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## TECHNICAL MEMORANDUM

DATE: November 2, 2018  
TO: Reh-Lin Chen, PE, PTOE, City of San Leandro  
Dean Hsiao, PhD, PE, PTOE, City of San Leandro  
FROM: David Mahama, PE  
Maria Tribelhorn, PE  
SUBJECT: Fairmont Drive Class IV Bike Lane Installation Project P# 18035-000

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This memorandum summarizes the analysis undertaken for the installation of Class IV bike lanes along Fairmont Drive in the City of San Leandro.

### HISTORICAL BACKGROUND

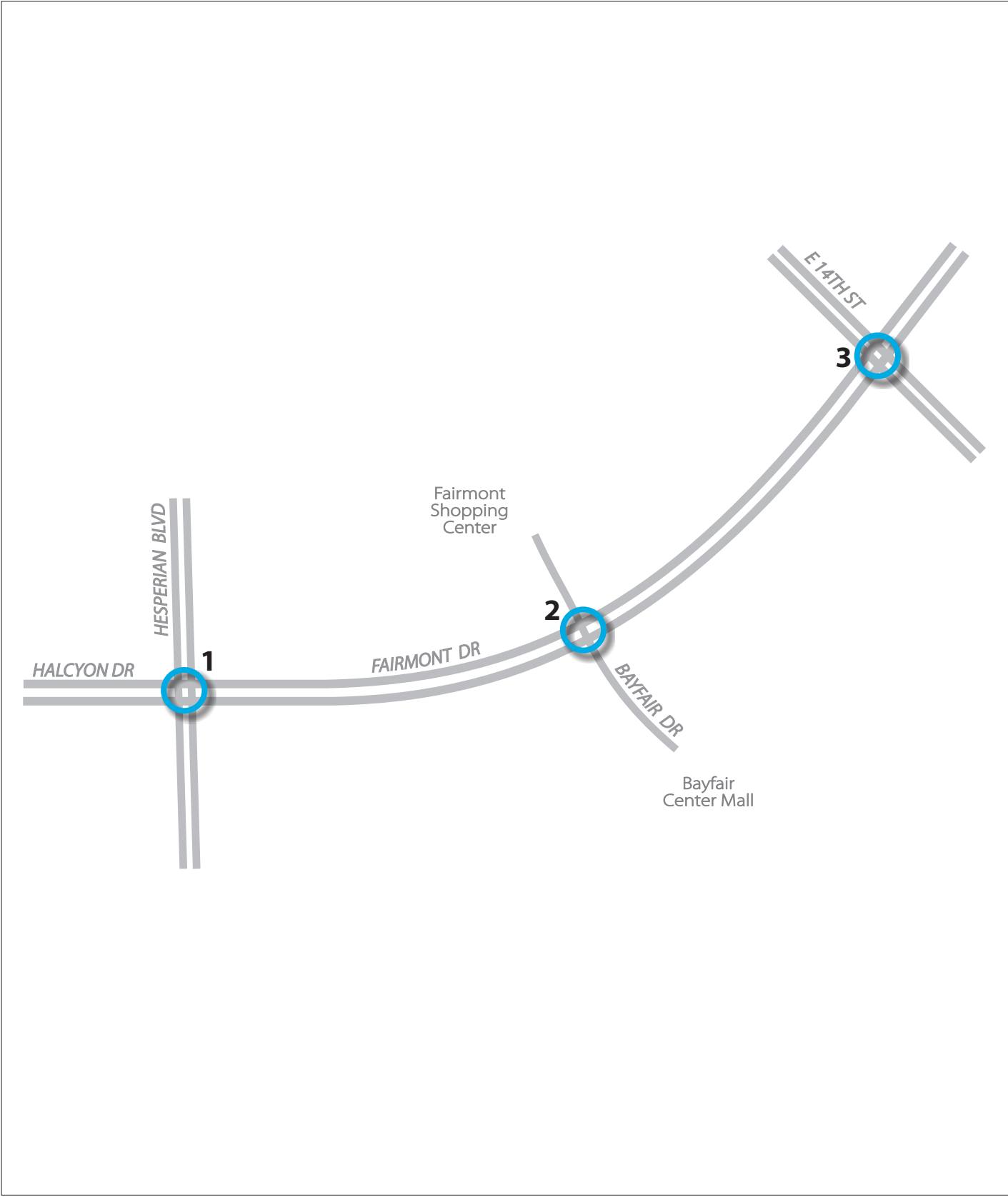
As recommended in the Bayfair Transit Oriented Development (TOD) Study and the City's Bicycle and Pedestrian Master Plan (adopted in March 2018), the City is interested in the installation of Class IV bike lane facilities on both sides of Fairmont Drive between Hesperian Boulevard and East 14<sup>th</sup> Street (SR 185). A Class IV separated bikeway, often referred to as cycle track or protected bike lane, is for exclusive use of bicycles, physically separated from motor vehicle traffic with a vertical feature. The separation may include, but is not limited to, grade separation, flexible posts, inflexible barriers, curb medians, or on-street parking.


Installation of a Class IV bikeway on the study corridor necessitates implementation of a road diet, which is a reduction in the number of travel lanes used for automobile traffic. The right lane, previously used for automobile traffic, would be reallocated to bicycle use on the separated bikeway. Currently, this segment of Fairmont Drive has three lanes in each direction. This road diet project would result in a reduction to two lanes in each direction.

The purpose of this memo is to present a conceptual design for the Class IV bikeway and to assess the potential traffic operational impacts of reducing the number of lanes as a result of the proposed project. DKS assessed the impact on the Fairmont Drive study corridor between Hesperian Boulevard and East 14<sup>th</sup> Street, for the existing year and the cumulative year. The analysis included both arterial level of service (LOS) analysis and signalized intersection LOS analysis. The signalized intersections included in this study are:

1. Fairmont Drive/Hesperian Boulevard
2. Fairmont Drive/Bayfair Drive
3. Fairmont Drive/East 14<sup>th</sup> Street (SR185)

**Figure 1** illustrates the study area.



**LEGEND**  
 #  Study Intersection

**DKS**  
  
 No Scale

**Figure 1**  
**Study Area Map**

## CONCEPTUAL DESIGN

Class IV bike lanes are often implemented using barriers, such as curb medians, landscaping, or striping with flexible posts, to physically prevent automobiles from encroaching on the space reserved for bicycles. Two Class IV bikeway concept plans are presented in **Appendix A** and described below.

For the initial stages of this bikeway, DKS has developed a conceptual plan utilizing striping with flexible posts, shown in Plan 1 (Permissive Bicycle Treatment). Plan 1 corresponds to a cost-effective alternative which consists of permissive phasing for bicycles when crossing an intersection. The operational analysis in the following section is based on recommendations for this plan. Below are the recommendations for Plan 1:

- Road diet in the east-west direction along Fairmont Drive, reducing from three (3) through lanes to two (2) through lanes in each direction.
- Hatched striping and flexible posts are used rather than landscaping or concrete curbs to delineate the boundary between the bike lane and the vehicle travel lane.
- The minimum green time is updated to include the bicycle minimum green time for the east-west phases at all intersections. The minimum bicycle green time is calculated based on the standards documented in the California MUTCD 2014 Edition, Table 4D-109(CA).
- The design standards for the bike lanes, bike lane transition through the intersections and driveways, bike waiting area, and bicycle signing and striping are based on the guidelines from the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide and City of San Leandro Bicycle & Pedestrian Master Plan.
- A bicycle waiting area is provided at the intersections for two reasons: to facilitate the left turning bicycles and to help manage expected conflicts between bicycles and corresponding right turning vehicles at an intersection.
- Right turn conflicts at intersections are managed in two ways depending on the location:
  - At the Hesperian Boulevard and Bayfair Drive intersections, right turn conflicts are managed by implementing a bicycle waiting area at the intersection, which facilitates bicycles moving to the front of a traffic stream, where they are visible and have priority.
  - At the East 14<sup>th</sup> Street intersection, on the eastbound approach, right turn conflicts are managed by implementing a mixing zone, which moves bicycles to the left of right turning vehicles. The bike lane does not continue east of 14<sup>th</sup> Street, so the protected bikeway treatment must end. The mixing zone treatment communicates to bicycles that they are entering the general traffic stream and must be aware of potential conflicts. The abrupt right turn lane entrance, in combination with signage, discourages fast vehicle traffic and encourages awareness of bicycles.
- Addition of an eastbound through bike lane at the intersection of Hesperian Boulevard to facilitate the transition from a Class II to Class IV bikeway along Fairmont Drive. This treatment also manages the right turn conflict between vehicles and bicycles by moving right turning vehicles to the right of bicycles traveling through the intersection.

DKS also presents a possible longer-term solution which would provide for the safest intersection treatment for bicycles. Plan 2 (Protected Bicycle Signal Phase) presents this alternative, which consists of protected traffic signal phasing for bicycles when crossing an intersection. Automobile operations would be more heavily impacted with this plan as automobile and bicycle traffic would be served separately. However, this is included as a long-term idea rather than a realistic current solution, and therefore no operational analysis was completed. Below are some of the recommendations for Plan 2:

- Road diet in the east-west direction along Fairmont Drive, reducing from three (3) through lanes to two (2) through lanes in each direction.
- Striping and flexible posts, landscaping or concrete curbs could be used to delineate the boundary between the bike lane and vehicle travel lane. The ultimate plan for this bikeway is to use curb medians and landscaping for the barrier between automobiles and bicycles.
- A protected bicycle phase is proposed for safe passage of bicycles through an intersection. The automobile permitted right turn movement is controlled to avoid conflicts with bicycles at an intersection. The right turn permitted phase is allowed during all phases but is prohibited (by a red arrow on the right turn vehicle head) during the corresponding bicycle through phase.
- New mast arm traffic signal poles will be required along Fairmont Drive to withstand the additional load of the new signal equipment and signage. The signal equipment includes five (5) vehicle heads in the east-west direction along Fairmont Drive:
  - One head for left turn vehicle phasing,
  - Two heads for through vehicle phasing,
  - One head for right turn vehicle phasing, and
  - One head for bicycle signals.
- The design standards for the bike lanes, bike lane transition through the intersection and driveways, bike waiting area, and bicycle signing and striping are based on the guidelines from the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide and City of San Leandro Bicycle & Pedestrian Master Plan.
- Conflicts between bicycles and corresponding right turning vehicles at an intersection are eliminated within the study area.
- A bicycle waiting area is provided at intersections to facilitate the left turning bicycle movement.

**Table 1** summarizes the pros and cons for each of the conceptual designs. Plan 2 represents a more comprehensive, safer solution for bicycle treatment. However, it would also cost more and would result in increased delay compared to Plan 1.

**Table 1: Pros and Cons for Design Alternatives**

Element	Plan 1	Plan 2	Notes
<b>Pros</b>			
Enhances bicycle connectivity in San Leandro	✓	✓	
Bicycle safety - dedicated lane	✓	✓	Safer for bikes due to dedicated lane
Bicycle safety - dedicated lane with physical barrier		✓	Safer, more comfortable bike lane with permanent, physical barrier
Bike box	✓	✓	Safer conflict zones due to bike box
Exclusive bike phase		✓	Safer conflict zones with exclusive bike phase
Bicycle timing	✓	✓	Update minimum green time to serve bicycles
Use		✓	Higher perception of safety and comfort likely to lead to higher use
Attractiveness		✓	Permanent infrastructure more attractive
<b>Cons</b>			
Delay due to lane reduction	✓	✓	Lane reduction results in higher delay for vehicles
Vehicle delay due to bike phase		✓	Plan 2 higher impact to vehicle traffic due to added bicycle phase
Multimodal delay due to bike phase		✓	Plan 2 higher delays for all users due to added phase
Cost		✓	Plan 2 more expensive due to signal modifications and curb work
Construction		✓	Plan 2 more traffic impact during construction due to longer, more invasive construction period
Maintenance	✓		Plan 1 would include more temporary elements requiring more maintenance



## PERFORMANCE ANALYSIS

This section includes the operational analysis completed for the Conceptual Plan 1 discussed in the previous section.

### Level of Service Standards

Fairmont Drive is designated as an Arterial in the City’s General Plan Transportation Element. It lies within an area that has been identified as the BayFair BART Transit Village Priority Development Area (PDA). PDAs are areas located around transit where development may occur without necessitating heavy automobile travel. Thus, these areas are currently being targeted for development.

In general, LOS along roadways in San Leandro shall be maintained at LOS D or better. However, roadways located within PDAs shall be maintained at LOS E or better. For this study, the LOS performance threshold used for Fairmont Drive is LOS E.

### Existing Conditions Operational Analysis

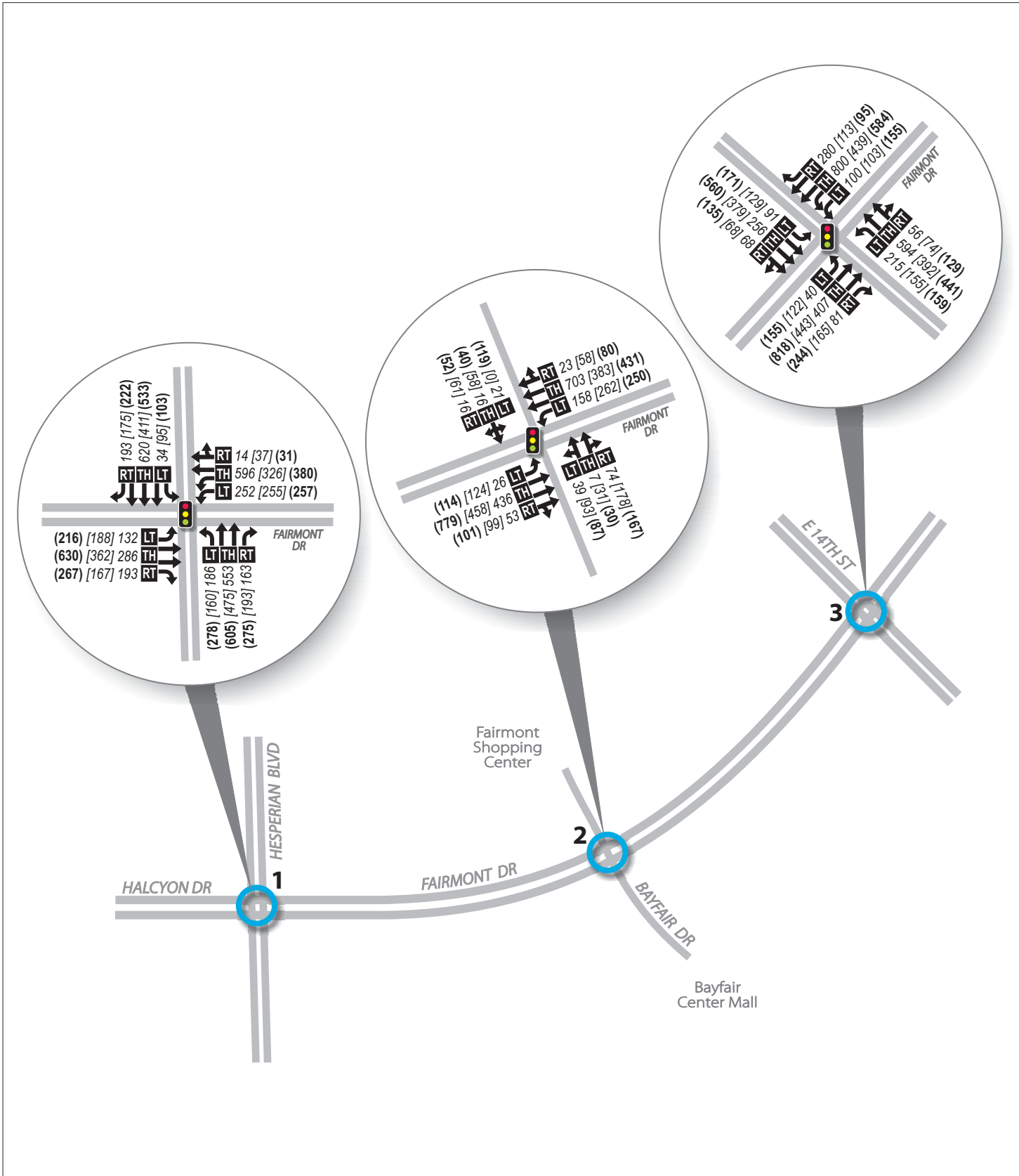
Existing traffic operations at the three study intersections and along the corridor were assessed using Synchro software. ADT counts and turn movement counts, including pedestrians and bicycles, were provided by the City of San Leandro. The AM and PM peak hour counts as well as roadway and intersection geometry for all three signalized intersections are illustrated in **Figure 2**.

DKS evaluated the existing network performance without the project for two scenarios – with the current signal timing and with optimized signal timing. As shown in **Table 2**, for the current signal timing all the study intersections currently operate at an acceptable level of service during the AM, midday and PM peak periods. The detailed reports from Synchro are included in **Appendix B**.

**Table 2: Existing Intersection Delay (Seconds)/LOS**

Study Intersection	Intersection Control	Current Timing			Optimized Timing		
		AM Peak	Midday Peak	PM Peak	AM Peak	Midday Peak	PM Peak
1) Fairmont Drive/Hesperian Boulevard	Signalized	37.0/D	38.5/D	44.2/D	35.7/D	39.8/D	38.4/D
2) Fairmont Drive/Bayfair Drive	Signalized	20.0/B	25.8/C	25.6/C	20.0/B	25.2/C	25.5/C
3) Fairmont Drive/E. 14 <sup>th</sup> Street (SR 185)	Signalized	33.3/C	31.8/C	45.1/D	33.3/C	31.8/C	39.1/D

The signal timings were optimized based on traffic volumes. DKS assumed that the cycle lengths would not be modified in order not to disturb the coordination along the adjacent corridors of Hesperian Boulevard and East 14<sup>th</sup> Street. After optimizing the timing, all intersections are expected to perform at an acceptable level of service.



**LEGEND**

- # Study Intersection
- Traffic Signal
- ← Lane Configuration
- AM [Midday] (PM) Peak Hour Traffic Volumes
- LT TH RT Volume Turn Movement (Left-Thru-Right)

**DKS**

No Scale

**Figure 2**  
Existing Peak Hour Volumes & Lane Geometry

Note that the optimized timings were calculated using a method focusing on the three study intersections alone and do not account for corridor operations beyond the study segment. The calculated timings are not recommended timings for the network but rather optimized timings for the purpose of making an accurate comparison between the existing conditions and the plus project conditions. The developed timings do not account for corridor operations beyond the study segment.

**Table 3** shows the Arterial LOS analysis results. As shown, with the current signal timings the corridor is currently operating at LOS F for all peak periods in the westbound direction and during the PM peak hour in the eastbound direction. With optimized timings, the network is expected to operate at LOS F for all peak periods in westbound direction and during the Midday and PM peak hour in the eastbound direction.

The degradation in operations during the Midday peak period is due to signal timing adjustment. Under the current timings, the maximum split allocated to the north-south movements at the Fairmont Drive/Bayfair Drive intersection is insufficient to serve pedestrians (although the controller would allocate the appropriate time if the push button is pushed). The optimized timings increase the maximum split for the north-south direction, which slightly reduces the estimated corridor speed (by 0.2 mph) in the east-west direction.

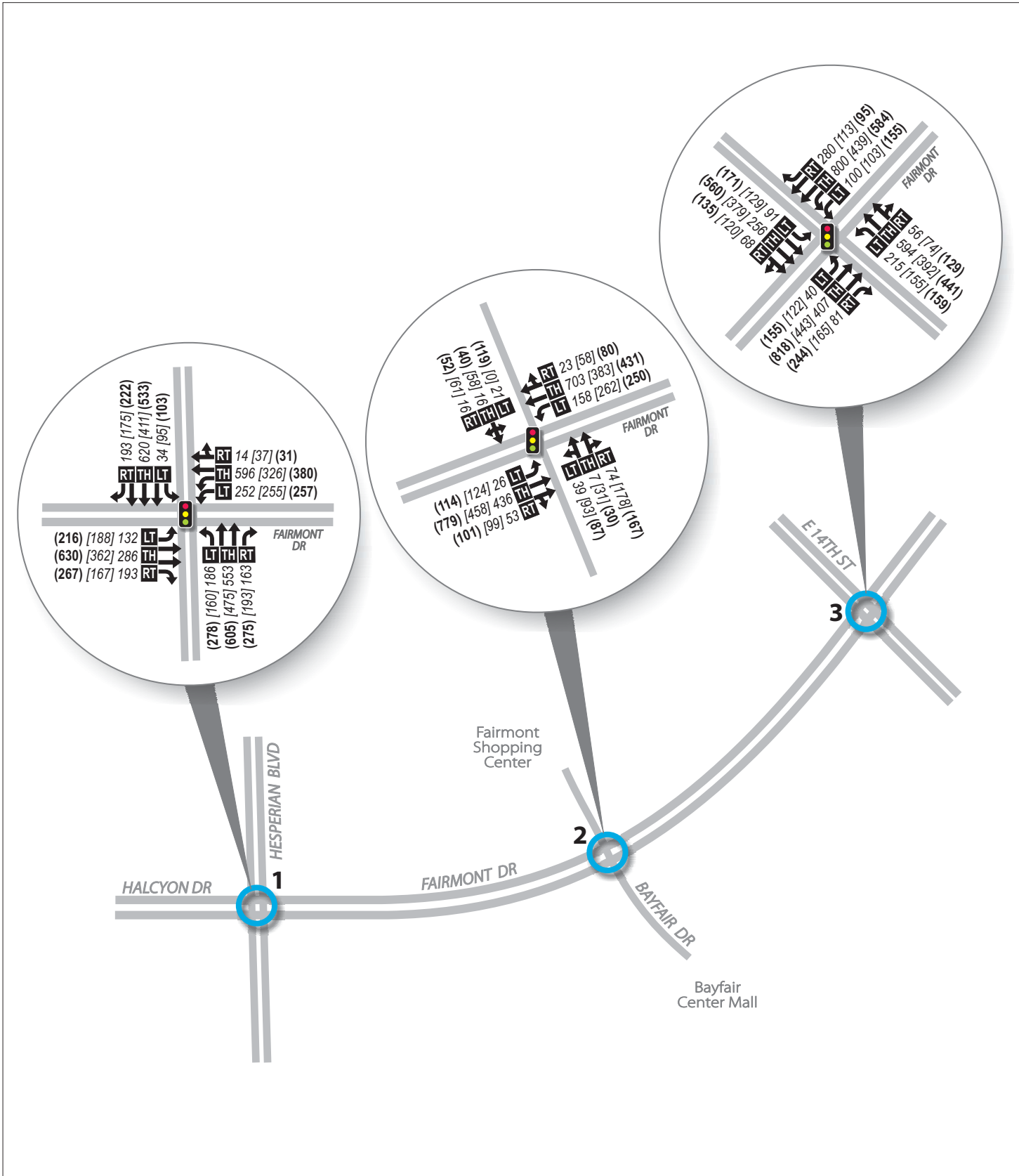
**Table 3: Existing Arterial LOS**

	Study Segment	Current Timings			Optimized Timings		
		Signal Delay (s)	Arterial Speed (mph)	Arterial LOS	Signal Delay (s)	Arterial Speed (mph)	Arterial LOS
AM	EB: Hesperian Boulevard to E. 14 <sup>th</sup> Street	56.6	10.4	E	56.8	10.4	E
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	66.1	9.4	F	66.1	9.4	F
Mid day	EB: Hesperian Boulevard to E. 14 <sup>th</sup> Street	59.3	10.1	E	61.5	9.9	F
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	73.1	8.8	F	72.7	8.8	F
PM	EB: Hesperian Boulevard to E. 14 <sup>th</sup> Street	100.0	6.9	F	67.6	9.1	F
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	67.0	9.1	F	66.8	9.1	F

### Existing Plus Project Conditions Operational Analysis

DKS revised the roadway geometry in the Synchro models to test the effect of the lane reduction due to installation of the proposed Class IV bike lanes. The project would reduce the number of lanes from three lanes to two lanes in each direction along Fairmont Drive. **Figure 3** illustrates the intersection geometry for the plus project conditions. These results provide an approximation of expected operations.





