BERKELEY DOWNTOWN AREA PLAN
PROGRAM ENVIRONMENTAL IMPACT REPORT
TRAFFIC IMPACT ANALYSIS

Prepared for:
City of Berkeley

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IBI
GROUP

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EXECUTIVE SUMMARY

This traffic impact analysis report summarizes the forecasted transportation conditions for the Year 2030 as part of the preparation of a Program Environmental Impact Report (EIR) for the Berkeley Downtown Area Plan (DAP).

Project Description

The land use assumptions for the Year 2030 Baseline condition are consistent with forecasts contained in the Alameda County Congestion Management Agency (ACCMA) travel demand model, which are based on the Year 2000 Census and the Association of Bay Area Governments (ABAG) *Projections 2005* data. The Year 2030 With Project condition assumes the implementation of approximately 3,100 additional residential units and about 1,000,000 of additional square feet of non-residential floor space to the existing DAP study area land use condition (the vast majority of which would be related to University of California, Berkeley growth).

The Year 2030 Baseline transportation network assumes no changes to the existing roadway network, with the exception of the signalization of three intersections along Oxford Street consistent with the UC Berkeley Long Range Development Plan (LRDP) EIR. Transit enhancements for the Year 2030 include only the improvements to local AC Transit services that are assumed in the ACCMA model.

The Year 2030 With Project condition proposes several changes to the downtown transportation network. This scenario includes the implementation of AC Transit's proposed bus rapid transit (BRT) service operating in an exclusive transit-only lane on Shattuck Avenue between Durant Avenue and Center Street. Proposed changes to the study area roadway network for the Year 2030 With Project condition include:

- A change in the operation of Shattuck Avenue (west side of the couplet) to two-way traffic with one lane in each direction between University Avenue and Center Street. Shattuck Square would be open for local traffic access only.

- The removal of mid-block traffic lanes on University Avenue and Hearst Avenue between Shattuck Avenue and Oxford Street, modifying these roadways from four lane streets (two lanes in each direction) to two lane streets (one lane in each direction).

- The conversion of Shattuck Avenue to a boulevard street, achieved through the removal of one traffic lane in each direction between Durant Avenue and Center Street.

- Closure of Center Street to vehicle traffic between Shattuck Avenue and Oxford Street.

Analysis Methodology

The traffic impact analysis is performed in accordance with the City of Berkeley standards. The transportation modeling effort was completed using the Alameda County Congestion Management Agency (ACCMA) travel demand model, and the traffic operations were analyzed using the Highway Capacity Manual (HCM) 2000 methodology.

Trip Generation

The ACCMA model produces auto trip generation forecasts for the AM and PM peak hours and transit trip forecasts for the AM peak period and the mid-day off-peak period. The AM peak period transit trip forecasts are then estimated for the AM peak hour by dividing the peak period trip forecast by the number of hours in the peak period. Table ES-1 summarizes the automobile person trips generated within the DAP study area in these time periods for each of the modeled Year 2030 scenarios and highlights the increase in trips between the Year 2000, Year 2030 Baseline, and Year 2030 With Project conditions. Table ES-2 summarizes the transit person trips

generated within the DAP study area for each of the modeled scenarios, as well as the increase between scenarios.

Table ES-1: Berkeley DAP Study Area Auto Trip Generation

Option	Total Auto Trips (person trips)				Increase in Auto Trips (person trips) Year 2000 to Year 2030			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	To	From	To	From	To	From	To	From
Year 2000	2,539	424	1,054	2,150	--	--	--	--
Year 2030 Baseline	2,884	659	1,733	2,774	345	235	679	624
Year 2030 With Project	3,038	900	2,048	2,940	499	476	994	790

Source: ACCMA Travel Demand Model Year 2030 Forecasts prepared by IBI Group

Table ES-2: Berkeley DAP Study Area Transit Trip Generation

Option	Total Transit (person trips)				Increase in Transit Trips (person trips) Year 2000 to Year 2030			
	AM Peak Hour		Off-Peak		AM Peak Hour		Off-peak	
	To	From	To	From	To	From	To	From
Year 2000	1,458	226	3,094	1,422	--	--	--	--
Year 2030 Baseline	2,631	379	4,513	2,168	1,173	154	1,419	746
Year 2030 With Project	2,666	548	5,202	2,983	1,208	322	2,108	1,561

Source: ACCMA Travel Demand Model Year 2030 Forecasts prepared by IBI Group

It is important to note that while the Year 2030 With Project condition does result in a substantial increase in auto and transit trips when compared to the Year 2000, the majority of this increase is forecast to already occur as part of the Year 2030 Baseline, which includes the development capacity of the Downtown Area under existing zoning. The trips generated by the Year 2030 With Project condition represent an incremental increase above the Year 2030 Baseline trip generation forecast.

Traffic Analysis Results

As anticipated, the Year 2030 Baseline traffic conditions do show an increase in automobile traffic in the downtown and the deterioration in level of service at study area intersections in the downtown. As discussed in the previous sections of this report, a significant portion of the traffic growth that occurs in the downtown is a result of regional traffic.

Table ES-3 and Table ES-4 summarize the results of the traffic analysis for the Year 2030 Baseline and Year 2030 With Project condition. Significant traffic impacts are also identified.

Table ES-3: Year 2030 AM Peak Hour Level of Service

No.	Intersection	Baseline		With Project		Significant Impact
		Delay (in Sec)	LOS	Delay (in Sec)	LOS	
1	Martin Luther Jr. Way / Hearst Avenue	16.5	B	45.0	D	
2	Martin Luther Jr. Way / University Avenue	63.9	E	51.7	D	
3	Martin Luther Jr. Way / Center Street	75.2	E	36.1	D	
4	Martin Luther Jr. Way / Allston Way	21.4	C	21.6	C	
5	Milvia Street / University Avenue	13.6	B	91.4	F	yes - LOS changes to "F"
6	Milvia Street / Center Street	10.8	B	44.0	D	
7	Milvia Street / Allston Way	12.6	B	37.9	D	
8	Shattuck Avenue / Hearst Avenue	13.4	B	12.1	B	
9	Shattuck Avenue / University Avenue	14.8	B	24.7	C	
10	Shattuck Avenue / Center Street	9.8	A	18.4	B	
11	Shattuck Avenue / Allston Way	10.2	B	27.0	C	
12	Shattuck Avenue / Bancroft Way	11.4	B	15.3	B	
13	Shattuck Avenue / Durant Avenue	23.8	C	108.5	F	yes - LOS changes to "F"
14	Shattuck Avenue / Haste Street	13.2	B	13.8	B	
15	Shattuck Avenue / Dwight Way	19	B	23.1	C	
16	Oxford Street / Hearst Avenue	46.4	D	112.7	F	yes - LOS changes to "F"
17	Oxford Street / University Avenue	43.6	D	59.7	E	yes - LOS changes to "E"
18	Oxford Street / Center Street	15.7	B	12.7	B	
19	Oxford Street / Allston Way	17.0	B	13.9	B	
20	Oxford Street / Fulton Street / Bancroft Way	9.6	A	11.5	B	
21	Fulton Street / Durant Avenue	16.4	B	15.2	B	

*All intersections are signalized in the Year 2030 condition

Table ES-4: Year 2030 PM Peak Hour Level of Service

No.	Intersection	Baseline		With Project		Significant Impact
		Delay (in Sec)	LOS	Delay (in Sec)	LOS	
1	Martin Luther Jr. Way / Hearst Avenue	200.6	F	261.1	F	yes - delay increase > 3 sec.
2	Martin Luther Jr. Way / University Avenue	61.3	E	63.2	E	no - delay increase < 3 sec.
3	Martin Luther Jr. Way / Center Street	36.9	D	35.1	D	
4	Martin Luther Jr. Way / Allston Way	40.7	D	80.7	F	yes - LOS changes to "F"
5	Milvia Street / University Avenue	53.2	D	57.5	E	yes - LOS changes to "E"
6	Milvia Street / Center Street	84.0	F	98.1	F	yes - delay increase > 3 sec.
7	Milvia Street / Allston Way	116.4	F	88.9	F	no - delay increase < 3 sec.
8	Shattuck Avenue / Hearst Avenue	137.9	F	12.6	B	
9	Shattuck Avenue / University Avenue	113.2	F	60.7	E	no - delay increase < 3 sec.
10	Shattuck Avenue / Center Street	66.7	E	106.1	F	yes - LOS changes to "F"
11	Shattuck Avenue / Allston Way	38.0	D	122.8	F	yes - LOS changes to "F"
12	Shattuck Avenue / Bancroft Way	16.7	B	67.8	E	yes - LOS changes to "E"
13	Shattuck Avenue / Durant Avenue	16.3	B	89.2	F	yes - LOS changes to "F"

		Baseline		With Project		
No.	Intersection	Delay (in Sec)	LOS	Delay (in Sec)	LOS	Significant Impact
14	Shattuck Avenue / Haste Street	24.0	C	43.0	D	
15	Shattuck Avenue / Dwight Way	50.0	D	35.4	D	
16	Oxford Street / Hearst Avenue	69.9	E	137.3	F	yes - LOS changes to "F"
17	Oxford Street / University Avenue	30.4	C	26.7	C	
18	Oxford Street / Center Street	54.2	D	13.9	B	
19	Oxford Street / Allston Way	64.4	E	112.0	F	yes - LOS changes to "F"
20	Oxford Street / Fulton Street / Bancroft Way	14.4	B	13.2	B	
21	Fulton Street / Durant Avenue	14.9	B	17.4	B	

*All intersections are signalized in the Year 2030 condition

In the Year 2030 Baseline, two intersections in the AM peak hour are forecast to operate at a deficient level of service. By comparison, nine intersections are forecast to operate at a deficient level of service in the PM peak hour.

The roadway network changes proposed in the Year 2030 With Project condition result in changes to traffic distribution within the DAP study area when compared to the Year 2030 Baseline. The ACCMA model forecasts produced for the Year 2030 With Project condition show a shift in automobile traffic volumes away from Shattuck Avenue as more drivers are inclined to use Oxford Street and Milvia Street because of the lane reductions on Shattuck.

In the Year 2030 With Project condition, four intersections in the AM peak hour are forecast to operate at a deficient level of service. By comparison, 13 intersections are forecast to operate at a deficient level of service in the PM peak hour.

Parking Demand

Existing public parking supply in the DAP study area is assumed to be about 3,800 parking spaces. In the Year 2030 Baseline condition, the public parking figure is anticipated to increase by at least 350 parking spaces due to the proposed expansion of the Center Street Garage currently under study and the reopening of the Oxford Plaza Garage, currently under construction. This would result in a supply of about 4,150 public parking spaces in the Year 2030.

Additional parking is planned by UC Berkeley as part of the Long Range Development Plan (LRDP). Up to 1,275 parking spaces are permitted to be developed by UC Berkeley under the LRDP by 2015. The portion of UC Berkeley parking spaces that could be built within the DAP study area has yet to be determined. If UC Berkeley parking is proposed in the DAP study area, UC Berkeley has proposed through the LRDP to attempt to prioritize locations that maximize shared public and campus use and would consider public/private partnerships to develop new parking structures.

Existing usage of on-street and off-street parking spaces is about 2,600 spaces (68%) in the AM peak hours, and 3,300 (86%) in mid day peak hours. With the proposed expansion of public parking capacity to 4,150 spaces, about 850 public parking spaces would be anticipated to be available during the mid-day mid-week time period.

Growth in future parking demand for the Year 2030 Baseline is forecast using the parking rates developed by Wilbur Smith Associates for the City of Berkeley in the MTC Smart Growth Study. The parking rates are presented for each land use considering the mid-day mid-week peak as well as the heaviest use time. The parking rates are applied to the anticipated new residential units and commercial floor area forecast for the DAP study area in the Year 2030 Baseline

condition. It is estimated that demand for up to 2,900 additional parking spaces would be generated during the mid-day mid-week period with the Year 2030 Baseline forecast new land use development in the downtown.

New developments (private and UC Berkeley) constructed as part of the Year 2030 Baseline condition are anticipated to contribute about 2,400 new private parking spaces in the downtown area, based on current city parking standards and the UC Berkeley LRDP. This figure, added to the 850 available public parking spaces, results in a supply increase of about 3,250 parking spaces. This figure exceeds the forecast increase in parking demand; therefore, the anticipated parking supply in the Year 2030 Baseline condition is estimated to be sufficient to accommodate the forecasted increase in parking demand.

The WSA parking demand rates are then applied to the anticipated new residential units and commercial floor area that are forecast for the downtown study area in the Year 2030 With Project condition. In this condition, it is estimated that demand for up to 4,500 additional parking spaces would be generated in the mid-day mid-week period with the Year 2030 With Project land use development.

As occurs in Year 2030 Baseline condition, the new developments (private and UC Berkeley) proposed in the Year 2030 with Project condition would to contribute additional parking spaces in the downtown. The estimated number of new private parking spaces added to the downtown as part of new development would be 4,200 spaces, using existing City parking standards. Adding this private supply to the 850 available public spaces, results in a supply of about 5,050 parking spaces. This supply figure exceeds the new demand of 4,500 parking spaces. Therefore, the parking supply in the Year 2030 With Project condition is estimated to accommodate the forecasted increase in parking demand.

Mitigation Measures

Traffic

Mitigation measures that address the significant traffic impacts are summarized in Table ES-5.

Table ES-5: Mitigation Measures

Intersection	Existing Geometry	With Project Geometry	Impact on LOS With Project	Mitigation Measures	New LOS	Geometry with Mitigation Measures
1	North/South: MLK Jr. Way East/West: Hearst Ave.	North/South: MLK Jr. Way East/West: Hearst Ave.	AM - not deficient PM - maintains LOS "F", delay changes from 200.6s to 261.1s	Add a lane for left turns in WB direction, changing the right lane to through-right.	AM - not deficient PM - maintains LOS "F", delay changes from 200.6s to 131.2s	North/South: MLK Jr. Way East/West: Hearst Ave.
4	North/South: MLK Jr. Way East/West: Allston Way	North/South: MLK Jr. Way East/West: Allston Way	AM - not deficient PM - change in LOS to "F"	Change EB lane configuration to one left turn lane and one through-right lane and add one right turn lane to the SB direction, changing the through-right lane to through only.	AM - not deficient PM - LOS changes to "D" (acceptable) with delay of 49.8s	North/South: MLK Jr. Way East/West: Allston Way
5	North/South: Milvia Street East/West: University Ave.	North/South: Milvia Street East/West: University Ave.	AM - change in LOS to "F" PM - change in LOS to "E"	Add one lane for left turns in the WB direction, changing the middle lane to through only and add one lane for right turns in EB direction, changing the middle lane to through only.	AM - LOS changed to "B" (acceptable) with delay of 14.9s PM - LOS changes to "C" (acceptable) with delay of 25.9	North/South: Milvia Street East/West: University Ave.
6	North/South: Milvia Street East/West: Center Street	North/South: Milvia Street East/West: Center Street	AM - not deficient PM - maintains LOS "F", delay changes from 84.0s to 98.1s	Add one left-turn lane to NB and SB directions	AM - not deficient PM - LOS changes to "C" (acceptable) with delay of 24.0s	North/South: Milvia Street East/West: Center Street

Intersection		With Project Geometry	Impact on LOS With Project	Mitigation Measures	New LOS	Geometry with Mitigation Measures
10	North/South: Shattuck Ave. East/West: Center Street	North/South: Shattuck Ave. East/West: Center Street	AM - not deficient	Add one through lane in NB direction.	AM - not deficient	North/South: Shattuck Ave. East/West: Center Street
			PM - change in LOS to "F"		PM - LOS changes to "D" (acceptable) with delay of 42.6	
11	North/South: Shattuck Ave. East/West: Allston Way	North/South: Shattuck Ave. East/West: Allston Way	AM - not deficient	Add one lane to WB direction and change lane configuration to one right turn lane and one through-left lane and maintain three lanes in NB and SB directions, with one lane for each movement.	AM - not deficient	North/South: Shattuck Ave. East/West: Allston Way
			PM - change in LOS to "F"		PM - LOS changes to "D" (acceptable) with delay of 37.6s	
12	North/South: Shattuck Ave. East/West: Bancroft Way	North/South: Shattuck Ave. East/West: Bancroft Way	AM - not deficient	Maintain two lanes in the SB direction, changing the geometry to one through lane and one through-right lane.	AM - not deficient	North/South: Shattuck Ave. East/West: Bancroft Way
			PM - change in LOS to "E"		PM - LOS changes to "D" (acceptable) with delay of 37.6s	
13	North/South: Shattuck Ave. East/West: Durant Ave.	North/South: Shattuck Ave. East/West: Durant Ave.	AM - change in LOS to "F"	Maintain existing number of lanes in the NB direction, designating one lane for each movement. Increase cycle time by 20s in PM peak.	AM - LOS changes to "B" (acceptable) with delay of 17.8s	North/South: Shattuck Ave. East/West: Durant Ave.
			PM - change in LOS to "F"		PM - LOS changes to "C" (acceptable) with delay of 21.6s	

Intersection	Existing Geometry	With Project Geometry	Impact on LOS With Project	Mitigation Measures	New LOS	Geometry with Mitigation Measures
16	North/South: Oxford Street East/West: Hearst Ave.	North/South: Oxford Street East/West: Hearst Ave.	AM - change in LOS to "F"	Maintain existing geometry in EB direction. Add one left turn lane in the SB direction, changing the middle lane to through only. Convert shared WB left/through lane to through only. Change signal phasing to provide protected left turns for all approaches	AM - LOS changes to "D" (acceptable) with delay of 44.9s	North/South: Oxford Street East/West: Hearst Ave.
			PM - change in LOS to "F"		PM - maintains LOS "E" (same as Baseline), delay changes to 69.0s	
17	North/South: Oxford Street East/West: University Ave.	North/South: Oxford Street East/West: University Ave.	AM – change in LOS to "E"	Maintain original EB configuration	AM - LOS changes to "D" (acceptable) with delay of 40.2s	North/South: Oxford Street East/West: University Ave.
			PM – not deficient		PM – not deficient	
19	North/South: Oxford Street East/West: Allston Way	North/South: Oxford Street East/West: Allston Way	AM - not deficient	Add one lane in EB direction, allowing turn movements to be in separate lanes. Add one right turn lane in SB direction and one left turn lane in NB direction. Increase cycle time by 25s. Protect NB left turn	AM - not deficient	North/South: Oxford Street East/West: Allston Way
			PM - change in LOS to "F"		PM - LOS changes to "C" (acceptable) with delay of 33.6s	

Alameda County Congestion Management Program Analysis

Significant traffic impacts were identified on Ashby Avenue in the Year 2030 With Project condition as part of the Alameda County CMP analysis. The recommended mitigation measure to address these roadway corridor impacts is to implement traffic signal coordination in the Ashby Avenue corridor between San Pablo Avenue and Telegraph Avenue. This mitigation measure is intended to improve traffic flow in the corridor and improve average vehicle speeds during the AM and PM peak hours.

Parking

The analysis of future parking demand in the study area identified that there is likely to be sufficient parking capacity to accommodate future demand.

Transit

The analysis of transit ridership and capacity for the Year 2030 With Project condition identified impacts to selected AC Transit bus lines and BART rail lines. Additionally, several AC Transit bus lines, including the proposed BRT line, and all BART lines serving the City of Berkeley in the Year 2030 are forecast to experience ridership volumes in excess of planned capacity. The City of Berkeley alone does not have the authority to increase service frequencies or the capacity of transit services operating within the City. However, the City does have the ability to provide

support to AC Transit and BART in the form of conditioning new development to contribute to a transportation services fee and/or seeking local, State, or Federal funding sources to assist in the expansion of transit services.

Findings

The key findings of the DAP transportation analysis are as follows:

- Traffic conditions in the DAP study area for the Year 2030 Baseline and Year 2030 With Project (i.e. under DAP assumptions) condition deteriorate when compared to the existing condition. The change in traffic conditions is partially attributable to growth in the study area. However, the substantial amounts of population and employment growth forecasted in the region and increased travel demand throughout Alameda County will also add trips in the study area.

- The ACCMA model forecasts suggest that a significant portion of the observed auto traffic growth within the DAP study area has origins located outside of the DAP boundaries and UC Berkeley campus. This is an important aspect of the analysis, because it demonstrates that while changes to land use densities and policies in the downtown would have an impact on automobile trip generation, the impact of these changes on the downtown roadway network is somewhat diluted by the percentage of trips in the DAP study area that are regional in nature, with origins and destinations located outside the boundaries and jurisdiction of the DAP.

- The population residing with the DAP study area is forecast to increase by 37% between Year 2000 and the Year 2030 Baseline condition. The additional residential units proposed in the Year 2030 With Project condition further increase the forecast population by an additional 50% above the Year 2030 Baseline condition. Employment within the DAP is forecast to grow at a slower pace than population between the Year 2000 and the Year 2030 Baseline condition. The estimated increase for this 30 year period is about 5%. The land use changes proposed in the Year 2030 With Project condition would further increase employment by about 6% above the Year 2030 Baseline forecast.

- The majority (about 60% to 70%) of the future forecast increase in auto trips generated in the DAP study area is projected to occur as part of the Year 2030 Baseline condition, which assumes that the population and employment levels will grow even with no change to the existing zoning. The Year 2030 With Project Condition generates an incremental increase in auto trips for the Year 2030 above the forecast for the Year 2030 Baseline. It is likely that the proposed lane reductions have a greater level of responsibility for the anticipated traffic impacts compared to the proposed land use changes.

- A higher transit mode split is forecast for the Year 2030 With Project condition when compared to the Year 2030 Baseline. This shift reflects the strategies employed with the DAP land use plan to focus density near transit services and stations. The increase in transit mode split also results in a lower number of new auto trips generated by the Year 2030 With Project condition than would otherwise be the case for this level of development.

- The increased land use densities associated with the 2030 With Project condition contributes toward higher levels of pedestrian and bicycle trip generation when compared to the Baseline 2030 condition.

- The proposed lane reductions on Shattuck Avenue between University Avenue and Durant Avenue result in a redistribution of traffic from this corridor to Milvia Street and Oxford Street. However, there does not appear to be a substantial shift in traffic to the Martin Luther King Jr. Way corridor. Unacceptable traffic conditions are forecast for the

Year 2030 With Project condition at several study intersections on Milvia Street and Oxford Street. Targeted improvements may mitigate some of these impacts.

- Traffic operations at intersections on Shattuck Avenue do deteriorate with the implementation of the lane reduction strategy. Targeted improvements to selected intersections could mitigate potentially significant traffic impacts.

- Potential mitigation measures could include improving traffic signal coordination and progression, maintaining travel lanes at intersections and limiting lane reductions, diverting traffic from particular streets, and implementing traffic improvements on streets that are parallel to the roadway segments with proposed lane reductions to better accommodate redistributed traffic volumes.

- The proposed lane reductions on Hearst Avenue and University Avenue (east of Shattuck Square) do not appear to be major contributors to unacceptable traffic conditions forecasted by the model.

- UC Berkeley does contribute a significant number of person trips to the DAP study area. However, the ACCMA model shows a high mode split towards transit use and non-motorized transportation that is consistent with the UC's strategies to promote alternative transportation modes. These trips are also part of the Year 2030 Baseline condition and are forecast to occur with or without the DAP With Project condition.

1.0   INTRODUCTION

This report documents the results of the transportation modeling effort conducted for the Year 2030 condition as part of the transportation analysis for the Downtown Area Plan (DAP) Program Environmental Impact Report (EIR).

1.1 REPORT SECTIONS

The information contained in this report is presented in the following sections:

1.   Introduction

2.   Transportation Analysis Methodology

3.   Existing Transportation Conditions

4.   Year 2030 Estimated Transportation Conditions Without the Proposed Project

5.   Project Trip Generation

6.   Year 2030 Estimated Transportation Conditions With the Proposed Project

7.   Recommended Mitigation Measures

Section 1 introduces the report, identifies the main sections, and provides a general overview of the project area. Section 2 describes the transportation analysis and the modeling process. The existing transportation conditions are presented in Section 3. Section 4 consolidates the results of the forecast transportation conditions for Year 2030 without the proposed project. The forecasts regarding future trip generation in the DAP study area are discussed in Section 5. The results of the analysis of the Year 2030 with proposed project are discussed in Section 6. Section 7 contains the recommended mitigation measures to address traffic impacts anticipated to occur with the proposed project.

1.2 PROJECT DESCRIPTION

The Berkeley Downtown Area Plan (DAP) was developed under the guidance of the Downtown Area Plan Advisory Committee (DAPAC), and the City of Berkeley Planning Commission. This section provides a brief overview of the proposed project, the study area for the transportation analysis, and the study intersections selected for inclusion in the traffic impact analysis.

Study Area

The proposed project site is located in Downtown Berkeley, adjacent to the University of California (UC Berkeley) campus in the City of Berkeley. The DAP study area is bounded by Hearst Avenue to the north, Dwight Way on the south, Martin Luther King Jr. Way to the west and Oxford Street/Fulton Street on the east.

Analysis Years

The transportation analysis described in this report involves the assessment of forecast transportation conditions for Year 2008 with existing transportation infrastructure and for two future scenarios:

- Year 2030 Baseline – This scenario serves as the future no project condition and assumes population and employment growth in the study area consistent with regional growth projections and existing city zoning and development regulations.

- Year 2030 With Project – This scenario incorporates population and employment growth that would be reasonably assumed to occur with the implementation of the proposed

DAP land use plan. The DAP land use plan assumes up to 3,100 new residential units the study area and up to 1,000,000 square feet of non-residential uses (the vast majority of which would be related to University of California, Berkeley growth). This scenario also includes the Alameda County Transit (AC Transit) proposed bus rapid transit (BRT) service operating in the median of Shattuck Avenue between Durant Avenue and the vicinity of Center Street, and changes to the study roadway network that will be described in greater detail later in this report.

Study Intersections

For the DAP Program EIR, a traffic analysis of Year 2030 forecast traffic conditions was performed for 21 intersections within the study area. The intersections analyzed are:

1) Martin Luther King Jr. Way / Hearst Avenue
2) Martin Luther King Jr. Way / University Avenue
3) Martin Luther King Jr. Way / Center Street
4) Martin Luther King Jr. Way / Allston Way
5) Milvia Street / University Avenue
6) Milvia Street / Center Street
7) Milvia Street / Allston Way
8) Shattuck Avenue / Hearst Avenue
9) Shattuck Avenue / University Avenue
10) Shattuck Avenue / Center Street
11) Shattuck Avenue / Allston Way
12) Shattuck Avenue / Bancroft Way
13) Shattuck Avenue / Durant Avenue
14) Shattuck Avenue / Haste Street
15) Shattuck Avenue / Dwight Way
16) Oxford Street / Hearst Avenue
17) Oxford Street / University Avenue
18) Oxford Street / Center Street
19) Oxford Street / Allston Way
20) Oxford Street / Fulton Street / Bancroft Way
21) Oxford Street / Durant Avenue

Figure 1-1 illustrates the project study area, the existing roadway network, and the study intersections.
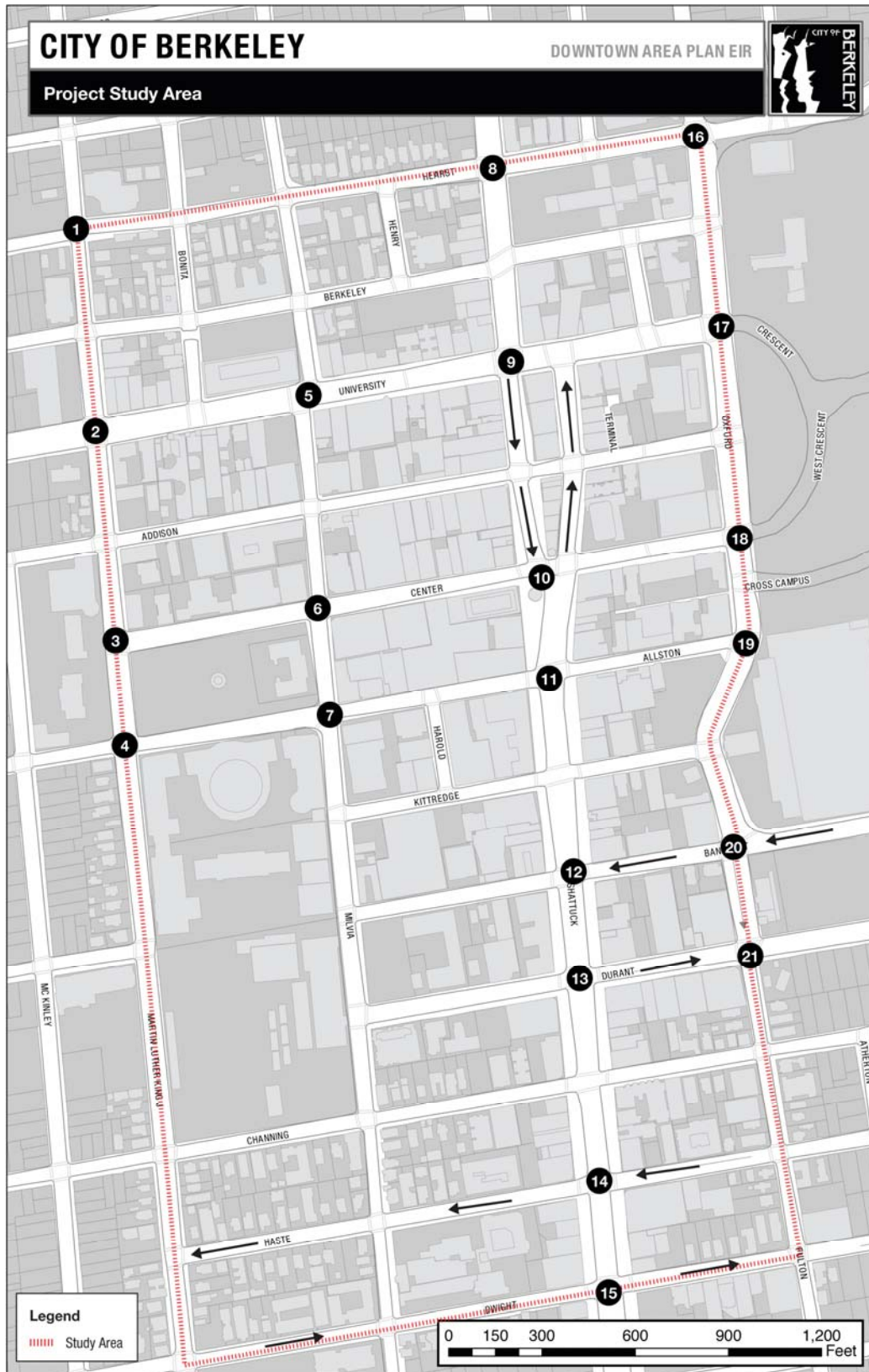
Figure 1-1: Project Study Area, Existing Roadway Network and Study Intersections

Study Area Roadway Network

The roadway network in the study area is defined by a north-south/east-west grid. The main roadways that serve the study area in the north-south direction are Martin Luther King Jr. Way (west boundary), Shattuck Avenue, and Oxford Street (east boundary). Milvia Street is a north-south collector street and Bicycle Boulevard in the study area, and is designed to serve lower traffic volumes than the three previously mentioned major streets. In the east-west direction, there is one main arterial roadway, University Avenue, which provides a connection from the study area to Interstate 80 (I-80). There are several smaller secondary local and collector streets in the study area, such as Hearst Avenue (north boundary), Center Street, Allston Way, Bancroft Way (also a Bicycle Boulevard), Durant Avenue, Haste Street, and Dwight Way (south boundary). Other streets complement the lists presented above, but primarily serve as local access streets. The existing configuration of selected arterial roadways and streets that serve or cross the study area are described below.

- **Shattuck Avenue** is a four-lane divided major street that runs north and south in the project area. Between University Avenue and Center Street, Shattuck Avenue branches into two separate one-way streets. The west branch has three southbound lanes, and the east branch has three northbound lanes. Shattuck Avenue has retail and commercial property along the east and west sides. On-street parking is available, and is separated from through traffic lanes by parking bays with landscaped buffers along some segments.

- **Oxford/Fulton Street** is a north-south divided major street that runs along the west side of the University of California at Berkeley (UCB) campus. The four-lane roadway is named Oxford Street north of Kittredge Street, and becomes Fulton Street south of Kittredge. South of Durant Avenue, Fulton transitions into a one-way street with two southbound lanes. Metered on-street parking is available along both sides of the street.

- **Martin Luther King Jr. Way** is a four-lane undivided major street that runs north and south in the project area.

- **Dwight Way** is an eastbound one-way major street with two lanes.

- **Center Street** is an east-west local street with one lane in each direction. Ground floor retail and restaurants line the street, and there is high pedestrian activity between UC Berkeley and Shattuck Avenue. Center Street is a heavily-used bicycle route with a Class II bike lane from Milvia to Shattuck.

- **Hearst Avenue** is a two-lane major street that runs east and west in the project area.

- **Allston Way** is an east-west local street with one lane in each direction.

- **Kittredge Street** is an east-west local street with one lane in each direction.

- **Bancroft Way** is a two-lane, east-west collector street with one lane in each direction west of Shattuck Avenue. East of Shattuck Avenue, Bancroft is one-way street with two westbound lanes.

- **Durant Avenue** is a two-lane, east-west collector street with one lane in each direction west of Shattuck Avenue. East of Shattuck Avenue, Durant is a one-way street with two eastbound lanes.

- **Channing Way** is a two-lane local street that runs east and west in the project area, and is designated as a Bicycle Boulevard.

The Year 2030 Baseline condition assumes limited changes to the transportation network in the downtown, which include planned service improvements to local AC Transit bus routes contained in the Alameda County Congestion Management Agency (ACCMA) travel demand model and the signalization of the Addison Street, Kittredge Street, and Allston Way intersections along Oxford

Street consistent with the UC Berkeley Long Range Development Plan (LRDP) EIR. The Year 2030 With Project condition proposes several alterations to the transportation network. The transportation network conditions for each of the Year 2030 analysis scenarios are summarized in Table 1-1. The changes are highlighted in Figure 1-2.

Table 1-1: Year 2030 Transportation Network Configuration

Transportation Network Feature	Existing/Year 2030 Baseline Configuration	Year 2030 With Project Configuration
BRT System	n/a	Operation of a BRT System, with vehicles running in dedicated lane on Shattuck Avenue between Durant Avenue and Center Street
Shattuck Avenue (West Shattuck Square between University Avenue and Center Street)	One-way street with three lanes southbound	Two-way street with one lane in each direction
East Shattuck Avenue (East Shattuck Square between University Avenue and Center Street)	One-way street with three lanes northbound	One-way street with one lane northbound, local access only
Shattuck Avenue (between Center Street and Durant Avenue)	Two lanes in each direction	One lane in each direction
Center Street (between Shattuck Avenue and Oxford Street)	Open to auto traffic	Closed to auto traffic, local access only
University Avenue (between Shattuck Avenue and Oxford Street)	Two lanes in each direction	One lane in each direction
Hearst Avenue (between Shattuck Avenue and Oxford Street)	Two lanes in each direction	One lane in each direction

Source: Draft Berkeley Downtown Area Plan

Figure 1-2: Year 2030 With Project Transportation Network

Study Area Socio-Economic Data

The transportation modeling effort was completed using the latest version of the Alameda County Congestion Management Agency (ACCMA) travel demand model, dated July 2007, available at the release of the Notice of Preparation (NOP). The ACCMA model includes estimates of existing development and future forecasted growth in Alameda County that are consistent with the Year 2000 Census and the Association of Bay Area Governments (ABAG) *Projections 2005* data. It is likely that the *Projections 2005* data provides a conservative assessment of growth in the DAP study area and the surrounding region as these forecasts are based on anticipated regional population and employment growth rather than strictly General Plan and zoning regulations.

The ACCMA model generates travel forecasts using socio-economic data factors that are contained within transportation analysis zones (TAZs). The primary socio-economic data factors include population, employment, employed residents, household type and size, income, and age allocations. Alameda County is subdivided into 1,403 TAZs, and the adopted Berkeley DAP study area is comprised of ten of these TAZs. TAZs can vary in size, but are typically larger than standard city blocks and encompass the population and employment figures for several parcels. The size of the TAZs also means that as updates are made to population, households, or employment figures, these changes are made at the TAZ level, not the parcel level. Spreading these changes throughout the TAZ helps to account for factors such as off-site parking, which is common in the downtown area. Figure 1-3 illustrates the TAZ boundaries within the DAP study area.
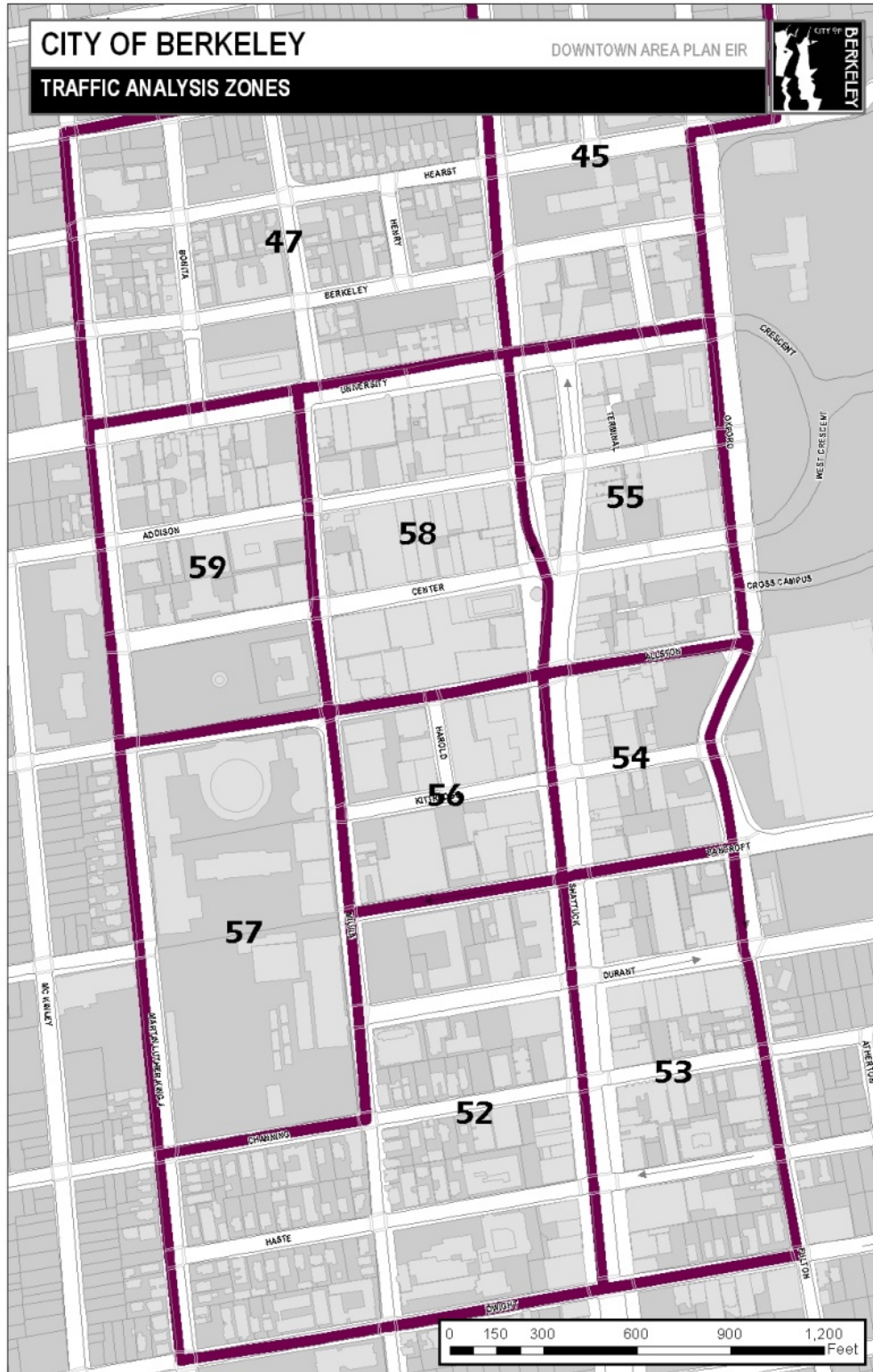
Figure 1-3: DAP Study Area Traffic Analysis Zones

As can be observed in Figure 1-3, the DAP study area boundaries are coincident with the TAZ boundaries in all directions, except to the north. In this direction, there are two TAZs that are not completely contained by the DAP study area. TAZ number 47 has approximately two-thirds of its area inside the DAP boundary, and TAZ number 45 has about one-third of its area within the study area boundary.

As mentioned previously, the population and employment forecasts included in the ACCMA model are based on the *Projections 2005* data prepared by ABAG. The Year 2030 Baseline condition assumed for the DAP transportation modeling effort is consistent with the ACCMA Baseline Year 2030 conditions. In order to produce travel demand forecasts for the Year 2030 With Project condition, updates to the Year 2030 household, population, and employment forecasts were incorporated into the ACCMA model.

The population and employment updates are made at a disaggregated level (parcel level) and then are aggregated to the respective blocks and TAZs. The updates made to the number of households in the study area are consistent with a maximum increase of 3,100 residential dwelling units assumed for the Year 2030 horizon for the DAP. The ACCMA model socio-economic projections estimate an average dwelling unit occupancy of 1.6 persons per unit in the DAP study area. This ratio is slightly lower than the typical ratio assumed in suburban areas (generally just above 2.0 persons per unit), but is believed to be reasonable for the DAP study area given the more urban environment and the prevalence of multi-family units that typically support lower person per unit ratios compared to single family residential areas. The Year 2030 With Project condition maintains the 1.6 persons per unit ratio with the addition of the 3,100 proposed residential units.

Figure 1-4 illustrates the population forecasts assumed in the ACCMA model for the ten ACCMA TAZs that encompass the DAP study area. These TAZs do incorporate about 800 additional residential units north of Hearst Avenue, but the information allows for a comparison between existing and future years. For the With Project condition, population forecasts are developed by converting the proposed residential units to a population figure using the baseline household type and size assumptions for the Year 2030 contained in the ACCMA data files.
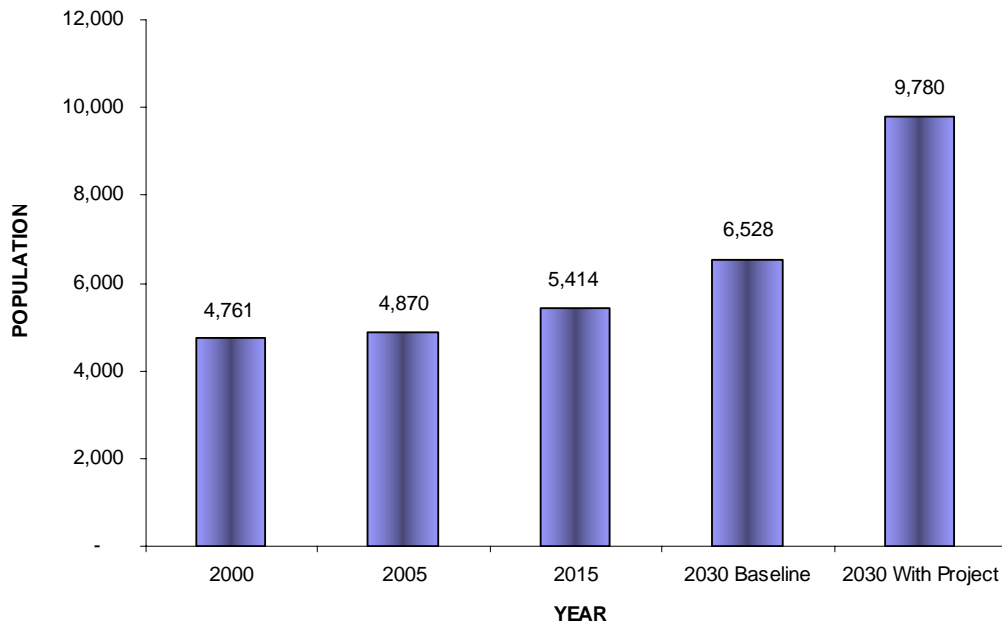
Figure 1-4: Population Forecasts

As shown in Figure 1-4, the population residing within the DAP study area is forecast to increase by 37% between Year 2000 and the Year 2030 Baseline condition. The additional residential units proposed in the Year 2030 With Project condition further increase the forecast population by an additional 50% above the Year 2030 Baseline condition to 105% over the Year 2000 figure.

Employment within the DAP is forecast to grow at a slower pace than population between the Year 2000 and the Year 2030 Baseline condition. The estimated increase for this 30 year period is about 5%. The land use changes proposed in the Year 2030 With Project condition would further increase employment by about 6% above the Year 2030 Baseline forecast to 11% over the Year 2000 figure. Figure 1-5 illustrates the employment forecasts assumed in the ACCMA model for the DAP study area.
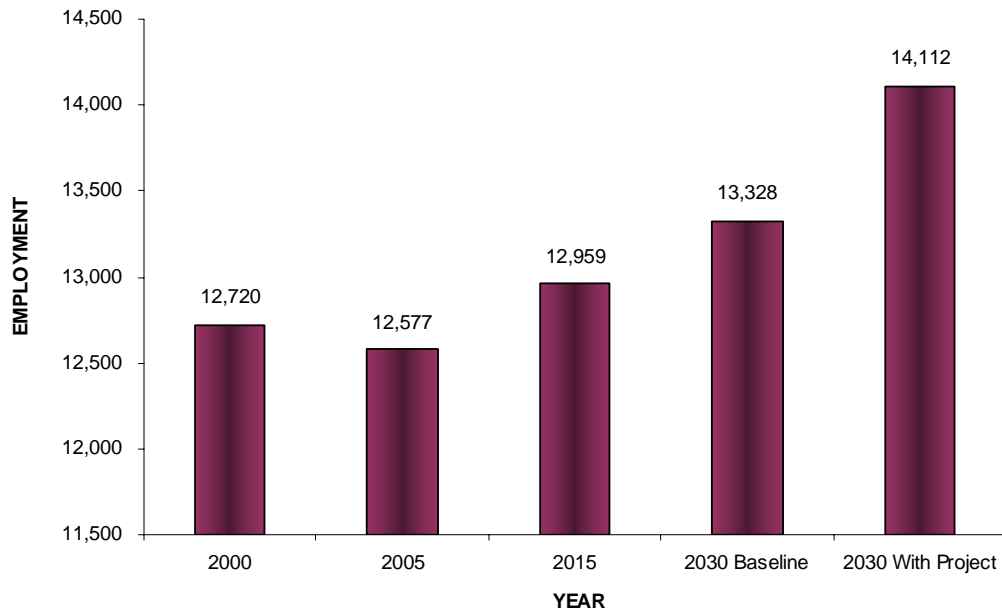
Figure 1-5: Employment Forecasts

The land use changes proposed in the DAP With Project condition add approximately 1,000,000 square feet of new non-residential uses to the existing condition. The vast majority of new non-residential growth is attributable to development by UC Berkeley in the Downtown Area and the adjacent "Tang" site. Aside from the future University Art Museum, UC Berkeley DAP growth has been assumed to be administrative uses because this use generates the highest level of impact among all of the uses that the University is considering. Non-University related non-residential growth was allocated primarily as retail or cultural uses as these are prevalent in the downtown and a majority of this non-residential growth is forecast to be located in the ground floor of mixed-use developments.

Travel demand forecasts for the Year 2030 Baseline condition and the Year 2030 With Project condition were generated using these land use assumptions. Additional detail regarding the results of the transportation modeling effort is provided in subsequent sections of this report.

2.0   TRANSPORTATION ANALYSIS METHODOLOGY

The traffic impact analysis is performed in accordance with the City of Berkeley standards. The analysis examines weekday AM peak hour and PM peak hour traffic conditions in the study area.

2.1 FUTURE TRAFFIC FORECASTING METHODOLOGY

The volumes for the future years are forecasted using the latest available version of the Alameda County Congestion Management Agency (ACCMA) travel demand model. This version of the model is the same version used in the previous Berkeley DAP modeling efforts, conducted in 2007, and is the most recent version available at the time of the release of the NOP. The ACCMA model is a regional travel demand model that is based on and consistent with the larger Metropolitan Transportation Commission (MTC) regional model. The ACCMA model is focused on Alameda County and is intended for use by the ACCMA and local agencies in Alameda County to forecast future travel demand for automobile, transit, and non-motorized transportation modes.

The existing network used to run the ACCMA model was updated near and inside the study area to produce a more representative distribution of the trips using the Downtown's transportation infrastructure. Updates included the inclusion of Milvia Street and the extension of streets such as Bancroft and Durant from Shattuck Avenue to Milvia Street. For the analysis of the Year 2030 With Project Condition, the ACCMA model was updated to include the new transportation network (consisting of the changes to the existing network listed in Table 1-1) and a new socioeconomic data file (generated by the application of the DAP land use assumptions described in Section 1.2). The outputs from the ACCMA model are processed to obtain the necessary data to analyze the forecast demand and traffic conditions.

2.2 TRAFFIC ANALYSIS

The DAP traffic impact analysis is performed in accordance with City of Berkeley Guidelines for Development of Traffic Impact Reports. Study intersection future forecast traffic conditions are analyzed with the Synchro traffic analysis software using the capacity analysis methodology published in the Transportation Research Board – Highway Capacity Manual (HCM) 2000 update.

City of Berkeley defines Level of Service (LOS) "D" or better as acceptable. LOS "E" and "F" are considered to be unacceptable or deficient. Traffic conditions at signalized intersections were evaluated using the 2000 HCM operations methodology for signalized intersections (Operational Method described in Chapter 16, Section II of the HCM), which evaluates capacity in terms of the volume-to-capacity (v/c) ratio and evaluates LOS based on controlled delay per vehicle. Controlled delay is defined as the portion of the total delay attributed to the traffic signal operation including deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The relationship between controlled delay per vehicle and LOS for signalized intersections is summarized in Table 2-1.

Table 2-1: Level of Service for Signalized Intersections

Level of Service	Description of Traffic Conditions	Controlled Delay (sec/veh)
A	Insignificant delays: no approach phase is fully utilized and no vehicle waits longer than one red indication.	≤ 10
B	Minimal delays: an occasional approach phase is fully utilized. Drivers begin to feel restricted.	> 10 – 20
C	Acceptable delays: major approach phase may become fully utilized. Most drivers feel somewhat restricted.	> 20 – 35
D	Tolerable delays: drivers may wait through more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.	> 35 – 55
E	Significant delays: volumes approaching capacity. Vehicles may wait through several cycles and long vehicle queues form upstream.	> 55 – 80
F	Excessive delays: represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	> 80

Source: Highway Capacity Manual, Transportation Research Board, 2000

2.3 DETERMINATION OF SIGNIFICANCE

Traffic Impacts

Per the City's Traffic Impact Report Guidelines (City of Berkeley, September 2005), level of service for signalized intersections and the determination of the threshold for significant impacts are assessed using the following standards:

- The Highway Capacity Manual (2000) defines levels of service based on average seconds of delay per vehicle. The upper threshold for LOS D is 55 sec/veh and for LOS E is 80 seconds/vehicle. The average delay can be significantly affected by signal timing at a signalized intersection. In general, traffic impact analyses should retain cycle lengths, phase minimums, and phasing that occur for existing conditions. Phase lengths can be adjusted but should not adversely affect signal coordination. Any major changes need to be documented and fully justified.

- The City has established significance thresholds based on the fact that for a given level of traffic on critical movements, the delay increases at a greater rate as LOS F is approached. The following average delay thresholds have been established: LOS D to E=2 seconds; LOS E and LOS E to F=3 seconds.

- The volume-to-capacity ratio (v/c) is also an important indicator of capacity and should be included as part of all Level of Service tables. It can indicate the extent to which the signal timing is optimal and provides a useful indicator for over-saturated conditions. However, v/c's are not utilized for identifying level of service. As the delay can increase dramatically with small increases of traffic after LOS F has been reached, a threshold of an increase of 0.01 in the volume-to-capacity ratio will be used.

- Intersection level of service is dependent on a variety of factors. In general, existing timing and phasing should be retained for scenarios with and without the project. In this way, the only variable is the traffic volume, which ensures a valid comparison of project impacts. Nevertheless, with the approval of City staff, mitigations can include changes in signal timing; but care must be taken to ensure that these changes do not affect

operations at adjacent signals. Finally, where closely spaced signals exist, estimated queue lengths should be provided to demonstrate whether or not there are potential impacts on upstream intersections or on access to turn lanes.

Transit Impacts

Significant impacts to ridership capacity on Alameda County (AC) Transit and Bay Area Rapid Transit (BART) services are defined as follows:

- Increase average ridership on AC Transit lines by 3% at bus stops where the average load factor with the project in place would exceed 125% over a peak 30-minute period.

- Increase peak hour ridership on BART by 3% where the passenger volume would exceed the standing capacity of BART trains.

3.0   EXISTING TRANSPORTATION CONDITIONS

This section provides information on the transportation system that serves the project site, including the surrounding street network, bus routes, bicycle paths, and parking facilities. Existing traffic counts and levels of service at the project study intersections are also presented in this section.

3.1 NON-MOTORIZED TRANSPORTATION

Bicycle Transportation

The City of Berkeley has a strong bike mode share and accommodating the bicycle as a mode of transportation is important to the overall success of the downtown network. The city has designated a series of classifications for their bicycle network. These classifications are defined as:

- Class 1 (Bike Path) – Completely separate right-of-way

- Bicycle Boulevard – Modified roadway to meet the needs of the cyclist ("arterials" of citywide bike network)

- Class 2 (Bike Lane) – Striped lane on roadway to designate exclusive bike use

- Class 2.5 (Bike Route) – Signed and improved roadway for bicycles but used in areas where conditions don't allow for designated bike lanes. Provides direct access and connections to major destinations in Berkeley.

- Class 3 (Bike Route) – Signed roadway for bicyclists

In the existing condition, about 3,200 daily bicycle trips are estimated to be generated in the Downtown Area. Bike volumes tend to concentrate outside the downtown core, and within the core at Center Street and Shattuck Avenue. This indicates that bicyclists transitioning between the UC Berkeley campus and the areas to the west prefer less congested streets such as Hearst Avenue, Berkeley Way, Channing Way, and Durant Avenue. The top six intersections for peak hour bike activity considered in the study area are:

- Shattuck Avenue and Hearst Avenue

- Oxford Street and Hearst Avenue

- Martin Luther King Jr. Way and Hearst Avenue

- Martin Luther King Jr. Way and University Avenue

- Shattuck Avenue and University Avenue

- Shattuck Avenue and Center Street

The downtown study area has both an east/west (Channing Way) and a north/south (Milvia Street) Bike Boulevard. These Bike Boulevards provide links to many other bike lanes in the City.

Pedestrians

The downtown study area's urban environment encourages walking as a feasible mode of access. UC Berkeley and Berkeley City College, and the compact development surrounding the major transit hubs, generate the highest volumes of pedestrian activity during certain times of the

day. The Downtown Area is estimated to generate approximately 17,700 pedestrian trips per day in the existing condition.

The pedestrian counts indicate that the intersections with high pedestrian volumes within the study area are:

- Milvia Street and Allston Way
- Milvia Street and Center Street
- Shattuck Avenue and Center Street
- Shattuck Avenue and Allston
- Shattuck Avenue and University Avenue

Existing midday pedestrian volumes can be observed in Figure 3-1, which graphically depicts these movement patterns. The figure also shows intersections where high numbers of accidents involving pedestrians occurred over the past five years.
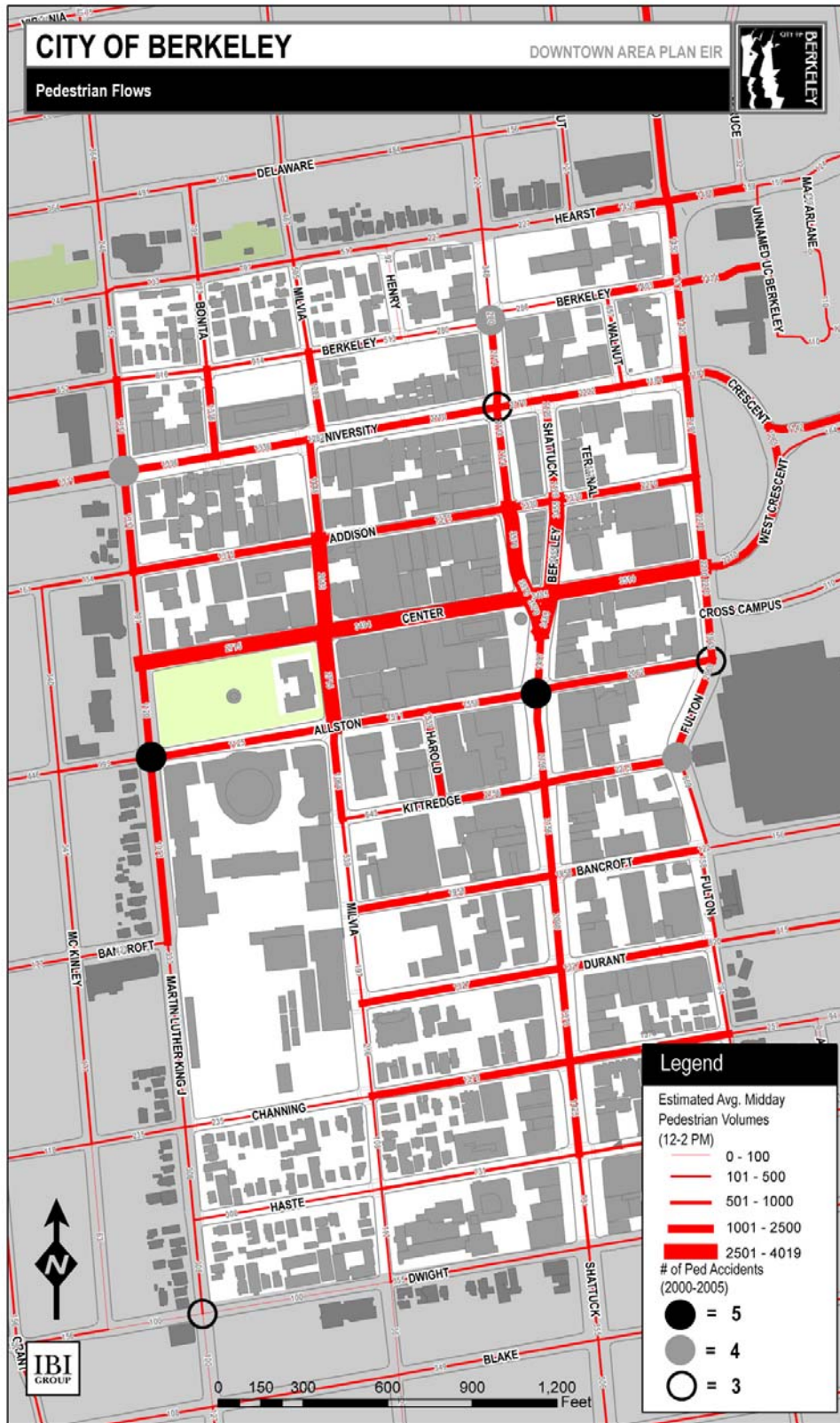
Figure 3-1: Midday Pedestrian Flows (Generated from Space Syntax Model)

3.2 TRANSIT

The Downtown Berkeley area is served by an extensive transit system, including bus service and the Bay Area Rapid Transit (BART) system. Transit service routes and frequencies are discussed in this section. The downtown study area is served by a number of different transit options as summarized in Table 3-1 and shown in Figure 3-2. The transit network includes commuter rail (BART), local and regional bus (AC Transit), and two campus shuttles (UC Shuttle and Lawrence Berkeley Lab Shuttle).

It is estimated that about 38,000 transit passenger trips for all purposes (work and non-work) occur in the study area during an average weekday. Two-thirds of these trips are produced by BART and nearly three-quarters of all transit trips have an origin or destination at the intersection of Shattuck Avenue and Center Street. The approximate location of the total daily activity for the AC Transit and for BART in the downtown area can be observed in Figure 3-3.

Table 3-1: Downtown Study Area Transit Summary

Agency	Mode	Avg. Weekday Trips	Number of Lines	Number of Stops
BART	Commuter Rail	24,316	2	1
AC Transit	Local/Regional Bus	10,743	14	33
UC Shuttle*	Campus Bus	1,425	4	9
Lawrence Berkeley Lab Shuttle	Campus Bus	1,300	2	10
Total		37,784	22	53

* Trips in daytime routes only – nighttime routes add 160 daily trips, 4 lines and 4 stops in Downtown Berkeley

Table 3-2 summarizes the number of bus routes traveling on major roadways in the downtown during peak hours. The numbers reflect the sum of both directions of travel. The numbers include both AC Transit routes and UC Berkeley shuttle routes. This can be better observed in Figure 3-4, which spacializes the transit density in the downtown area for the PM peak hour.

