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Kottinger Drive Senior Housing Project Traffic Impact Analysis

to the

City of Pleasanton

from

MidPen Housing Corporation

Updated Draft Report

February 13, 2014

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Executive Summary

The proposed Kottinger Drive Housing project would result in the development of 185 residential units for seniors on a site located at 240 Kottinger Drive (Kottinger Place) and 251 Kottinger Drive (Pleasanton Gardens) in the City of Pleasanton. The proposed project would demolish the 90 existing senior housing units and build 54 new units on the Pleasanton Gardens site and 131 units on the Kottinger Place site, for a net increase of 95 senior units. It was determined that this project was not included in the recently approved *Pleasanton Housing Element EIR*.

The project is anticipated to generate an average of 295 net new trips on a daily basis, of which 20 trips would occur during the morning peak hour and 24 trips during the evening peak hour. It should be noted that the trip generation analysis presented in this report is based on a previous concept plan that included a total of 189 new residential units. However, based on the most recent site plan dated January 2014, the project would provide 185 new residential units. Therefore, the trip generation and traffic operation analysis presented in this report is conservative based on the slightly higher unit count.

Currently the study intersection of 1st Street/Bernal Avenue-Sunol Boulevard operates unacceptably at LOS E during the p.m. peak hour and it would continue to do so under all study scenarios without and with the addition of project-generated traffic. However, according to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*. All the remaining study intersections would operate at acceptable levels of service under all study scenarios without and with the addition of project-generated traffic.

Vehicular access to the Kottinger Place project site would be provided via two new full access driveways: one on Vineyard Avenue and one on Kottinger Drive. Vehicular access to the Pleasanton Gardens project site would be maintained through an existing driveway located on the south side of Kottinger Drive. To maintain clear sight lines, it is recommended that on-street parking be prohibited for 50 feet on either side of the proposed driveway on Vineyard Avenue. Additionally, periodic maintenance, including trimming of the vegetation on both sides of the project driveways on Kottinger Drive and Vineyard Avenue, should be undertaken.

The proposed project would provide 149 parking spaces which is expected to be adequate to satisfy the projected parking demand of 0.8 parking spaces per dwelling unit, which is the same as the current site.

Pedestrian and bicycle access to the site is expected to be adequate. Separate pedestrian entrances on Kottinger Drive would be provided to connect the Pleasanton Gardens and Kottinger Place sites and avoid pedestrian access through the parking lot. Existing transit route and bus stops adjacent to the project site on Vineyard Avenue and 1st Street together with the relocated bus stop on Kottinger Drive along the project frontage would adequately serve the project-generated transit trips.

Introduction

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with the development of 185 residential units for seniors located at 240 Kottinger Drive and 251 Kottinger Drive in the City of Pleasanton. The traffic study was completed in accordance with the criteria established by the City of Pleasanton, and is consistent with standard traffic engineering techniques.

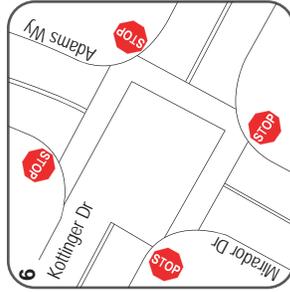
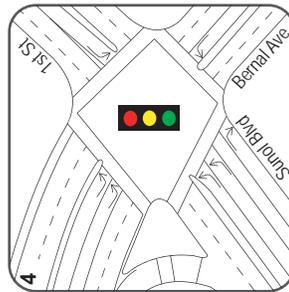
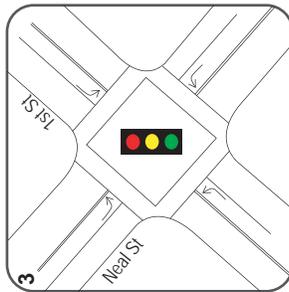
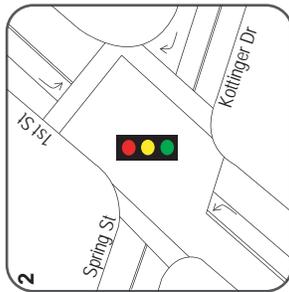
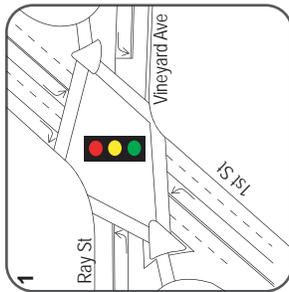
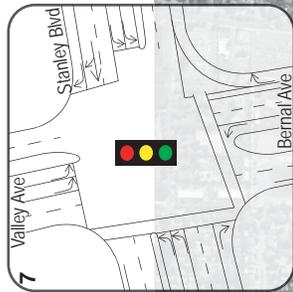
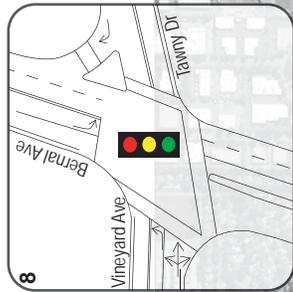
Prelude

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

Project Profile

The project as proposed includes the development of 185 residential units for seniors on sites that are located at 240 Kottinger Drive (Kottinger Place) and 251 Kottinger Drive (Pleasanton Gardens) in the City of Pleasanton, as shown in Figure 1. Currently, the two project sites are occupied by 90 residential units (50 on the Kottinger Place site and 40 on the Pleasanton Gardens site) for seniors. The proposed project would demolish the existing units and build 54 new units on the Pleasanton Gardens site and 131 units on the Kottinger Place site, for a net increase of 95 senior residential units. As part of the proposed project, the Regalia House site located at 4133 Regalia Court and a vacant parcel located at 4138 Vineyard Avenue would be incorporated into the new plan for Kottinger Place. The Kottinger Place project site would be accessed via two new full access driveways: one on Vineyard Avenue and one on Kottinger Drive, while access to the Pleasanton Gardens project site would be maintained through an existing driveway on Kottinger Drive.

LEGEND
● Study Intersection



Not to Scale
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Kottinger Drive Senior Housing Project Traffic Impact Analysis

Transportation Setting

Operational Analysis

Study Area and Periods

The study area includes the immediate site vicinity and local roadways, as well as the following eight intersections:

1. 1st Street/Vineyard Avenue-Ray Street
2. 1st Street/Kottinger Drive-Spring Street
3. 1st Street/Neal Street
4. 1st Street/Bernal Avenue
5. Vineyard Avenue/Adams Way
6. Kottinger Drive/Adams Way-Mirador Drive
7. Stanley Boulevard/Bernal Avenue-Valley Avenue
8. Bernal Avenue/Vineyard Avenue-Tawny Drive

Operating conditions during typical weekday 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.

At the direction of City staff, traffic volume data presented in the recently approved *Pleasanton Housing Element Transportation Analysis* (Fehr & Peers, 2011), were incorporated into this analysis. Existing traffic volume data were not available for the study intersections of Kottinger Drive/Adams Way and Vineyard Avenue/Adams Way; therefore, new a.m. (7:00-9:00) and p.m. (4:00-6:00) peak hour turning movement counts were conducted in April 2013.

Study Intersections

1st Street/Ray Street-Vineyard Avenue is a four-way, signalized intersection with protected left-turn phasing on the northbound and southbound 1st Street approaches and split, or exclusive, phasing on the eastbound Ray Street approach and westbound Vineyard Street approach. Marked crosswalks are provided across all legs of the intersection, along with pedestrian signals and push buttons.

1st Street/Kottinger Drive-Spring Street is a signalized four-legged intersection with permissive left-turn phasing on all approaches. Marked crosswalks and pedestrian signal heads with push buttons are provided across all legs of the intersection except the southern leg.

1st Street/Neal Street is a four-legged, signalized intersection with permissive left-turn phasing on all approaches. Marked crosswalks and pedestrian crossing signal equipment are provided across all legs of the intersection.

1st Street/Bernal Avenue is a four-legged signalized intersection with protected left-turn phasing on all approaches. Marked crosswalks and pedestrian crossing signal equipment are provided across all legs of the intersection.

Vineyard Avenue/Adams Way is an unsignalized tee-intersection with the eastbound and westbound Vineyard Street approaches being free and the northbound Adams Way approach being stop controlled. Marked crosswalks are provided across all legs of the intersection.

Kottinger Drive/Adams Way-Mirador Drive is a four-way, all-way stop-controlled intersection. Marked crosswalks are provided across all legs of the intersection except the western leg.

Stanley Boulevard/Bernal Avenue-Valley Avenue is a four-legged, signalized intersection with protected left-turn phasing on all approaches. Marked crosswalks and pedestrian crossing signal equipment are provided across the southern and western legs.

Bernal Avenue/Vineyard Avenue-Tawny Drive is a four-legged, signalized intersection with protected left-turn phasing on the northbound and southbound Bernal Avenue approaches and exclusive left-turn phasing on the eastbound and westbound Kottinger Drive-Tawny Drive approaches. Marked crosswalks with pedestrian signal heads and push buttons are provided across all legs of the intersection except the southern leg.

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

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide access for pedestrians in the vicinity of the proposed project site. Marked crosswalks and pedestrian signal phasing are provided at all signalized intersections. Additionally, a mid-block crosswalk exists on Kottinger Drive near the project vicinity providing pedestrian connectivity between the Pleasanton Gardens and Kottinger Place sites.

Bicycle Facilities

The *Highway Design Manual*, California Department of Transportation (Caltrans), 2012, classifies bikeways into three categories:

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

Within the project vicinity, Class II bike lanes exist on Vineyard Avenue, First Street north of Vineyard Avenue, and Bernal Avenue south of Stanley Boulevard.

Transit Facilities

Transit service in Pleasanton is provided by three agencies: The Livermore Amador Valley Transit Authority provides fixed route bus service, and the Bay Area Rapid Transit District (BART) and the

Altamont Commuter Express (ACE) both operate commuter rail service. Following is a summary of the transit lines that currently service the project site.

Wheels Bus

The Livermore Amador Valley Transit Authority provides fixed route bus service under the name “Wheels” in the City of Pleasanton as well as the neighboring Cities of Dublin, Livermore, and unincorporated portions of Alameda County.

Wheels Bus Route 8 provides weekday and weekend (Saturday) service along Kottinger Drive and Vineyard Avenue between the East Dublin/Pleasanton BART Station and Downtown Pleasanton connecting Hopyard Road, Civic Center, Senior Center, Fairgrounds and Vintage Hills. During weekdays, service is provided between 6:00 a.m. and 7:00 p.m. with about 60-minute headways. On Saturdays, service is provided between 6:00 a.m. and 9:00 p.m. with approximately 60 to 120 minute headways. Bus stops are provided in both the eastbound and westbound directions along the Kottinger Place site frontage. The eastbound direction bus stop is on the south side of Vineyard Avenue just east of Regalia Court. The westbound direction bus stop is on the north side of Kottinger Drive approximately 190 feet east of 2nd Street.

Wheels Bus Route 10 provides weekday and weekend service along 1st Street between the East/Dublin Pleasanton Station to the west and Livermore Transit Center and beyond to the east. On weekday evenings and weekends, this route continues east to the Stoneridge Mall. Service is generally provided between 4:30 a.m. and 12:30 a.m. with approximately 30 to 40 minute headways. Bus stops are provided in both the northbound and southbound directions on 1st Street near the project vicinity. The northbound direction bus stop is located on the east side of 1st Street just north of Kottinger Drive. The southbound direction bus stop is located on the west side of 1st Street approximately 200 feet north of Kottinger Drive.

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

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. The City of Pleasanton Dial-a-ride is designed to serve the needs of individuals with disabilities within Pleasanton which is supplemented by the Livermore Amador Valley Transit Authority in the greater Livermore-Amador Valley region.

BART

The Bay Area Rapid Transit District (BART) provides heavy-rail rapid transit service within Alameda, Contra Costa, San Francisco and San Mateo Counties. The East Dublin/Pleasanton station, located along I-580 between Hopyard Road-Dougherty Road and Hacienda Drive, is the easternmost station along that segment of the BART system and is approximately four miles northwest of the proposed project site. Additionally the West Dublin Pleasanton station, located near the Stoneridge Mall, serves the City. One line provides service to the two Dublin/Pleasanton stations with the line terminating in Daly City. Passengers can transfer to other BART lines that terminate at Richmond, Pittsburg/Bay Point, Fremont, Millbrae and the San Francisco International Airport. Wheels Bus Route 8 provides service between the project site and the East Dublin/Pleasanton BART Station.

ACE

The Altamont Commuter Express (ACE) is an intra-city rail transit service that provides commuter service between Stockton and San Jose with ten stations. Four westbound trains are provided in the morning and four eastbound trains are provided in the evening. The ACE station in Pleasanton is located at Pleasanton Avenue north of Bernal Avenue. Wheels Bus Route 8 does not provide direct service between the project site and the Pleasanton ACE station.

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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, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle. The use of these methodologies is consistent with the recently completed City of Pleasanton Housing Element traffic analysis.

The Levels of Service for the study intersection of Vineyard Avenue/Adams Way, which has side-street stop controls, were analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall age delay for the intersection.

The study intersection of Kottinger Drive/Adams Way has stop signs on all approaches, and was analyzed using the "All-Way Stop-Controlled" Intersection methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average vehicle delay is computed for the intersection as a whole, and is then related to a Level of Service.

All of the remaining study 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 or not the signals are coordinated, truck traffic, and pedestrian activity. Average stopped delay per vehicle (in seconds) is used as the basis for evaluation in this LOS methodology.

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

**Table I
Intersection Level of Service Criteria**

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

Reference: *Highway Capacity Manual*, Transportation Research Board, 2000

Traffic Operation Standards

The City of Pleasanton has adopted an LOS standard of D or better for intersection operations per the General Plan (adopted July 2009). However, there are a few exceptions to the LOS D standard in the Downtown area and at the City of Pleasanton gateway intersections. These intersections may have a level of service below the LOS D standard if no reasonable mitigation exists or if the necessary mitigation is contrary to other goals and policies of the City. Traffic impacts at the study intersections would be considered significant if the Project would result in any of the following:

Signalized Intersections

- Deterioration of a signalized intersection from LOS D (or better) to LOS E or LOS F
- The project adds ten or more trips to a signalized intersection projected to operate at LOS E prior to the addition of project traffic

Unsignalized Intersections

- Deterioration of a controlled movement at an unsignalized intersection from LOS E or better to LOS F, or at intersections where a controlled movement already operates at LOS F, one of the following:

- Project traffic results in satisfaction of the peak hour volume traffic signal warrant;
- Project traffic increases minor movement delay by more than 30 seconds; or
- Where the peak hour volume signal warrant is met without Project traffic and delay cannot be measured, Project increases traffic by 10 or more vehicles per lane on the controlled approach.

Traffic Model

The City of Pleasanton's traffic model is maintained by City Staff and uses Synchro analysis software. The model was provided by City staff to use for this analysis. This citywide model was last updated for the City's Housing Element update and is consistent with the buildout of the City's General Plan. The proposed project was not included in the environmental analysis for the City's Housing Element update. Level of service was evaluated at the study intersections for the following scenarios:

- *Existing conditions* – traffic volume data were obtained directly from the model for the existing conditions without project scenario.
- *Existing plus Project conditions* – project traffic volumes were added to the existing conditions traffic volumes to represent existing plus project conditions.
- *Existing plus Approved Projects conditions* – short-term future traffic volume data was directly obtained from the City's model.
- *Existing plus Approved Projects plus Project conditions* – project traffic volumes were added to the short-term conditions traffic volumes to represent existing plus approved project plus project conditions.
- *Cumulative conditions* – Cumulative conditions traffic volumes were obtained directly from City's model.
- *Cumulative plus Project conditions* – project traffic volumes were added to the cumulative conditions traffic volumes to represent cumulative plus project conditions.

Recent traffic volume data for the intersections of Kottinger Drive/Adams Way and Vineyard Avenue/Adams Way were not available. Therefore, traffic volumes for these intersections under short-term and cumulative scenarios were developed based on balancing traffic volumes with adjacent intersections.

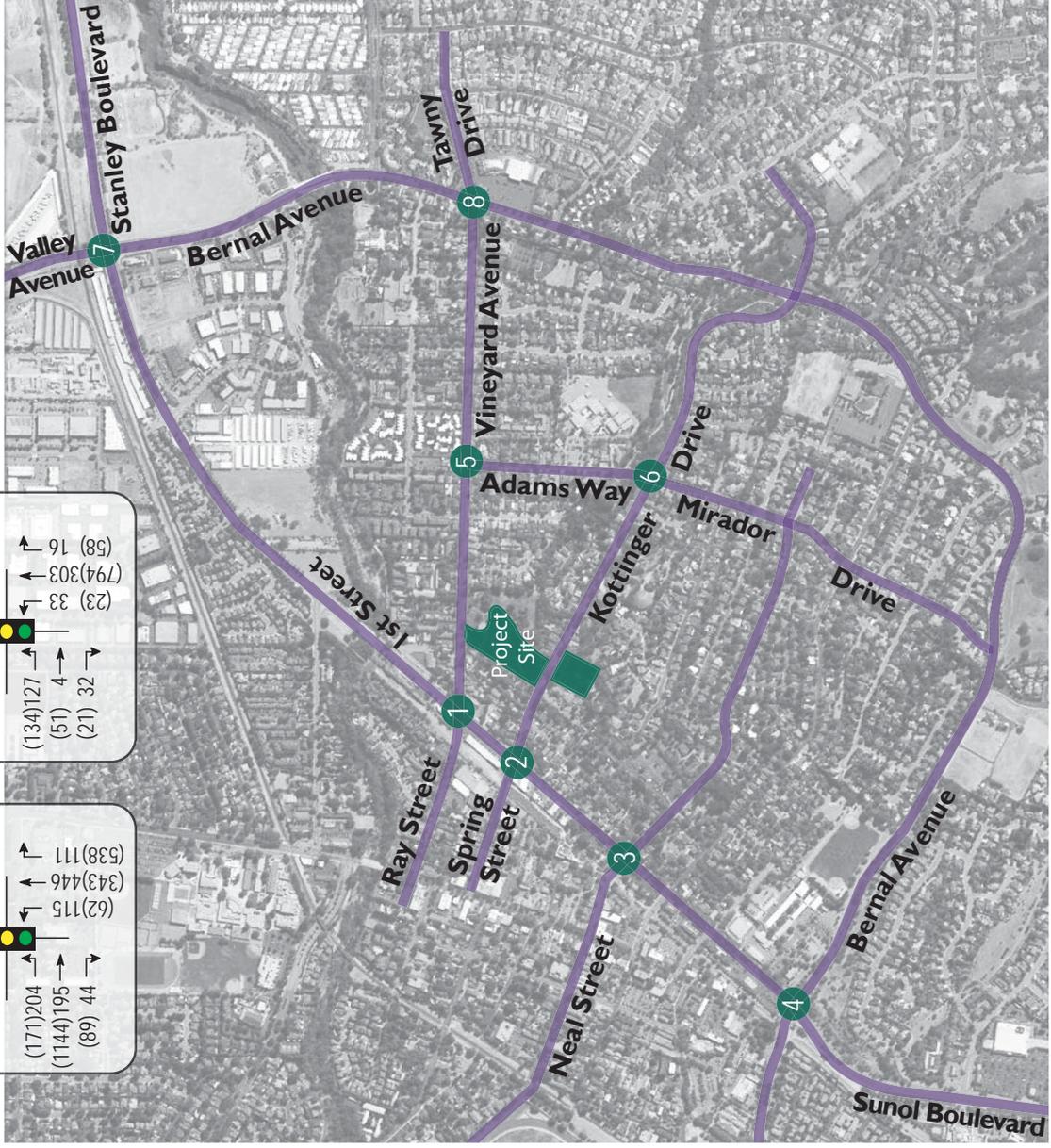
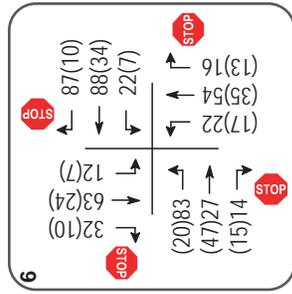
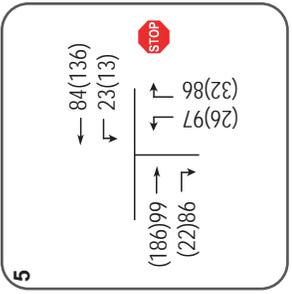
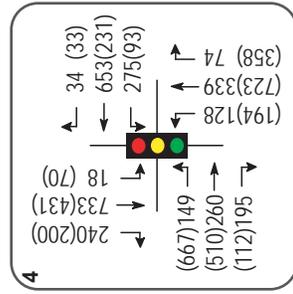
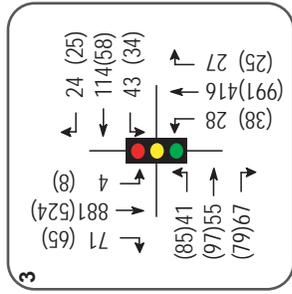
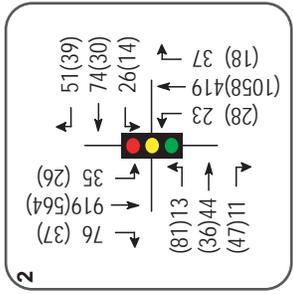
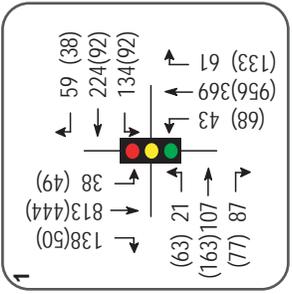
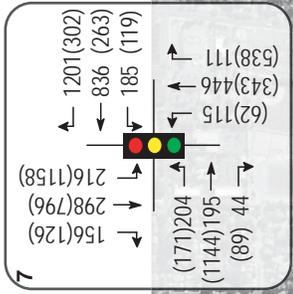
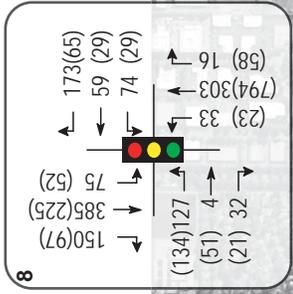
Existing Conditions

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.

Under existing conditions, all study intersections operate acceptably at LOS D or better except for the intersection of First Street/Bernal Avenue-Sunol Boulevard, which currently operates at LOS E during the p.m. peak hour. According to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard. The existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 2, and copies of the Level of Service calculations are provided in Appendix A.



LEGEND
 ● Study Intersection
 xx A.M. Peak Hour Volume
 (xx) P.M. Peak Hour Volume



Not to Scale
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Kottinger Drive Senior Housing Project Traffic Impact Analysis

City of Pleasanton

Figure 2

Existing Traffic Volumes

Table 2
Existing Peak Hour Intersection Levels of Service

Study Intersection <i>Approach</i>	Existing Conditions			
	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. 1 st St/Vineyard Ave-Ray St	20.5	C	28.5	C
2. 1 st St/Kottinger Dr-Spring St	18.3	B	21.1	C
3. 1 st St/Neal St	14.8	B	19.8	B
4. 1 st St/Bernal Ave-Sunol Blvd*	33.8	C	65.9	E
5. Vineyard Ave/Adams Way <i>Northbound (Adams Ave) approach</i>	6.6 <i>16.1</i>	A C	1.8 <i>11.2</i>	A B
6. Kottinger Dr/Adams Way-Mirador Dr	11.2	B	7.7	A
7. Stanley Blvd/Bernal Ave-Valley Ave	52.2	D	47.4	D
8. Bernal Ave/Vineyard Ave-Tawny Dr	17.4	B	10.7	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; *According to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard.

Traffic Impact Fee Program

The City of Pleasanton has established a Traffic Impact Fee (TIF) program to fund future enhancements to the transportation network based on anticipated needs. As part of the City's program, there are plans to modify the following two intersections:

Stanley Boulevard/Bernal Avenue-Valley Avenue

The westbound Stanley Boulevard approach is to be converted to two left-turn lanes, two through lanes and a free right-turn lane. Additionally, the eastbound approach would be modified to provide two left-turn lanes, two through lanes and a shared through/right-turn lane. These improvements were included for the analysis of Existing plus Approved Projects and Cumulative Conditions scenarios.

1st Street/Bernal Avenue-Sunol Boulevard

The westbound Bernal Avenue approach is to be converted to two left-turn lanes, one through lane and a shared through/right-turn lane. Per the City's direction, this improvement was included for the analysis of only the Cumulative Conditions scenario.

Project Description

The project as proposed includes the development of 185 residential units for seniors located at 240 Kottinger Drive (Kottinger Place) and 251 Kottinger Drive (Pleasanton Gardens). Currently, the two project sites include 90 senior housing units (50 on the Kottinger Place site and 40 on the Pleasanton Gardens site) for seniors. The proposed project would demolish the existing units and build 54 new units on the Pleasanton Gardens site and 131 units on the Kottinger Place site, for a net increase of 95

senior units. As part of the proposed project, the Regalia House site located at 4133 Regalia Court and a vacant parcel located at 4138 Vineyard Avenue would be incorporated into the new plan for Kottinger Place. The Kottinger Place project site would be accessed via two new driveways: one on Vineyard Avenue and one on Kottinger Drive, while access to the Pleasanton Gardens project site would be maintained through the existing driveway on Kottinger Drive. The proposed site plan is shown in Figure 3A and 3B.

Trip Generation

The anticipated trip generation for the proposed project was estimated using the fitted curve equations for Senior Adult Housing-Attached (ITE Trip Generation Land Use #252) published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 9th Edition, 2012. Because the site is currently occupied by 90 housing units for seniors, the trip generation of the existing use was also considered.

The expected trip generation potential for the proposed project is indicated in Table 3, with deductions taken for existing trips at the site. The proposed project is expected to result in a net increase of 295 daily trips, including 20 a.m. peak hour trips and 24 p.m. peak hour trips.

**Table 3
Trip Generation Summary**

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Proposed											
Senior Housing-Attached	189* du	3.0	584	0.20	38	13	25	0.25	47	25	22
Existing											
Senior Housing-Attached	-90 du	-3.0	-289	-0.20	-18	-6	-12	-0.26	-23	-13	-10
Total Net-New Trips			295		20	7	13		24	12	12

Note: du = dwelling unit; * = the trip generation for the proposed project was based on a previous concept plan that included 189 new residential units. However, the new site plan has proposed 185 residential units. The trip generation analysis and traffic operations analysis in this report are conservative based on the slightly higher unit count

Trip Distribution

The trip distribution patterns used to allocate new project trips to the street network were determined by reviewing existing turning movements at the study intersections, location of the project site access points and traffic distribution patterns applied in a recently completed traffic study for 3150 Bernal Avenue. The applied distribution assumptions are shown in Table 4 and the resulting net new project traffic volumes are shown in Figure 4.

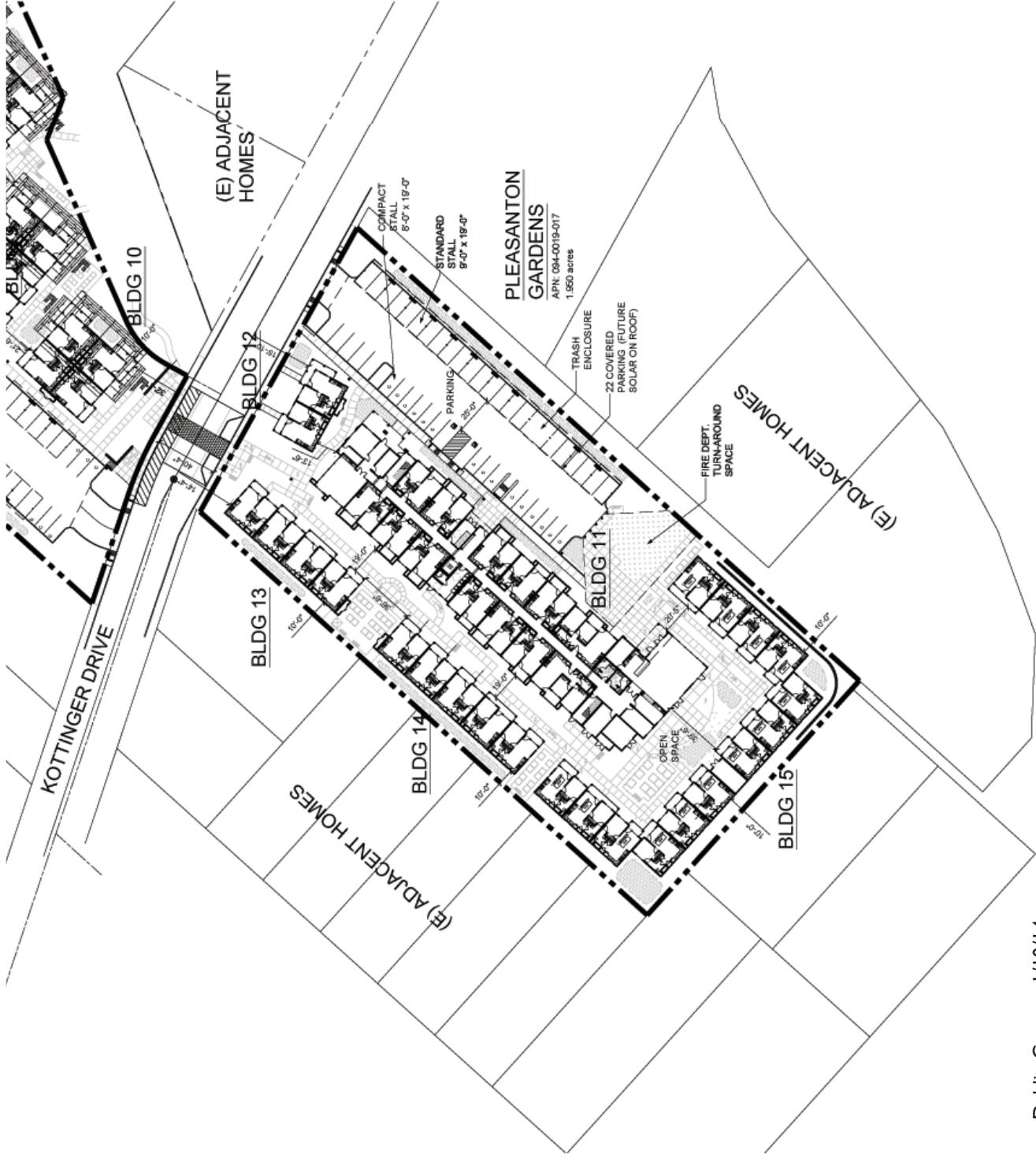


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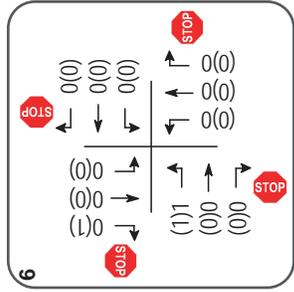
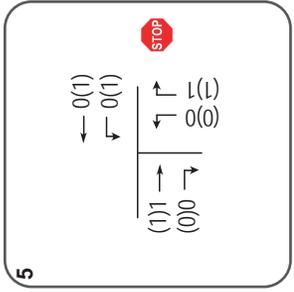
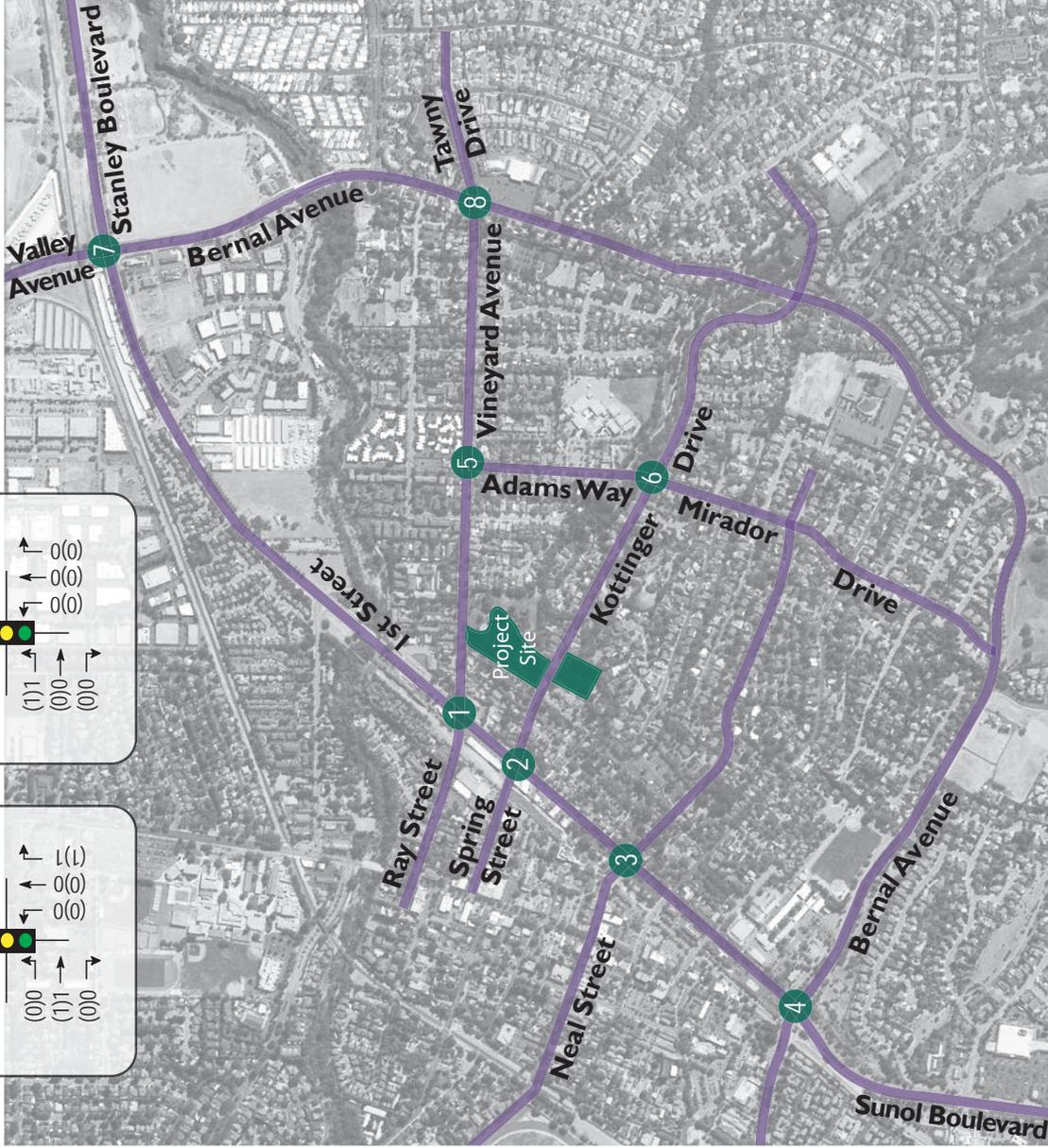
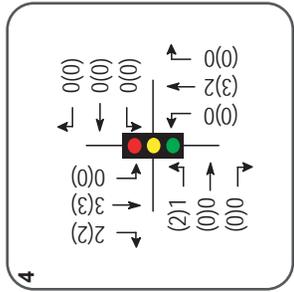
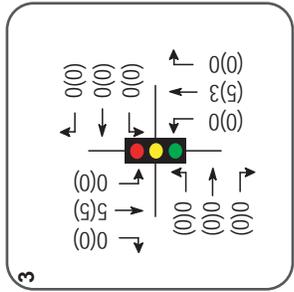
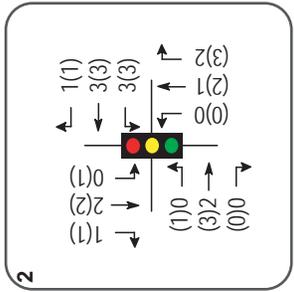
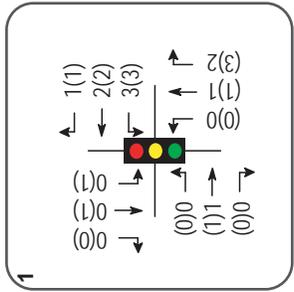
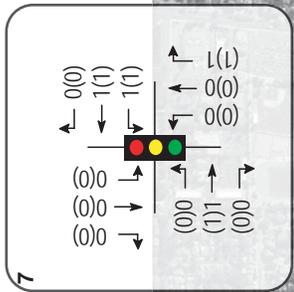
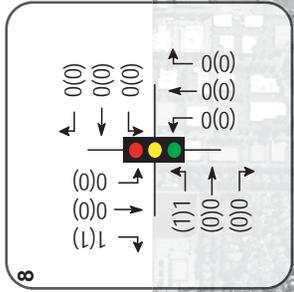
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Kottinger Drive Senior Housing Project Traffic Impact Analysis
City of Pleasanton

Figure 3A
Site Plan - Kottinger Place



LEGEND
 ● Study Intersection
 xx A.M. Peak Hour Volume
 (xx) P.M. Peak Hour Volume



Not to Scale
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Kottinger Drive Senior Housing Project Traffic Impact Analysis

Figure 4

**Table 4
Trip Distribution Assumptions**

Route	Percent
Santa Rita Rd north of Vineyard Ave	30%
Hopyard Rd west of 1 st St	10%
Sunol Blvd south of Bernal Ave	25%
Bernal Ave west of 1 st St	15%
Stanley Blvd east of Bernal Ave	20%
TOTAL	100%

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, all of the study intersections but one are expected to operate acceptably at LOS D or better during both the a.m. and p.m. peak hours. The intersection of 1st Street/Bernal Avenue-Sunol Boulevard would continue to operate at an unacceptable LOS E during the p.m. peak hour. A summary of the intersection level of service analysis is provided in Table 5 and copies of the Level of Service calculations are provided in Appendix A.

