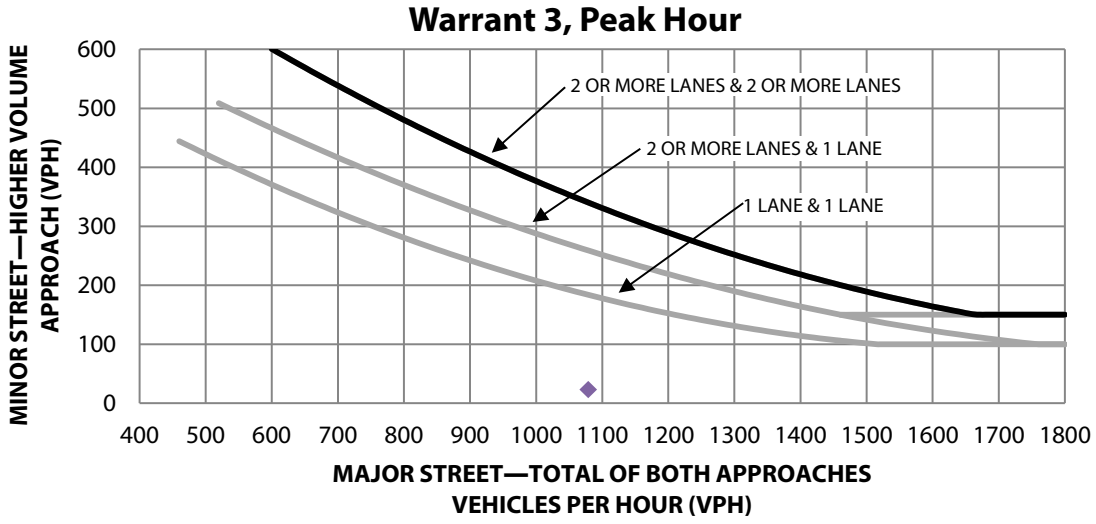
Condition A3 — Met

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: 1102 vph

Condition B — Not Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 1

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	3	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: AM Existing Plus 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: 0.17 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: 47 vph

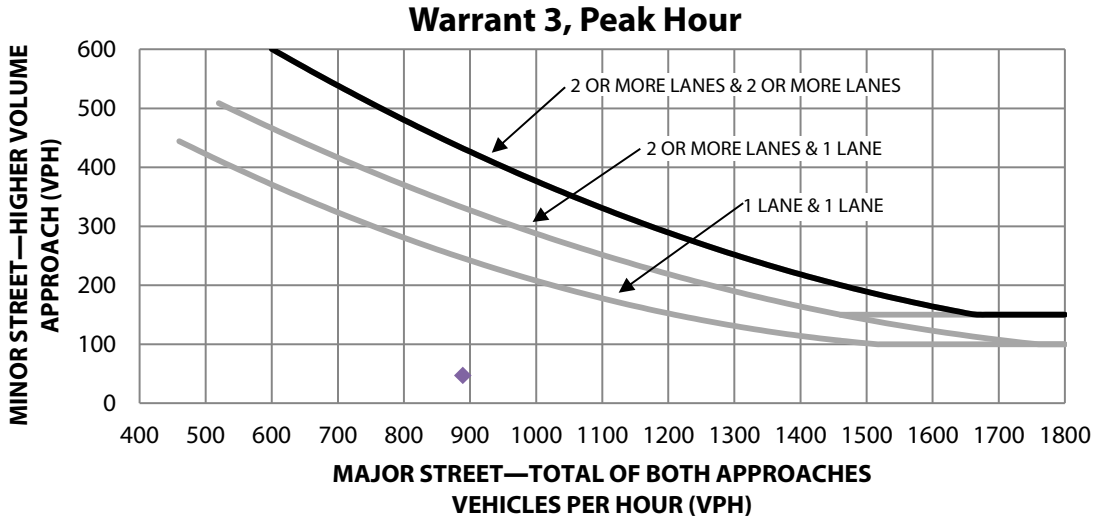
Condition A3 — Met

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: 936 vph

Condition B — Not Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 1

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	3	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: PM Existing Plus 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: 0.11 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: 23 vph