**LEGEND**

# Study Intersection

Traffic Signal

Lane Configuration

AM [Midday] (PM) Peak Hour Traffic Volumes

Volume Turn Movement  
Left • Thru • Right

**DKS**

No Scale

**Figure 3**

**Existing Plus Project Peak Hour Volumes & Lane Geometry**

As shown in **Table 4**, delay and LOS are expected to remain within acceptable limits after project implementation for all intersections. DKS assumed that signals would be retimed as part of this project (cycle lengths to remain the same), which resulted in an improvement in operations for the Hesperian Boulevard intersection as compared to existing conditions with the current timing plans. Compared to the existing conditions with optimized timings, delay increases at most locations but operations remain at acceptable LOS. The detailed reports from Synchro are included in **Appendix B**. **Appendix C** includes graphics showing the expected queues. Queuing is expected to increase somewhat along the corridor with the project addition.

**Table 4: Existing Plus Project Delay (Seconds)/LOS**

Study Intersection	Intersection Control	AM Peak	Midday Peak	PM Peak
1) Fairmont Drive/Hesperian Boulevard	Signalized	36.9/D	39.0/D	38.7/D
2) Fairmont Drive/Bayfair Drive	Signalized	21.9/C	27.0/C	34.6/D
3) Fairmont Drive/E. 14 <sup>th</sup> Street (SR 185)	Signalized	35.6/D	31.6/C	42.8/D

Note: Signal retiming assumed for plus project condition. Reduction in delay compared to existing conditions is due to signal retiming.

**Table 5** shows the Arterial LOS analysis results. As shown, the corridor is expected to operate at operate at LOS F for all peak periods in both the eastbound and westbound directions. This represents a degradation from LOS E to LOS F for the AM and Midday peak periods in the eastbound direction, correlated to an increase in delay of seven (7) seconds or less compared to the existing optimized conditions. For all other directions and peak periods, LOS F would be maintained.

It should be noted that coordination of the Fairmont Drive corridor would improve arterial operations. However, it is not possible to coordinate the Fairmont Drive corridor while maintaining current coordination patterns along Hesperian Boulevard and E. 14<sup>th</sup> Street, as the two corridors have different signal timings.

**Table 5: Existing Plus Project Arterial LOS**

	Study Segment	Signal Delay (s)	Arterial Speed (mph)	Arterial LOS
AM	EB: Hesperian Boulevard to E.14 <sup>th</sup> Street	60.8	9.9	F
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	69.0	9.1	F
Midday	EB: Hesperian Boulevard to E.14 <sup>th</sup> Street	68.3	9.2	F
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	74.1	8.7	F
PM	EB: Hesperian Boulevard to E.14 <sup>th</sup> Street	95.1	7.1	F
	WB: E.14 <sup>th</sup> Street to Hesperian Boulevard	67.9	9.0	F

## CUMULATIVE CONDITIONS ANALYSIS

DKS also evaluated the operation of Fairmont Drive under the cumulative condition AM and PM peak periods. Forecast volumes for the Midday period were not available. The cumulative scenario assumes that the transit-oriented development has been constructed.

### Cumulative Conditions Operational Analysis

Cumulative traffic operations at the three study intersections and along the corridor were assessed using Synchro software. Expected turn movement counts for the future year were provided by the City of San Leandro. The AM and PM peak hour counts as well as roadway and intersection geometry for all three signalized intersections are illustrated in **Figure 4**.

DKS assumed that the cycle length would change from existing conditions for the cumulative year. However, to be conservative it was assumed that coordination priority would remain on the Hesperian Boulevard corridor and the E. 14<sup>th</sup> Street corridor, as it is today. Therefore, individual intersection timings were optimized but the Fairmont Drive corridor was assumed to operate without coordination in the east-west direction.

As shown in **Table 6**, all study intersections are expected to operate at an acceptable LOS during the Cumulative AM and PM peak periods. The detailed reports from Synchro are included in **Appendix B**.

**Table 7** shows the Arterial LOS analysis results. As shown, the corridor is expected to operate at acceptable LOS eastbound during the AM peak period. However, the arterial is expected to operate at LOS F westbound during the AM peak period and PM peak period and eastbound during the PM peak period. Arterial operation improvement in the westbound direction during the PM peak period as compared to existing conditions is due to signal timing modifications.

**Table 6: Cumulative Delay (Seconds)/LOS**

Study Intersection	Intersection Control	AM Peak	PM Peak
1) Fairmont Drive/Hesperian Boulevard	Signalized	60.4/E	75.9/E
2) Fairmont Drive/Bayfair Drive	Signalized	21.7/C	36.8/D
3) Fairmont Drive/E. 14 <sup>th</sup> Street (SR 185)	Signalized	53.9/D	49.9/D

Note: Signal retiming assumed for Cumulative condition. Reduction in delay from existing conditions (current signal timing) is due to retiming.

**Table 7: Cumulative Arterial LOS**

	Study Segment	Signal Delay (s)	Arterial Speed (mph)	Arterial LOS
AM	EB: Hesperian Boulevard to E. 14 <sup>th</sup> Street	58.7	10.2	E
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	149.3	5.1	F
PM	EB: Hesperian Boulevard to E. 14 <sup>th</sup> Street	92.9	7.3	F
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	59.2	9.9	F

### Cumulative Plus Project Conditions Operational Analysis

DKS revised the roadway geometry in the Synchro models to test the effect of the lane reduction. **Figure 5** illustrates the roadway and intersection geometry for the plus project conditions. As shown in **Table 8**, delay and LOS would remain within acceptable limits after project implementation.

**Table 9** shows the Arterial LOS analysis results. As shown, the corridor is expected to maintain the Cumulative (no project) LOS for most scenarios. However, it is expected to deteriorate to LOS F in the eastbound direction during the AM peak period.

It should be noted that coordination of the Fairmont Drive corridor would improve arterial operations. However, it was assumed that current coordination priorities along Hesperian Boulevard and E. 14<sup>th</sup> Street would be maintained. To be conservative, it was assumed that the two corridors would continue to have different cycle lengths, not allowing for the coordination of the Fairmont Drive corridor.

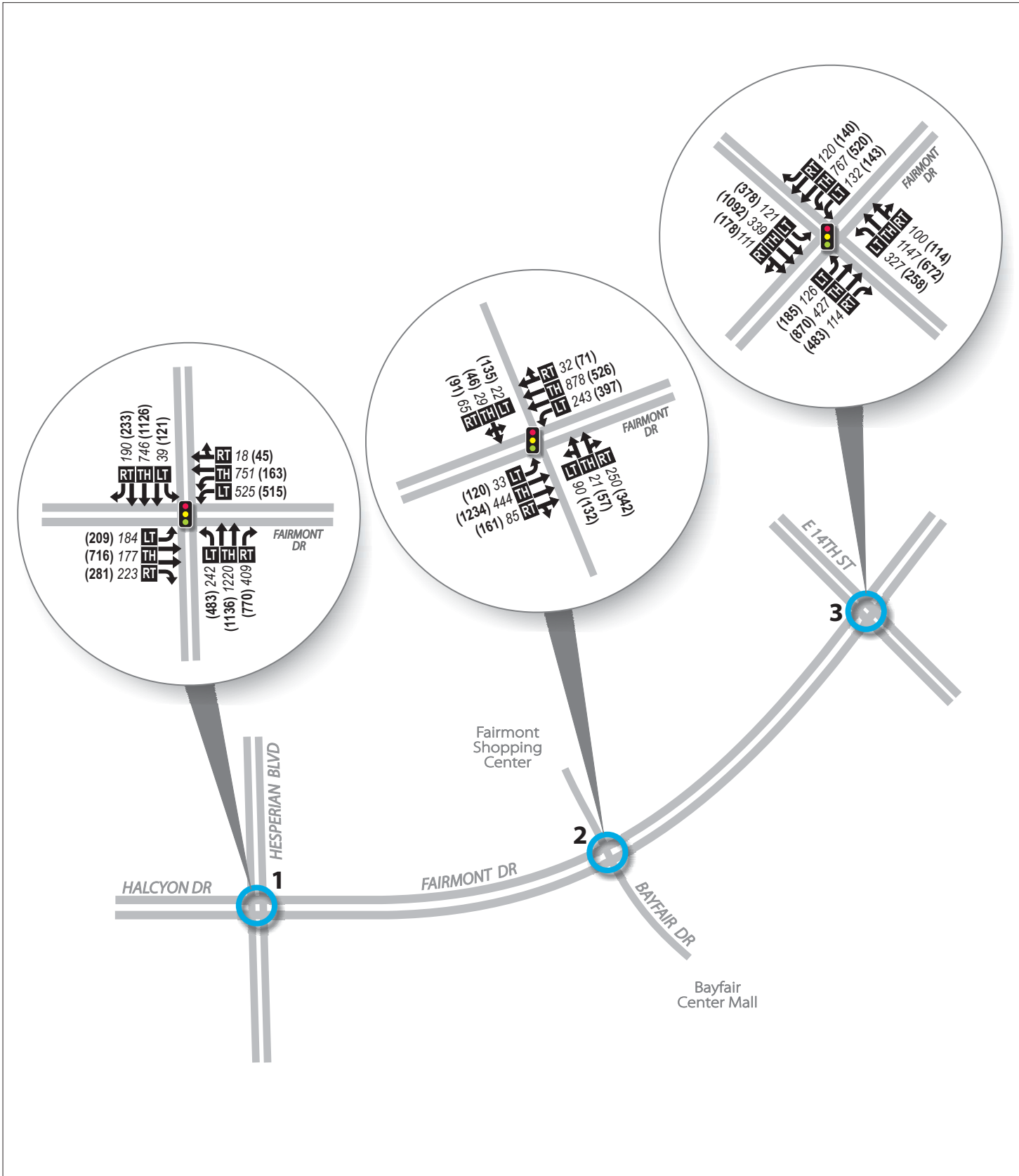
**Appendix C** shows the expected queuing for the Cumulative Plus Project conditions. In general, the project is expected to result in increased queuing. During the PM peak period the eastbound queue is expected to spill back from Bayfair Drive past Hesperian Boulevard.

**Table 8: Cumulative Plus Project Delay (Seconds)/LOS**

Study Intersection	Intersection Control	AM Peak	PM Peak
4) Fairmont Drive/Hesperian Boulevard	Signalized	51.6/D	72.9/E
5) Fairmont Drive/Bayfair Drive	Signalized	24.3/C	64.0/E
6) Fairmont Drive/E. 14 <sup>th</sup> Street (SR 185)	Signalized	49.2/D	60.4/E

**Table 9: Cumulative Plus Project Arterial LOS**

	Study Segment	Signal Delay (s)	Arterial Speed (mph)	Arterial LOS
AM	EB: Hesperian Boulevard to E.14 <sup>th</sup> Street	66.2	9.4	F
	WB: E. 14 <sup>th</sup> Street to Hesperian Boulevard	113.9	6.4	F
PM	EB: Hesperian Boulevard to E.14 <sup>th</sup> Street	175.9	4.4	F
	WB: E.14 <sup>th</sup> Street to Hesperian Boulevard	59.7	9.8	F



**LEGEND**

# Study Intersection

Traffic Signal

← Lane Configuration

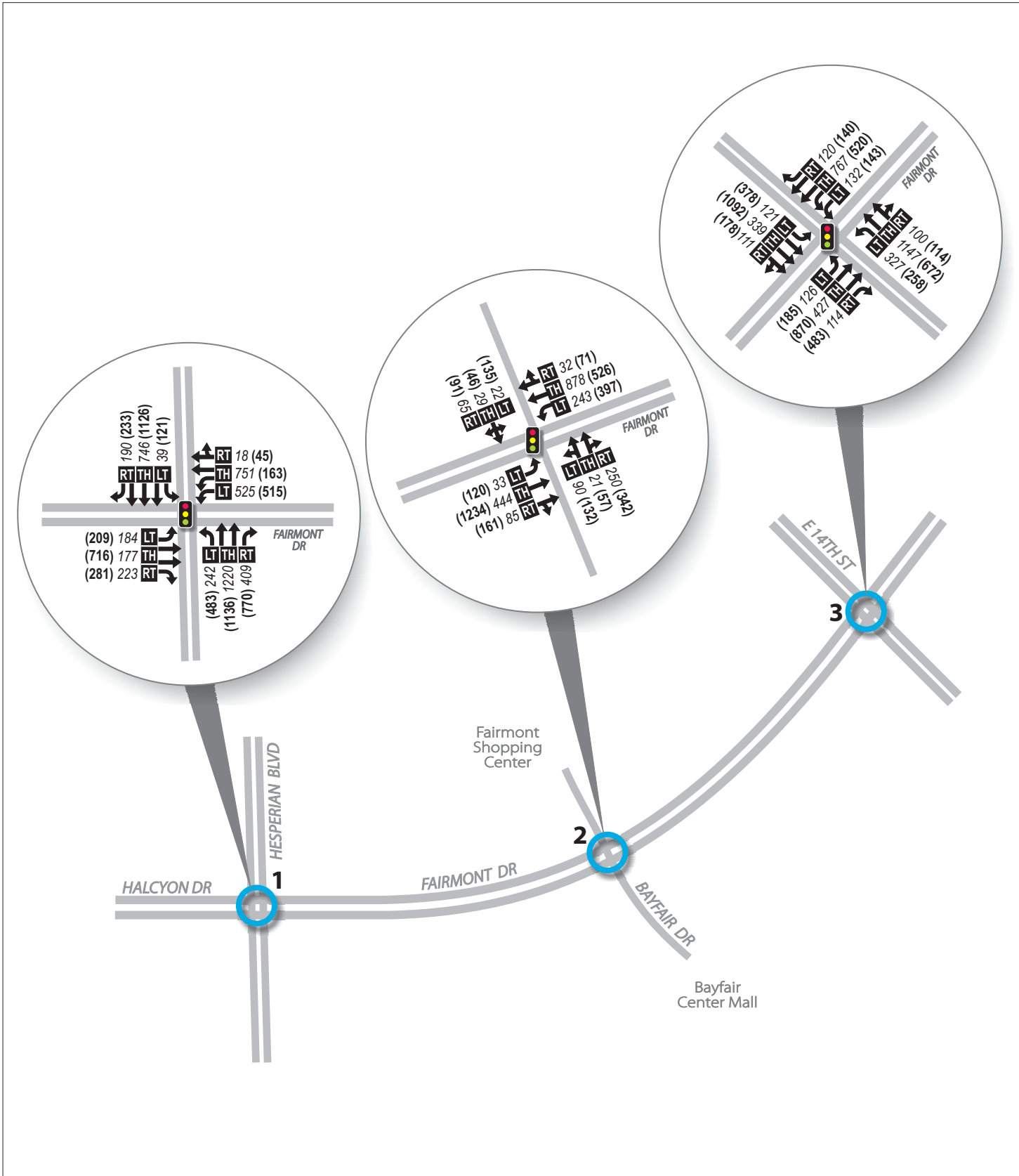
AM (PM) Peak Hour Traffic Volumes

Volume Turn Movement  
Left • Thru • Right

**DKS**

No Scale

**Figure 4**  
**Cumulative Peak Hour Volumes & Lane Geometry**



**LEGEND**

# Study Intersection

Traffic Signal

← Lane Configuration

AM (PM) → Peak Hour Traffic Volumes

**LT TH RT** Volume Turn Movement  
Left • Thru • Right

**DKS**

No Scale

**Figure 5**

**Cumulative Plus Project  
Peak Hour Volumes &  
Lane Geometry**



## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

Overall, the proposed road diet on Fairmont Drive from Hesperian Boulevard to East 14<sup>th</sup> Street is expected to have some impact on the roadway operations.

### Existing Year

For the Existing scenario with current signal timings, the study intersections all operate at acceptable LOS E or better. The arterial currently operates at LOS F for all peak periods in the westbound direction and during the PM peak hour in the eastbound direction.

With optimized signal timings, all the study intersections are expected to operate at acceptable LOS. The study arterial is expected to operate at LOS F for all peak periods in the westbound direction and during the Midday and PM peak hour in the eastbound direction.

Installation of the proposed project is not expected to cause intersection operations to deteriorate below standard. However, assuming that study intersection cycle lengths will be maintained and that the Fairmont corridor will not be coordinated, arterial operations are expected to deteriorate below standard (to LOS F) in the eastbound direction during the AM and Midday and periods.

In summary, the road diet is expected to have a significant impact on arterial operations in the eastbound direction during the Midday and PM peak periods. Some increased queuing is expected.

### Cumulative Year

For the Cumulative scenario (no project), all the study intersections are expected to operate at acceptable LOS. The corridor is expected to operate at acceptable LOS eastbound during the AM peak period. However, the arterial is expected to operate at LOS F westbound during the AM peak period and during the PM peak period in both directions.

Installation of the proposed project is not expected to cause intersection operations to deteriorate below standard. Assuming that the Fairmont Drive corridor will not be coordinated, the corridor is expected to deteriorate to LOS F in the eastbound direction during the AM peak period.

In general, queuing is expected to increase due to the project. During the PM peak period the eastbound queue is expected to spill back from Bayfair Drive past Hesperian Boulevard.

In summary, the project is expected to have a significant impact on arterial operations in the eastbound direction during the AM peak period. It is also expected to result in increased queuing.

## Recommendations

Installation of the Class IV bikeway would reduce the number of travel lanes from three (3) lanes to two (2) lanes in both directions. In this memorandum DKS included two possible design alternatives. Plan 1 corresponds to a cost-effective alternative which consists of permissive phasing for bicycles when crossing an intersection.

Plan 2 is recommended for the long term, safest bicycle treatment. This plan would provide for the safest intersection treatment for bicycles, consisting of protected traffic signal phasing for bicycles when crossing an intersection.

DKS recommends the following features for the Class IV bikeway under Plan 1:

- The bike lane shall be separated from the vehicle travel lane via hatched striping and flexible posts. A more permanent curb median would provide added safety for bicycles.
- The signal timings at all intersections shall be updated to include the bicycle minimum green times.
- The bicycle waiting area shall be provided to facilitate the left turning bicycles and help manage expected conflicts between bicycles and corresponding right turning vehicles at an intersection.
- The right turn conflicts at East 14<sup>th</sup> Street intersection shall be managed by implementing a mixing zone. This also helps warn the bicyclist of the termination of the Class IV bikeway.
- The installation of an eastbound through bike lane at the intersection of Hesperian Boulevard facilitates the transition from a Class II to Class IV bikeway along Fairmont Drive. It also manages the right turn vehicle conflicts.