**Table 5
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. 1 st St/Vineyard Ave-Ray St	20.5	C	28.5	C	20.6	C	28.7	C
2. 1 st St/Kottinger Dr-Spring St	18.3	B	21.1	C	18.9	B	21.7	C
3. 1 st St/Neal St	14.8	B	19.8	B	14.8	B	19.9	B
4. 1 st St/Bernal Ave-Sunol Blvd*	33.8	C	65.9	E	33.9	C	66.6	E
5. Vineyard Ave/Adams Way	6.6	A	1.8	A	6.7	A	1.9	A
<i>Northbound Adams Ave</i>	<i>16.1</i>	<i>C</i>	<i>11.2</i>	<i>B</i>	<i>16.2</i>	<i>C</i>	<i>11.2</i>	<i>B</i>
6. Kottinger Dr/Adams Way-Mirador Dr	11.2	B	7.7	A	11.2	B	7.7	A
7. Stanley Blvd/Bernal Ave-Valley Ave	52.2	D	47.4	D	52.3	D	47.4	D
8. Bernal Ave/Vineyard Ave-Tawny Dr	17.4	B	10.7	B	17.5	B	10.7	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; *According to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard

The intersection of 1st Street/Bernal Avenue-Sunol Boulevard currently operates at an unacceptable LOS E during the p.m. peak hour. With the addition of the proposed project, the intersection would continue to operate at an unacceptable LOS E. However, according to the *City of Pleasanton General Plan*, Downtown intersections such as 1st Street/Bernal Avenue-Sunol Boulevard are exempt from the

LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*.

Finding: The study intersections are expected to continue operating at an acceptable level of service with the addition of project-generated traffic except for the intersection of 1st Street/Bernal Avenue-Sunol Boulevard which would continue to operate at an unacceptable LOS E. However, according to the *City of Pleasanton General Plan*, Downtown intersections such as 1st Street/Bernal Avenue-Sunol Boulevard are exempt from the LOS D standard.

Existing plus Approved Projects Conditions

Existing plus Approved Projects operating conditions were determined with traffic that would be generated by all approved and pending projects, added to existing traffic volumes, including the City's Housing Element, as contained in the City's Synchro traffic model. It should be noted that the planned TIF improvements at the intersection of Stanley Boulevard/Bernal Avenue-Valley Avenue were included in this analysis. Under these conditions, all of the study intersections are expected to operate at an acceptable LOS D or better, except for the intersection of 1st Street/Bernal Avenue-Sunol Boulevard, which would operate at an unacceptable LOS E during the p.m. peak hour. These results are summarized in Table 6, and Existing plus Approved Projects volumes are shown in Figure 5.

Table 6
Existing plus Approved Projects Peak Hour Intersection Levels of Service

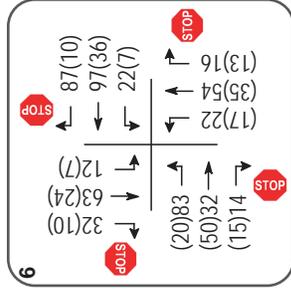
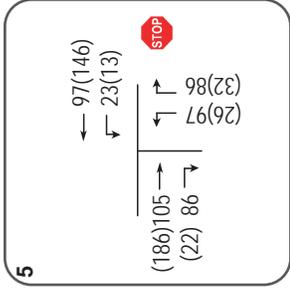
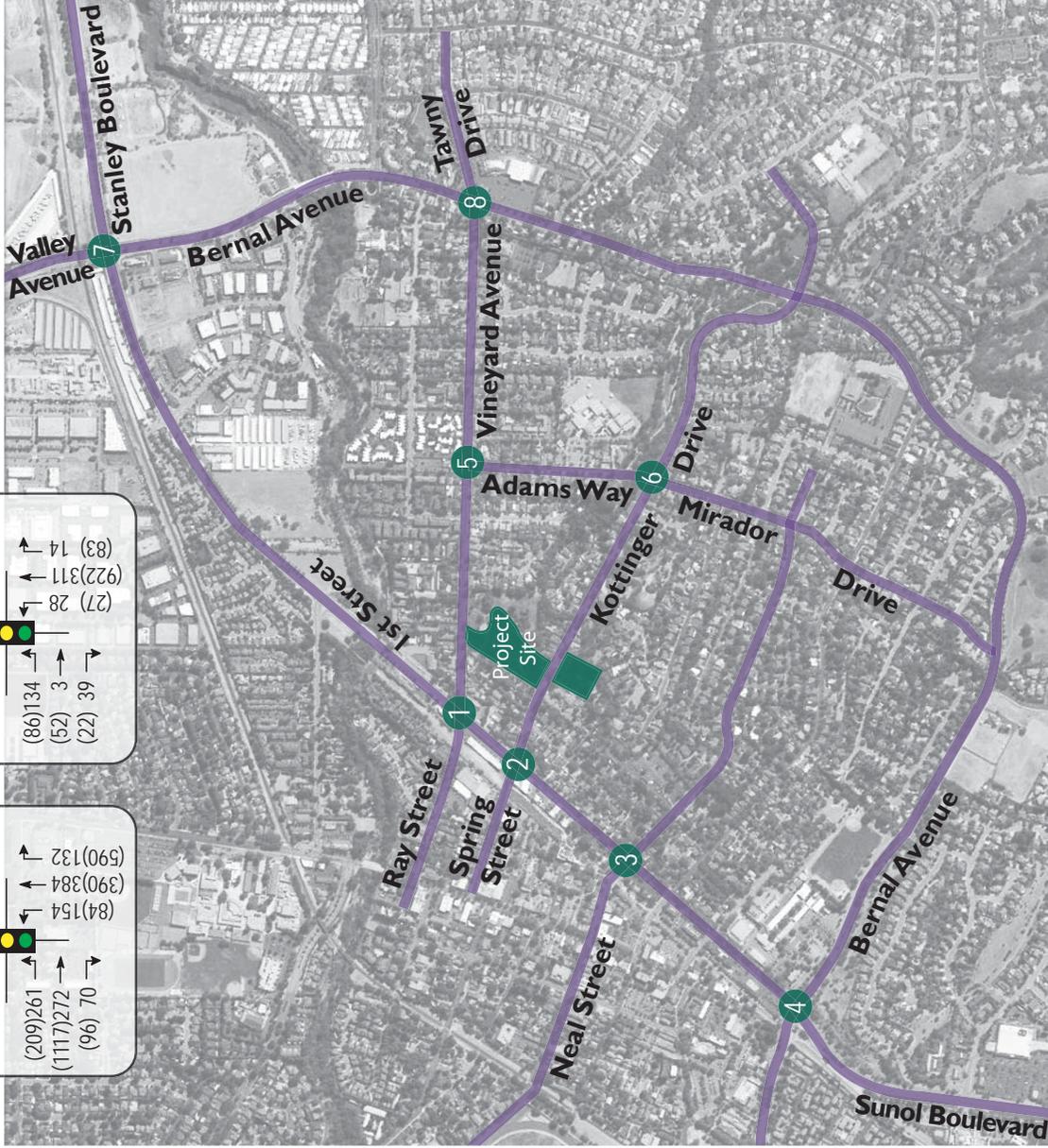
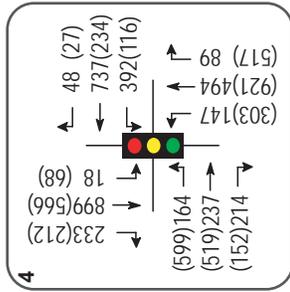
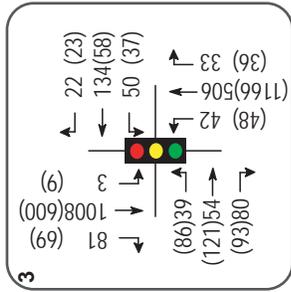
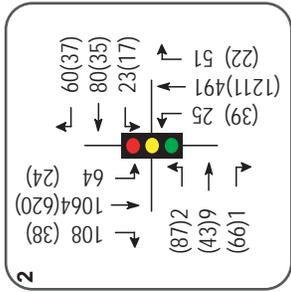
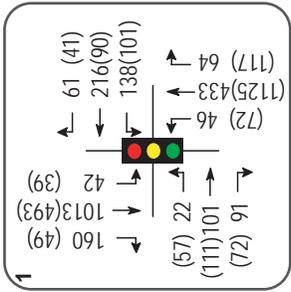
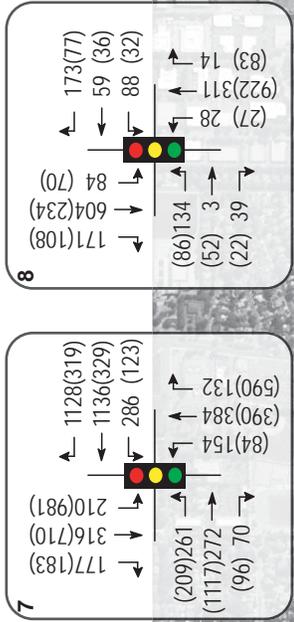
Study Intersection Approach	Existing Plus Approved Conditions			
	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. 1 st St/Vineyard Ave-Ray St	20.6	C	26.9	C
2. 1 st St/Kottinger Dr-Spring St	34.0	C	34.1	C
3. 1 st St/Neal St	17.5	B	34.2	C
4. 1 st St/Bernal Ave-Sunol Blvd*	47.4	D	79.6	E
5. Vineyard Ave/Adams Way	6.6	A	1.8	A
<i>Northbound Adams Ave</i>	<i>16.7</i>	<i>C</i>	<i>11.2</i>	<i>B</i>
6. Kottinger Dr/Adams Way-Mirador Dr	11.5	B	7.8	A
7. Stanley Blvd/Bernal Ave-Valley Ave	27.0	C	29.4	C
8. Bernal Ave/Vineyard Ave-Tawny Dr	25.3	C	10.8	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; *According to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard; **Shaded cells** = conditions with planned TIF improvements

Existing plus Approved Projects plus Project Conditions

Upon the addition of project-related traffic added to Existing plus Approved Projects volumes, and the planned TIF improvements, all of the study intersections are anticipated to operate at an acceptable LOS

LEGEND
 ● Study Intersection
 xx A.M. Peak Hour Volume
 (xx) P.M. Peak Hour Volume



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Kottinger Drive Senior Housing Project Traffic Impact Analysis
 Existing plus Approved Projects Traffic Volumes
 City of Pleasanton
 Figure 5

D or better, except for the intersection of 1st Street/Bernal Avenue-Sunol Boulevard, which would deteriorate from LOS E to LOS F during the p.m. peak hour. However, according to the *City of Pleasanton General Plan*, Downtown intersections such as 1st Street/Bernal Avenue-Sunol Boulevard are exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*. A summary of the intersection level of service analysis is provided in Table 7 and copies of the level of service calculations are provided in Appendix A.

Table 7
Existing plus Approved Projects plus Project Peak Hour Intersection Levels of Service

Study Intersection Approach	Without Project				With Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. 1 st St/Vineyard Ave-Ray St	20.6	C	26.9	C	20.7	C	27.1	C
2. 1 st St/Kottinger Dr-Spring St	34.0	C	34.1	C	35.2	D	36.0	D
3. 1 st St/Neal St	17.5	B	34.2	C	17.5	B	34.8	C
4. 1 st St/Bernal Ave-Sunol Blvd*	47.4	D	79.6	E	47.9	D	80.4	F
5. Vineyard Ave/Adams Way	6.6	A	1.8	A	6.7	A	1.8	A
<i>Northbound Adams Ave</i>	<i>16.7</i>	<i>C</i>	<i>11.2</i>	<i>B</i>	<i>16.8</i>	<i>C</i>	<i>11.2</i>	<i>B</i>
6. Kottinger Dr/Adams Way-Mirador Dr	11.5	B	7.8	A	11.5	B	7.8	A
7. Stanley Blvd/Bernal Ave-Valley Ave	27.0	C	29.4	C	27.0	C	29.4	C
8. Bernal Ave/Vineyard Ave-Tawny Dr	25.3	C	10.8	B	25.4	C	10.9	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; *According to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard; Shaded cells = conditions with planned TIF improvements

Finding: With the addition of project-generated traffic, the study intersections are expected to continue operating at an acceptable level of service except for the intersection of 1st Street/Bernal Avenue-Sunol Boulevard which would deteriorate from LOS E to LOS F. However, according to the *City of Pleasanton General Plan*, Downtown intersections such as 1st Street/Bernal Avenue-Sunol Boulevard are exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*.

Cumulative Conditions

Cumulative peak hour volume projections were taken from the build-out analysis contained in the *Pleasanton Housing Element Transportation Analysis*. This scenario represents cumulative traffic conditions that would be expected upon build out of the land uses identified in the *General Plan*, including the updated Housing Element. It should be noted that the planned TIF improvements at the intersections of 1st Street/Bernal Avenue-Sunol Boulevard and Stanley Boulevard/Bernal Avenue-Valley Avenue were included in this analysis.

Under the anticipated Future volumes and considering the planned TIF improvements at the intersections of 1st Street/Bernal Avenue-Sunol Boulevard and Stanley Boulevard/Bernal Avenue-Valley Avenue, all of the study intersections but one are expected to operate at an acceptable LOS D or better. The intersection of 1st Street/Bernal Avenue-Sunol Boulevard is expected to operate at an unacceptable LOS E during the p.m. peak hour even after the implementation of the planned improvements. However, according to the *City of Pleasanton General Plan*, Downtown intersections such as 1st Street/Bernal Avenue-Sunol Boulevard are exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*. Cumulative buildout volumes are shown in Figure 6 and operating conditions are summarized in Table 8.

Table 8
Cumulative Peak Hour Intersection Levels of Service

Study Intersection <i>Approach</i>	Cumulative Conditions			
	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. 1 st St/Vineyard Ave-Ray St	19.5	B	25.2	C
2. 1 st St/Kottinger Dr-Spring St	48.7	D	22.1	C
3. 1 st St/Neal St	19.2	B	39.5	D
4. 1 st St/Bernal Ave-Sunol Blvd*	36.1	D	76.6	E
5. Vineyard Ave/Adams Way	7.9	A	2.0	A
<i>Northbound Adams Ave</i>	<i>20.5</i>	<i>C</i>	<i>11.4</i>	<i>B</i>
6. Kottinger Dr/Adams Way-Mirador Dr	12.6	B	8.0	A
7. Stanley Blvd/Bernal Ave-Valley Ave	31.2	C	32.4	C
8. Bernal Ave/Vineyard Ave-Tawny Dr	35.8	D	12.3	B

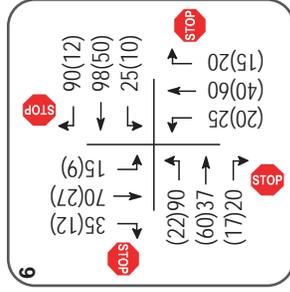
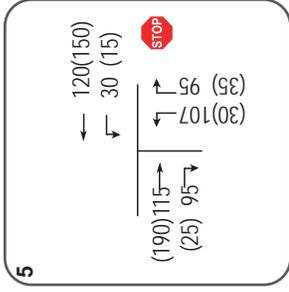
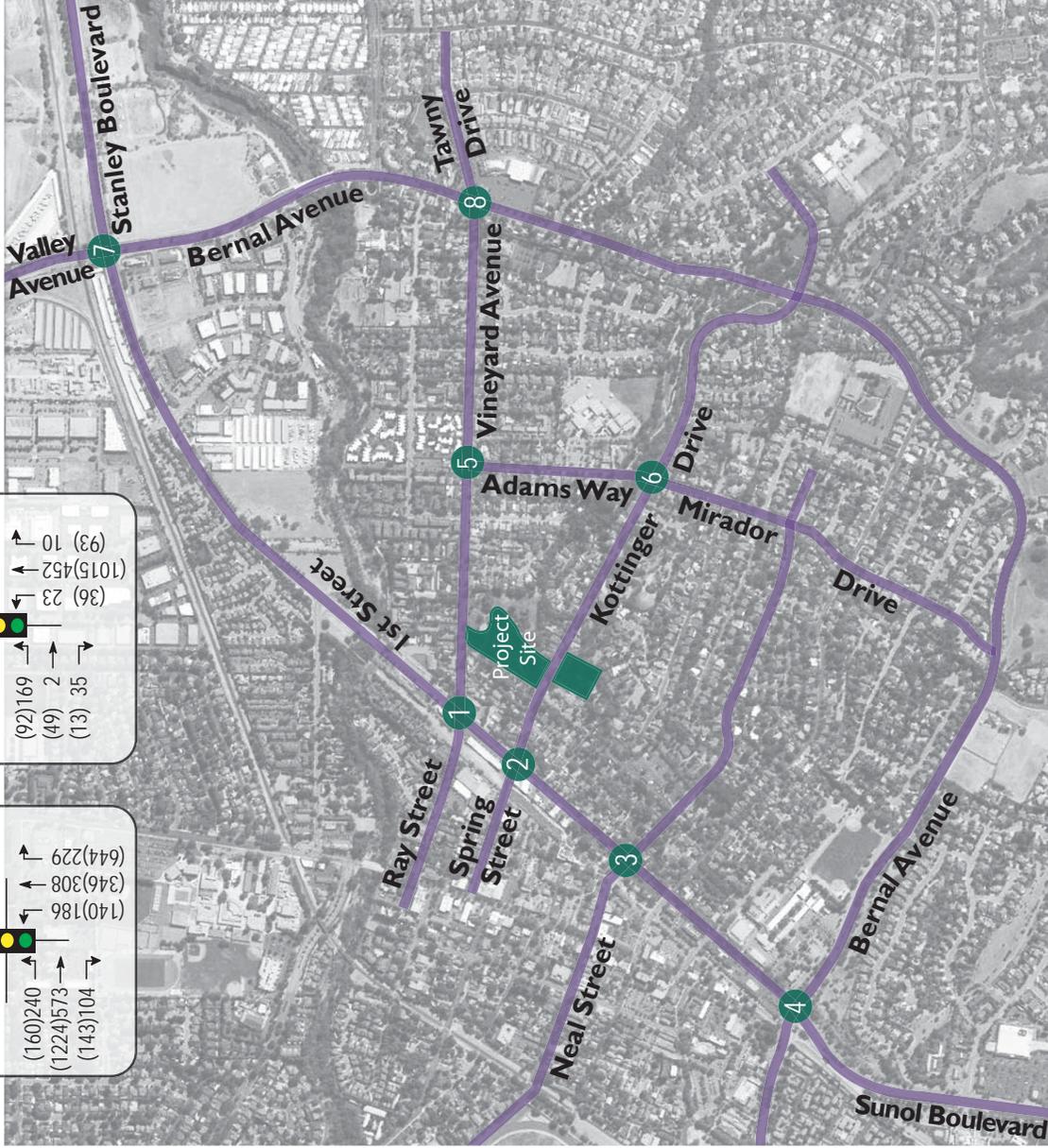
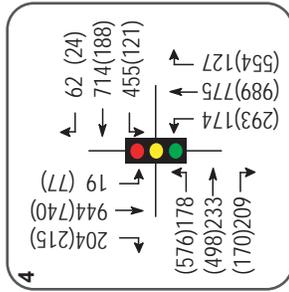
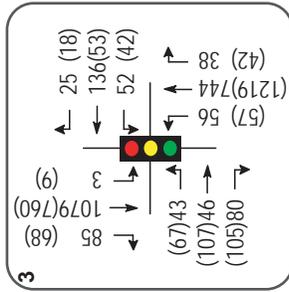
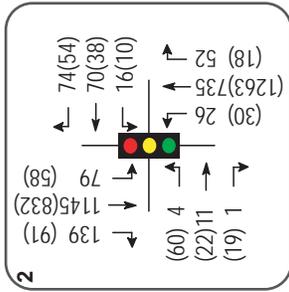
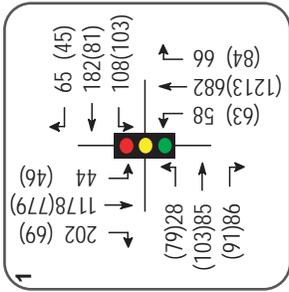
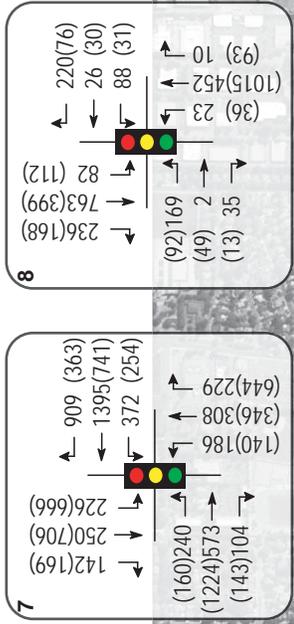
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; *According to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard; Shaded cells = conditions with TIF planned improvements

It was noted that some intersections are expected to operate better under Cumulative conditions than they would under the Existing plus Approved Projects Conditions. This is attributed to the fact that the City is anticipating regional improvements that would increase capacity elsewhere, resulting in a shift in traffic patterns.

Cumulative plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Cumulative volumes, the 1st Street Street/Bernal Avenue-Sunol Boulevard intersection is expected to continue operating at an unacceptable LOS E during the p.m. peak hour. As discussed previously, this intersection is exempt from the LOS D standard unless the City determines that improvements are necessary to maintain a LOS D standard. All of the remaining intersections would continue to operate at an acceptable LOS D or better with the addition of project generated traffic. A summary of the intersection level of service analysis is provided in Table 9 and copies of the level of service calculations are provided in Appendix A.

LEGEND
 ● Study Intersection
 xx A.M. Peak Hour Volume
 (xx) P.M. Peak Hour Volume



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Kottinger Drive Senior Housing Project Traffic Impact Analysis

Figure 6

Table 9
Cumulative and Cumulative plus Project Peak Hour Intersection Levels of Service

Study Intersection <i>Approach</i>	Cumulative				Cumulative plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. 1 st St/Vineyard Ave-Ray St	19.5	B	25.2	C	19.6	B	25.3	C
2. 1 st St/Kottinger Dr-Spring St	48.7	D	22.1	C	49.8	D	23.5	C
3. 1 st St/Neal St	19.2	B	39.5	D	19.5	B	40.1	D
4. 1 st St/Bernal Ave-Sunol Blvd*	36.1	D	76.6	E	36.3	D	77.4	E
5. Vineyard Ave/Adams Way	7.9	A	2.0	A	7.9	A	2.0	A
<i>Northbound Adams Ave</i>	<i>20.5</i>	<i>C</i>	<i>11.4</i>	<i>B</i>	<i>20.6</i>	<i>C</i>	<i>11.5</i>	<i>B</i>
6. Kottinger Dr/Adams Way-Mirador Dr	12.6	B	8.0	A	12.6	B	8.0	A
7. Stanley Blvd/Bernal Ave-Valley Ave	31.2	C	32.4	C	31.2	C	32.4	C
8. Bernal Ave/Vineyard Ave-Tawny Dr	35.8	D	12.3	B	35.9	D	12.3	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation; *According to the *City of Pleasanton General Plan*, Downtown intersections, including 1st Street/Bernal Avenue-Sunol Boulevard, are exempt from the LOS D standard; Shaded cells = conditions with TIF planned improvements

Finding: Upon the addition of project-generated traffic, the study intersections are expected to operate at an acceptable level of service except for 1st Street/Bernal Avenue-Sunol Boulevard which would continue to operate at an unacceptable LOS E. However, according to the *City of Pleasanton General Plan*, Downtown intersections (1st Street/Bernal Avenue-Sunol Boulevard) are exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*.

Queuing

Queuing analysis was performed of the study intersections of 1st Street/Vineyard Avenue-Ray Street and 1st Street/Kottinger Drive-Spring Street to determine if there would be adequate left-turn lane storage at these locations with the addition of project-generated traffic. Under the Existing plus Approved Projects Conditions and Cumulative Conditions, the queue lengths for left-turn pockets that would potentially receive project-generated traffic were determined using the SIMTRAFFIC application of Synchro, and averaging the 95th percentile queues for each of five runs.

The 95th percentile queue lengths are summarized in Table 10. Copies of the SIMTRAFFIC projections are provided in Appendix B.

Table 10
95th Percentile Left-Turn Queues

Intersection movement	Available Storage	95 th percentile Queues AM Peak Hour				95 th percentile Queues PM Peak Hour			
		E+A	E+A+P	C	C+P	E+A	E+A+P	C	C+P
1 st St/Vineyard Ave-Ray St									
Southbound left-turn	125	*	*	*	*	50	91	119	93
Westbound left-turn	75	120	128	118	122	101	101	95	111
1 st St/Kottinger Dr-Spring St									
Southbound left-turn	90	*	*	*	*	67	57	120	100

Notes: All distances are measured in feet; * = The project would not add traffic to these movements therefore, the queue length has not been reported; E+A = existing plus approved projects conditions, E+A+P = existing plus approved projects plus project conditions, C = cumulative conditions, C+P = cumulative plus project conditions; **Bold** text = queue length exceeds available storage

At the intersection of 1st Street/Vineyard Avenue-Ray Street, the 95th percentile queue for the westbound left-turn movement is expected to exceed the available storage length during both peak hours under the Existing plus Approved Project Conditions and Cumulative Conditions. With the addition of project-generated traffic, the queue length is expected to increase slightly but is not anticipated to result in an additional vehicle extending beyond the storage area assuming the typical size and spacing of vehicles in a turn lane to be in the range of 20 to 25 feet. During the p.m. peak hour, the southbound left-turn movement is expected to be accommodated within the available storage length under both scenarios. Further, with the addition of project-generated traffic, the queue length is expected to decrease slightly.

At the intersection of 1st Street/Kottinger Drive-Spring Street, the queue length for the southbound left-turn movement is expected to be accommodated within the available storage length under the Existing plus Approved Project Conditions without and with the addition of project generated trips during the p.m. peak hour. However, under Cumulative Conditions, the queue is anticipated to exceed the available storage length without and with the project.

It should be noted that with the addition of project-generated traffic, the queue lengths for the southbound left-turn movement at both of these study intersections would slightly decrease during the p.m. peak hour. The Southbound through queues would extend a significant distance in the through lane, blocking the left-turn pocket. Some of the project trips would not be able to enter the left-turn pocket due to the queuing in through lanes, which in turn would result in a decreased queue length in the left-turn pocket.

Findings: At the intersection of 1st Street/Vineyard Avenue-Ray Street, the westbound left-turn queue length is expected to exceed the available storage length under all scenarios without and with the addition of project-generated trips. During the p.m. peak hour, the southbound left-turn queue is expected to fit within the available storage length, without and with the project under both scenarios. The southbound left-turn queue at the 1st Street/Kottinger Drive-Spring Street intersection is expected to be accommodated within the available storage length under Existing plus Approved Projects Conditions, and exceed the storage length under Cumulative Conditions without and with the project. The increase in queue length due to the addition of the project-generated traffic would be less-than-significant.

Site Access and Parking

Site Access

Vehicular access to the Pleasanton Garden project site would be maintained through an existing driveway located on the south side Kottinger Drive. Vehicular access to the Kottinger Place project site would be provided via two new full access driveways: one on Kottinger Drive and one on Vineyard Avenue. Internally, pathways would connect the building units to the parking areas and streets.

Sight Distance

At unsignalized intersections a substantially clear line of sight should be maintained between the driver of a vehicle waiting on the driveway and the driver of an approaching vehicle. Adequate time must be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic to radically alter their speed.

Sight distance along Vineyard Avenue and Kottinger Drive for the proposed Kottinger Place project site driveways was evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for minor-street approaches that are either a private road or a driveway are based on stopping sight distance with the approach travel speeds as the basis for determining the recommended sight distance. Sight distance at the proposed project driveways on Vineyard Avenue and Kottinger Drive were field measured.

Vineyard Avenue

The posted speed limit on Vineyard Avenue is 25 miles per hour (mph). Based on a design speed of 25 mph, the minimum stopping sight distance needed is 150 feet. Vineyard Street is relatively flat and straight on either side of the project site; therefore, sight distance from the project driveway to the east and west would be adequate. However, it should be noted that on-street parking is permitted on the south side of Vineyard Street near the project vicinity. In order to have a clear line of sight for drivers exiting the proposed driveway it is recommended that on-street parking be prohibited for 50 feet on either side of the proposed driveway. Additionally, periodic maintenance, including trimming of the vegetation on both sides of the project driveway should be undertaken to maintain clear sight lines.

Kottinger Drive

The speed limit on Kottinger Drive is not posted. For sight distance evaluation, a speed limit of 25 mph was assumed. Based on a design speed of 25 mph, the minimum stopping sight distance needed is 150 feet. Kottinger Drive is relatively flat and straight on either side of the project site; therefore, sight distance from the project driveway to the east and west would be adequate. However, to maintain clear sight lines, periodic maintenance including trimming of vegetation should be undertaken.

Finding: Sight distance at the proposed project driveways on Vineyard Avenue and Kottinger Drive would be adequate in either direction.

Recommendation: On-street parking should be prohibited on the south side of Vineyard Avenue for 50 feet on either side of the proposed driveway. Periodic maintenance, including trimming of the vegetation on both sides of the project driveways on Kottinger Drive and Vineyard Avenue, should be undertaken.

Parking

To ensure that the proposed project would provide adequate on-site parking, the City of Pleasanton Municipal Code (§ 18.88.030) was reviewed. However, the code does not specify parking requirements for a residential land use that includes senior housing such as the proposed project. Based on the information provided by the project team, parking for the existing use is provided at a rate of 0.8 spaces per dwelling unit and is considered adequate for residents, visitors and other users. The proposed project would include 185 units, which would require 148 parking spaces based on the parking ratio demand for the existing use. The proposed project would provide 149 parking spaces including four visitor parking spaces and seven disabled parking spaces. The proposed parking would adequately satisfy the projected demand.

Finding: The proposed 148 parking spaces including four visitor parking spaces and five disabled parking spaces at the project site are expected to be adequate.

Alternative Modes

Pedestrian Facilities

Sidewalks currently exist on the project frontage along Kottinger Drive and Vineyard Avenue connecting the project site to the surrounding area. The project would create a separate pedestrian entrance to Pleasanton Gardens from Kottinger Drive to avoid pedestrian access through the parking lot and provide better connectivity between the two sites. It is anticipated that the existing and proposed pedestrian facilities would adequately serve the project site.

Finding: Existing and proposed pedestrian facilities would adequately serve the project site.

Bicycle Facilities

Due to the nature of the proposed project, bike oriented trips would be minimal. Existing bicycle facilities are expected to adequately serve the project site.

Finding: Bicycle facilities serving the project site are expected to be adequate.

Transit

The existing transit bus stops located on the project frontage at Vineyard Avenue and on 1st Street are within acceptable walking distance of both sites. The proposed project would relocate the existing transit stop located on the north side of Kottinger Drive slightly to the east due to the proposed frontage improvements. Existing and proposed pedestrian facilities that would connect the project site to the existing as well as the relocated bus stop are adequate. The existing and proposed transit and pedestrian facilities are anticipated to adequately accommodate the project-generated transit trips.

Finding: Existing and proposed transit route and bus stops adjacent to the project site are expected to be adequate.

Safety Analysis

Collision History

The collision histories for the study intersections were reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on collision data available from the California Highway Patrol as published in their *Statewide Integrated Traffic Records System (SWITRS)* reports. A five-year period between July 1, 2006, and June 30, 2011, was used in the analysis. The calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2009 Accident Data on California State Highways*, Caltrans.

The study intersections of 1st Street/Neal Street, 1st Street/Bernal Avenue-Sunol Boulevard and Vineyard Avenue/Adams Way were determined to have collision rates higher than the statewide averages for similar facilities. All of the remaining intersections experienced collision rates lower than the statewide averages for similar facilities. No fatalities were reported during the five-year period studied, although the injury rate for all the signalized intersections was higher than the statewide average for similar facilities. It should be noted that at the study intersection of 1st Street/Neal Street, six collisions out of the 19 reported involved a pedestrian or a bicyclist.

The calculated collision rates are presented in Table II and details are provided in Appendix C.

Table II
Collision Rates at the Study Intersections

Study Intersection	Number of Collisions	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. 1 st St/Vineyard Ave-Ray St	6	0.15	0.36
2. 1 st St/Kottinger Dr-Spring St	9	0.25	0.36
3. 1 st St/Neal St	19	0.51	0.36
4. 1 st St/Bernal Ave-Sunol Blvd	31	0.47	0.36
5. Vineyard Ave/Adams Way	3	0.39	0.15
6. Kottinger Dr/Adams Way-Mirador Dr	1	0.23	0.25
7. Stanley Blvd/Bernal Ave-Valley Ave	15	0.16	0.36
8. Bernal Ave/Vineyard Ave-Tawny Dr	8	0.28	0.36

Note: c/mve = collisions per million vehicles entering; **Bold text** indicates calculated collision rates higher than the statewide average

The collision data for the intersections with higher-than-average collision rates were further examined to determine any apparent trends in collision types. At the study intersections of 1st Street/Neal Street and 1st Street/Bernal Avenue-Sunol Boulevard, the majority of the collisions reported were rear-end type collisions, which is a common collision type for a signalized intersection on an arterial, especially where conditions are occasionally congested. The primary collision factor associated with the rear-end collision was “unsafe speed.”

At the study intersection of Vineyard Avenue/Adams Way, three collisions were reported over the five-year period, but no trend in collision types was noticed. The higher collision rate at this intersection can be attributed to the low traffic volumes.

Although the calculated collision rates at the three intersections were determined to be higher than the statewide averages for similar facilities, this does not indicate a safety concern because the intersections selected to determine the statewide collision rates does not necessarily correlate to the local conditions at the study intersections due to various factors including intersection spacing, signal timing, geometric design, traffic volumes, adjacent land uses, and travel mode.

Finding: All of the study intersections except three were determined to have a collision rates lower than the statewide averages for similar facilities. The higher collision rate at the three study intersections does not indicate any safety concern.

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Conclusions and Recommendations

Conclusions

The following summarizes the findings of this analysis.

Existing Conditions

- Currently the intersection of 1st Street/Bernal Avenue-Sunol Boulevard operates at an unacceptable LOS E during the p.m. peak hour, but all other study intersections operate acceptably.
- The City's Traffic Impact Fee (TIF) program includes planned improvements to Stanley Boulevard/Bernal Avenue-Valley Avenue and 1st Street/Bernal Avenue-Sunol Boulevard intersections.

Project Conditions

- The proposed project is anticipated to generate an average of 295 net new vehicle trips on a daily basis, of which 20 would occur during the a.m. peak hour and 24 would occur during the p.m. peak hour.

Existing plus Project Conditions

- The study intersections are expected to continue operating at acceptable levels of service with the addition of project-generated traffic except for the intersection of 1st Street/Bernal Avenue-Sunol Boulevard which would continue to operate at an unacceptable LOS E during the p.m. peak hour. However, according to the *City of Pleasanton General Plan*, Downtown intersections such as 1st Street/Bernal Avenue-Sunol Boulevard are exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*.

