FEHR PEERS

MEMORANDUM

Date: September 23, 2014

To: Chad Kiltz, Lennar Corporation

From: Dan Hennessey and Ellen Poling, Fehr & Peers

Subject: Lafayette Residential Development Transportation Impact Study

WC14-3117

This memorandum summarizes the transportation impact study for the proposed 66-unit residential development, flex space, and restaurant project (Project) in the City of Lafayette. The proposed Project is located at the northwest corner of the Mount Diablo Boulevard intersection with Dolores Drive. The study identifies Project impacts to the surrounding transportation system and recommends measures to mitigate significant impacts. The study also assesses the operations and design parameters of key intersections that will provide primary access to the site, as well as a detailed site plan review from a circulation perspective.

PROJECT DESCRIPTION

The Project consists of 66 residential units, a 4,500-square foot restaurant, and 1,400 square feet of flex space. The parcel is currently occupied by Celia's Mexican Restaurant and three office buildings. Several access options have been evaluated for the site, two of which are assessed in the site access and circulation section of this memorandum. Previous versions of this memorandum other site plan alternatives in more detail:

- April 28, 2014 memo detailed three access alternatives
    - Dolores Drive Only (full access)
    - Dolores Drive (full access) and Mount Diablo Boulevard mid-site (full access)
    - Dolores Drive (full access) and Mount Diablo Boulevard west-end (full access)

- July 28, 2014 memo detailed two additional access alternatives
    - Mount Diablo Boulevard Only mid-site (full access)
    - Mount Diablo Boulevard mid-site (full access) and Dolores Drive (full access)

The proposed Project now has a full access driveway on Dolores Drive and a right-in, right-out only driveway on Mount Diablo Boulevard, and the Project alternative has the same full access driveway on Dolores Drive only. For the purposes of the off-site traffic impact analysis, only the analysis of the primary proposed Project is shown. Changes with the proposed Project alternative (single access Dolores Drive driveway) are discussed qualitatively and have been analyzed in previous iterations of this analysis. **Figure 1** shows the Project location (all figures are attached at the end of this memo).

ANALYSIS LOCATIONS AND METHODS

Three intersections in the immediate vicinity of the site are evaluated for the weekday morning (7-9 AM) and evening (4-6 PM) peak periods, plus the Project driveway in the Plus Project scenarios:

- Mount Diablo Boulevard / Risa Road / Village Center
- Mount Diablo Boulevard / Dolores Drive / Mountain View Drive
- Mount Diablo Boulevard / Happy Valley Road
- Mount Diablo Boulevard / Project Driveway (Plus Project scenarios only)
- Dolores Drive / Project Driveway (Plus Project scenarios only)

Figure 2 shows the study intersection locations in relationship to the site.

ANALYSIS METHODS

The operational performance of a roadway network is commonly described with the term level of service (LOS). LOS is a qualitative description of operating conditions, ranging from LOS A (free-flow traffic conditions with little or no delay) to LOS F (oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays.) LOS E corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated as LOS F.

From the Downtown Lafayette Specific Plan: Environmental Impact Report (EIR), the City of Lafayette strives to maintain a "Good" LOS D (35 to 45 seconds of average control delay per vehicle). "Poor" LOS D is defined as 45 to 55 seconds of average control delay per vehicle. All

three study intersections have been designated as "downtown" intersections; as such, they have a different level of service threshold, per General Plan definitions. A project is considered to have a significant impact when it causes a "downtown" intersection operation to deteriorate to LOS E or F. These standards apply to both signalized and unsignalized intersections. Therefore, "Poor" LOS D is acceptable at the study intersections. The LOS analysis methods used in this study are consistent with the 2000 Highway Capacity Manual (HCM) published by the Transportation Research Board. The HCM methods for calculating LOS for signalized intersections and unsignalized intersections are described below.

Signalized Intersections

Traffic operations at signalized intersections are evaluated using the LOS method described in Chapter 16 of the HCM. A signalized intersection's LOS is based on the weighted average control delay measured in seconds per vehicle and includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration. **Table 1** summarizes the relationship between the control delay and LOS for signalized intersections.

TABLE 1: SIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay (seconds per vehicle)
A	Operations with very low delay occurring with favorable traffic signal progression and/or short cycle lengths.	< 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55.0 to 80.0
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80.0

Source: *Highway Capacity Manual, Transportation Research Board, 2000.*

Unsignalized Intersections

Traffic conditions at unsignalized intersections are evaluated using the method from Chapter 17 of the HCM. With this method, operations are defined by the average control delay per vehicle (measured in seconds) for each movement that must yield the right-of-way. For all-way stop-controlled intersections, the average control delay is calculated for the intersection as a whole. At two-way or side street-controlled intersections, the control delay (and LOS) is calculated for each controlled movement, the left turn movement from the major street, and the entire intersection. **Table 2** summarizes the relationship between delay and LOS for unsignalized intersections.

TABLE 2: UNSIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay (seconds per vehicle)
A	Little or no delays	< 10.0
B	Short traffic delays	> 10.0 to 15.0
C	Average traffic delays	> 15.0 to 25.0
D	Long traffic delays	> 25.0 to 35.0
E	Very long traffic delays	> 35.0 to 50.0
F	Extreme traffic delays with intersection capacity exceeded	> 50.0

Source: *Highway Capacity Manual, Transportation Research Board, 2000.*

TRAFFIC IMPACT ANALYSIS

Data Collection

Figure 2 shows the location of the proposed Project and the study intersections. These intersections have been identified as those most likely to be affected by the proposed Project.

Existing peak hour vehicle turning movement, bicycle, and pedestrian volume counts were collected from 7:00 to 9:00 AM and from 4:00 to 6:00 PM on Wednesday, March 12, 2014. 24-hour tube counts on Mount Diablo Boulevard (just west of the existing Celia's driveways) and

Dolores Drive (just north of the existing Celia's driveways) were collected on the same date[1]. Additional data collection was also completed, including observations of the lane configurations, signal timings, intersection operations and vehicle queuing on three occasions. A second set of peak hour vehicle turning movement counts were done on Thursday, May 22, 2014. The AM peak period and peak hour show an increase of seven percent from the original counts, and the PM peak period shows a decrease of four percent and the PM peak hour shows a decrease of one percent. These differences are well within the typical day-to-day variation of intersection volumes and would have little effect on the intersection analysis.

These daily vehicle counts suggest that the peak periods for both streets are captured by the peak period turning movement counts; the peak 15-minute periods for both streets started at 8:30 AM and 5:30 PM. The daily traffic on Mount Diablo Boulevard is 15,800 vehicles per day, and the daily traffic on Dolores Drive is 1,800 vehicles per day. The resulting peak hour vehicle volumes (8:00 to 9:00 AM and 4:45 to 5:45 PM), lane geometries, and traffic control can be seen in Figure 2. Traffic count data are available in **Attachment A**.

Existing Traffic Conditions

Traffic operations throughout the study area are analyzed using the Synchro 8.0 software program. Synchro calculations are based on the procedures outlined in the HCM. **Table 3** shows the LOS results for the existing weekday AM and PM peak hours. These results are mostly consistent with the Downtown Lafayette Specific Plan EIR. The LOS difference at the intersection of Mount Diablo Boulevard / Dolores Drive / Mountain View Drive is due to new vehicle counts (and peak hour factors), as well as other minor inputs.

Existing vehicle queues were also observed at the study intersections to ensure that the Synchro models were properly calibrated. Most queues were observed to be contained within their allotted storage lengths, though the eastbound left-turn queue at the Mount Diablo Boulevard / Happy Valley Road intersection extends one or two cars beyond the pocket in the AM peak hour and out of its pocket past the western Trader Joe's driveway and near Mountain View Drive in the PM peak hour. The queue lengths reported by the Synchro software were consistent with the observations. The 95th percentile queue length for the southbound approach on Dolores Drive is approximately 110 to 120 feet in both peak hours.

[1] The purpose of the ADT counts is to provide basic existing roadway volume information rather than to capture trip generation information for the existing site. Hoses are placed away from the intersection to avoid queued vehicles at the signal sitting on the hoses, which can lead to inaccurate counts. The peak period study intersection and existing driveway counts adequately capture the traffic at the driveways generated by other nearby land uses.

TABLE 3: EXISTING CONDITIONS INTERSECTION OPERATIONS SUMMARY

Intersection	Control[1]	Peak Hour	Existing Conditions		Existing Conditions from Specific Plan EIR	
			Delay[2]	LOS[2]	Delay[2]	LOS[2]
Mount Diablo Boulevard / Risa Road / Village Center	Signal	AM PM	8.8 10.5	A B	11.9 9.8	B A
Mount Diablo Boulevard / Dolores Drive / Mountain View Drive	Signal	AM PM	21.2 26.4	C C	11.3 17.1	B B
Mount Diablo Boulevard / Happy Valley Road	Signal	AM PM	16.9 25.7	B C	17.5 32.5	B C

Notes:
1. Signal = signalized intersection; SSSC = side-street stop controlled intersection.
2. Traffic operations results include LOS (level of service) and delay (seconds per vehicle). LOS is based on delay thresholds published in the Highway Capacity Manual (Transportation Research Board, 2000).

Source: *Fehr & Peers, September 2014*.

PROJECT VEHICLE TRIP GENERATION

Vehicle trip generation estimates for the proposed Project during both AM and PM peak hours have been developed using the trip generation equations and rates presented in Institute of Transportation Engineers' (ITE) Trip Generation, 9th Edition. No reductions are made to account for internal trips, pass-by trips, or transit use, and no reductions are made for the elimination of current land uses, even though the existing trips to and from the site will in fact be eliminated by the proposed Project.

Table 4 shows the vehicle trip generation estimates. Vehicle trip generation for the 66 residential units is estimated using rates and equations for the Apartment Category (Land Use 220) in ITE Trip Generation, 9th Edition. Vehicle trip generation for the 4,500 square feet of restaurant space is estimated using rates and equations for the Quality Restaurant Category (Land Use 931). Vehicle trip generation for the 1,400 square feet of flex space is estimated using rates and equations for the Variety Store Category (Land Use 814), which has the highest trip generation rates of the possible uses for this space. The proposed development would generate approximately 934 daily trips, 43 AM peak hour trips and 85 PM peak hour trips. For comparison purposes only, the existing restaurant and office uses are estimated to generate approximately 470 daily trips, 19 AM peak hour trips, and 45 PM peak hour trips, using ITE Trip Generation, 9th Edition rates.

TABLE 4: PROJECT TRIP GENERATION

Land Use	ITE Code	Units	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Apartment	220[1]	66 dwelling units	439	7	27	34	27	14	41
Restaurant	931[2]	4,500 square feet	405	3	1	4	23	11	34
Flex	814[3]	1,400 square feet	90	3	2	5	5	5	10
Total			***934***	***13***	***30***	***43***	***55***	***30***	***85***

Notes:
1. ITE trip generation average rates used (ITE Code 220 – Apartment):
   Daily: T = 6.65 * X AM: T = 0.51 * X; Enter = 20%, Exit = 80% PM: T = 0.62 * X; Enter = 65%, Exit = 35%
   Where X = total dwelling units, T = number of vehicle trips
2. ITE trip generation average rates used (ITE Code 931 – Quality Restaurant):
   Daily: T = 89.95 * X AM: T = 0.81 * X; Enter = 82%, Exit = 18% PM: T = 7.49 * X; Enter = 67%, Exit = 33%
   Where X = total square footage, T = number of vehicle trips
3. ITE trip generation average rates used (ITE Code 814 –Variety Store):
   Daily: T = 64.03 * X AM: T = 3.81 * X; Enter = 62%, Exit = 38% PM: T = 6.82 * X; Enter = 48%, Exit = 52%
   Where X = total square footage, T = number of vehicle trips

Source: *Trip Generation Manual (9th Edition), ITE, 2012.*

TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution is defined as the directions of approach and departure that vehicles would use to arrive at and depart from the site. This traffic analysis assumes that all new Project trips would be distributed proportionately based on an assessment of the current movements at the existing driveways on Dolores Drive and Mount Diablo Boulevard and at the intersection of Mount Diablo Boulevard and Dolores Drive. The movements to/from Dolores Drive from/to Mount Diablo Boulevard serve to inform the potential trip distribution for the Project because Dolores Drive primarily provides access between Mount Diablo Boulevard and a residential neighborhood. Because the external traffic impact analysis is performed for the alternative with driveways on both Dolores Drive and Mount Diablo Boulevard, all Project trips are shown entering or exiting the site at one of the two driveways.

Figure 3 shows the Project vehicle trips assigned to the intersection turning movements; **Figure 4** shows the Project trips combined with the existing traffic volumes shown on Figure 2.

EXISTING PLUS PROJECT TRAFFIC OPERATIONS

Traffic operations throughout the study area are analyzed using the Synchro models used in the evaluation of the existing peak hours. **Table 5** shows the LOS results for both scenarios; as shown, the additional traffic due to the Project is not projected to impact the study intersections. **Table 6** shows the 50th and 95th percentile queue results for both scenarios. The queue lengths reported are estimated from equations that approximate the length of the 50th and 95th longest queues from a sample of 100 observed maximum queues.

The analysis shows that the southbound approach on Dolores Drive at Mount Diablo Boulevard can accommodate the additional traffic generated by the Project with the current lane configuration. The southbound 95th percentile queue on Dolores Drive at Mount Diablo Boulevard would grow approximately 30 to 40 feet, reaching the proposed access driveway. Queues during most of the peak hour would be shorter than this maximum queue. A "keep clear" zone in front of the driveway could be considered to aid drivers entering and exiting the project driveway. The average cycle length at the intersection would increase approximately four seconds during each peak hour.

Additionally, vehicles turning left into the project site from Dolores Drive experience minimal delay yielding to vehicles coming southbound on Dolores Drive toward Mount Diablo Boulevard. The queue that results from the northbound left turn movement into the project site should not affect operations on Dolores Drive, at the project driveway, or at the private driveway across the street for 3658 Mount Diablo Boulevard.

The results of the April 28, 2014 memo that analyzed the Dolores Drive only scenario as the proposed project closely match the results presented here. The additional right-in, right-out driveway at Mount Diablo Boulevard removes some vehicles from Dolores Drive both entering and exiting, though the LOS and queue results are very similar.

Figure 5 shows the maximum peak hour queue for each intersection approach during either peak hour, both with and without the Project.

TABLE 5: EXISTING PLUS PROJECT CONDITIONS INTERSECTION OPERATIONS

Intersection	Control[1]	Peak Hour	Existing Conditions		Existing Plus Project Conditions	
			Delay[2]	LOS[2]	Delay[2]	LOS[2]
Mount Diablo Boulevard / Risa Road / Village Center	Signal	AM PM	8.8 10.5	A B	8.8 10.7	A B
Mount Diablo Boulevard / Dolores Drive / Mountain View Drive	Signal	AM PM	21.2 26.4	C C	23.1 30.3	C C
Mount Diablo Boulevard / Happy Valley Road	Signal	AM PM	16.9 25.7	B C	17.2 26.1	B C
Mount Diablo Bouelvard / Proposed Access Driveway	SSSC	AM PM	n/a	n/a	0.0 (9.0) 0.0 (8.9)	A (A) A (A)
Dolores Drive / Proposed Access Driveway	SSSC	AM PM	n/a	n/a	1.6 (8.9) 2.5 (8.9)	A (A) A (A)

Notes:
1. Signal = signalized intersection; SSSC = side-street stop controlled intersection.
2. Traffic operations results include LOS (level of service) and delay (seconds per vehicle). LOS is based on delay thresholds published in the Highway Capacity Manual (Transportation Research Board, 2000).
3. Delay is reported as: Average delay for intersection (Average delay for Project driveway).

Source: *Fehr & Peers, September 2014.*

TABLE 6: EXISTING AND EXISTING PLUS PROJECT CONDITIONS QUEUE LENGTHS

Intersection	Move-ment	Storage Length	Existing Conditions[1]		Existing Plus Project Conditions[1]		Change[1]	
			50th Percentile Queue	95th Percentile Queue	50th Percentile Queue	95th Percentile Queue	50th Percentile Queue	95th Percentile Queue
Mount Diablo Boulevard / Risa Road / Village Center	EBL	125	10 (10)	30 (30)	10 (10)	30 (30)	-	-
	EBT-R	-	30 (60)	60 (120)	30 (60)	70 (130)	-	10 (10)
	WBL	100	10 (20)	40 (50)	10 (20)	40 (50)	-	-
	WBT-R	-	20 (30)	80 (100)	20 (30)	80 (110)	-	0 (10)
	NB	-	10 (10)	40 (40)	10 (10)	40 (40)	-	-
	SB	-	10 (30)	40 (90)	10 (30)	40 (90)	-	-
Mount Diablo Boulevard / Dolores Drive / Mountain View Drive	EBL	75	10 (20)	50 (50)	20 (30)	60 (90)	10 (10)	10 (40)
	EBT-R	-	90 (270)	180 (470)	100 (290)	190 (510)	10 (20)	10 (40)
	WBL	100	20 (60)	60 **(130)**	20 (60)	70 **(130)**	-	10 (0)
	WBT-R	500	150 (130)	280 (230)	170 (150)	310 (270)	20 (20)	30 (40)
	NB	-	50 (120)	120 (230)	50 (130)	140 (250)	0 (10)	20 (20)
	SB	-	40 (50)	120 (110)	60 (70)	150 (150)	20 (20)	30 (40)
Mount Diablo Boulevard / Happy Valley Road	EBL	100	70 **(230)**	**180 (490)**	80 **(240)**	**190 (510)**	10 (10)	10 (20)
	EBT-R	500	20 (110)	50 (190)	20 (110)	60 (190)	-	10 (0)
	WBL	75	20 (60)	60 **(120)**	20 (60)	60 **(120)**	-	-
	WBT-R	-	50 (110)	110 (180)	50 (120)	110 (190)	0 (10)	0 (10)
	NB	-	20 (70)	70 (140)	20 (70)	70 (140)	-	-
	SBL-T	-	40 (110)	110 (210)	40 (120)	110 (210)	0 (10)	-
	SBR	125	10 (10)	80 (70)	10 (10)	80 (70)	-	-
Mount Diablo Bouelvard / Proposed Access Driveway	SBR	-	n/a	n/a	10 (10)	10 (10)	-	-
Dolores Drive / Proposed Access Driveway	EBL-R	-	n/a	n/a	10 (10)	10 (10)	-	-
	NBL-T	-			10 (10)	10 (10)	-	-

Notes:
1. Reported queues are AM peak hour (PM peak hour).
2. All distances are measured in feet.
3. Bold indicates queue length exceeds storage length.

Source: *Fehr & Peers, September 2014.*

CUMULATIVE TRAFFIC CONDITIONS

Traffic forecasts are from the *Downtown Lafayette Specific Plan EIR*. The "Cumulative with Specific Plan Project" scenario from the EIR represents the "Cumulative No Project" scenario for this traffic analysis. The forecasts from the EIR are adjusted to reflect the updated (2014) traffic data and to account for new developments expected to be built and occupied in the Project vicinity in the

near-term. Generally, these adjustments increased the previous forecasts and, as a result, increase the average vehicle delay and decrease the intersection LOS. **Figure 6** shows the resulting traffic forecasts at the study intersections and **Table 7** shows the Cumulative Conditions LOS results. Also shown are the results from the Specific Plan EIR, which are generally consistent with the findings of this analysis. The difference at the intersection of Mount Diablo Boulevard / Dolores Drive / Mountain View Drive is due to new vehicle forecasts, influenced by the recently obtained vehicle counts, as well as other minor inputs.

TABLE 7: CUMULATIVE CONDITIONS INTERSECTION OPERATIONS

Intersection	Control[1]	Peak Hour	Cumulative Conditions No Project		Cumulative Conditions with Specific Plan Project from Specific Plan EIR	
			Delay[2]	LOS[2]	Delay[2]	LOS[2]
Mount Diablo Boulevard / Risa Road / Village Center	Signal	AM PM	11.2 13.2	B B	10.0 11.2	A B
Mount Diablo Boulevard / Dolores Drive / Mountain View Drive	Signal	AM PM	25.8 42.1	C D	12.1 18.0	B B
Mount Diablo Boulevard / Happy Valley Road	Signal	AM PM	27.3 49.5	C D	27.2 45.4	C D

Notes:
1. Signal = signalized intersection; SSSC = side-street stop controlled intersection.
2. Traffic operations results include LOS (level of service) and delay (seconds per vehicle). LOS is based on delay thresholds published in the Highway Capacity Manual (Transportation Research Board, 2000).

Source: *Fehr & Peers, September 2014*.

CUMULATIVE PLUS PROJECT TRAFFIC OPERATIONS

The Project vehicle trip turning movements at the study intersections (Figure 3) are added to the Cumulative No Project traffic volumes (Figure 6) to obtain the Cumulative Plus Project traffic volumes shown on **Figure 7**. The Synchro models are used to evaluate the cumulative traffic forecasts (without and with Project) and the resulting LOS is shown in **Table 8**. As shown, the additional traffic due to the Project is not projected to impact the study intersections. **Table 9** shows the 50th and 95th percentile queue results for both scenarios. The queue lengths reported are estimated from equations that approximate the length of the 50th and 95th longest queues from a sample of 100 observed maximum queues. The analysis shows minimal impacts to the existing queues on Mount Diablo Boulevard and the local streets it intersects.

The analysis shows that the southbound approach on Dolores Drive at Mount Diablo Boulevard can accommodate the additional traffic generated by the Project with the current lane configuration. The southbound 95th percentile queue on Dolores Drive at Mount Diablo Boulevard would grow approximately 30 to 40 feet during both peak hours relative to Cumulative No Project Conditions; queues in both scenarios would reach the project driveway. A "keep clear" zone in front of the driveway could be considered to aid drivers entering and exiting the project driveway.

Again, vehicles turning left into the project site from Dolores Drive experience minimal delay yielding to vehicles coming southbound on Dolores Drive toward Mount Diablo Boulevard. The queue that results from the northbound left turn movement into the project site should not affect operations on Dolores Drive, at the project driveway, or at the private driveway across the street for 3658 Mount Diablo Boulevard.

Vehicles attempting to access 3658 Mount Diablo Boulevard via its Dolores Drive driveway will experience a minimal increase in delay on average (less than one second per vehicle) due to vehicles attempting to turn into the Project on Dolores Drive. Vehicles attempting to exit 3658 Mount Diablo Boulevard via the Dolores Drive driveway will experience a similar increase in delay on average (one to two seconds per vehicle) due to vehicles attempting to turn into the Project on Dolores Drive or the vehicles exiting the Project via Dolores Drive. During the AM and PM peak hours, the estimated traffic generated by the Project would add less than one vehicle per cycle to the southbound approach of Dolores Drive at the Mount Diablo Boulevard intersection.

The results of the April 28, 2014 memo that analyzed the Dolores Drive only scenario as the proposed project closely match the results presented here. The additional right-in, right-out driveway at Mount Diablo Boulevard removes some vehicles from Dolores Drive both entering and exiting, though the LOS and queue results are very similar.

Without the Mount Diablo Boulevard driveway, queues for vehicles exiting the driveway would rarely be more than one vehicle long, and the signal at Dolores Drive would effectively meter northbound traffic to increase the number of gaps available for vehicles to turn out of the driveway. The traffic operations analysis also shows that the impacts to the driveway from the Dolores Drive / Mount Diablo Boulevard signalized intersection will be occasional and restricted to the peak hours only. Southbound Dolores Drive vehicles will experience minor increases in delay from the additional southbound queue, but will still be able to pass through the intersection during each signal cycle. Northbound vehicles will also be delayed occasionally when a vehicle is

turning left into the driveway and must wait for a gap in southbound traffic, though this delay is expected to be minimal.

Figure 8 shows the maximum peak hour queue for each intersection approach during either peak hour, both with and without the Project.

TABLE 8: CUMULATIVE PLUS PROJECT INTERSECTION OPERATIONS

Intersection	Control[1]	Peak Hour	Cumulative No Project		Cumulative Plus Project	
			Delay[2]	LOS[2]	Delay[2]	LOS[2]
Mount Diablo Boulevard / Risa Road / Village Center	Signal	AM PM	11.2 13.2	B B	12.0 13.5	B B
Mount Diablo Boulevard / Dolores Drive / Mountain View Drive	Signal	AM PM	25.8 42.1	C D	28.2 48.3	C D
Mount Diablo Boulevard / Happy Valley Road	Signal	AM PM	27.3 49.5	C D	27.5 51.7	C D
Mount Diablo Bouelvard / Proposed Access Driveway	SSSC	AM PM	n/a	n/a	0.0 (9.2) 0.0 (9.7)	A (A) A (A)
Dolores Drive / Proposed Access Driveway	SSSC	AM PM	n/a	n/a	1.2 (9.0) 1.6 (9.4)	A (A) A (A)

Notes:
1. Signal = signalized intersection; SSSC = side-street stop controlled intersection.
2. Traffic operations results include LOS (level of service) and delay (seconds per vehicle). LOS is based on delay thresholds published in the Highway Capacity Manual (Transportation Research Board, 2000).
3. Delay is reported as: Average delay for intersection (Average delay for Project driveway).

Source: *Fehr & Peers, September 2014.*

TABLE 9: CUMULATIVE AND CUMULATIVE PLUS PROJECT CONDITIONS QUEUE LENGTHS

Intersection	Move-ment	Storage Length	Cumulative Conditions[1]		Cumulative Plus Project Conditions[1]		Change[1]	
			50th Percentile Queue	95th Percentile Queue	50th Percentile Queue	95th Percentile Queue	50th Percentile Queue	95th Percentile Queue
Mount Diablo Boulevard / Risa Road / Village Center	EBL	125	10 (10)	50 (50)	10 (10)	50 (50)	-	-
	EBT-R	-	50 (90)	100 (190)	50 (100)	100 (200)	0 (10)	0 (10)
	WBL	100	20 (30)	60 (80)	20 (30)	70 (90)	-	10 (10)
	WBT-R	-	70 (80)	150 (160)	70 (80)	150 (170)	-	0 (10)
	NB	-	20 (10)	70 (50)	20 (10)	70 (50)	-	-
	SB	-	30 (50)	90 (130)	30 (50)	100 (140)	-	10 (10)
Mount Diablo Boulevard / Dolores Drive / Mountain View Drive	EBL	75	20 (40)	60 **(90)**	20 (60)	70 **(120)**	0 (20)	10 (30)
	EBT-R	-	160 (440)	310 (760)	180 (480)	330 (810)	20 (40)	20 (50)
	WBL	100	30 (80)	90 **(170)**	30 (90)	90 **(170)**	0 (10)	-
	WBT-R	500	210 (420)	390 **(680)**	230 (490)	430 **(720)**	20 (70)	40 (40)
	NB	-	70 (180)	170 (310)	70 (190)	180 (330)	0 (10)	10 (20)
	SB	-	70 (140)	160 (250)	90 (170)	200 (280)	20 (30)	40 (30)
Mount Diablo Boulevard / Happy Valley Road	EBL	100	**160 (380)**	**310 (720)**	**170 (390)**	**310 (730)**	10 (10)	0 (10)
	EBT-R	500	90 (230)	140 (340)	90 (240)	140 (340)	0 (10)	-
	WBL	75	50 **(150)**	**120 (250)**	50 **(150)**	**120 (250)**	-	-
	WBT-R	-	190 (230)	290 (290)	190 (230)	290 (300)	-	0 (10)
	NB	-	50 (110)	120 (290)	50 (120)	120 (290)	0 (10)	-
	SBL-T	-	130 (260)	320 (540)	140 (270)	320 (540)	10 (10)	-
	SBR	125	40 (80)	**210 (210)**	50 (80)	**220 (220)**	10 (0)	10 (10)
Mount Diablo Bouelvard / Proposed Access Driveway	SBR	-	n/a	n/a	10 (10)	10 (10)	-	-
Dolores Drive / Proposed Access Driveway	EBL-R	-	n/a	n/a	10 (10)	10 (10)	-	-
	NBL-T	-			10 (10)	10 (10)	-	-

Notes:
1. Reported queues are AM peak hour (PM peak hour).
2. All distances are measured in feet.
3. Bold indicates queue length exceeds storage length.