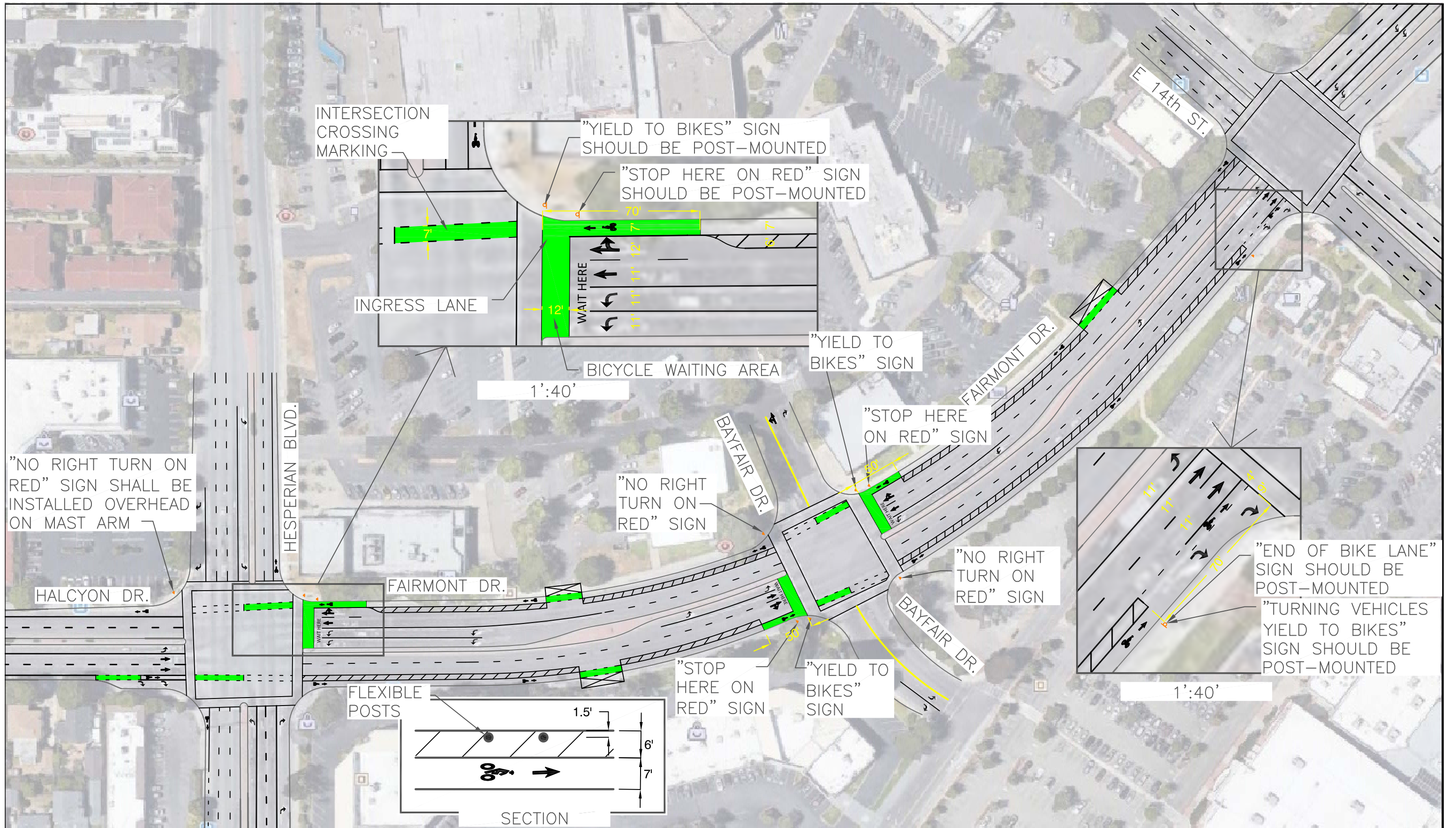
In order to properly implement the cost-effective Plan 1, DKS has a few key recommendations. In pursuit of safety, the bicycle lanes should be separated from the vehicle travel lanes via hatched pavement markings, signal timing shall be adjusted to include bicycle minimum green times and left turning waiting areas shall be installed to help manage conflicts between right-turning vehicles. To manage right turn conflicts along Fairmont Drive and facilitate transition between Class II and Class IV bikeways, a mixing zone and an eastbound through bike lane shall be added to the East 14<sup>th</sup> Street and Hesperian Boulevard intersections, respectively.





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## APPENDIX A



"NO RIGHT TURN ON RED" SIGN SHALL BE INSTALLED OVERHEAD ON MAST ARM

INTERSECTION CROSSING MARKING

"YIELD TO BIKES" SIGN SHOULD BE POST-MOUNTED

"STOP HERE ON RED" SIGN SHOULD BE POST-MOUNTED

INGRESS LANE

WAIT HERE

BICYCLE WAITING AREA

"YIELD TO BIKES" SIGN

"STOP HERE ON RED" SIGN

"NO RIGHT TURN ON RED" SIGN

"NO RIGHT TURN ON RED" SIGN

"END OF BIKE LANE" SIGN SHOULD BE POST-MOUNTED

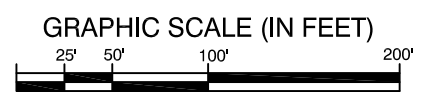
"TURNING VEHICLES YIELD TO BIKES" SIGN SHOULD BE POST-MOUNTED

"STOP HERE ON RED" SIGN

"YIELD TO BIKES" SIGN

FLEXIBLE POSTS

SECTION



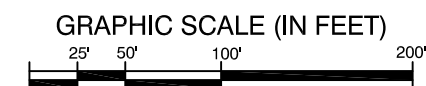
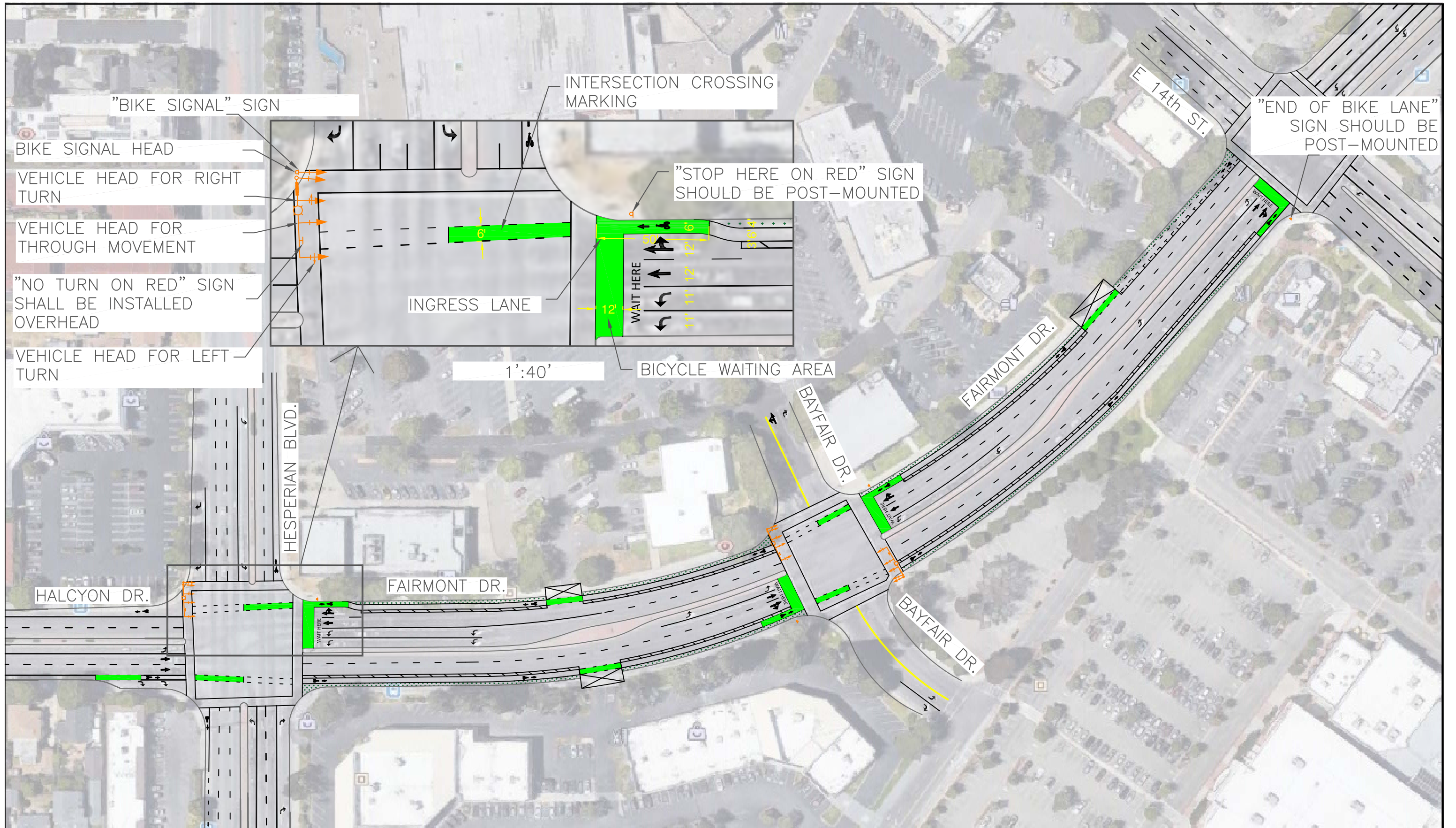
DKS ASSOCIATES  
1970 BROADWAY, SUITE # 740  
OAKLAND, CA 94612  
TEL: 510-763-2061

PREPARED BY:	CIVIL ENGINEER	No.	DATE	BY	REFERENCE
	RCE NO. _____ EXP. _____				
	CHECKED BY: MARIA TRBELHORN				
	DESIGNED BY: YANA LOGINOVA				
	DRAWN BY: YANA LOGINOVA				

Fairmont Drive  
Class IV Bike Lane Concept  
Permissive Bicycle Treatment

**DRAFT**

SCALE: 1"=100'  
HOR. VERT.  
DATE: APR 17, 2018  
SHEET NO. 01 OF 02



PREPARED BY:



DKS ASSOCIATES  
1970 BROADWAY, SUITE # 740  
OAKLAND, CA 94612  
TEL: 510-763-2061

CIVIL ENGINEER

RCE NO. \_\_\_\_\_ EXP. \_\_\_\_\_

CHECKED BY MARIA TRIBELHORN

DESIGNED BY YANA LOGINOVA

DRAWN BY YANA LOGINOVA

No.	DATE	BY	REFERENCE

Fairmont Drive  
Class IV Bike Lane Concept  
Protected Bicycle Signal Phase

**DRAFT**

SCALE: 1"=100'  
HOR.  
VERT.  
DATE: APR 17, 2018  
SHEET NO.  
02 OF 02

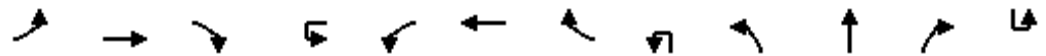


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## APPENDIX B

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Conditions  
Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	
Lane Configurations	↰	↑↑	↱		↰	↑↑			↰	↑↑	↱		
Traffic Volume (vph)	132	286	193	1	251	596	14	1	185	553	163	11	
Future Volume (vph)	132	286	193	1	251	596	14	1	185	553	163	11	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	13	11	11	12	12	12	12	12	12	12	
Total Lost time (s)	4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9		
Lane Util. Factor	1.00	0.95	1.00		0.97	0.95			1.00	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00			1.00	1.00	0.98		
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00			1.00	1.00	1.00		
Frt	1.00	1.00	0.85		1.00	1.00			1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00		
Satd. Flow (prot)	1770	3539	1590		3319	3526			1770	3539	1554		
Flt Permitted	0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00		
Satd. Flow (perm)	1770	3539	1590		3319	3526			1770	3539	1554		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	140	304	205	1	267	634	15	1	197	588	173	12	
RTOR Reduction (vph)	0	0	123	0	0	2	0	0	0	0	93	0	
Lane Group Flow (vph)	140	304	82	0	268	647	0	0	198	588	80	0	
Confl. Peds. (#/hr)			12				2				4		
Confl. Bikes (#/hr)			4				2				5		
Turn Type	Prot	NA	Perm	Prot	Prot	NA		Prot	Prot	NA	Perm	Prot	
Protected Phases	3	8		7	7	4		1	1	6		5	
Permitted Phases			8								6		
Actuated Green, G (s)	13.9	27.6	27.6		14.3	27.7			19.5	55.7	55.7		
Effective Green, g (s)	13.9	27.6	27.6		14.3	27.7			19.5	55.7	55.7		
Actuated g/C Ratio	0.12	0.23	0.23		0.12	0.23			0.16	0.46	0.46		
Clearance Time (s)	4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9		
Vehicle Extension (s)	3.0	4.0	4.0		4.0	3.0			2.0	6.0	6.0		
Lane Grp Cap (vph)	205	813	365		395	813			287	1642	721		
v/s Ratio Prot	0.08	0.09			c0.08	c0.18			c0.11	0.17			
v/s Ratio Perm			0.05								0.05		
v/c Ratio	0.68	0.37	0.22		0.68	0.80			0.69	0.36	0.11		
Uniform Delay, d1	50.9	38.9	37.5		50.6	43.5			47.4	20.7	18.2		
Progression Factor	1.00	1.00	1.00		1.00	1.00			0.92	0.73	1.71		
Incremental Delay, d2	9.0	0.4	0.4		5.0	5.4			5.3	0.4	0.2		
Delay (s)	60.0	39.3	37.9		55.6	48.9			49.1	15.5	31.3		
Level of Service	E	D	D		E	D			D	B	C		
Approach Delay (s)		43.3			50.9				25.3				
Approach LOS		D			D				C				
<b>Intersection Summary</b>													
HCM 2000 Control Delay			37.0									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.59										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	17.8
Intersection Capacity Utilization			78.6%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis  
 5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Conditions  
 Timing Plan: AM Peak Hour



Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (vph)	23	620	193
Future Volume (vph)	23	620	193
Ideal Flow (vphpl)	1900	1900	1900
Lane Width	12	12	15
Total Lost time (s)	4.0	4.9	4.9
Lane Util. Factor	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00
Frt	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1701
Flt Permitted	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1701
Peak-hour factor, PHF	0.94	0.94	0.94
Adj. Flow (vph)	24	660	205
RTOR Reduction (vph)	0	0	129
Lane Group Flow (vph)	36	660	76
Confl. Peds. (#/hr)			9
Confl. Bikes (#/hr)			3
Turn Type	Prot	NA	Perm
Protected Phases	5	2	
Permitted Phases			2
Actuated Green, G (s)	4.9	41.1	41.1
Effective Green, g (s)	4.9	41.1	41.1
Actuated g/C Ratio	0.04	0.34	0.34
Clearance Time (s)	4.0	4.9	4.9
Vehicle Extension (s)	2.0	6.0	6.0
Lane Grp Cap (vph)	72	1741	582
v/s Ratio Prot	c0.02	c0.13	
v/s Ratio Perm			0.04
v/c Ratio	0.50	0.38	0.13
Uniform Delay, d1	56.4	29.8	27.2
Progression Factor	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.6	0.5
Delay (s)	58.3	30.4	27.6
Level of Service	E	C	C
Approach Delay (s)		30.9	
Approach LOS		C	
<b>Intersection Summary</b>			

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Conditions  
Timing Plan: AM Peak Hour

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	2	24	436	53	2	156	703	23	39	7	74	21
Future Volume (vph)	2	24	436	53	2	156	703	23	39	7	74	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.0	4.5			4.0	4.5			5.0		
Lane Util. Factor		1.00	0.91			1.00	0.91			0.95		
Frbp, ped/bikes		1.00	1.00			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	1.00			0.91		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	4827			1652	4890			3134		
Flt Permitted		0.95	1.00			0.95	1.00			0.86		
Satd. Flow (perm)		1770	4827			1652	4890			2751		
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	27	490	60	2	175	790	26	44	8	83	24
RTOR Reduction (vph)	0	0	15	0	0	0	3	0	0	53	0	0
Lane Group Flow (vph)	0	29	535	0	0	177	813	0	0	82	0	0
Confl. Peds. (#/hr)				2					3		1	1
Confl. Bikes (#/hr)				2				2				
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	1	1	5		6	6	2			4		
Permitted Phases									4			4
Actuated Green, G (s)		2.6	20.7			15.3	33.4			28.1		
Effective Green, g (s)		2.6	20.7			15.3	33.4			28.1		
Actuated g/C Ratio		0.03	0.27			0.20	0.43			0.36		
Clearance Time (s)		4.0	4.5			4.0	4.5			5.0		
Vehicle Extension (s)		2.0	6.0			2.0	6.0			2.0		
Lane Grp Cap (vph)		59	1287			325	2104			996		
v/s Ratio Prot		0.02	c0.11			c0.11	0.17					
v/s Ratio Perm										c0.03		
v/c Ratio		0.49	0.42			0.54	0.39			0.08		
Uniform Delay, d1		36.9	23.5			28.0	15.1			16.3		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		2.3	0.6			1.0	0.3			0.0		
Delay (s)		39.2	24.1			29.0	15.4			16.3		
Level of Service		D	C			C	B			B		
Approach Delay (s)			24.8				17.9			16.3		
Approach LOS			C				B			B		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			20.0				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			77.6				Sum of lost time (s)			13.5		
Intersection Capacity Utilization			59.2%				ICU Level of Service			B		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Conditions  
Timing Plan: AM Peak Hour



Movement	SBT	SBR
Lane Configurations	↔	
Traffic Volume (vph)	16	16
Future Volume (vph)	16	16
Ideal Flow (vphpl)	1900	1900
Lane Width	16	12
Total Lost time (s)	5.0	
Lane Util. Factor	0.95	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.95	
Flt Protected	0.98	
Satd. Flow (prot)	3737	
Flt Permitted	0.86	
Satd. Flow (perm)	3259	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	18	18
RTOR Reduction (vph)	11	0
Lane Group Flow (vph)	49	0
Confl. Peds. (#/hr)		3
Confl. Bikes (#/hr)		2
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	28.1	
Effective Green, g (s)	28.1	
Actuated g/C Ratio	0.36	
Clearance Time (s)	5.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1180	
v/s Ratio Prot		
v/s Ratio Perm	0.01	
v/c Ratio	0.04	
Uniform Delay, d1	16.0	
Progression Factor	1.00	
Incremental Delay, d2	0.0	
Delay (s)	16.0	
Level of Service	B	
Approach Delay (s)	16.0	
Approach LOS	B	
<b>Intersection Summary</b>		



HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Conditions  
Timing Plan: AM Peak Hour

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	1	39	407	81	1	99	800	280	3	212	594	56
Future Volume (vph)	1	39	407	81	1	99	800	280	3	212	594	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12	12	11	12	10	12	12
Total Lost time (s)		3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6	
Lane Util. Factor		1.00	0.95	1.00		0.97	0.95	1.00		1.00	0.95	
Frbp, ped/bikes		1.00	1.00	0.98		1.00	1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Frt		1.00	1.00	0.85		1.00	1.00	0.85		1.00	0.99	
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)		1711	3539	1552		3433	3539	1502		1652	3488	
Flt Permitted		0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		1711	3539	1552		3433	3539	1502		1652	3488	
Peak-hour factor, PHF	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95
Adj. Flow (vph)	1	41	428	85	1	104	842	295	3	223	625	59
RTOR Reduction (vph)	0	0	0	64	0	0	0	179	0	0	7	0
Lane Group Flow (vph)	0	42	428	21	0	105	842	116	0	226	677	0
Confl. Peds. (#/hr)				5				6				8
Confl. Bikes (#/hr)				2								
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot	NA	
Protected Phases	3	3	8		7	7	4		1	1	6	
Permitted Phases				8				4				
Actuated Green, G (s)		2.8	23.0	23.0		5.4	25.6	25.6		17.9	42.0	
Effective Green, g (s)		2.8	23.0	23.0		5.4	25.6	25.6		17.9	42.0	
Actuated g/C Ratio		0.03	0.24	0.24		0.06	0.27	0.27		0.19	0.44	
Clearance Time (s)		3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0	2.0		2.0	4.0	
Lane Grp Cap (vph)		50	856	375		195	953	404		311	1542	
v/s Ratio Prot		c0.02	0.12			0.03	c0.24			c0.14	c0.19	
v/s Ratio Perm				0.01				0.08				
v/c Ratio		0.84	0.50	0.05		0.54	0.88	0.29		0.73	0.44	
Uniform Delay, d1		45.9	31.0	27.7		43.6	33.3	27.5		36.2	18.3	
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		67.6	0.2	0.0		1.4	9.5	0.1		7.0	0.9	
Delay (s)		113.5	31.2	27.7		45.0	42.8	27.6		43.2	19.3	
Level of Service		F	C	C		D	D	C		D	B	
Approach Delay (s)			36.9				39.4				25.2	
Approach LOS			D				D				C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			33.3				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			95.0				Sum of lost time (s)			16.6		
Intersection Capacity Utilization			76.7%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Conditions  
Timing Plan: AM Peak Hour



Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Volume (vph)	6	85	256	68
Future Volume (vph)	6	85	256	68
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width	12	12	12	12
Total Lost time (s)		3.7	4.6	
Lane Util. Factor		1.00	0.91	
Frbp, ped/bikes		1.00	0.99	
Flpb, ped/bikes		1.00	1.00	
Frt		1.00	0.97	
Flt Protected		0.95	1.00	
Satd. Flow (prot)		1770	4899	
Flt Permitted		0.95	1.00	
Satd. Flow (perm)		1770	4899	
Peak-hour factor, PHF	0.92	0.95	0.95	0.95
Adj. Flow (vph)	7	89	269	72
RTOR Reduction (vph)	0	0	48	0
Lane Group Flow (vph)	0	96	293	0
Confl. Peds. (#/hr)				10
Confl. Bikes (#/hr)				4
Turn Type	Prot	Prot	NA	
Protected Phases	5	5	2	
Permitted Phases				
Actuated Green, G (s)		8.0	32.1	
Effective Green, g (s)		8.0	32.1	
Actuated g/C Ratio		0.08	0.34	
Clearance Time (s)		3.7	4.6	
Vehicle Extension (s)		2.0	4.0	
Lane Grp Cap (vph)		149	1655	
v/s Ratio Prot		0.05	0.06	
v/s Ratio Perm				
v/c Ratio		0.64	0.18	
Uniform Delay, d1		42.1	22.1	
Progression Factor		1.00	1.00	
Incremental Delay, d2		7.0	0.2	
Delay (s)		49.1	22.4	
Level of Service		D	C	
Approach Delay (s)			28.2	
Approach LOS			C	
<b>Intersection Summary</b>				

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.0	22.7	39.7	0.13	12.1	E
E. 14th Street	III	35	16.2	33.9	50.1	0.13	9.1	F
Total	III		33.2	56.6	89.8	0.26	10.4	E

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	16.2	15.2	31.4	0.13	14.5	D
	III	35	17.0	50.9	67.9	0.13	7.1	F
Total	III		33.2	66.1	99.3	0.26	9.4	F

## Arterial Level of Service: NB Hesperian Blvd

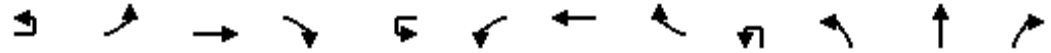
Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	13.9	26.9	0.11	15.1	E
Thornally Dr	II	40	24.0	36.8	60.8	0.21	12.4	F
Bayfair Dr	II	40	24.2	1.5	25.7	0.21	29.4	B
Fairmont Dr	II	40	13.5	16.9	30.4	0.12	13.9	E
Total	II		74.7	69.1	143.8	0.65	16.2	E