Existing plus Approved Projects Condition

- Under Existing plus Approved Projects Conditions and considering the planned improvements at the intersection of Stanley Boulevard/Bernal Avenue-Valley Avenue, the study intersections are expected to continue operating at acceptable levels of service except for the intersection of 1st Street/Bernal Avenue-Sunol Boulevard, which would continue to operate at an unacceptable LOS E during the p.m. peak hour.
- With the addition of project-generated traffic, the intersection of 1st Street/Bernal Avenue-Sunol Boulevard would deteriorate from an unacceptable LOS E to LOS F during the p.m. peak hour. However, according to the *City of Pleasanton General Plan*, this intersection is exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*. All of the remaining intersections would operate acceptably.
- The westbound left-turn queue at the 1st Street/Vineyard Avenue-Ray Street is expected to extend beyond the storage area without and with the addition of project-generated trips during both peak hours. The slight increase in the queue length due to the addition of project-generated traffic would result in a less-than-significant impact. During the p.m. peak hour, the southbound left-turn queue is expected to be accommodated within the available storage length without and with the project.

- The southbound left-turn queue at the 1st Street/Kottinger Drive-Spring Street intersection is expected to be accommodated within the available storage length without or with the project during the p.m. peak hour.

Cumulative Scenario

- Under Cumulative without Project Conditions and considering the planned improvements at the intersections of Stanley Boulevard/Bernal Avenue-Valley Avenue and 1st Street/Bernal Avenue-Sunol Boulevard, the study intersections are anticipated to operate acceptably except for the intersection of 1st Street/of Bernal Avenue-Sunol Boulevard, which would operate at an unacceptable LOS E during the p.m. peak hour even with planned improvements.
- With the addition of project-generated traffic, all study intersections are expected to operate acceptably except for the intersection of 1st Street/Bernal Avenue-Sunol Boulevard, which would continue to operate at an unacceptable LOS E during the p.m. peak hour. However, according to the *City of Pleasanton General Plan*, Downtown intersections such as 1st Street/Bernal Avenue-Sunol Boulevard are exempt from the LOS D standard unless the City determines that improvements necessary to maintain LOS D are consistent with the goals for the *Downtown Specific Plan*.
- The westbound left-turn queue length at the intersection of 1st Street/Vineyard Avenue-Ray Street is expected to exceed the available storage length without and with the addition of project-generated trips during both peak hours. The slight increase in the queue length due to the addition of project-generated traffic would result in a less-than-significant impact. During the p.m. peak hour, the southbound left-turn queue is expected to be accommodated within the available storage length without and with the project.
- The southbound left-turn queue at the 1st Street/Kottinger Drive-Spring Street intersection is expected to exceed the storage length under Cumulative Conditions without and with the project. The slight increase in the queue length due to the addition of project-generated traffic would result in a less-than-significant impact.

Project Access/Parking

- The project site would be accessed via one existing and one new full access driveway on Kottinger Drive and one new full access driveway on Vineyard Avenue.
- Parking would be provided at a rate of 0.8 spaces per one dwelling unit, resulting in 148 parking spaces. The proposed 149 parking spaces at the project site are expected to satisfy the projected parking demand.

Alternative Modes of Transportation

- Existing and proposed pedestrian facilities as well as existing bicycle facilities would adequately serve the project site.
- Existing transit route and bus stops adjacent to the project site on Vineyard Avenue and 1st Street together with the relocated bus stop on Kottinger Drive would adequately serve the project-generated transit trips.

Collision History

- For the five-year period of July 1, 2006, through June 30, 2011, the calculated collision rates for all study intersections except three were determined to be lower than the statewide average rates for similar facilities. The higher collision rate at the three study intersections does not indicate any safety concern.

Recommendations

- It is recommended that on-street parking be prohibited for 50 feet on either side of the proposed driveway on Vineyard Avenue to maintain clear sight lines.
- It is recommended that periodic maintenance, including trimming of the vegetation on both sides of the project driveways on Kottinger Drive and Vineyard Avenue, be undertaken to maintain clear sight lines.

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Study Participants and References

Study Participants

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References

2009 Collision Data on California State Highways, California Department of Transportation, 2009
Altamont Commuter Express, <http://www.acerail.com>
BART, <http://www.bart.gov/stations/schedules/>
Downtown Specific Plan, City of Pleasanton, 2002
Highway Capacity Manual, Transportation Research Board, 2000
Highway Design Manual, 6th Edition, California Department of Transportation, 2006
Livermore Amador Valley Transit Authority, <http://www.lavta.org/>
Pleasanton General Plan 2005-2025, City of Pleasanton, 2009
Pleasanton Housing Element Transportation Analysis, Fehr & Peers, 2011
Pleasanton Municipal Code, Quality Code Publishing, 2013
Statewide Integrated Traffic Records System (SWITRS), California Highway Patrol, 2006-2011
Trip Generation Manual, 9th Edition, Institute of Transportation Engineers, 2012

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Appendix A

Intersection Level of Service Calculations

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	204	195	44	185	836	111	446	111	216	216	298	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.91	1.00	0.95	1.00	0.95	1.00	0.97	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	0.84	1.00	1.00	1.00	0.85	1.00	0.85	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1591	3547	3241	1489	1829	3657	1599	3547	3469	3469
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3547	3657	1591	3547	3241	1489	1829	3657	1599	3547	3469	3469
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	224	214	48	203	919	1320	126	490	122	237	327	171
RTOR Reduction (vph)	0	0	28	0	87	198	0	0	0	0	0	74
Lane Group Flow (vph)	224	214	20	203	1452	502	126	490	122	237	424	0
Conf. Peds. (#/hr)			12			36					36	
Turn Type	Prot	1	6	Perm	5	2	2	3	8	Free	7	4
Protected Phases												
Permitted Phases												
Actuated Green, G (s)	10.3	37.0	37.0	10.2	36.9	36.9	10.8	19.8	100.0	12.0	21.0	21.0
Effective Green, g (s)	11.3	41.0	41.0	11.2	40.9	40.9	11.8	22.8	100.0	13.0	24.0	24.0
Actuated g/C Ratio	0.11	0.41	0.41	0.11	0.41	0.41	0.12	0.23	1.00	0.13	0.24	0.24
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	4.0	6.0	4.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	401	1499	652	397	1326	609	216	834	1599	461	833	833
vis Ratio Prot	c0.06	0.06	0.06	0.06	c0.45	0.34	c0.07	c0.13	c0.08	0.07	0.12	0.12
vis Ratio Perm												
v/c Ratio	0.56	0.14	0.03	0.51	1.10	0.82	0.58	0.59	0.08	0.51	0.51	0.51
Uniform Delay, d1	42.0	18.5	17.6	41.8	29.6	26.3	41.8	34.4	0.0	40.6	32.9	32.9
Progression Factor	1.01	0.90	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.2	0.1	1.1	55.0	12.0	4.0	1.1	0.1	1.0	0.5	0.5
Delay (s)	44.1	16.8	20.2	42.9	84.5	38.4	45.7	35.5	0.1	41.5	33.4	33.4
Level of Service	D	B	C	D	F	D	D	D	A	D	D	C
Approach Delay (s)		29.7			67.8			31.4			36.0	
Approach LOS		C			E			C			D	
Intersection Summary												
HCM Average Control Delay												D
HCM Volume to Capacity ratio												0.81
Actuated Cycle Length (s)												12.0
Intersection Capacity Utilization												81.5%
Analysis Period (min)												15
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	127	4	32	74	59	173	33	303	16	75	385	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.94	1.00	0.97	1.00	0.85	1.00	0.99	1.00	0.96	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.97	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1477	1412	1412	1592	1391	1829	3629	1829	1829	1829	1829	1829
Flt Permitted	0.95	0.97	1.00	0.97	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (perm)	1477	1412	1412	1592	1391	1829	3629	1829	1829	1829	1829	1829
Peak-hour factor, PHF	0.87	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	146	5	38	87	69	204	39	356	19	88	453	176
RTOR Reduction (vph)	0	26	0	0	0	110	0	4	0	0	14	0
Lane Group Flow (vph)	96	67	0	156	94	39	371	0	88	615	0	4
Conf. Peds. (#/hr)			3			4					4	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split											
Protected Phases												
Permitted Phases												
Actuated Green, G (s)	9.9	9.9	9.9	13.0	29.6	29.6	2	2	6	6	6	6
Effective Green, g (s)	11.9	11.9	11.9	15.0	31.6	31.6	3.16	3.16	3.16	3.16	3.16	3.16
Actuated g/C Ratio	0.18	0.18	0.18	0.22	0.22	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	260	249	249	354	309	186	1699	456	866	866	866	866
vis Ratio Prot	c0.07	0.05	0.05	c0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
vis Ratio Perm												
v/c Ratio	0.37	0.27	0.27	0.44	0.31	0.21	0.22	0.22	0.19	0.19	0.19	0.19
Uniform Delay, d1	24.5	24.0	24.0	22.6	21.9	10.6	10.6	10.6	10.5	10.5	10.5	10.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.6	0.6	0.9	0.6	0.6	0.1	0.1	0.2	0.2	0.2	0.2
Delay (s)	25.4	24.6	24.6	23.5	22.5	11.1	10.7	10.7	10.7	10.7	10.7	10.7
Level of Service	C	C	C	C	C	C	B	B	B	B	B	B
Approach Delay (s)												
Approach LOS												
Intersection Summary												
HCM Average Control Delay												B
HCM Volume to Capacity ratio												0.58
Actuated Cycle Length (s)												9.0
Intersection Capacity Utilization												58.4%
Analysis Period (min)												15
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	21	107	87	134	224	59	43	369	61	38	813	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1829	1925	1614	1554	1636	1372	1829	3550	1829	3657	1577	1777
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1829	1925	1614	1554	1636	1372	1829	3550	1829	3657	1577	1777
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	119	97	149	249	66	48	410	68	42	903	153
RTOR Reduction (vph)	0	0	83	0	0	26	0	10	0	0	0	80
Lane Group Flow (vph)	23	119	14	149	249	40	48	468	0	42	903	73
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)				10	10	10	10	10	10	10	10	10
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4		3	3	3	1	6	5	2		
Permitted Phases			4			3					2	
Actuated Green, G (s)	13.3	13.3	13.3	18.9	18.9	18.9	5.2	45.7	5.1	45.6	45.6	45.6
Effective Green, g (s)	14.3	14.3	14.3	19.9	19.9	19.9	6.2	47.7	6.1	47.6	47.6	47.6
Actuated g/C Ratio	0.14	0.14	0.14	0.20	0.20	0.20	0.06	0.48	0.06	0.48	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	262	275	231	309	326	273	113	1693	112	1741	751	751
vis Ratio Prot	0.01	c0.06		0.10	c0.15		c0.03	0.13	0.02	c0.25		
vis Ratio Perm			0.01			0.03					0.05	
v/c Ratio	0.09	0.43	0.06	0.48	0.76	0.15	0.42	0.28	0.38	0.52	0.10	0.10
Uniform Delay, d1	37.2	39.1	37.0	35.5	37.8	33.1	45.2	15.8	45.1	18.2	14.4	14.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.37	0.70	1.51	0.37	0.11	0.11
Incremental Delay, d2	0.1	1.1	0.1	1.2	10.2	0.3	2.4	0.4	1.9	1.0	0.2	0.2
Delay (s)	37.3	40.2	37.1	36.7	48.0	33.3	64.2	11.4	69.9	7.8	1.9	1.9
Level of Service	D	D	D	D	D	C	E	B	E	A	A	A
Approach Delay (s)												9.4
Approach LOS												A
Intersection Summary												
HCM Average Control Delay	20.5 HCM Level of Service C											
HCM Volume to Capacity ratio	0.55											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	54.1% ICU Level of Service A											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kottlinger-Spring & First

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	13	44	11	26	74	51	23	419	37	35	919	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.99	0.99	0.99	1.00	0.93	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Flpb, ped/bikes	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.98	0.98	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.99	1.00	0.89
Flt Protected	0.99	0.99	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1549	1549	1592	1292	1554	1600	1487	1600	1487	1600	1600	1600
Flt Permitted	0.94	0.94	1.00	0.93	1.00	0.93	1.00	1.00	0.45	1.00	1.00	1.00
Satd. Flow (perm)	1471	1471	1500	1292	1500	1292	290	1600	705	1600	1600	1600
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	14	48	12	29	81	56	25	460	41	38	1010	84
RTOR Reduction (vph)	0	9	0	0	0	48	0	2	0	0	2	0
Lane Group Flow (vph)	0	65	0	0	110	8	25	499	0	38	1092	0
Confl. Peds. (#/hr)	36	36	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2	6	6		
Permitted Phases			4			8					6	
Actuated Green, G (s)	13.3	13.3	13.3	13.3	13.3	13.3	78.7	78.7	78.7	78.7	78.7	78.7
Effective Green, g (s)	14.3	14.3	14.3	14.3	14.3	14.3	79.7	79.7	79.7	79.7	79.7	79.7
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.80	0.80	0.80	0.80	0.80	0.80
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	210	210	210	215	185	231	1275	1275	562	1278	1278	1278
vis Ratio Prot	0.04	c0.07	0.01	0.09					0.05			
vis Ratio Perm	0.31	0.51	0.04	0.11	0.39				0.07	0.85		
v/c Ratio	38.4	39.6	37.0	2.3	3.0	2.2	6.5	6.5	2.2	6.5	6.5	6.5
Uniform Delay, d1	1.00	1.00	1.00	1.62	1.81	0.62	2.06	2.06	0.62	2.06	2.06	2.06
Progression Factor	0.9	0.9	2.1	0.1	0.9	0.9	0.2	0.2	0.2	0.2	0.2	0.2
Incremental Delay, d2	39.3	41.7	37.0	4.6	6.3	1.6	20.0	20.0	1.6	20.0	20.0	20.0
Delay (s)												
Level of Service	D	D	D	D	D	A	A	A	A	A	A	A
Approach Delay (s)												19.4
Approach LOS												B
Intersection Summary												
HCM Average Control Delay	18.3 HCM Level of Service B											
HCM Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	73.0% ICU Level of Service C											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	41	55	67	43	114	24	28	416	27	4	881	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.99	1.00	1.00
Flpb, ped/bikes	0.99	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	0.99	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1537	1472	1536	1584	1554	1618	1543	1613	1543	1613	1543	1613
Flt Permitted	0.47	1.00	0.51	1.00	0.21	1.00	0.47	1.00	0.47	1.00	0.47	1.00
Satd. Flow (perm)	754	1472	829	1584	347	1618	761	1613	761	1613	761	1613
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	43	58	71	45	120	25	29	438	28	4	927	75
RTOR Reduction (vph)	0	55	0	0	9	0	0	1	0	0	2	0
Lane Group Flow (vph)	43	74	0	45	136	0	29	465	0	4	1000	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2				6	
Permitted Phases	4			8			2				6	
Actuated Green, G (s)	13.9	13.9	13.9	13.9	13.9	78.1	78.1	78.1	78.1	78.1	78.1	78.1
Effective Green, g (s)	14.9	14.9	14.9	14.9	14.9	79.1	79.1	79.1	79.1	79.1	79.1	79.1
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	112	219	124	236	c0.09	274	1280	602	1276	602	1276	1276
vis Ratio Prot	0.05			0.05			0.29				c0.62	
vis Ratio Perm	0.06	0.34	0.36	0.57	0.11	0.36	0.08	0.08	0.01	0.01	0.78	
v/c Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Uniform Delay, d1	38.4	38.1	38.3	39.6	2.4	3.1	2.2	5.7	2.2	5.7	2.2	5.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.9	1.8	3.4	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Delay (s)	40.6	39.0	40.1	43.0	3.2	3.9	3.9	1.9	10.8	1.9	10.8	10.8
Level of Service	D	D	D	D	D	A	A	A	A	A	B	B
Approach Delay (s)	39.4			42.3			3.8				10.8	
Approach LOS	D			D			A				B	
Intersection Summary												
HCM Average Control Delay	14.8 HCM Level of Service B											
HCM Volume to Capacity ratio	0.75											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	73.3% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	149	260	195	275	653	34	128	339	74	18	733	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	0.95	0.95
Frpb, ped/bikes	1.00	1.00	1.00	0.89	1.00	1.00	1.00	1.00	0.82	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.85	1.00	0.89	1.00	0.95	1.00	0.85	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1452	1829	3624	3547	1925	1345	1554	1554	3223	3223
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3547	3657	1452	1829	3624	3547	1925	1345	1554	1554	3223	3223
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	164	286	214	302	718	37	141	373	81	20	805	264
RTOR Reduction (vph)	0	177	0	4	0	0	0	0	45	0	27	0
Lane Group Flow (vph)	164	286	37	302	751	0	141	373	36	20	1042	0
Confl. Peds. (#/hr)	72	72	72	72	72	12	72	72	72	72	72	72
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases	7	4		3			5		2		1	
Permitted Phases	4			4			2				6	
Actuated Green, G (s)	9.9	15.3	15.3	20.8	26.2	8.9	42.6	42.6	42.6	42.6	33	37.0
Effective Green, g (s)	10.9	17.3	17.3	21.8	28.2	9.9	44.6	44.6	44.6	44.6	4.3	39.0
Actuated g/C Ratio	0.11	0.17	0.17	0.22	0.28	0.10	0.45	0.45	0.45	0.45	0.04	0.39
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	387	633	251	399	1022	351	859	600	67	1257	67	1257
vis Ratio Prot	0.05	c0.08		0.17	c0.21		c0.04	0.19	0.01	c0.32		
vis Ratio Perm	0.03			0.03			0.03		0.03		0.03	
v/c Ratio	0.42	0.45	0.15	0.76	0.73	0.40	0.43	0.06	0.30	0.30	0.83	0.83
Uniform Delay, d1	41.6	37.1	35.1	36.6	32.5	42.3	19.0	15.8	46.4	27.5	46.4	27.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.76	0.83	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.5	0.3	8.0	2.8	0.8	1.6	0.2	2.5	6.4	0.2	6.4
Delay (s)	42.4	37.6	35.4	44.6	35.3	38.4	16.1	13.3	48.9	33.9	48.9	33.9
Level of Service	D	D	D	D	D	D	B	B	D	D	C	C
Approach Delay (s)	38.1			37.9			21.0				34.2	
Approach LOS	D			D			C				C	
Intersection Summary												
HCM Average Control Delay	33.8 HCM Level of Service C											
HCM Volume to Capacity ratio	0.71											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	77.8% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/17/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	99	86	23	84	97	86
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	155	134	36	131	152	134
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	309				465	262
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	309				465	262
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				71	82
cM capacity (veh/h)	1229				520	749
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	289	167	286			
Volume Left	0	36	152			
Volume Right	134	0	134			
cSH	1700	1229	607			
Volume to Capacity	0.17	0.03	0.47			
Queue Length 95th (ft)	0	2	63			
Control Delay (s)	0.0	1.9	16.1			
Lane LOS	A	C	C			
Approach Delay (s)	0.0	1.9	16.1			
Approach LOS		C	C			
Intersection Summary						
Average Delay			6.6			
Intersection Capacity Utilization			40.4%			A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop		Stop	Stop			Stop			Stop	Stop
Volume (vph)	83	27	14	22	88	87	22	54	16	12	63	32
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	138	45	23	37	147	145	37	90	27	20	105	53
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	207	328	153	178								
Volume Left (vph)	138	37	37	20								
Volume Right (vph)	23	145	27	53								
Hadq (s)	0.10	-0.18	-0.02	-0.12								
Departure Headway (s)	5.4	5.0	5.6	5.5								
Degree Utilization, x	0.31	0.46	0.24	0.27								
Capacity (veh/h)	609	677	569	590								
Control Delay (s)	10.9	12.1	10.4	10.5								
Approach Delay (s)	10.9	12.1	10.4	10.5								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay			11.2									
HCM Level of Service			B									
Intersection Capacity Utilization			44.1%									A
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	171	1144	89	119	263	302	62	343	538	1158	796	126	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	1.00	0.85	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3547	3657	1586	3547	3285	1489	1829	3657	1599	3547	3582	3582	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3547	3657	1586	3547	3285	1489	1829	3657	1599	3547	3582	3582	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	182	1217	95	127	280	321	66	365	572	1232	847	134	
RTOR Reduction (vph)	0	0	61	0	41	123	0	0	0	0	0	9	
Lane Group Flow (vph)	182	1217	34	127	374	63	66	365	572	1232	972	0	
Confl. Peds. (#/hr)			12			36			36			36	
Turn Type	Prot	1	6	Perm	5	2	2	3	8	Free	Prot	7	
Protected Phases													
Permitted Phases													
Actuated Green, G (s)	11.5	38.6	38.6	9.4	36.5	36.5	8.5	14.6	120.0	36.4	42.5	42.5	
Effective Green, G (s)	12.5	42.6	42.6	10.4	40.5	40.5	9.5	17.6	120.0	37.4	45.5	45.5	
Actuated g/C Ratio	0.10	0.36	0.36	0.09	0.34	0.34	0.08	0.15	1.00	0.31	0.38	0.38	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	4.0	6.0	4.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	369	1298	563	307	1109	503	145	536	1599	1105	1358	1358	
vis Ratio Prot	c0.05	c0.33	0.02	0.04	0.11	0.04	0.04	c0.10	c0.36	c0.35	0.27	0.27	
vis Ratio Perm													
v/c Ratio	0.49	0.94	0.06	0.41	0.34	0.12	0.46	0.68	0.36	1.11	0.72	0.72	
Uniform Delay, d1	50.8	37.4	25.5	51.9	29.7	27.5	52.8	48.5	0.0	41.3	31.7	31.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.66	0.66	
Incremental Delay, d2	1.0	13.9	0.2	0.9	0.2	0.1	2.3	3.6	0.6	61.9	1.4	1.4	
Delay (s)	51.8	51.3	25.7	52.8	29.9	27.6	55.0	52.1	0.6	92.8	22.3	22.3	
Level of Service	D	D	C	D	C	C	E	D	A	F	C	C	
Approach Delay (s)		49.8			33.3			22.9			61.5		
Approach LOS		D			C			C			E		
Intersection Summary													
HCM Average Control Delay	47.4											HCM Level of Service	D
HCM Volume to Capacity ratio	0.90												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.3%											ICU Level of Service	F
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	134	51	21	29	29	65	23	794	58	52	225	97	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.97	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.95	1.00	0.95	
Flt Protected	0.95	0.99	1.00	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	1477	1480	1480	1596	1391	1822	3620	1829	1829	1824	1824	1824	
Flt Permitted	0.95	0.99	1.00	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	
Satd. Flow (perm)	1477	1480	1480	1596	1391	1822	3620	1829	1829	1824	1824	1824	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	140	53	22	30	30	68	24	827	60	54	234	101	
RTOR Reduction (vph)	0	17	0	0	0	58	0	8	0	0	23	0	
Lane Group Flow (vph)	108	90	0	0	60	10	24	879	0	54	312	0	
Confl. Peds. (#/hr)			3			3		4				4	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Split			Split			Split		Perm		Perm		
Protected Phases													
Permitted Phases													
Actuated Green, G (s)	7.7	7.7	7.7	4.2	4.2	17.3	17.3	17.3	17.3	17.3	17.3	17.3	
Effective Green, G (s)	9.7	9.7	9.7	6.2	6.2	19.3	19.3	19.3	19.3	19.3	19.3	19.3	
Actuated g/C Ratio	0.22	0.22	0.22	0.14	0.14	0.44	0.44	0.44	0.44	0.44	0.44	0.44	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	324	325	325	224	195	403	1881	190	796	190	796	796	
vis Ratio Prot	c0.07	0.06	0.06	c0.04				c0.24			0.17	0.17	
vis Ratio Perm													
v/c Ratio	0.33	0.28	0.28	0.27	0.06	0.06	0.56	0.12	0.28	0.39	0.39	0.39	
Uniform Delay, d1	14.5	14.3	14.3	17.0	16.4	7.2	9.3	8.0	8.5	8.5	8.5	8.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.5	0.5	0.6	0.1	0.1	0.4	0.8	0.3	0.3	0.3	0.3	
Delay (s)	15.1	14.8	14.8	17.6	16.6	7.3	9.7	8.8	8.8	8.8	8.8	8.8	
Level of Service	B	B	B	B	B	A	A	A	A	A	A	A	
Approach Delay (s)		15.0			17.1			9.6			8.8		
Approach LOS		B			B			A			A		
Intersection Summary													
HCM Average Control Delay	10.7											HCM Level of Service	B
HCM Volume to Capacity ratio	0.44												
Actuated Cycle Length (s)	44.2											Sum of lost time (s)	9.0
Intersection Capacity Utilization	54.9%											ICU Level of Service	A
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	163	77	92	92	38	68	956	133	49	444	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1829	1925	1613	1554	1636	1371	1829	3562	1829	3657	1571	1571
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	1829	1925	1613	1554	1636	1371	1829	3562	1829	3657	1571	1571
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	64	166	79	94	94	39	69	976	136	50	453	51
RTOR Reduction (vph)	0	0	40	0	0	34	0	6	0	0	0	22
Lane Group Flow (vph)	64	166	39	94	94	5	69	1106	0	50	453	29
Confl. Peds. (#/hr)	1	1	1	1	1	1	1	9	1	1	1	4
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4	4	3	3	3	1	6	5	2	2	2
Permitted Phases	4	4	4	3	3	3	1	6	5	2	2	2
Actuated Green, G (s)	15.8	15.8	15.8	13.7	13.7	13.7	7.2	66.7	6.8	66.3	66.3	66.3
Effective Green, g (s)	16.8	16.8	16.8	14.7	14.7	14.7	8.2	68.7	7.8	68.3	68.3	68.3
Actuated g/C Ratio	0.14	0.14	0.14	0.12	0.12	0.12	0.07	0.57	0.06	0.57	0.57	0.57
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	256	270	226	190	200	168	125	2039	119	2081	894	894
vis Ratio Prot	0.03	c0.09	c0.06	c0.06	0.06	0.04	c0.31	c0.03	c0.03	0.12	0.12	0.12
vis Ratio Perm	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
v/c Ratio	0.25	0.61	0.17	0.49	0.47	0.03	0.55	0.54	0.42	0.22	0.03	0.03
Uniform Delay, d1	46.0	48.6	45.5	49.2	49.0	46.4	54.1	15.9	53.9	12.7	11.3	11.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.12	1.34	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	4.1	0.4	2.0	1.7	0.1	2.8	0.5	2.4	0.2	0.1	0.1
Delay (s)	46.5	52.7	45.8	51.2	50.8	46.4	63.6	21.8	56.3	13.0	11.4	11.4
Level of Service	D	D	D	D	D	D	E	C	E	B	B	B
Approach Delay (s)	49.6	49.6	49.6	50.2	50.2	50.2	24.2	24.2	16.7	16.7	16.7	16.7
Approach LOS	D	D	D	D	D	D	C	C	B	B	B	B
Intersection Summary												
HCM Average Control Delay	28.5 HCM Level of Service C											
HCM Volume to Capacity ratio	0.54											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	62.2% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kottlinger-Spring & First

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	36	47	14	30	39	28	1058	18	26	564	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Frbp, ped/bikes	0.97	1.00	0.92	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Fipb, ped/bikes	0.97	1.00	0.99	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.96	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.89
Flt Protected	0.98	1.00	0.98	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1442	1590	1276	1499	1628	1554	1607	1607	1607	1607	1607	1607
Flt Permitted	0.83	0.91	1.00	0.38	1.00	0.38	1.00	0.16	1.00	1.00	1.00	0.16
Satd. Flow (perm)	1222	1471	1276	589	1628	254	1607	1607	1607	1607	1607	1607
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	84	37	48	14	31	40	29	1091	19	27	581	38
RTOR Reduction (vph)	0	12	0	0	0	33	0	0	0	0	0	2
Lane Group Flow (vph)	0	157	0	0	45	7	29	1110	0	27	617	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	4	8	8	8	2	2	6	6	6	6
Permitted Phases	4	4	4	8	8	8	2	2	6	6	6	6
Actuated Green, G (s)	19.7	19.7	19.7	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3	92.3
Effective Green, g (s)	20.7	20.7	20.7	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3
Actuated g/C Ratio	0.17	0.17	0.17	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	211	211	211	254	220	466	1266	c0.68	197	1249	1249	1249
vis Ratio Prot	c0.13	0.03	0.03	0.03	0.03	0.03	0.05	0.11	0.11	0.11	0.11	0.11
vis Ratio Perm	0.74	0.18	0.03	0.06	0.06	0.06	0.08	0.14	0.14	0.14	0.14	0.14
Uniform Delay, d1	47.1	42.4	41.3	3.1	9.3	3.3	4.8	3.3	3.3	3.3	3.3	3.3
Progression Factor	1.00	1.00	1.00	0.74	1.36	2.33	2.63	2.33	2.33	2.33	2.63	2.63
Incremental Delay, d2	13.1	0.3	0.1	0.2	5.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Delay (s)	60.3	42.7	41.4	2.5	18.2	4.7	14.1	4.7	4.7	4.7	4.7	4.7
Level of Service	E	D	D	A	B	A	B	A	B	A	B	B
Approach Delay (s)	60.3	42.1	42.1	17.8	17.8	13.9	13.9	13.9	13.9	13.9	13.9	13.9
Approach LOS	E	D	D	B	B	B	B	B	B	B	B	B
Intersection Summary												
HCM Average Control Delay	21.1 HCM Level of Service C											
HCM Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	91.7% ICU Level of Service F											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	85	97	79	34	58	25	38	991	25	8	524	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.93	1.00	0.96	1.00	0.96	1.00	1.00	1.00	1.00	0.98	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1530	1500	1538	1545	1546	1629	1546	1629	1554	1602	1554	1602
Flt Permitted	0.62	1.00	0.35	1.00	0.38	1.00	0.38	1.00	0.18	1.00	0.18	1.00
Satd. Flow (perm)	1000	1500	563	1545	626	1629	626	1629	300	1602	300	1602
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	102	83	36	61	26	40	1043	26	8	552	68
RTOR Reduction (vph)	0	26	0	0	13	0	0	1	0	0	0	3
Lane Group Flow (vph)	89	159	0	36	74	0	40	1068	0	8	617	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		6
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	17.8	17.8	17.8	17.8	17.8	94.2	94.2	94.2	94.2	94.2	94.2	94.2
Effective Green, g (s)	18.8	18.8	18.8	18.8	18.8	95.2	95.2	95.2	95.2	95.2	95.2	95.2
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	157	235	88	242	487	1292	487	1292	238	1271	238	1271
vis Ratio Prot	c0.11			0.05			c0.66			0.03		0.39
vis Ratio Perm	0.09	0.68	0.41	0.30	0.08	0.83	0.03	0.03	0.03	0.49		0.49
Uniform Delay, d1	46.8	47.7	45.6	44.8	2.7	7.5	2.6	4.2	2.6	4.2		4.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	2.10	2.42	2.10	2.42		2.42
Incremental Delay, d2	4.6	7.5	3.1	0.7	0.3	6.2	0.2	1.2	0.2	1.2		1.2
Delay (s)	51.5	55.2	48.7	45.5	3.1	13.6	5.8	11.3	5.8	11.3		11.3
Level of Service	D	E	D	D	D	A	B	A	B	A		B
Approach Delay (s)	54.0			46.4		13.2		11.2		11.2		11.2
Approach LOS	D			D		D		B		B		B
Intersection Summary												
HCM Average Control Delay	19.8 HCM Level of Service B											
HCM Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	78.5% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	667	510	112	93	231	33	194	723	358	70	431	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	0.98	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.85	1.00	0.88	1.00	1.00	1.00	0.85	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1419	1829	3572	3547	1925	1291	1554	3173	1554	3173
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3547	3657	1419	1829	3572	3547	1925	1291	1554	3173	1554	3173
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	855	654	144	119	296	42	249	927	459	90	553	256
RTOR Reduction (vph)	0	0	88	0	9	0	0	0	153	0	43	0
Lane Group Flow (vph)	855	654	56	119	329	0	249	927	306	90	766	0
Confl. Peds. (#/hr)	72					12			96			24
Parking (#/hr)												
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases	7	4		3	8	5	2			1		6
Permitted Phases	4			4			2			2		6
Actuated Green, G (s)	22.2	25.7	25.7	12.7	16.2	19.0	53.5	53.5	53.5	10.1	44.6	44.6
Effective Green, g (s)	23.2	27.7	27.7	13.7	18.2	20.0	55.5	55.5	55.5	11.1	46.6	46.6
Actuated g/C Ratio	0.19	0.23	0.23	0.11	0.15	0.17	0.46	0.46	0.46	0.09	0.39	0.39
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	686	844	328	209	542	591	890	597	144	1232	597	1232
vis Ratio Prot	c0.24	0.18		0.07	c0.09	0.07	c0.48		0.06	c0.24		0.24
vis Ratio Perm	1.25	0.77	0.17	0.57	0.61	0.42	1.04	0.51	0.62	0.82		0.82
Uniform Delay, d1	48.4	43.2	36.9	50.4	47.6	44.8	32.2	22.7	52.4	29.6		29.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.61	0.33	1.00	1.00		1.00
Incremental Delay, d2	122.8	4.5	0.2	3.5	1.9	0.5	40.4	2.9	8.2	2.4		2.4
Delay (s)	171.2	47.7	37.2	53.9	49.5	32.2	60.3	10.4	60.6	32.0		32.0
Level of Service	F	D	D	D	D	C	E	B	E	C		C
Approach Delay (s)	110.7			50.6		42.0		34.8		34.8		34.8
Approach LOS	F			D		D		D		D		C
Intersection Summary												
HCM Average Control Delay	65.9 HCM Level of Service E											
HCM Volume to Capacity ratio	0.97											
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	84.1% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions

Synchro 7 - Report
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HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/17/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	186	22	13	136	26	32
Sign Control	Free		Free	Stop		Stop
Grade	0%		0%	0%		0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	204	24	14	149	29	35
Pedestrians	20		20	20		20
Lane Width (ft)	13.0		13.0	13.0		13.0
Walking Speed (ft/s)	4.0		4.0	4.0		4.0
Percent Blockage	2		2	2		2
Right turn flare (veh)						
Median type	None		None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	249		249	435		256
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	249		249	435		256
tC, single (s)	4.1		4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)	2.2		2.2	3.5		3.3
p0 queue free %	99		99	95		95
cM capacity (veh/h)	1293		1293	552		754
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	229	164	64			
Volume Left	0	14	29			
Volume Right	24	0	35			
cSH	1700	1293	648			
Volume to Capacity	0.13	0.01	0.10			
Queue Length 95th (ft)	0	1	8			
Control Delay (s)	0.0	0.8	11.2			
Lane LOS	A	A	B			
Approach Delay (s)	0.0	0.8	11.2			
Approach LOS			B			
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			33.4%			ICU Level of Service A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop		Stop		Stop		Stop		Stop		Stop	Stop
Volume (vph)	20	47	15	7	34	10	17	35	13	7	24	10
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	25	58	19	9	42	12	21	43	16	9	30	12
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	101	63	80	51								
Volume Left (vph)	25	9	21	9								
Volume Right (vph)	19	12	16	12								
Hadq (s)	-0.01	-0.06	0.00	-0.08								
Departure Headway (s)	4.3	4.3	4.3	4.3								
Degree Utilization, x	0.12	0.07	0.10	0.06								
Capacity (veh/h)	815	814	793	803								
Control Delay (s)	7.8	7.6	7.8	7.6								
Approach Delay (s)	7.8	7.6	7.8	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.7									
HCM Level of Service			A									
Intersection Capacity Utilization			26.8%									ICU Level of Service A
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	204	196	44	186	837	112	446	112	216	216	298	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.91	1.00	0.95	1.00	0.95	1.00	0.97	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	0.94	0.85	1.00	1.00	0.85	1.00	0.95	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1591	3547	3241	1489	1829	3657	1599	3547	3469	3469
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1591	3547	3241	1489	1829	3657	1599	3547	3469	3469
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	224	215	48	204	920	1320	126	490	123	237	327	171
RTOR Reduction (vph)	0	0	28	0	87	198	0	0	0	0	0	74
Lane Group Flow (vph)	224	215	20	204	1453	502	126	490	123	237	424	0
Conf. Peds. (#/hr)			12			36			36			
Turn Type	Prot	1	6	Perm	5	2	2	3	8	Free	7	4
Protected Phases												
Permitted Phases												
Actuated Green, G (s)	10.3	37.0	37.0	10.2	36.9	36.9	10.8	19.8	100.0	12.0	21.0	21.0
Effective Green, g (s)	11.3	41.0	41.0	11.2	40.9	40.9	11.8	22.8	100.0	13.0	24.0	24.0
Actuated g/C Ratio	0.11	0.41	0.41	0.11	0.41	0.41	0.12	0.23	1.00	0.13	0.24	0.24
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	4.0	6.0	4.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	401	1499	652	397	1326	609	216	834	1599	461	833	833
vis Ratio Prot	c0.06	0.06	0.06	0.06	c0.45	0.34	c0.07	c0.13	c0.08	0.07	0.12	0.12
vis Ratio Perm												
v/c Ratio	0.56	0.14	0.03	0.51	1.10	0.82	0.58	0.59	0.08	0.51	0.51	0.51
Uniform Delay, d1	42.0	18.5	17.6	41.8	29.6	26.3	41.8	34.4	0.0	40.6	32.9	32.9
Progression Factor	1.01	0.90	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.2	0.1	1.1	55.3	12.0	4.0	1.1	0.1	1.0	0.5	0.5
Delay (s)	44.1	16.8	20.2	43.0	84.8	38.4	45.7	35.5	0.1	41.5	33.4	33.4
Level of Service	D	B	C	D	F	D	D	D	A	D	D	C
Approach Delay (s)												
Approach LOS												
Intersection Summary												
HCM Average Control Delay												
HCM Volume to Capacity ratio												
Actuated Cycle Length (s)												
Intersection Capacity Utilization												
Analysis Period (min)												
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	128	4	32	74	59	173	33	303	16	75	385	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.94	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.96	1.00	0.96
Flt Protected	0.95	0.97	1.00	0.97	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1477	1412	1592	1391	1829	3629	1829	1828	1828	1828	1828	1828
Flt Permitted	0.95	0.97	1.00	0.97	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1477	1412	1592	1391	1829	3629	1828	1828	1828	1828	1828	1828
Peak-hour factor, PHF	0.87	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	147	5	38	87	69	204	39	356	19	88	453	178
RTOR Reduction (vph)	0	26	0	0	0	110	0	4	0	0	14	0
Lane Group Flow (vph)	97	67	0	156	94	39	371	0	88	617	0	4
Conf. Peds. (#/hr)			3			4						
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split	4	4	Split	3	3	2	2	2	Perm	6	6
Protected Phases												
Permitted Phases												
Actuated Green, G (s)	10.0	10.0	10.0	13.1	13.1	29.7	29.7	29.7	29.7	29.7	29.7	29.7
Effective Green, g (s)	12.0	12.0	12.0	15.1	15.1	31.7	31.7	31.7	31.7	31.7	31.7	31.7
Actuated g/C Ratio	0.18	0.18	0.18	0.22	0.22	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	261	250	250	355	310	184	1697	454	855	855	855	855
vis Ratio Prot	c0.07	0.05	0.05	c0.10	c0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
vis Ratio Perm												
v/c Ratio	0.37	0.27	0.27	0.44	0.30	0.21	0.22	0.22	0.19	0.19	0.19	0.19
Uniform Delay, d1	24.6	24.1	24.1	22.7	22.0	10.7	10.7	10.7	10.6	10.6	10.6	10.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.6	0.6	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Delay (s)	25.5	24.7	24.7	23.6	22.5	11.2	10.8	10.8	10.8	10.8	10.8	10.8
Level of Service	C	C	C	C	C	C	B	B	B	B	B	B
Approach Delay (s)												
Approach LOS												
Intersection Summary												
HCM Average Control Delay												
HCM Volume to Capacity ratio												
Actuated Cycle Length (s)												
Intersection Capacity Utilization												
Analysis Period (min)												
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	108	87	137	226	60	43	370	63	38	813	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1829	1925	1614	1554	1636	1372	1829	3548	1829	3657	1577	1777
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1829	1925	1614	1554	1636	1372	1829	3548	1829	3657	1577	1777
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	120	97	152	251	67	48	411	70	42	903	153
RTOR Reduction (vph)	0	0	83	0	0	26	0	10	0	0	0	80
Lane Group Flow (vph)	23	120	14	152	251	41	48	471	0	42	903	73
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)				10	10	10	10	10	10	10	10	10
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4			3	3		1	6		5		2
Permitted Phases		4				3						2
Actuated Green, G (s)	13.3	13.3	13.3	19.0	19.0	19.0	5.2	45.6	5.1	45.5	45.5	45.5
Effective Green, g (s)	14.3	14.3	14.3	20.0	20.0	20.0	6.2	47.6	6.1	47.5	47.5	47.5
Actuated g/C Ratio	0.14	0.14	0.14	0.20	0.20	0.20	0.06	0.48	0.06	0.48	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	262	275	231	311	327	274	113	1689	112	1737	749	749
vis Ratio Prot	0.01	c0.06		0.10	c0.15		c0.03	0.13	0.02	c0.25		
vis Ratio Perm			0.01			0.03					0.05	
v/c Ratio	0.09	0.44	0.06	0.49	0.77	0.15	0.42	0.28	0.38	0.52	0.10	0.10
Uniform Delay, d1	37.2	39.2	37.0	35.5	37.8	33.0	45.2	15.8	45.1	18.3	14.4	14.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.37	0.70	1.51	0.37	0.11	0.11
Incremental Delay, d2	0.1	1.1	0.1	1.2	10.3	0.3	2.4	0.4	1.9	1.0	0.2	0.2
Delay (s)	37.3	40.3	37.1	36.7	48.1	33.3	64.2	11.4	69.9	7.8	1.9	1.9
Level of Service	D	D	D	D	D	C	E	B	E	A	A	A
Approach Delay (s)												9.4
Approach LOS												A
Intersection Summary												
HCM Average Control Delay	20.6											
HCM Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	100.0											
Intersection Capacity Utilization	54.1%											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kottlinger-Spring & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	46	11	29	77	52	23	420	39	35	921	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.99	0.99	1.00	1.00	0.93	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Flpb, ped/bikes	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00
Flt	0.98	0.98	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.99	1.00	0.89
Flt Protected	0.99	0.99	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1553	1553	1591	1292	1554	1599	1488	1602	1488	1602	1602	1602
Flt Permitted	0.94	0.94	1.00	0.93	1.00	0.93	1.00	0.94	1.00	0.94	1.00	1.00
Satd. Flow (perm)	1477	1477	1483	1292	1483	1599	1488	1602	1488	1602	1602	1602
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	14	51	12	32	85	57	25	462	43	38	1012	85
RTOR Reduction (vph)	0	8	0	0	0	49	0	2	0	0	2	0
Lane Group Flow (vph)	0	69	0	0	117	8	25	503	0	38	1095	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8	8		2			6		6
Permitted Phases		4				8						6
Actuated Green, G (s)	13.7	13.7	13.7	13.7	13.7	13.7	78.3	78.3	78.3	78.3	78.3	78.3
Effective Green, g (s)	14.7	14.7	14.7	14.7	14.7	14.7	79.3	79.3	79.3	79.3	79.3	79.3
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15	0.15	0.79	0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	217	219	190	224	1268	556	1270	556	1270	1270	1270
vis Ratio Prot	0.05	c0.08	0.01	0.09							c0.68	
vis Ratio Perm	0.32		0.83	0.04	0.11	0.40			0.05			0.86
Uniform Delay, d1	38.2	38.2	39.5	36.6	2.4	3.1	2.3	6.8	2.3	6.8	6.8	6.8
Progression Factor	1.00	1.00	1.00	1.00	1.62	1.80	0.63	2.01	0.63	2.01	2.01	2.01
Incremental Delay, d2	0.9	0.9	2.5	0.1	1.0	0.9	0.2	7.1	0.2	7.1	7.1	7.1
Delay (s)	39.0	39.0	42.0	36.7	4.8	6.5	1.6	20.7	1.6	20.7	20.7	20.7
Level of Service	D	D	D	D	D	A	A	C	A	C	C	C
Approach Delay (s)												20.1
Approach LOS												C
Intersection Summary												
HCM Average Control Delay	18.9											
HCM Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	100.0											
Intersection Capacity Utilization	73.2%											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	41	55	67	43	114	24	28	419	27	4	886	71	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	0.99	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.99	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1537	1472	1536	1584	1554	1618	1554	1618	1543	1614	1543	1614	
Flt Permitted	0.47	1.00	0.51	1.00	0.21	1.00	0.21	1.00	0.47	1.00	0.47	1.00	
Satd. Flow (perm)	754	1472	829	1584	343	1618	343	1618	758	1614	758	1614	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	43	58	71	45	120	25	29	441	28	4	933	75	
RTOR Reduction (vph)	0	55	0	0	9	0	0	1	0	0	2	0	
Lane Group Flow (vph)	43	74	0	45	136	0	29	468	0	4	1006	0	
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	
Protected Phases	4			8			2			6			
Permitted Phases	4			8			2			6			
Actuated Green, G (s)	13.9	13.9	13.9	13.9	13.9	78.1	78.1	78.1	78.1	78.1	78.1	78.1	
Effective Green, g (s)	14.9	14.9	14.9	14.9	14.9	79.1	79.1	79.1	79.1	79.1	79.1	79.1	
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15	0.79	0.79	0.79	0.79	0.79	0.79	0.79	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	112	219	124	236	c0.09	271	1280	600	1277	c0.62			
vis Ratio Prot	0.05			0.05			0.29			0.01			
vis Ratio Perm	0.06	0.34	0.36	0.57	0.11	0.37	0.01	0.01	0.01	0.79			
v/c Ratio	0.38	38.1	38.1	39.6	2.4	3.1	2.2	5.8	2.2	5.8			
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83	1.42	0.83	1.42	0.83	
Progression Factor	2.2	0.9	1.8	3.4	0.8	0.8	0.8	0.8	0.8	0.8	2.6	0.8	
Incremental Delay, d2	40.6	39.0	40.1	43.0	3.2	3.9	1.8	10.9	1.8	10.9			
Delay (s)	D	D	D	D	D	A	A	A	A	B			
Level of Service	D	D	D	D	D	A	A	A	A	B			
Approach Delay (s)	39.4			42.3			3.8			10.9			
Approach LOS	D			D			A			B			
Intersection Summary													
HCM Average Control Delay	14.8											HCM Level of Service	B
HCM Volume to Capacity ratio	0.75												
Actuated Cycle Length (s)	100.0											Sum of lost time (s)	6.0
Intersection Capacity Utilization	73.6%											ICU Level of Service	D
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	150	260	195	275	653	34	128	341	74	18	736	242	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.85	1.00	0.89	1.00	0.95	1.00	0.85	1.00	0.95	1.00	
Satd. Flow (prot)	3547	3657	1452	1829	3624	3547	1925	1345	1554	3223	1554	3223	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3547	3657	1452	1829	3624	3547	1925	1345	1554	3223	1554	3223	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	165	286	214	302	718	37	141	375	81	20	809	266	
RTOR Reduction (vph)	0	177	0	4	0	0	0	0	45	0	27	0	
Lane Group Flow (vph)	165	286	37	302	751	0	141	375	36	20	1048	0	
Confl. Peds. (#/hr)	72								96				
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot	
Protected Phases	7	4		3			5		2		1		
Permitted Phases	4			4			2		2		6		
Actuated Green, G (s)	10.0	15.3	15.3	20.9	26.2	8.9	42.5	42.5	42.5	3.3	36.9	36.9	
Effective Green, g (s)	11.0	17.3	17.3	21.9	28.2	9.9	44.5	44.5	44.5	4.3	38.9	38.9	
Actuated g/C Ratio	0.11	0.17	0.17	0.22	0.28	0.10	0.44	0.44	0.44	0.04	0.39	0.39	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	390	633	251	401	1022	c0.21	351	857	599	67	1254		
vis Ratio Prot	0.05	c0.08		0.17	c0.21		c0.04	0.19	0.01	c0.33			
vis Ratio Perm	0.03			0.03			0.03		0.03				
v/c Ratio	0.42	0.45	0.15	0.75	0.73	0.40	0.44	0.06	0.30	0.84			
Uniform Delay, d1	41.5	37.1	35.1	36.5	32.5	42.3	19.1	15.8	46.4	27.7			
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.89	0.76	0.83	1.00	1.00			
Incremental Delay, d2	0.7	0.5	0.3	7.8	2.8	0.8	1.6	0.2	2.5	6.7			
Delay (s)	42.3	37.6	35.4	44.3	35.3	38.5	16.2	13.3	48.9	34.3			
Level of Service	D	D	D	D	D	D	B	B	D	C			
Approach Delay (s)	38.0			37.9			21.1			34.6			
Approach LOS	D			D			C			C			
Intersection Summary													
HCM Average Control Delay	33.9											HCM Level of Service	C
HCM Volume to Capacity ratio	0.71												
Actuated Cycle Length (s)	100.0											Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.9%											ICU Level of Service	D
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/19/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	100	86	23	84	97	87
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	156	134	36	131	152	136
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None					
Median type	None					
Median storage (veh)	None					
Upstream signal (ft)	None					
pX, platoon unblocked	None					
VC, conflicting volume	311	467	263			
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	311	467	263			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	97	71	82			
cM capacity (veh/h)	1227	519	747			
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	291	167	288			
Volume Left	0	36	152			
Volume Right	134	0	136			
cSH	1700	1227	607			
Volume to Capacity	0.17	0.03	0.47			
Queue Length 95th (ft)	0	2	64			
Control Delay (s)	0.0	1.9	16.2			
Lane LOS	A	C	C			
Approach Delay (s)	0.0	1.9	16.2			
Approach LOS	C					
Intersection Summary						
Average Delay	6.7					
Intersection Capacity Utilization	40.5%					
Analysis Period (min)	15					
	ICU Level of Service					
	A					

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Volume (vph)	84	27	14	22	88	87	22	54	16	12	63	32
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	140	45	23	37	147	145	37	90	27	20	105	53
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	208	328	153	178								
Volume Left (vph)	140	37	37	20								
Volume Right (vph)	23	145	27	53								
Hadq (s)	0.10	-0.18	-0.02	-0.12								
Departure Headway (s)	5.4	5.0	5.6	5.5								
Degree Utilization, x	0.32	0.46	0.24	0.27								
Capacity (veh/h)	609	676	568	589								
Control Delay (s)	10.9	12.1	10.4	10.5								
Approach Delay (s)	10.9	12.1	10.4	10.5								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay	11.2											
HCM Level of Service	B											
Intersection Capacity Utilization	44.2%											
	ICU Level of Service											
	A											
Analysis Period (min)	15											

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	171	1145	89	120	264	302	62	343	539	1158	796	126	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.91	0.91	1.00	0.95	1.00	0.97	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	1.00	0.85	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3547	3657	1586	3547	3286	1489	1829	3657	1599	3547	3582	3582	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3547	3657	1586	3547	3286	1489	1829	3657	1599	3547	3582	3582	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	182	1218	95	128	281	321	66	365	573	1232	847	134	
RTOR Reduction (vph)	0	0	61	0	41	123	0	0	0	0	0	9	
Lane Group Flow (vph)	182	1218	34	128	375	63	66	365	573	1232	972	0	
Conf. Peds. (#/hr)	12	12	12	12	36	36	36	36	36	36	36	36	
Turn Type	Prot	1	6	Perm	5	2	2	3	8	Free	Prot	7	
Protected Phases	6											4	
Permitted Phases	11.5	38.6	38.6	9.4	36.5	36.5	8.5	14.6	120.0	36.4	42.5		
Actuated Green, G (s)	12.5	42.6	42.6	10.4	40.5	40.5	9.5	17.6	120.0	37.4	45.5		
Effective Green, g (s)	0.10	0.36	0.36	0.09	0.34	0.34	0.08	0.15	1.00	0.31	0.38		
Actuated g/C Ratio	4.0	7.0	7.0	4.0	7.0	7.0	4.0	6.0	4.0	6.0	6.0		
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Vehicle Extension (s)	369	1298	563	307	1109	503	145	536	1599	1105	1358		
Lane Grp Cap (vph)	c0.05	c0.33	0.02	0.04	0.11	0.04	0.04	c0.10	c0.35	0.27			
vis Ratio Prot													
vis Ratio Perm													
v/c Ratio	0.49	0.94	0.06	0.42	0.34	0.12	0.46	0.68	0.36	1.11	0.72		
Uniform Delay, d1	50.8	37.4	25.5	51.9	29.7	27.5	52.8	48.5	0.0	41.3	31.7		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.66		
Incremental Delay, d2	1.0	14.0	0.2	0.9	0.2	0.1	2.3	3.6	0.6	61.9	1.4		
Delay (s)	51.8	51.5	25.7	52.8	29.9	27.6	55.0	52.1	0.6	92.8	22.3		
Level of Service	D	D	C	D	C	C	E	D	A	F	C		
Approach Delay (s)	49.9			33.3			22.9			61.5			
Approach LOS	D			C			C			E			
Intersection Summary													
HCM Average Control Delay	47.4											HCM Level of Service	D
HCM Volume to Capacity ratio	0.90												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.4%											ICU Level of Service	F
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	135	51	21	29	65	23	794	58	52	225	98		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.97	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.95	1.00	0.95	
Flt Protected	0.95	0.99	1.00	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	1477	1480	1596	1391	1822	3620	1829	1823	1829	1823	1823	1823	
Flt Permitted	0.95	0.99	1.00	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	
Satd. Flow (perm)	1477	1480	1596	1391	1822	3620	1829	1823	1829	1823	1823	1823	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	141	53	22	30	30	68	24	827	60	54	234	102	
RTOR Reduction (vph)	0	17	0	0	0	58	0	8	0	0	23	0	
Lane Group Flow (vph)	109	90	0	0	60	10	24	879	0	54	313	0	
Conf. Peds. (#/hr)	10	10	10	10	10	10	10	10	10	10	10	4	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	4	
Turn Type	Split	4	4	Split	3	3	2	2	2	Perm	Perm	6	
Protected Phases	4											6	
Permitted Phases	7.7	7.7	7.7	4.2	4.2	17.3	17.3	17.3	17.3	17.3	17.3	17.3	
Actuated Green, G (s)	9.7	9.7	9.7	6.2	6.2	19.3	19.3	19.3	19.3	19.3	19.3	19.3	
Effective Green, g (s)	0.22	0.22	0.22	0.14	0.14	0.44	0.44	0.44	0.44	0.44	0.44	0.44	
Actuated g/C Ratio	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Vehicle Extension (s)	324	325	325	224	195	402	1881	190	796				
Lane Grp Cap (vph)	c0.07	0.06	0.06	c0.04									
vis Ratio Prot													
vis Ratio Perm													
v/c Ratio	0.34	0.28	0.27	0.27	0.06	0.06	0.56	0.12	0.28	0.39	0.12		
Uniform Delay, d1	14.5	14.3	17.0	16.4	7.2	9.3	8.0	8.5	8.0	8.5	8.0		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.6	0.5	0.6	0.6	0.1	0.1	0.4	0.8	0.3	0.8	0.3		
Delay (s)	15.2	14.8	17.6	16.6	7.3	9.7	8.8	8.8	8.8	8.8	8.8		
Level of Service	B	B	B	B	B	A	A	A	A	A	A		
Approach Delay (s)	15.0			17.1			9.6			8.8			
Approach LOS	B			B			A			A			
Intersection Summary													
HCM Average Control Delay	10.7											HCM Level of Service	B
HCM Volume to Capacity ratio	0.44												
Actuated Cycle Length (s)	44.2											Sum of lost time (s)	9.0
Intersection Capacity Utilization	54.9%											ICU Level of Service	A
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	63	165	77	95	94	39	68	957	136	50	445	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1829	1925	1613	1554	1636	1371	1829	3560	1829	3657	1571	1571
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (perm)	1829	1925	1613	1554	1636	1371	1829	3560	1829	3657	1571	1571
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	64	168	79	97	96	40	69	977	139	51	454	51
RTOR Reduction (vph)	0	0	40	0	0	35	0	7	0	0	0	22
Lane Group Flow (vph)	64	168	39	97	96	5	69	1109	0	51	454	29
Confl. Peds. (#/hr)	1	1	1	1	1	1	1	9	1	1	1	4
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4	3	3	3	3	1	6	5	2	2	2
Permitted Phases	4	4	3	3	3	3	1	6	5	2	2	2
Actuated Green, G (s)	15.9	15.9	13.8	13.8	13.8	13.8	7.2	66.5	6.8	66.1	66.1	66.1
Effective Green, g (s)	16.9	16.9	14.8	14.8	14.8	14.8	8.2	68.5	7.8	68.1	68.1	68.1
Actuated g/C Ratio	0.14	0.14	0.12	0.12	0.12	0.12	0.07	0.57	0.06	0.57	0.57	0.57
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	271	227	192	202	169	125	2032	119	2075	892	892
v/s Ratio Prot	0.03	c0.09	c0.06	0.06	0.06	0.04	c0.31	c0.03	0.12	0.12	0.12	0.12
v/s Ratio Perm	0.25	0.62	0.17	0.51	0.48	0.03	0.55	0.55	0.43	0.22	0.03	0.02
Uniform Delay, d1	45.9	48.5	45.4	49.2	49.0	46.3	54.1	16.1	54.0	12.8	11.4	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.13	1.34	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	4.2	0.4	2.1	1.8	0.1	2.7	0.5	2.5	0.2	0.1	0.1
Delay (s)	46.4	52.7	45.7	51.3	50.7	46.3	63.7	22.0	56.4	13.1	11.5	11.5
Level of Service	D	D	D	D	D	D	E	C	E	B	B	B
Approach Delay (s)	49.6	49.6	49.6	50.2	50.2	49.6	24.5	24.5	16.9	16.9	16.9	16.9
Approach LOS	D	D	D	D	D	D	C	C	B	B	B	B
Intersection Summary												
HCM Average Control Delay	28.7 HCM Level of Service C											
HCM Volume to Capacity ratio	0.54											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	62.6% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

94: Kottlinger-Spring & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	82	39	47	17	33	40	28	1060	21	27	566	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.97	1.00	0.92	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	0.97	1.00	0.99	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.96	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flt Protected	0.98	1.00	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1446	1446	1585	1276	1500	1627	1554	1607	1554	1607	1607	1607
Flt Permitted	0.82	0.82	0.89	1.00	0.38	1.00	0.38	1.00	0.15	1.00	0.15	1.00
Satd. Flow (perm)	1222	1222	1429	1276	1585	1627	1554	1607	1429	1607	1607	1607
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	85	40	48	18	34	41	29	1093	22	28	584	39
RTOR Reduction (vph)	0	12	0	0	0	34	0	0	0	0	0	2
Lane Group Flow (vph)	0	161	0	0	52	7	29	1115	0	28	621	0
Confl. Peds. (#/hr)	36	36	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	4	8	8	8	2	2	2	6	6	6
Permitted Phases	4	4	4	8	8	8	2	2	2	6	6	6
Actuated Green, G (s)	20.0	20.0	20.0	20.0	20.0	20.0	92.0	92.0	92.0	92.0	92.0	92.0
Effective Green, g (s)	21.0	21.0	21.0	21.0	21.0	21.0	93.0	93.0	93.0	93.0	93.0	93.0
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.18	0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	214	214	214	250	223	461	1261	1261	191	1245	1245	1245
v/s Ratio Prot	c0.13	0.75	0.21	0.03	0.06	0.88	0.11	0.11	0.11	0.11	0.11	0.11
v/s Ratio Perm	0.75	0.75	0.75	0.21	0.03	0.06	0.88	0.88	0.15	0.15	0.15	0.15
Uniform Delay, d1	47.0	47.0	47.0	42.4	41.1	3.2	9.6	3.4	5.0	5.0	5.0	5.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.74	1.36	2.33	2.33	2.33	2.33	2.33
Incremental Delay, d2	13.8	13.8	13.8	0.4	0.1	0.2	5.8	1.6	1.4	1.4	1.4	1.4
Delay (s)	60.8	60.8	60.8	42.8	41.1	2.5	18.9	9.6	14.4	14.4	14.4	14.4
Level of Service	E	E	E	D	D	A	B	A	A	A	B	B
Approach Delay (s)	60.8	60.8	60.8	42.1	42.1	18.5	18.5	14.2	14.2	14.2	14.2	14.2
Approach LOS	E	E	E	D	D	B	B	B	B	B	B	B
Intersection Summary												
HCM Average Control Delay	21.7 HCM Level of Service C											
HCM Volume to Capacity ratio	0.86											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	92.1% ICU Level of Service F											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	85	97	79	34	58	25	38	996	25	8	529	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.93	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1530	1500	1538	1545	1546	1629	1546	1629	1554	1603	1554	1603
Flt Permitted	0.62	1.00	0.35	1.00	0.38	1.00	0.38	1.00	0.18	1.00	0.18	1.00
Satd. Flow (perm)	1000	1500	563	1545	622	1629	622	1629	297	1603	297	1603
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	102	83	36	61	26	40	1048	26	8	557	68
RTOR Reduction (vph)	0	26	0	0	13	0	0	1	0	0	0	3
Lane Group Flow (vph)	89	159	0	36	74	0	40	1073	0	8	622	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.8	17.8	17.8	17.8	17.8	94.2	94.2	94.2	94.2	94.2	94.2	94.2
Effective Green, g (s)	18.8	18.8	18.8	18.8	18.8	95.2	95.2	95.2	95.2	95.2	95.2	95.2
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	157	235	c0.11	88	242	493	1292	c0.66	236	1272	c0.39	
vis Ratio Prot	0.09	0.68	0.41	0.30	0.08	0.83	0.03	0.03	0.03	0.49		
vis Ratio Perm	46.8	47.7	45.6	44.8	2.7	7.5	2.6	4.2	2.6	4.2		
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00	2.09	2.42	2.09	2.42		
Progression Factor	4.6	7.5	3.1	0.7	0.3	6.3	0.2	1.2	0.2	1.2		
Incremental Delay, d2	51.5	55.2	48.7	45.5	3.1	13.8	5.7	11.3	5.7	11.3		
Delay (s)	D	E	D	D	D	A	B	A	B	A	B	B
Level of Service	D	E	D	D	D	A	B	A	B	A	B	B
Approach Delay (s)	54.0			46.4		13.4		13.4		11.3		
Approach LOS	D			D		B		B		B		
Intersection Summary												
HCM Average Control Delay	19.9 HCM Level of Service B											
HCM Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	78.8% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	669	510	112	93	231	33	194	726	358	70	434	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	0.98	0.95
Frpb, ped/bikes	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.79	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.85	1.00	0.88	1.00	1.00	1.00	0.85	1.00	0.85	1.00
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1419	1829	3572	3547	1925	1291	1554	3172	1554	3172
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3547	3657	1419	1829	3572	3547	1925	1291	1554	3172	1554	3172
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	858	654	144	119	296	42	249	931	459	90	556	259
RTOR Reduction (vph)	0	0	88	0	9	0	0	0	152	0	43	0
Lane Group Flow (vph)	858	654	56	119	329	0	249	931	307	90	772	0
Confl. Peds. (#/hr)	72					12			96			24
Parking (#/hr)												
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases	7	4		3	8	5	2		2	1		6
Permitted Phases	4			4			2		2			6
Actuated Green, G (s)	22.2	25.7	25.7	12.7	16.2	19.0	53.5	53.5	53.5	10.1	44.6	44.6
Effective Green, g (s)	23.2	27.7	27.7	13.7	18.2	20.0	55.5	55.5	55.5	11.1	46.6	46.6
Actuated g/C Ratio	0.19	0.23	0.23	0.11	0.15	0.17	0.46	0.46	0.46	0.09	0.39	0.39
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	686	844	328	209	542	591	890	597	144	1232	c0.24	
vis Ratio Prot	c0.24	0.18	0.07	0.07	c0.09	0.07	c0.48	0.06	c0.24			
vis Ratio Perm	1.25	0.77	0.17	0.57	0.61	0.42	1.05	0.51	0.62	0.63		
Uniform Delay, d1	48.4	43.2	36.9	50.4	47.6	44.8	32.2	22.7	52.4	29.7		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.62	0.33	1.00	1.00		
Incremental Delay, d2	124.7	4.5	0.2	3.5	1.9	0.5	41.8	2.9	8.2	2.4		
Delay (s)	173.1	47.7	37.2	53.9	49.5	32.3	61.7	10.4	60.6	32.1		
Level of Service	F	D	D	D	D	C	E	B	E	C		
Approach Delay (s)	111.7			50.6		42.9		34.9				
Approach LOS	F			D		D		D		C		
Intersection Summary												
HCM Average Control Delay	66.6 HCM Level of Service E											
HCM Volume to Capacity ratio	0.98											
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	84.3% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/19/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	187	22	14	137	26	33
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	205	24	15	151	29	36
Pedestrians	20			20		
Lane Width (ft)	13.0			13.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	250			439		258
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	250			439		258
tC, single (s)	4.1			6.4		6.2
tC, 2 stage (s)						
tF (s)	2.2			3.5		3.3
p0 queue free %	99			95		95
cM capacity (veh/h)	1292			548		753
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	230	166	65			
Volume Left	0	15	29			
Volume Right	24	0	36			
cSH	1700	1292	647			
Volume to Capacity	0.14	0.01	0.10			
Queue Length 95th (ft)	0	1	8			
Control Delay (s)	0.0	0.8	11.2			
Lane LOS	A	A	B			
Approach Delay (s)	0.0	0.8	11.2			
Approach LOS			B			
Intersection Summary						
Average Delay	1.9			1.9		
Intersection Capacity Utilization	34.3%			ICU Level of Service		
Analysis Period (min)	15			A		

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Volume (vph)	21	47	15	7	34	10	17	35	13	7	24	11
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	26	58	19	9	42	12	21	43	16	9	30	14
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	102	63	80	52								
Volume Left (vph)	26	9	21	9								
Volume Right (vph)	19	12	16	14								
Hadq (s)	0.00	-0.06	0.00	-0.09								
Departure Headway (s)	4.3	4.3	4.3	4.3								
Degree Utilization, x	0.12	0.07	0.10	0.06								
Capacity (veh/h)	814	813	792	805								
Control Delay (s)	7.9	7.6	7.8	7.6								
Approach Delay (s)	7.9	7.6	7.8	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	7.7			7.7			7.7			7.7		
HCM Level of Service	A			A			A			A		
Intersection Capacity Utilization	27.0%			27.0%			27.0%			27.0%		
Analysis Period (min)	15			15			15			15		

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	261	272	70	286	1136	1128	154	384	132	210	316	177	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.97	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3547	5065	3547	3657	1599	1829	3657	1599	3547	3460	3460	3460	
Satd. Flow (perm)	3547	5065	3547	3657	1599	1829	3657	1599	3547	3460	3460	3460	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	287	299	77	314	1248	1240	169	422	145	231	347	195	
RTOR Reduction (vph)	0	40	0	0	0	0	0	0	0	0	0	86	
Lane Group Flow (vph)	287	336	0	314	1248	1240	169	422	145	231	456	0	
Conf. Peds. (#/hr)	12			36			36		36				
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases													
Actuated Green, G (s)	8.0	36.0	12.4	40.4	100.0	100.0	20.9	100.0	9.7	20.6			
Effective Green, g (s)	9.0	40.0	13.4	44.4	100.0	110.0	23.9	100.0	10.7	23.6			
Actuated g/C Ratio	0.09	0.40	0.13	0.44	1.00	0.11	0.24	1.00	0.11	0.24			
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	319	2026	475	1624	1599	201	874	1599	380	817			
vis Ratio Prot	0.08	0.07	0.09	0.34			0.09	0.12	0.07	0.13			
vis Ratio Perm													
v/c Ratio	0.90	0.17	0.66	0.77	0.78	0.84	0.48	0.09	0.61	0.56			
Uniform Delay, d1	45.1	19.3	41.1	23.5	0.0	43.6	32.7	0.0	42.6	33.6			
Progression Factor	0.90	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	26.2	0.2	3.4	3.6	3.7	25.9	0.4	0.1	2.7	0.8			
Delay (s)	66.9	20.3	44.6	27.0	3.7	69.5	33.2	0.1	45.4	34.4			
Level of Service	E	C	D	C	A	E	C	A	D	C			
Approach Delay (s)	40.5			18.7			35.0		37.7				
Approach LOS	D			B			C		D				
Intersection Summary													
HCM Average Control Delay	27.0 HCM Level of Service C												
HCM Volume to Capacity ratio	0.78												
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 0.0												
Intersection Capacity Utilization	75.1% ICU Level of Service D												
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions with Planned TIF Improvements-No Project

Synchro 7 - Report
W-T-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	134	3	39	88	59	173	28	311	14	84	604	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.93	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.97	1.00	0.97
Flt Protected	0.95	0.98	0.97	1.00	0.97	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1477	1401	1588	1391	1829	3634	1829	3634	1829	1848	1848	1848
Satd. Flow (perm)	1477	1401	1588	1391	1829	3634	1829	3634	1829	1848	1848	1848
Peak-hour factor, PHF	0.87	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	154	4	46	104	69	204	33	366	16	99	711	201
RTOR Reduction (vph)	0	34	0	0	0	104	0	3	0	0	9	0
Lane Group Flow (vph)	105	65	0	173	100	33	379	0	99	903	0	4
Conf. Peds. (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split			Split			Perm	Perm		Perm		
Protected Phases	4			3			2			6		
Permitted Phases												
Actuated Green, G (s)	13.1	13.1	13.1	14.1	14.1	14.1	46.5	46.5	46.5	46.5	46.5	46.5
Effective Green, g (s)	15.1	15.1	15.1	16.1	16.1	16.1	48.5	48.5	48.5	48.5	48.5	48.5
Actuated g/C Ratio	0.17	0.17	0.17	0.18	0.18	0.18	0.55	0.55	0.55	0.55	0.55	0.55
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	251	239	288	252	287	1987	530	1010				
vis Ratio Prot	c0.07	0.05		c0.11			0.10			c0.49		
vis Ratio Perm												
v/c Ratio	0.42	0.27	0.60	0.40	0.38	0.19	0.10			0.10		
Uniform Delay, d1	32.9	32.0	33.3	32.0	11.5	10.2	10.1	17.8		10.1		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00		
Incremental Delay, d2	1.1	0.6	3.5	1.0	2.8	0.0	0.2	10.2		0.2		
Delay (s)	34.0	32.6	36.9	33.0	14.2	10.2	10.3	28.0		10.3		
Level of Service	C	C	D	C	B	B	B	C		B		
Approach Delay (s)	33.3			34.8			10.5			26.3		
Approach LOS	C			C			B			C		
Intersection Summary												
HCM Average Control Delay	25.3 HCM Level of Service C											
HCM Volume to Capacity ratio	0.74											
Actuated Cycle Length (s)	88.7 Sum of lost time (s) 9.0											
Intersection Capacity Utilization	71.9% ICU Level of Service C											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions-No Project