Table 3-2: Bus Route Density in Downtown Berkeley

Street	Segment	Number of Buses During Peak Hour
University Avenue	MLK to Shattuck Avenue	30
University Avenue	Shattuck Avenue to Oxford Street	49
Center Street	MLK to Shattuck Avenue	12
Center Street	Shattuck Avenue to Oxford Street	28
Bancroft Way	Shattuck Avenue to Oxford Street	29
Durant Avenue	Shattuck Avenue to Oxford Street	24
MLK Jr.Way	Hearst Avenue to Center Street	2
Shattuck Avenue	Hearst Avenue to Center Street	42
Shattuck Avenue	Center Street to Durant Avenue	59
Oxford Street	Hearst Avenue to Center Street	25
Oxford/Fulton Street	Center Street to Durant Avenue	16
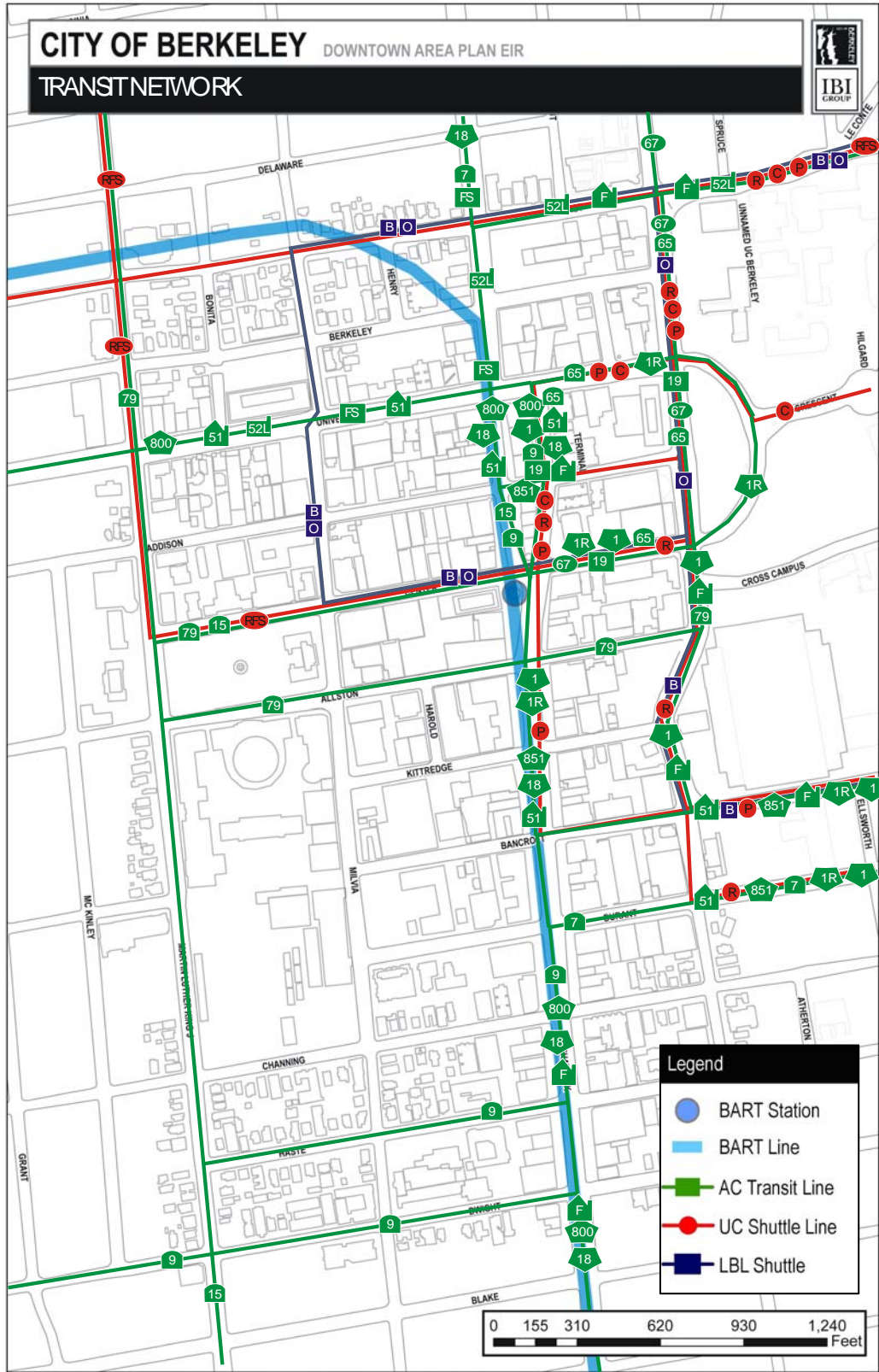
Figure 3-2: Study Area Transit Network (September 2008)

Figure 3-3: Total Daily AC Transit and BART Boardings by Nearest Intersection (Year 2008)
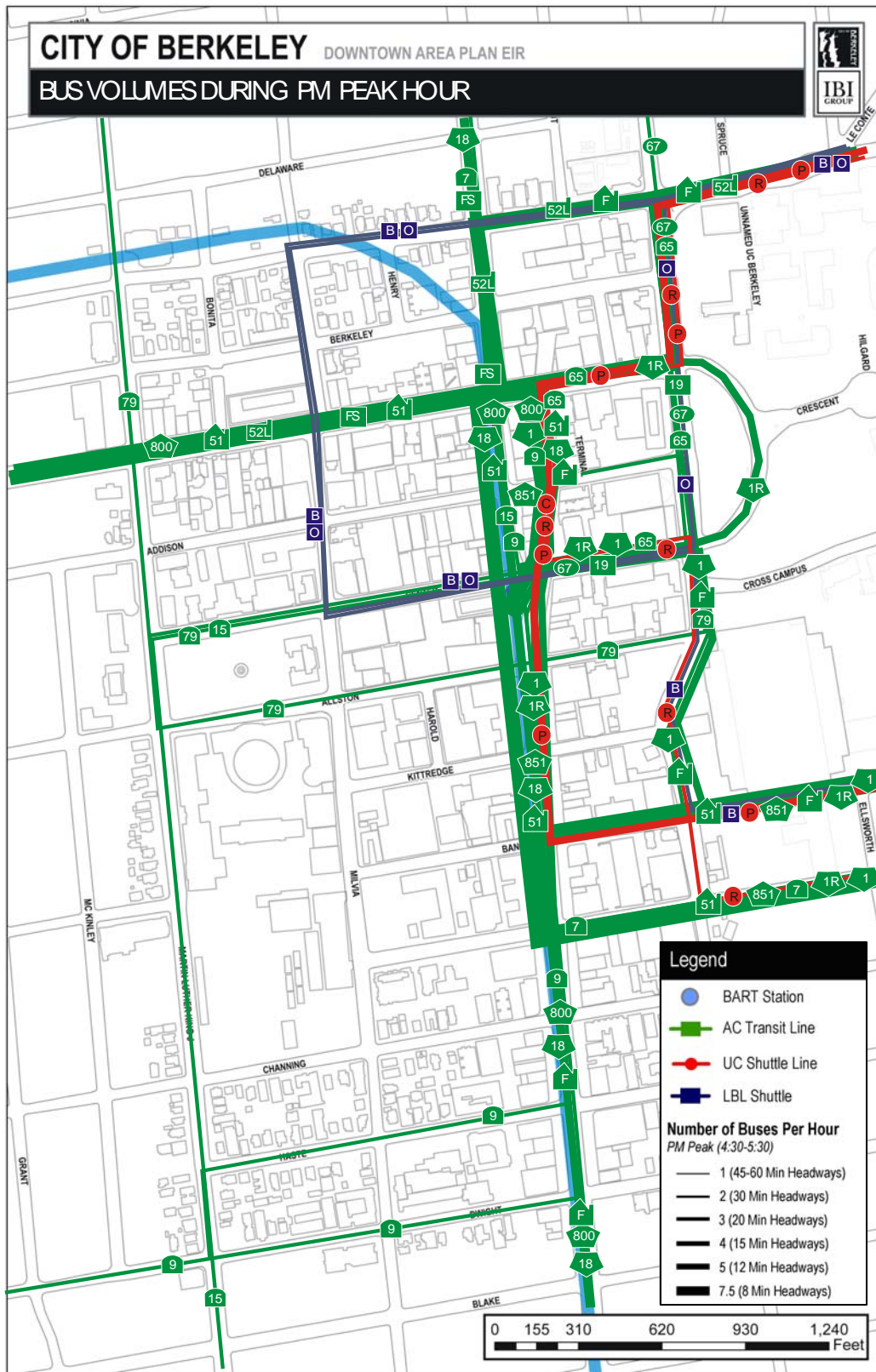
Figure 3-4: Volume of Bus Activity during PM Peak Hour (September 2008)

Bay Area Rapid Transit

The Bay Area Rapid Transit (BART) network provides service to the downtown area through the Downtown Berkeley Station. This station has the eighth highest ridership volume in the BART system. The Average Weekday Passengers at the Downtown Berkeley Station is 24,316[1] people with 11,992 boardings (ons) and 12,324 alightings (offs). The top three BART stations in terms of activity to and from Downtown Berkeley are El Cerrito del Norte (1,808 trips/day), Powell Street (2,358 trips/day), and Embarcadero (1,984 trips/day).

The Downtown Berkeley Station, located near the corner of Center Street and Shattuck Avenue, is served by two lines. The Richmond/Fremont train runs seven days a week between the hours of 4:00 AM and 1:30 AM (weekday), 6:00 AM and 1:30 AM (Saturday), and 8:00 AM and 1:30 AM (Sunday). The Richmond/Daly City/Millbrae train runs six days a week from 4:00 AM to 8:00 PM (weekday), and 9:00 AM to 8:00 PM (Saturday). The train lines operating between Richmond-Daly City/Millbrae and Richmond-Fremont run with 15-minute headways, for a total of 16 stops per hour at this station during the weekday peak periods.

AC Transit

Alameda County Transit (AC Transit) provides bus service to Downtown Berkeley seven days a week, 24 hours a day. A total of 16 routes (twelve local, two Transbay, and two all-night services) link the downtown to the rest of Alameda County and into San Francisco. Individual route descriptions are provided below. Headways range significantly between the different routes. Route 51 has headways as frequent as six to eight minutes during the weekday peak. The all-night routes typically run on 60-minute headways. The line descriptions are outlined below, and the average weekday headway on the local service is approximately 15 to 20 minutes.

AC Transit Local Service

- AC Transit Line 1: Line 1 runs in the north-south direction on weekdays and weekends between Bay Fair BART and Berkeley BART station.

- AC Transit Line 1R: Line 1R runs in the north-south direction on weekdays between Bay Fair BART to the West Entrance of UC Berkeley. It runs in the north/south direction between Bay Fair BART and 12th Street/Broadway.

- AC Transit Line 7 Arlington: Line 7 runs in the north-south direction on weekdays and weekend between Rockridge BART station and El Cerrito Del Norte BART station.

- AC Transit Line 9 Dwight: Line 9 runs in the east-west direction on weekdays and weekend between Berkeley Marina and Ashby Avenue/Claremont Avenue.

- AC Transit Line 15 Martin Luther King Jr.: Line 15 runs in the east-west direction on weekdays and weekends. In eastbound direction it runs between West Entrance of UC Berkeley and Morage Avenue/Medau Place. In westbound direction it runs between Morage Avenue/Medau Place and El Cerrito Plaza BART station.

- AC Transit Line 18: Line 18 runs in the east-west direction on both weekdays and weekends between San Pablo Avenue & Marin Avenue and Moraga Avenue & Medau Place.

- AC Transit Line 19: Line 19 serves the downtown area only on weekdays at select hours (6 trips for AM Peak and 7 trips for PM Peak). On these trips, it runs in the east-west direction from the Fruitvale BART station to the Berkeley BART station. On the

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[1] BART, August 2008

weekends it runs in the east/west direction between the North Berkeley BART station and Fruitvale BART station.

- AC Transit Line 51 Broadway: Line 51 runs in the north-south direction on weekdays and weekend between Broadway/Blanding Avenue and Third Street/University Avenue.

- AC Transit Line 52L University Limited: Line 52L runs in the north-south direction on weekdays and weekend between Bancroft Way/Telegraph Avenue and Jackson Street /Ohlone Avenue.

- AC Transit Line 65 Euclid: Line 65 runs in the east-west direction on weekdays and weekend. In eastbound direction it runs between Berkeley BART station and Grizzly Peak Boulevard /Senior Avenue on weekdays and between Berkeley BART and Lawrence Hall of Science on weekends. In westbound direction it runs between Lawrence Hall of Science and Berkeley BART station on both weekdays and weekends.

- AC Transit Line 67 Spruce: Line 67 runs in the east-west direction on weekdays and weekend. In eastbound direction it runs between Spruce Street/Grizzly Peak Boulevard and Berkeley BART station on weekdays and between Brazilian Building in Tilden Park and Berkeley BART station on weekends. In westbound direction it runs between Berkeley BART station and Spruce Street/Grizzly Peak Boulevard on weekdays and between Berkeley BART station and Brazilian Building in Tilden Park on weekends.

- AC Transit Line 79: Line 79 runs in the east/west direction on both weekdays and weekends between El Cerrito Plaza BART and Berkeley BART.

AC Transit All Nighter Service

- AC Transit Line 800 Transbay All Nighter: Line 800 is a daily service (including holidays) and runs in the east-west direction between Market Street/Van Ness Avenue and Richmond BART station.

- AC Transit Line 851 Broadway All Nighter: Line 851 is a daily service and runs in the north-south direction between Park Street/Santa Clara Avenue and Berkeley BART station.

AC Transit Transbay Service

- AC Transit Line F Adeline: Line F runs in the east-west direction on weekdays and weekend between San Francisco (Transbay Terminal) and University Avenue /Shattuck Avenue.

- AC Transit Line FS North Berkeley: Line FS runs in the east-west direction on weekdays and weekend between San Francisco (Transbay Terminal) and Solano Avenue /Colusa Avenue.

Table 3-3 shows a line by line and directional breakdown for a typical weekday on the AC Transit lines that service the downtown study area. The data presented is specific to the limits of the study area.

Table 3-3: AC Transit Study Area Serving Route Ridership

Route	# of Stops in Downtown	Direction	ON	OFF	Downtown Ridership	Total Downtown Ridership	% of Total Route's Ridership
1	2	NB	2	301	303	688	5%
	5	SB	370	15	385		6%
1R	1	NB	11	560	571	1,031	5%
	1	SB	454	6	460		4%
7	5	SB	314	191	505	910	22%
	3	NB	224	181	405		20%
9	7	EB	236	244	480	999	26%
	7	WB	273	246	519		28%
15	7	EB	241	5	246	555	22%
	7	WB	7	302	309		26%
18	5	EB	370	524	894	1,668	17%
	6	WB	434	340	774		15%
51	7	SB	1123	719	1842	3,584	13%
	5	NB	649	1093	1742		12%
52L	3	SB	73	145	218	396	12%
	3	NB	110	68	178		9%
65	2	EB	249	2	251	436	33%
	1	WB	0	185	185		33%
67	1	EB	0	86	86	290	27%
	3	WB	201	3	204		46%
79	5	EB	13	163	176	282	41%
	4	WB	101	5	106		34%
800	7	EB	10	7	17	25	12%
	7	WB	7	1	8		10%
851	3	SB	9	0	9	16	14%
	2	NB	0	7	7		7%
F	6	EB	94	415	509	1,009	37%
	9	WB	361	139	500		20%
FS	3	WB	0	11	11	21	6%
	3	EB	10	0	10		5%

Source: AC Transit, ridership data from September 2008, exception Route FS (ridership data from 2006)

UC Berkeley Shuttles

The UC Berkeley Shuttles provide service to the downtown study area due the close proximity of the campus to the area. The service is free for students and fares vary from $1.00 to $1.50 for non-students. Four of the five UC Shuttle daytime routes have at least one stop in the downtown study area (Figure 4-19). Shuttles run Monday through Friday with both daytime and nighttime service. The daytime service runs from 6:45 AM to 7:30 PM. The nighttime service runs from 7:30 PM to 3:00 AM. Weekday headways vary between 12 and 30 minutes. There is also a door-to-door night safety shuttle, named the "Owl Line" that runs from 3:00 AM to 6:00 AM upon phone

request. The Average Weekday Passengers is 1,585 people system wide. Figure 3-2 in the beginning of this section displays the UC Berkeley shuttle routes serving downtown with existing AC Transit bus services. Table 3-4 presents the average daily ridership for the UC Berkeley Shuttles.

Table 3-4: UC Berkeley Shuttle Ridership

Shuttle Line	Average Daily Ridership
Perimeter (P)	829
Reverse Perimeter (R)	238
Hill (H)	274
Central Campus (C)	36
Richmond Field Station (RFS)	48
Night Safety (N)	26
Night Safety (D)	27
Night Safety (E)	88
Night Safety (A)	19
Total	1,585

Source: UC Parking & Transportation Department, September 2008

Downtown Study Area
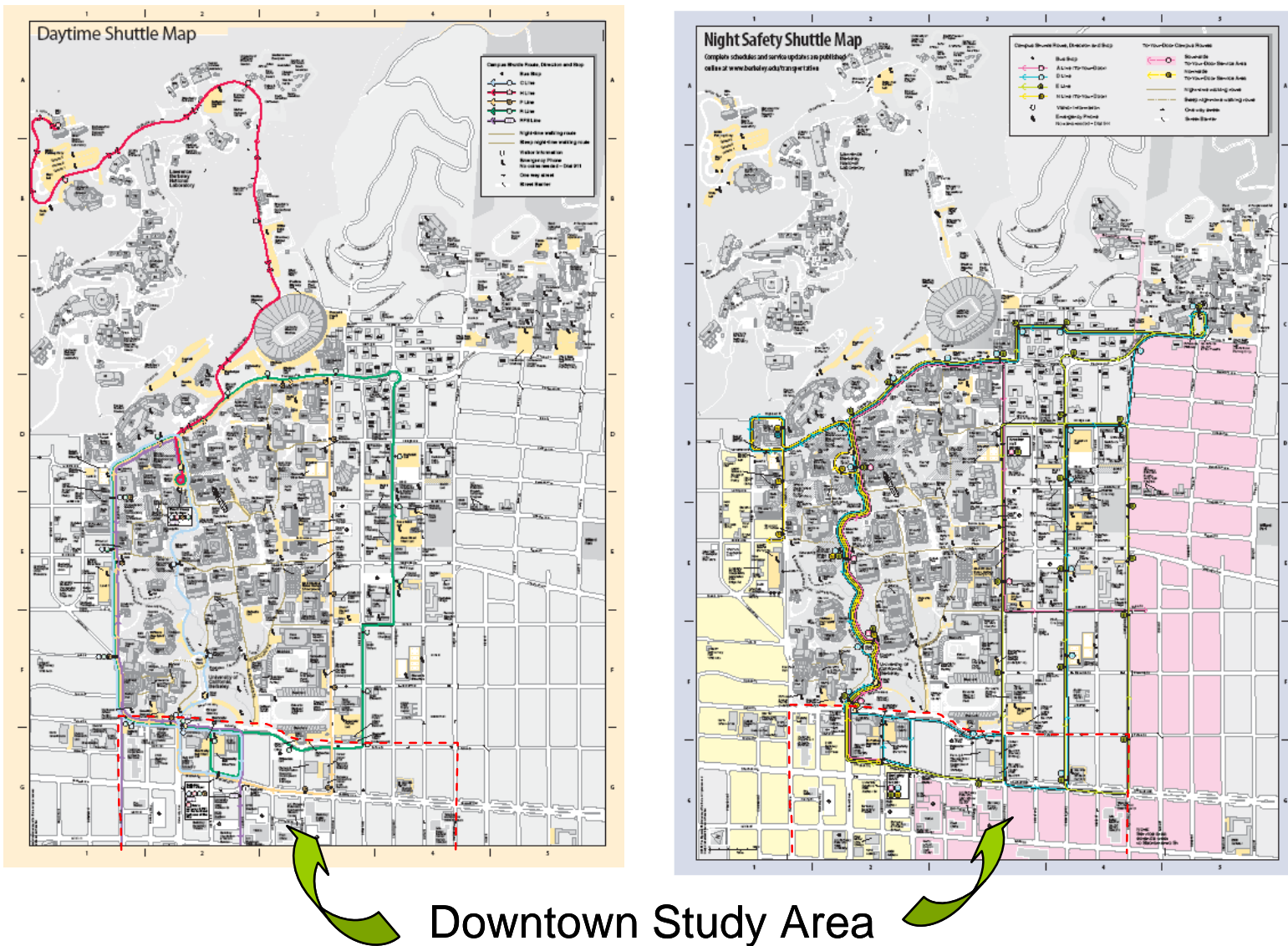
Figure 3-5: UC Shuttle Network

Lawrence Berkeley Lab Shuttles

The Lawrence Berkeley Lab, located in the Berkeley Hills to the east of campus, provides its own off-site shuttle service to the downtown study area. The service is free of charge for students, employees, and guests. Two of the three off-site routes connect the Laboratory to the downtown (Figure 3-6). The Orange Route traverses through the study area, servicing BART and multiple stops along Center Street, Milvia Street, and Hearst Avenue. It runs from 6:28 AM to 6:58 PM on 15-minute headways (30-minute headways during the first two and last hour of service). The Blue Route runs along the east side of the study area, entering Oxford Street on Bancroft, turning left on Center Street, right on Milvia Street and exiting the study area on Hearst Avenue. This route is offered from 6:10 AM to 7:25 PM, running on 15-minute headways (30-minute headways during the final two hours of service).

The current[2] daily average ridership provided from the Lab's transportation coordinator is 1,300 users system wide and does not include detailed stop by stop or line by line breakdowns.

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[2] Data provided in September 2008
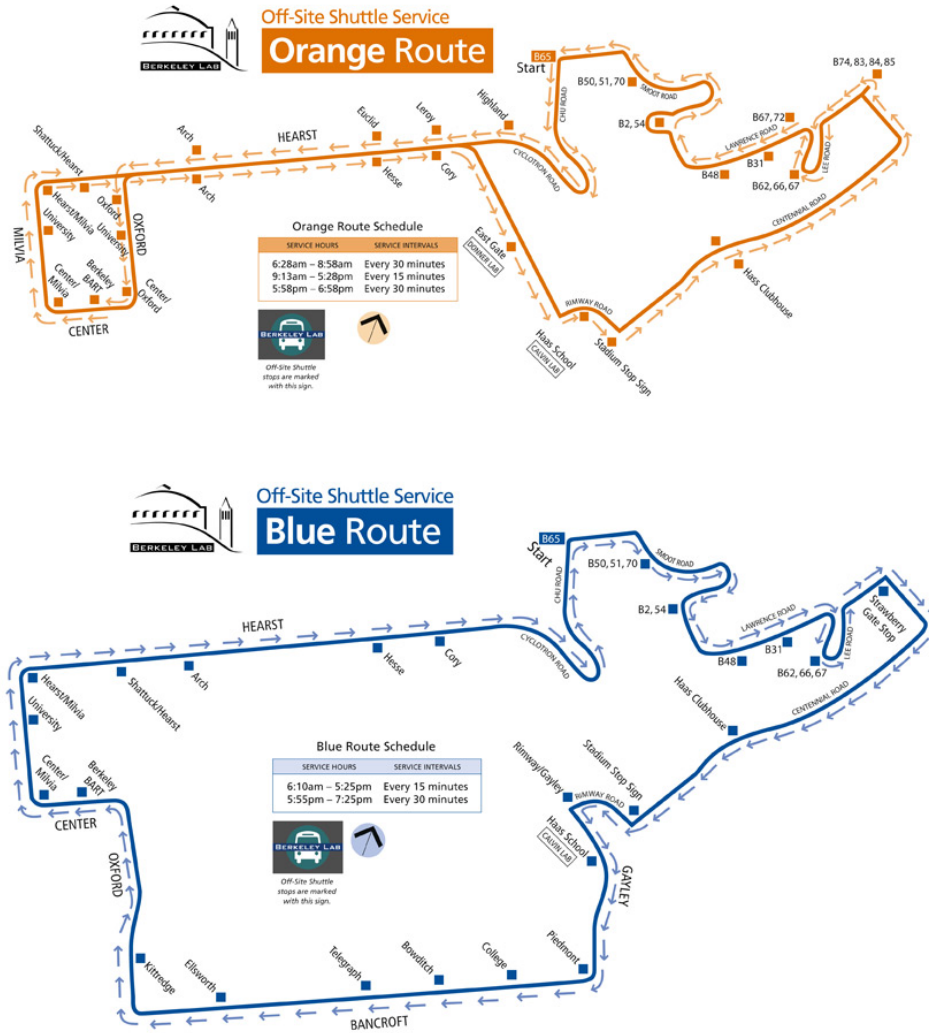
Figure 3-6: Lawrence Berkeley Lab Shuttle Routes Serving the Study Area

3.3 TRAFFIC

The DAP existing conditions traffic impact analysis is performed in accordance with City of Berkeley Guidelines for Development of Traffic Impact Reports. Traffic operations are analyzed with the Synchro traffic analysis software using the capacity analysis methodology published in the Transportation Research Board – Highway Capacity Manual (HCM) 2000 update. Signalized intersections are analyzed using the Operational Method described in Chapter 16, Section II of the HCM, and unsignalized intersections are analyzed using HCM Chapter 17.

Existing lane geometries at each of the project study intersections are illustrated in Figure 3-7 on the following page.

North/South: MLK Jr. Way
East/West: Hearst Ave.

1

North/South: Shattuck Ave.
East/West: University Ave.

9

North/South: Oxford Street
East/West: University Ave.

17

North/South: MLK Jr. Way
East/West: University Ave.

2

North/South: Shattuck Ave.
East/West: Center Street

10

North/South: Oxford Street
East/West: Center Street

18

North/South: MLK Jr. Way
East/West: Center Street

3

North/South: Shattuck Ave.
East/West: Allston Way

11

North/South: Oxford Street
East/West: Allston Way

19

North/South: MLK Jr. Way
East/West: Allston Way

4

North/South: Shattuck Ave.
East/West: Bancroft Way

12

North/South: Fulton Street
East/West: Bancroft Way

20

North/South: Milvia Street
East/West: University Ave.

5

North/South: Shattuck Ave.
East/West: Durant Ave.

13

North/South: Fulton Street
East/West: Durant Ave.

21

North/South: Milvia Street
East/West: Center Street

6

North/South: Shattuck Ave.
East/West: Haste Street

14

North/South: Milvia Street
East/West: Allston Way

7

North/South: Shattuck Ave.
East/West: Dwight Way

15

North/South: Shattuck Ave.
East/West: Hearst Ave.

8

North/South: Oxford Street
East/West: Hearst Ave.

16

Map labels:
Martin Luther King Jr. Wy.
Delaware St.
Milvia St.
Shattuck Ave.
Walnut St.
Oxford St.
Hearst Ave.
Berkeley Wy.
Bonita St.
University Ave.
Addison St.
W. Entrance
Campanile Wy.
Grove St.
Center St.
Allston Wy.
Kittredge St.
Fulton St.
Bancroft Wy.
Durant Ave.
Channing Wy.
Haste St.
Dwight Wy.

N

LEGEND
● Study Intersection - Signalized
○ Study Intersection - Unsignalized
Intersection Geometry

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Berkeley Downtown Area Traffic Impact Analysis

Existing Study Intersection Geometry

Figure 3-7

The existing traffic conditions are analyzed in terms of level of service according to methodology presented in Section 2. The weekday and weekend peak hour conditions are presented below.

Weekday Peak Hour Conditions

Existing traffic volumes at the project study intersections were obtained from the City of Berkeley or through traffic counts conducted in November 2006. A growth factor of 1% per year is applied to all traffic volumes collected from previous years in order to estimate Year 2008 conditions. Figures 3-8 and 3-9 summarize the existing traffic volumes at each of the study intersections.

Table 3-5 and Table 3-6 summarize the level of service values for study intersections in the existing condition.

Table 3-5: Existing Condition AM Peak Hour Level of Service

No.	Intersection	Control	V/C	Delay (in Sec)	LOS
1	Martin Luther Jr. Way / Hearst Avenue	Signalized	0.49	13.4	B
2	Martin Luther Jr. Way / University Avenue	Signalized	0.61	20.7	C
3	Martin Luther Jr. Way / Center Street	Signalized	0.55	10.6	B
4	Martin Luther Jr. Way / Allston Way	Signalized	0.50	14.2	B
5	Milvia Street / University Avenue	Signalized	0.40	7.2	A
6	Milvia Street / Center Street	Signalized	0.28	12.5	B
7	Milvia Street / Allston Way	Signalized	0.37	11.0	B
8	Shattuck Avenue / Hearst Avenue	Signalized	0.36	14.9	B
9	Shattuck Avenue / University Avenue	Signalized	0.41	14.2	B
10	Shattuck Avenue / Center Street	Signalized	0.25	11.2	B
11	Shattuck Avenue / Allston Way	Signalized	0.43	10.8	B
12	Shattuck Avenue / Bancroft Way	Signalized	0.32	6.1	A
13	Shattuck Avenue / Durant Avenue	Signalized	0.44	12.8	B
14	Shattuck Avenue / Haste Street	Signalized	0.48	9.3	A
15	Shattuck Avenue / Dwight Way	Signalized	0.63	16.2	B
16	Oxford Street / Hearst Avenue	Signalized	0.55	34.0	C
17	Oxford Street / University Avenue	Signalized	0.59	21.2	C
18	Oxford Street / Center Street	Signalized	0.37	12.3	B
19	Oxford Street / Allston Way	Unsignalized/ EB stop	0.43	0.8	A
20	Oxford Street / Fulton Street / Bancroft Way	Signalized	0.39	11.9	B
21	Fulton Street / Durant Avenue	Signalized	0.45	11.3	B

Table 3-6: Existing Condition PM Peak Hour Level of Service

No.	Intersection	Control	V/C	Delay (in Sec)	LOS
1	Martin Luther Jr. Way / Hearst Avenue	Signalized	0.58	14.8	B
2	Martin Luther Jr. Way / University Avenue	Signalized	0.67	20.5	C
3	Martin Luther Jr. Way / Center Street	Signalized	0.42	11.7	B
4	Martin Luther Jr. Way / Allston Way	Signalized	0.46	13.2	B
5	Milvia Street / University Avenue	Signalized	0.64	12.2	B
6	Milvia Street / Center Street	Signalized	0.51	12.7	B
7	Milvia Street / Allston Way	Signalized	0.56	13.8	B
8	Shattuck Avenue / Hearst Avenue	Signalized	0.40	18.3	B

No.	Intersection	Control	V/C	Delay (in Sec)	LOS
9	Shattuck Avenue / University Avenue	Signalized	0.44	15.0	B
10	Shattuck Avenue / Center Street	Signalized	0.31	10.1	B
11	Shattuck Avenue / Allston Way	Signalized	0.60	13.0	B
12	Shattuck Avenue / Bancroft Way	Signalized	0.47	5.9	A
13	Shattuck Avenue / Durant Avenue	Signalized	0.52	14.6	B
14	Shattuck Avenue / Haste Street	Signalized	0.59	9.3	A
15	Shattuck Avenue / Dwight Way	Signalized	0.72	17.7	B
16	Oxford Street / Hearst Avenue	Signalized	0.52	26.1	C
17	Oxford Street / University Avenue	Signalized	0.58	21.8	C
18	Oxford Street / Center Street	Signalized	0.39	12.0	B
19	Oxford Street / Allston Way	Unsignalized/ EB stop	0.59	7.3	A
20	Oxford Street / Fulton Street / Bancroft Way	Signalized	0.57	11.3	B
21	Fulton Street / Durant Avenue	Signalized	0.40	10.0	A

The LOS results summarized in Tables 3-5 and 3-6 present average intersection delay at the 21 study intersections in the downtown. The City of Berkeley Traffic Impact Guidelines also require that approach delay and level of service at two-way stop sign controlled intersections be provided for the approach(es) controlled by stop signs. There is one intersection that qualifies for this category. Table 3-7 summarizes the worst approach LOS at the unsignalized intersection during the AM and PM peak hours.

Table 3-7: Unsignalized Intersection Controlled Approach Level of Service

No.	Intersection	AM Peak			PM Peak		
		Approach	Delay (in sec)	LOS	Approach	Delay (in sec)	LOS
19	Oxford Street / Allston Way	EB	20.2	C	EB	132	F

At the intersection summarized in Table 3-7, the worst approach is operating at LOS "F" on the weekday PM peak hour. The City of Berkeley Traffic Impact Guidelines do not specifically call for mitigations at unsignalized intersections that experience a LOS "F" in a single approach, if the full intersection average delay is still acceptable based on the city guidelines. However, it is important to note that this intersection will be signalized in the future and is expected to operate at an acceptable level of service with signal control.

North/South: MLK Jr. Way.
East/West: Hearst Ave.
890
11 40
26 17 124
241 ①
51 74
8 78
549

North/South: MLK Jr. Way
East/West: University Ave.
964
43 51
63 36
613 ② 536
143 42
161 81
596

North/South: MLK Jr. Way
East/West: Center Street
915
170
128
③
72
95
690

North/South: MLK Jr. Way
East/West: Allston Way
867
106 118
111 106
136 ④ 125
95 51
103 127
626

North/South: Milvia Street
East/West: University Ave.
169
87 12
25 20
566 ⑤ 426
127 20
105 23
104

North/South: Milvia Street
East/West: Center Street
243
25 39
11 33
58 ⑥ 52
32 22
31 34
185

North/South: Milvia Street
East/West: Allston Way
164
83 42
80 52
148 ⑦ 68
97 25
57 36
134

North/South: Shattuck Ave.
East/West: Hearst Ave.
692
48 132
20 88
280 ⑧ 187
36 64
10 34
291

North/South: Shattuck Ave.
East/West: University Ave.
587
142 68
84 224
458 ⑨ 321
196 20

North/South: Shattuck Ave.
East/West: Center Street
672
71 12
37 ⑩ 115
55 12

North/South: Shattuck Ave.
East/West: Allston Way
799
84 30
43 16
38 ⑪ 36
100 5
104 18
654

North/South: Shattuck Ave.
East/West: Bancroft Way
751
20 66
⑫ 71
63 124
49
751

North/South: Shattuck Ave.
East/West: Durant Ave.
826
10 62
12
35 ⑬
13
30 345
759

North/South: Shattuck Ave.
East/West: Haste Street
871
36
82
⑭ 246
125
58
1092

North/South: Shattuck Ave.
East/West: Dwight Way
965
98
88
402 ⑮
85
168
1028

North/South: Oxford Street
East/West: University Ave.
894
67 32
390 14
37 ⑰ 17
231 11
129 16
295

North/South: Oxford Street
East/West: Center Street
1033
35 9
18 10
13 ⑱ 11
25 15
45 26
445

North/South: Oxford Street
East/West: Allston Way
1077
35
16 ⑲
43
20
615

North/South: Fulton Street
East/West: Bancroft Way
951
118 462
⑳ 171
71
41
93

North/South: Fulton Street
East/West: Durant Ave.
569
0 422
104
302 ㉑
40

North/South: Oxford Street
East/West: Hearst Ave.
685
24 96
22 33
344 ⑯ 203
110 159
49 408
236

N

LEGEND
● Study Intersection - Signalized
○ Study Intersection - Unsignalized
AM Peak Hour Volume

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Berkeley Downtown Area Traffic Impact Analysis

Existing Conditions Intersection Volumes - AM Peak Hour

Figure 3-8

North/South: MLK Jr. Way
East/West: Hearst Ave.
1
740
25 26
82 38
163 → ● ← 289
31 73
43 51
777

North/South: Shattuck Ave.
East/West: University Ave.
9
524
80 31
87 431
489 → ● ← 628
159 53

North/South: Oxford Street
East/West: University Ave.
17
700
123 8
301 23
51 → ● ← 12
247 6
238
699

North/South: MLK Jr. Way
East/West: University Ave.
2
560
94 39
87 41
739 → ● ← 907
193 96
276 38
738

North/South: Shattuck Ave.
East/West: Center Street
10
588
96 8
77 → ● ← 183
86 32

North/South: Oxford Street
East/West: Center Street
18
949
57 9
37 9
11 → ● ← 15
66 37
75 19
881

North/South: MLK Jr. Way
East/West: Center Street
3
865
57
111
● ↑
87
77
1050

North/South: Shattuck Ave.
East/West: Allston Way
11
970
86 49
62 27
49 → ● ← 25
159 17
71 69
876

North/South: Oxford Street
East/West: Allston Way
19
1003
35
90
●
21
27
897

North/South: MLK Jr. Way
East/West: Allston Way
4
781
56 100
85 85
91 → ● ← 114
87 68
93 66
968

North/South: Shattuck Ave.
East/West: Bancroft Way
12
937
52
181
● ← 77
46 207
53
1018

North/South: Fulton Street
East/West: Bancroft Way
20
964
143
821
● ← 309
84
8
137

North/South: Milvia Street
East/West: University Ave.
5
225
71 34
77 33
709 → ● ← 735
108 6
219 59
186

North/South: Shattuck Ave.
East/West: Durant Ave.
13
1035
22 98
26
59 → ●
47
80 210
1051

North/South: Fulton Street
East/West: Durant Ave.
21
654
0 400
157
179 → ●
24

North/South: Milvia Street
East/West: Center Street
6
210
63 58
18 82
74 → ● ← 103
39 41
63 81
329

North/South: Shattuck Ave.
East/West: Haste Street
14
1117
48
115
● 366
186
89
1194

North/South: Milvia Street
East/West: Allston Way
7
222
55 41
52 108
99 → ● ← 131
106 44
100 62
292

North/South: Shattuck Ave.
East/West: Dwight Way
15
1257
125
61
379 → ●
154
101
1269

North/South: Shattuck Ave.
East/West: Hearst Ave.
8
534
27 100
73 144
238 → ● ← 327
3 92
17 14
601

North/South: Oxford Street
East/West: Hearst Ave.
16
404
30 30
21 60
228 → ● ← 446
82 333
112 189
709

LEGEND
● Study Intersection - Signalized
○ Study Intersection - Unsignalized
PM Peak Hour Volume

Berkeley Downtown Area Traffic Impact Analysis

Existing Conditions Intersection Volumes - PM Peak Hour

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Figure 3-9

3.4 PARKING

Parking Supply and Policies

The downtown study area has an estimated combined 3,800 public parking spaces available between garages and lots (2,150 spaces) and on-street metered spaces (1,650 spaces). The off-street public parking supply is owned by the private sector and two public agencies. The ownership shares are illustrated in Figure 3-10.

Off-Street Parking Ownership
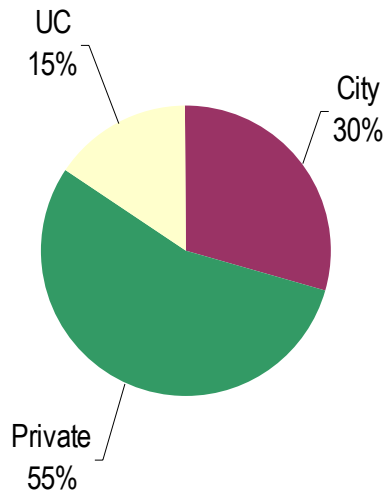
Figure 3-10: Distribution of downtown area off-street parking ownership

Four new developments are expected to add to or modify the existing parking supply in the downtown study area and are listed under Table 3-8. Except for Oxford Plaza and Library Gardens, other developments are in the planning stages. The supply of parking spaces for the developments in planning stages is subject to change.

Table 3-8: New Parking Developments

Name	Location	Status	# Public Spaces		Total Spaces Public	Total Spaces Private
			Daytime	Evening	Public	Private
Oxford Plaza*	Oxford between Allston & Kittredge	Under construction / Opening April 2009	97	97	97	40
Center Street Garage	Between Center and Addison and Milvia and Shattuck	Planning Stage	~250(net increase)	~250 (net increase)	~250 (net increase)	0
Berkeley High School	Milvia between Bancroft & Durant	Planning Stage	0	180	0	180
UC Hotel and Conference Facility	Shattuck Square and Center	Proposed	200	200	200	0
Total			677	857	677	330

* The old Oxford Plaza lot provided 132 spaces. The rebuilt lot will result in a net loss of 35 public parking spaces.

Off-street parking facility locations are shown in Figure 3.11 on the following page.

The on-street supply is composed of 600 single-head metered spaces with time limits varying from 10 minutes to 2 hours, 697 "Pay and Display" spaces, and approximately 375 free parking spaces within Residential Parking Permit areas (2 hour limit between 8:00 AM and 7:00 PM, except Saturdays, Sundays and Holidays). The rates for on-street metered spaces are currently $1.25 per hour. The spatial distribution of the on-street parking supply is shown in Figure 3-12. Figure 3-13 presents the distribution of the designated Residential Parking Permit Zones.
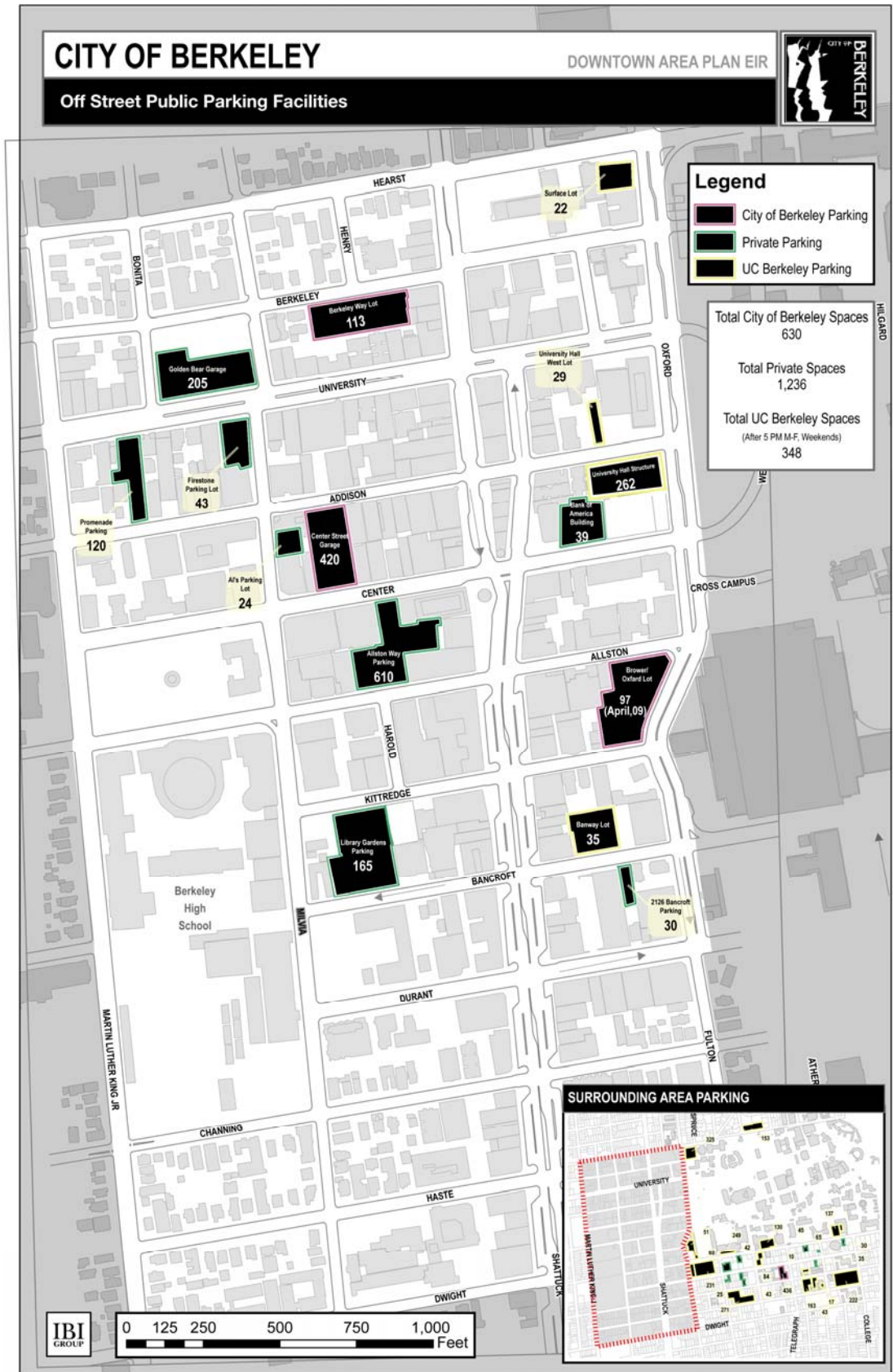
Figure 3-11: Off Street Parking Facilities
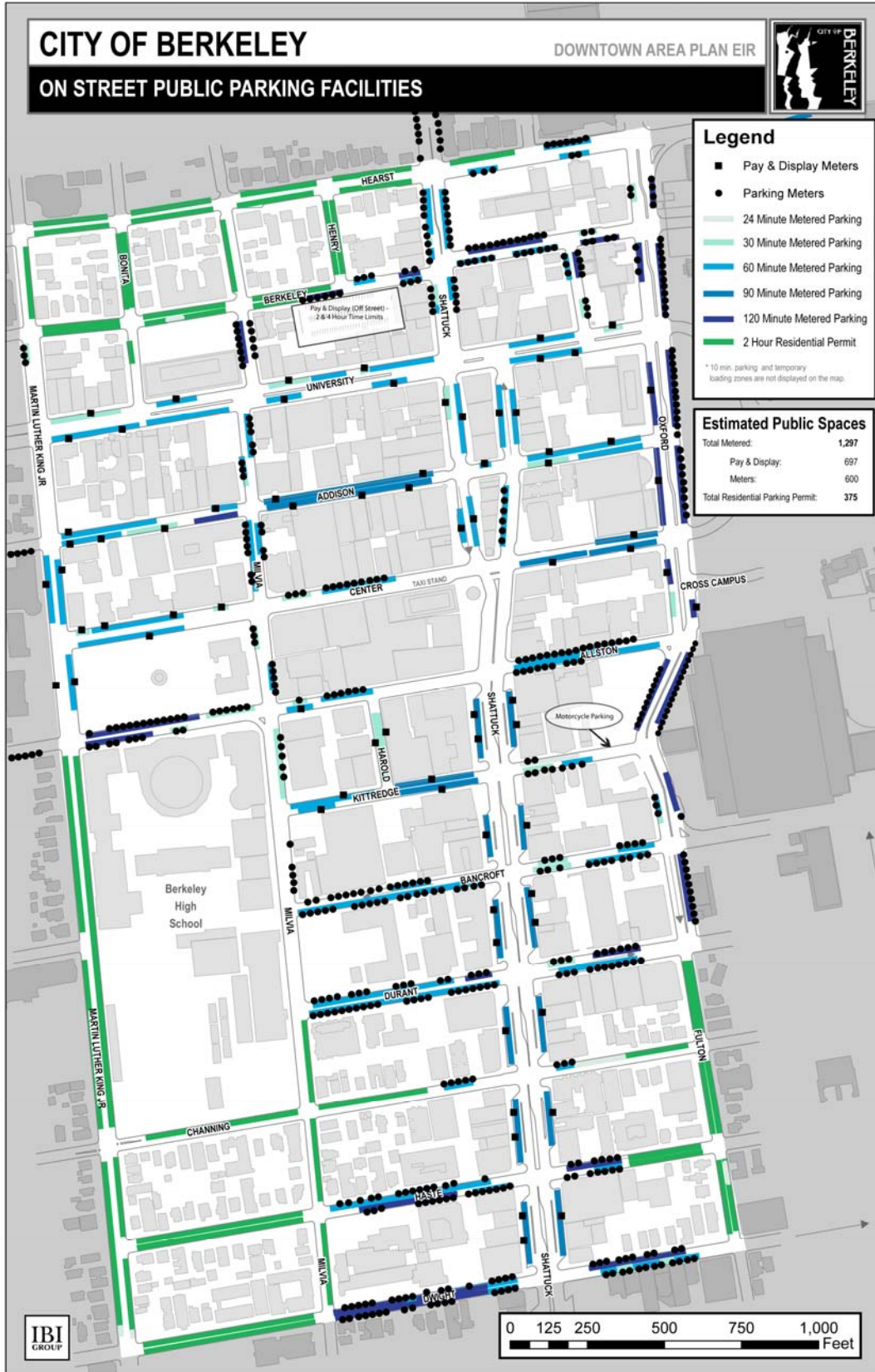
Figure 3-12: On-Street Parking

Figure 3-13: Residential Parking Permit Zones

Table 3-9 displays the current parking standards based on the City's zoning code. This table is accompanied by a map showing the spatial locations of the corresponding zoning classifications.

The zoning classifications used in Table 3-9 are:

- R2A – Multiple Family Residential District (medium density residential)
- R3 – Multiple Family Residential (higher density residential)
- R4 - Multiple Family Residential (higher density residential)
- C-1 – General Commercial
- C-2 – Central Commercial
- C-N – Neighborhood Commercial
- C-SA – South Area Commercial

Table 3-9: City Parking Standards

Use	Off Street Requirement	R2A	R3	R4	C-1	C-2	C-N	C-SA
Dwelling: Dorms; Fraternity and Sorority Houses; Rooming and Boarding Houses; and Senior Congregate Housing	One per 5 residents, plus one for manager		▒	▒				
Dwelling: One and Two Family	One per unit*	▒	▒	▒				
Dwelling: One to Four Units	One per unit						▒	
Dwelling: Multiple	One per unit (75% less for seniors)	▒						
Dwelling: Multiple (fewer than 10)	One per unit (75% less for seniors)		▒	▒				
Dwelling: Multiple (5 or more)	One per 3 dwelling units					▒		
Dwelling: Multiple (10 or more)	One per 1,000 sq. ft. of gross floor area (75% less for seniors)		▒	▒				
Employees: Community Care Facility	One per 2 non-resident employees for a Community Care Facility**	▒	▒	▒				
Group Living Accommodations	One per 4 residents						▒	
Senior Congregate Housing	One per each 5 residents plus 1 for manager	▒						
Nursing Homes	One per each 5 residents, plus one per each 3 employees	▒	▒	▒				
Hospitals	One per each 4 beds, plus one per each 3 employees	▒	▒	▒	▒		▒	
Room Rentals	One per each 2 roomers or boarders	▒						
Hotels	One per each 3 guest rooms, plus one per each 3 employees			▒	▒	▒		
Motels	One per each guest/sleeping room plus one space for owner or manager					▒		
Single Room Occupancy Residential Hotels, with only common facilities	One per 8 residents					▒		
Single Room Occupancy Residential Hotels, with some facilities	One per 4 residents			▒				
Libraries	One per 500 sq. ft of floor area that is publicly accessible	▒					▒	▒
Offices (Medical)	One per 300 sq. ft. of gross floor area			▒	▒		▒	▒
Offices (other)	One per 400 sq. ft. of gross floor area (possible reduction)			▒				
Quick or Full Service Restaurants	One per 300 sq. ft of floor area					▒	▒	▒
Residential Uses, Nursing Homes					R-3		R-3	R-4
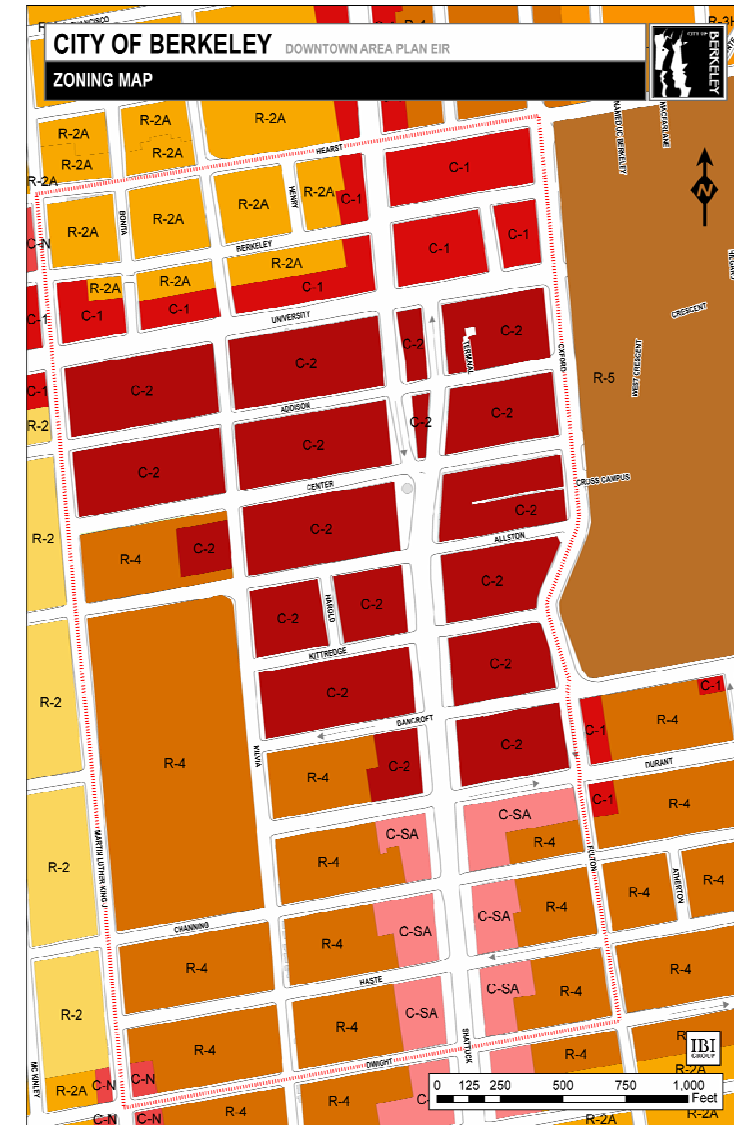
* This also shall include Accessory Dwelling Units. An application for an Accessory Dwelling Unit that does not meet this standard may apply for an administrative use permit to waive this requirement subject to a special finding under Section 23D.40.090.D

**This requirement does not apply to those Community Care Facilities which under state law must be treated in the same manner as a single family residence

Off-Street Parking Utilization

Utilization of off-street parking spaces varies by location and time of day. In 2007 the Berkeley Way lot was converted to a "Pay and Display" off-street lot, with three machines controlling 109 spaces and an occupancy rate of 79 percent (September 2008). Table 3-10 shows a breakdown of the off-street parking structures ownwed by the Private Sector, City of Berkeley and UC Berkeley, and their utilizations for the most recent year with available data.

Table 3-10: Off-Street Parking Peak Occupancy Rates

Facility Name	Ownership Type	Number of Spaces	Occupancy Rates				
			M-F AM	M-F Afternoon	M-F PM	Sat AM	Sat PM
Oxford Street Parking Lot	City of Berkeley	Currently closed	n/a	n/a	n/a	n/a	n/a
Center Street Garage	City of Berkeley	420	31%	40%	24%	13%	24%
Berkeley Way Lot	City of Berkeley	109	Average weekday occupancy of 79%			n/a	n/a
City of Berkeley Averages							
Surface Lot	UC Berkeley	22	n/a	n/a	n/a	n/a	n/a
University Hall Structure	UC Berkeley	262	96%	n/a	27%	13%	10%
University Hall West	UC Berkeley	29	95%	n/a	65%	65%	65%
Banway Lot	UC Berkeley	35	100%	n/a	15%	n/a	9%
Tang Center (Bancroft/ Fulton Lot)	UC Berkeley	232	n/a	n/a	n/a	n/a	n/a
UC Berkeley Averages:		n/a	97%	n/a	36%	39%	28%
Allston Way Parking	Private	610	73%	84%	37%	27%	11%
Kittredge Street Parking (new facility only)	Private	165	57%	70%	58%	48%	74%
Promenade Parking	Private	120	57%	n/a	30%	n/a	0%
Golden Bear Garage	Private	250	78%	n/a	22%	n/a	0%
2126 Bancroft Parking	Private	30	n/a	n/a	n/a	n/a	n/a
Al's Parking Lot	Private	24	129%	129%	21%	71%	0%
Bank of America Building	Private	39	n/a	n/a	n/a	n/a	n/a
Firestone Parking Lot	Private	43	n/a	n/a	n/a	n/a	n/a
Private Operators Averages:		n/a	79%	94%	34%	49%	17%
Downtown Averages:		n/a	82%	88%	43%	45%	30%
City of Berkeley Reserved Parking Spaces and Permits: Center Street Garage: 16 spaces (6 reserved for Court), Berkeley Way Lot: 19 permit, Old City Hall: 8 spaces, New City Hall: 13 spaces, Veterans Building: 12 spaces.							

n/a: not available

Sources: City of Berkeley (2008), UC Berkeley (2005), Private Operators (2005), Surveys

The weekday occupancy of the Center Street Garage by hour is shown in Figure 3-14. Data from September 2005 and September 2008 is shown for comparison. The weekend occupancy by hour for 2005 and 2008 is presented in Figure 3-15. As illustrated in these figures, occupancy has increased over the last three years during weekdays and weekends.
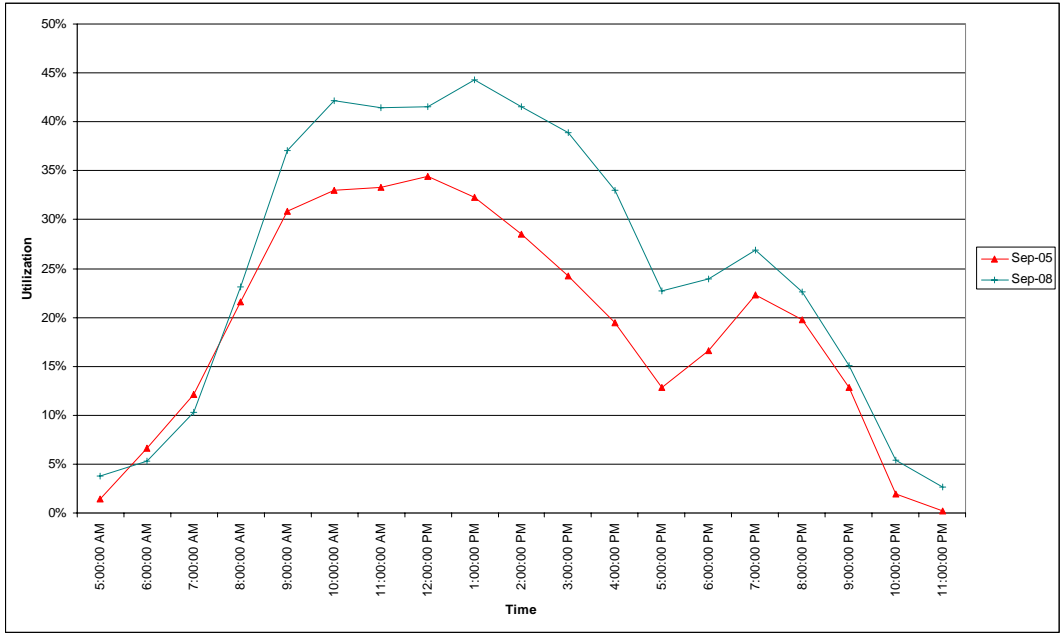
Figure 3-14: Center Street Garage – Average Weekday Utilization – **Comparison September 2005 and September 2008**
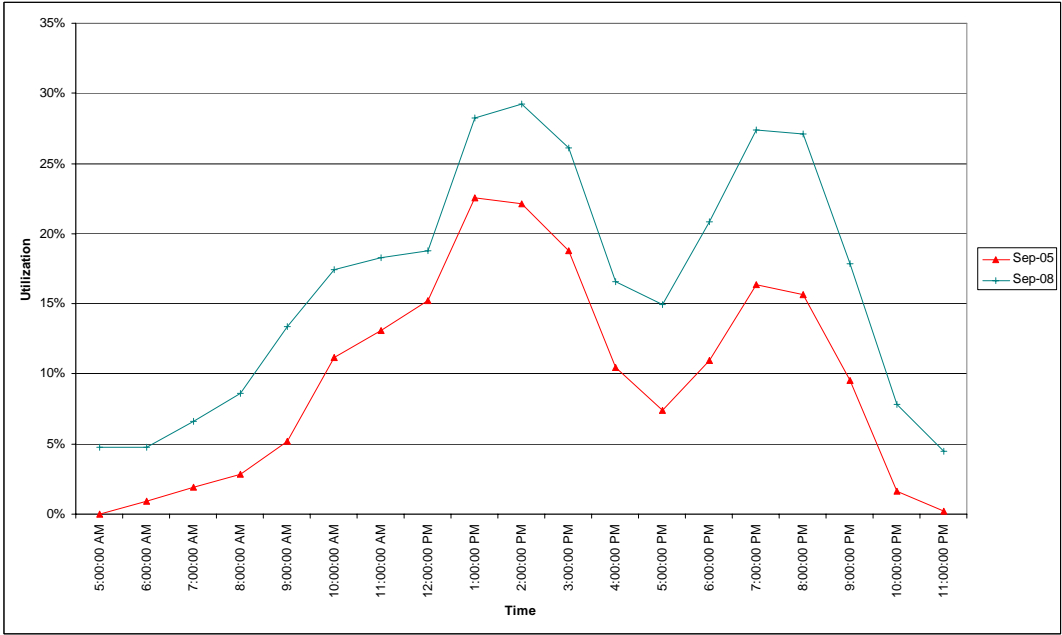
Figure 3-15: Center Street Garage – Average Weekend Utilization – Comparison September 2005 and September 2008

On-Street Parking Utilization

In 2007, the Metropolitan Transportation Commission (MTC) conducted the Parking Policies for Smart Growth Study and selected Downtown Berkeley as a case study location. The MTC study included the collection of existing on-street parking utilization data within the Downtown area. Data for on-street parking utilization collected to date and provided to the City of Berkeley by MTC is presented in this section. The observations include a ten-block area of Downtown Berkeley defined by University Avenue to the north, Bancroft Way to the south, Oxford Street to the east, and Milvia Street to the west. The parking utilization observations were conducted during three different time periods: 7:00 AM, 12:00 PM to 3:00 PM and 4:00 PM to 6:00 PM.