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	12.0	25.5	0.12	16.5	E
Thornally Dr	II	40	24.2	38.7	62.9	0.21	12.0	F
Drew St	II	40	24.0	20.0	44.0	0.21	17.1	D
Springlake Dr	II	40	13.0	27.4	40.4	0.11	10.0	F
Total	II		74.7	98.1	172.8	0.65	13.5	E

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Conditions  
Timing Plan: PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations		↔	↕	↗		↖	↕			↔	↕	↗
Traffic Volume (vph)	6	210	630	267	6	251	380	31	3	275	605	275
Future Volume (vph)	6	210	630	267	6	251	380	31	3	275	605	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	12	11	12	12	12	12	12	15
Total Lost time (s)		4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9
Lane Util. Factor		1.00	0.95	1.00		0.97	0.95			1.00	0.95	1.00
Frbp, ped/bikes		1.00	1.00	0.98		1.00	1.00			1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00			1.00	1.00	1.00
Frt		1.00	1.00	0.85		1.00	0.99			1.00	1.00	0.85
Flt Protected		0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00
Satd. Flow (prot)		1770	3539	1595		3319	3490			1770	3539	1699
Flt Permitted		0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00
Satd. Flow (perm)		1770	3539	1595		3319	3490			1770	3539	1699
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)	6	216	649	275	6	259	392	32	3	284	624	284
RTOR Reduction (vph)	0	0	0	65	0	0	5	0	0	0	0	167
Lane Group Flow (vph)	0	222	649	210	0	265	419	0	0	287	624	117
Confl. Peds. (#/hr)				9				18				9
Confl. Bikes (#/hr)				3				2				6
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA		Prot	Prot	NA	Perm
Protected Phases	3	3	8		7	7	4		1	1	6	
Permitted Phases				8								6
Actuated Green, G (s)		20.4	30.5	30.5		16.2	26.0			24.6	53.6	53.6
Effective Green, g (s)		20.4	30.5	30.5		16.2	26.0			24.6	53.6	53.6
Actuated g/C Ratio		0.16	0.23	0.23		0.12	0.20			0.19	0.41	0.41
Clearance Time (s)		4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9
Vehicle Extension (s)		3.0	4.0	4.0		4.0	3.0			2.0	6.0	6.0
Lane Grp Cap (vph)		277	830	374		413	698			334	1459	700
v/s Ratio Prot		c0.13	c0.18			0.08	0.12			c0.16	c0.18	
v/s Ratio Perm				0.13								0.07
v/c Ratio		0.80	0.78	0.56		0.64	0.60			0.86	0.43	0.17
Uniform Delay, d1		52.8	46.6	43.9		54.1	47.3			51.0	27.3	24.1
Progression Factor		1.00	1.00	1.00		1.00	1.00			0.95	0.66	1.81
Incremental Delay, d2		15.2	5.1	2.3		3.8	1.5			16.4	0.5	0.3
Delay (s)		68.1	51.7	46.2		57.9	48.7			64.7	18.4	44.0
Level of Service		E	D	D		E	D			E	B	D
Approach Delay (s)			53.6			52.3					35.6	
Approach LOS			D			D					D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			44.2			HCM 2000 Level of Service					D	
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				17.8		
Intersection Capacity Utilization			89.7%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

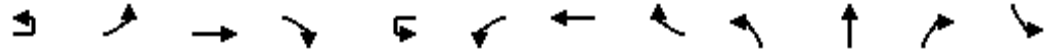
Existing Conditions  
Timing Plan: PM Peak Hour



Movement	SBU	SBL	SBT	SBR
Lane Configurations		5	↑↑↑	↑
Traffic Volume (vph)	32	71	533	222
Future Volume (vph)	32	71	533	222
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width	12	12	12	15
Total Lost time (s)		4.0	4.9	4.9
Lane Util. Factor		1.00	0.91	1.00
Frbp, ped/bikes		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	1.00
Frt		1.00	1.00	0.85
Flt Protected		0.95	1.00	1.00
Satd. Flow (prot)		1770	5085	1682
Flt Permitted		0.95	1.00	1.00
Satd. Flow (perm)		1770	5085	1682
Peak-hour factor, PHF	0.97	0.97	0.97	0.97
Adj. Flow (vph)	33	73	549	229
RTOR Reduction (vph)	0	0	0	156
Lane Group Flow (vph)	0	106	549	73
Confl. Peds. (#/hr)				19
Confl. Bikes (#/hr)				1
Turn Type	Prot	Prot	NA	Perm
Protected Phases	5	5	2	
Permitted Phases				2
Actuated Green, G (s)		12.2	41.2	41.2
Effective Green, g (s)		12.2	41.2	41.2
Actuated g/C Ratio		0.09	0.32	0.32
Clearance Time (s)		4.0	4.9	4.9
Vehicle Extension (s)		2.0	6.0	6.0
Lane Grp Cap (vph)		166	1611	533
v/s Ratio Prot		0.06	0.11	
v/s Ratio Perm				0.04
v/c Ratio		0.64	0.34	0.14
Uniform Delay, d1		56.8	34.0	31.7
Progression Factor		1.00	1.00	1.00
Incremental Delay, d2		5.8	0.6	0.5
Delay (s)		62.6	34.6	32.2
Level of Service		E	C	C
Approach Delay (s)			37.3	
Approach LOS			D	
<b>Intersection Summary</b>				

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Conditions  
Timing Plan: PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations		↔	↑↑↑			↔	↑↑↑			↔		
Traffic Volume (vph)	17	97	779	101	3	247	431	80	87	30	167	119
Future Volume (vph)	17	97	779	101	3	247	431	80	87	30	167	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.0	4.5			4.0	4.5			5.0		
Lane Util. Factor		1.00	0.91			1.00	0.91			0.95		
Frbp, ped/bikes		1.00	1.00			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	0.98			0.91		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	4823			1652	4785			3122		
Flt Permitted		0.95	1.00			0.95	1.00			0.79		
Satd. Flow (perm)		1770	4823			1652	4785			2493		
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)	18	100	803	104	3	255	444	82	90	31	172	123
RTOR Reduction (vph)	0	0	16	0	0	0	23	0	0	115	0	0
Lane Group Flow (vph)	0	118	891	0	0	258	503	0	0	178	0	0
Confl. Peds. (#/hr)				1				7	18		13	13
Confl. Bikes (#/hr)				2				1			1	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	1	1	5		6	6	2			4		
Permitted Phases									4			4
Actuated Green, G (s)		10.3	27.1			16.5	33.3			28.2		
Effective Green, g (s)		10.3	27.1			16.5	33.3			28.2		
Actuated g/C Ratio		0.12	0.32			0.19	0.39			0.33		
Clearance Time (s)		4.0	4.5			4.0	4.5			5.0		
Vehicle Extension (s)		2.0	6.0			2.0	6.0			2.0		
Lane Grp Cap (vph)		213	1532			319	1868			824		
v/s Ratio Prot		0.07	c0.18			c0.16	0.11					
v/s Ratio Perm										0.07		
v/c Ratio		0.55	0.58			0.81	0.27			0.22		
Uniform Delay, d1		35.3	24.4			32.9	17.7			20.6		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		1.8	1.1			13.2	0.2			0.0		
Delay (s)		37.1	25.4			46.1	17.9			20.6		
Level of Service		D	C			D	B			C		
Approach Delay (s)			26.8				27.2			20.6		
Approach LOS			C				C			C		

Intersection Summary		
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.49	C
Actuated Cycle Length (s)	85.3	Sum of lost time (s)
Intersection Capacity Utilization	93.2%	13.5
Analysis Period (min)	15	ICU Level of Service
c Critical Lane Group		F

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

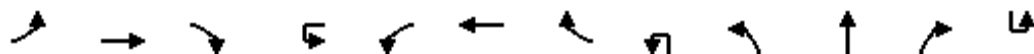
Existing Conditions  
Timing Plan: PM Peak Hour



Movement	SBT	SBR
Lane Configurations	↔	
Traffic Volume (vph)	40	52
Future Volume (vph)	40	52
Ideal Flow (vphpl)	1900	1900
Lane Width	16	12
Total Lost time (s)	5.0	
Lane Util. Factor	0.95	
Frbp, ped/bikes	0.99	
Flpb, ped/bikes	1.00	
Frt	0.96	
Flt Protected	0.97	
Satd. Flow (prot)	3713	
Flt Permitted	0.67	
Satd. Flow (perm)	2571	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	41	54
RTOR Reduction (vph)	23	0
Lane Group Flow (vph)	195	0
Confl. Peds. (#/hr)		18
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	28.2	
Effective Green, g (s)	28.2	
Actuated g/C Ratio	0.33	
Clearance Time (s)	5.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	849	
v/s Ratio Prot		
v/s Ratio Perm	c0.08	
v/c Ratio	0.23	
Uniform Delay, d1	20.7	
Progression Factor	1.00	
Incremental Delay, d2	0.1	
Delay (s)	20.7	
Level of Service	C	
Approach Delay (s)	20.7	
Approach LOS	C	
<b>Intersection Summary</b>		

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Conditions  
Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations	↔	↑↑	↗		↖	↑↑	↗		↔	↑↑		
Traffic Volume (vph)	155	818	244	7	148	584	95	4	155	441	129	14
Future Volume (vph)	155	818	244	7	148	584	95	4	155	441	129	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	10	12	12	12
Total Lost time (s)	3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6		
Lane Util. Factor	1.00	0.95	1.00		0.97	0.95	1.00		1.00	0.95		
Frpb, ped/bikes	1.00	1.00	0.95		1.00	1.00	0.97		1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85		1.00	1.00	0.85		1.00	0.97		
Flt Protected	0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00		
Satd. Flow (prot)	1770	3539	1510		3433	3539	1485		1652	3389		
Flt Permitted	0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00		
Satd. Flow (perm)	1770	3539	1510		3433	3539	1485		1652	3389		
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	158	835	249	7	151	596	97	4	158	450	132	14
RTOR Reduction (vph)	0	0	191	0	0	0	77	0	0	28	0	0
Lane Group Flow (vph)	158	835	58	0	158	596	20	0	162	554	0	0
Confl. Peds. (#/hr)			27				16				23	
Confl. Bikes (#/hr)			2								10	
Turn Type	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot	NA		Prot
Protected Phases	3	8		7	7	4		1	1	6		5
Permitted Phases			8				4					
Actuated Green, G (s)	10.7	22.0	22.0		8.7	20.0	20.0		12.3	36.2		
Effective Green, g (s)	10.7	22.0	22.0		8.7	20.0	20.0		12.3	36.2		
Actuated g/C Ratio	0.11	0.23	0.23		0.09	0.21	0.21		0.13	0.38		
Clearance Time (s)	3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6		
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0	2.0		2.0	4.0		
Lane Grp Cap (vph)	199	819	349		314	745	312		213	1291		
v/s Ratio Prot	c0.09	c0.24			0.05	0.17			c0.10	c0.16		
v/s Ratio Perm			0.04				0.01					
v/c Ratio	0.79	1.02	0.17		0.50	0.80	0.07		0.76	0.43		
Uniform Delay, d1	41.1	36.5	29.2		41.1	35.6	30.0		39.9	21.8		
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00		0.84	0.70		
Incremental Delay, d2	18.1	36.5	0.1		0.5	5.8	0.0		13.0	1.0		
Delay (s)	59.2	73.0	29.2		41.6	41.4	30.1		46.4	16.2		
Level of Service	E	E	C		D	D	C		D	B		
Approach Delay (s)		62.4			40.1					22.7		
Approach LOS		E			D					C		

Intersection Summary

HCM 2000 Control Delay	45.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



HCM Signalized Intersection Capacity Analysis  
 7: E. 14th Street & Fairmont Dr

Existing Conditions  
 Timing Plan: PM Peak Hour



Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (vph)	157	560	135
Future Volume (vph)	157	560	135
Ideal Flow (vphpl)	1900	1900	1900
Lane Width	12	12	12
Total Lost time (s)	3.7	4.6	
Lane Util. Factor	1.00	0.91	
Frbp, ped/bikes	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	
Frt	1.00	0.97	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	4909	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	4909	
Peak-hour factor, PHF	0.98	0.98	0.98
Adj. Flow (vph)	160	571	138
RTOR Reduction (vph)	0	43	0
Lane Group Flow (vph)	174	666	0
Confl. Peds. (#/hr)			15
Confl. Bikes (#/hr)			6
Turn Type	Prot	NA	
Protected Phases	5	2	
Permitted Phases			
Actuated Green, G (s)	11.5	35.4	
Effective Green, g (s)	11.5	35.4	
Actuated g/C Ratio	0.12	0.37	
Clearance Time (s)	3.7	4.6	
Vehicle Extension (s)	2.0	4.0	
Lane Grp Cap (vph)	214	1829	
v/s Ratio Prot	c0.10	0.14	
v/s Ratio Perm			
v/c Ratio	0.81	0.36	
Uniform Delay, d1	40.7	21.6	
Progression Factor	1.07	1.91	
Incremental Delay, d2	12.2	0.3	
Delay (s)	55.7	41.7	
Level of Service	E	D	
Approach Delay (s)		44.5	
Approach LOS		D	
<b>Intersection Summary</b>			

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	15.5	25.7	41.2	0.11	10.0	E
E. 14th Street	III	35	17.8	74.3	92.1	0.14	5.4	F
Total	III		33.3	100.0	133.3	0.25	6.9	F

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.8	17.1	34.9	0.14	14.3	D
	III	35	15.5	49.9	65.4	0.11	6.3	F
Total	III		33.3	67.0	100.3	0.25	9.1	F

## Arterial Level of Service: NB Hesperian Blvd

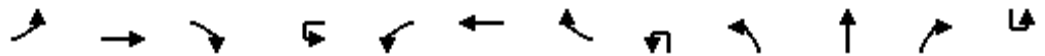
Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	3.4	16.4	0.11	24.9	C
Thornally Dr	II	40	24.0	48.7	72.7	0.21	10.3	F
Bayfair Dr	II	40	24.2	28.9	53.1	0.21	14.3	E
Fairmont Dr	II	40	13.5	20.1	33.6	0.12	12.5	F
Total	II		74.7	101.1	175.8	0.65	13.3	E

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	19.5	33.0	0.12	12.8	F
Thornally Dr	II	40	24.2	42.6	66.8	0.21	11.3	F
Drew St	II	40	24.0	8.7	32.7	0.21	22.9	C
Springlake Dr	II	40	13.0	18.8	31.8	0.11	12.8	F
Total	II		74.7	89.6	164.3	0.65	14.2	E

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Optimized Conditions  
Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations	↔	↑↑	↗		↖	↑↑			↔	↑↑	↗	
Traffic Volume (vph)	132	286	193	1	251	596	14	1	185	553	163	11
Future Volume (vph)	132	286	193	1	251	596	14	1	185	553	163	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	11	11	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9	
Lane Util. Factor	1.00	0.95	1.00		0.97	0.95			1.00	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00			1.00	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00			1.00	1.00	1.00	
Frt	1.00	1.00	0.85		1.00	1.00			1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00	
Satd. Flow (prot)	1770	3539	1590		3319	3526			1770	3539	1554	
Flt Permitted	0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00	
Satd. Flow (perm)	1770	3539	1590		3319	3526			1770	3539	1554	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	140	304	205	1	267	634	15	1	197	588	173	12
RTOR Reduction (vph)	0	0	118	0	0	2	0	0	0	0	91	0
Lane Group Flow (vph)	140	304	87	0	268	647	0	0	198	588	82	0
Confl. Peds. (#/hr)			12				2				4	
Confl. Bikes (#/hr)			4				2				5	
Turn Type	Prot	NA	Perm	Prot	Prot	NA		Prot	Prot	NA	Perm	Prot
Protected Phases	3	8		7	7	4		1	1	6		5
Permitted Phases			8								6	
Actuated Green, G (s)	13.7	27.1	27.1		14.6	27.7			19.2	56.6	56.6	
Effective Green, g (s)	13.7	27.1	27.1		14.6	27.7			19.2	56.6	56.6	
Actuated g/C Ratio	0.11	0.23	0.23		0.12	0.23			0.16	0.47	0.47	
Clearance Time (s)	4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9	
Vehicle Extension (s)	3.0	4.0	4.0		4.0	3.0			2.0	6.0	6.0	
Lane Grp Cap (vph)	202	799	359		403	813			283	1669	732	
v/s Ratio Prot	0.08	0.09			c0.08	c0.18			c0.11	0.17		
v/s Ratio Perm			0.05								0.05	
v/c Ratio	0.69	0.38	0.24		0.67	0.80			0.70	0.35	0.11	
Uniform Delay, d1	51.1	39.3	38.1		50.4	43.5			47.7	20.1	17.7	
Progression Factor	1.00	1.00	1.00		1.00	1.00			0.81	0.55	1.31	
Incremental Delay, d2	9.8	0.4	0.5		4.5	5.4			5.9	0.4	0.2	
Delay (s)	61.0	39.8	38.5		54.9	48.9			44.7	11.4	23.4	
Level of Service	E	D	D		D	D			D	B	C	
Approach Delay (s)		43.9			50.7				20.5			
Approach LOS		D			D				C			

Intersection Summary

HCM 2000 Control Delay	35.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Optimized Conditions  
 Timing Plan: AM Peak Hour

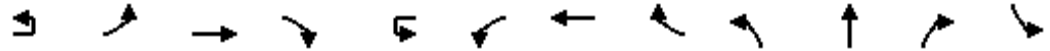


Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (vph)	23	620	193
Future Volume (vph)	23	620	193
Ideal Flow (vphpl)	1900	1900	1900
Lane Width	12	12	15
Total Lost time (s)	4.0	4.9	4.9
Lane Util. Factor	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00
Frt	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1701
Flt Permitted	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1701
Peak-hour factor, PHF	0.94	0.94	0.94
Adj. Flow (vph)	24	660	205
RTOR Reduction (vph)	0	0	127
Lane Group Flow (vph)	36	660	78
Confl. Peds. (#/hr)			9
Confl. Bikes (#/hr)			3
Turn Type	Prot	NA	Perm
Protected Phases	5	2	
Permitted Phases			2
Actuated Green, G (s)	4.2	41.6	41.6
Effective Green, g (s)	4.2	41.6	41.6
Actuated g/C Ratio	0.04	0.35	0.35
Clearance Time (s)	4.0	4.9	4.9
Vehicle Extension (s)	2.0	6.0	6.0
Lane Grp Cap (vph)	61	1762	589
v/s Ratio Prot	c0.02	c0.13	
v/s Ratio Perm			0.05
v/c Ratio	0.59	0.37	0.13
Uniform Delay, d1	57.1	29.4	26.8
Progression Factor	1.00	1.00	1.00
Incremental Delay, d2	9.8	0.6	0.5
Delay (s)	66.8	30.0	27.3
Level of Service	E	C	C
Approach Delay (s)		30.9	
Approach LOS		C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Optimized Conditions  
Timing Plan: AM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations		↔	↑↑↑			↔	↑↑↑			↔		
Traffic Volume (vph)	2	24	436	53	2	156	703	23	39	7	74	21
Future Volume (vph)	2	24	436	53	2	156	703	23	39	7	74	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.0	4.5			4.0	4.5			5.0		
Lane Util. Factor		1.00	0.91			1.00	0.91			0.95		
Frbp, ped/bikes		1.00	1.00			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	1.00			0.91		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	4827			1652	4890			3134		
Flt Permitted		0.95	1.00			0.95	1.00			0.86		
Satd. Flow (perm)		1770	4827			1652	4890			2750		
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	27	490	60	2	175	790	26	44	8	83	24
RTOR Reduction (vph)	0	0	13	0	0	0	3	0	0	53	0	0
Lane Group Flow (vph)	0	29	537	0	0	177	813	0	0	82	0	0
Confl. Peds. (#/hr)				2					3		1	1
Confl. Bikes (#/hr)				2				2				
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	1	1	5		6	6	2			4		
Permitted Phases									4			4
Actuated Green, G (s)		2.6	20.6			15.5	33.5			28.1		
Effective Green, g (s)		2.6	20.6			15.5	33.5			28.1		
Actuated g/C Ratio		0.03	0.27			0.20	0.43			0.36		
Clearance Time (s)		4.0	4.5			4.0	4.5			5.0		
Vehicle Extension (s)		2.0	6.0			2.0	6.0			2.0		
Lane Grp Cap (vph)		59	1279			329	2108			994		
v/s Ratio Prot		0.02	c0.11			c0.11	0.17					
v/s Ratio Perm										c0.03		
v/c Ratio		0.49	0.42			0.54	0.39			0.08		
Uniform Delay, d1		36.9	23.6			27.9	15.1			16.3		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		2.3	0.6			0.9	0.3			0.0		
Delay (s)		39.2	24.2			28.7	15.4			16.3		
Level of Service		D	C			C	B			B		
Approach Delay (s)			25.0				17.8			16.3		
Approach LOS			C				B			B		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			20.0				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			77.7				Sum of lost time (s)			13.5		
Intersection Capacity Utilization			59.2%				ICU Level of Service			B		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

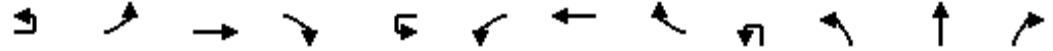
Existing Optimized Conditions  
Timing Plan: AM Peak Hour