Source: *Fehr & Peers, September 2014.*

TRAFFIC IMPACT SIGNIFICANCE DETERMINATION

As stated earlier, the City of Lafayette's standard for the study intersections is LOS D (less than 55 seconds of average control delay per vehicle). As shown in the previous tables, all intersections are projected to meet this standard under the evaluated scenarios; therefore, the Project does not

have a significant impact on the study intersections, and intersection mitigation is not needed. The Synchro worksheets used to complete this analysis are provided in **Attachment B**.

SITE PLAN REVIEW

The Project site plan has been reviewed with consideration for safe and efficient circulation of motor vehicles, bicyclists, and pedestrians through the Project site and on the roadways adjacent to the Project site. **Figure 9** shows the site plan that was reviewed for this study, which is current as of September 22, 2014. The review focuses on:

- Existing pedestrian, bicycle, and transit facilities
- Vehicle access and circulation, including parking layout within the site
- Emergency vehicle access to the site
- Pedestrian access and circulation within and adjacent to the site
- Viability of a roundabout along Mount Diablo Boulevard

EXISTING PEDESTRIAN, BICYCLE, AND TRANSIT FACILITIES

In the vicinity of the Project area, there is a sidewalk on the north side of Mount Diablo Boulevard, which extends from Risa Road in the west to Pleasant Hill Road in the east, which is typically six feet wide. A continuous sidewalk exists from the same extents on the south side of Mount Diablo Boulevard, except for a 300-foot segment west of Mountain View Drive in front of Diamond K Supply. In this location there is a wide, undefined driveway for supply trucks accessing materials at the Diamond K Supply storage yard, as well as parking in front of the Lescure Company building. Just west of Mountain View Drive, the sidewalk is approximately nine feet wide.

On the west side of Dolores Drive, there is a 100-foot segment of four- to five-foot wide sidewalk between Mount Diablo Boulevard and the existing Celia's driveway; the west side sidewalk begins again at the SR 24 overpass. On the east side of Dolores Drive, there is sidewalk from Mount Diablo Boulevard to the connection with Via Roble in the north that varies in width from five to ten feet. There are also crosswalks across all four approaches of the Mount Diablo Boulevard / Dolores Drive / Mountain View Drive intersection. The next crosswalk across Mount Diablo Boulevard west of the Dolores Drive intersection is approximately 2,000 feet to the west at Risa Road / Village Center. The next crosswalk across Mount Diablo Boulevard east of the Dolores Drive intersection is approximately 500 feet to the east at Happy Valley Road.

A Class II Bikeway (Bicycle Lane) provides a restricted right-of-way and is designated for the use of bicycles with a striped lane on a street or highway. Bicycle lanes are generally four to six feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted. A Class III Bikeway (Bicycle Route) provides for a right-of-way designated by signs or pavement markings (sharrows) for shared use with pedestrians or motor vehicles. Sharrows are a type of pavement marking (bike and arrow stencil) placed to guide bicyclists to the best place to ride on the road, avoid car doors, and remind drivers to share the road with cyclists.

Currently, there are Class II bicycle lanes in both directions on Mount Diablo Boulevard from Acalanes Road in the west to Dolores Drive in the east. East of Dolores Drive, there are Class III bicycle routes designated to First Street, where the Class II bicycle lanes pick up again and continue to Pleasant Hill Road. Typically, the Class II bicycle lanes are placed between a vehicle travel lane and vehicle parking. There is currently parking on both sides of Mount Diablo Boulevard in the vicinity of the Project.

The Project site is approximately one-half mile from the Lafayette Bay Area Rapid Transit (BART) Station. BART provides regional commuter rail service between San Francisco and the East Bay (Pittsburg/Bay Point, Richmond, Dublin/Pleasanton and Fremont), as well as between San Francisco and San Mateo County (SFO Airport and Millbrae). Weekday hours of operation are between 4 AM and midnight. During the weekday AM and PM peak periods, headways are five to 15 minutes along each line. Within Lafayette, BART operates above grade in the median of SR 24 and the Lafayette BART Station is located off Deer Hill Road between Oak Hill Road and Happy Valley Road.

Currently, two County Connection transit routes serve Lafayette in the vicinity of the Project site. Route 6 runs between the Orinda BART Station and the Lafayette BART Station, serving Moraga and St. Mary's College via Moraga Way and Moraga Road. Route 6 runs from 6:00 AM to 9:00 PM on weekdays and 9:30 AM to 6:00 PM on weekends, and headways for Route 6 are 30 minutes during the weekday peak periods, 90 minutes during the weekday off peak periods, and 80 minutes during the weekend. The closest bus stop for Route 6 is at the Lafayette BART Station.

Route 25 runs between the Lafayette BART Station and the Walnut Creek BART Station along Mount Diablo Boulevard. Route 25 runs from 7:30 AM to 6:30 PM on weekdays only, and headways for Route 25 are 60 minutes. The closest bus stop for Route 25 is at Happy Valley Road.

CITY-PLANNED PEDESTRIAN, BICYCLE, AND TRANSIT IMPROVEMENTS

In 2012, the City published a document entitled *"Feasibility & Options Study for a Pedestrian & Bicycle Pathway Along the EBMUD Aqueduct ROW"* that would potentially create a new pedestrian and bicycle path along East Bay Municipal Utility District (EBMUD) right-of-way on the south side of SR 24 from Risa Road to Brown Avenue. The preferred option includes a crossing at Dolores Drive; the study says that the only design option for this location is an uncontrolled, at-grade crossing. Recommendations for the Dolores Drive crossing include:

- Installing a necked-down high-visibility ladder crosswalk with pedestrian-scale lighting;
- Installing in-pavement flashers, signage, and advance yield markings along Dolores Drive;
- Installing passive video detection;
- Curving the pathway and installing bollards and stop signs;
- Completing the sidewalk along the west side of Dolores Drive between the pathway and Mount Diablo Boulevard.

There are no other pedestrian or bicycle improvements in the vicinity of the proposed project area planned at this time.

The City of Lafayette is currently participating in the Lamorinda Shuttle Study to evaluate the feasibility of operating a shuttle service within and between the area's three PDAs and two BART stations. The City's Downtown Specific Plan calls for shuttle service to reduce downtown congestion, though no transit improvements are planned at this time.

VEHICULAR ACCESS AND CIRCULATION

As previously noted, there are two access alternatives for the Project. The alternative that has been studied in the traffic impact analysis portion of this memorandum has a full access unsignalized driveway on Dolores Drive, approximately 130 feet north of Mount Diablo Boulevard, and a secondary right-in, right-out access driveway on Mount Diablo Boulevard across from Diamond K Supply, approximately 275 feet west of Dolores Drive. A second alternative proposes a full unsignalized access driveway on Dolores Drive only, with no access on Mount Diablo Boulevard. The following sections detail the evaluations and recommendations for each of the driveway locations.

Dolores Drive

Dolores Drive is signed with a 25 mile per hour speed limit, though observations and resident comments suggested that the prevailing speed southbound on Dolores Drive is higher. A 100-vehicle speed survey of southbound vehicles on Dolores Drive just north of the existing site showed that the 85th percentile speed is 33 miles per hour. Though somewhat winding, Dolores Drive has a downhill grade toward Mount Diablo Boulevard, likely a contributing factor to the higher speeds. Northbound vehicle speeds were not measured, as slower speeds near the proposed Project driveway were expected given the vicinity of the signalized intersection and the uphill grade.

Section 205.3 of the Caltrans Highway Design Manual describes the requirements for urban driveways. It references sections 405.1 and 201.3, which provide the requirements for sight distance from a driveway. Corner sight distance is not required from an urban driveway, leaving stopping sight distance as the minimum standard. The required stopping sight distance from the driveway for a 25 mile per hour road would be 150 feet, while the required sight distance from the driveway for a 33 mile per hour road would be 230 feet.

Section 201.3 also warns that "the stopping sight distances in Table 201.1 should be increased by 20 percent on sustained downgrades steeper than 3 percent and longer than one mile." Though not longer than one mile, the required stopping sight distance when the downgrade is accounted for is 276 feet. Based on field measurements, there is approximately 290 feet of stopping sight distance from the proposed Dolores Drive driveway. The signal at Dolores Drive will occasionally meter vehicles able to arrive at the driveway, providing additional gaps for vehicles exiting the driveway and vehicles entering the driveway from the west. The same effect will also decrease vehicle speeds at this location.

Due to the curvature of the road, vehicles turning left into the Project driveway would have approximately 200 feet of sight distance to see southbound vehicles on Dolores Drive. **Figure 10** shows the sight distances at each driveway. As shown, the proposed driveway layout provides adequate sight distance in each direction. Additionally, the proposed loading driveway adjacent to the south edge of the proposed access driveway will have approximately the same sight distance to the north. The service area appears long enough that trucks in the loading dock should not obscure the view of drivers attempting to exit the driveway and turn north onto Dolores Drive. Trucks should be able to efficiently maneuver into the loading space, though use of the loading dock should be limited to outside the morning and afternoon peak periods given its proximity to Mount Diablo Bouelvard.

The ramp into the garage should be carefully designed to maximize sight distance from the driveway. Vehicles should be close to level with Dolores Drive as they stop to look for a gap between vehicle, bicycle, and pedestrian traffic to enter Dolores Drive. Drivers will also need to be able to see pedestrians on the sidewalk waiting to cross the driveway.

Consultant Recommendation 1: Ensure adequate sight distance is maintained at the Dolores Drive driveway after the installation of the garage ramp and that vehicles will be able to see pedestrians on the sidewalk waiting to cross the driveway. The grade of the sidewalk should remain constant across the driveway. Exiting vehicles should be level with Dolores Drive before reaching sidewalk. Retaining walls should be designed to ensure that vehicles have appropriate sight distance at the intersection with Dolores Drive. Prohibit on-street parking on the west side of Dolores Drive between the proposed driveway and the SR 24 overpass or the proposed trail crossing. Ensure that any vegetation adjacent to the proposed driveway does not obstruct sight distance. Ensure that the service area for the loading dock does not interfere with driver sight distance looking south from the access driveway.

The traffic operations analysis also shows that the driveway impacts on Dolores Drive will be occasional and restricted to the peak hours only. Southbound Dolores Drive vehicles will experience minor increases in delay from the additional southbound queue, but will still be able to pass through the intersection during each signal cycle. Northbound vehicles will be delayed occasionally when a vehicle is turning left into the driveway and must wait for a gap in southbound traffic, though this delay is expected to be minimal. Additionally, five to six vehicles could queue without reaching Mount Diablo Boulevard while waiting for a vehicle to turn into the project. A "keep clear" zone could be implemented in the southbound lane with pavement markings.

The proposed driveway appears to have larger-than-necessary curb radii given the low speed desired for vehicles entering and exiting the Project. A standard driveway apron should also be considered, instead of an intersection design with raised curbs, as the apron design would create lower vehicle speeds entering and exiting the driveway and a more pleasant pedestrian experience by preserving the sidewalk grade across the driveway.

Consultant Recommendation 2: Decrease the curb radii or include a standard driveway apron at the driveway to slow vehicles entering and exiting the Project site.

Additionally, the *Feasibility & Options Study* for the EBMUD pathway states that "[t]he geometric design of Dolores Drive poses sight distance (especially for the northbound approach) and speed control issues for both motorists and pathway users." With respect to the Project, drivers leaving the proposed driveway on Dolores Drive will have better sight distance than most northbound vehicles, given the geometry of the roadway. These vehicles will also be moving slower as they approach the pathway crossing, due to the decreased acceleration distance. The proposed development does not conflict with the proposed pathway or its proposed crossing treatment in any other manner; in fact, the proposed crossing design should slow down vehicles as they approach the proposed driveway, and pathway users, as they cross Dolores Drive, could create additional gaps for vehicles leaving the proposed driveway and for vehicles leaving the driveway at 3658 Mount Diablo Boulevard. Sight distance for pedestrians on the west side of Dolores Drive at the crossing looking south will be greater than for drivers at the same point due to the curvature of the road. The recommended bulbout on the east side of the crossing would help increase sight distance looking south and decrease the distance of crossing the northbound lane.

Mount Diablo Boulevard

The Project proposes angled on-street parking on Mount Diablo Boulevard to supplement the parking provided on-site. These parking stalls have been designed to allow back-in angled parking, which is appropriate with the Class II bicycle lane on westbound Mount Diablo Boulevard. Back-in angled parking has been shown to reduce the number of conflicts and collisions between bicyclists and vehicles on roadway segments, when compared to the traditional forward-in angled parking.[2] Back-in angled parking has not conclusively been proven to affect vehicle speeds, though studies have shown that back-in angled parking does not induce U-turns or other movements that would create additional conflicts between vehicles and cyclists.[3]

With the proposed on-street angled parking (whether the proposed back-in, or forward-in), there will be an increase in the number of potential vehicle-vehicle and vehicle-bicycle conflicts on westbound Mount Diablo Boulevard as compared to the existing condition. The decision to design this parking area as back-in angle parking will allow both drivers of parked vehicles to have a better awareness for the conditions on Mount Diablo Boulevard before exiting a parking space, and drivers of vehicles entering a space to have to look over their shoulder through the bicycle lane before entering a parking space.

[2] "Back-in/Head-out Angle Parking," Nelson\Nygaard Consulting Associates, January 2005.
[3] "High Street Back in Angle Parking Evaluation," URS Corporation.

With the proposed on-street angled parking, the project's driveway will be between two on-street parking zones. This will also be a potentially busy pedestrian area, increasing the importance of appropriate sight distance at this location. The proposed plan will allow drivers exiting the Project to first cross the sidewalk before entering the storage space between the Mount Diablo Boulevard travel lane and the sidewalk. This space can be utilized to determine if there is an acceptable gap for vehicles to enter Mount Diablo Boulevard. Sidewalk extensions or "bulb-outs" could also be considered at the driveway to increase vehicle sight distance near the parking areas, though it appears the on-street parking to the east is far enough to not obstruct sight distance from the driveway. The proposed design provides adequate sight distance in each direction, as shown on **Figure 10**.

Consultant Recommendation 3: Ensure adequate sight distance is maintained at the Mount Diablo Boulevard driveway after the installation of the garage ramp and that vehicles will be able to see pedestrians on the sidewalk as they cross the driveways. The grade of the sidewalk should remain constant across the driveways. Exiting vehicles should be level with Mount Diablo Boulevard before reaching the sidewalk. The parking ramp should incorporate visual cues and design details to alert drivers to the potential for pedestrians and there should be design details to alert pedestrians to possible vehicles crossing.

Additionally, there are currently six driveways on what would be the Project's Mount Diablo Boulevard frontage. Consolidating them to a single main driveway and eliminating left turns into and out of that driveway would remove many of the conflicts associated with vehicles entering and exiting several closely spaced driveways and the driveways on the south side of Mount Diablo Boulevard. The proposed development would generate approximately double the number of trips that the existing land uses generate, though most of these trips will move to Dolores Drive. Focusing the remaining trips at one point (instead of six) decreases the number of conflict points of which drivers exiting the driveway, drivers on Mount Diablo Boulevard, pedestrians, and bicyclists need to be aware. This effect counter-balances the addition of angled parking along the frontage.

Limiting this driveway to right-in, right-out turns only will decrease the number of vehicle conflicts between entering and exiting vehicles and westbound vehicles on Mount Diablo Boulevard with other vehicles. The channeling island's concrete face along Mount Diablo Boulevard appears long enough to discourage the left-turn movement into the driveway and make that movement difficult, though it is still feasible for drivers to turn left into the driveway from Mount Diablo Boulevard.

Other potential treatments to control access points, such as median barriers along this stretch of Mount Diablo Boulevard, could significantly alter the circulation in the 500-foot stretch between Dolores Drive and the Desco Plaza for the land uses on the south side of Mount Diablo Boulevard, necessitating the coordination of several land owners and a thorough traffic operations analysis once a detailed plan was developed.

Each driveway has space inside the garage for two vehicles to wait for the gate to open to access the secure parking and still allow vehicles to pass to access the guest spaces, which is unlikely to cause queuing on the ramp.

EMERGENCY VEHICLE ACCESS

Factors such as number of access points, roadway width, and proximity to fire stations determine whether a project provides sufficient emergency access. The proposed Project provides a point of entry on Dolores Drive under both the proposed plan and the project alternative. The proposed plan has a second entry on Mount Diablo Boulevard. Section 6-623 of the *Lafayette, California Municipal Code* states that access drives must be at least 20 feet wide; the driveways proposed in the plan shown on Figure 9 appears to meet this requirement, though the driveway widths should be checked to ensure the proposed driveways are adequate for emergency vehicle access. The area adjacent to the channelizing island for the right-in, right-out driveway on Mount Diablo Boulevard will be less than 20 feet wide and could restrict emergency vehicle access at this location.

The fire station most likely to serve the site is located on Mount Diablo Boulevard, just over one mile to the east. Emergency vehicles would travel west directly down Mount Diablo Boulevard to access the site and would not have to complete any U-turns to gain entry. Given these considerations, the Project provides sufficient emergency access.

PEDESTRIAN ACCESS AND CIRCULATION

There are sidewalks proposed fronting the Project site on both Dolores Drive and Mount Diablo Boulevard. The existing sidewalks, which are approximately five feet wide with numerous curb cuts, would be replaced. This is compliant with *Americans with Disabilities Act Standards for Accessible Design*, which requires four feet of clear distance, but eight-foot sidewalks on Mount Diablo Boulevard fronting the Project and a reduction in the number of curb cuts will make the sidewalks more comfortable for users. Additionally, the Dolores Drive sidewalk will provide access to/from the future EBMUD pathway and should be wider than the minimum required.

The overall plan provides good connectivity throughout the site and to the surrounding sidewalks, particularly with the plaza at the southeast corner of the Project. Internal pedestrian paths should be at least six feet wide to ensure a comfortable passage for pedestrians walking next to each other. All building frontages are set back an appropriate distance from Mount Diablo Boulevard and Dolores Drive. Section 6-990 of the *Lafayette, California Municipal Code* requires at least ten feet of setback from any street line to any structure. There are no minimum standards for setback in the M-R-T district (Section 6-887 of the *Lafayette, California Municipal Code*). The building faces along Dolores Drive are the closest to a street curb, and they are all more than ten feet from the curb. ADA-compliant curb ramps should be built at the corner of the Mount Diablo Boulevard / Dolores Drive intersection when the sidewalks are rebuilt. This corner provides the access to downtown and to transit connections (both BART and County Connection), as well as the future EBMUD pathway.

Consultant Recommendation 4: Ensure that all internal pedestrian paths are at least six feet wide and sidewalks on Mount Diablo Boulevard and Dolores Drive fronting the Project are at least eight feet wide.

As stated earlier, consolidation to one driveway along the Project's Mount Diablo Boulevard frontage, or elimination of the driveways in this area, would improve safety for pedestrians along the north side of Mount Diablo Boulevard. The right-in, right-out channelizing island at the driveway is close enough to Mount Diablo Boulevard such that is not an obstacle for pedestrians, and it does not interfere with the path of pedestrian travel. The channelizing island should also help to slow vehicles entering and exiting the garage, and as previously mentioned, the concrete face along Mount Diablo Boulevard is long enough to discourage the left-turn movement into the driveway.

ROUNDABOUT EVALUATION

City staff has asked the applicant to determine if a roundabout is feasible at the Mount Diablo Boulevard / Dolores Drive intersection or at the Mount Diablo Boulevard intersection with the a potential project driveway. The roundabout options were analyzed using the HCM 2010 methodology for roundabout capacity analysis, which does not account for pedestrian or bicycle activity at the roundabout. AM and PM peak hour Cumulative Plus Project volumes were used for the analysis.

Mount Diablo Boulevard / Dolores Drive

At Mount Diablo Boulevard / Dolores Drive, the HCM analysis indicates that a single-lane roundabout would operate at LOS F during the PM peak hour, creating queues of approximately 1,000 feet in both directions on Mount Diablo Boulevard. A two-lane roundabout would operate at an acceptable level of service for vehicles (LOS A or B during both peak hours). Queue lengths would be shorter than at a signalized intersection; eastbound and westbound queue lengths are estimated to be approximately 125 feet during the PM hour. Side-street vehicles would experience delays of six to twelve seconds on average during the peak hours. Additionally, the roundabout would likely slow eastbound Mount Diablo Boulevard vehicle speeds entering downtown. All roundabout analysis worksheets are included in **Attachment C.**

Two-lane roundabouts present challenges for pedestrians and bicycles. A two-lane roundabout requires a pedestrian to cross two lanes at a time and presents a multiple-threat condition. This occurs when one vehicle yields to a pedestrian in a crosswalk but a vehicle in the adjacent lane does not. Additionally, visually impaired pedestrians have difficulty detecting when it is safe to cross a roundabout as audible queues at typical signal or stop controlled intersections are not present at roundabouts. This is particularly a challenge at two-lane roundabouts. Because of these concerns, the use of a pedestrian hybrid beacon or full traffic signal is recommended at the two-lane entrances and exits of two-lane roundabouts. Similarly, bicycles traversing a two-lane roundabout must be aware of vehicles turning from two lanes and requires them to navigate the roundabout similar to how they would navigate a multi-lane intersection. For these reasons, a two-lane roundabout does not provide the advantages that a single-lane roundabout does for pedestrians and bicycles.

As mentioned, the analysis does not account for pedestrian and bicycle activity at the intersection. The pedestrian activated signals mentioned above would increase delay for vehicles compared to that stated in the analysis.

The geometry of the intersection also makes physical layout of a roundabout difficult. To accommodate the offset of the Dolores Drive and Mountain View Drive approaches to the intersection, substantial realignment of the roadways and/or an oval or elliptical design would be required to sufficiently control vehicle speeds. Both of these options would require substantial right-of-way from adjacent properties.

There is approximately 100 feet between the building at the northeast corner of the intersection (3658 Mount Diablo Boulevard) and the building at the southwest corner of the intersection

(3651, 3653, and 3655 Mount Diablo Boulevard and 965 Mountain View Drive). The construction of a two-lane roundabout at this location would likely necessitate the demolition of the building on the south side of Mount Diablo Boulevard and removal of a portion of the building on the north side. Without this additional space, an elongated roundabout would not deflect Mount Diablo Boulevard vehicles enough to slow them down.

Mount Diablo Boulevard / Project Driveway / Diamond K Supply Driveway

At a potential Project driveway on Mount Diablo Boulevard, the HCM analysis method indicates that a single-lane roundabout would operate at LOS F during the PM peak hour with queues of approximately 600 feet in the eastbound direction and 800 feet in the westbound direction. Driveway vehicles would experience delays of six to ten seconds on average during the peak hours. A two-lane roundabout would operate at LOS A during both peak hours with queues less than 100 feet in both directions on Mount Diablo Boulevard. A two-lane roundabout would present the same challenges to pedestrians and bicycles as identified in the Mount Diablo Boulevard / Dolores Drive section.

The existing curb-to-curb distance in this area is approximately 70 feet. Modifications would need to be made to the existing Diamond K Supply site, potentially including the building. A complete curb and sidewalk would need to be constructed along the south side of Mount Diablo Boulevard at the Diamond K Supply frontage. The driveway into their site would need to be consolidated to a single location, and the roundabout would need to be designed to accommodate the necessary truck movements into and out of the site. Currently, trucks use the entire frontage to maneuver into and out of the site due to the lack of defined curb and sidewalk. This movement would be eliminated with construction of a roundabout and a new truck access plan would need to be created. The project site would also require modification to accommodate entrance and exit to the roundabout.

PARKING SUPPLY AND DEMAND

The site plan shows 179 parking spaces. There are 164 underground parking spaces and 15 on-street parking spaces for residents, guests of residents and customers of the restaurant and flex space locations. This is sufficient parking to meet code requirements as discussed below.

CITY CODE REQUIREMENTS

Currently, the parcel is classified as part of the General Commercial District (C-1). The City of Lafayette's off-street parking requirement in the General Commercial District is one parking space per one bedroom dwelling unit, 1.2 parking spaces per two bedroom dwelling unit, and 1.5 parking spaces per three bedroom dwelling unit (Section 6-992 of the *Lafayette, California Municipal Code*) in a multi-family residential district. In addition, for multi-family residential developments, one guest parking space is required for each five dwelling units.

With 66 dwelling units, 122 parking spaces are required if the parcel is zoned as part of the multi-family residential townhouse district (M-R-T district); both spaces for each unit are accessible from the unit per code. In addition, thirteen parking spaces for guests would be required in the garage.

The 4,500 square foot restaurant will require one parking space for every 500 feet of gross kitchen area and an additional space for every 45 square feet of gross dining area (Section 6-641 (r) of the *Lafayette, California Municipal Code*). Based on the floor space estimates from the architect, 52 parking spaces will be required for the restaurant use. The 1,400 square foot flex space will require one parking space for every 250 feet of net floor area (Section 6-641 (v) of the *Lafayette, California Municipal Code*). Based on the floor space estimates from the architect, 6 parking spaces will be required for the flex space use.

On-street parking on Mount Diablo Boulevard could also supplement the parking provided on-site. There are currently five parking spaces on Mount Diablo Boulevard along the Project frontage; these parking spaces will be removed in favor of new on-street parking stalls. As recommended, these parking stalls should be designed to allow back-in angled parking, given the Class II bicycle lane on westbound Mount Diablo Boulevard.

Based on observations, three to four of the existing five parking spaces were occupied during a weekday afternoon. These parking spaces were limited to two hours from Monday to Saturday during the hours of 7:00 AM to 6:00 PM. More on-street parking exists on the north side of Mount Diablo Boulevard to the west of the Project site that could potentially supplement the proposed parking supply.

There are currently no bicycle parking requirements per the *Lafayette, California Municipal Code*. The *Lafayette Bikeways Master Plan,* published in 2006, recommended that the City "[i]ncorporate into the future redevelopment plans for the downtown detailed bicycle parking requirements,

such as secure on-site bicycle parking be included in all new commercial, office and multi-family development projects and new parks and community buildings in the Lafayette. Requirements for quantity and type of parking would vary based on the size and type of the proposed development." Requirements for nearby communities, including Walnut Creek and Pleasant Hill, range from two to ten percent of automobile spaces. There are currently four proposed bicycle parking racks, two of which will be available to the public at ground level. Assuming that each bicycle rack will allow parking for at least six bicycles, there will be at least twelve public bicycle parking spaces as compared to 155 required parking spaces. The twelve bicycle parking spaces represent almost eight percent of the required automobile parking spaces, which is acceptable based on the standards from other communities mentioned above. Additionally, the bicycle racks are likely to fit more than six bicycles per rack.

The site plan shows two proposed parking stalls located west of Dolores Drive along the frontage to be used as a drop-off area. These parallel parking stalls should be used for loading and unloading only. Re-locating this loading area to Mount Diablo Boulevard from Dolores Drive will decrease the number of turning movements to access the area and will be more user-friendly with respect to project access.

Consultant Recommendation 5: Paint the curb white or yellow in the parking area to denote a loading (or commercial loading) zone.