Synchro 7 - Report
W-T-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	22	101	91	138	216	61	46	433	64	42	1013	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1829	1925	1614	1554	1636	1372	1829	3560	1829	3657	1577	1777
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	1829	1925	1614	1554	1636	1372	1829	3560	1829	3657	1577	1777
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	24	112	101	153	240	68	51	481	71	47	1126	178
RTOR Reduction (vph)	0	0	87	0	0	27	0	9	0	0	0	83
Lane Group Flow (vph)	24	112	14	153	240	41	51	543	0	47	1126	95
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)												
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4		3	3	3	1	6		5	2	
Permitted Phases			4			3						2
Actuated Green, G (s)	13.1	13.1	13.1	18.7	18.7	18.7	6.6	46.0	5.2	44.6	44.6	44.6
Effective Green, g (s)	14.1	14.1	14.1	19.7	19.7	19.7	7.6	48.0	6.2	46.6	46.6	46.6
Actuated g/C Ratio	0.14	0.14	0.14	0.20	0.20	0.20	0.08	0.48	0.06	0.47	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	271	228	306	322	270	139	1709	113	1704	735	1104
vis Ratio Prot	0.01	c0.06		0.10	c0.15	0.03	0.15		c0.03	c0.31		
vis Ratio Perm			0.01			0.03					0.06	
v/c Ratio	0.09	0.41	0.06	0.50	0.75	0.15	0.37	0.32	0.42	0.66	0.13	0.13
Uniform Delay, d1	37.4	39.2	37.2	35.8	37.8	33.2	43.9	16.0	45.2	20.6	15.2	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.39	0.65	1.48	0.46	0.45	0.45
Incremental Delay, d2	0.2	1.0	0.1	1.3	9.0	0.3	1.5	0.4	2.0	1.7	0.3	0.3
Delay (s)	37.5	40.2	37.3	37.0	46.8	33.5	62.7	10.8	68.9	11.2	7.1	7.1
Level of Service	D	D	D	D	D	C	E	B	E	B	B	A
Approach Delay (s)		38.7			41.6			15.2				12.6
Approach LOS		D			D			B				B
Intersection Summary												
HCM Average Control Delay	20.6 HCM Level of Service C											
HCM Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	60.5% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions-No Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	2	9	1	23	80	60	25	491	51	64	1064	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.99	0.99	1.00	1.00	0.93	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Flpb, ped/bikes	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.99	0.99	1.00	1.00	0.85	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Flt Protected	0.99	0.99	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1585	1585	1595	1292	1554	1595	1554	1595	1500	1596	1586	1586
Flt Permitted	0.97	0.97	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94
Satd. Flow (perm)	1547	1547	1547	1292	149	1595	1595	1595	632	1586	1586	1586
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	2	10	1	25	88	66	27	540	56	70	1169	119
RTOR Reduction (vph)	0	1	0	0	0	57	0	2	0	0	2	0
Lane Group Flow (vph)	0	12	0	0	113	9	27	594	0	70	1286	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2		6	6	6
Permitted Phases			4			8						
Actuated Green, G (s)	13.3	13.3	13.3	13.3	13.3	13.3	78.7	78.7	78.7	78.7	78.7	78.7
Effective Green, g (s)	14.3	14.3	14.3	14.3	14.3	14.3	79.7	79.7	79.7	79.7	79.7	79.7
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.80	0.80	0.80	0.80	0.80	0.80
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	217	185	119	1271	504	1272	1272	504	1272	1272	1272
vis Ratio Prot	0.01	c0.07	0.01	0.18					0.11			
vis Ratio Perm	0.05		0.82	0.06	0.23	0.47			0.14			1.01
Uniform Delay, d1	37.0	39.7	37.0	37.0	2.5	3.3			2.3			10.1
Progression Factor	1.00	1.00	1.00	1.00	1.63	1.82			0.50			2.22
Incremental Delay, d2	0.1	2.2	0.1	4.1	1.1	1.1			0.5			25.4
Delay (s)	37.1	41.9	37.1	37.1	8.2	7.1			1.6			47.9
Level of Service	D	D	D	D	A	A			A			D
Approach Delay (s)		37.1			40.1				7.2			45.5
Approach LOS		D			D				A			D
Intersection Summary												
HCM Average Control Delay	34.0 HCM Level of Service C											
HCM Volume to Capacity ratio	0.94											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	82.4% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions-No Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
95: Neal St & First

4/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	39	54	80	50	134	22	42	506	33	3	1008	81
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frbp, ped/bikes	1.00	0.91	1.00	0.98	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1538	1459	1537	1594	1554	1617	1546	1614	1546	1614	1546	1614
Flt Permitted	0.43	1.00	0.50	1.00	0.14	1.00	0.41	1.00	0.41	1.00	0.41	1.00
Satd. Flow (perm)	702	1459	802	1594	232	1617	666	1614	666	1614	666	1614
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	41	57	84	53	141	23	44	533	35	3	1061	85
RTOR Reduction (vph)	0	65	0	0	8	0	0	1	0	0	2	0
Lane Group Flow (vph)	41	76	0	53	156	0	44	567	0	3	1144	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2				6	
Permitted Phases	4			8			2				6	
Actuated Green, G (s)	15.1	15.1	15.1	15.1	15.1	15.1	76.9	76.9	76.9	76.9	76.9	76.9
Effective Green, g (s)	16.1	16.1	16.1	16.1	16.1	16.1	77.9	77.9	77.9	77.9	77.9	77.9
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.16	0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	113	235	129	257	c0.10	181	1260	519	1257	519	1257	1257
vis Ratio Prot	0.05						0.35				c0.71	
vis Ratio Perm	0.06	0.32	0.41	0.61	0.24	0.45	0.19	0.00	0.00	0.00	0.01	0.91
v/c Ratio	0.36	0.37	0.37	0.39	0.30	0.38	2.5	8.4	2.5	8.4	2.5	8.4
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.55
Progression Factor	2.0	0.8	2.1	4.0	3.2	1.2	3.2	1.2	0.0	3.2	0.0	3.2
Incremental Delay, d2	39.4	37.9	39.8	43.1	6.2	4.9	6.2	4.9	2.2	16.2	2.2	16.2
Delay (s)	D	D	D	D	D	D	A	A	A	A	A	B
Level of Service	D	D	D	D	D	D	A	A	A	A	A	B
Approach Delay (s)	38.2			42.3			5.0				16.1	
Approach LOS	D			D			A				B	
Intersection Summary												
HCM Average Control Delay	17.5 HCM Level of Service B											
HCM Volume to Capacity ratio	0.86											
Actuated Cycle Length (s)	100.0 Sum of lost time (s)											
Intersection Capacity Utilization	81.4% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
96: Bernal & First St

4/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	164	237	214	392	737	48	147	494	89	18	899	233
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Total Lost time (s)	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00
Lane Util. Factor	1.00	1.00	1.00	0.89	1.00	1.00	1.00	1.00	0.82	1.00	0.99	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.85	1.00	0.89	1.00	0.95	1.00	0.85	1.00	0.97	1.00
Satd. Flow (prot)	3547	3657	3547	1829	3616	3547	1925	1345	1554	3250	3547	3250
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1452	1829	3616	3547	1925	1345	1554	3250	3547	3250
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	180	260	235	431	810	53	162	543	98	20	988	256
RTOR Reduction (vph)	0	0	184	0	5	0	0	0	57	0	21	0
Lane Group Flow (vph)	180	260	51	431	858	0	162	543	41	20	1223	0
Confl. Peds. (#/hr)	72	72	72	72	72	12	72	72	96	72	72	72
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases	7	4	4	3	8	5	2	2	1	1	6	6
Permitted Phases	7	4	4	3	8	5	2	2	1	1	6	6
Actuated Green, G (s)	10.4	14.9	14.9	23.6	28.1	9.2	40.2	40.2	40.2	3.3	34.3	34.3
Effective Green, g (s)	11.4	16.9	16.9	24.6	30.1	10.2	42.2	42.2	42.2	4.3	36.3	36.3
Actuated g/C Ratio	0.11	0.17	0.17	0.25	0.30	0.10	0.42	0.42	0.42	0.04	0.36	0.36
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	404	618	245	450	1088	362	812	568	67	1180	618	1180
vis Ratio Prot	c0.05	0.07		c0.24	c0.24	c0.05	0.28	0.03	0.01	c0.38		
vis Ratio Perm	0.45	0.42	0.21	0.96	0.79	0.45	0.67	0.07	0.30	1.04		
v/c Ratio	41.4	37.2	35.8	37.2	32.0	42.2	23.3	17.2	46.4	31.9		
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Progression Factor	0.8	0.5	0.4	3.14	3.9	0.9	4.3	0.2	2.5	36.1		
Incremental Delay, d2	42.1	37.6	36.2	68.6	35.9	35.3	21.5	19.7	48.9	67.9		
Delay (s)	D	D	D	E	D	D	C	B	D	E		
Level of Service	D	D	D	E	D	D	C	B	D	E		
Approach Delay (s)	38.3			46.8			24.1			67.6		
Approach LOS	D			D			C			E		
Intersection Summary												
HCM Average Control Delay	47.4 HCM Level of Service D											
HCM Volume to Capacity ratio	0.86											
Actuated Cycle Length (s)	100.0 Sum of lost time (s)											
Intersection Capacity Utilization	88.5% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/18/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	105	86	23	97	97	86
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	164	134	36	152	152	134
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None					
Median type	None					
Median storage (veh)	None					
Upstream signal (ft)	None					
pX platoon unblocked	None					
VC, conflicting volume	318	495	271			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	495	271			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	97	70	82			
cM capacity (veh/h)	1219	500	740			
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	298	188	286			
Volume Left	0	36	152			
Volume Right	134	0	134			
cSH	1700	1219	590			
Volume to Capacity	0.18	0.03	0.48			
Queue Length 95th (ft)	0	2	66			
Control Delay (s)	0.0	1.8	16.7			
Lane LOS	A	C	C			
Approach Delay (s)	0.0	1.8	16.7			
Approach LOS				C		
Intersection Summary						
Average Delay	6.6			ICU Level of Service		
Intersection Capacity Utilization	41.3%			A		
Analysis Period (min)	15					

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/18/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	83	32	14	22	97	87
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	138	53	23	37	162	145
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None					
Median type	None					
Median storage (veh)	None					
Upstream signal (ft)	None					
pX platoon unblocked	None					
VC, conflicting volume	318	495	271			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	495	271			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	97	70	82			
cM capacity (veh/h)	1219	500	740			
Direction, Lane #						
	EB 1	WB 1	NB 1	SB 1		
Volume Total (vph)	215	343	153	178		
Volume Left (vph)	138	37	37	20		
Volume Right (vph)	23	145	27	53		
Hadq (s)	0.10	-0.17	-0.02	-0.12		
Departure Headway (s)	5.5	5.0	5.7	5.6		
Degree Utilization, x	0.33	0.48	0.24	0.27		
Capacity (veh/h)	605	673	557	579		
Control Delay (s)	11.1	12.6	10.5	10.6		
Approach Delay (s)	11.1	12.6	10.5	10.6		
Approach LOS	B	B	B	B		
Intersection Summary						
Delay	11.5			ICU Level of Service		
HCM Level of Service	B			A		
Intersection Capacity Utilization	44.5%			15		
Analysis Period (min)	15					

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Project Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	209	1117	96	123	329	319	84	390	590	981	710	183	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.99	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3547	5180	3547	3657	1599	1829	3657	1599	3547	3547	3545	3545	
Satd. Flow (perm)	3547	5180	3547	3657	1599	1829	3657	1599	3547	3547	3545	3545	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	222	1188	102	131	350	339	89	415	628	1044	755	195	
RTOR Reduction (vph)	0	9	0	0	0	0	0	0	0	0	0	19	
Lane Group Flow (vph)	222	1282	0	131	350	339	89	415	628	1044	931	0	
Confl. Peds. (#/hr)			12			36			36				
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases							Free				Free		
Actuated Green, G (s)	10.7	31.0	7.0	27.3	120.0	9.9	14.8	120.0	46.2	51.1	120.0	46.2	
Effective Green, g (s)	11.7	35.0	8.0	31.3	120.0	10.9	17.8	120.0	47.2	54.1	120.0	47.2	
Actuated g/C Ratio	0.10	0.29	0.07	0.26	1.00	0.09	0.15	1.00	0.39	0.45	1.00	0.39	
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	346	1511	236	954	1599	166	542	1599	1395	1598	1395	1598	
vis Ratio Prot	c0.06	c0.25	0.04	0.10	0.10	0.05	c0.11	0.05	c0.29	0.26	c0.29	0.26	
vis Ratio Perm													
v/c Ratio	0.64	0.85	0.56	0.37	0.21	0.54	0.77	0.39	0.75	0.58	0.75	0.58	
Uniform Delay, d1	52.1	40.0	54.3	36.3	0.0	52.1	49.1	0.0	31.3	24.5	31.3	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.68	1.00	0.60	
Incremental Delay, d2	4.0	6.1	2.8	0.2	0.3	3.3	6.4	0.7	2.7	0.4	2.7	0.4	
Delay (s)	56.2	46.1	57.1	36.5	0.3	55.4	55.5	0.7	24.1	15.1	24.1	15.1	
Level of Service	E	D	E	D	A	E	E	A	C	B	A	C	
Approach Delay (s)	47.6		24.8			25.1					19.8		
Approach LOS	D		C			C					B		
Intersection Summary													
HCM Average Control Delay	29.4												
HCM Volume to Capacity ratio	0.77												
Actuated Cycle Length (s)	120.0												
Sum of lost time (s)	9.0												
Intersection Capacity Utilization	81.9%												
ICU Level of Service	D												
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions with Planned TIF Improvements-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	86	52	22	32	36	77	27	922	83	70	234	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	0.99
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.96	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.99	1.00	0.95
Flt Protected	0.95	0.99	0.98	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1477	1479	1479	1599	1391	1823	3612	1829	1819	1829	1819	1819
Satd. Flow (perm)	1477	1479	1479	1599	1391	1823	3612	1829	1819	1829	1819	1819
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	90	54	23	33	38	80	28	960	86	73	244	112
RTOR Reduction (vph)	0	18	0	0	0	69	0	9	0	0	23	0
Lane Group Flow (vph)	81	68	0	0	71	11	28	1037	0	73	333	0
Confl. Peds. (#/hr)			3			3		4				4
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split			Split			Split		Split		Split	
Protected Phases												
Permitted Phases												
Actuated Green, G (s)	7.2	7.2	4.2	4.2	4.2	18.4	18.4	18.4	18.4	18.4	18.4	18.4
Effective Green, g (s)	9.2	9.2	6.2	6.2	6.2	20.4	20.4	20.4	20.4	20.4	20.4	20.4
Actuated g/C Ratio	0.21	0.21	0.14	0.14	0.14	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	303	304	221	193	408	1645	172	828	172	828	172	828
vis Ratio Prot	c0.05	0.05				c0.04						
vis Ratio Perm												
v/c Ratio	0.27	0.22	0.32	0.06	0.07	0.63	0.19	0.42	0.40	0.40	0.40	0.40
Uniform Delay, d1	15.0	14.8	17.4	16.8	6.9	9.3	8.2	8.1	8.2	8.1	8.2	8.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4	0.8	0.1	0.1	0.8	1.7	0.3	1.7	0.3	1.7	0.3
Delay (s)	15.4	15.2	18.2	16.9	6.9	10.1	9.9	8.5	9.9	8.5	9.9	8.5
Level of Service	B	B	B	B	A	B	A	A	A	A	A	A
Approach Delay (s)	15.3		B			17.5			10.0		8.7	
Approach LOS	B		B			B			B		A	
Intersection Summary												
HCM Average Control Delay	10.8											
HCM Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	44.8											
Sum of lost time (s)	9.0											
Intersection Capacity Utilization	58.1%											
ICU Level of Service	B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	57	111	72	101	90	41	72	1125	117	39	493	49	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96	
Fibp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	1.00	1.00	1.00	0.85	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	0.95	
Satd. Flow (prot)	1829	1925	1613	1554	1636	1371	1829	3584	1829	3657	1571	1571	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	
Satd. Flow (perm)	1829	1925	1613	1554	1636	1371	1829	3584	1829	3657	1571	1571	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
Adj. Flow (vph)	58	113	73	103	92	42	73	1148	119	40	503	50	
RTOR Reduction (vph)	0	0	56	0	0	37	0	5	0	0	0	21	
Lane Group Flow (vph)	58	113	17	103	92	5	73	1262	0	40	503	29	
Confl. Peds. (#/hr)	1	1	1	1	1	1	1	9	1	1	1	4	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm	
Protected Phases	4	4	3	3	3	3	1	6	5	2	2	2	
Permitted Phases	4	4	3	3	3	3	1	6	5	2	2	2	
Actuated Green, G (s)	13.7	13.7	14.1	14.1	14.1	14.1	7.2	68.6	6.6	68.0	68.0	68.0	
Effective Green, g (s)	14.7	14.7	15.1	15.1	15.1	15.1	8.2	70.6	7.6	70.0	70.0	70.0	
Actuated g/C Ratio	0.12	0.12	0.13	0.13	0.13	0.13	0.07	0.59	0.06	0.58	0.58	0.58	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	224	236	198	196	206	173	125	2109	116	2133	916	916	
vis Ratio Prot	0.03	c0.06	c0.07	c0.07	0.06	0.04	c0.35	c0.02	0.14	c0.02	0.14	0.14	
vis Ratio Perm	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	
v/c Ratio	0.26	0.48	0.09	0.53	0.45	0.03	0.58	0.60	0.34	0.24	0.03	0.03	
Uniform Delay, d1	47.7	49.1	46.7	49.1	48.6	46.0	54.2	15.7	53.8	12.1	10.6	10.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.36	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	1.5	0.2	2.5	1.5	0.1	1.9	0.3	1.8	0.3	0.1	0.1	
Delay (s)	48.3	50.6	46.9	51.6	50.1	46.1	63.6	21.8	55.6	12.3	10.7	10.7	
Level of Service	D	D	D	D	D	D	E	C	E	B	B	B	
Approach Delay (s)	49.0	50.1	46.1	50.1	49.0	46.1	24.0	24.0	55.6	12.3	10.7	10.7	
Approach LOS	D	D	D	D	D	D	C	C	E	B	B	B	
Intersection Summary													
HCM Average Control Delay	26.9											HCM Level of Service	C
HCM Volume to Capacity ratio	0.55												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.5%											ICU Level of Service	B
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	87	43	66	17	35	37	39	1211	22	24	620	38	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	
Frbp, ped/bikes	0.97	1.00	0.92	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	0.99	
Fibp, ped/bikes	0.97	1.00	0.99	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	0.95	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.89	
Flt Protected	0.98	1.00	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (prot)	1433	1433	1589	1276	1511	1628	1511	1628	1554	1609	1609	1609	
Flt Permitted	0.84	1.00	0.84	1.00	0.84	1.00	0.84	1.00	0.84	1.00	1.00	0.84	
Satd. Flow (perm)	1227	1227	1420	1276	1546	1628	1546	1628	1554	1609	1609	1609	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	90	44	68	18	36	38	40	1248	23	25	639	39	
RTOR Reduction (vph)	0	16	0	0	0	31	0	0	0	0	0	2	
Lane Group Flow (vph)	0	186	0	0	54	7	40	1271	0	25	676	0	
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	
Protected Phases	4	4	8	8	8	8	2	2	6	6	6	6	
Permitted Phases	4	4	8	8	8	8	2	2	6	6	6	6	
Actuated Green, G (s)	21.7	21.7	21.7	21.7	21.7	21.7	90.3	90.3	90.3	90.3	90.3	90.3	
Effective Green, g (s)	22.7	22.7	22.7	22.7	22.7	22.7	91.3	91.3	91.3	91.3	91.3	91.3	
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.76	0.76	0.76	0.76	0.76	0.76	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	232	232	269	241	415	1239	81	1224	81	1224	1224	1224	
vis Ratio Prot	c0.15	0.04	0.04	0.01	0.07	0.04	c0.78	c0.78	0.24	0.24	0.24	0.24	
vis Ratio Perm	0.80	0.20	0.20	0.03	0.10	0.03	1.03	1.03	0.31	0.31	0.55	0.55	
Uniform Delay, d1	46.5	41.0	39.7	3.7	14.4	4.5	5.9	5.9	4.5	5.9	5.9	5.9	
Progression Factor	1.00	1.00	1.00	1.00	0.63	1.25	2.44	2.53	2.44	2.53	2.53	2.53	
Incremental Delay, d2	17.7	0.4	0.4	0.1	0.1	21.4	9.5	1.8	9.5	1.8	1.8	1.8	
Delay (s)	64.2	41.4	39.7	2.5	39.3	20.4	16.8	16.8	20.4	16.8	16.8	16.8	
Level of Service	E	D	D	D	A	D	C	C	D	C	C	B	
Approach Delay (s)	64.2	40.7	39.7	40.7	38.2	38.2	38.2	38.2	64.2	38.2	38.2	38.2	
Approach LOS	E	D	D	D	D	D	D	D	E	D	D	B	
Intersection Summary													
HCM Average Control Delay	34.1											HCM Level of Service	C
HCM Volume to Capacity ratio	0.98												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	6.0
Intersection Capacity Utilization	100.8%											ICU Level of Service	G
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	86	121	93	37	58	23	48	1166	36	9	600	69	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt Protected	1.00	0.93	1.00	0.96	1.00	0.96	1.00	1.00	1.00	1.00	0.98	1.00	
Std. Flow (prot)	1530	1504	1540	1540	1550	1548	1627	1554	1604	1554	1604	1604	
Flt Permitted	0.64	1.00	0.30	1.00	0.33	1.00	0.08	1.00	0.08	1.00	0.08	1.00	
Satd. Flow (perm)	1030	1504	480	1550	545	1627	129	1604	129	1604	129	1604	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	91	127	98	39	61	24	51	1227	38	9	632	73	
RTOR Reduction (vph)	0	25	0	0	12	0	0	1	0	0	3	0	
Lane Group Flow (vph)	91	200	0	39	73	0	51	1264	0	9	702	0	
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Perm												
Protected Phases	4	4	4	8	8	8	2	2	2	2	6	6	
Permitted Phases	4	4	4	8	8	8	2	2	2	2	6	6	
Actuated Green, G (s)	20.3	20.3	20.3	20.3	20.3	20.3	91.7	91.7	91.7	91.7	91.7	91.7	
Effective Green, g (s)	21.3	21.3	21.3	21.3	21.3	21.3	92.7	92.7	92.7	92.7	92.7	92.7	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.18	0.77	0.77	0.77	0.77	0.77	0.77	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	183	267	85	275	0.05	421	1257	100	1239	100	1239	100	
vis Ratio Prot	c0.13	c0.13	c0.13	c0.05	c0.05	c0.78							
vis Ratio Perm	0.09	0.09	0.09	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
v/c Ratio	0.50	0.75	0.46	0.26	0.12	1.01	0.09	0.09	0.09	0.09	0.57	0.57	
Uniform Delay, d1	44.5	46.8	44.2	42.6	3.4	13.6	3.3	5.5	3.3	5.5	3.3	5.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	2.08	2.30	2.08	2.30	2.08	2.30	
Incremental Delay, d2	2.1	11.2	3.9	0.5	0.6	26.8	1.5	1.6	1.5	1.6	1.5	1.6	
Delay (s)	46.6	58.1	48.1	43.1	4.0	40.5	8.4	14.3	8.4	14.3	8.4	14.3	
Level of Service	D	E	D	D	D	A	A	D	A	A	B	B	
Approach Delay (s)	54.8	54.8	54.8	44.7	44.7	39.0	44.7	44.7	44.7	44.7	44.2	44.2	
Approach LOS	D	D	D	D	D	D	D	D	D	D	B	B	
Intersection Summary													
HCM Average Control Delay	34.2											HCM Level of Service	C
HCM Volume to Capacity ratio	0.96												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	6.0
Intersection Capacity Utilization	90.2%											ICU Level of Service	E
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	599	519	152	116	234	27	303	921	517	68	566	212	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.79	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt Protected	1.00	1.00	0.85	1.00	0.88	1.00	1.00	1.00	0.85	1.00	0.85	1.00	
Std. Flow (prot)	3547	3657	1419	1829	3585	3547	1925	1291	1554	3201	1554	3201	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3547	3657	1419	1829	3585	3547	1925	1291	1554	3201	1554	3201	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
Adj. Flow (vph)	768	665	195	149	300	35	388	1181	663	87	726	272	
RTOR Reduction (vph)	0	0	118	0	8	0	0	0	175	0	31	0	
Lane Group Flow (vph)	768	665	77	149	327	0	388	1181	488	87	967	0	
Confl. Peds. (#/hr)	72	72	72	72	72	12	72	72	96	72	72	72	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot	
Protected Phases	7	4	4	3	8	5	2	2	1	1	6	6	
Permitted Phases	7	4	4	3	8	5	2	2	1	1	6	6	
Actuated Green, G (s)	23.0	25.3	25.3	13.9	16.2	19.0	52.8	52.8	52.8	10.0	43.8	43.8	
Effective Green, g (s)	24.0	27.3	27.3	14.9	18.2	20.0	54.8	54.8	54.8	11.0	45.8	45.8	
Actuated g/C Ratio	0.20	0.23	0.23	0.12	0.15	0.17	0.46	0.46	0.46	0.09	0.38	0.38	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	709	832	323	227	544	591	879	590	142	1222	590	142	
vis Ratio Prot	c0.22	c0.18	c0.18	c0.08	c0.09	c0.11	c0.61	c0.61	c0.61	c0.06	c0.30	c0.30	
vis Ratio Perm	0.05	0.05	0.05	0.05	0.05	0.05	0.38	0.38	0.38	0.06	0.30	0.30	
v/c Ratio	1.08	0.80	0.24	0.66	0.60	0.66	1.34	0.83	0.61	0.79	0.79	0.79	
Uniform Delay, d1	48.0	43.8	37.9	50.1	47.5	46.8	32.6	28.5	52.4	32.9	32.9	32.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.63	0.38	1.00	1.00	1.00	1.00	
Incremental Delay, d2	58.6	5.4	0.4	6.7	1.9	2.1	160.8	10.4	7.6	5.3	5.3	5.3	
Delay (s)	106.6	49.2	38.2	56.8	49.4	35.5	181.4	21.1	60.1	38.2	38.2	38.2	
Level of Service	F	D	D	E	D	D	F	C	E	D	D	D	
Approach Delay (s)	74.9	74.9	74.9	51.7	51.7	108.4	74.9	74.9	74.9	74.9	74.9	74.9	
Approach LOS	E	E	E	D	D	F	E	F	E	D	D	D	
Intersection Summary													
HCM Average Control Delay	79.6											HCM Level of Service	E
HCM Volume to Capacity ratio	1.11												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.5%											ICU Level of Service	F
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/19/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	186	22	13	146	26	32
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	204	24	14	160	29	35
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None					
Median type	None					
Median storage (veh)	None					
Upstream signal (ft)	None					
pX, platoon unblocked	None					
VC, conflicting volume	249	445				
vC1, stage 1 conf vol	None					
vC2, stage 2 conf vol	None					
vCu, unblocked vol	249	445				
tC, single (s)	4.1	6.4				
tC, 2 stage (s)	None					
tF (s)	2.2	3.5				
p0 queue free %	99	95				
cM capacity (veh/h)	1293	544				
cM capacity (veh/h)	1293	544				
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	229	175	64			
Volume Left	0	14	29			
Volume Right	24	0	35			
cSH	1700	1293	643			
Volume to Capacity	0.13	0.01	0.10			
Queue Length 95th (ft)	0	1	8			
Control Delay (s)	0.0	0.7	11.2			
Lane LOS	A	B	B			
Approach Delay (s)	0.0	0.7	11.2			
Approach LOS	A	B	B			
Intersection Summary						
Average Delay	1.8					
Intersection Capacity Utilization	33.9%					
Analysis Period (min)	15					
ICU Level of Service	A					

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Volume (vph)	20	50	15	7	36	10	17	35	13	7	24	10
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	25	62	19	9	44	12	21	43	16	9	30	12
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	105	65	80	51								
Volume Left (vph)	25	9	21	9								
Volume Right (vph)	19	12	16	12								
Hadq (s)	-0.02	-0.01	0.00	-0.08								
Departure Headway (s)	4.2	4.3	4.3	4.3								
Degree Utilization, x	0.12	0.08	0.10	0.06								
Capacity (veh/h)	818	804	789	799								
Control Delay (s)	7.8	7.7	7.8	7.6								
Approach Delay (s)	7.8	7.7	7.8	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	7.8											
HCM Level of Service	A											
Intersection Capacity Utilization	26.9%											
ICU Level of Service	A											
Analysis Period (min)	15											

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	261	273	70	287	1137	1128	133	384	133	210	316	177	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.97	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3547	5065	3547	3657	1599	1829	3657	1599	3547	3460	3460	3460	
Satd. Flow (perm)	3547	5065	3547	3657	1599	1829	3657	1599	3547	3460	3460	3460	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	287	300	77	315	1249	1240	169	422	146	231	347	195	
RTOR Reduction (vph)	0	40	0	0	0	0	0	0	0	0	0	86	
Lane Group Flow (vph)	287	337	0	315	1249	1240	169	422	146	231	456	0	
Conf. Peds. (#/hr)			12			36			36			36	
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases							Free				Free		
Actuated Green, G (s)	8.0	36.0	12.4	40.4	100.0	100.0	20.9	100.0	9.7	20.6	100.0	20.6	
Effective Green, g (s)	9.0	40.0	13.4	44.4	100.0	110.0	23.9	100.0	10.7	23.6	100.0	23.6	
Actuated g/C Ratio	0.09	0.40	0.13	0.44	1.00	0.11	0.24	1.00	0.11	0.24	1.00	0.11	
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	319	2026	475	1624	1599	201	874	1599	380	817	1599	380	
vis Ratio Prot	0.08	0.07	0.09	0.34		0.09	0.12		0.07	0.13		0.13	
vis Ratio Perm													
v/c Ratio	0.90	0.17	0.66	0.77	0.78	0.84	0.48	0.09	0.61	0.56	0.09	0.61	
Uniform Delay, d1	45.1	19.3	41.2	23.5	0.0	43.6	32.7	0.0	42.6	33.6	0.0	42.6	
Progression Factor	0.91	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	26.2	0.2	3.5	3.6	3.7	25.9	0.4	0.1	2.7	0.8	0.1	2.7	
Delay (s)	67.0	20.2	44.6	27.0	3.7	69.5	33.2	0.1	45.4	34.4	0.1	45.4	
Level of Service	E	C	D	C	A	E	C	A	D	D	C	D	
Approach Delay (s)		40.4			18.7		34.9		37.7			37.7	
Approach LOS		D			B		C		D			D	
Intersection Summary													
HCM Average Control Delay	27.0 HCM Level of Service C												
HCM Volume to Capacity ratio	0.78												
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 0.0												
Intersection Capacity Utilization	75.1% ICU Level of Service D												
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects with Planned TIF Improvements plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	135	3	39	88	59	173	28	311	14	84	604	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.93	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.97	1.00	0.97
Flt Protected	0.95	0.98	0.97	1.00	0.97	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1477	1401	1588	1391	1829	3634	1829	3634	1829	1848	1848	1848
Satd. Flow (perm)	1477	1401	1588	1391	1829	3634	1829	3634	1829	1848	1848	1848
Peak-hour factor, PHF	0.87	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	155	4	46	104	69	204	33	366	16	99	711	202
RTOR Reduction (vph)	0	33	0	0	0	104	0	3	0	0	9	0
Lane Group Flow (vph)	105	67	0	173	100	33	379	0	99	904	0	4
Conf. Peds. (#/hr)			3			3			4			4
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split			Split			Perm	Perm		Perm		
Protected Phases												
Permitted Phases												
Actuated Green, G (s)	13.1	13.1	13.1	14.1	14.1	14.1	46.5	46.5	46.5	46.5	46.5	46.5
Effective Green, g (s)	15.1	15.1	15.1	16.1	16.1	16.1	48.5	48.5	48.5	48.5	48.5	48.5
Actuated g/C Ratio	0.17	0.17	0.17	0.18	0.18	0.18	0.55	0.55	0.55	0.55	0.55	0.55
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	251	239	288	252	87	1987	530	1010				
vis Ratio Prot	c0.07	0.05		c0.11			0.10					c0.49
vis Ratio Perm												
v/c Ratio	0.42	0.28	0.60	0.40	0.38	0.19	0.10	0.10	0.19	0.89	0.10	0.89
Uniform Delay, d1	32.9	32.1	33.3	32.0	11.5	10.2	10.1	17.8	10.1	17.8	10.1	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.6	3.5	1.0	2.8	0.0	0.2	10.3	0.2	10.3	0.2	10.3
Delay (s)	34.0	32.7	36.9	33.0	14.2	10.2	10.3	28.1	10.3	28.1	10.3	28.1
Level of Service	C	C	C	D	C	B	B	B	B	B	B	C
Approach Delay (s)		33.4			34.8		10.5		26.4			26.4
Approach LOS		C			C		B		C			C
Intersection Summary												
HCM Average Control Delay	25.4 HCM Level of Service C											
HCM Volume to Capacity ratio	0.74											
Actuated Cycle Length (s)	88.7 Sum of lost time (s) 9.0											
Intersection Capacity Utilization	72.0% ICU Level of Service C											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	102	91	141	218	62	46	434	66	42	1013	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1829	1925	1614	1554	1636	1372	1829	3558	1829	3657	1577	1577
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (perm)	1829	1925	1614	1554	1636	1372	1829	3558	1829	3657	1577	1577
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	24	113	101	157	242	69	51	482	73	47	1126	178
RTOR Reduction (vph)	0	0	87	0	0	28	0	9	0	0	0	83
Lane Group Flow (vph)	24	113	14	157	242	41	51	546	0	47	1126	95
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)				10	10	10	10	10	10	10	10	10
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4		3	3	3	1	6	5	2		
Permitted Phases			4			3					2	
Actuated Green, G (s)	13.1	13.1	13.1	18.7	18.7	18.7	6.6	46.0	5.2	44.6	44.6	44.6
Effective Green, g (s)	14.1	14.1	14.1	19.7	19.7	19.7	7.6	48.0	6.2	46.6	46.6	46.6
Actuated g/C Ratio	0.14	0.14	0.14	0.20	0.20	0.20	0.08	0.48	0.06	0.47	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	271	228	306	322	270	139	1708	113	1704	735	735
vis Ratio Prot	0.01	c0.06	0.10	c0.15	c0.15	0.03	0.15	0.15	c0.03	c0.31		
vis Ratio Perm	0.09	0.42	0.06	0.51	0.75	0.15	0.37	0.32	0.42	0.66	0.13	0.13
Uniform Delay, d1	37.4	39.2	37.2	35.9	37.8	33.2	43.9	16.0	45.2	20.6	15.2	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.39	0.65	1.48	0.46	0.45	0.45
Incremental Delay, d2	0.2	1.0	0.1	1.5	9.5	0.3	1.5	0.5	2.0	1.7	0.3	0.3
Delay (s)	37.5	40.2	37.3	37.3	47.4	33.5	62.5	10.8	69.0	11.2	7.1	7.1
Level of Service	D	D	D	D	D	C	E	B	E	B	B	A
Approach Delay (s)												
Approach LOS												
Intersection Summary												
HCM Average Control Delay	20.7 HCM Level of Service C											
HCM Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	60.5% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	11	1	26	83	61	25	492	53	64	1066	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	0.99	1.00	0.93	1.00	0.93	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Fipb, ped/bikes	0.99	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Flt	0.99	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Flt Protected	0.99	1.00	0.99	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1592	1592	1591	1292	1554	1594	1500	1596	1500	1596	1596	1596
Flt Permitted	0.97	1.00	1.00	0.93	1.00	0.93	1.00	0.93	1.00	0.93	1.00	0.93
Satd. Flow (perm)	1558	1558	1558	1292	1502	1594	1500	1594	1500	1594	1596	1596
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	2	12	1	29	91	67	27	541	58	70	1171	120
RTOR Reduction (vph)	0	1	0	0	0	57	0	2	0	0	2	0
Lane Group Flow (vph)	0	14	0	0	120	10	27	597	0	70	1289	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2	6	6		
Permitted Phases			4			8					6	
Actuated Green, G (s)	13.7	13.7	13.7	13.7	13.7	13.7	78.3	78.3	78.3	78.3	78.3	78.3
Effective Green, g (s)	14.7	14.7	14.7	14.7	14.7	14.7	79.3	79.3	79.3	79.3	79.3	79.3
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15	0.15	0.79	0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	229	229	221	190	112	1264	498	1266	498	1266	498	1266
vis Ratio Prot	0.01	0.01	0.01	0.08	0.01	0.19	0.11	0.11	0.11	0.11	0.11	0.11
vis Ratio Perm	0.06	0.06	0.06	0.54	0.06	0.24	0.47	0.47	0.47	0.47	0.47	0.47
Uniform Delay, d1	36.7	36.7	36.7	39.5	36.7	2.6	3.4	2.4	2.4	10.4	10.4	10.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.63	1.81	1.81	1.81	0.51	2.17	2.17
Incremental Delay, d2	0.1	0.1	0.1	2.7	0.1	4.7	1.2	1.2	1.2	0.5	27.3	27.3
Delay (s)	36.8	36.8	36.8	42.2	36.8	9.0	7.4	7.4	7.4	1.7	49.8	49.8
Level of Service	D	D	D	D	D	A	A	A	A	A	D	D
Approach Delay (s)												
Approach LOS												
Intersection Summary												
HCM Average Control Delay	35.2 HCM Level of Service D											
HCM Volume to Capacity ratio	0.94											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	88.0% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	39	54	80	50	134	22	42	509	33	3	1013	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.99	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Flt Protected	1.00	0.91	1.00	0.98	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1538	1459	1537	1594	1554	1618	1554	1618	1546	1614	1546	1614
Satd. Flow (perm)	702	1459	802	1594	802	1594	229	1618	663	1614	663	1614
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	41	57	84	53	141	23	44	536	35	3	1066	85
RTOR Reduction (vph)	0	65	0	0	8	0	0	1	0	0	0	2
Lane Group Flow (vph)	41	76	0	53	156	0	44	570	0	3	1149	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2				6	
Permitted Phases	4			8			2				6	
Actuated Green, G (s)	15.1	15.1	15.1	15.1	15.1	15.1	76.9	76.9	76.9	76.9	76.9	76.9
Effective Green, g (s)	16.1	16.1	16.1	16.1	16.1	16.1	77.9	77.9	77.9	77.9	77.9	77.9
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.16	0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	113	235	129	257	129	257	178	1260	516	1257	516	1257
vis Ratio Prot	0.05			c0.10			0.19	0.35			c0.71	
vis Ratio Perm	0.06	0.32	0.41	0.61	0.25	0.45	0.01	0.91			0.01	0.91
v/c Ratio	0.36	0.32	0.41	0.61	0.25	0.45	0.01	0.91			0.01	0.91
Uniform Delay, d1	37.4	37.1	37.7	39.0	3.0	3.8	2.5	8.5			2.5	8.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.86	1.53			0.86	1.53
Incremental Delay, d2	2.0	0.8	2.1	4.0	3.3	1.2	0.0	3.2			0.0	3.2
Delay (s)	39.4	37.9	39.8	43.1	6.3	4.9	2.1	16.2			2.1	16.2
Level of Service	D	D	D	D	A	A	A	A			A	B
Approach Delay (s)	38.2			42.3			5.0				16.1	
Approach LOS	D			D			A				B	
Intersection Summary												
HCM Average Control Delay	17.5 HCM Level of Service B											
HCM Volume to Capacity ratio	0.86											
Actuated Cycle Length (s)	100.0 Sum of lost time (s)											
Intersection Capacity Utilization	81.6% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	165	237	214	392	737	48	147	496	89	18	902	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.85	1.00	0.89	1.00	0.95	1.00	1.00	0.85	1.00	0.97
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	3547	3657	1452	1829	3616	3547	1925	1345	1554	3249	1554	3249
Satd. Flow (perm)	3547	3657	1452	1829	3616	3547	1925	1345	1554	3249	1554	3249
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	181	260	235	431	810	53	162	545	98	20	991	258
RTOR Reduction (vph)	0	0	184	0	5	0	0	0	0	57	0	21
Lane Group Flow (vph)	181	260	51	431	858	0	162	545	41	20	1228	0
Confl. Peds. (#/hr)	72	72	72	72	72	12	72	72	72	72	72	72
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases	7	4	4	3	8	5	2	2	1	1	6	
Permitted Phases	4			4			2				2	
Actuated Green, G (s)	10.4	14.9	14.9	23.6	28.1	9.2	40.2	40.2	40.2	3.3	34.3	
Effective Green, g (s)	11.4	16.9	16.9	24.6	30.1	10.2	42.2	42.2	42.2	4.3	36.3	
Actuated g/C Ratio	0.11	0.17	0.17	0.25	0.30	0.10	0.42	0.42	0.42	0.04	0.36	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	404	618	245	450	1088	362	812	568	67	1179	568	1179
vis Ratio Prot	c0.05	0.07		c0.24	c0.24	c0.05	0.28	0.01	c0.38		0.03	
vis Ratio Perm	0.45	0.42	0.21	0.96	0.79	0.45	0.67	0.07	0.30	1.04	0.07	0.30
v/c Ratio	0.45	0.42	0.21	0.96	0.79	0.45	0.67	0.07	0.30	1.04	0.07	0.30
Uniform Delay, d1	41.4	37.2	35.8	37.2	32.0	42.2	23.3	17.2	46.4	31.9	17.2	46.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.82	0.74	1.13	1.00	1.00	0.82	0.74
Incremental Delay, d2	0.8	0.5	0.4	3.14	3.9	0.9	4.3	0.2	2.5	37.7	0.2	2.5
Delay (s)	42.2	37.6	36.2	68.6	35.9	35.3	21.6	19.7	48.9	69.5	19.7	48.9
Level of Service	D	D	D	E	D	D	C	B	D	E	C	B
Approach Delay (s)	38.3			46.8			24.1			69.2		
Approach LOS	D			D			C			E		
Intersection Summary												
HCM Average Control Delay	47.9 HCM Level of Service D											
HCM Volume to Capacity ratio	0.86											
Actuated Cycle Length (s)	100.0 Sum of lost time (s)											
Intersection Capacity Utilization	88.7% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/19/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	106	86	23	97	97	87
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	166	134	36	152	152	136
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None	None	None	None	None	None
Median type	None	None	None	None	None	None
Median storage (veh)						
Upstream signal (ft)						
pX platoon unblocked						
VC, conflicting volume	320	496	273			
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	320	496	273			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	97	70	82			
cM capacity (veh/h)	1218	499	738			
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	300	188	288			
Volume Left	0	36	152			
Volume Right	134	0	136			
cSH	1700	1218	589			
Volume to Capacity	0.18	0.03	0.49			
Queue Length 95th (ft)	0	2	67			
Control Delay (s)	0.0	1.8	16.8			
Lane LOS	A	C	C			
Approach Delay (s)	0.0	1.8	16.8			
Approach LOS						
Intersection Summary						
Average Delay	6.7					
Intersection Capacity Utilization	41.3%					
Analysis Period (min)	15					
	ICU Level of Service					
	A					