Table 3-11 summarizes the utilization data for the morning time period. The street segments with the highest utilization rate during this time period are Addison Street between Shattuck Avenue and Shattuck Square and on Shattuck Avenue between Addison Street and Center Street at 83 percent. The second highest utilized street segments are Addison Street between Milvia and Shattuck with 64 percent and Milvia Street between Addison and Center at 62 percent. Shattuck Avenue between University and Addison and between Allston and Kittredge followed with around 50 percent occupancy. The total average utilization for the 7:00 AM time period is 44 percent.

Table 3-11: On Street Parking Occupancy – 7:00 AM

Downtown On-Street Parking Occupancy – 7:00 AM				
Street	Between	Supply	# Occupied Spaces	% Occupied
University Avenue	Milvia/Shattuck	32	9	28%
University Avenue	Shattuck/Oxford	24	12	50%
Addison Street	Milvia/ Shattuck	47	30	64%
Addison Street	Shattuck Ave/Shattuck Sq	6	5	83%
Addison Street	Shattuck/Oxford	25	5	20%
Center Street	Milvia/Shattuck	17	5	29%
Center Street	Shattuck/Oxford	24	9	38%
Milvia Street	Addison/Center	13	9	62%
Shattuck Avenue	University/Addison	20	10	50%
Shattuck Square	University/Addison	17	2	12%
Shattuck Avenue	Addison/Center	12	10	83%
Shattuck Square	Addison/Center	7	2	29%
Shattuck Avenue	Center/Allston	2	0	0%
Shattuck Avenue	Allston/Kittredge	34	18	53%
Shattuck Avenue	Kittredge/Bancroft	25	8	32%
	Total	305	134	44%
Source: MTC Smart Growth and Parking Study, 2006				

Table 3-12 summarizes the on-street parking utilization data for the mid-day time period. Information for this time period was collected on an hourly basis and covers the street limits identified above.

Table 3-12: On Street Parking Occupancy – 12:00 Noon to 3:00 PM

Downtown On-Street Parking Supply 12:00PM to 3:00PM										
			12:00 PM		1:00 PM		2:00 PM		3:00 PM	
Street	Between	Supply	#	%	#	%	#	%	#	%
			Spaces	Occup.	Spaces	Occup.	Spaces	Occup.	Spaces	Occup.
University Avenue	Milvia/Shattuck	32	27	84%	25	78%	24	75%	28	88%
University Avenue	Shattuck/Oxford	24	20	83%	24	100%	22	92%	21	88%
Addison Street	Milvia/ Shattuck	47	32	68%	32	68%	36	77%	36	70%
Addison Street	Shattuck Ave/Shattuck Sq	6	4	67%	4	67%	6	100%	6	100%
Addison Street	Shattuck/Oxford	25	22	88%	22	88%	22	88%	23	92%
Center Street	Milvia/Shattuck	17	15	88%	12	71%	13	76%	14	82%
Center Street	Shattuck/Oxford	24	13	54%	19	79%	17	71%	11	46%
Milvia Street	Addison/Center	13	13	100%	13	100%	11	85%	13	100%
Shattuck Avenue	University/Addison	20	15	75%	18	90%	18	90%	19	95%
Shattuck Square	University/Addison	17	16	94%	17	100%	17	100%	15	88%
Shattuck Avenue	Addison/Center	12	11	92%	12	100%	10	83%	11	92%
Shattuck Square	Addison/Center	7	7	100%	7	100%	6	86%	7	100%
Shattuck Avenue	Center/Allston	2	0	0%	1	50%	1	50%	1	50%
Shattuck Avenue	Allston/Kittredge	34	32	94%	32	94%	31	91%	33	97%
Shattuck Avenue	Kittredge/Bancroft	25	23	92%	21	84%	20	80%	21	84%
Total		305	250	82%	263	86%	250	82%	256	84%
Source: MTC Smart Growth and Parking Study, 2006										

The street segments with the highest utilization at 12:00 PM are Shattuck Square between Addison/Center and Milvia Street between Addison/Center at 100 percent. Shattuck Avenue between Allston/Kittredge and Shattuck Square between University/Addison were the next highest at 94 percent. Out of 305 parking spots, 250 are utilized at 12:00 PM. The total average occupancy for this time period is 77 percent.

In the 1:00 PM time slot, two of the most highly utilized street segments in the 12:00 PM stayed constant. (Milvia Street between Addison/Center and Shattuck Square between Addison/Center) Addison Street between the Shattuck couplet and Shattuck Avenue between Addison/Center increased to 100 percent. This time period experiences a higher occupancy rate than 12:00 PM, with 263 parking spots utilized out of 305 (an average occupancy rate of 86 percent).

At 2:00 PM, the highest utilization occurs on Addison Street in the Shattuck couplet and on Shattuck Square between University/Addison. Addison Street between Shattuck/Oxford is occupied at 88 percent. Shattuck Avenue between Allston/Kittredge experiences a utilization of 91 percent. The

lowest utilization observed is on Center Street between Shattuck and Oxford at 71 percent. The average occupancy is 82 percent.

The street segments at 3:00 PM with the highest occupancy are Addison Street between Shattuck Square and Shattuck Avenue and Shattuck Square between Addison/Center. Shattuck Avenue between Allston/Kittredge is occupied at 97 percent. Shattuck Avenue between University/Addison is at 95 percent occupancy. Out of the 305 parking spots available, on average 256 are occupied, equaling an 84 percent utilization rate. In the mid-day time period, the 1:00 to 3:00 PM time period experienced the highest average parking occupancy rates.

Table 3-13 summarizes the parking utilization data in the late afternoon/evening time period. This time period experiences the highest parking utilization rates, particularly closer to 6:00 PM when parking meter enforcement is discontinued.

Table 3-13: On Street Parking Occupancy – 4:00 PM to 6:00 PM

Downtown On-Street Parking Supply 4:00PM to 6:00PM								
			4:00 PM		5:00 PM		6:00 PM	
Street	Between	Supply	#	%	#	%	#	%
			Spaces	Occup.	Spaces	Occup.	Spaces	Occup.
University Avenue	Milvia/Shattuck	32	28	88%	32	100%	31	97%
University Avenue	Shattuck/Oxford	24	21	88%	21	88%	24	100%
Addison Street	Milvia/ Shattuck	47	36	77%	37	79%	42	89%
Addison Street	Shattuck Ave/Shattuck Sq	6	6	100%	6	100%	6	100%
Addison Street	Shattuck/Oxford	25	23	92%	23	92%	25	100%
Center Street	Milvia/Shattuck	17	15	88%	16	94%	15	88%
Center Street	Shattuck/Oxford	24	16	67%	21	88%	24	100%
Milvia Street	Addison/Center	13	13	100%	11	85%	13	100%
Shattuck Avenue	University/Addison	20	20	100%	18	90%	19	95%
Shattuck Square	University/Addison	18	15	83%	16	89%	18	100%
Shattuck Avenue	Addison/Center	12	11	92%	11	92%	11	92%
Shattuck Square	Addison/Center	7	7	100%	6	86%	7	100%
Shattuck Avenue	Center/Allston	2	2	100%	1	50%	1	50%
Shattuck Avenue	Allston/Kittredge	34	34	100%	33	97%	34	100%
Shattuck Avenue	Kittredge/Bancroft	25	21	84%	22	88%	22	88%
Total		305	268	88%	274	89%	292	96%
Source: MTC Smart Growth and Parking Study, 2006								

At 4:00 PM, the highest record parking utilization was 100 percent, observed on the following street segments:

- Addison Street between Shattuck Avenue and Shattuck Square
- Milvia Street between Addison and Center

- Shattuck Avenue between University and Addison

- Shattuck Square between Addison and Center

- Shattuck Avenue between Center and Allston

- Shattuck Street between Allston and Kittredge

The lowest occupancy of 67 percent occurs on Center Street between Shattuck Avenue and Oxford Street. Out of 305 parking slots, 268 are occupied for an average 88 percent utilization rate.

At 5:00 PM, the highest observed parking utilization occurred on University Avenue between Milvia/Shattuck and Addison Street between Shattuck Avenue and Shattuck Square, both of which are 100 percent occupied. Out of 305 parking spots avaliable, 274 are occupied for an average utilization of 89 percent.

At 6:00 PM, full (100 percent) utilization was observed at the following locations:

- University Avenue between Shattuck Avenue and Oxford Street

- Addison Street between Shattuck Avenue and Shattuck Square

- Addison Street between Shattuck Square and Oxford Street

- Center Street between Shattuck Square and Oxford Street

- Milvia Street between Addison Street and Center Street

- Shattuck Square between University Avenue and Addison Street

- Shattuck Square between Addison Street and Center Street

- Shattuck Avenue between Allston Street and Kittredge Street

This time period experienced the highest average occupancy rate at 96 percent and is the peak parking demand period for on-street parking in the Downtown. On-street parking utilization increases during the day and reaches high rates of occupancy, particularly in the late afternoon time period between 4:00 PM and 6:00 PM. The highest demand occurs in the downtown "core" along Shattuck Avenue/Shattuck Square, Center Street and Addison Street.

4.0 FUTURE TRANSPORTATION CONDITIONS WITHOUT THE PROPOSED PROJECT – YEAR 2030 BASELINE

The Year 2030 Without Project Transportation (Year 2030 Baseline) conditions were estimated using the Year 2030 population and employment forecasts contained in the ACCMA model, consistent with ABAG's *Projections 2005.* The network configuration assumed transportation improvements that included transit enhancements contained in the ACCMA model (increased AC Transit service levels) and signalization of Oxford Street intersections with Addison, Kittredge, and Allston proposed as part of the UC Berkeley Long Range Development Plan (LRDP). Traffic volumes for the AM and PM peak hours were forecasted using the ACCMA model with the assumptions identified above. The resulting forecast traffic volumes were then compared to the ACCMA model's Year 2000 baseline forecast to identify the anticipated annual growth for traffic in the study area. This growth is applied to existing traffic volumes to establish the refined forecast for the Year 2030 intersection volumes at each of the twenty-one intersections identified earlier in this document.

4.1 NON-MOTORIZED TRANSPORTATION

The use of non-motorized transportation modes for Year 2030 Baseline is discussed in this section. Considering a linear annual growth factor, the non-motorized modes are forecast to increase at an annual growth rate of about 0.5%, when compared to the existing condition.

Bicycle Transportation

The forecast daily number of bicycle trips generated in the downtown area for Year 2030 Baseline is estimated to be approximately 3,750 trips. This represents about 15% of the total number of non-motorized trips.

Pedestrians

Pedestrians are responsible for about 85% of the non-motorized trips. The forecast number of people using walking as their only mode of transportation in the downtown area for Year 2030 Baseline is estimated to be about 20,400 people per day.

4.2 TRANSIT

In the AM peak period, the number of transit trips that originate or arrive in the downtown area is estimated to grow at an average annual rate of 2.0%. The transit trips that originate in the downtown area for this same period are estimated to increase by 1.7% per year. For the off-peak period the increase in transit trips is slightly lower, around 1.3% per year for both directions.

AC Transit

The average number of passengers and load factors for the AC Transit bus lines that serve the study area for the Year 2030 Baseline AM peak hour are shown in Table 4-1. The load factor represents the ratio of passengers to seating capacity for each bus. A load factor greater than 1.0 (one) represents that the maximum seating capacity has been reached.

Table 4-1: AM Peak Hour Average Load of AC Transit Lines

Route	Direction	Load[3]	Load Factor
1	SB	n/a	n/a
	NB	n/a	n/a
7	SB	33	0.82
	NB	8	0.20
9	EB	4	0.19
	WB	1	0.06
15	EB	13	0.33
	WB	7	0.18
15 ext to Albany	EB	10	0.24
	WB	21	0.53
18	EB	n/a	n/a
	WB	n/a	n/a
51	SB	26	0.83
	NB	43	1.34
65	EB	5	0.15
	WB	12	0.41
67	EB	1	0.02
	WB	5	0.16
79	EB	n/a	n/a
	WB	n/a	n/a
800	EB	n/a	n/a
	WB	n/a	n/a
851	SB	n/a	n/a
	NB	n/a	n/a
1R	SB	n/a	n/a
	NB	n/a	n/a
43.1	SB	10	0.17
	NB	27	0.45
43.2	SB	13	0.21
	NB	21	0.35
52L	SB	38	1.28
	NB	0	0.01
F	EB	26	0.87
	WB	0	0.01
FS	EB	--	--
	WB	0	0

ACCMA model does not produce ridership forecast data for AC Transit routes 1/1R, 18, 79, 800, and 851

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[3] Estimated average number of on-board passengers for the entire segment of one trip of each bus line during the AM Peak Hour

The data presented in Table 4-1 indicates that AC Transit Lines 51 and 52L are forecast to operate with load factors greater than 1.0 during AM peak period during the Year 2030 Baseline condition. This condition does not necessarily mean that the line is operating beyond service capacity, because buses can accommodate standing passengers during peak hours.

Bay Area Rapid Transit

BART ridership forecasts were obtained from the ACCMA model for both lines serving the City of Berkeley (Richmond to Fremont and Richmond to Millbrae/Daly City). Ridership figures were blended for the two lines as suggested by BART staff, since most riders at Berkeley stations will take the first available train and then transfer, if necessary, at the MacArthur station.

Year 2030 Baseline condition BART service assumptions are as follows (verified with BART staff):

- Headways – 15 minutes for each line – effectively means one train every 7.5 minutes
- Cars per train - Richmond-Fremont 8 cars, Richmond - Millbrae/Daly City 10 cars
- Seated Capacity – 75 persons per car

Ridership forecasts for BART system within the City of Berkeley in the Year 2030 Baseline condition are summarized in Table 4-2. The ridership numbers are presented for the AM peak hour only as forecasted by the ACCMA model.

Table 4-2: AM Peak Hour Ridership in Berkeley for BART Lines Year 2030 Baseline

Richmond/Millbrae & Fremont/Richmond		
AM Peak Hour		
Northbound Direction		
From Station	To Station	Volume
MacArthur	Ashby	1,741
Ashby	Berkeley	1,751
Berkeley	North Berkeley	340
North Berkeley	El Cerrito Plaza	337
Southbound Direction		
From Station	To Station	Volume
El Cerrito Plaza	North Berkeley	8,956
North Berkeley	Berkeley	10,164
Berkeley	Ashby	10,008
Ashby	MacArthur	10,758

The load factors for the BART lines that serve the Study Area for the AM peak hour for the Year 2030 Baseline condition are presented in Table 4-3. These load factors represent the maximum peak load segment for each BART line, and the maximum load segment is not necessarily the segment within the Berkeley DAP Study Area. While the individual BART lines may have ridership forecasts that exceed capacity, this condition may not occur with the City of Berkeley. The Richmond-Fremont train was considered to be constituted of eight cars and the trains running the Richmond-Millbrae/Daly City line were considered to operate with ten cars.

Table 4-3: AM Peak Hour Average Load for BART Lines Year 2030 Baseline

Route	Direction	Passenger Load per Train[4]	Load Factor
BART - Rich. ->Frem.	Richmond-Fremont	316	0.53
	Fremont-Richmond	827	1.38
BART - Rich. ->Mill./D.City	Richmond-Millbrae/D. City	2,366	3.15
	Millbrae/D.City-Richmond	1,047	1.40

The data indicates that both lines are estimated to operate at load factors higher than 1.0. Load factors can be higher than 1.0 due to the fact that the trains can accommodate standing passengers during peak hours, which can double the capacity of the line, but both lines are expected to operate well beyond seated and standing capacity for the Year 2030 Baseline.

4.3 TRAFFIC

As anticipated, the Year 2030 Baseline traffic conditions do show an increase in automobile traffic in the downtown and the deterioration in level of service at study area intersections when compared to the existing condition. A significant portion of the traffic growth that occurs in the downtown is a result of regional traffic. Trip generation and trip origins are discussed in Section 5 in greater detail.

Figure 4-1 on the following page identifies the study intersection lane geometry. Figure 4-2 and 4-3 show the traffic volumes at study intersections in the AM and PM peak hours.

---

[4] Load extracted from the maximum load point

Berkeley Downtown Area Traffic Impact Analysis

2030 Baseline Study Intersection Geometry

Figure 4-1

1 — MLK Jr. Way / Hearst Ave.
1182
6 / 10
43 ↑ / 8
347 → / 121
383 / 163 ←
23 / 94
749

2 — MLK Jr. Way / University Ave.
1602
82 / 83
83 / 51
1051 → / 1112 ←
249 / 77
324 / 141
806

3 — MLK Jr. Way / Center Street
1589
288
130
68
140
1122

4 — MLK Jr. Way / Allston Way
1444
128 / 186
144 / 157
141 → / 114 ←
104 / 63
103 / 165
1016

5 — Milvia Street / University Ave.
180
105 / 20
26 / 36
1079 → / 1018 ←
155 / 43
120 / 37
88

6 — Milvia Street / Center Street
327
20 / 22
24 / 30
97 → / 51 ←
132 / 38
35 / 28
188

7 — Milvia Street / Allston Way
345
105 / 40
77 / 37
145 → / 67 ←
214 / 41
89 / 42
152

8 — Shattuck Ave. / Hearst Ave.
811
77 / 378
19 / 136
399 → / 245 ←
21 / 62
9 / 54
298

9 — Shattuck Ave. / University Ave.
398
455 / 53
272 / 222
713 → / 621 ←
263 / 8

10 — Shattuck Ave. / Center Street
596
30 / 12
39 → / 142 ←
54 / 32

11 — Shattuck Ave. / Allston Way
728
89 / 36
42 / 10
47 → / 24 ←
93 / 3
111 / 22
614

12 — Shattuck Ave. / Bancroft Way
712
19
107
105
184
65
38
637

13 — Shattuck Ave. / Durant Ave.
576
20 / 324
42
269 →
13
20 / 597
602

14 — Shattuck Ave. / Haste Street
666
25
85
534
296
118
1080

15 — Shattuck Ave. / Dwight Way
971
56
143
612 →
227
156
1022

16 — Oxford Street / Hearst Ave.
1114
22 / 191
25 / 85
561 → / 344 ←
146 / 484
28 / 505
199

17 — Oxford Street / University Ave.
1515
264 / 49
533 / 11
42 → / 28 ←
288 / 8
255 / 12
273

18 — Oxford Street / Center Street
1649
85 / 15
24 / 12
12 / 13
22 / 12
55 / 22
543

19 — Oxford Street / Allston Way
1694
26
25
53
9
707

20 — Fulton Street / Bancroft Way
1549
149
536
260
139
57
98

21 — Fulton Street / Durant Ave.
1274
0 / 385
123
817 →
269

Map streets: Delaware St., Hearst Ave., Berkeley Wy., University Ave., Addison St., Center St., Allston Wy., Kittredge St., Bancroft Wy., Durant Ave., Channing Wy., Haste St., Dwight Wy. Martin Luther King Jr. Wy., Bonita St., Milvia St., Grove St., Shattuck Ave., Walnut St., Fulton St., Oxford St., Campanile Wy., W. Entrance.

N

LEGEND
● Study Intersection - Signalized
AM Peak Hour Volume

IBI GROUP

Berkeley Downtown Area Traffic Impact Analysis

2030 Baseline Intersection Volumes - AM Peak Hour

Figure 4-2

Intersection Volume Diagrams

1 — North/South: MLK Jr. Way / East/West: Hearst Ave.
824; 33, 31; 51, 28; 296, 679; 54, 147; 215, 228; 1193

2 — North/South: MLK Jr. Way / East/West: University Ave.
666; 126, 60; 198, 87; 1182, 1181; 240, 110; 304, 48; 1317

3 — North/South: MLK Jr. Way / East/West: Center Street
804; 291; 463; 168; 245; 1314

4 — North/South: MLK Jr. Way / East/West: Allston Way
682; 125, 150; 166, 182; 203, 418; 113, 96; 201, 95; 1229

5 — North/South: Milvia Street / East/West: University Ave.
237; 55, 37; 50, 21; 1120, 792; 168, 9; 506, 187; 245

6 — North/South: Milvia Street / East/West: Center Street
172; 155, 78; 100, 172; 321, 313; 103, 42; 173, 123; 632

7 — North/South: Milvia Street / East/West: Allston Way
199; 92, 53; 109, 277; 194, 408; 145, 73; 216, 102; 520

8 — North/South: Shattuck Ave. / East/West: Hearst Ave.
994; 79, 598; 41, 147; 576, 700; 2, 126; 46, 78; 769

9 — North/South: Shattuck Ave. / East/West: University Ave.
722; 347, 45; 638, 596; 482, 352; 150, 9

10 — North/South: Shattuck Ave. / East/West: Center Street
784; 44, 30; 262, 443; 105, 228

11 — North/South: Shattuck Ave. / East/West: Allston Way
1089; 296, 128; 103, 98; 131, 191; 182, 42; 172, 125; 1013

12 — North/South: Shattuck Ave. / East/West: Bancroft Way
906; 66; 486; 99; 204; 61; 28; 1136

13 — North/South: Shattuck Ave. / East/West: Durant Ave.
929; 40, 168; 94; 151; 64; 61, 155; 1077

14 — North/South: Shattuck Ave. / East/West: Haste Street
987; 82; 148; 916; 244; 161; 1109

15 — North/South: Shattuck Ave. / East/West: Dwight Way
1173; 138; 42; 823; 283; 315; 1273

16 — North/South: Oxford Street / East/West: Hearst Ave.
567; 41, 146; 26, 178; 661, 882; 69, 676; 91, 538; 868

17 — North/South: Oxford Street / East/West: University Ave.
1093; 321, 47; 671, 74; 56, 9; 73, 3; 75, 2; 991

18 — North/South: Oxford Street / East/West: Center Street
921; 285, 5; 221, 6; 26, 37; 272, 18; 261, 7; 844

19 — North/South: Oxford Street / East/West: Allston Way
1355; 190; 270; 59; 134; 1203

20 — North/South: Fulton Street / East/West: Bancroft Way
1392; 106; 1174; 669; 353; 18; 206

21 — North/South: Fulton Street / East/West: Durant Ave.
1180; 0, 572; 221; 216; 37

Map Labels

Streets (N/S): Martin Luther King Jr. Wy., Bonita St., Milvia St., Grove St., Shattuck Ave., Walnut St., Fulton St., Oxford St.

Streets (E/W): Delaware St., Hearst Ave., Berkeley Wy., University Ave., Addison St., Center St., Allston Wy., Kittredge St., Bancroft Wy., Durant Ave., Channing Wy., Haste St., Dwight Wy., Campanile Wy., W. Entrance

Study Intersections: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

N

LEGEND
● Study Intersection - Signalized
PM Peak Hour Volume

IBI GROUP

Berkeley Downtown Area Traffic Impact Analysis

2030 Baseline Intersection Volumes - PM Peak Hour

Figure 4-3

Tables 4-4 and 4-5 summarize the traffic conditions for the study intersections for the AM and PM peak hours.

Table 4-4: Year 2030 Baseline Condition AM Peak Hour Level of Service

No.	Intersection	Control	V/C	Delay (in Sec)	LOS	Deficient
1	Martin Luther Jr. Way / Hearst Avenue	Signalized	0.74	16.5	B	
2	Martin Luther Jr. Way / University Avenue	Signalized	1.15	63.9	E	X
3	Martin Luther Jr. Way / Center Street	Signalized	1.08	75.2	E	X
4	Martin Luther Jr. Way / Allston Way	Signalized	0.92	21.4	C	
5	Milvia Street / University Avenue	Signalized	0.63	13.6	B	
6	Milvia Street / Center Street	Signalized	0.32	10.8	B	
7	Milvia Street / Allston Way	Signalized	0.57	12.6	B	
8	Shattuck Avenue / Hearst Avenue	Signalized	0.61	13.4	B	
9	Shattuck Avenue / University Avenue	Signalized	0.72	14.8	B	
10	Shattuck Avenue / Center Street	Signalized	0.27	9.8	A	
11	Shattuck Avenue / Allston Way	Signalized	0.41	10.2	B	
12	Shattuck Avenue / Bancroft Way	Signalized	0.36	11.4	B	
13	Shattuck Avenue / Durant Avenue	Signalized	0.68	23.8	C	
14	Shattuck Avenue / Haste Street	Signalized	0.66	13.2	B	
15	Shattuck Avenue / Dwight Way	Signalized	0.79	19.0	B	
16	Oxford Street / Hearst Avenue	Signalized	0.96	46.4	D	
17	Oxford Street / University Avenue	Signalized	0.98	43.6	D	
18	Oxford Street / Center Street	Signalized	0.60	15.7	B	
19	Oxford Street / Allston Way	Signalized	0.60	17.0	B	
20	Oxford Street / Fulton Street / Bancroft Way	Signalized	0.48	9.6	A	
21	Fulton Street / Durant Avenue	Signalized	0.78	16.4	B	

Table 4-5: Year 2030 Baseline PM Peak Hour Level of Service

No.	Intersection	Control	V/C	Delay (in Sec)	LOS	Deficient
1	Martin Luther Jr. Way / Hearst Avenue	Signalized	1.55	200.6	F	X
2	Martin Luther Jr. Way / University Avenue	Signalized	1.37	61.3	E	X
3	Martin Luther Jr. Way / Center Street	Signalized	0.97	36.9	D	
4	Martin Luther Jr. Way / Allston Way	Signalized	1.31	40.7	D	
5	Milvia Street / University Avenue	Signalized	1.10	53.2	D	
6	Milvia Street / Center Street	Signalized	1.13	84.0	F	X
7	Milvia Street / Allston Way	Signalized	1.31	116.4	F	X
8	Shattuck Avenue / Hearst Avenue	Signalized	1.93	137.9	F	X
9	Shattuck Avenue / University Avenue	Signalized	1.50	113.2	F	X
10	Shattuck Avenue / Center Street	Signalized	0.90	66.7	E	X
11	Shattuck Avenue / Allston Way	Signalized	1.39	38.0	D	
12	Shattuck Avenue / Bancroft Way	Signalized	0.79	16.7	B	
13	Shattuck Avenue / Durant Avenue	Signalized	0.58	16.3	B	
14	Shattuck Avenue / Haste Street	Signalized	1.06	24.0	C	
15	Shattuck Avenue / Dwight Way	Signalized	1.01	50.0	D	
16	Oxford Street / Hearst Avenue	Signalized	1.09	69.9	E	X

No.	Intersection	Control	V/C	Delay (in Sec)	LOS	Deficient
17	Oxford Street / University Avenue	Signalized	0.91	30.4	C	
18	Oxford Street / Center Street	Signalized	1.42	54.2	D	
19	Oxford Street / Allston Way	Signalized	0.96	64.4	E	X
20	Oxford Street / Fulton Street / Bancroft Way	Signalized	0.82	14.4	B	
21	Fulton Street / Durant Avenue	Signalized	0.56	14.9	B	

As can be seen in tables 4-4 and 4-5, there is a significant deterioration of the traffic conditions between the existing condition and the Year 2030 Baseline, mostly along the north-south corridors (Martin Luther King Jr. Way, Shattuck Avenue and Milvia Street), which is evidence of the growth of the number of trips passing through the downtown area. In the east-west direction, it can be observed that the trips along Hearst Avenue and University Avenue are forecast to increase significantly.

4.4 PARKING

Existing public parking supply in the DAP study area is assumed to be about 3,800 parking spaces. In the Year 2030 Baseline condition, the public parking figure is anticipated to increase by at least 350 parking spaces due to the proposed expansion of the Center Street Garage currently under study and the reopening of the Oxford Plaza Garage, currently under construction. This would result in a supply of about 4,150 public parking spaces in the Year 2030.

Additional parking is planned by UC Berkeley as part of the Long Range Development Plan (LRDP). Up to 1,275 parking spaces are permitted to be developed by UC Berkeley under the LRDP by 2015. The portion of UC Berkeley parking spaces that could be built within the DAP study area has yet to be determined. If UC Berkeley parking is proposed in the DAP study area, UC Berkeley has proposed through the LRDP to attempt to prioritize locations that maximize shared public and campus use and would consider public/private partnerships to develop new parking structures.

Existing usage of on-street and off-street parking spaces is about 2,600 spaces (68%) in the AM peak hours, and 3,300 (86%) in mid day peak hours. With the proposed expansion of public parking capacity to 4,150 spaces, about 850 public parking spaces would be anticipated to be available during the mid-day mid-week time period.

Growth in future parking demand for the Year 2030 Baseline is forecast using the parking rates developed by Wilbur Smith Associates for the City of Berkeley in the MTC Smart Growth Study. The parking rates are presented for each land use considering the mid-day mid-week peak as well as the heaviest use time. The parking rates are applied to the anticipated new residential units and commercial floor area forecast for the DAP study area in the Year 2030 Baseline condition. It is estimated that demand for up to 2,900 additional parking spaces would be generated during the mid-day mid-week period with the Year 2030 Baseline forecast new land use development in the downtown.

New developments (private and UC Berkeley) constructed as part of the Year 2030 Baseline condition are anticipated to contribute about 2,400 new private parking spaces in the downtown area, based on current city parking standards and the UC Berkeley LRDP. This figure, added to the 850 available public parking spaces, results in a supply increase of about 3,250 parking spaces. This figure exceeds the forecast increase in parking demand; therefore, the anticipated parking supply in the Year 2030 Baseline condition is estimated to be sufficient to accommodate the forecasted increase in parking demand.

5.0   TRIP GENERATION

The ACCMA Model was used to forecast future travel demand and trip generation for motorized and non-motorized transportation modes. At an aggregate level, the model generates trips for automobile, transit, pedestrian and bicycle modes. The ACCMA Model trip generation forecasts for Year 2030 in the DAP study area are discussed below.

Automobile and Transit Trip Generation

The ACCMA model produces daily trip generation forecasts. These daily trip forecasts are then converted to auto trip forecasts for the AM and PM peak hours and transit trip forecasts for the AM peak period and the off-peak period. The AM peak period transit trip forecasts are then estimated for the AM peak hour by multiplying the peak period trip forecast by a peak factor, assumed to be one-third of the four hour peak period demand. Table 5-1 summarizes the automobile person trips generated within the DAP study area in these time periods for each of the modeled Year 2030 scenarios and highlights the increase in trips between the Year 2000, Year 2030 Baseline, and Year 2030 With Project conditions. Table 5-2 summarizes the transit person trips generated within the DAP study area for each of the modeled scenarios, as well as the increase between scenarios.

Table 5-1: Berkeley DAP Study Area Auto Trip Generation

Option	Total Auto Trips (person trips)				Increase in Auto Trips (person trips) Year 2000 to Year 2030			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	To	From	To	From	To	From	To	From
Year 2000	2,539	424	1,054	2,150	--	--	--	--
Year 2030 Baseline	2,884	659	1,733	2,774	345	235	679	624
Year 2030 With Project	3,038	900	2,048	2,940	499	476	994	790

Source: ACCMA Travel Demand Model Year 2030 Forecasts prepared by IBI Group

Table 5-2: Berkeley DAP Study Area Transit Trip Generation

Option	Total Transit Trips (person trips)				Increase in Transit Trips (person trips) Year 2000 to Year 2030			
	AM Peak Hour		Off-Peak		AM Peak Hour		Off-peak	
	To	From	To	From	To	From	To	From
Year 2000	1,458	226	3,094	1,422	--	--	--	--
Year 2030 Baseline	2,631	379	4,513	2,168	1,173	154	1,419	746
Year 2030 With Project	2,666	548	5,202	2,983	1,208	322	2,108	1,561

Source: ACCMA Travel Demand Model Year 2030 Forecasts prepared by IBI Group

The data contained in Table 5-1 and Table 5-2 shows that auto and transit trip generation forecasts in the Year 2030 With Project condition are higher than the forecast for the Year 2030 Baseline. Overall, the Year 2030 With Project condition increases the total number of auto and transit trips traveling to and from the DAP study area when compared to the Year 2000 and the Year 2030 Baseline.

It is important to note that while the Year 2030 With Project condition does result in a substantial increase in auto and transit trips when compared to the Year 2000, a majority (60% to 70%) of this

increase is forecast to already occur as part of the Year 2030 Baseline, which includes the development capacity of the Downtown Area under existing zoning. The trips generated by the Year 2030 With Project condition represent an incremental increase above the Year 2030 Baseline trip generation forecast.

Additional findings in this data to be highlighted include the increase in outbound auto and transit trips in the AM peak period. This is reflective of the increase in residential uses in the study area proposed in the With Project Condition. There is also a strong increase in off-peak transit trips, which suggests that the land use changes in the downtown result in a higher transit mode split during off-peak as well as peak time periods.

Pedestrian and Bicycle Trip Generation

ACCMA model also produces trip generation data for pedestrian and bicycle modes in a daily format. Table 5-3 summarizes pedestrian and bicycle trip generation data produced by the model for the DAP study area. Trip generation forecasts for pedestrians and bicycles are only available for the daily time period, so a direct comparison with automobile and transit person trips is not possible. However, this daily information does allow for a comparison of the trends associated with the Year 2030 Baseline condition and the Year 2030 With Project condition.

Table 5-3: Berkeley DAP Study Area Pedestrian and Bike Trip Generation

Option	Walk		Bicycle	
	Daily Trips		Daily Trips	
	To	From	To	From
Year 2000	12,178	5,584	2,524	682
Year 2030 Baseline	13,450	6,942	2,850	883
Year 2030 With Project	14,847	9,040	3,006	1,310

Source: ACCMA Travel Demand Model Year 2030 Forecasts prepared by IBI Group

As shown in Table 5-3, there is a significant forecasted increase in pedestrian trips (around 17%) and bicycle trips (approximately 16%) between the Year 2030 Baseline condition and the Year 2030 With Project condition. The results suggest that the increased densities associated with the Year 2030 With Project condition improve the land use mix within the downtown and help to encourage increased levels of pedestrian and bicycle travel.

6.0   FUTURE TRANSPORTATION CONDITIONS WITH PROPOSED PROJECT

The future transportation conditions in the DAP study area, considering the proposed land use development and network changes are discussed in this section.

6.1 NON-MOTORIZED TRANSPORTATION

The use of non-motorized transportation modes for Year 2030 With Project is discussed in this section. Non-motorized transportation modes are forecast to experience a growth of about 1.0% per year. There was no significant change in the usage of these two modes, maintaining the mode split observed in the base year.

Bicycle Transportation

The forecast daily number of bicycle trips in the downtown area is estimated to be approximately 4,300 trips. This represents 15% of the total number of non-motorized trips in the study area for the Year 2030 With Project condition.

The Downtown area includes several designated bicycle corridors that provide essential connections through the City of Berkeley and provide residents and commuters with opportunities to utilize a non-motorized transportation mode to access destinations in the Downtown and nearby UC Berkeley. Designated bicycle corridors, and their limits within the DAP study area, include the following:

- Bicycle Boulevards

    o   Milvia Street – Hearst Avenue to Dwight Way

    o   Channing Way – MLK Jr. Way to Fulton Street

- Class 2 Bike Lanes

    o   Center Street – Milvia Street to Shattuck Avenue

    o   Oxford Street/Fulton Street – Hearst Avenue to Dwight Way

    o   Hearst Avenue – MLK Jr. Way to Oxford Street

- Class 2.5 Bike Route (upgraded bike route with targeted improvements)

    o   Center Street – Shattuck Avenue to Oxford Street

- Class 3 Bike Route

    o   Allston Way – MLK Jr. Way to Shattuck Avenue

The City of Berkeley has defined a Bicycle Boulevard as "a roadway that has been modified as needed to enhance bicyclists' safety and convenience". Both Milvia Street and Channing Way are existing low volume streets that incorporate specific traffic control and traffic calming measures that are intended to reduce automobile volumes and speeds, while improving the operating environment for cyclists. The City of Berkeley Bicycle Plan notes that if traffic volumes increase significantly along Bicycle Boulevards modifications, including the implementation of Class 2 bike lanes, are recommended to maintain a safe and convenient environment for cyclists.

The ACCMA model network produces traffic volume forecasts in AM and PM peak hours for Milvia Street between University Avenue and Dwight Way. The vehicle traffic forecasts were obtained from the model by segment for both the Year 2030 Baseline condition and the Year 2030 With Project condition in order to compare the two scenarios and to determine in the proposed land use and transportation network changes contained in the DAP proposal would result in a significant impact to bicycle transition along Milvia Street. Tables 6-1 and 6-2 summarize the Am and PM peak hour traffic

volumes on Milvia Street for the Year 2030 Baseline condition and the Year 2030 With Project condition.

Table 6-1: Milvia Street Bicycle Boulevard - AM Peak Hour Vehicle Traffic Volumes

| | | AM Peak Hour Volumes | | | | | |
| | | Southbound Direction | | | Northbound Direction | | |
From Street	To Street	Year 2030 Baseline	Year 2030 With Project	Change (%)	Year 2030 Baseline	Year 2030 With Project	Change (%)
University Avenue	Center Street	180	250	39%	88	84	-5%
Center Street	Allston Way	327	666	103%	188	178	-6%
Allston Way	Kittredge Street	345	454	32%	152	136	-11%
Kittredge Street	Bancroft Way	631	648	3%	335	233	-30%
Bancroft Way	Durant Avenue	550	541	-2%	278	186	-33%
Durant Avenue	Channing Way	368	326	-11%	345	236	-31%
Channing Way	Haste Street	293	276	-6%	406	354	-13%
Haste Street	Dwight Way	210	208	-1%	369	352	-4%

Table 6-2: Milvia Street Bicycle Boulevard - PM Peak Hour Vehicle Traffic Volumes

| | | PM Peak Hour Volumes | | | | | |
| | | Southbound Direction | | | Northbound Direction | | |
From Street	To Street	Year 2030 Baseline	Year 2030 With Project	Change (%)	Year 2030 Baseline	Year 2030 With Project	Change (%)
University Avenue	Center Street	237	285	20%	245	253	3%
Center Street	Allston Way	172	276	60%	632	620	-2%
Allston Way	Kittredge Street	199	254	28%	520	510	-2%
Kittredge Street	Bancroft Way	463	335	-28%	581	538	-7%
Bancroft Way	Durant Avenue	469	350	-25%	379	357	-6%
Durant Avenue	Channing Way	395	276	-30%	395	312	-21%
Channing Way	Haste Street	375	294	-22%	481	415	-14%
Haste Street	Dwight Way	252	229	-9%	411	398	-3%

In most cases, the Year 2030 With Project condition results in a lower forecast traffic volume on Milvia Street than is forecast for the Year 2030 Baseline condition. There are several factors behind this condition:

- Milvia Street operates more as a local street within the Downtown, providing connections to adjacent properties and parking facilities. The street is not conducive to through vehicle traffic given the limited capacity of the roadway and the frequency of traffic controls and traffic diverters used on the street.

- The lane reductions proposed on Shattuck Avenue as part of the Year 2030 With Project condition are forecast to cause a shift in traffic away from the Shattuck Avenue corridor towards Oxford Street and Martin Luther King Jr. Way. This redistribution of traffic may also divert some traffic from Milvia Street, since vehicle trips that may have used Milvia Street and Shattuck Avenue together are now forecast to use alternative routes.

While traffic volume forecasts do show a reduction in traffic volumes on most segments of Milvia Street between the Year 2030 Baseline and Year 2030 With Project conditions, select segments of Milvia Street are anticipated to experience a substantial increase in vehicle traffic volumes. The section of Milvia Street between University Avenue and Allston Way is forecast to experience a net increase in traffic volumes during both the AM and PM peak hours between the Year 2030 Baseline and Year 2030 With Project conditions. The size of the forecasted increase in traffic volumes within this segment of the Bicycle Boulevard is anticipated to significantly impact the convenience of bicyclists using this segment of the Milvia Street Bicycle Boulevard. Mitigation measures to address this impact are discussed in Section 7.0.

While the ACCMA model does not forecast traffic volumes on Channing Way, the DAP land use and transportation network changes are not anticipated to substantially change traffic volumes on this street between the Year 2030 Baseline and Year 2030 With Project conditions. No significant impacts to bicycle transportation are anticipated on the Channing Way Bicycle Boulevard.

The roadway network changes and improvements proposed as part of the DAP would not result in a significant impact to any existing or proposed Class 2 Bike Lanes and Class 3 Bike Routes in the DAP study area. While traffic volumes may increase on these streets, the bicycle infrastructure would be maintained. In select cases, such as the proposed Hearst Avenue lane reductions between Shattuck Avenue and Oxford Street, the proposed roadway network changes would improve the street environment for bicyclists by providing additional right-of-way for wider bicycle lanes.

Pedestrians

Pedestrians are responsible for about 85% of the non-motorized trips. The forecast number of people using walking as their only mode of transportation in the downtown area for Year 2030 Baseline is estimated to be about 23,900 people per day.

6.2 TRANSIT

The use of transit modes in the downtown area for Year 2030 With Project is forecast to experience similar growth to the Year 2030 Baseline Condition for the AM peak period. The number of transit trips that arrive in the downtown area is estimated to grow an average of 2.0% per year. The transit trips that have origins in the downtown area for this same period are estimated to grow at 3.0% per year. The off-peak period experiences a slightly lower increase when compared to AM peak period. The increase in transit trips is around 1.7% for arriving trips and 2.5% for those trips that leave the downtown area.

AC Transit

The average number of passengers and load factors for the AC Transit bus lines that serve the study area for the Year 2030 Baseline AM peak hour are shown in Table 6-3. The load factor represents the ratio of passengers to seating capacity for each bus. A load factor greater than 1.0 (one) represents that the maximum seating capacity has been reached.

Table 6-3: AM Peak Hour Average Load of AC Transit Lines

Route	Direction	Passenger Load per Bus[5]	Load Factor	Change from 2030 Baseline	Significant Impact
1	SB	n/a	n/a	n/a	
	NB	n/a	n/a	n/a	

[5] Estimated average number of on-board passengers for the entire segment of one trip of each bus line during the AM Peak Hour

Route	Direction	Passenger Load per Bus[5]	Load Factor	Change from 2030 Baseline	Significant Impact
7	SB	37	0.93	0.11	
	NB	7	0.18	(0.02)	
9	EB	5	0.21	0.02	
	WB	1	0.05	(0.01)	
15	EB	15	0.39	0.06	
	WB	7	0.18	0	
15 ext to Albany	EB	10	0.24	0	
	WB	22	0.55	0.02	
18	EB	n/a	n/a	n/a	
	WB	n/a	n/a	n/a	
51	SB	25	0.77	(0.06)	
	NB	33	1.02	(0.32)	
65	EB	3	0.10	(0.05)	
	WB	12	0.40	(0.01)	
67	EB	1	0.02	0	
	WB	5	0.17	0.01	
79	EB	n/a	n/a	n/a	
	WB	n/a	n/a	n/a	
800	EB	n/a	n/a	n/a	
	WB	n/a	n/a	n/a	
851	SB	n/a	n/a	n/a	
	NB	n/a	n/a	n/a	
1R	SB	n/a	n/a	n/a	
	NB	n/a	n/a	n/a	
43.1	SB	10	0.17	0	
	NB	27	0.46	0.01	
43.2	SB	12	0.21	0	
	NB	22	0.37	0.02	
52L	SB	3	0.10	(1.18)	
	NB	0	0.01	0	
F	EB	11	0.35	(0.52)	
	WB	3	0.10	0.09	
FS	EB	--	--	n/a	
	WB	0	0.00	0	

ACCMA model did not produce ridership forecast data for AC Transit routes 1/1R, 18, 79, 800, and 851

The data presented in Table 6-3 indicates that Line 51 is estimated to operate with load factor greater than 1.0 during AM peak hour. This condition does not necessarily mean that the line is operating beyond service capacity, because buses can accommodate standing passengers during peak hours. A significant impact is defined as a change where the route is now over capacity with the proposed project, assuming available capacity in the Year 2030 Baseline or an increase in the load factor of

greater than 3 percent if the line is already at capacity in the Baseline condition. Using this criterion, no significant impacts are identified to AC Transit services in the Year 2030 With Project condition.

Bay Area Rapid Transit

Consistent with the analysis completed for the Year 2030 Baseline condition, BART ridership forecasts were obtained from the ACCMA model for both lines serving the City of Berkeley (Richmond to Fremont and Richmond to Millbrae/Daly City). Table 6-4 presents this information. Ridership figures were blended for the two lines as suggested by BART staff, since most riders at Berkeley stations will take the first available train and then transfer, if necessary, at the MacArthur station.

Table 6-4: AM Peak Hour Ridership in Berkeley for BART Lines Year 2030 With Project

Richmond/Millbrae & Fremont/Richmond AM Peak Hour		
Northbound Direction		
From Station	To Station	Volume
MacArthur	Ashby	1,415
Ashby	Berkeley	1,438
Berkeley	North Berkeley	346
North Berkeley	El Cerrito Plaza	342
Southbound Direction		
From Station	To Station	Volume
El Cerrito Plaza	North Berkeley	9,235
North Berkeley	Berkeley	10,526
Berkeley	Ashby	10,155
Ashby	MacArthur	10,857

Southbound BART ridership volumes are forecast to increase between the Year 2030 Baseline condition and the Year 2030 With Project condition. This increase reflects the proposed increase in land use development with Downtown Berkeley proposed as part of the With Project condition. In contrast, the northbound BART ridership volumes are forecast to decrease between the Year 2030 Baseline condition and the Year 2030 With Project condition. This decrease is likely linked to the proposed implementation of the AC Transit BRT service, which is incorporated into the With Project condition.

The load factors for the BART lines that serve the Study Area for the AM peak hour for the Year 2030 Baseline condition are presented in Table 6-5. The Richmond-Fremont train was considered to be constituted of eight cars and the trains running the Richmond-Millbrae/Daly City were considered to operate with ten cars.

Table 6-5: AM Peak Hour Average Load of BART Lines Year 2030 With Project

Route	Direction	Passenger Load per Train[6]	Load Factor	Change from 2030 Baseline	Significant Impact
BART - Rich. ->Frem.	Richmond-Fremont	351	0.59	0.06	
	Fremont-Richmond	778	1.30	(0.08)	
BART - Rich. ->Mill./D.City	Richmond-Millbrae/D. City	2,374	3.17	0.02	
	Millbrae/D.City-Richmond	1,044	1.39	0.01	

[6] Load extracted from the maximum load point

The BART ridership forecast data indicates that both lines are estimated to operate at load factors higher than 1.0. Load factors can be higher than 1.0 due to the fact that the trains can accommodate standing passengers during peak hours, which can double the capacity of the line, but both lines are expected to operate beyond seated and standing capacity. Using the same criterion for determining a significant impact that was applied to AC Transit bus routes, BART trips generated in the Year 2030 With Project condition are not forecast to cause a significant impact.

AC Transit BRT

The average passenger load of the BRT Line that is proposed to operate the DAP study area in the Year 2030 With Project condition is summarized in Table 6-6.

Table 6-6: AM Peak Hour Average Load of AC Transit BRT Line

Route	Direction	Passenger Load per Bus[7]	Load Factor
BRT	Southbound	56	0.99
	Northbound	67	1.17

The data indicates that the BRT line is estimated to operate at load factors higher than 1.0. Load factors can be higher than 1.0 due to the fact that the bus can accommodate standing passengers during peak hours, which can increase the capacity of the line. This ridership forecasts also correlate to the BART ridership forecasts and show the forecasted shift in transit ridership from BART to BRT in the Year 2030 With Project condition.

6.3 TRAFFIC

Year 2030 With Project condition assumes the implementation of the DAP proposed land use scenario, which includes up to 3,100 new residential dwelling units and up to 1,000,000 new square feet of non-residential floor area in the downtown when compared to the existing condition. The ACCMA model forecasts also incorporate the impact of the proposed transportation network changes outlined in Table 2-1.

The roadway network changes proposed in the Year 2030 With Project condition result in changes to traffic distribution within the DAP study area when compared to the Year 2030 Baseline. The ACCMA model forecasts produced for the Year 2030 With Project condition show a shift in automobile traffic volumes away from Shattuck Avenue as more drivers are inclined to use Oxford Street and Milvia Street because of the lane reductions on Shattuck. The redistribution of traffic away from the Shattuck Avenue corridor would help in reducing the potential traffic delays in this corridor resulting from the proposed lane reduction. The level of service is considered deficient in fourteen intersections inside the study area, three of them in both peak hours analyzed. As observed in the Year 2030 Without Project Condition, the PM peak is responsible for the majority of the intersections with unacceptable Level of service (LOS "E" or "F"), and a significant portion of the traffic growth that occurs in the downtown is a result of regional traffic.

Figure 6-1 on the following page shows the study intersection geometries for the Year 2030 With Project condition. Figure 6-2 and 6-3 show the traffic volumes for the AM and PM peak hours at these study intersections.

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[7] Load extracted from the maximum load point

Intersection geometry diagrams for study intersections 1–21:

1. North/South: MLK Jr. Way — East/West: Hearst Ave.
2. North/South: MLK Jr. Way — East/West: University Ave.
3. North/South: MLK Jr. Way — East/West: Center Street
4. North/South: MLK Jr. Way — East/West: Allston Way
5. North/South: Milvia Street — East/West: University Ave.
6. North/South: Milvia Street — East/West: Center Street
7. North/South: Milvia Street — East/West: Allston Way
8. North/South: Shattuck Ave. — East/West: Hearst Ave.
9. North/South: Shattuck Ave. — East/West: University Ave.
10. North/South: Shattuck Ave. — East/West: Center Street
11. North/South: Shattuck Ave. — East/West: Allston Way
12. North/South: Shattuck Ave. — East/West: Bancroft Way
13. North/South: Shattuck Ave. — East/West: Durant Ave.
14. North/South: Shattuck Ave. — East/West: Haste Street
15. North/South: Shattuck Ave. — East/West: Dwight Way
16. North/South: Oxford Street — East/West: Hearst Ave.
17. North/South: Oxford Street — East/West: University Ave.
18. North/South: Oxford Street — East/West: Center Street
19. North/South: Oxford Street — East/West: Allston Way
20. North/South: Fulton Street — East/West: Bancroft Way
21. North/South: Fulton Street — East/West: Durant Ave.

LEGEND
● Study Intersection - Signalized
Intersection Geometry

N

IBI GROUP
Berkeley Downtown Area Traffic Impact Analysis
2030 Downtown Area Plan Study Intersection Geometry

Figure 6-1

North/South: MLK Jr. Way
East/West: Hearst Ave.
1250
4　24
40
35　137
344　①
173　342
6　98
736

North/South: MLK Jr. Way
East/West: University Ave.
1564
81　160
66　76
1154　②　1174
138　81
217　186
770

North/South: MLK Jr. Way
East/West: Center Street
1493
226
130
❸
77
123
1025

North/South: MLK Jr. Way
East/West: Allston Way
1416
108　149
143　134
177　④　129
160　83
125　192
934

North/South: Milvia Street
East/West: University Ave.
250
47　10
23　42
1036　⑤　1157
419　149
110　37
84

North/South: Milvia Street
East/West: Center Street
666
35　109
13　38
113　⑥　51
63　43
26　56
178

North/South: Milvia Street
East/West: Allston Way
454
158　151
83　56
252　⑦　64
128　35
50　60
136

North/South: Shattuck Ave.
East/West: Hearst Ave.
748
58　322
14　218
393　⑧　457
23　140
9　65
276

North/South: Shattuck Ave.
East/West: University Ave.
368
527　32
239　52
560　⑨　285
365　18
419　70
273

North/South: Shattuck Ave.
East/West: Center Street
665
49
73
❿
161
74
669

North/South: Shattuck Ave.
East/West: Allston Way
788
104　106
92　94
197　⑪　82
130　6
68　88
631

North/South: Shattuck Ave.
East/West: Bancroft Way
574
11
140
⑫　124
62　306
35
651

North/South: Shattuck Ave.
East/West: Durant Ave.
782
8　113
48
351　⑬
67
26　693
608

North/South: Shattuck Ave.
East/West: Haste Street
848
217
95
⑭　404
34
85
1142

North/South: Shattuck Ave.
East/West: Dwight Way
897
51
152
719　⑮
271
176
1042

North/South: Oxford Street
East/West: Hearst Ave.
1073
67　117
27　30
504　⑯　500
207　220
135　487
236

North/South: Oxford Street
East/West: University Ave.
1309
194　66
452　29
27　⑰　317
112　95
114　13
429

North/South: Oxford Street
East/West: Center Street
1326
0　10
10
⑱
27
0　55
581

North/South: Oxford Street
East/West: Allston Way
1291
117
217
⑲
133
76
532

North/South: Fulton Street
East/West: Bancroft Way
1148
231
494
⑳　377
97
28
31

North/South: Fulton Street
East/West: Durant Ave.
778
0　436
29
968　㉑
172

Map of study intersections with streets: Delaware St., Hearst Ave., Berkeley Wy., University Ave., Addison St., Center St., Allston Wy., Kittredge St., Bancroft Wy., Durant Ave., Channing Wy., Haste St., Dwight Wy. North/South streets: Martin Luther King Jr. Wy., Bonita St., Milvia St., Grove St., Shattuck Ave., Walnut St., Oxford St., Fulton St. W. Entrance, Campanile Wy.

N

LEGEND
● Study Intersection - Signalized
AM Peak Hour Volume

IBI GROUP

Berkeley Downtown Area Traffic Impact Analysis

2030 With Project Intersection Volumes - AM Peak Hour

Figure 6-2

Intersection 1
North/South: MLK Jr. Way
East/West: Hearst Ave.
961
19 14
67 17
432 ① 582
196 249
249 209
995

Intersection 9
North/South: Shattuck Ave.
East/West: University Ave.
491
152 21
366 524
626 ⑨ 658
288 27
267 140
771

Intersection 17
North/South: Oxford Street
East/West: University Ave.
1089
430 77
524 81
36 ⑰ 6
29 1
60 2
1174

Intersection 2
North/South: MLK Jr. Way
East/West: University Ave.
925
168 138
155 110
1294 ② 1206
159 118
214 59
1149

Intersection 10
North/South: Shattuck Ave.
East/West: Center Street
611
153
137
14 ⑩
273
131
1062

Intersection 18
North/South: Oxford Street
East/West: Center Street
1126
0 39
26
⑱
81
0 68
1146

Intersection 3
North/South: MLK Jr. Way
East/West: Center Street
1012
270
388
③
253
284
1142

Intersection 11
North/South: Shattuck Ave.
East/West: Allston Way
903
172 222
62 172
171 ⑪ 245
113 77
98 213
787

Intersection 19
North/South: Oxford Street
East/West: Allston Way
1422
282
473
166 ⑲
305
1200

Intersection 4
North/South: MLK Jr. Way
East/West: Allston Way
878
169 202
183 144
280 ④ 418
149 91
228 107
1103

Intersection 12
North/South: Shattuck Ave.
East/West: Bancroft Way
863
101
298
⑫ 253
42 322
97
941

Intersection 20
North/South: Fulton Street
East/West: Bancroft Way
1457
170
1115
⑳ 672
232
40
427

Intersection 5
North/South: Milvia Street
East/West: University Ave.
285
27 25
43 28
1178 ⑤ 926
306 25
450 243
253

Intersection 13
North/South: Shattuck Ave.
East/West: Durant Ave.
1022
31 139
63
221 ⑬
124
114 309
982

Intersection 21
North/South: Fulton Street
East/West: Durant Ave.
1026
0 670
407
231 ㉑
29

Intersection 6
North/South: Milvia Street
East/West: Center Street
276
201 130
92 191
326 ⑥ 300
101 49
147 133
620

Intersection 14
North/South: Shattuck Ave.
East/West: Haste Street
1233
106
75
⑭ 682
174
241
1136

Intersection 7
North/South: Milvia Street
East/West: Allston Way
254
126 74
145 225
262 ⑦ 335
181 56
213 101
510

Intersection 15
North/South: Shattuck Ave.
East/West: Dwight Way
1337
149
73
703 ⑮
256
164
1350

Intersection 8
North/South: Shattuck Ave.
East/West: Hearst Ave.
648
156 144
111 38
592 ⑧ 549
6 33
153 32
834

Intersection 16
North/South: Oxford Street
East/West: Hearst Ave.
831
47 262
24 205
529 ⑯ 573
45 572
51 480
861

Martin Luther King Jr. Wy.
Delaware St.
Milvia St.
Bonita St.
Shattuck Ave.
Walnut St.
Oxford St.
Hearst Ave.
Berkeley Wy.
University Ave.
Addison St.
Center St.
Allston Wy.
Kittredge St.
Grove St.
Bancroft Wy.
Durant Ave.
Channing Wy.
Haste St.
Dwight Wy.
Fulton St.
Campanile Wy.
W. Entrance

N

LEGEND
● Study Intersection - Signalized
PM Peak Hour Volume

IBI GROUP

Berkeley Downtown Area Traffic Impact Analysis

2030 With Project Intersection Volumes - PM Peak Hour

Figure 6-3

Tables 6-7 and 6-8 summarize the traffic conditions for the studied intersections for the AM and PM peak hours.

Table 6-7: Year 2030 With Project Condition AM Peak Hour Level of Service

No.	Intersection	Control	V/C	Delay (in Sec)	LOS	Deficient
1	Martin Luther Jr. Way / Hearst Avenue	Signalized	1.13	45.0	D	
2	Martin Luther Jr. Way / University Avenue	Signalized	1.06	51.7	D	
3	Martin Luther Jr. Way / Center Street	Signalized	0.94	36.1	D	
4	Martin Luther Jr. Way / Allston Way	Signalized	1.06	21.6	C	
5	Milvia Street / University Avenue	Signalized	0.99	91.4	F	X
6	Milvia Street / Center Street	Signalized	0.66	44.0	D	
7	Milvia Street / Allston Way	Signalized	0.83	37.9	D	
8	Shattuck Avenue / Hearst Avenue	Signalized	0.72	12.1	B	
9	Shattuck Avenue / University Avenue	Signalized	0.88	24.7	C	
10	Shattuck Avenue / Center Street	Signalized	0.67	18.4	B	
11	Shattuck Avenue / Allston Way	Signalized	0.90	27.0	C	
12	Shattuck Avenue / Bancroft Way	Signalized	0.60	15.3	B	
13	Shattuck Avenue / Durant Avenue	Signalized	1.10	108.5	F	X
14	Shattuck Avenue / Haste Street	Signalized	0.54	13.8	B	
15	Shattuck Avenue / Dwight Way	Signalized	0.85	23.1	C	
16	Oxford Street / Hearst Avenue	Signalized	1.61	112.7	F	X
17	Oxford Street / University Avenue	Signalized	1.05	59.7	E	X
18	Oxford Street / Center Street	Signalized	0.44	12.7	B	
19	Oxford Street / Allston Way	Signalized	0.66	13.9	B	
20	Oxford Street / Fulton Street / Bancroft Way	Signalized	0.45	11.5	B	
21	Fulton Street / Durant Avenue	Signalized	0.71	15.2	B	

Table 6-8: Year 2030 With Project Condition PM Peak Hour Level of Service

No.	Intersection	Control	V/C	Delay (in Sec)	LOS	Deficient
1	Martin Luther Jr. Way / Hearst Avenue	Signalized	2.01	261.1	F	X
2	Martin Luther Jr. Way / University Avenue	Signalized	1.85	63.2	E	X
3	Martin Luther Jr. Way / Center Street	Signalized	0.98	35.1	D	
4	Martin Luther Jr. Way / Allston Way	Signalized	1.65	80.7	F	X
5	Milvia Street / University Avenue	Signalized	1.14	57.5	E	X
6	Milvia Street / Center Street	Signalized	1.15	98.1	F	X
7	Milvia Street / Allston Way	Signalized	1.21	88.9	F	X
8	Shattuck Avenue / Hearst Avenue	Signalized	0.68	12.6	B	
9	Shattuck Avenue / University Avenue	Signalized	1.31	60.7	E	X
10	Shattuck Avenue / Center Street	Signalized	1.29	106.1	F	X
11	Shattuck Avenue / Allston Way	Signalized	1.63	122.8	F	X
12	Shattuck Avenue / Bancroft Way	Signalized	0.98	67.8	E	X
13	Shattuck Avenue / Durant Avenue	Signalized	1.04	89.2	F	X
14	Shattuck Avenue / Haste Street	Signalized	1.29	43.0	D	
15	Shattuck Avenue / Dwight Way	Signalized	0.95	35.4	D	

No.	Intersection	Control	V/C	Delay (in Sec)	LOS	Deficient
16	Oxford Street / Hearst Avenue	Signalized	1.35	137.3	F	X
17	Oxford Street / University Avenue	Signalized	0.89	26.7	C	
18	Oxford Street / Center Street	Signalized	0.47	13.9	B	
19	Oxford Street / Allston Way	Signalized	1.32	112.0	F	X
20	Oxford Street / Fulton Street / Bancroft Way	Signalized	0.78	13.2	B	
21	Fulton Street / Durant Avenue	Signalized	0.77	17.4	B	

The street lane reductions and increased land use development proposed in the Year 2030 With Project condition do increase auto travel delay in the downtown. Significant traffic impacts and mitigation measures to address these impacts are discussed in Section 7.0.