Table 10 displays the parking requirements per code and the supply proposed for the Project.

TABLE 10: PARKING REQUIREMENTS AND SUPPLY

Land Use	For Residents			For Guests			Does Parking Supply Meet City Code?
	Required	Supplied	Surplus / Deficit	Required	Supplied	Surplus / Deficit	
Residential	83	105[1]	+22	13	15[2]	+2	Yes
Flex	-	-	-	6	59[1]	-	Yes
Restaurant	-	-	-	53		-	Yes
Total	***83***	***105***	***+22***	***72***	***74***	***-***	***Yes***

Notes:
1. Basement parking spaces.
2. On-street parking spaces.

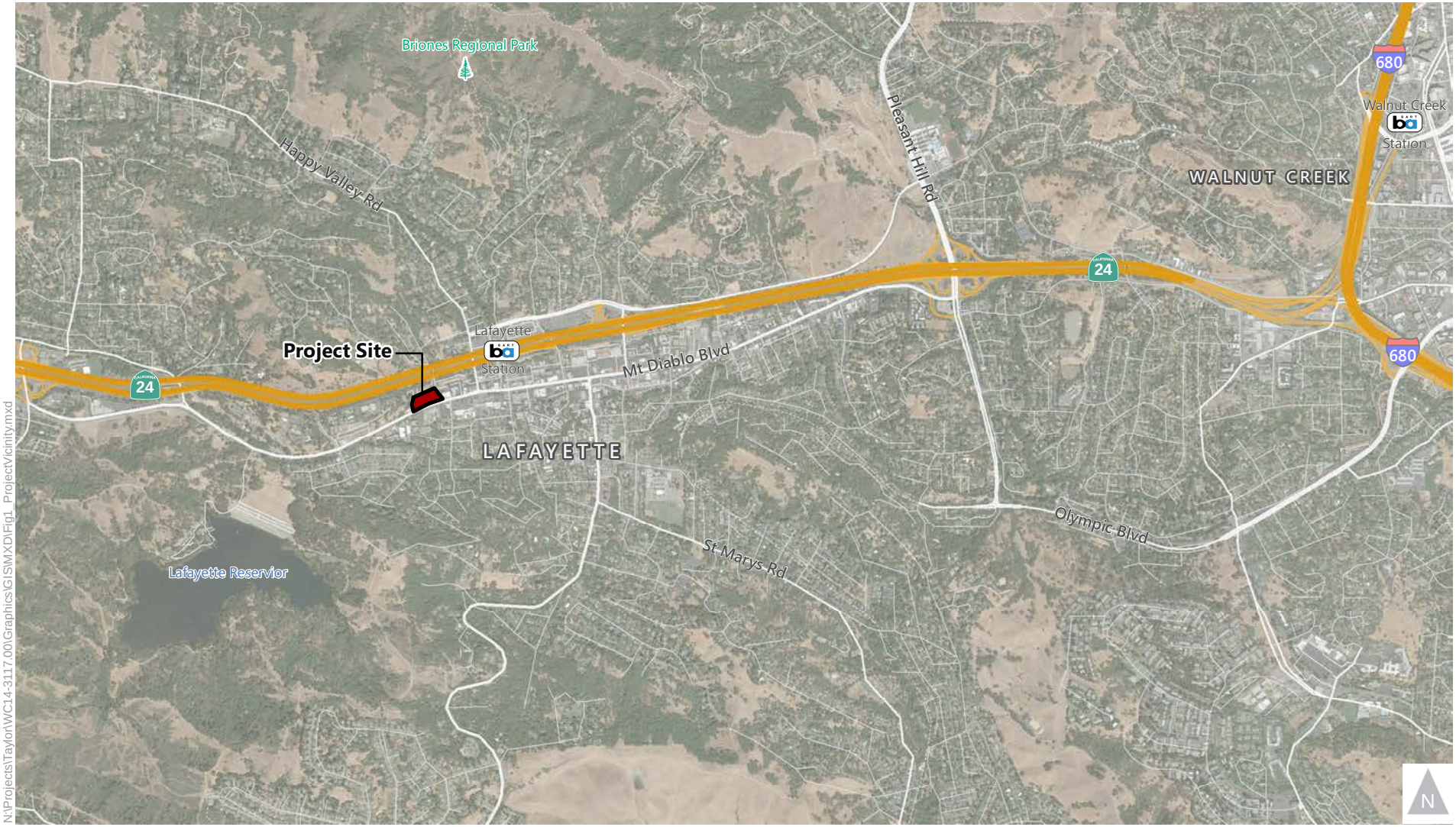
Source: Fehr & Peers, September 2014.

In the parking garage, the parking spaces provided are of adequate depth and width and there is adequate space to maneuver in/out of each space. About 50 feet should be provided between the driveway entry and the first parking space. However, given the size of the Project it is expected that internal conflicts will appear infrequently. In addition, recommendations to reduce the curb radii will slow vehicle speeds entering and exiting the site. The dead-end aisles, while typically not recommended, are located in areas with assigned parking spaces only, which will eliminate the need for turnarounds when vehicles searching for a parking space are not able to find one.

Attachments:

Figure 1	Project Vicinity
Figure 2	Existing Traffic Control, Lane Configurations, and Peak Hour Traffic Volumes
Figure 3	Project Trip Turning Movements
Figure 4	Existing Plus Project Peak Hour Traffic Forecasts
Figure 5	Existing and Existing Plus Project 95th Percentile Queue Lengths
Figure 6	Cumulative Conditions Peak Hour Traffic Forecasts
Figure 7	Cumulative Plus Project Peak Hour Traffic Forecasts
Figure 8	Cumulative and Cumulative Plus Project 95th Percentile Queue Lengths
Figure 9	Site Plan Recommendations
Figure 10	Driveway Sight Distances

Attachment A	Traffic Counts
Attachment B	Synchro Worksheets
Attachment C	Roundabout Analysis Worksheets

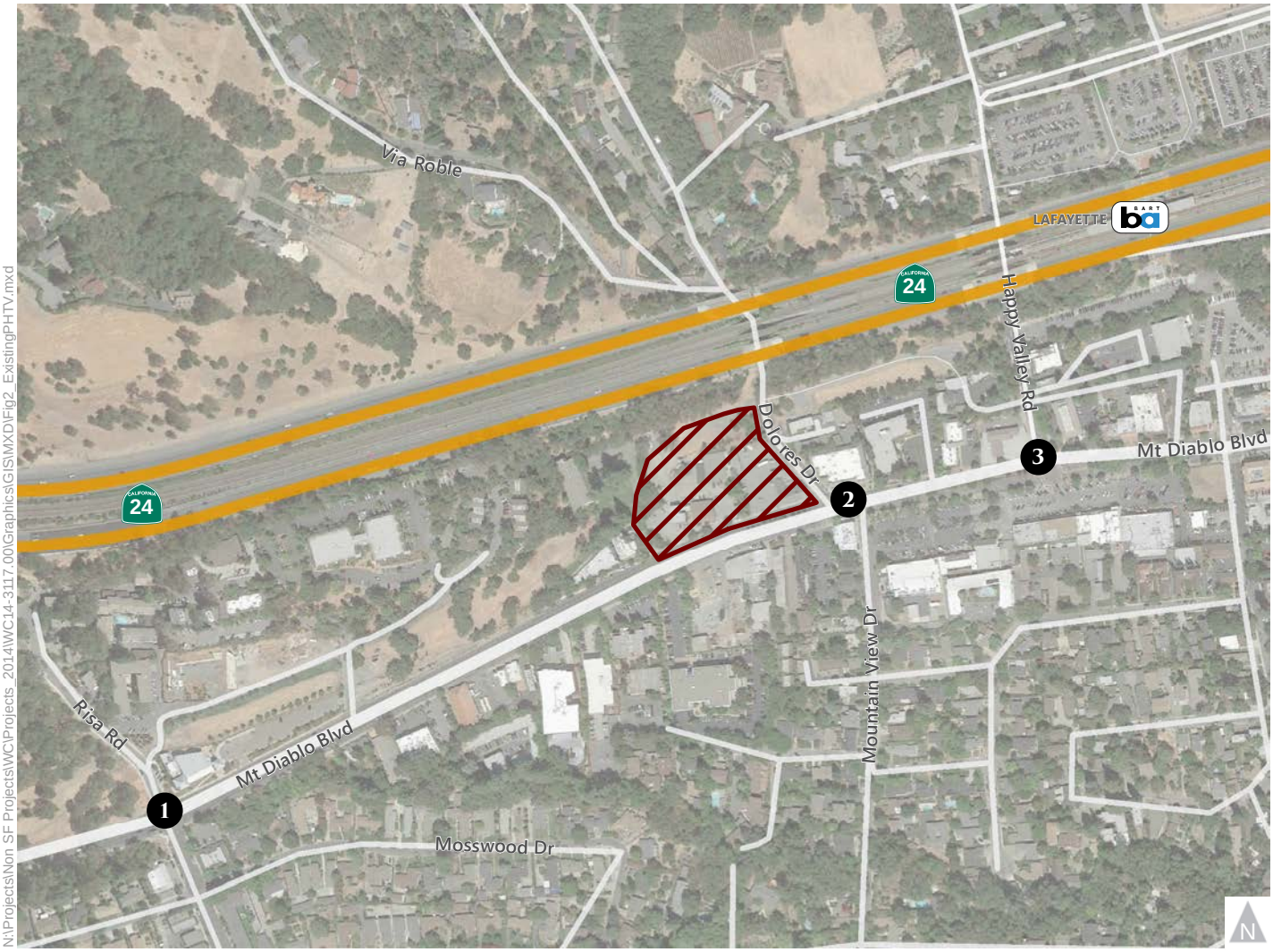


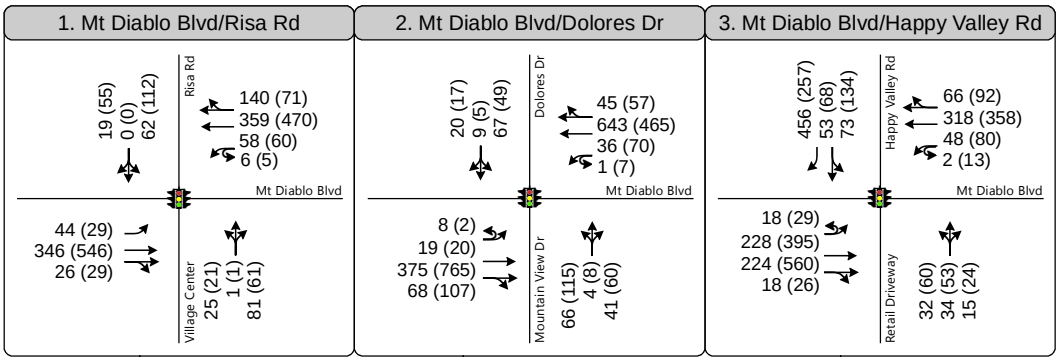
Project Site

BART Station

Figure 1

Project Vicinity





1 Study Intersection

Traffic Signal

Turn Lane

BART Station

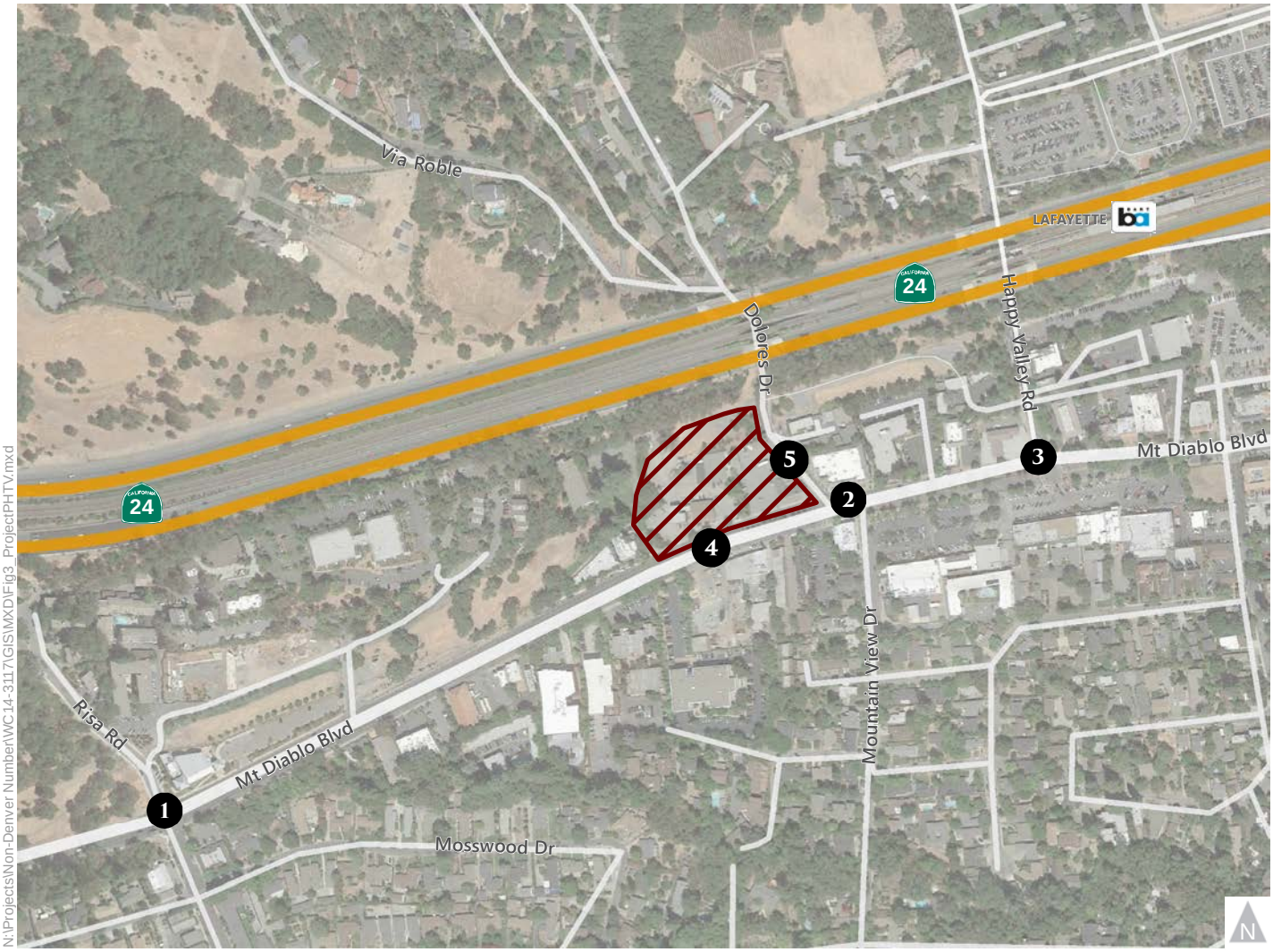
Stop Sign

AM (PM) Peak Hour Traffic Volume

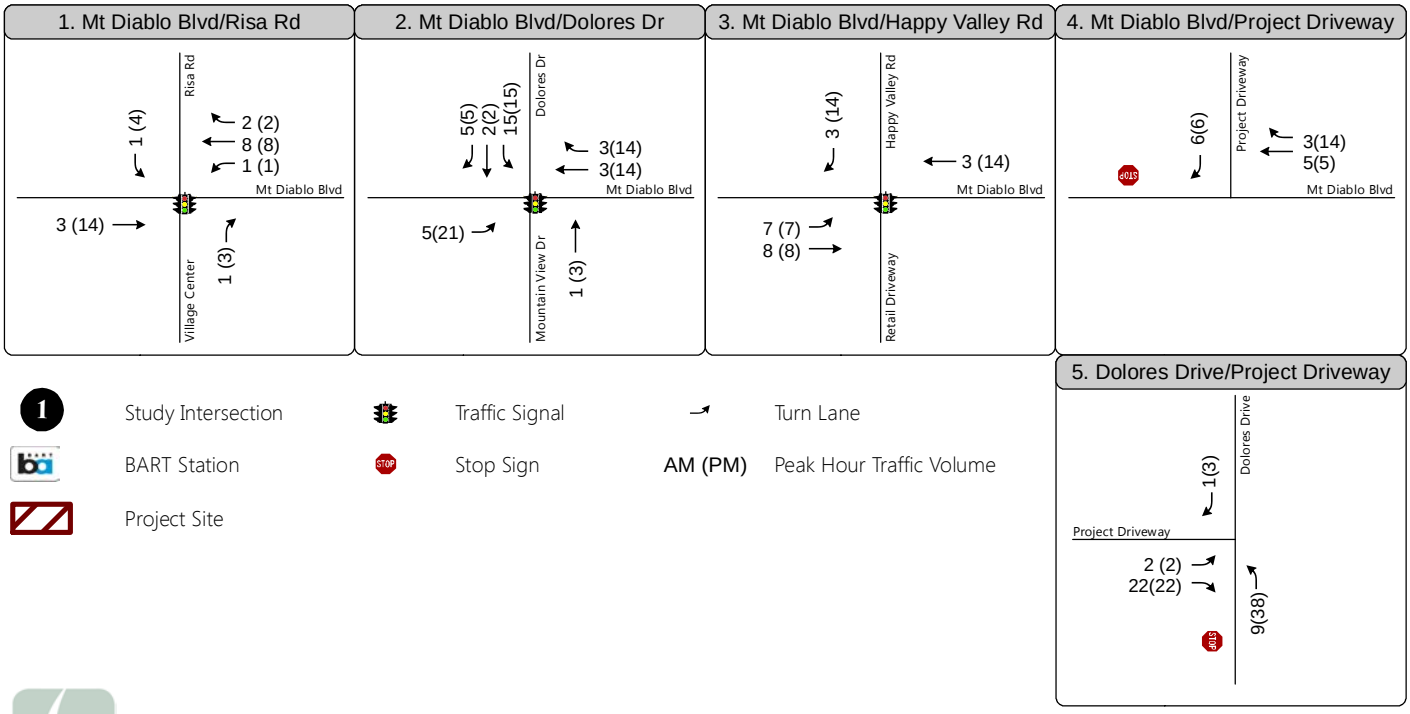
Project Site

Figure 2

Existing Traffic Control, Lane Configurations, and Peak Hour Traffic Volumes



N:\Projects\Non-Denver Number\WC14-3117\GIS\MXD\Fig3_ProjectPHTV.mxd



1 Study Intersection

BART Station

Project Site

Traffic Signal

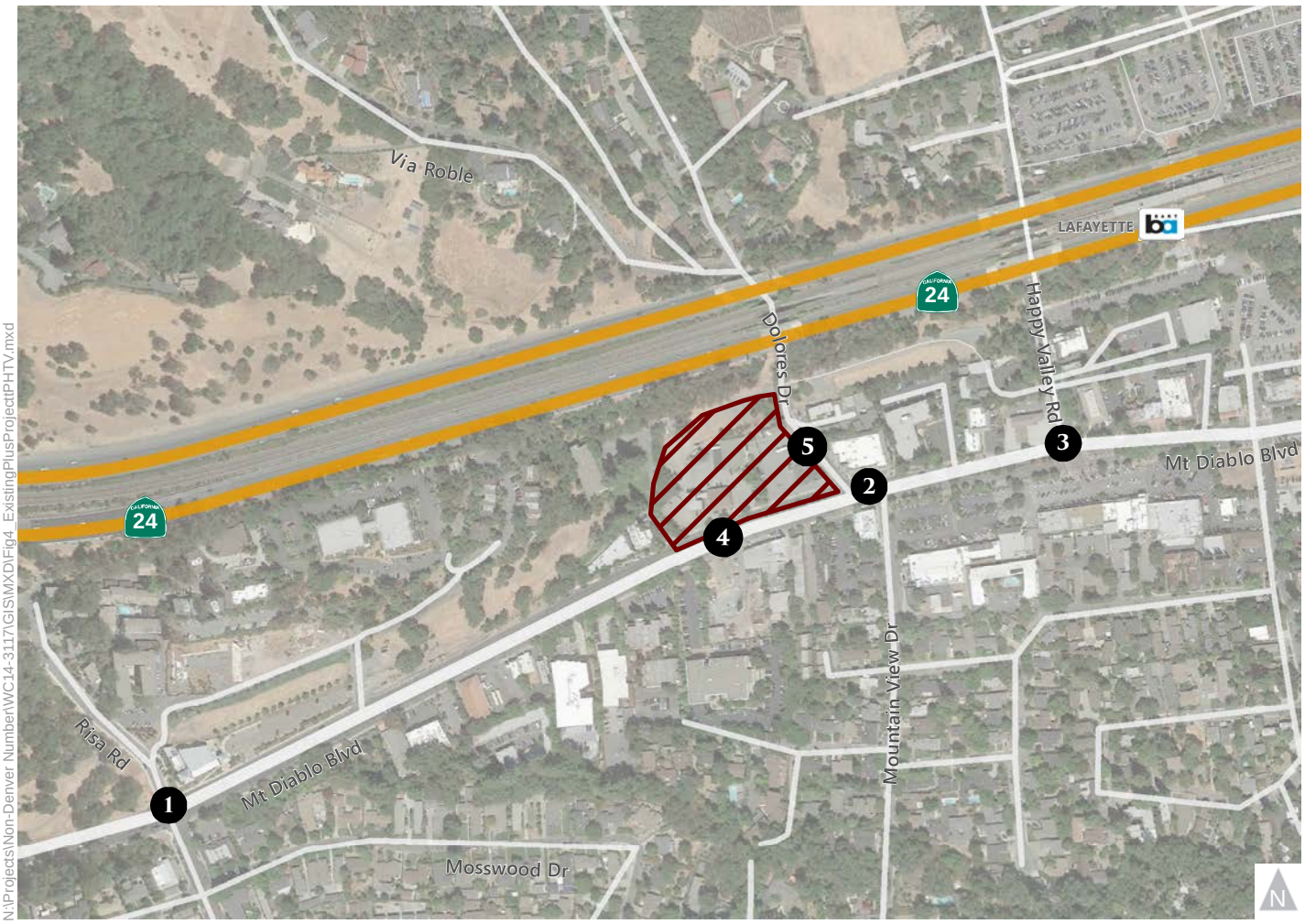
Stop Sign

Turn Lane

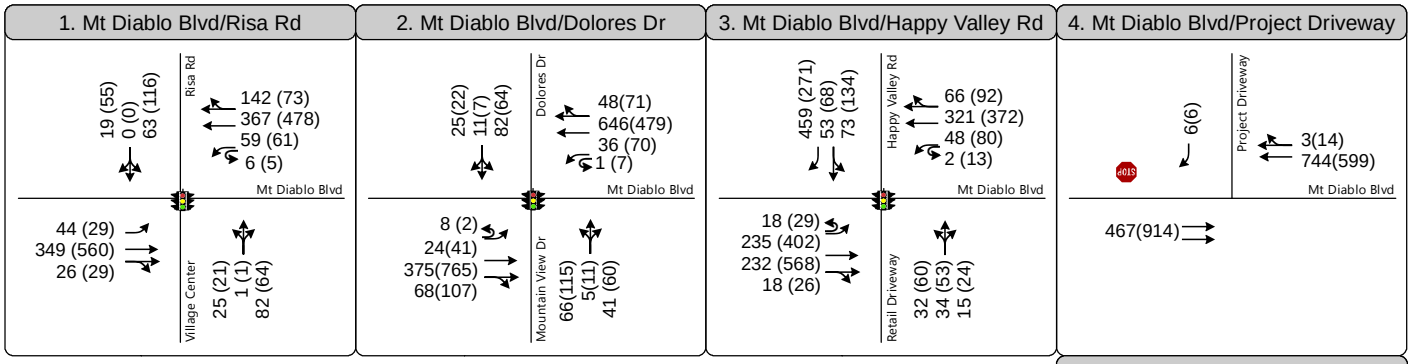
AM (PM) Peak Hour Traffic Volume

Figure 3

Project Trip Turning Movements



N:\Projects\Non-Denver Number\WC14-3117\GIS\MXD\Fig4_ExistingPlusProjectPHTV.mxd



1 Study Intersection

Traffic Signal

Turn Lane

BART Station

Stop Sign

AM (PM) Peak Hour Traffic Volume

Project Site

Figure 4

Existing Plus Project Peak Hour Traffic Forecasts

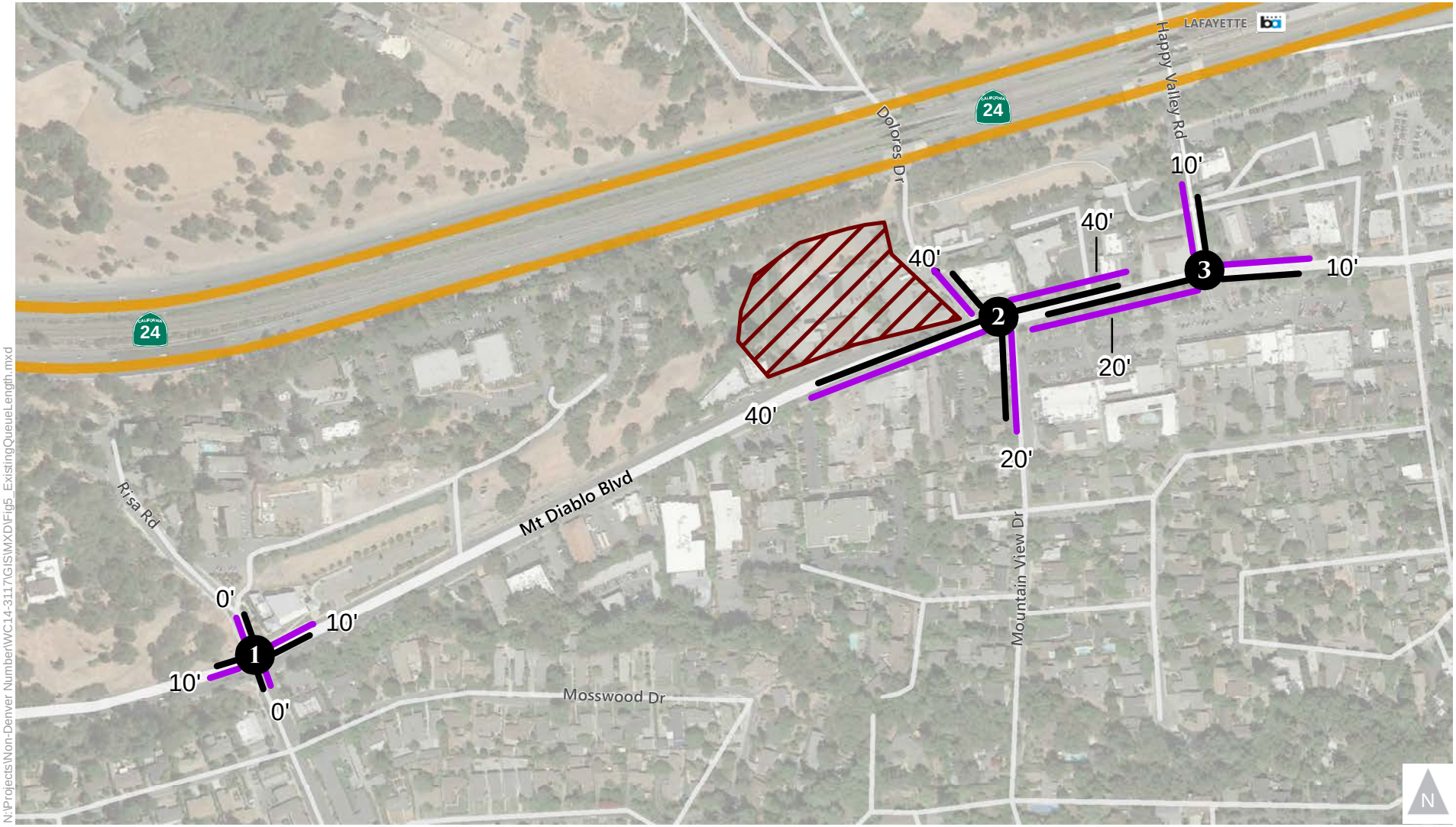
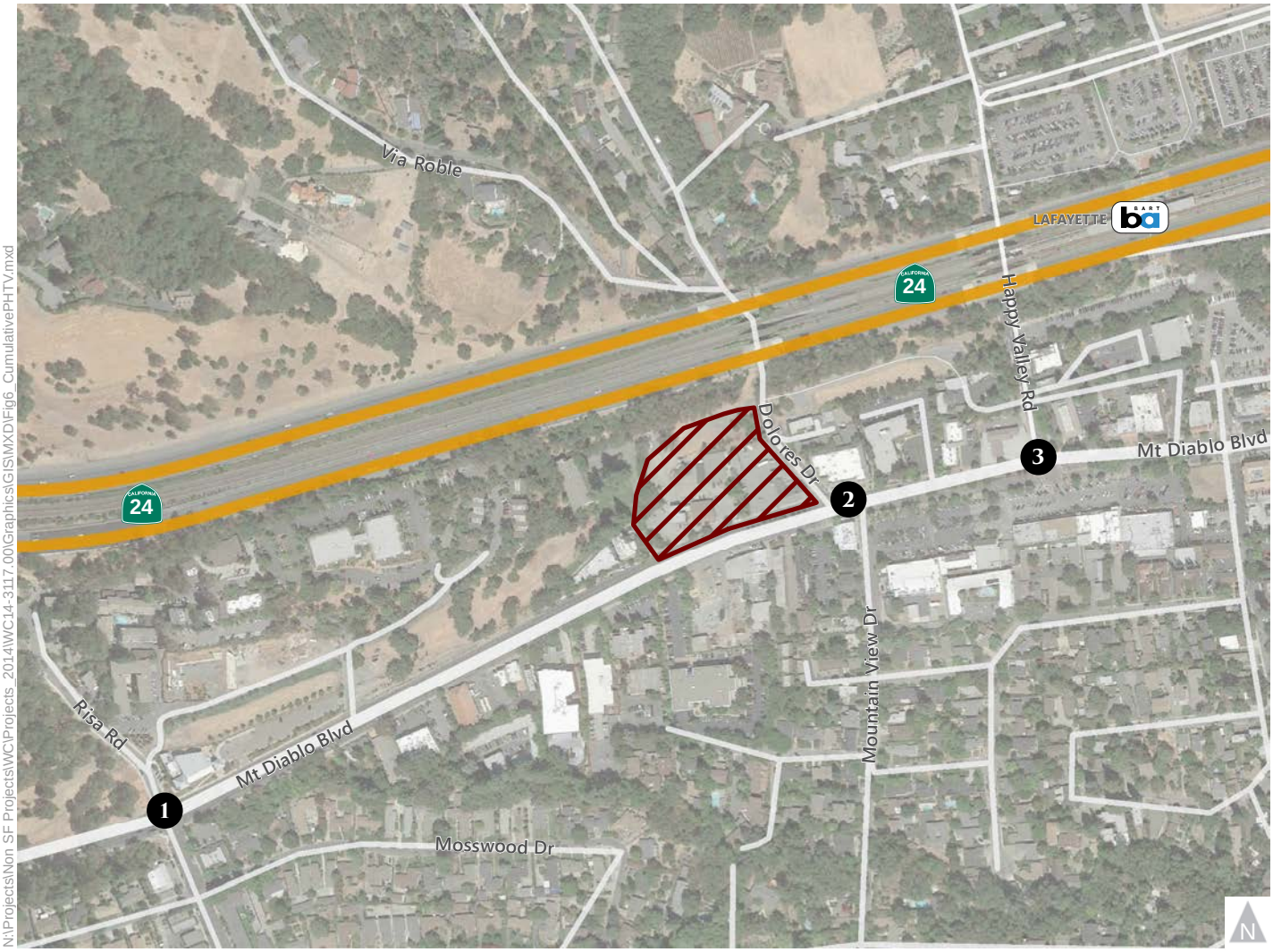
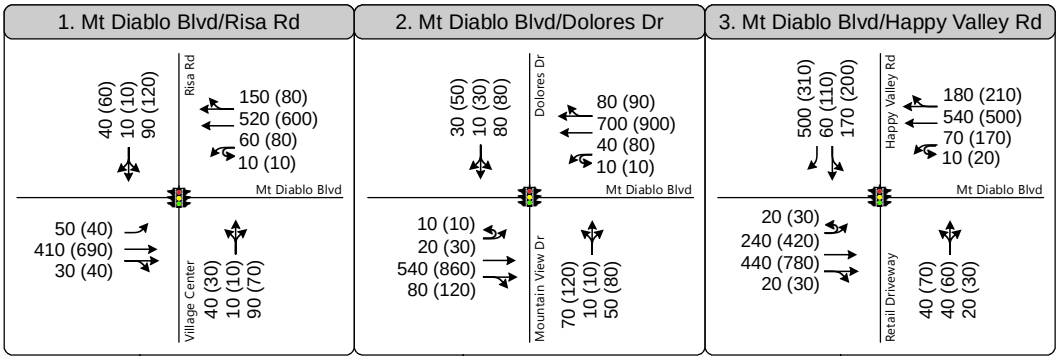


Figure 5

Existing and Existing Plus Project 95th Percentile Queue Lengths





1 Study Intersection

Traffic Signal

Turn Lane

BART Station

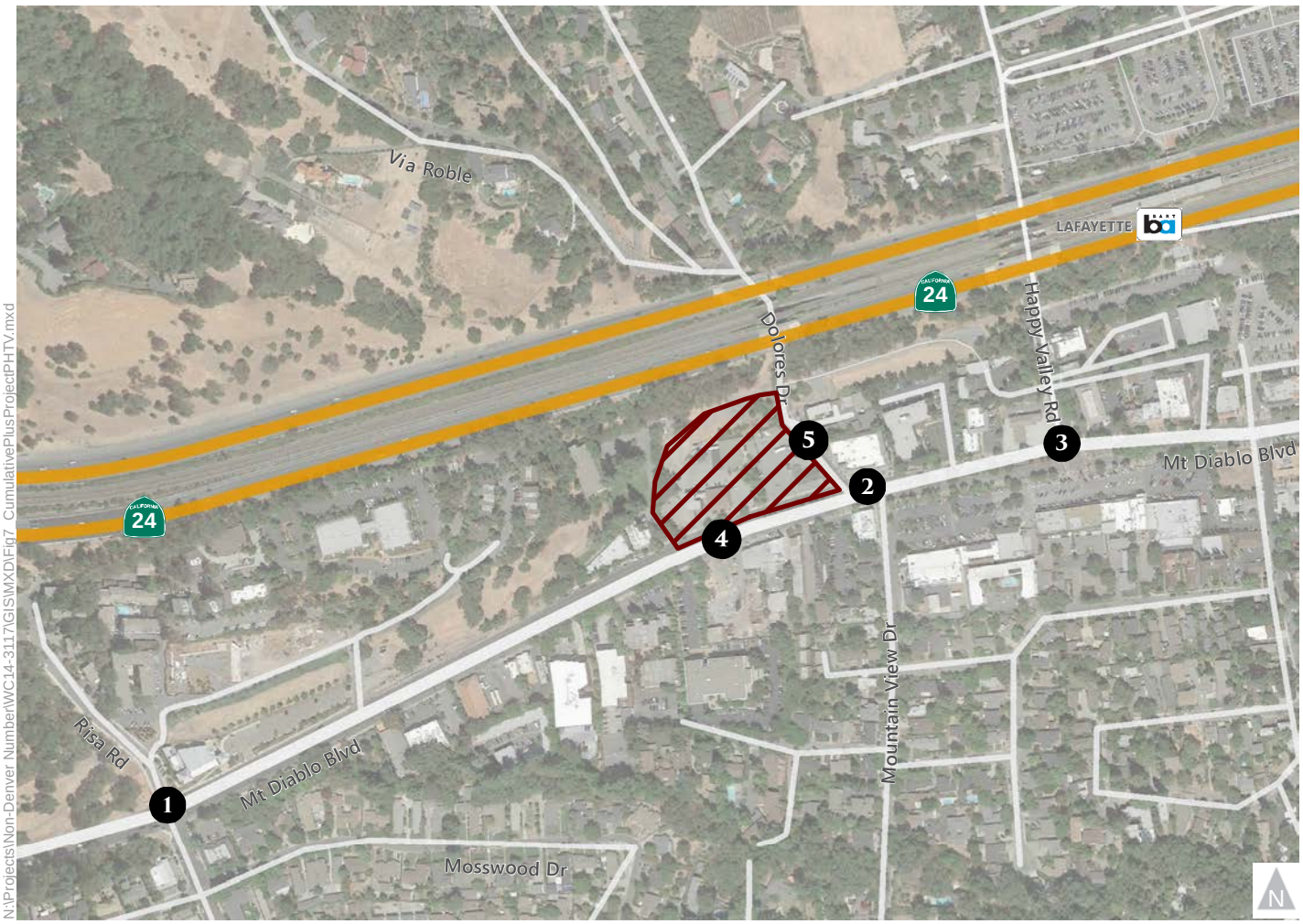
Stop Sign

AM (PM) Peak Hour Traffic Volume

Project Site

Figure 6

Cumulative Conditions Peak Hour Traffic Forecasts



N:\Projects\Non-Denver Number\WC14-3117\GIS\MXD\Fig7_CumulativePlusProjectPHTV.mxd

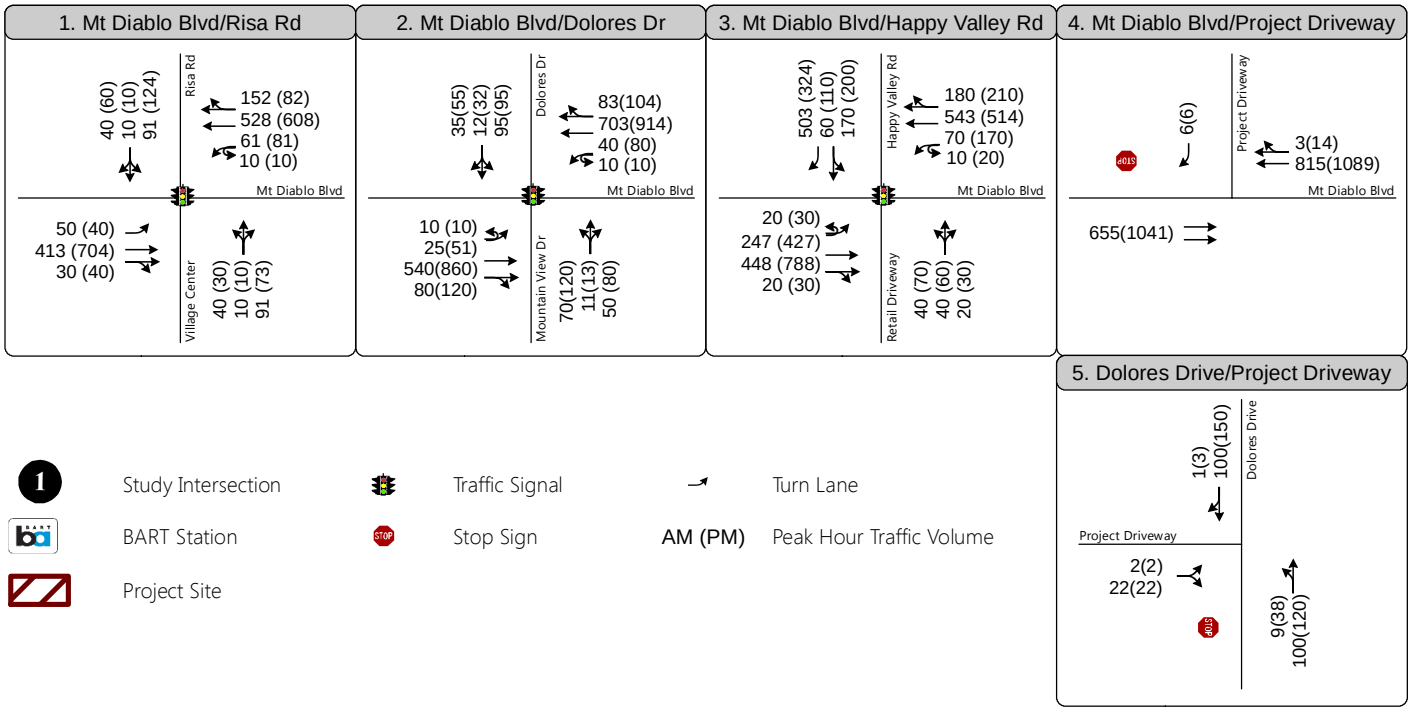


Figure 7

Cumulative Plus Project Conditions Peak Hour Traffic Forecasts

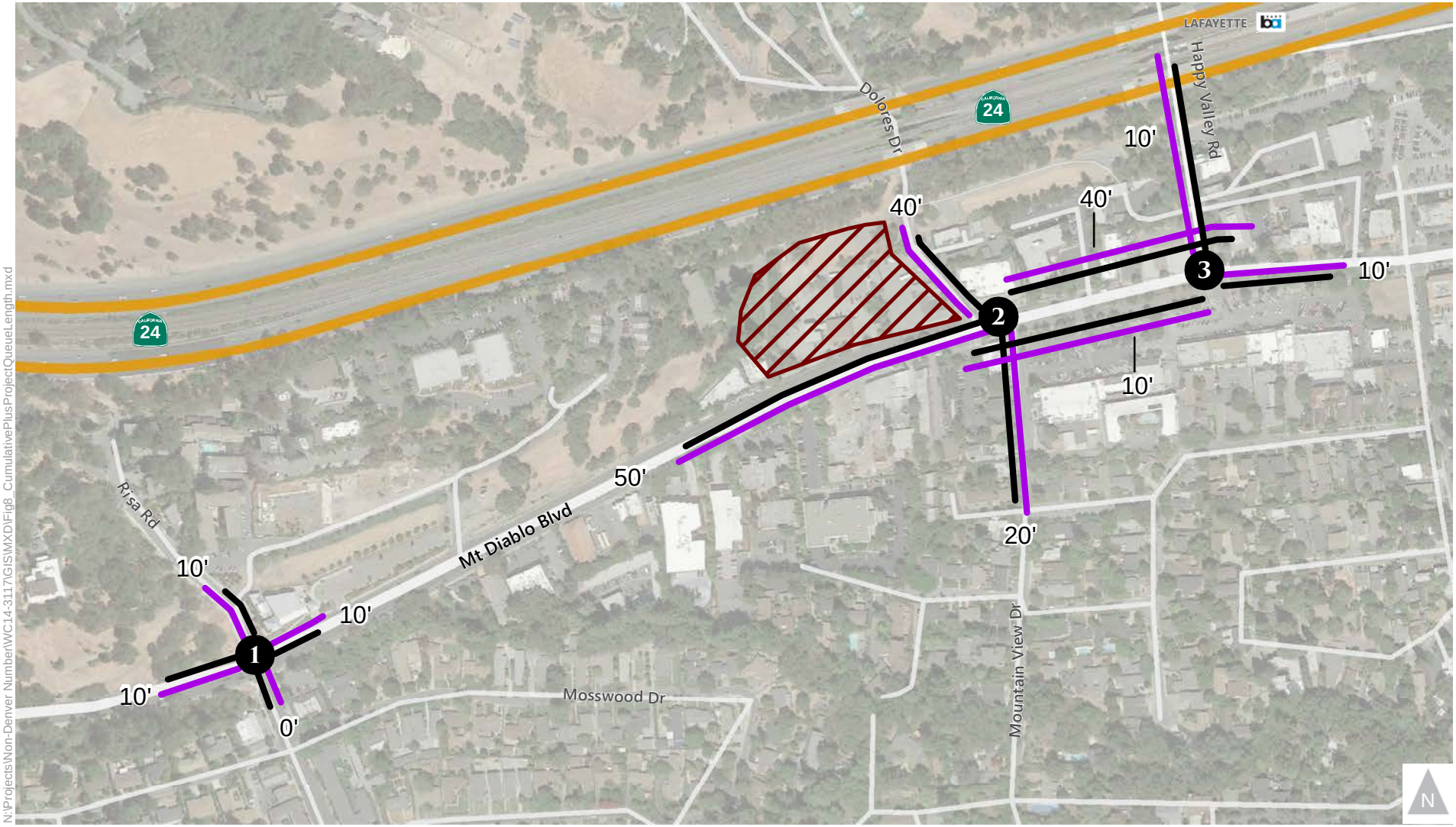


Figure 8

Cumulative and Cumulative Plus Project 95th Percentile Queue Lengths

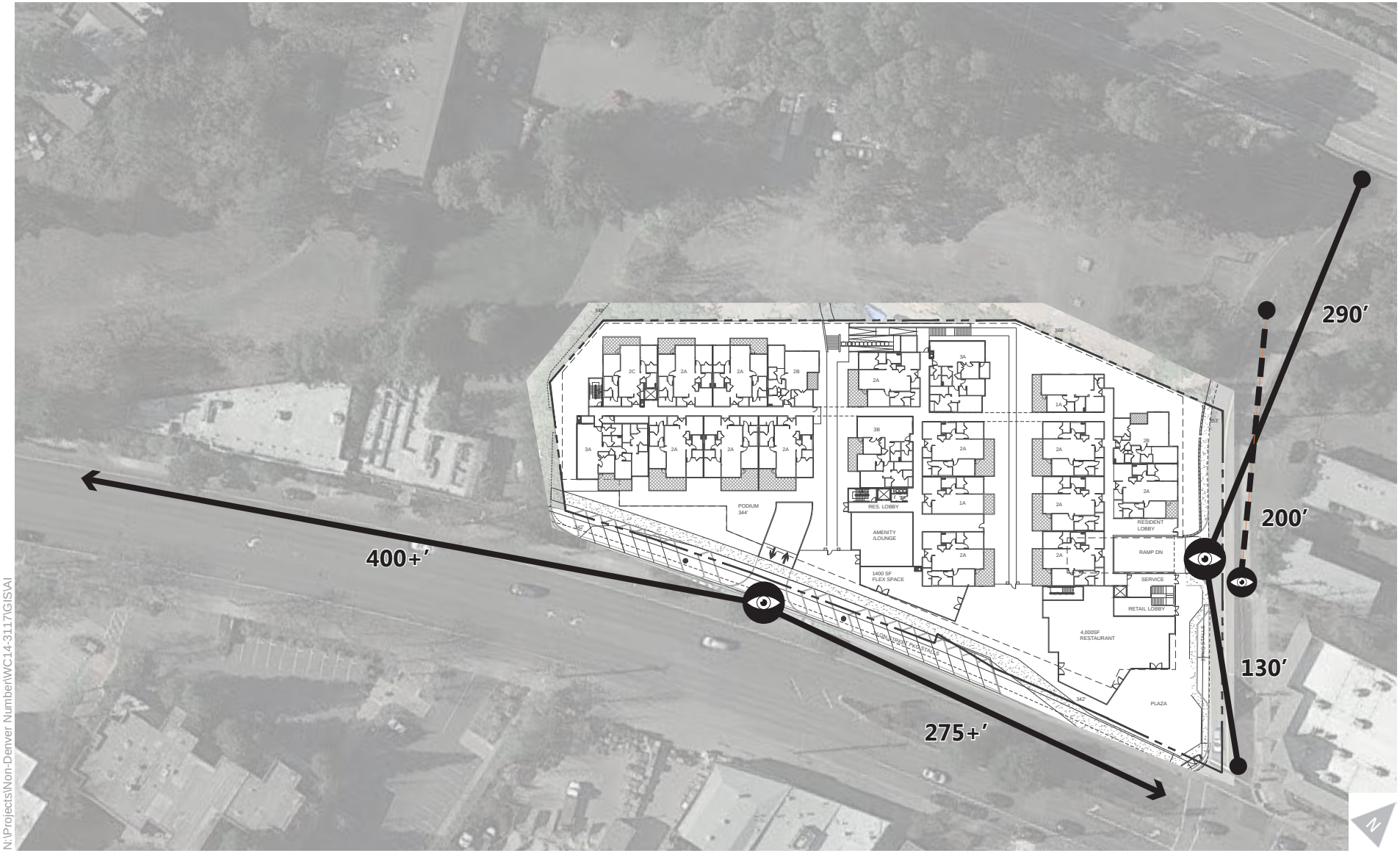
N:\Projects\Non-Denver Number\WC14-3117\GIS\AI

NOTE: Updated proposal has back-in angled parking.

SOURCE: StudioT SQ., Architecture Planning Urban Design. Lafayette, California

Figure 9

Site Plan Recommendations



N:\Projects\Non-Denver Number\WC14-3117\GIS\AI

Sight distance to/from driveway

Sight distance for turning movement

Figure 10

Driveway Sight Distances

SOURCE: StudioT SQ., Architecture Planning Urban Design. Lafayette, California

ALL TRAFFIC DATA

City of Lafayette
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 14-7150-001 Risa Road-Mt. Diablo Boulevard.ppd
Date : 3/12/2014

Unshifted Count = All Vehicles

	Risa Road Southbound					Mt. Diablo Boulevard Westbound					Village Center Northbound					Mt. Diablo Boulevard Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	3	0	2	0	5	7	44	1	1	53	9	0	7	0	16	2	31	3	0	36	110	1
07:15	3	0	1	0	4	3	60	6	0	69	8	0	5	0	13	6	39	3	0	48	134	0
07:30	4	0	0	0	4	2	83	5	1	91	7	0	19	0	26	1	41	3	0	45	166	1
07:45	8	0	1	0	9	11	95	25	0	131	11	0	15	0	26	13	61	4	0	78	244	0
Total	18	0	4	0	22	23	282	37	2	344	35	0	46	0	81	22	172	13	0	207	654	2
08:00	25	0	2	0	27	6	80	44	2	132	5	0	23	0	28	14	71	6	0	91	278	2
08:15	20	0	7	0	27	18	74	15	0	107	7	0	24	0	31	8	92	4	0	104	269	0
08:30	8	0	2	0	10	15	96	41	1	153	7	0	20	0	27	12	96	6	0	114	304	1
08:45	9	0	8	0	17	19	109	40	3	171	6	1	14	0	21	10	87	10	0	107	316	3
Total	62	0	19	0	81	58	359	140	6	563	25	1	81	0	107	44	346	26	0	416	1167	6
16:00	33	0	22	0	55	17	100	30	2	149	8	0	5	0	13	13	125	6	0	144	361	2
16:15	22	0	13	0	35	17	110	15	3	145	2	0	11	0	13	4	173	6	0	183	376	3
16:30	31	1	7	0	39	8	100	12	3	123	3	0	19	0	22	1	135	6	0	142	326	3
16:45	23	0	11	0	34	7	131	17	0	155	4	0	21	0	25	5	137	7	0	149	363	0
Total	109	1	53	0	163	49	441	74	8	572	17	0	56	0	73	23	570	25	0	618	1426	8
17:00	31	0	20	0	51	19	117	17	1	154	6	0	13	0	19	8	130	8	1	147	371	2
17:15	29	0	10	0	39	19	105	15	3	142	6	0	13	0	19	4	136	9	0	149	349	3
17:30	29	0	14	0	43	15	117	22	1	155	5	1	14	0	20	12	143	5	0	160	378	1
17:45	14	0	7	0	21	21	112	36	3	172	4	0	11	0	15	14	129	7	0	150	358	3
Total	103	0	51	0	154	74	451	90	8	623	21	1	51	0	73	38	538	29	1	606	1456	9
Grand Total	292	1	127	0	420	204	1533	341	24	2102	98	2	234	0	334	127	1626	93	1	1847	4703	25
Apprch %	69.5%	0.2%	30.2%	0.0%		9.7%	72.9%	16.2%	1.1%		29.3%	0.6%	70.1%	0.0%		6.9%	88.0%	5.0%	0.1%			
Total %	6.2%	0.0%	2.7%	0.0%	8.9%	4.3%	32.6%	7.3%	0.5%	44.7%	2.1%	0.0%	5.0%	0.0%	7.1%	2.7%	34.6%	2.0%	0.0%	39.3%	100.0%	

ALL TRAFFIC DATA

City of Lafayette
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 14-7150-001 Risa Road-Mt. Diablo Boulevard.ppd
Date : 3/12/2014

Unshifted Count = All Vehicles

AM PEAK HOUR	Risa Road Southbound					Mt. Diablo Boulevard Westbound					Village Center Northbound					Mt. Diablo Boulevard Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	25	0	2	0	27	6	80	44	2	132	5	0	23	0	28	14	71	6	0	91	278
08:15	20	0	7	0	27	18	74	15	0	107	7	0	24	0	31	8	92	4	0	104	269
08:30	8	0	2	0	10	15	96	41	1	153	7	0	20	0	27	12	96	6	0	114	304
08:45	9	0	8	0	17	19	109	40	3	171	6	1	14	0	21	10	87	10	0	107	316
Total Volume	62	0	19	0	81	58	359	140	6	563	25	1	81	0	107	44	346	26	0	416	1167
% App Total	76.5%	0.0%	23.5%	0.0%		10.3%	63.8%	24.9%	1.1%		23.4%	0.9%	75.7%	0.0%		10.6%	83.2%	6.3%	0.0%		
PHF	.620	.000	.594	.000	.750	.763	.823	.795	.500	.823	.893	.250	.844	.000	.863	.786	.901	.650	.000	.912	.923

PM PEAK HOUR	Risa Road Southbound					Mt. Diablo Boulevard Westbound					Village Center Northbound					Mt. Diablo Boulevard Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:45 to 17:45																					
Peak Hour For Entire Intersection Begins at 16:45																					
16:45	23	0	11	0	34	7	131	17	0	155	4	0	21	0	25	5	137	7	0	149	363
17:00	31	0	20	0	51	19	117	17	1	154	6	0	13	0	19	8	130	8	1	147	371
17:15	29	0	10	0	39	19	105	15	3	142	6	0	13	0	19	4	136	9	0	149	349
17:30	29	0	14	0	43	15	117	22	1	155	5	1	14	0	20	12	143	5	0	160	378
Total Volume	112	0	55	0	167	60	470	71	5	606	21	1	61	0	83	29	546	29	1	605	1461
% App Total	67.1%	0.0%	32.9%	0.0%		9.9%	77.6%	11.7%	0.8%		25.3%	1.2%	73.5%	0.0%		4.8%	90.2%	4.8%	0.2%		
PHF	.903	.000	.688	.000	.819	.789	.897	.807	.417	.977	.875	.250	.726	.000	.830	.604	.955	.806	.250	.945	.966

ALL TRAFFIC DATA

City of Lafayette
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Outbound Driveway on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 14-7150-002 Dolores Drive-Mt. Diablo Boulevard.ppd
Date : 3/12/2014