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/19/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	84	32	14	22	97	87
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	140	53	23	37	162	145
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None	None	None	None	None	None
Median type	None	None	None	None	None	None
Median storage (veh)						
Upstream signal (ft)						
pX platoon unblocked						
VC, conflicting volume	320	496	273			
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	320	496	273			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	97	70	82			
cM capacity (veh/h)	1218	499	738			
Direction, Lane #						
	EB 1	WB 1	NB 1	SB 1		
Volume Total (vph)	217	343	153	178		
Volume Left (vph)	140	37	37	20		
Volume Right (vph)	23	145	27	53		
Hadq (s)	0.10	-0.17	-0.02	-0.12		
Departure Headway (s)	5.5	5.0	5.7	5.6		
Degree Utilization, x	0.33	0.48	0.24	0.28		
Capacity (veh/h)	605	672	556	579		
Control Delay (s)	11.2	12.6	10.5	10.7		
Approach Delay (s)	11.2	12.6	10.5	10.7		
Approach LOS	B	B	B	B		
Intersection Summary						
Delay	11.5					
HCM Level of Service	B					
Intersection Capacity Utilization	44.5%					
Analysis Period (min)	15					
	ICU Level of Service					
	A					

Kotlinger Drive Senior Housing Project
AM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	209	1118	96	124	330	319	84	390	591	981	710	183	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.99	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Satd. Flow (prot)	3547	5180	3547	3657	1599	1829	3657	1599	3547	3547	3545	3545	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Satd. Flow (perm)	3547	5180	3547	3657	1599	1829	3657	1599	3547	3547	3545	3545	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	222	1189	102	132	351	339	89	415	629	1044	755	195	
RTOR Reduction (vph)	0	9	0	0	0	0	0	0	0	0	0	19	
Lane Group Flow (vph)	222	1283	0	132	351	339	89	415	629	1044	931	0	
Conf. Peds. (#/hr)			12			36			36			36	
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases							Free				Free		
Actuated Green, G (s)	10.7	31.0	7.0	27.3	120.0	9.9	14.8	120.0	46.2	51.1	120.0	46.2	
Effective Green, g (s)	11.7	35.0	8.0	31.3	120.0	10.9	17.8	120.0	47.2	54.1	120.0	47.2	
Actuated g/C Ratio	0.10	0.29	0.07	0.26	1.00	0.09	0.15	1.00	0.39	0.45	1.00	0.39	
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	346	1511	236	954	1599	166	542	1599	1395	1598	1395	1598	
vis Ratio Prot	c0.06	c0.25	0.04	0.10	0.10	0.05	c0.11	0.05	c0.29	0.26	c0.29	0.26	
vis Ratio Perm													
v/c Ratio	0.64	0.85	0.56	0.37	0.21	0.54	0.77	0.39	0.75	0.58	0.75	0.58	
Uniform Delay, d1	52.1	40.0	54.3	36.3	0.0	52.1	49.1	0.0	31.3	24.5	31.3	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.68	1.00	0.60	
Incremental Delay, d2	4.0	6.1	2.9	0.2	0.3	3.3	6.4	0.7	2.7	0.4	2.7	0.4	
Delay (s)	56.2	46.1	57.2	36.5	0.3	55.4	55.5	0.7	24.1	15.1	24.1	15.1	
Level of Service	E	D	E	D	A	E	E	A	C	B	C	B	
Approach Delay (s)	47.6		24.9			25.1					19.8		
Approach LOS	D		C			C					B		
Intersection Summary													
HCM Average Control Delay	29.4												
HCM Volume to Capacity ratio	0.77												
Actuated Cycle Length (s)	120.0												
Sum of lost time (s)	9.0												
Intersection Capacity Utilization	81.9%												
ICU Level of Service	D												
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects with Planned TIF Improvements plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	87	52	22	32	36	77	27	922	83	70	234	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	0.99
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.96	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.95	1.00	0.95
Flt Protected	0.95	0.99	0.98	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1477	1479	1479	1599	1391	1823	3612	3612	1829	1818	1829	1818
Flt Permitted	0.95	0.99	0.98	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	1477	1479	1479	1599	1391	1823	3612	3612	1829	1818	1829	1818
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	91	54	23	33	38	80	28	960	86	73	244	114
RTOR Reduction (vph)	0	18	0	0	0	69	0	9	0	0	23	0
Lane Group Flow (vph)	82	68	0	0	71	11	28	1037	0	73	335	0
Conf. Peds. (#/hr)			3			3		4				4
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split			Split			Perm	Perm			Perm	
Protected Phases												
Permitted Phases												
Actuated Green, G (s)	7.3	7.3	4.2	4.2	4.2	18.4	18.4	18.4	18.4	18.4	18.4	18.4
Effective Green, g (s)	9.3	9.3	6.2	6.2	6.2	20.4	20.4	20.4	20.4	20.4	20.4	20.4
Actuated g/C Ratio	0.21	0.21	0.14	0.14	0.14	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	306	306	221	192	405	1641	1641	1641	171	826	171	826
vis Ratio Prot	c0.06	0.05				c0.04						
vis Ratio Perm												
v/c Ratio	0.27	0.22	0.32	0.06	0.07	0.63	0.63	0.63	0.19	0.43	0.43	0.41
Uniform Delay, d1	14.9	14.8	17.5	16.8	6.9	9.4	8.3	8.2	8.3	8.2	8.3	8.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4	0.8	0.1	0.1	0.8	0.8	0.8	1.7	0.3	1.7	0.3
Delay (s)	15.4	15.2	18.3	16.9	7.0	10.2	10.0	10.0	8.5	8.5	8.5	8.5
Level of Service	B	B	B	B	B	A	B	B	A	B	B	A
Approach Delay (s)	15.3		17.6			10.1			8.8		8.8	
Approach LOS	B		B			B			A		B	
Intersection Summary												
HCM Average Control Delay	10.9											
HCM Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	44.9											
Sum of lost time (s)	9.0											
Intersection Capacity Utilization	58.1%											
ICU Level of Service	B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	57	113	72	104	92	42	72	1126	120	40	494	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1829	1925	1613	1554	1636	1371	1829	3582	1829	3657	1571	1571
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	1829	1925	1613	1554	1636	1371	1829	3582	1829	3657	1571	1571
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	58	115	73	106	94	43	73	1149	122	41	504	50
RTOR Reduction (vph)	0	0	55	0	0	38	0	5	0	0	0	21
Lane Group Flow (vph)	58	115	18	106	94	5	73	1266	0	41	504	29
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)												
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Prot	Perm
Protected Phases	4	4		3	3	3	1	6	5	2		
Permitted Phases			4			3					5	2
Actuated Green, G (s)	13.8	13.8	14.1	14.1	14.1	14.1	7.2	68.5	6.6	67.9	67.9	67.9
Effective Green, g (s)	14.8	14.8	14.8	15.1	15.1	15.1	8.2	70.5	7.6	69.9	69.9	69.9
Actuated g/C Ratio	0.12	0.12	0.12	0.13	0.13	0.13	0.07	0.59	0.06	0.58	0.58	0.58
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	226	237	199	196	206	173	125	2104	116	2130	915	915
vis Ratio Prot	0.03	c0.06		c0.07	0.06		0.04	c0.35	c0.02	0.14		
vis Ratio Perm	0.01											
v/c Ratio	0.26	0.49	0.09	0.54	0.46	0.03	0.58	0.60	0.35	0.24	0.03	0.03
Uniform Delay, d1	47.6	49.0	46.6	49.2	48.6	46.0	54.2	15.8	53.8	12.1	10.7	10.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.36	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	1.6	0.2	3.0	1.6	0.1	1.7	0.3	1.9	0.3	0.1	0.1
Delay (s)	48.2	50.6	46.8	52.2	50.2	46.1	63.6	21.9	55.7	12.4	10.7	10.7
Level of Service	D	D	D	D	D	D	E	C	E	B	B	B
Approach Delay (s)		48.9			50.4		24.1				15.2	
Approach LOS		D			D		C				B	
Intersection Summary												
HCM Average Control Delay	27.1 HCM Level of Service C											
HCM Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	61.7% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	88	46	66	20	38	38	38	1213	25	25	622	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.97	1.00	0.92	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	0.97	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.96	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.89
Flt Protected	0.98	1.00	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1437	1587	1276	1511	1627	1554	1609	1609	1554	1609	1609	1609
Flt Permitted	0.84	1.00	0.86	1.00	0.84	1.00	1.00	0.86	1.00	1.00	1.00	0.84
Satd. Flow (perm)	1228	1391	1276	1542	1627	1554	1609	1609	1554	1609	1609	1609
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	91	47	68	21	39	39	40	1251	26	26	641	40
RTOR Reduction (vph)	0	15	0	0	0	32	0	0	0	0	0	2
Lane Group Flow (vph)	0	191	0	0	60	7	40	1277	0	26	679	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2	6	6		
Permitted Phases			4			8					6	
Actuated Green, G (s)	22.0	22.0	22.0	22.0	22.0	22.0	90.0	90.0	90.0	90.0	90.0	90.0
Effective Green, g (s)	23.0	23.0	23.0	23.0	23.0	23.0	91.0	91.0	91.0	91.0	91.0	91.0
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.76	0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	235	235	267	245	411	1234	74	1220	42	42	1120	1120
vis Ratio Prot	c0.16				0.04	0.01	0.07					
vis Ratio Perm	0.81				0.22	0.03	0.10	1.03	0.35	0.56		
v/c Ratio	46.4	41.0	39.4	3.8	14.5	4.8	6.1	6.1	4.8	6.1	6.1	6.1
Uniform Delay, d1	1.00	1.00	1.00	1.00	0.64	1.25	2.38	2.51	2.38	2.51	2.38	2.51
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.8	0.4	0.1	0.1	24.3	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Delay (s)	65.2	41.4	39.5	2.6	42.4	23.8	17.0	17.0	17.0	17.0	17.0	17.0
Level of Service	E	D	D	D	A	D	C	B	C	B	B	B
Approach Delay (s)		65.2			40.6		41.2				17.3	
Approach LOS		E			D		D				B	
Intersection Summary												
HCM Average Control Delay	36.0 HCM Level of Service D											
HCM Volume to Capacity ratio	0.99											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	101.2% ICU Level of Service G											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	86	121	93	37	58	23	48	1171	36	9	605	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.93	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1530	1504	1540	1550	1548	1627	1554	1605	1554	1605	1554	1605
Satd. Flow (perm)	1030	1504	1540	1550	1548	1627	1554	1605	1554	1605	1554	1605
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	91	127	98	39	61	24	51	1233	38	9	637	73
RTOR Reduction (vph)	0	25	0	0	12	0	0	1	0	0	0	3
Lane Group Flow (vph)	91	200	0	39	73	0	51	1270	0	9	707	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	4	8	8	8	2	2	2	2	6	6
Permitted Phases	4	4	4	8	8	8	2	2	2	2	6	6
Actuated Green, G (s)	20.3	20.3	20.3	20.3	20.3	20.3	91.7	91.7	91.7	91.7	91.7	91.7
Effective Green, g (s)	21.3	21.3	21.3	21.3	21.3	21.3	92.7	92.7	92.7	92.7	92.7	92.7
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.18	0.77	0.77	0.77	0.77	0.77	0.77
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	183	267	85	275	418	1257	418	1257	96	1240	418	1257
vis Ratio Prot	c0.13	c0.13	c0.13	0.05	0.05	0.05	c0.78	c0.78	0.07	0.07	0.07	0.07
vis Ratio Perm	0.09	0.75	0.46	0.26	0.12	1.01	0.12	1.01	0.09	0.09	0.57	0.57
v/c Ratio	0.50	0.75	0.46	0.26	0.12	1.01	0.12	1.01	0.09	0.09	0.57	0.57
Uniform Delay, d1	44.5	46.8	44.2	42.6	3.4	13.6	3.3	13.6	3.3	3.3	5.6	5.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	11.2	3.9	0.5	0.6	28.0	0.6	28.0	1.6	1.6	1.6	1.6
Delay (s)	46.6	58.1	48.1	43.1	4.0	41.7	4.0	41.7	8.7	8.7	14.3	14.3
Level of Service	D	E	D	D	D	A	A	D	A	A	B	B
Approach Delay (s)	54.8	54.8	54.8	44.7	44.7	40.2	40.2	40.2	40.2	40.2	40.2	40.2
Approach LOS	D	D	D	D	D	D	D	D	D	D	D	D
Intersection Summary												
HCM Average Control Delay	34.8 HCM Level of Service C											
HCM Volume to Capacity ratio	0.96											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	90.4% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	601	519	152	116	234	27	303	924	517	68	569	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.85	1.00	0.96
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1419	1829	3585	3547	1925	1291	1554	3201	1554	3201
Satd. Flow (perm)	3547	3657	1419	1829	3585	3547	1925	1291	1554	3201	1554	3201
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	771	665	195	149	300	35	388	1185	663	87	729	274
RTOR Reduction (vph)	0	0	118	0	8	0	0	0	174	0	31	0
Lane Group Flow (vph)	771	665	77	149	327	0	388	1185	489	87	972	0
Confl. Peds. (#/hr)	72	72	72	72	72	12	72	72	96	96	72	24
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases	7	4	4	3	8	5	2	2	1	1	6	6
Permitted Phases	7	4	4	3	8	5	2	2	1	1	6	6
Actuated Green, G (s)	23.0	25.3	25.3	13.9	16.2	19.0	52.8	52.8	52.8	10.0	43.8	43.8
Effective Green, g (s)	24.0	27.3	27.3	14.9	18.2	20.0	54.8	54.8	54.8	11.0	45.8	45.8
Actuated g/C Ratio	0.20	0.23	0.23	0.12	0.15	0.17	0.46	0.46	0.46	0.09	0.38	0.38
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	709	832	323	227	544	591	879	590	142	1222	591	879
vis Ratio Prot	c0.22	c0.18	c0.18	c0.08	c0.09	c0.11	c0.62	c0.62	0.06	c0.30	c0.30	c0.30
vis Ratio Perm	0.05	0.05	0.05	0.05	0.05	0.05	0.38	0.38	0.06	0.06	0.38	0.38
v/c Ratio	1.09	0.80	0.24	0.66	0.60	0.66	1.35	1.35	0.83	0.61	0.80	0.80
Uniform Delay, d1	48.0	43.8	37.9	50.1	47.5	46.8	32.6	32.6	28.5	52.4	32.9	32.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.63	0.63	0.37	1.00	1.00	1.00
Incremental Delay, d2	60.0	5.4	0.4	6.7	1.9	2.1	162.8	162.8	10.4	7.6	5.4	5.4
Delay (s)	108.0	49.2	38.2	56.8	49.4	35.6	183.5	183.5	21.0	60.1	38.4	38.4
Level of Service	F	D	D	E	D	D	F	F	C	E	D	D
Approach Delay (s)	75.7	75.7	75.7	51.7	51.7	109.7	109.7	109.7	109.7	40.1	40.1	40.1
Approach LOS	E	E	E	D	D	D	D	D	D	F	F	F
Intersection Summary												
HCM Average Control Delay	80.4 HCM Level of Service F											
HCM Volume to Capacity ratio	1.12											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	92.7% ICU Level of Service F											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/19/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	187	22	14	147	26	33
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	205	24	15	162	29	36
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None	None	None	None	None	None
Median type	None	None	None	None	None	None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	250	450	258			
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	250	450	258			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	99	95	95			
cM capacity (veh/h)	1292	540	753			
Direction, Lane #						
Volume Total	EB 1	WB 1	NB 1			
Volume Left	230	177	65			
Volume Right	0	15	29			
cSH	24	0	36			
Volume to Capacity	1700	1292	642			
Queue Length 95th (ft)	0.14	0.01	0.10			
Control Delay (s)	0	1	8			
Lane LOS	A	A	B			
Approach Delay (s)	0.0	0.8	11.2			
Approach LOS	A	B	B			
Intersection Summary						
Average Delay	1.8			ICU Level of Service		
Intersection Capacity Utilization	34.8%			A		
Analysis Period (min)	15					

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
597: Kotlinger & Adams

4/19/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Volume (vph)	21	50	15	7	36	10	17	35	13	7	24	11
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	26	62	19	9	44	12	21	43	16	9	30	14
Direction, Lane #												
Volume Total (vph)	EB 1	WB 1	NB 1	SB 1								
Volume Left (vph)	106	65	80	52								
Volume Right (vph)	26	9	21	9								
Volume Right (vph)	19	12	16	14								
Hadq (s)	-0.02	-0.01	0.00	-0.09								
Departure Headway (s)	4.3	4.3	4.3	4.3								
Degree Utilization, x	0.13	0.08	0.10	0.06								
Capacity (veh/h)	817	803	788	791								
Control Delay (s)	7.9	7.7	7.8	7.6								
Approach Delay (s)	7.9	7.7	7.8	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	7.8			ICU Level of Service								
HCM Level of Service	A			27.1%								
Intersection Capacity Utilization	27.1%			A								
Analysis Period (min)	15											

Kotlinger Drive Senior Housing Project
PM Peak Hour Existing plus Approved Projects plus Project Conditions

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	240	573	104	372	1395	909	186	308	229	226	250	142	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.98	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3547	5113	3547	3657	1599	1829	3657	1599	1829	3657	3459	3459	
Satd. Flow (perm)	3547	5113	3547	3657	1599	1829	3657	1599	1829	3657	3459	3459	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	264	630	114	409	1533	999	204	338	252	248	275	156	
RTOR Reduction (vph)	0	22	0	0	0	0	0	0	0	0	0	90	
Lane Group Flow (vph)	264	722	0	409	1533	999	204	338	252	248	341	0	
Confl. Peds. (#/hr)			12				36				36		
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases							Free				Free		
Actuated Green, G (s)	7.0	34.8	15.1	42.9	100.0	10.0	18.5	100.0	10.6	19.1	10.6	19.1	
Effective Green, g (s)	8.0	38.8	16.1	46.9	100.0	11.0	21.5	100.0	11.6	22.1	11.6	22.1	
Actuated g/C Ratio	0.08	0.39	0.16	0.47	1.00	0.11	0.22	1.00	0.12	0.22	0.12	0.22	
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	284	1984	571	1715	1599	201	786	1599	411	764	411	764	
vis Ratio Prot	c0.07	0.14		c0.12	c0.42		c0.11	0.09	0.07	0.10	0.07	0.10	
vis Ratio Perm									0.16		0.16	0.60	
v/c Ratio	0.93	0.36	0.72	0.89	0.62	1.01	0.43	0.16	0.60	0.45	0.60	0.45	
Uniform Delay, d1	45.7	21.8	39.8	24.3	0.0	44.5	34.0	0.0	42.0	33.7	42.0	33.7	
Progression Factor	0.82	1.31	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	33.6	0.5	4.3	7.6	1.9	67.4	0.4	0.2	2.5	0.4	2.5	0.4	
Delay (s)	70.9	29.1	44.1	31.9	1.9	111.9	34.3	0.2	44.5	34.1	44.5	34.1	
Level of Service	E	C	D	C	A	F	C	A	D	D	A	C	
Approach Delay (s)			40.1		23.4			43.4				37.9	
Approach LOS			D		C		D				D		
Intersection Summary													
HCM Average Control Delay	31.2											HCM Level of Service	C
HCM Volume to Capacity ratio	0.82												
Actuated Cycle Length (s)	100.0											Sum of lost time (s)	6.0
Intersection Capacity Utilization	80.5%											ICU Level of Service	D
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions with Planned TIF Improvements-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	169	2	35	88	26	220	23	452	10	82	763	236	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.95	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.96	
Flt Protected	0.95	0.97	0.96	1.00	0.96	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1477	1419	1477	1575	1391	1829	3645	1829	1842	1842	1842	1842	
Satd. Flow (perm)	1477	1419	1477	1575	1391	1829	3645	1829	1842	1842	1842	1842	
Peak-hour factor, PHF	0.87	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Adj. Flow (vph)	194	2	41	104	31	259	27	532	12	96	898	278	
RTOR Reduction (vph)	0	19	0	0	0	150	0	1	0	0	9	0	
Lane Group Flow (vph)	120	98	0	135	109	27	543	0	96	1167	0	4	
Confl. Peds. (#/hr)			3				4						
Turn Type	Split	10	10	10	10	10	10	10	10	10	10	10	
Protected Phases													
Permitted Phases													
Actuated Green, G (s)	14.4	14.4	14.4	10.6	10.6	10.6	64.2	64.2	64.2	64.2	64.2	64.2	
Effective Green, g (s)	16.4	16.4	16.4	12.6	12.6	12.6	66.2	66.2	66.2	66.2	66.2	66.2	
Actuated g/C Ratio	0.16	0.16	0.16	0.12	0.12	0.12	0.64	0.64	0.64	0.64	0.64	0.64	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	232	223	232	190	168	74	2316	515	1170	515	1170	1170	
vis Ratio Prot	c0.08	0.07				c0.09					c0.63		
vis Ratio Perm									0.08	0.23		0.12	
v/c Ratio	0.52	0.44	0.71	0.65	0.36	0.23	0.23	0.19	0.19	0.19	1.00	1.00	
Uniform Delay, d1	40.3	39.8	44.0	43.7	9.0	8.1	7.9	18.9	7.9	18.9	18.9	18.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.9	1.4	11.8	8.3	3.0	0.1	0.2	25.5	0.2	25.5	25.5	25.5	
Delay (s)	42.2	41.1	55.9	52.0	12.1	8.2	8.0	44.4	8.0	44.4	44.4	44.4	
Level of Service	D	D	E	D	B	A	A	D	A	D	A	D	
Approach Delay (s)			41.7		53.3			8.4			41.6		
Approach LOS			D		D			A			D		
Intersection Summary													
HCM Average Control Delay	35.8											HCM Level of Service	D
HCM Volume to Capacity ratio	0.88												
Actuated Cycle Length (s)	104.2											Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.5%											ICU Level of Service	E
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	28	85	86	108	182	65	58	682	66	44	1178	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1829	1925	1614	1554	1636	1372	1829	3591	1829	3657	1577	1577
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1829	1925	1614	1554	1636	1372	1829	3591	1829	3657	1577	1577
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	31	94	96	120	202	72	64	758	73	49	1309	224
RTOR Reduction (vph)	0	0	83	0	0	35	0	6	0	0	0	87
Lane Group Flow (vph)	31	94	13	120	202	37	64	825	0	49	1309	137
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)				10	10	10						
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4		3	3	3	1	6	5	2		
Permitted Phases	4			3							2	
Actuated Green, G (s)	12.6	12.6	12.6	17.1	17.1	17.1	6.9	46.7	6.6	46.4	46.4	46.4
Effective Green, g (s)	13.6	13.6	13.6	18.1	18.1	18.1	7.9	48.7	7.6	48.4	48.4	48.4
Actuated g/C Ratio	0.14	0.14	0.14	0.18	0.18	0.18	0.08	0.49	0.08	0.48	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	249	262	220	281	296	248	144	1749	139	1770	763	763
vis Ratio Prot	0.02	c0.05		0.08	c0.12		c0.03	0.23	0.03	c0.36		
vis Ratio Perm	0.12	0.36	0.06	0.43	0.88	0.15	0.44	0.47	0.35	0.74	0.18	0.18
Uniform Delay, d1	38.0	39.2	37.6	36.3	36.3	34.5	44.0	17.1	43.9	20.7	14.6	14.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.29	0.83	1.44	0.44	0.51	0.51
Incremental Delay, d2	0.2	0.8	0.1	1.0	6.4	0.3	1.7	0.7	1.1	2.0	0.4	0.4
Delay (s)	38.2	40.1	37.7	37.4	44.6	34.7	58.3	14.8	64.4	11.2	7.8	7.8
Level of Service	D	D	D	D	D	C	E	B	E	B	A	A
Approach Delay (s)												
Approach LOS												
Intersection Summary												
HCM Average Control Delay	19.5 HCM Level of Service B											
HCM Volume to Capacity ratio	0.64											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	64.0% ICU Level of Service C											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	4	11	11	16	70	74	26	735	52	79	1145	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	0.99	1.00	1.00	1.00	0.93	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Fipb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.99	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.99	1.00	0.98	1.00
Flt Protected	0.99	1.00	1.00	0.99	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1577	1577	1577	1601	1292	1554	1607	1527	1589	1527	1589	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1514	1514	1514	1538	1292	1538	1607	1527	1589	1527	1589	1589
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	4	12	11	18	77	81	29	808	57	87	1258	153
RTOR Reduction (vph)	0	1	0	0	0	70	0	2	0	0	0	3
Lane Group Flow (vph)	0	16	0	0	95	11	29	863	0	87	1408	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2	6	6		
Permitted Phases	4			8							6	
Actuated Green, G (s)	12.7	12.7	12.7	12.7	12.7	12.7	79.3	79.3	79.3	79.3	79.3	79.3
Effective Green, g (s)	13.7	13.7	13.7	13.7	13.7	13.7	80.3	80.3	80.3	80.3	80.3	80.3
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.80	0.80	0.80	0.80	0.80	0.80
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	207	211	177	65	1290	358	1276	1276	358	1276	1276	1276
vis Ratio Prot	0.01	c0.06	0.01	0.36					0.20			
vis Ratio Perm	0.08	0.45	0.06	0.45	0.67	0.24	1.10	1.10	0.24	1.10	1.10	1.10
Uniform Delay, d1	37.6	39.7	37.6	3.0	4.2	2.4	9.9	9.9	2.4	9.9	9.9	9.9
Progression Factor	1.00	1.00	1.00	1.00	1.48	1.76	0.30	2.16	0.30	2.16	2.16	2.16
Incremental Delay, d2	0.2	0.8	0.1	1.5	0.1	16.9	2.3	2.3	1.2	56.0	56.0	56.0
Delay (s)	37.8	39.8	37.8	41.2	37.7	21.4	9.6	9.6	1.9	77.3	77.3	77.3
Level of Service	D	D	D	D	D	C	A	A	A	A	A	A
Approach Delay (s)												
Approach LOS												
Intersection Summary												
HCM Average Control Delay	48.7 HCM Level of Service D											
HCM Volume to Capacity ratio	1.01											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	87.9% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	43	46	80	52	136	25	56	744	38	3	1079	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.90	1.00	0.98	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1538	1447	1536	1536	1590	1554	1621	1550	1614	1550	1614	1614
Satd. Flow (perm)	690	1447	848	848	1590	169	1621	462	1614	462	1614	1614
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	45	48	84	55	143	26	59	783	40	3	1136	89
RTOR Reduction (vph)	0	70	0	0	8	0	0	1	0	0	0	2
Lane Group Flow (vph)	45	62	0	55	161	0	59	822	0	3	1223	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	4	8	8	8	2	2	2	6	6	6
Permitted Phases	4	4	4	8	8	8	2	2	2	6	6	6
Actuated Green, G (s)	15.4	15.4	15.4	15.4	15.4	15.4	76.6	76.6	76.6	76.6	76.6	76.6
Effective Green, g (s)	16.4	16.4	16.4	16.4	16.4	16.4	77.6	77.6	77.6	77.6	77.6	77.6
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.16	0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	113	237	139	261	131	1258	359	1252	359	1252	1252	1252
vis Ratio Prot	0.04	0.04	0.04	c0.10	c0.10	0.51	0.51	0.51	0.51	0.51	0.51	0.51
vis Ratio Perm	0.07	0.06	0.06	0.06	0.06	0.35	0.35	0.35	0.35	0.35	0.35	0.35
v/c Ratio	0.40	0.26	0.40	0.62	0.45	0.65	0.65	0.65	0.65	0.01	0.98	0.98
Uniform Delay, d1	37.4	36.5	37.4	38.9	37.4	38.9	3.9	5.1	2.5	10.4	10.4	10.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89	1.56	1.56
Incremental Delay, d2	2.3	0.6	1.9	4.3	10.8	2.7	10.8	2.7	0.0	4.0	4.0	4.0
Delay (s)	39.7	37.1	39.2	43.1	14.6	7.7	23.3	20.2	20.2	20.2	20.2	20.2
Level of Service	D	D	D	D	D	B	A	A	A	A	C	C
Approach Delay (s)	37.8	37.8	37.8	42.2	42.2	8.2	8.2	8.2	8.2	20.2	20.2	20.2
Approach LOS	D	D	D	D	D	A	A	A	A	C	C	C
Intersection Summary												
HCM Average Control Delay	19.2 HCM Level of Service B											
HCM Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	85.6% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	178	233	209	455	714	62	174	775	127	19	944	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	0.97	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	0.97
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1452	3547	3604	3547	1925	1345	1554	1554	3268	3268
Satd. Flow (perm)	3547	3657	1452	3547	3604	3547	1925	1345	1554	1554	3268	3268
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	196	256	230	500	785	68	191	852	140	21	1037	224
RTOR Reduction (vph)	0	0	130	0	7	0	0	0	0	60	0	18
Lane Group Flow (vph)	196	256	100	500	846	0	191	852	80	21	1243	0
Confl. Peds. (#/hr)	72	72	72	72	72	12	12	96	96	96	96	24
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Prot	Prot	Prot	Prot
Protected Phases	7	4	4	3	8	5	2	2	1	1	6	6
Permitted Phases	7	4	4	3	8	5	2	2	1	1	6	6
Actuated Green, G (s)	7.0	14.9	14.9	17.6	25.5	7.0	46.7	46.7	2.8	42.5	42.5	42.5
Effective Green, g (s)	8.0	16.9	16.9	18.6	27.5	8.0	48.7	48.7	3.8	44.5	44.5	44.5
Actuated g/C Ratio	0.08	0.17	0.17	0.19	0.28	0.08	0.49	0.49	0.04	0.44	0.44	0.44
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	284	618	245	660	991	284	937	655	59	1454	1454	1454
vis Ratio Prot	c0.06	0.07	0.07	0.14	c0.23	c0.05	c0.44	c0.44	0.01	0.38	0.38	0.38
vis Ratio Perm	0.07	0.07	0.07	0.14	0.14	0.06	0.06	0.06	0.06	0.06	0.06	0.06
v/c Ratio	0.69	0.41	0.41	0.76	0.85	0.67	0.91	0.91	0.12	0.36	0.85	0.85
Uniform Delay, d1	44.8	37.1	37.1	38.6	34.3	44.7	23.6	23.6	14.0	46.9	24.9	24.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.13	0.64	0.37	1.00	1.00	1.00
Incremental Delay, d2	7.0	0.5	1.1	5.0	7.3	5.8	13.7	0.4	3.7	6.6	6.6	6.6
Delay (s)	51.8	37.6	38.2	43.5	41.6	56.4	28.8	5.5	50.6	31.8	31.8	31.8
Level of Service	D	D	D	D	D	E	C	A	D	C	C	C
Approach Delay (s)	41.9	41.9	41.9	42.3	42.3	30.5	30.5	30.5	31.8	31.8	31.8	31.8
Approach LOS	D	D	D	D	D	C	C	C	D	C	C	C
Intersection Summary												
HCM Average Control Delay	36.1 HCM Level of Service D											
HCM Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 9.0											
Intersection Capacity Utilization	87.8% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions with Planned TIF Improvements-No Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	115	95	30	120	107	95
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	180	148	47	188	167	148
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None	None	None	None	None	None
Median type	None	None	None	None	None	None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	348	575	294			
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCU, unblocked vol	348	575	294			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	96	62	79			
cM capacity (veh/h)	1189	444	719			
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	328	234	316			
Volume Left	0	47	167			
Volume Right	148	0	148			
cSH	1700	1189	541			
Volume to Capacity	0.19	0.04	0.58			
Queue Length 95th (ft)	0	3	93			
Control Delay (s)	0.0	1.9	20.5			
Lane LOS	A	C	C			
Approach Delay (s)	0.0	1.9	20.5			
Approach LOS						
Intersection Summary						
Average Delay				7.9		
Intersection Capacity Utilization				44.0%	ICU Level of Service	A
Analysis Period (min)				15		