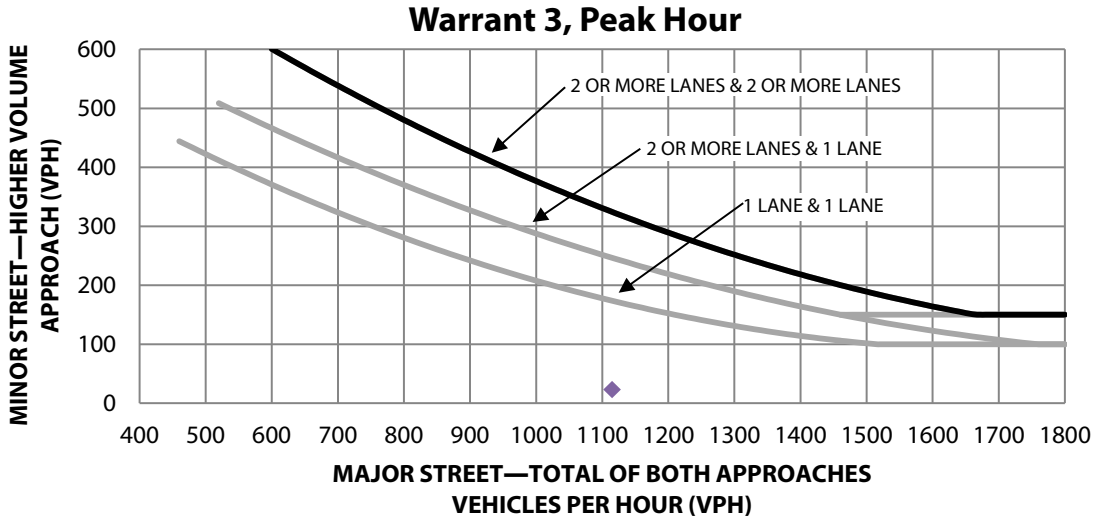
Condition A3 — Met

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: 1138 vph

Condition B — Not Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 1

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	4	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: AM Future

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: 0.17 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: 47 vph

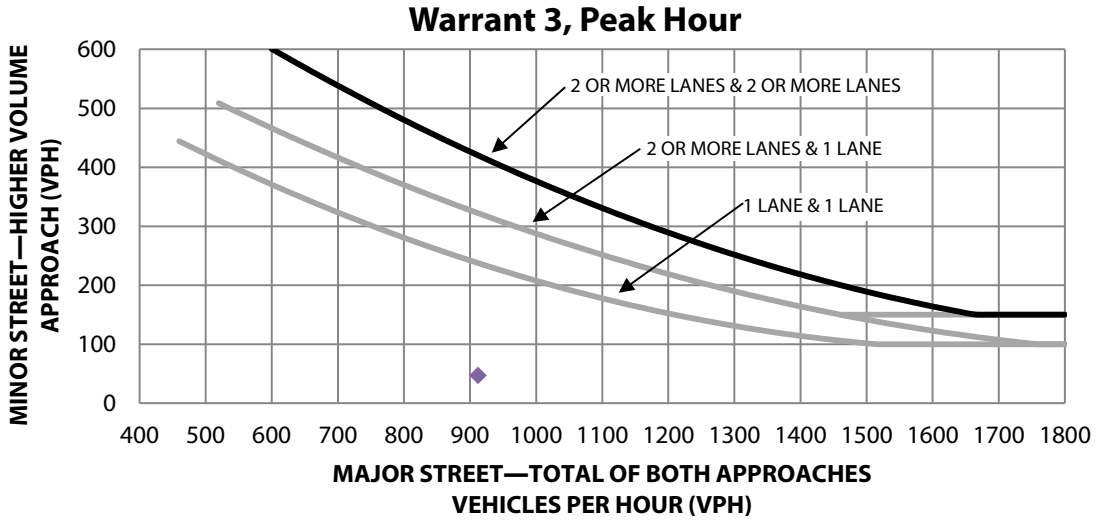
Condition A3 — Met

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: 959 vph

Condition B — Not Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 1

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	4	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: PM Future

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: 0.1 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: 23 vph

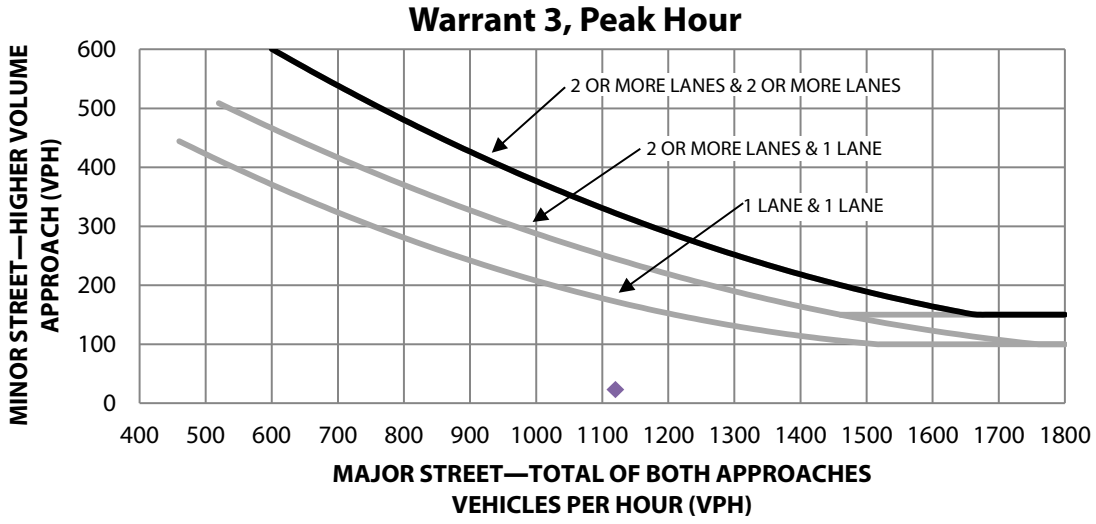
Condition A3 — Met

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: 1143 vph

Condition B — Not Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 3

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	4	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: AM Future Plus 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: 0.17 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: 47 vph

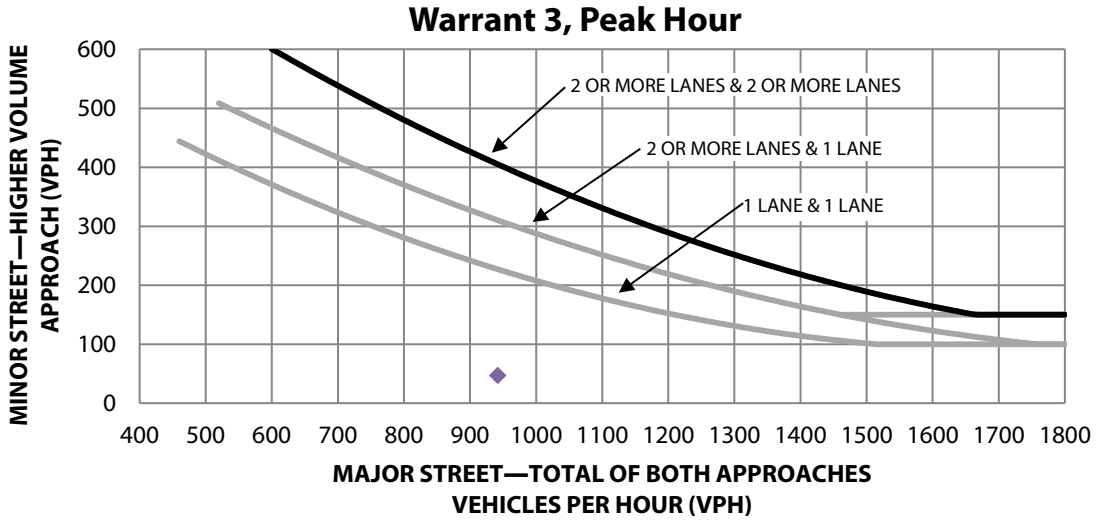
Condition A3 — Met

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: 989 vph

Condition B — Not Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

West College Avenue & Navarro Street
Santa Rosa

Project Name: West College Avenue Apartments

Intersection: 3

	Major Street	Minor Street
Street Name	West College Avenue	Navarro Street
Direction	E-W	N-S
Number of Lanes	4	2
Approach Speed	40	25

Population less than 10,000? No
Date of Count: Tuesday, March 12, 2019
Scenario: PM Future Plus 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: 0.1 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: 23 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: 1179 vph

Condition B — Not Met

The plotted point falls above the curve