Unshifted Count = All Vehicles

	Dolores Drive Southbound					Mt. Diablo Boulevard Westbound					Mountain View Drive Northbound					Mt. Diablo Boulevard Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	7	1	4	0	12	4	68	6	0	78	4	0	5	0	9	3	34	3	1	41	140	1
07:15	15	0	3	0	18	7	82	7	0	96	10	1	3	0	14	4	37	1	2	44	172	2
07:30	21	0	7	0	28	4	117	8	0	129	12	1	10	0	23	4	59	7	2	72	252	2
07:45	14	1	2	0	17	6	174	8	0	188	11	0	7	0	18	5	57	11	0	73	296	0
Total	57	2	16	0	75	21	441	29	0	491	37	2	25	0	64	16	187	22	5	230	860	5
08:00	19	1	6	0	26	2	139	8	1	150	10	0	9	0	19	5	93	14	1	113	308	2
08:15	20	3	1	0	24	7	142	9	0	158	11	1	18	0	30	4	98	20	1	123	335	1
08:30	14	3	7	0	24	11	170	15	0	196	23	1	6	0	30	5	93	14	2	114	364	2
08:45	14	2	6	0	22	16	192	13	0	221	22	2	8	0	32	5	91	20	4	120	395	4
Total	67	9	20	0	96	36	643	45	1	725	66	4	41	0	111	19	375	68	8	470	1402	9
16:00	11	2	8	0	21	20	126	14	2	162	19	1	12	0	32	1	179	29	0	209	424	2
16:15	16	1	3	0	20	13	112	12	0	137	31	0	20	0	51	9	179	32	3	223	431	3
16:30	14	2	4	0	20	13	102	10	2	127	20	2	26	0	48	2	185	38	4	229	424	6
16:45	10	0	3	0	13	20	123	14	2	159	25	1	14	0	40	8	173	24	1	206	418	3
Total	51	5	18	0	74	66	463	50	6	585	95	4	72	0	171	20	716	123	8	867	1697	14
17:00	15	0	5	0	20	13	109	11	2	135	27	4	15	0	46	7	215	24	1	247	448	3
17:15	10	2	6	0	18	16	95	9	1	121	36	2	15	0	53	3	165	28	0	196	388	1
17:30	14	3	3	0	20	21	138	23	2	184	27	1	16	0	44	2	212	31	0	245	493	2
17:45	9	2	3	0	14	13	138	11	1	163	32	2	15	0	49	7	163	19	0	189	415	1
Total	48	7	17	0	72	63	480	54	6	603	122	9	61	0	192	19	755	102	1	877	1744	7
Grand Total	223	23	71	0	317	186	2027	178	13	2404	320	19	199	0	538	74	2033	315	22	2444	5703	35
Apprch %	70.3%	7.3%	22.4%	0.0%		7.7%	84.3%	7.4%	0.5%		59.5%	3.5%	37.0%	0.0%		3.0%	83.2%	12.9%	0.9%			
Total %	3.9%	0.4%	1.2%	0.0%	5.6%	3.3%	35.5%	3.1%	0.2%	42.2%	5.6%	0.3%	3.5%	0.0%	9.4%	1.3%	35.6%	5.5%	0.4%	42.9%	100.0%	

ALL TRAFFIC DATA

City of Lafayette
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Outbound Driveway on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 14-7150-002 Dolores Drive-Mt. Diablo Boulevard.ppd
Date : 3/12/2014

Unshifted Count = All Vehicles

AM PEAK HOUR	Dolores Drive Southbound					Mt. Diablo Boulevard Westbound					Mountain View Drive Northbound					Mt. Diablo Boulevard Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	19	1	6	0	26	2	139	8	1	150	10	0	9	0	19	5	93	14	1	113	308
08:15	20	3	1	0	24	7	142	9	0	158	11	1	18	0	30	4	98	20	1	123	335
08:30	14	3	7	0	24	11	170	15	0	196	23	1	6	0	30	5	93	14	2	114	364
08:45	14	2	6	0	22	16	192	13	0	221	22	2	8	0	32	5	91	20	4	120	395
Total Volume	67	9	20	0	96	36	643	45	1	725	66	4	41	0	111	19	375	68	8	470	1402
% App Total	69.8%	9.4%	20.8%	0.0%		5.0%	88.7%	6.2%	0.1%		59.5%	3.6%	36.9%	0.0%		4.0%	79.8%	14.5%	1.7%		
PHF	.838	.750	.714	.000	.923	.563	.837	.750	.250	.820	.717	.500	.569	.000	.867	.950	.957	.850	.500	.955	.887

PM PEAK HOUR	Dolores Drive Southbound					Mt. Diablo Boulevard Westbound					Mountain View Drive Northbound					Mt. Diablo Boulevard Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:45 to 17:45																					
Peak Hour For Entire Intersection Begins at 16:45																					
16:45	10	0	3	0	13	20	123	14	2	159	25	1	14	0	40	8	173	24	1	206	418
17:00	15	0	5	0	20	13	109	11	2	135	27	4	15	0	46	7	215	24	1	247	448
17:15	10	2	6	0	18	16	95	9	1	121	36	2	15	0	53	3	165	28	0	196	388
17:30	14	3	3	0	20	21	138	23	2	184	27	1	16	0	44	2	212	31	0	245	493
Total Volume	49	5	17	0	71	70	465	57	7	599	115	8	60	0	183	20	765	107	2	894	1747
% App Total	69.0%	7.0%	23.9%	0.0%		11.7%	77.6%	9.5%	1.2%		62.8%	4.4%	32.8%	0.0%		2.2%	85.6%	12.0%	0.2%		
PHF	.817	.417	.708	.000	.888	.833	.842	.620	.875	.814	.799	.500	.938	.000	.863	.625	.890	.863	.500	.905	.886

ALL TRAFFIC DATA

City of Lafayette
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 14-7150-003 Happy Valley Road-Mt. Diablo Boulevard.ppd
Date : 3/12/2014

Unshifted Count = All Vehicles

	Happy Valley Road Southbound					Mt. Diablo Boulevard Westbound					Driveway Northbound					Mt. Diablo Boulevard Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	1	5	48	0	54	2	33	10	0	45	1	3	3	0	7	20	22	2	2	46	152	2
07:15	9	8	56	0	73	11	51	10	0	72	5	2	2	0	9	23	32	1	4	60	214	4
07:30	10	8	62	0	80	7	54	22	0	83	3	1	6	0	10	41	37	4	3	85	258	3
07:45	20	8	100	0	128	6	86	23	1	116	4	4	0	0	8	39	29	5	2	75	327	3
Total	40	29	266	0	335	26	224	65	1	316	13	10	11	0	34	123	120	12	11	266	951	12
08:00	13	5	98	0	116	9	74	23	0	106	3	7	2	0	12	67	55	5	1	128	362	1
08:15	19	14	98	0	131	8	64	16	0	88	6	7	3	0	16	68	44	6	9	127	362	9
08:30	23	21	129	0	173	15	79	16	1	111	12	10	5	0	27	44	65	4	6	119	430	7
08:45	18	13	131	0	162	16	101	11	1	129	11	10	5	0	26	49	60	3	2	114	431	3
Total	73	53	456	0	582	48	318	66	2	434	32	34	15	0	81	228	224	18	18	488	1585	20
16:00	27	13	78	0	118	35	100	15	3	153	11	14	5	0	30	102	127	4	4	237	538	7
16:15	24	13	72	0	109	33	81	14	3	131	17	10	9	0	36	96	119	9	5	229	505	8
16:30	23	20	63	0	106	33	82	19	3	137	9	12	6	0	27	114	134	4	8	260	530	11
16:45	20	18	61	0	99	16	81	23	1	121	15	13	9	0	37	96	132	8	5	241	498	6
Total	94	64	274	0	432	117	344	71	10	542	52	49	29	0	130	408	512	25	22	967	2071	32
17:00	33	17	57	0	107	19	94	26	2	141	10	13	6	0	29	115	148	4	9	276	553	11
17:15	49	19	64	0	132	20	79	23	4	126	18	14	5	0	37	78	116	6	8	208	503	12
17:30	32	14	75	0	121	25	104	20	6	155	17	13	4	0	34	106	164	8	7	285	595	13
17:45	31	12	83	0	126	16	85	18	6	125	13	19	5	0	37	94	109	6	1	210	498	7
Total	145	62	279	0	486	80	362	87	18	547	58	59	20	0	137	393	537	24	25	979	2149	43
Grand Total	352	208	1275	0	1835	271	1248	289	31	1839	155	152	75	0	382	1152	1393	79	76	2700	6756	107
Apprch %	19.2%	11.3%	69.5%	0.0%		14.7%	67.9%	15.7%	1.7%		40.6%	39.8%	19.6%	0.0%		42.7%	51.6%	2.9%	2.8%			
Total %	5.2%	3.1%	18.9%	0.0%	27.2%	4.0%	18.5%	4.3%	0.5%	27.2%	2.3%	2.2%	1.1%	0.0%	5.7%	17.1%	20.6%	1.2%	1.1%	40.0%	100.0%	

ALL TRAFFIC DATA

City of Lafayette
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 14-7150-003 Happy Valley Road-Mt. Diablo Boulevard.ppd
Date : 3/12/2014

Unshifted Count = All Vehicles

AM PEAK HOUR	Happy Valley Road Southbound					Mt. Diablo Boulevard Westbound					Driveway Northbound					Mt. Diablo Boulevard Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	13	5	98	0	116	9	74	23	0	106	3	7	2	0	12	67	55	5	1	128	362
08:15	19	14	98	0	131	8	64	16	0	88	6	7	3	0	16	68	44	6	9	127	362
08:30	23	21	129	0	173	15	79	16	1	111	12	10	5	0	27	44	65	4	6	119	430
08:45	18	13	131	0	162	16	101	11	1	129	11	10	5	0	26	49	60	3	2	114	431
Total Volume	73	53	456	0	582	48	318	66	2	434	32	34	15	0	81	228	224	18	18	488	1585
% App Total	12.5%	9.1%	78.4%	0.0%		11.1%	73.3%	15.2%	0.5%		39.5%	42.0%	18.5%	0.0%		46.7%	45.9%	3.7%	3.7%		
PHF	.793	.631	.870	.000	.841	.750	.787	.717	.500	.841	.667	.850	.750	.000	.750	.838	.862	.750	.500	.953	.919

PM PEAK HOUR	Happy Valley Road Southbound					Mt. Diablo Boulevard Westbound					Driveway Northbound					Mt. Diablo Boulevard Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:45 to 17:45																					
Peak Hour For Entire Intersection Begins at 16:45																					
16:45	20	18	61	0	99	16	81	23	1	121	15	13	9	0	37	96	132	8	5	241	498
17:00	33	17	57	0	107	19	94	26	2	141	10	13	6	0	29	115	148	4	9	276	553
17:15	49	19	64	0	132	20	79	23	4	126	18	14	5	0	37	78	116	6	8	208	503
17:30	32	14	75	0	121	25	104	20	6	155	17	13	4	0	34	106	164	8	7	285	595
Total Volume	134	68	257	0	459	80	358	92	13	543	60	53	24	0	137	395	560	26	29	1010	2149
% App Total	29.2%	14.8%	56.0%	0.0%		14.7%	65.9%	16.9%	2.4%		43.8%	38.7%	17.5%	0.0%		39.1%	55.4%	2.6%	2.9%		
PHF	.684	.895	.857	.000	.869	.800	.861	.885	.542	.876	.833	.946	.667	.000	.926	.859	.854	.813	.806	.886	.903

14-7150 Driveway A

Celia's Driveway west of Dolores Drive

	Inbound	Outbound				
3/12/2014 7:00	7	1	8	13	13	
3/12/2014 7:15	4	0	4	7	10	
3/12/2014 7:30	0	1	1	8	12	
3/12/2014 7:45	0	0	0	14	14	
3/12/2014 8:00	1	1	2	14	16	30
3/12/2014 8:15	0	5	5			
3/12/2014 8:30	1	6	7			
3/12/2014 8:45	0	0	0			
3/12/2014 16:00	1	0	1	14	12	
3/12/2014 16:15	2	2	4	16	14	30
3/12/2014 16:30	5	2	7	15	14	
3/12/2014 16:45	1	1	2	13	13	
3/12/2014 17:00	2	1	3	16	11	
3/12/2014 17:15	3	0	3			
3/12/2014 17:30	4	1	5			
3/12/2014 17:45	5	0	5			

14-7150 Driveway B

Celia's Driveway north of Mt. Diablo Boulevard

	Inbound	Outbound		
3/12/2014 7:00	3	2	5	13
3/12/2014 7:15	1	1	2	10
3/12/2014 7:30	1	3	4	12
3/12/2014 7:45	1	1	2	14
3/12/2014 8:00	1	1	2	16
3/12/2014 8:15	1	3	4	
3/12/2014 8:30	2	4	6	
3/12/2014 8:45	0	4	4	
3/12/2014 16:00	0	1	1	12
3/12/2014 16:15	2	1	3	14
3/12/2014 16:30	2	1	3	14
3/12/2014 16:45	3	2	5	13
3/12/2014 17:00	1	2	3	11
3/12/2014 17:15	1	2	3	
3/12/2014 17:30	0	2	2	
3/12/2014 17:45	2	1	3	

14-7150 Driveway C

Retail Driveway directly west of Celia's

	Inbound	Outbound		
3/12/2014 7:00	4	0	4	10
3/12/2014 7:15	3	0	3	6
3/12/2014 7:30	2	0	2	4
3/12/2014 7:45	1	0	1	5
3/12/2014 8:00	0	0	0	6
3/12/2014 8:15	1	0	1	
3/12/2014 8:30	3	0	3	
3/12/2014 8:45	2	0	2	
3/12/2014 16:00	4	0	4	10
3/12/2014 16:15	4	1	5	7
3/12/2014 16:30	0	1	1	3
3/12/2014 16:45	0	0	0	2
3/12/2014 17:00	0	1	1	3
3/12/2014 17:15	0	1	1	
3/12/2014 17:30	0	0	0	
3/12/2014 17:45	1	0	1	

Volumes for: Wednesday, March 12, 2014 City: Lafayette Project #: 14-7151-001

Location: Mt. Diablo Boulevard west of Dolores Drive

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	3	169			4	124				
12:15	2	154			2	143				
12:30	2	146			3	117				
12:45	2	158	9	627	3	129	12	513	21	1140
1:00	3	155			3	142				
1:15	3	138			5	129				
1:30	2	134			3	143				
1:45	7	141	15	568	3	141	14	555	29	1123
2:00	1	137			0	109				
2:15	1	135			3	131				
2:30	0	162			5	157				
2:45	1	134	3	568	0	164	8	561	11	1129
3:00	0	140			1	160				
3:15	1	156			0	165				
3:30	1	177			2	138				
3:45	2	196	4	669	3	185	6	648	10	1317
4:00	6	194			3	144				
4:15	3	216			1	157				
4:30	0	220			3	122				
4:45	0	219	9	849	18	159	25	582	34	1431
5:00	3	238			13	136				
5:15	5	218			19	140				
5:30	11	227			16	162				
5:45	7	190	26	873	18	170	66	608	92	1481
6:00	14	204			21	129				
6:15	15	156			28	125				
6:30	24	150			37	136				
6:45	29	137	82	647	59	110	145	500	227	1147
7:00	43	138			74	110				
7:15	42	100			93	86				
7:30	73	108			139	80				
7:45	68	61	226	407	180	67	486	343	712	750
8:00	109	41			163	66				
8:15	124	54			167	63				
8:30	119	82			207	56				
8:45	108	42	460	219	217	43	754	228	1214	447
9:00	101	34			190	47				
9:15	115	34			159	34				
9:30	90	25			146	37				
9:45	112	16	418	109	116	27	611	145	1029	254
10:00	137	17			133	14				
10:15	122	14			121	24				
10:30	134	14			122	9				
10:45	116	6	509	51	117	9	493	56	1002	107
11:00	150	11			136	10				
11:15	137	6			102	10				
11:30	145	9			102	5				
11:45	142	5	574	31	150	6	490	31	1064	62
Total	2335	5618	2335	5618	3110	4770	3110	4770	5445	10388
Combined Total	7953		7953		7880		7880		15833	
AM Peak	11:45 AM				8:15 AM					
Vol.	611				781					
P.H.F.	0.904				0.900					
PM Peak		4:45 PM				3:00 PM				
Vol.		902				648				
P.H.F.		0.947				0.876				
Percentage	29.4%	70.6%			39.5%	60.5%				

Volumes for: Wednesday, March 12, 2014 City: Lafayette Project #: 14-7151-002

Location: Dolores Drive north of Mt. Diablo Boulevard

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	1	21			2	13				
12:15	3	9			0	10				
12:30	2	23			0	7				
12:45	1	11	7	64	0	16	2	46	9	110
1:00	0	11			0	9				
1:15	0	12			0	9				
1:30	0	9			0	9				
1:45	5	14	5	46	1	13	1	40	6	86
2:00	1	12			0	16				
2:15	2	14			0	22				
2:30	0	15			4	15				
2:45	1	18	4	59	1	20	5	73	9	132
3:00	0	16			0	18				
3:15	0	18			1	20				
3:30	0	18			0	9				
3:45	0	12	0	64	1	19	2	66	2	130
4:00	0	16			0	19				
4:15	0	18			0	16				
4:30	0	14			0	18				
4:45	0	23	0	71	0	12	0	65	0	136
5:00	0	22			1	15				
5:15	3	14			1	17				
5:30	0	25			2	18				
5:45	3	21	6	82	6	12	10	62	16	144
6:00	2	19			5	15				
6:15	2	22			5	16				
6:30	3	12			9	19				
6:45	5	16	12	69	12	11	31	61	43	130
7:00	8	19			13	12				
7:15	12	20			18	13				
7:30	11	13			26	9				
7:45	13	12	44	64	17	8	74	42	118	106
8:00	10	7			25	3				
8:15	11	10			23	6				
8:30	20	10			20	9				
8:45	13	10	54	37	19	8	87	26	141	63
9:00	7	6			22	5				
9:15	5	4			19	7				
9:30	14	8			14	0	0			
9:45	11	3	37	21	12	1	67	13	104	34
10:00	14	2			11	5				
10:15	15	4			13	3				
10:30	12	2			16	2				
10:45	15	3	56	11	15	0	55	10	111	21
11:00	14	3			21	3				
11:15	11	5			18	2				
11:30	11	1			17	1				
11:45	12	4	48	13	10	0	66	6	114	19
Total	273	601	273	601	400	510	400	510	673	1111
Combined Total	874		874		910		910		1784	
AM Peak	11:45 AM				7:30 AM					
Vol.	65				91					
P.H.F.	0.707				0.875					
PM Peak		5:30 PM				2:15 PM				
Vol.		87				75				
P.H.F.		0.840				0.852				
Percentage	31.2%	68.8%			44.0%	56.0%				

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	44	346	26	6	58	359	140	25	1	81	62	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	0.99			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.96			0.90			0.97
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.96
Satd. Flow (prot)	1770	3494			1770	3367			1635			1736
Flt Permitted	0.95	1.00			0.95	1.00			0.89			0.87
Satd. Flow (perm)	1770	3494			1770	3367			1478			1567
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	376	28	7	63	390	152	27	1	88	67	0
RTOR Reduction (vph)	0	4	0	0	0	26	0	0	76	0	0	42
Lane Group Flow (vph)	48	400	0	0	70	516	0	0	40	0	0	46
Confl. Peds. (#/hr)			13				4			2	2	
Confl. Bikes (#/hr)			6				1			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	1.9	16.7			3.3	18.1			5.1			5.1
Effective Green, g (s)	1.9	16.7			3.3	18.1			5.1			5.1
Actuated g/C Ratio	0.05	0.44			0.09	0.48			0.14			0.14
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	89	1551			155	1620			200			212
v/s Ratio Prot	0.03	0.11			c0.04	c0.15						
v/s Ratio Perm									0.03			c0.03
v/c Ratio	0.54	0.26			0.45	0.32			0.20			0.22
Uniform Delay, d1	17.4	6.6			16.3	6.0			14.4			14.5
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	3.1	0.1			0.8	0.2			0.2			0.2
Delay (s)	20.5	6.7			17.1	6.1			14.6			14.7
Level of Service	C	A			B	A			B			B
Approach Delay (s)		8.2				7.4			14.6			14.7
Approach LOS		A				A			B			B

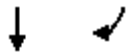
Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	37.6	Sum of lost time (s)	12.5
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	19
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	21
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

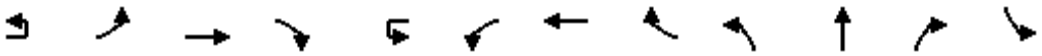
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	8	19	375	68	1	36	643	45	66	4	41	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	1.00			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.99			0.95		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3414			1770	3493			1700		
Flt Permitted		0.95	1.00			0.95	1.00			0.76		
Satd. Flow (perm)		1770	3414			1770	3493			1323		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	9	21	421	76	1	40	722	51	74	4	46	75
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	14	0	0
Lane Group Flow (vph)	0	30	497	0	0	41	773	0	0	110	0	0
Confl. Peds. (#/hr)				26				12	4		7	7
Confl. Bikes (#/hr)				6								
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		3.4	28.9			3.8	29.3			14.0		
Effective Green, g (s)		3.4	28.9			3.8	29.3			14.0		
Actuated g/C Ratio		0.04	0.38			0.05	0.38			0.18		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		78	1291			88	1339			242		
v/s Ratio Prot		0.02	0.15			c0.02	c0.22					
v/s Ratio Perm										c0.08		
v/c Ratio		0.38	0.38			0.47	0.58			0.46		
Uniform Delay, d1		35.5	17.3			35.3	18.6			27.8		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		1.1	0.3			1.4	0.8			1.6		
Delay (s)		36.6	17.6			36.7	19.5			29.4		
Level of Service		D	B			D	B			C		
Approach Delay (s)			18.7				20.4			29.4		
Approach LOS			B				C			C		

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	17.5
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



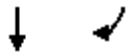
Movement	SBT	SBR
Lane Configurations		
Volume (vph)	9	20
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	0.97	
Satd. Flow (prot)	1737	
Flt Permitted	0.68	
Satd. Flow (perm)	1224	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	10	22
RTOR Reduction (vph)	6	0
Lane Group Flow (vph)	101	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	12.2	
Effective Green, g (s)	12.2	
Actuated g/C Ratio	0.16	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	195	
v/s Ratio Prot		
v/s Ratio Perm	c0.08	
v/c Ratio	0.52	
Uniform Delay, d1	29.4	
Progression Factor	1.00	
Incremental Delay, d2	1.0	
Delay (s)	30.4	
Level of Service	C	
Approach Delay (s)	30.4	
Approach LOS	C	

Intersection Summary



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	18	228	224	18	2	48	318	66	32	34	15	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.99			1.00	0.97			0.98		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3487			1770	3431			1771		
Flt Permitted		0.95	1.00			0.95	1.00			0.85		
Satd. Flow (perm)		1770	3487			1770	3431			1527		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	248	243	20	2	52	346	72	35	37	16	79
RTOR Reduction (vph)	0	0	4	0	0	0	15	0	0	6	0	0
Lane Group Flow (vph)	0	268	259	0	0	54	403	0	0	82	0	0
Confl. Peds. (#/hr)				12				4	9		14	14
Confl. Bikes (#/hr)				6				1				
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		13.4	29.8			3.8	20.2			10.9		
Effective Green, g (s)		13.4	29.8			3.8	20.2			10.9		
Actuated g/C Ratio		0.24	0.53			0.07	0.36			0.19		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		419	1839			119	1226			294		
v/s Ratio Prot		c0.15	0.07			0.03	c0.12					
v/s Ratio Perm										0.05		
v/c Ratio		0.64	0.14			0.45	0.33			0.28		
Uniform Delay, d1		19.4	6.8			25.4	13.2			19.4		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		2.4	0.1			1.0	0.5			0.2		
Delay (s)		21.7	6.9			26.4	13.7			19.6		
Level of Service		C	A			C	B			B		
Approach Delay (s)			14.4				15.2			19.6		
Approach LOS			B				B			B		

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	53	456
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.97	1.00
Satd. Flow (prot)	1801	1552
Flt Permitted	0.83	1.00
Satd. Flow (perm)	1530	1552
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	58	496
RTOR Reduction (vph)	0	400
Lane Group Flow (vph)	137	96
Confl. Peds. (#/hr)		9
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	10.9	10.9
Effective Green, g (s)	10.9	10.9
Actuated g/C Ratio	0.19	0.19
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	295	299
v/s Ratio Prot		
v/s Ratio Perm	c0.09	0.06
v/c Ratio	0.46	0.32
Uniform Delay, d1	20.2	19.6
Progression Factor	1.00	1.00
Incremental Delay, d2	0.4	0.2
Delay (s)	20.6	19.8
Level of Service	C	B
Approach Delay (s)	20.0	
Approach LOS	C	

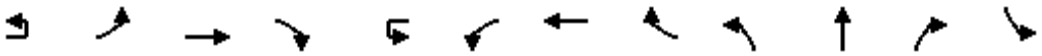
Intersection Summary

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	29	546	29	5	60	470	71	21	1	61	112	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	1.00			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.98			0.90			0.96
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.97
Satd. Flow (prot)	1770	3503			1770	3457			1637			1718
Flt Permitted	0.95	1.00			0.95	1.00			0.90			0.75
Satd. Flow (perm)	1770	3503			1770	3457			1493			1326
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)	30	563	30	5	62	485	73	22	1	63	115	0
RTOR Reduction (vph)	0	3	0	0	0	8	0	0	49	0	0	38
Lane Group Flow (vph)	30	590	0	0	67	550	0	0	37	0	0	134
Confl. Peds. (#/hr)			25				3			7	7	
Confl. Bikes (#/hr)			6				7			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	1.8	18.9			3.5	20.6			9.8			9.8
Effective Green, g (s)	1.8	18.9			3.5	20.6			9.8			9.8
Actuated g/C Ratio	0.04	0.42			0.08	0.46			0.22			0.22
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	71	1481			138	1593			327			290
v/s Ratio Prot	0.02	c0.17			c0.04	0.16						
v/s Ratio Perm									0.02			c0.10
v/c Ratio	0.42	0.40			0.49	0.35			0.11			0.46
Uniform Delay, d1	20.9	9.0			19.7	7.7			14.0			15.2
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	1.5	0.2			1.0	0.2			0.1			0.4
Delay (s)	22.4	9.2			20.7	7.9			14.0			15.6
Level of Service	C	A			C	A			B			B
Approach Delay (s)		9.8				9.3			14.0			15.6
Approach LOS		A				A			B			B

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	44.7	Sum of lost time (s)	12.5
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

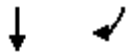
Movement	SBR
Lane Configurations	
Volume (vph)	55
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	57
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary



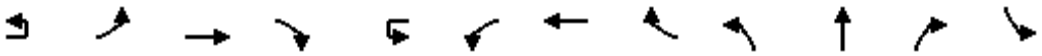
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	2	20	765	107	7	70	465	57	115	8	60	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.98			0.96		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3441			1770	3461			1697		
Flt Permitted		0.95	1.00			0.95	1.00			0.76		
Satd. Flow (perm)		1770	3441			1770	3461			1333		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	2	22	860	120	8	79	522	64	129	9	67	55
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	11	0	0
Lane Group Flow (vph)	0	24	980	0	0	87	586	0	0	194	0	0
Confl. Peds. (#/hr)				18				11	4		14	14
Confl. Bikes (#/hr)				5				2			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		3.4	45.0			9.8	51.4			22.3		
Effective Green, g (s)		3.4	45.0			9.8	51.4			22.3		
Actuated g/C Ratio		0.03	0.44			0.09	0.50			0.22		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		58	1500			168	1723			288		
v/s Ratio Prot		0.01	c0.28			c0.05	0.17					
v/s Ratio Perm										c0.15		
v/c Ratio		0.41	0.65			0.52	0.34			0.67		
Uniform Delay, d1		48.9	22.9			44.5	15.7			37.1		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		1.7	1.3			1.1	0.2			6.3		
Delay (s)		50.7	24.2			45.6	15.9			43.4		
Level of Service		D	C			D	B			D		
Approach Delay (s)			24.8				19.7			43.4		
Approach LOS			C				B			D		

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	103.2	Sum of lost time (s)	17.5
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	5	17
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	0.99	
Frt	0.97	
Flt Protected	0.97	
Satd. Flow (prot)	1718	
Flt Permitted	0.72	
Satd. Flow (perm)	1279	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	6	19
RTOR Reduction (vph)	8	0
Lane Group Flow (vph)	72	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	8.6	
Effective Green, g (s)	8.6	
Actuated g/C Ratio	0.08	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	106	
v/s Ratio Prot		
v/s Ratio Perm	c0.06	
v/c Ratio	0.68	
Uniform Delay, d1	46.0	
Progression Factor	1.00	
Incremental Delay, d2	12.6	
Delay (s)	58.6	
Level of Service	E	
Approach Delay (s)	58.6	
Approach LOS	E	

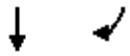
Intersection Summary



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	29	395	560	26	13	80	358	92	60	53	24	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			0.99		
Frt		1.00	0.99			1.00	0.97			0.98		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3505			1770	3397			1754		
Flt Permitted		0.95	1.00			0.95	1.00			0.68		
Satd. Flow (perm)		1770	3505			1770	3397			1227		
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)	32	439	622	29	14	89	398	102	67	59	27	149
RTOR Reduction (vph)	0	0	2	0	0	0	23	0	0	6	0	0
Lane Group Flow (vph)	0	471	649	0	0	103	477	0	0	147	0	0
Confl. Peds. (#/hr)				17				10	23		22	22
Confl. Bikes (#/hr)				6				1			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		30.5	44.8			9.2	23.5			21.2		
Effective Green, g (s)		30.5	44.8			9.2	23.5			21.2		
Actuated g/C Ratio		0.35	0.51			0.11	0.27			0.24		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		619	1800			186	915			298		
v/s Ratio Prot		c0.27	0.19			0.06	c0.14					
v/s Ratio Perm										0.12		
v/c Ratio		0.76	0.36			0.55	0.52			0.49		
Uniform Delay, d1		25.1	12.6			37.0	27.1			28.4		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		5.0	0.4			2.0	1.5			0.5		
Delay (s)		30.1	13.0			39.1	28.6			28.8		
Level of Service		C	B			D	C			C		
Approach Delay (s)			20.2				30.4			28.8		
Approach LOS			C				C			C		

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	68	257
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.96
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.97	1.00
Satd. Flow (prot)	1782	1522
Flt Permitted	0.69	1.00
Satd. Flow (perm)	1267	1522
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	76	286
RTOR Reduction (vph)	0	204
Lane Group Flow (vph)	225	82
Confl. Peds. (#/hr)		23
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	21.2	21.2
Effective Green, g (s)	21.2	21.2
Actuated g/C Ratio	0.24	0.24
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	308	370
v/s Ratio Prot		
v/s Ratio Perm	c0.18	0.05
v/c Ratio	0.73	0.22
Uniform Delay, d1	30.4	26.4
Progression Factor	1.00	1.00
Incremental Delay, d2	7.5	0.1
Delay (s)	37.8	26.5
Level of Service	D	C
Approach Delay (s)	31.5	
Approach LOS	C	

Intersection Summary

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	44	349	26	6	59	367	142	25	1	82	63	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	0.99			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.96			0.90			0.97
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.96
Satd. Flow (prot)	1770	3494			1770	3369			1634			1736
Flt Permitted	0.95	1.00			0.95	1.00			0.90			0.87
Satd. Flow (perm)	1770	3494			1770	3369			1482			1561
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	379	28	7	64	399	154	27	1	89	68	0
RTOR Reduction (vph)	0	4	0	0	0	25	0	0	77	0	0	42
Lane Group Flow (vph)	48	403	0	0	71	528	0	0	40	0	0	47
Confl. Peds. (#/hr)			13				4			2	2	
Confl. Bikes (#/hr)			6				1			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	2.0	17.0			3.3	18.3			5.2			5.2
Effective Green, g (s)	2.0	17.0			3.3	18.3			5.2			5.2
Actuated g/C Ratio	0.05	0.45			0.09	0.48			0.14			0.14
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	93	1563			153	1622			202			213
v/s Ratio Prot	0.03	0.12			c0.04	c0.16						
v/s Ratio Perm									0.03			c0.03
v/c Ratio	0.52	0.26			0.46	0.33			0.20			0.22
Uniform Delay, d1	17.5	6.6			16.5	6.1			14.6			14.6
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	2.0	0.1			0.8	0.2			0.2			0.2
Delay (s)	19.5	6.7			17.3	6.2			14.7			14.8
Level of Service	B	A			B	A			B			B
Approach Delay (s)		8.0				7.5			14.7			14.8
Approach LOS		A				A			B			B

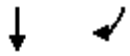
Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	38.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	19
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	21
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

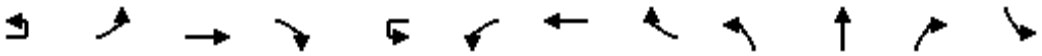
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	8	24	375	68	1	36	646	48	66	5	41	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	1.00			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.99			0.95		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3413			1770	3491			1702		
Flt Permitted		0.95	1.00			0.95	1.00			0.75		
Satd. Flow (perm)		1770	3413			1770	3491			1306		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	9	27	421	76	1	40	726	54	74	6	46	92
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	14	0	0
Lane Group Flow (vph)	0	36	497	0	0	41	780	0	0	112	0	0
Confl. Peds. (#/hr)				26				12	4		7	7
Confl. Bikes (#/hr)				6								
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		3.7	29.8			3.9	30.0			14.7		
Effective Green, g (s)		3.7	29.8			3.9	30.0			14.7		
Actuated g/C Ratio		0.05	0.37			0.05	0.37			0.18		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		81	1265			85	1302			238		
v/s Ratio Prot		0.02	0.15			c0.02	c0.22					
v/s Ratio Perm										c0.09		
v/c Ratio		0.44	0.39			0.48	0.60			0.47		
Uniform Delay, d1		37.3	18.6			37.3	20.3			29.4		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		1.4	0.3			1.6	1.0			1.7		
Delay (s)		38.8	19.0			38.8	21.3			31.1		
Level of Service		D	B			D	C			C		
Approach Delay (s)			20.3				22.2			31.1		
Approach LOS			C				C			C		

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.4	Sum of lost time (s)	17.5
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



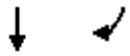
Movement	SBT	SBR
Lane Configurations		
Volume (vph)	11	25
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	0.97	
Satd. Flow (prot)	1736	
Flt Permitted	0.67	
Satd. Flow (perm)	1208	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	12	28
RTOR Reduction (vph)	7	0
Lane Group Flow (vph)	125	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	14.5	
Effective Green, g (s)	14.5	
Actuated g/C Ratio	0.18	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	217	
v/s Ratio Prot		
v/s Ratio Perm	c0.10	
v/c Ratio	0.58	
Uniform Delay, d1	30.2	
Progression Factor	1.00	
Incremental Delay, d2	2.3	
Delay (s)	32.5	
Level of Service	C	
Approach Delay (s)	32.5	
Approach LOS	C	

Intersection Summary



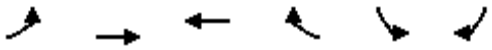
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	18	235	232	18	2	48	321	66	32	34	15	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.99			1.00	0.97			0.98		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3489			1770	3432			1770		
Flt Permitted		0.95	1.00			0.95	1.00			0.85		
Satd. Flow (perm)		1770	3489			1770	3432			1527		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	255	252	20	2	52	349	72	35	37	16	79
RTOR Reduction (vph)	0	0	4	0	0	0	15	0	0	6	0	0
Lane Group Flow (vph)	0	275	268	0	0	54	406	0	0	82	0	0
Confl. Peds. (#/hr)				12				4	9		14	14
Confl. Bikes (#/hr)				6				1				
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		13.8	30.5			3.8	20.5			11.0		
Effective Green, g (s)		13.8	30.5			3.8	20.5			11.0		
Actuated g/C Ratio		0.24	0.53			0.07	0.36			0.19		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		426	1857			117	1227			293		
v/s Ratio Prot		c0.16	0.08			0.03	c0.12					
v/s Ratio Perm										0.05		
v/c Ratio		0.65	0.14			0.46	0.33			0.28		
Uniform Delay, d1		19.6	6.8			25.8	13.4			19.8		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		2.5	0.1			1.1	0.5			0.2		
Delay (s)		22.1	6.9			26.8	13.9			20.0		
Level of Service		C	A			C	B			B		
Approach Delay (s)			14.5				15.4			20.0		
Approach LOS			B				B			B		

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	53	459
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.97	1.00
Satd. Flow (prot)	1801	1552
Flt Permitted	0.83	1.00
Satd. Flow (perm)	1530	1552
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	58	499
RTOR Reduction (vph)	0	403
Lane Group Flow (vph)	137	96
Confl. Peds. (#/hr)		9
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	11.0	11.0
Effective Green, g (s)	11.0	11.0
Actuated g/C Ratio	0.19	0.19
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	293	297
v/s Ratio Prot		
v/s Ratio Perm	c0.09	0.06
v/c Ratio	0.47	0.32
Uniform Delay, d1	20.6	19.9
Progression Factor	1.00	1.00
Incremental Delay, d2	0.4	0.2
Delay (s)	21.0	20.2
Level of Service	C	C
Approach Delay (s)	20.3	
Approach LOS	C	

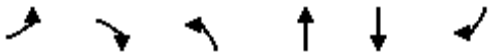
Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	467	744	3	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	525	836	3	0	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (ft)			346			
pX, platoon unblocked	0.83				0.83	0.83
vC, conflicting volume	839				1100	420
vC1, stage 1 conf vol					838	
vC2, stage 2 conf vol					262	
vCu, unblocked vol	388				703	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	966				495	897

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	262	262	557	282	7
Volume Left	0	0	0	0	0
Volume Right	0	0	0	3	7
cSH	1700	1700	1700	1700	897
Volume to Capacity	0.15	0.15	0.33	0.17	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.0
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	22	9	64	85	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	25	10	72	96	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				256		
pX, platoon unblocked						
vC, conflicting volume	188	96	97			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188	96	97			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	99			
cM capacity (veh/h)	795	960	1497			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	82	97
Volume Left	2	10	0
Volume Right	25	0	1
cSH	944	1497	1700
Volume to Capacity	0.03	0.01	0.06
Queue Length 95th (ft)	2	1	0
Control Delay (s)	8.9	1.0	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	1.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	29	560	29	5	61	478	73	21	1	64	116	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	1.00			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.98			0.90			0.96
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.97
Satd. Flow (prot)	1770	3504			1770	3456			1635			1719
Flt Permitted	0.95	1.00			0.95	1.00			0.90			0.76
Satd. Flow (perm)	1770	3504			1770	3456			1491			1355
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)	30	577	30	5	63	493	75	22	1	66	120	0
RTOR Reduction (vph)	0	3	0	0	0	8	0	0	51	0	0	38
Lane Group Flow (vph)	30	604	0	0	68	560	0	0	38	0	0	139
Confl. Peds. (#/hr)			25				3			7	7	
Confl. Bikes (#/hr)			6				7			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	1.8	19.0			3.5	20.7			10.2			10.2
Effective Green, g (s)	1.8	19.0			3.5	20.7			10.2			10.2
Actuated g/C Ratio	0.04	0.42			0.08	0.46			0.23			0.23
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	70	1472			137	1582			336			305
v/s Ratio Prot	0.02	c0.17			c0.04	0.16						
v/s Ratio Perm									0.03			c0.10
v/c Ratio	0.43	0.41			0.50	0.35			0.11			0.46
Uniform Delay, d1	21.2	9.2			20.0	7.9			13.9			15.1
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	1.5	0.3			1.0	0.2			0.1			0.4
Delay (s)	22.7	9.4			21.0	8.1			14.0			15.5
Level of Service	C	A			C	A			B			B
Approach Delay (s)		10.1				9.5			14.0			15.5
Approach LOS		B				A			B			B

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	45.2	Sum of lost time (s)	12.5
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

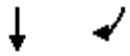
c Critical Lane Group

Movement	SBR
Lane Configurations	
Volume (vph)	55
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	57
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

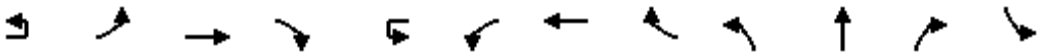
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	2	41	765	107	7	70	479	71	115	11	60	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.98			0.96		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3440			1770	3445			1699		
Flt Permitted		0.95	1.00			0.95	1.00			0.75		
Satd. Flow (perm)		1770	3440			1770	3445			1313		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	2	46	860	120	8	79	538	80	129	12	67	72
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	11	0	0
Lane Group Flow (vph)	0	48	980	0	0	87	618	0	0	197	0	0
Confl. Peds. (#/hr)				18				11	4		14	14
Confl. Bikes (#/hr)				5				2			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		6.0	44.3			9.9	48.2			23.2		
Effective Green, g (s)		6.0	44.3			9.9	48.2			23.2		
Actuated g/C Ratio		0.06	0.41			0.09	0.45			0.21		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		98	1411			162	1537			282		
v/s Ratio Prot		0.03	c0.28			c0.05	0.18					
v/s Ratio Perm										c0.15		
v/c Ratio		0.49	0.69			0.54	0.40			0.70		
Uniform Delay, d1		49.5	26.3			46.9	20.2			39.2		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		1.4	1.7			1.7	0.3			7.6		
Delay (s)		50.9	28.0			48.6	20.5			46.8		
Level of Service		D	C			D	C			D		
Approach Delay (s)			29.1				23.9			46.8		
Approach LOS			C				C			D		

Intersection Summary			
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	108.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



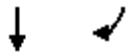
Movement	SBT	SBR
Lane Configurations		
Volume (vph)	7	22
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	0.99	
Frt	0.97	
Flt Protected	0.97	
Satd. Flow (prot)	1720	
Flt Permitted	0.71	
Satd. Flow (perm)	1255	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	8	25
RTOR Reduction (vph)	8	0
Lane Group Flow (vph)	97	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	13.1	
Effective Green, g (s)	13.1	
Actuated g/C Ratio	0.12	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	152	
v/s Ratio Prot		
v/s Ratio Perm	c0.08	
v/c Ratio	0.64	
Uniform Delay, d1	45.2	
Progression Factor	1.00	
Incremental Delay, d2	6.3	
Delay (s)	51.5	
Level of Service	D	
Approach Delay (s)	51.5	
Approach LOS	D	

Intersection Summary



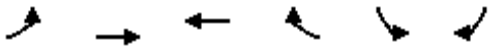
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	29	402	568	26	13	80	372	92	60	53	24	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			0.99		
Frt		1.00	0.99			1.00	0.97			0.98		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3505			1770	3401			1754		
Flt Permitted		0.95	1.00			0.95	1.00			0.68		
Satd. Flow (perm)		1770	3505			1770	3401			1224		
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)	32	447	631	29	14	89	413	102	67	59	27	149
RTOR Reduction (vph)	0	0	2	0	0	0	22	0	0	6	0	0
Lane Group Flow (vph)	0	479	658	0	0	103	493	0	0	147	0	0
Confl. Peds. (#/hr)				17				10	23		22	22
Confl. Bikes (#/hr)				6				1			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		30.5	45.2			9.2	23.9			21.3		
Effective Green, g (s)		30.5	45.2			9.2	23.9			21.3		
Actuated g/C Ratio		0.35	0.52			0.10	0.27			0.24		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		615	1806			185	926			297		
v/s Ratio Prot		c0.27	0.19			0.06	c0.14					
v/s Ratio Perm										0.12		
v/c Ratio		0.78	0.36			0.56	0.53			0.49		
Uniform Delay, d1		25.6	12.7			37.3	27.1			28.6		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		5.7	0.4			2.1	1.6			0.5		
Delay (s)		31.2	13.1			39.4	28.7			29.0		
Level of Service		C	B			D	C			C		
Approach Delay (s)			20.7				30.5			29.0		
Approach LOS			C				C			C		

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	68	271
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.96
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.97	1.00
Satd. Flow (prot)	1782	1522
Flt Permitted	0.69	1.00
Satd. Flow (perm)	1266	1522
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	76	301
RTOR Reduction (vph)	0	214
Lane Group Flow (vph)	225	87
Confl. Peds. (#/hr)		23
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	21.3	21.3
Effective Green, g (s)	21.3	21.3
Actuated g/C Ratio	0.24	0.24
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	307	369
v/s Ratio Prot		
v/s Ratio Perm	c0.18	0.06
v/c Ratio	0.73	0.24
Uniform Delay, d1	30.6	26.7
Progression Factor	1.00	1.00
Incremental Delay, d2	7.6	0.1
Delay (s)	38.1	26.8
Level of Service	D	C
Approach Delay (s)	31.6	
Approach LOS	C	

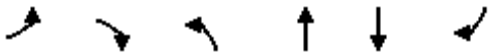
Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	914	599	14	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	1027	673	16	0	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (ft)			346			
pX, platoon unblocked	0.89				0.89	0.89
vC, conflicting volume	689				1194	344
vC1, stage 1 conf vol					681	
vC2, stage 2 conf vol					513	
vCu, unblocked vol	408				975	22
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1023				444	937

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	513	513	449	240	7
Volume Left	0	0	0	0	0
Volume Right	0	0	0	16	7
cSH	1700	1700	1700	1700	937
Volume to Capacity	0.30	0.30	0.26	0.14	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	8.9
Lane LOS					A
Approach Delay (s)	0.0		0.0		8.9
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	22	38	78	65	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	25	43	88	73	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				256		
pX, platoon unblocked						
vC, conflicting volume	248	75	76			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	248	75	76			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	97			
cM capacity (veh/h)	720	987	1522			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	130	76
Volume Left	2	43	0
Volume Right	25	0	3
cSH	957	1522	1700
Volume to Capacity	0.03	0.03	0.04
Queue Length 95th (ft)	2	2	0
Control Delay (s)	8.9	2.6	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	2.6	0.0
Approach LOS	A		

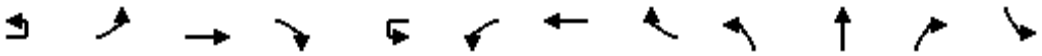
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	50	410	30	10	60	520	150	40	10	90	90	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	0.99			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.97			0.91			0.96
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.97
Satd. Flow (prot)	1770	3493			1770	3401			1661			1735
Flt Permitted	0.95	1.00			0.95	1.00			0.90			0.75
Satd. Flow (perm)	1770	3493			1770	3401			1515			1345
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	446	33	11	65	565	163	43	11	98	98	11
RTOR Reduction (vph)	0	4	0	0	0	16	0	0	64	0	0	14
Lane Group Flow (vph)	54	475	0	0	76	712	0	0	88	0	0	138
Confl. Peds. (#/hr)			13				4			2	2	
Confl. Bikes (#/hr)			6				1			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	3.3	21.7			5.0	23.4			8.9			8.9
Effective Green, g (s)	3.3	21.7			5.0	23.4			8.9			8.9
Actuated g/C Ratio	0.07	0.45			0.10	0.49			0.19			0.19
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	121	1575			183	1654			280			248
v/s Ratio Prot	0.03	0.14			c0.04	c0.21						
v/s Ratio Perm									0.06			c0.10
v/c Ratio	0.45	0.30			0.42	0.43			0.31			0.56
Uniform Delay, d1	21.5	8.4			20.2	8.0			17.0			17.8
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	1.0	0.1			0.6	0.2			0.2			1.5
Delay (s)	22.5	8.5			20.7	8.3			17.2			19.3
Level of Service	C	A			C	A			B			B
Approach Delay (s)		9.9				9.4			17.2			19.3
Approach LOS		A				A			B			B

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	48.1	Sum of lost time (s)	12.5
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

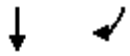
Movement	SBR
Lane Configurations	
Volume (vph)	40
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	43
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary



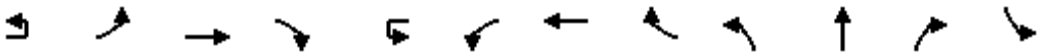
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	10	20	540	80	10	40	700	80	70	10	50	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.98			0.95		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3429			1770	3467			1700		
Flt Permitted		0.95	1.00			0.95	1.00			0.76		
Satd. Flow (perm)		1770	3429			1770	3467			1325		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	22	607	90	11	45	787	90	79	11	56	90
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	15	0	0
Lane Group Flow (vph)	0	33	697	0	0	56	877	0	0	131	0	0
Confl. Peds. (#/hr)				26				12	4		7	7
Confl. Bikes (#/hr)				6								
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		3.7	33.2			6.2	35.7			16.7		
Effective Green, g (s)		3.7	33.2			6.2	35.7			16.7		
Actuated g/C Ratio		0.04	0.37			0.07	0.40			0.19		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		73	1271			122	1382			247		
v/s Ratio Prot		0.02	0.20			c0.03	c0.25					
v/s Ratio Perm										c0.10		
v/c Ratio		0.45	0.55			0.46	0.63			0.53		
Uniform Delay, d1		41.9	22.2			40.0	21.7			32.9		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		1.6	0.7			1.0	1.2			2.5		
Delay (s)		43.5	23.0			41.0	22.9			35.3		
Level of Service		D	C			D	C			D		
Approach Delay (s)			23.9				23.9			35.3		
Approach LOS			C				C			D		

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	89.5	Sum of lost time (s)	17.5
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



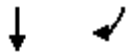
Movement	SBT	SBR
Lane Configurations		
Volume (vph)	10	30
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	0.97	
Satd. Flow (prot)	1728	
Flt Permitted	0.64	
Satd. Flow (perm)	1142	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	11	34
RTOR Reduction (vph)	8	0
Lane Group Flow (vph)	127	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	15.9	
Effective Green, g (s)	15.9	
Actuated g/C Ratio	0.18	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	202	
v/s Ratio Prot		
v/s Ratio Perm	c0.11	
v/c Ratio	0.63	
Uniform Delay, d1	34.1	
Progression Factor	1.00	
Incremental Delay, d2	4.3	
Delay (s)	38.4	
Level of Service	D	
Approach Delay (s)	38.4	
Approach LOS	D	

Intersection Summary



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	20	240	440	20	10	70	540	180	40	40	20	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.99			1.00	0.96			0.97		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3507			1770	3379			1761		
Flt Permitted		0.95	1.00			0.95	1.00			0.78		
Satd. Flow (perm)		1770	3507			1770	3379			1395		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	261	478	22	11	76	587	196	43	43	22	185
RTOR Reduction (vph)	0	0	2	0	0	0	27	0	0	7	0	0
Lane Group Flow (vph)	0	283	498	0	0	87	756	0	0	101	0	0
Confl. Peds. (#/hr)				12				4	9		14	14
Confl. Bikes (#/hr)				6				1				
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		19.6	49.9			7.5	37.8			24.9		
Effective Green, g (s)		19.6	49.9			7.5	37.8			24.9		
Actuated g/C Ratio		0.21	0.53			0.08	0.40			0.26		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		367	1855			140	1354			368		
v/s Ratio Prot		c0.16	0.14			0.05	c0.22					
v/s Ratio Perm										0.07		
v/c Ratio		0.77	0.27			0.62	0.56			0.28		
Uniform Delay, d1		35.2	12.2			42.0	21.8			27.5		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		8.8	0.2			6.0	1.2			0.1		
Delay (s)		44.1	12.4			48.1	23.0			27.7		
Level of Service		D	B			D	C			C		
Approach Delay (s)			23.9				25.5			27.7		
Approach LOS			C				C			C		

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	94.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	60	500
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.96	1.00
Satd. Flow (prot)	1778	1546
Flt Permitted	0.71	1.00
Satd. Flow (perm)	1312	1546
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	65	543
RTOR Reduction (vph)	0	333
Lane Group Flow (vph)	250	210
Confl. Peds. (#/hr)		9
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	24.9	24.9
Effective Green, g (s)	24.9	24.9
Actuated g/C Ratio	0.26	0.26
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	346	408
v/s Ratio Prot		
v/s Ratio Perm	c0.19	0.14
v/c Ratio	0.72	0.52
Uniform Delay, d1	31.6	29.6
Progression Factor	1.00	1.00
Incremental Delay, d2	6.2	0.5
Delay (s)	37.8	30.0
Level of Service	D	C
Approach Delay (s)	32.5	
Approach LOS	C	

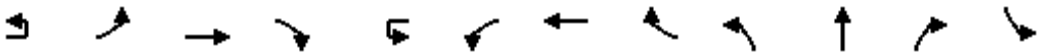
Intersection Summary

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	40	690	40	10	80	600	80	30	10	70	120	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	1.00			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.98			0.91			0.96
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.97
Satd. Flow (prot)	1770	3500			1770	3465			1661			1724
Flt Permitted	0.95	1.00			0.95	1.00			0.90			0.79
Satd. Flow (perm)	1770	3500			1770	3465			1514			1400
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)	41	711	41	10	82	619	82	31	10	72	124	10
RTOR Reduction (vph)	0	3	0	0	0	6	0	0	54	0	0	15
Lane Group Flow (vph)	41	749	0	0	92	695	0	0	59	0	0	181
Confl. Peds. (#/hr)			25				3			7	7	
Confl. Bikes (#/hr)			6				7			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	3.1	22.9			5.9	25.7			13.7			13.7
Effective Green, g (s)	3.1	22.9			5.9	25.7			13.7			13.7
Actuated g/C Ratio	0.06	0.42			0.11	0.47			0.25			0.25
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	99	1457			189	1619			377			348
v/s Ratio Prot	0.02	c0.21			c0.05	c0.20						
v/s Ratio Perm									0.04			c0.13
v/c Ratio	0.41	0.51			0.49	0.43			0.16			0.52
Uniform Delay, d1	25.1	11.9			23.1	9.8			16.1			17.8
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	1.0	0.4			0.7	0.3			0.1			0.6
Delay (s)	26.1	12.3			23.8	10.0			16.2			18.5
Level of Service	C	B			C	B			B			B
Approach Delay (s)		13.0				11.6			16.2			18.5
Approach LOS		B				B			B			B

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

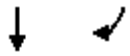
Movement	SBR
Lane Configurations	
Volume (vph)	60
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	62
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary



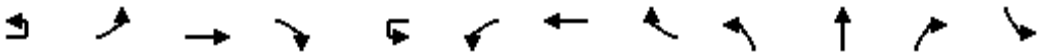
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	10	30	860	120	10	80	900	90	120	10	80	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	0.99			0.98		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.99			0.95		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3435			1770	3471			1681		
Flt Permitted		0.95	1.00			0.95	1.00			0.72		
Satd. Flow (perm)		1770	3435			1770	3471			1253		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	34	966	135	11	90	1011	101	135	11	90	90
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	14	0	0
Lane Group Flow (vph)	0	45	1101	0	0	101	1112	0	0	222	0	0
Confl. Peds. (#/hr)				18				11	4		14	14
Confl. Bikes (#/hr)				5				2			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		6.4	52.1			11.4	57.1			28.4		
Effective Green, g (s)		6.4	52.1			11.4	57.1			28.4		
Actuated g/C Ratio		0.05	0.40			0.09	0.44			0.22		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		86	1368			154	1515			272		
v/s Ratio Prot		0.03	c0.32			c0.06	0.32					
v/s Ratio Perm										c0.18		
v/c Ratio		0.52	0.80			0.66	0.73			0.82		
Uniform Delay, d1		60.7	34.8			57.8	30.6			48.7		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		2.6	3.9			7.4	2.1			17.4		
Delay (s)		63.3	38.8			65.2	32.7			66.1		
Level of Service		E	D			E	C			E		
Approach Delay (s)			39.8				35.4			66.1		
Approach LOS			D				D			E		

Intersection Summary			
HCM 2000 Control Delay	42.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	130.8	Sum of lost time (s)	17.5
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



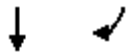
Movement	SBT	SBR
Lane Configurations		
Volume (vph)	30	50
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	0.99	
Flpb, ped/bikes	1.00	
Frt	0.96	
Flt Protected	0.98	
Satd. Flow (prot)	1730	
Flt Permitted	0.73	
Satd. Flow (perm)	1290	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	34	56
RTOR Reduction (vph)	11	0
Lane Group Flow (vph)	169	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	21.4	
Effective Green, g (s)	21.4	
Actuated g/C Ratio	0.16	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	211	
v/s Ratio Prot		
v/s Ratio Perm	c0.13	
v/c Ratio	0.80	
Uniform Delay, d1	52.7	
Progression Factor	1.00	
Incremental Delay, d2	18.3	
Delay (s)	71.0	
Level of Service	E	
Approach Delay (s)	71.0	
Approach LOS	E	

Intersection Summary



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	30	420	780	30	20	170	500	210	70	60	30	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	0.98			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			0.99		
Frt		1.00	0.99			1.00	0.96			0.97		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3509			1770	3327			1752		
Flt Permitted		0.95	1.00			0.95	1.00			0.44		
Satd. Flow (perm)		1770	3509			1770	3327			786		
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)	33	467	867	33	22	189	556	233	78	67	33	222
RTOR Reduction (vph)	0	0	2	0	0	0	42	0	0	6	0	0
Lane Group Flow (vph)	0	500	898	0	0	211	747	0	0	172	0	0
Confl. Peds. (#/hr)				17				10	23		22	22
Confl. Bikes (#/hr)				6				1			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		30.2	52.4			17.0	39.2			30.2		
Effective Green, g (s)		30.2	52.4			17.0	39.2			30.2		
Actuated g/C Ratio		0.27	0.47			0.15	0.35			0.27		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		478	1647			269	1168			212		
v/s Ratio Prot		c0.28	0.26			0.12	c0.22					
v/s Ratio Perm										0.22		
v/c Ratio		1.05	0.55			0.78	0.64			0.81		
Uniform Delay, d1		40.7	21.1			45.5	30.3			38.0		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		53.7	0.9			12.9	2.1			19.6		
Delay (s)		94.4	22.0			58.4	32.4			57.6		
Level of Service		F	C			E	C			E		
Approach Delay (s)			47.9				37.9			57.6		
Approach LOS			D				D			E		

Intersection Summary			
HCM 2000 Control Delay	49.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	111.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	110	310
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.95
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.97	1.00
Satd. Flow (prot)	1781	1511
Flt Permitted	0.67	1.00
Satd. Flow (perm)	1224	1511
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	122	344
RTOR Reduction (vph)	0	155
Lane Group Flow (vph)	344	189
Confl. Peds. (#/hr)		23
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	30.2	30.2
Effective Green, g (s)	30.2	30.2
Actuated g/C Ratio	0.27	0.27
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	331	408
v/s Ratio Prot		
v/s Ratio Perm	c0.28	0.13
v/c Ratio	1.04	0.46
Uniform Delay, d1	40.7	34.0
Progression Factor	1.00	1.00
Incremental Delay, d2	60.0	0.3
Delay (s)	100.7	34.3
Level of Service	F	C
Approach Delay (s)	67.5	
Approach LOS	E	

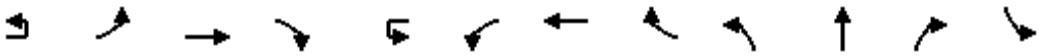
Intersection Summary

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	50	413	30	10	61	528	152	40	10	91	91	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	0.99			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.97			0.91			0.96
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.97
Satd. Flow (prot)	1770	3493			1770	3401			1661			1735
Flt Permitted	0.95	1.00			0.95	1.00			0.89			0.75
Satd. Flow (perm)	1770	3493			1770	3401			1505			1349
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	449	33	11	66	574	165	43	11	99	99	11
RTOR Reduction (vph)	0	4	0	0	0	18	0	0	61	0	0	13
Lane Group Flow (vph)	54	478	0	0	77	721	0	0	92	0	0	140
Confl. Peds. (#/hr)			13				4			2	2	
Confl. Bikes (#/hr)			6				1			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	3.3	19.5			5.2	21.4			11.2			11.2
Effective Green, g (s)	3.3	19.5			5.2	21.4			11.2			11.2
Actuated g/C Ratio	0.07	0.40			0.11	0.44			0.23			0.23
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	120	1407			190	1503			348			312
v/s Ratio Prot	0.03	0.14			c0.04	c0.21						
v/s Ratio Perm									0.06			c0.10
v/c Ratio	0.45	0.34			0.41	0.48			0.26			0.45
Uniform Delay, d1	21.7	10.0			20.2	9.6			15.2			16.0
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	1.0	0.2			0.5	0.3			0.1			0.4
Delay (s)	22.7	10.2			20.7	9.9			15.4			16.3
Level of Service	C	B			C	A			B			B
Approach Delay (s)		11.5				10.9			15.4			16.3
Approach LOS		B				B			B			B

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	48.4	Sum of lost time (s)	12.5
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

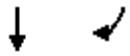
Movement	SBR
Lane Configurations	
Volume (vph)	40
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	43
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary



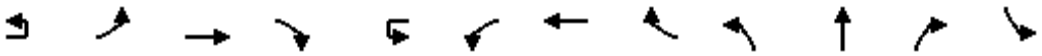
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	10	25	540	80	10	40	703	83	70	11	50	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.98			0.95		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3427			1770	3464			1700		
Flt Permitted		0.95	1.00			0.95	1.00			0.75		
Satd. Flow (perm)		1770	3427			1770	3464			1306		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	28	607	90	11	45	790	93	79	12	56	107
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	15	0	0
Lane Group Flow (vph)	0	39	697	0	0	56	883	0	0	132	0	0
Confl. Peds. (#/hr)				26				12	4		7	7
Confl. Bikes (#/hr)				6								
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		4.0	34.9			6.3	37.2			17.4		
Effective Green, g (s)		4.0	34.9			6.3	37.2			17.4		
Actuated g/C Ratio		0.04	0.37			0.07	0.39			0.18		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		74	1257			117	1355			238		
v/s Ratio Prot		0.02	0.20			c0.03	c0.25					
v/s Ratio Perm										c0.10		
v/c Ratio		0.53	0.55			0.48	0.65			0.56		
Uniform Delay, d1		44.6	23.9			42.8	23.7			35.3		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		3.1	0.8			1.1	1.4			3.1		
Delay (s)		47.7	24.7			43.9	25.0			38.4		
Level of Service		D	C			D	C			D		
Approach Delay (s)			25.9				26.2			38.4		
Approach LOS			C				C			D		

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	95.1	Sum of lost time (s)	17.5
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



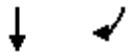
Movement	SBT	SBR
Lane Configurations		
Volume (vph)	12	35
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.97	
Flt Protected	0.97	
Satd. Flow (prot)	1734	
Flt Permitted	0.63	
Satd. Flow (perm)	1136	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	13	39
RTOR Reduction (vph)	7	0
Lane Group Flow (vph)	152	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	19.0	
Effective Green, g (s)	19.0	
Actuated g/C Ratio	0.20	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	226	
v/s Ratio Prot		
v/s Ratio Perm	c0.13	
v/c Ratio	0.67	
Uniform Delay, d1	35.2	
Progression Factor	1.00	
Incremental Delay, d2	6.0	
Delay (s)	41.2	
Level of Service	D	
Approach Delay (s)	41.2	
Approach LOS	D	

Intersection Summary



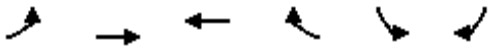
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	20	247	448	20	10	70	543	180	40	40	20	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	0.99			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.99			1.00	0.96			0.97		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3507			1770	3379			1761		
Flt Permitted		0.95	1.00			0.95	1.00			0.77		
Satd. Flow (perm)		1770	3507			1770	3379			1387		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	268	487	22	11	76	590	196	43	43	22	185
RTOR Reduction (vph)	0	0	2	0	0	0	27	0	0	7	0	0
Lane Group Flow (vph)	0	290	507	0	0	87	759	0	0	101	0	0
Confl. Peds. (#/hr)				12				4	9		14	14
Confl. Bikes (#/hr)				6				1				
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		20.0	50.5			7.5	38.0			24.9		
Effective Green, g (s)		20.0	50.5			7.5	38.0			24.9		
Actuated g/C Ratio		0.21	0.53			0.08	0.40			0.26		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		373	1866			139	1353			363		
v/s Ratio Prot		c0.16	0.14			0.05	c0.22					
v/s Ratio Perm										0.07		
v/c Ratio		0.78	0.27			0.63	0.56			0.28		
Uniform Delay, d1		35.3	12.1			42.3	22.0			27.9		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		9.0	0.3			6.2	1.2			0.2		
Delay (s)		44.3	12.4			48.5	23.2			28.0		
Level of Service		D	B			D	C			C		
Approach Delay (s)			24.0				25.7			28.0		
Approach LOS			C				C			C		

Intersection Summary			
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	94.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	60	503
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.98
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.96	1.00
Satd. Flow (prot)	1778	1546
Flt Permitted	0.71	1.00
Satd. Flow (perm)	1311	1546
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	65	547
RTOR Reduction (vph)	0	333
Lane Group Flow (vph)	250	214
Confl. Peds. (#/hr)		9
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	24.9	24.9
Effective Green, g (s)	24.9	24.9
Actuated g/C Ratio	0.26	0.26
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	343	405
v/s Ratio Prot		
v/s Ratio Perm	c0.19	0.14
v/c Ratio	0.73	0.53
Uniform Delay, d1	31.9	30.0
Progression Factor	1.00	1.00
Incremental Delay, d2	6.4	0.6
Delay (s)	38.4	30.6
Level of Service	D	C
Approach Delay (s)	33.0	
Approach LOS	C	

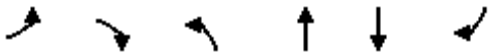
Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	655	815	3	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	736	916	3	0	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (ft)			346			
pX, platoon unblocked	0.80				0.80	0.80
vC, conflicting volume	919				1285	460
vC1, stage 1 conf vol					917	
vC2, stage 2 conf vol					368	
vCu, unblocked vol	403				860	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	923				449	869

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	368	368	610	309	7
Volume Left	0	0	0	0	0
Volume Right	0	0	0	3	7
cSH	1700	1700	1700	1700	869
Volume to Capacity	0.22	0.22	0.36	0.18	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.2
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.2
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	22	9	100	100	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	25	10	112	112	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				256		
pX, platoon unblocked						
vC, conflicting volume	246	113	113			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	246	113	113			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	99			
cM capacity (veh/h)	738	940	1476			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	122	113
Volume Left	2	10	0
Volume Right	25	0	1
cSH	919	1476	1700
Volume to Capacity	0.03	0.01	0.07
Queue Length 95th (ft)	2	1	0
Control Delay (s)	9.0	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

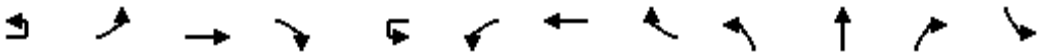
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	40	704	40	10	81	608	82	30	10	73	124	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00			1.00
Frpb, ped/bikes	1.00	1.00			1.00	1.00			0.99			1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00			1.00
Frt	1.00	0.99			1.00	0.98			0.91			0.96
Flt Protected	0.95	1.00			0.95	1.00			0.99			0.97
Satd. Flow (prot)	1770	3500			1770	3464			1659			1725
Flt Permitted	0.95	1.00			0.95	1.00			0.90			0.78
Satd. Flow (perm)	1770	3500			1770	3464			1516			1386
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)	41	726	41	10	84	627	85	31	10	75	128	10
RTOR Reduction (vph)	0	3	0	0	0	7	0	0	56	0	0	15
Lane Group Flow (vph)	41	764	0	0	94	705	0	0	60	0	0	185
Confl. Peds. (#/hr)			25				3			7	7	
Confl. Bikes (#/hr)			6				7			1		
Turn Type	Prot	NA		Prot	Prot	NA		Perm	NA		Perm	NA
Protected Phases	5	2		1	1	6			8			4
Permitted Phases								8			4	
Actuated Green, G (s)	3.2	24.0			6.0	26.8			14.3			14.3
Effective Green, g (s)	3.2	24.0			6.0	26.8			14.3			14.3
Actuated g/C Ratio	0.06	0.42			0.11	0.47			0.25			0.25
Clearance Time (s)	4.0	4.5			4.0	4.5			4.0			4.0
Vehicle Extension (s)	1.0	4.0			1.0	4.0			2.0			2.0
Lane Grp Cap (vph)	99	1478			186	1634			381			348
v/s Ratio Prot	0.02	c0.22			c0.05	c0.20						
v/s Ratio Perm									0.04			c0.13
v/c Ratio	0.41	0.52			0.51	0.43			0.16			0.53
Uniform Delay, d1	25.9	12.1			24.0	9.9			16.6			18.4
Progression Factor	1.00	1.00			1.00	1.00			1.00			1.00
Incremental Delay, d2	1.0	0.4			0.8	0.3			0.1			0.8
Delay (s)	26.9	12.5			24.8	10.2			16.6			19.1
Level of Service	C	B			C	B			B			B
Approach Delay (s)		13.3				11.9			16.6			19.1
Approach LOS		B				B			B			B

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	56.8	Sum of lost time (s)	12.5
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

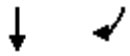
Movement	SBR
Lane Configurations	
Volume (vph)	60
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	62
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary



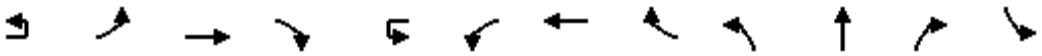
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	10	51	860	120	10	80	914	104	120	13	80	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.5			3.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	0.99			1.00	0.99			0.98		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.98			0.95		
Flt Protected		0.95	1.00			0.95	1.00			0.97		
Satd. Flow (prot)		1770	3434			1770	3462			1683		
Flt Permitted		0.95	1.00			0.95	1.00			0.72		
Satd. Flow (perm)		1770	3434			1770	3462			1238		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	57	966	135	11	90	1027	117	135	15	90	107
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	13	0	0
Lane Group Flow (vph)	0	68	1101	0	0	101	1144	0	0	227	0	0
Confl. Peds. (#/hr)				18				11	4		14	14
Confl. Bikes (#/hr)				5				2			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		8.0	52.1			11.6	55.7			30.1		
Effective Green, g (s)		8.0	52.1			11.6	55.7			30.1		
Actuated g/C Ratio		0.06	0.38			0.08	0.41			0.22		
Clearance Time (s)		3.0	4.5			3.0	4.5			5.0		
Vehicle Extension (s)		1.5	4.5			1.5	4.5			3.5		
Lane Grp Cap (vph)		103	1310			150	1412			272		
v/s Ratio Prot		0.04	0.32			c0.06	c0.33					
v/s Ratio Perm										c0.18		
v/c Ratio		0.66	0.84			0.67	0.81			0.83		
Uniform Delay, d1		62.9	38.4			60.6	35.7			50.8		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		11.6	5.4			9.0	4.0			19.6		
Delay (s)		74.5	43.9			69.6	39.7			70.5		
Level of Service		E	D			E	D			E		
Approach Delay (s)			45.6				42.2			70.5		
Approach LOS			D				D			E		

Intersection Summary			
HCM 2000 Control Delay	48.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	136.5	Sum of lost time (s)	17.5
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



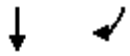
Movement	SBT	SBR
Lane Configurations		
Volume (vph)	32	55
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	5.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	0.99	
Flpb, ped/bikes	1.00	
Frt	0.96	
Flt Protected	0.97	
Satd. Flow (prot)	1730	
Flt Permitted	0.71	
Satd. Flow (perm)	1263	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	36	62
RTOR Reduction (vph)	11	0
Lane Group Flow (vph)	194	0
Confl. Peds. (#/hr)		4
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	25.2	
Effective Green, g (s)	25.2	
Actuated g/C Ratio	0.18	
Clearance Time (s)	5.0	
Vehicle Extension (s)	1.5	
Lane Grp Cap (vph)	233	
v/s Ratio Prot		
v/s Ratio Perm	c0.15	
v/c Ratio	0.83	
Uniform Delay, d1	53.6	
Progression Factor	1.00	
Incremental Delay, d2	21.1	
Delay (s)	74.7	
Level of Service	E	
Approach Delay (s)	74.7	
Approach LOS	E	

Intersection Summary



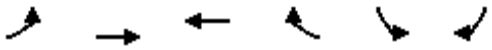
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	30	427	788	30	20	170	514	210	70	60	30	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			1.00		
Frpb, ped/bikes		1.00	1.00			1.00	0.98			0.99		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			0.99		
Frt		1.00	0.99			1.00	0.96			0.97		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3509			1770	3331			1752		
Flt Permitted		0.95	1.00			0.95	1.00			0.43		
Satd. Flow (perm)		1770	3509			1770	3331			769		
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)	33	474	876	33	22	189	571	233	78	67	33	222
RTOR Reduction (vph)	0	0	2	0	0	0	39	0	0	6	0	0
Lane Group Flow (vph)	0	507	907	0	0	211	765	0	0	172	0	0
Confl. Peds. (#/hr)				17				10	23		22	22
Confl. Bikes (#/hr)				6				1			2	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	5	5	2		1	1	6			8		
Permitted Phases									8			4
Actuated Green, G (s)		30.2	53.5			17.2	40.5			30.2		
Effective Green, g (s)		30.2	53.5			17.2	40.5			30.2		
Actuated g/C Ratio		0.27	0.47			0.15	0.36			0.27		
Clearance Time (s)		4.0	4.0			4.0	4.0			4.0		
Vehicle Extension (s)		1.5	6.5			1.5	6.5			1.5		
Lane Grp Cap (vph)		473	1662			269	1194			205		
v/s Ratio Prot		c0.29	0.26			0.12	c0.23					
v/s Ratio Perm										0.22		
v/c Ratio		1.07	0.55			0.78	0.64			0.84		
Uniform Delay, d1		41.4	21.1			46.1	30.1			39.1		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		62.0	0.9			12.9	2.1			24.0		
Delay (s)		103.3	22.0			59.0	32.2			63.0		
Level of Service		F	C			E	C			E		
Approach Delay (s)			51.1				37.8			63.0		
Approach LOS			D				D			E		

Intersection Summary			
HCM 2000 Control Delay	51.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	112.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBT	SBR
Lane Configurations		
Volume (vph)	110	324
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	4.0
Lane Util. Factor	1.00	1.00
Frpb, ped/bikes	1.00	0.95
Flpb, ped/bikes	0.99	1.00
Frt	1.00	0.85
Flt Protected	0.97	1.00
Satd. Flow (prot)	1781	1511
Flt Permitted	0.66	1.00
Satd. Flow (perm)	1222	1511
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	122	360
RTOR Reduction (vph)	0	163
Lane Group Flow (vph)	344	197
Confl. Peds. (#/hr)		23
Confl. Bikes (#/hr)		1
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Actuated Green, G (s)	30.2	30.2
Effective Green, g (s)	30.2	30.2
Actuated g/C Ratio	0.27	0.27
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	1.5	1.5
Lane Grp Cap (vph)	326	404
v/s Ratio Prot		
v/s Ratio Perm	c0.28	0.13
v/c Ratio	1.06	0.49
Uniform Delay, d1	41.4	34.8
Progression Factor	1.00	1.00
Incremental Delay, d2	65.1	0.3
Delay (s)	106.5	35.2
Level of Service	F	D
Approach Delay (s)	70.0	
Approach LOS	E	

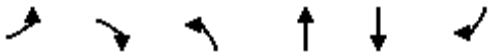
Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	1041	1085	14	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	1170	1219	16	0	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (ft)			346			
pX, platoon unblocked	0.71				0.71	0.71
vC, conflicting volume	1235				1812	617
vC1, stage 1 conf vol					1227	
vC2, stage 2 conf vol					585	
vCu, unblocked vol	523				1333	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	741				326	773

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	585	585	813	422	7
Volume Left	0	0	0	0	0
Volume Right	0	0	0	16	7
cSH	1700	1700	1700	1700	773
Volume to Capacity	0.34	0.34	0.48	0.25	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.7
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.7
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	22	38	120	150	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	25	43	135	169	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				256		
pX, platoon unblocked						
vC, conflicting volume	390	170	172			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	390	170	172			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	97			
cM capacity (veh/h)	595	874	1405			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	178	172
Volume Left	2	43	0
Volume Right	25	0	3
cSH	841	1405	1700
Volume to Capacity	0.03	0.03	0.10
Queue Length 95th (ft)	2	2	0
Control Delay (s)	9.4	2.0	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	2.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation	E-W Street	Mt. Diablo Blvd
PHF	0.92	Scenario	Cumulative Plus Project AM (Single Lane Roundabout)	N-S Street	Dolores St / Mountain View Dr

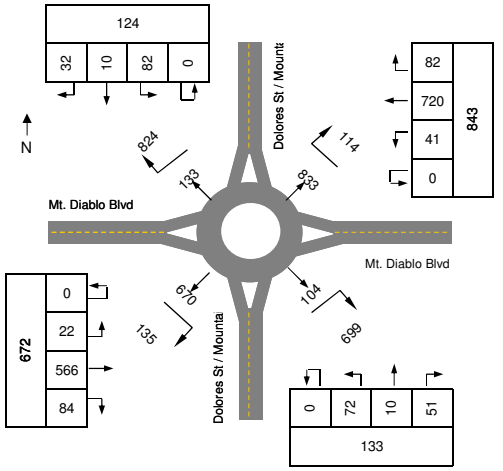
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	133	670	1	578	0.25	8.5	A	25
	Bypass?													
	No													
	Total			100%	100%	100%	133					8.5	A	
South	1	1	LTR	100%	100%	100%	124	833	1	491	0.27	10.4	B	28
	Bypass?													
	No													
	Total			100%	100%	100%	124					10.4	B	
East	1	1	LTR	100%	100%	100%	672	133	1	989	0.74	13.9	B	174
	Bypass?													
	No													
	Total			100%	100%	100%	672					13.9	B	
West	1	1	LTR	100%	100%	100%	843	104	1	1,018	0.90	25.9	D	331
	Bypass?													
	No													
	Total			100%	100%	100%	843					25.9	D	
All							1,772					19.0	C	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	71	10	50	0	80	10	31	0	22	555	82	0	40	706	80
Trucks	0	1	0	1	0	2	0	1	0	0	11	2	0	1	14	2
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	70	10	49	0	78	10	30	0	22	544	80	0	39	692	78
f_{HV}	1.00	0.99	1.00	0.98	1.00	0.98	1.00	0.97	1.00	1.00	0.98	0.98	1.00	0.98	0.98	0.98
Total (pcph)	0	72	10	51	0	82	10	32	0	22	566	84	0	41	720	82

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation	E-W Street	Mt. Diablo Blvd
PHF	0.92	Scenario	Cumulative Plus Project PM (Single Lane Roundabout)	N-S Street	Dolores St / Mountain View Dr

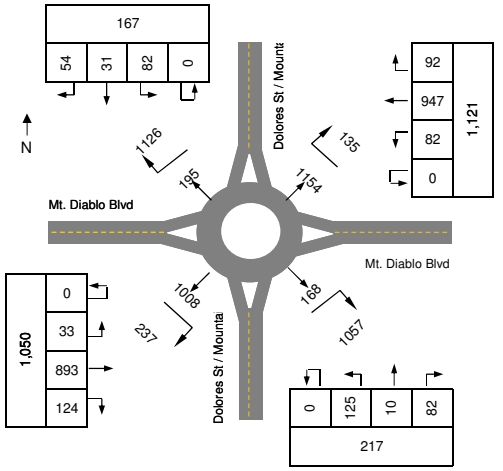
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	217	1,008	1	412	0.57	20.3	C	87
	Bypass?													
	No													
	Total			100%	100%	100%	217					20.3	C	
South	1	1	LTR	100%	100%	100%	167	1,154	1	356	0.51	20.6	C	69
	Bypass?													
	No													
	Total			100%	100%	100%	167					20.6	C	
East	1	1	LTR	100%	100%	100%	1,050	195	1	930	*1.23*	*125.3*	*F*	*944*
	Bypass?													
	No													
	Total			100%	100%	100%	1,050					*125.3*	*F*	
West	1	1	LTR	100%	100%	100%	1,121	168	1	955	*1.28*	*144.6*	*F*	*1,086*
	Bypass?													
	No													
	Total			100%	100%	100%	1,121					*144.6*	*F*	
All							2,555					118.0	F	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

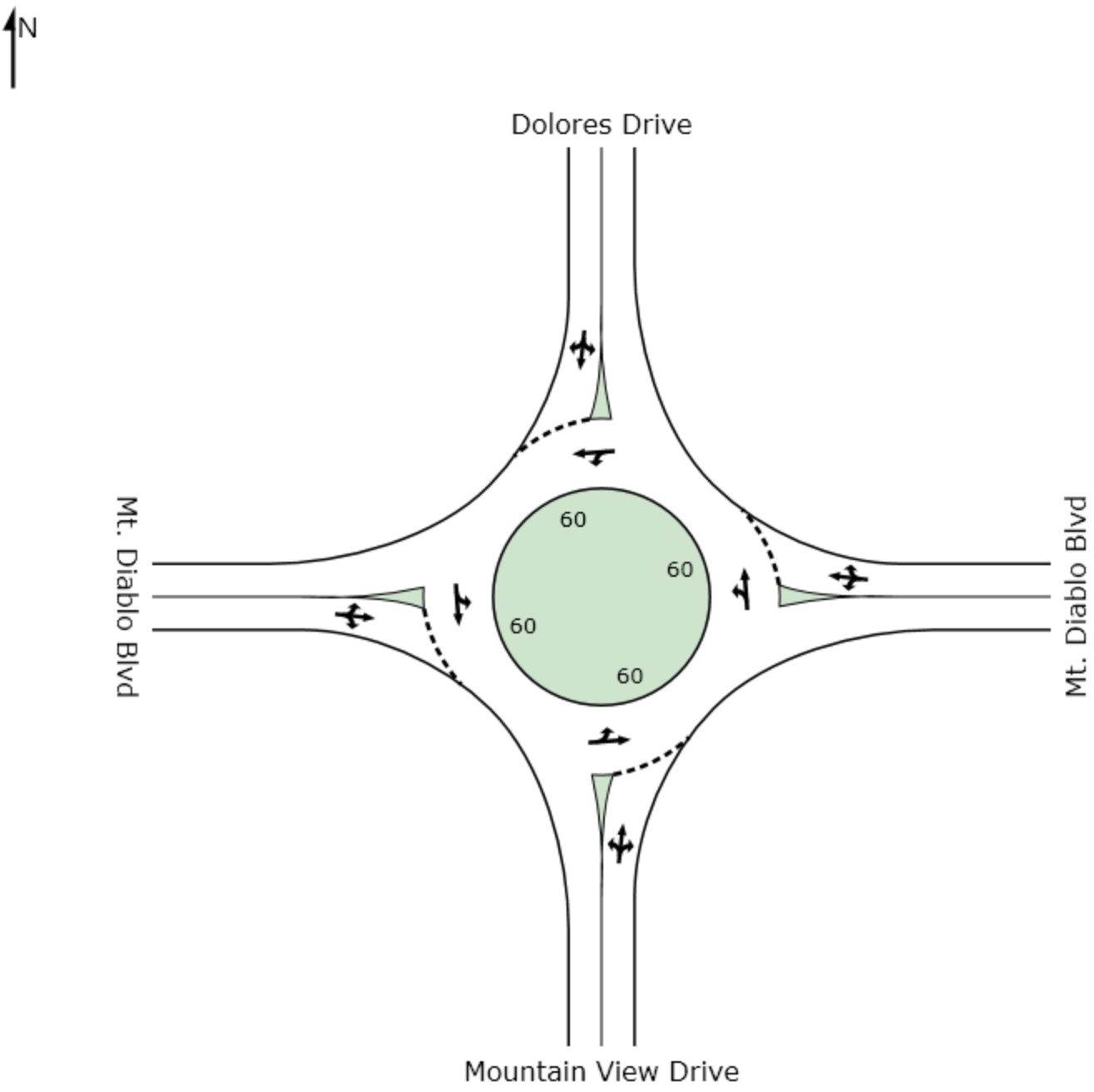
Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	123	10	80	0	80	30	53	0	32	875	122	0	80	928	90
Trucks	0	2	0	2	0	2	1	1	0	1	18	2	0	2	19	2
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	121	10	78	0	78	29	52	0	31	857	120	0	78	909	88
f_{HV}	1.00	0.98	1.00	0.98	1.00	0.98	0.97	0.98	1.00	0.97	0.98	0.98	1.00	0.98	0.98	0.98
Total (pcph)	0	125	10	82	0	82	31	54	0	33	893	124	0	82	947	92