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Volume (vph)	90	37	20	25	98	90	25	60	20	15	70	35
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	150	62	33	42	163	150	42	100	33	25	117	58
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	245	355	175	200								
Volume Left (vph)	150	42	42	25								
Volume Right (vph)	33	150	33	58								
Hadq (s)	0.07	-0.17	-0.03	-0.12								
Departure Headway (s)	5.7	5.3	5.9	5.8								
Degree Utilization, x	0.39	0.52	0.29	0.32								
Capacity (veh/h)	561	639	533	552								
Control Delay (s)	12.3	13.9	11.3	11.5								
Approach Delay (s)	12.3	13.9	11.3	11.5								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay					12.6							
HCM Level of Service					B							
Intersection Capacity Utilization					45.7%	ICU Level of Service						A
Analysis Period (min)					15							

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	160	1224	143	254	741	363	140	346	644	666	706	169	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.97	0.95		
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Flt	1.00	0.98	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00		
Satd. Flow (prot)	3547	5156	3547	3657	1599	1829	3657	1599	3547	3547	3551		
Flt Permitted	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00		
Satd. Flow (perm)	3547	5156	3547	3657	1599	1829	3657	1599	3547	3547	3551		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	170	1302	152	270	788	386	149	368	685	709	751	180	
RTOR Reduction (vph)	0	12	0	0	0	0	0	0	0	0	0	17	
Lane Group Flow (vph)	170	1442	0	270	788	386	149	368	685	709	914	0	
Conf. Peds. (#/hr)			12			36			36				
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases							Free				Free		
Actuated Green, G (s)	8.8	35.3	11.7	38.2	120.0	12.9	16.3	120.0	35.7	39.1			
Effective Green, g (s)	9.8	39.3	12.7	42.2	120.0	13.9	19.3	120.0	36.7	42.1			
Actuated g/C Ratio	0.08	0.33	0.11	0.35	1.00	0.12	0.16	1.00	0.31	0.35			
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	290	1889	375	1286	1599	212	588	1599	1085	1246			
vis Ratio Prot	0.05	c0.28	c0.08	0.22		c0.08	c0.10		0.20	c0.26			
vis Ratio Perm									c0.43				
v/c Ratio	0.59	0.85	0.72	0.61	0.24	0.70	0.63	0.43	0.65	0.73			
Uniform Delay, d1	53.1	37.7	51.9	32.1	0.0	51.1	47.0	0.0	36.1	34.0			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.78			
Incremental Delay, d2	3.0	5.7	6.5	0.9	0.4	10.1	2.1	0.8	2.8	2.1			
Delay (s)	56.2	43.4	58.4	33.0	0.4	61.1	49.1	0.8	31.6	28.6			
Level of Service	E	D	E	C	A	E	D	A	C	C			
Approach Delay (s)		44.7			29.0		23.1			29.9			
Approach LOS		D			C		C			C			
Intersection Summary													
HCM Average Control Delay	32.4 HCM Level of Service C												
HCM Volume to Capacity ratio	0.76												
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 9.0												
Intersection Capacity Utilization	80.2% ICU Level of Service D												
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions with Planned TIF Improvements-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	92	49	13	31	31	30	76	36	1015	93	112	399
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.99	1.00	0.99
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.97	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.96	1.00	0.96
Flt Protected	0.95	0.99	0.98	1.00	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1477	1496	1477	1496	1596	1391	1825	3611	1829	1825		
Flt Permitted	0.95	0.99	0.98	1.00	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1477	1496	1477	1496	1596	1391	1825	3611	1829	1825		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	96	51	14	32	31	79	38	1057	97	117	416	175
RTOR Reduction (vph)	0	11	0	0	0	68	0	9	0	0	20	0
Lane Group Flow (vph)	80	70	0	0	63	11	38	1145	0	117	571	0
Conf. Peds. (#/hr)			3		3		4					4
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split			Split			Perm	Perm		Perm		
Protected Phases												
Permitted Phases							3	3	2		6	
Actuated Green, G (s)	7.5	7.5	4.3	4.3	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Effective Green, g (s)	9.5	9.5	6.3	6.3	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Actuated g/C Ratio	0.20	0.20	0.13	0.13	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	297	300	213	185	240	1718			163	888		
vis Ratio Prot	c0.05	0.05		c0.04					0.32			
vis Ratio Perm										c0.34		
v/c Ratio	0.27	0.23	0.30	0.06	0.16	0.67			0.72	0.66		
Uniform Delay, d1	16.0	15.8	18.5	17.9	7.0	9.5			9.9	9.5		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00		
Incremental Delay, d2	0.5	0.4	0.8	0.1	0.3	1.0			14.0	1.8		
Delay (s)	16.5	16.2	19.3	18.0	7.3	10.5			23.9	11.3		
Level of Service	B	B	B	B	A	B			C	B		
Approach Delay (s)		16.4			18.6				10.4			
Approach LOS		B			B				B			
Intersection Summary												
HCM Average Control Delay	12.3 HCM Level of Service B											
HCM Volume to Capacity ratio	0.54											
Actuated Cycle Length (s)	47.3 Sum of lost time (s) 9.0											
Intersection Capacity Utilization	60.8% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	103	91	103	81	45	63	1213	84	46	779	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Flpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1829	1925	1613	1554	1636	1371	1829	3606	1829	3657	1571	1571
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1829	1925	1613	1554	1636	1371	1829	3606	1829	3657	1571	1571
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	105	93	105	83	46	64	1238	86	47	795	70
RTOR Reduction (vph)	0	0	77	0	0	40	0	3	0	0	0	29
Lane Group Flow (vph)	81	105	16	105	83	6	64	1321	0	47	795	41
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)												
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4		3	3	3	1	6	5	2		
Permitted Phases			4			3					2	
Actuated Green, G (s)	13.5	13.5	14.1	14.1	14.1	14.1	7.2	68.7	6.7	68.2	68.2	68.2
Effective Green, g (s)	14.5	14.5	15.1	15.1	15.1	15.1	8.2	70.7	7.7	70.2	70.2	70.2
Actuated g/C Ratio	0.12	0.12	0.13	0.13	0.13	0.13	0.07	0.59	0.06	0.59	0.59	0.59
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	233	195	196	206	173	125	2125	117	2139	919	919
vis Ratio Prot	0.04	c0.05		c0.07	0.05		0.03	c0.37		c0.03	0.22	
vis Ratio Perm			0.01			0.00						0.03
v/c Ratio	0.37	0.45	0.08	0.54	0.40	0.03	0.51	0.62	0.40	0.37	0.04	0.04
Uniform Delay, d1	48.5	49.0	46.8	49.2	48.3	46.0	54.0	16.0	53.9	13.2	10.6	10.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.26	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	1.4	0.2	2.8	1.3	0.1	1.3	0.5	2.3	0.5	0.1	0.1
Delay (s)	49.6	50.4	47.0	52.0	49.6	46.1	60.2	20.6	56.2	13.7	10.7	10.7
Level of Service	D	D	D	D	D	D	E	C	E	B	B	B
Approach Delay (s)			49.0			50.0		22.5			15.7	
Approach LOS			D			D		C			B	
Intersection Summary												
HCM Average Control Delay	25.2											
HCM Volume to Capacity ratio	0.57											
Actuated Cycle Length (s)	120.0											
Intersection Capacity Utilization	62.9%											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	22	19	10	38	54	30	1263	18	58	832	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.98	1.00	0.92	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	0.96	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.97	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flt Protected	0.97	1.00	0.99	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1459	1602	1276	1554	1629	1554	1629	1554	1590	1554	1590	1590
Flt Permitted	0.80	1.00	0.96	1.00	0.25	1.00	1.00	0.09	1.00	0.09	1.00	1.00
Satd. Flow (perm)	1203	1546	1276	1546	1276	1546	1276	1546	152	1590	1590	1590
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	62	23	20	10	39	56	31	1302	19	60	888	94
RTOR Reduction (vph)	0	8	0	0	0	49	0	0	0	0	0	2
Lane Group Flow (vph)	0	97	0	0	49	7	31	1321	0	60	950	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2	6	6		
Permitted Phases			4			8					6	
Actuated Green, G (s)	14.8	14.8	14.8	14.8	14.8	14.8	97.2	97.2	97.2	97.2	97.2	97.2
Effective Green, g (s)	15.8	15.8	15.8	15.8	15.8	15.8	98.2	98.2	98.2	98.2	98.2	98.2
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13	0.13	0.82	0.82	0.82	0.82	0.82	0.82
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	158	158	158	204	168	330	1333	c0.81	124	1301	1301	1301
vis Ratio Prot	c0.08			0.03	0.01	0.08				0.39		
vis Ratio Perm	0.62			0.24	0.04	0.09	0.99		0.48	0.73		
v/c Ratio	49.2	49.2	49.2	46.7	45.5	2.1	10.5	3.3	3.3	4.9		
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	0.52	1.36	2.83	2.83	3.29		
Progression Factor	6.9	6.9	6.9	0.6	0.1	0.1	5.6	12.3	12.3	3.5		
Incremental Delay, d2	56.2	56.2	56.2	47.3	45.6	1.2	19.8	21.6	21.6	19.7		
Delay (s)	E	E	E	D	D	A	B	C	C	B		
Level of Service	E	E	E	D	D	A	B	C	C	B		
Approach Delay (s)			56.2			46.4		19.4			19.8	
Approach LOS			E			D		B			B	
Intersection Summary												
HCM Average Control Delay	22.1											
HCM Volume to Capacity ratio	0.94											
Actuated Cycle Length (s)	120.0											
Intersection Capacity Utilization	101.0%											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	67	107	105	42	53	18	57	1219	42	9	760	68	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	0.93	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1529	1486	1540	1559	1554	1626	1554	1611	1554	1611	1554	1611	
Flt Permitted	0.66	1.00	0.29	1.00	0.26	1.00	0.05	1.00	0.05	1.00	0.05	1.00	
Satd. Flow (perm)	1089	1486	471	1559	423	1626	80	1611	80	1611	80	1611	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	71	113	111	44	56	19	60	1283	44	9	800	72	
RTOR Reduction (vph)	0	31	0	0	11	0	0	1	0	0	0	2	
Lane Group Flow (vph)	71	193	0	44	64	0	60	1326	0	9	870	0	
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	
Protected Phases	4			8			2				6		
Permitted Phases	4			8			2				6		
Actuated Green, G (s)	19.9	19.9	19.9	19.9	19.9	19.9	92.1	92.1	92.1	92.1	92.1	92.1	
Effective Green, g (s)	20.9	20.9	20.9	20.9	20.9	20.9	93.1	93.1	93.1	93.1	93.1	93.1	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.78	0.78	0.78	0.78	0.78	0.78	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	186	259	82	272	0.04		328	1262	62	1250	62	1250	
vis Ratio Prot	c0.13			0.04			0.14		c0.82		0.11		
vis Ratio Perm	0.07	0.74	0.54	0.24	0.18	1.05	0.15	0.15	0.15	0.70			
v/c Ratio	0.38	0.74	0.54	0.24	0.18	1.05	0.15	0.15	0.15	0.70			
Uniform Delay, d1	43.8	47.0	45.1	42.7	3.5	13.5	3.4	6.6	3.4	6.6			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.65	1.96	1.65	1.96			
Incremental Delay, d2	1.3	11.0	6.6	0.4	1.2	39.8	3.3	2.2	3.3	2.2			
Delay (s)	45.1	58.0	51.7	43.1	4.7	53.3	8.9	15.0	8.9	15.0			
Level of Service	D	E	D	D	D	A	A	B	A	B			
Approach Delay (s)	54.9			46.3			51.2		51.2		15.0		
Approach LOS	D			D			D		D		B		
Intersection Summary													
HCM Average Control Delay	39.5											HCM Level of Service	D
HCM Volume to Capacity ratio	0.99												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	6.0
Intersection Capacity Utilization	93.4%											ICU Level of Service	F
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions-No Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	576	498	170	121	188	24	293	989	554	77	740	215	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.85	1.00	0.88	1.00	0.95	1.00	0.85	1.00	0.95	1.00	
Satd. Flow (prot)	3547	3657	1419	3547	3579	3547	3547	1925	1291	1554	3233	3233	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	3547	3657	1419	3547	3579	3547	3547	1925	1291	1554	3233	3233	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
Adj. Flow (vph)	738	638	218	155	241	31	376	1268	710	99	949	276	
RTOR Reduction (vph)	0	0	140	0	9	0	0	0	114	0	22	0	
Lane Group Flow (vph)	738	638	79	155	263	0	376	1268	596	99	1203	0	
Confl. Peds. (#/hr)	72	72	72	72	72	12	72	72	96	72	72	72	
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			4			2			2			
Actuated Green, G (s)	18.2	25.0	25.0	7.0	13.8		15.0	63.0	63.0	7.0	55.0		
Effective Green, g (s)	19.2	27.0	27.0	8.0	15.8		16.0	65.0	65.0	8.0	57.0		
Actuated g/C Ratio	0.16	0.22	0.22	0.07	0.13		0.13	0.54	0.54	0.07	0.48		
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0	4.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	568	823	319	236	471		473	1043	699	104	1536		
vis Ratio Prot	c0.21	c0.17		c0.04	0.07		0.11	c0.66		c0.06	0.37		
vis Ratio Perm	0.06	0.06	0.25	0.66	0.56		0.79	1.22	0.85	0.95	0.78		
v/c Ratio	1.30	0.78	0.25	0.66	0.56		0.79	1.22	0.85	0.95	0.78		
Uniform Delay, d1	50.4	43.7	38.1	54.7	48.8		50.4	27.5	23.4	55.8	26.3		
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.73	0.54	0.26	1.00	1.00		
Incremental Delay, d2	147.3	4.6	0.4	6.4	1.4		7.0	104.0	9.9	72.5	4.1		
Delay (s)	197.7	48.3	38.6	61.1	50.3		43.9	118.8	15.9	128.3	30.4		
Level of Service	F	D	D	E	D		D	F	B	F	C		
Approach Delay (s)	116.1			54.2			75.8		75.8		37.7		
Approach LOS	F			D			E		E		D		
Intersection Summary													
HCM Average Control Delay	76.6											HCM Level of Service	E
HCM Volume to Capacity ratio	1.15												
Actuated Cycle Length (s)	120.0											Sum of lost time (s)	15.0
Intersection Capacity Utilization	94.6%											ICU Level of Service	F
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions with Planned TIF Improvements-No Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	190	25	15	150	30	35
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	209	27	16	165	33	38
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None					
Median type	None					
Median storage (veh)	None					
Upstream signal (ft)	None					
pX, platoon unblocked	None					
VC, conflicting volume	256	460	263			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	256	460	263			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	99	94	95			
cM capacity (veh/h)	1285	532	748			
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	236	181	71			
Volume Left	0	16	33			
Volume Right	27	0	38			
cSH	1700	1285	630			
Volume to Capacity	0.14	0.01	0.11			
Queue Length 95th (ft)	0	1	10			
Control Delay (s)	0.0	0.8	11.4			
Lane LOS	A	B	B			
Approach Delay (s)	0.0	0.8	11.4			
Approach LOS	A	B	B			
Intersection Summary						
Average Delay	2.0					
Intersection Capacity Utilization	36.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	22	60	17	10	50	12
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	27	74	21	12	62	15
Direction, Lane #						
	EB 1	WB 1	NB 1	SB 1		
Volume Total (vph)	122	89	93	59		
Volume Left (vph)	27	12	25	11		
Volume Right (vph)	21	15	19	15		
Hadq (s)	-0.02	0.01	0.01	-0.08		
Departure Headway (s)	4.3	4.4	4.5	4.4		
Degree Utilization, x	0.15	0.11	0.11	0.07		
Capacity (veh/h)	798	775	764	763		
Control Delay (s)	8.1	7.9	8.0	7.8		
Approach Delay (s)	8.1	7.9	8.0	7.8		
Approach LOS	A	A	A	A		
Intersection Summary						
Delay	8.0					
HCM Level of Service	A					
Intersection Capacity Utilization	27.7%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	240	574	104	373	1396	909	186	308	226	250	142		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95			
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.98	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			
Satd. Flow (prot)	3547	5113	3547	3657	1599	1829	3657	1599	3547	3459			
Flt Permitted	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			
Satd. Flow (perm)	3547	5113	3547	3657	1599	1829	3657	1599	3547	3459			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	264	631	114	410	1534	999	204	338	253	248	156		
RTOR Reduction (vph)	0	22	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	264	723	0	410	1534	999	204	338	253	248	341	0	
Confl. Peds. (#/hr)			12				36				36		
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases							Free				Free		
Actuated Green, G (s)	7.0	34.8	15.1	42.9	100.0	10.0	18.5	100.0	10.6	19.1			
Effective Green, g (s)	8.0	38.8	16.1	46.9	100.0	11.0	21.5	100.0	11.6	22.1			
Actuated g/C Ratio	0.08	0.39	0.16	0.47	1.00	0.11	0.22	1.00	0.12	0.22			
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	284	1984	571	1715	1599	201	786	1599	411	764			
vis Ratio Prot	c0.07	0.14		c0.12	c0.42		c0.11	0.09	0.07	0.10			
vis Ratio Perm									0.16				
v/c Ratio	0.93	0.36	0.72	0.89	0.62	1.01	0.43	0.16	0.60	0.45			
Uniform Delay, d1	45.7	21.8	39.8	24.3	0.0	44.5	34.0	0.0	42.0	33.7			
Progression Factor	0.82	1.31	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	33.6	0.5	4.3	7.7	1.9	67.4	0.4	0.2	2.5	0.4			
Delay (s)	71.0	29.1	44.1	31.9	1.9	111.9	34.3	0.2	44.5	34.1			
Level of Service	E	C	D	C	A	F	C	A	D	D			
Approach Delay (s)			40.0		23.4		43.4			37.9			
Approach LOS			D		C		D			D			
Intersection Summary													
HCM Average Control Delay	31.2											HCM Level of Service	C
HCM Volume to Capacity ratio	0.82												
Actuated Cycle Length (s)	100.0											Sum of lost time (s)	6.0
Intersection Capacity Utilization	80.5%											ICU Level of Service	D
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions with Planned TIF Improvements plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	170	2	35	88	26	220	23	452	10	82	763	237	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.95	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.96		
Flt Protected	0.95	0.97	0.96	1.00	1.00	0.95	1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1477	1419	1477	1575	1391	1829	3645	1829	1842	1842			
Flt Permitted	0.95	0.97	0.96	1.00	1.00	0.95	1.00	1.00	0.95	1.00			
Satd. Flow (perm)	1477	1419	1477	1575	1391	1829	3645	1829	1842	1842			
Peak-hour factor, PHF	0.87	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Adj. Flow (vph)	195	2	41	104	31	259	27	532	12	96	898	279	
RTOR Reduction (vph)	0	19	0	0	0	150	0	1	0	0	9	0	
Lane Group Flow (vph)	121	98	0	135	109	27	543	0	96	1168	0	4	
Confl. Peds. (#/hr)			3				4						
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10	
Turn Type	Split			Split			Perm	Perm		Perm			
Protected Phases													
Permitted Phases							3	2		6			
Actuated Green, G (s)	14.4	14.4	14.4	10.6	10.6	10.6	64.2	64.2	64.2	64.2	64.2	64.2	
Effective Green, g (s)	16.4	16.4	16.4	12.6	12.6	12.6	66.2	66.2	66.2	66.2	66.2	66.2	
Actuated g/C Ratio	0.16	0.16	0.16	0.12	0.12	0.12	0.64	0.64	0.64	0.64	0.64	0.64	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	232	223	232	190	168	74	2316	515	1170				
vis Ratio Prot	c0.08	0.07		c0.09			0.15		c0.63				
vis Ratio Perm								0.08	0.23				
v/c Ratio	0.52	0.44	0.71	0.65	0.36	0.23	0.19	0.12	0.19	1.00			
Uniform Delay, d1	40.3	39.8	44.0	43.7	9.0	8.1	7.9	18.9					
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	2.1	1.4	11.8	8.3	3.0	0.1	0.2	25.7					
Delay (s)	42.4	41.1	55.9	52.0	12.1	8.2	8.0	44.6					
Level of Service	D	D	E	D	B	A	A	A					
Approach Delay (s)			41.8		53.3		8.4			41.9			
Approach LOS			D		D		A			D			
Intersection Summary													
HCM Average Control Delay	35.9											HCM Level of Service	D
HCM Volume to Capacity ratio	0.88												
Actuated Cycle Length (s)	104.2											Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.6%											ICU Level of Service	E
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	86	111	184	66	58	683	68	44	1178	202	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1829	1925	1614	1554	1636	1372	1829	3589	1829	3657	1577	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	1829	1925	1614	1554	1636	1372	1829	3589	1829	3657	1577	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	31	96	96	123	204	73	64	759	76	49	1309	224
RTOR Reduction (vph)	0	0	83	0	0	35	0	6	0	0	0	88
Lane Group Flow (vph)	31	96	13	123	204	38	64	829	0	49	1309	136
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)				10	10	10						
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4		3	3	3	1	6		5	2	
Permitted Phases	4			3		3						2
Actuated Green, G (s)	12.7	12.7	12.7	17.2	17.2	17.2	6.9	46.5	6.6	46.2	46.2	
Effective Green, g (s)	13.7	13.7	13.7	18.2	18.2	18.2	7.9	48.5	7.6	48.2	48.2	
Actuated g/C Ratio	0.14	0.14	0.14	0.18	0.18	0.18	0.08	0.48	0.08	0.48	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	251	264	221	283	298	250	144	1741	139	1763	760	
vis Ratio Prot	0.02	c0.05		0.08	c0.12		c0.03	0.23	0.03	c0.36		
vis Ratio Perm			0.01			0.03					0.09	
v/c Ratio	0.12	0.36	0.06	0.43	0.88	0.15	0.44	0.48	0.35	0.74	0.18	
Uniform Delay, d1	37.9	39.2	37.5	36.3	36.2	34.4	44.0	17.2	43.9	20.9	14.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.29	0.83	1.45	0.44	0.51	
Incremental Delay, d2	0.2	0.9	0.1	1.1	6.4	0.3	1.7	0.7	1.1	2.0	0.4	
Delay (s)	38.1	40.0	37.7	37.4	44.6	34.7	58.3	15.0	64.5	11.3	7.9	
Level of Service	D	D	D	D	D	C	E	B	E	B	A	
Approach Delay (s)		38.7			40.6			18.1			12.4	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM Average Control Delay	19.6 HCM Level of Service B											
HCM Volume to Capacity ratio	0.64											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 12.0											
Intersection Capacity Utilization	64.1% ICU Level of Service C											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions plus Project

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	13	1	19	73	75	26	736	54	79	1147	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	0.93	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00
Flt	0.99	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.99	1.00	0.98	1.00
Flt Protected	0.99	1.00	0.99	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1584	1584	1597	1292	1554	1606	1528	1589	1528	1589	1528	1589
Flt Permitted	0.95	1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1525	1525	1525	1292	1525	1606	1442	1589	1442	1589	1442	1589
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	4	14	1	21	80	82	29	809	59	87	1260	154
RTOR Reduction (vph)	0	1	0	0	0	71	0	2	0	0	3	0
Lane Group Flow (vph)	0	18	0	0	101	11	29	866	0	87	1411	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2		6	6	
Permitted Phases	4			8		8						6
Actuated Green, G (s)	12.9	12.9	12.9	12.9	12.9	12.9	79.1	79.1	79.1	79.1	79.1	79.1
Effective Green, g (s)	13.9	13.9	13.9	13.9	13.9	13.9	80.1	80.1	80.1	80.1	80.1	80.1
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.80	0.80	0.80	0.80	0.80	0.80
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	212	212	212	180	180	180	66	1286	354	1273	1273	
vis Ratio Prot				c0.07	0.01	0.35			0.20			
vis Ratio Perm	0.01	0.09		0.48	0.06	0.44	0.67	0.25	1.11			
v/c Ratio	0.09	0.37	0.01	0.37	0.06	0.44	0.31	0.43	2.5	1.00		
Uniform Delay, d1	37.5	39.7	37.4	37.4	37.4	37.4	148	17.5	0.31	2.14		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.48	1.75	0.31	2.14		
Incremental Delay, d2	0.2	0.9	0.1	1.7	0.1	16.2	2.3	2.3	1.2	57.9		
Delay (s)	37.7	37.7	37.7	41.4	37.5	20.7	9.8	2.0	79.3	2.0	79.3	
Level of Service	D	D	D	D	D	C	A	A	A	A	E	
Approach Delay (s)		37.7			39.7			10.2			74.8	
Approach LOS		D			D			B			E	
Intersection Summary												
HCM Average Control Delay	49.8 HCM Level of Service D											
HCM Volume to Capacity ratio	1.02											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	88.3% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	43	46	80	52	136	25	56	747	38	3	1084	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.99	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.90	1.00	0.98	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.97
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1538	1447	1536	1590	1554	1621	1550	1614	1550	1614	1550	1614
Satd. Flow (perm)	690	1447	848	1590	165	1621	460	1614	460	1614	460	1614
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	45	48	84	55	143	26	59	786	40	3	1141	89
RTOR Reduction (vph)	0	70	0	0	8	0	0	1	0	0	0	2
Lane Group Flow (vph)	45	62	0	55	161	0	59	825	0	3	1228	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	4	8	8	8	2	2	2	2	2	6
Permitted Phases	4	4	4	8	8	8	2	2	2	2	2	6
Actuated Green, G (s)	15.4	15.4	15.4	15.4	15.4	15.4	76.6	76.6	76.6	76.6	76.6	76.6
Effective Green, g (s)	16.4	16.4	16.4	16.4	16.4	16.4	77.6	77.6	77.6	77.6	77.6	77.6
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.16	0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	113	237	139	261	128	1258	357	1252	357	1252	357	1252
vis Ratio Prot	0.04	0.04	0.04	c0.10	c0.10	0.51	0.51	0.51	0.51	0.51	0.51	0.51
vis Ratio Perm	0.07	0.06	0.06	0.06	0.06	0.36	0.36	0.36	0.36	0.36	0.36	0.36
v/c Ratio	0.40	0.26	0.40	0.62	0.46	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Uniform Delay, d1	37.4	36.5	37.4	38.9	37.4	38.9	3.9	5.1	2.5	10.5	2.5	10.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.6	1.9	4.3	11.5	2.7	0.0	4.4	0.0	4.4	0.0	4.4
Delay (s)	39.7	37.1	39.2	43.1	15.4	7.8	2.3	20.9	2.3	20.9	2.3	20.9
Level of Service	D	D	D	D	D	B	A	A	A	A	A	C
Approach Delay (s)	37.8	37.8	37.8	42.2	42.2	8.3	8.3	20.8	8.3	20.8	8.3	20.8
Approach LOS	D	D	D	D	D	A	A	A	A	A	A	C
Intersection Summary												
HCM Average Control Delay	19.5 HCM Level of Service B											
HCM Volume to Capacity ratio	0.92											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	85.9% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions plus Project

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HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	179	233	209	455	714	62	174	777	127	19	947	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	0.97	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	0.97
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1452	3547	3604	3547	1925	1345	1554	1554	3267	3267
Satd. Flow (perm)	3547	3657	1452	3547	3604	3547	1925	1345	1554	1554	3267	3267
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	197	256	230	500	785	68	191	854	140	21	1041	226
RTOR Reduction (vph)	0	0	129	0	7	0	0	0	0	0	60	0
Lane Group Flow (vph)	197	256	101	500	846	0	191	854	80	21	1249	0
Confl. Peds. (#/hr)	72	72	72	72	72	12	12	96	96	96	96	24
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Prot	Prot	Prot	Prot
Protected Phases	7	4	4	3	8	5	2	2	2	1	1	6
Permitted Phases	7	4	4	3	8	5	2	2	2	1	1	6
Actuated Green, G (s)	7.0	14.9	14.9	17.6	25.5	7.0	46.7	46.7	46.7	2.8	42.5	42.5
Effective Green, g (s)	8.0	16.9	16.9	18.6	27.5	8.0	48.7	48.7	48.7	3.8	44.5	44.5
Actuated g/C Ratio	0.08	0.17	0.17	0.19	0.28	0.08	0.49	0.49	0.49	0.04	0.44	0.44
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	284	618	245	660	991	284	937	655	59	1454	655	1454
vis Ratio Prot	c0.06	0.07	0.07	0.14	c0.23	c0.05	c0.44	c0.44	c0.44	0.01	0.38	0.38
vis Ratio Perm	0.07	0.07	0.07	0.14	0.14	0.14	0.06	0.06	0.06	0.06	0.06	0.06
v/c Ratio	0.69	0.41	0.41	0.76	0.85	0.67	0.91	0.91	0.91	0.12	0.36	0.86
Uniform Delay, d1	44.8	37.1	37.1	38.6	34.3	44.7	23.7	14.0	46.9	24.9	46.9	24.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.13	0.64	0.37	1.00	1.00	1.00
Incremental Delay, d2	7.1	0.5	1.1	5.0	7.3	5.8	13.9	0.4	3.7	6.8	0.4	3.7
Delay (s)	52.0	37.6	38.3	43.5	41.6	56.4	29.1	5.5	50.6	31.7	5.5	31.7
Level of Service	D	D	D	D	D	E	C	A	D	D	C	C
Approach Delay (s)	42.0	42.0	42.0	42.3	42.3	30.7	30.7	30.7	30.7	30.7	30.7	30.7
Approach LOS	D	D	D	D	D	C	C	C	C	C	C	C
Intersection Summary												
HCM Average Control Delay	36.3 HCM Level of Service D											
HCM Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	100.0 Sum of lost time (s) 9.0											
Intersection Capacity Utilization	87.9% ICU Level of Service E											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
AM Peak Hour Buildout Conditions with Planned TIF Improvements plus Project

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HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	116	95	30	120	107	96
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	181	148	47	188	167	150
Pedestrians	20	20	20	20	20	20
Lane Width (ft)	13.0	13.0	13.0	13.0	13.0	13.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0	4.0	4.0
Percent Blockage	2	2	2	2	2	2
Right turn flare (veh)	None					
Median type	None					
Median storage (veh)	None					
Upstream signal (ft)	None					
pX, platoon unblocked	None					
VC, conflicting volume	350	577	295			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	350	577	295			
tC, single (s)	4.1	6.4	6.2			
tC, 2 stage (s)						
tF (s)	2.2	3.5	3.3			
p0 queue free %	96	62	79			
cM capacity (veh/h)	1187	443	717			
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	330	234	317			
Volume Left	0	47	167			
Volume Right	148	0	150			
cSH	1700	1187	541			
Volume to Capacity	0.19	0.04	0.59			
Queue Length 95th (ft)	0	3	94			
Control Delay (s)	0.0	1.9	20.6			
Lane LOS	A	C	C			
Approach Delay (s)	0.0	1.9	20.6			
Approach LOS				C		
Intersection Summary						
Average Delay	7.9					
Intersection Capacity Utilization	44.0%					
Analysis Period (min)	15					
	ICU Level of Service					
	A					

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Volume (vph)	91	37	20	25	98	90	25	60	20	15	70	35
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	152	62	33	42	163	150	42	100	33	25	117	58
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	247	355	175	200								
Volume Left (vph)	152	42	42	25								
Volume Right (vph)	33	150	33	58								
Hadq (s)	0.08	-0.17	-0.03	-0.12								
Departure Headway (s)	5.7	5.3	5.9	5.8								
Degree Utilization, x	0.39	0.52	0.29	0.32								
Capacity (veh/h)	561	638	532	551								
Control Delay (s)	12.3	14.0	11.3	11.6								
Approach Delay (s)	12.3	14.0	11.3	11.6								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay	12.6											
HCM Level of Service	B											
Intersection Capacity Utilization	45.7%											
Analysis Period (min)	15											
	ICU Level of Service											
	A											

HCM Signalized Intersection Capacity Analysis

28: Stanley Blvd & Valley

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	160	1225	143	255	742	363	140	346	645	666	706	169	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	0.97	0.91	0.97	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.98	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3547	5156	3547	3657	1599	1829	3657	1599	1829	3547	3551	3551	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	3547	5156	3547	3657	1599	1829	3657	1599	1829	3547	3551	3551	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	170	1303	152	271	789	386	149	368	686	709	751	180	
RTOR Reduction (vph)	0	12	0	0	0	0	0	0	0	0	0	17	
Lane Group Flow (vph)	170	1443	0	271	789	386	149	368	686	709	914	0	
Conf. Peds. (#/hr)			12			36			36				
Turn Type	Prot	1	6	Prot	5	2	Free	Prot	3	8	Free	Prot	7
Protected Phases													
Permitted Phases							Free				Free		
Actuated Green, G (s)	8.8	35.3	11.7	38.2	120.0	12.9	16.3	120.0	35.7	39.1			
Effective Green, g (s)	9.8	39.3	12.7	42.2	120.0	13.9	19.3	120.0	36.7	42.1			
Actuated g/C Ratio	0.08	0.33	0.11	0.35	1.00	0.12	0.16	1.00	0.31	0.35			
Clearance Time (s)	4.0	7.0	4.0	7.0	4.0	6.0	4.0	6.0	4.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	290	1889	375	1286	1599	212	588	1599	1085	1246			
vis Ratio Prot	0.05	c0.28	c0.08	0.22		c0.08	c0.10		0.20	c0.26			
vis Ratio Perm									c0.43				
v/c Ratio	0.59	0.85	0.72	0.61	0.24	0.70	0.63	0.43	0.65	0.73			
Uniform Delay, d1	53.1	37.7	51.9	32.2	0.0	51.1	47.0	0.0	36.1	34.0			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.78			
Incremental Delay, d2	3.0	5.7	6.7	0.9	0.4	10.1	2.1	0.8	2.8	2.1			
Delay (s)	56.2	43.4	58.7	33.0	0.4	61.1	49.1	0.8	31.6	28.6			
Level of Service	E	D	E	C	A	E	D	A	D	A	C	C	
Approach Delay (s)		44.8		29.1		23.1			29.9				
Approach LOS		D		C		C			C				
Intersection Summary													
HCM Average Control Delay	32.4 HCM Level of Service C												
HCM Volume to Capacity ratio	0.76												
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 9.0												
Intersection Capacity Utilization	80.3% ICU Level of Service D												
Analysis Period (min)	15												
c Critical Lane Group													

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions with Planned TIF Improvements plus Project

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HCM Signalized Intersection Capacity Analysis