In terms of auto and transit mobility, the conversion of Shattuck Avenue between Center Street and University Avenue to serve two-way traffic would allow for more efficient traffic operations in the corridor as the proposal would eliminate the existing jog on Shattuck Square at University Avenue. However, the reduction in travel lanes in the Shattuck Avenue corridor from two lanes in each direction to a single lane may impact bus and auto traffic flow as buses service bus stops in the corridor. As is the case in the Year 2030 Baseline condition, some minor localized delays to transit services would be anticipated at intersections that experience higher levels of traffic delay. The closure of Center Street, also assumed in the With Project condition, would necessitate the rerouting of AC Transit Lines 1, 15, 65, and 67 to a parallel street.

6.4 PARKING

The review of anticipated parking demand and supply in the Year 2030 Baseline condition did not identify a forecasted shortfall in parking supply with the downtown. The increased land use development proposed in the Year 2030 With Project condition would also increase parking demand compared with the Year 2030 Baseline, but the new development would be anticipated to also provide additional parking supply.

The WSA parking demand rates were applied to the anticipated new residential units and commercial floor area that are forecast for the downtown study area in the Year 2030 With Project condition. In this condition, it is estimated that demand for up to 4,500 additional parking spaces would be generated in the mid-day mid-week period with the Year 2030 With Project land use development.

As occurs in Year 2030 Baseline condition, the new developments (private and UC Berkeley) proposed in the Year 2030 with Project condition would to contribute additional parking spaces in the downtown. The estimated number of new private parking spaces added to the downtown as part of new development would be 4,200 spaces, using existing City parking standards. Adding this private supply to the 850 available public spaces, results in a supply of about 5,050 parking spaces. This supply figure exceeds the new demand of 4,500 parking spaces. Therefore, the parking supply in the Year 2030 With Project condition is estimated to accommodate the forecasted increase in parking demand.

6.5 GRADE CROSSINGS

The California Public Utilities Commission (CPUC) requested the analysis of three grade crossings to assess the potential impacts of the DAP scenario on future traffic conditions for at-grade crossings located near the study area. The nearest rail corridor to the DAP study area is the Capital Corridor/Union Pacific rail corridor, which operates in a north-south alignment within the City of Berkeley, immediately east of the Interstate 80 (I-80) Freeway. This rail corridor is located about 1.5

miles from the western edge of the DAP study area. The three at-grade crossings requested for review are:

- Addison Street/Third Street

- Hearst Avenue/Third Street

- Virginia Street/Third Street

Table 6-9 summarizes the forecast Year 2030 traffic volumes at each grade crossing for the Baseline and With Project conditions for the AM and PM peak periods.

Table 6-9: At-Grade Crossings Year 2030 Traffic Volume Comparison

CPUC Crossing No.	Intersection	Peak Period	Year 2030 Baseline Traffic Volume	Year 2030 With Project Traffic Volume
001A-9.10	Addison Street/Third Street	AM	27	45
		PM	14	34
001A-9.30	Hearst Avenue/Third Street	AM	585	962
		PM	366	876
001A-9.60	Virginia Street/Third Street	AM	n/a	n/a
		PM	n/a	n/a

n/a: not available. The ACCMA model does not include Virginia Street in the roadway network. As such, no future forecast traffic volumes are available. Given the location of this street in relation to the DAP study area, no significant impact is anticipated as a result of DAP generated traffic.

A rail grade crossing delay analysis was completed for the Addison Street and Hearst Avenue grade crossings using the traffic volumes presented in Table 6-9. Information on future forecast train volumes and physical conditions at both of the grade crossings was obtained from the West Berkeley Circulation Master Plan, Quiet Zone Study – Existing Conditions Report[8].

The rail grade crossing delay analysis methodology is focused on the amount of peak hour delay imposed on each vehicle at each at-grade crossing. The formulas are based on several data factors, including:

- Traffic Volumes

- Train Trips, Length and Train Speed

- Roadway Classification and Number of Lanes for each Street

- Width of Street at each Crossing

- Arrival and Departure Rates

- Additional Delay due to Switching and/or Passenger Loading at Stations

The formula used in this analysis looks at the delay at an at-grade crossing as a function of the time of crossing blockage, highway traffic volume, and the rate of vehicle queue discharge after the train has passed. This can be calculated on both a daily and peak hour basis. The formula for determining the delay is:

Delay = (TB2*q) / 2*(1-q/d)

Where:

Delay = total minutes of vehicle delay

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[8] City of Berkeley - West Berkeley Circulation Master Plan, Quiet Zone Study – Existing Conditions Report, Prepared by Wilbur Smith & Associates, March 28, 2008.

TB = the length of time the crossing is blocked by the train

q = vehicle arrival rate (vpm)

d = vehicle departure rate (vpm)

The vehicle departure rate is calculated as a function of the number of traffic lanes available and the percentage of trucks in the traffic stream. It was assumed that 10-percent of the overall traffic stream during the day was comprised of trucks. This is a conservative estimate that accounts for potential growth of truck volumes in the future. Using this assumption, the departure rate calculated was 1,520 vehicles per hour per lane following the passage of the trains.

In determining the amount of time each crossing is blocked when a train passes, two components are calculated. One component is based on the lead and lag time of the crossing closing. The lead time is the amount of time that the gates are lowered before a train begins to cross the arterial. The lag time is the amount of time that passes after the end of the train has crossed the arterial until the gates rise. A lead time of 28 seconds and a lag time of 8 seconds are assumed to be typical for all crossings, for a total delay of 36 seconds or 0.603 minutes per crossing.

The second component is a variable and is equal to the span of time beginning when the front of the train enters the near side of the intersection and ending when the rear of the train clears the point beyond the intersection that signals the end of the crossing warning. As a factor of safety, a distance of 50 feet is added to the train length in the following formula, which was developed to calculate the amount of time (in minutes) an arterial is blocked.

TB = .603+((50+L+W) / V)

Where:

L = length of the train in feet

W = roadway width at the crossing in feet

V = train speed in feet per minute

The width of each roadway, train speeds and average train length was obtained from the West Berkeley Circulation Master Plan. The lane width is 12 feet, the train speeds are 35 mph (passenger) and 25 mph (freight), and average train length are 700 ft (passenger) and 7,000 ft (freight). Forecasts of railroad passenger and freight train information were obtained from the West Berkeley Circulation Master Plan, Quiet Zone Study – Existing Conditions Report, and are presented below:

- 30 freight trains per day (evenly spread throughout the day – 1.25 trains per hour)

- 44 passenger trains per day (from 6am to 10pm – 4 to 5 trains on peak hours)

The results of the application of the proposed methodology to the Year 2030 Without Project condition and to Year 2030 With Project Condition are summarized in Table 6-10.

Table 6-10: Year 2030 Without Project and Year 2030 With Project Peak Hour Delay

CPUC Crossing No.	Intersection	Time Period	Year 2030 Without Project			Year 2030 With Project			Impact
			Vehicle Volume (veh/hr)	Vehicles Delayed (veh)	Average Delay (sec/veh)	Vehicle Volume (veh/hr)	Vehicles Delayed (veh)	Average Delay (sec/veh)	
001A-9.10	Addison Street/Third Street	AM	26	2	13	29	2	14	No
		PM	14	2	8	34	2	16	No
001A-9.30	Hearst Avenue /Third Street	AM	430	11	48	764	27	51	No
		PM	288	7	44	439	12	48	No
001A-9.60	Virginia Street /Third Street	AM	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		PM	n/a	n/a	n/a	n/a	n/a	n/a	n/a

* Total Peak Delay considers the influence of the Berkeley Amtrak Station

While the traffic volumes at both grade crossings are forecast to increase between the Year 2030 Baseline and the Year 2030 With Project, the volume of traffic is not forecast to create a significant traffic impact at the either Hearst Avenue or the Addison Street grade crossing. At the Addison Street crossing, there is a forecasted increase in average delay of one second per vehicle in the AM peak hour and eight seconds in the PM peak hour. In the Year 2030 With Project, the Addison Street crossing would continue to operate at LOS "C" in the AM peak hour and change from LOS "C" to LOS "D" in the PM peak hour when compared to the Year 2030 Baseline. The Hearst Avenue crossing is forecasted to operate at LOS "F" during both peak hours. The 2030 With Project condition is forecast to cause a slight increase in the average delay in both time periods, but this increase is not a significant change compared to the Year 2030 Baseline.

6.6 CALTRANS/CONGESTION MANAGEMENT PROGRAM ANALYSIS

No Caltrans or Alameda County Congestion Management Program (CMP) facilities pass directly through the DAP study area. The three closest Caltrans/CMP roadways and/or freeways to the DAP study area are as follows:

- Ashby Avenue – State Route (SR) 13, located 0.6 miles south of the southern study area boundary

- San Pablo Avenue – SR 123, located one mile west of the western study area boundary

- I-80 Freeway - located 1.7 miles west of the western study area boundary

Table 6-11 provides a comparison of the Existing Year 2008, Year 2030 Baseline, and Year 2030 With Project traffic volumes for specific segments of each Caltrans highway. Year 2008 volumes are obtained using Year 2007 traffic counts obtained from Caltrans and applying a 1% annual growth factor to estimated Year 2008 volumes.

Table 6-11: Caltrans/CMP Facilities Daily Traffic Volumes

Caltrans Facility	Segment	Year 2008 Traffic Volume	Year 2030 Baseline Traffic Volume	Year 2030 With Project Traffic Volume	Impact
I-80	Gilman to University	270,000	280,000	280,000	No
	University to Ashby	273,000	275,000	276,000	No
SR-13 (Ashby Avenue)	I-80 to San Pablo	31,000	38,400	38,600	No
	San Pablo to Adeline	24,000	38,100	36,400	No
	Adeline to Telegraph	21,000	33,000	30,200	No
SR-123 (San Pablo Avenue)	Gilman to University	26,000	56,600	55,200	No
	University to Ashby	25,000	51,600	50,900	No

The majority of future growth in daily volumes is anticipated to occur as part of the Year 2030 Baseline condition. The implementation of the DAP land use plane will increase forecast traffic volumes on selected CMP roadway and freeways segments and reduce volumes on other segments. The volume reductions are likely a result of the changing travel patterns that are forecast to occur in the Year 2030 With Project condition, which showed increases in transit use, and pedestrian and bicycle transportation over the Year 2030 Baseline forecast.

To complete this analysis, the performance of the street segments identified above is assessed using the Alameda County CMP methodology for determining roadway and freeway segment LOS. This methodology is based on Chapter 15 of the 2000 HCM and is also used by Caltrans to assess LOS. In this analysis LOS is determining using the average travel speed for the roadway/freeway express in miles per hour. Table 6-12 identifies the LOS ranges by arterial roadway classification. Table 6-13 identifies LOS for freeways.

Table 6-12: Alameda County CMP Arterial Roadway Average Travel Speed and LOS

Arterial Class	I	II	III
Range of Free Flow Speeds (mph)	35 to 45	30 to 35	25 to 35
Typical Free Flow Speed (mph)	40	33	27
Level of Service	I	II	III
	Average Travel Speed (miles per hour)		
A	$\geq$35	$\geq$30	$\geq$25
B	$\geq$28	$\geq$24	$\geq$19
C	$\geq$22	$\geq$18	$\geq$13
D	$\geq$17	$\geq$14	$\geq$9
E	$\geq$13	$\geq$10	$\geq$7
F	<13	<10	<7

Table 6-13: Alameda County CMP Freeway Average Travel Speed and LOS

LOS	Average Travel Speed (miles per hour)	Volume-to-Capacity Ratio	Maximum Traffic Volume (vehicles/hour/lane)
A	≥60	0.35	700
B	≥55	0.58	1,000
C	≥49	0.75	1,500
D	≥41	0.90	1,800
E	≥30	1.00	2,000
F	<30	variable	-

The results of this analysis are presented in Table 6-14 and 6-15.

Table 6-14: Alameda County CMP LOS Analysis AM Peak Hour

Caltrans Facility	Segment / Direction	Year 2030 Baseline Speed (mph)	Year 2030 Baseline Level of Service	Year 2030 With Project Speed (mph)	Year 2030 With Project Level of Service	Impact
I-80	Gilman to University NB	43	D	41	D	
	Gilman to University SB	3	F	2	F	
	University to Ashby NB	42	D	42	D	
	University to Ashby SB	2	F	2	F	
SR-13 (Ashby Avenue)	I-80 to San Pablo EB	29	A	30	A	
	I-80 to San Pablo WB	30	A	30	A	
	San Pablo to Adeline EB	1	F	24	B	
	San Pablo to Adeline WB	4	F	30	A	
	Adeline to Telegraph EB	11	D	7	F	x
	Adeline to Telegraph WB	30	A	30	A	
SR-123 (San Pablo Avenue)	Gilman to University NB	30	B	30	B	
	Gilman to UniversitySB	1	F	1	F	
	University to Ashby NB	30	B	30	B	
	University to Ashby SB	2	F	1	F	

Table 6-15: Alameda County CMP LOS Analysis PM Peak Hour

Caltrans Facility	Segment / Direction	Year 2030 Baseline Speed (mph)	Year 2030 Baseline Level of Service	Year 2030 With Project Speed (mph)	Year 2030 With Project Level of Service	Impact
I-80	Gilman to University NB	4	F	4	F	
	Gilman to University SB	50	C	50	C	
	University to Ashby NB	4	F	4	F	
	University to Ashby SB	46	D	47	D	
SR-13 (Ashby Avenue)	I-80 to San Pablo EB	30	A	15	C	
	I-80 to San Pablo WB	30	A	29	A	
	San Pablo to Adeline EB	29	A	12	D	
	San Pablo to Adeline WB	29	A	23	B	
	Adeline to Telegraph EB	30	A	30	A	
	Adeline to Telegraph WB	1	F	4	F	
SR-123 (San Pablo Avenue)	Gilman to University NB	3	F	4	F	
	Gilman to UniversitySB	29	B	30	B	
	University to Ashby NB	1	F	2	F	
	University to Ashby SB	2	F	1	F	

One significant traffic impact was identified in the AM peak hour on Ashby Avenue (SR-13) in the eastbound direction between Adeline and Telegraph. Mitigation measures for these impacts are discussed in Section 7.0.

6.7 PEDESTRIAN AND BICYCLE SAFETY

Improving pedestrian and bicycle safety is a goal of the DAP process and policies proposed as part of the plan. While it is not feasible to specifically quantify the potential for reducing pedestrian and bicycle accidents, nor to predict how many accidents would occur if the DAP roadway and sidewalk changes are not implemented, it is possible to discuss the potential improvements to the pedestrian and bicycle environment that are proposed to be implemented as part of the DAP.

The roadway lane reduction proposals on Shattuck Avenue, University Avenue, and Hearst Avenue are designed improve the pedestrian and bicycle environment through the provision of wider sidewalks, bicycle lanes, and reducing street crossing distances at designated crossing locations. These roadway design features are intended to improve pedestrian and bicycle mobility in the downtown and promote safer pedestrian and bicyclist operation within the DAP study area.

6.8 CONSISTENCY WITH LOCAL AND REGIONAL TRANSPORTATION POLICIES

The transportation and access components of the proposed DAP are designed to enhance mobility within the Downtown, particularly with transit use and non-motorized transportation. The Strategic Statement for the DAP Access Chapter states:

> "Downtown Berkeley's transportation system must support existing and proposed land uses and serve the needs and goals of Downtown in its three different roles: Downtown as a walkable neighborhood, Downtown as a thriving community center service Berkeley as a whole, and Downtown as a regional employment, arts, and education destination."

The DAP Access Chapter spelled out elsewhere in the Draft Environmental Impact Report outline the specific goals, objectives, and policies of the DAP. It is necessary to compare these goals, objectives and policies with local and regional documents and policies that support alternative transportation modes.

Local Alternative Transportation Policy Sources include (but are not limited to):

- Berkeley General Plan Transportation Element
- Berkeley Bicycle Plan
- Berkeley Pedestrian Master Plan
- BART Plaza and Transit Area Design Plan

Regional Alternative Transportation Policy Sources include (but are not limited to):

- Alameda County Congestion Management Agency Congestion Management Program
- Caltrans Directive 64: Outlines complete streets policies
- MTC Regional Policy for the Accommodation of Non-Motorized Travelers

The DAP Access Chapter specifically encourages the improvement of the Downtown roadway network and transportation infrastructure to provide more support for transit services and non-motorized transportation. The Access Chapter notes that the DAP should:

> "Prioritize transit, pedestrians, and bicyclists"

and

> "Seek(s) to establish walking as the dominant mode in Downtown, paired with transit service and bicycle use"

Many of the street modifications proposed to Shattuck Avenue, Hearst Avenue, Center Street, and University Avenue are intended to increase the amount of street right-of-way available for exclusive use by pedestrians and bicyclists. The improvements proposed for Center Street and Hearst Avenue overlap with designated bicycle corridors in the City of Berkeley, promoting the enhancement of these facilities. Given the stated non-motorized transportation goals, objectives, and policies of the DAP, no significant impacts are anticipated to be caused by the project with regard to local and regional alternative transportation policies and plans.

7.0   RECOMMENDED MITIGATION MEASURES

Significant traffic impacts in the DAP study area forecast to result from the proposed project are identified in this section.   Mitigations measures to address these impacts are also discussed. Strategies to address potential parking shortfalls are also presented.

7.1 NON-MOTORIZED TRANSPORTATION

The Year 2030 With Project condition is forecast to cause a significant impact to bicycle transportation along the Milvia Street Bicycle Boulevard between University Avenue and Allston Way. Two potential mitigation measures have been identified to address this impact. Either mitigation measure would address the significant impact. The mitigation measure alternatives are:

- Install Class 2 Bike Lanes on Milvia Street between University Avenue and Allston Way. This mitigation measure may result in the loss of on-street parking stalls along Milvia Street in order to accommodate the bike lanes. Up to 35 on-street parking stalls could be impacted by this mitigation measure. As noted in the parking demand discussion presented in this report, sufficient public parking capacity is anticipated in the Year 2030 With Project condition, so the loss of these parking stalls would not be anticipated to cause a significant impact. This mitigation measure would also not preclude the implementation of the traffic mitigation measures at the University Avenue/Milvia Street intersection and the Center Street/Milvia Street intersection.

- Install traffic calming devices on Milvia Street either between University Avenue and Allston Way or immediately north and south of this segment to discourage through vehicle traffic from traveling on this section of the roadway. Traffic calming devices could include speed humps, turn restrictions/prohibitions, or other measures determined by the City of Berkeley.

7.2 TRAFFIC

The changes in intersection level of service from the Year 2030 Baseline to the Year 2030 With Project Condition is shown in Table 7-1 and Table 7-2.

Table 7-1: Changes in Year 2030 AM Peak Hour Level of Service

		Baseline		With Project		
No.	Intersection	Delay (in Sec)	LOS	Delay (in Sec)	LOS	Significant Impact
1	Martin Luther Jr. Way / Hearst Avenue	16.5	B	45.0	D	
2	Martin Luther Jr. Way / University Avenue	63.9	E	51.7	D	
3	Martin Luther Jr. Way / Center Street	75.2	E	36.1	D	
4	Martin Luther Jr. Way / Allston Way	21.4	C	21.6	C	
5	Milvia Street / University Avenue	13.6	B	91.4	F	yes - LOS changes to "F"
6	Milvia Street / Center Street	10.8	B	44.0	D	
7	Milvia Street / Allston Way	12.6	B	37.9	D	
8	Shattuck Avenue / Hearst Avenue	13.4	B	12.1	B	
9	Shattuck Avenue / University Avenue	14.8	B	24.7	C	
10	Shattuck Avenue / Center Street	9.8	A	18.4	B	
11	Shattuck Avenue / Allston Way	10.2	B	27.0	C	
12	Shattuck Avenue / Bancroft Way	11.4	B	15.3	B	
13	Shattuck Avenue / Durant Avenue	23.8	C	108.5	F	yes - LOS changes to "F"

		Baseline		With Project		
No.	Intersection	Delay (in Sec)	LOS	Delay (in Sec)	LOS	Significant Impact
14	Shattuck Avenue / Haste Street	13.2	B	13.8	B	
15	Shattuck Avenue / Dwight Way	19.0	B	23.1	C	
16	Oxford Street / Hearst Avenue	46.4	D	112.7	F	yes - LOS changes to "F"
17	Oxford Street / University Avenue	43.6	D	59.7	E	yes - LOS changes to "E"
18	Oxford Street / Center Street	15.7	B	12.7	B	
19	Oxford Street / Allston Way	17.0	B	13.9	B	
20	Oxford Street / Fulton Street / Bancroft Way	9.6	A	11.5	B	
21	Fulton Street / Durant Avenue	16.4	B	15.2	B	

Table 7-2: Changes in Year 2030 PM Peak Hour Level of Service

		Baseline		With Project		
No.	Intersection	Delay (in Sec)	LOS	Delay (in Sec)	LOS	Significant Impact
1	Martin Luther Jr. Way / Hearst Avenue	200.6	F	261.1	F	yes - delay increase > 3 sec.
2	Martin Luther Jr. Way / University Avenue	61.3	E	63.2	E	no - delay increase < 3 sec.
3	Martin Luther Jr. Way / Center Street	36.9	D	35.1	D	
4	Martin Luther Jr. Way / Allston Way	40.7	D	80.7	F	yes - LOS changes to "F"
5	Milvia Street / University Avenue	53.2	D	57.5	E	yes - LOS changes to "E"
6	Milvia Street / Center Street	84.0	F	98.1	F	yes - delay increase > 3 sec.
7	Milvia Street / Allston Way	116.4	F	88.9	F	no - delay increase < 3 sec.
8	Shattuck Avenue / Hearst Avenue	137.9	F	12.6	B	
9	Shattuck Avenue / University Avenue	113.2	F	60.7	E	no - delay increase < 3 sec.
10	Shattuck Avenue / Center Street	66.7	E	106.1	F	yes - LOS changes to "F"
11	Shattuck Avenue / Allston Way	38.0	D	122.8	F	yes - LOS changes to "F"
12	Shattuck Avenue / Bancroft Way	16.7	B	67.8	E	yes - LOS changes to "E"
13	Shattuck Avenue / Durant Avenue	16.3	B	89.2	F	yes - LOS changes to "F"
14	Shattuck Avenue / Haste Street	24.0	C	43.0	D	
15	Shattuck Avenue / Dwight Way	50.0	D	35.4	D	
16	Oxford Street / Hearst Avenue	69.9	E	137.3	F	yes - LOS changes to "F"
17	Oxford Street / University Avenue	30.4	C	26.7	C	
18	Oxford Street / Center Street	54.2	D	13.9	B	
19	Oxford Street / Allston Way	64.4	E	112.0	F	yes - LOS changes to "F"
20	Oxford Street / Fulton Street / Bancroft Way	14.4	B	13.2	B	
21	Fulton Street / Durant Avenue	14.9	B	17.4	B	

The intersections identified as impacted in Tables 7.1 and 7.2, as well as the mitigation measures proposed to eliminate or reduce the impacts, are discussed below.

- **Intersection 1 – Martin Luther King Jr. Way/Hearst Avenue:**

    o **Impact:** Unacceptable LOS at PM peak hour

    o **Magnitude of impact:** LOS "F" occurs in Year 2030 Baseline, but delay increases from 200.6 seconds to 261.1 seconds in Year 2030 With Project condition. This impact results from the increase in vehicle traffic due to the land use development proposed in the DAP, and is aggravated by a redistribution of traffic due to proposed changes in the downtown street network.

    o **Existing Geometry:** one through-right and one through-left lane for northbound and southbound directions, one through-left and one right-turn lane for eastbound direction and one lane permitting left, through and right movements in the westbound direction. Bicycle lane on the east portion of Hearst Avenue on both sides of the avenue, and on the right side of the west portion of Hearst.

    o **With Project Geometry:** same as existing geometry

    o **Mitigation Measure:** modify lane configuration at the intersection

        ▪ Add a lane to Hearst Avenue for left turns in the westbound direction, changing the right lane to a through-right. Implementation of this mitigation measure would still result in LOS "F" in the PM peak hour, but delay will be reduced to 131.2 seconds, eliminating the significant impact. The implementation of this mitigation measure requires re-striping of Hearst Avenue east of Martin Luther King Jr. Way to accommodate the new lane, eliminating the bike lane in part of the block; or the acquisition of additional right of way on this segment of Hearst Avenue to accommodate the new lane and maintain the bike lane. This measure is not anticipated to cause significant impacts to pedestrian traffic.

- **Intersection 4 – Martin Luther King Jr. Way/Allston Way:**

    o **Impact:** Unacceptable LOS at PM peak hour

    o **Magnitude of impact:** LOS changes from "D" in Year 2030 Baseline to "F" in Year 2030 With Project condition. The likely cause of this impact is the increase in traffic volumes due to increased land use development proposed in the DAP.

    o **Existing Geometry:** one through-right and one through-left lane for northbound and southbound directions, one through-left and one right-turn lane for eastbound and westbound directions.

    o **With Project Geometry:** same as existing geometry

    o **Mitigation Measure:** modify lane configuration at the intersection

        ▪ Change lane configuration on Allston Way in the eastbound direction, turning the existing through-left lane to left turn only and the right lane to a through-right. Add a right turn lane to Martin Luther King Jr. Way in the southbound direction, changing the through-right lane to through only. This mitigation measure will result in change of LOS to "D", with a delay of 49.8 seconds. The implementation of this mitigation measure requires re-striping of Allston Way west of Martin Luther King Jr. Way to accommodate the lane changes, and the acquisition of right of way north of Allston Way to accommodate the southbound right turn lane. This measure is not anticipated to cause significant impacts to pedestrian traffic.

- **Intersection 5 – Milvia Street/University Avenue:**
  - **Impact:** Unacceptable LOS at AM and PM peak hours
  - **Magnitude of impact:** LOS changes from "B" in Year 2030 Baseline to "F" in Year 2030 With Project condition for the AM peak hour and from LOS "D" to "E" in the PM peak hour. The likely cause of this impact is the reconfiguration of the downtown street network and redistribution of vehicle traffic.
  - **Existing Geometry:** one through-right and one left lane for the northbound direction, one lane in the southbound direction, one through-left and one through-right lane for eastbound and westbound directions. Milvia Street is also a Bicycle Boulevard
  - **With Project Geometry:** same as existing geometry
  - **Mitigation Measure:** modify lane configuration at the intersection
    - Add right turn lane to University Avenue to the eastbound direction and one left turn lane to University Avenue in the westbound direction. In the eastbound direction, the configuration of lanes would be one through-left lane, one through and one right turn lane. In the westbound direction, the configuration of lanes would be one left turn lane, one through lane and one through-right lane. This mitigation measure would change LOS to "B", with delay of 14.9 seconds in the AM peak and to LOS "C" with delay of 25.9 seconds in the PM peak. The implementation of this mitigation measure requires the removal of the median east of the intersection in order to accommodate the extra lane, and the re-striping of University Avenue on both sides of Milvia Street.

      This measure is not anticipated to cause significant impacts to pedestrian traffic, but a right turn on green only with an advance stop bar can be implemented on University Avenue to avoid conflicts with pedestrians crossing Milvia Street. This measure would increase pedestrian safety and does not change the LOS of the intersection. The implementation of a bicycle waiting area placed ahead of the cars waiting to turn right can reduce the conflicts between through bicycle flows and right-turn vehicle movements on Milvia Street in the southbound direction. This measure requires re-striping of Milvia Street.

- **Intersection 6 – Milvia Street/Center Street:**
  - **Impact:** Unacceptable LOS at PM peak hour
  - **Magnitude of impact:** LOS "F" occurs in Year 2030 Baseline, but delay increases from 84.0 seconds to 98.1 seconds in Year 2030 With Project condition. The likely cause of this impact is the increase in traffic volumes due to land use development proposed by the DAP.
  - **Existing Geometry:** one lane for Northbound and Southbound directions, one lane for Eastbound direction, and one through-left and one right lane for Westbound direction. Milvia Street is also a Bicycle Boulevard
  - **With Project Geometry:** same as existing geometry
  - **Mitigation Measure:** modify lane configuration at the intersection
    - Add one left turn lane to Milvia Street in the northbound and southbound directions, changing lane configuration to one through-right and one left turn lane. This mitigation measure will result in change of LOS to "C", with delay of

24.0 seconds in the PM peak. The implementation of this mitigation measure requires the removal of on-street parking spaces in the northbound and southbound directions to accommodate the left turn, and the re-striping of Milvia Street on both sides of Center Street. This measure is not anticipated to cause significant impacts to pedestrian or bicycle traffic. Milvia Street will remain a bicycle boulevard and sufficient traffic lane width would be provided for bicycles and vehicles to make through movements at this intersection. This improvement would result in the loss of about eight on-street parking spaces, but is not anticipated to generate significant impact with regard to parking.

- **Intersection 10 – Shattuck Avenue/Center Street:**

  o **Impact:** Unacceptable LOS at PM peak hour

  o **Magnitude of impact:** LOS "E" occurs in Year 2030 Baseline, but deteriorates to F in Year 2030 With Project condition. The likely cause of this impact is the reconfiguration of the downtown street network, in particular the changes in the number of lanes on Shattuck Avenue.

  o **Existing Geometry:** Shattuck Avenue is a one-way street, with four lanes in the southbound direction: one through-left, two through lanes and one through-right lane. In the eastbound and westbound directions, there is one through-left lane.

  o **With Project Geometry:** Shattuck Avenue will be converted to a two-way street, with one through and one left-turn lane northbound and one through and one right-turn lane southbound. Center Street will be closed to traffic east of Shattuck and the eastbound direction will have one right-turn lane and one left-turn lane.

  o **Mitigation Measure:** modify lane configuration at the intersection

    ▪ The significant impact at this intersection can only be mitigated by restoring Shattuck Avenue to provide two traffic lanes in the northbound direction. The proposed mitigation measure would add one lane to Shattuck Avenue in the northbound direction, changing lane configuration to one left-turn and two through lanes. This mitigation measure would result in change of LOS to "D", with an average delay of 42.6 seconds per vehicle in the PM peak. The implementation of this mitigation measure requires the removal of the parking spaces in the northbound direction on Shattuck Avenue, the reconfiguration of the southeast sidewalk, and the re-striping of Shattuck Avenue in the block south of Center Street. This improvement would result in the loss of about eight on-street parking spaces, but is not anticipated to cause a significant impact to parking.

- **Intersection 11 – Shattuck Avenue/Allston Way:**

  o **Impact:** Unacceptable LOS at PM peak hour

  o **Magnitude of impact:** LOS "D" occurs in Year 2030 Baseline, and deteriorates to "F" in Year 2030 With Project condition. This impact results from the combination of the increase in vehicle traffic due to increased land use development and the reconfiguration of the downtown street network. This impact is connected to the changes proposed on Shattuck Avenue.

  o **Existing Geometry:** In the northbound and southbound directions, the lane configuration is one left-turn, one through and one through-right lane. In the eastbound and westbound directions, there is one lane that allows all movements.

  o **With Project Geometry:** Northbound and southbound directions loose a through lane. Existing lane configuration in eastbound and westbound directions is maintained.

  o **Mitigation Measure:** modify lane configuration at the intersection

   ▪ Maintain existing number of lanes (three) in the northbound and southbound directions, changing lane configuration to one left-turn lane, one through lane, and one right-turn lane. Add one right-turn lane to the westbound direction, changing the existing lane to a through-left only. This mitigation measure would change the forecast LOS to "D", with an average delay of 37.6 seconds per vehicle in the PM peak. The proposed mitigation measure would maintain the single through lane concept of the Shattuck Boulevard plan, but would widen the street cross section by providing a right turn lane in the northbound and southbound directions.

   On Allston Way, the implementation of the proposed mitigation measure requires the removal of on-street parking to accommodate the new lane configuration. This measure is not anticipated to cause significant impacts to pedestrian traffic. The anticipated loss of six on-street parking spaces on Allston Way and nine spaces on Shattuck is not anticipated to generate significant impacts.

- **Intersection 12 – Shattuck Avenue/Bancroft Way:**

  o **Impact:** Unacceptable LOS at PM peak hour

  o **Magnitude of impact:** LOS "B" occurs in Year 2030 Baseline, and deteriorates to "E" in Year 2030 With Project condition. This impact results from the combination of the increase in trips due to increased land use development and the reconfiguration of the downtown street network. This impact is associated to the changes proposed to lane geometries on Shattuck Avenue.

  o **Existing Geometry:** one left-turn and two through lanes in the northbound direction. One through and one through-right lane in the westbound direction, one through and one through-right lane in southbound direction, and one right turn in the eastbound direction. Bancroft Way is also a Bicycle Boulevard.

  o **With Project Geometry:** Northbound direction configuration is one left-turn and one through lane and southbound direction should be reduced to one lane. Existing lane configuration in eastbound and westbound directions is maintained.

  o **Mitigation Measure:** modify lane configuration at the intersection

   ▪ Maintain existing configuration in the southbound direction (one through and one through-right lane). This mitigation measure will result in change of LOS to "D", with delay of 37.6 seconds in the PM peak. The proposed mitigation measure would not maintain the single through concept of the Shattuck Boulevard plan. On Shattuck Avenue, the implementation of this mitigation measure requires the reconfiguration of the parking spaces and sidewalk in the southbound direction and the re-striping of the segment in the block north of Bancroft Way. This measure is not anticipated to cause significant impacts to pedestrian traffic.

- **Intersection 13 – Shattuck Avenue/Durant Avenue:**

  o **Impact:** Unacceptable LOS at AM and PM peak hours

  o **Magnitude of impact:** LOS "C" occurs in the AM peak hour and in LOS "B" occurs in the PM peak hour in Year 2030 Baseline, and both periods experience deterioration to LOS "F" in Year 2030 With Project condition. The likely cause of this impact is the reconfiguration of lane geometry on Shattuck Avenue.

  o **Existing Geometry:** one left-turn, one through and one through-right lane in the northbound and southbound directions. Durant Way is a one-way street with one through-left and one through-right turn in the eastbound direction.

  o **With Project Geometry:** Northbound and southbound directions are changed to one left-turn and one through-right lanes. Existing lane configuration in eastbound and westbound directions is maintained.

  o **Mitigation Measure:** modify lane configuration at the intersection

    ▪ Maintain existing number of lanes in the northbound direction, changing lane configuration to one left-turn, one through and one right-turn lane. This mitigation measure will result in change of LOS to "B" in the AM peak hour (17.8 seconds delay). LOS "C" is achieved in the PM peak hour (21.6 seconds delay) applying the mitigation measures described above plus a 20 second increase in cycle time. On Shattuck Avenue, the implementation of this mitigation measure requires the reconfiguration of the parking spaces and sidewalk in the northbound direction and the re-striping of the segment in the block south of Durant Avenue. This measure is not anticipated to cause significant impacts to pedestrian traffic.

- **Intersection 16 – Oxford Street/Hearst Avenue:**

  o **Impact:** Unacceptable LOS at AM and PM peak hours

  o **Magnitude of impact:** LOS "D" occurs in the AM peak hour and in LOS "E" occurs in the PM peak hour in Year 2030 Baseline, and both periods experience deterioration to LOS "F" in Year 2030 With Project condition. This impact results from the increase in traffic due to increased land use development, and is aggravated by the proposed lane reductions on Hearst Avenue.

  o **Existing Geometry:** one left-turn, two through and one right-turn lane in the northbound direction, one through-left and one through-right in the southbound direction. Eastbound lane configuration is one left-turn, one through and one through-right lane, and westbound configuration is one left-turn, one through-left and one through-right lane.

  o **With Project Geometry:** Eastbound configuration is changed to one left-turn lane and one through-right lane. Existing lane configuration in northbound, southbound and westbound directions is maintained.

  o **Mitigation Measure:** modify lane configuration at the intersection

    ▪ Maintain existing lane geometry in the northbound and eastbound directions at this intersection. Proposed lane reduction on Hearst could be maintained to the west of the intersection. Add one lane in southbound direction, changing lane configuration to one left-turn, one through and one through-right lane. Change the westbound direction lane configuration to one left-turn, one through and one right-turn lane. This mitigation measure will result in

change of LOS to "D" in the AM peak hour (44.9 seconds delay). In the PM peak hour, the 2030 Baseline level of service is maintained (LOS "E"), with delay reduced from 69.9 seconds to 69.0 seconds. On Oxford Street, the implementation of this mitigation measure requires the removal of seven parking spaces in the southbound direction and the re-striping of the segment in the block north of Hearst Avenue. On Hearst Avenue, existing configuration should be maintained in both directions. This measure is not anticipated to cause significant impacts to pedestrian traffic. The loss of on-street parking spaces on Oxford is not anticipated to generate significant impacts.

- **Intersection 17 – Oxford Street/University Avenue:**

  o **Impact:** Unacceptable LOS at AM peak hour

  o **Magnitude of impact:** LOS "D" occurs in the AM peak hour in Year 2030 Baseline, and experiences deterioration to LOS "E" in Year 2030 With Project condition. The primary cause of this impact is the increase in traffic volumes due to the land use development proposed by the DAP.

  o **Existing Geometry:** one left-turn, one through and one through-right lane in the northbound and southbound directions, one left-turn and one through-right in the eastbound direction. Westbound lane configuration is one lane only allowing all movements.

  o **With Project Geometry:** Eastbound direction lane configuration changes to one left-turn and one through-right lane. All other directions maintain existing geometry.

  o **Mitigation Measure:** modify lane configuration at the intersection

    ▪ Maintain existing eastbound lane configuration. This mitigation measure will result in change of LOS to "D" in the AM peak hour, with delay of 40.2 seconds. Proposed lane reduction on University could be maintained west of the intersection. The implementation of this mitigation measure requires the maintenance of the eastbound lane configuration. This measure is not anticipated to cause significant impacts to pedestrian traffic.

- **Intersection 19 – Oxford Street/Allston Way:**

  o **Impact:** Unacceptable LOS at PM peak hour

  o **Magnitude of impact:** LOS "E" occurs in the PM peak hour in Year 2030 Baseline, and experiences deterioration to LOS "F" in Year 2030 With Project condition. The likely cause of this impact is the increase in vehicle trips due to the land use development proposed by the DAP.

  o **Existing Geometry:** one through-left and one through lane in the northbound direction, one through and one through-right in the southbound direction. Eastbound lane configuration is one lane only allowing right and left turns only.

  o **With Project Geometry:** same as existing geometry

  o **Mitigation Measure:** modify lane configuration at the intersection

    ▪ Add one lane in southbound direction, changing lane configuration to two through and one right turn lane. Add one left turn lane to the northbound direction, changing the configuration to one left-turn and two through lanes. Add a lane in the eastbound direction, changing configuration to one left-turn lane and one right-turn lane. Increase cycle length by 25 seconds and provide a protected left signal phase in the northbound direction. This mitigation

measure will result in change of LOS to "C" in the PM peak hour, with delay of 33.6 seconds.

On Oxford Street, the implementation of this mitigation measure requires the removal of five parking spaces in the southbound direction and the re-striping of the segment in the block north of Allston Way. In the northbound direction there is the need to use the median space, as well as re-stripe the roadway. On Allston Way, the addition of the extra lane will require the loss of four on-street parking spaces on the south side of the street, as well as re-striping. This measure is not anticipated to cause significant impacts to pedestrian traffic. The loss of on-street parking spaces on Oxford Street and Allston Way are not anticipated to generate significant impacts.

Table 7-3 contains the current configuration of the intersections that need mitigation measures, the identified mitigation measures and the level of service achieved with the changes to geometry/signal operation.

Table 7-3: Mitigation Measures

Intersection	Existing Geometry	With Project Geometry	Impact on LOS With Project	Mitigation Measures	New LOS	Geometry with Mitigation Measures
1	North/South: MLK Jr. Way East/West: Hearst Ave.	North/South: MLK Jr. Way East/West: Hearst Ave.	AM - not deficient / PM - maintains LOS "F", delay changes from 200.6s to 261.1s	Add a lane for left turns in WB direction, changing the right lane to through-right.	AM - not deficient / PM - maintains LOS "F", delay changes from 200.6s to 131.2s	North/South: MLK Jr. Way East/West: Hearst Ave.
4	North/South: MLK Jr. Way East/West: Allston Way	North/South: MLK Jr. Way East/West: Allston Way	AM - not deficient / PM - change in LOS to "F"	Change EB lane configuration to one left turn lane and one through-right lane and add one right turn lane to the SB direction, changing the through-right lane to through only.	AM - not deficient / PM - LOS changes to "D" (acceptable) with delay of 49.8s	North/South: MLK Jr. Way East/West: Allston Way
5	North/South: Milvia Street East/West: University Ave.	North/South: Milvia Street East/West: University Ave.	AM - change in LOS to "F" / PM - change in LOS to "E"	Add one lane for left turns in the WB direction, changing the middle lane to through only and add one lane for right turns in EB direction, changing the middle lane to through only.	AM - LOS changed to "B" (acceptable) with delay of 14.9s / PM - LOS changes to "C" (acceptable) with delay of 25.9	North/South: Milvia Street East/West: University Ave.

Intersection	Existing Geometry	With Project Geometry	Impact on LOS With Project	Mitigation Measures	New LOS	Geometry with Mitigation Measures
6	North/South: Milvia Street East/West: Center Street	North/South: Milvia Street East/West: Center Street	AM - not deficient PM - maintains LOS "F", delay changes from 84.0s to 98.1s	Add one left-turn lane to NB and SB directions	AM - not deficient PM - LOS changes to "C" (acceptable) with delay of 24.0s	North/South: Milvia Street East/West: Center Street
10	North/South: Shattuck Ave. East/West: Center Street	North/South: Shattuck Ave. East/West: Center Street	AM - not deficient PM - change in LOS to "F"	Add one through lane in NB direction.	AM - not deficient PM - LOS changes to "D" (acceptable) with delay of 42.6	North/South: Shattuck Ave. East/West: Center Street
11	North/South: Shattuck Ave. East/West: Allston Way	North/South: Shattuck Ave. East/West: Allston Way	AM - not deficient PM - change in LOS to "F"	Add one lane to WB direction and change lane configuration to one right turn lane and one through-left lane and maintain three lanes in NB and SB directions, with one lane for each movement.	AM - not deficient PM - LOS changes to "D" (acceptable) with delay of 37.6s	North/South: Shattuck Ave. East/West: Allston Way
12	North/South: Shattuck Ave. East/West: Bancroft Way	North/South: Shattuck Ave. East/West: Bancroft Way	AM - not deficient PM - change in LOS to "E"	Maintain two lanes in the SB direction, changing the geometry to one through lane and one through-right lane.	AM - not deficient PM - LOS changes to "D" (acceptable) with delay of 37.6s	North/South: Shattuck Ave. East/West: Bancroft Way
13	North/South: Shattuck Ave. East/West: Durant Ave.	North/South: Shattuck Ave. East/West: Durant Ave.	AM - change in LOS to "F" PM - change in LOS to "F"	Maintain existing number of lanes in the NB direction, designating one lane for each movement. Increase cycle time in 20s for PM peak.	AM - LOS changes to "B" (acceptable) with delay of 17.8s PM - LOS changes to "C" (acceptable) with delay of 21.6s	North/South: Shattuck Ave. East/West: Durant Ave.

Intersection	Existing Geometry	With Project Geometry	Impact on LOS With Project	Mitigation Measures	New LOS	Geometry with Mitigation Measures
16	North/South: Oxford Street East/West: Hearst Ave.	North/South: Oxford Street East/West: Hearst Ave.	AM - change in LOS to "F"	Maintain existing geometry in EB direction. Add one left turn lane in the SB direction, changing the middle lane to through only. Convert shared WB left/through lane to through only. Change signal phasing to provide protected left turns for all approaches	AM - LOS changes to "D" (acceptable) with delay of 44.9s	North/South: Oxford Street East/West: Hearst Ave.
			PM - change in LOS to "F"		PM - maintains LOS "E" (same as Baseline), delay changes to 69.0s	
17	North/South: Oxford Street East/West: University Ave.	North/South: Oxford Street East/West: University Ave.	AM – change in LOS to "E"	Maintain original EB configuration	AM - LOS changes to "D" (acceptable) with delay of 40.2s	North/South: Oxford Street East/West: University Ave.
			PM – not deficient		PM – not deficient	
19	North/South: Oxford Street East/West: Allston Way	North/South: Oxford Street East/West: Allston Way	AM - not deficient	Add one lane in EB direction, allowing turn movements to be in separate lanes. Add one right turn lane in SB direction and one left turn lane in NB direction. Increase cycle time in 25s. Protect NB left turn	AM - not deficient	North/South: Oxford Street East/West: Allston Way
			PM - change in LOS to "F"		PM - LOS changes to "C" (acceptable) with delay of 33.6s	

One significant traffic impacts was identified on Ashby Avenue in the Year 2030 With Project condition as part of the Alameda County CMP analysis. The recommended mitigation measure to address this roadway corridor impact is to implement traffic signal coordination in the Ashby Avenue corridor between San Pablo Avenue and Telegraph Avenue. This mitigation measure is intended to improve traffic flow in the corridor and improve average vehicle speeds during the AM and PM peak hours.

7.3 PARKING

The analysis of future parking demand in the study area identified adequate parking supply would be available to meet future parking demand generated by proposed increases in land use development within the downtown.

7.4 TRANSIT

The analysis of transit ridership and capacity for the Year 2030 With Project condition identified impacts to selected AC Transit bus lines and BART rail lines. Additionally, several AC Transit bus lines, including the proposed BRT line and all BART lines serving the City of Berkeley in the Year 2030, are forecast to experience ridership volumes in excess of planned capacity. The City of Berkeley alone does not have the authority to increase service frequencies or the capacity of transit

services operating within the City. However, the City does have the ability to provide support to AC Transit and BART in form of conditioning new development to contribute to a transportation services fee and/or seeking local, State, or Federal funding sources to assist in the expansion of transit services.

APPENDIX

SYNCHRO FILES – EXISTING CONDITION AM PEAK HOUR LEVEL OF SERVICE

1: Hearst Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�	↱		↔			�1↳			�1↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.86		0.99			0.99			1.00	
Flpb, ped/bikes		0.99	1.00		0.98			1.00			1.00	
Frt		1.00	0.85		0.99			0.98			1.00	
Flt Protected		1.00	1.00		0.98			1.00			1.00	
Satd. Flow (prot)		1791	1320		1709			3340			3425	
Flt Permitted		0.96	1.00		0.83			0.94			0.91	
Satd. Flow (perm)		1732	1320		1436			3156			3113	
Volume (vph)	26	241	51	74	124	17	8	549	78	40	890	11
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	241	51	74	124	17	8	549	78	40	890	11
RTOR Reduction (vph)	0	0	30	0	4	0	0	14	0	0	1	0
Lane Group Flow (vph)	0	267	21	0	211	0	0	621	0	0	940	0
Confl. Peds. (#/hr)	118		81	81		118	49		34	34		49
Confl. Bikes (#/hr)			99			51			22			25
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		32.0	32.0		32.0			40.0			40.0	
Effective Green, g (s)		33.0	33.0		33.0			41.0			41.0	
Actuated g/C Ratio		0.41	0.41		0.41			0.51			0.51	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		714	545		592			1617			1595	
v/s Ratio Prot												
v/s Ratio Perm		c0.15	0.02		0.15			0.20			c0.30	
v/c Ratio		0.37	0.04		0.36			0.38			0.59	
Uniform Delay, d1		16.3	14.0		16.2			11.8			13.6	
Progression Factor		1.00	1.00		1.00			0.56			1.00	
Incremental Delay, d2		1.5	0.1		1.7			0.7			1.6	
Delay (s)		17.8	14.2		17.9			7.3			15.2	
Level of Service		B	B		B			A			B	
Approach Delay (s)		17.2			17.9			7.3			15.2	
Approach LOS		B			B			A			B	

Intersection Summary

HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

2: University Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑		↰	↑↑		↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.81	1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	0.96	1.00	1.00	0.96	1.00		1.00	1.00		0.95	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1657	3446	1250	1656	3384		1723	3325		1636	3416	
Flt Permitted	0.29	1.00	1.00	0.26	1.00		0.14	1.00		0.39	1.00	
Satd. Flow (perm)	500	3446	1250	450	3384		248	3325		679	3416	
Volume (vph)	63	613	143	42	536	36	161	596	81	51	964	43
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	613	143	42	536	36	161	596	81	51	964	43
RTOR Reduction (vph)	0	0	100	0	6	0	0	9	0	0	4	0
Lane Group Flow (vph)	63	613	43	42	566	0	161	668	0	51	1003	0
Confl. Peds. (#/hr)	96		106	106		96	22		119	119		22
Confl. Bikes (#/hr)			107			36			25			35
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	23.0	23.0	23.0	23.0	23.0		49.0	49.0		33.0	33.0	
Effective Green, g (s)	24.0	24.0	24.0	24.0	24.0		50.0	50.0		34.0	34.0	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.62	0.62		0.42	0.42	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	150	1034	375	135	1015		395	2078		289	1452	
v/s Ratio Prot		c0.18			0.17		c0.07	0.20			c0.29	
v/s Ratio Perm	0.13		0.03	0.09			0.19			0.08		
v/c Ratio	0.42	0.59	0.11	0.31	0.56		0.41	0.32		0.18	0.69	
Uniform Delay, d1	22.4	23.8	20.3	21.6	23.5		9.6	7.0		14.3	18.7	
Progression Factor	1.00	1.00	1.00	1.31	1.34		1.97	1.13		0.95	0.77	
Incremental Delay, d2	8.4	2.5	0.6	5.7	2.1		3.0	0.4		1.2	2.4	
Delay (s)	30.8	26.3	20.9	34.0	33.8		21.8	8.3		14.7	16.9	
Level of Service	C	C	C	C	C		C	A		B	B	
Approach Delay (s)		25.7			33.8			10.9			16.8	
Approach LOS		C			C			B			B	

Intersection Summary

HCM Average Control Delay	20.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

3: Center Street & Martin Luther King Jr. Way

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑↱			↰↑↑
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.98			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1723	1542	3341			3406
Flt Permitted	0.95	1.00	1.00			0.68
Satd. Flow (perm)	1723	1542	3341			2334
Volume (vph)	72	128	690	95	170	915
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	72	128	690	95	170	915
RTOR Reduction (vph)	0	91	13	0	0	0
Lane Group Flow (vph)	72	37	772	0	0	1085
Confl. Peds. (#/hr)	27	44		77	77	
Confl. Bikes (#/hr)		28		34		
Turn Type		Prot			Perm	
Protected Phases	8	8	2			6
Permitted Phases					6	
Actuated Green, G (s)	22.0	22.0	50.0			50.0
Effective Green, g (s)	23.0	23.0	51.0			51.0
Actuated g/C Ratio	0.29	0.29	0.64			0.64
Clearance Time (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	495	443	2130			1488
v/s Ratio Prot	c0.04	0.02	0.23			
v/s Ratio Perm						c0.46
v/c Ratio	0.15	0.08	0.36			0.73
Uniform Delay, d1	21.2	20.8	6.8			9.8
Progression Factor	1.00	1.00	0.87			0.91
Incremental Delay, d2	0.6	0.4	0.5			2.6
Delay (s)	21.8	21.2	6.4			11.5
Level of Service	C	C	A			B
Approach Delay (s)	21.4		6.4			11.5
Approach LOS	C		A			B

Intersection Summary

HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

4: Allston Way & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�	↗		�	↗	↰	↑↑2		↰	↑↑2	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.93		1.00	0.90	1.00	0.98		1.00	0.98	
Flpb, ped/bikes		0.97	1.00		0.99	1.00	0.98	1.00		0.97	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected		0.98	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1725	1434		1772	1382	1690	3291		1673	3339	
Flt Permitted		0.80	1.00		0.87	1.00	0.22	1.00		0.31	1.00	
Satd. Flow (perm)		1406	1434		1558	1382	397	3291		546	3339	
Volume (vph)	111	136	95	51	125	106	103	626	127	118	867	106
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	111	136	95	51	125	106	103	626	127	118	867	106
RTOR Reduction (vph)	0	0	61	0	0	68	0	21	0	0	12	0
Lane Group Flow (vph)	0	247	34	0	176	38	103	732	0	118	961	0
Confl. Peds. (#/hr)	76		44	44		76	55		89	89		55
Confl. Bikes (#/hr)			19			20			41			34
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		28.0	28.0		28.0	28.0	44.0	44.0		44.0	44.0	
Effective Green, g (s)		29.0	29.0		29.0	29.0	45.0	45.0		45.0	45.0	
Actuated g/C Ratio		0.36	0.36		0.36	0.36	0.56	0.56		0.56	0.56	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		510	520		565	501	223	1851		307	1878	
v/s Ratio Prot								0.22			c0.29	
v/s Ratio Perm		c0.18	0.02		0.11	0.03	0.26			0.22		
v/c Ratio		0.48	0.07		0.31	0.08	0.46	0.40		0.38	0.51	
Uniform Delay, d1		19.7	16.7		18.3	16.7	10.3	9.8		9.8	10.8	
Progression Factor		1.00	1.00		1.00	1.00	1.37	1.53		0.75	0.78	
Incremental Delay, d2		3.3	0.2		1.4	0.3	5.8	0.5		2.8	0.8	
Delay (s)		23.0	16.9		19.8	17.0	19.9	15.6		10.2	9.2	
Level of Service		C	B		B	B	B	B		B	A	
Approach Delay (s)		21.3			18.7			16.1			9.3	
Approach LOS		C			B			B			A	

Intersection Summary

HCM Average Control Delay	14.2	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	84.4%	ICU Level of Service	E	
Analysis Period (min)	15			

c   Critical Lane Group

5: University Avenue & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�			�			🔺			♦	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	
Frpb, ped/bikes		0.98			0.99		1.00	0.99			0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00			1.00	
Frt		0.97			0.99		1.00	0.97			0.96	
Flt Protected		1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		3286			3393		1704	1746			1710	
Flt Permitted		0.93			0.92		0.52	1.00			0.99	
Satd. Flow (perm)		3065			3117		937	1746			1696	
Volume (vph)	25	566	127	20	426	20	105	104	23	12	169	87
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	566	127	20	426	20	105	104	23	12	169	87
RTOR Reduction (vph)	0	23	0	0	4	0	0	10	0	0	22	0
Lane Group Flow (vph)	0	695	0	0	462	0	105	117	0	0	246	0
Confl. Peds. (#/hr)	67		42	42		67	18		42	42		18
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		39.0			39.0		33.0	33.0			33.0	
Effective Green, g (s)		40.0			40.0		34.0	34.0			34.0	
Actuated g/C Ratio		0.50			0.50		0.42	0.42			0.42	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1533			1559		398	742			721	
v/s Ratio Prot								0.07				
v/s Ratio Perm		c0.23			0.15		0.11				c0.15	
v/c Ratio		0.45			0.30		0.26	0.16			0.34	
Uniform Delay, d1		12.9			11.7		14.9	14.2			15.5	
Progression Factor		0.21			0.23		1.00	1.00			1.00	
Incremental Delay, d2		0.8			0.5		1.6	0.5			1.3	
Delay (s)		3.5			3.2		16.5	14.6			16.8	
Level of Service		A			A		B	B			B	
Approach Delay (s)		3.5			3.2			15.5			16.8	
Approach LOS		A			A			B			B	

Intersection Summary				
HCM Average Control Delay	7.2	HCM Level of Service		A
HCM Volume to Capacity ratio	0.40			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)		6.0
Intersection Capacity Utilization	86.7%	ICU Level of Service		E
Analysis Period (min)	15			

c   Critical Lane Group

6: Center Street & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↔			↔			↔	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.58		0.93			0.93			0.98	
Flpb, ped/bikes		0.97	1.00		0.93			0.99			0.96	
Frt		1.00	0.85		0.96			0.98			0.99	
Flt Protected		0.99	1.00		0.99			0.99			0.99	
Satd. Flow (prot)		1750	898		1479			1633			1690	
Flt Permitted		0.97	1.00		0.95			0.94			0.94	
Satd. Flow (perm)		1709	898		1426			1549			1605	
Volume (vph)	11	58	32	22	52	33	31	185	34	39	243	25
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	11	58	32	22	52	33	31	185	34	39	243	25
RTOR Reduction (vph)	0	0	17	0	18	0	0	9	0	0	5	0
Lane Group Flow (vph)	0	69	15	0	89	0	0	241	0	0	302	0
Confl. Peds. (#/hr)	138		269	269		138	211		311	311		211
Confl. Bikes (#/hr)			17			20			23			18
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		29.0	29.0		29.0			28.0			28.0	
Effective Green, g (s)		30.0	30.0		30.0			29.0			29.0	
Actuated g/C Ratio		0.46	0.46		0.46			0.45			0.45	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		789	414		658			691			716	
v/s Ratio Prot												
v/s Ratio Perm		0.04	0.02		c0.06			0.16			c0.19	
v/c Ratio		0.09	0.04		0.14			0.35			0.42	
Uniform Delay, d1		9.8	9.6		10.1			11.8			12.3	
Progression Factor		1.00	1.00		1.00			0.93			1.00	
Incremental Delay, d2		0.2	0.2		0.4			1.3			1.8	
Delay (s)		10.0	9.7		10.5			12.4			14.1	
Level of Service		B	A		B			B			B	
Approach Delay (s)		9.9			10.5			12.4			14.1	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	12.5	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.28			
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c   Critical Lane Group

Baseline

7: Allston Way & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�↦	↱		✛			✛			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.36		0.89			0.91			0.96	
Flpb, ped/bikes		0.92	1.00		0.92			0.98			0.95	
Frt		1.00	0.85		0.95			0.98			0.96	
Flt Protected		0.98	1.00		0.99			0.99			0.99	
Satd. Flow (prot)		1640	553		1407			1564			1574	
Flt Permitted		0.86	1.00		0.94			0.88			0.94	
Satd. Flow (perm)		1443	553		1333			1386			1487	
Volume (vph)	80	148	97	25	68	52	57	134	36	42	164	83
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	80	148	97	25	68	52	57	134	36	42	164	83
RTOR Reduction (vph)	0	0	52	0	11	0	0	3	0	0	22	0
Lane Group Flow (vph)	0	228	45	0	134	0	0	224	0	0	267	0
Confl. Peds. (#/hr)	199		792	792		199	144		560	560		144
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		29.0	29.0		29.0			28.0			28.0	
Effective Green, g (s)		30.0	30.0		30.0			29.0			29.0	
Actuated g/C Ratio		0.46	0.46		0.46			0.45			0.45	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		666	255		615			618			663	
v/s Ratio Prot												
v/s Ratio Perm		c0.16	0.08		0.10			0.16			c0.18	
v/c Ratio		0.34	0.18		0.22			0.36			0.40	
Uniform Delay, d1		11.2	10.3		10.5			11.9			12.2	
Progression Factor		1.00	1.00		1.00			1.00			0.45	
Incremental Delay, d2		1.4	1.5		0.8			1.6			1.7	
Delay (s)		12.6	11.8		11.3			13.5			7.2	
Level of Service		B	B		B			B			A	
Approach Delay (s)		12.3			11.3			13.5			7.2	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

8: Hearst Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�			�		↰	↑↑5		↰	↑↑5	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.97			0.95		1.00	0.99		1.00	0.98	
Flpb, ped/bikes		0.99			0.98		0.94	1.00		0.94	1.00	
Frt		0.98			0.96		1.00	0.98		1.00	0.99	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3272			3059		1625	3350		1618	3356	
Flt Permitted		0.93			0.84		0.28	1.00		0.53	1.00	
Satd. Flow (perm)		3044			2586		482	3350		907	3356	
Volume (vph)	20	280	36	64	187	88	10	291	34	132	692	48
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	280	36	64	187	88	10	291	34	132	692	48
RTOR Reduction (vph)	0	11	0	0	44	0	0	11	0	0	6	0
Lane Group Flow (vph)	0	325	0	0	295	0	10	314	0	132	734	0
Confl. Peds. (#/hr)	133		190	190		133	110		91	91		110
Confl. Bikes (#/hr)			118			54			20			63
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		36.0			36.0		36.0	36.0		36.0	36.0	
Effective Green, g (s)		37.0			37.0		37.0	37.0		37.0	37.0	
Actuated g/C Ratio		0.46			0.46		0.46	0.46		0.46	0.46	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1408			1196		223	1549		419	1552	
v/s Ratio Prot								0.09			c0.22	
v/s Ratio Perm		0.11			c0.11		0.02			0.15		
v/c Ratio		0.23			0.25		0.04	0.20		0.32	0.47	
Uniform Delay, d1		12.9			13.0		11.8	12.8		13.5	14.8	
Progression Factor		1.00			0.96		1.24	1.26		1.00	1.00	
Incremental Delay, d2		0.4			0.5		0.4	0.3		2.0	1.0	
Delay (s)		13.3			12.9		15.0	16.4		15.5	15.8	
Level of Service		B			B		B	B		B	B	
Approach Delay (s)	13.3			12.9			16.4			15.8		
Approach LOS	B			B			B			B		