Movement	SBT	SBR
Lane Configurations	↔	
Traffic Volume (vph)	16	16
Future Volume (vph)	16	16
Ideal Flow (vphpl)	1900	1900
Lane Width	16	12
Total Lost time (s)	5.0	
Lane Util. Factor	0.95	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.95	
Flt Protected	0.98	
Satd. Flow (prot)	3737	
Flt Permitted	0.86	
Satd. Flow (perm)	3259	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	18	18
RTOR Reduction (vph)	11	0
Lane Group Flow (vph)	49	0
Confl. Peds. (#/hr)		3
Confl. Bikes (#/hr)		2
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	28.1	
Effective Green, g (s)	28.1	
Actuated g/C Ratio	0.36	
Clearance Time (s)	5.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1178	
v/s Ratio Prot		
v/s Ratio Perm	0.01	
v/c Ratio	0.04	
Uniform Delay, d1	16.1	
Progression Factor	1.00	
Incremental Delay, d2	0.0	
Delay (s)	16.1	
Level of Service	B	
Approach Delay (s)	16.1	
Approach LOS	B	
<b>Intersection Summary</b>		

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Optimized Conditions  
Timing Plan: AM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations		↔	↕	↗		↖	↕	↗		↔	↕	↗
Traffic Volume (vph)	1	39	407	81	1	99	800	280	3	212	594	56
Future Volume (vph)	1	39	407	81	1	99	800	280	3	212	594	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12	12	11	12	10	12	12
Total Lost time (s)		3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6	
Lane Util. Factor		1.00	0.95	1.00		0.97	0.95	1.00		1.00	0.95	
Frbp, ped/bikes		1.00	1.00	0.98		1.00	1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Frt		1.00	1.00	0.85		1.00	1.00	0.85		1.00	0.99	
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)		1711	3539	1552		3433	3539	1502		1652	3488	
Flt Permitted		0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		1711	3539	1552		3433	3539	1502		1652	3488	
Peak-hour factor, PHF	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95
Adj. Flow (vph)	1	41	428	85	1	104	842	295	3	223	625	59
RTOR Reduction (vph)	0	0	0	64	0	0	0	179	0	0	7	0
Lane Group Flow (vph)	0	42	428	21	0	105	842	116	0	226	677	0
Confl. Peds. (#/hr)				5				6				8
Confl. Bikes (#/hr)				2								
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot	NA	
Protected Phases	3	3	8		7	7	4		1	1	6	
Permitted Phases				8				4				
Actuated Green, G (s)		2.8	23.0	23.0		5.4	25.6	25.6		17.9	42.0	
Effective Green, g (s)		2.8	23.0	23.0		5.4	25.6	25.6		17.9	42.0	
Actuated g/C Ratio		0.03	0.24	0.24		0.06	0.27	0.27		0.19	0.44	
Clearance Time (s)		3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0	2.0		2.0	4.0	
Lane Grp Cap (vph)		50	856	375		195	953	404		311	1542	
v/s Ratio Prot		c0.02	0.12			0.03	c0.24			c0.14	c0.19	
v/s Ratio Perm				0.01				0.08				
v/c Ratio		0.84	0.50	0.05		0.54	0.88	0.29		0.73	0.44	
Uniform Delay, d1		45.9	31.0	27.7		43.6	33.3	27.5		36.2	18.3	
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		67.6	0.2	0.0		1.4	9.5	0.1		7.0	0.9	
Delay (s)		113.5	31.2	27.7		45.0	42.8	27.6		43.2	19.3	
Level of Service		F	C	C		D	D	C		D	B	
Approach Delay (s)			36.9				39.4				25.2	
Approach LOS			D				D				C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			33.3				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			95.0				Sum of lost time (s)			16.6		
Intersection Capacity Utilization			76.7%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Optimized Conditions  
Timing Plan: AM Peak Hour



Movement	SBU	SBL	SBT	SBR
Lane Configurations		↔	↑↑↑	
Traffic Volume (vph)	6	85	256	68
Future Volume (vph)	6	85	256	68
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width	12	12	12	12
Total Lost time (s)		3.7	4.6	
Lane Util. Factor		1.00	0.91	
Frbp, ped/bikes		1.00	0.99	
Flpb, ped/bikes		1.00	1.00	
Frt		1.00	0.97	
Flt Protected		0.95	1.00	
Satd. Flow (prot)		1770	4899	
Flt Permitted		0.95	1.00	
Satd. Flow (perm)		1770	4899	
Peak-hour factor, PHF	0.92	0.95	0.95	0.95
Adj. Flow (vph)	7	89	269	72
RTOR Reduction (vph)	0	0	48	0
Lane Group Flow (vph)	0	96	293	0
Confl. Peds. (#/hr)				10
Confl. Bikes (#/hr)				4
Turn Type	Prot	Prot	NA	
Protected Phases	5	5	2	
Permitted Phases				
Actuated Green, G (s)		8.0	32.1	
Effective Green, g (s)		8.0	32.1	
Actuated g/C Ratio		0.08	0.34	
Clearance Time (s)		3.7	4.6	
Vehicle Extension (s)		2.0	4.0	
Lane Grp Cap (vph)		149	1655	
v/s Ratio Prot		0.05	0.06	
v/s Ratio Perm				
v/c Ratio		0.64	0.18	
Uniform Delay, d1		42.1	22.1	
Progression Factor		1.00	1.00	
Incremental Delay, d2		7.0	0.2	
Delay (s)		49.1	22.4	
Level of Service		D	C	
Approach Delay (s)			28.2	
Approach LOS			C	
<b>Intersection Summary</b>				



## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.1	22.9	40.0	0.13	12.0	E
E. 14th Street	III	35	16.3	33.9	50.2	0.13	9.1	F
Total	III		33.4	56.8	90.2	0.26	10.4	E

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	16.3	15.2	31.5	0.13	14.5	D
	III	35	17.1	50.9	68.0	0.13	7.1	F
Total	III		33.4	66.1	99.5	0.26	9.4	F

## Arterial Level of Service: NB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	11.6	24.6	0.11	16.5	E
Thornally Dr	II	40	24.0	31.1	55.1	0.21	13.6	E
Bayfair Dr	II	40	24.2	1.7	25.9	0.21	29.2	B
Fairmont Dr	II	40	13.5	12.3	25.8	0.12	16.3	E
Total	II		74.7	56.7	131.4	0.65	17.8	D

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	5.3	18.8	0.12	22.4	C
Thornally Dr	II	40	24.2	29.4	53.6	0.21	14.1	E
Drew St	II	40	24.0	3.9	27.9	0.21	27.0	C
Springlake Dr	II	40	13.0	11.1	24.1	0.11	16.8	E
Total	II		74.7	49.7	124.4	0.65	18.8	D

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Optimized Conditions  
PM Peak Hour

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	6	210	630	267	6	251	380	31	3	275	605	275
Future Volume (vph)	6	210	630	267	6	251	380	31	3	275	605	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	12	11	12	12	12	12	12	15
Total Lost time (s)		4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9
Lane Util. Factor		1.00	0.95	1.00		0.97	0.95			1.00	0.95	1.00
Frbp, ped/bikes		1.00	1.00	0.98		1.00	1.00			1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00			1.00	1.00	1.00
Frt		1.00	1.00	0.85		1.00	0.99			1.00	1.00	0.85
Flt Protected		0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00
Satd. Flow (prot)		1770	3539	1595		3319	3490			1770	3539	1699
Flt Permitted		0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00
Satd. Flow (perm)		1770	3539	1595		3319	3490			1770	3539	1699
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)	6	216	649	275	6	259	392	32	3	284	624	284
RTOR Reduction (vph)	0	0	0	101	0	0	5	0	0	0	0	165
Lane Group Flow (vph)	0	222	649	174	0	265	419	0	0	287	624	119
Confl. Peds. (#/hr)				9				18				9
Confl. Bikes (#/hr)				3				2				6
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA		Prot	Prot	NA	Perm
Protected Phases	3	3	8		7	7	4		1	1	6	
Permitted Phases				8								6
Actuated Green, G (s)		20.5	30.9	30.9		15.6	25.7			26.1	54.3	54.3
Effective Green, g (s)		20.5	30.9	30.9		15.6	25.7			26.1	54.3	54.3
Actuated g/C Ratio		0.16	0.24	0.24		0.12	0.20			0.20	0.42	0.42
Clearance Time (s)		4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9
Vehicle Extension (s)		3.0	4.0	4.0		4.0	3.0			2.0	6.0	6.0
Lane Grp Cap (vph)		279	841	379		398	689			355	1478	709
v/s Ratio Prot		0.13	c0.18			0.08	c0.12			c0.16	c0.18	
v/s Ratio Perm				0.11								0.07
v/c Ratio		0.80	0.77	0.46		0.67	0.61			0.81	0.42	0.17
Uniform Delay, d1		52.7	46.3	42.4		54.7	47.6			49.6	26.8	23.7
Progression Factor		1.00	1.00	1.00		1.00	1.00			0.59	0.42	0.16
Incremental Delay, d2		14.5	4.7	1.2		4.6	1.5			10.6	0.5	0.3
Delay (s)		67.2	50.9	43.6		59.3	49.1			39.9	11.6	4.1
Level of Service		E	D	D		E	D			D	B	A
Approach Delay (s)			52.3			53.0					16.6	
Approach LOS			D			D					B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			38.4			HCM 2000 Level of Service					D	
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				17.8		
Intersection Capacity Utilization			89.7%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Optimized Conditions  
PM Peak Hour



Movement	SBU	SBL	SBT	SBR
Lane Configurations		5	↑↑↑	↑
Traffic Volume (vph)	32	71	533	222
Future Volume (vph)	32	71	533	222
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width	12	12	12	15
Total Lost time (s)		4.0	4.9	4.9
Lane Util. Factor		1.00	0.91	1.00
Frpb, ped/bikes		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	1.00
Frt		1.00	1.00	0.85
Flt Protected		0.95	1.00	1.00
Satd. Flow (prot)		1770	5085	1682
Flt Permitted		0.95	1.00	1.00
Satd. Flow (perm)		1770	5085	1682
Peak-hour factor, PHF	0.97	0.97	0.97	0.97
Adj. Flow (vph)	33	73	549	229
RTOR Reduction (vph)	0	0	0	159
Lane Group Flow (vph)	0	106	549	70
Confl. Peds. (#/hr)				19
Confl. Bikes (#/hr)				1
Turn Type	Prot	Prot	NA	Perm
Protected Phases	5	5	2	
Permitted Phases				2
Actuated Green, G (s)		11.7	39.9	39.9
Effective Green, g (s)		11.7	39.9	39.9
Actuated g/C Ratio		0.09	0.31	0.31
Clearance Time (s)		4.0	4.9	4.9
Vehicle Extension (s)		2.0	6.0	6.0
Lane Grp Cap (vph)		159	1560	516
v/s Ratio Prot		0.06	0.11	
v/s Ratio Perm				0.04
v/c Ratio		0.67	0.35	0.14
Uniform Delay, d1		57.3	35.0	32.6
Progression Factor		1.00	1.00	1.00
Incremental Delay, d2		7.9	0.6	0.5
Delay (s)		65.2	35.6	33.1
Level of Service		E	D	C
Approach Delay (s)			38.5	
Approach LOS			D	
<b>Intersection Summary</b>				

# HCM Signalized Intersection Capacity Analysis

## 6: Bayfair Dr & Fairmont Dr

Existing Optimized Conditions  
PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations		↔	↑↑↑			↔	↑↑↑			↔		
Traffic Volume (vph)	17	97	779	101	3	247	431	80	87	30	167	119
Future Volume (vph)	17	97	779	101	3	247	431	80	87	30	167	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.0	4.5			4.0	4.5			5.0		
Lane Util. Factor		1.00	0.91			1.00	0.91			0.95		
Frbp, ped/bikes		1.00	1.00			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	0.98			0.91		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	4823			1652	4784			3121		
Flt Permitted		0.95	1.00			0.95	1.00			0.79		
Satd. Flow (perm)		1770	4823			1652	4784			2489		
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)	18	100	803	104	3	255	444	82	90	31	172	123
RTOR Reduction (vph)	0	0	14	0	0	0	24	0	0	116	0	0
Lane Group Flow (vph)	0	118	893	0	0	258	502	0	0	177	0	0
Confl. Peds. (#/hr)				1				7	18		13	13
Confl. Bikes (#/hr)				2				1			1	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	1	1	5		6	6	2			4		
Permitted Phases									4			4
Actuated Green, G (s)		10.3	27.2			18.1	35.0			28.3		
Effective Green, g (s)		10.3	27.2			18.1	35.0			28.3		
Actuated g/C Ratio		0.12	0.31			0.21	0.40			0.32		
Clearance Time (s)		4.0	4.5			4.0	4.5			5.0		
Vehicle Extension (s)		2.0	6.0			2.0	6.0			2.0		
Lane Grp Cap (vph)		209	1506			343	1922			808		
v/s Ratio Prot		0.07	c0.19			c0.16	0.10					
v/s Ratio Perm										0.07		
v/c Ratio		0.56	0.59			0.75	0.26			0.22		
Uniform Delay, d1		36.3	25.3			32.4	17.4			21.4		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		2.1	1.2			8.0	0.2			0.0		
Delay (s)		38.4	26.4			40.4	17.6			21.4		
Level of Service		D	C			D	B			C		
Approach Delay (s)			27.8				25.1			21.4		
Approach LOS			C				C			C		

### Intersection Summary

HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	87.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Optimized Conditions  
PM Peak Hour



Movement	SBT	SBR
Lane Configurations	↔	
Traffic Volume (vph)	40	52
Future Volume (vph)	40	52
Ideal Flow (vphpl)	1900	1900
Lane Width	16	12
Total Lost time (s)	5.0	
Lane Util. Factor	0.95	
Frbp, ped/bikes	0.99	
Flpb, ped/bikes	1.00	
Frt	0.96	
Flt Protected	0.97	
Satd. Flow (prot)	3713	
Flt Permitted	0.67	
Satd. Flow (perm)	2564	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	41	54
RTOR Reduction (vph)	27	0
Lane Group Flow (vph)	191	0
Confl. Peds. (#/hr)		18
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	28.3	
Effective Green, g (s)	28.3	
Actuated g/C Ratio	0.32	
Clearance Time (s)	5.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	833	
v/s Ratio Prot		
v/s Ratio Perm	c0.07	
v/c Ratio	0.23	
Uniform Delay, d1	21.4	
Progression Factor	1.00	
Incremental Delay, d2	0.1	
Delay (s)	21.5	
Level of Service	C	
Approach Delay (s)	21.5	
Approach LOS	C	
<b>Intersection Summary</b>		

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Optimized Conditions  
PM Peak Hour

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (vph)	155	818	244	7	148	584	95	4	155	441	129	14
Future Volume (vph)	155	818	244	7	148	584	95	4	155	441	129	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	10	12	12	12
Total Lost time (s)	3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6		
Lane Util. Factor	1.00	0.95	1.00		0.97	0.95	1.00		1.00	0.95		
Frbp, ped/bikes	1.00	1.00	0.95		1.00	1.00	0.97		1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85		1.00	1.00	0.85		1.00	0.97		
Flt Protected	0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00		
Satd. Flow (prot)	1770	3539	1510		3433	3539	1485		1652	3389		
Flt Permitted	0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00		
Satd. Flow (perm)	1770	3539	1510		3433	3539	1485		1652	3389		
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	158	835	249	7	151	596	97	4	158	450	132	14
RTOR Reduction (vph)	0	0	179	0	0	0	73	0	0	28	0	0
Lane Group Flow (vph)	158	835	70	0	158	596	24	0	162	554	0	0
Confl. Peds. (#/hr)			27				16				23	
Confl. Bikes (#/hr)			2								10	
Turn Type	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot	NA		Prot
Protected Phases	3	8		7	7	4		1	1	6		5
Permitted Phases			8				4					
Actuated Green, G (s)	10.0	26.7	26.7		6.5	23.2	23.2		10.3	34.0		
Effective Green, g (s)	10.0	26.7	26.7		6.5	23.2	23.2		10.3	34.0		
Actuated g/C Ratio	0.11	0.28	0.28		0.07	0.24	0.24		0.11	0.36		
Clearance Time (s)	3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6		
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0	2.0		2.0	4.0		
Lane Grp Cap (vph)	186	994	424		234	864	362		179	1212		
v/s Ratio Prot	c0.09	c0.24			0.05	0.17			c0.10	c0.16		
v/s Ratio Perm			0.05				0.02					
v/c Ratio	0.85	0.84	0.17		0.68	0.69	0.07		0.91	0.46		
Uniform Delay, d1	41.8	32.1	25.7		43.2	32.6	27.6		41.9	23.4		
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00		0.89	0.77		
Incremental Delay, d2	27.6	6.2	0.1		5.9	1.8	0.0		39.5	1.2		
Delay (s)	69.4	38.4	25.8		49.2	34.5	27.6		76.8	19.3		
Level of Service	E	D	C		D	C	C		E	B		
Approach Delay (s)		39.8				36.4				31.9		
Approach LOS		D				D				C		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			39.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			95.0			Sum of lost time (s)				16.6		
Intersection Capacity Utilization			76.7%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Optimized Conditions  
PM Peak Hour



Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (vph)	157	560	135
Future Volume (vph)	157	560	135
Ideal Flow (vphpl)	1900	1900	1900
Lane Width	12	12	12
Total Lost time (s)	3.7	4.6	
Lane Util. Factor	1.00	0.91	
Frbp, ped/bikes	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	
Frt	1.00	0.97	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	4908	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	4908	
Peak-hour factor, PHF	0.98	0.98	0.98
Adj. Flow (vph)	160	571	138
RTOR Reduction (vph)	0	41	0
Lane Group Flow (vph)	174	668	0
Confl. Peds. (#/hr)			15
Confl. Bikes (#/hr)			6
Turn Type	Prot	NA	
Protected Phases	5	2	
Permitted Phases			
Actuated Green, G (s)	11.2	34.9	
Effective Green, g (s)	11.2	34.9	
Actuated g/C Ratio	0.12	0.37	
Clearance Time (s)	3.7	4.6	
Vehicle Extension (s)	2.0	4.0	
Lane Grp Cap (vph)	208	1803	
v/s Ratio Prot	c0.10	0.14	
v/s Ratio Perm			
v/c Ratio	0.84	0.37	
Uniform Delay, d1	41.0	22.0	
Progression Factor	1.40	1.82	
Incremental Delay, d2	14.8	0.3	
Delay (s)	72.4	40.3	
Level of Service	E	D	
Approach Delay (s)		46.6	
Approach LOS		D	

Intersection Summary

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	15.5	27.1	42.6	0.11	9.7	F
E. 14th Street	III	35	17.8	40.5	58.3	0.14	8.6	F
Total	III		33.3	67.6	100.9	0.25	9.1	F

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.8	16.6	34.4	0.14	14.6	D
	III	35	15.5	50.2	65.7	0.11	6.3	F
Total	III		33.3	66.8	100.1	0.25	9.1	F

## Arterial Level of Service: NB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	4.5	17.5	0.11	23.3	C
Thornally Dr	II	40	24.0	28.6	52.6	0.21	14.3	E
Bayfair Dr	II	40	24.2	6.9	31.1	0.21	24.3	C
Fairmont Dr	II	40	13.5	12.6	26.1	0.12	16.1	E
Total	II		74.7	52.6	127.3	0.65	18.3	D

## Arterial Level of Service: SB Hesperian Blvd





















Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	8.5	22.0	0.12	19.2	D
Thornally Dr	II	40	24.2	8.9	33.1	0.21	22.9	C
Drew St	II	40	24.0	5.0	29.0	0.21	25.9	C
Springlake Dr	II	40	13.0	7.9	20.9	0.11	19.5	D
Total	II		74.7	30.3	105.0	0.65	22.2	C



# HCM Signalized Intersection Capacity Analysis

## 5: Hesperian Blvd & Fairmont Dr

Existing Plus Project Conditions  
AM Peak Hour

														
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU		
Lane Configurations														
Traffic Volume (vph)	132	286	193	1	251	596	14	1	185	553	163	11		
Future Volume (vph)	132	286	193	1	251	596	14	1	185	553	163	11		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	10	12	10	11	11	11	10	10	10	12	14	12		
Total Lost time (s)	4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9			
Lane Util. Factor	1.00	0.95	1.00		0.97	0.95			1.00	0.95	1.00			
Frbp, ped/bikes	1.00	1.00	0.97		1.00	1.00			1.00	1.00	0.98			
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00			1.00	1.00	1.00			
Frt	1.00	1.00	0.85		1.00	1.00			1.00	1.00	0.85			
Flt Protected	0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00			
Satd. Flow (prot)	1652	3539	1436		3319	3408			1652	3539	1657			
Flt Permitted	0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00			
Satd. Flow (perm)	1652	3539	1436		3319	3408			1652	3539	1657			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94		
Adj. Flow (vph)	140	304	205	1	267	634	15	1	197	588	173	12		
RTOR Reduction (vph)	0	0	117	0	0	2	0	0	0	0	91	0		
Lane Group Flow (vph)	140	304	88	0	268	647	0	0	198	588	82	0		
Confl. Peds. (#/hr)			12				2				4			
Confl. Bikes (#/hr)			4				2				5			
Turn Type	Prot	NA	Perm	Prot	Prot	NA		Prot	Prot	NA	Perm	Prot		
Protected Phases	3	8		7	7	4		1	1	6		5		
Permitted Phases			8								6			
Actuated Green, G (s)	13.8	28.6	28.6		13.8	28.3			17.5	48.4	48.4			
Effective Green, g (s)	13.8	28.6	28.6		13.8	28.3			17.5	48.4	48.4			
Actuated g/C Ratio	0.12	0.24	0.24		0.12	0.24			0.15	0.40	0.40			
Clearance Time (s)	4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9			
Vehicle Extension (s)	3.0	4.0	4.0		4.0	3.0			2.0	6.0	6.0			
Lane Grp Cap (vph)	189	843	342		381	803			240	1427	668			
v/s Ratio Prot	c0.08	0.09			0.08	c0.19			c0.12	0.17				
v/s Ratio Perm			0.06								0.05			
v/c Ratio	0.74	0.36	0.26		0.70	0.81			0.82	0.41	0.12			
Uniform Delay, d1	51.4	38.1	37.1		51.1	43.3			49.8	25.6	22.5			
Progression Factor	1.00	1.00	1.00		1.00	1.00			0.73	0.53	0.69			
Incremental Delay, d2	14.4	0.4	0.5		6.2	5.9			18.6	0.5	0.2			
Delay (s)	65.8	38.4	37.6		57.3	49.2			55.1	14.1	15.8			
Level of Service	E	D	D		E	D			E	B	B			
Approach Delay (s)		44.1			51.6				22.9					
Approach LOS		D			D				C					
<b>Intersection Summary</b>														
HCM 2000 Control Delay			36.9									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.68											
Actuated Cycle Length (s)			120.0								17.8			
Intersection Capacity Utilization			80.6%										ICU Level of Service	D
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Fairmont Dr

Existing Plus Project Conditions  
AM Peak Hour

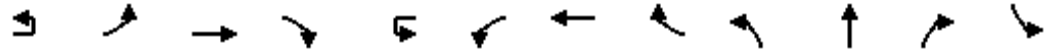


Movement	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔
Traffic Volume (vph)	23	620	193
Future Volume (vph)	23	620	193
Ideal Flow (vphpl)	1900	1900	1900
Lane Width	12	12	15
Total Lost time (s)	4.0	4.9	4.9
Lane Util. Factor	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00
Frt	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1701
Flt Permitted	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1701
Peak-hour factor, PHF	0.94	0.94	0.94
Adj. Flow (vph)	24	660	205
RTOR Reduction (vph)	0	0	88
Lane Group Flow (vph)	36	660	117
Confl. Peds. (#/hr)			9
Confl. Bikes (#/hr)			3
Turn Type	Prot	NA	Perm
Protected Phases	5	2	
Permitted Phases			2
Actuated Green, G (s)	11.7	42.6	42.6
Effective Green, g (s)	11.7	42.6	42.6
Actuated g/C Ratio	0.10	0.36	0.36
Clearance Time (s)	4.0	4.9	4.9
Vehicle Extension (s)	2.0	6.0	6.0
Lane Grp Cap (vph)	334	1256	603
v/s Ratio Prot	0.01	c0.19	
v/s Ratio Perm			0.07
v/c Ratio	0.11	0.53	0.19
Uniform Delay, d1	49.4	30.7	26.8
Progression Factor	1.00	1.00	1.00
Incremental Delay, d2	0.1	1.6	0.7
Delay (s)	49.4	32.3	27.5
Level of Service	D	C	C
Approach Delay (s)		31.9	
Approach LOS		C	

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Plus Project Conditions  
AM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations		↔	↕			↔	↕			↕		
Traffic Volume (vph)	2	24	436	53	2	156	703	23	39	7	74	21
Future Volume (vph)	2	24	436	53	2	156	703	23	39	7	74	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.0	4.5			4.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			0.95		
Frbp, ped/bikes		1.00	1.00			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	1.00			0.91		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1711	3359			1652	3403			3134		
Flt Permitted		0.95	1.00			0.95	1.00			0.86		
Satd. Flow (perm)		1711	3359			1652	3403			2747		
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	27	490	60	2	175	790	26	44	8	83	24
RTOR Reduction (vph)	0	0	9	0	0	0	2	0	0	54	0	0
Lane Group Flow (vph)	0	29	541	0	0	177	814	0	0	81	0	0
Confl. Peds. (#/hr)				2					3		1	1
Confl. Bikes (#/hr)				2				2				
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	1	1	5		6	6	2			4		
Permitted Phases									4			4
Actuated Green, G (s)		3.3	22.3			16.2	35.2			28.2		
Effective Green, g (s)		3.3	22.3			16.2	35.2			28.2		
Actuated g/C Ratio		0.04	0.28			0.20	0.44			0.35		
Clearance Time (s)		4.0	4.5			4.0	4.5			5.0		
Vehicle Extension (s)		2.0	6.0			2.0	6.0			2.0		
Lane Grp Cap (vph)		70	933			333	1493			965		
v/s Ratio Prot		0.02	c0.16			0.11	c0.24					
v/s Ratio Perm										c0.03		
v/c Ratio		0.41	0.58			0.53	0.55			0.08		
Uniform Delay, d1		37.5	24.9			28.6	16.6			17.4		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		1.4	1.8			0.8	0.9			0.0		
Delay (s)		39.0	26.7			29.4	17.5			17.4		
Level of Service		D	C			C	B			B		
Approach Delay (s)			27.3				19.6			17.4		
Approach LOS			C				B			B		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			80.2				Sum of lost time (s)			13.5		
Intersection Capacity Utilization			62.2%				ICU Level of Service			B		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Plus Project Conditions  
AM Peak Hour



Movement	SBT	SBR
Lane Configurations	↔	
Traffic Volume (vph)	16	16
Future Volume (vph)	16	16
Ideal Flow (vphpl)	1900	1900
Lane Width	16	12
Total Lost time (s)	5.0	
Lane Util. Factor	0.95	
Frbp, ped/bikes	1.00	
Flpb, ped/bikes	1.00	
Frt	0.95	
Flt Protected	0.98	
Satd. Flow (prot)	3737	
Flt Permitted	0.85	
Satd. Flow (perm)	3254	
Peak-hour factor, PHF	0.89	0.89
Adj. Flow (vph)	18	18
RTOR Reduction (vph)	12	0
Lane Group Flow (vph)	48	0
Confl. Peds. (#/hr)		3
Confl. Bikes (#/hr)		2
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	28.2	
Effective Green, g (s)	28.2	
Actuated g/C Ratio	0.35	
Clearance Time (s)	5.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1144	
v/s Ratio Prot		
v/s Ratio Perm	0.01	
v/c Ratio	0.04	
Uniform Delay, d1	17.1	
Progression Factor	1.00	
Incremental Delay, d2	0.0	
Delay (s)	17.1	
Level of Service	B	
Approach Delay (s)	17.1	
Approach LOS	B	
<b>Intersection Summary</b>		

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Plus Project Conditions  
AM Peak Hour

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	1	39	407	81	1	99	800	280	3	212	594	56
Future Volume (vph)	1	39	407	81	1	99	800	280	3	212	594	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12	12	11	12	10	12	12
Total Lost time (s)		3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6	
Lane Util. Factor		1.00	0.95	1.00		0.97	0.95	1.00		1.00	0.95	
Frbp, ped/bikes		1.00	1.00	0.98		1.00	1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Frt		1.00	1.00	0.85		1.00	1.00	0.85		1.00	0.99	
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)		1711	3421	1500		3433	3539	1502		1652	3488	
Flt Permitted		0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		1711	3421	1500		3433	3539	1502		1652	3488	
Peak-hour factor, PHF	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95
Adj. Flow (vph)	1	41	428	85	1	104	842	295	3	223	625	59
RTOR Reduction (vph)	0	0	0	65	0	0	0	176	0	0	6	0
Lane Group Flow (vph)	0	42	428	20	0	105	842	119	0	226	678	0
Confl. Peds. (#/hr)				5				6				8
Confl. Bikes (#/hr)				2								
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot	NA	
Protected Phases	3	3	8		7	7	4		1	1	6	
Permitted Phases				8				4				
Actuated Green, G (s)		6.0	22.6	22.6		8.8	25.4	25.4		14.0	39.0	
Effective Green, g (s)		6.0	22.6	22.6		8.8	25.4	25.4		14.0	39.0	
Actuated g/C Ratio		0.06	0.24	0.24		0.09	0.27	0.27		0.15	0.41	
Clearance Time (s)		3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0	2.0		2.0	4.0	
Lane Grp Cap (vph)		108	813	356		318	946	401		243	1431	
v/s Ratio Prot		0.02	0.13			c0.03	c0.24			c0.14	c0.19	
v/s Ratio Perm				0.01				0.08				
v/c Ratio		0.39	0.53	0.06		0.33	0.89	0.30		0.93	0.47	
Uniform Delay, d1		42.7	31.5	28.0		40.3	33.5	27.7		40.0	20.5	
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8	0.3	0.0		0.2	10.2	0.2		38.6	1.1	
Delay (s)		43.6	31.8	28.0		40.6	43.7	27.8		78.7	21.6	
Level of Service		D	C	C		D	D	C		E	C	
Approach Delay (s)			32.1				39.7				35.8	
Approach LOS			C				D				D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			35.6				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			95.0				Sum of lost time (s)			16.6		
Intersection Capacity Utilization			81.7%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Plus Project Conditions  
AM Peak Hour



Movement	SBU	SBL	SBT	SBR
Lane Configurations		3	↑↑↑	
Traffic Volume (vph)	6	85	256	68
Future Volume (vph)	6	85	256	68
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width	12	12	12	12
Total Lost time (s)		3.7	4.6	
Lane Util. Factor		1.00	0.91	
Frbp, ped/bikes		1.00	0.99	
Flpb, ped/bikes		1.00	1.00	
Frt		1.00	0.97	
Flt Protected		0.95	1.00	
Satd. Flow (prot)		1770	4899	
Flt Permitted		0.95	1.00	
Satd. Flow (perm)		1770	4899	
Peak-hour factor, PHF	0.92	0.95	0.95	0.95
Adj. Flow (vph)	7	89	269	72
RTOR Reduction (vph)	0	0	47	0
Lane Group Flow (vph)	0	96	294	0
Confl. Peds. (#/hr)				10
Confl. Bikes (#/hr)				4
Turn Type	Prot	Prot	NA	
Protected Phases	5	5	2	
Permitted Phases				
Actuated Green, G (s)		8.0	33.0	
Effective Green, g (s)		8.0	33.0	
Actuated g/C Ratio		0.08	0.35	
Clearance Time (s)		3.7	4.6	
Vehicle Extension (s)		2.0	4.0	
Lane Grp Cap (vph)		149	1701	
v/s Ratio Prot		0.05	0.06	
v/s Ratio Perm				
v/c Ratio		0.64	0.17	
Uniform Delay, d1		42.1	21.5	
Progression Factor		1.00	1.00	
Incremental Delay, d2		7.0	0.2	
Delay (s)		49.1	21.7	
Level of Service		D	C	
Approach Delay (s)			27.8	
Approach LOS			C	
<b>Intersection Summary</b>				

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.0	25.9	42.9	0.13	11.1	E
E. 14th Street	III	35	16.2	34.9	51.1	0.13	8.9	F
Total	III		33.2	60.8	94.0	0.26	9.9	F

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	16.2	17.7	33.9	0.13	13.5	E
	III	35	17.0	51.3	68.3	0.13	7.0	F
Total	III		33.2	69.0	102.2	0.26	9.1	F

## Arterial Level of Service: NB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	14.8	27.8	0.11	14.6	E
Thornally Dr	II	40	24.0	22.0	46.0	0.21	16.3	E
Bayfair Dr	II	40	24.2	1.7	25.9	0.21	29.2	B
Fairmont Dr	II	40	13.5	15.9	29.4	0.12	14.3	E
Total	II		74.7	54.4	129.1	0.65	18.1	D

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	10.2	23.7	0.12	17.8	D
Thornally Dr	II	40	24.2	13.6	37.8	0.21	20.0	D
Drew St	II	40	24.0	7.6	31.6	0.21	23.8	C
Springlake Dr	II	40	13.0	17.3	30.3	0.11	13.4	E
Total	II		74.7	48.7	123.4	0.65	18.9	D

HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

Existing Plus Project Conditions  
PM Peak Hour

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	6	210	630	267	6	251	380	31	3	275	605	275
Future Volume (vph)	6	210	630	267	6	251	380	31	3	275	605	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	12	11	11	12	12	12	12	15
Total Lost time (s)		4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9
Lane Util. Factor		1.00	0.95	1.00		0.97	0.95			1.00	0.95	1.00
Frbp, ped/bikes		1.00	1.00	0.98		1.00	1.00			1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00			1.00	1.00	1.00
Frt		1.00	1.00	0.85		1.00	0.99			1.00	1.00	0.85
Flt Protected		0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00
Satd. Flow (prot)		1770	3539	1595		3319	3374			1770	3539	1699
Flt Permitted		0.95	1.00	1.00		0.95	1.00			0.95	1.00	1.00
Satd. Flow (perm)		1770	3539	1595		3319	3374			1770	3539	1699
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)	6	216	649	275	6	259	392	32	3	284	624	284
RTOR Reduction (vph)	0	0	0	101	0	0	5	0	0	0	0	110
Lane Group Flow (vph)	0	222	649	174	0	265	419	0	0	287	624	174
Confl. Peds. (#/hr)				9				18				9
Confl. Bikes (#/hr)				3				2				6
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA		Prot	Prot	NA	Perm
Protected Phases	3	3	8		7	7	4		1	1	6	
Permitted Phases				8								6
Actuated Green, G (s)		19.4	30.9	30.9		15.6	26.8			24.4	57.5	57.5
Effective Green, g (s)		19.4	30.9	30.9		15.6	26.8			24.4	57.5	57.5
Actuated g/C Ratio		0.15	0.24	0.24		0.12	0.21			0.19	0.44	0.44
Clearance Time (s)		4.0	4.6	4.6		4.0	4.9			4.0	4.9	4.9
Vehicle Extension (s)		3.0	4.0	4.0		4.0	3.0			2.0	6.0	6.0
Lane Grp Cap (vph)		264	841	379		398	695			332	1565	751
v/s Ratio Prot		c0.13	c0.18			c0.08	0.12			c0.16	0.18	
v/s Ratio Perm				0.11								0.10
v/c Ratio		0.84	0.77	0.46		0.67	0.60			0.86	0.40	0.23
Uniform Delay, d1		53.8	46.3	42.4		54.7	46.8			51.2	24.5	22.5
Progression Factor		1.00	1.00	1.00		1.00	1.00			0.56	0.37	0.11
Incremental Delay, d2		20.8	4.7	1.2		4.6	1.5			16.0	0.4	0.3
Delay (s)		74.6	50.9	43.6		59.3	48.3			44.8	9.5	2.8
Level of Service		E	D	D		E	D			D	A	A
Approach Delay (s)			53.8			52.5					16.4	
Approach LOS			D			D					B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			38.7			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			17.8			
Intersection Capacity Utilization			89.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												



HCM Signalized Intersection Capacity Analysis  
5: Hesperian Blvd & Halcyon Dr/Fairmont Dr

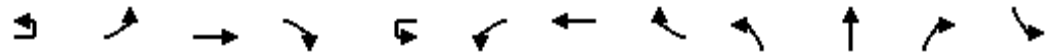
Existing Plus Project Conditions  
PM Peak Hour



Movement	SBU	SBL	SBT	SBR
Lane Configurations		↘ ↙	↑ ↑	↗
Traffic Volume (vph)	32	71	533	222
Future Volume (vph)	32	71	533	222
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width	12	12	12	15
Total Lost time (s)		4.0	4.9	4.9
Lane Util. Factor		0.97	0.95	1.00
Frbp, ped/bikes		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	1.00
Frt		1.00	1.00	0.85
Flt Protected		0.95	1.00	1.00
Satd. Flow (prot)		3433	3539	1682
Flt Permitted		0.95	1.00	1.00
Satd. Flow (perm)		3433	3539	1682
Peak-hour factor, PHF	0.97	0.97	0.97	0.97
Adj. Flow (vph)	33	73	549	229
RTOR Reduction (vph)	0	0	0	112
Lane Group Flow (vph)	0	106	549	117
Confl. Peds. (#/hr)				19
Confl. Bikes (#/hr)				1
Turn Type	Prot	Prot	NA	Perm
Protected Phases	5	5	2	
Permitted Phases				2
Actuated Green, G (s)		8.5	41.6	41.6
Effective Green, g (s)		8.5	41.6	41.6
Actuated g/C Ratio		0.07	0.32	0.32
Clearance Time (s)		4.0	4.9	4.9
Vehicle Extension (s)		2.0	6.0	6.0
Lane Grp Cap (vph)		224	1132	538
v/s Ratio Prot		0.03	c0.16	
v/s Ratio Perm				0.07
v/c Ratio		0.47	0.48	0.22
Uniform Delay, d1		58.6	35.6	32.3
Progression Factor		1.00	1.00	1.00
Incremental Delay, d2		0.6	1.5	0.9
Delay (s)		59.2	37.1	33.2
Level of Service		E	D	C
Approach Delay (s)			38.7	
Approach LOS			D	
<b>Intersection Summary</b>				

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr

Existing Plus Project Conditions  
PM Peak Hour



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations		↔	↕			↔	↕			↕		
Traffic Volume (vph)	17	97	779	101	3	247	431	80	87	30	167	119
Future Volume (vph)	17	97	779	101	3	247	431	80	87	30	167	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.0	4.5			4.0	4.5			5.0		
Lane Util. Factor		1.00	0.95			1.00	0.95			0.95		
Frbp, ped/bikes		1.00	1.00			1.00	1.00			0.98		
Flpb, ped/bikes		1.00	1.00			1.00	1.00			1.00		
Frt		1.00	0.98			1.00	0.98			0.91		
Flt Protected		0.95	1.00			0.95	1.00			0.98		
Satd. Flow (prot)		1770	3357			1652	3328			3110		
Flt Permitted		0.95	1.00			0.95	1.00			0.77		
Satd. Flow (perm)		1770	3357			1652	3328			2425		
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)	18	100	803	104	3	255	444	82	90	31	172	123
RTOR Reduction (vph)	0	0	9	0	0	0	13	0	0	124	0	0
Lane Group Flow (vph)	0	118	898	0	0	258	513	0	0	169	0	0
Confl. Peds. (#/hr)				1				7	18		13	13
Confl. Bikes (#/hr)				2				1			1	
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA		Perm
Protected Phases	1	1	5		6	6	2			4		
Permitted Phases									4			4
Actuated Green, G (s)		15.0	39.9			30.1	55.0			32.0		
Effective Green, g (s)		15.0	39.9			30.1	55.0			32.0		
Actuated g/C Ratio		0.13	0.35			0.26	0.48			0.28		
Clearance Time (s)		4.0	4.5			4.0	4.5			5.0		
Vehicle Extension (s)		2.0	6.0			2.0	6.0			2.0		
Lane Grp Cap (vph)		229	1159			430	1584			671		
v/s Ratio Prot		0.07	c0.27			c0.16	0.15					
v/s Ratio Perm										0.07		
v/c Ratio		0.52	0.78			0.60	0.32			0.25		
Uniform Delay, d1		46.9	33.8			37.4	18.7			32.4		
Progression Factor		1.00	1.00			1.00	1.00			1.00		
Incremental Delay, d2		8.1	5.1			6.1	0.5			0.9		
Delay (s)		54.9	38.9			43.5	19.3			33.3		
Level of Service		D	D			D	B			C		
Approach Delay (s)			40.7				27.2			33.3		
Approach LOS			D				C			C		

Intersection Summary

HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	115.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	100.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr






















Existing Plus Project Conditions  
PM Peak Hour



Movement	SBT	SBR
Lane Configurations	←T→	
Traffic Volume (vph)	40	52
Future Volume (vph)	40	52
Ideal Flow (vphpl)	1900	1900
Lane Width	16	12
Total Lost time (s)	5.0	
Lane Util. Factor	0.95	
Frbp, ped/bikes	0.99	
Flpb, ped/bikes	0.99	
Frt	0.96	
Flt Protected	0.97	
Satd. Flow (prot)	3703	
Flt Permitted	0.65	
Satd. Flow (perm)	2477	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	41	54
RTOR Reduction (vph)	27	0
Lane Group Flow (vph)	191	0
Confl. Peds. (#/hr)		18
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	32.0	
Effective Green, g (s)	32.0	
Actuated g/C Ratio	0.28	
Clearance Time (s)	5.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	686	
v/s Ratio Prot		
v/s Ratio Perm	c0.08	
v/c Ratio	0.28	
Uniform Delay, d1	32.7	
Progression Factor	1.00	
Incremental Delay, d2	1.0	
Delay (s)	33.7	
Level of Service	C	
Approach Delay (s)	33.7	
Approach LOS	C	
<b>Intersection Summary</b>		

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Plus Project Conditions  
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (vph)	155	818	244	7	148	584	95	4	155	441	129	14
Future Volume (vph)	155	818	244	7	148	584	95	4	155	441	129	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	11	12	10	12	12	12
Total Lost time (s)	3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6		
Lane Util. Factor	1.00	0.95	1.00		0.97	0.95	1.00		1.00	0.95		
Frbp, ped/bikes	1.00	1.00	0.95		1.00	1.00	0.97		1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85		1.00	1.00	0.85		1.00	0.97		
Flt Protected	0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00		
Satd. Flow (prot)	1711	3421	1460		3433	3539	1485		1652	3389		
Flt Permitted	0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00		
Satd. Flow (perm)	1711	3421	1460		3433	3539	1485		1652	3389		
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	158	835	249	7	151	596	97	4	158	450	132	14
RTOR Reduction (vph)	0	0	124	0	0	0	71	0	0	29	0	0
Lane Group Flow (vph)	158	835	125	0	158	596	26	0	162	553	0	0
Confl. Peds. (#/hr)			27				16				23	
Confl. Bikes (#/hr)			2								10	
Turn Type	Prot	NA	Perm	Prot	Prot	NA	Perm	Prot	Prot	NA		Prot
Protected Phases	3	8		7	7	4		1	1	6		5
Permitted Phases			8				4					
Actuated Green, G (s)	10.2	24.4	24.4		11.0	25.2	25.2		10.3	32.7		
Effective Green, g (s)	10.2	24.4	24.4		11.0	25.2	25.2		10.3	32.7		
Actuated g/C Ratio	0.11	0.26	0.26		0.12	0.27	0.27		0.11	0.34		
Clearance Time (s)	3.7	4.6	4.6		3.7	4.6	4.6		3.7	4.6		
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0	2.0		2.0	4.0		
Lane Grp Cap (vph)	183	878	374		397	938	393		179	1166		
v/s Ratio Prot	0.09	c0.24			0.05	c0.17			c0.10	c0.16		
v/s Ratio Perm			0.09				0.02					
v/c Ratio	0.86	0.95	0.33		0.40	0.64	0.07		0.91	0.47		
Uniform Delay, d1	41.7	34.7	28.7		38.9	30.8	26.1		41.9	24.4		
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00		0.90	0.79		
Incremental Delay, d2	30.9	19.3	0.2		0.2	1.0	0.0		39.5	1.3		
Delay (s)	72.6	54.0	28.9		39.2	31.9	26.1		77.0	20.5		
Level of Service	E	D	C		D	C	C		E	C		
Approach Delay (s)		51.4				32.6				32.8		
Approach LOS		D				C				C		
<b>Intersection Summary</b>												
HCM 2000 Control Delay			42.8			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			95.0			Sum of lost time (s)			16.6			
Intersection Capacity Utilization			81.4%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Existing Plus Project Conditions  
PM Peak Hour



Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (vph)	157	560	135
Future Volume (vph)	157	560	135
Ideal Flow (vphpl)	1900	1900	1900
Lane Width	12	12	12
Total Lost time (s)	3.7	4.6	
Lane Util. Factor	1.00	0.91	
Frbp, ped/bikes	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	
Frt	1.00	0.97	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	4908	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	4908	
Peak-hour factor, PHF	0.98	0.98	0.98
Adj. Flow (vph)	160	571	138
RTOR Reduction (vph)	0	43	0
Lane Group Flow (vph)	174	666	0
Confl. Peds. (#/hr)			15
Confl. Bikes (#/hr)			6
Turn Type	Prot	NA	
Protected Phases	5	2	
Permitted Phases			
Actuated Green, G (s)	10.3	32.7	
Effective Green, g (s)	10.3	32.7	
Actuated g/C Ratio	0.11	0.34	
Clearance Time (s)	3.7	4.6	
Vehicle Extension (s)	2.0	4.0	
Lane Grp Cap (vph)	191	1689	
v/s Ratio Prot	c0.10	0.14	
v/s Ratio Perm			
v/c Ratio	0.91	0.39	
Uniform Delay, d1	41.9	23.6	
Progression Factor	1.38	1.69	
Incremental Delay, d2	27.7	0.4	
Delay (s)	85.6	40.3	
Level of Service	F	D	
Approach Delay (s)		49.2	
Approach LOS		D	

Intersection Summary

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	15.4	38.8	54.2	0.11	7.6	F
E. 14th Street	III	35	17.9	56.3	74.2	0.14	6.8	F
Total	III		33.3	95.1	128.4	0.25	7.1	F

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.9	18.5	36.4	0.14	13.8	E
	III	35	15.4	49.4	64.8	0.11	6.4	F
Total	III		33.3	67.9	101.2	0.25	9.0	F

## Arterial Level of Service: NB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	4.2	17.2	0.11	23.7	C
Thornally Dr	II	40	24.0	36.2	60.2	0.21	12.5	F
Bayfair Dr	II	40	24.2	5.2	29.4	0.21	25.7	C
Fairmont Dr	II	40	13.5	10.2	23.7	0.12	17.8	D
Total	II		74.7	55.8	130.5	0.65	17.9	D

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	5.7	19.2	0.12	21.9	D
Thornally Dr	II	40	24.2	24.6	48.8	0.21	15.5	E
Drew St	II	40	24.0	5.4	29.4	0.21	25.5	C
Springlake Dr	II	40	13.0	9.8	22.8	0.11	17.9	D
Total	II		74.7	45.5	120.2	0.65	19.4	D

# HCM Signalized Intersection Capacity Analysis

























## 5: Hesperian Blvd/Hesperian BI & Halcyon Dr/Fairmont Dr

Cumulative TOD  
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	177	223	525	751	18	242	1220	409	39	746	190
Future Volume (vph)	184	177	223	525	751	18	242	1220	409	39	746	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6	4.9	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1608	3185	1334	3090	3166		1562	3094	1343	1577	4577	1383
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1608	3185	1334	3090	3166		1562	3094	1343	1577	4577	1383
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	198	190	240	565	808	19	260	1312	440	42	802	204
RTOR Reduction (vph)	0	0	197	0	1	0	0	0	153	0	0	85
Lane Group Flow (vph)	198	190	43	565	826	0	260	1312	287	42	802	119
Confl. Peds. (#/hr)	10		17	17		10	13		14	14		13
Confl. Bikes (#/hr)			2			1			1			1
Heavy Vehicles (%)	1%	2%	5%	2%	2%	11%	4%	5%	5%	3%	2%	2%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8						6			2
Actuated Green, G (s)	26.6	26.6	26.6	34.1	34.1		27.7	65.1	65.1	5.8	43.2	43.2
Effective Green, g (s)	26.6	26.6	26.6	34.1	34.1		27.7	65.1	65.1	5.8	43.2	43.2
Actuated g/C Ratio	0.18	0.18	0.18	0.23	0.23		0.18	0.43	0.43	0.04	0.29	0.29
Clearance Time (s)	4.6	4.6	4.6	4.9	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	4.0	4.0	4.0	3.0	3.0		2.0	6.0	6.0	2.0	6.0	6.0
Lane Grp Cap (vph)	285	564	236	702	719		288	1342	582	60	1318	398
v/s Ratio Prot	c0.12	0.06		0.18	c0.26		0.17	c0.42		0.03	c0.18	
v/s Ratio Perm			0.03						0.21			0.09
v/c Ratio	0.69	0.34	0.18	0.80	1.15		0.90	0.98	0.49	0.70	0.61	0.30
Uniform Delay, d1	57.9	54.0	52.4	54.8	58.0		59.8	41.7	30.6	71.2	46.1	41.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.61	0.45	0.07	1.00	1.00	1.00
Incremental Delay, d2	7.7	0.5	0.5	6.7	82.8		28.1	19.2	1.8	24.9	2.1	1.9
Delay (s)	65.6	54.5	52.9	61.5	140.7		64.6	37.9	4.0	96.2	48.2	43.5
Level of Service	E	D	D	E	F		E	D	A	F	D	D
Approach Delay (s)		57.4			108.5			34.0			49.2	
Approach LOS		E			F			C			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			60.4			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)		18.4				
Intersection Capacity Utilization			94.9%			ICU Level of Service		F				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
6: Bayfair Dr & Fairmont Dr



























Cumulative TOD  
AM Peak Hour

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations		  			  			 			 			
Traffic Volume (vph)	33	444	85	243	878	32	90	21	250	22	29	65		
Future Volume (vph)	33	444	85	243	878	32	90	21	250	22	29	65		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	11	12	10	11	12	12	12	12	12	16	12		
Total Lost time (s)	4.0	4.5		4.0	4.5			5.0			5.0			
Lane Util. Factor	1.00	0.91		1.00	0.91			0.95			0.95			
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00			
Frt	1.00	0.98		1.00	0.99			0.90			0.92			
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99			
Satd. Flow (prot)	1770	4784		1652	4888			3103			3608			
Flt Permitted	0.95	1.00		0.95	1.00			0.83			0.85			
Satd. Flow (perm)	1770	4784		1652	4888			2615			3108			
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)	37	499	96	273	987	36	101	24	281	25	33	73		
RTOR Reduction (vph)	0	23	0	0	4	0	0	185	0	0	48	0		
Lane Group Flow (vph)	37	572	0	273	1019	0	0	221	0	0	83	0		
Confl. Peds. (#/hr)			2				3		1	1		3		
Confl. Bikes (#/hr)			2			2						2		
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA			
Protected Phases	1	5		6	2			4			4			
Permitted Phases							4			4				
Actuated Green, G (s)	4.0	21.4		19.6	37.0			28.2			28.2			
Effective Green, g (s)	4.0	21.4		19.6	37.0			28.2			28.2			
Actuated g/C Ratio	0.05	0.26		0.24	0.45			0.34			0.34			
Clearance Time (s)	4.0	4.5		4.0	4.5			5.0			5.0			
Vehicle Extension (s)	2.0	6.0		2.0	6.0			2.0			2.0			
Lane Grp Cap (vph)	85	1237		391	2186			891			1059			
v/s Ratio Prot	0.02	c0.12		c0.17	0.21									
v/s Ratio Perm								c0.08			0.03			
v/c Ratio	0.44	0.46		0.70	0.47			0.25			0.08			
Uniform Delay, d1	38.3	25.8		28.8	16.0			19.6			18.5			
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00			
Incremental Delay, d2	1.3	0.8		4.4	0.4			0.1			0.0			
Delay (s)	39.6	26.6		33.2	16.4			19.7			18.5			
Level of Service	D	C		C	B			B			B			
Approach Delay (s)		27.3			19.9			19.7			18.5			
Approach LOS		C			B			B			B			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			21.7									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.44											
Actuated Cycle Length (s)			82.7								13.5			
Intersection Capacity Utilization			63.9%										ICU Level of Service	B
Analysis Period (min)			15											
c	Critical Lane Group													



HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Cumulative TOD  
AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	126	427	114	132	767	120	327	1147	100	121	339	111	
Future Volume (vph)	126	427	114	132	767	120	327	1147	100	121	339	111	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	11	12	12	12	12	11	10	12	12	12	12	12	
Total Lost time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95		1.00	0.91		
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1711	3539	1552	3433	3539	1502	1652	3491		1770	4868		
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)	1711	3539	1552	3433	3539	1502	1652	3491		1770	4868		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	133	449	120	139	807	126	344	1207	105	127	357	117	
RTOR Reduction (vph)	0	0	90	0	0	94	0	7	0	0	63	0	
Lane Group Flow (vph)	133	449	30	139	807	32	344	1305	0	127	411	0	
Confl. Peds. (#/hr)			5			6			8			10	
Confl. Bikes (#/hr)			2									4	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA		
Protected Phases	3	8		7	4		1	6		5	2		
Permitted Phases			8			4							
Actuated Green, G (s)	7.2	23.8	23.8	7.5	24.1	24.1	15.3	39.0		8.1	31.8		
Effective Green, g (s)	7.2	23.8	23.8	7.5	24.1	24.1	15.3	39.0		8.1	31.8		
Actuated g/C Ratio	0.08	0.25	0.25	0.08	0.25	0.25	0.16	0.41		0.09	0.33		
Clearance Time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6		
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0		2.0	4.0		
Lane Grp Cap (vph)	129	886	388	271	897	381	266	1433		150	1629		
v/s Ratio Prot	c0.08	0.13		0.04	c0.23		c0.21	c0.37		c0.07	0.08		
v/s Ratio Perm			0.02			0.02							
v/c Ratio	1.03	0.51	0.08	0.51	0.90	0.08	1.29	0.91		0.85	0.25		
Uniform Delay, d1	43.9	30.6	27.2	42.0	34.3	27.0	39.9	26.4		42.8	23.0		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	87.7	0.2	0.0	0.7	11.5	0.0	157.0	10.2		32.2	0.4		
Delay (s)	131.6	30.7	27.2	42.7	45.8	27.1	196.9	36.6		75.0	23.3		
Level of Service	F	C	C	D	D	C	F	D		E	C		
Approach Delay (s)		49.3			43.2			69.9			34.3		
Approach LOS		D			D			E			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			53.9				HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.97										
Actuated Cycle Length (s)			95.0				Sum of lost time (s)			16.6			
Intersection Capacity Utilization			85.6%				ICU Level of Service			E			
Analysis Period (min)			15										
c Critical Lane Group													

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.0	25.5	42.5	0.13	11.3	E
E. 14th Street	III	35	16.2	33.2	49.4	0.13	9.2	F
Total	III		33.2	58.7	91.9	0.26	10.2	E

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	16.2	16.4	32.6	0.13	14.0	E
Hesperian Bl	III	35	17.0	132.9	149.9	0.13	3.2	F
Total	III		33.2	149.3	182.5	0.26	5.1	F

## Arterial Level of Service: NB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	18.7	31.7	0.11	12.8	F
Thornally Dr	II	40	24.0	23.1	47.1	0.21	16.0	E
Bayfair Dr	II	40	24.2	1.3	25.5	0.21	29.7	B
Fairmont Dr	II	40	13.5	38.7	52.2	0.12	8.1	F
Total	II		74.7	81.8	156.5	0.65	14.9	E

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	9.1	22.6	0.12	18.6	D
Thornally Dr	II	40	24.2	21.2	45.4	0.21	16.7	E
Drew St	II	40	24.0	5.7	29.7	0.21	25.3	C
Springlake Dr	II	40	13.0	17.5	30.5	0.11	13.3	E
Total	II		74.7	53.5	128.2	0.65	18.2	D

HCM Signalized Intersection Capacity Analysis  
 5: Hesperian Blvd/Hesperian BI & Halcyon Dr/Fairmont Dr

Cumulative TOD  
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	716	281	515	163	45	483	1136	770	121	1126	233
Future Volume (vph)	209	716	281	515	163	45	483	1136	770	121	1126	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6	4.6	4.0	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1608	3217	1387	3090	3104		1593	3185	1414	1608	4622	1398
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1608	3217	1387	3090	3104		1593	3185	1414	1608	4622	1398
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)	215	738	290	531	168	46	498	1171	794	125	1161	240
RTOR Reduction (vph)	0	0	197	0	16	0	0	0	226	0	0	85
Lane Group Flow (vph)	215	738	93	531	198	0	498	1171	568	125	1161	155
Confl. Peds. (#/hr)	8		10	10		8	12		12	12		12
Confl. Bikes (#/hr)			2			1			1			1
Heavy Vehicles (%)	1%	1%	2%	2%	1%	0%	2%	2%	0%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8						6			2
Actuated Green, G (s)	21.1	34.0	34.0	22.0	34.6		40.0	64.3	64.3	12.2	36.5	36.5
Effective Green, g (s)	21.1	34.0	34.0	22.0	34.6		40.0	64.3	64.3	12.2	36.5	36.5
Actuated g/C Ratio	0.14	0.23	0.23	0.15	0.23		0.27	0.43	0.43	0.08	0.24	0.24
Clearance Time (s)	4.0	4.6	4.6	4.0	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	3.0	4.0	4.0	4.0	3.0		2.0	6.0	6.0	2.0	6.0	6.0
Lane Grp Cap (vph)	226	729	314	453	715		424	1365	606	130	1124	340
v/s Ratio Prot	0.13	c0.23		c0.17	0.06		c0.31	0.37		0.08	c0.25	
v/s Ratio Perm			0.07						0.40			0.11
v/c Ratio	0.95	1.01	0.30	1.17	0.28		1.17	0.86	0.94	0.96	1.03	0.46
Uniform Delay, d1	63.9	58.0	48.1	64.0	47.4		55.0	38.7	40.9	68.7	56.8	48.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.61	0.49	0.14	1.00	1.00	1.00
Incremental Delay, d2	46.1	36.4	0.7	98.7	0.2		96.5	5.0	19.4	66.4	35.7	4.4
Delay (s)	110.1	94.4	48.8	162.7	47.6		129.9	23.9	25.0	135.1	92.4	52.7
Level of Service	F	F	D	F	D		F	C	C	F	F	D
Approach Delay (s)		86.5			129.7			45.7			89.7	
Approach LOS		F			F			D			F	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			75.9				HCM 2000 Level of Service		E			
HCM 2000 Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)		17.8			
Intersection Capacity Utilization			112.8%				ICU Level of Service		H			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 6: Bayfair Dr & Fairmont Dr

Cumulative TOD  
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↔			↔	
Traffic Volume (vph)	120	1234	161	397	526	71	132	57	342	135	46	91
Future Volume (vph)	120	1234	161	397	526	71	132	57	342	135	46	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	10	11	12	12	12	12	12	16	12
Total Lost time (s)	4.0	4.5		4.0	4.5			5.0			5.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.98			0.90			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1770	4822		1652	4815			3093			3667	
Flt Permitted	0.95	1.00		0.95	1.00			0.76			0.55	
Satd. Flow (perm)	1770	4822		1652	4815			2367			2071	
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)	124	1272	166	409	542	73	136	59	353	139	47	94
RTOR Reduction (vph)	0	13	0	0	13	0	0	259	0	0	59	0
Lane Group Flow (vph)	124	1425	0	409	602	0	0	289	0	0	221	0
Confl. Peds. (#/hr)			1			7	18		13	13		18
Confl. Bikes (#/hr)			2			1			1			
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	5		6	2			4			4	
Permitted Phases							4			4		
Actuated Green, G (s)	11.4	34.5		29.3	52.4			28.0			28.0	
Effective Green, g (s)	11.4	34.5		29.3	52.4			28.0			28.0	
Actuated g/C Ratio	0.11	0.33		0.28	0.50			0.27			0.27	
Clearance Time (s)	4.0	4.5		4.0	4.5			5.0			5.0	
Vehicle Extension (s)	2.0	6.0		2.0	6.0			2.0			2.0	
Lane Grp Cap (vph)	191	1579		459	2396			629			550	
v/s Ratio Prot	0.07	c0.30		c0.25	0.13							
v/s Ratio Perm								c0.12			0.11	
v/c Ratio	0.65	0.90		0.89	0.25			0.46			0.40	
Uniform Delay, d1	45.0	33.8		36.5	15.2			32.3			31.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	5.6	8.3		18.6	0.2			0.2			0.2	
Delay (s)	50.6	42.1		55.1	15.3			32.5			31.9	
Level of Service	D	D		E	B			C			C	
Approach Delay (s)		42.8			31.2			32.5			31.9	
Approach LOS		D			C			C			C	

### Intersection Summary

HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	105.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	111.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Cumulative TOD  
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	185	870	483	143	520	140	258	672	114	378	1092	178		
Future Volume (vph)	185	870	483	143	520	140	258	672	114	378	1092	178		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	12	12	12	12	11	10	12	12	12	12	12		
Total Lost time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6			
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95		1.00	0.91			
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.97	1.00	0.99		1.00	1.00			
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00			
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.98			
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)	1770	3539	1505	3433	3539	1482	1652	3441		1770	4956			
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)	1770	3539	1505	3433	3539	1482	1652	3441		1770	4956			
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98		
Adj. Flow (vph)	189	888	493	146	531	143	263	686	116	386	1114	182		
RTOR Reduction (vph)	0	0	258	0	0	109	0	13	0	0	21	0		
Lane Group Flow (vph)	189	888	235	146	531	34	263	789	0	386	1275	0		
Confl. Peds. (#/hr)			27			16			23			15		
Confl. Bikes (#/hr)			2						10			6		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA			
Protected Phases	3	8		7	4		1	6		5	2			
Permitted Phases			8			4								
Actuated Green, G (s)	10.3	29.1	29.1	5.8	24.6	24.6	17.9	31.8		21.7	35.6			
Effective Green, g (s)	10.3	29.1	29.1	5.8	24.6	24.6	17.9	31.8		21.7	35.6			
Actuated g/C Ratio	0.10	0.28	0.28	0.06	0.23	0.23	0.17	0.30		0.21	0.34			
Clearance Time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6			
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0		2.0	4.0			
Lane Grp Cap (vph)	173	980	417	189	829	347	281	1042		365	1680			
v/s Ratio Prot	c0.11	c0.25		0.04	c0.15		c0.16	0.23		c0.22	c0.26			
v/s Ratio Perm			0.16			0.02								
v/c Ratio	1.09	0.91	0.56	0.77	0.64	0.10	0.94	0.76		1.06	0.76			
Uniform Delay, d1	47.4	36.6	32.5	48.9	36.2	31.5	43.0	33.1		41.6	30.9			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2	95.3	11.4	1.0	16.2	1.3	0.0	36.2	5.1		63.1	3.3			
Delay (s)	142.6	48.1	33.6	65.1	37.5	31.5	79.2	38.2		104.7	34.2			
Level of Service	F	D	C	E	D	C	E	D		F	C			
Approach Delay (s)		54.9			41.4			48.4			50.4			
Approach LOS		D			D			D			D			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			49.9									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.92											
Actuated Cycle Length (s)			105.0								16.6			
Intersection Capacity Utilization			90.4%										ICU Level of Service	E
Analysis Period (min)			15											
c Critical Lane Group														

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	15.5	42.6	58.1	0.11	7.1	F
E. 14th Street	III	35	17.9	50.3	68.2	0.14	7.4	F
Total	III		33.4	92.9	126.3	0.25	7.3	F

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.9	15.2	33.1	0.14	15.2	D
Hesperian Bl	III	35	15.5	44.0	59.5	0.11	7.0	F
Total	III		33.4	59.2	92.6	0.25	9.9	F

## Arterial Level of Service: NB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	2.1	15.1	0.11	27.0	C
Thornally Dr	II	40	24.0	35.3	59.3	0.21	12.6	F
Bayfair Dr	II	40	24.2	10.2	34.4	0.21	22.0	C
Fairmont Dr	II	40	13.5	24.9	38.4	0.12	11.0	F
Total	II		74.7	72.5	147.2	0.65	15.9	E

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	5.7	19.2	0.12	21.9	D
Thornally Dr	II	40	24.2	11.1	35.3	0.21	21.4	D
Drew St	II	40	24.0	2.8	26.8	0.21	28.0	C
Springlake Dr	II	40	13.0	14.1	27.1	0.11	15.0	E
Total	II		74.7	33.7	108.4	0.65	21.5	D

HCM Signalized Intersection Capacity Analysis  
 5: Hesperian Blvd/Hesperian BI & Halcyon Dr/Fairmont Dr

Cumulative TOD Plus Project  
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	177	223	525	751	18	242	1220	409	39	746	190
Future Volume (vph)	184	177	223	525	751	18	242	1220	409	39	746	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	11	11	12	12	12	12	12	12	15
Total Lost time (s)	4.6	4.6	4.6	4.9	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3539	1531	3319	3401		1736	3438	1492	3400	3539	1690
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1787	3539	1531	3319	3401		1736	3438	1492	3400	3539	1690
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	198	190	240	565	808	19	260	1312	440	42	802	204
RTOR Reduction (vph)	0	0	173	0	1	0	0	0	74	0	0	59
Lane Group Flow (vph)	198	190	67	565	826	0	260	1312	366	42	802	145
Confl. Peds. (#/hr)	10		17	17		10	13		14	14		13
Confl. Bikes (#/hr)			2			1			1			1
Heavy Vehicles (%)	1%	2%	5%	2%	2%	11%	4%	5%	5%	3%	2%	2%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8						6			2
Actuated Green, G (s)	25.8	25.8	25.8	35.5	35.5		25.0	65.2	65.2	5.1	45.3	45.3
Effective Green, g (s)	25.8	25.8	25.8	35.5	35.5		25.0	65.2	65.2	5.1	45.3	45.3
Actuated g/C Ratio	0.17	0.17	0.17	0.24	0.24		0.17	0.43	0.43	0.03	0.30	0.30
Clearance Time (s)	4.6	4.6	4.6	4.9	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	4.0	4.0	4.0	3.0	3.0		2.0	6.0	6.0	2.0	6.0	6.0
Lane Grp Cap (vph)	307	608	263	785	804		289	1494	648	115	1068	510
v/s Ratio Prot	c0.11	0.05		0.17	c0.24		0.15	c0.38		0.01	c0.23	
v/s Ratio Perm			0.04						0.25			0.09
v/c Ratio	0.64	0.31	0.25	0.72	1.03		0.90	0.88	0.56	0.37	0.75	0.29
Uniform Delay, d1	57.8	54.3	53.8	52.7	57.2		61.3	38.8	31.8	70.9	47.3	40.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.69	0.55	0.45	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.4	0.7	3.2	39.0		26.3	6.5	2.2	0.7	4.9	1.4
Delay (s)	63.0	54.7	54.5	55.9	96.2		68.7	28.0	16.3	71.6	52.1	41.4
Level of Service	E	D	D	E	F		E	C	B	E	D	D
Approach Delay (s)		57.2			79.9			30.7			50.8	
Approach LOS		E			E			C			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			51.6			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			18.4			
Intersection Capacity Utilization			93.1%			ICU Level of Service			F			
Analysis Period (min)			15									

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 6: Bayfair Dr & Fairmont Dr

Cumulative TOD Plus Project  
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	444	85	243	878	32	90	21	250	22	29	65
Future Volume (vph)	33	444	85	243	878	32	90	21	250	22	29	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	10	11	12	12	12	12	12	16	12
Total Lost time (s)	4.0	4.5		4.0	4.5			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.90			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1711	3330		1652	3402			3103			3608	
Flt Permitted	0.95	1.00		0.95	1.00			0.83			0.85	
Satd. Flow (perm)	1711	3330		1652	3402			2610			3100	
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)	37	499	96	273	987	36	101	24	281	25	33	73
RTOR Reduction (vph)	0	14	0	0	3	0	0	189	0	0	49	0
Lane Group Flow (vph)	37	581	0	273	1020	0	0	217	0	0	82	0
Confl. Peds. (#/hr)			2				3		1	1		3
Confl. Bikes (#/hr)			2			2						2
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	5		6	2			4			4	
Permitted Phases							4			4		
Actuated Green, G (s)	5.0	24.3		21.0	40.3			28.4			28.4	
Effective Green, g (s)	5.0	24.3		21.0	40.3			28.4			28.4	
Actuated g/C Ratio	0.06	0.28		0.24	0.46			0.33			0.33	
Clearance Time (s)	4.0	4.5		4.0	4.5			5.0			5.0	
Vehicle Extension (s)	2.0	6.0		2.0	6.0			2.0			2.0	
Lane Grp Cap (vph)	98	927		397	1572			850			1009	
v/s Ratio Prot	0.02	c0.17		0.17	c0.30							
v/s Ratio Perm								c0.08			0.03	
v/c Ratio	0.38	0.63		0.69	0.65			0.25			0.08	
Uniform Delay, d1	39.6	27.5		30.1	18.0			21.6			20.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.9	2.3		3.9	1.5			0.1			0.0	
Delay (s)	40.5	29.8		34.0	19.5			21.7			20.4	
Level of Service	D	C		C	B			C			C	
Approach Delay (s)		30.4			22.6			21.7			20.4	
Approach LOS		C			C			C			C	

























### Intersection Summary

HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Cumulative TOD Plus Project  
AM Peak Hour

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	126	427	114	132	767	120	327	1147	100	121	339	111		
Future Volume (vph)	126	427	114	132	767	120	327	1147	100	121	339	111		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	11	11	11	12	12	11	10	12	12	12	12	12		
Total Lost time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6			
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95		1.00	0.91			
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	0.99			
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00			
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96			
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)	1711	3421	1500	3433	3539	1501	1652	3491		1770	4867			
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)	1711	3421	1500	3433	3539	1501	1652	3491		1770	4867			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95		
Adj. Flow (vph)	133	449	120	139	807	126	344	1207	105	127	357	117		
RTOR Reduction (vph)	0	0	92	0	0	95	0	7	0	0	59	0		
Lane Group Flow (vph)	133	449	28	139	807	31	344	1305	0	127	415	0		
Confl. Peds. (#/hr)			5			6			8			10		
Confl. Bikes (#/hr)			2									4		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA			
Protected Phases	3	8		7	4		1	6		5	2			
Permitted Phases			8			4								
Actuated Green, G (s)	10.0	23.5	23.5	11.0	24.5	24.5	18.8	40.2		8.7	30.1			
Effective Green, g (s)	10.0	23.5	23.5	11.0	24.5	24.5	18.8	40.2		8.7	30.1			
Actuated g/C Ratio	0.10	0.24	0.24	0.11	0.24	0.24	0.19	0.40		0.09	0.30			
Clearance Time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6			
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0		2.0	4.0			
Lane Grp Cap (vph)	171	803	352	377	867	367	310	1403		153	1464			
v/s Ratio Prot	c0.08	0.13		0.04	c0.23		c0.21	c0.37		c0.07	0.09			
v/s Ratio Perm			0.02			0.02								
v/c Ratio	0.78	0.56	0.08	0.37	0.93	0.08	1.11	0.93		0.83	0.28			
Uniform Delay, d1	43.9	33.7	29.8	41.3	36.9	29.1	40.6	28.6		44.9	26.7			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2	18.1	0.5	0.0	0.2	16.1	0.0	83.9	12.3		28.9	0.5			
Delay (s)	62.0	34.2	29.9	41.5	53.0	29.1	124.5	40.9		73.9	27.2			
Level of Service	E	C	C	D	D	C	F	D		E	C			
Approach Delay (s)		38.7			48.7			58.3			37.1			
Approach LOS		D			D			E			D			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			49.2									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.93											
Actuated Cycle Length (s)			100.0								16.6			
Intersection Capacity Utilization			87.0%										ICU Level of Service	E
Analysis Period (min)			15											
c Critical Lane Group														

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.0	29.5	46.5	0.13	10.3	E
E. 14th Street	III	35	16.3	36.7	53.0	0.13	8.7	F
Total	III		33.3	66.2	99.5	0.26	9.4	F

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	16.3	19.9	36.2	0.13	12.7	E
Hesperian Bl	III	35	17.0	94.0	111.0	0.13	4.3	F
Total	III		33.3	113.9	147.2	0.26	6.4	F

## Arterial Level of Service: NB Hesperian Blvd
























Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	21.4	34.4	0.11	11.8	F
Thornally Dr	II	40	24.0	34.7	58.7	0.21	12.8	F
Bayfair Dr	II	40	24.2	3.4	27.6	0.21	27.4	C
Fairmont Dr	II	40	13.5	29.9	43.4	0.12	9.7	F
Total	II		74.7	89.4	164.1	0.65	14.2	E

## Arterial Level of Service: SB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	3.9	17.4	0.12	24.2	C
Thornally Dr	II	40	24.2	26.6	50.8	0.21	14.9	E
Drew St	II	40	24.0	9.1	33.1	0.21	22.7	C
Springlake Dr	II	40	13.0	22.4	35.4	0.11	11.5	F
Total	II		74.7	62.0	136.7	0.65	17.1	D

HCM Signalized Intersection Capacity Analysis  
 5: Hesperian Blvd/Hesperian Bl & Halcyon Dr/Fairmont Dr

Cumulative TOD Plus Project  
 PM Peak Hour



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	716	281	515	163	45	483	1136	770	121	1126	233
Future Volume (vph)	209	716	281	515	163	45	483	1136	770	121	1126	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	11	11	12	12	12	12	12	12	15
Total Lost time (s)	4.0	4.6	4.6	4.0	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3574	1592	3319	3334		1770	3539	1571	3467	3574	1709
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1787	3574	1592	3319	3334		1770	3539	1571	3467	3574	1709
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)	215	738	290	531	168	46	498	1171	794	125	1161	240
RTOR Reduction (vph)	0	0	88	0	16	0	0	0	165	0	0	79
Lane Group Flow (vph)	215	738	202	531	198	0	498	1171	629	125	1161	161
Confl. Peds. (#/hr)	8		10	10		8	12		12	12		12
Confl. Bikes (#/hr)			2			1			1			1
Heavy Vehicles (%)	1%	1%	2%	2%	1%	0%	2%	2%	0%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8						6			2
Actuated Green, G (s)	19.0	33.9	33.9	20.1	34.7		34.0	71.7	71.7	6.8	44.5	44.5
Effective Green, g (s)	19.0	33.9	33.9	20.1	34.7		34.0	71.7	71.7	6.8	44.5	44.5
Actuated g/C Ratio	0.13	0.23	0.23	0.13	0.23		0.23	0.48	0.48	0.05	0.30	0.30
Clearance Time (s)	4.0	4.6	4.6	4.0	4.9		4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	3.0	4.0	4.0	4.0	3.0		2.0	6.0	6.0	2.0	6.0	6.0
Lane Grp Cap (vph)	226	807	359	444	771		401	1691	750	157	1060	507
v/s Ratio Prot	0.12	c0.21		c0.16	0.06		c0.28	0.33		0.04	c0.32	
v/s Ratio Perm			0.13						0.40			0.09
v/c Ratio	0.95	0.91	0.56	1.20	0.26		1.24	0.69	0.84	0.80	1.10	0.32
Uniform Delay, d1	65.0	56.6	51.5	65.0	47.1		58.0	30.5	34.1	70.9	52.8	41.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.57	0.35	0.10	1.00	1.00	1.00
Incremental Delay, d2	46.1	15.0	2.4	108.3	0.2		114.7	0.5	2.7	22.3	57.4	1.6
Delay (s)	111.2	71.6	53.9	173.3	47.3		147.9	11.2	6.1	93.2	110.2	42.6
Level of Service	F	E	D	F	D		F	B	A	F	F	D
Approach Delay (s)		74.3			137.1			37.2			98.2	
Approach LOS		E			F			D			F	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			72.9			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			17.8			
Intersection Capacity Utilization			109.4%			ICU Level of Service			H			
Analysis Period (min)			15									

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 6: Bayfair Dr & Fairmont Dr

Cumulative TOD Plus Project  
PM Peak Hour

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	120	1234	161	397	526	71	132	57	342	135	46	91		
Future Volume (vph)	120	1234	161	397	526	71	132	57	342	135	46	91		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	11	12	10	11	12	12	12	12	12	16	12		
Total Lost time (s)	4.0	4.5		4.0	4.5			5.0			5.0			
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			0.95			
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98			0.99			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00			
Frt	1.00	0.98		1.00	0.98			0.90			0.95			
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98			
Satd. Flow (prot)	1770	3356		1652	3350			3090			3665			
Flt Permitted	0.95	1.00		0.95	1.00			0.75			0.55			
Satd. Flow (perm)	1770	3356		1652	3350			2336			2079			
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)	124	1272	166	409	542	73	136	59	353	139	47	94		
RTOR Reduction (vph)	0	8	0	0	8	0	0	266	0	0	56	0		
Lane Group Flow (vph)	124	1430	0	409	607	0	0	282	0	0	224	0		
Confl. Peds. (#/hr)			1			7	18		13	13		18		
Confl. Bikes (#/hr)			2			1			1					
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA			
Protected Phases	1	5		6	2			4			4			
Permitted Phases							4			4				
Actuated Green, G (s)	12.1	43.5		28.0	59.4			28.0			28.0			
Effective Green, g (s)	12.1	43.5		28.0	59.4			28.0			28.0			
Actuated g/C Ratio	0.11	0.38		0.25	0.53			0.25			0.25			
Clearance Time (s)	4.0	4.5		4.0	4.5			5.0			5.0			
Vehicle Extension (s)	2.0	6.0		2.0	6.0			2.0			2.0			
Lane Grp Cap (vph)	189	1291		409	1760			578			515			
v/s Ratio Prot	0.07	c0.43		c0.25	0.18									
v/s Ratio Perm								c0.12			0.11			
v/c Ratio	0.66	1.11		1.00	0.35			0.49			0.43			
Uniform Delay, d1	48.5	34.8		42.5	15.5			36.4			35.8			
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00			
Incremental Delay, d2	6.1	60.0		44.5	0.3			0.2			0.2			
Delay (s)	54.6	94.8		87.0	15.9			36.6			36.0			
Level of Service	D	F		F	B			D			D			
Approach Delay (s)		91.6			44.3			36.6			36.0			
Approach LOS		F			D			D			D			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			64.0									HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio			0.90											
Actuated Cycle Length (s)			113.0								13.5			
Intersection Capacity Utilization			123.3%										ICU Level of Service	H
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis  
7: E. 14th Street & Fairmont Dr

Cumulative TOD Plus Project  
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	185	870	483	143	520	140	258	672	114	378	1092	178		
Future Volume (vph)	185	870	483	143	520	140	258	672	114	378	1092	178		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	11	11	11	12	12	11	10	12	12	12	12	12		
Total Lost time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6			
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95		1.00	0.91			
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.97	1.00	0.99		1.00	1.00			
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00			
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.98			
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)	1711	3421	1452	3433	3539	1481	1652	3441		1770	4955			
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)	1711	3421	1452	3433	3539	1481	1652	3441		1770	4955			
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98		
Adj. Flow (vph)	189	888	493	146	531	143	263	686	116	386	1114	182		
RTOR Reduction (vph)	0	0	131	0	0	110	0	12	0	0	20	0		
Lane Group Flow (vph)	189	888	362	146	531	33	263	790	0	386	1276	0		
Confl. Peds. (#/hr)			27			16			23			15		
Confl. Bikes (#/hr)			2						10			6		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA			
Protected Phases	3	8		7	4		1	6		5	2			
Permitted Phases			8			4								
Actuated Green, G (s)	13.2	27.4	27.4	11.0	25.2	25.2	22.2	31.7		23.3	32.8			
Effective Green, g (s)	13.2	27.4	27.4	11.0	25.2	25.2	22.2	31.7		23.3	32.8			
Actuated g/C Ratio	0.12	0.25	0.25	0.10	0.23	0.23	0.20	0.29		0.21	0.30			
Clearance Time (s)	3.7	4.6	4.6	3.7	4.6	4.6	3.7	4.6		3.7	4.6			
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0		2.0	4.0			
Lane Grp Cap (vph)	205	852	361	343	810	339	333	991		374	1477			
v/s Ratio Prot	0.11	c0.26		0.04	c0.15		0.16	c0.23		c0.22	c0.26			
v/s Ratio Perm			0.25			0.02								
v/c Ratio	0.92	1.04	1.00	0.43	0.66	0.10	0.79	0.80		1.03	0.86			
Uniform Delay, d1	47.9	41.3	41.3	46.5	38.5	33.4	41.7	36.2		43.4	36.5			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2	41.0	42.4	47.8	0.3	1.5	0.0	10.9	6.7		55.0	6.9			
Delay (s)	88.9	83.7	89.1	46.8	39.9	33.5	52.6	42.8		98.4	43.4			
Level of Service	F	F	F	D	D	C	D	D		F	D			
Approach Delay (s)		86.0			40.0			45.2			56.0			
Approach LOS		F			D			D			E			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			60.4									HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio			0.93											
Actuated Cycle Length (s)			110.0								16.6			
Intersection Capacity Utilization			95.5%										ICU Level of Service	F
Analysis Period (min)			15											
c Critical Lane Group														

## Arterial Level of Service: EB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	15.5	92.8	108.3	0.11	3.8	F
E. 14th Street	III	35	17.8	83.1	100.9	0.14	5.0	F
Total	III		33.3	175.9	209.2	0.25	4.4	F

## Arterial Level of Service: WB Fairmont Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	III	35	17.8	16.1	33.9	0.14	14.8	D
Hesperian Bl	III	35	15.5	43.6	59.1	0.11	7.0	F
Total	III		33.3	59.7	93.0	0.25	9.8	F

## Arterial Level of Service: NB Hesperian Blvd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Drew St	II	40	13.0	2.8	15.8	0.11	25.8	C
Thornally Dr	II	40	24.0	88.3	112.3	0.21	6.7	F
Bayfair Dr	II	40	24.2	151.7	175.9	0.21	4.3	F
Fairmont Dr	II	40	13.5	11.5	25.0	0.12	16.9	E
Total	II		74.7	254.3	329.0	0.65	7.1	F

## Arterial Level of Service: SB Hesperian Blvd

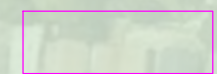

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bayfair Dr	II	40	13.5	4.4	17.9	0.12	23.5	C
Thornally Dr	II	40	24.2	33.5	57.7	0.21	13.1	E
Drew St	II	40	24.0	7.5	31.5	0.21	23.8	C
Springlake Dr	II	40	13.0	94.6	107.6	0.11	3.8	F
Total	II		74.7	140.0	214.7	0.65	10.9	F



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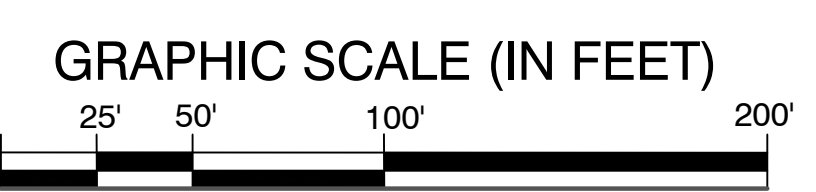
## APPENDIX C

# LEGEND:


-  AM PEAK - EXISTING
-  AM PEAK - EXISTING + PROJECT



I:\FILENAME: Fairmont queuing 11-02-18 10:09am Dane.Rini II XREFS\I <<--



PREPARED BY:



DKS ASSOCIATES  
1970 BROADWAY, SUITE # 740  
OAKLAND, CA 94612  
TEL: 510-783-2061

CIVIL ENGINEER	No.	DATE	BY	REFERENCE
RCE NO. _____ EXP. _____				
CHECKED BY MARIA TRIBELHORN				
DESIGNED BY				
DRAWN BY DANE RINI				

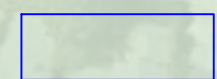

Fairmont Dr.  
Corridor Queuing Diagram (95th Percentile)  
Existing vs. Existing Plus Project AM

**DRAFT**

SCALE:  
HOR.  
VERT.  
DATE: OCT 26, 2018  
SHEET NO.  
01 OF 04



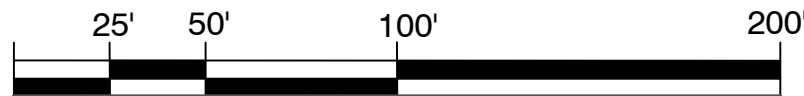
# LEGEND:

-  PM PEAK - EXISTING
-  PM PEAK - EXISTING + PROJECT



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### GRAPHIC SCALE (IN FEET)



PREPARED BY:



DKS ASSOCIATES  
1970 BROADWAY, SUITE # 740  
OAKLAND, CA 94612  
TEL: 510-763-2061

CIVIL ENGINEER

RCE NO. \_\_\_\_\_ EXP. \_\_\_\_\_  
CHECKED BY MARIA TRIBELHORN  
DESIGNED BY  
DRAWN BY DANE RINI

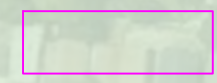

No.	DATE	BY	REFERENCE

Fairmont Dr.  
Corridor Queuing Diagram (95th Percentile)  
Existing vs. Existing Plus Project PM

**DRAFT**

SCALE:  
HOR.  
VERT.  
DATE: OCT 26, 2018  
SHEET NO.  
02 OF 04

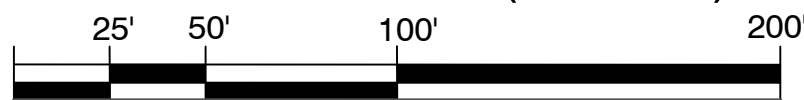
# LEGEND:

-  AM PEAK - CUMULATIVE
-  AM PEAK - CUMULATIVE + PROJECT



I FILENAME: Fairmont queuing 11-02-18 10:09am Dane.Rini II XREFS:il <<--

### GRAPHIC SCALE (IN FEET)



PREPARED BY:



DKS ASSOCIATES  
1970 BROADWAY, SUITE # 740  
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TEL: 510-763-2061

CIVIL ENGINEER

RCE NO. \_\_\_\_\_ EXP. \_\_\_\_\_

CHECKED BY MARIA TRIBELHORN

DESIGNED BY

DRAWN BY DANE RINI

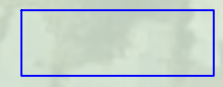
No.	DATE	BY	REFERENCE

Fairmont Dr.  
Corridor Queuing Diagram (95th Percentile)  
Cumulative vs. Cumulative Plus Project AM

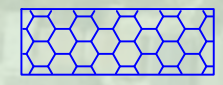
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HOR.  
VERT.  
DATE: OCT 26, 2018  
SHEET NO.  
03 OF 04

# LEGEND:



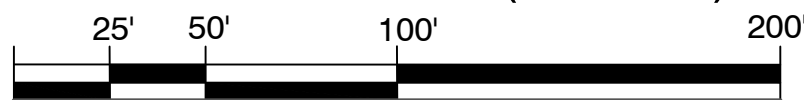
PM PEAK - CUMULATIVE



PM PEAK - CUMULATIVE + PROJECT



## GRAPHIC SCALE (IN FEET)



PREPARED BY:



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1970 BROADWAY, SUITE # 740  
OAKLAND, CA 94612  
TEL: 510-763-2061

CIVIL ENGINEER

RCE NO. \_\_\_\_ EXP. \_\_\_\_

CHECKED BY MARIA TRIBELHORN

DESIGNED BY

DRAWN BY DANE RINI

No.	DATE	BY	REFERENCE

Fairmont Dr.  
Corridor Queuing Diagram (95th Percentile)  
Cumulative vs. Cumulative Plus Project PM

**DRAFT**

SCALE:  
HOR.  
VERT.  
DATE: OCT 26, 2018  
SHEET NO.  
04 OF 04