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																


N
Dolores Drive
Mt. Diablo Blvd
Mt. Diablo Blvd
60
60
60
60
Mountain View Drive

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation	E-W Street	Mt. Diablo Blvd
PHF	0.92	Scenario	Cumulative Plus Project AM (2-Lane Roundabout)	N-S Street	Dolores St / Mountain View Dr

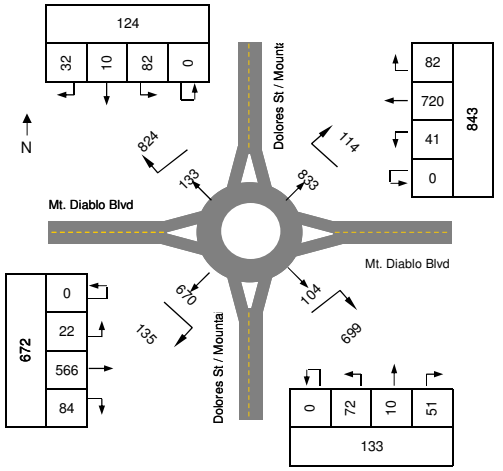
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	133	670	2	707	0.20	6.6	A	19
	Bypass?													
	No													
	Total			100%	100%	100%	133					6.6	A	
South	1	1	LTR	100%	100%	100%	124	833	2	631	0.21	7.5	A	20
	Bypass?													
	No													
	Total			100%	100%	100%	124					7.5	A	
East	2	1 (Left)	LT	100%	50%	0%	305	133	1	989	0.34	5.8	A	37
	Bypass?	2 (Right)	TR	0%	50%	100%	367	133	1	989	0.40	6.5	A	49
	No													
	Total			100%	100%	100%	672					6.2	A	
West	2	1 (Left)	LT	100%	50%	0%	401	104	1	1,018	0.43	6.6	A	54
	Bypass?	2 (Right)	TR	0%	50%	100%	442	104	1	1,018	0.47	7.1	A	65
	No													
	Total			100%	100%	100%	843					6.9	A	
All							1,772					6.6	A	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	71	10	50	0	80	10	31	0	22	555	82	0	40	706	80
Trucks	0	1	0	1	0	2	0	1	0	0	11	2	0	1	14	2
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	70	10	49	0	78	10	30	0	22	544	80	0	39	692	78
f_{HV}	1.00	0.99	1.00	0.98	1.00	0.98	1.00	0.97	1.00	1.00	0.98	0.98	1.00	0.98	0.98	0.98
Total (pcph)	0	72	10	51	0	82	10	32	0	22	566	84	0	41	720	82

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation	E-W Street	Mt. Diablo Blvd
PHF	0.92	Scenario	Cumulative Plus Project PM (2-Lane Roundabout)	N-S Street	Dolores St / Mountain View Dr

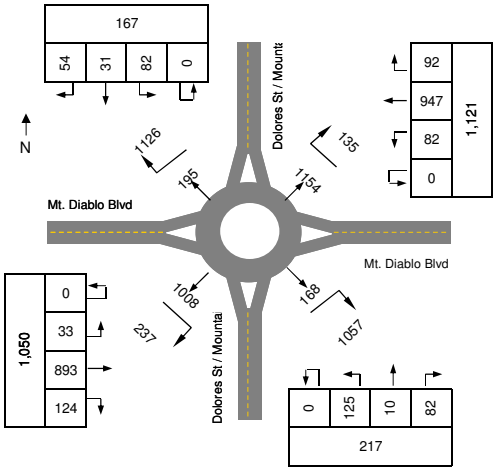
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	217	1,008	2	558	0.42	11.5	B	52
	Bypass?													
	No													
	Total			100%	100%	100%	217					11.5	B	
South	1	1	LTR	100%	100%	100%	167	1,154	2	504	0.36	11.5	B	41
	Bypass?													
	No													
	Total			100%	100%	100%	167					11.5	B	
East	2	1 (Left)	LT	100%	50%	0%	480	195	1	930	0.56	9.3	A	89
	Bypass?	2 (Right)	TR	0%	50%	100%	571	195	1	930	0.67	11.9	B	132
	No													
	Total			100%	100%	100%	1,050					10.7	B	
West	2	1 (Left)	LT	100%	50%	0%	556	168	1	955	0.63	10.6	B	116
	Bypass?	2 (Right)	TR	0%	50%	100%	566	168	1	955	0.64	10.9	B	121
	No													
	Total			100%	100%	100%	1,121					10.8	B	
All							2,555					10.9	B	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

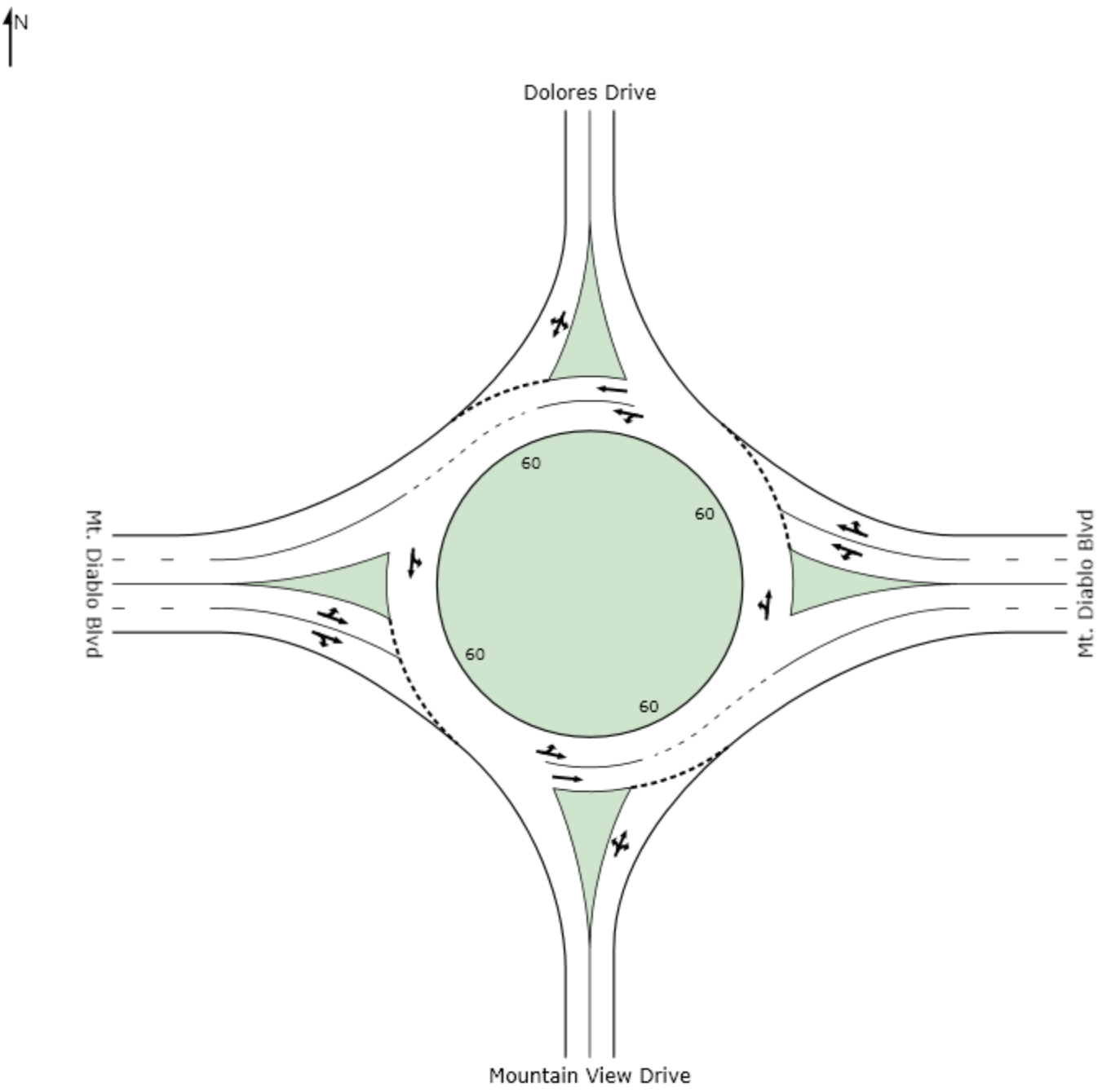
Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	123	10	80	0	80	30	53	0	32	875	122	0	80	928	90
Trucks	0	2	0	2	0	2	1	1	0	1	18	2	0	2	19	2
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	121	10	78	0	78	29	52	0	31	857	120	0	78	909	88
f_{HV}	1.00	0.98	1.00	0.98	1.00	0.98	0.97	0.98	1.00	0.97	0.98	0.98	1.00	0.98	0.98	0.98
Total (pcph)	0	125	10	82	0	82	31	54	0	33	893	124	0	82	947	92

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																


N
Dolores Drive
Mt. Diablo Blvd
Mt. Diablo Blvd
Mountain View Drive
60
60
60
60

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation	E-W Street	Mt. Diablo Blvd
PHF	0.92	Scenario	Cumulative Plus Project AM (Single Lane Roundabout)	N-S Street	Project Driveway

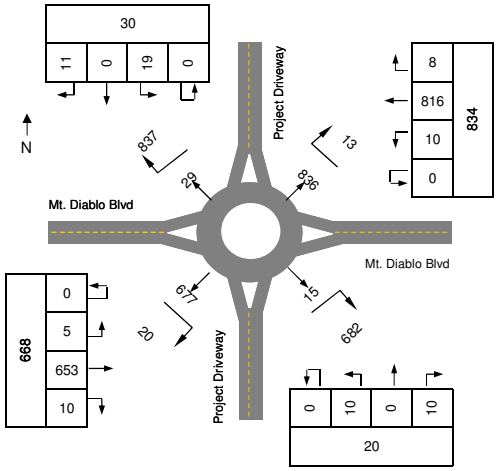
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	20	677	1	574	0.04	6.6	A	3
	Bypass?													
	No													
	Total			100%	100%	100%	20					6.6	A	
South	1	1	LTR	100%	100%	100%	30	836	1	490	0.07	7.9	A	5
	Bypass?													
	No													
	Total			100%	100%	100%	30					7.9	A	
East	1	1	LT	100%	100%	100%	668	29	1	1,098	0.66	10.1	B	132
	Bypass?													
	No													
	Total			100%	100%	100%	668					10.1	B	
West	1	1	LT	100%	100%	100%	834	15	1	1,113	0.81	16.4	C	240
	Bypass?													
	No													
	Total			100%	100%	100%	834					16.4	C	
All							1,552					13.4	B	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	10	0	10	0	19	0	11	0	5	640	10	0	10	800	8
Trucks	0	0	0	0	0	0	0	0	0	0	13	0	0	0	16	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	10	0	10	0	19	0	11	0	5	627	10	0	10	784	8
f_{HV}	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.98	1.00
Total (pcph)	0	10	0	10	0	19	0	11	0	5	653	10	0	10	816	8

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation	E-W Street	Mt. Diablo Blvd
PHF	0.92	Scenario	Cumulative Plus Project PM (Single Lane Roundabout)	N-S Street	Project Driveway

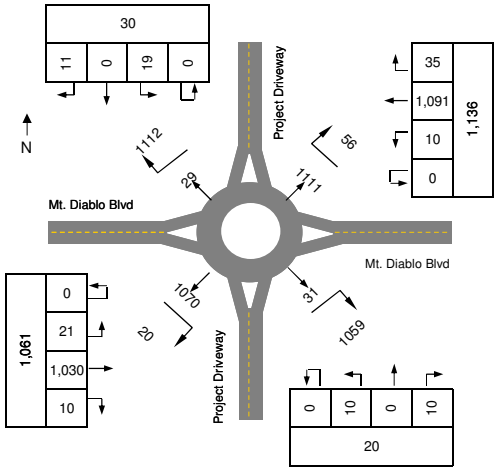
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	20	1,070	1	388	0.06	9.9	A	4
	Bypass?													
	No													
	Total			100%	100%	100%	20					9.9	A	
South	1	1	LTR	100%	100%	100%	30	1,111	1	372	0.09	10.7	B	7
	Bypass?													
	No													
	Total			100%	100%	100%	30					10.7	B	
East	1	1	LT	100%	100%	100%	1,061	29	1	1,098	*1.05*	*56.7*	*F*	*614*
	Bypass?													
	No													
	Total			100%	100%	100%	1,061					*56.7*	*F*	
West	1	1	LT	100%	100%	100%	1,136	31	1	1,096	*1.13*	*82.9*	*F*	*798*
	Bypass?													
	No													
	Total			100%	100%	100%	1,136					*82.9*	*F*	
All							2,247					68.9	F	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

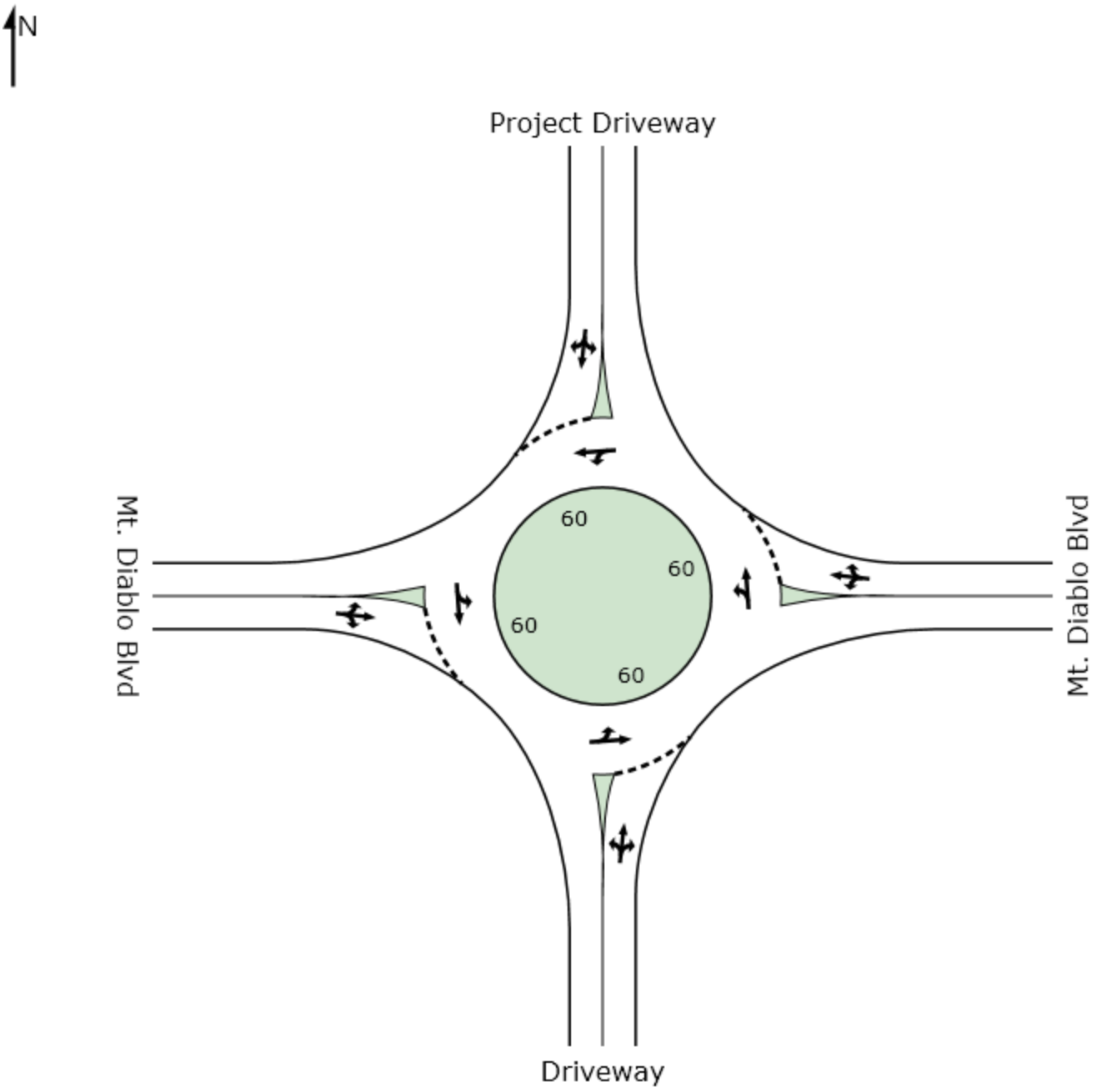
Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	10	0	10	0	19	0	11	0	21	1,010	10	0	10	1,070	34
Trucks	0	0	0	0	0	0	0	0	0	0	20	0	0	0	21	1
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	10	0	10	0	19	0	11	0	21	990	10	0	10	1,049	33
f_{HV}	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.98	0.97
Total (pcph)	0	10	0	10	0	19	0	11	0	21	1,030	10	0	10	1,091	35

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																


N
Project Driveway
Mt. Diablo Blvd
Mt. Diablo Blvd
60
60
60
60
Driveway

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation				E-W Street	Mt. Diablo Blvd					
PHF	0.92	Scenario	Cumulative Plus Project AM (2-Lane Roundabout)				N-S Street	Project Driveway					

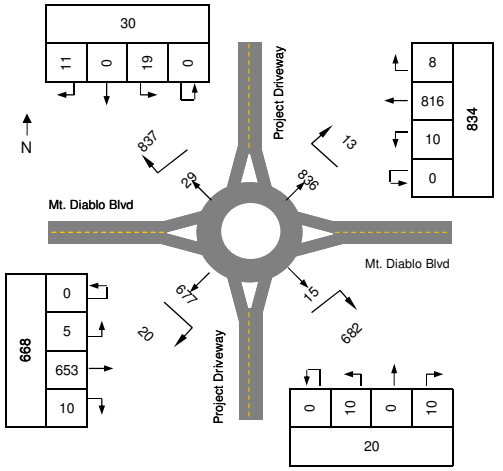
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	20	677	2	704	0.03	5.3	A	2
	Bypass?													
	No													
	Total			100%	100%	100%	20					5.3	A	
South	1	1	LTR	100%	100%	100%	30	836	2	629	0.05	6.1	A	4
	Bypass?													
	No													
	Total			100%	100%	100%	30					6.1	A	
East	2	1 (Left)	LT	100%	50%	0%	332	29	1	1,098	0.33	5.2	A	36
	Bypass?	2 (Right)	TR	0%	50%	100%	337	29	1	1,098	0.33	5.2	A	37
	No													
	Total			100%	100%	100%	668					5.2	A	
West	2	1 (Left)	LT	100%	50%	0%	418	15	1	1,113	0.41	5.9	A	50
	Bypass?	2 (Right)	TR	0%	50%	100%	416	15	1	1,113	0.41	5.8	A	50
	No													
	Total			100%	100%	100%	834					5.8	A	
All							1,552					5.6	A	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	10	0	10	0	19	0	11	0	5	640	10	0	10	800	8
Trucks	0	0	0	0	0	0	0	0	0	0	13	0	0	0	16	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	10	0	10	0	19	0	11	0	5	627	10	0	10	784	8
f_{HV}	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.98	1.00
Total (pcph)	0	10	0	10	0	19	0	11	0	5	653	10	0	10	816	8

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																

ROUNDABOUT CAPACITY ANALYSIS - HCM 2010

Period (hr)	0.25	Project	Lennar Lafayette Residential Traffic Circulation	E-W Street	Mt. Diablo Blvd
PHF	0.92	Scenario	Cumulative Plus Project PM (2-Lane Roundabout)	N-S Street	Project Driveway

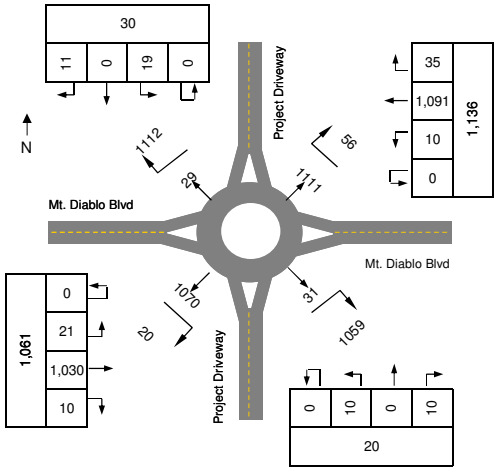
Approach		Lane	Lane Config.	Percentage			Flow (pcph)	Conflicting		Capacity (pcph)	v/c	Control Delay (sec)	LOS*	95th Queue** (ft)
Direction	Lanes			L	T	R		Flow	Lanes					
North	1	1	LTR	100%	100%	100%	20	1,070	2	534	0.04	7.1	A	3
	Bypass?													
	No													
	Total			100%	100%	100%	20					7.1	A	
South	1	1	LTR	100%	100%	100%	30	1,111	2	519	0.06	7.5	A	5
	Bypass?													
	No													
	Total			100%	100%	100%	30					7.5	A	
East	2	1 (Left)	LT	100%	50%	0%	536	29	1	1,098	0.53	7.5	A	81
	Bypass?	2 (Right)	TR	0%	50%	100%	525	29	1	1,098	0.52	7.3	A	78
	No													
	Total			100%	100%	100%	1,061					7.4	A	
West	2	1 (Left)	LT	100%	50%	0%	556	31	1	1,096	0.55	7.8	A	87
	Bypass?	2 (Right)	TR	0%	50%	100%	581	31	1	1,096	0.58	8.2	A	96
	No													
	Total			100%	100%	100%	1,136					8.0	A	
All							2,247					7.7	A	

Source: NCHRP Report 672 - Roundabouts: An Informational Guide, Second Edition (TRB, 2010)

** Does not include the effect of conflicting pedestrians*

*** Assumes a queued vehicle length of 25 feet*

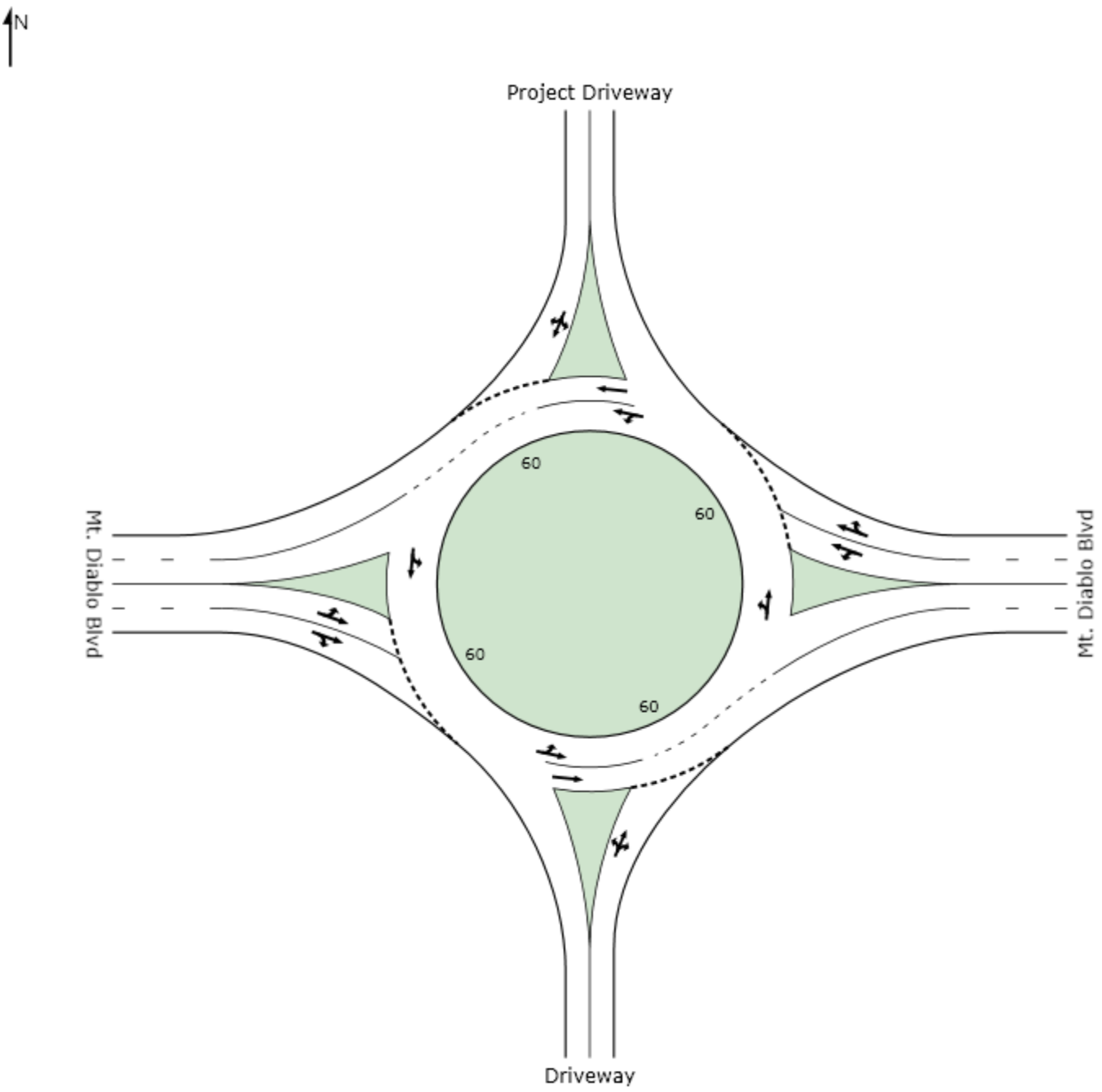
Diagram



Volumes

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Total (vph)	0	10	0	10	0	19	0	11	0	21	1,010	10	0	10	1,070	34
Trucks	0	0	0	0	0	0	0	0	0	0	20	0	0	0	21	1
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars	0	10	0	10	0	19	0	11	0	21	990	10	0	10	1,049	33
f_{HV}	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.98	0.97
Total (pcph)	0	10	0	10	0	19	0	11	0	21	1,030	10	0	10	1,091	35

	Northbound				Southbound				Eastbound				Westbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Truck %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trucks (vph)																


N
Project Driveway
Mt. Diablo Blvd
Mt. Diablo Blvd
Driveway
60
60
60
60