Intersection Summary

HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

9: University Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱			↰↑↱	↱					↰↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0	3.0					3.0	
Lane Util. Factor	1.00	0.95			0.91	0.91					0.91	
Frpb, ped/bikes	1.00	0.89			0.98	0.82					0.96	
Flpb, ped/bikes	0.92	1.00			0.99	1.00					0.99	
Frt	1.00	0.96			0.98	0.85					0.97	
Flt Protected	0.95	1.00			1.00	1.00					1.00	
Satd. Flow (prot)	1577	2943			3133	1144					4564	
Flt Permitted	0.48	1.00			0.91	1.00					1.00	
Satd. Flow (perm)	794	2943			2873	1144					4564	
Volume (vph)	84	458	196	20	321	224	0	0	0	68	587	142
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	458	196	20	321	224	0	0	0	68	587	142
RTOR Reduction (vph)	0	30	0	0	14	89	0	0	0	0	43	0
Lane Group Flow (vph)	84	624	0	0	378	84	0	0	0	0	754	0
Confl. Peds. (#/hr)	142		350	350		142				92		179
Confl. Bikes (#/hr)			143			61						73
Turn Type	Perm			Perm		Perm				Perm		
Protected Phases		4			8						6	
Permitted Phases	4			8		8				6		
Actuated Green, G (s)	38.0	38.0			38.0	38.0					34.0	
Effective Green, g (s)	39.0	39.0			39.0	39.0					35.0	
Actuated g/C Ratio	0.49	0.49			0.49	0.49					0.44	
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	
Lane Grp Cap (vph)	387	1435			1401	558					1997	
v/s Ratio Prot		c0.21										
v/s Ratio Perm	0.11				0.13	0.07					0.17	
v/c Ratio	0.22	0.43			0.27	0.15					0.38	
Uniform Delay, d1	11.7	13.3			12.1	11.3					15.2	
Progression Factor	0.97	0.83			1.43	2.86					0.64	
Incremental Delay, d2	1.2	0.9			0.5	0.6					0.5	
Delay (s)	12.6	12.0			17.8	33.0					10.3	
Level of Service	B	B			B	C					B	
Approach Delay (s)		12.1			22.5			0.0			10.3	
Approach LOS		B			C			A			B	

Intersection Summary

HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

10: Center Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱			↲						↲↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		1.00			1.00						0.91	
Frpb, ped/bikes		0.79			1.00						0.95	
Flpb, ped/bikes		1.00			0.97						0.99	
Frt		0.92			1.00						0.99	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		1320			1758						4593	
Flt Permitted		1.00			0.98						1.00	
Satd. Flow (perm)		1320			1733						4593	
Volume (vph)	0	37	55	12	115	0	0	0	0	12	672	71
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	37	55	12	115	0	0	0	0	12	672	71
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	82	0	0	127	0	0	0	0	0	747	0
Confl. Peds. (#/hr)	668		334	334		668	323		314	314		323
Confl. Bikes (#/hr)			134									29
Turn Type				Perm						Perm		
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		37.0			37.0						35.0	
Effective Green, g (s)		38.0			38.0						36.0	
Actuated g/C Ratio		0.48			0.48						0.45	
Clearance Time (s)		4.0			4.0						4.0	
Lane Grp Cap (vph)		627			823						2067	
v/s Ratio Prot		0.06										
v/s Ratio Perm					c0.07						0.16	
v/c Ratio		0.13			0.15						0.36	
Uniform Delay, d1		11.8			11.9						14.4	
Progression Factor		1.00			0.54						0.79	
Incremental Delay, d2		0.4			0.4						0.5	
Delay (s)		12.2			6.8						11.8	
Level of Service		B			A						B	
Approach Delay (s)		12.2			6.8			0.0			11.8	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

c   Critical Lane Group

11: Allston Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⊕			⊕		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.88			0.93		1.00	0.98		1.00	0.95	
Flpb, ped/bikes		0.95			0.99		0.87	1.00		0.80	1.00	
Frt		0.93			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1399			1604		1501	3377		1377	3212	
Flt Permitted		0.93			0.98		0.26	1.00		0.35	1.00	
Satd. Flow (perm)		1320			1582		405	3377		503	3212	
Volume (vph)	43	38	100	5	36	16	104	654	18	30	799	84
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	38	100	5	36	16	104	654	18	30	799	84
RTOR Reduction (vph)	0	12	0	0	10	0	0	3	0	0	10	0
Lane Group Flow (vph)	0	169	0	0	47	0	104	669	0	30	873	0
Confl. Peds. (#/hr)	197		176	176		197	424		508	508		424
Confl. Bikes (#/hr)			22			35			34			27
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		28.0			28.0		44.0	44.0		44.0	44.0	
Effective Green, g (s)		29.0			29.0		45.0	45.0		45.0	45.0	
Actuated g/C Ratio		0.36			0.36		0.56	0.56		0.56	0.56	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		479			573		228	1900		283	1807	
v/s Ratio Prot								0.20			c0.27	
v/s Ratio Perm		c0.13			0.03		0.26			0.06		
v/c Ratio		0.35			0.08		0.46	0.35		0.11	0.48	
Uniform Delay, d1		18.6			16.8		10.3	9.5		8.1	10.5	
Progression Factor		1.00			0.56		0.67	0.72		1.00	1.00	
Incremental Delay, d2		2.0			0.3		5.7	0.5		0.8	0.9	
Delay (s)		20.7			9.7		12.6	7.3		8.9	11.4	
Level of Service		C			A		B	A		A	B	
Approach Delay (s)		20.7			9.7			8.0			11.4	
Approach LOS		C			A			A			B	

Intersection Summary

HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

c   Critical Lane Group

12: Bancroft Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗	↖	↑↘		↖	↑↑			↑↑↘	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor			1.00	1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes			0.97	1.00	0.98		1.00	1.00			0.99	
Flpb, ped/bikes			1.00	0.98	1.00		0.92	1.00			1.00	
Frt			0.86	1.00	0.93		1.00	1.00			1.00	
Flt Protected			1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)			1523	1695	1653		1586	3446			3404	
Flt Permitted			1.00	0.95	1.00		0.27	1.00			1.00	
Satd. Flow (perm)			1523	1695	1653		455	3446			3404	
Volume (vph)	0	0	63	124	71	66	49	751	0	0	751	20
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	63	124	71	66	49	751	0	0	751	20
RTOR Reduction (vph)	0	0	28	0	36	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	35	124	101	0	49	751	0	0	769	0
Confl. Peds. (#/hr)			15	15		22	161					161
Confl. Bikes (#/hr)			3			1						30
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			35.0	35.0	35.0		37.0	37.0			37.0	
Effective Green, g (s)			36.0	36.0	36.0		38.0	38.0			38.0	
Actuated g/C Ratio			0.45	0.45	0.45		0.48	0.48			0.48	
Clearance Time (s)			4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)			685	763	744		216	1637			1617	
v/s Ratio Prot					0.06			0.22			c0.23	
v/s Ratio Perm			0.02	c0.07			0.11					
v/c Ratio			0.05	0.16	0.14		0.23	0.46			0.48	
Uniform Delay, d1			12.4	13.1	12.9		12.4	14.1			14.2	
Progression Factor			1.00	0.92	0.92		0.16	0.16			0.40	
Incremental Delay, d2			0.1	0.4	0.4		1.8	0.7			0.9	
Delay (s)			12.5	12.5	12.2		3.7	2.9			6.7	
Level of Service			B	B	B		A	A			A	
Approach Delay (s)		12.5			12.3			3.0			6.7	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c   Critical Lane Group

13: Durant Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�					↰	↑↑		↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95					1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99					1.00	0.96		1.00	1.00	
Flpb, ped/bikes		1.00					0.91	1.00		1.00	1.00	
Frt		0.97					1.00	0.95		1.00	1.00	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3273					1564	3155		1721	3427	
Flt Permitted		0.99					0.34	1.00		0.13	1.00	
Satd. Flow (perm)		3273					555	3155		240	3427	
Volume (vph)	12	35	13	0	0	0	30	759	345	62	826	10
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	12	35	13	0	0	0	30	759	345	62	826	10
RTOR Reduction (vph)	0	9	0	0	0	0	0	66	0	0	1	0
Lane Group Flow (vph)	0	51	0	0	0	0	30	1038	0	62	835	0
Confl. Peds. (#/hr)	20		22				162		99	99		162
Confl. Bikes (#/hr)			5						21			25
Turn Type	Split						Perm			pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		24.0					37.0	37.0		48.0	48.0	
Effective Green, g (s)		25.0					38.0	38.0		49.0	49.0	
Actuated g/C Ratio		0.31					0.48	0.48		0.61	0.61	
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1023					264	1499		295	2099	
v/s Ratio Prot		c0.02						c0.33		0.02	c0.24	
v/s Ratio Perm							0.05			0.11		
v/c Ratio		0.05					0.11	0.69		0.21	0.40	
Uniform Delay, d1		19.2					11.7	16.4		9.1	7.9	
Progression Factor		1.00					1.13	0.84		1.31	0.93	
Incremental Delay, d2		0.1					0.8	2.3		1.5	0.5	
Delay (s)		19.3					13.9	16.1		13.4	7.9	
Level of Service		B					B	B		B	A	
Approach Delay (s)		19.3			0.0			16.1			8.3	
Approach LOS		B			A			B			A	

Intersection Summary

HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

14: Haste Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↲↑↳		↰	↑↑			↑↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0		3.0	3.0			3.0	
Lane Util. Factor					0.95		1.00	0.95			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.99	
Flpb, ped/bikes					1.00		0.96	1.00			1.00	
Frt					0.97		1.00	1.00			0.99	
Flt Protected					0.99		0.95	1.00			1.00	
Satd. Flow (prot)					3283		1661	3446			3401	
Flt Permitted					0.99		0.23	1.00			1.00	
Satd. Flow (perm)					3283		409	3446			3401	
Volume (vph)	0	0	0	125	246	82	58	1092	0	0	871	36
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	125	246	82	58	1092	0	0	871	36
RTOR Reduction (vph)	0	0	0	0	23	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	0	430	0	58	1092	0	0	903	0
Confl. Peds. (#/hr)				15			20	154				154
Confl. Bikes (#/hr)							11					25
Turn Type				Split			Perm					
Protected Phases				8	8			2			6	
Permitted Phases							2					
Actuated Green, G (s)					31.0		41.0	41.0			41.0	
Effective Green, g (s)					32.0		42.0	42.0			42.0	
Actuated g/C Ratio					0.40		0.52	0.52			0.52	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1313		215	1809			1786	
v/s Ratio Prot					c0.13			c0.32			0.27	
v/s Ratio Perm							0.14					
v/c Ratio					0.33		0.27	0.60			0.51	
Uniform Delay, d1					16.6		10.5	13.2			12.3	
Progression Factor					0.70		0.23	0.22			1.10	
Incremental Delay, d2					0.7		2.3	1.1			1.0	
Delay (s)					12.2		4.7	4.0			14.4	
Level of Service					B		A	A			B	
Approach Delay (s)		0.0			12.2			4.0			14.4	
Approach LOS		A			B			A			B	

Intersection Summary

HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

15: Dwight Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←↑↑→						↑↑→		↑	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0						3.0		3.0	3.0	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		1.00						0.99		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.98						0.98		1.00	1.00	
Flt Protected		0.99						1.00		0.95	1.00	
Satd. Flow (prot)		3334						3345		1721	3446	
Flt Permitted		0.99						1.00		0.12	1.00	
Satd. Flow (perm)		3334						3345		222	3446	
Volume (vph)	88	402	85	0	0	0	0	1028	168	98	965	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	88	402	85	0	0	0	0	1028	168	98	965	0
RTOR Reduction (vph)	0	18	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	557	0	0	0	0	0	1179	0	98	965	0
Confl. Peds. (#/hr)	7		6						37	152		
Confl. Bikes (#/hr)			2						19			
Turn Type	Split									pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases										6		
Actuated Green, G (s)		22.0						39.9		50.0	50.0	
Effective Green, g (s)		23.0						40.9		51.0	51.0	
Actuated g/C Ratio		0.29						0.51		0.64	0.64	
Clearance Time (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		959						1710		275	2197	
v/s Ratio Prot		c0.17						c0.35		0.03	c0.28	
v/s Ratio Perm										0.20		
v/c Ratio		0.58						0.69		0.36	0.44	
Uniform Delay, d1		24.4						14.8		9.2	7.3	
Progression Factor		1.00						1.00		2.06	1.05	
Incremental Delay, d2		2.6						2.3		3.2	0.6	
Delay (s)		26.9						17.1		22.1	8.2	
Level of Service		C						B		C	A	
Approach Delay (s)		26.9			0.0			17.1			9.5	
Approach LOS		C			A			B			A	

Intersection Summary

HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

16: Hearst Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱		↱	↔↱		↱	↑↑	↱		↔↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95		0.91	0.91		1.00	0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.98		1.00	1.00	0.73		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00		0.98	
Frt	1.00	0.96		1.00	0.98		1.00	1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	0.99		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1723	3123		1568	3157		1698	3446	1132		3339	
Flt Permitted	0.95	1.00		0.95	0.99		0.16	1.00	1.00		0.87	
Satd. Flow (perm)	1723	3123		1568	3157		286	3446	1132		2937	
Volume (vph)	22	344	110	159	203	33	49	236	408	96	685	24
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	22	344	110	159	203	33	49	236	408	96	685	24
RTOR Reduction (vph)	0	38	0	0	13	0	0	0	281	0	3	0
Lane Group Flow (vph)	22	416	0	130	252	0	49	236	128	0	802	0
Confl. Peds. (#/hr)	104		171	171		104	60		187	187		60
Confl. Bikes (#/hr)			97			62			115			92
Turn Type	Split			Split			Perm		Perm	Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	22.0	22.0		22.0	22.0		24.0	24.0	24.0		24.0	
Effective Green, g (s)	23.0	23.0		23.0	23.0		25.0	25.0	25.0		25.0	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.31	0.31	0.31		0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	495	898		451	908		89	1077	354		918	
v/s Ratio Prot	0.01	c0.13		c0.08	0.08			0.07				
v/s Ratio Perm							0.17		0.11		c0.27	
v/c Ratio	0.04	0.46		0.29	0.28		0.55	0.22	0.36		0.87	
Uniform Delay, d1	20.6	23.4		22.1	22.1		22.8	20.3	21.3		26.0	
Progression Factor	1.26	1.31		1.00	1.00		0.46	0.50	2.40		1.00	
Incremental Delay, d2	0.2	1.7		1.6	0.8		21.4	0.4	2.7		11.3	
Delay (s)	26.0	32.3		23.7	22.8		32.0	10.7	53.8		37.3	
Level of Service	C	C		C	C		C	B	D		D	
Approach Delay (s)		32.0			23.1			37.6			37.3	
Approach LOS		C			C			D			D	

Intersection Summary

HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

17: University Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↰	↱		⟷		↱	↑↱		↱	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.79		0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.99	0.99	1.00		0.97		1.00	1.00		0.90	1.00	
Frt	1.00	1.00	0.85		0.95		1.00	0.99		1.00	0.99	
Flt Protected	0.95	0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1620	1639	1222		1647		1720	3386		1554	3369	
Flt Permitted	0.79	0.74	1.00		0.93		0.14	1.00		0.56	1.00	
Satd. Flow (perm)	1352	1258	1222		1545		252	3386		921	3369	
Volume (vph)	390	37	231	11	17	14	129	295	16	32	894	67
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	390	37	231	11	17	14	129	295	16	32	894	67
RTOR Reduction (vph)	0	0	153	0	9	0	0	5	0	0	7	0
Lane Group Flow (vph)	195	232	78	0	33	0	129	306	0	32	954	0
Confl. Peds. (#/hr)	10		147	147		10	117		83	83		117
Confl. Bikes (#/hr)			79			13			41			80
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	26.0	26.0	26.0		26.0		46.0	46.0		31.1	31.1	
Effective Green, g (s)	27.0	27.0	27.0		27.0		47.0	47.0		32.1	32.1	
Actuated g/C Ratio	0.34	0.34	0.34		0.34		0.59	0.59		0.40	0.40	
Clearance Time (s)	4.0	4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	456	425	412		521		366	1989		370	1352	
v/s Ratio Prot							c0.05	0.09			c0.28	
v/s Ratio Perm	0.14	c0.18	0.06		0.02		0.15			0.03		
v/c Ratio	0.43	0.55	0.19		0.06		0.35	0.15		0.09	0.71	
Uniform Delay, d1	20.5	21.5	18.8		17.9		10.2	7.5		14.9	20.0	
Progression Factor	1.07	1.07	2.13		1.00		1.90	0.95		1.06	0.80	
Incremental Delay, d2	2.8	4.8	1.0		0.2		2.6	0.2		0.4	2.8	
Delay (s)	24.8	27.8	40.8		18.2		22.1	7.3		16.1	18.9	
Level of Service	C	C	D		B		C	A		B	B	
Approach Delay (s)		31.5			18.2			11.6			18.8	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

18: Center Street & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⬥			⬥		↰	↑↑↳		↰	↑↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.93			0.97		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		0.97			0.94		0.96	1.00		0.91	1.00	
Frt		0.94			0.96		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1511			1567		1657	3376		1564	3397	
Flt Permitted		0.94			0.93		0.18	1.00		0.45	1.00	
Satd. Flow (perm)		1443			1481		309	3376		736	3397	
Volume (vph)	18	13	25	15	11	10	45	445	26	9	1033	35
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	18	13	25	15	11	10	45	445	26	9	1033	35
RTOR Reduction (vph)	0	15	0	0	6	0	0	5	0	0	3	0
Lane Group Flow (vph)	0	41	0	0	30	0	45	466	0	9	1065	0
Confl. Peds. (#/hr)	88		133	133		88	137		105	105		137
Confl. Bikes (#/hr)			17			1			27			39
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.0			31.0		41.0	41.0		41.0	41.0	
Effective Green, g (s)		32.0			32.0		42.0	42.0		42.0	42.0	
Actuated g/C Ratio		0.40			0.40		0.52	0.52		0.52	0.52	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		577			592		162	1772		386	1783	
v/s Ratio Prot								0.14			c0.31	
v/s Ratio Perm		c0.03			0.02		0.15			0.01		
v/c Ratio		0.07			0.05		0.28	0.26		0.02	0.60	
Uniform Delay, d1		14.8			14.7		10.6	10.5		9.1	13.1	
Progression Factor		0.62			1.00		1.00	1.00		1.00	0.88	
Incremental Delay, d2		0.2			0.2		4.2	0.4		0.1	1.3	
Delay (s)		9.4			14.9		14.8	10.8		9.3	12.9	
Level of Service		A			B		B	B		A	B	
Approach Delay (s)		9.4			14.9			11.2			12.9	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c   Critical Lane Group

19: Allston Way & Oxford Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	⑂			◁↟	↟↟	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	16	43	20	615	1077	35
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	16	43	20	615	1077	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					317	
pX, platoon unblocked	0.79	0.79	0.79			
vC, conflicting volume	1442	556	1112			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1290	164	871			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	94	97			
cM capacity (veh/h)	118	670	605			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	59	225	410	718	394
Volume Left	16	20	0	0	0
Volume Right	43	0	0	0	35
cSH	295	605	1700	1700	1700
Volume to Capacity	0.20	0.03	0.24	0.42	0.23
Queue Length 95th (ft)	18	3	0	0	0
Control Delay (s)	20.2	1.4	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	20.2	0.5		0.0	
Approach LOS	C				

Intersection Summary

Average Delay		0.8		
Intersection Capacity Utilization		42.6%	ICU Level of Service	A
Analysis Period (min)		15		

20: Bancroft Way & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					�	↱	↰	↑			↑↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor					0.95	1.00	1.00	1.00			0.91	
Frpb, ped/bikes					1.00	0.96	1.00	1.00			0.99	
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	
Frt					1.00	0.85	1.00	1.00			0.98	
Flt Protected					0.99	1.00	0.95	1.00			1.00	
Satd. Flow (prot)					3396	1475	1698	1814			4814	
Flt Permitted					0.99	1.00	0.20	1.00			1.00	
Satd. Flow (perm)					3396	1475	352	1814			4814	
Volume (vph)	0	0	0	71	171	462	41	93	0	0	951	118
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	71	171	462	41	93	0	0	951	118
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	0	242	462	41	93	0	0	1050	0
Confl. Peds. (#/hr)				53		92	74					74
Confl. Bikes (#/hr)						19						28
Turn Type				Split		Free	Perm					
Protected Phases				8	8			2			6	
Permitted Phases						Free	2					
Actuated Green, G (s)					35.0	80.0	37.0	37.0			37.0	
Effective Green, g (s)					36.0	80.0	38.0	38.0			38.0	
Actuated g/C Ratio					0.45	1.00	0.48	0.48			0.48	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1528	1475	167	862			2287	
v/s Ratio Prot					0.07			0.05			c0.22	
v/s Ratio Perm						c0.31	0.12					
v/c Ratio					0.16	0.31	0.25	0.11			0.46	
Uniform Delay, d1					13.0	0.0	12.5	11.6			14.1	
Progression Factor					1.00	1.00	2.06	2.05			1.00	
Incremental Delay, d2					0.2	0.6	3.5	0.3			0.7	
Delay (s)					13.3	0.6	29.2	24.1			14.8	
Level of Service					B	A	C	C			B	
Approach Delay (s)		0.0			4.9			25.7			14.8	
Approach LOS		A			A			C			B	

Intersection Summary

HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

c   Critical Lane Group

21: Durant Avenue & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱								↱	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0								3.0	3.0	
Lane Util. Factor	1.00	0.95								1.00	0.95	
Frpb, ped/bikes	1.00	0.99								1.00	1.00	
Flpb, ped/bikes	0.84	1.00								0.78	1.00	
Frt	1.00	0.98								1.00	1.00	
Flt Protected	0.95	1.00								0.95	1.00	
Satd. Flow (prot)	1447	3339								1340	3446	
Flt Permitted	0.95	1.00								0.95	1.00	
Satd. Flow (perm)	1447	3339								1340	3446	
Volume (vph)	104	302	40	0	0	0	0	0	0	422	569	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	104	302	40	0	0	0	0	0	0	422	569	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	104	329	0	0	0	0	0	0	0	422	569	0
Confl. Peds. (#/hr)	147		91							204		
Confl. Bikes (#/hr)			16									
Turn Type	Perm									Perm		
Protected Phases		4									6	
Permitted Phases	4									6		
Actuated Green, G (s)	29.0	29.0								43.0	43.0	
Effective Green, g (s)	30.0	30.0								44.0	44.0	
Actuated g/C Ratio	0.38	0.38								0.55	0.55	
Clearance Time (s)	4.0	4.0								4.0	4.0	
Lane Grp Cap (vph)	543	1252								737	1895	
v/s Ratio Prot		c0.10									0.17	
v/s Ratio Perm	0.07									c0.32		
v/c Ratio	0.19	0.26								0.57	0.30	
Uniform Delay, d1	16.8	17.3								11.8	9.7	
Progression Factor	1.18	1.18								0.55	0.49	
Incremental Delay, d2	0.6	0.4								2.9	0.4	
Delay (s)	20.4	20.9								9.4	5.1	
Level of Service	C	C								A	A	
Approach Delay (s)		20.8			0.0			0.0			7.0	
Approach LOS		C			A			A			A	

Intersection Summary

HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c   Critical Lane Group

SYNCHRO FILES – EXISTING CONDITION PM PEAK HOUR LEVEL OF SERVICE

1: Hearst Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↤	↱		↔			↨↦			↨↦	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.91		0.99			0.99			1.00	
Flpb, ped/bikes		0.99	1.00		0.99			1.00			1.00	
Frt		1.00	0.85		0.99			0.99			1.00	
Flt Protected		0.98	1.00		0.99			1.00			1.00	
Satd. Flow (prot)		1769	1409		1748			3383			3413	
Flt Permitted		0.80	1.00		0.90			0.88			0.91	
Satd. Flow (perm)		1433	1409		1593			2997			3115	
Volume (vph)	82	163	31	73	289	38	43	777	51	26	740	25
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	82	163	31	73	289	38	43	777	51	26	740	25
RTOR Reduction (vph)	0	0	17	0	5	0	0	5	0	0	3	0
Lane Group Flow (vph)	0	245	14	0	395	0	0	866	0	0	788	0
Confl. Peds. (#/hr)	51		57	57		51	33		42	42		33
Confl. Bikes (#/hr)			30			24			22			13
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		36.0	36.0		36.0			36.0			36.0	
Effective Green, g (s)		37.0	37.0		37.0			37.0			37.0	
Actuated g/C Ratio		0.46	0.46		0.46			0.46			0.46	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		663	652		737			1386			1441	
v/s Ratio Prot												
v/s Ratio Perm		0.17	0.01		c0.25			c0.29			0.25	
v/c Ratio		0.37	0.02		0.54			0.62			0.55	
Uniform Delay, d1		13.9	11.7		15.4			16.3			15.5	
Progression Factor		1.00	1.00		1.00			0.56			1.00	
Incremental Delay, d2		1.6	0.1		2.8			2.0			1.5	
Delay (s)		15.5	11.7		18.2			11.1			17.0	
Level of Service		B	B		B			B			B	
Approach Delay (s)		15.1			18.2			11.1			17.0	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

2: University Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↱		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.84	1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.96	1.00		1.00	1.00		0.94	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1686	3446	1293	1658	3403		1721	3387		1616	3346	
Flt Permitted	0.18	1.00	1.00	0.27	1.00		0.20	1.00		0.36	1.00	
Satd. Flow (perm)	317	3446	1293	474	3403		368	3387		608	3346	
Volume (vph)	87	739	193	96	907	41	276	738	38	39	560	94
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	739	193	96	907	41	276	738	38	39	560	94
RTOR Reduction (vph)	0	0	109	0	4	0	0	5	0	0	17	0
Lane Group Flow (vph)	87	739	84	96	944	0	276	771	0	39	637	0
Confl. Peds. (#/hr)	109		122	122		109	27		168	168		27
Confl. Bikes (#/hr)			48			34			26			18
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	34.0	34.0	34.0	34.0	34.0		38.0	38.0		22.8	22.8	
Effective Green, g (s)	35.0	35.0	35.0	35.0	35.0		39.0	39.0		23.8	23.8	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.44		0.49	0.49		0.30	0.30	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	139	1508	566	207	1489		386	1651		181	995	
v/s Ratio Prot		0.21			c0.28		c0.11	0.23			0.19	
v/s Ratio Perm	0.27		0.07	0.20			c0.24			0.06		
v/c Ratio	0.63	0.49	0.15	0.46	0.63		0.72	0.47		0.22	0.64	
Uniform Delay, d1	17.4	16.1	13.5	15.9	17.5		14.3	13.6		21.1	24.4	
Progression Factor	1.00	1.00	1.00	1.08	1.11		1.79	1.02		0.95	0.82	
Incremental Delay, d2	19.4	1.1	0.6	6.4	1.8		9.9	0.9		2.5	2.9	
Delay (s)	36.9	17.3	14.1	23.6	21.3		35.5	14.7		22.5	22.9	
Level of Service	D	B	B	C	C		D	B		C	C	
Approach Delay (s)		18.3			21.5			20.2			22.9	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

3: Center Street & Martin Luther King Jr. Way

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.99			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1723	1542	3384			3433
Flt Permitted	0.95	1.00	1.00			0.79
Satd. Flow (perm)	1723	1542	3384			2723
Volume (vph)	87	111	1050	77	57	865
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	111	1050	77	57	865
RTOR Reduction (vph)	0	31	7	0	0	0
Lane Group Flow (vph)	87	80	1120	0	0	922
Confl. Peds. (#/hr)	26	16		90	90	
Confl. Bikes (#/hr)		2		25		
Turn Type		Prot			Perm	
Protected Phases	8	8	2			6
Permitted Phases					6	
Actuated Green, G (s)	30.0	30.0	42.0			42.0
Effective Green, g (s)	31.0	31.0	43.0			43.0
Actuated g/C Ratio	0.39	0.39	0.54			0.54
Clearance Time (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	668	598	1819			1464
v/s Ratio Prot	0.05	c0.05	0.33			
v/s Ratio Perm					c0.34	
v/c Ratio	0.13	0.13	0.62			0.63
Uniform Delay, d1	15.8	15.8	12.8			12.9
Progression Factor	1.00	1.00	0.61			0.92
Incremental Delay, d2	0.4	0.5	1.4			2.0
Delay (s)	16.2	16.3	9.2			13.8
Level of Service	B	B	A			B
Approach Delay (s)	16.3		9.2			13.8
Approach LOS	B		A			B

Intersection Summary

HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

4: Allston Way & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↵	↗		↵	↗	↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.92		1.00	0.95	1.00	0.99		1.00	0.99	
Flpb, ped/bikes		0.99	1.00		0.98	1.00	0.98	1.00		0.98	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.98	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1757	1412		1749	1471	1689	3390		1696	3387	
Flt Permitted		0.80	1.00		0.84	1.00	0.28	1.00		0.21	1.00	
Satd. Flow (perm)		1432	1412		1504	1471	495	3390		368	3387	
Volume (vph)	85	91	87	68	114	85	93	968	66	100	781	56
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	85	91	87	68	114	85	93	968	66	100	781	56
RTOR Reduction (vph)	0	0	57	0	0	51	0	6	0	0	6	0
Lane Group Flow (vph)	0	176	30	0	182	34	93	1028	0	100	831	0
Confl. Peds. (#/hr)	20		59	59		20	42		83	83		42
Confl. Bikes (#/hr)			16			20			17			22
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		27.0	27.0		27.0	27.0	45.0	45.0		45.0	45.0	
Effective Green, g (s)		28.0	28.0		28.0	28.0	46.0	46.0		46.0	46.0	
Actuated g/C Ratio		0.35	0.35		0.35	0.35	0.58	0.58		0.58	0.58	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		501	494		526	515	285	1949		212	1948	
v/s Ratio Prot								c0.30			0.25	
v/s Ratio Perm		c0.12	0.02		0.12	0.02	0.19			0.27		
v/c Ratio		0.35	0.06		0.35	0.07	0.33	0.53		0.47	0.43	
Uniform Delay, d1		19.3	17.3		19.2	17.3	8.9	10.4		9.9	9.6	
Progression Factor		1.00	1.00		1.00	1.00	1.35	1.34		0.58	0.67	
Incremental Delay, d2		1.9	0.2		1.8	0.2	2.8	1.0		6.0	0.6	
Delay (s)		21.2	17.5		21.0	17.6	14.8	14.8		11.8	7.0	
Level of Service		C	B		C	B	B	B		B	A	
Approach Delay (s)		20.0			19.9			14.8			7.5	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

5: University Avenue & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�			�		↰	↱			↔	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	
Frpb, ped/bikes		0.97			0.99		1.00	0.97			0.99	
Flpb, ped/bikes		0.99			1.00		0.98	1.00			0.99	
Frt		0.98			0.99		1.00	0.96			0.97	
Flt Protected		1.00			1.00		0.95	1.00			0.99	
Satd. Flow (prot)		3240			3382		1697	1696			1724	
Flt Permitted		0.80			0.95		0.49	1.00			0.95	
Satd. Flow (perm)		2593			3211		872	1696			1654	
Volume (vph)	77	709	108	6	735	33	219	186	59	34	225	71
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	77	709	108	6	735	33	219	186	59	34	225	71
RTOR Reduction (vph)	0	14	0	0	4	0	0	14	0	0	12	0
Lane Group Flow (vph)	0	880	0	0	770	0	219	231	0	0	318	0
Confl. Peds. (#/hr)	128		129	129		128	28		99	99		28
Confl. Bikes (#/hr)		41			41			15				
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		37.0			37.0		35.0	35.0			35.0	
Effective Green, g (s)		38.0			38.0		36.0	36.0			36.0	
Actuated g/C Ratio		0.48			0.48		0.45	0.45			0.45	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1232			1525		392	763			744	
v/s Ratio Prot								0.14				
v/s Ratio Perm		c0.34			0.24		c0.25				0.19	
v/c Ratio		0.71			0.50		0.56	0.30			0.43	
Uniform Delay, d1		16.7			14.5		16.2	14.0			15.0	
Progression Factor		0.38			0.58		1.00	1.00			1.00	
Incremental Delay, d2		3.3			1.1		5.7	1.0			1.8	
Delay (s)		9.6			9.5		21.8	15.0			16.8	
Level of Service		A			A		C	B			B	
Approach Delay (s)		9.6			9.5		18.2				16.8	
Approach LOS		A			A		B				B	

Intersection Summary

HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

6: Center Street & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↤	↱		⊕			⊕			⊕	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.61		0.83			0.94			0.95	
Flpb, ped/bikes		0.95	1.00		0.94			0.98			0.98	
Frt		1.00	0.85		0.95			0.98			0.97	
Flt Protected		0.99	1.00		0.99			0.99			0.99	
Satd. Flow (prot)		1698	938		1340			1617			1621	
Flt Permitted		0.94	1.00		0.94			0.92			0.88	
Satd. Flow (perm)		1608	938		1277			1499			1434	
Volume (vph)	18	74	39	41	103	82	63	329	81	58	210	63
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	18	74	39	41	103	82	63	329	81	58	210	63
RTOR Reduction (vph)	0	0	23	0	32	0	0	11	0	0	13	0
Lane Group Flow (vph)	0	92	16	0	194	0	0	462	0	0	318	0
Confl. Peds. (#/hr)	296		250	250		296	293		232	230		293
Confl. Bikes (#/hr)			16			23			31			16
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		25.0	25.0		25.0			32.0			32.0	
Effective Green, g (s)		26.0	26.0		26.0			33.0			33.0	
Actuated g/C Ratio		0.40	0.40		0.40			0.51			0.51	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		643	375		511			761			728	
v/s Ratio Prot												
v/s Ratio Perm		0.06	0.02		c0.15			c0.31			0.22	
v/c Ratio		0.14	0.04		0.38			0.61			0.44	
Uniform Delay, d1		12.4	11.9		13.8			11.4			10.1	
Progression Factor		1.00	1.00		1.00			0.76			1.00	
Incremental Delay, d2		0.5	0.2		2.1			3.1			1.9	
Delay (s)		12.9	12.1		15.9			11.7			12.0	
Level of Service		B	B		B			B			B	
Approach Delay (s)		12.6			15.9			11.7			12.0	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	12.7		HCM Level of Service	B
HCM Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	65.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	66.9%		ICU Level of Service	C
Analysis Period (min)	15			

c   Critical Lane Group

7: Allston Way & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↤	↱		✛			✛			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.60		0.80			0.96			0.96	
Flpb, ped/bikes		0.90	1.00		0.95			0.97			0.99	
Frt		1.00	0.85		0.95			0.98			0.98	
Flt Protected		0.98	1.00		0.99			0.99			0.99	
Satd. Flow (prot)		1605	931		1303			1646			1659	
Flt Permitted		0.84	1.00		0.94			0.86			0.92	
Satd. Flow (perm)		1376	931		1238			1437			1532	
Volume (vph)	52	99	106	44	131	108	100	292	62	41	222	55
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	52	99	106	44	131	108	100	292	62	41	222	55
RTOR Reduction (vph)	0	0	64	0	34	0	0	9	0	0	12	0
Lane Group Flow (vph)	0	151	42	0	249	0	0	445	0	0	306	0
Confl. Peds. (#/hr)	371		260	260		371	281		168	168		281
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		25.0	25.0		25.0			32.0			32.0	
Effective Green, g (s)		26.0	26.0		26.0			33.0			33.0	
Actuated g/C Ratio		0.40	0.40		0.40			0.51			0.51	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		550	372		495			730			778	
v/s Ratio Prot												
v/s Ratio Perm		0.11	0.05		c0.20			c0.31			0.20	
v/c Ratio		0.27	0.11		0.50			0.61			0.39	
Uniform Delay, d1		13.1	12.3		14.6			11.4			9.8	
Progression Factor		1.00	1.00		1.00			1.00			0.66	
Incremental Delay, d2		1.2	0.6		3.6			3.8			1.4	
Delay (s)		14.4	12.9		18.3			15.2			7.9	
Level of Service		B	B		B			B			A	
Approach Delay (s)		13.8			18.3			15.2			7.9	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

8: Hearst Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�			�		↰	↑↑ʖ		↰	↑↑ʖ	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.90	1.00		0.95	1.00	
Frt		1.00			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3389			3225		1557	3423		1642	3378	
Flt Permitted		0.76			0.84		0.38	1.00		0.35	1.00	
Satd. Flow (perm)		2617			2725		624	3423		606	3378	
Volume (vph)	73	238	3	92	327	144	17	601	14	100	534	27
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	73	238	3	92	327	144	17	601	14	100	534	27
RTOR Reduction (vph)	0	1	0	0	43	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	313	0	0	520	0	17	613	0	100	556	0
Confl. Peds. (#/hr)	31		36	36		31	131		118	118		131
Confl. Bikes (#/hr)			31			28			24			18
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		35.0			35.0		37.0	37.0		37.0	37.0	
Effective Green, g (s)		36.0			36.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio		0.45			0.45		0.48	0.48		0.48	0.48	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1178			1226		296	1626		288	1605	
v/s Ratio Prot								c0.18			0.16	
v/s Ratio Perm		0.12			c0.19		0.03			0.17		
v/c Ratio		0.27			0.42		0.06	0.38		0.35	0.35	
Uniform Delay, d1		13.7			15.0		11.3	13.4		13.2	13.2	
Progression Factor		1.00			1.92		1.01	1.04		1.00	1.00	
Incremental Delay, d2		0.6			0.9		0.4	0.7		3.3	0.6	
Delay (s)		14.3			29.6		11.8	14.6		16.5	13.8	
Level of Service		B			C		B	B		B	B	
Approach Delay (s)		14.3			29.6			14.6			14.2	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

9: University Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱			↰↑↱	↱					↰↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0	3.0					3.0	
Lane Util. Factor	1.00	0.95			0.91	0.91					0.91	
Frpb, ped/bikes	1.00	0.91			0.98	0.75					0.96	
Flpb, ped/bikes	0.94	1.00			0.99	1.00					0.99	
Frt	1.00	0.96			0.99	0.85					0.98	
Flt Protected	0.95	1.00			1.00	1.00					1.00	
Satd. Flow (prot)	1612	3023			3137	1057					4606	
Flt Permitted	0.29	1.00			0.87	1.00					1.00	
Satd. Flow (perm)	495	3023			2742	1057					4606	
Volume (vph)	87	489	159	53	628	431	0	0	0	31	524	80
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	489	159	53	628	431	0	0	0	31	524	80
RTOR Reduction (vph)	0	5	0	0	9	161	0	0	0	0	24	0
Lane Group Flow (vph)	87	643	0	0	745	197	0	0	0	0	611	0
Confl. Peds. (#/hr)	204		455	455		204					131	341
Confl. Bikes (#/hr)			113			66						72
Turn Type	Perm			Perm		Perm				Perm		
Protected Phases		4			8						6	
Permitted Phases	4			8		8				6		
Actuated Green, G (s)	43.0	43.0			43.0	43.0					29.0	
Effective Green, g (s)	44.0	44.0			44.0	44.0					30.0	
Actuated g/C Ratio	0.55	0.55			0.55	0.55					0.38	
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	
Lane Grp Cap (vph)	272	1663			1508	581					1727	
v/s Ratio Prot		0.21										
v/s Ratio Perm	0.18				c0.27	0.19					0.13	
v/c Ratio	0.32	0.39			0.49	0.34					0.35	
Uniform Delay, d1	9.8	10.3			11.1	10.0					18.0	
Progression Factor	0.89	0.83			1.26	2.73					0.72	
Incremental Delay, d2	2.2	0.5			1.2	1.6					0.6	
Delay (s)	11.0	9.0			15.2	28.7					13.6	
Level of Service	B	A			B	C					B	
Approach Delay (s)		9.3			19.5			0.0			13.6	
Approach LOS		A			B			A			B	

Intersection Summary

HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

10: Center Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱			↰						↰↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		1.00			1.00						0.91	
Frpb, ped/bikes		0.74			1.00						0.93	
Flpb, ped/bikes		1.00			0.94						0.99	
Frt		0.93			1.00						0.98	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1240			1698						4485	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1240			1623						4485	
Volume (vph)	0	77	86	32	183	0	0	0	0	8	588	96
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	77	86	32	183	0	0	0	0	8	588	96
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	143	0	0	215	0	0	0	0	0	685	0
Confl. Peds. (#/hr)	670		1152	1152		670	256		261	261		256
Confl. Bikes (#/hr)			84									54
Turn Type				Perm						Perm		
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		37.0			37.0						35.0	
Effective Green, g (s)		38.0			38.0						36.0	
Actuated g/C Ratio		0.48			0.48						0.45	
Clearance Time (s)		4.0			4.0						4.0	
Lane Grp Cap (vph)		589			771						2018	
v/s Ratio Prot		0.11										
v/s Ratio Perm					c0.13						0.15	
v/c Ratio		0.24			0.28						0.34	
Uniform Delay, d1		12.5			12.7						14.3	
Progression Factor		1.00			0.60						0.66	
Incremental Delay, d2		1.0			0.9						0.4	
Delay (s)		13.4			8.5						9.8	
Level of Service		B			A						A	
Approach Delay (s)		13.4			8.5			0.0			9.8	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c   Critical Lane Group

11: Allston Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↑↳		↰	↑↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.81			0.88		1.00	0.95		1.00	0.94	
Flpb, ped/bikes		0.94			0.96		0.88	1.00		0.85	1.00	
Frt		0.92			0.95		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1261			1434		1518	3225		1472	3195	
Flt Permitted		0.92			0.92		0.19	1.00		0.23	1.00	
Satd. Flow (perm)		1179			1331		304	3225		354	3195	
Volume (vph)	62	49	159	17	25	27	71	876	69	49	970	86
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	62	49	159	17	25	27	71	876	69	49	970	86
RTOR Reduction (vph)	0	1	0	0	1	0	0	7	0	0	8	0
Lane Group Flow (vph)	0	269	0	0	68	0	71	938	0	49	1048	0
Confl. Peds. (#/hr)	262		286	387		262	918		871	871		918
Confl. Bikes (#/hr)			43			15			74			78
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		29.0			29.0		43.0	43.0		43.0	43.0	
Effective Green, g (s)		30.0			30.0		44.0	44.0		44.0	44.0	
Actuated g/C Ratio		0.38			0.38		0.55	0.55		0.55	0.55	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		442			499		167	1774		195	1757	
v/s Ratio Prot								0.29			c0.33	
v/s Ratio Perm		c0.23			0.05		0.23			0.14		
v/c Ratio		0.61			0.14		0.43	0.53		0.25	0.60	
Uniform Delay, d1		20.3			16.5		10.6	11.4		9.4	12.1	
Progression Factor		1.00			0.78		0.65	0.64		1.00	1.00	
Incremental Delay, d2		6.1			0.6		7.3	1.1		3.1	1.5	
Delay (s)		26.4			13.4		14.1	8.4		12.5	13.6	
Level of Service		C			B		B	A		B	B	
Approach Delay (s)		26.4			13.4			8.8			13.5	
Approach LOS		C			B			A			B	

Intersection Summary

HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

12: Bancroft Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗	↖	↱		↖	↑↑			↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor			1.00	1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes			0.92	1.00	0.96		1.00	1.00			0.97	
Flpb, ped/bikes			1.00	0.94	1.00		0.91	1.00			1.00	
Frt			0.86	1.00	0.89		1.00	1.00			0.99	
Flt Protected			1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)			1449	1618	1558		1563	3446			3320	
Flt Permitted			1.00	0.95	1.00		0.20	1.00			1.00	
Satd. Flow (perm)			1449	1618	1558		327	3446			3320	
Volume (vph)	0	0	46	207	77	181	53	1018	0	0	937	52
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	46	207	77	181	53	1018	0	0	937	52
RTOR Reduction (vph)	0	0	9	0	45	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	37	207	213	0	53	1018	0	0	984	0
Confl. Peds. (#/hr)			56	56			40	329				329
Confl. Bikes (#/hr)			9				5					60
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			32.0	32.0	32.0		40.0	40.0			40.0	
Effective Green, g (s)			33.0	33.0	33.0		41.0	41.0			41.0	
Actuated g/C Ratio			0.41	0.41	0.41		0.51	0.51			0.51	
Clearance Time (s)			4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)			598	667	643		168	1766			1702	
v/s Ratio Prot					c0.14			0.30			c0.30	
v/s Ratio Perm			0.03	0.13			0.16					
v/c Ratio			0.06	0.31	0.33		0.32	0.58			0.58	
Uniform Delay, d1			14.2	15.8	16.0		11.3	13.5			13.5	
Progression Factor			1.00	0.73	0.63		0.08	0.07			0.42	
Incremental Delay, d2			0.2	1.2	1.3		3.2	0.9			1.3	
Delay (s)			14.4	12.7	11.3		4.1	1.9			7.0	
Level of Service			B	B	B		A	A			A	
Approach Delay (s)		14.4			11.9			2.0			7.0	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	5.9		HCM Level of Service	A
HCM Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	80.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	67.2%		ICU Level of Service	C
Analysis Period (min)	15			

c   Critical Lane Group

13: Durant Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�span					↱	↑↱		↱	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95					1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99					1.00	0.97		1.00	0.99	
Flpb, ped/bikes		1.00					0.91	1.00		1.00	1.00	
Frt		0.95					1.00	0.98		1.00	1.00	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3188					1570	3255		1723	3406	
Flt Permitted		0.99					0.27	1.00		0.11	1.00	
Satd. Flow (perm)		3188					448	3255		193	3406	
Volume (vph)	26	59	47	0	0	0	80	1051	210	98	1035	22
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	59	47	0	0	0	80	1051	210	98	1035	22
RTOR Reduction (vph)	0	33	0	0	0	0	0	21	0	0	2	0
Lane Group Flow (vph)	0	99	0	0	0	0	80	1240	0	98	1055	0
Confl. Peds. (#/hr)	21		20				212		156	156		212
Confl. Bikes (#/hr)			4						27			27
Turn Type	Split						Perm			pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		22.0					40.0	40.0		50.0	50.0	
Effective Green, g (s)		23.0					41.0	41.0		51.0	51.0	
Actuated g/C Ratio		0.29					0.51	0.51		0.64	0.64	
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		917					230	1668		257	2171	
v/s Ratio Prot		c0.03						c0.38		0.03	c0.31	
v/s Ratio Perm							0.18			0.21		
v/c Ratio		0.11					0.35	0.74		0.38	0.49	
Uniform Delay, d1		21.0					11.6	15.4		9.9	7.6	
Progression Factor		1.00					1.11	1.01		2.02	1.02	
Incremental Delay, d2		0.2					3.8	2.8		3.7	0.7	
Delay (s)		21.2					16.6	18.3		23.6	8.4	
Level of Service		C					B	B		C	A	
Approach Delay (s)		21.2			0.0			18.2			9.7	
Approach LOS		C			A			B			A	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

14: Haste Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					⮌⇈⮎		⮌	⇈			⇈⮎	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0		3.0	3.0			3.0	
Lane Util. Factor					0.95		1.00	0.95			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.99	
Flpb, ped/bikes					1.00		0.98	1.00			1.00	
Frt					0.97		1.00	1.00			0.99	
Flt Protected					0.99		0.95	1.00			1.00	
Satd. Flow (prot)					3294		1683	3446			3398	
Flt Permitted					0.99		0.17	1.00			1.00	
Satd. Flow (perm)					3294		309	3446			3398	
Volume (vph)	0	0	0	186	366	115	89	1194	0	0	1117	48
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	186	366	115	89	1194	0	0	1117	48
RTOR Reduction (vph)	0	0	0	0	22	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	0	645	0	89	1194	0	0	1161	0
Confl. Peds. (#/hr)				7		12	157					157
Confl. Bikes (#/hr)						7						31
Turn Type				Split			Perm					
Protected Phases				8	8			2			6	
Permitted Phases							2					
Actuated Green, G (s)					25.0		47.0	47.0			47.0	
Effective Green, g (s)					26.0		48.0	48.0			48.0	
Actuated g/C Ratio					0.32		0.60	0.60			0.60	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1071		185	2068			2039	
v/s Ratio Prot					c0.20			c0.35			0.34	
v/s Ratio Perm							0.29					
v/c Ratio					0.60		0.48	0.58			0.57	
Uniform Delay, d1					22.7		9.0	9.8			9.7	
Progression Factor					0.78		0.18	0.12			1.00	
Incremental Delay, d2					2.5		5.0	0.7			1.1	
Delay (s)					20.2		6.7	1.8			10.9	
Level of Service					C		A	A			B	
Approach Delay (s)		0.0			20.2			2.2			10.9	
Approach LOS		A			C			A			B	

Intersection Summary

HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

15: Dwight Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↝↱						↟↱		↰	↟↟	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0						3.0		3.0	3.0	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		0.99						0.99		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.96						0.99		1.00	1.00	
Flt Protected		0.99						1.00		0.95	1.00	
Satd. Flow (prot)		3249						3363		1723	3446	
Flt Permitted		0.99						1.00		0.09	1.00	
Satd. Flow (perm)		3249						3363		169	3446	
Volume (vph)	61	379	154	0	0	0	0	1269	101	125	1257	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	61	379	154	0	0	0	0	1269	101	125	1257	0
RTOR Reduction (vph)	0	43	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	551	0	0	0	0	0	1363	0	125	1257	0
Confl. Peds. (#/hr)	34		36						152	152		
Confl. Bikes (#/hr)			5						18			
Turn Type	Split									pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases										6		
Actuated Green, G (s)		22.0						39.0		50.0	50.0	
Effective Green, g (s)		23.0						40.0		51.0	51.0	
Actuated g/C Ratio		0.29						0.50		0.64	0.64	
Clearance Time (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		934						1682		263	2197	
v/s Ratio Prot		c0.17						c0.41		0.05	c0.36	
v/s Ratio Perm										0.26		
v/c Ratio		0.59						0.81		0.48	0.57	
Uniform Delay, d1		24.4						16.8		11.9	8.3	
Progression Factor		1.00						1.00		1.90	0.91	
Incremental Delay, d2		2.7						4.3		5.1	0.9	
Delay (s)		27.2						21.2		27.7	8.4	
Level of Service		C						C		C	A	
Approach Delay (s)		27.2			0.0			21.2			10.2	
Approach LOS		C			A			C			B	

Intersection Summary

HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

16: Hearst Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱		↱	↲↑↳		↱	↑↑	↱		↲↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95		0.91	0.91		1.00	0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	1.00	0.73		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00	1.00		1.00	
Frt	1.00	0.96		1.00	0.98		1.00	1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	0.99		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1723	3225		1568	3196		1692	3446	1128		3375	
Flt Permitted	0.95	1.00		0.95	0.99		0.38	1.00	1.00		0.85	
Satd. Flow (perm)	1723	3225		1568	3196		670	3446	1128		2890	
Volume (vph)	21	228	82	333	446	60	112	709	189	30	404	30
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	21	228	82	333	446	60	112	709	189	30	404	30
RTOR Reduction (vph)	0	46	0	0	11	0	0	0	130	0	6	0
Lane Group Flow (vph)	21	264	0	274	554	0	112	709	59	0	458	0
Confl. Peds. (#/hr)	63		55	55		63	36		207	207		36
Confl. Bikes (#/hr)			36			37			79			16
Turn Type	Split			Split			Perm		Perm	Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	22.0	22.0		22.0	22.0		24.0	24.0	24.0		24.0	
Effective Green, g (s)	23.0	23.0		23.0	23.0		25.0	25.0	25.0		25.0	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.31	0.31	0.31		0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	495	927		451	919		209	1077	353		903	
v/s Ratio Prot	0.01	c0.08		c0.17	0.17			c0.21				
v/s Ratio Perm							0.17		0.05		0.16	
v/c Ratio	0.04	0.29		0.61	0.60		0.54	0.66	0.17		0.51	
Uniform Delay, d1	20.6	22.1		24.6	24.6		22.7	23.8	19.9		22.5	
Progression Factor	1.36	1.50		1.00	1.00		0.84	0.85	0.75		1.00	
Incremental Delay, d2	0.2	0.8		6.0	2.9		9.4	3.1	1.0		2.0	
Delay (s)	28.1	34.0		30.6	27.5		28.5	23.2	16.0		24.5	
Level of Service	C	C		C	C		C	C	B		C	
Approach Delay (s)		33.6			28.5			22.4			24.5	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	26.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

17: University Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	←	↱		↔		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.74		0.93		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.90	0.93	1.00		0.98		1.00	1.00		0.90	1.00	
Frt	1.00	1.00	0.85		0.92		1.00	1.00		1.00	0.98	
Flt Protected	0.95	0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1476	1539	1137		1513		1718	3439		1552	3297	
Flt Permitted	0.80	0.76	1.00		0.96		0.18	1.00		0.38	1.00	
Satd. Flow (perm)	1248	1215	1137		1470		324	3439		628	3297	
Volume (vph)	301	51	247	6	12	23	238	699	3	8	700	123
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	301	51	247	6	12	23	238	699	3	8	700	123
RTOR Reduction (vph)	0	0	173	0	16	0	0	0	0	0	18	0
Lane Group Flow (vph)	151	201	74	0	25	0	238	702	0	8	805	0
Confl. Peds. (#/hr)	96		203	203		96	102		145	145		102
Confl. Bikes (#/hr)			72			17			60			46
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	23.0	23.0	23.0		23.0		49.0	49.0		29.2	29.2	
Effective Green, g (s)	24.0	24.0	24.0		24.0		50.0	50.0		30.2	30.2	
Actuated g/C Ratio	0.30	0.30	0.30		0.30		0.62	0.62		0.38	0.38	
Clearance Time (s)	4.0	4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	374	365	341		441		495	2149		237	1245	
v/s Ratio Prot							c0.10	0.20			c0.24	
v/s Ratio Perm	0.12	c0.17	0.07		0.02		0.20			0.01		
v/c Ratio	0.40	0.55	0.22		0.06		0.48	0.33		0.03	0.65	
Uniform Delay, d1	22.3	23.5	21.0		19.9		9.1	7.1		15.7	20.5	
Progression Factor	1.43	1.41	3.76		1.00		2.33	0.98		0.50	0.35	
Incremental Delay, d2	3.1	5.7	1.4		0.2		3.2	0.4		0.2	2.3	
Delay (s)	35.1	38.7	80.2		20.2		24.3	7.3		8.1	9.5	
Level of Service	D	D	F		C		C	A		A	A	
Approach Delay (s)		54.9			20.2			11.6			9.4	
Approach LOS		D			C			B			A	

Intersection Summary

HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

18: Center Street & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⟷			⟷		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.89			0.99		1.00	0.99		1.00	0.98	
Flpb, ped/bikes		0.99			0.92		0.95	1.00		0.91	1.00	
Frt		0.92			0.98		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1437			1566		1640	3401		1560	3359	
Flt Permitted		0.91			0.84		0.21	1.00		0.25	1.00	
Satd. Flow (perm)		1335			1351		358	3401		403	3359	
Volume (vph)	37	11	66	37	15	9	75	881	19	9	949	57
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	37	11	66	37	15	9	75	881	19	9	949	57
RTOR Reduction (vph)	0	33	0	0	6	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	82	0	0	55	0	75	898	0	9	1001	0
Confl. Peds. (#/hr)	46		158	158		46	148		234	234		148
Confl. Bikes (#/hr)			37			14			89			28
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		29.0			29.0		43.0	43.0		43.0	43.0	
Effective Green, g (s)		30.0			30.0		44.0	44.0		44.0	44.0	
Actuated g/C Ratio		0.38			0.38		0.55	0.55		0.55	0.55	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		501			507		197	1871		222	1847	
v/s Ratio Prot								0.26			c0.30	
v/s Ratio Perm		c0.06			0.04		0.21			0.02		
v/c Ratio		0.16			0.11		0.38	0.48		0.04	0.54	
Uniform Delay, d1		16.6			16.3		10.2	11.0		8.3	11.5	
Progression Factor		0.63			1.00		1.00	1.00		1.11	0.92	
Incremental Delay, d2		0.7			0.4		5.5	0.9		0.3	1.1	
Delay (s)		11.1			16.7		15.8	11.9		9.5	11.7	
Level of Service		B			B		B	B		A	B	
Approach Delay (s)		11.1			16.7			12.2			11.7	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	12.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

19: Allston Way & Oxford Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↵↑	↑↱	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	90	21	27	897	1003	35
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	90	21	27	897	1003	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					317	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1523	519	1038			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1419	196	828			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	10	97	96			
cM capacity (veh/h)	100	667	656			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	111	326	598	669	369
Volume Left	90	27	0	0	0
Volume Right	21	0	0	0	35
cSH	120	656	1700	1700	1700
Volume to Capacity	0.93	0.04	0.35	0.39	0.22
Queue Length 95th (ft)	148	3	0	0	0
Control Delay (s)	132.0	1.4	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	132.0	0.5		0.0	
Approach LOS	F				

Intersection Summary

Average Delay	7.3		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

20: Bancroft Way & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					�	↱	↰	↑			↑↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor					0.95	1.00	1.00	1.00			0.91	
Frpb, ped/bikes					1.00	0.93	1.00	1.00			0.98	
Flpb, ped/bikes					1.00	1.00	0.97	1.00			1.00	
Frt					1.00	0.85	1.00	1.00			0.98	
Flt Protected					0.99	1.00	0.95	1.00			1.00	
Satd. Flow (prot)					3410	1431	1679	1814			4740	
Flt Permitted					0.99	1.00	0.18	1.00			1.00	
Satd. Flow (perm)					3410	1431	322	1814			4740	
Volume (vph)	0	0	0	84	309	821	8	137	0	0	964	143
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	84	309	821	8	137	0	0	964	143
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	25	0
Lane Group Flow (vph)	0	0	0	0	393	821	8	137	0	0	1082	0
Confl. Peds. (#/hr)				177		150	140					140
Confl. Bikes (#/hr)						75						62
Turn Type				Split		Free	Perm					
Protected Phases				8	8			2			6	
Permitted Phases						Free	2					
Actuated Green, G (s)					36.0	80.0	36.0	36.0			36.0	
Effective Green, g (s)					37.0	80.0	37.0	37.0			37.0	
Actuated g/C Ratio					0.46	1.00	0.46	0.46			0.46	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1577	1431	149	839			2192	
v/s Ratio Prot					0.12			0.08			0.23	
v/s Ratio Perm						c0.57	0.02					
v/c Ratio					0.25	0.57	0.05	0.16			0.49	
Uniform Delay, d1					13.1	0.0	11.9	12.5			15.0	
Progression Factor					1.00	1.00	2.04	2.09			1.00	
Incremental Delay, d2					0.4	1.7	0.7	0.4			0.8	
Delay (s)					13.4	1.7	24.9	26.6			15.8	
Level of Service					B	A	C	C			B	
Approach Delay (s)		0.0			5.5			26.5			15.8	
Approach LOS		A			A			C			B	

Intersection Summary

HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c   Critical Lane Group

21: Durant Avenue & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱								↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0								3.0	3.0	
Lane Util. Factor	1.00	0.95								1.00	0.95	
Frpb, ped/bikes	1.00	0.99								1.00	1.00	
Flpb, ped/bikes	0.83	1.00								0.90	1.00	
Frt	1.00	0.98								1.00	1.00	
Flt Protected	0.95	1.00								0.95	1.00	
Satd. Flow (prot)	1434	3336								1552	3446	
Flt Permitted	0.95	1.00								0.95	1.00	
Satd. Flow (perm)	1434	3336								1552	3446	
Volume (vph)	157	179	24	0	0	0	0	0	0	400	654	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	157	179	24	0	0	0	0	0	0	400	654	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	157	190	0	0	0	0	0	0	0	400	654	0
Confl. Peds. (#/hr)	154		92							91		
Confl. Bikes (#/hr)			24									
Turn Type	Perm									Perm		
Protected Phases		4									6	
Permitted Phases	4									6		
Actuated Green, G (s)	32.0	32.0								40.0	40.0	
Effective Green, g (s)	33.0	33.0								41.0	41.0	
Actuated g/C Ratio	0.41	0.41								0.51	0.51	
Clearance Time (s)	4.0	4.0								4.0	4.0	
Lane Grp Cap (vph)	592	1376								795	1766	
v/s Ratio Prot		0.06									0.19	
v/s Ratio Perm	c0.11									c0.26		
v/c Ratio	0.27	0.14								0.50	0.37	
Uniform Delay, d1	15.5	14.6								12.8	11.7	
Progression Factor	1.26	1.26								0.46	0.47	
Incremental Delay, d2	0.9	0.2								2.0	0.5	
Delay (s)	20.5	18.6								7.9	6.0	
Level of Service	C	B								A	A	
Approach Delay (s)		19.5			0.0			0.0			6.7	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		

c   Critical Lane Group

SYNCHRO FILES – YEAR 2030 BASELINE AM PEAK HOUR LEVEL OF SERVICE

1: Hearst Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↔			↔↟			↔↟	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.88		1.00			0.99			1.00	
Flpb, ped/bikes		0.99	1.00		0.98			1.00			1.00	
Frt		1.00	0.85		1.00			0.98			1.00	
Flt Protected		0.99	1.00		0.97			1.00			1.00	
Satd. Flow (prot)		1793	1362		1722			3356			3440	
Flt Permitted		0.95	1.00		0.57			0.90			0.95	
Satd. Flow (perm)		1704	1362		1001			3037			3262	
Volume (vph)	43	347	383	163	121	8	23	749	94	10	1182	6
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	347	383	163	121	8	23	749	94	10	1182	6
RTOR Reduction (vph)	0	0	14	0	2	0	0	17	0	0	1	0
Lane Group Flow (vph)	0	390	369	0	290	0	0	849	0	0	1197	0
Confl. Peds. (#/hr)	118		81	81		118	49		34	34		49
Confl. Bikes (#/hr)			99			51			22			25
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		23.0	23.0		23.0			24.0			24.0	
Effective Green, g (s)		24.0	24.0		24.0			25.0			25.0	
Actuated g/C Ratio		0.44	0.44		0.44			0.45			0.45	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		744	594		437			1380			1483	
v/s Ratio Prot												
v/s Ratio Perm		0.23	0.27		c0.29			0.28			c0.37	
v/c Ratio		0.52	0.62		0.66			0.62			0.81	
Uniform Delay, d1		11.3	12.0		12.3			11.4			12.9	
Progression Factor		1.00	1.00		1.30			1.00			1.00	
Incremental Delay, d2		2.6	4.8		7.7			2.1			4.8	
Delay (s)		14.0	16.8		23.7			13.4			17.7	
Level of Service		B	B		C			B			B	
Approach Delay (s)		15.4			23.7			13.4			17.7	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

2: University Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↟↟	↗	↱	↟↳		↱	↟↳		↱	↟↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.80	1.00	0.99		1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.96	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1723	3446	1227	1723	3400		1723	3280		1648	3411	
Flt Permitted	0.11	1.00	1.00	0.11	1.00		0.09	1.00		0.30	1.00	
Satd. Flow (perm)	202	3446	1227	202	3400		158	3280		524	3411	
Volume (vph)	83	1051	249	77	1112	51	324	806	141	83	1602	82
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	83	1051	249	77	1112	51	324	806	141	83	1602	82
RTOR Reduction (vph)	0	0	148	0	3	0	0	3	0	0	3	0
Lane Group Flow (vph)	83	1051	101	77	1160	0	324	944	0	83	1681	0
Confl. Peds. (#/hr)	96		106	106		96	22		119	119		22
Confl. Bikes (#/hr)			107			36			25			35
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	35.0	35.0	35.0	35.0	35.0		57.0	57.0		42.0	42.0	
Effective Green, g (s)	36.0	36.0	36.0	36.0	36.0		58.0	58.0		43.0	43.0	
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.36		0.58	0.58		0.43	0.43	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	73	1241	442	73	1224		279	1902		225	1467	
v/s Ratio Prot		0.30			0.34		c0.14	0.29			0.49	
v/s Ratio Perm	c0.41		0.08	0.38			c0.53			0.16		
v/c Ratio	1.14	0.85	0.23	1.05	0.95		1.16	0.50		0.37	1.15	
Uniform Delay, d1	32.0	29.5	22.3	32.0	31.1		46.2	12.4		19.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	147.3	7.3	1.2	121.2	15.9		104.8	0.9		4.6	74.1	
Delay (s)	179.3	36.7	23.5	153.2	47.0		151.0	13.3		23.9	102.6	
Level of Service	F	D	C	F	D		F	B		C	F	
Approach Delay (s)		42.9			53.6			48.4			98.9	
Approach LOS		D			D			D			F	

Intersection Summary

HCM Average Control Delay	63.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	118.2%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

3: Center Street & Martin Luther King Jr. Way

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↱	↗	↑↑			↰↑
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	0.98			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.98			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1723	1542	3324			3410
Flt Permitted	0.95	1.00	1.00			0.55
Satd. Flow (perm)	1723	1542	3324			1891
Volume (vph)	68	130	1122	140	288	1589
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	68	130	1122	140	288	1589
RTOR Reduction (vph)	0	110	6	0	0	0
Lane Group Flow (vph)	68	20	1256	0	0	1877
Confl. Peds. (#/hr)	27	44		77	77	
Confl. Bikes (#/hr)		28		34		
Turn Type		Prot			Perm	
Protected Phases	8	8	2			6
Permitted Phases					6	
Actuated Green, G (s)	22.0	22.0	120.0			120.0
Effective Green, g (s)	23.0	23.0	121.0			121.0
Actuated g/C Ratio	0.15	0.15	0.81			0.81
Clearance Time (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	264	236	2681			1525
v/s Ratio Prot	c0.04	0.01	0.38			
v/s Ratio Perm						c0.99
v/c Ratio	0.26	0.08	0.47			1.23
Uniform Delay, d1	56.0	54.5	4.5			14.5
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	2.3	0.7	0.6			109.8
Delay (s)	58.3	55.2	5.1			124.3
Level of Service	E	E	A			F
Approach Delay (s)	56.3		5.1			124.3
Approach LOS	E		A			F

Intersection Summary

HCM Average Control Delay	75.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	119.0%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

4: Allston Way & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↲	↱		↲	↱	↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.93		1.00	0.91	1.00	0.98		1.00	0.99	
Flpb, ped/bikes		0.97	1.00		0.99	1.00	0.99	1.00		0.99	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.98	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1721	1441		1766	1395	1714	3323		1703	3369	
Flt Permitted		0.74	1.00		0.80	1.00	0.10	1.00		0.17	1.00	
Satd. Flow (perm)		1298	1441		1442	1395	176	3323		300	3369	
Volume (vph)	144	141	104	63	114	157	103	1016	165	186	1444	128
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	144	141	104	63	114	157	103	1016	165	186	1444	128
RTOR Reduction (vph)	0	0	20	0	0	48	0	19	0	0	10	0
Lane Group Flow (vph)	0	285	84	0	177	109	103	1162	0	186	1562	0
Confl. Peds. (#/hr)	76		44	44		76	55		89	89		55
Confl. Bikes (#/hr)			19			20			41			34
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		22.0	22.0		22.0	22.0	40.0	40.0		40.0	40.0	
Effective Green, g (s)		23.0	23.0		23.0	23.0	41.0	41.0		41.0	41.0	
Actuated g/C Ratio		0.33	0.33		0.33	0.33	0.59	0.59		0.59	0.59	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		426	473		474	458	103	1946		176	1973	
v/s Ratio Prot								0.35			0.46	
v/s Ratio Perm		c0.22	0.06		0.12	0.08	0.59			c0.62		
v/c Ratio		0.67	0.18		0.37	0.24	1.00	0.60		1.06	0.79	
Uniform Delay, d1		20.2	16.8		18.0	17.1	14.5	9.2		14.5	11.2	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.1	0.8		2.2	1.2	88.7	1.4		83.7	3.4	
Delay (s)		28.3	17.6		20.2	18.3	103.2	10.6		98.2	14.6	
Level of Service		C	B		C	B	F	B		F	B	
Approach Delay (s)		25.4			19.3			18.0			23.4	
Approach LOS		C			B			B			C	

Intersection Summary

HCM Average Control Delay	21.4		HCM Level of Service	C
HCM Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	70.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	101.4%		ICU Level of Service	G
Analysis Period (min)	15			

c Critical Lane Group

5: University Avenue & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↲↑↳			↲↑↳		↰	↑↳			♣	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	
Frpb, ped/bikes		0.99			1.00		1.00	0.99			0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00			1.00	
Frt		0.98			1.00		1.00	0.96			0.95	
Flt Protected		1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		3346			3409		1709	1710			1705	
Flt Permitted		0.92			0.84		0.49	1.00			0.98	
Satd. Flow (perm)		3084			2880		880	1710			1679	
Volume (vph)	26	1079	155	43	1018	36	120	88	37	20	180	105
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	1079	155	43	1018	36	120	88	37	20	180	105
RTOR Reduction (vph)	0	18	0	0	4	0	0	23	0	0	31	0
Lane Group Flow (vph)	0	1242	0	0	1093	0	120	102	0	0	274	0
Confl. Peds. (#/hr)	67		42	42		67	18		42	42		18
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		30.0			30.0		22.0	22.0			22.0	
Effective Green, g (s)		31.0			31.0		23.0	23.0			23.0	
Actuated g/C Ratio		0.52			0.52		0.38	0.38			0.38	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1593			1488		337	656			644	
v/s Ratio Prot								0.06				
v/s Ratio Perm		c0.40			0.38		0.14				c0.16	
v/c Ratio		0.78			0.73		0.36	0.16			0.42	
Uniform Delay, d1		11.7			11.3		13.2	12.1			13.6	
Progression Factor		1.00			0.68		1.00	1.00			1.00	
Incremental Delay, d2		3.8			3.0		2.9	0.5			2.0	
Delay (s)		15.6			10.7		16.1	12.6			15.7	
Level of Service		B			B		B	B			B	
Approach Delay (s)		15.6			10.7			14.4			15.7	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.6		HCM Level of Service	B
HCM Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	60.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	109.4%		ICU Level of Service	H
Analysis Period (min)	15			

c   Critical Lane Group

6: Center Street & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		✛			✛			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.64		0.95			0.95			0.99	
Flpb, ped/bikes		0.97	1.00		0.91			0.99			0.99	
Frt		1.00	0.85		0.97			0.98			0.99	
Flt Protected		0.99	1.00		0.98			0.99			1.00	
Satd. Flow (prot)		1745	989		1488			1674			1752	
Flt Permitted		0.95	1.00		0.91			0.93			0.98	
Satd. Flow (perm)		1672	989		1373			1562			1718	
Volume (vph)	24	97	132	38	51	30	35	188	28	22	327	20
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	24	97	132	38	51	30	35	188	28	22	327	20
RTOR Reduction (vph)	0	0	58	0	16	0	0	8	0	0	4	0
Lane Group Flow (vph)	0	121	74	0	103	0	0	243	0	0	365	0
Confl. Peds. (#/hr)	138		269	269		138	211		311	311		211
Confl. Bikes (#/hr)			17			20			23			18
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		24.0	24.0		24.0			23.0			23.0	
Effective Green, g (s)		25.0	25.0		25.0			24.0			24.0	
Actuated g/C Ratio		0.45	0.45		0.45			0.44			0.44	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		760	450		624			682			750	
v/s Ratio Prot												
v/s Ratio Perm		0.07	c0.08		0.07			0.16			c0.21	
v/c Ratio		0.16	0.16		0.16			0.36			0.49	
Uniform Delay, d1		8.8	8.8		8.8			10.3			11.1	
Progression Factor		1.00	1.00		0.69			0.86			1.00	
Incremental Delay, d2		0.4	0.8		0.6			1.3			2.3	
Delay (s)		9.3	9.6		6.6			10.2			13.3	
Level of Service		A	A		A			B			B	
Approach Delay (s)		9.5			6.6			10.2			13.3	
Approach LOS		A			A			B			B	

Intersection Summary

HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

7: Allston Way & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		✛			✛			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.39		0.93			0.92			0.97	
Flpb, ped/bikes		0.93	1.00		0.88			0.99			0.97	
Frt		1.00	0.85		0.97			0.98			0.97	
Flt Protected		0.98	1.00		0.99			0.98			1.00	
Satd. Flow (prot)		1662	607		1416			1586			1665	
Flt Permitted		0.87	1.00		0.89			0.78			0.96	
Satd. Flow (perm)		1471	607		1284			1257			1605	
Volume (vph)	77	145	214	41	67	37	89	152	42	40	345	105
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	77	145	214	41	67	37	89	152	42	40	345	105
RTOR Reduction (vph)	0	0	85	0	10	0	0	3	0	0	18	0
Lane Group Flow (vph)	0	222	129	0	135	0	0	280	0	0	472	0
Confl. Peds. (#/hr)	199		792	792		199	144		560	560		144
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		24.0	24.0		24.0			23.0			23.0	
Effective Green, g (s)		25.0	25.0		25.0			24.0			24.0	
Actuated g/C Ratio		0.45	0.45		0.45			0.44			0.44	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		669	276		584			549			700	
v/s Ratio Prot												
v/s Ratio Perm		0.15	c0.21		0.11			0.22			c0.29	
v/c Ratio		0.33	0.47		0.23			0.51			0.67	
Uniform Delay, d1		9.6	10.4		9.1			11.2			12.4	
Progression Factor		1.00	1.00		1.00			1.00			0.54	
Incremental Delay, d2		1.3	5.6		0.9			3.4			4.8	
Delay (s)		11.0	16.0		10.1			14.6			11.4	
Level of Service		B	B		B			B			B	
Approach Delay (s)		13.4			10.1			14.6			11.4	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

8: Hearst Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⬔⬕			⬔⬕		⬈	⬔⬕		⬈	⬔⬕	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.96		1.00	0.99		1.00	0.98	
Flpb, ped/bikes		1.00			0.99		0.97	1.00		0.96	1.00	
Frt		0.99			0.95		1.00	0.98		1.00	0.99	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3374			3098		1665	3322		1651	3343	
Flt Permitted		0.93			0.85		0.23	1.00		0.53	1.00	
Satd. Flow (perm)		3151			2666		407	3322		928	3343	
Volume (vph)	19	399	21	62	245	136	9	298	54	378	811	77
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	19	399	21	62	245	136	9	298	54	378	811	77
RTOR Reduction (vph)	0	6	0	0	79	0	0	27	0	0	13	0
Lane Group Flow (vph)	0	433	0	0	364	0	9	325	0	378	875	0
Confl. Peds. (#/hr)	133		190	190		133	110			91	91		110
Confl. Bikes (#/hr)		118			54			20				63
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		25.0	25.0		25.0	25.0	
Effective Green, g (s)		23.0			23.0		26.0	26.0		26.0	26.0	
Actuated g/C Ratio		0.42			0.42		0.47	0.47		0.47	0.47	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1318			1115		192	1570		439	1580	
v/s Ratio Prot								0.10			0.26	
v/s Ratio Perm		c0.14			0.14		0.02			c0.41		
v/c Ratio		0.33			0.33		0.05	0.21		0.86	0.55	
Uniform Delay, d1		10.8			10.8		7.8	8.5		12.9	10.4	
Progression Factor		0.95			0.59		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.7			0.5		0.5	0.3		19.4	1.4	
Delay (s)		10.9			6.9		8.3	8.8		32.3	11.8	
Level of Service		B			A		A	A		C	B	
Approach Delay (s)		10.9			6.9			8.8			17.9	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

9: University Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱			↰↑↱	↱					↰↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0	3.0					3.0	
Lane Util. Factor	1.00	0.95			0.91	0.91					0.91	
Frpb, ped/bikes	1.00	0.91			1.00	0.85					0.91	
Flpb, ped/bikes	0.96	1.00			1.00	1.00					1.00	
Frt	1.00	0.96			1.00	0.85					0.92	
Flt Protected	0.95	1.00			1.00	1.00					1.00	
Satd. Flow (prot)	1647	3017			3296	1197					4117	
Flt Permitted	0.35	1.00			0.94	1.00					1.00	
Satd. Flow (perm)	610	3017			3114	1197					4117	
Volume (vph)	272	713	263	8	621	222	0	0	0	53	398	455
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	272	713	263	8	621	222	0	0	0	53	398	455
RTOR Reduction (vph)	0	36	0	0	0	107	0	0	0	0	65	0
Lane Group Flow (vph)	272	940	0	0	629	115	0	0	0	0	841	0
Confl. Peds. (#/hr)	142		350	350		142				92		179
Confl. Bikes (#/hr)			143			61						73
Turn Type	Perm			Perm		Perm				Perm		
Protected Phases		4			8						6	
Permitted Phases	4			8		8				6		
Actuated Green, G (s)	30.0	30.0			30.0	30.0					22.0	
Effective Green, g (s)	31.0	31.0			31.0	31.0					23.0	
Actuated g/C Ratio	0.52	0.52			0.52	0.52					0.38	
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	
Lane Grp Cap (vph)	315	1559			1609	618					1578	
v/s Ratio Prot		0.31										
v/s Ratio Perm	c0.45				0.20	0.10					0.20	
v/c Ratio	0.86	0.60			0.39	0.19					0.53	
Uniform Delay, d1	12.7	10.2			8.8	7.8					14.3	
Progression Factor	1.10	1.21			1.00	1.00					1.00	
Incremental Delay, d2	19.6	1.2			0.7	0.7					1.3	
Delay (s)	33.5	13.5			9.5	8.4					15.6	
Level of Service	C	B			A	A					B	
Approach Delay (s)		17.9			9.2			0.0			15.6	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

10: Center Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱			↲						↲↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		1.00			1.00						0.91	
Frpb, ped/bikes		0.83			1.00						0.98	
Flpb, ped/bikes		1.00			0.96						0.99	
Frt		0.92			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1385			1724						4777	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1385			1655						4777	
Volume (vph)	0	39	54	32	142	0	0	0	0	12	596	30
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	39	54	32	142	0	0	0	0	12	596	30
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	82	0	0	174	0	0	0	0	0	632	0
Confl. Peds. (#/hr)	668		334	334		668	323		314	314		323
Confl. Bikes (#/hr)			133									29
Turn Type				Perm						Perm		
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		24.0			24.0						23.0	
Effective Green, g (s)		25.0			25.0						24.0	
Actuated g/C Ratio		0.45			0.45						0.44	
Clearance Time (s)		4.0			4.0						4.0	
Lane Grp Cap (vph)		630			752						2085	
v/s Ratio Prot		0.06										
v/s Ratio Perm					c0.11						0.13	
v/c Ratio		0.13			0.23						0.30	
Uniform Delay, d1		8.7			9.1						10.1	
Progression Factor		0.61			1.00						1.00	
Incremental Delay, d2		0.4			0.7						0.4	
Delay (s)		5.7			9.9						10.4	
Level of Service		A			A						B	
Approach Delay (s)		5.7			9.9			0.0			10.4	
Approach LOS		A			A			A			B	

Intersection Summary

HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

c   Critical Lane Group

11: Allston Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.91			0.95		1.00	0.98		1.00	0.94	
Flpb, ped/bikes		0.96			0.99		0.85	1.00		0.79	1.00	
Frt		0.93			0.96		1.00	0.99		1.00	0.98	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1462			1633		1472	3361		1363	3189	
Flt Permitted		0.94			0.98		0.29	1.00		0.37	1.00	
Satd. Flow (perm)		1390			1614		442	3361		530	3189	
Volume (vph)	42	47	93	3	24	10	111	614	22	36	728	89
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	42	47	93	3	24	10	111	614	22	36	728	89
RTOR Reduction (vph)	0	14	0	0	6	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	168	0	0	31	0	111	632	0	36	803	0
Confl. Peds. (#/hr)	197		176	176		197	424		508	508		424
Confl. Bikes (#/hr)			22			35			34			27
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		35.0	35.0		35.0	35.0	
Effective Green, g (s)		23.0			23.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio		0.35			0.35		0.55	0.55		0.55	0.55	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		492			571		245	1861		294	1766	
v/s Ratio Prot								0.19			c0.25	
v/s Ratio Perm		c0.12			0.02		0.25			0.07		
v/c Ratio		0.34			0.05		0.45	0.34		0.12	0.45	
Uniform Delay, d1		15.4			13.8		8.6	8.0		6.9	8.6	
Progression Factor		1.00			0.69		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9			0.1		5.9	0.5		0.9	0.8	
Delay (s)		17.3			9.7		14.6	8.5		7.8	9.5	
Level of Service		B			A		B	A		A	A	
Approach Delay (s)		17.3			9.7			9.4			9.4	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c   Critical Lane Group

12: Bancroft Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗	↰	⬆↱		↰	⬆⬆			⬆↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor			1.00	1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes			0.98	1.00	0.99		1.00	1.00			0.99	
Flpb, ped/bikes			1.00	0.99	1.00		0.94	1.00			1.00	
Frt			0.86	1.00	0.92		1.00	1.00			1.00	
Flt Protected			1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)			1530	1704	1652		1613	3446			3411	
Flt Permitted			1.00	0.95	1.00		0.29	1.00			1.00	
Satd. Flow (perm)			1530	1704	1652		491	3446			3411	
Volume (vph)	0	0	65	184	105	107	38	637	0	0	712	19
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	65	184	105	107	38	637	0	0	712	19
RTOR Reduction (vph)	0	0	23	0	58	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	42	184	154	0	38	637	0	0	728	0
Confl. Peds. (#/hr)			15	15			22	161				161
Confl. Bikes (#/hr)			3				1					30
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			24.0	24.0	24.0		23.0	23.0			23.0	
Effective Green, g (s)			25.0	25.0	25.0		24.0	24.0			24.0	
Actuated g/C Ratio			0.45	0.45	0.45		0.44	0.44			0.44	
Clearance Time (s)			4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)			695	775	751		214	1504			1488	
v/s Ratio Prot					0.09			0.18			c0.21	
v/s Ratio Perm			0.03	c0.11			0.08					
v/c Ratio			0.06	0.24	0.20		0.18	0.42			0.49	
Uniform Delay, d1			8.4	9.2	9.0		9.5	10.7			11.1	
Progression Factor			1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2			0.2	0.7	0.6		1.8	0.9			1.2	
Delay (s)			8.6	9.9	9.6		11.3	11.6			12.3	
Level of Service			A	A	A		B	B			B	
Approach Delay (s)		8.6			9.8			11.6			12.3	
Approach LOS		A			A			B			B	

Intersection Summary

HCM Average Control Delay	11.4		HCM Level of Service	B
HCM Volume to Capacity ratio	0.36			
Actuated Cycle Length (s)	55.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	52.7%		ICU Level of Service	A
Analysis Period (min)	15			

c   Critical Lane Group

13: Durant Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�					↑	↑↑3		↑	↑↑3	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95					1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00					1.00	0.93		1.00	0.99	
Flpb, ped/bikes		1.00					0.86	1.00		1.00	1.00	
Frt		0.99					1.00	0.93		1.00	0.99	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3397					1474	2967		1723	3388	
Flt Permitted		0.99					0.43	1.00		0.10	1.00	
Satd. Flow (perm)		3397					662	2967		173	3388	
Volume (vph)	42	269	13	0	0	0	20	602	597	324	576	20
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	42	269	13	0	0	0	20	602	597	324	576	20
RTOR Reduction (vph)	0	3	0	0	0	0	0	122	0	0	3	0
Lane Group Flow (vph)	0	321	0	0	0	0	20	1077	0	324	593	0
Confl. Peds. (#/hr)	20		22				162		99	99		162
Confl. Bikes (#/hr)			5						21			25
Turn Type	Split						Perm			pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		22.0					38.0	38.0		60.0	60.0	
Effective Green, g (s)		23.0					39.0	39.0		61.0	61.0	
Actuated g/C Ratio		0.26					0.43	0.43		0.68	0.68	
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		868					287	1286		444	2296	
v/s Ratio Prot		c0.09						c0.36		c0.15	0.18	
v/s Ratio Perm							0.03			0.34		
v/c Ratio		0.37					0.07	0.84		0.73	0.26	
Uniform Delay, d1		27.5					14.9	22.7		22.0	5.7	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.2					0.5	6.6		10.1	0.3	
Delay (s)		28.8					15.4	29.3		32.1	5.9	
Level of Service		C					B	C		C	A	
Approach Delay (s)		28.8			0.0			29.1			15.2	
Approach LOS		C			A			C			B	

Intersection Summary

HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

14: Haste Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					⬥↟↟		↟	↟↟			↟↟	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0		3.0	3.0			3.0	
Lane Util. Factor					0.95		1.00	0.95			0.95	
Frpb, ped/bikes					1.00		1.00	1.00			1.00	
Flpb, ped/bikes					1.00		0.96	1.00			1.00	
Frt					0.99		1.00	1.00			0.99	
Flt Protected					0.98		0.95	1.00			1.00	
Satd. Flow (prot)					3334		1654	3446			3411	
Flt Permitted					0.98		0.32	1.00			1.00	
Satd. Flow (perm)					3334		564	3446			3411	
Volume (vph)	0	0	0	296	534	85	118	1080	0	0	666	25
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	296	534	85	118	1080	0	0	666	25
RTOR Reduction (vph)	0	0	0	0	14	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	0	901	0	118	1080	0	0	686	0
Confl. Peds. (#/hr)				15			20	154				154
Confl. Bikes (#/hr)						11						25
Turn Type				Split			Perm					
Protected Phases				8	8			2			6	
Permitted Phases							2					
Actuated Green, G (s)					22.0		25.0	25.0			25.0	
Effective Green, g (s)					23.0		26.0	26.0			26.0	
Actuated g/C Ratio					0.42		0.47	0.47			0.47	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1394		267	1629			1612	
v/s Ratio Prot					c0.27			c0.31			0.20	
v/s Ratio Perm							0.21					
v/c Ratio					0.65		0.44	0.66			0.43	
Uniform Delay, d1					12.8		9.7	11.1			9.6	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					2.3		5.2	2.1			0.8	
Delay (s)					15.1		14.9	13.3			10.4	
Level of Service					B		B	B			B	
Approach Delay (s)		0.0			15.1			13.4			10.4	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

15: Dwight Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�						↑↑		↱	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0						3.0		3.0	3.0	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		1.00						0.99		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.97						0.98		1.00	1.00	
Flt Protected		0.99						1.00		0.95	1.00	
Satd. Flow (prot)		3288						3354		1721	3446	
Flt Permitted		0.99						1.00		0.13	1.00	
Satd. Flow (perm)		3288						3354		238	3446	
Volume (vph)	143	612	227	0	0	0	0	1022	156	56	971	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	143	612	227	0	0	0	0	1022	156	56	971	0
RTOR Reduction (vph)	0	43	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	939	0	0	0	0	0	1160	0	56	971	0
Confl. Peds. (#/hr)	7		6						37	152		
Confl. Bikes (#/hr)			2						19			
Turn Type	Split									pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases										6		
Actuated Green, G (s)		22.0						26.5		35.0	35.0	
Effective Green, g (s)		23.0						27.5		36.0	36.0	
Actuated g/C Ratio		0.35						0.42		0.55	0.55	
Clearance Time (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		1163						1419		257	1909	
v/s Ratio Prot		c0.29						c0.35		0.02	c0.28	
v/s Ratio Perm										0.10		
v/c Ratio		0.81						0.82		0.22	0.51	
Uniform Delay, d1		19.0						16.5		9.9	9.0	
Progression Factor		1.00						1.00		1.00	1.00	
Incremental Delay, d2		6.1						5.3		1.9	1.0	
Delay (s)		25.0						21.9		11.9	10.0	
Level of Service		C						C		B	A	
Approach Delay (s)		25.0			0.0			21.9			10.1	
Approach LOS		C			A			C			B	

Intersection Summary

HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

16: Hearst Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱		↱	↲↑↳		↱	↑↑	↱		↲↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95		0.91	0.91		1.00	0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.97		1.00	1.00	0.91		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		0.97	
Frt	1.00	0.97		1.00	0.98		1.00	1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	0.99		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1723	3120		1568	3090		1723	3446	1403		3302	
Flt Permitted	0.95	1.00		0.95	0.99		0.08	1.00	1.00		0.85	
Satd. Flow (perm)	1723	3120		1568	3090		140	3446	1403		2821	
Volume (vph)	25	561	146	484	344	85	28	199	505	191	1114	22
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	561	146	484	344	85	28	199	505	191	1114	22
RTOR Reduction (vph)	0	21	0	0	11	0	0	0	0	0	1	0
Lane Group Flow (vph)	25	686	0	306	596	0	28	199	505	0	1326	0
Confl. Peds. (#/hr)	104		171	171		104	60		187	187		60
Confl. Bikes (#/hr)			97			62			115			92
Turn Type	Split			Split			Perm		Free	Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		Free	6		
Actuated Green, G (s)	24.0	24.0		22.0	22.0		52.0	52.0	110.0		52.0	
Effective Green, g (s)	25.0	25.0		23.0	23.0		53.0	53.0	110.0		53.0	
Actuated g/C Ratio	0.23	0.23		0.21	0.21		0.48	0.48	1.00		0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	392	709		328	646		67	1660	1403		1359	
v/s Ratio Prot	0.01	c0.22		c0.20	0.19			0.06				
v/s Ratio Perm							0.20		0.36		c0.47	
v/c Ratio	0.06	0.97		0.93	0.92		0.42	0.12	0.36		0.98	
Uniform Delay, d1	33.3	42.1		42.7	42.6		18.5	15.7	0.0		27.9	
Progression Factor	0.85	0.83		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.3	23.9		35.2	20.8		18.0	0.1	0.7		19.3	
Delay (s)	28.7	58.8		78.0	63.4		36.5	15.8	0.7		47.1	
Level of Service	C	E		E	E		D	B	A		D	
Approach Delay (s)		57.8			68.3			6.2			47.1	
Approach LOS		E			E			A			D	

Intersection Summary

HCM Average Control Delay	46.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	110.6%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

17: University Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↰	↱		⟷		↱	↑↱		↱	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.76		0.99		1.00	0.99		1.00	0.97	
Flpb, ped/bikes	0.99	0.99	1.00		0.99		1.00	1.00		0.89	1.00	
Frt	1.00	1.00	0.85		0.97		1.00	0.99		1.00	0.98	
Flt Protected	0.95	0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1619	1636	1177		1702		1723	3395		1526	3280	
Flt Permitted	0.78	0.76	1.00		0.94		0.08	1.00		0.58	1.00	
Satd. Flow (perm)	1321	1302	1177		1616		142	3395		927	3280	
Volume (vph)	533	42	288	8	28	11	255	273	12	49	1515	264
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	533	42	288	8	28	11	255	273	12	49	1515	264
RTOR Reduction (vph)	0	0	138	0	8	0	0	4	0	0	16	0
Lane Group Flow (vph)	267	308	150	0	39	0	255	281	0	49	1763	0
Confl. Peds. (#/hr)	10		147	147		10	117		83	83		117
Confl. Bikes (#/hr)			79			13			41			80
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	22.0	22.0	22.0		22.0		60.0	60.0		47.0	47.0	
Effective Green, g (s)	23.0	23.0	23.0		23.0		61.0	61.0		48.0	48.0	
Actuated g/C Ratio	0.26	0.26	0.26		0.26		0.68	0.68		0.53	0.53	
Clearance Time (s)	4.0	4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	338	333	301		413		272	2301		494	1749	
v/s Ratio Prot							c0.10	0.08			c0.54	
v/s Ratio Perm	0.20	c0.24	0.13		0.02		0.53			0.05		
v/c Ratio	0.79	0.92	0.50		0.09		0.94	0.12		0.10	1.01	
Uniform Delay, d1	31.2	32.7	28.6		25.6		28.1	5.1		10.3	21.0	
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	17.0	33.5	5.8		0.5		40.6	0.1		0.4	23.5	
Delay (s)	48.2	66.1	34.4		26.0		68.7	5.2		10.7	44.5	
Level of Service	D	E	C		C		E	A		B	D	
Approach Delay (s)		50.0			26.0			35.2			43.6	
Approach LOS		D			C			D			D	

Intersection Summary

HCM Average Control Delay	43.6	HCM Level of Service		D
HCM Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		9.0
Intersection Capacity Utilization	106.3%	ICU Level of Service		G
Analysis Period (min)	15			

c   Critical Lane Group

18: Center Street & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⊕			⊕		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.94			0.97		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		0.97			0.96		1.00	1.00		0.93	1.00	
Frt		0.95			0.96		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1540			1592		1723	3400		1600	3378	
Flt Permitted		0.91			0.94		0.10	1.00		0.41	1.00	
Satd. Flow (perm)		1437			1522		177	3400		691	3378	
Volume (vph)	24	12	22	12	13	12	55	543	22	15	1649	85
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	24	12	22	12	13	12	55	543	22	15	1649	85
RTOR Reduction (vph)	0	8	0	0	8	0	0	4	0	0	5	0
Lane Group Flow (vph)	0	50	0	0	29	0	55	561	0	15	1729	0
Confl. Peds. (#/hr)	88		133	133		88	137		105	105		137
Confl. Bikes (#/hr)			17			1			27			39
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		40.0	40.0		40.0	40.0	
Effective Green, g (s)		23.0			23.0		41.0	41.0		41.0	41.0	
Actuated g/C Ratio		0.33			0.33		0.59	0.59		0.59	0.59	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		472			500		104	1991		405	1979	
v/s Ratio Prot								0.16			c0.51	
v/s Ratio Perm		c0.03			0.02		0.31			0.02		
v/c Ratio		0.11			0.06		0.53	0.28		0.04	0.87	
Uniform Delay, d1		16.3			16.1		8.7	7.2		6.1	12.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			0.2		17.9	0.4		0.2	5.7	
Delay (s)		16.8			16.3		26.6	7.5		6.3	18.0	
Level of Service		B			B		C	A		A	B	
Approach Delay (s)		16.8			16.3			9.2			17.9	
Approach LOS		B			B			A			B	

Intersection Summary

HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

19: Allston Way & Oxford Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	⅄			◁↑	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	0.91			1.00	1.00	
Flt Protected	0.98			1.00	1.00	
Satd. Flow (prot)	1621			3444	3438	
Flt Permitted	0.98			0.91	1.00	
Satd. Flow (perm)	1621			3129	3438	
Volume (vph)	25	53	9	707	1694	26
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	53	9	707	1694	26
RTOR Reduction (vph)	11	0	0	0	2	0
Lane Group Flow (vph)	67	0	0	716	1718	0
Turn Type			Perm			
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	22.0			35.0	35.0	
Effective Green, g (s)	23.0			36.0	36.0	
Actuated g/C Ratio	0.35			0.55	0.55	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	574			1733	1904	
v/s Ratio Prot	c0.04				c0.50	
v/s Ratio Perm				0.23		
v/c Ratio	0.12			0.41	0.90	
Uniform Delay, d1	14.2			8.4	12.9	
Progression Factor	0.98			1.00	1.00	
Incremental Delay, d2	0.4			0.7	7.5	
Delay (s)	14.3			9.1	20.4	
Level of Service	B			A	C	
Approach Delay (s)	14.3			9.1	20.4	
Approach LOS	B			A	C	

Intersection Summary

HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

c   Critical Lane Group

20: Bancroft Way & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↵↑	↗	↰	↑			↑↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor					0.95	1.00	1.00	1.00			0.91	
Frpb, ped/bikes					1.00	0.96	1.00	1.00			0.99	
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	
Frt					1.00	0.85	1.00	1.00			0.99	
Flt Protected					0.98	1.00	0.95	1.00			1.00	
Satd. Flow (prot)					3387	1475	1714	1814			4844	
Flt Permitted					0.98	1.00	0.10	1.00			1.00	
Satd. Flow (perm)					3387	1475	180	1814			4844	
Volume (vph)	0	0	0	139	260	536	57	98	0	0	1549	149
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	139	260	536	57	98	0	0	1549	149
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	0	0	0	399	536	57	98	0	0	1684	0
Confl. Peds. (#/hr)				53		92	74					74
Confl. Bikes (#/hr)						19						28
Turn Type				Split		Free	Perm					
Protected Phases				8	8			2			6	
Permitted Phases						Free	2					
Actuated Green, G (s)					22.0	80.0	50.0	50.0			50.0	
Effective Green, g (s)					23.0	80.0	51.0	51.0			51.0	
Actuated g/C Ratio					0.29	1.00	0.64	0.64			0.64	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					974	1475	115	1156			3088	
v/s Ratio Prot					0.12			0.05			c0.35	
v/s Ratio Perm						c0.36	0.32					
v/c Ratio					0.41	0.36	0.50	0.08			0.55	
Uniform Delay, d1					23.0	0.0	7.7	5.6			8.1	
Progression Factor					1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2					1.3	0.7	14.5	0.1			0.7	
Delay (s)					24.3	0.7	22.1	5.7			8.8	
Level of Service					C	A	C	A			A	
Approach Delay (s)		0.0			10.8			11.7			8.8	
Approach LOS		A			B			B			A	

Intersection Summary

HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

21: Durant Avenue & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↳								↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0								3.0	3.0	
Lane Util. Factor	1.00	0.95								1.00	0.95	
Frpb, ped/bikes	1.00	0.98								1.00	1.00	
Flpb, ped/bikes	0.89	1.00								0.85	1.00	
Frt	1.00	0.96								1.00	1.00	
Flt Protected	0.95	1.00								0.95	1.00	
Satd. Flow (prot)	1533	3247								1459	3446	
Flt Permitted	0.95	1.00								0.95	1.00	
Satd. Flow (perm)	1533	3247								1459	3446	
Volume (vph)	123	817	269	0	0	0	0	0	0	385	1274	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	123	817	269	0	0	0	0	0	0	385	1274	0
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	123	1070	0	0	0	0	0	0	0	385	1274	0
Confl. Peds. (#/hr)	147		91							204		
Confl. Bikes (#/hr)			16									
Turn Type	Perm									Perm		
Protected Phases		4									6	
Permitted Phases	4									6		
Actuated Green, G (s)	22.0	22.0								25.0	25.0	
Effective Green, g (s)	23.0	23.0								26.0	26.0	
Actuated g/C Ratio	0.42	0.42								0.47	0.47	
Clearance Time (s)	4.0	4.0								4.0	4.0	
Lane Grp Cap (vph)	641	1358								690	1629	
v/s Ratio Prot		c0.33									c0.37	
v/s Ratio Perm	0.08									0.26		
v/c Ratio	0.19	0.79								0.56	0.78	
Uniform Delay, d1	10.1	13.9								10.4	12.1	
Progression Factor	1.00	1.00								1.00	1.00	
Incremental Delay, d2	0.7	4.7								3.2	3.8	
Delay (s)	10.8	18.6								13.6	15.9	
Level of Service	B	B								B	B	
Approach Delay (s)		17.8			0.0			0.0			15.4	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

SYNCHRO FILES – YEAR 2030 BASELINE PM PEAK HOUR LEVEL OF SERVICE

1: Hearst Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↔			↔↱			↔↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.93		1.00			0.99			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		1.00			0.98			0.99	
Flt Protected		0.99	1.00		0.99			0.99			1.00	
Satd. Flow (prot)		1799	1437		1779			3306			3412	
Flt Permitted		0.84	1.00		0.80			0.61			0.69	
Satd. Flow (perm)		1521	1437		1442			2041			2350	
Volume (vph)	51	296	54	147	679	28	215	1193	228	31	824	33
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	51	296	54	147	679	28	215	1193	228	31	824	33
RTOR Reduction (vph)	0	0	30	0	2	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	347	24	0	852	0	0	1613	0	0	883	0
Confl. Peds. (#/hr)	51		57	57		51	33		42	42		33
Confl. Bikes (#/hr)			30			24			22			13
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		23.0	23.0		23.0			24.0			24.0	
Effective Green, g (s)		24.0	24.0		24.0			25.0			25.0	
Actuated g/C Ratio		0.44	0.44		0.44			0.45			0.45	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		664	627		629			928			1068	
v/s Ratio Prot												
v/s Ratio Perm		0.23	0.02		c0.59			c0.79			0.38	
v/c Ratio		0.52	0.04		1.35			1.74			0.83	
Uniform Delay, d1		11.3	8.9		15.5			15.0			13.1	
Progression Factor		1.00	1.00		1.10			1.00			1.00	
Incremental Delay, d2		2.9	0.1		169.6			336.5			7.4	
Delay (s)		14.2	9.0		186.7			351.5			20.5	
Level of Service		B	A		F			F			C	
Approach Delay (s)		13.5			186.7			351.5			20.5	
Approach LOS		B			F			F			C	

Intersection Summary

HCM Average Control Delay	200.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.55		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	152.9%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

2: University Avenue & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↑	↱	↱	↑↱		↱	↑↱		↱	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.81	1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1701	3446	1251	1692	3371		1723	3398		1723	3330	
Flt Permitted	0.14	1.00	1.00	0.16	1.00		0.15	1.00		0.17	1.00	
Satd. Flow (perm)	245	3446	1251	285	3371		269	3398		302	3330	
Volume (vph)	198	1182	240	110	1181	87	304	1317	48	60	666	126
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	198	1182	240	110	1181	87	304	1317	48	60	666	126
RTOR Reduction (vph)	0	0	101	0	1	0	0	3	0	0	16	0
Lane Group Flow (vph)	198	1182	139	110	1267	0	304	1362	0	60	776	0
Confl. Peds. (#/hr)	109		122	122		109	27		168	168		27
Confl. Bikes (#/hr)			48			34			26			18
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	57.0	57.0	57.0	57.0	57.0		35.0	35.0		23.0	23.0	
Effective Green, g (s)	58.0	58.0	58.0	58.0	58.0		36.0	36.0		24.0	24.0	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58		0.36	0.36		0.24	0.24	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	142	1999	726	165	1955		228	1223		72	799	
v/s Ratio Prot		0.34			0.38		c0.12	0.40			0.23	
v/s Ratio Perm	c0.81		0.11	0.39			c0.36			0.20		
v/c Ratio	1.39	0.59	0.19	0.67	0.65		1.33	1.11		0.83	0.97	
Uniform Delay, d1	21.0	13.4	9.9	14.4	14.1		27.9	32.0		36.1	37.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	214.5	1.3	0.6	19.3	1.7		176.8	63.0		66.3	25.6	
Delay (s)	235.5	14.7	10.5	33.7	15.8		204.7	95.0		102.4	63.2	
Level of Service	F	B	B	C	B		F	F		F	E	
Approach Delay (s)		41.1			17.2			115.0			66.0	
Approach LOS		D			B			F			E	

Intersection Summary				
HCM Average Control Delay	61.3	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.37			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	104.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

3: Center Street & Martin Luther King Jr. Way

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↱			↰↑
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	0.97			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.98			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1723	1542	3260			3401
Flt Permitted	0.95	1.00	1.00			0.49
Satd. Flow (perm)	1723	1542	3260			1679
Volume (vph)	168	463	1314	245	291	804
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	168	463	1314	245	291	804
RTOR Reduction (vph)	0	40	10	0	0	0
Lane Group Flow (vph)	168	423	1549	0	0	1095
Confl. Peds. (#/hr)	26	16		90	90	
Confl. Bikes (#/hr)		2		25		
Turn Type		Prot			Perm	
Protected Phases	8	8	2			6
Permitted Phases					6	
Actuated Green, G (s)	42.0	42.0	100.0			100.0
Effective Green, g (s)	43.0	43.0	101.0			101.0
Actuated g/C Ratio	0.29	0.29	0.67			0.67
Clearance Time (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	494	442	2195			1131
v/s Ratio Prot	0.10	c0.27	0.48			
v/s Ratio Perm						c0.65
v/c Ratio	0.34	0.96	0.71			2.33dl
Uniform Delay, d1	42.3	52.6	15.2			23.0
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	1.9	33.3	1.9			20.1
Delay (s)	44.2	85.9	17.2			43.1
Level of Service	D	F	B			D
Approach Delay (s)	74.8		17.2			43.1
Approach LOS	E		B			D

Intersection Summary

HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	106.1%	ICU Level of Service	G
Analysis Period (min)	15		

dl   Defacto Left Lane. Recode with 1 though lane as a left lane.
c   Critical Lane Group

4: Allston Way & Martin Luther King Jr. Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		◀	↗		◀	↗	↰	↑↑⤷		↰	↑↑⤷	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.93		1.00	0.96	1.00	0.99		1.00	0.98	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	0.98	1.00		0.99	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1769	1426		1788	1479	1692	3385		1711	3313	
Flt Permitted		0.41	1.00		0.81	1.00	0.26	1.00		0.12	1.00	
Satd. Flow (perm)		750	1426		1454	1479	471	3385		212	3313	
Volume (vph)	166	203	113	96	418	182	201	1229	95	150	682	125
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	166	203	113	96	418	182	201	1229	95	150	682	125
RTOR Reduction (vph)	0	0	65	0	0	13	0	8	0	0	22	0
Lane Group Flow (vph)	0	369	48	0	514	169	201	1316	0	150	785	0
Confl. Peds. (#/hr)	20		59	59		20	42		83	83		42
Confl. Bikes (#/hr)			16			20			17			22
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		29.0	29.0		29.0	29.0	33.0	33.0		33.0	33.0	
Effective Green, g (s)		30.0	30.0		30.0	30.0	34.0	34.0		34.0	34.0	
Actuated g/C Ratio		0.43	0.43		0.43	0.43	0.49	0.49		0.49	0.49	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		321	611		623	634	229	1644		103	1609	
v/s Ratio Prot								0.39			0.24	
v/s Ratio Perm		c0.49	0.03		0.35	0.11	0.43			c0.71		
v/c Ratio		1.15	0.08		0.83	0.27	0.88	0.80		1.46	0.49	
Uniform Delay, d1		20.0	11.8		17.7	12.9	16.1	15.1		18.0	12.1	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		97.1	0.3		11.8	1.0	34.6	4.2		251.0	1.1	
Delay (s)		117.1	12.1		29.5	13.9	50.8	19.3		269.0	13.2	
Level of Service		F	B		C	B	D	B		F	B	
Approach Delay (s)	92.5			25.4			23.5			53.3		
Approach LOS	F			C			C			D		

Intersection Summary

HCM Average Control Delay	40.7		HCM Level of Service	D
HCM Volume to Capacity ratio	1.31			
Actuated Cycle Length (s)	70.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	108.7%		ICU Level of Service	G
Analysis Period (min)	15			

c   Critical Lane Group

5: University Avenue & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⬏⬆⬊			⬏⬆⬊			⬑	⬆⬊			⬦	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	
Frpb, ped/bikes		0.97			0.99		1.00	0.96			0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00			1.00	
Frt		0.98			1.00		1.00	0.94			0.98	
Flt Protected		1.00			1.00		0.95	1.00			0.99	
Satd. Flow (prot)		3275			3411		1701	1625			1745	
Flt Permitted		0.88			0.85		0.53	1.00			0.93	
Satd. Flow (perm)		2896			2892		949	1625			1637	
Volume (vph)	50	1120	168	9	792	21	506	245	187	37	237	55
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	50	1120	168	9	792	21	506	245	187	37	237	55
RTOR Reduction (vph)	0	19	0	0	3	0	0	5	0	0	12	0
Lane Group Flow (vph)	0	1319	0	0	819	0	506	428	0	0	317	0
Confl. Peds. (#/hr)	128		129	129		128	28		99	99		28
Confl. Bikes (#/hr)			41			41			15			
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		23.0			23.0		29.0	29.0			29.0	
Effective Green, g (s)		24.0			24.0		30.0	30.0			30.0	
Actuated g/C Ratio		0.40			0.40		0.50	0.50			0.50	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1158			1157		475	813			819	
v/s Ratio Prot								0.26				
v/s Ratio Perm		c0.46			0.28		c0.53				0.19	
v/c Ratio		1.14			0.71		1.07	0.53			0.39	
Uniform Delay, d1		18.0			15.1		15.0	10.2			9.3	
Progression Factor		1.00			0.82		1.00	1.00			1.00	
Incremental Delay, d2		73.6			3.3		59.8	2.4			1.4	
Delay (s)		91.6			15.7		74.8	12.6			10.7	
Level of Service		F			B		E	B			B	
Approach Delay (s)		91.6			15.7			46.1			10.7	
Approach LOS		F			B			D			B	

Intersection Summary

HCM Average Control Delay	53.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	124.1%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

6: Center Street & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		✛			✛			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.66		0.87			0.96			0.91	
Flpb, ped/bikes		0.97	1.00		0.99			0.98			0.99	
Frt		1.00	0.85		0.96			0.98			0.95	
Flt Protected		0.99	1.00		1.00			0.99			0.99	
Satd. Flow (prot)		1735	1024		1486			1657			1537	
Flt Permitted		0.78	1.00		0.95			0.84			0.76	
Satd. Flow (perm)		1368	1024		1415			1411			1185	
Volume (vph)	100	321	103	42	313	172	173	632	123	78	172	155
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	100	321	103	42	313	172	173	632	123	78	172	155
RTOR Reduction (vph)	0	0	60	0	27	0	0	10	0	0	29	0
Lane Group Flow (vph)	0	421	43	0	500	0	0	918	0	0	376	0
Confl. Peds. (#/hr)	296		250	250		296	293		232	230		293
Confl. Bikes (#/hr)			16			23			31			16
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	22.0		22.0			25.0			25.0	
Effective Green, g (s)		23.0	23.0		23.0			26.0			26.0	
Actuated g/C Ratio		0.42	0.42		0.42			0.47			0.47	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		572	428		592			667			560	
v/s Ratio Prot												
v/s Ratio Perm		0.31	0.04		c0.35			c0.65			0.32	
v/c Ratio		0.74	0.10		0.84			1.38			0.67	
Uniform Delay, d1		13.4	9.7		14.4			14.5			11.2	
Progression Factor		1.00	1.00		1.53			0.94			1.00	
Incremental Delay, d2		8.2	0.5		1.5			170.2			6.3	
Delay (s)		21.7	10.2		23.4			183.8			17.5	
Level of Service		C	B		C			F			B	
Approach Delay (s)		19.4			23.4			183.8			17.5	
Approach LOS		B			C			F			B	

Intersection Summary

HCM Average Control Delay	84.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	135.5%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

7: Allston Way & Milvia Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↵	↗		✥			✥			✥	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.66		0.83			0.97			0.94	
Flpb, ped/bikes		0.96	1.00		0.98			0.97			0.99	
Frt		1.00	0.85		0.95			0.98			0.96	
Flt Protected		0.98	1.00		1.00			0.99			0.99	
Satd. Flow (prot)		1712	1020		1391			1663			1623	
Flt Permitted		0.60	1.00		0.94			0.80			0.85	
Satd. Flow (perm)		1049	1020		1316			1340			1389	
Volume (vph)	109	194	145	73	408	277	216	520	102	53	199	92
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	109	194	145	73	408	277	216	520	102	53	199	92
RTOR Reduction (vph)	0	0	63	0	38	0	0	9	0	0	15	0
Lane Group Flow (vph)	0	303	82	0	720	0	0	829	0	0	329	0
Confl. Peds. (#/hr)	371		260	260		371	281		168	168		281
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		23.0	23.0		23.0			24.0			24.0	
Effective Green, g (s)		24.0	24.0		24.0			25.0			25.0	
Actuated g/C Ratio		0.44	0.44		0.44			0.45			0.45	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		458	445		574			609			631	
v/s Ratio Prot												
v/s Ratio Perm		0.29	0.08		c0.55			c0.62			0.24	
v/c Ratio		0.66	0.19		1.25			1.36			0.52	
Uniform Delay, d1		12.3	9.5		15.5			15.0			10.7	
Progression Factor		1.00	1.00		1.00			1.00			0.84	
Incremental Delay, d2		7.3	0.9		128.4			172.8			2.7	
Delay (s)		19.6	10.4		143.9			187.8			11.7	
Level of Service		B	B		F			F			B	
Approach Delay (s)		16.6			143.9			187.8			11.7	
Approach LOS		B			F			F			B	

Intersection Summary

HCM Average Control Delay	116.4		HCM Level of Service	F
HCM Volume to Capacity ratio	1.31			
Actuated Cycle Length (s)	55.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	148.0%		ICU Level of Service	H
Analysis Period (min)	15			

c   Critical Lane Group

8: Hearst Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�			�		↱	↑↑3		↱	↑↑3	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.97	1.00		0.98	1.00	
Frt		1.00			0.98		1.00	0.99		1.00	0.99	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3431			3317		1674	3365		1683	3360	
Flt Permitted		0.84			0.77		0.16	1.00		0.25	1.00	
Satd. Flow (perm)		2904			2561		284	3365		442	3360	
Volume (vph)	41	576	2	126	700	147	46	769	78	598	994	79
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	41	576	2	126	700	147	46	769	78	598	994	79
RTOR Reduction (vph)	0	1	0	0	26	0	0	14	0	0	11	0
Lane Group Flow (vph)	0	618	0	0	947	0	46	833	0	598	1062	0
Confl. Peds. (#/hr)	31		36	36		31	131		118	118		131
Confl. Bikes (#/hr)			31			28			24			18
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		25.0	25.0		25.0	25.0	
Effective Green, g (s)		23.0			23.0		26.0	26.0		26.0	26.0	
Actuated g/C Ratio		0.42			0.42		0.47	0.47		0.47	0.47	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1214			1071		134	1591		209	1588	
v/s Ratio Prot								0.25			0.32	
v/s Ratio Perm		0.21			c0.37		0.16			c1.35		
v/c Ratio		0.51			0.88		0.34	0.52		2.86	0.67	
Uniform Delay, d1		11.8			14.8		9.1	10.2		14.5	11.2	
Progression Factor		0.99			1.51		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.5			1.1		6.9	1.2		850.6	2.3	
Delay (s)		13.2			23.5		16.0	11.4		865.1	13.4	
Level of Service		B			C		B	B		F	B	
Approach Delay (s)		13.2			23.5			11.6			318.2	
Approach LOS		B			C			B			F	

Intersection Summary

HCM Average Control Delay	137.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.93		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	119.5%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

9: University Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱			↲↑↱	↱					↲↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0	3.0					3.0	
Lane Util. Factor	1.00	0.95			0.91	0.91					0.91	
Frpb, ped/bikes	1.00	0.92			0.91	0.80					0.90	
Flpb, ped/bikes	0.94	1.00			1.00	1.00					1.00	
Frt	1.00	0.96			0.93	0.85					0.95	
Flt Protected	0.95	1.00			1.00	1.00					1.00	
Satd. Flow (prot)	1619	3053			2798	1128					4241	
Flt Permitted	0.34	1.00			0.95	1.00					1.00	
Satd. Flow (perm)	573	3053			2653	1128					4241	
Volume (vph)	638	482	150	9	352	596	0	0	0	45	722	347
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	638	482	150	9	352	596	0	0	0	45	722	347
RTOR Reduction (vph)	0	3	0	0	144	144	0	0	0	0	94	0
Lane Group Flow (vph)	638	629	0	0	515	154	0	0	0	0	1020	0
Confl. Peds. (#/hr)	204		455	455		204				131		341
Confl. Bikes (#/hr)			113			66						72
Turn Type	Perm			Perm		Perm				Perm		
Protected Phases		4			8						6	
Permitted Phases	4			8		8				6		
Actuated Green, G (s)	30.0	30.0			30.0	30.0					22.0	
Effective Green, g (s)	31.0	31.0			31.0	31.0					23.0	
Actuated g/C Ratio	0.52	0.52			0.52	0.52					0.38	
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	
Lane Grp Cap (vph)	296	1577			1371	583					1626	
v/s Ratio Prot		0.21										
v/s Ratio Perm	c1.11				0.19	0.14					0.24	
v/c Ratio	2.16	0.40			0.38	0.26					0.63	
Uniform Delay, d1	14.5	8.8			8.7	8.1					15.0	
Progression Factor	1.15	1.33			1.00	1.00					1.00	
Incremental Delay, d2	521.0	0.1			0.8	1.1					1.8	
Delay (s)	537.7	11.8			9.5	9.2					16.9	
Level of Service	F	B			A	A					B	
Approach Delay (s)		276.0			9.4			0.0			16.9	
Approach LOS		F			A			A			B	

Intersection Summary

HCM Average Control Delay	113.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.50		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

10: Center Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱			↰						↰↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		1.00			1.00						0.91	
Frpb, ped/bikes		0.88			1.00						0.98	
Flpb, ped/bikes		1.00			0.92						0.99	
Frt		0.96			1.00						0.99	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1530			1648						4758	
Flt Permitted		1.00			0.65						1.00	
Satd. Flow (perm)		1530			1086						4758	
Volume (vph)	0	262	105	228	443	0	0	0	0	30	784	44
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	262	105	228	443	0	0	0	0	30	784	44
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	359	0	0	671	0	0	0	0	0	855	0
Confl. Peds. (#/hr)	670		1152	1152		670	256		261	261		256
Confl. Bikes (#/hr)			84									54
Turn Type				Perm						Perm		
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		25.0			25.0						22.0	
Effective Green, g (s)		26.0			26.0						23.0	
Actuated g/C Ratio		0.47			0.47						0.42	
Clearance Time (s)		4.0			4.0						4.0	
Lane Grp Cap (vph)		723			513						1990	
v/s Ratio Prot		0.23										
v/s Ratio Perm					c0.62						0.18	
v/c Ratio		0.50			1.31						0.43	
Uniform Delay, d1		10.0			14.5						11.3	
Progression Factor		1.06			1.00						1.00	
Incremental Delay, d2		1.1			152.2						0.7	
Delay (s)		11.7			166.7						12.0	
Level of Service		B			F						B	
Approach Delay (s)		11.7			166.7			0.0			12.0	
Approach LOS		B			F			A			B	

Intersection Summary

HCM Average Control Delay	66.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

11: Allston Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⬥			⬥		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.88			0.93		1.00	0.93		1.00	0.85	
Flpb, ped/bikes		0.97			0.98		0.94	1.00		0.90	1.00	
Frt		0.94			0.96		1.00	0.98		1.00	0.97	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1440			1578		1618	3136		1551	2840	
Flt Permitted		0.81			0.92		0.11	1.00		0.17	1.00	
Satd. Flow (perm)		1183			1469		189	3136		278	2840	
Volume (vph)	103	131	182	42	191	98	172	1013	125	128	1089	296
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	103	131	182	42	191	98	172	1013	125	128	1089	296
RTOR Reduction (vph)	0	1	0	0	1	0	0	15	0	0	30	0
Lane Group Flow (vph)	0	415	0	0	330	0	172	1123	0	128	1355	0
Confl. Peds. (#/hr)	262		286	387		262	918		871	871		918
Confl. Bikes (#/hr)			43			15			74			78
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		35.0	35.0		35.0	35.0	
Effective Green, g (s)		23.0			23.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio		0.35			0.35		0.55	0.55		0.55	0.55	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		419			520		105	1737		154	1573	
v/s Ratio Prot								0.36			0.48	
v/s Ratio Perm		c0.35			0.22		c0.91			0.46		
v/c Ratio		0.99			0.64		1.64	0.65		0.83	1.02dr	
Uniform Delay, d1		20.9			17.5		14.5	10.1		12.0	12.4	
Progression Factor		1.00			0.77		1.00	1.00		1.00	1.00	
Incremental Delay, d2		41.9			1.7		325.9	1.9		38.3	6.4	
Delay (s)		62.8			15.1		340.4	12.0		50.3	18.8	
Level of Service		E			B		F	B		D	B	
Approach Delay (s)		62.8			15.1			55.1			21.5	
Approach LOS		E			B			E			C	

Intersection Summary

HCM Average Control Delay	38.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	109.4%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

12: Bancroft Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗	↰	↑↘		↰	↑↑			↑↑↘	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor			1.00	1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes			0.94	1.00	0.96		1.00	1.00			0.97	
Flpb, ped/bikes			1.00	0.96	1.00		0.92	1.00			1.00	
Frt			0.86	1.00	0.88		1.00	1.00			0.99	
Flt Protected			1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)			1479	1651	1530		1578	3446			3306	
Flt Permitted			1.00	0.95	1.00		0.18	1.00			1.00	
Satd. Flow (perm)			1479	1651	1530		300	3446			3306	
Volume (vph)	0	0	61	204	99	486	28	1136	0	0	906	66
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	61	204	99	486	28	1136	0	0	906	66
RTOR Reduction (vph)	0	0	4	0	17	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	57	204	568	0	28	1136	0	0	962	0
Confl. Peds. (#/hr)			56	56			40	329				329
Confl. Bikes (#/hr)			9				5					60
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			24.0	24.0	24.0		23.0	23.0			23.0	
Effective Green, g (s)			25.0	25.0	25.0		24.0	24.0			24.0	
Actuated g/C Ratio			0.45	0.45	0.45		0.44	0.44			0.44	
Clearance Time (s)			4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)			672	750	695		131	1504			1443	
v/s Ratio Prot					c0.37			c0.33			0.29	
v/s Ratio Perm			0.04	0.12			0.09					
v/c Ratio			0.09	0.27	0.82		0.21	0.76			0.67	
Uniform Delay, d1			8.5	9.3	13.0		9.6	13.0			12.3	
Progression Factor			1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2			0.2	0.9	10.3		3.7	3.6			2.5	
Delay (s)			8.8	10.2	23.3		13.3	16.6			14.8	
Level of Service			A	B	C		B	B			B	
Approach Delay (s)		8.8			19.9			16.5			14.8	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

13: Durant Avenue & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↱					↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95					1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99					1.00	0.97		1.00	0.98	
Flpb, ped/bikes		1.00					0.89	1.00		1.00	1.00	
Frt		0.97					1.00	0.98		1.00	0.99	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3262					1529	3293		1723	3361	
Flt Permitted		0.99					0.30	1.00		0.11	1.00	
Satd. Flow (perm)		3262					476	3293		196	3361	
Volume (vph)	94	151	64	0	0	0	61	1077	155	168	929	40
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	94	151	64	0	0	0	61	1077	155	168	929	40
RTOR Reduction (vph)	0	26	0	0	0	0	0	12	0	0	4	0
Lane Group Flow (vph)	0	283	0	0	0	0	61	1220	0	168	965	0
Confl. Peds. (#/hr)	21		20				212		156	156		212
Confl. Bikes (#/hr)			4						27			27
Turn Type	Split						Perm			pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		22.0					44.2	44.2		60.0	60.0	
Effective Green, g (s)		23.0					45.2	45.2		61.0	61.0	
Actuated g/C Ratio		0.26					0.50	0.50		0.68	0.68	
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		834					239	1654		350	2278	
v/s Ratio Prot		c0.09						c0.37		c0.07	0.29	
v/s Ratio Perm							0.13			0.26		
v/c Ratio		0.34					0.26	0.74		0.48	0.42	
Uniform Delay, d1		27.3					12.8	17.7		11.1	6.6	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1					2.6	3.0		4.7	0.6	
Delay (s)		28.4					15.4	20.7		15.8	7.1	
Level of Service		C					B	C		B	A	
Approach Delay (s)		28.4			0.0			20.4			8.4	
Approach LOS		C			A			C			A	

Intersection Summary

HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

14: Haste Street & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔↑↳		↱	↑↑			↑↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0		3.0	3.0			3.0	
Lane Util. Factor					0.95		1.00	0.95			0.95	
Frpb, ped/bikes					1.00		1.00	1.00			0.99	
Flpb, ped/bikes					1.00		0.98	1.00			1.00	
Frt					0.98		1.00	1.00			0.99	
Flt Protected					0.99		0.95	1.00			1.00	
Satd. Flow (prot)					3346		1688	3446			3371	
Flt Permitted					0.99		0.16	1.00			1.00	
Satd. Flow (perm)					3346		289	3446			3371	
Volume (vph)	0	0	0	244	916	148	161	1109	0	0	987	82
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	244	916	148	161	1109	0	0	987	82
RTOR Reduction (vph)	0	0	0	0	18	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	0	1290	0	161	1109	0	0	1058	0
Confl. Peds. (#/hr)				7		12	157					157
Confl. Bikes (#/hr)						11						25
Turn Type				Split			Perm					
Protected Phases				8	8			2			6	
Permitted Phases							2					
Actuated Green, G (s)					22.0		25.0	25.0			25.0	
Effective Green, g (s)					23.0		26.0	26.0			26.0	
Actuated g/C Ratio					0.42		0.47	0.47			0.47	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1399		137	1629			1594	
v/s Ratio Prot					c0.39			0.32			0.31	
v/s Ratio Perm							c0.56					
v/c Ratio					0.92		1.18	0.68			0.66	
Uniform Delay, d1					15.2		14.5	11.3			11.1	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					11.5		131.6	2.3			2.2	
Delay (s)					26.6		146.1	13.6			13.3	
Level of Service					C		F	B			B	
Approach Delay (s)		0.0			26.6			30.4			13.3	
Approach LOS		A			C			C			B	

Intersection Summary

HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

15: Dwight Way & Shattuck Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�tↄ						↑↑ↄ		↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0						3.0		3.0	3.0	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		0.99						0.97		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.96						0.97		1.00	1.00	
Flt Protected		1.00						1.00		0.95	1.00	
Satd. Flow (prot)		3275						3243		1723	3446	
Flt Permitted		1.00						1.00		0.13	1.00	
Satd. Flow (perm)		3275						3243		238	3446	
Volume (vph)	42	823	283	0	0	0	0	1273	315	138	1173	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	42	823	283	0	0	0	0	1273	315	138	1173	0
RTOR Reduction (vph)	0	42	0	0	0	0	0	33	0	0	0	0
Lane Group Flow (vph)	0	1106	0	0	0	0	0	1555	0	138	1173	0
Confl. Peds. (#/hr)	34		36						152	152		
Confl. Bikes (#/hr)			5						18			
Turn Type	Split									pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases										6		
Actuated Green, G (s)		22.0						26.5		35.0	35.0	
Effective Green, g (s)		23.0						27.5		36.0	36.0	
Actuated g/C Ratio		0.35						0.42		0.55	0.55	
Clearance Time (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		1159						1372		257	1909	
v/s Ratio Prot		c0.34						c0.48		0.05	c0.34	
v/s Ratio Perm										0.25		
v/c Ratio		0.95						1.13		0.54	0.61	
Uniform Delay, d1		20.5						18.8		29.6	9.8	
Progression Factor		1.00						1.00		1.00	1.00	
Incremental Delay, d2		17.5						69.5		7.8	1.5	
Delay (s)		38.0						88.2		37.4	11.3	
Level of Service		D						F		D	B	
Approach Delay (s)		38.0			0.0			88.2			14.0	
Approach LOS		D			A			F			B	

Intersection Summary

HCM Average Control Delay	50.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

16: Hearst Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↑		↱	↓↑↱		↱	↑↑	↱		↓↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor	1.00	0.95		0.91	0.91		1.00	0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.91		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00		0.99	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1723	3357		1568	3149		1702	3446	1405		3340	
Flt Permitted	0.95	1.00		0.95	1.00		0.22	1.00	1.00		0.53	
Satd. Flow (perm)	1723	3357		1568	3149		402	3446	1405		1803	
Volume (vph)	26	661	69	676	882	178	91	868	538	146	567	41
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	661	69	676	882	178	91	868	538	146	567	41
RTOR Reduction (vph)	0	7	0	0	13	0	0	0	0	0	4	0
Lane Group Flow (vph)	26	723	0	572	1151	0	91	868	538	0	750	0
Confl. Peds. (#/hr)	63		55	55		63	36		207	207		36
Confl. Bikes (#/hr)			36			37			79			16
Turn Type	Split			Split			Perm		Free	Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		Free	6		
Actuated Green, G (s)	22.0	22.0		35.0	35.0		41.0	41.0	110.0		41.0	
Effective Green, g (s)	23.0	23.0		36.0	36.0		42.0	42.0	110.0		42.0	
Actuated g/C Ratio	0.21	0.21		0.33	0.33		0.38	0.38	1.00		0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	360	702		513	1031		153	1316	1405		688	
v/s Ratio Prot	0.02	c0.22		0.36	c0.37			0.25				
v/s Ratio Perm							0.23		0.38		c0.42	
v/c Ratio	0.07	1.03		1.12	1.12		0.59	0.66	0.38		1.26dl	
Uniform Delay, d1	34.9	43.5		37.0	37.0		27.2	28.1	0.0		34.0	
Progression Factor	0.99	0.95		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	19.0		75.2	65.8		15.9	2.6	0.8		61.6	
Delay (s)	34.5	60.2		112.2	102.8		43.1	30.7	0.8		95.6	
Level of Service	C	E		F	F		D	C	A		F	
Approach Delay (s)		59.3			105.9			20.7			95.6	
Approach LOS		E			F			C			F	

Intersection Summary

HCM Average Control Delay	69.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	115.9%	ICU Level of Service	H
Analysis Period (min)	15		

dl   Defacto Left Lane. Recode with 1 though lane as a left lane.

c   Critical Lane Group

17: University Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.72		0.88		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.90	0.92	1.00		1.00		1.00	1.00		0.93	1.00	
Frt	1.00	1.00	0.85		0.88		1.00	1.00		1.00	0.97	
Flt Protected	0.95	0.96	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1475	1512	1109		1409		1723	3443		1609	3214	
Flt Permitted	0.71	0.71	1.00		0.99		0.09	1.00		0.25	1.00	
Satd. Flow (perm)	1105	1118	1109		1397		163	3443		431	3214	
Volume (vph)	671	56	73	3	9	74	75	991	2	47	1093	321
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	671	56	73	3	9	74	75	991	2	47	1093	321
RTOR Reduction (vph)	0	0	45	0	30	0	0	0	0	0	30	0
Lane Group Flow (vph)	336	391	28	0	56	0	75	993	0	47	1384	0
Confl. Peds. (#/hr)	96		203	203		96	102		145	145		102
Confl. Bikes (#/hr)			72			17			60			46
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.0	33.0	33.0		33.0		49.0	49.0		40.5	40.5	
Effective Green, g (s)	34.0	34.0	34.0		34.0		50.0	50.0		41.5	41.5	
Actuated g/C Ratio	0.38	0.38	0.38		0.38		0.56	0.56		0.46	0.46	
Clearance Time (s)	4.0	4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	417	422	419		528		186	1913		199	1482	
v/s Ratio Prot							0.02	c0.29			c0.43	
v/s Ratio Perm	0.30	c0.35	0.02		0.04		0.20			0.11		
v/c Ratio	0.81	0.93	0.07		0.11		0.40	0.52		0.24	0.93	
Uniform Delay, d1	25.0	26.8	17.9		18.1		16.6	12.5		14.7	22.9	
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.2	28.8	0.3		0.4		6.4	1.0		2.8	12.2	
Delay (s)	40.3	55.6	18.2		18.5		22.9	13.5		17.4	35.1	
Level of Service	D	E	B		B		C	B		B	D	
Approach Delay (s)		45.7			18.5			14.2			34.5	
Approach LOS		D			B			B			C	

Intersection Summary

HCM Average Control Delay	30.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

18: Center Street & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.91			0.99		1.00	1.00		1.00	0.94	
Flpb, ped/bikes		0.98			0.99		0.97	1.00		0.90	1.00	
Frt		0.93			0.99		1.00	1.00		1.00	0.96	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1471			1728		1669	3430		1556	3116	
Flt Permitted		0.85			0.88		0.16	1.00		0.28	1.00	
Satd. Flow (perm)		1276			1536		282	3430		456	3116	
Volume (vph)	221	26	272	18	37	6	261	844	7	5	921	285
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	221	26	272	18	37	6	261	844	7	5	921	285
RTOR Reduction (vph)	0	45	0	0	4	0	0	1	0	0	42	0
Lane Group Flow (vph)	0	474	0	0	57	0	261	850	0	5	1164	0
Confl. Peds. (#/hr)	46		158	158		46	148		234	234		148
Confl. Bikes (#/hr)			37			14			89			28
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		40.0	40.0		40.0	40.0	
Effective Green, g (s)		23.0			23.0		41.0	41.0		41.0	41.0	
Actuated g/C Ratio		0.33			0.33		0.59	0.59		0.59	0.59	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		419			505		165	2009		267	1825	
v/s Ratio Prot								0.25			0.37	
v/s Ratio Perm		c0.37			0.04		c0.93			0.01		
v/c Ratio		1.13			0.11		1.58	0.42		0.02	0.64	
Uniform Delay, d1		23.5			16.4		14.5	8.0		6.1	9.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		84.9			0.5		288.7	0.7		0.1	1.7	
Delay (s)		108.4			16.8		303.2	8.6		6.2	11.3	
Level of Service		F			B		F	A		A	B	
Approach Delay (s)		108.4			16.8			77.8			11.3	
Approach LOS		F			B			E			B	

Intersection Summary

HCM Average Control Delay	54.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.42		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

19: Allston Way & Oxford Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘			↰↑	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	0.98			1.00	0.98	
Flt Protected	0.96			1.00	1.00	
Satd. Flow (prot)	1700			3429	3383	
Flt Permitted	0.96			0.56	1.00	
Satd. Flow (perm)	1700			1942	3383	
Volume (vph)	270	59	134	1203	1355	190
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	270	59	134	1203	1355	190
RTOR Reduction (vph)	12	0	0	0	17	0
Lane Group Flow (vph)	317	0	0	1337	1528	0
Turn Type			Perm			
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	22.0			35.0	35.0	
Effective Green, g (s)	23.0			36.0	36.0	
Actuated g/C Ratio	0.35			0.55	0.55	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	602			1076	1874	
v/s Ratio Prot	c0.19				0.45	
v/s Ratio Perm				c0.69		
v/c Ratio	0.53			1.24	0.82	
Uniform Delay, d1	16.7			14.5	11.8	
Progression Factor	1.07			1.00	1.00	
Incremental Delay, d2	1.7			117.1	4.0	
Delay (s)	19.7			131.6	15.8	
Level of Service	B			F	B	
Approach Delay (s)	19.7			131.6	15.8	
Approach LOS	B			F	B	

Intersection Summary

HCM Average Control Delay	64.4		HCM Level of Service	E
HCM Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	65.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	111.9%		ICU Level of Service	H
Analysis Period (min)	15			

c   Critical Lane Group

20: Bancroft Way & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↲↑	↗	↰	↑			↑↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor					0.95	1.00	1.00	1.00			0.91	
Frpb, ped/bikes					1.00	0.93	1.00	1.00			0.99	
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	
Frt					1.00	0.85	1.00	1.00			0.99	
Flt Protected					0.98	1.00	0.95	1.00			1.00	
Satd. Flow (prot)					3388	1431	1702	1814			4835	
Flt Permitted					0.98	1.00	0.11	1.00			1.00	
Satd. Flow (perm)					3388	1431	199	1814			4835	
Volume (vph)	0	0	0	353	669	1174	18	206	0	0	1392	106
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	353	669	1174	18	206	0	0	1392	106
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	0	1022	1174	18	206	0	0	1487	0
Confl. Peds. (#/hr)				177		150	140					140
Confl. Bikes (#/hr)						75						62
Turn Type				Split		Free	Perm					
Protected Phases				8	8			2			6	
Permitted Phases						Free	2					
Actuated Green, G (s)					37.0	80.0	35.0	35.0			35.0	
Effective Green, g (s)					38.0	80.0	36.0	36.0			36.0	
Actuated g/C Ratio					0.48	1.00	0.45	0.45			0.45	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1609	1431	90	816			2176	
v/s Ratio Prot					0.30			0.11			0.31	
v/s Ratio Perm						c0.82	0.09					
v/c Ratio					0.64	0.82	0.20	0.25			0.68	
Uniform Delay, d1					15.8	0.0	13.3	13.7			17.5	
Progression Factor					1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2					1.9	5.4	4.9	0.7			1.8	
Delay (s)					17.7	5.4	18.2	14.4			19.2	
Level of Service					B	A	B	B			B	
Approach Delay (s)		0.0			11.1			14.7			19.2	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

21: Durant Avenue & Fulton Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱								↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0								3.0	3.0	
Lane Util. Factor	1.00	0.95								1.00	0.95	
Frpb, ped/bikes	1.00	0.99								1.00	1.00	
Flpb, ped/bikes	0.88	1.00								0.93	1.00	
Frt	1.00	0.98								1.00	1.00	
Flt Protected	0.95	1.00								0.95	1.00	
Satd. Flow (prot)	1524	3326								1605	3446	
Flt Permitted	0.95	1.00								0.95	1.00	
Satd. Flow (perm)	1524	3326								1605	3446	
Volume (vph)	221	216	37	0	0	0	0	0	0	572	1180	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	221	216	37	0	0	0	0	0	0	572	1180	0
RTOR Reduction (vph)	0	22	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	221	231	0	0	0	0	0	0	0	572	1180	0
Confl. Peds. (#/hr)	154		92							91		
Confl. Bikes (#/hr)			24									
Turn Type	Perm									Perm		
Protected Phases		4									6	
Permitted Phases	4									6		
Actuated Green, G (s)	22.0	22.0								25.0	25.0	
Effective Green, g (s)	23.0	23.0								26.0	26.0	
Actuated g/C Ratio	0.42	0.42								0.47	0.47	
Clearance Time (s)	4.0	4.0								4.0	4.0	
Lane Grp Cap (vph)	637	1391								759	1629	
v/s Ratio Prot		0.07									0.34	
v/s Ratio Perm	c0.15									c0.36		
v/c Ratio	0.35	0.17								0.75	0.72	
Uniform Delay, d1	10.9	10.0								11.9	11.6	
Progression Factor	1.00	1.00								1.00	1.00	
Incremental Delay, d2	1.5	0.3								6.8	2.8	
Delay (s)	12.4	10.3								18.7	14.5	
Level of Service	B	B								B	B	
Approach Delay (s)		11.3			0.0			0.0			15.9	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

SYNCHRO FILES – YEAR 2030 WITH PROJECT AM PEAK HOUR LEVEL OF SERVICE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱			↰↑↑↱			↰↑↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.89		0.99			0.99			1.00	
Flpb, ped/bikes		1.00	1.00		0.98			1.00			1.00	
Frt		1.00	0.85		0.99			0.98			1.00	
Flt Protected		0.99	1.00		0.97			1.00			1.00	
Satd. Flow (prot)		1798	1367		1689			3353			3439	
Flt Permitted		0.93	1.00		0.48			0.94			0.93	
Satd. Flow (perm)		1674	1367		836			3150			3210	
Volume (vph)	40	344	173	342	137	35	6	736	98	24	1250	4
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	344	173	342	137	35	6	736	98	24	1250	4
RTOR Reduction (vph)	0	0	7	0	5	0	0	19	0	0	1	0
Lane Group Flow (vph)	0	384	166	0	509	0	0	821	0	0	1277	0
Confl. Peds. (#/hr)	118		81	81		118	49		34	34		49
Confl. Bikes (#/hr)			99			51			22			25
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		25.0	25.0		25.0			22.0			22.0	
Effective Green, g (s)		26.0	26.0		26.0			23.0			23.0	
Actuated g/C Ratio		0.47	0.47		0.47			0.42			0.42	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		791	646		395			1317			1342	
v/s Ratio Prot												
v/s Ratio Perm		0.23	0.12		c0.61			0.26			c0.40	
v/c Ratio		0.49	0.26		1.29			0.62			0.95	
Uniform Delay, d1		9.9	8.7		14.5			12.6			15.5	
Progression Factor		1.00	1.00		1.25			1.00			1.00	
Incremental Delay, d2		2.1	1.0		148.0			2.2			15.5	
Delay (s)		12.1	9.7		166.0			14.8			30.9	
Level of Service		B	A		F			B			C	
Approach Delay (s)		11.3			166.0			14.8			30.9	
Approach LOS		B			F			B			C	

Intersection Summary

HCM Average Control Delay	45.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.13			
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	113.5%	ICU Level of Service	H	
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↑	↗	↱	↑↱		↱	↑↱		↱	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.80	1.00	0.99		1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.96	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1723	3446	1232	1723	3382		1723	3229		1654	3411	
Flt Permitted	0.11	1.00	1.00	0.11	1.00		0.08	1.00		0.28	1.00	
Satd. Flow (perm)	191	3446	1232	191	3382		151	3229		486	3411	
Volume (vph)	66	1154	138	81	1174	76	217	770	186	160	1564	81
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	66	1154	138	81	1174	76	217	770	186	160	1564	81
RTOR Reduction (vph)	0	0	86	0	5	0	0	3	0	0	4	0
Lane Group Flow (vph)	66	1154	52	81	1245	0	217	953	0	160	1641	0
Confl. Peds. (#/hr)	96		106	106		96	22		119	119		22
Confl. Bikes (#/hr)			107			36			25			35
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	37.0	37.0	37.0	37.0	37.0		55.0	55.0		44.0	44.0	
Effective Green, g (s)	38.0	38.0	38.0	38.0	38.0		56.0	56.0		45.0	45.0	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38		0.56	0.56		0.45	0.45	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	73	1309	468	73	1285		210	1808		219	1535	
v/s Ratio Prot		0.33			0.37		c0.08	0.30			0.48	
v/s Ratio Perm	0.35		0.04	c0.42			c0.49			0.33		
v/c Ratio	0.90	0.88	0.11	1.11	0.97		1.03	0.53		0.73	1.07	
Uniform Delay, d1	29.3	28.9	20.1	31.0	30.4		48.2	13.7		22.5	27.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	80.9	8.8	0.5	138.3	18.7		71.1	1.1		19.2	44.0	
Delay (s)	110.2	37.7	20.6	169.3	49.1		119.3	14.8		41.8	71.5	
Level of Service	F	D	C	F	D		F	B		D	E	
Approach Delay (s)		39.5			56.4			34.2			68.8	
Approach LOS		D			E			C			E	

Intersection Summary

HCM Average Control Delay	51.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.06			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	112.8%	ICU Level of Service	H	
Analysis Period (min)	15			

c   Critical Lane Group

IBI Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑ʲ			↰↑↑
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	0.98			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.98			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1723	1542	3328			3413
Flt Permitted	0.95	1.00	1.00			0.59
Satd. Flow (perm)	1723	1542	3328			2011
Volume (vph)	77	130	1025	123	226	1493
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	77	130	1025	123	226	1493
RTOR Reduction (vph)	0	110	6	0	0	0
Lane Group Flow (vph)	77	20	1142	0	0	1719
Confl. Peds. (#/hr)	27	44		77	77	
Confl. Bikes (#/hr)		28		34		
Turn Type		Prot			Perm	
Protected Phases	8	8	2			6
Permitted Phases					6	
Actuated Green, G (s)	22.0	22.0	120.0			120.0
Effective Green, g (s)	23.0	23.0	121.0			121.0
Actuated g/C Ratio	0.15	0.15	0.81			0.81
Clearance Time (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	264	236	2685			1622
v/s Ratio Prot	c0.04	0.01	0.34			
v/s Ratio Perm						c0.85
v/c Ratio	0.29	0.08	0.43			1.06
Uniform Delay, d1	56.3	54.5	4.3			14.5
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	2.8	0.7	0.5			40.1
Delay (s)	59.1	55.2	4.8			54.6
Level of Service	E	E	A			D
Approach Delay (s)	56.6		4.8			54.6
Approach LOS	E		A			D

Intersection Summary

HCM Average Control Delay	36.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	111.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱	↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.93		1.00	0.91	1.00	0.98		1.00	0.99	
Flpb, ped/bikes		0.98	1.00		0.99	1.00	0.99	1.00		0.99	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.98	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1734	1441		1763	1395	1713	3296		1700	3379	
Flt Permitted		0.70	1.00		0.68	1.00	0.10	1.00		0.18	1.00	
Satd. Flow (perm)		1250	1441		1213	1395	176	3296		328	3379	
Volume (vph)	143	177	160	83	129	134	125	934	192	149	1416	108
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	143	177	160	83	129	134	125	934	192	149	1416	108
RTOR Reduction (vph)	0	0	21	0	0	58	0	24	0	0	8	0
Lane Group Flow (vph)	0	320	139	0	212	76	125	1102	0	149	1516	0
Confl. Peds. (#/hr)	76		44	44		76	55		89	89		55
Confl. Bikes (#/hr)			19			20			41			34
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		22.0	22.0		22.0	22.0	40.0	40.0		40.0	40.0	
Effective Green, g (s)		23.0	23.0		23.0	23.0	41.0	41.0		41.0	41.0	
Actuated g/C Ratio		0.33	0.33		0.33	0.33	0.59	0.59		0.59	0.59	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		411	473		399	458	103	1931		192	1979	
v/s Ratio Prot								0.33			0.45	
v/s Ratio Perm		c0.26	0.10		0.17	0.05	c0.71			0.45		
v/c Ratio		0.78	0.29		0.53	0.17	1.21	0.57		0.78	0.77	
Uniform Delay, d1		21.2	17.5		19.1	16.7	14.5	9.0		11.0	10.9	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		13.6	1.6		5.0	0.8	156.9	1.2		25.9	2.9	
Delay (s)		34.8	19.0		24.1	17.5	171.4	10.3		36.9	13.8	
Level of Service		C	B		C	B	F	B		D	B	
Approach Delay (s)		29.5			21.5			26.4			15.9	
Approach LOS		C			C			C			B	

Intersection Summary

HCM Average Control Delay	21.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.06			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	101.1%	ICU Level of Service	G	
Analysis Period (min)	15			

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�			�		↹	↱			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	
Frpb, ped/bikes		0.98			1.00		1.00	0.99			1.00	
Flpb, ped/bikes		1.00			1.00		0.99	1.00			1.00	
Frt		0.96			1.00		1.00	0.95			0.98	
Flt Protected		1.00			0.99		0.95	1.00			1.00	
Satd. Flow (prot)		3225			3398		1709	1706			1765	
Flt Permitted		0.92			0.55		0.48	1.00			0.99	
Satd. Flow (perm)		2974			1871		869	1706			1754	
Volume (vph)	23	1036	419	149	1157	42	110	84	37	10	250	47
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	1036	419	149	1157	42	110	84	37	10	250	47
RTOR Reduction (vph)	0	70	0	0	4	0	0	23	0	0	11	0
Lane Group Flow (vph)	0	1408	0	0	1344	0	110	98	0	0	296	0
Confl. Peds. (#/hr)	67		42	42		67	18		42	42		18
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		30.0			30.0		22.0	22.0			22.0	
Effective Green, g (s)		31.0			31.0		23.0	23.0			23.0	
Actuated g/C Ratio		0.52			0.52		0.38	0.38			0.38	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1537			967		333	654			672	
v/s Ratio Prot								0.06				
v/s Ratio Perm		0.47			c0.72		0.13				c0.17	
v/c Ratio		0.92			1.39		0.33	0.15			0.44	
Uniform Delay, d1		13.3			14.5		13.1	12.1			13.7	
Progression Factor		1.00			1.11		1.00	1.00			1.00	
Incremental Delay, d2		10.1			180.5		2.6	0.5			2.1	
Delay (s)		23.4			196.5		15.7	12.6			15.8	
Level of Service		C			F		B	B			B	
Approach Delay (s)		23.4			196.5			14.1			15.8	
Approach LOS		C			F			B			B	

Intersection Summary

HCM Average Control Delay	91.4	HCM Level of Service		F
HCM Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)		6.0
Intersection Capacity Utilization	133.7%	ICU Level of Service		H
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�↓	↱		⊕			⊕			⊕	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.64		0.94			0.91			0.99	
Flpb, ped/bikes		0.99	1.00		0.91			1.00			0.97	
Frt		1.00	0.85		0.96			0.97			0.99	
Flt Protected		0.99	1.00		0.98			1.00			0.99	
Satd. Flow (prot)		1779	987		1466			1591			1719	
Flt Permitted		0.98	1.00		0.90			0.92			0.92	
Satd. Flow (perm)		1744	987		1341			1473			1591	
Volume (vph)	13	113	63	43	51	38	26	178	56	109	666	35
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	113	63	43	51	38	26	178	56	109	666	35
RTOR Reduction (vph)	0	0	27	0	22	0	0	18	0	0	3	0
Lane Group Flow (vph)	0	126	36	0	110	0	0	242	0	0	807	0
Confl. Peds. (#/hr)	138		269	269		138	211		311	311		211
Confl. Bikes (#/hr)			17			20			23			18
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	22.0		22.0			25.0			25.0	
Effective Green, g (s)		23.0	23.0		23.0			26.0			26.0	
Actuated g/C Ratio		0.42	0.42		0.42			0.47			0.47	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		729	413		561			696			752	
v/s Ratio Prot												
v/s Ratio Perm		0.07	0.04		c0.08			0.16			c0.51	
v/c Ratio		0.17	0.09		0.20			0.35			1.07	
Uniform Delay, d1		10.0	9.7		10.1			9.1			14.5	
Progression Factor		1.00	1.00		0.87			0.88			1.00	
Incremental Delay, d2		0.5	0.4		0.7			1.3			54.2	
Delay (s)		10.5	10.1		9.6			9.3			68.7	
Level of Service		B	B		A			A			E	
Approach Delay (s)		10.4			9.6			9.3			68.7	
Approach LOS		B			A			A			E	

Intersection Summary

HCM Average Control Delay	44.0		HCM Level of Service	D
HCM Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	55.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	91.4%		ICU Level of Service	F
Analysis Period (min)	15			

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		✛			✛			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.39		0.90			0.87			0.98	
Flpb, ped/bikes		0.95	1.00		0.92			0.99			0.93	
Frt		1.00	0.85		0.95			0.97			0.97	
Flt Protected		0.99	1.00		0.99			0.99			0.99	
Satd. Flow (prot)		1707	607		1425			1496			1585	
Flt Permitted		0.90	1.00		0.89			0.84			0.89	
Satd. Flow (perm)		1549	607		1290			1263			1425	
Volume (vph)	83	252	128	35	64	56	50	136	60	151	454	158
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	83	252	128	35	64	56	50	136	60	151	454	158
RTOR Reduction (vph)	0	0	74	0	15	0	0	1	0	0	17	0
Lane Group Flow (vph)	0	335	54	0	140	0	0	245	0	0	746	0
Confl. Peds. (#/hr)	199		792	792		199	144		560	560		144
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	22.0		22.0			25.0			25.0	
Effective Green, g (s)		23.0	23.0		23.0			26.0			26.0	
Actuated g/C Ratio		0.42	0.42		0.42			0.47			0.47	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		648	254		539			597			674	
v/s Ratio Prot												
v/s Ratio Perm		c0.22	0.09		0.11			0.19			c0.52	
v/c Ratio		0.52	0.21		0.26			0.41			1.11	
Uniform Delay, d1		11.9	10.2		10.4			9.5			14.5	
Progression Factor		1.00	1.00		1.00			1.00			0.71	
Incremental Delay, d2		2.9	1.9		1.2			2.1			55.9	
Delay (s)		14.8	12.1		11.6			11.6			66.2	
Level of Service		B	B		B			B			E	
Approach Delay (s)		14.1			11.6			11.6			66.2	
Approach LOS		B			B			B			E	

Intersection Summary

HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�lↄ			�ↄ		↰	↑ↄ		↰	↑ↄ	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.96		1.00	0.98		1.00	0.99	
Flpb, ped/bikes		1.00			0.99		0.96	1.00		0.96	1.00	
Frt		0.99			0.96		1.00	0.97		1.00	0.99	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3373			3121		1656	3292		1650	3360	
Flt Permitted		0.93			0.80		0.27	1.00		0.54	1.00	
Satd. Flow (perm)		3132			2520		467	3292		942	3360	
Volume (vph)	14	393	23	140	457	218	9	276	65	322	748	58
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	393	23	140	457	218	9	276	65	322	748	58
RTOR Reduction (vph)	0	8	0	0	67	0	0	34	0	0	11	0
Lane Group Flow (vph)	0	422	0	0	748	0	9	307	0	322	795	0
Confl. Peds. (#/hr)	133		190	190		133	110		91	91		110
Confl. Bikes (#/hr)			118			54			20			63
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		25.0	25.0		25.0	25.0	
Effective Green, g (s)		23.0			23.0		26.0	26.0		26.0	26.0	
Actuated g/C Ratio		0.42			0.42		0.47	0.47		0.47	0.47	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1310			1054		221	1556		445	1588	
v/s Ratio Prot								0.09			0.24	
v/s Ratio Perm		0.13			c0.30		0.02			c0.34		
v/c Ratio		0.32			0.71		0.04	0.20		0.72	0.50	
Uniform Delay, d1		10.8			13.2		7.8	8.4		11.6	10.0	
Progression Factor		0.95			0.74		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			1.7		0.3	0.3		9.8	1.1	
Delay (s)		10.9			11.6		8.1	8.7		21.4	11.1	
Level of Service		B			B		A	A		C	B	
Approach Delay (s)		10.9			11.6			8.7			14.1	
Approach LOS		B			B			A			B	

Intersection Summary

HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.87			1.00	0.85	1.00	1.00		1.00	1.00	0.82
Flpb, ped/bikes	0.92	1.00			1.00	1.00	1.00	1.00		0.96	1.00	1.00
Frt	1.00	0.94			1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1593	2812			3424	1304	1723	1758		1649	1814	1265
Flt Permitted	0.55	1.00			0.89	1.00	0.46	1.00		0.49	1.00	1.00
Satd. Flow (perm)	927	2812			3073	1304	842	1758		844	1814	1265
Volume (vph)	239	560	365	18	285	52	419	273	70	32	368	527
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	239	560	365	18	285	52	419	273	70	32	368	527
RTOR Reduction (vph)	0	103	0	0	0	32	0	5	0	0	0	72
Lane Group Flow (vph)	239	822	0	0	303	20	419	338	0	32	368	455
Confl. Peds. (#/hr)	142		350	350		142				92		179
Confl. Bikes (#/hr)			143			61						73
Turn Type	Perm			Perm		Perm	Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	22.0	22.0			22.0	22.0	30.0	30.0		30.0	30.0	30.0
Effective Green, g (s)	23.0	23.0			23.0	23.0	31.0	31.0		31.0	31.0	31.0
Actuated g/C Ratio	0.38	0.38			0.38	0.38	0.52	0.52		0.52	0.52	0.52
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	355	1078			1178	500	435	908		436	937	654
v/s Ratio Prot		c0.29						0.19			0.20	
v/s Ratio Perm	0.26				0.10	0.02	c0.50			0.04		0.36
v/c Ratio	0.67	0.76			0.26	0.04	0.96	0.37		0.07	0.39	0.70
Uniform Delay, d1	15.4	16.1			12.7	11.6	14.0	8.7		7.3	8.8	10.9
Progression Factor	1.70	1.87			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.3	2.8			0.5	0.1	34.9	1.2		0.3	1.2	6.0
Delay (s)	31.4	32.9			13.2	11.7	48.8	9.8		7.6	10.0	17.0
Level of Service	C	C			B	B	D	A		A	B	B
Approach Delay (s)		32.6			13.0			31.3			13.9	
Approach LOS		C			B			C			B	

Intersection Summary

HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	106.9%	ICU Level of Service	G
Analysis Period (min)	15		

c　Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⬧					↰	↑			↑	↱
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0			3.0	3.0
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.66					1.00	1.00			1.00	0.57
Flpb, ped/bikes		0.89					0.89	1.00			1.00	1.00
Frt		0.91					1.00	1.00			1.00	0.85
Flt Protected		0.98					0.95	1.00			1.00	1.00
Satd. Flow (prot)		952					1535	1814			1814	880
Flt Permitted		0.98					0.19	1.00			1.00	1.00
Satd. Flow (perm)		952					307	1814			1814	880
Volume (vph)	73	0	161	0	0	0	74	669	0	0	665	49
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	73	0	161	0	0	0	74	669	0	0	665	49
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	0	26
Lane Group Flow (vph)	0	221	0	0	0	0	74	669	0	0	665	23
Confl. Peds. (#/hr)	668		334	334		668	323		314	314		323
Confl. Bikes (#/hr)			134									29
Turn Type	Perm						Perm					Perm
Protected Phases		4						2			6	
Permitted Phases	4						2					6
Actuated Green, G (s)		22.0					25.0	25.0			25.0	25.0
Effective Green, g (s)		23.0					26.0	26.0			26.0	26.0
Actuated g/C Ratio		0.42					0.47	0.47			0.47	0.47
Clearance Time (s)		4.0					4.0	4.0			4.0	4.0
Lane Grp Cap (vph)		398					145	858			858	416
v/s Ratio Prot								c0.37			0.37	
v/s Ratio Perm		0.23					0.24					0.03
v/c Ratio		0.55					0.51	0.78			0.78	0.06
Uniform Delay, d1		12.1					10.1	12.1			12.1	7.9
Progression Factor		0.96					1.00	1.00			1.00	1.00
Incremental Delay, d2		4.6					12.3	6.9			6.8	0.3
Delay (s)		16.3					22.3	19.0			18.8	8.1
Level of Service		B					C	B			B	A
Approach Delay (s)		16.3			0.0			19.4			18.1	
Approach LOS		B			A			B			B	

Intersection Summary

HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⊕			⊕		↰	↱		↰	↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.95			0.83		1.00	0.93		1.00	0.94	
Flpb, ped/bikes		0.96			1.00		1.00	1.00		0.87	1.00	
Frt		0.96			0.93		1.00	0.98		1.00	0.98	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1553			1393		1723	1656		1503	1669	
Flt Permitted		0.90			0.99		0.11	1.00		0.21	1.00	
Satd. Flow (perm)		1419			1378		202	1656		340	1669	
Volume (vph)	92	197	130	6	82	94	68	631	88	106	788	104
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	92	197	130	6	82	94	68	631	88	106	788	104
RTOR Reduction (vph)	0	12	0	0	12	0	0	8	0	0	7	0
Lane Group Flow (vph)	0	407	0	0	170	0	68	711	0	106	885	0
Confl. Peds. (#/hr)	197		176	176		197	424		508	508		424
Confl. Bikes (#/hr)			22			35			34			27
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		35.0	35.0		35.0	35.0	
Effective Green, g (s)		23.0			23.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio		0.35			0.35		0.55	0.55		0.55	0.55	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		502			488		112	917		188	924	
v/s Ratio Prot								0.43			c0.53	
v/s Ratio Perm		c0.29			0.12		0.34			0.31		
v/c Ratio		0.81			0.35		0.61	0.78		0.56	0.96	
Uniform Delay, d1		19.0			15.5		9.7	11.3		9.4	13.8	
Progression Factor		1.00			0.88		1.00	1.00		1.00	1.00	
Incremental Delay, d2		13.3			1.5		22.1	6.4		11.7	21.0	
Delay (s)		32.4			15.2		31.8	17.7		21.1	34.7	
Level of Service		C			B		C	B		C	C	
Approach Delay (s)		32.4			15.2			18.9			33.3	
Approach LOS		C			B			B			C	

Intersection Summary

HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	112.1%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗	↰	↱		↰	↑			↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor			1.00	1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes			0.98	1.00	0.98		1.00	1.00			1.00	
Flpb, ped/bikes			1.00	0.99	1.00		0.93	1.00			1.00	
Frt			0.86	1.00	0.92		1.00	1.00			1.00	
Flt Protected			1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)			1530	1704	1644		1608	1814			1801	
Flt Permitted			1.00	0.95	1.00		0.26	1.00			1.00	
Satd. Flow (perm)			1530	1704	1644		434	1814			1801	
Volume (vph)	0	0	62	306	124	140	35	651	0	0	574	11
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	62	306	124	140	35	651	0	0	574	11
RTOR Reduction (vph)	0	0	36	0	74	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	26	306	190	0	35	651	0	0	584	0
Confl. Peds. (#/hr)			15	15			22	161				161
Confl. Bikes (#/hr)			3				1					30
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			22.0	22.0	22.0		25.0	25.0			25.0	
Effective Green, g (s)			23.0	23.0	23.0		26.0	26.0			26.0	
Actuated g/C Ratio			0.42	0.42	0.42		0.47	0.47			0.47	
Clearance Time (s)			4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)			640	713	687		205	858			851	
v/s Ratio Prot					0.12			c0.36			0.32	
v/s Ratio Perm			0.02	c0.18			0.08					
v/c Ratio			0.04	0.43	0.28		0.17	0.76			0.69	
Uniform Delay, d1			9.5	11.3	10.5		8.3	11.9			11.3	
Progression Factor			1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2			0.1	1.9	1.0		1.8	6.2			4.5	
Delay (s)			9.6	13.2	11.5		10.1	18.2			15.8	
Level of Service			A	B	B		B	B			B	
Approach Delay (s)		9.6			12.4			17.8			15.8	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	15.3	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	69.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�440↑					↰	↟		↰	↟	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95					1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99					1.00	0.93		1.00	1.00	
Flpb, ped/bikes		1.00					0.92	1.00		1.00	1.00	
Frt		0.98					1.00	0.92		1.00	1.00	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3334					1581	1547		1723	1804	
Flt Permitted		0.99					0.29	1.00		0.07	1.00	
Satd. Flow (perm)		3334					480	1547		131	1804	
Volume (vph)	48	351	67	0	0	0	26	608	693	113	782	8
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	351	67	0	0	0	26	608	693	113	782	8
RTOR Reduction (vph)	0	15	0	0	0	0	0	45	0	0	0	0
Lane Group Flow (vph)	0	451	0	0	0	0	26	1256	0	113	790	0
Confl. Peds. (#/hr)	20		22				162		99	99		162
Confl. Bikes (#/hr)			5						21			25
Turn Type	Split						Perm			pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		22.0					51.5	51.5		60.0	60.0	
Effective Green, g (s)		23.0					52.5	52.5		61.0	61.0	
Actuated g/C Ratio		0.26					0.58	0.58		0.68	0.68	
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		852					280	902		186	1223	
v/s Ratio Prot		c0.14						c0.81		0.04	c0.44	
v/s Ratio Perm							0.05			0.38		
v/c Ratio		0.53					0.09	1.39		0.61	0.65	
Uniform Delay, d1		28.8					8.3	18.8		42.5	8.3	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.4					0.7	183.2		13.9	2.6	
Delay (s)		31.2					8.9	202.0		56.3	10.9	
Level of Service		C					A	F		E	B	
Approach Delay (s)		31.2			0.0			198.2			16.6	
Approach LOS		C			A			F			B	

Intersection Summary

HCM Average Control Delay	108.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	114.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					⬅↱		↰	↑↑			↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0		3.0	3.0			3.0	
Lane Util. Factor					0.95		1.00	0.95			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.97	
Flpb, ped/bikes					1.00		0.98	1.00			1.00	
Frt					0.97		1.00	1.00			0.97	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					3324		1688	3446			3249	
Flt Permitted					1.00		0.16	1.00			1.00	
Satd. Flow (perm)					3324		292	3446			3249	
Volume (vph)	0	0	0	34	404	95	85	1142	0	0	848	217
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	34	404	95	85	1142	0	0	848	217
RTOR Reduction (vph)	0	0	0	0	24	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	0	0	0	509	0	85	1142	0	0	1024	0
Confl. Peds. (#/hr)				15			20	154				154
Confl. Bikes (#/hr)						11						25
Turn Type				Split			Perm					
Protected Phases				8	8			2			6	
Permitted Phases							2					
Actuated Green, G (s)					22.0		25.0	25.0			25.0	
Effective Green, g (s)					23.0		26.0	26.0			26.0	
Actuated g/C Ratio					0.42		0.47	0.47			0.47	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1390		138	1629			1536	
v/s Ratio Prot					c0.15			c0.33			0.32	
v/s Ratio Perm							0.29					
v/c Ratio					0.37		0.62	0.70			0.67	
Uniform Delay, d1					11.0		10.8	11.4			11.2	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					0.7		18.9	2.5			2.3	
Delay (s)					11.7		29.6	14.0			13.5	
Level of Service					B		C	B			B	
Approach Delay (s)		0.0			11.7			15.1			13.5	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�440						↑↑0		↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0						3.0		3.0	3.0	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		1.00						0.99		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.96						0.98		1.00	1.00	
Flt Protected		0.99						1.00		0.95	1.00	
Satd. Flow (prot)		3287						3345		1721	3446	
Flt Permitted		0.99						1.00		0.14	1.00	
Satd. Flow (perm)		3287						3345		246	3446	
Volume (vph)	152	719	271	0	0	0	0	1042	176	51	897	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	152	719	271	0	0	0	0	1042	176	51	897	0
RTOR Reduction (vph)	0	45	0	0	0	0	0	21	0	0	0	0
Lane Group Flow (vph)	0	1097	0	0	0	0	0	1197	0	51	897	0
Confl. Peds. (#/hr)	7		6						37	152		
Confl. Bikes (#/hr)			2						19			
Turn Type	Split									pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases										6		
Actuated Green, G (s)		23.0						25.5		34.0	34.0	
Effective Green, g (s)		24.0						26.5		35.0	35.0	
Actuated g/C Ratio		0.37						0.41		0.54	0.54	
Clearance Time (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		1214						1364		257	1856	
v/s Ratio Prot		c0.33						c0.36		0.02	c0.26	
v/s Ratio Perm										0.09		
v/c Ratio		0.90						0.88		0.20	0.48	
Uniform Delay, d1		19.4						17.8		10.8	9.4	
Progression Factor		1.00						1.00		1.00	1.00	
Incremental Delay, d2		11.0						8.2		1.7	0.9	
Delay (s)		30.4						26.0		12.6	10.3	
Level of Service		C						C		B	B	
Approach Delay (s)		30.4			0.0			26.0			10.4	
Approach LOS		C			A			C			B	

Intersection Summary

HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor	1.00	1.00		0.91	0.91		1.00	0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.91		1.00	0.99		1.00	1.00	0.85		0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		0.97	
Frt	1.00	0.96		1.00	0.99		1.00	1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1723	1579		1568	3233		1723	3446	1310		3275	
Flt Permitted	0.95	1.00		0.95	1.00		0.09	1.00	1.00		0.88	
Satd. Flow (perm)	1723	1579		1568	3233		154	3446	1310		2901	
Volume (vph)	27	504	207	220	500	30	135	235	487	117	1073	67
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	27	504	207	220	500	30	135	235	487	117	1073	67
RTOR Reduction (vph)	0	14	0	0	4	0	0	0	0	0	3	0
Lane Group Flow (vph)	27	697	0	220	526	0	135	235	487	0	1254	0
Confl. Peds. (#/hr)	104		171	171		104	60		187	187		60
Confl. Bikes (#/hr)			97			62			115			92
Turn Type	Split			Split			Perm		Free	Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		Free	6		
Actuated Green, G (s)	30.0	30.0		22.0	22.0		46.0	46.0	110.0		46.0	
Effective Green, g (s)	31.0	31.0		23.0	23.0		47.0	47.0	110.0		47.0	
Actuated g/C Ratio	0.28	0.28		0.21	0.21		0.43	0.43	1.00		0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	486	445		328	676		66	1472	1310		1240	
v/s Ratio Prot	0.02	c0.44		0.14	c0.16			0.07				
v/s Ratio Perm							c0.87		0.37		0.43	
v/c Ratio	0.06	1.57		0.67	0.78		2.05	0.16	0.37		1.01	
Uniform Delay, d1	28.8	39.5		40.0	41.1		31.5	19.4	0.0		31.5	
Progression Factor	0.88	0.90		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	264.8		10.4	8.6		518.8	0.2	0.8		28.3	
Delay (s)	25.5	300.2		50.5	49.7		550.3	19.6	0.8		59.8	
Level of Service	C	F		D	D		F	B	A		E	
Approach Delay (s)		290.2			49.9			92.5			59.8	
Approach LOS		F			D			F			E	

Intersection Summary

HCM Average Control Delay	112.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	128.7%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	⊕			⊕		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.95	0.95			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93			1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00			0.98		1.00	1.00		0.91	1.00	
Frt	1.00	0.95			0.99		1.00	1.00		1.00	0.98	
Flt Protected	0.95	0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1484			1744		1723	3410		1565	3299	
Flt Permitted	0.42	0.50			0.72		0.10	1.00		0.50	1.00	
Satd. Flow (perm)	713	764			1268		179	3410		817	3299	
Volume (vph)	452	27	112	95	317	29	114	429	13	66	1309	194
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	452	27	112	95	317	29	114	429	13	66	1309	194
RTOR Reduction (vph)	0	18	0	0	3	0	0	2	0	0	13	0
Lane Group Flow (vph)	226	347	0	0	438	0	114	440	0	66	1490	0
Confl. Peds. (#/hr)	10		147	147		10	117		83	83		117
Confl. Bikes (#/hr)			79			13			41			80
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	37.0	37.0			37.0		45.0	45.0		36.5	36.5	
Effective Green, g (s)	38.0	38.0			38.0		46.0	46.0		37.5	37.5	
Actuated g/C Ratio	0.42	0.42			0.42		0.51	0.51		0.42	0.42	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	301	323			535		186	1743		340	1375	
v/s Ratio Prot							c0.04	0.13			c0.45	
v/s Ratio Perm	0.32	c0.45			0.35		0.28			0.08		
v/c Ratio	0.75	1.07			0.82		0.61	0.25		0.19	1.08	
Uniform Delay, d1	22.0	26.0			23.0		42.5	12.3		16.7	26.2	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.8	71.3			13.1		14.2	0.3		1.3	50.4	
Delay (s)	37.8	97.3			36.1		56.6	12.7		17.9	76.6	
Level of Service	D	F			D		E	B		B	E	
Approach Delay (s)		74.6			36.1			21.7			74.1	
Approach LOS		E			D			C			E	

Intersection Summary

HCM Average Control Delay	59.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					⊕		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0			3.0		3.0	3.0	
Lane Util. Factor					1.00			0.95		1.00	0.95	
Frpb, ped/bikes					0.97			0.98		1.00	1.00	
Flpb, ped/bikes					0.91			1.00		0.94	1.00	
Frt					0.96			0.99		1.00	1.00	
Flt Protected					0.96			1.00		0.95	1.00	
Satd. Flow (prot)					1491			3343		1616	3446	
Flt Permitted					0.96			1.00		0.36	1.00	
Satd. Flow (perm)					1491			3343		619	3446	
Volume (vph)	0	0	0	27	0	10	0	581	55	10	1326	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	27	0	10	0	581	55	10	1326	0
RTOR Reduction (vph)	0	0	0	0	6	0	0	10	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	31	0	0	626	0	10	1326	0
Confl. Peds. (#/hr)	88		133	133		88	137		105	105		137
Confl. Bikes (#/hr)			17			1			27			39
Turn Type				Perm			Perm			Perm		
Protected Phases					8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)					25.0			37.0		37.0	37.0	
Effective Green, g (s)					26.0			38.0		38.0	38.0	
Actuated g/C Ratio					0.37			0.54		0.54	0.54	
Clearance Time (s)					4.0			4.0		4.0	4.0	
Lane Grp Cap (vph)					554			1815		336	1871	
v/s Ratio Prot								0.19			c0.38	
v/s Ratio Perm					0.02					0.02		
v/c Ratio					0.06			0.34		0.03	0.71	
Uniform Delay, d1					14.1			9.0		7.4	11.9	
Progression Factor					1.00			1.00		1.00	1.00	
Incremental Delay, d2					0.2			0.5		0.2	2.3	
Delay (s)					14.3			9.5		7.6	14.2	
Level of Service					B			A		A	B	
Approach Delay (s)		0.0			14.3			9.5			14.1	
Approach LOS		A			B			A			B	

Intersection Summary

HCM Average Control Delay	12.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	62.6%	ICU Level of Service	B	
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	0.95			1.00	0.99	
Flt Protected	0.97			0.99	1.00	
Satd. Flow (prot)	1669			3425	3403	
Flt Permitted	0.97			0.66	1.00	
Satd. Flow (perm)	1669			2278	3403	
Volume (vph)	217	133	76	532	1291	117
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	217	133	76	532	1291	117
RTOR Reduction (vph)	31	0	0	0	10	0
Lane Group Flow (vph)	319	0	0	608	1398	0
Turn Type			Perm			
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	22.0			35.0	35.0	
Effective Green, g (s)	23.0			36.0	36.0	
Actuated g/C Ratio	0.35			0.55	0.55	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	591			1262	1885	
v/s Ratio Prot	c0.19				c0.41	
v/s Ratio Perm				0.27		
v/c Ratio	0.54			0.48	0.74	
Uniform Delay, d1	16.8			8.8	11.0	
Progression Factor	1.16			1.00	1.00	
Incremental Delay, d2	2.3			1.3	2.7	
Delay (s)	21.7			10.1	13.7	
Level of Service	C			B	B	
Approach Delay (s)	21.7			10.1	13.7	
Approach LOS	C			B	B	

Intersection Summary

HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↤↑	↗	↰	↑			↑↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor					0.95	1.00	1.00	1.00			0.91	
Frpb, ped/bikes					1.00	0.96	1.00	1.00			0.98	
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	
Frt					1.00	0.85	1.00	1.00			0.97	
Flt Protected					0.99	1.00	0.95	1.00			1.00	
Satd. Flow (prot)					3411	1475	1708	1814			4745	
Flt Permitted					0.99	1.00	0.13	1.00			1.00	
Satd. Flow (perm)					3411	1475	238	1814			4745	
Volume (vph)	0	0	0	97	377	494	28	31	0	0	1148	231
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	97	377	494	28	31	0	0	1148	231
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	38	0
Lane Group Flow (vph)	0	0	0	0	474	494	28	31	0	0	1341	0
Confl. Peds. (#/hr)				53		92	74					74
Confl. Bikes (#/hr)						19						28
Turn Type				Split		Free	Perm					
Protected Phases				8	8			2			6	
Permitted Phases						Free	2					
Actuated Green, G (s)					31.0	80.0	41.0	41.0			41.0	
Effective Green, g (s)					32.0	80.0	42.0	42.0			42.0	
Actuated g/C Ratio					0.40	1.00	0.52	0.52			0.52	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1364	1475	125	952			2491	
v/s Ratio Prot					0.14			0.02			c0.28	
v/s Ratio Perm						c0.33	0.12					
v/c Ratio					0.35	0.33	0.22	0.03			0.54	
Uniform Delay, d1					16.7	0.0	10.2	9.2			12.6	
Progression Factor					1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2					0.7	0.6	4.1	0.1			0.8	
Delay (s)					17.4	0.6	14.3	9.2			13.4	
Level of Service					B	A	B	A			B	
Approach Delay (s)		0.0			8.8			11.7			13.4	
Approach LOS		A			A			B			B	

Intersection Summary

HCM Average Control Delay	11.5	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.45			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0	
Intersection Capacity Utilization	65.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↑↾								↱	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0								3.0	3.0	
Lane Util. Factor	1.00	0.95								1.00	0.95	
Frpb, ped/bikes	1.00	0.99								1.00	1.00	
Flpb, ped/bikes	0.89	1.00								0.85	1.00	
Frt	1.00	0.98								1.00	1.00	
Flt Protected	0.95	1.00								0.95	1.00	
Satd. Flow (prot)	1533	3324								1459	3446	
Flt Permitted	0.95	1.00								0.95	1.00	
Satd. Flow (perm)	1533	3324								1459	3446	
Volume (vph)	29	968	172	0	0	0	0	0	0	436	778	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	29	968	172	0	0	0	0	0	0	436	778	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	29	1114	0	0	0	0	0	0	0	436	778	0
Confl. Peds. (#/hr)	147		91							204		
Confl. Bikes (#/hr)			16									
Turn Type	Perm									Perm		
Protected Phases		4									6	
Permitted Phases	4									6		
Actuated Green, G (s)	23.0	23.0								24.0	24.0	
Effective Green, g (s)	24.0	24.0								25.0	25.0	
Actuated g/C Ratio	0.44	0.44								0.45	0.45	
Clearance Time (s)	4.0	4.0								4.0	4.0	
Lane Grp Cap (vph)	669	1450								663	1566	
v/s Ratio Prot		c0.33									0.23	
v/s Ratio Perm	0.02									c0.30		
v/c Ratio	0.04	0.77								0.66	0.50	
Uniform Delay, d1	8.9	13.1								11.7	10.6	
Progression Factor	1.00	1.00								1.00	1.00	
Incremental Delay, d2	0.1	4.0								5.0	1.1	
Delay (s)	9.0	17.1								16.7	11.7	
Level of Service	A	B								B	B	
Approach Delay (s)		16.9			0.0			0.0			13.5	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c   Critical Lane Group

SYNCHRO FILES – YEAR 2030 WITH PROJECT PM PEAK HOUR LEVEL OF SERVICE

IBI
GROUP

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱			↰↑↱			↰↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.93		1.00			0.99			1.00	
Flpb, ped/bikes		1.00	1.00		0.99			1.00			1.00	
Frt		1.00	0.85		1.00			0.98			1.00	
Flt Protected		0.99	1.00		0.99			0.99			1.00	
Satd. Flow (prot)		1800	1437		1772			3296			3429	
Flt Permitted		0.85	1.00		0.46			0.56			0.85	
Satd. Flow (perm)		1539	1437		830			1861			2930	
Volume (vph)	67	432	196	249	582	17	249	995	209	14	961	19
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	432	196	249	582	17	249	995	209	14	961	19
RTOR Reduction (vph)	0	0	29	0	1	0	0	25	0	0	3	0
Lane Group Flow (vph)	0	499	167	0	847	0	0	1428	0	0	991	0
Confl. Peds. (#/hr)	51		57	57		51	33		42	42		33
Confl. Bikes (#/hr)			30			24			22			13
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		23.0	23.0		23.0			24.0			24.0	
Effective Green, g (s)		24.0	24.0		24.0			25.0			25.0	
Actuated g/C Ratio		0.44	0.44		0.44			0.45			0.45	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		672	627		362			846			1332	
v/s Ratio Prot												
v/s Ratio Perm		0.32	0.12		c1.02			c0.77			0.34	
v/c Ratio		0.74	0.27		2.34			1.69			0.74	
Uniform Delay, d1		12.9	9.9		15.5			15.0			12.4	
Progression Factor		1.00	1.00		1.19			1.00			1.00	
Incremental Delay, d2		7.3	1.0		611.3			314.9			3.8	
Delay (s)		20.2	10.9		629.8			329.9			16.2	
Level of Service		C	B		F			F			B	
Approach Delay (s)		17.6			629.8			329.9			16.2	
Approach LOS		B			F			F			B	

Intersection Summary

HCM Average Control Delay	261.1	HCM Level of Service	F
HCM Volume to Capacity ratio	2.01		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	158.6%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↑	↱	↱	↑↱		↱	↑↱		↱	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.81	1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.97	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1723	3446	1247	1723	3355		1723	3380		1678	3337	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.10	1.00		0.13	1.00	
Satd. Flow (perm)	154	3446	1247	154	3355		177	3380		228	3337	
Volume (vph)	155	1294	159	118	1206	110	214	1149	59	138	925	168
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	155	1294	159	118	1206	110	214	1149	59	138	925	168
RTOR Reduction (vph)	0	0	84	0	7	0	0	4	0	0	14	0
Lane Group Flow (vph)	155	1294	75	118	1309	0	214	1204	0	138	1079	0
Confl. Peds. (#/hr)	109		122	122		109	27		168	168		27
Confl. Bikes (#/hr)			48			34			26			18
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	46.0	46.0	46.0	46.0	46.0		46.0	46.0		37.0	37.0	
Effective Green, g (s)	47.0	47.0	47.0	47.0	47.0		47.0	47.0		38.0	38.0	
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.47		0.47	0.47		0.38	0.38	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	72	1620	586	72	1577		176	1589		87	1268	
v/s Ratio Prot		0.38			0.39		c0.07	0.36			0.32	
v/s Ratio Perm	c1.00		0.06	0.76			0.50			c0.61		
v/c Ratio	2.15	0.80	0.13	1.64	0.83		1.22	0.76		1.59	0.85	
Uniform Delay, d1	26.5	22.5	14.9	26.5	23.0		21.7	21.8		31.0	28.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	561.9	4.2	0.4	341.5	5.2		137.8	3.4		311.2	7.3	
Delay (s)	588.4	26.7	15.4	368.0	28.3		159.5	25.3		342.2	35.7	
Level of Service	F	C	B	F	C		F	C		F	D	
Approach Delay (s)		79.7			56.2			45.5			70.1	
Approach LOS		E			E			D			E	

Intersection Summary

HCM Average Control Delay	63.2	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.85			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0	
Intersection Capacity Utilization	104.8%	ICU Level of Service	G	
Analysis Period (min)	15			

c   Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑↳			↲↑↑
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	0.96			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.97			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1723	1542	3212			3410
Flt Permitted	0.95	1.00	1.00			0.50
Satd. Flow (perm)	1723	1542	3212			1733
Volume (vph)	253	388	1142	284	270	1012
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	253	388	1142	284	270	1012
RTOR Reduction (vph)	0	84	15	0	0	0
Lane Group Flow (vph)	253	304	1411	0	0	1282
Confl. Peds. (#/hr)	26	16		90	90	
Confl. Bikes (#/hr)		2		25		
Turn Type		Prot			Perm	
Protected Phases	8	8	2			6
Permitted Phases					6	
Actuated Green, G (s)	30.0	30.0	112.0			112.0
Effective Green, g (s)	31.0	31.0	113.0			113.0
Actuated g/C Ratio	0.21	0.21	0.75			0.75
Clearance Time (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	356	319	2420			1306
v/s Ratio Prot	0.15	c0.20	0.44			
v/s Ratio Perm						c0.74
v/c Ratio	0.71	0.95	0.58			1.34dl
Uniform Delay, d1	55.3	58.8	8.1			17.5
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	11.4	39.7	1.0			20.9
Delay (s)	66.7	98.5	9.2			38.4
Level of Service	E	F	A			D
Approach Delay (s)	85.9		9.2			38.4
Approach LOS	F		A			D

Intersection Summary

HCM Average Control Delay	35.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	108.0%	ICU Level of Service	G	
Analysis Period (min)	15			

dl   Defacto Left Lane. Recode with 1 though lane as a left lane.
c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↵	↱		↵	↱	↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.93		1.00	0.96	1.00	0.99		1.00	0.98	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00		0.99	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1774	1427		1790	1479	1704	3371		1708	3307	
Flt Permitted		0.44	1.00		0.73	1.00	0.16	1.00		0.12	1.00	
Satd. Flow (perm)		798	1427		1316	1479	293	3371		218	3307	
Volume (vph)	183	280	149	91	418	144	228	1103	107	202	878	169
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	183	280	149	91	418	144	228	1103	107	202	878	169
RTOR Reduction (vph)	0	0	40	0	0	16	0	11	0	0	23	0
Lane Group Flow (vph)	0	463	109	0	509	128	228	1199	0	202	1024	0
Confl. Peds. (#/hr)	20		59	59		20	42		83	83		42
Confl. Bikes (#/hr)			16			20			17			22
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		30.0	30.0		30.0	30.0	32.0	32.0		32.0	32.0	
Effective Green, g (s)		31.0	31.0		31.0	31.0	33.0	33.0		33.0	33.0	
Actuated g/C Ratio		0.44	0.44		0.44	0.44	0.47	0.47		0.47	0.47	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		353	632		583	655	138	1589		103	1559	
v/s Ratio Prot								0.36			0.31	
v/s Ratio Perm		c0.58	0.08		0.39	0.09	0.78			c0.93		
v/c Ratio		1.31	0.17		0.87	0.20	1.65	0.75		1.96	0.66	
Uniform Delay, d1		19.5	11.8		17.7	11.9	18.5	15.2		18.5	14.2	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		159.1	0.6		16.5	0.7	323.5	3.4		465.6	2.2	
Delay (s)		178.6	12.4		34.2	12.6	342.0	18.6		484.1	16.3	
Level of Service		F	B		C	B	F	B		F	B	
Approach Delay (s)		138.2			29.4			69.8			92.0	
Approach LOS		F			C			E			F	

Intersection Summary

HCM Average Control Delay	80.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.65		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	113.4%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↱			↔↱		↰	↱			✥	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	
Frpb, ped/bikes		0.96			0.99		1.00	0.95			1.00	
Flpb, ped/bikes		1.00			1.00		0.99	1.00			1.00	
Frt		0.97			1.00		1.00	0.93			0.99	
Flt Protected		1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		3187			3405		1702	1604			1778	
Flt Permitted		0.90			0.75		0.50	1.00			0.95	
Satd. Flow (perm)		2871			2544		894	1604			1704	
Volume (vph)	43	1178	306	25	926	28	450	253	234	25	285	27
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	1178	306	25	926	28	450	253	234	25	285	27
RTOR Reduction (vph)	0	37	0	0	3	0	0	7	0	0	6	0
Lane Group Flow (vph)	0	1490	0	0	976	0	450	480	0	0	332	0
Confl. Peds. (#/hr)	128		129	129		128	28		99	99		28
Confl. Bikes (#/hr)			41			41			15			
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		26.0			26.0		26.0	26.0			26.0	
Effective Green, g (s)		27.0			27.0		27.0	27.0			27.0	
Actuated g/C Ratio		0.45			0.45		0.45	0.45			0.45	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1292			1145		402	722			767	
v/s Ratio Prot								0.30				
v/s Ratio Perm		c0.52			0.38		c0.50				0.19	
v/c Ratio		1.15			0.85		1.12	0.66			0.43	
Uniform Delay, d1		16.5			14.7		16.5	12.9			11.3	
Progression Factor		1.00			0.64		1.00	1.00			1.00	
Incremental Delay, d2		78.3			6.5		81.4	4.8			1.8	
Delay (s)		94.8			15.9		97.9	17.7			13.0	
Level of Service		F			B		F	B			B	
Approach Delay (s)		94.8			15.9			56.2			13.0	
Approach LOS		F			B			E			B	

Intersection Summary

HCM Average Control Delay	57.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	137.5%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		⬥			⬥			⬥	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.66		0.86			0.95			0.92	
Flpb, ped/bikes		0.97	1.00		0.99			0.99			0.99	
Frt		1.00	0.85		0.95			0.98			0.96	
Flt Protected		0.99	1.00		1.00			0.99			0.99	
Satd. Flow (prot)		1742	1024		1459			1660			1564	
Flt Permitted		0.80	1.00		0.94			0.81			0.69	
Satd. Flow (perm)		1404	1024		1376			1360			1084	
Volume (vph)	92	326	101	49	300	191	147	620	133	130	276	201
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	92	326	101	49	300	191	147	620	133	130	276	201
RTOR Reduction (vph)	0	0	53	0	28	0	0	12	0	0	31	0
Lane Group Flow (vph)	0	418	48	0	512	0	0	888	0	0	576	0
Confl. Peds. (#/hr)	296		250	250		296	293		232	230		293
Confl. Bikes (#/hr)			16			23			31			16
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	22.0		22.0			25.0			25.0	
Effective Green, g (s)		23.0	23.0		23.0			26.0			26.0	
Actuated g/C Ratio		0.42	0.42		0.42			0.47			0.47	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		587	428		575			643			512	
v/s Ratio Prot												
v/s Ratio Perm		0.30	0.05		c0.37			c0.65			0.53	
v/c Ratio		0.71	0.11		0.89			1.38			1.13	
Uniform Delay, d1		13.3	9.8		14.8			14.5			14.5	
Progression Factor		1.00	1.00		1.00			0.93			1.00	
Incremental Delay, d2		7.2	0.5		18.1			172.6			79.1	
Delay (s)		20.4	10.3		32.9			186.2			93.6	
Level of Service		C	B		C			F			F	
Approach Delay (s)		18.5			32.9			186.2			93.6	
Approach LOS		B			C			F			F	

Intersection Summary

HCM Average Control Delay	98.1	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.15			
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	130.2%	ICU Level of Service	H	
Analysis Period (min)	15			

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		⊕			⊕			⊕	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.66		0.83			0.97			0.94	
Flpb, ped/bikes		0.95	1.00		0.99			0.98			0.99	
Frt		1.00	0.85		0.95			0.98			0.96	
Flt Protected		0.98	1.00		1.00			0.99			0.99	
Satd. Flow (prot)		1692	1020		1399			1672			1615	
Flt Permitted		0.60	1.00		0.94			0.75			0.82	
Satd. Flow (perm)		1037	1020		1317			1274			1342	
Volume (vph)	145	262	181	56	335	225	213	510	101	74	254	126
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	145	262	181	56	335	225	213	510	101	74	254	126
RTOR Reduction (vph)	0	0	61	0	38	0	0	9	0	0	16	0
Lane Group Flow (vph)	0	407	120	0	578	0	0	815	0	0	438	0
Confl. Peds. (#/hr)	371		260	260		371	281		168	168		281
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	22.0		22.0			25.0			25.0	
Effective Green, g (s)		23.0	23.0		23.0			26.0			26.0	
Actuated g/C Ratio		0.42	0.42		0.42			0.47			0.47	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Grp Cap (vph)		434	427		551			602			634	
v/s Ratio Prot												
v/s Ratio Perm		0.39	0.12		c0.44			c0.64			0.33	
v/c Ratio		0.94	0.28		1.05			1.35			0.69	
Uniform Delay, d1		15.3	10.6		16.0			14.5			11.4	
Progression Factor		1.00	1.00		1.00			1.00			0.90	
Incremental Delay, d2		30.1	1.6		51.9			170.0			3.3	
Delay (s)		45.4	12.2		67.9			184.5			13.6	
Level of Service		D	B		E			F			B	
Approach Delay (s)		35.2			67.9			184.5			13.6	
Approach LOS		D			E			F			B	

Intersection Summary

HCM Average Control Delay	88.9		HCM Level of Service	F
HCM Volume to Capacity ratio	1.21			
Actuated Cycle Length (s)	55.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	145.9%		ICU Level of Service	H
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		�			�		�	↑17		�7	↑17	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.96	
Flpb, ped/bikes		1.00			1.00		0.95	1.00		0.98	1.00	
Frt		1.00			0.99		1.00	0.99		1.00	0.97	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3409			3393		1643	3413		1684	3221	
Flt Permitted		0.77			0.90		0.27	1.00		0.24	1.00	
Satd. Flow (perm)		2633			3068		465	3413		428	3221	
Volume (vph)	111	592	6	33	549	38	153	834	32	144	648	156
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	111	592	6	33	549	38	153	834	32	144	648	156
RTOR Reduction (vph)	0	1	0	0	9	0	0	5	0	0	38	0
Lane Group Flow (vph)	0	708	0	0	611	0	153	861	0	144	766	0
Confl. Peds. (#/hr)	31		36	36		31	131		118	118		131
Confl. Bikes (#/hr)			31			28			24			18
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		25.0	25.0		25.0	25.0	
Effective Green, g (s)		23.0			23.0		26.0	26.0		26.0	26.0	
Actuated g/C Ratio		0.42			0.42		0.47	0.47		0.47	0.47	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1101			1283		220	1613		202	1523	
v/s Ratio Prot								0.25			0.24	
v/s Ratio Perm		c0.27			0.20		0.33			c0.34		
v/c Ratio		0.64			0.48		0.70	0.53		0.71	0.50	
Uniform Delay, d1		12.7			11.6		11.4	10.2		11.5	10.0	
Progression Factor		0.99			0.39		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.9			0.1		16.7	1.3		19.3	1.2	
Delay (s)		15.5			4.6		28.0	11.5		30.8	11.2	
Level of Service		B			A		C	B		C	B	
Approach Delay (s)		15.5			4.6			14.0			14.2	
Approach LOS		B			A			B			B	

Intersection Summary

HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.89			1.00	0.80	1.00	1.00		1.00	1.00	0.69
Flpb, ped/bikes	0.94	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95			1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1625	2925			3430	1236	1723	1772		1723	1814	1071
Flt Permitted	0.32	1.00			0.91	1.00	0.30	1.00		0.15	1.00	1.00
Satd. Flow (perm)	549	2925			3112	1236	538	1772		279	1814	1071
Volume (vph)	366	626	288	27	658	524	267	771	140	21	497	152
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	366	626	288	27	658	524	267	771	140	21	497	152
RTOR Reduction (vph)	0	13	0	0	0	55	0	6	0	0	0	28
Lane Group Flow (vph)	366	901	0	0	685	469	267	905	0	21	497	124
Confl. Peds. (#/hr)	204		455	455		204				131		341
Confl. Bikes (#/hr)			113			66						72
Turn Type	Perm			Perm		Perm	Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	27.0	27.0			27.0	27.0	25.0	25.0		25.0	25.0	25.0
Effective Green, g (s)	28.0	28.0			28.0	28.0	26.0	26.0		26.0	26.0	26.0
Actuated g/C Ratio	0.47	0.47			0.47	0.47	0.43	0.43		0.43	0.43	0.43
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	256	1365			1452	577	233	768		121	786	464
v/s Ratio Prot		0.31						c0.51			0.27	
v/s Ratio Perm	c0.67				0.22	0.38	0.50			0.08		0.12
v/c Ratio	1.43	0.66			0.47	0.81	1.15	1.18		0.17	0.63	0.27
Uniform Delay, d1	16.0	12.3			10.9	13.7	17.0	17.0		10.4	13.3	10.9
Progression Factor	1.45	1.58			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	195.4	0.2			1.1	11.9	104.0	93.4		3.1	3.8	1.4
Delay (s)	218.7	19.7			12.0	25.6	121.0	110.4		13.5	17.1	12.3
Level of Service	F	B			B	C	F	F		B	B	B
Approach Delay (s)		76.6			17.9			112.8			15.9	
Approach LOS		E			B			F			B	

Intersection Summary

HCM Average Control Delay	60.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	131.8%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✛					↰	↑			↑	↗
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0			3.0	3.0
Lane Util. Factor		1.00					1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.52					1.00	1.00			1.00	0.64
Flpb, ped/bikes		0.81					0.90	1.00			1.00	1.00
Frt		0.91					1.00	1.00			1.00	0.85
Flt Protected		0.98					0.95	1.00			1.00	1.00
Satd. Flow (prot)		688					1548	1811			1814	981
Flt Permitted		0.98					0.22	1.00			1.00	1.00
Satd. Flow (perm)		688					355	1811			1814	981
Volume (vph)	137	0	273	0	0	0	131	1062	3	0	611	153
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	137	0	273	0	0	0	131	1062	3	0	611	153
RTOR Reduction (vph)	0	21	0	0	0	0	0	0	0	0	0	83
Lane Group Flow (vph)	0	389	0	0	0	0	131	1065	0	0	611	70
Confl. Peds. (#/hr)	670		1152	1152		670	265		261	261		256
Confl. Bikes (#/hr)			84									54
Turn Type	Perm						Perm					Perm
Protected Phases		4						2			6	
Permitted Phases	4						2					6
Actuated Green, G (s)		23.0					24.0	24.0			24.0	24.0
Effective Green, g (s)		24.0					25.0	25.0			25.0	25.0
Actuated g/C Ratio		0.44					0.45	0.45			0.45	0.45
Clearance Time (s)		4.0					4.0	4.0			4.0	4.0
Lane Grp Cap (vph)		300					161	823			825	446
v/s Ratio Prot								c0.59			0.34	
v/s Ratio Perm		0.57					0.37					0.07
v/c Ratio		1.30					0.81	1.29			0.74	0.16
Uniform Delay, d1		15.5					13.0	15.0			12.3	8.8
Progression Factor		1.25					1.00	1.00			1.00	1.00
Incremental Delay, d2		141.7					34.6	141.3			5.9	0.7
Delay (s)		161.0					47.6	156.3			18.3	9.6
Level of Service		F					D	F			B	A
Approach Delay (s)		161.0			0.0			144.4			16.5	
Approach LOS		F			A			F			B	

Intersection Summary

HCM Average Control Delay	106.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⟷			⟷		↰	↱		↰	↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.91			0.86		1.00	0.85		1.00	0.89	
Flpb, ped/bikes		0.98			0.98		1.00	1.00		1.00	1.00	
Frt		0.96			0.95		1.00	0.97		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1526			1437		1723	1501		1723	1573	
Flt Permitted		0.83			0.89		0.11	1.00		0.11	1.00	
Satd. Flow (perm)		1279			1290		202	1501		202	1573	
Volume (vph)	62	171	113	77	245	172	98	787	213	222	903	172
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	62	171	113	77	245	172	98	787	213	222	903	172
RTOR Reduction (vph)	0	1	0	0	1	0	0	15	0	0	11	0
Lane Group Flow (vph)	0	345	0	0	493	0	98	985	0	222	1064	0
Confl. Peds. (#/hr)	262		286	387		262	918		871	871		918
Confl. Bikes (#/hr)			43			15			74			78
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.0			22.0		35.0	35.0		35.0	35.0	
Effective Green, g (s)		23.0			23.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio		0.35			0.35		0.55	0.55		0.55	0.55	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		453			456		112	831		112	871	
v/s Ratio Prot								0.66			0.68	
v/s Ratio Perm		0.27			c0.38		0.49			c1.10		
v/c Ratio		0.76			1.08		0.88	1.19		1.98	1.22	
Uniform Delay, d1		18.6			21.0		12.6	14.5		14.5	14.5	
Progression Factor		1.00			0.78		1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.5			40.5		56.2	95.4		472.3	110.2	
Delay (s)		30.1			56.9		68.8	109.9		486.8	124.7	
Level of Service		C			E		E	F		F	F	
Approach Delay (s)		30.1			56.9			106.2			186.7	
Approach LOS		C			E			F			F	

Intersection Summary

HCM Average Control Delay	122.8	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.63			
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	120.4%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↱	↰	↱		↰	↑			↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor			1.00	1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes			0.94	1.00	0.98		1.00	1.00			0.95	
Flpb, ped/bikes			1.00	0.96	1.00		1.00	1.00			1.00	
Frt			0.86	1.00	0.92		1.00	1.00			0.99	
Flt Protected			1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)			1478	1651	1627		1723	1814			1704	
Flt Permitted			1.00	0.95	1.00		0.15	1.00			1.00	
Satd. Flow (perm)			1478	1651	1627		279	1814			1704	
Volume (vph)	0	0	42	322	253	298	97	941	0	0	863	101
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	42	322	253	298	97	941	0	0	863	101
RTOR Reduction (vph)	0	0	7	0	45	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	35	322	506	0	97	941	0	0	956	0
Confl. Peds. (#/hr)			56	56		40	329					329
Confl. Bikes (#/hr)			9			5						60
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			22.0	22.0	22.0		25.0	25.0			25.0	
Effective Green, g (s)			23.0	23.0	23.0		26.0	26.0			26.0	
Actuated g/C Ratio			0.42	0.42	0.42		0.47	0.47			0.47	
Clearance Time (s)			4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)			618	690	680		132	858			806	
v/s Ratio Prot					c0.31			0.52			c0.56	
v/s Ratio Perm			0.02	0.20			0.35					
v/c Ratio			0.06	0.47	0.74		0.73	1.10			1.19	
Uniform Delay, d1			9.5	11.6	13.5		11.7	14.5			14.5	
Progression Factor			1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2			0.2	2.3	7.3		30.2	60.6			96.2	
Delay (s)			9.7	13.8	20.8		41.9	75.1			110.7	
Level of Service			A	B	C		D	E			F	
Approach Delay (s)		9.7			18.2			72.0			110.7	
Approach LOS		A			B			E			F	

Intersection Summary

HCM Average Control Delay	67.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔					↱	↱		↱	↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95					1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99					1.00	0.95		1.00	0.99	
Flpb, ped/bikes		1.00					1.00	1.00		1.00	1.00	
Frt		0.95					1.00	0.96		1.00	1.00	
Flt Protected		0.99					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3225					1723	1662		1723	1782	
Flt Permitted		0.99					0.13	1.00		0.07	1.00	
Satd. Flow (perm)		3225					229	1662		131	1782	
Volume (vph)	63	221	124	0	0	0	114	982	309	139	1022	31
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	221	124	0	0	0	114	982	309	139	1022	31
RTOR Reduction (vph)	0	46	0	0	0	0	0	13	0	0	1	0
Lane Group Flow (vph)	0	362	0	0	0	0	114	1279	0	139	1052	0
Confl. Peds. (#/hr)	21		20				212		156	156		212
Confl. Bikes (#/hr)			4						27			27
Turn Type	Split						Perm			pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		22.0					51.5	51.5		60.0	60.0	
Effective Green, g (s)		23.0					52.5	52.5		61.0	61.0	
Actuated g/C Ratio		0.26					0.58	0.58		0.68	0.68	
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		824					134	970		186	1208	
v/s Ratio Prot		c0.11						c0.77		0.05	c0.59	
v/s Ratio Perm							0.50			0.46		
v/c Ratio		0.44					0.85	1.32		0.75	0.87	
Uniform Delay, d1		28.1					15.5	18.8		43.1	11.4	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.7					45.6	150.4		23.7	8.7	
Delay (s)		29.8					61.1	169.2		66.8	20.1	
Level of Service		C					E	F		E	C	
Approach Delay (s)		29.8			0.0			160.4			25.6	
Approach LOS		C			A			F			C	

Intersection Summary

HCM Average Control Delay	89.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	110.3%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					⬥⬥⬥		⬥	⬥⬥			⬥⬥⬥	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0		3.0	3.0			3.0	
Lane Util. Factor					0.95		1.00	0.95			0.95	
Frpb, ped/bikes					1.00		1.00	1.00			0.99	
Flpb, ped/bikes					1.00		0.99	1.00			1.00	
Frt					0.99		1.00	1.00			0.99	
Flt Protected					0.99		0.95	1.00			1.00	
Satd. Flow (prot)					3366		1703	3446			3368	
Flt Permitted					0.99		0.15	1.00			1.00	
Satd. Flow (perm)					3366		276	3446			3368	
Volume (vph)	0	0	0	174	682	75	241	1136	0	0	1233	106
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	174	682	75	241	1136	0	0	1233	106
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	0	0	919	0	241	1136	0	0	1327	0
Confl. Peds. (#/hr)				7		12	157					157
Confl. Bikes (#/hr)						7						31
Turn Type				Split			Perm					
Protected Phases				8	8			2			6	
Permitted Phases							2					
Actuated Green, G (s)					22.0		25.0	25.0			25.0	
Effective Green, g (s)					23.0		26.0	26.0			26.0	
Actuated g/C Ratio					0.42		0.47	0.47			0.47	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1408		130	1629			1592	
v/s Ratio Prot					c0.27			0.33			0.39	
v/s Ratio Perm							c0.87					
v/c Ratio					0.65		1.85	0.70			0.83	
Uniform Delay, d1					12.8		14.5	11.4			12.6	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					2.4		412.2	2.5			5.3	
Delay (s)					15.2		426.7	13.9			17.9	
Level of Service					B		F	B			B	
Approach Delay (s)		0.0			15.2			86.2			17.9	
Approach LOS		A			B			F			B	

Intersection Summary

HCM Average Control Delay	43.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↲↑↳						↑↑↳		↰	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0						3.0		3.0	3.0	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		0.99						0.98		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.96						0.98		1.00	1.00	
Flt Protected		1.00						1.00		0.95	1.00	
Satd. Flow (prot)		3268						3335		1723	3446	
Flt Permitted		1.00						1.00		0.13	1.00	
Satd. Flow (perm)		3268						3335		238	3446	
Volume (vph)	73	703	256	0	0	0	0	1350	164	149	1337	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	73	703	256	0	0	0	0	1350	164	149	1337	0
RTOR Reduction (vph)	0	27	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	1005	0	0	0	0	0	1500	0	149	1337	0
Confl. Peds. (#/hr)	34		36						152	152		
Confl. Bikes (#/hr)			5						18			
Turn Type	Split									pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases										6		
Actuated Green, G (s)		22.0						26.5		35.0	35.0	
Effective Green, g (s)		23.0						27.5		36.0	36.0	
Actuated g/C Ratio		0.35						0.42		0.55	0.55	
Clearance Time (s)		4.0						4.0		4.0	4.0	
Lane Grp Cap (vph)		1156						1411		257	1909	
v/s Ratio Prot		c0.31						c0.45		0.05	c0.39	
v/s Ratio Perm										0.27		
v/c Ratio		0.87						1.06		0.58	0.70	
Uniform Delay, d1		19.6						18.8		14.0	10.6	
Progression Factor		1.00						1.00		1.00	1.00	
Incremental Delay, d2		9.0						42.6		9.2	2.2	
Delay (s)		28.6						61.3		23.2	12.7	
Level of Service		C						E		C	B	
Approach Delay (s)		28.6			0.0			61.3			13.8	
Approach LOS		C			A			E			B	

Intersection Summary

HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱		↱	↔↱		↱	↑↑	↱		↔↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor	1.00	1.00		0.91	0.91		1.00	0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.97		1.00	1.00	0.85		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		0.98	
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	0.99		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1723	1776		1568	3070		1723	3446	1314		3306	
Flt Permitted	0.95	1.00		0.95	0.99		0.10	1.00	1.00		0.54	
Satd. Flow (perm)	1723	1776		1568	3070		178	3446	1314		1806	
Volume (vph)	24	529	45	572	573	205	51	861	480	262	831	47
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	24	529	45	572	573	205	51	861	480	262	831	47
RTOR Reduction (vph)	0	3	0	0	23	0	0	0	0	0	3	0
Lane Group Flow (vph)	24	571	0	449	878	0	51	861	480	0	1137	0
Confl. Peds. (#/hr)	63		55	55		63	36		207	207		36
Confl. Bikes (#/hr)			36			37			79			16
Turn Type	Split			Split			Perm		Free	Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		Free	6		
Actuated Green, G (s)	27.0	27.0		25.0	25.0		46.0	46.0	110.0		46.0	
Effective Green, g (s)	28.0	28.0		26.0	26.0		47.0	47.0	110.0		47.0	
Actuated g/C Ratio	0.25	0.25		0.24	0.24		0.43	0.43	1.00		0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	439	452		371	726		76	1472	1314		772	
v/s Ratio Prot	0.01	c0.32		c0.29	0.29			0.25				
v/s Ratio Perm							0.29		0.37		c0.63	
v/c Ratio	0.05	1.26		1.21	1.21		0.67	0.58	0.37		1.79dl	
Uniform Delay, d1	31.0	41.0		42.0	42.0		25.3	24.1	0.0		31.5	
Progression Factor	1.00	0.88		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	131.5		117.2	106.9		38.4	1.7	0.8		219.9	
Delay (s)	31.2	167.7		159.2	148.9		63.7	25.8	0.8		251.4	
Level of Service	C	F		F	F		E	C	A		F	
Approach Delay (s)		162.2			152.3			18.5			251.4	
Approach LOS		F			F			B			F	

Intersection Summary

HCM Average Control Delay	137.3	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.35			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0	
Intersection Capacity Utilization	130.0%	ICU Level of Service	H	
Analysis Period (min)	15			

dl   Defacto Left Lane. Recode with 1 though lane as a left lane.
c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	⊕			⊕		↱	↑↳		↱	↑↳	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.95	0.95			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.97			0.87		1.00	1.00		1.00	0.96	
Flpb, ped/bikes	0.90	0.92			1.00		1.00	1.00		0.95	1.00	
Frt	1.00	0.99			0.88		1.00	1.00		1.00	0.96	
Flt Protected	0.95	0.96			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1477	1469			1386		1723	3443		1640	3159	
Flt Permitted	0.70	0.71			1.00		0.08	1.00		0.20	1.00	
Satd. Flow (perm)	1088	1089			1384		150	3443		348	3159	
Volume (vph)	524	36	29	1	6	81	60	1174	2	77	1089	430
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	524	36	29	1	6	81	60	1174	2	77	1089	430
RTOR Reduction (vph)	0	4	0	0	27	0	0	0	0	0	46	0
Lane Group Flow (vph)	262	323	0	0	61	0	60	1176	0	77	1473	0
Confl. Peds. (#/hr)	96		203	203		96	102		145	145		102
Confl. Bikes (#/hr)			72			17			60			46
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	29.0	29.0			29.0		53.0	53.0		44.5	44.5	
Effective Green, g (s)	30.0	30.0			30.0		54.0	54.0		45.5	45.5	
Actuated g/C Ratio	0.33	0.33			0.33		0.60	0.60		0.51	0.51	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	363	363			461		186	2066		176	1597	
v/s Ratio Prot							0.02	c0.34			c0.47	
v/s Ratio Perm	0.24	c0.30			0.04		0.17			0.22		
v/c Ratio	0.72	0.89			0.13		0.32	0.57		0.44	0.92	
Uniform Delay, d1	26.3	28.4			20.9		15.3	10.9		14.1	20.6	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.8	26.2			0.6		4.5	1.1		7.7	10.3	
Delay (s)	38.1	54.6			21.5		19.9	12.1		21.8	30.9	
Level of Service	D	D			C		B	B		C	C	
Approach Delay (s)		47.3			21.5			12.5			30.5	
Approach LOS		D			C			B			C	

Intersection Summary

HCM Average Control Delay	26.7	HCM Level of Service		C
HCM Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		9.0
Intersection Capacity Utilization	84.0%	ICU Level of Service		E
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					⊕		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0			3.0		3.0	3.0	
Lane Util. Factor					1.00			0.95		1.00	0.95	
Frpb, ped/bikes					0.98			0.98		1.00	1.00	
Flpb, ped/bikes					0.89			1.00		0.95	1.00	
Frt					0.97			0.99		1.00	1.00	
Flt Protected					0.96			1.00		0.95	1.00	
Satd. Flow (prot)					1475			3336		1645	3446	
Flt Permitted					0.96			1.00		0.14	1.00	
Satd. Flow (perm)					1475			3336		237	3446	
Volume (vph)	0	0	0	81	0	26	0	1146	68	39	1126	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	81	0	26	0	1146	68	39	1126	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	97	0	0	1208	0	39	1126	0
Confl. Peds. (#/hr)	46		158	158		46	148		234	234		148
Confl. Bikes (#/hr)			37			14			89			28
Turn Type				Perm			Perm			Perm		
Protected Phases					8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)					26.0			36.0		36.0	36.0	
Effective Green, g (s)					27.0			37.0		37.0	37.0	
Actuated g/C Ratio					0.39			0.53		0.53	0.53	
Clearance Time (s)					4.0			4.0		4.0	4.0	
Lane Grp Cap (vph)					569			1763		125	1821	
v/s Ratio Prot								c0.36			0.33	
v/s Ratio Perm					0.07					0.16		
v/c Ratio					0.17			0.69		0.31	0.62	
Uniform Delay, d1					14.1			12.2		9.3	11.6	
Progression Factor					1.00			1.00		1.00	1.00	
Incremental Delay, d2					0.7			2.2		6.4	1.6	
Delay (s)					14.8			14.4		15.7	13.1	
Level of Service					B			B		B	B	
Approach Delay (s)		0.0			14.8			14.4			13.2	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	¥			◀↑	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	0.96			1.00	0.98	
Flt Protected	0.96			0.99	1.00	
Satd. Flow (prot)	1688			3412	3361	
Flt Permitted	0.96			0.53	1.00	
Satd. Flow (perm)	1688			1809	3361	
Volume (vph)	473	166	305	1200	1422	282
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	473	166	305	1200	1422	282
RTOR Reduction (vph)	19	0	0	0	25	0
Lane Group Flow (vph)	620	0	0	1505	1679	0
Turn Type			Perm			
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	22.0			35.0	35.0	
Effective Green, g (s)	23.0			36.0	36.0	
Actuated g/C Ratio	0.35			0.55	0.55	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	597			1002	1861	
v/s Ratio Prot	c0.37				0.50	
v/s Ratio Perm				c0.83		
v/c Ratio	1.04			2.75dl	0.90	
Uniform Delay, d1	21.0			14.5	12.9	
Progression Factor	0.89			1.00	1.00	
Incremental Delay, d2	22.6			231.2	7.6	
Delay (s)	41.4			245.7	20.5	
Level of Service	D			F	C	
Approach Delay (s)	41.4			245.7	20.5	
Approach LOS	D			F	C	

Intersection Summary

HCM Average Control Delay	112.0		HCM Level of Service	F
HCM Volume to Capacity ratio	1.32			
Actuated Cycle Length (s)	65.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization	140.1%		ICU Level of Service	H
Analysis Period (min)	15			

dl   Defacto Left Lane. Recode with 1 though lane as a left lane.
c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑	↱	↰	↑			↑↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)					3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor					0.95	1.00	1.00	1.00			0.91	
Frpb, ped/bikes					1.00	0.93	1.00	1.00			0.98	
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	
Frt					1.00	0.85	1.00	1.00			0.98	
Flt Protected					0.99	1.00	0.95	1.00			1.00	
Satd. Flow (prot)					3402	1431	1704	1814			4782	
Flt Permitted					0.99	1.00	0.10	1.00			1.00	
Satd. Flow (perm)					3402	1431	178	1814			4782	
Volume (vph)	0	0	0	232	672	1115	40	427	0	0	1457	170
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	232	672	1115	40	427	0	0	1457	170
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	0	904	1115	40	427	0	0	1617	0
Confl. Peds. (#/hr)				177		150	140					140
Confl. Bikes (#/hr)						75						62
Turn Type				Split		Free	Perm					
Protected Phases				8	8			2			6	
Permitted Phases						Free	2					
Actuated Green, G (s)					27.0	80.0	45.0	45.0			45.0	
Effective Green, g (s)					28.0	80.0	46.0	46.0			46.0	
Actuated g/C Ratio					0.35	1.00	0.58	0.58			0.58	
Clearance Time (s)					4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)					1191	1431	102	1043			2750	
v/s Ratio Prot					0.27			0.24			0.34	
v/s Ratio Perm						c0.78	0.23					
v/c Ratio					0.76	0.78	0.39	0.41			0.59	
Uniform Delay, d1					23.0	0.0	9.3	9.4			10.9	
Progression Factor					1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2					4.6	4.3	10.9	1.2			0.9	
Delay (s)					27.6	4.3	20.3	10.6			11.8	
Level of Service					C	A	C	B			B	
Approach Delay (s)		0.0			14.7			11.5			11.8	
Approach LOS		A			B			B			B	

Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↑↱								↱	↑↑	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0								3.0	3.0	
Lane Util. Factor	1.00	0.95								1.00	0.95	
Frpb, ped/bikes	1.00	0.99								1.00	1.00	
Flpb, ped/bikes	0.88	1.00								0.93	1.00	
Frt	1.00	0.98								1.00	1.00	
Flt Protected	0.95	1.00								0.95	1.00	
Satd. Flow (prot)	1524	3354								1605	3446	
Flt Permitted	0.95	1.00								0.95	1.00	
Satd. Flow (perm)	1524	3354								1605	3446	
Volume (vph)	407	231	29	0	0	0	0	0	0	670	1026	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	407	231	29	0	0	0	0	0	0	670	1026	0
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	407	243	0	0	0	0	0	0	0	670	1026	0
Confl. Peds. (#/hr)	154		92							91		
Confl. Bikes (#/hr)			24									
Turn Type	Perm									Perm		
Protected Phases		4									6	
Permitted Phases	4									6		
Actuated Green, G (s)	22.0	22.0								25.0	25.0	
Effective Green, g (s)	23.0	23.0								26.0	26.0	
Actuated g/C Ratio	0.42	0.42								0.47	0.47	
Clearance Time (s)	4.0	4.0								4.0	4.0	
Lane Grp Cap (vph)	637	1403								759	1629	
v/s Ratio Prot		0.07									0.30	
v/s Ratio Perm	c0.27									c0.42		
v/c Ratio	0.64	0.17								0.88	0.63	
Uniform Delay, d1	12.7	10.0								13.1	10.9	
Progression Factor	1.00	1.00								1.00	1.00	
Incremental Delay, d2	4.9	0.3								14.1	1.9	
Delay (s)	17.6	10.3								27.2	12.7	
Level of Service	B	B								C	B	
Approach Delay (s)		14.7			0.0			0.0			18.5	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

IBI Group

SYNCHRO FILES – YEAR 2030 MITIGATION MEASURES – AM PEAK HOUR

IBI
GROUP

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		◖↑	↗	↖	↑↱		↖	↱			✛	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes		1.00	0.92	1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.99	1.00			1.00	
Frt		1.00	0.85	1.00	0.99		1.00	0.95			0.98	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)		3441	1424	1706	3415		1709	1706			1765	
Flt Permitted		0.92	1.00	0.18	1.00		0.48	1.00			0.99	
Satd. Flow (perm)		3159	1424	329	3415		869	1706			1754	
Volume (vph)	23	1036	419	149	1157	42	110	84	37	10	250	47
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	1036	419	149	1157	42	110	84	37	10	250	47
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1059	419	149	1199	0	110	121	0	0	307	0
Confl. Peds. (#/hr)	67		42	42		67	18		42	42		18
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		30.0	30.0	30.0	30.0		22.0	22.0			22.0	
Effective Green, g (s)		31.0	31.0	31.0	31.0		23.0	23.0			23.0	
Actuated g/C Ratio		0.52	0.52	0.52	0.52		0.38	0.38			0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1632	736	170	1764		333	654			672	
v/s Ratio Prot					0.35			0.07				
v/s Ratio Perm		0.34	0.29	c0.45			0.13				c0.17	
v/c Ratio		0.65	0.57	0.88	0.68		0.33	0.19			0.46	
Uniform Delay, d1		10.5	9.9	12.8	10.8		13.1	12.3			13.8	
Progression Factor		1.00	1.00	1.07	1.06		1.00	1.00			1.00	
Incremental Delay, d2		2.0	3.2	35.3	1.6		2.6	0.6			2.2	
Delay (s)		12.6	13.1	48.9	13.1		15.7	12.9			16.1	
Level of Service		B	B	D	B		B	B			B	
Approach Delay (s)		12.7			17.0			14.2			16.1	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay		14.9	HCM Level of Service	B
HCM Volume to Capacity ratio		0.70		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization		114.5%	ICU Level of Service	H
Analysis Period (min)		15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔					↰	↑	↱	↰	↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor		0.95					1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.99					1.00	1.00	0.86	1.00	1.00	
Flpb, ped/bikes		1.00					0.92	1.00	1.00	0.99	1.00	
Frt		0.98					1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99					0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3334					1581	1814	1330	1710	1804	
Flt Permitted		0.99					0.29	1.00	1.00	0.28	1.00	
Satd. Flow (perm)		3334					480	1814	1330	513	1804	
Volume (vph)	48	351	67	0	0	0	26	608	693	113	782	8
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	351	67	0	0	0	26	608	693	113	782	8
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	91	0	0	0
Lane Group Flow (vph)	0	451	0	0	0	0	26	608	602	113	790	0
Confl. Peds. (#/hr)	20		22				162		99	99		162
Confl. Bikes (#/hr)			5						21			25
Turn Type	Split						Perm		Perm	pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		22.0					51.5	51.5	51.5	60.0	60.0	
Effective Green, g (s)		23.0					52.5	52.5	52.5	61.0	61.0	
Actuated g/C Ratio		0.26					0.58	0.58	0.58	0.68	0.68	
Clearance Time (s)		4.0					4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)		852					280	1058	776	421	1223	
v/s Ratio Prot		c0.14						0.34		0.02	c0.44	
v/s Ratio Perm							0.05		c0.45	0.17		
v/c Ratio		0.53					0.09	0.57	0.78	0.27	0.65	
Uniform Delay, d1		28.8					8.3	11.8	14.3	7.4	8.3	
Progression Factor		1.00					1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.4					0.7	2.3	7.5	1.6	2.6	
Delay (s)		31.2					8.9	14.0	21.7	8.9	10.9	
Level of Service		C					A	B	C	A	B	
Approach Delay (s)		31.2			0.0			17.9			10.7	
Approach LOS		C			A			B			B	

Intersection Summary

HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.91		1.00	0.99		1.00	1.00	0.91	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	
Frt	1.00	0.96		1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1723	2993		1723	3377		1723	3446	1403	1723	3386	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1723	2993		1723	3377		1723	3446	1403	1723	3386	
Volume (vph)	27	504	207	220	500	30	135	235	487	117	1073	67
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	27	504	207	220	500	30	135	235	487	117	1073	67
RTOR Reduction (vph)	0	40	0	0	4	0	0	0	0	0	4	0
Lane Group Flow (vph)	27	671	0	220	526	0	135	235	487	117	1136	0
Confl. Peds. (#/hr)	104		171	171		104	60		187	187		60
Confl. Bikes (#/hr)			97			62			115			92
Turn Type	Prot			Prot			Prot		Free	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									Free			
Actuated Green, G (s)	22.0	25.0		22.0	25.0		9.0	33.0	110.0	14.0	38.0	
Effective Green, g (s)	23.0	26.0		23.0	26.0		10.0	34.0	110.0	15.0	39.0	
Actuated g/C Ratio	0.21	0.24		0.21	0.24		0.09	0.31	1.00	0.14	0.35	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	360	707		360	798		157	1065	1403	235	1200	
v/s Ratio Prot	0.02	c0.22		c0.13	0.16		c0.08	0.07		0.07	c0.34	
v/s Ratio Perm									0.35			
v/c Ratio	0.07	0.95		0.61	0.66		0.86	0.22	0.35	0.50	0.95	
Uniform Delay, d1	35.0	41.3		39.4	38.0		49.3	28.2	0.0	44.0	34.5	
Progression Factor	0.94	1.01		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	21.6		7.5	4.2		42.2	0.5	0.7	7.4	16.0	
Delay (s)	33.0	63.3		47.0	42.2		91.5	28.7	0.7	51.4	50.5	
Level of Service	C	E		D	D		F	C	A	D	D	
Approach Delay (s)		62.2			43.6			22.7			50.6	
Approach LOS		E			D			C			D	

Intersection Summary

HCM Average Control Delay	44.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.7%	ICU Level of Service	E	
Analysis Period (min)	15			

c   Critical Lane Group

IBI Group

17: University Avenue & Oxford Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.78		1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00		0.98		1.00	1.00		0.91	1.00	
Frt	1.00	1.00	0.85		0.99		1.00	1.00		1.00	0.98	
Flt Protected	0.95	0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1643	1200		1734		1723	3410		1565	3300	
Flt Permitted	0.39	0.39	1.00		0.81		0.09	1.00		0.50	1.00	
Satd. Flow (perm)	670	671	1200		1427		163	3410		817	3300	
Volume (vph)	452	27	112	95	317	29	114	429	13	66	1309	194
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	452	27	112	95	317	29	114	429	13	66	1309	194
RTOR Reduction (vph)	0	0	70	0	3	0	0	2	0	0	13	0
Lane Group Flow (vph)	226	253	42	0	438	0	114	440	0	66	1490	0
Confl. Peds. (#/hr)	10		147	147		10	117		83	83		117
Confl. Bikes (#/hr)			79			13			41			80
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.0	33.0	33.0		33.0		49.0	49.0		40.5	40.5	
Effective Green, g (s)	34.0	34.0	34.0		34.0		50.0	50.0		41.5	41.5	
Actuated g/C Ratio	0.38	0.38	0.38		0.38		0.56	0.56		0.46	0.46	
Clearance Time (s)	4.0	4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	253	253	453		539		186	1894		377	1522	
v/s Ratio Prot							c0.04	0.13			c0.45	
v/s Ratio Perm	0.34	c0.38	0.04		0.31		0.30			0.08		
v/c Ratio	0.89	1.00	0.09		0.81		0.61	0.23		0.18	0.98	
Uniform Delay, d1	26.3	28.0	18.1		25.1		18.5	10.2		14.2	23.8	
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	34.6	56.6	0.4		12.6		14.2	0.3		1.0	18.6	
Delay (s)	60.9	84.6	18.5		37.7		32.6	10.5		15.2	42.4	
Level of Service	E	F	B		D		C	B		B	D	
Approach Delay (s)		63.0			37.7			15.0			41.3	
Approach LOS		E			D			B			D	

Intersection Summary

HCM Average Control Delay	40.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	106.8%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

SYNCHRO FILES – YEAR 2030 MITIGATION MEASURES – PM PEAK HOUR

IBI
GROUP

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱	↰	↱			↰↑↱			↰↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0	3.0	3.0			3.0			3.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.95	
Frpb, ped/bikes		1.00	0.93	1.00	1.00			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	0.98	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.98			1.00	
Flt Protected		0.99	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1799	1436	1694	1803			3296			3429	
Flt Permitted		0.63	1.00	0.29	1.00			0.56			0.88	
Satd. Flow (perm)		1143	1436	511	1803			1878			3026	
Volume (vph)	67	432	196	249	582	17	249	995	209	14	961	19
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	432	196	249	582	17	249	995	209	14	961	19
RTOR Reduction (vph)	0	0	34	0	2	0	0	25	0	0	3	0
Lane Group Flow (vph)	0	499	162	249	597	0	0	1428	0	0	991	0
Confl. Peds. (#/hr)	51		57	57		51	33		42	42		33
Confl. Bikes (#/hr)			30			24			22			13
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			25.0			25.0	
Effective Green, g (s)		23.0	23.0	23.0	23.0			26.0			26.0	
Actuated g/C Ratio		0.42	0.42	0.42	0.42			0.47			0.47	
Clearance Time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		478	601	214	754			888			1430	
v/s Ratio Prot					0.33							
v/s Ratio Perm		0.44	0.11	c0.49				c0.76			0.33	
v/c Ratio		1.04	0.27	1.16	0.79			1.61			0.69	
Uniform Delay, d1		16.0	10.5	16.0	13.9			14.5			11.4	
Progression Factor		1.00	1.00	1.14	1.05			1.00			1.00	
Incremental Delay, d2		53.1	1.1	112.7	8.3			279.0			2.8	
Delay (s)		69.1	11.6	130.9	23.0			293.5			14.2	
Level of Service		E	B	F	C			F			B	
Approach Delay (s)		52.9			54.7			293.5			14.2	
Approach LOS		D			D			F			B	

Intersection Summary

HCM Average Control Delay	131.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	144.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			1.00	0.96	1.00	0.99		1.00	1.00	0.90
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.98	1.00		0.99	1.00	1.00
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1712	1675			1790	1479	1696	3371		1707	3446	1386
Flt Permitted	0.27	1.00			0.75	1.00	0.23	1.00		0.12	1.00	1.00
Satd. Flow (perm)	493	1675			1353	1479	417	3371		212	3446	1386
Volume (vph)	183	280	149	91	418	144	228	1103	107	202	878	169
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	183	280	149	91	418	144	228	1103	107	202	878	169
RTOR Reduction (vph)	0	27	0	0	0	18	0	10	0	0	0	87
Lane Group Flow (vph)	183	402	0	0	509	126	228	1200	0	202	878	82
Confl. Peds. (#/hr)	20		59	59		20	42		83	83		42
Confl. Bikes (#/hr)			16			20			17			22
Turn Type	Perm			Perm		Perm	Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	29.0	29.0			29.0	29.0	33.0	33.0		33.0	33.0	33.0
Effective Green, g (s)	30.0	30.0			30.0	30.0	34.0	34.0		34.0	34.0	34.0
Actuated g/C Ratio	0.43	0.43			0.43	0.43	0.49	0.49		0.49	0.49	0.49
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	211	718			580	634	203	1637		103	1674	673
v/s Ratio Prot		0.24						0.36			0.25	
v/s Ratio Perm	0.37				c0.38	0.09	0.55			c0.95		0.06
v/c Ratio	0.87	0.56			0.88	0.20	1.12	0.73		1.96	0.52	0.12
Uniform Delay, d1	18.2	15.0			18.3	12.5	18.0	14.4		18.0	12.4	9.8
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	35.1	3.1			17.0	0.7	100.2	2.9		465.6	1.2	0.4
Delay (s)	53.3	18.2			35.3	13.2	118.2	17.3		483.6	13.6	10.2
Level of Service	D	B			D	B	F	B		F	B	B
Approach Delay (s)		28.7			30.4			33.3			89.2	
Approach LOS		C			C			C			F	

Intersection Summary

HCM Average Control Delay	49.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.45			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	113.9%	ICU Level of Service	H	
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↲↑	↱	↰	↑↱		↰	↱			⊕	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes		1.00	0.78	1.00	0.99		1.00	0.95			1.00	
Flpb, ped/bikes		1.00	1.00	0.98	1.00		0.99	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.93			0.99	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)		3436	1201	1688	3409		1702	1604			1778	
Flt Permitted		0.88	1.00	0.15	1.00		0.51	1.00			0.96	
Satd. Flow (perm)		3042	1201	273	3409		908	1604			1705	
Volume (vph)	43	1178	306	25	926	28	450	253	234	25	285	27
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	1178	306	25	926	28	450	253	234	25	285	27
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1221	306	25	954	0	450	487	0	0	337	0
Confl. Peds. (#/hr)	128		129	129		128	28		99	99		28
Confl. Bikes (#/hr)			41			41			15			
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		25.0	25.0	25.0	25.0		27.0	27.0			27.0	
Effective Green, g (s)		26.0	26.0	26.0	26.0		28.0	28.0			28.0	
Actuated g/C Ratio		0.43	0.43	0.43	0.43		0.47	0.47			0.47	
Clearance Time (s)		4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)		1318	520	118	1477		424	749			796	
v/s Ratio Prot					0.28			0.30				
v/s Ratio Perm		c0.40	0.25	0.09			c0.50				0.20	
v/c Ratio		0.93	0.59	0.21	0.65		1.06	0.65			0.42	
Uniform Delay, d1		16.1	12.9	10.6	13.4		16.0	12.3			10.6	
Progression Factor		1.00	1.00	0.74	0.68		1.00	1.00			1.00	
Incremental Delay, d2		12.5	4.8	3.2	1.7		60.9	4.3			1.6	
Delay (s)		28.6	17.8	11.0	10.9		76.9	16.6			12.3	
Level of Service		C	B	B	B		E	B			B	
Approach Delay (s)		26.4			10.9			45.6			12.3	
Approach LOS		C			B			D			B	

Intersection Summary

HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	125.4%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⬅	↗		⬌		↖	↱		↖	↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.66		0.86		1.00	0.94		1.00	0.90	
Flpb, ped/bikes		0.97	1.00		0.99		0.91	1.00		0.94	1.00	
Frt		1.00	0.85		0.95		1.00	0.97		1.00	0.94	
Flt Protected		0.99	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1742	1024		1459		1561	1665		1620	1533	
Flt Permitted		0.80	1.00		0.94		0.35	1.00		0.15	1.00	
Satd. Flow (perm)		1404	1024		1376		575	1665		262	1533	
Volume (vph)	92	326	101	49	300	191	147	620	133	130	276	201
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	92	326	101	49	300	191	147	620	133	130	276	201
RTOR Reduction (vph)	0	0	53	0	28	0	0	14	0	0	31	0
Lane Group Flow (vph)	0	418	48	0	512	0	147	739	0	130	446	0
Confl. Peds. (#/hr)	296		250	250		296	293		232	230		293
Confl. Bikes (#/hr)			16			23			31			16
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	22.0		22.0		25.0	25.0		25.0	25.0	
Effective Green, g (s)		23.0	23.0		23.0		26.0	26.0		26.0	26.0	
Actuated g/C Ratio		0.42	0.42		0.42		0.47	0.47		0.47	0.47	
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		587	428		575		272	787		124	725	
v/s Ratio Prot								0.44			0.29	
v/s Ratio Perm		0.30	0.05		c0.37		0.26			c0.50		
v/c Ratio		0.71	0.11		0.89		0.54	0.94		1.05	0.62	
Uniform Delay, d1		13.3	9.8		14.8		10.3	13.7		14.5	10.8	
Progression Factor		1.00	1.00		0.96		0.96	0.95		1.00	1.00	
Incremental Delay, d2		7.2	0.5		17.9		0.7	2.9		94.4	3.9	
Delay (s)		20.4	10.3		32.1		10.6	15.9		108.9	14.7	
Level of Service		C	B		C		B	B		F	B	
Approach Delay (s)		18.5			32.1			15.0			34.8	
Approach LOS		B			C			B			C	

Intersection Summary

HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	120.8%	ICU Level of Service	H
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔					↰	↑↑			↑	↗
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0			3.0	3.0
Lane Util. Factor		1.00					1.00	0.95			1.00	1.00
Frpb, ped/bikes		0.52					1.00	1.00			1.00	0.63
Flpb, ped/bikes		0.81					0.90	1.00			1.00	1.00
Frt		0.91					1.00	1.00			1.00	0.85
Flt Protected		0.98					0.95	1.00			1.00	1.00
Satd. Flow (prot)		690					1553	3441			1814	977
Flt Permitted		0.98					0.18	1.00			1.00	1.00
Satd. Flow (perm)		690					294	3441			1814	977
Volume (vph)	137	0	273	0	0	0	131	1062	3	0	611	153
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	137	0	273	0	0	0	131	1062	3	0	611	153
RTOR Reduction (vph)	0	14	0	0	0	0	0	1	0	0	0	89
Lane Group Flow (vph)	0	396	0	0	0	0	131	1064	0	0	611	64
Confl. Peds. (#/hr)	670		1152	1152		670	265		261	261		256
Confl. Bikes (#/hr)			84									54
Turn Type	Perm						Perm					Perm
Protected Phases		4						2			6	
Permitted Phases	4						2					6
Actuated Green, G (s)		25.0					22.0	22.0			22.0	22.0
Effective Green, g (s)		26.0					23.0	23.0			23.0	23.0
Actuated g/C Ratio		0.47					0.42	0.42			0.42	0.42
Clearance Time (s)		4.0					4.0	4.0			4.0	4.0
Lane Grp Cap (vph)		326					123	1439			759	409
v/s Ratio Prot								0.31			0.34	
v/s Ratio Perm		0.57					c0.45					0.07
v/c Ratio		1.21					1.07	0.74			0.81	0.16
Uniform Delay, d1		14.5					16.0	13.5			14.0	10.0
Progression Factor		1.14					1.00	1.00			1.00	1.00
Incremental Delay, d2		110.4					99.7	3.5			8.9	0.8
Delay (s)		127.0					115.7	16.9			22.9	10.8
Level of Service		F					F	B			C	B
Approach Delay (s)		127.0			0.0			27.7			20.5	
Approach LOS		F			A			C			C	

Intersection Summary

HCM Average Control Delay	42.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⊕			⊿	↗	↖	↑	↗	↖	↑	↗
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.91			1.00	0.59	1.00	1.00	0.59	1.00	1.00	0.31
Flpb, ped/bikes		0.96			0.96	1.00	1.00	1.00	1.00	0.93	1.00	1.00
Frt		0.96			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1504			1728	911	1723	1814	912	1596	1814	470
Flt Permitted		0.88			0.84	1.00	0.11	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)		1332			1476	911	202	1814	912	283	1814	470
Volume (vph)	62	171	113	77	245	172	98	787	213	222	903	172
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	62	171	113	77	245	172	98	787	213	222	903	172
RTOR Reduction (vph)	0	1	0	0	0	1	0	0	27	0	0	24
Lane Group Flow (vph)	0	345	0	0	322	171	98	787	186	222	903	148
Confl. Peds. (#/hr)	262		286	387		262	918		871	871		918
Confl. Bikes (#/hr)			43			15			74			78
Turn Type	Perm			Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		22.0			22.0	22.0	35.0	35.0	35.0	35.0	35.0	35.0
Effective Green, g (s)		23.0			23.0	23.0	36.0	36.0	36.0	36.0	36.0	36.0
Actuated g/C Ratio		0.35			0.35	0.35	0.55	0.55	0.55	0.55	0.55	0.55
Clearance Time (s)		4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)		471			522	322	112	1005	505	157	1005	260
v/s Ratio Prot								0.43			0.50	
v/s Ratio Perm		c0.26			0.22	0.19	0.49		0.20	c0.79		0.31
v/c Ratio		0.73			0.62	0.53	0.88	0.78	0.37	1.41	0.90	0.57
Uniform Delay, d1		18.3			17.4	16.7	12.6	11.4	8.1	14.5	12.9	9.4
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		9.7			5.4	6.1	56.2	6.1	2.1	219.5	12.5	8.7
Delay (s)		28.0			22.7	22.8	68.8	17.5	10.2	234.0	25.3	18.2
Level of Service		C			C	C	E	B	B	F	C	B
Approach Delay (s)		28.0			22.8			20.7			60.1	
Approach LOS		C			C			C			E	

Intersection Summary				
HCM Average Control Delay	37.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.15			
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	109.5%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

IBI Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↱	↰	↱		↰	↑			↑↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor			1.00	1.00	1.00		1.00	1.00			0.95	
Frpb, ped/bikes			0.94	1.00	0.98		1.00	1.00			0.95	
Flpb, ped/bikes			1.00	0.96	1.00		0.91	1.00			1.00	
Frt			0.86	1.00	0.92		1.00	1.00			0.98	
Flt Protected			1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)			1478	1651	1627		1573	1814			3232	
Flt Permitted			1.00	0.95	1.00		0.20	1.00			1.00	
Satd. Flow (perm)			1478	1651	1627		333	1814			3232	
Volume (vph)	0	0	42	322	253	298	97	941	0	0	863	101
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	42	322	253	298	97	941	0	0	863	101
RTOR Reduction (vph)	0	0	7	0	45	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	35	322	506	0	97	941	0	0	948	0
Confl. Peds. (#/hr)			56	56			40	329				329
Confl. Bikes (#/hr)			9				5					60
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			22.0	22.0	22.0		25.0	25.0			25.0	
Effective Green, g (s)			23.0	23.0	23.0		26.0	26.0			26.0	
Actuated g/C Ratio			0.42	0.42	0.42		0.47	0.47			0.47	
Clearance Time (s)			4.0	4.0	4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)			618	690	680		157	858			1528	
v/s Ratio Prot					c0.31			c0.52			0.29	
v/s Ratio Perm			0.02	0.20			0.29					
v/c Ratio			0.06	0.47	0.74		0.62	1.10			0.62	
Uniform Delay, d1			9.5	11.6	13.5		10.8	14.5			10.8	
Progression Factor			1.00	1.00	1.00		1.73	2.03			1.00	
Incremental Delay, d2			0.2	2.3	7.3		9.5	53.9			1.9	
Delay (s)			9.7	13.8	20.8		28.1	83.3			12.7	
Level of Service			A	B	C		C	F			B	
Approach Delay (s)		9.7			18.2			78.2			12.7	
Approach LOS		A			B			E			B	

Intersection Summary

HCM Average Control Delay	37.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.93			
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	91.8%	ICU Level of Service	F	
Analysis Period (min)	15			

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↱					↰	↑	↱	↰	↱	
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)		3.0					3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor		0.95					1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.99					1.00	1.00	0.75	1.00	0.98	
Flpb, ped/bikes		1.00					1.00	1.00	1.00	1.00	1.00	
Frt		0.95					1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99					0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3219					1723	1814	1161	1723	1778	
Flt Permitted		0.99					0.17	1.00	1.00	0.11	1.00	
Satd. Flow (perm)		3219					316	1814	1161	204	1778	
Volume (vph)	63	221	124	0	0	0	114	982	309	139	1022	31
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	221	124	0	0	0	114	982	309	139	1022	31
RTOR Reduction (vph)	0	44	0	0	0	0	0	0	82	0	1	0
Lane Group Flow (vph)	0	364	0	0	0	0	114	982	227	139	1052	0
Confl. Peds. (#/hr)	21		20				212		156	156		212
Confl. Bikes (#/hr)			4						27			27
Turn Type	Split						Perm		Perm	pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		22.0					70.0	70.0	70.0	80.0	80.0	
Effective Green, g (s)		23.0					71.0	71.0	71.0	81.0	81.0	
Actuated g/C Ratio		0.21					0.65	0.65	0.65	0.74	0.74	
Clearance Time (s)		4.0					4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)		673					204	1171	749	247	1309	
v/s Ratio Prot		c0.11						c0.54		0.04	c0.59	
v/s Ratio Perm							0.36		0.20	0.38		
v/c Ratio		0.54					0.56	0.84	0.30	0.56	0.80	
Uniform Delay, d1		38.8					10.8	15.1	8.6	17.4	9.4	
Progression Factor		1.00					1.00	1.00	1.00	1.85	1.04	
Incremental Delay, d2		3.1					10.6	7.3	1.0	7.5	4.5	
Delay (s)		41.9					21.4	22.3	9.6	39.8	14.2	
Level of Service		D					C	C	A	D	B	
Approach Delay (s)		41.9			0.0			19.5			17.2	
Approach LOS		D			A			B			B	

Intersection Summary

HCM Average Control Delay	21.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.97		1.00	1.00	0.91	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.94	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1723	3372		1723	3195		1707	3446	1405	1627	3405	
Flt Permitted	0.95	1.00		0.95	1.00		0.21	1.00	1.00	0.22	1.00	
Satd. Flow (perm)	1723	3372		1723	3195		375	3446	1405	370	3405	
Volume (vph)	24	529	45	572	573	205	51	861	480	262	831	47
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	24	529	45	572	573	205	51	861	480	262	831	47
RTOR Reduction (vph)	0	6	0	0	33	0	0	0	0	0	4	0
Lane Group Flow (vph)	24	568	0	572	745	0	51	861	480	262	874	0
Confl. Peds. (#/hr)	63		55	55		63	36		207	207		36
Confl. Bikes (#/hr)			36			37			79			16
Turn Type	Split			Split			Perm		Free	Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		Free	6		
Actuated Green, G (s)	22.0	22.0		27.0	27.0		49.0	49.0	110.0	49.0	49.0	
Effective Green, g (s)	23.0	23.0		28.0	28.0		50.0	50.0	110.0	50.0	50.0	
Actuated g/C Ratio	0.21	0.21		0.25	0.25		0.45	0.45	1.00	0.45	0.45	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	360	705		439	813		170	1566	1405	168	1548	
v/s Ratio Prot	0.01	c0.17		c0.33	0.23			0.25			0.26	
v/s Ratio Perm							0.14		0.34	c0.71		
v/c Ratio	0.07	0.81		1.30	0.92		0.30	0.55	0.34	1.56	0.56	
Uniform Delay, d1	34.9	41.4		41.0	39.9		18.9	21.8	0.0	30.0	22.0	
Progression Factor	1.16	1.11		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	7.4		152.1	16.8		4.5	1.4	0.7	278.8	1.5	
Delay (s)	40.7	53.2		193.1	56.7		23.4	23.2	0.7	308.8	23.5	
Level of Service	D	D		F	E		C	C	A	F	C	
Approach Delay (s)		52.7			114.5			15.4			89.1	
Approach LOS		D			F			B			F	

Intersection Summary

HCM Average Control Delay	69.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		

c   Critical Lane Group

IBI Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↱	↰	↰	↑↑	↑↑	↰
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1723	1542	1723	3446	3446	1542
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1723	1542	1723	3446	3446	1542
Volume (vph)	473	166	305	1200	1422	282
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	473	166	305	1200	1422	282
RTOR Reduction (vph)	0	120	0	0	0	157
Lane Group Flow (vph)	473	46	305	1200	1422	125
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	24.0	24.0	15.0	58.0	39.0	39.0
Effective Green, g (s)	25.0	25.0	16.0	59.0	40.0	40.0
Actuated g/C Ratio	0.28	0.28	0.18	0.66	0.44	0.44
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	479	428	306	2259	1532	685
v/s Ratio Prot	c0.27		c0.18	0.35	c0.41	
v/s Ratio Perm		0.03				0.08
v/c Ratio	0.99	0.11	1.00	0.53	0.93	0.18
Uniform Delay, d1	32.3	24.2	37.0	8.2	23.6	15.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.1	0.5	50.6	0.9	11.3	0.6
Delay (s)	70.5	24.7	87.6	9.1	34.9	15.7
Level of Service	E	C	F	A	C	B
Approach Delay (s)	58.6			25.0	31.7	
Approach LOS	E			C	C	

Intersection Summary

HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c   Critical Lane Group