30: Vineyard-Tawny & Bernal

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	93	49	13	31	30	76	36	1015	93	112	399	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	0.99
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.97	1.00	0.85	1.00	0.85	1.00	0.99	1.00	0.96	1.00	0.96
Flt Protected	0.95	0.99	0.98	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1477	1496	1596	1391	1825	3611	1829	3611	1829	1825	1825	1825
Flt Permitted	0.95	0.99	0.98	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1477	1496	1596	1391	1825	3611	1829	3611	1829	1825	1825	1825
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	97	51	14	32	31	79	38	1057	97	117	416	176
RTOR Reduction (vph)	0	11	0	0	0	68	0	9	0	0	20	0
Lane Group Flow (vph)	81	70	0	0	63	11	38	1145	0	117	572	0
Conf. Peds. (#/hr)			3			3		4				4
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Split			Split			Split			Perm		Perm
Protected Phases												
Permitted Phases							3		3		2	
Actuated Green, G (s)	7.5	7.5	4.3	4.3	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Effective Green, g (s)	9.5	9.5	6.3	6.3	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Actuated g/C Ratio	0.20	0.20	0.13	0.13	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	297	300	213	185	239	1718	163	868				
vis Ratio Prot	c0.05	0.05		c0.04		0.01	0.08		0.32		0.31	
vis Ratio Perm						0.30	0.16	0.67		0.72	0.66	
v/c Ratio	0.27	0.23	0.30	0.06	0.16	0.67	0.72	0.66		0.72	0.66	
Uniform Delay, d1	16.0	15.8	18.5	17.9	7.0	9.5	9.9	9.5		9.9	9.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.4	0.8	0.1	0.3	1.0	1.0	1.0		1.0	1.0	
Delay (s)	16.5	16.2	19.3	18.0	7.3	10.5	10.5	10.5		10.5	11.3	
Level of Service	B	B	B	B	A	B	A	B		C	B	
Approach Delay (s)		16.4		18.6		10.4		13.4				
Approach LOS		B		B		B		B				
Intersection Summary												
HCM Average Control Delay	12.3 HCM Level of Service B											
HCM Volume to Capacity ratio	0.54											
Actuated Cycle Length (s)	47.3 Sum of lost time (s) 9.0											
Intersection Capacity Utilization	60.8% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions plus Project

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

93: Vineyard-Ray St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	79	105	91	106	83	46	63	1214	87	47	780	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1829	1925	1613	1554	1636	1371	1829	3605	1829	3657	1571	1571
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	1829	1925	1613	1554	1636	1371	1829	3605	1829	3657	1571	1571
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	107	93	108	85	47	64	1239	89	48	796	70
RTOR Reduction (vph)	0	0	76	0	0	41	0	3	0	0	0	29
Lane Group Flow (vph)	81	107	17	108	85	6	64	1325	0	48	796	41
Confl. Peds. (#/hr)			1			1			9			4
Parking (#/hr)												
Turn Type	Split	Perm	Split	Perm	Split	Perm	Prot	Prot	Prot	Prot	Perm	Perm
Protected Phases	4	4		3	3	3	1	6	5	2		
Permitted Phases			4			3					2	
Actuated Green, G (s)	13.5	13.5	14.2	14.2	14.2	7.2	68.6	6.7	68.1	68.1		
Effective Green, g (s)	14.5	14.5	15.2	15.2	15.2	8.2	70.6	7.7	70.1	70.1		
Actuated g/C Ratio	0.12	0.12	0.13	0.13	0.13	0.07	0.59	0.06	0.58	0.58		
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	221	233	195	197	207	174	125	2121	117	2136	918	
vis Ratio Prot	0.04	c0.06		c0.07	0.05		0.03	c0.37		c0.03	0.22	
vis Ratio Perm			0.01			0.00					0.03	
v/c Ratio	0.37	0.46	0.08	0.55	0.41	0.03	0.51	0.62	0.41	0.37	0.04	
Uniform Delay, d1	48.5	49.1	46.9	49.2	48.3	46.0	54.0	16.1	54.0	13.3	10.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.26	1.00	1.00	1.00	
Incremental Delay, d2	1.0	1.4	0.2	3.1	1.3	0.1	1.2	0.5	2.3	0.5	0.1	
Delay (s)	49.6	50.5	47.0	52.3	49.6	46.0	60.6	20.7	56.3	13.8	10.7	
Level of Service	D	D	D	D	D	D	E	C	E	B	B	
Approach Delay (s)		49.1			50.1		22.6			15.8		B
Approach LOS		D			D		C			C		B
Intersection Summary												
HCM Average Control Delay	25.3 HCM Level of Service C											
HCM Volume to Capacity ratio	0.58											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	63.2% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

94: Kotlinger-Spring & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	61	25	19	13	41	55	30	1265	21	59	834	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.98	0.98	0.99	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	0.96	0.96	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.98	0.98	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flt Protected	0.97	0.97	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1465	1597	1276	1554	1628	1554	1628	1554	1590	1590	1590	1590
Flt Permitted	0.80	0.80	0.94	1.00	0.24	1.00	0.24	1.00	0.09	1.00	1.00	0.09
Satd. Flow (perm)	1207	1523	1276	1523	1276	1523	1276	1523	144	1590	1590	1590
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	63	26	20	13	42	57	31	1304	22	61	860	95
RTOR Reduction (vph)	0	8	0	0	0	49	0	0	0	0	0	2
Lane Group Flow (vph)	0	101	0	0	55	8	31	1326	0	61	953	0
Confl. Peds. (#/hr)	36	24	24	24	36	36	36	36	36	36	36	36
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4		8	8	8	2	2	6	6		
Permitted Phases			4			8					6	
Actuated Green, G (s)	15.1	15.1	15.1	15.1	15.1	15.1	96.9	96.9	96.9	96.9	96.9	96.9
Effective Green, g (s)	16.1	16.1	16.1	16.1	16.1	16.1	97.9	97.9	97.9	97.9	97.9	97.9
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13	0.13	0.82	0.82	0.82	0.82	0.82	0.82
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	162	162	162	204	171	326	1328	c0.81		117	1297	
vis Ratio Prot											0.60	
vis Ratio Perm				0.04	0.01	0.08					0.42	
v/c Ratio	0.62	0.62	0.27	0.27	0.04	0.10	1.00	1.00	0.52	0.73		
Uniform Delay, d1	49.1	49.1	46.7	45.3	2.2	11.0	3.5	5.1	2.80	3.23		
Progression Factor	1.00	1.00	1.00	1.00	0.52	1.36	2.80	3.23	2.80	3.23		
Incremental Delay, d2	7.3	7.3	0.7	0.1	0.1	0.1	7.0	15.0	3.6	3.6		
Delay (s)	56.4	56.4	47.4	45.4	1.2	21.9	24.9	20.0	24.9	20.0		
Level of Service	E	E	D	D	D	A	C	C	C	B		
Approach Delay (s)		56.4			46.4		21.5			20.3		C
Approach LOS		E			D		C			C		B
Intersection Summary												
HCM Average Control Delay	23.5 HCM Level of Service C											
HCM Volume to Capacity ratio	0.95											
Actuated Cycle Length (s)	120.0 Sum of lost time (s)											
Intersection Capacity Utilization	101.4% ICU Level of Service G											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

95: Neal St & First

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	67	107	105	42	53	18	57	1224	42	9	765	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.93	1.00	0.96	1.00	0.96	1.00	1.00	1.00	1.00	0.99	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1529	1486	1540	1559	1554	1626	1554	1611	1554	1611	1554	1611
Flt Permitted	0.66	1.00	0.29	1.00	0.26	1.00	0.05	1.00	0.05	1.00	0.05	1.00
Satd. Flow (perm)	1089	1486	471	1559	419	1626	419	1626	75	1611	471	1611
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	71	113	111	44	56	19	60	1288	44	9	805	72
RTOR Reduction (vph)	0	31	0	0	11	0	0	1	0	0	0	2
Lane Group Flow (vph)	71	193	0	44	64	0	60	1331	0	9	875	0
Confl. Peds. (#/hr)	5	5	5	5	5	5	5	5	5	5	5	5
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.9	19.9	19.9	19.9	19.9	19.9	92.1	92.1	92.1	92.1	92.1	92.1
Effective Green, g (s)	20.9	20.9	20.9	20.9	20.9	20.9	93.1	93.1	93.1	93.1	93.1	93.1
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.78	0.78	0.78	0.78	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	186	259	82	272	0.04	325	1262	58	1250	0.12	0.12	0.54
vis Ratio Prot	c0.13			0.04			c0.82			0.14		
vis Ratio Perm	0.07	0.74	0.54	0.24	0.18	1.05	0.16	0.70	0.16	0.16	0.70	0.70
v/c Ratio	0.38	0.38	0.38	0.38	0.38	0.38	1.64	1.95	0.38	0.38	0.38	0.38
Uniform Delay, d1	43.8	47.0	45.1	42.7	3.5	13.5	3.4	6.6	3.4	6.6	3.4	6.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	11.0	6.6	0.4	1.2	41.1	3.8	2.2	3.8	2.2	3.8	2.2
Delay (s)	45.1	58.0	51.7	43.1	4.8	54.6	9.5	15.1	9.5	15.1	9.5	15.1
Level of Service	D	E	D	D	D	D	A	D	A	A	B	B
Approach Delay (s)	54.9			46.3			52.4			15.1		
Approach LOS	D			D			D			B		
Intersection Summary												
HCM Average Control Delay	40.1 HCM Level of Service D											
HCM Volume to Capacity ratio	1.00											
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 6.0											
Intersection Capacity Utilization	93.6% ICU Level of Service F											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions plus Project

Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis

96: Bernal & First St

4/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	578	498	170	121	188	24	293	992	554	77	743	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.85	1.00	0.88	1.00	0.95	1.00	0.85	1.00	0.95	1.00
Satd. Flow (prot)	3547	3657	1419	3547	3579	3547	3547	1925	1291	1554	3232	3232
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3547	3657	1419	3547	3579	3547	3547	1925	1291	1554	3232	3232
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	741	638	218	155	241	31	376	1272	710	99	963	278
RTOR Reduction (vph)	0	0	140	0	9	0	0	0	114	0	22	0
Lane Group Flow (vph)	741	638	79	155	263	0	376	1272	596	99	1209	0
Confl. Peds. (#/hr)	72	72	72	72	72	72	72	72	72	72	72	72
Parking (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot	Perm	Prot	Prot	Prot	Prot	Prot	Prot	Perm	Prot	Prot	Prot
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases	4			4			2			2		6
Actuated Green, G (s)	18.2	25.0	25.0	7.0	13.8	15.0	63.0	63.0	63.0	7.0	55.0	55.0
Effective Green, g (s)	19.2	27.0	27.0	8.0	15.8	16.0	65.0	65.0	65.0	8.0	57.0	57.0
Actuated g/C Ratio	0.16	0.22	0.22	0.07	0.13	0.13	0.54	0.54	0.54	0.07	0.48	0.48
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	568	823	319	236	471	473	1043	699	104	1535	1535	1535
vis Ratio Prot	c0.21	c0.17		c0.04	0.07	0.11	c0.66			c0.06		
vis Ratio Perm	0.06	0.25	0.25	0.66	0.56	0.79	1.22	0.85	0.95	0.79	0.79	0.79
v/c Ratio	1.30	0.78	0.78	0.66	0.56	0.56	2.34	2.34	2.34	0.66	0.66	0.66
Uniform Delay, d1	50.4	43.7	38.1	54.7	48.8	50.4	27.5	23.4	55.8	26.4	26.4	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	149.5	4.6	0.4	6.4	1.4	7.0	105.7	9.9	72.5	4.2	4.2	4.2
Delay (s)	199.9	48.3	38.6	61.1	50.3	43.9	120.5	15.9	128.3	30.6	30.6	30.6
Level of Service	F	D	D	E	D	D	F	B	F	F	C	C
Approach Delay (s)	117.3			54.2			76.8			37.9		
Approach LOS	F			D			E			D		
Intersection Summary												
HCM Average Control Delay	77.4 HCM Level of Service E											
HCM Volume to Capacity ratio	1.16											
Actuated Cycle Length (s)	120.0 Sum of lost time (s) 15.0											
Intersection Capacity Utilization	94.8% ICU Level of Service F											
Analysis Period (min)	15											
c Critical Lane Group												

Kotlinger Drive Senior Housing Project
PM Peak Hour Buildout Conditions with Planned TIF Improvements plus Project

Synchro 7 - Report
W-Trans

HCM Unsignalized Intersection Capacity Analysis
595: Vineyard & Adams

4/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	191	25	16	151	30	36
Sign Control	Free		Free	Stop		
Grade	0%		0%	0%		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	210	27	18	166	33	40
Pedestrians	20		20	20		20
Lane Width (ft)	13.0		13.0	13.0		13.0
Walking Speed (ft/s)	4.0		4.0	4.0		4.0
Percent Blockage	2		2	2		2
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	257		257	465		264
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	257		257	465		264
tC, single (s)	4.1		4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)	2.2		2.2	3.5		3.3
p0 queue free %	99		99	94		95
cM capacity (veh/h)	1284		1284	529		747
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	237	184	73			
Volume Left	0	18	33			
Volume Right	27	0	40			
cSH	1700	1284	629			
Volume to Capacity	0.14	0.01	0.12			
Queue Length 95th (ft)	0	1	10			
Control Delay (s)	0.0	0.9	11.5			
Lane LOS	A	B	B			
Approach Delay (s)	0.0	0.9	11.5			
Approach LOS						
Intersection Summary						
Average Delay				2.0		
Intersection Capacity Utilization				37.0%	ICU Level of Service A	
Analysis Period (min)				15		

HCM Unsignalized Intersection Capacity Analysis
597: Kottinger & Adams

4/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	23	60	17	10	50	12
Sign Control	Stop		Stop		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	28	74	21	12	62	15
Pedestrians	20		20		20	
Lane Width (ft)	13.0		13.0		13.0	
Walking Speed (ft/s)	4.0		4.0		4.0	
Percent Blockage	2		2		2	
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	257		257	465		264
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	257		257	465		264
tC, single (s)	4.1		4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)	2.2		2.2	3.5		3.3
p0 queue free %	99		99	94		95
cM capacity (veh/h)	1284		1284	529		747
Direction, Lane #						
	EB 1	WB 1	NB 1	SB 1		
Volume Total (vph)	123	89	93	60		
Volume Left (vph)	28	12	25	11		
Volume Right (vph)	21	15	19	16		
Hadq (s)	-0.02	0.01	0.01	-0.09		
Departure Headway (s)	4.3	4.4	4.5	4.4		
Degree Utilization, x	0.15	0.11	0.11	0.07		
Capacity (veh/h)	797	774	763	764		
Control Delay (s)	8.1	7.9	8.0	7.8		
Approach Delay (s)	8.1	7.9	8.0	7.8		
Approach LOS	A	A	A	A		
Intersection Summary						
Delay				8.0		
HCM Level of Service				A		
Intersection Capacity Utilization				27.8%	ICU Level of Service A	
Analysis Period (min)				15		

Appendix B

DRAFT

Queuing Calculations

Queuing and Blocking Report

AM Peak Hour Existing plus Approved Project Conditions-No Project

5/13/2013

Intersection: 93: Vineyard-Ray St. & First

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB	SB	SB
	L	T	R	L	T	R	L	T	TR	L	TR	L	T	T
Directions Served	25	143	65	99	294	63	41	63	72	93	1317	1154		
Maximum Queue (ft)	9	85	51	61	184	32	18	25	30	22	959	783		
Average Queue (ft)	27	165	84	120	364	73	50	66	76	100	1453	1229		
95th Queue (ft)	142				1758			116	116	116	1303	1303		
Link Distance (ft)	0													
Upstream Blk Time (%)	2										12	1		
Queuing Penalty (veh)	0										0	0		
Storage Bay Dist (ft)	225			40	75		40	100			125			
Storage Blk Time (%)	31		11	10	45		2	0			52	7		
Queuing Penalty (veh)	35		13	28	89		5	0			22	11		

Intersection: 93: Vineyard-Ray St. & First

Movement	SB	SB
Directions Served	R	
Maximum Queue (ft)	64	
Average Queue (ft)	36	
95th Queue (ft)	163	
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	220	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 94: Kottinger-Spring & First

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB	B788
	LTR	LT	R	L	TR	L	TR	L	TR	T
Directions Served	15	122	57	50	213	47	230	62		
Maximum Queue (ft)	3	67	34	26	107	19	143	20		
Average Queue (ft)	21	140	71	63	236	55	288	109		
95th Queue (ft)	548	473			1064		224	116		
Link Distance (ft)							2	0		
Upstream Blk Time (%)							19	2		
Queuing Penalty (veh)							90			
Storage Bay Dist (ft)	16		0	6	9		9			
Storage Blk Time (%)	10		0	31	2		6			

Network Summary

Network wide Queuing Penalty: 275

Queuing and Blocking Report

PM Peak Hour Existing plus Approved Projects Conditions-No Project

5/14/2013

Intersection: 93: Vineyard-Ray St. & First

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB	SB	SB
	L	T	R	L	T	R	L	T	TR	L	TR	L	T	T
Directions Served	63	135	63	15	91	111	50	82	194	187	139	154		
Maximum Queue (ft)	22	62	43	3	51	60	28	34	181	185	80	95		
Average Queue (ft)	73	150	76	27	101	135	65	96	216	193	170	172		
95th Queue (ft)	142				1018				116	116	224	224		
Link Distance (ft)	0													
Upstream Blk Time (%)	0										19	26		
Queuing Penalty (veh)	0										0	128		
Storage Bay Dist (ft)	225			40	75		40	100			100			
Storage Blk Time (%)	0		27	5	6	13	2	0			21			
Queuing Penalty (veh)	0		34	8	8	19	4	1			15			

Intersection: 93: Vineyard-Ray St. & First

Movement	SB	SB
Directions Served	L	T
Maximum Queue (ft)	36	298
Average Queue (ft)	13	189
95th Queue (ft)	50	315
Link Distance (ft)		1303
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	125	
Storage Blk Time (%)	11	
Queuing Penalty (veh)	4	

Intersection: 94: Kottinger-Spring & First

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB	B788
	LTR	LT	R	L	TR	L	TR	L	TR	T
Directions Served	226	62	62	46	1079	62	301	111		
Maximum Queue (ft)	175	38	33	15	753	18	232	35		
Average Queue (ft)	287	71	72	53	1292	67	363	125		
95th Queue (ft)	548	473			1064		224	116		
Link Distance (ft)							7	9		
Upstream Blk Time (%)							0	60		
Queuing Penalty (veh)							90			
Storage Bay Dist (ft)	60		3	0	24		16			
Storage Blk Time (%)	2		1	4	9		4			

Network Summary

Network wide Queuing Penalty: 479

Queuing and Blocking Report

AM Peak Hour Existing plus Approved Project plus Projct Conditions

5/13/2013

Intersection: 93: Vineyard-Ray St & First

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB	SB
	L	T	R	L	T	R	L	T	TR	L	T	T	T
Directions Served	46	147	65	99	301	57	25	65	95	68	1236	1060	
Maximum Queue (ft)	14	83	50	81	215	33	7	26	39	14	900	722	
Average Queue (ft)	58	165	77	128	416	76	26	66	104	80	1497	1294	
95th Queue (ft)	142			1758				116	116	116	1303	1303	
Link Distance (ft)	0	2	0	0	0	0	0	0	0	1	11	0	
Upstream Blk Time (%)	0	0	0	0	0	0	0	0	0	0	0	0	
Queuing Penalty (veh)	225	0	0	40	75	40	100	0	0	125	0	0	
Storage Bay Dist (ft)	0	27	16	9	44	1	0	0	0	0	49	2	
Storage Blk Time (%)	0	31	20	25	90	5	0	0	0	0	21	4	
Queuing Penalty (veh)	0	0	0	0	0	0	0	0	0	0	0	0	

Intersection: 93: Vineyard-Ray St & First

Movement	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
	T	T	R	L	TR								
Directions Served	102												
Maximum Queue (ft)	32												
Average Queue (ft)	162												
95th Queue (ft)	1303												
Link Distance (ft)	0	0	0	0	0	0	0	0	0	0	0	0	
Upstream Blk Time (%)	0	0	0	0	0	0	0	0	0	0	0	0	
Queuing Penalty (veh)	220												
Storage Bay Dist (ft)	0	9	0	0	0	0	0	0	0	0	0	0	
Storage Blk Time (%)	0	4	0	0	0	0	0	0	0	0	0	0	
Queuing Penalty (veh)	0	0	0	0	0	0	0	0	0	0	0	0	

Intersection: 94: Kottinger-Spring & First

Movement	EB	WB	WB	NB	NB	SB	SB	SB	SB	B788	B788	B788	B788
	LTR	LT	R	L	TR	L	TR	L	TR	L	TR	L	TR
Directions Served	30	118	75	52	176	69	215	26					
Maximum Queue (ft)	16	61	39	21	88	28	143	10					
Average Queue (ft)	42	130	81	54	191	83	250	64					
95th Queue (ft)	548	473			1064		224	116					
Link Distance (ft)	0	0	0	0	0	0	0	0					
Upstream Blk Time (%)	0	0	0	0	0	0	0	0					
Queuing Penalty (veh)	60	60	0	0	90	0	6	1					
Storage Bay Dist (ft)	14	0	0	0	8	0	12						
Storage Blk Time (%)	8	0	1	2	1	13							
Queuing Penalty (veh)	0	0	0	0	0	0	0	0					

Network Summary

Network wide Queuing Penalty: 230

Queuing and Blocking Report

PM Peak Hour Existing plus Approved Projects plus Project Conditions

5/14/2013

Intersection: 93: Vineyard-Ray St & First

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB	SB
	L	T	R	L	T	R	L	T	TR	L	T	T	T
Directions Served	76	139	63	89	97	53	66	204	197	153	171	55	
Maximum Queue (ft)	22	81	45	47	47	26	26	187	186	93	116	25	
Average Queue (ft)	77	173	78	101	106	64	72	208	205	189	206	91	
95th Queue (ft)	142			1758				116	116	116	224	224	
Link Distance (ft)	0	3	0	0	0	0	0	0	0	22	26	0	
Upstream Blk Time (%)	0	0	0	0	0	0	0	0	0	0	0	0	
Queuing Penalty (veh)	225	0	0	40	75	40	100	0	0	148	173	0	
Storage Bay Dist (ft)	0	32	8	3	15	1	1	24					
Storage Blk Time (%)	0	42	14	4	22	3	8	17					
Queuing Penalty (veh)	0	0	0	0	0	0	0	0					

Intersection: 93: Vineyard-Ray St & First

Movement	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
	T	T	R	L	TR								
Directions Served	261	99	51										
Maximum Queue (ft)	162	20	10										
Average Queue (ft)	285	131	89										
95th Queue (ft)	1303	1303											
Link Distance (ft)	0	0	0	0	0	0	0	0					
Upstream Blk Time (%)	0	0	0	0	0	0	0	0					
Queuing Penalty (veh)	220												
Storage Bay Dist (ft)	9	0	0	0	0	0	0	0					
Storage Blk Time (%)	4	0	0	0	0	0	0	0					
Queuing Penalty (veh)	0	0	0	0	0	0	0	0					

Intersection: 94: Kottinger-Spring & First

Movement	EB	WB	WB	NB	NB	SB	SB	SB	SB	B788	B788	B788	B788
	LTR	LT	R	L	TR	L	TR	L	TR	L	TR	L	TR
Directions Served	273	58	33	49	1083	45	295	156					
Maximum Queue (ft)	204	37	21	19	938	15	229	41					
Average Queue (ft)	346	68	42	55	1357	57	368	154					
95th Queue (ft)	548	473			1064		224	116					
Link Distance (ft)	0	0	0	0	0	0	0	0					
Upstream Blk Time (%)	60	60	0	0	90	0	69	7					
Queuing Penalty (veh)	2	0	0	0	25	0	14						
Storage Bay Dist (ft)	1	0	0	0	10	0	4						
Storage Blk Time (%)	0	0	0	0	0	0	0						
Queuing Penalty (veh)	0	0	0	0	0	0	0						

Network Summary

Network wide Queuing Penalty: 526

Queuing and Blocking Report
AM Peak Hour Buildout Conditions-No Project

5/13/2013

Intersection: 93: First & Vineyard-Ray St/Vineyard

Movement	EB	EB	EB	EB	B371	WB	WB	WB	WB	NB	NB	NB	NB	B788	SB
	L	T	R	T	R	L	T	R	L	T	TR	T	TR	T	L
Directions Served	29	140	66	3	99	255	65	72	145	147	6	125			
Maximum Queue (ft)	7	58	47	0	58	133	34	22	71	78	1	27			
Average Queue (ft)	25	133	79	6	118	256	77	67	140	152	9	113			
95th Queue (ft)	142				1018	1758						224			
Link Distance (ft)	1											3			
Upstream Blk Time (%)	0											2			
Queuing Penalty (veh)	0											9			12
Storage Bay Dist (ft)	225				40	75	40	100				125			
Storage Blk Time (%)	21	11			3	37	2	0	4						
Queuing Penalty (veh)	24	13			7	64	6	0	2						

Intersection: 93: First & Vineyard-Ray St/Vineyard

Movement	SB	SB	SB	SB	R
	L	T	R	T	R
Directions Served	1337	1347	222		
Maximum Queue (ft)	1222	1207	53		
Average Queue (ft)	1532	1549	209		
95th Queue (ft)	1303	1303			
Link Distance (ft)	59	57			
Upstream Blk Time (%)	0	0			
Queuing Penalty (veh)	54	6	0		
Storage Bay Dist (ft)	24	13	0		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 94: First & Kottinger-Spring/Kottinger

Movement	EB	WB	WB	NB	NB	SB	SB	SB	SB	B788
	L	TR	R	L	TR	L	TR	L	TR	T
Directions Served	39	85	74	51	389	108	242	10		
Maximum Queue (ft)	11	47	40	18	151	29	124	1		
Average Queue (ft)	34	90	78	52	360	86	225	12		
95th Queue (ft)	548	473			1064		224	116		
Link Distance (ft)										
Upstream Blk Time (%)										1
Queuing Penalty (veh)										12
Storage Bay Dist (ft)	8	1	2	13	3	0	12			
Storage Blk Time (%)	6	1	13	3	0	10				
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 219

Queuing and Blocking Report
PM Peak Hour Buildout Conditions-No Project

5/13/2013

Intersection: 93: Vineyard-Ray St & First

Movement	EB	EB	EB	EB	B371	WB	WB	WB	WB	NB	NB	NB	NB	B788	SB
	L	T	R	T	R	L	T	R	L	T	TR	T	TR	T	L
Directions Served	90	145	64	19	83	104	58	85	191	201	182	192			
Maximum Queue (ft)	43	83	46	4	43	54	30	43	184	188	108	130			
Average Queue (ft)	108	192	82	34	95	117	63	102	199	205	212	213			
95th Queue (ft)	142				1018	1758						224			
Link Distance (ft)	0	6										27			
Upstream Blk Time (%)	0	0										0			
Queuing Penalty (veh)	225				40	75	40	100				137			189
Storage Bay Dist (ft)	0	34	14		3	18	2	0	22						
Storage Blk Time (%)	0	57	25		4	26	4	1	14						
Queuing Penalty (veh)															

Intersection: 93: Vineyard-Ray St & First

Movement	SB	SB	SB	SB	R
	L	T	R	T	R
Directions Served	130	492	451	51	
Maximum Queue (ft)	32	390	235	10	
Average Queue (ft)	119	585	555	89	
95th Queue (ft)	1303	1303			
Link Distance (ft)					
Upstream Blk Time (%)					
Queuing Penalty (veh)	125			220	
Storage Bay Dist (ft)					
Storage Blk Time (%)	35	1			
Queuing Penalty (veh)	16	0			

Intersection: 94: Kottinger-Spring & First

Movement	EB	WB	WB	NB	NB	SB	SB	SB	SB	B788
	L	TR	R	L	TR	L	TR	L	TR	T
Directions Served	109	85	64	54	928	106	295	253		
Maximum Queue (ft)	78	45	40	22	693	57	273	134		
Average Queue (ft)	122	100	80	65	1212	120	312	312		
95th Queue (ft)	548	473			1064		224	116		
Link Distance (ft)										
Upstream Blk Time (%)										5
Queuing Penalty (veh)										0
Storage Bay Dist (ft)	60	60	4	0	20	3	15			
Storage Blk Time (%)	3	2	0	6	25	9				
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 673

Queuing and Blocking Report
AM Peak Hour Buildout plus Project Conditions

5/13/2013

Intersection: 93: First & Vineyard-Ray St/Vineyard

Movement	EB	EB	EB	EB	B371	WB	WB	WB	WB	NB	NB	NB	B788	B788
	L	T	R	T	L	T	R	T	L	T	TR	T	T	T
Directions Served	49	141	66	17	99	294	65	82	138	152	7	6		
Maximum Queue (ft)	10	56	46	2	59	148	42	30	72	80	1	1		
Average Queue (ft)	46	130	79	22	122	294	85	77	140	150	10	8		
95th Queue (ft)	142	142	1018	1018	1758	1758								
Link Distance (ft)	0	1	0	0	0	0	0	3	3	3				
Upstream Blk Time (%)	0	0	0	0	0	0	0	11	13					
Queuing Penalty (veh)	225	40	40	40	75	40	100							
Storage Bay Dist (ft)	0	23	13	6	36	2	0	4						
Storage Blk Time (%)	0	26	14	14	63	7	1	2						
Queuing Penalty (veh)	0	26	14	14	63	7	1	2						

Intersection: 93: First & Vineyard-Ray St/Vineyard

Movement	SB	SB	SB	SB	SB	SB	SB	SB	SB	B788	B788
	L	T	T	R							
Directions Served	148	1336	1335	226							
Maximum Queue (ft)	36	1208	1187	63							
Average Queue (ft)	131	1535	1546	221							
95th Queue (ft)	1303	1303	1303								
Link Distance (ft)	57	54									
Upstream Blk Time (%)	0	0	0	220							
Queuing Penalty (veh)	54	4	0	0							
Storage Bay Dist (ft)	24	8	0	0							
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 94: First & Kottinger-Spring/Kottinger

Movement	EB	WB	WB	NB	NB	SB	SB	SB	SB	B788	B788
	L	TR	R	L	TR	L	TR	L	TR	T	T
Directions Served	56	129	80	62	244	88	225	40	12		
Maximum Queue (ft)	16	58	40	22	132	29	128	4	1		
Average Queue (ft)	49	125	83	59	248	78	239	45	15		
95th Queue (ft)	548	473			1064	224	116	116			
Link Distance (ft)	1	0			1	0					
Upstream Blk Time (%)	13	1			13	1					
Queuing Penalty (veh)	60	60	40	90							
Storage Bay Dist (ft)	12	1	4	14	0	14					
Storage Blk Time (%)	9	1	33	4	1	11					
Queuing Penalty (veh)											

Network Summary

Network wide Queuing Penalty: 256

Queuing and Blocking Report
PM Peak Hour Buildout plus Project Conditions

5/13/2013

Intersection: 93: Vineyard-Ray St & First

Movement	EB	EB	EB	EB	B371	WB	WB	WB	WB	NB	NB	NB	B788	B788
	L	T	R	T	L	T	R	T	L	T	TR	T	T	T
Directions Served	73	171	62	51	94	122	53	98	192	187	200	200		
Maximum Queue (ft)	35	85	46	19	53	63	27	49	183	184	86	122		
Average Queue (ft)	100	200	76	120	111	147	62	114	206	192	224	224		
95th Queue (ft)	142	142	1018	1018	1758	1758								
Link Distance (ft)	0	6	0	0	0	0	0	20	28	1	4			
Upstream Blk Time (%)	0	0	0	0	0	0	0	140	191					
Queuing Penalty (veh)	225	40	40	40	75	40	100							
Storage Bay Dist (ft)	0	36	8	8	15	4	2	22						
Storage Blk Time (%)	1	61	14	14	11	23	8	10	14					
Queuing Penalty (veh)														

Intersection: 93: Vineyard-Ray St & First

Movement	SB	SB	SB	SB	SB	SB	SB	SB	SB	B788	B788
	L	T	T	R							
Directions Served	79	549	471	96							
Maximum Queue (ft)	26	421	266	19							
Average Queue (ft)	93	623	620	127							
95th Queue (ft)	1303	1303									
Link Distance (ft)	125										
Upstream Blk Time (%)	40	0	0	220							
Queuing Penalty (veh)	19	0	0	0							
Storage Bay Dist (ft)											
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 94: Kottinger-Spring & First

Movement	EB	WB	WB	NB	NB	SB	SB	SB	SB	B788	B788
	L	TR	R	L	TR	L	TR	L	TR	T	T
Directions Served	118	103	71	43	994	67	295	245			
Maximum Queue (ft)	73	47	43	16	653	42	256	131			
Average Queue (ft)	129	125	90	49	1237	100	365	314			
95th Queue (ft)	548	473			1064	224	116	116			
Link Distance (ft)	7	12			7	12	8				
Upstream Blk Time (%)	0	0			0	118	40				
Queuing Penalty (veh)	60	60	40	90							
Storage Bay Dist (ft)	9	4	19	7	15						
Storage Blk Time (%)	5	2	6	69	9						
Queuing Penalty (veh)											

Network Summary

Network wide Queuing Penalty: 744

Appendix C

Collision Rate Calculations

INTERSECTION COLLISION RATE CALCULATIONS

Kottinger Drive Senior Housing Redevelopment

Intersection # 1: 1st St & Vineyard Ave-Ray St

Date of Count:

Number of Collisions: 6
Number of Injuries: 5
Number of Fatalities: 0
ADT: 22300
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{6}{22,300} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.15 c/mve	0.0%	83.3%
Statewide Average*	0.36 c/mve	0.5%	39.5%

ADT = average daily total vehicles entering intersection
 c/mve = collisions per million vehicles entering intersection
 * 2009 Collision Data on California State Highways, Caltrans

Intersection # 2: 1st St & Kottinger Dr-Spring St

Date of Count:

Number of Collisions: 9
Number of Injuries: 5
Number of Fatalities: 0
ADT: 19800
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{9}{19,800} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.25 c/mve	0.0%	55.6%
Statewide Average*	0.36 c/mve	0.5%	39.5%

ADT = average daily total vehicles entering intersection
 c/mve = collisions per million vehicles entering intersection
 * 2009 Collision Data on California State Highways, Caltrans

INTERSECTION COLLISION RATE CALCULATIONS

Kottinger Drive Senior Housing Redevelopment

Intersection # 3: 1st St & Neal St

Date of Count:

Number of Collisions: 19
Number of Injuries: 9
Number of Fatalities: 0
ADT: 20300
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{19}{20,300} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.51 c/mve	0.0%	47.4%
Statewide Average*	0.36 c/mve	0.5%	39.5%

ADT = average daily total vehicles entering intersection
 c/mve = collisions per million vehicles entering intersection
 * 2009 Collision Data on California State Highways, Caltrans

Intersection # 4: 1st St & Bernal Ave-Sunol Blvd

Date of Count:

Number of Collisions: 31
Number of Injuries: 10
Number of Fatalities: 0
ADT: 36000
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{31}{36,000} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.47 c/mve	0.0%	32.3%
Statewide Average*	0.36 c/mve	0.5%	39.5%

ADT = average daily total vehicles entering intersection
 c/mve = collisions per million vehicles entering intersection
 * 2009 Collision Data on California State Highways, Caltrans

INTERSECTION COLLISION RATE CALCULATIONS

Kottinger Drive Senior Housing Redevelopment

Intersection # 5: Vineyard Ave & Adams Way

Date of Count:

Number of Collisions: 3
Number of Injuries: 0
Number of Fatalities: 0
ADT: 4200
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{3}{4,200} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.39 c/mve	0.0%	0.0%
Statewide Average*	0.15 c/mve	0.8%	39.7%

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection # 6: Kottinger Dr & Adams Way-Mirador Dr

Date of Count:

Number of Collisions: 1
Number of Injuries: 0
Number of Fatalities: 0
ADT: 2400
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: 4 Way Stop
Area: Urban

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{1}{2,400} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.23 c/mve	0.0%	0.0%
Statewide Average*	0.25 c/mve	0.7%	28.4%

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

INTERSECTION COLLISION RATE CALCULATIONS

Kottinger Drive Senior Housing Redevelopment

Intersection # 7: Stanley Blvd & Bernal Ave-Valley Ave

Date of Count:

Number of Collisions: 15
Number of Injuries: 6
Number of Fatalities: 0
ADT: 51100
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{15}{51,100} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.16 c/mve	0.0%	40.0%
Statewide Average*	0.36 c/mve	0.5%	39.5%

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection # 8: Bernal Ave & Vineayrd Ave-Tawny Dr

Date of Count: Saturday, January 00, 1900

Number of Collisions: 8
Number of Injuries: 4
Number of Fatalities: 0
ADT: 15800
Start Date: July 1, 2006
End Date: June 30, 2011
Number of Years: 5

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

$$\text{collision rate} = \frac{\text{NUMBER OF COLLISIONS} \times 1 \text{ MILLION}}{\text{ADT} \times 365 \text{ DAYS PER YEAR} \times \text{NUMBER OF YEARS}}$$

$$\text{collision rate} = \frac{8}{15,800} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.28 c/mve	0.0%	50.0%
Statewide Average*	0.36 c/mve	0.5%	39.5%

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans