

OPERATIONS AND MAINTENANCE FACILITY TRAFFIC ANALYSIS

West Valley
Connector Project



cta

San Bernardino County
Transportation Authority



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1.0 INTRODUCTION

The San Bernardino County Transportation Authority (SBCTA), in cooperation with the cities of Pomona, Montclair, Ontario, Rancho Cucamonga, and Fontana, proposes construction of the West Valley Connector (WVC) Project, a 35-mile-long Bus Rapid Transit BRT project that will decrease travel times and improve the existing public transit system within the corridor.

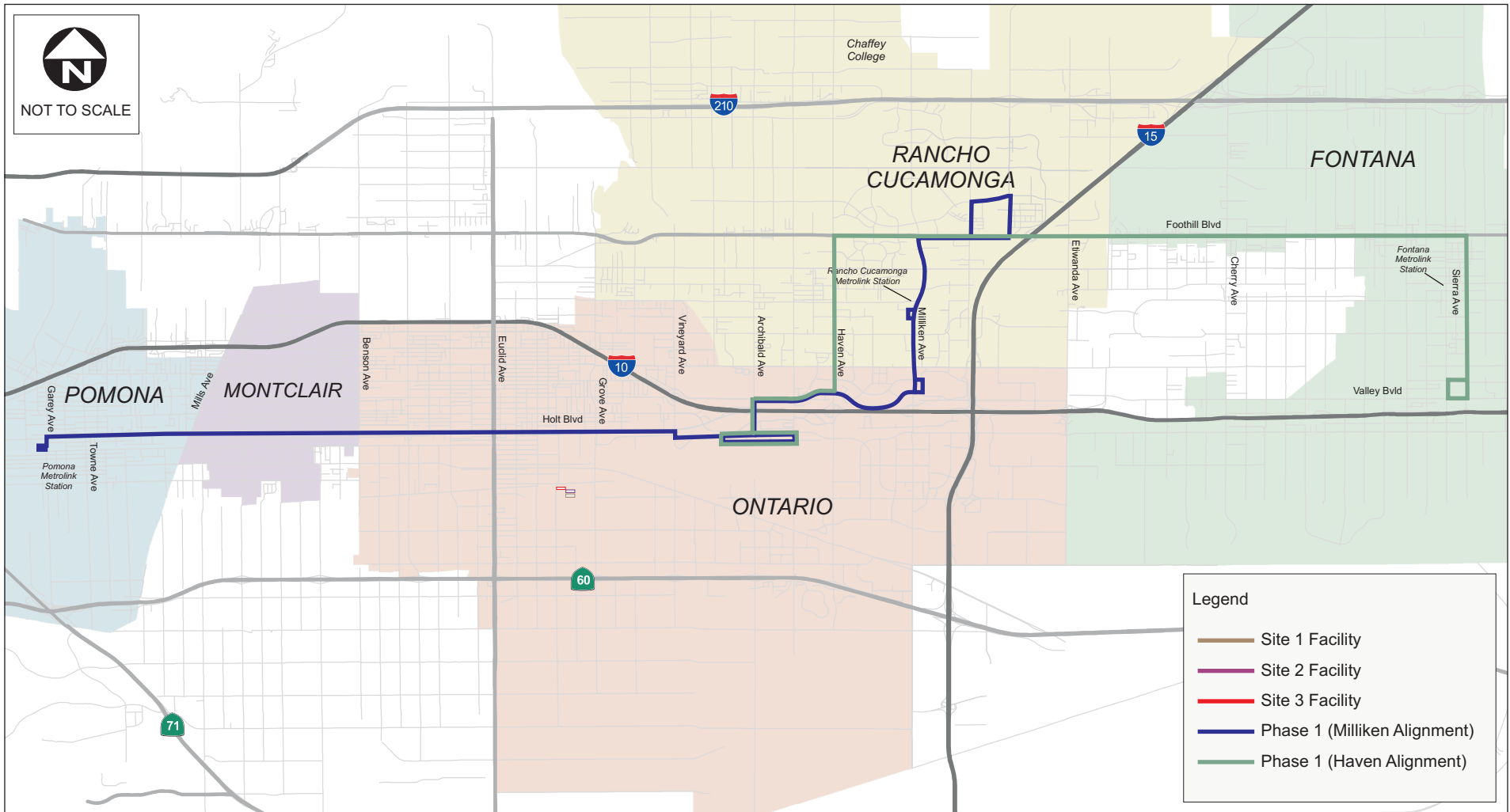
In January, 2017, SBCTA entered into a cooperative agreement with Omnitrans designating SBCTA as the lead agency for the proposed WVC Project. SBCTA intends to construct the WVC, which will then be operated by Omnitrans. SBCTA has the authority to allocate Federal Transit Administration (FTA) funds; however, it does not have the ability to receive funds directly from the FTA. Omnitrans is the direct FTA grantee for the San Bernardino Valley. As a result, SBCTA and Omnitrans have developed a successful direct recipient/sub-recipient working relationship to deliver projects with FTA funds. The current relationship allows the delivery of FTA-funded projects that meet FTA requirements without duplicating staff, assuring the best use of limited public funds available. Omnitrans and SBCTA executed Memorandum of Understanding (MOU) 15-1001289 in October 2015, setting forth the roles and responsibilities of the recipient/sub-recipient relationship.

The project is subject to state and federal environmental review requirements because it involves the use of federal funds from the Federal Transit Administration (FTA). An Environmental Impact Report (EIR)/Environmental Assessment (EA) has been prepared for the proposed project in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). SBCTA is the CEQA lead agency, and FTA is the NEPA lead agency.

The West Valley Connector line would primarily run along Holt Avenue/Boulevard, Milliken Avenue, Foothill Boulevard, and Sierra Avenue through the cities mentioned. It would consist of two phases. On the west end of the line, in the City of Pomona, the Phase 1 route would begin at the Pomona Metrolink station. On the east end, the Phase 2 route would terminate and subsequently loop back at the Kaiser Permanente medical facility along Sierra Avenue in the City of Fontana. **Figure 1** shows the overall study area and the proposed alignments of the West Valley Connector line for Phases 1 and 2. The proposed project studies two phases with varying alignments which includes six build alternatives. Four of the build alternatives consist of center-running bus lanes, raised medians, and left-turn access restrictions within the City of Ontario.

Omnitrans operates and maintains its existing bus fleets from two major Operations and Maintenance (O&M) facilities: East Valley Vehicle Maintenance Facility (EVVMF), located at 1700 W. 5th Street in the City of San Bernardino and West Valley Vehicle Maintenance Facility (WVVMF), located at 4748 E. Arrow Highway in the City of Montclair. EVVMF is a Level III facility capable of full maintenance of buses and WVVMF is a Level II facility suitable for light maintenance. Neither facility has sufficient capacity to accommodate the additional maintenance and storage requirements of the bus fleet associated with the proposed WVC Project.

The purpose of the new O&M facility is to provide operations and maintenance support to the existing full-service EVVMF. The new facility would be designed and constructed to provide Level I service maintenance with a capacity to be upgraded to provide Level II service maintenance. Heavy repair functions and administrative functions would remain exclusively with the EVVMF in San Bernardino.



2.0 PROJECT DESCRIPTION

Conceptually, the new O&M facility would be built on an approximate 5-acre site. The Level I facility would include a parking area, bus washing area, fueling area, and a personnel and storage building. As needs arise, the facility could be upgraded to provide Level II service, which will include the addition of a maintenance shop and a larger administrative building. Landscaping and irrigation would be provided to enhance the comfort of employees and the appearance of the facility, and to help screen maintenance facilities and operations from offsite viewpoints within the community. **Figure 2** shows the conceptual site plan of the Level II facility.

Three sites are being considered for the placement of the new O&M facility (see **Figure 3**). All are owned by the City of Ontario and are located in the industrial zoned area, slightly more than a mile from the proposed BRT corridor alignment on Holt Boulevard:

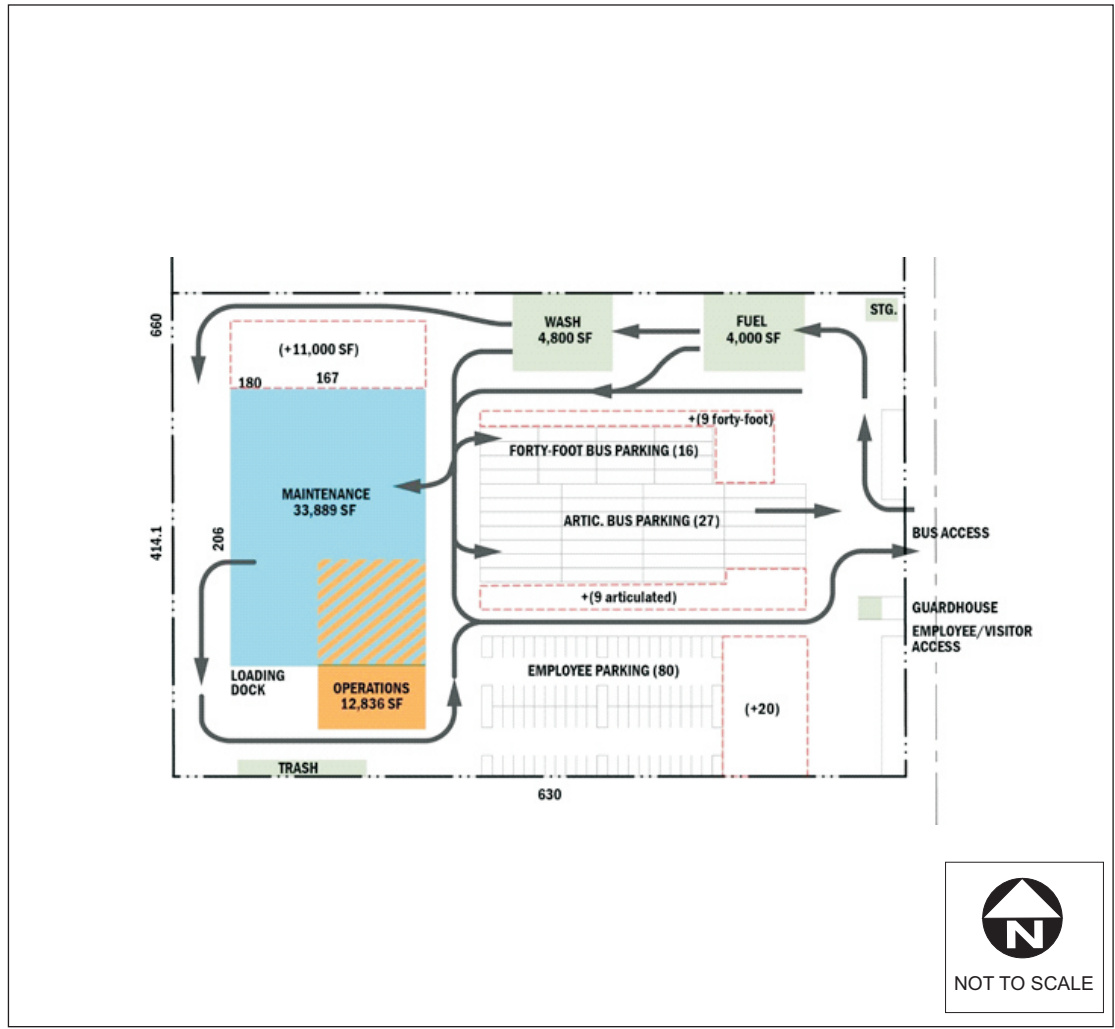
- Site 1: 1516 S. Cucamonga Avenue, Ontario (APN 1050-131-03-0000 and APN 1050-131-02-0000). The current use of this property is public works storage yard. If selected, the O&M facility will be built at the bottom portion of the parcel encompassing an area of approximately 6.0 acres.
- Site 2: 1440 S. Cucamonga Avenue, Ontario (APN 1050-141-07-0000). The current use of this property is compressed natural gas fueling station. If selected, the O&M facility will utilize the entire parcel encompassing an area of approximately 4.8 acres.
- Site 3: 1333 S. Bon View Avenue, Ontario (APN 1049-421-01-0000 and APN 1049-421-02-0000). The current use of this property is municipal utility and customer service center. If selected, the O&M facility will be built at the bottom portion of the parcel encompassing an area of approximately 6.6 acres.

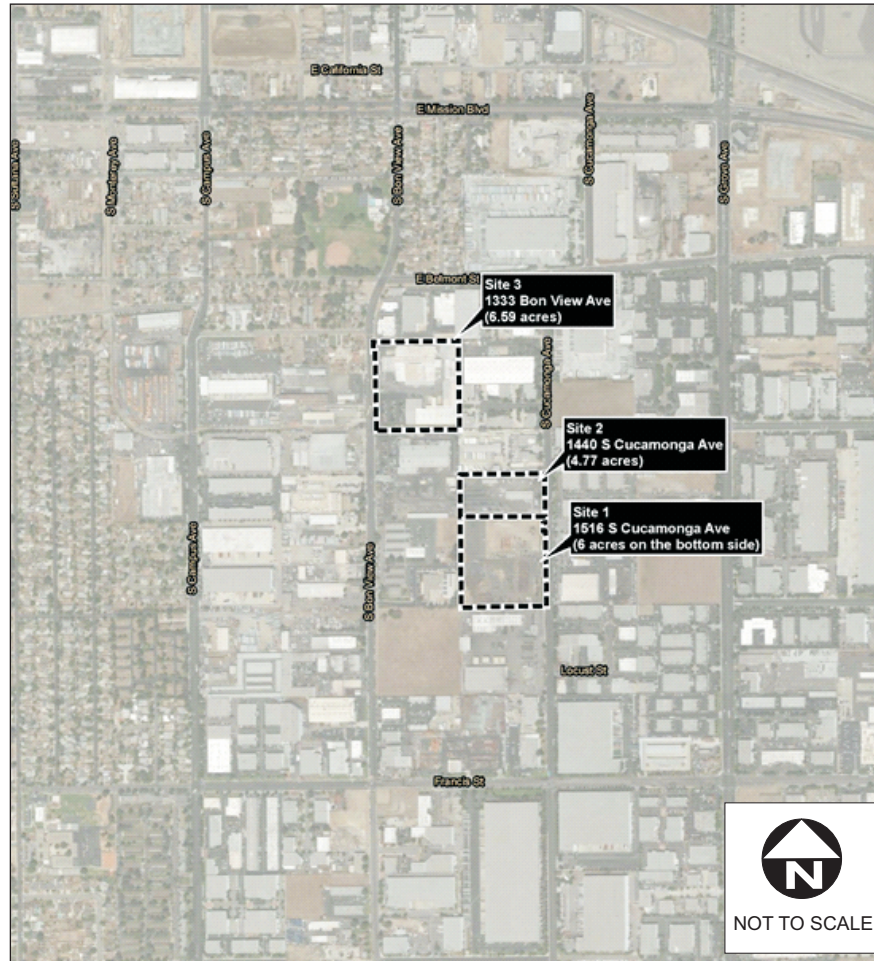
Buses coming to and from the new facility could use nearby access roads that directly connect to the BRT corridor such as South Campus Avenue, South Bon View Avenue, and South Grove Avenue. The O&M facility will be constructed during the same period as the Phase I/Milliken Alignment and would be open for operation at the same time as the Phase I alignment. Construction duration is estimated at 12 months.

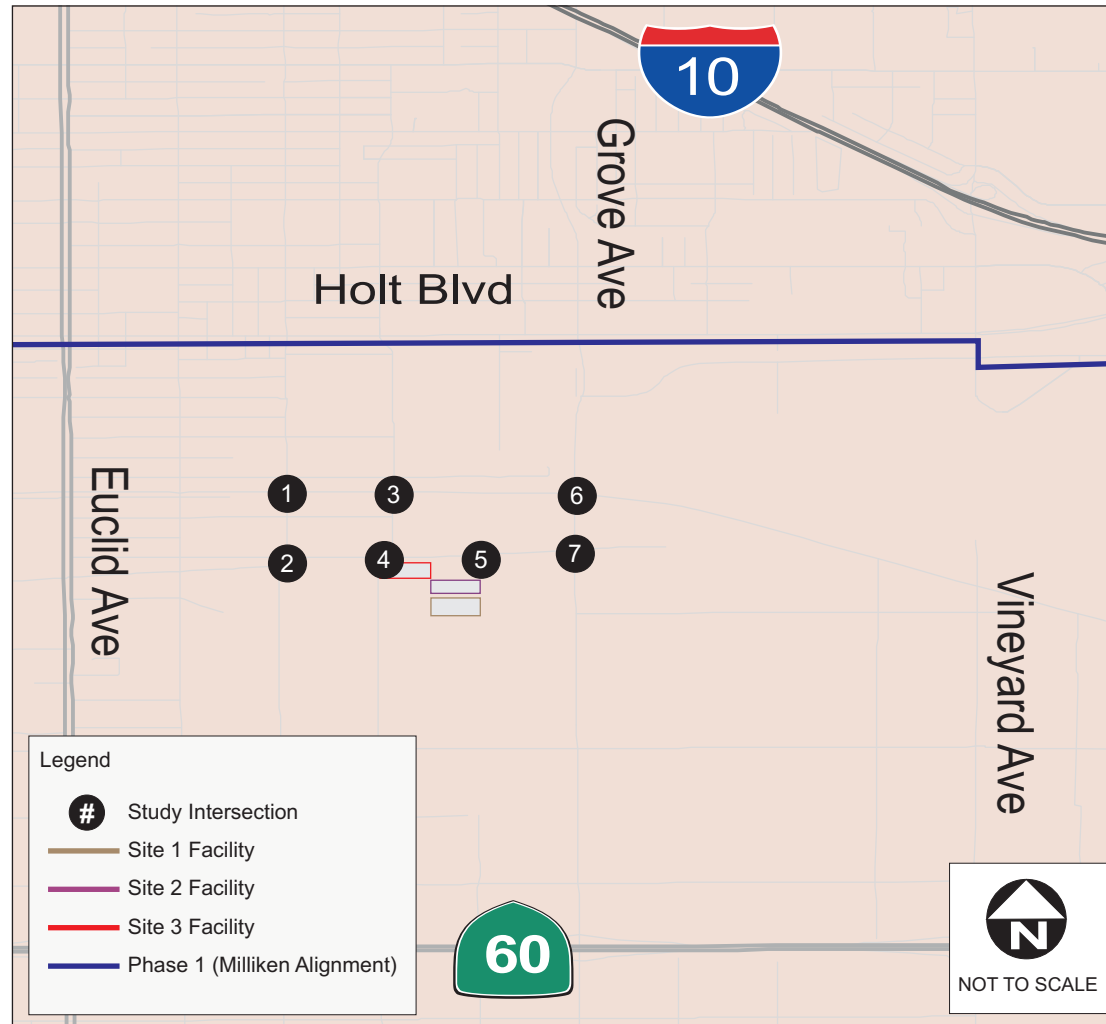
2.1 STUDY AREA

The project is located primarily at the eastern end of Los Angeles County in the city of Pomona and at the southwestern end of San Bernardino County in the cities of Montclair, Ontario, Rancho Cucamonga, and Fontana. There are seven study intersections analyzed in this report as a result of three proposed O&M facility site locations. The study area includes the following intersections, also shown in **Figure 4**:

1. Campus Avenue/Mission Boulevard;
2. Campus Avenue/Belmont Street;
3. Bon View Avenue/Mission Boulevard;
4. Bon View Avenue/Belmont Street;
5. Cucamonga Avenue/Belmont Street;
6. Grove Avenue/Mission Boulevard; and
7. Grove Avenue/Belmont Street;







3.0 TRAFFIC OPERATIONS METHODOLOGY

The quality of traffic operations is characterized using the concept of level of service (LOS). Level of service is defined by a range of grades from A (best) to F (worst). At intersections, LOS “A” represents relatively free operating conditions with little or no delay. LOS “F” is characterized by extremely unstable flow conditions and severe congestion with volumes at or near the intersection’s design capacity. This results in long queues backing up from all approaches to intersections.

Analysis of traffic operations were conducted using the San Bernardino Association of Governments (SANBAG) CMP Traffic Impact Analysis guidelines. SANBAG uses the Highway Capacity Manual (HCM) methodology for evaluation of intersection operating conditions. LOS analysis was calculated at the majority of the study area intersections using Synchro software. Within each scenario, network cycle lengths and splits were optimized. As a result, some intersections may show lower average vehicle delays in the build alternatives with additional bus trips, due to improved signal coordination. **Table 1** presents a brief description of each level of service letter grade, as well as the range of HCM average intersection delay associated with each grade for both signalized and unsignalized intersections.

TABLE 1: INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Signalized Intersection Delay (seconds per vehicle)	Unsignalized Intersection Delay (seconds per vehicle)
A	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.	≤ 10	≤ 10
B	Very good operation. Many drivers begin to feel somewhat restricted within platoons of vehicles. This represents stable flow. An approach to an intersection may occasionally be fully utilized and traffic queues start to form.	>10 and ≤ 20	>10 and ≤ 15
C	Good operation. Occasionally drivers may have to wait more than 60 seconds, and back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted.	>20 and ≤ 35	>15 and ≤ 25
D	Fair operation. Cars are sometimes required to wait more than 60 seconds during short peaks. There are no long-standing traffic queues.	>35 and ≤ 55	>25 and ≤ 35
E	Poor operation. Some long-standing vehicular queues develop on critical approaches to intersections. Delays may be up to several minutes.	>55 and ≤ 80	>35 and ≤ 50
F	Forced flow. Represents jammed conditions. Backups form locations downstream or on the cross street may restrict or prevent movement of vehicles out of the intersection approach lanes; therefore, volumes carried are not predictable. Potential for stop and go type traffic flow.	> 80	> 50

Source: *Highway Capacity Manual*, Special Report 209, Transportation Research Board, Washington, DC, 2000.

3.1 THRESHOLDS OF SIGNIFICANCE

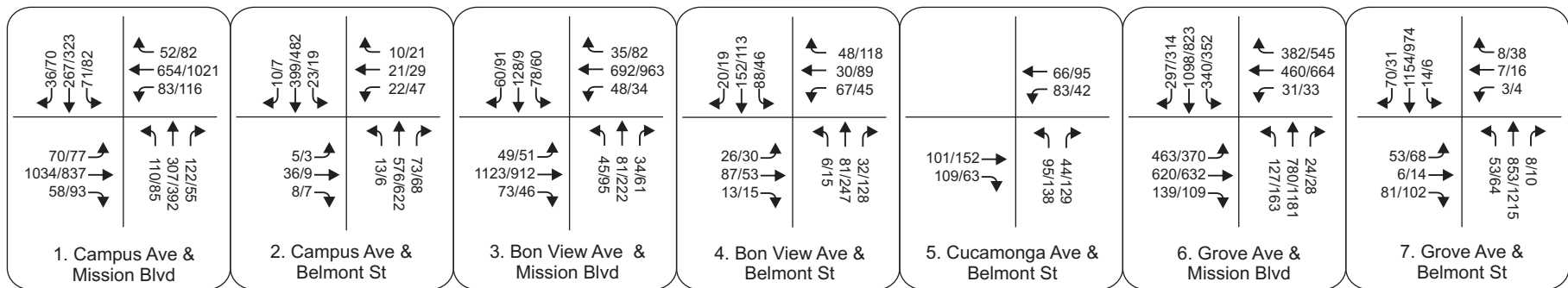
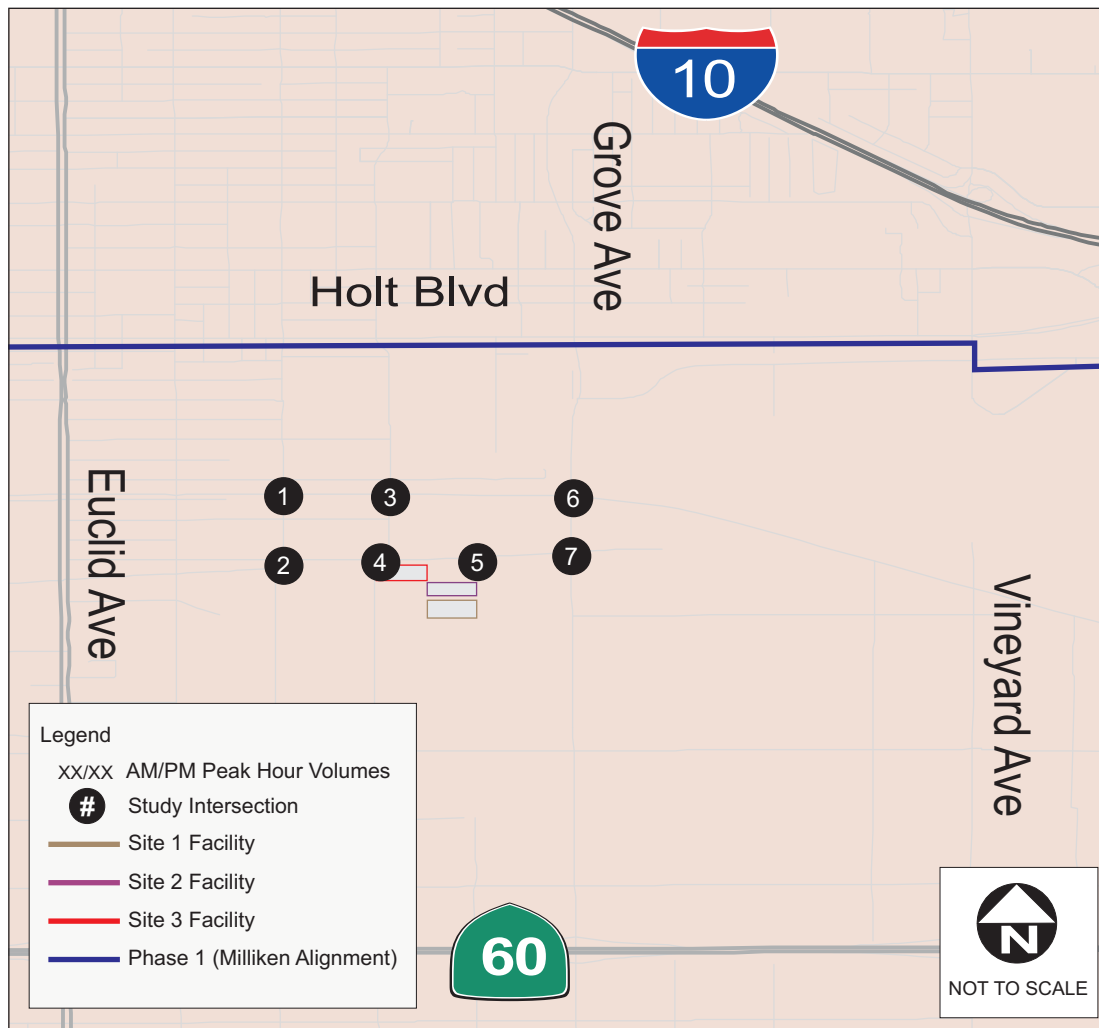
The jurisdictions within the study area consider LOS D as the minimum acceptable LOS to be used for all intersections. A significant impact is considered to occur if an intersection that is forecast to operate at LOS D or better in “No Build” conditions exceeds LOS D in “Build” conditions. In addition, a significant impact is considered to occur if the project results in any increase in delay at an intersection forecast to operate at LOS E or F in “No Build” conditions. The jurisdictions do not have specific significant impact criteria for unsignalized intersections.

4.0 TRAFFIC VOLUME DEVELOPMENT

This section summarizes the methodologies used to develop the existing and forecast future traffic volumes in the study area.

4.1 EXISTING VOLUMES

Existing traffic counts were collected on February 21, 2018 at the seven study intersections. Detailed vehicle classification counts (passenger vehicles, buses, 2-axle trucks, 3-axle trucks, and trucks with 4 or more axles) was used from a nearby intersection collected for the Traffic Operations Analysis report. Truck percentages from the intersection was used to calculate the vehicle classification counts at the seven study intersections. Traffic volumes at all study intersections were then converted to passenger car equivalent (PCE) volumes. PCE volumes are used to represent the greater impact that trucks have on traffic operations because of their larger size and generally slower acceleration than passenger vehicles. A PCE factor of 1.5 was used for 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for trucks with 4 or more axles. Existing traffic count data is provided in **Appendix A**. Existing a.m. and p.m. peak hour traffic volumes at the study intersections are illustrated in **Figure 5**.



4.2 TRAVEL DEMAND MODEL REFINEMENT AND POST-PROCESSING

This section describes the methodology used to develop future traffic volume forecasts in the study area using a travel-demand model. A key objective of the traffic modeling effort for this project was to maintain consistency with the traffic forecasts developed for the I-10 Corridor Study – PA/ED HOV and Express Lanes Project by the San Bernardino Association of Governments (SANBAG). The San Bernardino County Transportation Analysis Model (SBTAM) used for the I-10 Corridor Study – PA/ED HOV and Express Lanes Project was utilized for this project, including all base roadway network and demographic data assumptions.

SANBAG developed the SBTAM based on the SCAG RTP 2012 model. The SBTAM has been validated to Base Year 2008 conditions and has a horizon year of 2035. The SBTAM, which utilizes the TransCAD platform (version 5.0 r4), includes additional detail within San Bernardino County. The model has been recalibrated based on countywide traffic activity, with the screenline analysis showing that the model validates against base year counts along several screenlines in both the Valley and Mountain/Desert areas. SBTAM is a multi-modal model that can incorporate potential vehicle trip reductions as a result of a mode shift to transit use.

Future year 2040 forecasts were developed through the following process. Growth between the model's base year (2008) and horizon year (2035) volumes were extrapolated to represent traffic growth for the number of years between the existing traffic volumes and the project's design year using the following methodology:

- For each intersection approach, modeled 2008 turning movement volumes were subtracted from modeled 2035 volumes. This difference represents 27 years of model volume growth at each intersection.
- The 27 years of traffic volume growth were factored down linearly to develop 24 years of growth (representing 2016 to 2040) at each intersection turning movement.
- The 24 years of traffic volume growth were added to the 2016 traffic counts to obtain future year 2040 turning movement volumes.

Opening year 2023 traffic volumes were developed using growth rate factors extrapolated from the model growth between the 2008 and 2035 model scenarios. Note that the traffic analysis was prepared when 2020 was the estimated opening year. The current opening year estimate is 2023. Nevertheless, the traffic modeling forecasts volumes through 2040, and the results showed that a negligible traffic increase would occur between 2020 and 2023. Thus, a three-year delay in the opening date does not substantially alter this analysis.

5.0 EXISTING CONDITIONS

This section presents the existing environmental setting in addition to the intersection traffic levels of service in existing conditions as well as the three build alternatives in existing conditions. Peak hour traffic volumes at the study intersections for all of the build alternatives in existing conditions are provided in **Appendix C**.

5.1 EXISTING INTERSECTION LEVEL OF SERVICE ANALYSIS

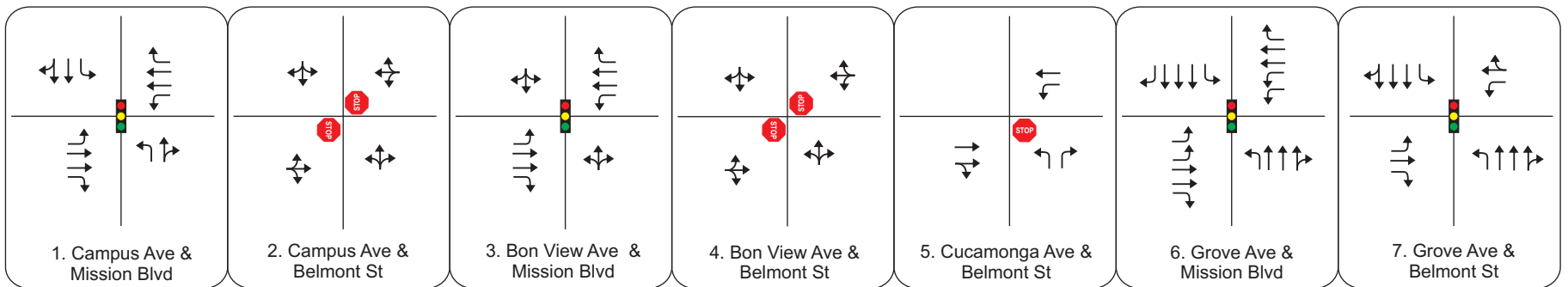
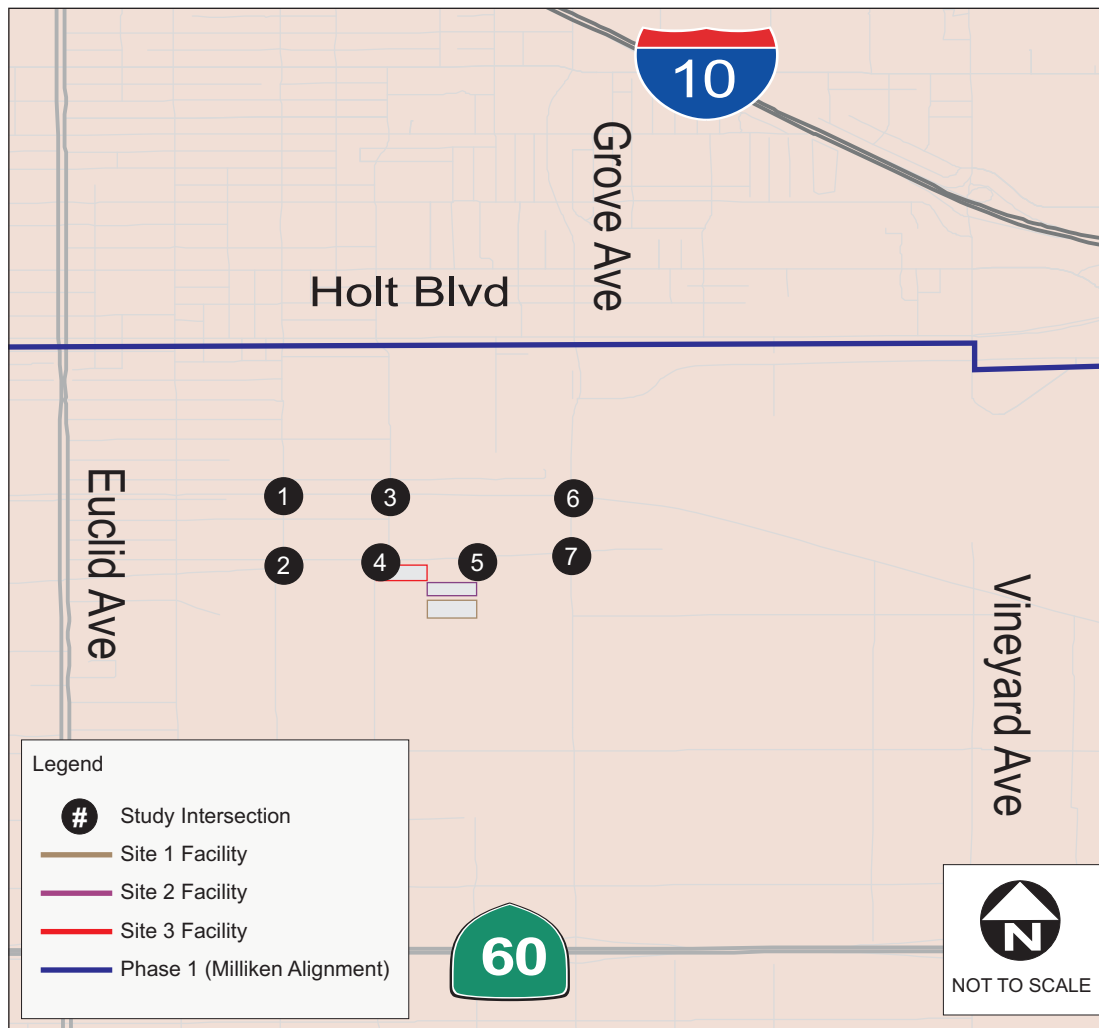
A level of service analysis was conducted to evaluate existing intersection operations during the a.m. and p.m. peak hours at the 7 study intersections using the methodologies described in Section 3. **Table 2** summarizes the existing peak hour intersection level of service at the study intersections. LOS calculations sheets are provided in **Appendix C**. **Figure 6** shows the existing intersection lane configurations along the Holt Boulevard segment within the City of Ontario where dedicated BRT lanes would be provided as part of the project.

TABLE 2: EXISTING INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Traffic Control	AM Peak Hour		PM Peak Hour	
			Delay (sec)	LOS	Delay (sec)	LOS
1	Campus Ave/Mission Blvd	Signalized	25.9	C	23.8	C
2	Campus Ave/Belmont St	Stop Control	64.9	F	73.1	F
3	Bon View Ave/Mission Blvd	Signalized	24.4	C	23.8	C
4	Bon View Ave/Belmont St	Stop Control	17.7	C	31.1	D
5	Cucamonga Ave/Belmont St	Stop Control	13.8	B	13.5	B
6	Grove Ave/Mission Blvd	Signalized	39.1	D	47.2	D
7	Grove Ave/Belmont St	Signalized	8.5	A	8.8	A

Note: LOS = level of service

As shown in **Table 2**, the unsignalized study intersection of Campus Avenue/Belmont Street is currently operating at LOS F.



6.0 PROPOSED PROJECT TRAFFIC

This section defines the traffic generated by the proposed O & M project in a three-step process including trip generation, trip distribution and trip assignment. The proposed project consists of three different options for O&M facility. Access to O&M facilities sites 1 and 2 would be provided along Cucamonga Avenue, south of Belmont Street. Access to O&M facility site 3 would be provided along Bon View Avenue, south of Belmont Street.

6.1 PROJECT TRIP GENERATION

Trip generation rates for the proposed O&M facility were calculated based on the number of staff members and bus operators stated in the “Needs Assessment Report” (December 2017). The results of this calculation are shown in **Table 3**.

TABLE 3: O&M FACILITY TRIP GENERATION

Trip Generation Component		AM Peak Hour Trips			PM Peak Hour Trips			Off-Peak Hour Trips			Daily Trips
		In	Out	Total	In	Out	Total	In	Out	Total	
Staff	Operations Staff	16	0	16	0	16	16	0	0	0	32
	Maintenance Staff	18	0	18	0	18	18	4	4	8	44
	Bus Operators	0	0	0	0	0	0	54	54	108	108
	Fueling/cleaning Staff	0	0	0	0	0	0	8	8	16	16
Bus	Bus Trips	0	0	0	0	0	0	24	24	48	48
	Bus Trips PCE-adjusted (3.0 factor)	0	0	0	0	0	0	72	72	144	144
Total (PCE-adjusted trips)		34	0	34	0	34	34	138	138	276	344

As shown in **Table 3**, the proposed project is forecast to generate 34 new a.m. peak hour trips, 34 new p.m. peak hour trips, 276 new off-peak hour trips and 344 new daily trips.

It is assumed that 80% of maintenance staff arrive at and depart the facility during the peak hours whereas 20% of the maintenance staff arrive during off-peak hours. The bus operators arrive at and depart the facility outside of peak hours due to the bus route run time from 6 a.m. to 8 p.m. The staff required for fueling and/or cleaning of the bus and facility are also assumed to arrive at and depart the facility outside of peak hours due to the nature of the work required. **Table 4** lists the potential daily timeline of inbound and outbound schedule of buses required for the West Valley Connector line based on shift occurrences. It is assumed that a typical shift for a bus operator is nine hours.

TABLE 4: TIMELINE OF BUS TRIPS AT O&M SITE

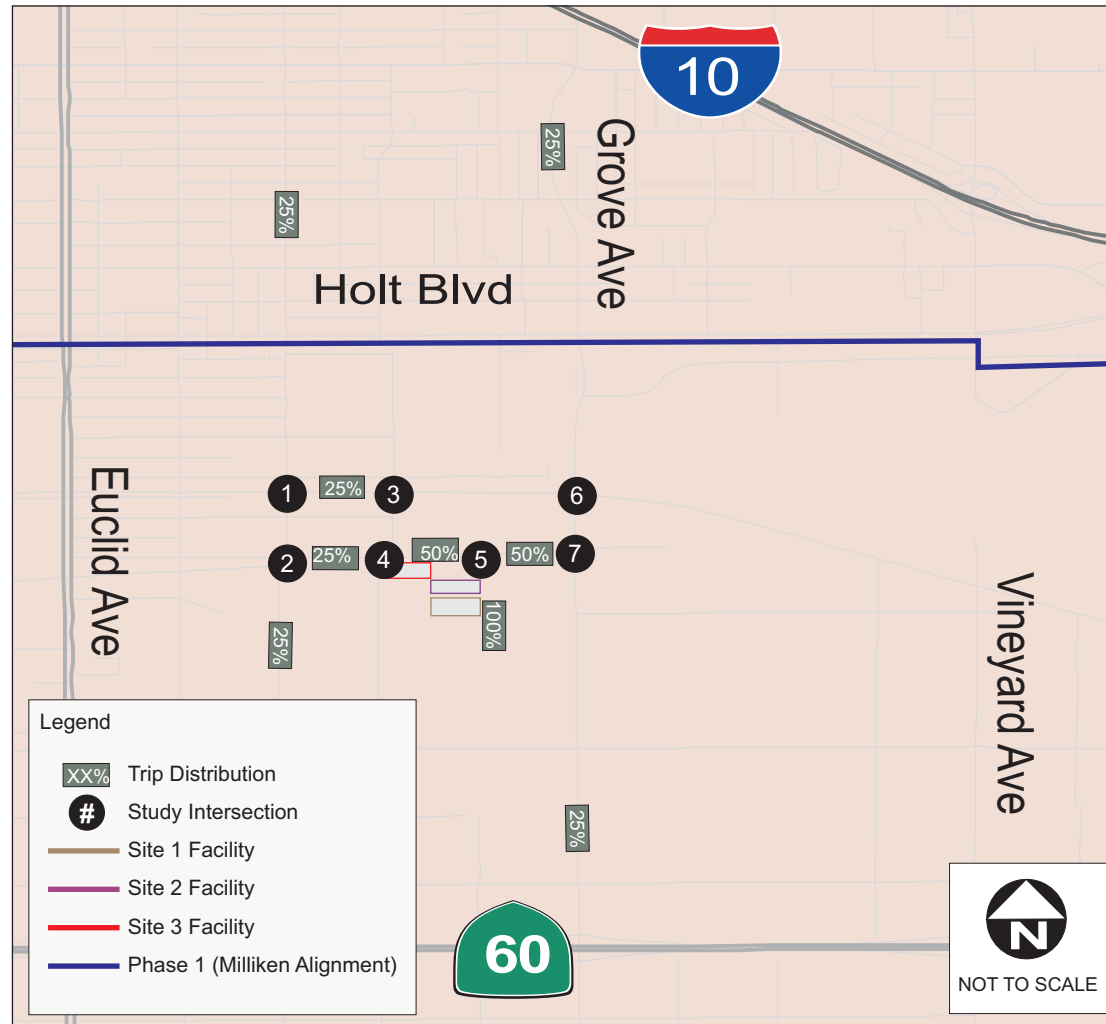
Timeline of Bus Trips at O & M Site			
Time of Day	Inbound	Outbound	Shift Occurrence Type
5:00 to 5:30 a.m.	-	12	AM Bus Peak start
11:00 a.m.	6	-	AM Bus Peak end
1:00 p.m.	-	6	New shift of operators
2:00 p.m.	6	-	End shift of operators
3:00 p.m.	-	6	PM Bus Peak start
8:30 to 9:00 p.m.	12	-	PM Peak end
Total	24	24	-

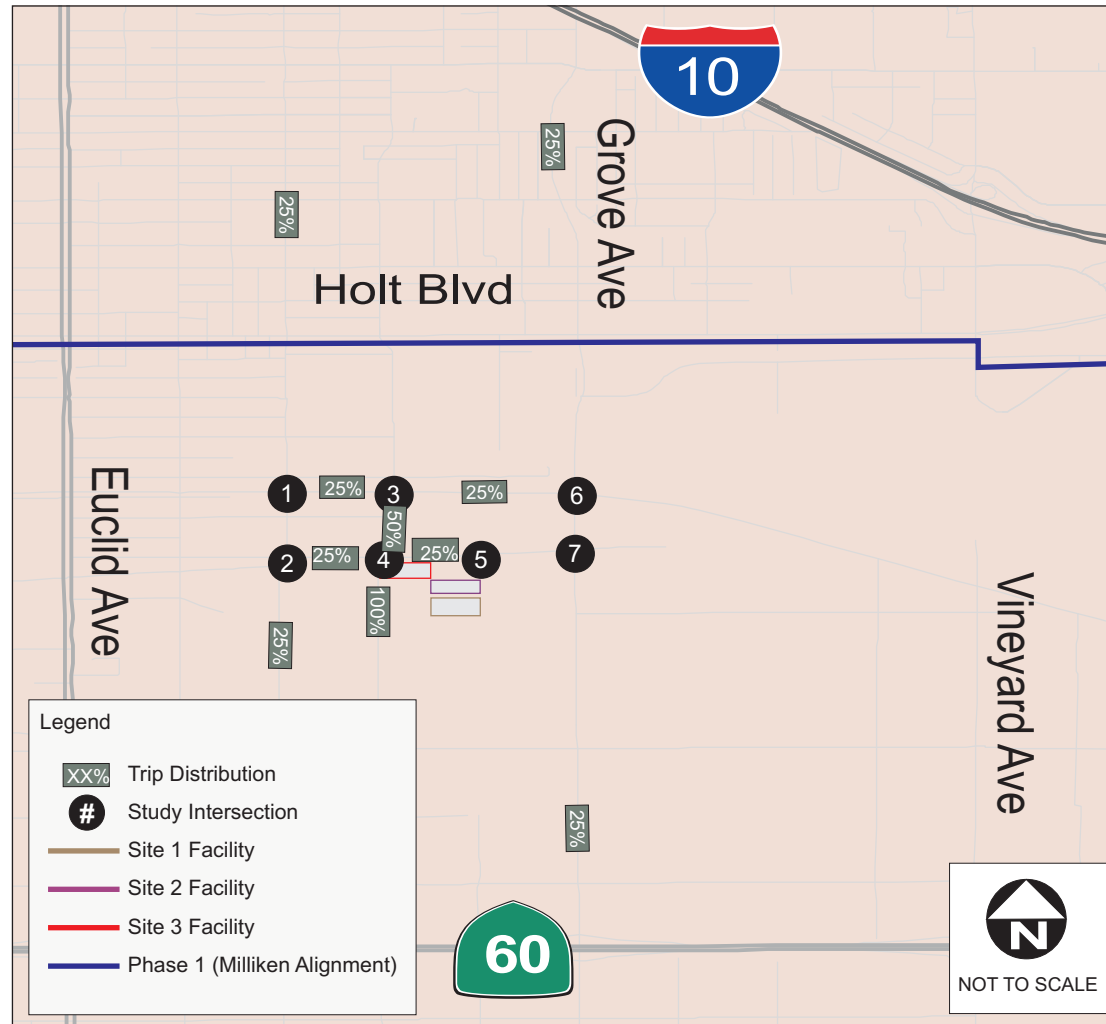
6.2 PROJECT TRIP DISTRIBUTION

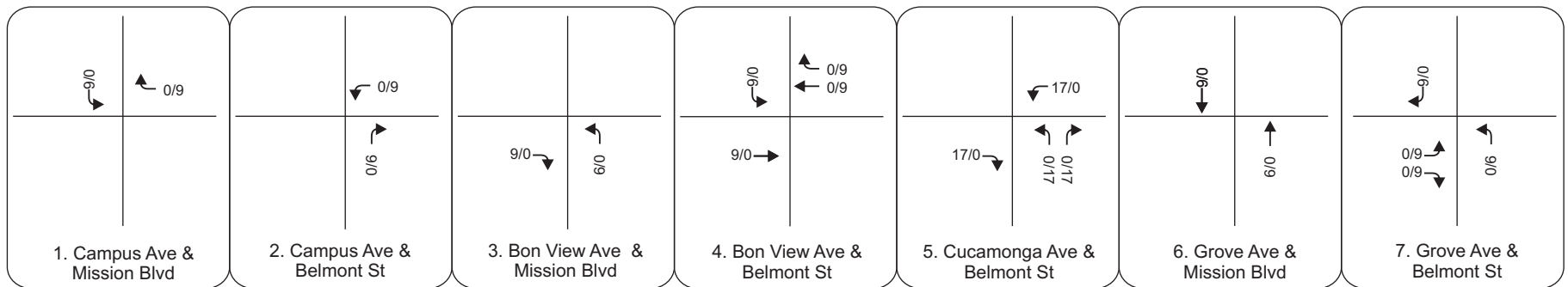
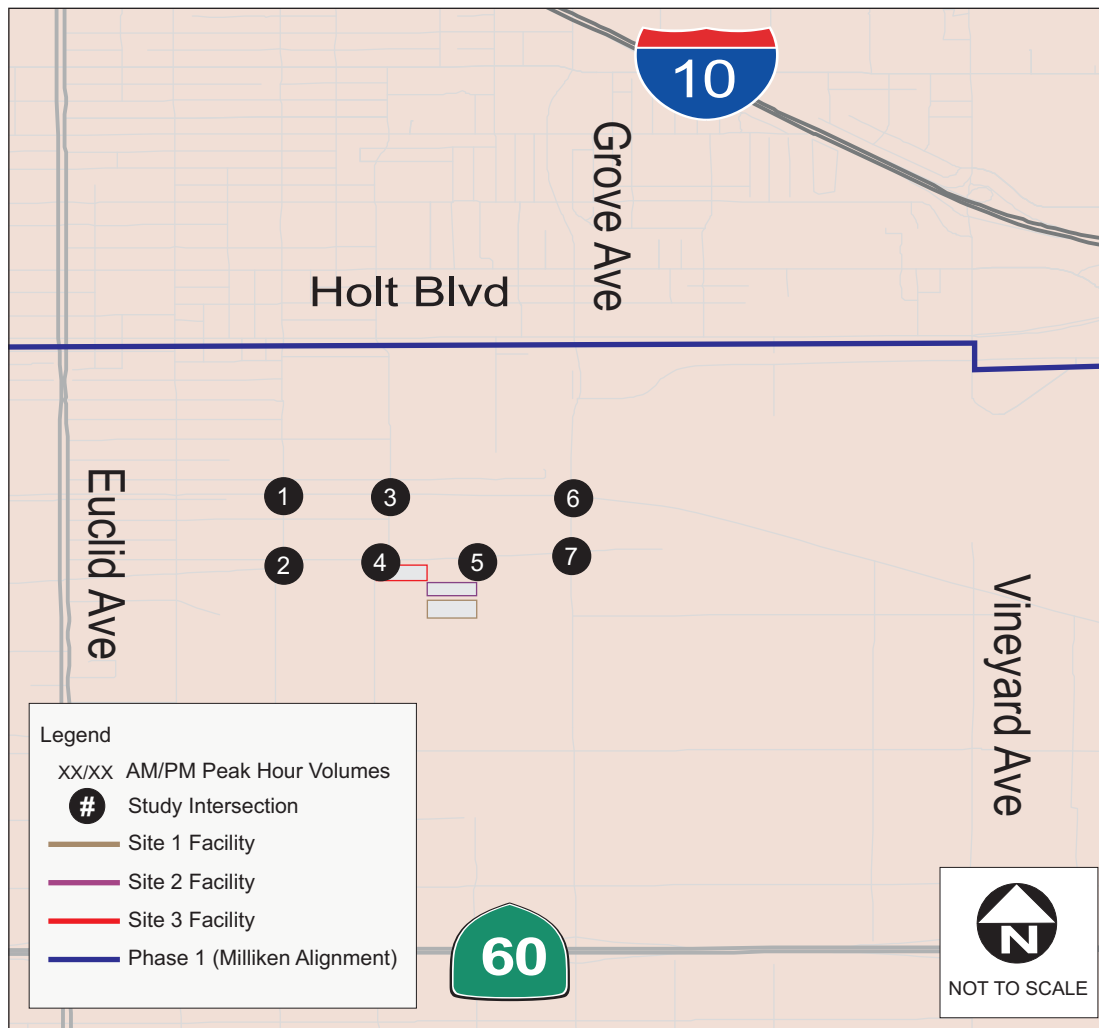
Trip distribution assumptions are used to determine the origin and destination of new vehicle trips associated with the project. The geographic distribution of project trips is based on the locations of local activity centers and the street system that serves the site. The trip distribution utilized for the new peak hour trips only relate to the staff members as the bus operation shifts occur outside of the peak-hours. The distribution of trips varies between facilities as the access to O&M facilities sites 1 and 2 would be provided along Cucamonga Avenue, south of Belmont Street and access to O&M facility site 3 would be provided along Bon View Avenue, south of Belmont Street. The distribution pattern developed for the project O&M facility sites 1 or 2 is shown in **Figure 7**. The distribution pattern developed for the project O&M facility site 3 is shown in **Figure 8**.

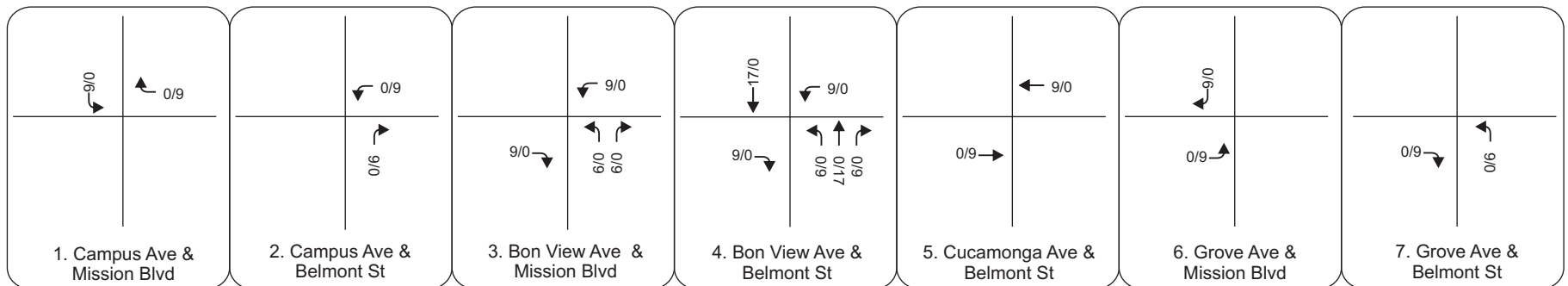
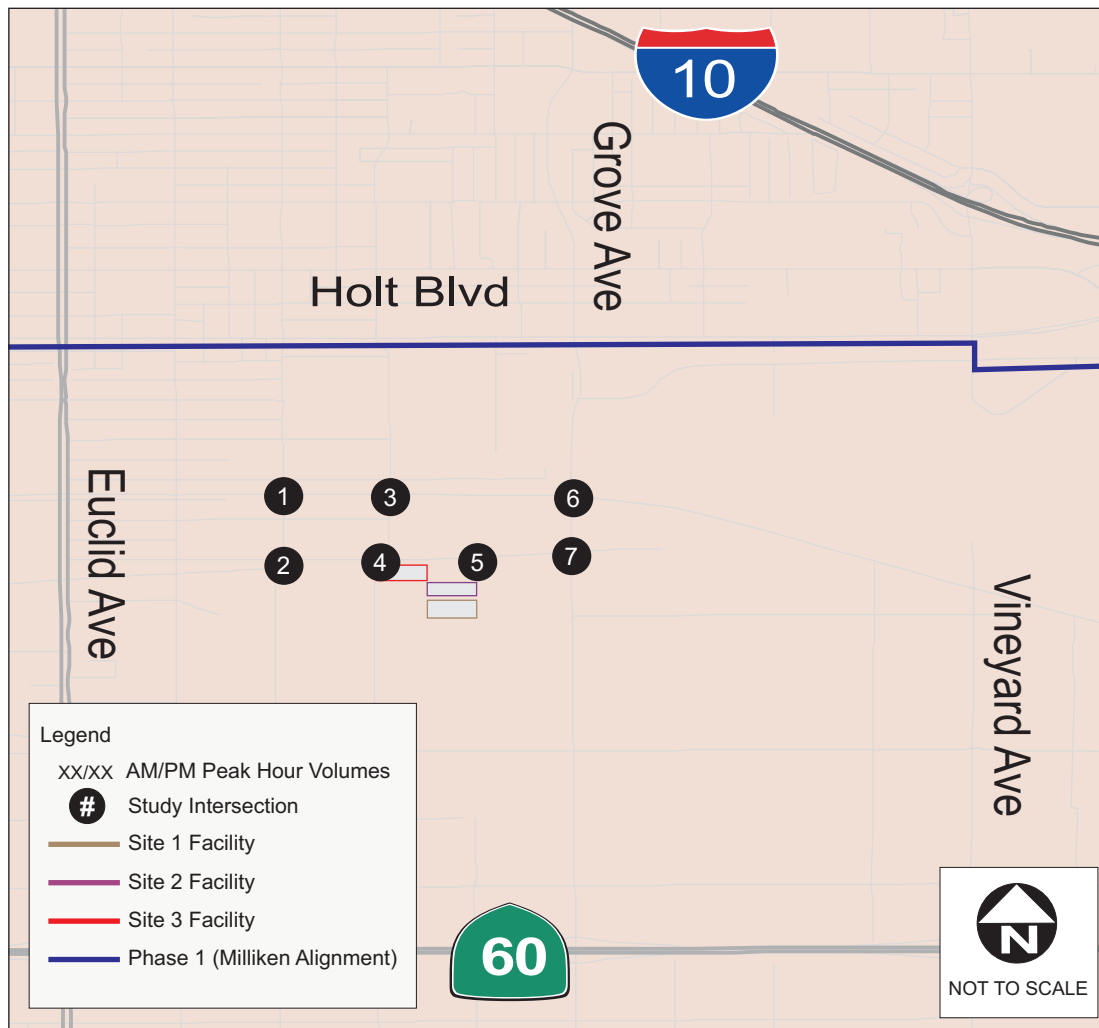
6.3 PROJECT TRIP ASSIGNMENT

Trips generated by the project were assigned to the surrounding roadway system based on the distribution patterns to estimate the project related peak-hour traffic at each of the study intersections. The project trips were assigned based on distribution inputs to the existing and future volumes. **Figure 9** illustrates the a.m. and p.m. peak hour project trip assignment for O&M facility sites 1 or 2. **Figure 10** illustrates the a.m. and p.m. peak hour project trip assignment for O&M facility site 3.









7.0 EXISTING PLUS O&M FACILITY SITE 1 OR 2 LEVEL OF SERVICE ANALYSIS

This section presents the existing plus O&M facility site 1 or 2 conditions traffic operations at the seven study intersections using the methodologies described in previous sections. **Table 5** summarizes the existing plus O&M facility site 1 or 2 level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**. All intersection configurations would remain the same as existing conditions.

TABLE 5: EXISTING PLUS O&M FACILITY SITE 1 OR 2 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Existing Conditions				Existing Plus O&M Facility Site 1 or 2				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
1	Campus Ave/Mission Blvd	25.9	C	23.8	C	26.5	C	23.7	C	0.6	-0.1	No
2	Campus Ave/Belmont St	64.9	F	73.1	F	66.0	F	88.2	F	1.1	15.1	Yes
3	Bon View Ave/Mission Blvd	24.4	C	23.8	C	23.4	C	24.2	C	-1.0	0.4	No
4	Bon View Ave/Belmont St	17.7	C	31.1	D	18.9	C	34.6	D	1.2	3.5	No
5	Cucamonga Ave/Belmont St	13.8	B	13.5	B	14.9	B	14.1	B	1.1	0.6	No
6	Grove Ave/Mission Blvd	39.1	D	47.2	D	39.1	D	46.9	D	0.0	-0.3	No
7	Grove Ave/Belmont St	8.5	A	8.8	A	8.7	A	9.1	A	0.2	0.3	No

Note: LOS = Level of service

As shown in **Table 5**, based on the thresholds of significance described in Section 3.1, the unsignalized study intersection of Campus Avenue/Belmont Street is forecast to be significantly impacted by the O&M facility site 1 or 2 scenario in existing conditions.

7.1 EXISTING PLUS O&M FACILITY SITE 3 LEVEL OF SERVICE ANALYSIS

This section presents the existing plus O&M facility site 3 conditions traffic operations at the seven study intersections using the methodologies described in previous sections. **Table 6** summarizes the existing plus O&M facility site 3 level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**. Intersection lane configurations along the rest of the project alignment would remain the same as existing conditions.

TABLE 6: EXISTING PLUS O&M FACILITY SITE 3 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Existing Conditions				Existing Plus Build Alternative B				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
1	Campus Ave/Mission Blvd	25.9	C	23.8	C	26.5	C	23.7	C	0.6	-0.1	No
2	Campus Ave/Belmont St	64.9	F	73.1	F	66.0	F	88.2	F	1.1	15.1	Yes
3	Bon View Ave/Mission Blvd	24.4	C	23.8	C	24.0	C	24.4	C	-0.4	0.6	No
4	Bon View Ave/Belmont St	17.7	C	31.1	D	19.7	C	36.7	E	2.0	5.6	Yes
5	Cucamonga Ave/Belmont St	13.8	B	13.5	B	13.9	B	13.7	B	0.1	0.2	No
6	Grove Ave/Mission Blvd	39.1	D	47.2	D	39.0	D	47.5	D	-0.1	0.3	No
7	Grove Ave/Belmont St	8.5	A	8.8	A	8.7	A	8.8	A	0.2	0.0	No

Note: LOS = Level of service

As shown in **Table 6**, based on the thresholds of significance described in Section 3.1, the following unsignalized intersections are forecast to be significantly impacted by the O&M facility site 3 in existing conditions:

- Campus Avenue/Belmont Street; and
- Bon View Avenue/Belmont Street.

8.0 OPENING YEAR 2023 TRAFFIC OPERATIONS

This section provides the opening year 2023 intersection traffic levels of service for the No Build condition as well as the O&M facility site location alternatives described. Peak hour traffic volumes at the study intersections for all of the opening year 2023 scenarios are provided in **Appendix C**. Note that the traffic analysis was prepared when 2023 was the estimated opening year. The current opening year estimate is 2023. Nevertheless, the traffic modeling forecasts volumes through 2040, and the results showed that a negligible traffic increase would occur between 2020 and 2023. Thus, a three-year delay in the opening date does not substantially alter this analysis.

8.1 OPENING YEAR 2023 NO BUILD LEVEL OF SERVICE ANALYSIS

This section presents the opening year 2023 No Build conditions traffic operations at the seven study intersections using the methodologies described in previous sections. **Table 7** summarizes the opening year 2023 peak hour intersection level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**.

TABLE 7: OPENING YEAR 2023 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Traffic Control	AM Peak Hour		PM Peak Hour	
			Delay (sec)	LOS	Delay (sec)	LOS
1	Campus Ave/Mission Blvd	Signalized	26.8	C	25.1	C
2	Campus Ave/Belmont St	Stop Control	78.5	F	87.9	F
3	Bon View Ave/Mission Blvd	Signalized	25.3	C	23.7	C
4	Bon View Ave/Belmont St	Stop Control	18.5	C	34.6	D
5	Cucamonga Ave/Belmont St	Stop Control	14.0	B	13.9	B
6	Grove Ave/Mission Blvd	Signalized	41.6	D	50.4	D
7	Grove Ave/Belmont St	Signalized	8.7	A	8.9	A

Note: LOS = Level of service

As shown in **Table 7**, the study intersection of Campus Avenue/Belmont Street is forecast to operate at LOS F in opening year 2023 No Build conditions.

8.2 OPENING YEAR 2023 PLUS O&M FACILITY SITE 1 OR 2 LEVEL OF SERVICE ANALYSIS

This section presents the opening year 2023 plus O&M facility site 1 or 2 conditions traffic operations at the seven study intersections using the methodologies described in previous sections. **Table 8** summarizes the opening year 2023 plus O&M facility site 1 or 2 level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**.

TABLE 8: OPENING YEAR 2023 PLUS O&M FACILITY SITE 1 OR 2 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Opening Year 2023 No Build				Opening Year 2023 Plus O&M Facility Site 1 or 2				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
1	Campus Ave/Mission Blvd	26.8	C	25.1	C	27.1	C	25.0	C	0.3	-0.1	No
2	Campus Ave/Belmont St	78.5	F	87.9	F	80.0	F	107.9	F	1.5	20.0	Yes
3	Bon View Ave/Mission Blvd	25.3	C	23.7	C	25.1	C	24.1	C	-0.2	0.4	No
4	Bon View Ave/Belmont St	18.5	C	34.6	D	19.9	C	38.9	E	1.4	4.3	Yes
5	Cucamonga Ave/Belmont St	14.0	B	13.9	B	15.2	C	14.5	B	1.2	0.6	No
6	Grove Ave/Mission Blvd	41.6	D	50.4	D	41.7	D	50.7	D	0.1	0.3	No
7	Grove Ave/Belmont St	8.7	A	8.9	A	8.8	A	9.2	A	0.1	0.3	No

Note: LOS = Level of service

As shown in **Table 8**, based on the thresholds of significance described in Section 3.1, the following intersections are forecast to be significantly impacted by the O&M facility site 1 or 2 in opening year 2023:

- Campus Avenue/Belmont Street; and
- Bon View Avenue/Belmont Street.

8.3 OPENING YEAR 2023 PLUS O&M FACILITY SITE 3 LEVEL OF SERVICE ANALYSIS

This section presents the opening year 2023 plus O&M facility site 3 conditions traffic operations at the seven study intersections using the methodologies described in previous sections. **Table 9** summarizes the opening year 2023 plus O&M facility site 3 level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**.

TABLE 9: OPENING YEAR 2023 PLUS O&M FACILITY SITE 3 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Opening Year 2023 No Build				Opening Year 2023 Plus O&M Facility Site 3				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
1	Campus Ave/Mission Blvd	26.8	C	25.1	C	27.1	C	25.0	C	0.3	-0.1	No
2	Campus Ave/Belmont St	78.5	F	87.9	F	80.0	F	107.9	F	1.5	20.0	Yes
3	Bon View Ave/Mission Blvd	25.3	C	23.7	C	25.7	C	24.3	C	0.4	0.6	No
4	Bon View Ave/Belmont St	18.5	C	34.6	D	20.9	C	41.7	E	2.4	7.1	Yes
5	Cucamonga Ave/Belmont St	14.0	B	13.9	B	14.2	B	14.1	B	0.2	0.2	No
6	Grove Ave/Mission Blvd	41.6	D	50.4	D	41.6	D	50.9	D	0.0	0.5	No
7	Grove Ave/Belmont St	8.7	A	8.9	A	8.8	A	8.9	A	0.1	0.0	No

Note: LOS = Level of service

As shown in **Table 9**, based on the thresholds of significance described in Section 3.1, the following intersections are forecast to be significantly impacted by the O&M facility site 3 in opening year 2023:

- Campus Avenue/Belmont Street; and
- Bon View Avenue/Belmont Street.

9.0 FUTURE YEAR 2040 TRAFFIC OPERATIONS

This section provides the future year 2040 intersection traffic levels of service for the No Build condition as well as the O&M facility site location alternatives described. Peak hour traffic volumes at the study intersections for all of the future year 2040 scenarios are provided in **Appendix C**.

9.1 FUTURE YEAR 2040 NO BUILD LEVEL OF SERVICE ANALYSIS

This section presents the future year 2040 No Build conditions traffic operations at the seven study intersections using the methodologies described in previous sections. **Table 10** summarizes the future year 2040 peak hour intersection level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**.

TABLE 10: FUTURE YEAR 2040 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection	Traffic Control	AM Peak Hour		PM Peak Hour	
		Delay (sec)	LOS	Delay (sec)	LOS
1 Campus Ave/Mission Blvd	Signalized	36.9	D	30.4	C
2 Campus Ave/Belmont St	Stop Control	342.1	F	308.0	F
3 Bon View Ave/Mission Blvd	Signalized	41.0	D	26.6	C
4 Bon View Ave/Belmont St	Stop Control	25.9	D	82.7	F
5 Cucamonga Ave/Belmont St	Stop Control	16.4	C	16.5	C
6 Grove Ave/Mission Blvd	Signalized	58.2	E	82.0	F
7 Grove Ave/Belmont St	Signalized	9.3	A	9.6	A

Note: LOS = Level of service

As shown in **Table 10**, the following study intersections are forecast to operate at LOS E or worse in future year 2040 No Build conditions:

- Campus Avenue/Belmont Street;
- Bon View Avenue/Belmont Street; and
- Grove Avenue/Mission Boulevard.

9.2 FUTURE YEAR 2040 PLUS O&M FACILITY SITE 1 OR 2 LEVEL OF SERVICE ANALYSIS

This section presents the future year 2040 plus O&M facility site 1 or 2 conditions traffic operations at the seven study intersections using the methodologies described in Section 3. **Table 11** summarizes the future year 2040 plus O&M facility site 1 or 2 level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**.

TABLE 11: FUTURE YEAR 2040 PLUS O&M FACILITY SITE 1 OR 2 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Future Year 2040 No Build				Future Year 2040 Plus O&M Facility Site 1 or 2				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
1	Campus Ave/Mission Blvd	36.9	D	30.4	C	37.3	D	30.3	C	0.4	-0.1	No
2	Campus Ave/Belmont St	342.1	F	308.0	F	357.9	F	369.3	F	15.8	61.3	Yes
3	Bon View Ave/Mission Blvd	41.0	D	26.6	C	40.6	D	27.2	C	-0.4	0.6	No
4	Bon View Ave/Belmont St	25.9	D	82.7	F	28.9	D	97.3	F	3.0	14.6	Yes
5	Cucamonga Ave/Belmont St	16.4	C	16.5	C	18.3	C	17.6	C	1.9	1.1	No
6	Grove Ave/Mission Blvd	58.2	E	82.0	F	58.3	E	97.3	F	0.1	15.3	Yes
7	Grove Ave/Belmont St	9.3	A	9.6	A	9.5	A	17.6	C	0.2	8.0	No

Note: LOS = Level of service

As shown in **Table 11**, based on the thresholds of significance described in Section 3.1, the following intersections are forecast to be significantly impacted by the O&M facility site 1 or 2 in future year 2040:

- Campus Avenue/Belmont Street;
- Bon View Avenue/Belmont Street; and
- Grove Avenue/Mission Boulevard.

9.3 FUTURE YEAR 2040 PLUS O&M FACILITY SITE 3 LEVEL OF SERVICE ANALYSIS

This section presents the future year 2040 plus O&M facility site 3 conditions traffic operations at the seven study intersections using the methodologies described in previous sections. **Table 12** summarizes the future year 2040 plus O&M facility site 3 level of service at the study intersections. LOS calculations sheets are provided in **Appendix B**.

TABLE 12: FUTURE YEAR 2040 PLUS O&M FACILITY SITE 3 INTERSECTION PEAK HOUR LEVEL OF SERVICE

Intersection		Future Year 2040 No Build				Future Year 2040 Plus O&M Facility Site 3				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
1	Campus Ave/Mission Blvd	36.9	D	30.4	C	36.6	D	30.4	C	-0.3	0.0	No
2	Campus Ave/Belmont St	342.1	F	308.0	F	480.5	F	369.3	F	138.4	61.3	Yes
3	Bon View Ave/Mission Blvd	41.0	D	26.6	C	41.4	D	27.5	C	0.4	0.9	No
4	Bon View Ave/Belmont St	25.9	D	82.7	F	26.9	D	107.1	F	1.0	24.4	Yes
5	Cucamonga Ave/Belmont St	16.4	C	16.5	C	17.1	C	16.9	C	0.7	0.4	No
6	Grove Ave/Mission Blvd	58.2	E	82.0	F	58.8	E	83.5	F	0.6	1.5	Yes
7	Grove Ave/Belmont St	9.3	A	9.6	A	9.7	A	9.7	A	0.4	0.1	No

Note: LOS = Level of service

As shown in **Table 12**, based on the thresholds of significance described in Section 3.1, the following intersections are forecast to be significantly impacted by the O&M facility site 3 in future year 2040:

- Campus Avenue/Belmont Street;
- Bon View Avenue/Belmont Street; and
- Grove Avenue/Mission Boulevard.

10.0 POTENTIAL MITIGATION MEASURES

This section presents potential mitigation measure recommendations to alleviate the significant traffic impacts forecast to result upon implementation of the proposed O & M project. The following potential mitigation measures have been identified:

- *Campus Avenue/Belmont Street* – The project impact, occurring with O&M facility sites 1, 2, or 3, at the stop-controlled intersection can be fully mitigated by the installation of a traffic signal. The intersection currently operates at LOS F yet peak hour traffic volumes do not currently and are not forecast to meet MUTCD minimum peak hour signal warrant thresholds. As a result, this impact would be considered significant and unavoidable.
- *Bon View Avenue/Belmont Street* – The project impact, occurring with O&M facility sites 1, 2, or 3, at the stop-controlled intersection can be fully mitigated by the installation of a traffic signal. However, peak hour traffic volumes do not currently and are not large enough to meet MUTCD minimum peak hour signal warrant thresholds. As a result, this impact would be considered significant and unavoidable.
- *Grove Avenue/Mission Boulevard* – The project impact, occurring in future year 2040 with O&M facility sites 1, 2, or 3, can be fully mitigated by modifying the traffic signal to include a right-turn overlap phase at the westbound Mission Boulevard approach.

Note that for the purposes of this analysis, the unsignalized intersections are forecast to be affected by project-related traffic. However, jurisdictions such as the City of Ontario do not have specific significant impact criteria for unsignalized intersections. **Tables 13** and **14** summarize the Grove Avenue/Mission Boulevard intersection LOS with the recommended mitigation measure.

TABLE 13: FUTURE YEAR 2040 PLUS O&M FACILITY SITE 1 & 2 INTERSECTION WITH MITIGATION MEASURES

Intersection		Future Year 2040 No Build				Future Year 2040 Plus O&M Facility Site 3				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
6	Grove Ave/Mission Blvd	58.2	E	82.0	F	56.7	E	74.4	E	-1.5	-7.6	No

Note: LOS = Level of service

TABLE 14: FUTURE YEAR 2040 PLUS O&M FACILITY SITE 3 INTERSECTION WITH MITIGATION MEASURES

Intersection		Future Year 2040 No Build				Future Year 2040 Plus O&M Facility Site 3				Change in AM Delay (sec)	Change in PM Delay (sec)	Significant Impact?
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS			
6	Grove Ave/Mission Blvd	58.2	E	82.0	F	57.2	E	74.4	E	-1.0	-7.6	No

Note: LOS = Level of service

11.0 CONCLUSIONS

Omnitrans operates and maintains its existing bus fleets from two major Operations and Maintenance (O&M) facilities: Neither facility has sufficient capacity to accommodate the additional maintenance and storage requirements of the bus fleet associated with the proposed West Valley Connector Project. The purpose of the new O&M facility is to provide operations and maintenance support to the existing full-service East Valley Vehicle Maintenance Facility (EVVMF).

The new O&M facility in the City of Ontario will provide operations and maintenance support to the existing full-service EVVMF. Traffic operations were evaluated during existing, 2023, and 2040 conditions, for the a.m. and p.m. peak hour. New traffic forecast to be generated by the three proposed site project options during peak hours result in up to three impacted intersections with implementation of either site 1, 2, or 3. Two of the three intersections are currently unsignalized. Traffic volumes at these intersections do not meet the MUTCD minimum peak hour signal warrant thresholds. As a result, potential impacts at these two intersections are considered significant and unavoidable. However, it should be noted that the City of Ontario does not have specific significant impact criteria for unsignalized intersections.



WEST VALLEY CONNECTOR PROJECT
O & M TRAFFIC OPERATIONS ANALYSIS
TECHNICAL APPENDIX

Prepared for:

SBCTA

San Bernardino County Transportation Authority

Prepared By:

Iteris, Inc.

J17-0110

APPENDIX A: EXISTING TRAFFIC COUNTS

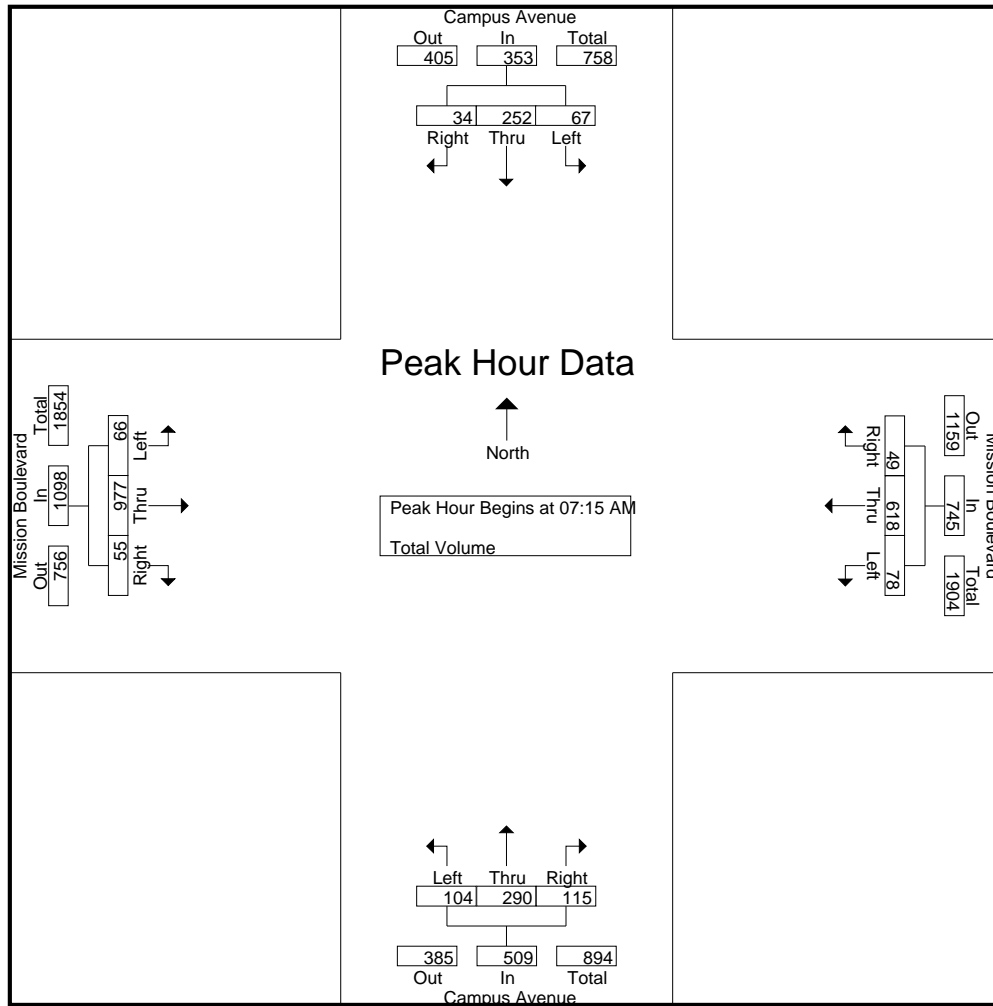
City of Ontario
 N/S: Campus Avenue
 E/W: Mission Boulevard
 Weather: Clear

File Name : 01_ONT_Campus_Mission AM
 Site Code : 04218136
 Start Date : 2/21/2018
 Page No : 1

Groups Printed- Total Volume

Start Time	Campus Avenue Southbound				Mission Boulevard Westbound				Campus Avenue Northbound				Mission Boulevard Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	10	58	9	77	10	141	11	162	13	52	16	81	9	167	8	184	504
07:15 AM	12	63	14	89	15	159	10	184	22	57	16	95	12	198	7	217	585
07:30 AM	24	56	9	89	21	147	17	185	31	73	28	132	22	269	15	306	712
07:45 AM	21	75	6	102	24	169	14	207	25	83	33	141	21	281	13	315	765
Total	67	252	38	357	70	616	52	738	91	265	93	449	64	915	43	1022	2566
08:00 AM	10	58	5	73	18	143	8	169	26	77	38	141	11	229	20	260	643
08:15 AM	14	64	10	88	17	146	9	172	15	52	26	93	9	180	16	205	558
08:30 AM	15	43	10	68	19	118	12	149	19	46	24	89	15	175	8	198	504
08:45 AM	9	45	9	63	6	108	8	122	16	53	17	86	12	162	13	187	458
Total	48	210	34	292	60	515	37	612	76	228	105	409	47	746	57	850	2163
Grand Total	115	462	72	649	130	1131	89	1350	167	493	198	858	111	1661	100	1872	4729
Apprch %	17.7	71.2	11.1		9.6	83.8	6.6		19.5	57.5	23.1		5.9	88.7	5.3		
Total %	2.4	9.8	1.5	13.7	2.7	23.9	1.9	28.5	3.5	10.4	4.2	18.1	2.3	35.1	2.1	39.6	

Start Time	Campus Avenue Southbound				Mission Boulevard Westbound				Campus Avenue Northbound				Mission Boulevard Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	12	63	14	89	15	159	10	184	22	57	16	95	12	198	7	217	585
07:30 AM	24	56	9	89	21	147	17	185	31	73	28	132	22	269	15	306	712
07:45 AM	21	75	6	102	24	169	14	207	25	83	33	141	21	281	13	315	765
08:00 AM	10	58	5	73	18	143	8	169	26	77	38	141	11	229	20	260	643
Total Volume	67	252	34	353	78	618	49	745	104	290	115	509	66	977	55	1098	2705
% App. Total	19	71.4	9.6		10.5	83	6.6		20.4	57	22.6		6	89	5		
PHF	.698	.840	.607	.865	.813	.914	.721	.900	.839	.873	.757	.902	.750	.869	.688	.871	.884



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:00 AM				07:15 AM				07:15 AM				07:15 AM			
+0 mins.	10	58	9	77	15	159	10	184	22	57	16	95	12	198	7	217
+15 mins.	12	63	14	89	21	147	17	185	31	73	28	132	22	269	15	306
+30 mins.	24	56	9	89	24	169	14	207	25	83	33	141	21	281	13	315
+45 mins.	21	75	6	102	18	143	8	169	26	77	38	141	11	229	20	260
Total Volume	67	252	38	357	78	618	49	745	104	290	115	509	66	977	55	1098
% App. Total	18.8	70.6	10.6		10.5	83	6.6		20.4	57	22.6		6	89	5	
PHF	.698	.840	.679	.875	.813	.914	.721	.900	.839	.873	.757	.902	.750	.869	.688	.871

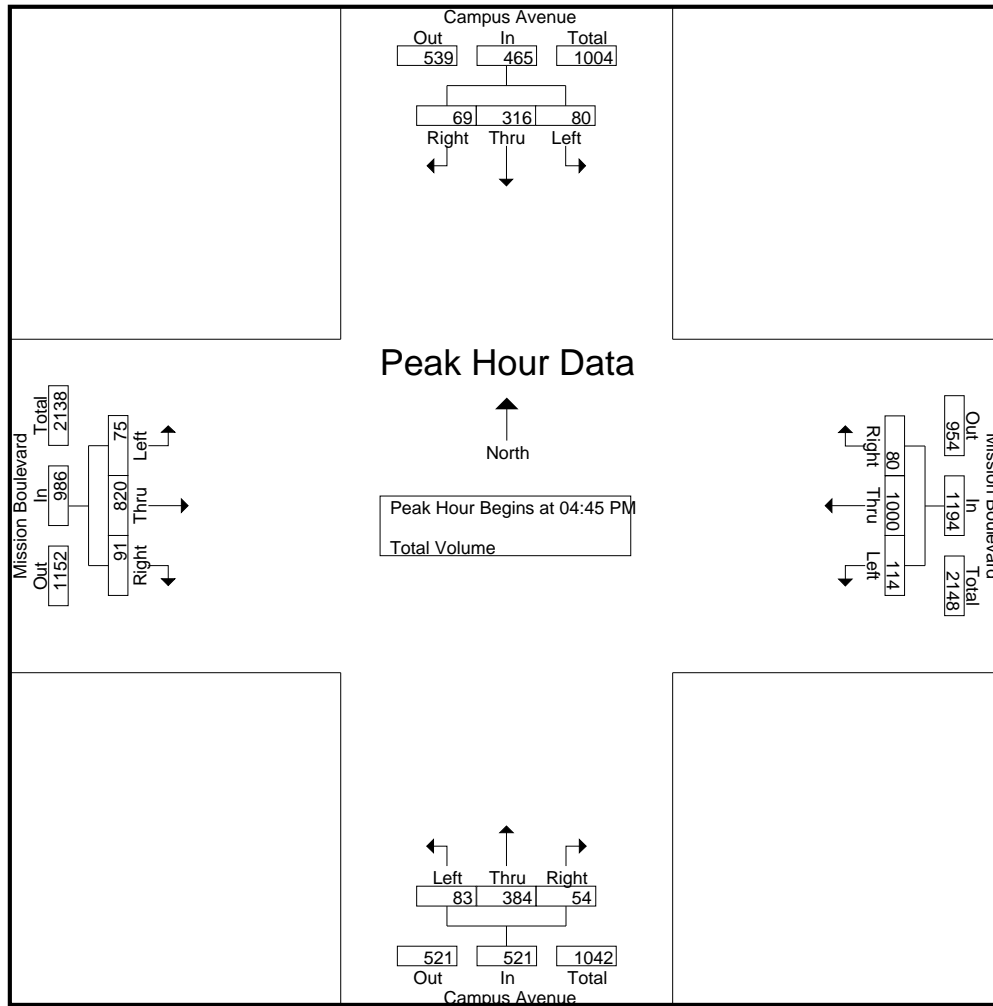
City of Ontario
 N/S: Campus Avenue
 E/W: Mission Boulevard
 Weather: Clear

File Name : 01_ONT_Campus_Mission PM
 Site Code : 04218136
 Start Date : 2/21/2018
 Page No : 1

Groups Printed- Total Volume

Start Time	Campus Avenue Southbound				Mission Boulevard Westbound				Campus Avenue Northbound				Mission Boulevard Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	26	67	22	115	26	232	22	280	16	87	24	127	13	210	19	242	764
04:15 PM	20	81	16	117	27	241	19	287	14	102	17	133	17	192	20	229	766
04:30 PM	20	55	19	94	11	216	18	245	28	106	23	157	11	202	18	231	727
04:45 PM	15	81	20	116	24	271	21	316	24	90	10	124	29	214	27	270	826
Total	81	284	77	442	88	960	80	1128	82	385	74	541	70	818	84	972	3083
05:00 PM	17	84	10	111	28	227	18	273	27	83	19	129	18	181	17	216	729
05:15 PM	28	80	23	131	36	255	19	310	12	111	9	132	11	211	25	247	820
05:30 PM	20	71	16	107	26	247	22	295	20	100	16	136	17	214	22	253	791
05:45 PM	14	75	9	98	22	228	16	266	16	80	14	110	16	171	20	207	681
Total	79	310	58	447	112	957	75	1144	75	374	58	507	62	777	84	923	3021
Grand Total	160	594	135	889	200	1917	155	2272	157	759	132	1048	132	1595	168	1895	6104
Apprch %	18	66.8	15.2		8.8	84.4	6.8		15	72.4	12.6		7	84.2	8.9		
Total %	2.6	9.7	2.2	14.6	3.3	31.4	2.5	37.2	2.6	12.4	2.2	17.2	2.2	26.1	2.8	31	

Start Time	Campus Avenue Southbound				Mission Boulevard Westbound				Campus Avenue Northbound				Mission Boulevard Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	15	81	20	116	24	271	21	316	24	90	10	124	29	214	27	270	826
05:00 PM	17	84	10	111	28	227	18	273	27	83	19	129	18	181	17	216	729
05:15 PM	28	80	23	131	36	255	19	310	12	111	9	132	11	211	25	247	820
05:30 PM	20	71	16	107	26	247	22	295	20	100	16	136	17	214	22	253	791
Total Volume	80	316	69	465	114	1000	80	1194	83	384	54	521	75	820	91	986	3166
% App. Total	17.2	68	14.8		9.5	83.8	6.7		15.9	73.7	10.4		7.6	83.2	9.2		
PHF	.714	.940	.750	.887	.792	.923	.909	.945	.769	.865	.711	.958	.647	.958	.843	.913	.958



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				04:15 PM				04:45 PM			
+0 mins.	15	81	20	116	24	271	21	316	14	102	17	133	29	214	27	270
+15 mins.	17	84	10	111	28	227	18	273	28	106	23	157	18	181	17	216
+30 mins.	28	80	23	131	36	255	19	310	24	90	10	124	11	211	25	247
+45 mins.	20	71	16	107	26	247	22	295	27	83	19	129	17	214	22	253
Total Volume	80	316	69	465	114	1000	80	1194	93	381	69	543	75	820	91	986
% App. Total	17.2	68	14.8		9.5	83.8	6.7		17.1	70.2	12.7		7.6	83.2	9.2	
PHF	.714	.940	.750	.887	.792	.923	.909	.945	.830	.899	.750	.865	.647	.958	.843	.913

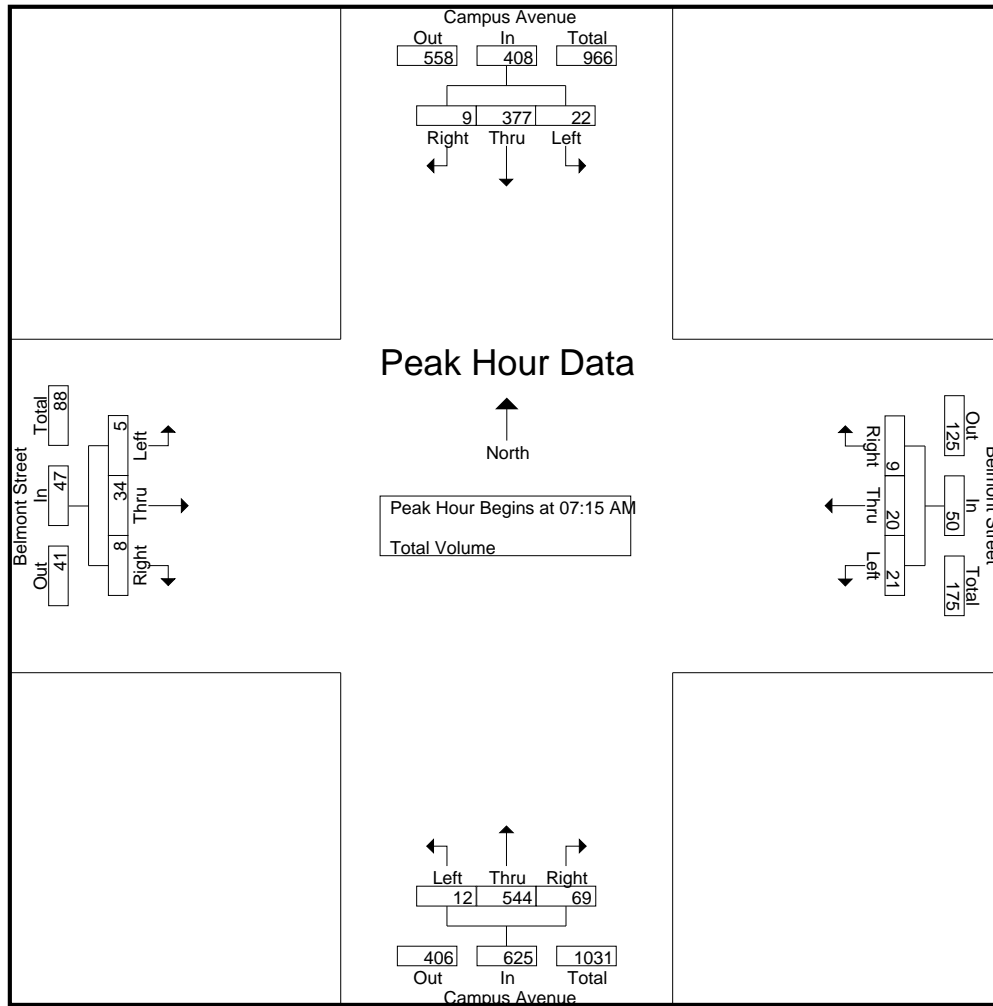
City of Ontario
 N/S: Campus Avenue
 E/W: Belmont Street
 Weather: Clear

File Name : 02_ONT_Campus_Belmont AM
 Site Code : 04218136
 Start Date : 2/21/2018
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Groups Printed- Total Volume

Start Time	Campus Avenue Southbound				Belmont Street Westbound				Campus Avenue Northbound				Belmont Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	5	79	1	85	4	8	2	14	0	78	9	87	2	3	0	5	191
07:15 AM	5	86	3	94	3	3	3	9	2	120	11	133	1	6	1	8	244
07:30 AM	5	89	1	95	4	5	1	10	3	128	15	146	1	8	5	14	265
07:45 AM	7	109	2	118	7	7	3	17	4	170	20	194	2	11	1	14	343
Total	22	363	7	392	18	23	9	50	9	496	55	560	6	28	7	41	1043
08:00 AM	5	93	3	101	7	5	2	14	3	126	23	152	1	9	1	11	278
08:15 AM	3	92	1	96	5	3	4	12	1	98	7	106	1	3	2	6	220
08:30 AM	4	62	2	68	5	7	1	13	0	89	12	101	0	4	0	4	186
08:45 AM	3	58	1	62	3	4	0	7	0	82	8	90	1	1	0	2	161
Total	15	305	7	327	20	19	7	46	4	395	50	449	3	17	3	23	845
Grand Total	37	668	14	719	38	42	16	96	13	891	105	1009	9	45	10	64	1888
Apprch %	5.1	92.9	1.9		39.6	43.8	16.7		1.3	88.3	10.4		14.1	70.3	15.6		
Total %	2	35.4	0.7	38.1	2	2.2	0.8	5.1	0.7	47.2	5.6	53.4	0.5	2.4	0.5	3.4	

Start Time	Campus Avenue Southbound				Belmont Street Westbound				Campus Avenue Northbound				Belmont Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	5	86	3	94	3	3	3	9	2	120	11	133	1	6	1	8	244
07:30 AM	5	89	1	95	4	5	1	10	3	128	15	146	1	8	5	14	265
07:45 AM	7	109	2	118	7	7	3	17	4	170	20	194	2	11	1	14	343
08:00 AM	5	93	3	101	7	5	2	14	3	126	23	152	1	9	1	11	278
Total Volume	22	377	9	408	21	20	9	50	12	544	69	625	5	34	8	47	1130
% App. Total	5.4	92.4	2.2		42	40	18		1.9	87	11		10.6	72.3	17		
PHF	.786	.865	.750	.864	.750	.714	.750	.735	.750	.800	.750	.805	.625	.773	.400	.839	.824



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:15 AM				07:15 AM			
+0 mins.	5	89	1	95	7	7	3	17	2	120	11	133	1	6	1	8
+15 mins.	7	109	2	118	7	5	2	14	3	128	15	146	1	8	5	14
+30 mins.	5	93	3	101	5	3	4	12	4	170	20	194	2	11	1	14
+45 mins.	3	92	1	96	5	7	1	13	3	126	23	152	1	9	1	11
Total Volume	20	383	7	410	24	22	10	56	12	544	69	625	5	34	8	47
% App. Total	4.9	93.4	1.7		42.9	39.3	17.9		1.9	87	11		10.6	72.3	17	
PHF	.714	.878	.583	.869	.857	.786	.625	.824	.750	.800	.750	.805	.625	.773	.400	.839

City of Ontario
 N/S: Campus Avenue
 E/W: Belmont Street
 Weather: Clear

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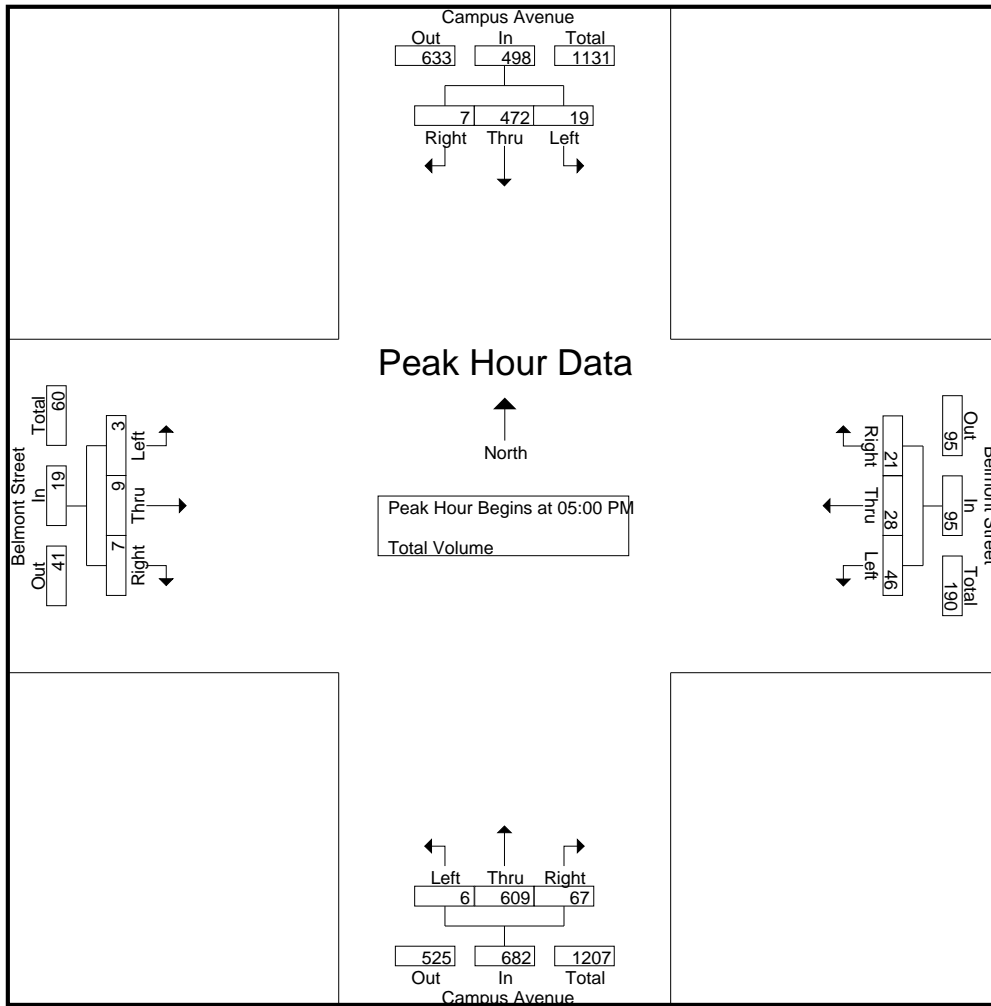
Groups Printed- Total Volume

Start Time	Campus Avenue Southbound				Belmont Street Westbound				Campus Avenue Northbound				Belmont Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	4	104	2	110	5	17	3	25	2	148	13	163	1	1	1	3	301
04:15 PM	2	115	3	120	8	12	6	26	1	131	19	151	3	6	1	10	307
04:30 PM	7	83	2	92	6	13	10	29	4	158	17	179	0	3	2	5	305
04:45 PM	2	102	6	110	8	16	3	27	3	152	14	169	0	1	2	3	309
Total	15	404	13	432	27	58	22	107	10	589	63	662	4	11	6	21	1222
05:00 PM	2	115	1	118	9	11	3	23	1	140	17	158	0	1	1	2	301
05:15 PM	7	133	3	143	11	6	10	27	1	130	21	152	1	6	0	7	329
05:30 PM	7	112	0	119	17	6	7	30	2	140	14	156	1	1	4	6	311
05:45 PM	3	112	3	118	9	5	1	15	2	199	15	216	1	1	2	4	353
Total	19	472	7	498	46	28	21	95	6	609	67	682	3	9	7	19	1294
Grand Total	34	876	20	930	73	86	43	202	16	1198	130	1344	7	20	13	40	2516
Apprch %	3.7	94.2	2.2		36.1	42.6	21.3		1.2	89.1	9.7		17.5	50	32.5		
Total %	1.4	34.8	0.8	37	2.9	3.4	1.7	8	0.6	47.6	5.2	53.4	0.3	0.8	0.5	1.6	

Start Time	Campus Avenue Southbound				Belmont Street Westbound				Campus Avenue Northbound				Belmont Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	2	115	1	118	9	11	3	23	1	140	17	158	0	1	1	2	301
05:15 PM	7	133	3	143	11	6	10	27	1	130	21	152	1	6	0	7	329
05:30 PM	7	112	0	119	17	6	7	30	2	140	14	156	1	1	4	6	311
05:45 PM	3	112	3	118	9	5	1	15	2	199	15	216	1	1	2	4	353
Total Volume	19	472	7	498	46	28	21	95	6	609	67	682	3	9	7	19	1294
% App. Total	3.8	94.8	1.4		48.4	29.5	22.1		0.9	89.3	9.8		15.8	47.4	36.8		
PHF	.679	.887	.583	.871	.676	.636	.525	.792	.750	.765	.798	.789	.750	.375	.438	.679	.916

City of Ontario
 N/S: Campus Avenue
 E/W: Belmont Street
 Weather: Clear

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Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	05:00 PM				04:00 PM				05:00 PM				04:00 PM			
+0 mins.	2	115	1	118	5	17	3	25	1	140	17	158	1	1	1	3
+15 mins.	7	133	3	143	8	12	6	26	1	130	21	152	3	6	1	10
+30 mins.	7	112	0	119	6	13	10	29	2	140	14	156	0	3	2	5
+45 mins.	3	112	3	118	8	16	3	27	2	199	15	216	0	1	2	3
Total Volume	19	472	7	498	27	58	22	107	6	609	67	682	4	11	6	21
% App. Total	3.8	94.8	1.4		25.2	54.2	20.6		0.9	89.3	9.8		19	52.4	28.6	
PHF	.679	.887	.583	.871	.844	.853	.550	.922	.750	.765	.798	.789	.333	.458	.750	.525

APPENDIX B: LOS CALCULATION SHEETS

EXISTING CONDITIONS

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

Existing Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	70	1034	58	83	654	52	110	307	122	71	267	36
Future Volume (vph)	70	1034	58	83	654	52	110	307	122	71	267	36
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1783	1770	1783	1770	3476
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.54	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1004	1783	414	3476	414	3476
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	80	1175	66	94	743	59	125	349	139	81	303	41
RTOR Reduction (vph)	0	0	39	0	0	35	0	24	0	0	18	0
Lane Group Flow (vph)	80	1175	27	94	743	24	125	464	0	81	327	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.2	24.4	24.4	4.1	24.3	24.3	18.0	18.0		18.0	18.0	
Effective Green, g (s)	4.2	24.4	24.4	4.1	24.3	24.3	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.07	0.41	0.41	0.07	0.41	0.41	0.30	0.30		0.30	0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	123	1439	643	120	1433	641	301	534		124	1042	
v/s Ratio Prot	0.05	c0.33		c0.05	0.21			c0.26			0.09	
v/s Ratio Perm			0.02			0.02	0.12			0.20		
v/c Ratio	0.65	0.82	0.04	0.78	0.52	0.04	0.42	0.87		0.65	0.31	
Uniform Delay, d1	27.2	15.8	10.7	27.5	13.4	10.8	16.8	19.9		18.3	16.2	
Progression Factor	1.00	1.00	1.00	0.59	1.58	8.25	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.7	5.2	0.1	24.2	1.1	0.1	4.2	17.3		23.7	0.8	
Delay (s)	38.8	21.0	10.9	40.3	22.4	89.1	21.0	37.2		42.0	17.0	
Level of Service	D	C	B	D	C	F	C	D		D	B	
Approach Delay (s)		21.6			28.6			33.9			21.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

Existing Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	5	36	8	22	21	10	13	576	73	23	399	10
Future Volume (Veh/h)	5	36	8	22	21	10	13	576	73	23	399	10
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	44	10	27	26	12	16	702	89	28	487	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)	1281											
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94	0.94	0.94					
vC, conflicting volume	1352	1372	493	1360	1334	746	499			791		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1342	1363	425	1350	1322	746	431			791		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	67	98	68	81	97	98			97		
cM capacity (veh/h)	97	132	590	84	139	413	1057			829		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	60	65	807	527								
Volume Left	6	27	16	28								
Volume Right	10	12	89	12								
cSH	145	121	1057	829								
Volume to Capacity	0.41	0.54	0.02	0.03								
Queue Length 95th (ft)	45	64	1	3								
Control Delay (s)	46.2	64.9	0.4	0.9								
Lane LOS	E	F	A	A								
Approach Delay (s)	46.2	64.9	0.4	0.9								
Approach LOS	E	F										

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

Existing Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	49	1123	73	48	692	35	45	81	34	78	128	60
Future Volume (vph)	49	1123	73	48	692	35	45	81	34	78	128	60
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.97	0.97	0.97	0.97	0.97	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1784	1784	1784	1784	1784	1784
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.84	0.84	0.84	0.84	0.84	0.84
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1526	1526	1526	1526	1526	1526
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	59	1353	88	58	834	42	54	98	41	94	154	72
RTOR Reduction (vph)	0	0	51	0	0	25	0	16	0	0	18	0
Lane Group Flow (vph)	59	1353	37	58	834	17	0	177	0	0	303	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2	2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.8	25.5	25.5	3.0	24.7	24.7	18.0	18.0			18.0	
Effective Green, g (s)	3.8	25.5	25.5	3.0	24.7	24.7	18.0	18.0			18.0	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.41	0.41	0.30	0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)	112	1504	672	88	1456	651	457	457			465	
v/s Ratio Prot	c0.03	c0.38		0.03	0.24							
v/s Ratio Perm			0.02		0.01		0.12				c0.19	
v/c Ratio	0.53	0.90	0.06	0.66	0.57	0.03	0.39	0.39			0.65	
Uniform Delay, d1	27.2	16.1	10.2	28.0	13.6	10.5	16.6	16.6			18.3	
Progression Factor	0.61	1.45	3.52	1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	2.9	6.2	0.1	16.4	1.6	0.1	2.5	2.5			6.9	
Delay (s)	19.5	29.6	35.8	44.4	15.2	10.6	19.1	19.1			25.2	
Level of Service	B	C	D	D	B	B	B	B			C	
Approach Delay (s)		29.6			16.8		19.1	19.1			25.2	
Approach LOS		C			B		B	B			C	
Intersection Summary												
HCM 2000 Control Delay		24.4										C
HCM 2000 Volume to Capacity ratio		0.79										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)		13.5					
Intersection Capacity Utilization		66.3%			ICU Level of Service		C					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

Existing Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	26	87	13	67	30	48	6	81	32	88	152	20
Future Volume (Veh/h)	26	87	13	67	30	48	6	81	32	88	152	20
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	30	99	15	76	34	55	7	92	36	100	173	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None	None	None	None	None
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	580	526	184	573	520	110	196	196			128	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	580	526	184	573	520	110	196	196			128	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1			4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2			2.2	
p0 queue free %	92	77	98	77	92	94	99	99			93	
cM capacity (veh/h)	355	423	858	328	427	943	1377	1377			1458	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	144	165	135	296								
Volume Left	30	76	7	100								
Volume Right	15	55	36	23								
cSH	429	446	1377	1458								
Volume to Capacity	0.34	0.37	0.01	0.07								
Queue Length 95th (ft)	36	42	0	6								
Control Delay (s)	17.6	17.7	0.4	3.0								
Lane LOS	C	C	A	A								
Approach Delay (s)	17.6	17.7	0.4	3.0								
Approach LOS	C	C										
Intersection Summary												
Average Delay		8.6										
Intersection Capacity Utilization		42.3%			ICU Level of Service		A					
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
5: Cucamonga Ave & Belmont St

Existing Conditions
Timing Plan: AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	101	109	83	66	95	44
Future Volume (Veh/h)	101	109	83	66	95	44
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	131	142	108	86	123	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			273		504	136
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			273		504	136
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		73	94
cM capacity (veh/h)			1287		455	887
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	87	186	108	86	180	
Volume Left	0	0	108	0	123	
Volume Right	0	142	0	0	57	
cSH	1700	1700	1287	1700	667	
Volume to Capacity	0.05	0.11	0.08	0.05	0.27	
Queue Length 95th (ft)	0	0	7	0	27	
Control Delay (s)	0.0	0.0	8.1	0.0	13.8	
Lane LOS			A		B	
Approach Delay (s)	0.0		4.5		13.8	
Approach LOS					B	
Intersection Summary						
Average Delay			5.2			
Intersection Capacity Utilization			26.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
6: Grove Ave & Mission Blvd

Existing Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	463	620	139	31	460	382	127	780	24	340	1098	297
Future Volume (vph)	463	620	139	31	460	382	127	780	24	340	1098	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	0.91	1.00	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	526	705	158	35	523	434	144	886	27	386	1248	338
RTOR Reduction (vph)	0	0	105	0	0	317	0	3	0	0	0	55
Lane Group Flow (vph)	526	705	53	35	523	117	144	910	0	386	1248	283
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov	
Protected Phases	7	4		3	8		5	2	1	6	7	
Permitted Phases			4			8						6
Actuated Green, G (s)	14.8	30.4	30.4	3.0	18.6	18.6	10.3	18.0	20.6	28.3	43.1	
Effective Green, g (s)	14.8	30.4	30.4	3.0	18.6	18.6	10.3	18.0	20.6	28.3	43.1	
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.11	0.20	0.23	0.31	0.48	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	564	1195	534	114	731	327	202	1012	405	1598	837	
v/s Ratio Prot	c0.15	0.20		0.01	c0.15		0.08	c0.18	c0.22	0.25	0.06	
v/s Ratio Perm			0.03			0.07					0.12	
v/c Ratio	0.93	0.59	0.10	0.31	0.72	0.36	0.71	0.90	0.95	0.78	0.34	
Uniform Delay, d1	37.1	24.6	20.4	42.5	33.2	30.6	38.4	35.1	34.2	28.0	14.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	22.5	2.1	0.4	1.5	5.9	3.0	11.3	12.4	32.6	3.9	2.2	
Delay (s)	59.6	26.8	20.8	44.0	39.2	33.6	49.7	47.5	66.9	31.9	14.8	
Level of Service	E	C	C	D	D	C	D	D	E	C	B	
Approach Delay (s)		38.5			36.9		47.8				35.8	
Approach LOS		D			D		D				D	
Intersection Summary												
HCM 2000 Control Delay			39.1		HCM 2000 Level of Service		D					
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)		18.0					
Intersection Capacity Utilization			75.4%		ICU Level of Service		D					
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

7: Belmont St & Grove Ave

Existing Conditions

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↗	↗
Traffic Volume (vph)	53	6	81	3	7	8	53	853	8	14	1154	70
Future Volume (vph)	53	6	81	3	7	8	53	853	8	14	1154	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1715		1770	5078		1770	5042	
Flt Permitted	0.75	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1390	1863	1583	1403	1715		1770	5078		1770	5042	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	7	88	3	8	9	58	927	9	15	1254	76
RTOR Reduction (vph)	0	0	78	0	8	0	0	1	0	0	8	0
Lane Group Flow (vph)	58	7	10	3	9	0	58	935	0	15	1322	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	6.9	6.9	6.9	6.9	6.9		5.1	38.2		1.4	34.5	
Effective Green, g (s)	6.9	6.9	6.9	6.9	6.9		5.1	38.2		1.4	34.5	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.08	0.64		0.02	0.58	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	159	214	182	161	197		150	3232		41	2899	
v/s Ratio Prot		0.00			0.01		c0.03	c0.18		0.01	c0.26	
v/s Ratio Perm	c0.04		0.01	0.00								
v/c Ratio	0.36	0.03	0.06	0.02	0.05		0.39	0.29		0.37	0.46	
Uniform Delay, d1	24.5	23.6	23.6	23.5	23.6		26.0	4.9		28.9	7.3	
Progression Factor	0.97	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.1	0.0	0.1		1.7	0.2		5.5	0.5	
Delay (s)	25.3	23.5	22.9	23.6	23.7		27.6	5.1		34.3	7.9	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.9			23.7			6.4			8.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

Existing Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	77	837	93	116	1021	82	85	392	55	82	323	70
Future Volume (vph)	77	837	93	116	1021	82	85	392	55	82	323	70
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	3444	1770	3444
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.48	1.00	0.25	1.00	0.25	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	902	1828	457	3444	457	3444
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	80	872	97	121	1064	85	89	408	57	85	336	73
RTOR Reduction (vph)	0	0	62	0	0	52	0	8	0	0	31	0
Lane Group Flow (vph)	80	872	35	121	1064	33	89	457	0	85	378	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.1	21.8	21.8	5.5	23.2	23.2	19.2	19.2		19.2	19.2	
Effective Green, g (s)	4.1	21.8	21.8	5.5	23.2	23.2	19.2	19.2		19.2	19.2	
Actuated g/C Ratio	0.07	0.36	0.36	0.09	0.39	0.39	0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	1285	575	162	1368	612	288	584		146	1102	
v/s Ratio Prot	0.05	0.25		c0.07	c0.30			c0.25			0.11	
v/s Ratio Perm			0.02			0.02	0.10			0.19		
v/c Ratio	0.67	0.68	0.06	0.75	0.78	0.05	0.31	0.78		0.58	0.34	
Uniform Delay, d1	27.3	16.1	12.4	26.6	16.1	11.5	15.4	18.5		17.0	15.6	
Progression Factor	1.00	1.00	1.00	0.60	1.38	3.42	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	2.9	0.2	14.1	3.6	0.1	2.8	10.0		15.8	0.9	
Delay (s)	40.4	19.0	12.6	30.1	25.9	39.5	18.2	28.5		32.9	16.4	
Level of Service	D	B	B	C	C	D	B	C		C	B	
Approach Delay (s)		20.1			27.2			26.9			19.3	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.8									C
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			60.0					13.5				
Intersection Capacity Utilization			76.0%									D
ICU Level of Service												
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

Existing Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	3	9	7	47	29	21	6	622	68	19	482	7
Future Volume (Veh/h)	3	9	7	47	29	21	6	622	68	19	482	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	8	51	32	23	7	676	74	21	524	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	1336	1334	528	1310	1301	713	532				750	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1321	1319	439	1293	1283	713	443				750	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	97	93	99	56	78	95	99				98	
cM capacity (veh/h)	94	139	566	117	147	432	1023				859	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	21	106	757	553								
Volume Left	3	51	7	21								
Volume Right	8	23	74	8								
cSH	178	149	1023	859								
Volume to Capacity	0.12	0.71	0.01	0.02								
Queue Length 95th (ft)	10	104	1	2								
Control Delay (s)	27.9	73.1	0.2	0.7								
Lane LOS	D	F	A	A								
Approach Delay (s)	27.9	73.1	0.2	0.7								
Approach LOS	D	F										
Intersection Summary												
Average Delay			6.2									
Intersection Capacity Utilization			57.9%									B
ICU Level of Service												
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

Existing Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	51	912	46	34	963	82	95	222	61	60	9	91
Future Volume (vph)	51	912	46	34	963	82	95	222	61	60	9	91
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.98	0.98	0.98	0.98	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1799	1799	1799	1799	1688	1688
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.89	0.89	0.89	0.89	0.74	0.74
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1614	1614	1614	1614	1274	1274
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	53	950	48	35	1003	85	99	231	64	62	9	95
RTOR Reduction (vph)	0	0	27	0	0	50	0	12	0	0	66	0
Lane Group Flow (vph)	53	950	21	35	1003	35	0	382	0	0	101	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	NA	NA
Protected Phases	7	4		3	8		2	2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.1	26.0	26.0	2.0	24.9	24.9	18.5	18.5			18.5	18.5
Effective Green, g (s)	3.1	26.0	26.0	2.0	24.9	24.9	18.5	18.5			18.5	18.5
Actuated g/C Ratio	0.05	0.43	0.43	0.03	0.41	0.41	0.31	0.31			0.31	0.31
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	91	1533	685	59	1468	656	497	497			392	392
v/s Ratio Prot	c0.03	0.27		0.02	c0.28							
v/s Ratio Perm			0.01			0.02	c0.24				0.08	
v/c Ratio	0.58	0.62	0.03	0.59	0.68	0.05	0.77	0.77			0.26	0.26
Uniform Delay, d1	27.8	13.2	9.8	28.6	14.3	10.5	18.8	18.8			15.6	15.6
Progression Factor	0.61	1.56	19.09	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	7.2	1.5	0.1	15.0	2.6	0.2	10.9	10.9			1.6	1.6
Delay (s)	24.0	22.0	186.5	43.6	16.9	10.7	29.7	29.7			17.2	17.2
Level of Service	C	C	F	D	B	B	C	C			B	B
Approach Delay (s)		29.6			17.3		29.7	29.7			17.2	17.2
Approach LOS		C			B		C	C			B	B

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

Existing Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	30	53	15	45	89	118	15	247	128	46	113	19
Future Volume (Veh/h)	30	53	15	45	89	118	15	247	128	46	113	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	36	63	18	54	106	140	18	294	152	55	135	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	856	738	146	712	674	370	158				446	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	856	738	146	712	674	370	158				446	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	78	81	98	80	70	79	99				95	
cM capacity (veh/h)	162	324	901	276	353	676	1422				1114	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	117	300	464	213								
Volume Left	36	54	18	55								
Volume Right	18	140	152	23								
cSH	268	427	1422	1114								
Volume to Capacity	0.44	0.70	0.01	0.05								
Queue Length 95th (ft)	52	133	1	4								
Control Delay (s)	28.5	31.1	0.4	2.5								
Lane LOS	D	D	A	A								
Approach Delay (s)	28.5	31.1	0.4	2.5								
Approach LOS	D	D										

Intersection Summary			
Average Delay	12.2		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Cucamonga Ave & Belmont St

Existing Conditions
Timing Plan: PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	152	63	42	95	138	129
Future Volume (Veh/h)	152	63	42	95	138	129
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	203	84	56	127	184	172
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			287	484	144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			287	484	144	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			96	62	80	
cM capacity (veh/h)			1272	489	878	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	135	152	56	127	356	
Volume Left	0	0	56	0	184	
Volume Right	0	84	0	0	172	
cSH	1700	1700	1272	1700	947	
Volume to Capacity	0.08	0.09	0.04	0.07	0.38	
Queue Length 95th (ft)	0	0	3	0	44	
Control Delay (s)	0.0	0.0	8.0	0.0	13.5	
Lane LOS			A	B		
Approach Delay (s)	0.0	2.4		13.5		
Approach LOS			B			
Intersection Summary						
Average Delay			6.4			
Intersection Capacity Utilization			27.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
6: Grove Ave & Mission Blvd

Existing Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑	
Traffic Volume (vph)	370	632	109	33	664	545	163	1181	28	352	823	314	
Future Volume (vph)	370	632	109	33	664	545	163	1181	28	352	823	314	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	0.91	1.00	0.91	
Frt	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068	1770	5068	1770	5068	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068	1770	5068	1770	5068	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	389	665	115	35	699	574	172	1243	29	371	866	331	
RTOR Reduction (vph)	0	0	80	0	0	313	0	3	0	0	0	86	
Lane Group Flow (vph)	389	665	35	35	699	261	172	1269	0	371	866	245	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov		
Protected Phases	7	4		3	8		5	2	1	6	7		
Permitted Phases			4			8						6	
Actuated Green, G (s)	10.7	27.4	27.4	3.0	19.7	19.7	13.4	22.1	19.5	28.2	38.9		
Effective Green, g (s)	10.7	27.4	27.4	3.0	19.7	19.7	13.4	22.1	19.5	28.2	38.9		
Actuated g/C Ratio	0.12	0.30	0.30	0.03	0.22	0.22	0.15	0.25	0.22	0.31	0.43		
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	408	1077	481	114	774	346	263	1244	383	1593	763		
v/s Ratio Prot	c0.11	0.19		0.01	c0.20		0.10	c0.25	c0.21	0.17	0.04		
v/s Ratio Perm			0.02			0.16					0.12		
v/c Ratio	0.95	0.62	0.07	0.31	0.90	0.75	0.65	1.02	0.97	0.54	0.32		
Uniform Delay, d1	39.4	26.8	22.3	42.5	34.2	32.9	36.1	34.0	34.9	25.6	16.8		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	32.5	2.7	0.3	1.5	15.9	14.1	5.7	30.7	37.3	1.3	0.2		
Delay (s)	72.0	29.5	22.6	44.0	50.1	47.0	41.9	64.6	72.3	26.9	17.1		
Level of Service	E	C	C	D	D	D	D	E	E	C	B		
Approach Delay (s)	42.9			48.6			61.9			35.6			
Approach LOS	D			D			E			D			
Intersection Summary													
HCM 2000 Control Delay	47.2			HCM 2000 Level of Service			D						
HCM 2000 Volume to Capacity ratio	0.96												
Actuated Cycle Length (s)	90.0			Sum of lost time (s)			18.0						
Intersection Capacity Utilization	86.9%			ICU Level of Service			E						
Analysis Period (min)	15												

HCM Signalized Intersection Capacity Analysis

7: Belmont St & Grove Ave

Existing Conditions

Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↘	↘
Traffic Volume (vph)	68	14	102	4	16	38	64	1215	10	6	974	31
Future Volume (vph)	68	14	102	4	16	38	64	1215	10	6	974	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1665		1770	5079		1770	5062	
Flt Permitted	0.72	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1343	1863	1583	1394	1665		1770	5079		1770	5062	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	69	14	104	4	16	39	65	1240	10	6	994	32
RTOR Reduction (vph)	0	0	91	0	34	0	0	1	0	0	4	0
Lane Group Flow (vph)	69	14	13	4	21	0	65	1249	0	6	1022	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.4	7.4	7.4	7.4	7.4		5.2	37.8		1.3	33.9	
Effective Green, g (s)	7.4	7.4	7.4	7.4	7.4		5.2	37.8		1.3	33.9	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.63		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	165	229	195	171	205		153	3199		38	2860	
v/s Ratio Prot		0.01			0.01		c0.04	c0.25		0.00	0.20	
v/s Ratio Perm	c0.05		0.01	0.00								
v/c Ratio	0.42	0.06	0.07	0.02	0.10		0.42	0.39		0.16	0.36	
Uniform Delay, d1	24.3	23.2	23.2	23.1	23.3		26.0	5.4		28.8	7.1	
Progression Factor	0.99	0.99	0.95	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1	0.1	0.1	0.2		1.9	0.4		1.9	0.3	
Delay (s)	25.7	23.0	22.3	23.2	23.6		27.9	5.8		30.8	7.5	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.6			23.5			6.9			7.6	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.41		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		49.5%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

EXISTING PLUS O&M FACILITY SITE 1 OR 2

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 1: Campus Ave & Mission Blvd Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	70	1034	58	83	654	52	110	307	122	80	267	36
Future Volume (vph)	70	1034	58	83	654	52	110	307	122	80	267	36
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1783	1770	1783	1770	3476
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.54	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1008	1783	403	3476	403	3476
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	80	1175	66	94	743	59	125	349	139	91	303	41
RTOR Reduction (vph)	0	0	40	0	0	35	0	24	0	0	17	0
Lane Group Flow (vph)	80	1175	26	94	743	24	125	464	0	91	327	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.1	23.9	23.9	4.1	23.9	23.9	18.5	18.5		18.5	18.5	
Effective Green, g (s)	4.1	23.9	23.9	4.1	23.9	23.9	18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.07	0.40	0.40	0.07	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	1409	630	120	1409	630	310	549		124	1071	
v/s Ratio Prot	0.05	c0.33		c0.05	0.21			c0.26			0.09	
v/s Ratio Perm			0.02			0.01	0.12			0.23		
v/c Ratio	0.67	0.83	0.04	0.78	0.53	0.04	0.40	0.84		0.73	0.31	
Uniform Delay, d1	27.3	16.3	11.0	27.5	13.7	11.0	16.4	19.4		18.5	15.8	
Progression Factor	1.00	1.00	1.00	0.62	1.60	8.87	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	5.9	0.1	24.2	1.2	0.1	3.9	14.7		31.7	0.7	
Delay (s)	40.4	22.2	11.2	41.3	23.3	97.9	20.3	34.1		50.2	16.6	
Level of Service	D	C	B	D	C	F	C	C		D	B	
Approach Delay (s)		22.8			30.1			31.3			23.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			26.5			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)		13.5				
Intersection Capacity Utilization			76.2%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 2: Belmont St & Campus Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	5	36	8	22	21	10	13	576	82	23	399	10
Future Volume (Veh/h)	5	36	8	22	21	10	13	576	82	23	399	10
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	44	10	27	26	12	16	702	100	28	487	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)	1281											
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1358	1383	493	1365	1339	752	499			802		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1349	1375	428	1356	1329	752	434			802		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	66	98	67	81	97	98			97		
cM capacity (veh/h)	96	130	589	83	138	410	1057			822		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	60	65	818	527								
Volume Left	6	27	16	28								
Volume Right	10	12	100	12								
cSH	143	120	1057	822								
Volume to Capacity	0.42	0.54	0.02	0.03								
Queue Length 95th (ft)	46	65	1	3								
Control Delay (s)	47.1	66.0	0.4	0.9								
Lane LOS	E	F	A	A								
Approach Delay (s)	47.1	66.0	0.4	0.9								
Approach LOS	E	F										
Intersection Summary												
Average Delay			5.4									
Intersection Capacity Utilization			54.2%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 3: Bon View Ave & Mission Blvd
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	49	1123	82	48	692	35	45	81	34	78	128	60
Future Volume (vph)	49	1123	82	48	692	35	45	81	34	78	128	60
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.97	0.97	0.97	0.97	0.97	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1784	1784	1784	1784	1784	1784
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.84	0.84	0.84	0.84	0.84	0.84
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1526	1526	1526	1526	1526	1526
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	59	1353	99	58	834	42	54	98	41	94	154	72
RTOR Reduction (vph)	0	0	57	0	0	25	0	16	0	0	18	0
Lane Group Flow (vph)	59	1353	42	58	834	17	0	177	0	0	303	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.8	25.5	25.5	3.0	24.7	24.7	18.0				18.0	
Effective Green, g (s)	3.8	25.5	25.5	3.0	24.7	24.7	18.0				18.0	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.41	0.41	0.30				0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5				4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0				3.0	
Lane Grp Cap (vph)	112	1504	672	88	1456	651	457				465	
v/s Ratio Prot	c0.03	c0.38		0.03	0.24							
v/s Ratio Perm			0.03		0.01		0.12				c0.19	
v/c Ratio	0.53	0.90	0.06	0.66	0.57	0.03	0.39				0.65	
Uniform Delay, d1	27.2	16.1	10.2	28.0	13.6	10.5	16.6				18.3	
Progression Factor	0.55	1.37	2.84	1.00	1.00	1.00	1.00				1.00	
Incremental Delay, d2	2.9	6.1	0.1	16.4	1.6	0.1	2.5				6.9	
Delay (s)	18.0	28.1	29.1	44.4	15.2	10.6	19.1				25.2	
Level of Service	B	C	C	D	B	B	B				C	
Approach Delay (s)		27.7			16.8		19.1				25.2	
Approach LOS		C			B		B				C	
Intersection Summary												
HCM 2000 Control Delay		23.4										C
HCM 2000 Volume to Capacity ratio		0.79										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)		13.5					
Intersection Capacity Utilization		66.3%			ICU Level of Service		C					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 4: Belmont St & Bon View Ave
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	26	96	13	67	30	48	6	81	32	97	152	20
Future Volume (Veh/h)	26	96	13	67	30	48	6	81	32	97	152	20
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	30	109	15	76	34	55	7	92	36	110	173	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	600	546	184	598	540	110	196				128	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	600	546	184	598	540	110	196				128	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	91	73	98	75	92	94	99				92	
cM capacity (veh/h)	342	409	858	304	413	943	1377				1458	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	154	165	135	306								
Volume Left	30	76	7	110								
Volume Right	15	55	36	23								
cSH	414	423	1377	1458								
Volume to Capacity	0.37	0.39	0.01	0.08								
Queue Length 95th (ft)	42	45	0	6								
Control Delay (s)	18.7	18.9	0.4	3.2								
Lane LOS	C	C	A	A								
Approach Delay (s)	18.7	18.9	0.4	3.2								
Approach LOS	C	C										
Intersection Summary												
Average Delay		9.2										
Intersection Capacity Utilization		42.8%			ICU Level of Service		A					
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 5: Cucamonga Ave & Belmont St
 Timing Plan: AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	101	126	100	66	95	44
Future Volume (Veh/h)	101	126	100	66	95	44
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	131	164	130	86	123	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			295		559	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			295		559	148
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		70	93
cM capacity (veh/h)			1263		412	873
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	87	208	130	86	180	
Volume Left	0	0	130	0	123	
Volume Right	0	164	0	0	57	
cSH	1700	1700	1263	1700	603	
Volume to Capacity	0.05	0.12	0.10	0.05	0.30	
Queue Length 95th (ft)	0	0	9	0	31	
Control Delay (s)	0.0	0.0	8.2	0.0	14.9	
Lane LOS			A		B	
Approach Delay (s)	0.0		4.9		14.9	
Approach LOS					B	
Intersection Summary						
Average Delay			5.4			
Intersection Capacity Utilization			27.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 6: Grove Ave & Mission Blvd
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↔↔	↔	↔↔	↔↔	↔	↔↔	↔↔	↔	↔↔	↔↔	↔↔
Traffic Volume (vph)	463	620	139	31	460	382	127	780	24	340	1107	297
Future Volume (vph)	463	620	139	31	460	382	127	780	24	340	1107	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5063		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5063		1770	5085	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	526	705	158	35	523	434	144	886	27	386	1258	338
RTOR Reduction (vph)	0	0	105	0	0	317	0	3	0	0	0	55
Lane Group Flow (vph)	526	705	53	35	523	117	144	910	0	386	1258	283
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	14.8	30.4	30.4	3.0	18.6	18.6	10.3	18.0		20.6	28.3	43.1
Effective Green, g (s)	14.8	30.4	30.4	3.0	18.6	18.6	10.3	18.0		20.6	28.3	43.1
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.11	0.20		0.23	0.31	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	564	1195	534	114	731	327	202	1012		405	1598	837
v/s Ratio Prot	c0.15	0.20		0.01	c0.15		0.08	c0.18		c0.22	0.25	0.06
v/s Ratio Perm			0.03			0.07						0.12
v/c Ratio	0.93	0.59	0.10	0.31	0.72	0.36	0.71	0.90		0.95	0.79	0.34
Uniform Delay, d1	37.1	24.6	20.4	42.5	33.2	30.6	38.4	35.1		34.2	28.1	14.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.5	2.1	0.4	1.5	5.9	3.0	11.3	12.4		32.6	4.0	0.2
Delay (s)	59.6	26.8	20.8	44.0	39.2	33.6	49.7	47.5		66.9	32.1	14.8
Level of Service	E	C	C	D	D	C	D	D		E	C	B
Approach Delay (s)		38.5			36.9			47.8				35.9
Approach LOS		D			D			D				D
Intersection Summary												
HCM 2000 Control Delay			39.1					HCM 2000 Level of Service				D
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			90.0					Sum of lost time (s)				18.0
Intersection Capacity Utilization			75.4%					ICU Level of Service				D
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions

7: Belmont St & Grove Ave

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↗	↗
Traffic Volume (vph)	53	6	81	3	7	8	62	853	8	14	1154	79
Future Volume (vph)	53	6	81	3	7	8	62	853	8	14	1154	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1715		1770	5078		1770	5036	
Flt Permitted	0.75	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1390	1863	1583	1403	1715		1770	5078		1770	5036	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	7	88	3	8	9	67	927	9	15	1254	86
RTOR Reduction (vph)	0	0	78	0	8	0	0	1	0	0	9	0
Lane Group Flow (vph)	58	7	10	3	9	0	67	935	0	15	1331	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	6.9	6.9	6.9	6.9	6.9		5.3	38.2		1.4	34.3	
Effective Green, g (s)	6.9	6.9	6.9	6.9	6.9		5.3	38.2		1.4	34.3	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.64		0.02	0.57	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	159	214	182	161	197		156	3232		41	2878	
v/s Ratio Prot		0.00			0.01		c0.04	c0.18		0.01	c0.26	
v/s Ratio Perm	c0.04		0.01	0.00								
v/c Ratio	0.36	0.03	0.06	0.02	0.05		0.43	0.29		0.37	0.46	
Uniform Delay, d1	24.5	23.6	23.6	23.5	23.6		25.9	4.9		28.9	7.5	
Progression Factor	0.98	0.99	0.96	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.1	0.0	0.1		1.9	0.2		5.5	0.5	
Delay (s)	25.4	23.5	22.9	23.6	23.7		27.8	5.1		34.3	8.0	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.8			23.7			6.6			8.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.43		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		49.1%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 1: Campus Ave & Mission Blvd Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	77	837	93	116	1021	91	85	392	55	82	323	70
Future Volume (vph)	77	837	93	116	1021	91	85	392	55	82	323	70
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	3444	1770	3444
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.48	1.00	0.25	1.00	0.25	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	902	1828	457	3444	457	3444
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	80	872	97	121	1064	95	89	408	57	85	336	73
RTOR Reduction (vph)	0	0	62	0	0	58	0	8	0	0	31	0
Lane Group Flow (vph)	80	872	35	121	1064	37	89	457	0	85	378	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.1	21.8	21.8	5.5	23.2	23.2	19.2	19.2		19.2	19.2	
Effective Green, g (s)	4.1	21.8	21.8	5.5	23.2	23.2	19.2	19.2		19.2	19.2	
Actuated g/C Ratio	0.07	0.36	0.36	0.09	0.39	0.39	0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	1285	575	162	1368	612	288	584		146	1102	
v/s Ratio Prot	0.05	0.25		c0.07	c0.30			c0.25			0.11	
v/s Ratio Perm			0.02			0.02	0.10			0.19		
v/c Ratio	0.67	0.68	0.06	0.75	0.78	0.06	0.31	0.78		0.58	0.34	
Uniform Delay, d1	27.3	16.1	12.4	26.6	16.1	11.6	15.4	18.5		17.0	15.6	
Progression Factor	1.00	1.00	1.00	0.62	1.39	2.99	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	2.9	0.2	13.9	3.5	0.1	2.8	10.0		15.8	0.9	
Delay (s)	40.4	19.0	12.6	30.3	25.9	34.7	18.2	28.5		32.9	16.4	
Level of Service	D	B	B	C	C	C	B	C		C	B	
Approach Delay (s)		20.1			27.0			26.9			19.3	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.7									C
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)		13.5				
Intersection Capacity Utilization			76.0%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 2: Belmont St & Campus Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	3	9	7	56	29	21	6	622	68	19	482	7
Future Volume (Veh/h)	3	9	7	56	29	21	6	622	68	19	482	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	8	61	32	23	7	676	74	21	524	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1281	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	1336	1334	528	1310	1301	713	532			750		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1321	1319	439	1293	1283	713	443			750		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	93	99	48	78	95	99			98		
cM capacity (veh/h)	94	139	566	117	147	432	1023			859		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	21	116	757	553								
Volume Left	3	61	7	21								
Volume Right	8	23	74	8								
cSH	178	146	1023	859								
Volume to Capacity	0.12	0.80	0.01	0.02								
Queue Length 95th (ft)	10	125	1	2								
Control Delay (s)	27.9	88.2	0.2	0.7								
Lane LOS	D	F	A	A								
Approach Delay (s)	27.9	88.2	0.2	0.7								
Approach LOS	D	F										
Intersection Summary												
Average Delay			7.8									
Intersection Capacity Utilization			58.4%				ICU Level of Service			B		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 3: Bon View Ave & Mission Blvd Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	51	912	46	34	963	82	104	222	61	60	9	91
Future Volume (vph)	51	912	46	34	963	82	104	222	61	60	9	91
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.98	0.98	0.98	0.98	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.98	0.98	0.98	0.98	0.98	0.98
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1799	1799	1799	1799	1688	1688
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.88	0.88	0.88	0.88	0.75	0.75
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1600	1600	1600	1600	1296	1296
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	53	950	48	35	1003	85	108	231	64	62	9	95
RTOR Reduction (vph)	0	0	28	0	0	51	0	11	0	0	64	0
Lane Group Flow (vph)	53	950	20	35	1003	34	0	392	0	0	103	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.1	25.0	25.0	2.0	23.9	23.9	19.5				19.5	
Effective Green, g (s)	3.1	25.0	25.0	2.0	23.9	23.9	19.5				19.5	
Actuated g/C Ratio	0.05	0.42	0.42	0.03	0.40	0.40	0.32				0.32	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5				4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0				3.0	
Lane Grp Cap (vph)	91	1474	659	59	1409	630	520				421	
v/s Ratio Prot	c0.03	0.27		0.02	c0.28						0.08	
v/s Ratio Perm			0.01			0.02	c0.24					0.08
v/c Ratio	0.58	0.64	0.03	0.59	0.71	0.05	0.75				0.24	
Uniform Delay, d1	27.8	14.0	10.3	28.6	15.2	11.1	18.1				14.8	
Progression Factor	0.61	1.50	18.11	1.00	1.00	1.00	1.00				1.00	
Incremental Delay, d2	7.2	1.7	0.1	15.0	3.1	0.2	9.7				1.4	
Delay (s)	24.0	22.7	187.3	43.6	18.2	11.3	27.8				16.2	
Level of Service	C	C	F	D	B	B	C				B	
Approach Delay (s)		30.3			18.5		27.8				16.2	
Approach LOS		C			B		C				B	
Intersection Summary												
HCM 2000 Control Delay			24.2									C
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)	13.5					
Intersection Capacity Utilization			66.9%			ICU Level of Service						C
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 4: Belmont St & Bon View Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	30	53	15	45	98	127	15	247	128	46	113	19
Future Volume (Veh/h)	30	53	15	45	98	127	15	247	128	46	113	19
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	36	63	18	54	117	151	18	294	152	55	135	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	872	738	146	712	674	370	158				446	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	872	738	146	712	674	370	158				446	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	76	81	98	80	67	78	99				95	
cM capacity (veh/h)	149	324	901	276	353	676	1422				1114	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	117	322	464	213								
Volume Left	36	54	18	55								
Volume Right	18	151	152	23								
cSH	257	429	1422	1114								
Volume to Capacity	0.46	0.75	0.01	0.05								
Queue Length 95th (ft)	56	154	1	4								
Control Delay (s)	30.2	34.6	0.4	2.5								
Lane LOS	D	D	A	A								
Approach Delay (s)	30.2	34.6	0.4	2.5								
Approach LOS	D	D										
Intersection Summary												
Average Delay							13.8					
Intersection Capacity Utilization							52.6%				ICU Level of Service	A
Analysis Period (min)							15					

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 5: Cucamonga Ave & Belmont St
 Timing Plan: PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	152	63	42	95	155	146
Future Volume (Veh/h)	152	63	42	95	155	146
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	203	84	56	127	207	195
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	5					
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			287	484	144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			287	484	144	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			96	58	78	
cM capacity (veh/h)			1272	489	878	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	135	152	56	127	402	
Volume Left	0	0	56	0	207	
Volume Right	0	84	0	0	195	
cSH	1700	1700	1272	1700	950	
Volume to Capacity	0.08	0.09	0.04	0.07	0.42	
Queue Length 95th (ft)	0	0	3	0	53	
Control Delay (s)	0.0	0.0	8.0	0.0	14.1	
Lane LOS	A		A		B	
Approach Delay (s)	0.0		2.4		14.1	
Approach LOS	A		A		B	
Intersection Summary						
Average Delay			7.0			
Intersection Capacity Utilization			28.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 6: Grove Ave & Mission Blvd
 Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	370	632	109	33	664	545	163	1190	28	352	823	314
Future Volume (vph)	370	632	109	33	664	545	163	1190	28	352	823	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	389	665	115	35	699	574	172	1253	29	371	866	331
RTOR Reduction (vph)	0	0	80	0	0	310	0	3	0	0	0	86
Lane Group Flow (vph)	389	665	35	35	699	264	172	1279	0	371	866	245
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	10.7	27.4	27.4	3.0	19.7	19.7	13.4	22.5		19.1	28.2	38.9
Effective Green, g (s)	10.7	27.4	27.4	3.0	19.7	19.7	13.4	22.5		19.1	28.2	38.9
Actuated g/C Ratio	0.12	0.30	0.30	0.03	0.22	0.22	0.15	0.25		0.21	0.31	0.43
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	408	1077	481	114	774	346	263	1267		375	1593	763
v/s Ratio Prot	c0.11	0.19		0.01	c0.20		0.10	c0.25		c0.21	0.17	0.04
v/s Ratio Perm			0.02			0.17						0.12
v/c Ratio	0.95	0.62	0.07	0.31	0.90	0.76	0.65	1.01		0.99	0.54	0.32
Uniform Delay, d1	39.4	26.8	22.3	42.5	34.2	33.0	36.1	33.8		35.3	25.6	16.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	32.5	2.7	0.3	1.5	15.9	14.7	5.7	27.6		43.1	1.3	0.2
Delay (s)	72.0	29.5	22.6	44.0	50.1	47.7	41.9	61.4		78.5	26.9	17.1
Level of Service	E	C	C	D	D	D	D	E		E	C	B
Approach Delay (s)	42.9			48.9			59.1			37.0		
Approach LOS	D			D			E			D		
Intersection Summary												
HCM 2000 Control Delay	46.9			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.97											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)			18.0					
Intersection Capacity Utilization	87.0%			ICU Level of Service			E					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Sites 1 or 2 Conditions
 7: Belmont St & Grove Ave
 Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↘	↘
Traffic Volume (vph)	77	14	111	4	16	38	64	1215	10	6	974	31
Future Volume (vph)	77	14	111	4	16	38	64	1215	10	6	974	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1665		1770	5079		1770	5062	
Flt Permitted	0.72	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1343	1863	1583	1394	1665		1770	5079		1770	5062	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	79	14	113	4	16	39	65	1240	10	6	994	32
RTOR Reduction (vph)	0	0	98	0	34	0	0	1	0	0	4	0
Lane Group Flow (vph)	79	14	15	4	21	0	65	1249	0	6	1022	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.8	7.8	7.8	7.8	7.8		5.2	37.4		1.3	33.5	
Effective Green, g (s)	7.8	7.8	7.8	7.8	7.8		5.2	37.4		1.3	33.5	
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13		0.09	0.62		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	174	242	205	181	216		153	3165		38	2826	
v/s Ratio Prot		0.01			0.01		c0.04	c0.25		0.00	0.20	
v/s Ratio Perm	c0.06		0.01	0.00								
v/c Ratio	0.45	0.06	0.07	0.02	0.10		0.42	0.39		0.16	0.36	
Uniform Delay, d1	24.1	22.9	22.9	22.8	23.0		26.0	5.6		28.8	7.3	
Progression Factor	0.99	0.99	0.97	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.1	0.1	0.0	0.2		1.9	0.4		1.9	0.4	
Delay (s)	25.7	22.6	22.3	22.8	23.2		27.9	6.0		30.8	7.7	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.6			23.2			7.1			7.8	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.42		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		50.0%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

EXISTING PLUS O&M FACILITY SITE 3

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 1: Campus Ave & Mission Blvd Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	70	1034	58	83	654	52	110	307	122	80	267	36
Future Volume (vph)	70	1034	58	83	654	52	110	307	122	80	267	36
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1783	1770	1783	1770	3476
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.54	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1008	1783	403	3476	403	3476
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	80	1175	66	94	743	59	125	349	139	91	303	41
RTOR Reduction (vph)	0	0	40	0	0	35	0	24	0	0	17	0
Lane Group Flow (vph)	80	1175	26	94	743	24	125	464	0	91	327	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.1	23.9	23.9	4.1	23.9	23.9	18.5	18.5		18.5	18.5	
Effective Green, g (s)	4.1	23.9	23.9	4.1	23.9	23.9	18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.07	0.40	0.40	0.07	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	1409	630	120	1409	630	310	549		124	1071	
v/s Ratio Prot	0.05	c0.33		c0.05	0.21		c0.26				0.09	
v/s Ratio Perm			0.02			0.01	0.12			0.23		
v/c Ratio	0.67	0.83	0.04	0.78	0.53	0.04	0.40	0.84		0.73	0.31	
Uniform Delay, d1	27.3	16.3	11.0	27.5	13.7	11.0	16.4	19.4		18.5	15.8	
Progression Factor	1.00	1.00	1.00	0.62	1.60	8.87	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	5.9	0.1	24.2	1.2	0.1	3.9	14.7		31.7	0.7	
Delay (s)	40.4	22.2	11.2	41.3	23.3	97.9	20.3	34.1		50.2	16.6	
Level of Service	D	C	B	D	C	F	C	C		D	B	
Approach Delay (s)		22.8			30.1			31.3			23.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			26.5			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)		13.5				
Intersection Capacity Utilization			76.2%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 2: Belmont St & Campus Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	5	36	8	22	21	10	13	576	82	23	399	10
Future Volume (Veh/h)	5	36	8	22	21	10	13	576	82	23	399	10
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	44	10	27	26	12	16	702	100	28	487	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)	1281											
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1358	1383	493	1365	1339	752	499			802		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1349	1375	428	1356	1329	752	434			802		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	66	98	67	81	97	98			97		
cM capacity (veh/h)	96	130	589	83	138	410	1057			822		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	60	65	818	527								
Volume Left	6	27	16	28								
Volume Right	10	12	100	12								
cSH	143	120	1057	822								
Volume to Capacity	0.42	0.54	0.02	0.03								
Queue Length 95th (ft)	46	65	1	3								
Control Delay (s)	47.1	66.0	0.4	0.9								
Lane LOS	E	F	A	A								
Approach Delay (s)	47.1	66.0	0.4	0.9								
Approach LOS	E	F										
Intersection Summary												
Average Delay			5.4									
Intersection Capacity Utilization			54.2%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 3: Bon View Ave & Mission Blvd Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	49	1123	82	57	692	35	45	81	34	78	128	60
Future Volume (vph)	49	1123	82	57	692	35	45	81	34	78	128	60
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1784			1780	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.84			0.86	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1526			1552	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	59	1353	99	69	834	42	54	98	41	94	154	72
RTOR Reduction (vph)	0	0	57	0	0	25	0	16	0	0	18	0
Lane Group Flow (vph)	59	1353	42	69	834	17	0	177	0	0	303	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Effective Green, g (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.41	0.41		0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	112	1504	672	88	1456	651		457			465	
v/s Ratio Prot	0.03	c0.38		c0.04	0.24						c0.19	
v/s Ratio Perm			0.03			0.01		0.12				
v/c Ratio	0.53	0.90	0.06	0.78	0.57	0.03		0.39			0.65	
Uniform Delay, d1	27.2	16.1	10.2	28.2	13.6	10.5		16.6			18.3	
Progression Factor	0.55	1.37	2.84	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	2.9	6.1	0.1	35.5	1.6	0.1		2.5			6.9	
Delay (s)	18.0	28.1	29.1	63.7	15.2	10.6		19.1			25.2	
Level of Service	B	C	C	E	B	B		B			C	
Approach Delay (s)		27.7			18.6			19.1			25.2	
Approach LOS		C			B			B			C	
Intersection Summary												
HCM 2000 Control Delay		24.0										C
HCM 2000 Volume to Capacity ratio		0.80										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)			13.5				
Intersection Capacity Utilization		66.3%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 4: Belmont St & Bon View Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (veh/h)	26	87	22	76	30	48	6	81	32	88	169	20
Future Volume (Veh/h)	26	87	22	76	30	48	6	81	32	88	169	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	30	99	25	86	34	55	7	92	36	100	192	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	600	546	204	602	539	110	215				128	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	600	546	204	602	539	110	215				128	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	91	76	97	72	92	94	99				93	
cM capacity (veh/h)	345	413	837	308	416	943	1355				1458	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	154	175	135	315								
Volume Left	30	86	7	100								
Volume Right	25	55	36	23								
cSH	432	417	1355	1458								
Volume to Capacity	0.36	0.42	0.01	0.07								
Queue Length 95th (ft)	40	51	0	6								
Control Delay (s)	17.9	19.7	0.4	2.8								
Lane LOS	C	C	A	A								
Approach Delay (s)	17.9	19.7	0.4	2.8								
Approach LOS	C	C										
Intersection Summary												
Average Delay		9.2										
Intersection Capacity Utilization		43.7%			ICU Level of Service						A	
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 5: Cucamonga Ave & Belmont St
 Timing Plan: AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	101	109	83	75	95	44
Future Volume (Veh/h)	101	109	83	75	95	44
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	131	142	108	97	123	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			273		515	136
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			273		515	136
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		73	94
cM capacity (veh/h)			1287		448	887
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	87	186	108	97	180	
Volume Left	0	0	108	0	123	
Volume Right	0	142	0	0	57	
cSH	1700	1700	1287	1700	656	
Volume to Capacity	0.05	0.11	0.08	0.06	0.27	
Queue Length 95th (ft)	0	0	7	0	28	
Control Delay (s)	0.0	0.0	8.1	0.0	13.9	
Lane LOS			A		B	
Approach Delay (s)	0.0		4.2		13.9	
Approach LOS					B	
Intersection Summary						
Average Delay			5.1			
Intersection Capacity Utilization			26.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 6: Grove Ave & Mission Blvd
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑	↑↑	↑	↑↑	↑↑	↑	↑	↑↑	↑
Traffic Volume (vph)	463	620	139	31	460	382	127	780	24	340	1098	306
Future Volume (vph)	463	620	139	31	460	382	127	780	24	340	1098	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5063		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5063		1770	5085	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88		0.88	0.88	0.88
Adj. Flow (vph)	526	705	158	35	523	434	144	886		27	386	1248
RTOR Reduction (vph)	0	0	105	0	0	317	0	3		0	0	55
Lane Group Flow (vph)	526	705	53	35	523	117	144	910		0	386	1248
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	14.8	30.4	30.4	3.0	18.6	18.6	10.3	18.0		20.6	28.3	43.1
Effective Green, g (s)	14.8	30.4	30.4	3.0	18.6	18.6	10.3	18.0		20.6	28.3	43.1
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.11	0.20		0.23	0.31	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	564	1195	534	114	731	327	202	1012		405	1598	837
v/s Ratio Prot	c0.15	0.20		0.01	c0.15		0.08	c0.18		c0.22	0.25	0.06
v/s Ratio Perm			0.03			0.07						0.13
v/c Ratio	0.93	0.59	0.10	0.31	0.72	0.36	0.71	0.90		0.95	0.78	0.35
Uniform Delay, d1	37.1	24.6	20.4	42.5	33.2	30.6	38.4	35.1		34.2	28.0	14.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.5	2.1	0.4	1.5	5.9	3.0	11.3	12.4		32.6	3.9	0.3
Delay (s)	59.6	26.8	20.8	44.0	39.2	33.6	49.7	47.5		66.9	31.9	14.9
Level of Service	E	C	C	D	D	C	D	D		E	C	B
Approach Delay (s)		38.5			36.9			47.8				35.7
Approach LOS		D			D			D				D
Intersection Summary												
HCM 2000 Control Delay			39.0				HCM 2000 Level of Service					D
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			75.4%			ICU Level of Service				D		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 7: Belmont St & Grove Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Traffic Volume (vph)	53	6	81	3	7	8	62	853	8	14	1154	70
Future Volume (vph)	53	6	81	3	7	8	62	853	8	14	1154	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1715		1770	5078		1770	5042	
Flt Permitted	0.75	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1390	1863	1583	1403	1715		1770	5078		1770	5042	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	7	88	3	8	9	67	927	9	15	1254	76
RTOR Reduction (vph)	0	0	78	0	8	0	0	1	0	0	8	0
Lane Group Flow (vph)	58	7	10	3	9	0	67	935	0	15	1322	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	6.9	6.9	6.9	6.9	6.9		5.3	38.2		1.4	34.3	
Effective Green, g (s)	6.9	6.9	6.9	6.9	6.9		5.3	38.2		1.4	34.3	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.64		0.02	0.57	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	159	214	182	161	197		156	3232		41	2882	
v/s Ratio Prot		0.00			0.01		c0.04	c0.18		0.01	c0.26	
v/s Ratio Perm	c0.04		0.01	0.00								
v/c Ratio	0.36	0.03	0.06	0.02	0.05		0.43	0.29		0.37	0.46	
Uniform Delay, d1	24.5	23.6	23.6	23.5	23.6		25.9	4.9		28.9	7.5	
Progression Factor	0.97	1.00	0.95	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.1	0.0	0.1		1.9	0.2		5.5	0.5	
Delay (s)	25.3	23.6	22.6	23.6	23.7		27.8	5.1		34.3	8.0	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.7			23.7			6.6			8.3	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.7							A		
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			60.0					Sum of lost time (s)		13.5		
Intersection Capacity Utilization			48.9%					ICU Level of Service		A		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 1: Campus Ave & Mission Blvd Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	77	837	93	116	1021	91	85	392	55	82	323	70
Future Volume (vph)	77	837	93	116	1021	91	85	392	55	82	323	70
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.95	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	3444	1770	3444
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.48	1.00	0.25	1.00	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	902	1828	457	3444	1770	3444
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	80	872	97	121	1064	95	89	408	57	85	336	73
RTOR Reduction (vph)	0	0	62	0	0	58	0	8	0	0	31	0
Lane Group Flow (vph)	80	872	35	121	1064	37	89	457	0	85	378	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.1	21.8	21.8	5.5	23.2	23.2	19.2	19.2		19.2	19.2	
Effective Green, g (s)	4.1	21.8	21.8	5.5	23.2	23.2	19.2	19.2		19.2	19.2	
Actuated g/C Ratio	0.07	0.36	0.36	0.09	0.39	0.39	0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	1285	575	162	1368	612	288	584		146	1102	
v/s Ratio Prot	0.05	0.25		c0.07	c0.30			c0.25			0.11	
v/s Ratio Perm			0.02			0.02	0.10			0.19		
v/c Ratio	0.67	0.68	0.06	0.75	0.78	0.06	0.31	0.78		0.58	0.34	
Uniform Delay, d1	27.3	16.1	12.4	26.6	16.1	11.6	15.4	18.5		17.0	15.6	
Progression Factor	1.00	1.00	1.00	0.62	1.39	2.99	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	2.9	0.2	13.8	3.5	0.1	2.8	10.0		15.8	0.9	
Delay (s)	40.4	19.0	12.6	30.2	25.9	34.7	18.2	28.5		32.9	16.4	
Level of Service	D	B	B	C	C	C	B	C		C	B	
Approach Delay (s)		20.1			27.0			26.9			19.3	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay		23.7			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.80										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)		13.5					
Intersection Capacity Utilization		76.0%			ICU Level of Service		D					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 2: Belmont St & Campus Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	3	9	7	56	29	21	6	622	68	19	482	7
Future Volume (Veh/h)	3	9	7	56	29	21	6	622	68	19	482	7
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	8	61	32	23	7	676	74	21	524	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1281	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	1336	1334	528	1310	1301	713	532			750		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1321	1319	439	1293	1283	713	443			750		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	93	99	48	78	95	99			98		
cM capacity (veh/h)	94	139	566	117	147	432	1023			859		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	21	116	757	553								
Volume Left	3	61	7	21								
Volume Right	8	23	74	8								
cSH	178	146	1023	859								
Volume to Capacity	0.12	0.80	0.01	0.02								
Queue Length 95th (ft)	10	125	1	2								
Control Delay (s)	27.9	88.2	0.2	0.7								
Lane LOS	D	F	A	A								
Approach Delay (s)	27.9	88.2	0.2	0.7								
Approach LOS	D	F										
Intersection Summary												
Average Delay		7.8										
Intersection Capacity Utilization		58.4%			ICU Level of Service		B					
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 3: Bon View Ave & Mission Blvd Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	51	912	46	34	963	82	104	222	70	60	9	91
Future Volume (vph)	51	912	46	34	963	82	104	222	70	60	9	91
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.98	0.98	0.98	0.98	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1795	1795	1795	1688	1688	1688
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.88	0.88	0.88	0.88	0.75	0.75
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1600	1600	1600	1286	1286	1286
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	53	950	48	35	1003	85	108	231	73	62	9	95
RTOR Reduction (vph)	0	0	28	0	0	51	0	13	0	0	64	0
Lane Group Flow (vph)	53	950	20	35	1003	34	0	399	0	0	103	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.1	25.0	25.0	2.0	23.9	23.9	19.5			19.5		
Effective Green, g (s)	3.1	25.0	25.0	2.0	23.9	23.9	19.5			19.5		
Actuated g/C Ratio	0.05	0.42	0.42	0.03	0.40	0.40	0.32			0.32		
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0		
Lane Grp Cap (vph)	91	1474	659	59	1409	630	520			417		
v/s Ratio Prot	c0.03	0.27		0.02	c0.28							
v/s Ratio Perm			0.01			0.02	c0.25				0.08	
v/c Ratio	0.58	0.64	0.03	0.59	0.71	0.05	0.77			0.25		
Uniform Delay, d1	27.8	14.0	10.3	28.6	15.2	11.1	18.2			14.9		
Progression Factor	0.61	1.50	18.11	1.00	1.00	1.00	1.00			1.00		
Incremental Delay, d2	7.2	1.7	0.1	15.0	3.1	0.2	10.4			1.4		
Delay (s)	24.0	22.7	187.3	43.6	18.2	11.3	28.6			16.3		
Level of Service	C	C	F	D	B	B	C			B		
Approach Delay (s)		30.3			18.5		28.6			16.3		
Approach LOS		C			B		C			B		

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 4: Belmont St & Bon View Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	30	53	15	45	89	118	24	264	137	46	113	19
Future Volume (Veh/h)	30	53	15	45	89	118	24	264	137	46	113	19
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	36	63	18	54	106	140	29	314	163	55	135	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	903	792	146	760	722	396	158			477		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	903	792	146	760	722	396	158			477		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	75	79	98	79	68	79	98			95		
cM capacity (veh/h)	144	299	901	251	328	654	1422			1085		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	117	300	506	213
Volume Left	36	54	29	55
Volume Right	18	140	163	23
cSH	244	399	1422	1085
Volume to Capacity	0.48	0.75	0.02	0.05
Queue Length 95th (ft)	60	152	2	4
Control Delay (s)	32.7	36.7	0.6	2.5
Lane LOS	D	E	A	A
Approach Delay (s)	32.7	36.7	0.6	2.5
Approach LOS	D	E		

Intersection Summary			
Average Delay	13.8		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
5: Cucamonga Ave & Belmont St
Timing Plan: PM Peak Hour

	→		↖		←		↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↕↕		↕	↕	↕	↕		
Traffic Volume (veh/h)	161	63	42	95	138	129		
Future Volume (Veh/h)	161	63	42	95	138	129		
Sign Control	Free		Free		Stop			
Grade	0%		0%		0%			
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75		
Hourly flow rate (vph)	215	84	56	127	184	172		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)							5	
Median type	None		None					
Median storage (veh)								
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume			299		496	150		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			299		496	150		
tC, single (s)			4.1		6.8	6.9		
tC, 2 stage (s)								
tF (s)			2.2		3.5	3.3		
p0 queue free %			96		62	80		
cM capacity (veh/h)			1259		481	870		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1			
Volume Total	143	156	56	127	356			
Volume Left	0	0	56	0	184			
Volume Right	0	84	0	0	172			
cSH	1700	1700	1259	1700	930			
Volume to Capacity	0.08	0.09	0.04	0.07	0.38			
Queue Length 95th (ft)	0	0	3	0	45			
Control Delay (s)	0.0	0.0	8.0	0.0	13.7			
Lane LOS	A		A		B			
Approach Delay (s)	0.0		2.4		13.7			
Approach LOS	A		A		B			
Intersection Summary								
Average Delay			6.4					
Intersection Capacity Utilization			27.4%	ICU Level of Service		A		
Analysis Period (min)			15					

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
6: Grove Ave & Mission Blvd
Timing Plan: PM Peak Hour

	→		↖		←		↗		↑		↓	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	379	632	109	33	664	545	163	1181	28	352	823	314
Future Volume (vph)	379	632	109	33	664	545	163	1181	28	352	823	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	399	665	115	35	699	574	172	1243	29	371	866	331
RTOR Reduction (vph)	0	0	79	0	0	311	0	3	0	0	0	86
Lane Group Flow (vph)	399	665	36	35	699	263	172	1269	0	371	866	245
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	10.9	27.8	27.8	3.0	19.9	19.9	13.4	22.1		19.1	27.8	38.7
Effective Green, g (s)	10.9	27.8	27.8	3.0	19.9	19.9	13.4	22.1		19.1	27.8	38.7
Actuated g/C Ratio	0.12	0.31	0.31	0.03	0.22	0.22	0.15	0.25		0.21	0.31	0.43
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	415	1093	488	114	782	350	263	1244		375	1570	759
v/s Ratio Prot	c0.12	0.19		0.01	c0.20		0.10	c0.25		c0.21	0.17	0.04
v/s Ratio Perm			0.02			0.17						0.12
v/c Ratio	0.96	0.61	0.07	0.31	0.89	0.75	0.65	1.02		0.99	0.55	0.32
Uniform Delay, d1	39.3	26.5	22.0	42.5	34.0	32.7	36.1	34.0		35.3	25.9	17.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	34.1	2.5	0.3	1.5	14.8	13.9	5.7	30.7		43.1	1.4	0.2
Delay (s)	73.5	29.0	22.3	44.0	48.8	46.6	41.9	64.6		78.5	27.3	17.2
Level of Service	E	C	C	D	D	D	D	E		E	C	B
Approach Delay (s)	43.4				47.7		61.9				37.3	
Approach LOS	D				D		E				D	
Intersection Summary												
HCM 2000 Control Delay			47.5		HCM 2000 Level of Service		D					
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)		18.0					
Intersection Capacity Utilization			87.1%		ICU Level of Service		E					
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis Existing Plus O&M Facility Site 3 Conditions
 7: Belmont St & Grove Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Traffic Volume (vph)	68	14	111	4	16	38	64	1215	10	6	974	31
Future Volume (vph)	68	14	111	4	16	38	64	1215	10	6	974	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1665		1770	5079		1770	5062	
Flt Permitted	0.72	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1343	1863	1583	1394	1665		1770	5079		1770	5062	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	69	14	113	4	16	39	65	1240	10	6	994	32
RTOR Reduction (vph)	0	0	99	0	34	0	0	1	0	0	4	0
Lane Group Flow (vph)	69	14	14	4	21	0	65	1249	0	6	1022	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.4	7.4	7.4	7.4	7.4		5.2	37.8		1.3	33.9	
Effective Green, g (s)	7.4	7.4	7.4	7.4	7.4		5.2	37.8		1.3	33.9	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.63		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	165	229	195	171	205		153	3199		38	2860	
v/s Ratio Prot		0.01			0.01		c0.04	c0.25		0.00	0.20	
v/s Ratio Perm	c0.05		0.01	0.00								
v/c Ratio	0.42	0.06	0.07	0.02	0.10		0.42	0.39		0.16	0.36	
Uniform Delay, d1	24.3	23.2	23.3	23.1	23.3		26.0	5.4		28.8	7.1	
Progression Factor	0.99	0.99	0.96	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1	0.2	0.1	0.2		1.9	0.4		1.9	0.3	
Delay (s)	25.8	23.0	22.5	23.2	23.6		27.9	5.8		30.8	7.5	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.7			23.5			6.9			7.6	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.8							A		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			60.0						13.5			
Intersection Capacity Utilization			49.5%							A		
Analysis Period (min)			15									

c Critical Lane Group

OPENING YEAR 2020 NO BUILD

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2020 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	72	1064	60	85	673	53	113	316	125	73	274	37
Future Volume (vph)	72	1064	60	85	673	53	113	316	125	73	274	37
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1784	1770	1784	1770	3476
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.53	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	988	1784	414	3476	414	3476
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	82	1209	68	97	765	60	128	359	142	83	311	42
RTOR Reduction (vph)	0	0	40	0	0	36	0	24	0	0	18	0
Lane Group Flow (vph)	82	1209	28	97	765	25	128	477	0	83	336	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	24.4	24.4	4.1	24.5	24.5	18.0	18.0		18.0	18.0	
Effective Green, g (s)	4.0	24.4	24.4	4.1	24.5	24.5	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.07	0.41	0.41	0.07	0.41	0.41	0.30	0.30		0.30	0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1439	643	120	1445	646	296	535		124	1042	
v/s Ratio Prot	0.05	c0.34		c0.05	0.22			c0.27			0.10	
v/s Ratio Perm			0.02			0.02	0.13			0.20		
v/c Ratio	0.69	0.84	0.04	0.81	0.53	0.04	0.43	0.89		0.67	0.32	
Uniform Delay, d1	27.4	16.0	10.7	27.6	13.4	10.7	16.9	20.1		18.4	16.3	
Progression Factor	1.00	1.00	1.00	0.59	1.59	7.81	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	6.1	0.1	27.5	1.2	0.1	4.6	19.8		25.1	0.8	
Delay (s)	43.7	22.1	10.9	43.6	22.4	83.4	21.4	39.8		43.5	17.1	
Level of Service	D	C	B	D	C	F	C	D		D	B	
Approach Delay (s)		22.8			28.6			36.1			22.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			26.8			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			60.0	Sum of lost time (s)		13.5						
Intersection Capacity Utilization			77.5%	ICU Level of Service		D						
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2020 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	5	37	9	23	22	10	13	592	75	24	410	10
Future Volume (Veh/h)	5	37	9	23	22	10	13	592	75	24	410	10
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	45	11	28	27	12	16	722	91	29	500	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	1389	1409	506	1397	1370	768	512	813				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1381	1402	430	1389	1360	768	437	813				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	93	64	98	63	79	97	98	96				
cM capacity (veh/h)	89	123	581	76	131	402	1044	814				
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	62	67	829	541								
Volume Left	6	28	16	29								
Volume Right	11	12	91	12								
cSH	137	110	1044	814								
Volume to Capacity	0.45	0.61	0.02	0.04								
Queue Length 95th (ft)	51	75	1	3								
Control Delay (s)	51.1	78.5	0.4	1.0								
Lane LOS	F	F	A	A								
Approach Delay (s)	51.1	78.5	0.4	1.0								
Approach LOS	F	F										
Intersection Summary												
Average Delay			6.2									
Intersection Capacity Utilization			55.1%	ICU Level of Service		B						
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

2020 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔		↔			↔	↔
Traffic Volume (vph)	50	1155	75	49	712	36	47	84	35	81	132	62
Future Volume (vph)	50	1155	75	49	712	36	47	84	35	81	132	62
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1785			1780	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.83			0.85	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1502			1538	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	60	1392	90	59	858	43	57	101	42	98	159	75
RTOR Reduction (vph)	0	0	52	0	0	25	0	16	0	0	18	0
Lane Group Flow (vph)	60	1392	38	59	858	18	0	184	0	0	315	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Effective Green, g (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.41	0.41		0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	112	1504	672	88	1456	651		450			461	
v/s Ratio Prot	c0.03	c0.39		0.03	0.24							
v/s Ratio Perm			0.02			0.01		0.12			c0.20	
v/c Ratio	0.54	0.93	0.06	0.67	0.59	0.03		0.41			0.68	
Uniform Delay, d1	27.2	16.4	10.2	28.0	13.7	10.5		16.8			18.5	
Progression Factor	0.60	1.44	3.32	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	3.1	7.7	0.1	18.2	1.8	0.1		2.7			7.9	
Delay (s)	19.4	31.2	33.8	46.2	15.5	10.6		19.5			26.4	
Level of Service	B	C	C	D	B	B		B			C	
Approach Delay (s)		30.9			17.1			19.5			26.4	
Approach LOS		C			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

2020 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	27	89	13	69	30	49	7	84	33	90	157	21
Future Volume (Veh/h)	27	89	13	69	30	49	7	84	33	90	157	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	31	101	15	78	34	56	8	95	38	102	178	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	597	543	190	590	536	114	202			133		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	597	543	190	590	536	114	202			133		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	76	98	75	92	94	99			93		
cM capacity (veh/h)	345	413	852	316	417	939	1370			1452		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	147	168	141	304								
Volume Left	31	78	8	102								
Volume Right	15	56	38	24								
cSH	418	433	1370	1452								
Volume to Capacity	0.35	0.39	0.01	0.07								
Queue Length 95th (ft)	39	45	0	6								
Control Delay (s)	18.2	18.5	0.5	3.0								
Lane LOS	C	C	A	A								
Approach Delay (s)	18.2	18.5	0.5	3.0								
Approach LOS	C	C										

Intersection Summary			
Average Delay	8.9		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Cucamonga Ave & Belmont St

2020 No Build Conditions
Timing Plan: AM Peak Hour

	→		↖		←		↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑		↑	↑	↑	↑		
Traffic Volume (veh/h)	103	112	85	68	98	46		
Future Volume (Veh/h)	103	112	85	68	98	46		
Sign Control	Free		Free		Stop			
Grade	0%		0%		0%			
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77		
Hourly flow rate (vph)	134	145	110	88	127	60		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)							5	
Median type	None		None					
Median storage (veh)								
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume			279		514	140		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			279		514	140		
tC, single (s)			4.1		6.8	6.9		
tC, 2 stage (s)								
tF (s)			2.2		3.5	3.3		
p0 queue free %			91		72	93		
cM capacity (veh/h)			1281		448	883		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1			
Volume Total	89	190	110	88	187			
Volume Left	0	0	110	0	127			
Volume Right	0	145	0	0	60			
cSH	1700	1700	1281	1700	659			
Volume to Capacity	0.05	0.11	0.09	0.05	0.28			
Queue Length 95th (ft)	0	0	7	0	29			
Control Delay (s)	0.0	0.0	8.1	0.0	14.0			
Lane LOS			A		B			
Approach Delay (s)	0.0		4.5		14.0			
Approach LOS					B			
Intersection Summary								
Average Delay			5.3					
Intersection Capacity Utilization			26.6%	ICU Level of Service		A		
Analysis Period (min)			15					

HCM Signalized Intersection Capacity Analysis
6: Grove Ave & Mission Blvd

2020 No Build Conditions
Timing Plan: AM Peak Hour

	→		↖		←		↗		↑		↓	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑↑	↑	↑↑	↑
Traffic Volume (vph)	477	638	143	32	474	393	131	802	25	349	1130	306
Future Volume (vph)	477	638	143	32	474	393	131	802	25	349	1130	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	0.91	1.00	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	542	725	162	36	539	447	149	911	28	397	1284	348
RTOR Reduction (vph)	0	0	108	0	0	316	0	3	0	0	0	54
Lane Group Flow (vph)	542	725	55	36	539	131	149	936	0	397	1284	294
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov	
Protected Phases	7	4		3	8		5	2	1	6	7	
Permitted Phases			4			8						6
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	19.0	10.5	18.0	20.5	28.0	42.5	
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	19.0	10.5	18.0	20.5	28.0	42.5	
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.12	0.20	0.23	0.31	0.47	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	553	1199	536	114	747	334	206	1012	403	1582	826	
v/s Ratio Prot	c0.16	0.20		0.01	c0.15		0.08	0.18	c0.22	c0.25	0.06	
v/s Ratio Perm			0.03			0.08					0.13	
v/c Ratio	0.98	0.60	0.10	0.32	0.72	0.39	0.72	0.92	0.99	0.81	0.36	
Uniform Delay, d1	37.6	24.7	20.4	42.5	33.0	30.5	38.3	35.3	34.6	28.6	15.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	33.1	2.3	0.4	1.6	6.0	3.5	11.8	15.1	40.6	4.6	0.3	
Delay (s)	70.7	27.0	20.8	44.1	39.0	34.0	50.2	50.4	75.2	33.2	15.3	
Level of Service	E	C	C	D	D	C	D	D	E	C	B	
Approach Delay (s)	42.8				37.0		50.4		38.4			
Approach LOS	D				D		D		D			
Intersection Summary												
HCM 2000 Control Delay			41.6	HCM 2000 Level of Service		D						
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)		18.0						
Intersection Capacity Utilization			77.1%	ICU Level of Service		D						
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

2020 No Build Conditions

7: Belmont St & Grove Ave

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↘	↘
Traffic Volume (vph)	54	7	84	3	8	9	54	878	9	14	1188	72
Future Volume (vph)	54	7	84	3	8	9	54	878	9	14	1188	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1716		1770	5077		1770	5042	
Flt Permitted	0.75	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1388	1863	1583	1402	1716		1770	5077		1770	5042	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	8	91	3	9	10	59	954	10	15	1291	78
RTOR Reduction (vph)	0	0	80	0	9	0	0	1	0	0	8	0
Lane Group Flow (vph)	59	8	11	3	10	0	59	963	0	15	1361	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.0	7.0	7.0	7.0	7.0		5.1	38.1		1.4	34.4	
Effective Green, g (s)	7.0	7.0	7.0	7.0	7.0		5.1	38.1		1.4	34.4	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.08	0.64		0.02	0.57	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	161	217	184	163	200		150	3223		41	2890	
v/s Ratio Prot		0.00			0.01		c0.03	c0.19		0.01	c0.27	
v/s Ratio Perm	c0.04		0.01	0.00								
v/c Ratio	0.37	0.04	0.06	0.02	0.05		0.39	0.30		0.37	0.47	
Uniform Delay, d1	24.5	23.5	23.6	23.5	23.5		26.0	4.9		28.9	7.5	
Progression Factor	0.98	1.01	0.97	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.1	0.0	0.1		1.7	0.2		5.5	0.6	
Delay (s)	25.4	23.9	23.1	23.5	23.7		27.7	5.2		34.3	8.0	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		24.0			23.6			6.5			8.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.44		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		49.6%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2020 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	79	862	96	120	1051	84	87	404	57	84	332	73
Future Volume (vph)	79	862	96	120	1051	84	87	404	57	84	332	73
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	3444	1770	3444
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.47	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	873	1828	403	3444	403	3444
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	82	898	100	125	1095	88	91	421	59	88	346	76
RTOR Reduction (vph)	0	0	62	0	0	53	0	8	0	0	31	0
Lane Group Flow (vph)	82	898	38	125	1095	35	91	472	0	88	391	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	22.8	22.8	5.2	24.0	24.0	18.5	18.5		18.5	18.5	
Effective Green, g (s)	4.0	22.8	22.8	5.2	24.0	24.0	18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.07	0.38	0.38	0.09	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1344	601	153	1415	633	269	563		124	1061	
v/s Ratio Prot	0.05	0.25		c0.07	c0.31			c0.26			0.11	
v/s Ratio Perm			0.02			0.02	0.10			0.22		
v/c Ratio	0.69	0.67	0.06	0.82	0.77	0.06	0.34	0.84		0.71	0.37	
Uniform Delay, d1	27.4	15.5	11.8	26.9	15.6	11.0	16.0	19.4		18.4	16.2	
Progression Factor	1.00	1.00	1.00	0.61	1.46	3.44	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	2.6	0.2	22.6	3.3	0.1	3.4	13.9		29.0	1.0	
Delay (s)	43.7	18.1	12.0	39.0	26.1	38.1	19.4	33.2		47.4	17.2	
Level of Service	D	B	B	D	C	D	B	C		D	B	
Approach Delay (s)		19.5			28.1			31.0			22.4	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			25.1									C
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)		13.5				
Intersection Capacity Utilization			77.8%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2020 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	3	9	7	48	29	22	6	640	70	20	496	7
Future Volume (Veh/h)	3	9	7	48	29	22	6	640	70	20	496	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	8	52	32	24	7	696	76	22	539	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.90	0.90	0.90	0.90	0.90		0.90					
vC, conflicting volume	1375	1373	543	1348	1339	734	547				772	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1362	1360	441	1332	1322	734	446				772	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	96	92	99	52	77	94	99				97	
cM capacity (veh/h)	85	130	557	107	137	420	1007				843	
Direction, Lane #												
Volume Total	21	108	779	569								
Volume Left	3	52	7	22								
Volume Right	8	24	76	8								
cSH	166	139	1007	843								
Volume to Capacity	0.13	0.78	0.01	0.03								
Queue Length 95th (ft)	11	118	1	2								
Control Delay (s)	29.8	87.9	0.2	0.7								
Lane LOS	D	F	A	A								
Approach Delay (s)	29.8	87.9	0.2	0.7								
Approach LOS	D	F										
Intersection Summary												
Average Delay			7.2									
Intersection Capacity Utilization			59.1%				ICU Level of Service				B	
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

2020 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↕	↔	↕	↕	↔	↕	↕	↔	↕	↕
Traffic Volume (vph)	53	938	47	35	991	84	98	228	63	62	9	94
Future Volume (vph)	53	938	47	35	991	84	98	228	63	62	9	94
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.98	0.98	0.98	0.98	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1799	1799	1799	1799	1688	1688
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.88	0.88	0.88	0.88	0.74	0.74
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1611	1611	1611	1611	1273	1273
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	55	977	49	36	1032	88	102	238	66	65	9	98
RTOR Reduction (vph)	0	0	28	0	0	53	0	12	0	0	67	0
Lane Group Flow (vph)	55	977	21	36	1032	35	0	394	0	0	105	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	NA	NA
Protected Phases	7	4		3	8		2	2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.1	25.3	25.3	2.0	24.2	24.2		19.2			19.2	
Effective Green, g (s)	3.1	25.3	25.3	2.0	24.2	24.2		19.2			19.2	
Actuated g/C Ratio	0.05	0.42	0.42	0.03	0.40	0.40		0.32			0.32	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	91	1492	667	59	1427	638		515			407	
v/s Ratio Prot	c0.03	0.28		0.02	c0.29							
v/s Ratio Perm			0.01			0.02		c0.24			0.08	
v/c Ratio	0.60	0.65	0.03	0.61	0.72	0.06		0.77			0.26	
Uniform Delay, d1	27.8	13.9	10.2	28.6	15.1	10.9		18.4			15.1	
Progression Factor	0.59	1.50	14.74	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	8.4	1.7	0.1	17.2	3.2	0.2		10.4			1.5	
Delay (s)	24.9	22.5	149.9	45.8	18.3	11.1		28.8			16.7	
Level of Service	C	C	F	D	B	B		C			B	
Approach Delay (s)		28.4			18.6			28.8			16.7	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

2020 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	30	55	16	46	91	122	16	254	131	47	117	20
Future Volume (Veh/h)	30	55	16	46	91	122	16	254	131	47	117	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	36	65	19	55	108	145	19	302	156	56	139	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	880	759	151	732	693	380	163			458		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	880	759	151	732	693	380	163			458		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	79	98	79	69	78	99			95		
cM capacity (veh/h)	151	315	895	264	343	667	1416			1103		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	120	308	477	219								
Volume Left	36	55	19	56								
Volume Right	19	145	156	24								
cSH	258	416	1416	1103								
Volume to Capacity	0.47	0.74	0.01	0.05								
Queue Length 95th (ft)	58	148	1	4								
Control Delay (s)	30.6	34.6	0.4	2.5								
Lane LOS	D	D	A	A								
Approach Delay (s)	30.6	34.6	0.4	2.5								
Approach LOS	D	D										

Intersection Summary			
Average Delay	13.4		
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Cucamonga Ave & Belmont St

2020 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑	↔	↑
Traffic Volume (veh/h)	157	65	43	98	142	132
Future Volume (Veh/h)	157	65	43	98	142	132
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	209	87	57	131	189	176
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			296		498	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			296		498	148
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		61	80
cM capacity (veh/h)			1262		479	872
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	139	157	57	131	365	
Volume Left	0	0	57	0	189	
Volume Right	0	87	0	0	176	
cSH	1700	1700	1262	1700	925	
Volume to Capacity	0.08	0.09	0.05	0.08	0.39	
Queue Length 95th (ft)	0	0	4	0	48	
Control Delay (s)	0.0	0.0	8.0	0.0	13.9	
Lane LOS			A		B	
Approach Delay (s)	0.0		2.4		13.9	
Approach LOS					B	
Intersection Summary						
Average Delay			6.5			
Intersection Capacity Utilization			27.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
6: Grove Ave & Mission Blvd

2020 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Traffic Volume (vph)	380	651	112	34	683	561	168	1215	28	363	847	323
Future Volume (vph)	380	651	112	34	683	561	168	1215	28	363	847	323
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	400	685	118	36	719	591	177	1279	29	382	892	340
RTOR Reduction (vph)	0	0	83	0	0	314	0	2	0	0	0	84
Lane Group Flow (vph)	400	685	35	36	719	277	177	1306	0	382	892	256
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	10.7	27.0	27.0	3.0	19.3	19.3	13.6	22.5		19.5	28.4	39.1
Effective Green, g (s)	10.7	27.0	27.0	3.0	19.3	19.3	13.6	22.5		19.5	28.4	39.1
Actuated g/C Ratio	0.12	0.30	0.30	0.03	0.21	0.21	0.15	0.25		0.22	0.32	0.43
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	408	1061	474	114	758	339	267	1267		383	1604	766
v/s Ratio Prot	c0.12	0.19		0.01	c0.20		0.10	c0.26		c0.22	0.18	0.04
v/s Ratio Perm			0.02			0.17						0.12
v/c Ratio	0.98	0.65	0.07	0.32	0.95	0.82	0.66	1.03		1.00	0.56	0.33
Uniform Delay, d1	39.5	27.3	22.6	42.5	34.9	33.7	36.0	33.8		35.2	25.6	16.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	39.2	3.0	0.3	1.6	22.3	19.2	6.1	33.5		45.0	1.4	0.3
Delay (s)	78.8	30.4	22.9	44.1	57.2	52.8	42.1	67.2		80.2	27.0	17.1
Level of Service	E	C	C	D	E	D	D	E		F	C	B
Approach Delay (s)		45.7			54.9			64.2				37.5
Approach LOS		D			D			E				D
Intersection Summary												
HCM 2000 Control Delay			50.4		HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)			18.0				
Intersection Capacity Utilization			88.9%		ICU Level of Service			E				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

2020 No Build Conditions

7: Belmont St & Grove Ave

Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↘	↘
Traffic Volume (vph)	70	15	105	4	17	39	66	1251	11	6	1003	32
Future Volume (vph)	70	15	105	4	17	39	66	1251	11	6	1003	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1667		1770	5079		1770	5061	
Flt Permitted	0.72	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1341	1863	1583	1393	1667		1770	5079		1770	5061	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	71	15	107	4	17	40	67	1277	11	6	1023	33
RTOR Reduction (vph)	0	0	94	0	35	0	0	1	0	0	4	0
Lane Group Flow (vph)	71	15	13	4	22	0	67	1287	0	6	1052	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.5	7.5	7.5	7.5	7.5		5.3	37.7		1.3	33.7	
Effective Green, g (s)	7.5	7.5	7.5	7.5	7.5		5.3	37.7		1.3	33.7	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.63		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	232	197	174	208		156	3191		38	2842	
v/s Ratio Prot		0.01			0.01		c0.04	c0.25		0.00	0.21	
v/s Ratio Perm	c0.05		0.01	0.00								
v/c Ratio	0.43	0.06	0.07	0.02	0.11		0.43	0.40		0.16	0.37	
Uniform Delay, d1	24.3	23.2	23.2	23.0	23.3		25.9	5.6		28.8	7.3	
Progression Factor	0.99	0.99	0.96	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1	0.1	0.1	0.2		1.9	0.4		1.9	0.4	
Delay (s)	25.7	23.0	22.3	23.1	23.5		27.8	5.9		30.8	7.6	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.6			23.5			7.0			7.8	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.43		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		50.4%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

OPENING YEAR 2020 PLUS O&M FACILITY
SITE 1 OR 2

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 1: Campus Ave & Mission Blvd
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	72	1064	60	85	673	53	113	316	125	82	274	37
Future Volume (vph)	72	1064	60	85	673	53	113	316	125	82	274	37
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1784	1770	1784	1770	3476
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.53	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	992	1784	403	3476	403	3476
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	82	1209	68	97	765	60	128	359	142	93	311	42
RTOR Reduction (vph)	0	0	41	0	0	36	0	24	0	0	17	0
Lane Group Flow (vph)	82	1209	27	97	765	24	128	477	0	93	336	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	23.9	23.9	4.1	24.0	24.0	18.5	18.5		18.5	18.5	
Effective Green, g (s)	4.0	23.9	23.9	4.1	24.0	24.0	18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.07	0.40	0.40	0.07	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1409	630	120	1415	633	305	550		124	1071	
v/s Ratio Prot	0.05	c0.34		c0.05	0.22			c0.27			0.10	
v/s Ratio Perm			0.02			0.02	0.13			0.23		
v/c Ratio	0.69	0.86	0.04	0.81	0.54	0.04	0.42	0.87		0.75	0.31	
Uniform Delay, d1	27.4	16.5	11.0	27.6	13.8	11.0	16.5	19.6		18.7	15.9	
Progression Factor	1.00	1.00	1.00	0.59	1.55	7.61	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	7.0	0.1	27.5	1.3	0.1	4.2	16.8		33.5	0.8	
Delay (s)	43.7	23.5	11.2	43.6	22.6	83.6	20.7	36.4		52.2	16.7	
Level of Service	D	C	B	D	C	F	C	D		D	B	
Approach Delay (s)		24.1			28.8			33.2			24.1	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			27.1									C
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			60.0					13.5				
Intersection Capacity Utilization			77.9%									D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 2: Belmont St & Campus Ave
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	5	37	9	23	22	10	13	592	84	24	410	10
Future Volume (Veh/h)	5	37	9	23	22	10	13	592	84	24	410	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	45	11	28	27	12	16	722	102	29	500	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	1394	1420	506	1402	1375	773	512				824	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1387	1414	434	1395	1366	773	440				824	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	93	63	98	62	79	97	98				96	
cM capacity (veh/h)	88	122	580	75	130	399	1044				806	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	62	67	840	541								
Volume Left	6	28	16	29								
Volume Right	11	12	102	12								
cSH	136	109	1044	806								
Volume to Capacity	0.46	0.61	0.02	0.04								
Queue Length 95th (ft)	52	76	1	3								
Control Delay (s)	52.1	80.0	0.4	1.0								
Lane LOS	F	F	A	A								
Approach Delay (s)	52.1	80.0	0.4	1.0								
Approach LOS	F	F										
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			55.6%									B
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
3: Bon View Ave & Mission Blvd

Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	50	1155	84	49	712	36	47	84	35	81	132	62
Future Volume (vph)	50	1155	84	49	712	36	47	84	35	81	132	62
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1785			1780	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.83			0.85	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1502			1538	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	60	1392	101	59	858	43	57	101	42	98	159	75
RTOR Reduction (vph)	0	0	58	0	0	25	0	16	0	0	18	0
Lane Group Flow (vph)	60	1392	43	59	858	18	0	184	0	0	315	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Effective Green, g (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.41	0.41		0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	112	1504	672	88	1456	651		450			461	
v/s Ratio Prot	c0.03	c0.39		0.03	0.24							
v/s Ratio Perm			0.03			0.01		0.12			c0.20	
v/c Ratio	0.54	0.93	0.06	0.67	0.59	0.03		0.41			0.68	
Uniform Delay, d1	27.2	16.4	10.2	28.0	13.7	10.5		16.8			18.5	
Progression Factor	0.61	1.44	3.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	3.0	7.5	0.1	18.2	1.8	0.1		2.7			7.9	
Delay (s)	19.6	31.0	30.7	46.2	15.5	10.6		19.5			26.4	
Level of Service	B	C	C	D	B	B		B			C	
Approach Delay (s)		30.5			17.1			19.5			26.4	
Approach LOS		C			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			25.1									C
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)		13.5				
Intersection Capacity Utilization			67.8%			ICU Level of Service						C
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
4: Belmont St & Bon View Ave

Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (veh/h)	27	98	13	69	30	49	7	84	33	99	157	21
Future Volume (Veh/h)	27	98	13	69	30	49	7	84	33	99	157	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	31	111	15	78	34	56	8	95	38	113	178	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	619	565	190	616	558	114	202				133	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	619	565	190	616	558	114	202				133	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	91	72	98	73	92	94	99				92	
cM capacity (veh/h)	330	398	852	291	402	939	1370				1452	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	157	168	141	315								
Volume Left	31	78	8	113								
Volume Right	15	56	38	24								
cSH	402	408	1370	1452								
Volume to Capacity	0.39	0.41	0.01	0.08								
Queue Length 95th (ft)	45	49	0	6								
Control Delay (s)	19.6	19.9	0.5	3.2								
Lane LOS	C	C	A	A								
Approach Delay (s)	19.6	19.9	0.5	3.2								
Approach LOS	C	C										
Intersection Summary												
Average Delay			9.6									
Intersection Capacity Utilization			43.4%				ICU Level of Service					A
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 5: Cucamonga Ave & Belmont St
 Timing Plan: AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	103	129	102	68	98	46
Future Volume (Veh/h)	103	129	102	68	98	46
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	134	168	132	88	127	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			302		570	151
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			302		570	151
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		69	93
cM capacity (veh/h)			1256		404	868
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	89	213	132	88	187	
Volume Left	0	0	132	0	127	
Volume Right	0	168	0	0	60	
cSH	1700	1700	1256	1700	595	
Volume to Capacity	0.05	0.13	0.11	0.05	0.31	
Queue Length 95th (ft)	0	0	9	0	33	
Control Delay (s)	0.0	0.0	8.2	0.0	15.2	
Lane LOS	A		A		C	
Approach Delay (s)	0.0		4.9		15.2	
Approach LOS	A		A		C	
Intersection Summary						
Average Delay			5.5			
Intersection Capacity Utilization			28.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 6: Grove Ave & Mission Blvd
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	477	638	143	32	474	393	131	802	25	349	1139	306
Future Volume (vph)	477	638	143	32	474	393	131	802	25	349	1139	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	0.91	1.00	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	542	725	162	36	539	447	149	911	28	397	1294	348
RTOR Reduction (vph)	0	0	108	0	0	316	0	3	0	0	0	54
Lane Group Flow (vph)	542	725	55	36	539	131	149	936	0	397	1294	294
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov	
Protected Phases	7	4		3	8		5	2	1	6	7	
Permitted Phases			4			8					6	
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	19.0	10.5	18.0	20.5	28.0	42.5	
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	19.0	10.5	18.0	20.5	28.0	42.5	
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.12	0.20	0.23	0.31	0.47	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	553	1199	536	114	747	334	206	1012	403	1582	826	
v/s Ratio Prot	c0.16	0.20		0.01	c0.15		0.08	0.18	c0.22	c0.25	0.06	
v/s Ratio Perm			0.03			0.08					0.13	
v/c Ratio	0.98	0.60	0.10	0.32	0.72	0.39	0.72	0.92	0.99	0.82	0.36	
Uniform Delay, d1	37.6	24.7	20.4	42.5	33.0	30.5	38.3	35.3	34.6	28.6	15.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	33.1	2.3	0.4	1.6	6.0	3.5	11.8	15.1	40.6	4.8	0.3	
Delay (s)	70.7	27.0	20.8	44.1	39.0	34.0	50.2	50.4	75.2	33.5	15.3	
Level of Service	E	C	C	D	D	C	D	D	E	C	B	
Approach Delay (s)	42.8				37.0		50.4				38.5	
Approach LOS	D				D		D				D	
Intersection Summary												
HCM 2000 Control Delay			41.7	HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				18.0				
Intersection Capacity Utilization			77.1%	ICU Level of Service				D				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions

7: Belmont St & Grove Ave

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑	↔	↔	↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	54	7	84	3	8	9	63	878	9	14	1188	81
Future Volume (vph)	54	7	84	3	8	9	63	878	9	14	1188	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1716		1770	5077		1770	5037	
Flt Permitted	0.75	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1388	1863	1583	1402	1716		1770	5077		1770	5037	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	8	91	3	9	10	68	954	10	15	1291	88
RTOR Reduction (vph)	0	0	80	0	9	0	0	1	0	0	9	0
Lane Group Flow (vph)	59	8	11	3	10	0	68	963	0	15	1370	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.0	7.0	7.0	7.0	7.0		5.3	38.1		1.4	34.2	
Effective Green, g (s)	7.0	7.0	7.0	7.0	7.0		5.3	38.1		1.4	34.2	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.64		0.02	0.57	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	161	217	184	163	200		156	3223		41	2871	
v/s Ratio Prot		0.00			0.01		c0.04	c0.19		0.01	c0.27	
v/s Ratio Perm	c0.04		0.01	0.00								
v/c Ratio	0.37	0.04	0.06	0.02	0.05		0.44	0.30		0.37	0.48	
Uniform Delay, d1	24.5	23.5	23.6	23.5	23.5		25.9	4.9		28.9	7.6	
Progression Factor	0.98	0.97	0.95	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.1	0.0	0.1		1.9	0.2		5.5	0.6	
Delay (s)	25.3	22.8	22.6	23.5	23.7		27.9	5.2		34.3	8.2	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.6			23.6			6.7			8.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 1: Campus Ave & Mission Blvd

Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	79	862	96	120	1051	93	87	404	57	84	332	73
Future Volume (vph)	79	862	96	120	1051	93	87	404	57	84	332	73
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	1828	1770	3444
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.47	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	873	1828	403	3444	403	3444
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	82	898	100	125	1095	97	91	421	59	88	346	76
RTOR Reduction (vph)	0	0	62	0	0	58	0	8	0	0	31	0
Lane Group Flow (vph)	82	898	38	125	1095	39	91	472	0	88	391	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	22.8	22.8	5.2	24.0	24.0	18.5	18.5		18.5	18.5	
Effective Green, g (s)	4.0	22.8	22.8	5.2	24.0	24.0	18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.07	0.38	0.38	0.09	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1344	601	153	1415	633	269	563		124	1061	
v/s Ratio Prot	0.05	0.25		c0.07	c0.31			c0.26			0.11	
v/s Ratio Perm			0.02			0.02	0.10			0.22		
v/c Ratio	0.69	0.67	0.06	0.82	0.77	0.06	0.34	0.84		0.71	0.37	
Uniform Delay, d1	27.4	15.5	11.8	26.9	15.6	11.1	16.0	19.4		18.4	16.2	
Progression Factor	1.00	1.00	1.00	0.62	1.46	3.11	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	2.6	0.2	22.3	3.3	0.1	3.4	13.9		29.0	1.0	
Delay (s)	43.7	18.1	12.0	39.1	26.0	34.5	19.4	33.2		47.4	17.2	
Level of Service	D	B	B	D	C	C	B	C		D	B	
Approach Delay (s)		19.5			27.9			31.0			22.4	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 2: Belmont St & Campus Ave

Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Traffic Volume (veh/h)	3	9	7	57	29	22	6	640	70	20	496	7	
Future Volume (Veh/h)	3	9	7	57	29	22	6	640	70	20	496	7	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	3	10	8	62	32	24	7	696	76	22	539	8	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)												1281	
pX, platoon unblocked	0.90	0.90	0.90	0.90	0.90	0.90	0.90						
vC, conflicting volume	1375	1373	543	1348	1339	734	547	772					
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1362	1360	441	1332	1322	734	446	772					
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1					
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2					
p0 queue free %	96	92	99	42	77	94	99	97					
cM capacity (veh/h)	85	130	557	107	137	420	1007	843					
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	21	118	779	569									
Volume Left	3	62	7	22									
Volume Right	8	24	76	8									
cSH	166	136	1007	843									
Volume to Capacity	0.13	0.87	0.01	0.03									
Queue Length 95th (ft)	11	141	1	2									
Control Delay (s)	29.8	107.9	0.2	0.7									
Lane LOS	D	F	A	A									
Approach Delay (s)	29.8	107.9	0.2	0.7									
Approach LOS	D	F											

Intersection Summary			
Average Delay	9.3		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 3: Bon View Ave & Mission Blvd

Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	53	938	47	35	991	84	107	228	63	62	9	94
Future Volume (vph)	53	938	47	35	991	84	107	228	63	62	9	94
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.98	0.98	0.98	0.98	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1799	1799	1799	1799	1688	1688
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.88	0.88	0.88	0.88	0.75	0.75
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1596	1596	1596	1596	1281	1281
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	55	977	49	36	1032	88	111	238	66	65	9	98
RTOR Reduction (vph)	0	0	29	0	0	53	0	11	0	0	66	0
Lane Group Flow (vph)	55	977	20	36	1032	35	0	404	0	0	106	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2	2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.1	24.8	24.8	2.0	23.7	23.7	19.7	19.7			19.7	19.7
Effective Green, g (s)	3.1	24.8	24.8	2.0	23.7	23.7	19.7	19.7			19.7	19.7
Actuated g/C Ratio	0.05	0.41	0.41	0.03	0.39	0.39	0.33	0.33			0.33	0.33
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	91	1462	654	59	1397	625	524	524			420	420
v/s Ratio Prot	c0.03	0.28		0.02	c0.29							
v/s Ratio Perm			0.01			0.02	c0.25				0.08	
v/c Ratio	0.60	0.67	0.03	0.61	0.74	0.06	0.77	0.77			0.25	
Uniform Delay, d1	27.8	14.3	10.5	28.6	15.5	11.2	18.1	18.1			14.8	14.8
Progression Factor	0.59	1.47	14.38	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	8.4	1.9	0.1	17.2	3.5	0.2	10.5	10.5			1.4	1.4
Delay (s)	24.9	22.9	150.4	45.8	19.0	11.4	28.6	28.6			16.2	16.2
Level of Service	C	C	F	D	B	B	C	C			B	B
Approach Delay (s)		28.8			19.3		28.6	28.6			16.2	16.2
Approach LOS		C			B		C	C			B	B

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 4: Belmont St & Bon View Ave

Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	30	55	16	46	100	131	16	254	131	47	117	20
Future Volume (Veh/h)	30	55	16	46	100	131	16	254	131	47	117	20
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	36	65	19	55	119	156	19	302	156	56	139	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None				
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	896	759	151	732	693	380	163			458		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	896	759	151	732	693	380	163			458		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	74	79	98	79	65	77	99			95		
cM capacity (veh/h)	139	315	895	264	343	667	1416			1103		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	120	330	477	219								
Volume Left	36	55	19	56								
Volume Right	19	156	156	24								
cSH	247	418	1416	1103								
Volume to Capacity	0.49	0.79	0.01	0.05								
Queue Length 95th (ft)	61	172	1	4								
Control Delay (s)	32.6	38.9	0.4	2.5								
Lane LOS	D	E	A	A								
Approach Delay (s)	32.6	38.9	0.4	2.5								
Approach LOS	D	E										

Intersection Summary			
Average Delay	15.3		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 5: Cucamonga Ave & Belmont St
 Timing Plan: PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	157	65	43	98	159	149
Future Volume (Veh/h)	157	65	43	98	159	149
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	209	87	57	131	212	199
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	5					
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			296		498	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			296		498	148
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		56	77
cM capacity (veh/h)			1262		479	872
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	139	157	57	131	411	
Volume Left	0	0	57	0	212	
Volume Right	0	87	0	0	199	
cSH	1700	1700	1262	1700	929	
Volume to Capacity	0.08	0.09	0.05	0.08	0.44	
Queue Length 95th (ft)	0	0	4	0	57	
Control Delay (s)	0.0	0.0	8.0	0.0	14.5	
Lane LOS	A		A		B	
Approach Delay (s)	0.0		2.4		14.5	
Approach LOS	A		A		B	
Intersection Summary						
Average Delay			7.2			
Intersection Capacity Utilization			28.6%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions
 6: Grove Ave & Mission Blvd
 Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑	↑	↑	↑↑	↑	↑	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	380	651	112	34	683	561	168	1224	28	363	847	323
Future Volume (vph)	380	651	112	34	683	561	168	1224	28	363	847	323
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95		0.95	0.95	0.95
Adj. Flow (vph)	400	685	118	36	719	591	177	1288		29	382	892
RTOR Reduction (vph)	0	0	83	0	0	314	0	2		0	0	84
Lane Group Flow (vph)	400	685	35	36	719	277	177	1315		0	382	892
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	10.9	26.8	26.8	3.0	18.9	18.9	13.6	22.7		19.5	28.6	39.5
Effective Green, g (s)	10.9	26.8	26.8	3.0	18.9	18.9	13.6	22.7		19.5	28.6	39.5
Actuated g/C Ratio	0.12	0.30	0.30	0.03	0.21	0.21	0.15	0.25		0.22	0.32	0.44
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	415	1053	471	114	743	332	267	1278		383	1615	773
v/s Ratio Prot	c0.12	0.19		0.01	c0.20		0.10	c0.26		c0.22	0.18	0.04
v/s Ratio Perm			0.02			0.18						0.12
v/c Ratio	0.96	0.65	0.07	0.32	0.97	0.84	0.66	1.03		1.00	0.55	0.33
Uniform Delay, d1	39.4	27.5	22.7	42.5	35.2	34.1	36.0	33.6		35.2	25.4	16.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	34.6	3.1	0.3	1.6	26.0	21.4	6.1	32.8		45.0	1.4	0.3
Delay (s)	74.0	30.6	23.0	44.1	61.3	55.4	42.1	66.5		80.2	26.8	16.8
Level of Service	E	C	C	D	E	E	D	E		F	C	B
Approach Delay (s)	44.3				58.2		63.6			37.3		
Approach LOS	D				E		E			D		
Intersection Summary												
HCM 2000 Control Delay			50.7		HCM 2000 Level of Service		D					
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)		18.0					
Intersection Capacity Utilization			89.1%		ICU Level of Service		E					
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Sites 1 or 2 Conditions

7: Belmont St & Grove Ave

Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↘	↘
Traffic Volume (vph)	79	15	114	4	17	39	66	1251	11	6	1003	32
Future Volume (vph)	79	15	114	4	17	39	66	1251	11	6	1003	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1667		1770	5079		1770	5061	
Flt Permitted	0.72	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1341	1863	1583	1393	1667		1770	5079		1770	5061	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	15	116	4	17	40	67	1277	11	6	1023	33
RTOR Reduction (vph)	0	0	101	0	35	0	0	1	0	0	4	0
Lane Group Flow (vph)	81	15	15	4	22	0	67	1287	0	6	1052	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.9	7.9	7.9	7.9	7.9		5.3	37.3		1.3	33.3	
Effective Green, g (s)	7.9	7.9	7.9	7.9	7.9		5.3	37.3		1.3	33.3	
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13		0.09	0.62		0.02	0.55	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	176	245	208	183	219		156	3157		38	2808	
v/s Ratio Prot		0.01			0.01		c0.04	c0.25		0.00	0.21	
v/s Ratio Perm	c0.06		0.01	0.00								
v/c Ratio	0.46	0.06	0.07	0.02	0.10		0.43	0.41		0.16	0.37	
Uniform Delay, d1	24.1	22.8	22.8	22.7	22.9		25.9	5.8		28.8	7.5	
Progression Factor	0.99	0.99	0.97	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.1	0.2	0.0	0.2		1.9	0.4		1.9	0.4	
Delay (s)	25.7	22.6	22.2	22.7	23.1		27.8	6.1		30.8	7.9	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.6			23.1			7.2			8.0	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.44		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		50.9%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

OPENING YEAR 2020 PLUS O&M FACILITY SITE 3

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	72	1064	60	85	673	53	113	316	125	82	274	37
Future Volume (vph)	72	1064	60	85	673	53	113	316	125	82	274	37
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1784	1770	1784	1770	3476
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.53	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	992	1784	403	3476	403	3476
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	82	1209	68	97	765	60	128	359	142	93	311	42
RTOR Reduction (vph)	0	0	41	0	0	36	0	24	0	0	17	0
Lane Group Flow (vph)	82	1209	27	97	765	24	128	477	0	93	336	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2			6		6
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	23.9	23.9	4.1	24.0	24.0	18.5	18.5		18.5	18.5	
Effective Green, g (s)	4.0	23.9	23.9	4.1	24.0	24.0	18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.07	0.40	0.40	0.07	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1409	630	120	1415	633	305	550		124	1071	
v/s Ratio Prot	0.05	c0.34		c0.05	0.22			c0.27			0.10	
v/s Ratio Perm			0.02			0.02	0.13			0.23		
v/c Ratio	0.69	0.86	0.04	0.81	0.54	0.04	0.42	0.87		0.75	0.31	
Uniform Delay, d1	27.4	16.5	11.0	27.6	13.8	11.0	16.5	19.6		18.7	15.9	
Progression Factor	1.00	1.00	1.00	0.59	1.55	7.61	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	7.0	0.1	27.5	1.3	0.1	4.2	16.8		33.5	0.8	
Delay (s)	43.7	23.5	11.2	43.6	22.6	83.6	20.7	36.4		52.2	16.7	
Level of Service	D	C	B	D	C	F	C	D		D	B	
Approach Delay (s)		24.1			28.8			33.2			24.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	5	37	9	23	22	10	13	592	84	24	410	10
Future Volume (Veh/h)	5	37	9	23	22	10	13	592	84	24	410	10
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	45	11	28	27	12	16	722	102	29	500	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)										1281		
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93	0.93	0.93					
vC, conflicting volume	1394	1420	506	1402	1375	773	512			824		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1387	1414	434	1395	1366	773	440			824		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	63	98	62	79	97	98			96		
cM capacity (veh/h)	88	122	580	75	130	399	1044			806		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	62	67	840	541								
Volume Left	6	28	16	29								
Volume Right	11	12	102	12								
cSH	136	109	1044	806								
Volume to Capacity	0.46	0.61	0.02	0.04								
Queue Length 95th (ft)	52	76	1	3								
Control Delay (s)	52.1	80.0	0.4	1.0								
Lane LOS	F	F	A	A								
Approach Delay (s)	52.1	80.0	0.4	1.0								
Approach LOS	F	F										

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	50	1155	84	58	712	36	47	84	35	81	132	62
Future Volume (vph)	50	1155	84	58	712	36	47	84	35	81	132	62
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1785			1780	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.83			0.85	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1502			1538	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	60	1392	101	70	858	43	57	101	42	98	159	75
RTOR Reduction (vph)	0	0	58	0	0	25	0	16	0	0	18	0
Lane Group Flow (vph)	60	1392	43	70	858	18	0	184	0	0	315	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Effective Green, g (s)	3.8	25.5	25.5	3.0	24.7	24.7		18.0			18.0	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.41	0.41		0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	112	1504	672	88	1456	651		450			461	
v/s Ratio Prot	0.03	c0.39		c0.04	0.24						c0.20	
v/s Ratio Perm			0.03			0.01		0.12				
v/c Ratio	0.54	0.93	0.06	0.80	0.59	0.03		0.41			0.68	
Uniform Delay, d1	27.2	16.4	10.2	28.2	13.7	10.5		16.8			18.5	
Progression Factor	0.61	1.44	3.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	3.0	7.5	0.1	37.6	1.8	0.1		2.7			7.9	
Delay (s)	19.6	31.0	30.7	65.8	15.5	10.6		19.5			26.4	
Level of Service	B	C	C	E	B	B		B			C	
Approach Delay (s)		30.5			18.9			19.5			26.4	
Approach LOS		C			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			25.7									C
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			60.0					13.5				
Intersection Capacity Utilization			67.8%									C
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (veh/h)	27	89	22	78	30	49	7	84	33	90	174	21
Future Volume (Veh/h)	27	89	22	78	30	49	7	84	33	90	174	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	31	101	25	89	34	56	8	95	38	102	198	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	617	563	210	620	556	114	222				133	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	617	563	210	620	556	114	222				133	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	91	75	97	70	92	94	99				93	
cM capacity (veh/h)	334	402	830	296	406	939	1347				1452	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	157	179	141	324								
Volume Left	31	89	8	102								
Volume Right	25	56	38	24								
cSH	420	403	1347	1452								
Volume to Capacity	0.37	0.44	0.01	0.07								
Queue Length 95th (ft)	43	56	0	6								
Control Delay (s)	18.6	20.9	0.5	2.8								
Lane LOS	C	C	A	A								
Approach Delay (s)	18.6	20.9	0.5	2.8								
Approach LOS	C	C										
Intersection Summary												
Average Delay			9.5									
Intersection Capacity Utilization			44.3%					ICU Level of Service			A	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Site 3 Conditions
 5: Cucamonga Ave & Belmont St Timing Plan: AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	103	112	85	77	98	46
Future Volume (Veh/h)	103	112	85	77	98	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	134	145	110	100	127	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			279		526	140
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			279		526	140
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		71	93
cM capacity (veh/h)			1281		440	883
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	89	190	110	100	187	
Volume Left	0	0	110	0	127	
Volume Right	0	145	0	0	60	
cSH	1700	1700	1281	1700	648	
Volume to Capacity	0.05	0.11	0.09	0.06	0.29	
Queue Length 95th (ft)	0	0	7	0	30	
Control Delay (s)	0.0	0.0	8.1	0.0	14.2	
Lane LOS			A		B	
Approach Delay (s)	0.0		4.2		14.2	
Approach LOS					B	
Intersection Summary						
Average Delay			5.2			
Intersection Capacity Utilization			26.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Site 3 Conditions
 6: Grove Ave & Mission Blvd Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑	↑	↑	↑
Traffic Volume (vph)	477	638	143	32	474	393	131	802	25	349	1130	315
Future Volume (vph)	477	638	143	32	474	393	131	802	25	349	1130	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	0.91	1.00	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5063	1770	5063	1770	5085
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	542	725	162	36	539	447	149	911	28	397	1284	358
RTOR Reduction (vph)	0	0	108	0	0	316	0	3	0	0	0	54
Lane Group Flow (vph)	542	725	55	36	539	131	149	936	0	397	1284	304
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov	
Protected Phases	7	4		3	8		5	2	1	6	7	
Permitted Phases			4			8						6
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	19.0	10.5	18.0	20.5	28.0	42.5	
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	19.0	10.5	18.0	20.5	28.0	42.5	
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.12	0.20	0.23	0.31	0.47	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	553	1199	536	114	747	334	206	1012	403	1582	826	
v/s Ratio Prot	c0.16	0.20		0.01	c0.15		0.08	0.18	c0.22	c0.25	0.06	
v/s Ratio Perm			0.03			0.08					0.13	
v/c Ratio	0.98	0.60	0.10	0.32	0.72	0.39	0.72	0.92	0.99	0.81	0.37	
Uniform Delay, d1	37.6	24.7	20.4	42.5	33.0	30.5	38.3	35.3	34.6	28.6	15.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	33.1	2.3	0.4	1.6	6.0	3.5	11.8	15.1	40.6	4.6	0.3	
Delay (s)	70.7	27.0	20.8	44.1	39.0	34.0	50.2	50.4	75.2	33.2	15.4	
Level of Service	E	C	C	D	D	C	D	D	E	C	B	
Approach Delay (s)		42.8			37.0			50.4			38.3	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.6		HCM 2000 Level of Service				D			
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)			18.0				
Intersection Capacity Utilization			77.1%		ICU Level of Service			D				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Site 3 Conditions
 7: Belmont St & Grove Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Traffic Volume (vph)	54	7	84	3	8	9	63	878	9	14	1188	72
Future Volume (vph)	54	7	84	3	8	9	63	878	9	14	1188	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1716		1770	5077		1770	5042	
Flt Permitted	0.75	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1388	1863	1583	1402	1716		1770	5077		1770	5042	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	8	91	3	9	10	68	954	10	15	1291	78
RTOR Reduction (vph)	0	0	80	0	9	0	0	1	0	0	8	0
Lane Group Flow (vph)	59	8	11	3	10	0	68	963	0	15	1361	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.0	7.0	7.0	7.0	7.0		5.3	38.1		1.4	34.2	
Effective Green, g (s)	7.0	7.0	7.0	7.0	7.0		5.3	38.1		1.4	34.2	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.64		0.02	0.57	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	161	217	184	163	200		156	3223		41	2873	
v/s Ratio Prot		0.00			0.01		c0.04	c0.19		0.01	c0.27	
v/s Ratio Perm	c0.04		0.01	0.00								
v/c Ratio	0.37	0.04	0.06	0.02	0.05		0.44	0.30		0.37	0.47	
Uniform Delay, d1	24.5	23.5	23.6	23.5	23.5		25.9	4.9		28.9	7.6	
Progression Factor	0.97	0.97	0.94	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.1	0.0	0.1		1.9	0.2		5.5	0.6	
Delay (s)	25.2	22.9	22.3	23.5	23.7		27.9	5.2		34.3	8.2	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.4			23.6			6.7			8.4	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.8								A	
HCM 2000 Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			60.0							13.5		
Intersection Capacity Utilization			49.6%								A	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	79	862	96	120	1051	93	87	404	57	84	332	73
Future Volume (vph)	79	862	96	120	1051	93	87	404	57	84	332	73
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	3444	1770	3444
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.47	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	873	1828	403	3444	403	3444
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	82	898	100	125	1095	97	91	421	59	88	346	76
RTOR Reduction (vph)	0	0	62	0	0	58	0	8	0	0	31	0
Lane Group Flow (vph)	82	898	38	125	1095	39	91	472	0	88	391	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	22.8	22.8	5.2	24.0	24.0	18.5	18.5		18.5	18.5	
Effective Green, g (s)	4.0	22.8	22.8	5.2	24.0	24.0	18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.07	0.38	0.38	0.09	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1344	601	153	1415	633	269	563		124	1061	
v/s Ratio Prot	0.05	0.25		c0.07	c0.31			c0.26			0.11	
v/s Ratio Perm			0.02			0.02	0.10			0.22		
v/c Ratio	0.69	0.67	0.06	0.82	0.77	0.06	0.34	0.84		0.71	0.37	
Uniform Delay, d1	27.4	15.5	11.8	26.9	15.6	11.1	16.0	19.4		18.4	16.2	
Progression Factor	1.00	1.00	1.00	0.63	1.46	3.13	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	2.6	0.2	22.2	3.2	0.1	3.4	13.9		29.0	1.0	
Delay (s)	43.7	18.1	12.0	39.1	26.1	34.8	19.4	33.2		47.4	17.2	
Level of Service	D	B	B	D	C	C	B	C		D	B	
Approach Delay (s)		19.5			28.0			31.0			22.4	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			25.0									C
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			60.0					13.5				
Intersection Capacity Utilization			77.8%									D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	3	9	7	57	29	22	6	640	70	20	496	7
Future Volume (Veh/h)	3	9	7	57	29	22	6	640	70	20	496	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	10	8	62	32	24	7	696	76	22	539	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.90	0.90	0.90	0.90	0.90		0.90					
vC, conflicting volume	1375	1373	543	1348	1339	734	547				772	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1362	1360	441	1332	1322	734	446				772	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	96	92	99	42	77	94	99				97	
cM capacity (veh/h)	85	130	557	107	137	420	1007				843	
Direction, Lane #												
Volume Total	21	118		779	569							
Volume Left	3	62		7	22							
Volume Right	8	24	76	8								
cSH	166	136	1007	843								
Volume to Capacity	0.13	0.87	0.01	0.03								
Queue Length 95th (ft)	11	141	1	2								
Control Delay (s)	29.8	107.9	0.2	0.7								
Lane LOS	D	F	A	A								
Approach Delay (s)	29.8	107.9	0.2	0.7								
Approach LOS	D	F										
Intersection Summary												
Average Delay					9.3							
Intersection Capacity Utilization					59.6%							B
Analysis Period (min)					15							

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	53	938	47	35	991	84	107	228	72	62	9	94
Future Volume (vph)	53	938	47	35	991	84	107	228	72	62	9	94
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	0.98	0.98	0.98	0.98	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1795	1795	1795	1688	1688	1688
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.88	0.88	0.88	0.74	0.74	0.74
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1597	1597	1597	1279	1279	1279
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	55	977	49	36	1032	88	111	238	75	65	9	98
RTOR Reduction (vph)	0	0	29	0	0	54	0	13	0	0	65	0
Lane Group Flow (vph)	55	977	20	36	1032	34	0	411	0	0	107	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	NA	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.1	24.5	24.5	2.0	23.4	23.4	20.0			20.0		
Effective Green, g (s)	3.1	24.5	24.5	2.0	23.4	23.4	20.0			20.0		
Actuated g/C Ratio	0.05	0.41	0.41	0.03	0.39	0.39	0.33			0.33		
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0		
Lane Grp Cap (vph)	91	1445	646	59	1380	617	532			426		
v/s Ratio Prot	c0.03	0.28		0.02	c0.29							
v/s Ratio Perm			0.01			0.02	c0.26			0.08		
v/c Ratio	0.60	0.68	0.03	0.61	0.75	0.06	0.77			0.25		
Uniform Delay, d1	27.8	14.5	10.6	28.6	15.8	11.4	18.0			14.5		
Progression Factor	0.59	1.46	14.15	1.00	1.00	1.00	1.00			1.00		
Incremental Delay, d2	8.4	2.0	0.1	17.2	3.7	0.2	10.5			1.4		
Delay (s)	24.9	23.1	150.5	45.8	19.5	11.6	28.4			16.0		
Level of Service	C	C	F	D	B	B	C			B		
Approach Delay (s)		29.0			19.7		28.4			16.0		
Approach LOS		C			B		C			B		

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

2020 Plus O&M Facility Site 3 Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	30	55	16	46	91	122	25	271	140	47	117	20
Future Volume (Veh/h)	30	55	16	46	91	122	25	271	140	47	117	20
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	36	65	19	55	108	145	30	323	167	56	139	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None					None
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	928	813	151	781	742	406	163			490		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928	813	151	781	742	406	163			490		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	73	78	98	77	66	78	98			95		
cM capacity (veh/h)	134	290	895	239	319	644	1416			1073		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	120	308	520	219
Volume Left	36	55	30	56
Volume Right	19	145	167	24
cSH	234	388	1416	1073
Volume to Capacity	0.51	0.79	0.02	0.05
Queue Length 95th (ft)	67	171	2	4
Control Delay (s)	35.6	41.7	0.7	2.6
Lane LOS	E	E	A	A
Approach Delay (s)	35.6	41.7	0.7	2.6
Approach LOS	E	E		

Intersection Summary			
Average Delay	15.4		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2020 Plus O&M Facility Site 3 Conditions
 5: Cucamonga Ave & Belmont St Timing Plan: PM Peak Hour

	→		↖		←		↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↕↕		↕	↕	↕	↕		
Traffic Volume (veh/h)	166	65	43	98	142	132		
Future Volume (Veh/h)	166	65	43	98	142	132		
Sign Control	Free		Free		Stop			
Grade	0%		0%		0%			
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75		
Hourly flow rate (vph)	221	87	57	131	189	176		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)						5		
Median type	None		None					
Median storage (veh)								
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume			308		510	154		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			308		510	154		
tC, single (s)			4.1		6.8	6.9		
tC, 2 stage (s)								
tF (s)			2.2		3.5	3.3		
p0 queue free %			95		60	80		
cM capacity (veh/h)			1249		471	864		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1			
Volume Total	147	161	57	131	365			
Volume Left	0	0	57	0	189			
Volume Right	0	87	0	0	176			
cSH	1700	1700	1249	1700	909			
Volume to Capacity	0.09	0.09	0.05	0.08	0.40			
Queue Length 95th (ft)	0	0	4	0	49			
Control Delay (s)	0.0	0.0	8.0	0.0	14.1			
Lane LOS			A		B			
Approach Delay (s)	0.0		2.4		14.1			
Approach LOS					B			
Intersection Summary								
Average Delay			6.5					
Intersection Capacity Utilization			27.9%		ICU Level of Service		A	
Analysis Period (min)			15					

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Site 3 Conditions
 6: Grove Ave & Mission Blvd Timing Plan: PM Peak Hour

	↖		→		↗		←		↖		↗		↖		↗	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
Lane Configurations	↕↕	↕↕	↕	↕↕	↕↕	↕	↕↕	↕↕	↕	↕↕	↕↕	↕	↕↕	↕↕	↕↕	↕
Traffic Volume (vph)	389	651	112	34	683	561	168	1215	28	363	847	323				
Future Volume (vph)	389	651	112	34	683	561	168	1215	28	363	847	323				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900				
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00				
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85				
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	0.95				
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5068	1583				
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	0.95				
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5068	1583				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95		0.95	0.95	0.95				
Adj. Flow (vph)	409	685	118	36	719	591	177	1279		29	382	892				
RTOR Reduction (vph)	0	0	83	0	0	314	0	2		0	0	84				
Lane Group Flow (vph)	409	685	35	36	719	277	177	1306		0	382	892				
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov				
Protected Phases	7	4		3	8		5	2		1	6	7				
Permitted Phases			4			8						6				
Actuated Green, G (s)	11.1	27.0	27.0	3.0	18.9	18.9	13.6	22.5		19.5	28.4	39.5				
Effective Green, g (s)	11.1	27.0	27.0	3.0	18.9	18.9	13.6	22.5		19.5	28.4	39.5				
Actuated g/C Ratio	0.12	0.30	0.30	0.03	0.21	0.21	0.15	0.25		0.22	0.32	0.44				
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0				
Lane Grp Cap (vph)	423	1061	474	114	743	332	267	1267		383	1604	773				
v/s Ratio Prot	c0.12	0.19		0.01	c0.20		0.10	c0.26		c0.22	0.18	0.04				
v/s Ratio Perm			0.02			0.18						0.12				
v/c Ratio	0.97	0.65	0.07	0.32	0.97	0.84	0.66	1.03		1.00	0.56	0.33				
Uniform Delay, d1	39.3	27.3	22.6	42.5	35.2	34.1	36.0	33.8		35.2	25.6	16.6				
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00				
Incremental Delay, d2	34.8	3.0	0.3	1.6	26.0	21.4	6.1	33.5		45.0	1.4	0.3				
Delay (s)	74.1	30.4	22.9	44.1	61.3	55.4	42.1	67.2		80.2	27.0	16.8				
Level of Service	E	C	C	D	E	E	D	E		F	C	B				
Approach Delay (s)		44.4			58.2		64.2				37.4					
Approach LOS		D			E		E				D					
Intersection Summary																
HCM 2000 Control Delay			50.9		HCM 2000 Level of Service		D									
HCM 2000 Volume to Capacity ratio			0.99													
Actuated Cycle Length (s)			90.0		Sum of lost time (s)		18.0									
Intersection Capacity Utilization			89.2%		ICU Level of Service		E									
Analysis Period (min)			15													

HCM Signalized Intersection Capacity Analysis 2020 Plus O&M Facility Site 3 Conditions
 7: Belmont St & Grove Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗	↗	↘	↗	↘
Traffic Volume (vph)	70	15	114	4	17	39	66	1251	11	6	1003	32
Future Volume (vph)	70	15	114	4	17	39	66	1251	11	6	1003	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1667		1770	5079		1770	5061	
Flt Permitted	0.72	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1341	1863	1583	1393	1667		1770	5079		1770	5061	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	71	15	116	4	17	40	67	1277	11	6	1023	33
RTOR Reduction (vph)	0	0	102	0	35	0	0	1	0	0	4	0
Lane Group Flow (vph)	71	15	15	4	22	0	67	1287	0	6	1052	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.5	7.5	7.5	7.5	7.5		5.3	37.7		1.3	33.7	
Effective Green, g (s)	7.5	7.5	7.5	7.5	7.5		5.3	37.7		1.3	33.7	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.63		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	232	197	174	208		156	3191		38	2842	
v/s Ratio Prot		0.01			0.01		c0.04	c0.25		0.00	0.21	
v/s Ratio Perm	c0.05		0.01	0.00								
v/c Ratio	0.43	0.06	0.07	0.02	0.11		0.43	0.40		0.16	0.37	
Uniform Delay, d1	24.3	23.2	23.2	23.0	23.3		25.9	5.6		28.8	7.3	
Progression Factor	0.99	0.99	0.96	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1	0.2	0.1	0.2		1.9	0.4		1.9	0.4	
Delay (s)	25.7	23.0	22.4	23.1	23.5		27.8	5.9		30.8	7.6	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.6			23.5			7.0			7.8	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.43		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		50.4%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

FUTURE YEAR 2040 NO BUILD

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2040 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	83	1225	69	98	775	61	130	364	144	84	316	43
Future Volume (vph)	83	1225	69	98	775	61	130	364	144	84	316	43
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1783	1770	1783	1770	3475
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.48	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	891	1783	414	3475	414	3475
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	94	1392	78	111	881	69	148	414	164	95	359	49
RTOR Reduction (vph)	0	0	46	0	0	42	0	24	0	0	18	0
Lane Group Flow (vph)	94	1392	32	111	881	27	148	554	0	95	391	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.7	24.5	24.5	4.0	23.8	23.8	18.0	18.0		18.0	18.0	
Effective Green, g (s)	4.7	24.5	24.5	4.0	23.8	23.8	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.08	0.41	0.41	0.07	0.40	0.40	0.30	0.30		0.30	0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	138	1445	646	118	1403	627	267	534		124	1042	
v/s Ratio Prot	0.05	c0.39		c0.06	0.25		c0.31				0.11	
w/s Ratio Perm			0.02			0.02	0.17			0.23		
v/c Ratio	0.68	0.96	0.05	0.94	0.63	0.04	0.55	1.04		0.77	0.37	
Uniform Delay, d1	26.9	17.3	10.7	27.9	14.5	11.1	17.6	21.0		19.1	16.6	
Progression Factor	1.00	1.00	1.00	0.60	1.55	5.99	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.0	16.4	0.1	55.5	1.7	0.1	8.1	49.1		35.5	1.0	
Delay (s)	39.9	33.7	10.9	72.1	24.3	66.7	25.7	70.1		54.6	17.6	
Level of Service	D	C	B	E	C	E	C	E		D	B	
Approach Delay (s)		33.0			32.0			61.0			24.6	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2040 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	6	43	10	26	25	11	15	682	87	28	473	11
Future Volume (Veh/h)	6	43	10	26	25	11	15	682	87	28	473	11
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	52	12	32	30	13	18	832	106	34	577	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	1600	1626	584	1610	1579	885	590			938		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1613	1641	469	1624	1589	885	476			938		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	37	98	6	66	96	98			95		
cM capacity (veh/h)	51	83	528	34	90	344	965			730		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	71	75	956	624								
Volume Left	7	32	18	34								
Volume Right	12	13	106	13								
cSH	90	57	965	730								
Volume to Capacity	0.79	1.31	0.02	0.05								
Queue Length 95th (ft)	102	163	1	4								
Control Delay (s)	125.0	342.1	0.5	1.2								
Lane LOS	F	F	A	A								
Approach Delay (s)	125.0	342.1	0.5	1.2								
Approach LOS	F	F										

Intersection Summary			
Average Delay	20.7		
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

2040 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	58	1330	87	56	820	41	54	97	40	93	152	71
Future Volume (vph)	58	1330	87	56	820	41	54	97	40	93	152	71
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1785			1780	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.79			0.82	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1433			1482	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	70	1602	105	67	988	49	65	117	48	112	183	86
RTOR Reduction (vph)	0	0	60	0	0	28	0	16	0	0	18	0
Lane Group Flow (vph)	70	1602	45	67	988	21	0	214	0	0	364	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.0	25.5	25.5	3.0	25.5	25.5		18.0			18.0	
Effective Green, g (s)	3.0	25.5	25.5	3.0	25.5	25.5		18.0			18.0	
Actuated g/C Ratio	0.05	0.42	0.42	0.05	0.42	0.42		0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	88	1504	672	88	1504	672		429			444	
v/s Ratio Prot	c0.04	c0.45		0.04	0.28							
v/s Ratio Perm			0.03			0.01		0.15			c0.25	
v/c Ratio	0.80	1.07	0.07	0.76	0.66	0.03		0.50			0.82	
Uniform Delay, d1	28.2	17.2	10.2	28.1	13.8	10.1		17.3			19.5	
Progression Factor	0.58	1.45	2.87	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	20.6	36.7	0.1	31.5	2.3	0.1		4.1			15.4	
Delay (s)	36.9	61.7	29.4	59.6	16.0	10.1		21.4			34.9	
Level of Service	D	E	C	E	B	B		C			C	
Approach Delay (s)		58.8			18.4			21.4			34.9	
Approach LOS		E			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

2040 No Build Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	31	103	15	79	35	56	8	97	38	104	181	24
Future Volume (Veh/h)	31	103	15	79	35	56	8	97	38	104	181	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	35	117	17	90	40	64	9	110	43	118	206	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	689	626	220	680	618	132	233			153		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	689	626	220	680	618	132	233			153		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	68	98	64	89	93	99			92		
cM capacity (veh/h)	287	365	820	251	369	918	1335			1428		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	169	194	162	351
Volume Left	35	90	9	118
Volume Right	17	64	43	27
cSH	365	362	1335	1428
Volume to Capacity	0.46	0.54	0.01	0.08
Queue Length 95th (ft)	59	76	1	7
Control Delay (s)	23.1	25.9	0.5	3.1
Lane LOS	C	D	A	A
Approach Delay (s)	23.1	25.9	0.5	3.1
Approach LOS	C	D		

Intersection Summary			
Average Delay	11.5		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Cucamonga Ave & Belmont St

2040 No Build Conditions
Timing Plan: AM Peak Hour

	→		↖		←		↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑		↑	↑	↑	↑		
Traffic Volume (veh/h)	119	129	98	78	113	53		
Future Volume (Veh/h)	119	129	98	78	113	53		
Sign Control	Free		Free		Stop			
Grade	0%		0%		0%			
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77		
Hourly flow rate (vph)	155	168	127	101	147	69		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)							5	
Median type	None		None					
Median storage (veh)								
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume			323		594	162		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			323		594	162		
tC, single (s)			4.1		6.8	6.9		
tC, 2 stage (s)								
tF (s)			2.2		3.5	3.3		
p0 queue free %			90		62	92		
cM capacity (veh/h)			1234		391	855		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1			
Volume Total	103	220	127	101	216			
Volume Left	0	0	127	0	147			
Volume Right	0	168	0	0	69			
cSH	1700	1700	1234	1700	575			
Volume to Capacity	0.06	0.13	0.10	0.06	0.38			
Queue Length 95th (ft)	0	0	9	0	43			
Control Delay (s)	0.0	0.0	8.3	0.0	16.4			
Lane LOS			A		C			
Approach Delay (s)	0.0		4.6		16.4			
Approach LOS					C			
Intersection Summary								
Average Delay			6.0					
Intersection Capacity Utilization			29.1%		ICU Level of Service		A	
Analysis Period (min)			15					

HCM Signalized Intersection Capacity Analysis
6: Grove Ave & Mission Blvd

2040 No Build Conditions
Timing Plan: AM Peak Hour

	→		↖		←		↗		↑		↓	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑↑	↑	↑↑	↑
Traffic Volume (vph)	549	735	164	36	545	453	150	924	29	402	1301	352
Future Volume (vph)	549	735	164	36	545	453	150	924	29	402	1301	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	624	835	186	41	619	515	170	1050	33	457	1478	400
RTOR Reduction (vph)	0	0	123	0	0	314	0	4	0	0	0	38
Lane Group Flow (vph)	624	835	63	41	619	201	170	1079	0	457	1478	362
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases	4			8			6			6		
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	19.0	9.6	18.0		20.5	28.9	43.4
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	19.0	9.6	18.0		20.5	28.9	43.4
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.11	0.20		0.23	0.32	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	553	1199	536	114	747	334	188	1012		403	1632	842
v/s Ratio Prot	c0.18	0.24		0.01	c0.17		0.10	c0.21		c0.26	0.29	0.07
v/s Ratio Perm			0.04			0.13						0.16
v/c Ratio	1.13	0.70	0.12	0.36	0.83	0.60	0.90	1.07		1.13	0.91	0.43
Uniform Delay, d1	37.8	25.7	20.5	42.6	33.9	32.1	39.7	36.0		34.8	29.2	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	78.8	3.4	0.4	1.9	10.3	7.8	39.6	47.7		86.6	8.8	0.4
Delay (s)	116.5	29.1	20.9	44.5	44.2	39.9	79.3	83.7		121.4	38.0	15.6
Level of Service	F	C	C	D	D	D	E	F		F	D	B
Approach Delay (s)	61.3			42.3			83.1			50.5		
Approach LOS	E			D			F			D		
Intersection Summary												
HCM 2000 Control Delay			58.2	HCM 2000 Level of Service				E				
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				18.0				
Intersection Capacity Utilization			86.5%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2040 No Build Conditions

7: Belmont St & Grove Ave

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↗	↗
Traffic Volume (vph)	63	8	97	4	9	10	63	1011	10	16	1368	83
Future Volume (vph)	63	8	97	4	9	10	63	1011	10	16	1368	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1716		1770	5078		1770	5042	
Flt Permitted	0.74	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1385	1863	1583	1400	1716		1770	5078		1770	5042	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	9	105	4	10	11	68	1099	11	17	1487	90
RTOR Reduction (vph)	0	0	92	0	10	0	0	1	0	0	8	0
Lane Group Flow (vph)	68	9	13	4	11	0	68	1109	0	17	1569	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.3	7.3	7.3	7.3	7.3		5.3	37.7		1.5	33.9	
Effective Green, g (s)	7.3	7.3	7.3	7.3	7.3		5.3	37.7		1.5	33.9	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.63		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	168	226	192	170	208		156	3190		44	2848	
v/s Ratio Prot		0.00			0.01		c0.04	c0.22		0.01	c0.31	
v/s Ratio Perm	c0.05		0.01	0.00								
v/c Ratio	0.40	0.04	0.07	0.02	0.05		0.44	0.35		0.39	0.55	
Uniform Delay, d1	24.3	23.3	23.3	23.2	23.3		25.9	5.3		28.8	8.2	
Progression Factor	0.97	0.97	0.95	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.1	0.1	0.1	0.1		1.9	0.3		5.6	0.8	
Delay (s)	25.2	22.6	22.4	23.3	23.4		27.9	5.6		34.4	9.0	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.4			23.4			6.9			9.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.51		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		53.9%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2040 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	91	992	110	138	1210	97	100	465	65	97	382	84
Future Volume (vph)	91	992	110	138	1210	97	100	465	65	97	382	84
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	1828	1770	3443
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.42	1.00	0.21	1.00	0.21	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	774	1828	398	3443	398	3443
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	95	1033	115	144	1260	101	104	484	68	101	398	88
RTOR Reduction (vph)	0	0	73	0	0	61	0	8	0	0	32	0
Lane Group Flow (vph)	95	1033	42	144	1260	40	104	544	0	101	454	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	21.9	21.9	5.9	23.8	23.8	18.7	18.7		18.7	18.7	
Effective Green, g (s)	4.0	21.9	21.9	5.9	23.8	23.8	18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.07	0.36	0.36	0.10	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1291	577	174	1403	627	241	569		124	1073	
v/s Ratio Prot	0.05	0.29		c0.08	c0.36			c0.30			0.13	
v/s Ratio Perm			0.03			0.03	0.13			0.25		
v/c Ratio	0.81	0.80	0.07	0.83	0.90	0.06	0.43	0.96		0.81	0.42	
Uniform Delay, d1	27.6	17.1	12.4	26.6	17.0	11.2	16.4	20.2		19.1	16.4	
Progression Factor	1.00	1.00	1.00	0.60	1.43	2.83	1.00	1.00		1.00	1.00	
Incremental Delay, d2	31.5	5.3	0.2	19.7	6.9	0.1	5.5	28.2		42.3	1.2	
Delay (s)	59.1	22.4	12.7	35.5	31.1	31.8	22.0	48.5		61.4	17.6	
Level of Service	E	C	B	D	C	C	C	D		E	B	
Approach Delay (s)		24.3			31.6			44.3			25.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			30.4		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)				13.5			
Intersection Capacity Utilization			87.3%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2040 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	4	11	8	56	34	25	7	737	81	23	571	8
Future Volume (Veh/h)	4	11	8	56	34	25	7	737	81	23	571	8
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	12	9	61	37	27	8	801	88	25	621	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	1582	1580	626	1552	1541	845	630			889		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1595	1593	485	1560	1548	845	490			889		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	86	98	9	61	93	99			97		
cM capacity (veh/h)	46	88	502	67	94	363	924			762		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	25	125	897	655								
Volume Left	4	61	8	25								
Volume Right	9	27	88	9								
cSH	104	91	924	762								
Volume to Capacity	0.24	1.38	0.01	0.03								
Queue Length 95th (ft)	22	233	1	3								
Control Delay (s)	50.2	308.0	0.2	0.9								
Lane LOS	F	F	A	A								
Approach Delay (s)	50.2	308.0	0.2	0.9								
Approach LOS	F	F										
Intersection Summary												
Average Delay			23.8									
Intersection Capacity Utilization			66.1%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

2040 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔		↔			↔	↔
Traffic Volume (vph)	61	1081	54	40	1141	97	113	263	73	71	11	108
Future Volume (vph)	61	1081	54	40	1141	97	113	263	73	71	11	108
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.98	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1799			1688	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.86			0.68	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1573			1165	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	64	1126	56	42	1189	101	118	274	76	74	11	112
RTOR Reduction (vph)	0	0	32	0	0	59	0	12	0	0	78	0
Lane Group Flow (vph)	64	1126	24	42	1189	42	0	456	0	0	120	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.0	26.0	26.0	2.0	25.0	25.0		18.5			18.5	
Effective Green, g (s)	3.0	26.0	26.0	2.0	25.0	25.0		18.5			18.5	
Actuated g/C Ratio	0.05	0.43	0.43	0.03	0.42	0.42		0.31			0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	88	1533	685	59	1474	659		485			359	
v/s Ratio Prot	c0.04	0.32		0.02	c0.34						0.10	
v/s Ratio Perm			0.02			0.03		c0.29				0.10
v/c Ratio	0.73	0.73	0.04	0.71	0.81	0.06		0.94			0.33	
Uniform Delay, d1	28.1	14.1	9.8	28.7	15.4	10.5		20.2			16.0	
Progression Factor	0.57	1.47	8.01	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	16.4	1.9	0.1	33.2	4.8	0.2		28.5			2.5	
Delay (s)	32.3	22.7	78.4	62.0	20.2	10.7		48.7			18.5	
Level of Service	C	C	E	E	C	B		D			B	
Approach Delay (s)		25.7			20.8			48.7			18.5	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave


2040 No Build Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	35	63	18	53	105	140	18	293	151	54	134	23
Future Volume (Veh/h)	35	63	18	53	105	140	18	293	151	54	134	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	42	75	21	63	125	167	21	349	180	64	160	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	1012	872	174	841	796	439	187				529	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1012	872	174	841	796	439	187				529	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	58	72	98	69	58	73	98				94	
cM capacity (veh/h)	101	267	870	205	296	618	1387				1038	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	138	355	550	251								
Volume Left	42	63	21	64								
Volume Right	21	167	180	27								
cSH	191	355	1387	1038								
Volume to Capacity	0.72	1.00	0.02	0.06								
Queue Length 95th (ft)	115	288	1	5								
Control Delay (s)	61.5	82.7	0.5	2.7								
Lane LOS	F	F	A	A								
Approach Delay (s)	61.5	82.7	0.5	2.7								
Approach LOS	F	F										

Intersection Summary			
Average Delay	30.0		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Cucamonga Ave & Belmont St


2040 No Build Conditions
Timing Plan: PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑	↔	↑
Traffic Volume (veh/h)	180	75	50	113	163	152
Future Volume (Veh/h)	180	75	50	113	163	152
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	240	100	67	151	217	203
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			340		575	170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			340		575	170
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		49	76
cM capacity (veh/h)			1216		424	844
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	160	180	67	151	420	
Volume Left	0	0	67	0	217	
Volume Right	0	100	0	0	203	
cSH	1700	1700	1216	1700	820	
Volume to Capacity	0.09	0.11	0.06	0.09	0.51	
Queue Length 95th (ft)	0	0	4	0	74	
Control Delay (s)	0.0	0.0	8.1	0.0	16.5	
Lane LOS			A		C	
Approach Delay (s)	0.0		2.5		16.5	
Approach LOS					C	
Intersection Summary						
Average Delay			7.7			
Intersection Capacity Utilization			29.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
6: Grove Ave & Mission Blvd

2040 No Build Conditions
Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Traffic Volume (vph)	438	749	129	39	787	646	194	1399	33	418	975	372
Future Volume (vph)	438	749	129	39	787	646	194	1399	33	418	975	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5068	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5068	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	461	788	136	41	828	680	204	1473	35	440	1026	392
RTOR Reduction (vph)	0	0	92	0	0	278	0	3	0	0	0	50
Lane Group Flow (vph)	461	788	44	41	828	403	204	1505	0	440	1026	342
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	9.5	29.0	29.0	3.0	22.5	22.5	13.3	22.5		17.5	26.7	36.2
Effective Green, g (s)	9.5	29.0	29.0	3.0	22.5	22.5	13.3	22.5		17.5	26.7	36.2
Actuated g/C Ratio	0.11	0.32	0.32	0.03	0.25	0.25	0.15	0.25		0.19	0.30	0.40
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	362	1140	510	114	884	395	261	1267		344	1508	715
v/s Ratio Prot	c0.13	0.22		0.01	0.23		0.12	c0.30		c0.25	c0.20	0.05
v/s Ratio Perm			0.03			c0.25						0.17
v/c Ratio	1.27	0.69	0.09	0.36	0.94	1.02	0.78	1.19		1.28	0.68	0.48
Uniform Delay, d1	40.2	26.6	21.3	42.6	33.1	33.8	37.0	33.8		36.2	27.9	19.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	143.0	3.4	0.3	1.9	18.3	50.2	14.1	92.7		146.2	2.5	0.5
Delay (s)	183.2	30.0	21.6	44.5	51.4	83.9	51.0	126.5		182.4	30.4	20.4
Level of Service	F	C	C	D	D	F	D	F		F	C	C
Approach Delay (s)			80.2			65.5			117.5			64.3
Approach LOS			F			E			F			E
Intersection Summary												
HCM 2000 Control Delay			82.0			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			100.2%			ICU Level of Service			G			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

2040 No Build Conditions

7: Belmont St & Grove Ave

Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗		↘	↘	↘
Traffic Volume (vph)	81	17	121	5	19	45	76	1440	12	7	1155	36
Future Volume (vph)	81	17	121	5	19	45	76	1440	12	7	1155	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1665		1770	5079		1770	5062	
Flt Permitted	0.71	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1331	1863	1583	1390	1665		1770	5079		1770	5062	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	83	17	123	5	19	46	78	1469	12	7	1179	37
RTOR Reduction (vph)	0	0	107	0	40	0	0	1	0	0	4	0
Lane Group Flow (vph)	83	17	16	5	25	0	78	1480	0	7	1212	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	8.0	8.0	8.0	8.0	8.0		5.5	37.2		1.3	33.0	
Effective Green, g (s)	8.0	8.0	8.0	8.0	8.0		5.5	37.2		1.3	33.0	
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13		0.09	0.62		0.02	0.55	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	177	248	211	185	222		162	3148		38	2784	
v/s Ratio Prot		0.01			0.02		c0.04	c0.29		0.00	0.24	
v/s Ratio Perm	c0.06		0.01	0.00								
v/c Ratio	0.47	0.07	0.08	0.03	0.11		0.48	0.47		0.18	0.44	
Uniform Delay, d1	24.0	22.7	22.8	22.6	22.9		25.9	6.1		28.8	8.0	
Progression Factor	0.99	0.99	0.96	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.1	0.2	0.1	0.2		2.2	0.5		2.3	0.5	
Delay (s)	25.8	22.7	22.0	22.7	23.1		28.1	6.6		31.2	8.5	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.5			23.1			7.7			8.6	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.49		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		54.7%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

FUTURE YEAR 2040 PLUS O&M FACILITY
SITE 1 OR 2

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 1: Campus Ave & Mission Blvd Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	83	1225	69	98	775	61	130	364	144	93	316	43
Future Volume (vph)	83	1225	69	98	775	61	130	364	144	93	316	43
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1783	1770	1783	1770	3475
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.48	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	891	1783	414	3475	414	3475
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	94	1392	78	111	881	69	148	414	164	106	359	49
RTOR Reduction (vph)	0	0	46	0	0	42	0	24	0	0	18	0
Lane Group Flow (vph)	94	1392	32	111	881	27	148	554	0	106	391	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.7	24.5	24.5	4.0	23.8	23.8	18.0	18.0		18.0	18.0	
Effective Green, g (s)	4.7	24.5	24.5	4.0	23.8	23.8	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.08	0.41	0.41	0.07	0.40	0.40	0.30	0.30		0.30	0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	138	1445	646	118	1403	627	267	534		124	1042	
v/s Ratio Prot	0.05	c0.39		c0.06	0.25		c0.31				0.11	
v/s Ratio Perm			0.02			0.02	0.17			0.26		
v/c Ratio	0.68	0.96	0.05	0.94	0.63	0.04	0.55	1.04		0.85	0.37	
Uniform Delay, d1	26.9	17.3	10.7	27.9	14.5	11.1	17.6	21.0		19.8	16.6	
Progression Factor	1.00	1.00	1.00	0.60	1.55	5.99	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.0	16.4	0.1	55.5	1.7	0.1	8.1	49.1		48.9	1.0	
Delay (s)	39.9	33.7	10.9	72.1	24.3	66.7	25.7	70.1		68.7	17.6	
Level of Service	D	C	B	E	C	E	C	E		E	B	
Approach Delay (s)		33.0			32.0			61.0			28.1	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	37.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 2: Belmont St & Campus Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	6	43	10	26	25	11	15	682	96	28	473	11
Future Volume (Veh/h)	6	43	10	26	25	11	15	682	96	28	473	11
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	52	12	32	30	13	18	832	117	34	577	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	1606	1636	584	1616	1584	890	590			949		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1619	1654	469	1631	1595	890	476			949		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	36	98	3	66	96	98			95		
cM capacity (veh/h)	50	82	528	33	89	341	965			724		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	71	75	967	624								
Volume Left	7	32	18	34								
Volume Right	12	13	117	13								
cSH	89	56	965	724								
Volume to Capacity	0.80	1.34	0.02	0.05								
Queue Length 95th (ft)	104	166	1	4								
Control Delay (s)	129.4	357.9	0.5	1.3								
Lane LOS	F	F	A	A								
Approach Delay (s)	129.4	357.9	0.5	1.3								
Approach LOS	F	F										

Intersection Summary			
Average Delay	21.5		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 3: Bon View Ave & Mission Blvd
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔		↔			↔	↔
Traffic Volume (vph)	58	1330	96	56	820	41	54	97	40	93	152	71
Future Volume (vph)	58	1330	96	56	820	41	54	97	40	93	152	71
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1785			1780	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.79			0.82	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1433			1482	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	70	1602	116	67	988	49	65	117	48	112	183	86
RTOR Reduction (vph)	0	0	63	0	0	28	0	16	0	0	18	0
Lane Group Flow (vph)	70	1602	53	67	988	21	0	214	0	0	364	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.0	25.5	25.5	3.0	25.5	25.5		18.0			18.0	
Effective Green, g (s)	3.0	25.5	25.5	3.0	25.5	25.5		18.0			18.0	
Actuated g/C Ratio	0.05	0.42	0.42	0.05	0.42	0.42		0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	88	1504	672	88	1504	672		429			444	
v/s Ratio Prot	c0.04	c0.45		0.04	0.28							
v/s Ratio Perm			0.03			0.01		0.15			c0.25	
v/c Ratio	0.80	1.07	0.08	0.76	0.66	0.03		0.50			0.82	
Uniform Delay, d1	28.2	17.2	10.3	28.1	13.8	10.1		17.3			19.5	
Progression Factor	0.59	1.43	2.58	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	20.3	36.6	0.1	31.5	2.3	0.1		4.1			15.4	
Delay (s)	36.8	61.3	26.6	59.6	16.0	10.1		21.4			34.9	
Level of Service	D	E	C	E	B	B		C			C	
Approach Delay (s)		58.1			18.4			21.4			34.9	
Approach LOS		E			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	40.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 4: Belmont St & Bon View Ave
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	31	112	15	79	35	56	8	97	38	113	181	24
Future Volume (Veh/h)	31	112	15	79	35	56	8	97	38	113	181	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	35	127	17	90	40	64	9	110	43	128	206	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	709	646	220	706	638	132	233				153	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	709	646	220	706	638	132	233				153	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	87	64	98	61	89	93	99				91	
cM capacity (veh/h)	275	353	820	230	356	918	1335				1428	

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	179	194	162	361
Volume Left	35	90	9	128
Volume Right	17	64	43	27
cSH	352	339	1335	1428
Volume to Capacity	0.51	0.57	0.01	0.09
Queue Length 95th (ft)	69	85	1	7
Control Delay (s)	25.3	28.9	0.5	3.3
Lane LOS	D	D	A	A
Approach Delay (s)	25.3	28.9	0.5	3.3
Approach LOS	D	D		

Intersection Summary			
Average Delay	12.7		
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 5: Cucamonga Ave & Belmont St
 Timing Plan: AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	119	146	115	78	113	53
Future Volume (Veh/h)	119	146	115	78	113	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	155	190	149	101	147	69
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			345		649	172
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			345		649	172
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		58	92
cM capacity (veh/h)			1211		353	841
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	103	242	149	101	216	
Volume Left	0	0	149	0	147	
Volume Right	0	190	0	0	69	
cSH	1700	1700	1211	1700	519	
Volume to Capacity	0.06	0.14	0.12	0.06	0.42	
Queue Length 95th (ft)	0	0	10	0	51	
Control Delay (s)	0.0	0.0	8.4	0.0	18.3	
Lane LOS			A		C	
Approach Delay (s)	0.0		5.0		18.3	
Approach LOS					C	
Intersection Summary						
Average Delay			6.4			
Intersection Capacity Utilization			30.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 6: Grove Ave & Mission Blvd
 Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↔↔	↔	↔↔	↔↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	549	735	164	36	545	453	150	924	29	402	1310	352
Future Volume (vph)	549	735	164	36	545	453	150	924	29	402	1310	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	624	835	186	41	619	515	170	1050	33	457	1489	400
RTOR Reduction (vph)	0	0	123	0	0	314	0	4	0	0	0	38
Lane Group Flow (vph)	624	835	63	41	619	201	170	1079	0	457	1489	362
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	19.0	9.6	18.0		20.5	28.9	43.4
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	19.0	9.6	18.0		20.5	28.9	43.4
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.11	0.20		0.23	0.32	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	553	1199	536	114	747	334	188	1012		403	1632	842
v/s Ratio Prot	c0.18	0.24		0.01	c0.17		0.10	c0.21		c0.26	0.29	0.07
v/s Ratio Perm			0.04			0.13						0.16
v/c Ratio	1.13	0.70	0.12	0.36	0.83	0.60	0.90	1.07		1.13	0.91	0.43
Uniform Delay, d1	37.8	25.7	20.5	42.6	33.9	32.1	39.7	36.0		34.8	29.3	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	78.8	3.4	0.4	1.9	10.3	7.8	39.6	47.7		86.6	9.3	0.4
Delay (s)	116.5	29.1	20.9	44.5	44.2	39.9	79.3	83.7		121.4	38.6	15.6
Level of Service	F	C	C	D	D	D	E	F		F	D	B
Approach Delay (s)		61.3			42.3			83.1			50.8	
Approach LOS		E			D			F			D	
Intersection Summary												
HCM 2000 Control Delay			58.3									E
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			90.0					Sum of lost time (s)		18.0		
Intersection Capacity Utilization			86.5%					ICU Level of Service		E		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 7: Belmont St & Grove Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗	↗	↘	↗	↗
Traffic Volume (vph)	63	8	97	4	9	10	72	1011	10	16	1368	92
Future Volume (vph)	63	8	97	4	9	10	72	1011	10	16	1368	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1716		1770	5078		1770	5037	
Flt Permitted	0.74	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1385	1863	1583	1400	1716		1770	5078		1770	5037	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	9	105	4	10	11	78	1099	11	17	1487	100
RTOR Reduction (vph)	0	0	92	0	10	0	0	1	0	0	9	0
Lane Group Flow (vph)	68	9	13	4	11	0	78	1109	0	17	1578	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.3	7.3	7.3	7.3	7.3		5.6	37.7		1.5	33.6	
Effective Green, g (s)	7.3	7.3	7.3	7.3	7.3		5.6	37.7		1.5	33.6	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.09	0.63		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	168	226	192	170	208		165	3190		44	2820	
v/s Ratio Prot		0.00			0.01		c0.04	c0.22		0.01	c0.31	
v/s Ratio Perm	c0.05		0.01	0.00								
v/c Ratio	0.40	0.04	0.07	0.02	0.05		0.47	0.35		0.39	0.56	
Uniform Delay, d1	24.3	23.3	23.3	23.2	23.3		25.8	5.3		28.8	8.5	
Progression Factor	0.96	0.96	0.93	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.1	0.1	0.1	0.1		2.1	0.3		5.6	0.8	
Delay (s)	25.0	22.3	21.9	23.3	23.4		27.9	5.6		34.4	9.3	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.1			23.4			7.1			9.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 1: Campus Ave & Mission Blvd
 Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	992	110	138	1210	106	100	465	65	97	382	84
Future Volume (vph)	91	992	110	138	1210	106	100	465	65	97	382	84
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	3443	1770	3443
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.42	1.00	0.21	1.00	0.21	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	774	1828	398	3443	398	3443
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	95	1033	115	144	1260	110	104	484	68	101	398	88
RTOR Reduction (vph)	0	0	73	0	0	66	0	8	0	0	32	0
Lane Group Flow (vph)	95	1033	42	144	1260	44	104	544	0	101	454	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	21.9	21.9	5.9	23.8	23.8	18.7	18.7		18.7	18.7	
Effective Green, g (s)	4.0	21.9	21.9	5.9	23.8	23.8	18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.07	0.36	0.36	0.10	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1291	577	174	1403	627	241	569		124	1073	
v/s Ratio Prot	0.05	0.29		c0.08	c0.36			c0.30			0.13	
v/s Ratio Perm			0.03			0.03	0.13			0.25		
v/c Ratio	0.81	0.80	0.07	0.83	0.90	0.07	0.43	0.96		0.81	0.42	
Uniform Delay, d1	27.6	17.1	12.4	26.6	17.0	11.2	16.4	20.2		19.1	16.4	
Progression Factor	1.00	1.00	1.00	0.61	1.43	2.67	1.00	1.00		1.00	1.00	
Incremental Delay, d2	31.5	5.3	0.2	19.4	6.8	0.1	5.5	28.2		42.3	1.2	
Delay (s)	59.1	22.4	12.7	35.5	30.9	30.2	22.0	48.5		61.4	17.6	
Level of Service	E	C	B	D	C	C	C	D		E	B	
Approach Delay (s)		24.3			31.3			44.3			25.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			30.3			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			60.0	Sum of lost time (s)		13.5						
Intersection Capacity Utilization			87.3%	ICU Level of Service		E						
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 2: Belmont St & Campus Ave
 Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	11	8	65	34	25	7	737	81	23	571	8
Future Volume (Veh/h)	4	11	8	65	34	25	7	737	81	23	571	8
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	12	9	71	37	27	8	801	88	25	621	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	1582	1580	626	1552	1541	845	630	889				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1595	1593	485	1560	1548	845	490	889				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	91	86	98	0	61	93	99	97				
cM capacity (veh/h)	46	88	502	67	94	363	924	762				
Direction, Lane #												
Volume Total	25	135	897	655								
Volume Left	4	71	8	25								
Volume Right	9	27	88	9								
cSH	104	88	924	762								
Volume to Capacity	0.24	1.53	0.01	0.03								
Queue Length 95th (ft)	22	265	1	3								
Control Delay (s)	50.2	369.3	0.2	0.9								
Lane LOS	F	F	A	A								
Approach Delay (s)	50.2	369.3	0.2	0.9								
Approach LOS	F	F										
Intersection Summary												
Average Delay			30.3									
Intersection Capacity Utilization			66.6%	ICU Level of Service		C						
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 3: Bon View Ave & Mission Blvd
 Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔		↔			↔	↔
Traffic Volume (vph)	61	1081	54	40	1141	97	122	263	73	71	11	108
Future Volume (vph)	61	1081	54	40	1141	97	122	263	73	71	11	108
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.98	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1799			1688	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.85			0.68	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1556			1176	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	64	1126	56	42	1189	101	127	274	76	74	11	112
RTOR Reduction (vph)	0	0	32	0	0	60	0	12	0	0	77	0
Lane Group Flow (vph)	64	1126	24	42	1189	41	0	465	0	0	121	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.0	25.6	25.6	2.0	24.6	24.6		18.9			18.9	
Effective Green, g (s)	3.0	25.6	25.6	2.0	24.6	24.6		18.9			18.9	
Actuated g/C Ratio	0.05	0.43	0.43	0.03	0.41	0.41		0.31			0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	88	1509	675	59	1450	649		490			370	
v/s Ratio Prot	c0.04	0.32		0.02	c0.34						0.10	
v/s Ratio Perm			0.02			0.03		c0.30				0.10
v/c Ratio	0.73	0.75	0.04	0.71	0.82	0.06		0.95			0.33	
Uniform Delay, d1	28.1	14.5	10.0	28.7	15.7	10.7		20.1			15.7	
Progression Factor	0.57	1.44	7.85	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	16.4	2.1	0.1	33.2	5.3	0.2		29.9			2.3	
Delay (s)	32.3	22.9	78.6	62.0	21.0	10.9		50.0			18.0	
Level of Service	C	C	E	E	C	B		D			B	
Approach Delay (s)		25.9			21.6			50.0			18.0	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group


HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 4: Belmont St & Bon View Ave
 Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	35	63	18	53	114	149	18	293	151	54	134	23
Future Volume (Veh/h)	35	63	18	53	114	149	18	293	151	54	134	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	42	75	21	63	136	177	21	349	180	64	160	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	1028	872	174	841	796	439	187				529	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1028	872	174	841	796	439	187				529	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	54	72	98	69	54	71	98				94	
cM capacity (veh/h)	92	267	870	205	296	618	1387				1038	

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	138	376	550	251
Volume Left	42	63	21	64
Volume Right	21	177	180	27
cSH	181	357	1387	1038
Volume to Capacity	0.76	1.05	0.02	0.06
Queue Length 95th (ft)	125	328	1	5
Control Delay (s)	69.9	97.3	0.5	2.7
Lane LOS	F	F	A	A
Approach Delay (s)	69.9	97.3	0.5	2.7
Approach LOS	F	F		


Intersection Summary			
Average Delay	35.9		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 5: Cucamonga Ave & Belmont St
 Timing Plan: PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑	↔	↑
Traffic Volume (veh/h)	180	75	50	113	180	169
Future Volume (Veh/h)	180	75	50	113	180	169
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	240	100	67	151	240	225
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			340		575	170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			340		575	170
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		43	73
cM capacity (veh/h)			1216		424	844
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	160	180	67	151	465	
Volume Left	0	0	67	0	240	
Volume Right	0	100	0	0	225	
cSH	1700	1700	1216	1700	821	
Volume to Capacity	0.09	0.11	0.06	0.09	0.57	
Queue Length 95th (ft)	0	0	4	0	91	
Control Delay (s)	0.0	0.0	8.1	0.0	17.6	
Lane LOS			A		C	
Approach Delay (s)	0.0		2.5		17.6	
Approach LOS					C	
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization			30.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 6: Grove Ave & Mission Blvd
 Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Traffic Volume (vph)	438	749	129	39	787	646	194	1408	33	418	975	372
Future Volume (vph)	438	749	129	39	787	646	194	1408	33	418	975	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	461	788	136	41	828	680	204	1482	35	440	1026	392
RTOR Reduction (vph)	0	0	91	0	0	273	0	3	0	0	0	51
Lane Group Flow (vph)	461	788	45	41	828	407	204	1514	0	440	1026	341
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	9.5	30.0	30.0	3.0	23.5	23.5	13.3	22.5		16.5	25.7	35.2
Effective Green, g (s)	9.5	30.0	30.0	3.0	23.5	23.5	13.3	22.5		16.5	25.7	35.2
Actuated g/C Ratio	0.11	0.33	0.33	0.03	0.26	0.26	0.15	0.25		0.18	0.29	0.39
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	362	1179	527	114	924	413	261	1267		324	1452	698
v/s Ratio Prot	c0.13	0.22		0.01	0.23		0.12	c0.30		c0.25	c0.20	0.05
v/s Ratio Perm			0.03			c0.26						0.16
v/c Ratio	1.27	0.67	0.09	0.36	0.90	0.98	0.78	1.19		1.36	0.71	0.49
Uniform Delay, d1	40.2	25.7	20.6	42.6	32.1	33.1	37.0	33.8		36.8	28.8	20.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	143.0	3.0	0.3	1.9	13.1	40.6	14.1	95.7		180.0	2.9	0.5
Delay (s)	183.2	28.7	20.9	44.5	45.2	73.7	51.0	129.5		216.7	31.7	21.2
Level of Service	F	C	C	D	D	E	D	F		F	C	C
Approach Delay (s)		79.4			57.7		120.2				73.3	
Approach LOS		E			E		F				E	
Intersection Summary												
HCM 2000 Control Delay			83.3	HCM 2000 Level of Service		F						
HCM 2000 Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)		18.0						
Intersection Capacity Utilization			100.3%	ICU Level of Service		G						
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions
 7: Belmont St & Grove Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗		↖	↗		↖	↗	↘
Traffic Volume (vph)	90	17	130	5	19	45	76	1440	12	7	1155	36
Future Volume (vph)	90	17	130	5	19	45	76	1440	12	7	1155	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1665		1770	5079		1770	5062	
Flt Permitted	0.71	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1331	1863	1583	1390	1665		1770	5079		1770	5062	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	92	17	133	5	19	46	78	1469	12	7	1179	37
RTOR Reduction (vph)	0	0	114	0	39	0	0	1	0	0	4	0
Lane Group Flow (vph)	92	17	19	5	26	0	78	1480	0	7	1212	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	8.5	8.5	8.5	8.5	8.5		5.3	36.7		1.3	32.7	
Effective Green, g (s)	8.5	8.5	8.5	8.5	8.5		5.3	36.7		1.3	32.7	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.09	0.61		0.02	0.55	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	263	224	196	235		156	3106		38	2758	
v/s Ratio Prot		0.01			0.02		c0.04	c0.29		0.00	0.24	
v/s Ratio Perm	c0.07		0.01	0.00								
v/c Ratio	0.49	0.06	0.08	0.03	0.11		0.50	0.48		0.18	0.44	
Uniform Delay, d1	23.7	22.3	22.4	22.2	22.4		26.1	6.4		28.8	8.2	
Progression Factor	0.99	0.99	0.97	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.1	0.2	0.1	0.2		2.5	0.5		2.3	0.5	
Delay (s)	25.5	22.2	21.8	22.2	22.7		28.6	6.9		31.2	8.7	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.2			22.6			8.0			8.8	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

FUTURE YEAR 2040 PLUS O&M FACILITY SITE 3

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2040 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔	↔	↔	↔	↔↔	↔
Traffic Volume (vph)	83	1225	69	98	775	70	130	364	144	84	316	43
Future Volume (vph)	83	1225	69	98	775	70	130	364	144	84	316	43
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00	0.96	1.00	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1783	1770	1783	1770	3475
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.48	1.00	0.22	1.00	0.22	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	891	1783	414	3475	414	3475
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	94	1392	78	111	881	80	148	414	164	95	359	49
RTOR Reduction (vph)	0	0	46	0	0	48	0	24	0	0	18	0
Lane Group Flow (vph)	94	1392	32	111	881	32	148	554	0	95	391	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.7	24.5	24.5	4.0	23.8	23.8	18.0	18.0		18.0	18.0	
Effective Green, g (s)	4.7	24.5	24.5	4.0	23.8	23.8	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.08	0.41	0.41	0.07	0.40	0.40	0.30	0.30		0.30	0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	138	1445	646	118	1403	627	267	534		124	1042	
v/s Ratio Prot	0.05	c0.39		c0.06	0.25		c0.31				0.11	
v/s Ratio Perm			0.02			0.02	0.17			0.23		
v/c Ratio	0.68	0.96	0.05	0.94	0.63	0.05	0.55	1.04		0.77	0.37	
Uniform Delay, d1	26.9	17.3	10.7	27.9	14.5	11.1	17.6	21.0		19.1	16.6	
Progression Factor	1.00	1.00	1.00	0.60	1.54	4.58	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.0	16.4	0.1	55.4	1.7	0.1	8.1	49.1		35.5	1.0	
Delay (s)	39.9	33.7	10.9	72.2	24.1	51.1	25.7	70.1		54.6	17.6	
Level of Service	D	C	B	E	C	D	C	E		D	B	
Approach Delay (s)		33.0			31.1			61.0			24.6	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	36.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2040 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	6	43	10	35	25	11	15	682	87	28	473	11
Future Volume (Veh/h)	6	43	10	35	25	11	15	682	87	28	473	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	52	12	43	30	13	18	832	106	34	577	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	1600	1626	584	1610	1579	885	590			938		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1613	1641	469	1624	1589	885	476			938		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	37	98	0	66	96	98			95		
cM capacity (veh/h)	51	83	528	34	90	344	965			730		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	71	86	956	624								
Volume Left	7	43	18	34								
Volume Right	12	13	106	13								
cSH	90	53	965	730								
Volume to Capacity	0.79	1.63	0.02	0.05								
Queue Length 95th (ft)	102	203	1	4								
Control Delay (s)	125.0	480.5	0.5	1.2								
Lane LOS	F	F	A	A								
Approach Delay (s)	125.0	480.5	0.5	1.2								
Approach LOS	F	F										

Intersection Summary			
Average Delay	29.6		
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: Bon View Ave & Mission Blvd

2040 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	58	1330	87	56	820	41	63	97	40	93	152	71
Future Volume (vph)	58	1330	87	56	820	41	63	97	40	93	152	71
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1785			1780	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.76			0.82	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1371			1473	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	70	1602	105	67	988	49	76	117	48	112	183	86
RTOR Reduction (vph)	0	0	60	0	0	28	0	15	0	0	18	0
Lane Group Flow (vph)	70	1602	45	67	988	21	0	226	0	0	364	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.0	25.5	25.5	3.0	25.5	25.5		18.0			18.0	
Effective Green, g (s)	3.0	25.5	25.5	3.0	25.5	25.5		18.0			18.0	
Actuated g/C Ratio	0.05	0.42	0.42	0.05	0.42	0.42		0.30			0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	88	1504	672	88	1504	672		411			441	
v/s Ratio Prot	c0.04	c0.45		0.04	0.28							
v/s Ratio Perm			0.03			0.01		0.17			c0.25	
v/c Ratio	0.80	1.07	0.07	0.76	0.66	0.03		0.55			0.82	
Uniform Delay, d1	28.2	17.2	10.2	28.1	13.8	10.1		17.6			19.5	
Progression Factor	0.58	1.45	2.87	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	20.6	36.7	0.1	31.5	2.3	0.1		5.2			15.9	
Delay (s)	36.9	61.7	29.4	59.6	16.0	10.1		22.8			35.5	
Level of Service	D	E	C	E	B	B		C			D	
Approach Delay (s)		58.8			18.4			22.8			35.5	
Approach LOS		E			B			C			D	
Intersection Summary												
HCM 2000 Control Delay		41.1										D
HCM 2000 Volume to Capacity ratio		0.95										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)			13.5				
Intersection Capacity Utilization		74.7%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
4: Belmont St & Bon View Ave

2040 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (veh/h)	31	103	15	79	44	65	8	97	38	104	181	24
Future Volume (Veh/h)	31	103	15	79	44	65	8	97	38	104	181	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	35	117	17	90	50	74	9	110	43	118	206	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	704	626	220	680	618	132	233			153		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	704	626	220	680	618	132	233			153		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	68	98	64	86	92	99			92		
cM capacity (veh/h)	270	365	820	251	369	918	1335			1428		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	169	214	162	351								
Volume Left	35	90	9	118								
Volume Right	17	74	43	27								
cSH	359	372	1335	1428								
Volume to Capacity	0.47	0.57	0.01	0.08								
Queue Length 95th (ft)	61	86	1	7								
Control Delay (s)	23.6	26.9	0.5	3.1								
Lane LOS	C	D	A	A								
Approach Delay (s)	23.6	26.9	0.5	3.1								
Approach LOS	C	D										
Intersection Summary												
Average Delay		12.2										
Intersection Capacity Utilization		51.9%			ICU Level of Service					A		
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 5: Cucamonga Ave & Belmont St Timing Plan: AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Volume (veh/h)	119	129	98	78	130	70
Future Volume (Veh/h)	119	129	98	78	130	70
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	155	168	127	101	169	91
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						5
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			323		594	162
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			323		594	162
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		57	89
cM capacity (veh/h)			1234		391	855
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	103	220	127	101	260	
Volume Left	0	0	127	0	169	
Volume Right	0	168	0	0	91	
cSH	1700	1700	1234	1700	602	
Volume to Capacity	0.06	0.13	0.10	0.06	0.43	
Queue Length 95th (ft)	0	0	9	0	54	
Control Delay (s)	0.0	0.0	8.3	0.0	17.1	
Lane LOS			A		C	
Approach Delay (s)	0.0		4.6		17.1	
Approach LOS					C	
Intersection Summary						
Average Delay			6.8			
Intersection Capacity Utilization			30.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 6: Grove Ave & Mission Blvd Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	549	735	164	36	545	453	150	933	29	402	1301	352
Future Volume (vph)	549	735	164	36	545	453	150	933	29	402	1301	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	624	835	186	41	619	515	170	1060	33	457	1478	400
RTOR Reduction (vph)	0	0	123	0	0	314	0	3	0	0	0	38
Lane Group Flow (vph)	624	835	63	41	619	201	170	1090	0	457	1478	362
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	19.0	9.6	18.0		20.5	28.9	43.4
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	19.0	9.6	18.0		20.5	28.9	43.4
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.21	0.11	0.20		0.23	0.32	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	553	1199	536	114	747	334	188	1012		403	1632	842
v/s Ratio Prot	c0.18	0.24		0.01	c0.17		0.10	c0.22		c0.26	0.29	0.07
v/s Ratio Perm			0.04			0.13						0.16
v/c Ratio	1.13	0.70	0.12	0.36	0.83	0.60	0.90	1.08		1.13	0.91	0.43
Uniform Delay, d1	37.8	25.7	20.5	42.6	33.9	32.1	39.7	36.0		34.8	29.2	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	78.8	3.4	0.4	1.9	10.3	7.8	39.6	51.4		86.6	8.8	0.4
Delay (s)	116.5	29.1	20.9	44.5	44.2	39.9	79.3	87.4		121.4	38.0	15.6
Level of Service	F	C	C	D	D	D	E	F		F	D	B
Approach Delay (s)	61.3				42.3		86.3			50.5		
Approach LOS	E				D		F			D		
Intersection Summary												
HCM 2000 Control Delay			58.8		HCM 2000 Level of Service		E					
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)		18.0					
Intersection Capacity Utilization			86.7%		ICU Level of Service		E					
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 7: Belmont St & Grove Ave Timing Plan: AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↘		↗	↗	↗	↘	↗	↗
Traffic Volume (vph)	72	8	106	4	9	10	63	1011	10	16	1368	83
Future Volume (vph)	72	8	106	4	9	10	63	1011	10	16	1368	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		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)	1770	1863	1583	1770	1716		1770	5078		1770	5042	
Flt Permitted	0.74	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1385	1863	1583	1400	1716		1770	5078		1770	5042	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	9	115	4	10	11	68	1099	11	17	1487	90
RTOR Reduction (vph)	0	0	100	0	10	0	0	1	0	0	8	0
Lane Group Flow (vph)	78	9	15	4	11	0	68	1109	0	17	1569	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	7.7	7.7	7.7	7.7	7.7		5.3	37.3		1.5	33.5	
Effective Green, g (s)	7.7	7.7	7.7	7.7	7.7		5.3	37.3		1.5	33.5	
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13		0.09	0.62		0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	177	239	203	179	220		156	3156		44	2815	
v/s Ratio Prot		0.00			0.01		c0.04	c0.22		0.01	c0.31	
v/s Ratio Perm	c0.06		0.01	0.00								
v/c Ratio	0.44	0.04	0.07	0.02	0.05		0.44	0.35		0.39	0.56	
Uniform Delay, d1	24.2	22.9	23.0	22.9	22.9		25.9	5.5		28.8	8.5	
Progression Factor	0.97	0.98	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1	0.2	0.1	0.1		1.9	0.3		5.6	0.8	
Delay (s)	25.3	22.5	22.7	22.9	23.0		27.9	5.8		34.4	9.3	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.7			23.0			7.1			9.6	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.52		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		54.4%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Campus Ave & Mission Blvd

2040 Plus O&M Facility Site 3 Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	91	992	110	138	1210	106	100	465	65	97	382	84
Future Volume (vph)	91	992	110	138	1210	106	100	465	65	97	382	84
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	0.97	1.00	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1828	1770	3443	1583	1770
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.42	1.00	0.21	1.00	0.21	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	774	1828	398	3443	774	3443
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	95	1033	115	144	1260	110	104	484	68	101	398	88
RTOR Reduction (vph)	0	0	73	0	0	66	0	8	0	0	32	0
Lane Group Flow (vph)	95	1033	42	144	1260	44	104	544	0	101	454	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2			6		6
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.0	21.9	21.9	5.9	23.8	23.8	18.7	18.7		18.7	18.7	
Effective Green, g (s)	4.0	21.9	21.9	5.9	23.8	23.8	18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.07	0.36	0.36	0.10	0.40	0.40	0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	1291	577	174	1403	627	241	569		124	1073	
v/s Ratio Prot	0.05	0.29		c0.08	c0.36			c0.30			0.13	
w/s Ratio Perm			0.03			0.03	0.13			0.25		
v/c Ratio	0.81	0.80	0.07	0.83	0.90	0.07	0.43	0.96		0.81	0.42	
Uniform Delay, d1	27.6	17.1	12.4	26.6	17.0	11.2	16.4	20.2		19.1	16.4	
Progression Factor	1.00	1.00	1.00	0.61	1.43	2.69	1.00	1.00		1.00	1.00	
Incremental Delay, d2	31.5	5.3	0.2	19.3	6.7	0.1	5.5	28.2		42.3	1.2	
Delay (s)	59.1	22.4	12.7	35.5	31.0	30.4	22.0	48.5		61.4	17.6	
Level of Service	E	C	B	D	C	C	C	D		E	B	
Approach Delay (s)		24.3			31.4			44.3			25.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			30.4			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)		13.5				
Intersection Capacity Utilization			87.3%			ICU Level of Service		E				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: Belmont St & Campus Ave

2040 Plus O&M Facility Site 3 Conditions
Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	4	11	8	65	34	25	7	737	81	23	571	8
Future Volume (Veh/h)	4	11	8	65	34	25	7	737	81	23	571	8
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	12	9	71	37	27	8	801	88	25	621	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												1281
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	1582	1580	626	1552	1541	845	630	889				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1595	1593	485	1560	1548	845	490	889				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	91	86	98	0	61	93	99	97				
cM capacity (veh/h)	46	88	502	67	94	363	924	762				
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	25	135	897	655								
Volume Left	4	71	8	25								
Volume Right	9	27	88	9								
cSH	104	88	924	762								
Volume to Capacity	0.24	1.53	0.01	0.03								
Queue Length 95th (ft)	22	265	1	3								
Control Delay (s)	50.2	369.3	0.2	0.9								
Lane LOS	F	F	A	A								
Approach Delay (s)	50.2	369.3	0.2	0.9								
Approach LOS	F	F										
Intersection Summary												
Average Delay			30.3									
Intersection Capacity Utilization			66.6%			ICU Level of Service		C				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 3: Bon View Ave & Mission Blvd Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔		↔			↔	
Traffic Volume (vph)	61	1081	54	40	1141	97	122	263	82	71	11	108
Future Volume (vph)	61	1081	54	40	1141	97	122	263	82	71	11	108
Ideal Flow (vp/h)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.98	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1795			1688	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.86			0.68	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1559			1172	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	64	1126	56	42	1189	101	127	274	85	74	11	112
RTOR Reduction (vph)	0	0	32	0	0	60	0	13	0	0	77	0
Lane Group Flow (vph)	64	1126	24	42	1189	41	0	473	0	0	121	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8		2				6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.0	25.4	25.4	2.0	24.4	24.4		19.1			19.1	
Effective Green, g (s)	3.0	25.4	25.4	2.0	24.4	24.4		19.1			19.1	
Actuated g/C Ratio	0.05	0.42	0.42	0.03	0.41	0.41		0.32			0.32	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	88	1498	670	59	1439	643		496			373	
v/s Ratio Prot	c0.04	0.32		0.02	c0.34						0.10	
v/s Ratio Perm			0.01			0.03		c0.30				0.10
v/c Ratio	0.73	0.75	0.04	0.71	0.83	0.06		0.95			0.32	
Uniform Delay, d1	28.1	14.6	10.1	28.7	15.9	10.8		20.0			15.5	
Progression Factor	0.57	1.43	7.75	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	16.4	2.1	0.1	33.2	5.6	0.2		30.4			2.3	
Delay (s)	32.3	23.0	78.6	62.0	21.5	11.0		50.4			17.8	
Level of Service	C	C	E	E	C	B		D			B	
Approach Delay (s)		26.0			21.9			50.4			17.8	
Approach LOS		C			C			D			B	
Intersection Summary												
HCM 2000 Control Delay			27.5									C
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)		13.5				
Intersection Capacity Utilization			76.9%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 4: Belmont St & Bon View Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	35	63	18	53	105	140	27	310	160	54	134	23
Future Volume (Veh/h)	35	63	18	53	105	140	27	310	160	54	134	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	42	75	21	63	125	167	32	369	190	64	160	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											1278	
pX, platoon unblocked												
vC, conflicting volume	1059	924	174	888	843	464	187				559	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1059	924	174	888	843	464	187				559	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	52	70	98	66	55	72	98				94	
cM capacity (veh/h)	88	246	870	185	275	598	1387				1012	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	138	355	591	251								
Volume Left	42	63	32	64								
Volume Right	21	167	190	27								
cSH	172	330	1387	1012								
Volume to Capacity	0.80	1.07	0.02	0.06								
Queue Length 95th (ft)	135	329	2	5								
Control Delay (s)	79.6	107.1	0.7	2.7								
Lane LOS	F	F	A	A								
Approach Delay (s)	79.6	107.1	0.7	2.7								
Approach LOS	F	F										
Intersection Summary												
Average Delay			37.5									
Intersection Capacity Utilization			55.6%			ICU Level of Service		B				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 5: Cucamonga Ave & Belmont St Timing Plan: PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑	↔	↑
Traffic Volume (veh/h)	189	75	50	113	163	152
Future Volume (Veh/h)	189	75	50	113	163	152
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	252	100	67	151	217	203
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	5					
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			352		587	176
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			352		587	176
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		48	76
cM capacity (veh/h)			1203		416	837
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	168	184	67	151	420	
Volume Left	0	0	67	0	217	
Volume Right	0	100	0	0	203	
cSH	1700	1700	1203	1700	805	
Volume to Capacity	0.10	0.11	0.06	0.09	0.52	
Queue Length 95th (ft)	0	0	4	0	77	
Control Delay (s)	0.0	0.0	8.2	0.0	16.9	
Lane LOS	A		A		C	
Approach Delay (s)	0.0		2.5		16.9	
Approach LOS	A		A		C	
Intersection Summary						
Average Delay			7.7			
Intersection Capacity Utilization			30.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 6: Grove Ave & Mission Blvd Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔	↔	↑↑	↔	
Traffic Volume (vph)	447	749	129	39	787	646	194	1399	33	418	975	372	
Future Volume (vph)	447	749	129	39	787	646	194	1399	33	418	975	372	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5068	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5068	1583	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	471	788	136	41	828	680	204	1473	35	440	1026	392	
RTOR Reduction (vph)	0	0	91	0	0	273	0	3	0	0	0	51	
Lane Group Flow (vph)	471	788	45	41	828	407	204	1505	0	440	1026	341	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	
Protected Phases	7	4		3	8		5	2		1	6	7	
Permitted Phases			4			8						6	
Actuated Green, G (s)	9.5	30.0	30.0	3.0	23.5	23.5	13.3	22.5		16.5	25.7	35.2	
Effective Green, g (s)	9.5	30.0	30.0	3.0	23.5	23.5	13.3	22.5		16.5	25.7	35.2	
Actuated g/C Ratio	0.11	0.33	0.33	0.03	0.26	0.26	0.15	0.25		0.18	0.29	0.39	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	362	1179	527	114	924	413	261	1267		324	1452	698	
v/s Ratio Prot	c0.14	0.22		0.01	0.23		0.12	c0.30		c0.25	c0.20	0.05	
v/s Ratio Perm			0.03			c0.26						0.16	
v/c Ratio	1.30	0.67	0.09	0.36	0.90	0.98	0.78	1.19		1.36	0.71	0.49	
Uniform Delay, d1	40.2	25.7	20.6	42.6	32.1	33.1	37.0	33.8		36.8	28.8	20.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	154.4	3.0	0.3	1.9	13.1	40.6	14.1	92.7		180.0	2.9	0.5	
Delay (s)	194.6	28.7	20.9	44.5	45.2	73.7	51.0	126.5		216.7	31.7	21.2	
Level of Service	F	C	C	D	D	E	D	F		F	C	C	
Approach Delay (s)	84.0			57.7			117.5			73.3			
Approach LOS	F			E			F			E			
Intersection Summary													
HCM 2000 Control Delay				83.5	HCM 2000 Level of Service			F					
HCM 2000 Volume to Capacity ratio				1.16									
Actuated Cycle Length (s)				90.0	Sum of lost time (s)			18.0					
Intersection Capacity Utilization				100.4%	ICU Level of Service			G					
Analysis Period (min)				15									

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 3 Conditions
 7: Belmont St & Grove Ave Timing Plan: PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗		↖	↗		↖	↗	↘
Traffic Volume (vph)	81	17	130	5	19	45	76	1440	12	7	1155	36
Future Volume (vph)	81	17	130	5	19	45	76	1440	12	7	1155	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1665		1770	5079		1770	5062	
Flt Permitted	0.71	1.00	1.00	0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1331	1863	1583	1390	1665		1770	5079		1770	5062	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	83	17	133	5	19	46	78	1469	12	7	1179	37
RTOR Reduction (vph)	0	0	115	0	40	0	0	1	0	0	4	0
Lane Group Flow (vph)	83	17	18	5	25	0	78	1480	0	7	1212	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	8.2	8.2	8.2	8.2	8.2		5.4	37.0		1.3	32.9	
Effective Green, g (s)	8.2	8.2	8.2	8.2	8.2		5.4	37.0		1.3	32.9	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.09	0.62		0.02	0.55	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	181	254	216	189	227		159	3132		38	2775	
v/s Ratio Prot		0.01			0.02		c0.04	c0.29		0.00	0.24	
v/s Ratio Perm	c0.06		0.01	0.00								
v/c Ratio	0.46	0.07	0.08	0.03	0.11		0.49	0.47		0.18	0.44	
Uniform Delay, d1	23.9	22.6	22.6	22.4	22.7		26.0	6.2		28.8	8.0	
Progression Factor	0.99	0.99	0.96	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.1	0.2	0.1	0.2		2.4	0.5		2.3	0.5	
Delay (s)	25.5	22.5	22.0	22.5	22.9		28.4	6.7		31.2	8.5	
Level of Service	C	C	C	C	C		C	A		C	A	
Approach Delay (s)		23.3			22.9			7.8			8.7	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay		9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.49		
Actuated Cycle Length (s)		60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization		54.7%	ICU Level of Service	A
Analysis Period (min)		15		

c Critical Lane Group

LOS CALCULATIONS WITH MITIGATION

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions

6: Grove Ave & Mission Blvd

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↕	↖	↖↗	↕	↖	↖	↕↖↗		↖	↕↖↗	↖
Traffic Volume (vph)	549	735	164	36	545	453	150	924	29	402	1310	352
Future Volume (vph)	549	735	164	36	545	453	150	924	29	402	1310	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	624	835	186	41	619	515	170	1050	33	457	1489	400
RTOR Reduction (vph)	0	0	123	0	0	71	0	4	0	0	0	38
Lane Group Flow (vph)	624	835	63	41	619	444	170	1079	0	457	1489	362
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	39.5	9.6	18.0		20.5	28.9	43.4
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	39.5	9.6	18.0		20.5	28.9	43.4
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.44	0.11	0.20		0.23	0.32	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	553	1199	536	114	747	773	188	1012		403	1632	842
v/s Ratio Prot	c0.18	0.24		0.01	c0.17	0.13	0.10	c0.21		c0.26	0.29	0.07
v/s Ratio Perm			0.04			0.15						0.16
v/c Ratio	1.13	0.70	0.12	0.36	0.83	0.57	0.90	1.07		1.13	0.91	0.43
Uniform Delay, d1	37.8	25.7	20.5	42.6	33.9	18.9	39.7	36.0		34.8	29.3	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	78.8	3.4	0.4	1.9	10.3	1.0	39.6	47.7		86.6	9.3	0.4
Delay (s)	116.5	29.1	20.9	44.5	44.2	20.0	79.3	83.7		121.4	38.6	15.6
Level of Service	F	C	C	D	D	B	E	F		F	D	B
Approach Delay (s)		61.3			33.6			83.1			50.8	
Approach LOS		E			C			F			D	

Intersection Summary
































HCM 2000 Control Delay	56.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis 2040 Plus O&M Facility Site 1 or 2 Conditions

6: Grove Ave & Mission Blvd
































Timing Plan: PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	 	 		 	 			  			  		
Traffic Volume (vph)	438	749	129	39	787	646	194	1408	33	418	975	372	
Future Volume (vph)	438	749	129	39	787	646	194	1408	33	418	975	372	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	461	788	136	41	828	680	204	1482	35	440	1026	392	
RTOR Reduction (vph)	0	0	92	0	0	72	0	3	0	0	0	49	
Lane Group Flow (vph)	461	788	44	41	828	608	204	1514	0	440	1026	343	
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov	
Protected Phases	7	4		3	8	1	5	2		1	6	7	
Permitted Phases			4			8						6	
Actuated Green, G (s)	10.5	29.0	29.0	3.0	21.5	39.0	13.3	22.5		17.5	26.7	37.2	
Effective Green, g (s)	10.5	29.0	29.0	3.0	21.5	39.0	13.3	22.5		17.5	26.7	37.2	
Actuated g/C Ratio	0.12	0.32	0.32	0.03	0.24	0.43	0.15	0.25		0.19	0.30	0.41	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	400	1140	510	114	845	765	261	1267		344	1508	733	
v/s Ratio Prot	c0.13	0.22		0.01	c0.23	0.15	0.12	c0.30		c0.25	c0.20	0.05	
v/s Ratio Perm			0.03			0.23						0.16	
v/c Ratio	1.15	0.69	0.09	0.36	0.98	0.79	0.78	1.19		1.28	0.68	0.47	
Uniform Delay, d1	39.8	26.6	21.3	42.6	34.0	22.0	37.0	33.8		36.2	27.9	19.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	93.6	3.4	0.3	1.9	26.5	5.7	14.1	95.7		146.2	2.5	0.5	
Delay (s)	133.3	30.0	21.6	44.5	60.5	27.8	51.0	129.5		182.4	30.4	19.7	
Level of Service	F	C	C	D	E	C	D	F		F	C	B	
Approach Delay (s)		63.6			45.7			120.2			64.1		
Approach LOS		E			D			F			E		
Intersection Summary													
HCM 2000 Control Delay			74.4									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.12										
Actuated Cycle Length (s)			90.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			100.3%									ICU Level of Service	G
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Grove Ave & Mission Blvd

2040 Plus O&M Facility Site 3 Conditions
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 			  			  	
Traffic Volume (vph)	549	735	164	36	545	453	150	933	29	402	1301	352
Future Volume (vph)	549	735	164	36	545	453	150	933	29	402	1301	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5062		1770	5085	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	624	835	186	41	619	515	170	1060	33	457	1478	400
RTOR Reduction (vph)	0	0	123	0	0	71	0	3	0	0	0	38
Lane Group Flow (vph)	624	835	63	41	619	444	170	1090	0	457	1478	362
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	14.5	30.5	30.5	3.0	19.0	39.5	9.6	18.0		20.5	28.9	43.4
Effective Green, g (s)	14.5	30.5	30.5	3.0	19.0	39.5	9.6	18.0		20.5	28.9	43.4
Actuated g/C Ratio	0.16	0.34	0.34	0.03	0.21	0.44	0.11	0.20		0.23	0.32	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	553	1199	536	114	747	773	188	1012		403	1632	842
v/s Ratio Prot	c0.18	0.24		0.01	c0.17	0.13	0.10	c0.22		c0.26	0.29	0.07
v/s Ratio Perm			0.04			0.15						0.16
v/c Ratio	1.13	0.70	0.12	0.36	0.83	0.57	0.90	1.08		1.13	0.91	0.43
Uniform Delay, d1	37.8	25.7	20.5	42.6	33.9	18.9	39.7	36.0		34.8	29.2	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	78.8	3.4	0.4	1.9	10.3	1.0	39.6	51.4		86.6	8.8	0.4
Delay (s)	116.5	29.1	20.9	44.5	44.2	20.0	79.3	87.4		121.4	38.0	15.6
Level of Service	F	C	C	D	D	B	E	F		F	D	B
Approach Delay (s)		61.3			33.6			86.3			50.5	
Approach LOS		E			C			F			D	
Intersection Summary												
HCM 2000 Control Delay			57.2			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			86.7%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2040 Plus O&M Facility Site 3 Conditions

6: Grove Ave & Mission Blvd

Timing Plan: PM Peak Hour



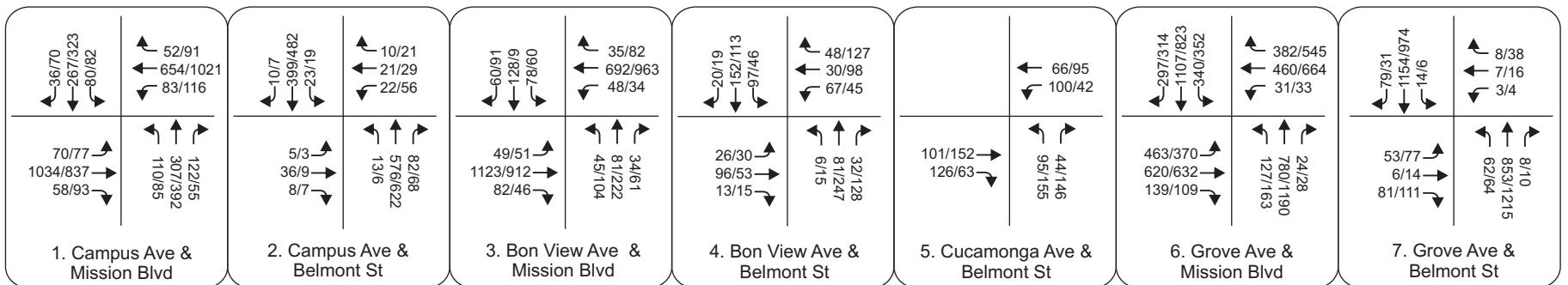
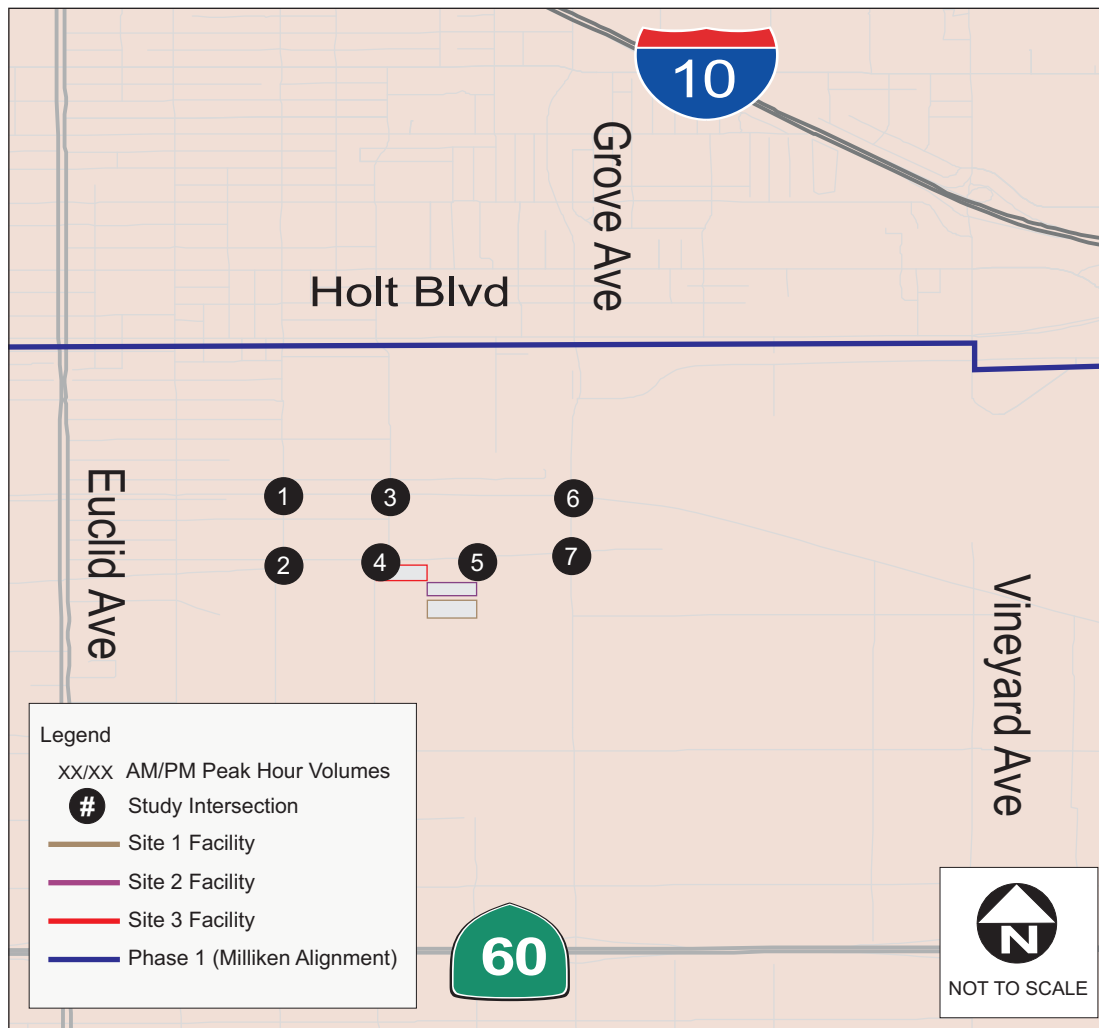
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↕	↖	↖↗	↕	↖	↖	↕↖↗		↖	↕↖↗	↖
Traffic Volume (vph)	447	749	129	39	787	646	194	1399	33	418	975	372
Future Volume (vph)	447	749	129	39	787	646	194	1399	33	418	975	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	5068		1770	5085	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	471	788	136	41	828	680	204	1473	35	440	1026	392
RTOR Reduction (vph)	0	0	92	0	0	72	0	3	0	0	0	49
Lane Group Flow (vph)	471	788	44	41	828	608	204	1505	0	440	1026	343
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases			4			8						6
Actuated Green, G (s)	10.5	29.0	29.0	3.0	21.5	39.0	13.3	22.5		17.5	26.7	37.2
Effective Green, g (s)	10.5	29.0	29.0	3.0	21.5	39.0	13.3	22.5		17.5	26.7	37.2
Actuated g/C Ratio	0.12	0.32	0.32	0.03	0.24	0.43	0.15	0.25		0.19	0.30	0.41
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	400	1140	510	114	845	765	261	1267		344	1508	733
v/s Ratio Prot	c0.14	0.22		0.01	c0.23	0.15	0.12	c0.30		c0.25	c0.20	0.05
v/s Ratio Perm			0.03			0.23						0.16
v/c Ratio	1.18	0.69	0.09	0.36	0.98	0.79	0.78	1.19		1.28	0.68	0.47
Uniform Delay, d1	39.8	26.6	21.3	42.6	34.0	22.0	37.0	33.8		36.2	27.9	19.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	103.0	3.4	0.3	1.9	26.5	5.7	14.1	92.7		146.2	2.5	0.5
Delay (s)	142.8	30.0	21.6	44.5	60.5	27.8	51.0	126.5		182.4	30.4	19.7
Level of Service	F	C	C	D	E	C	D	F		F	C	B
Approach Delay (s)		67.3			45.7			117.5			64.1	
Approach LOS		E			D			F			E	

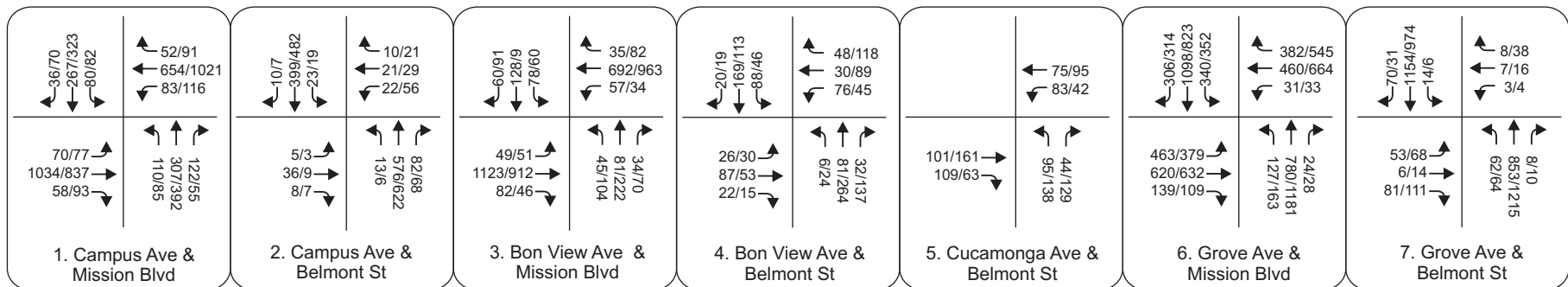
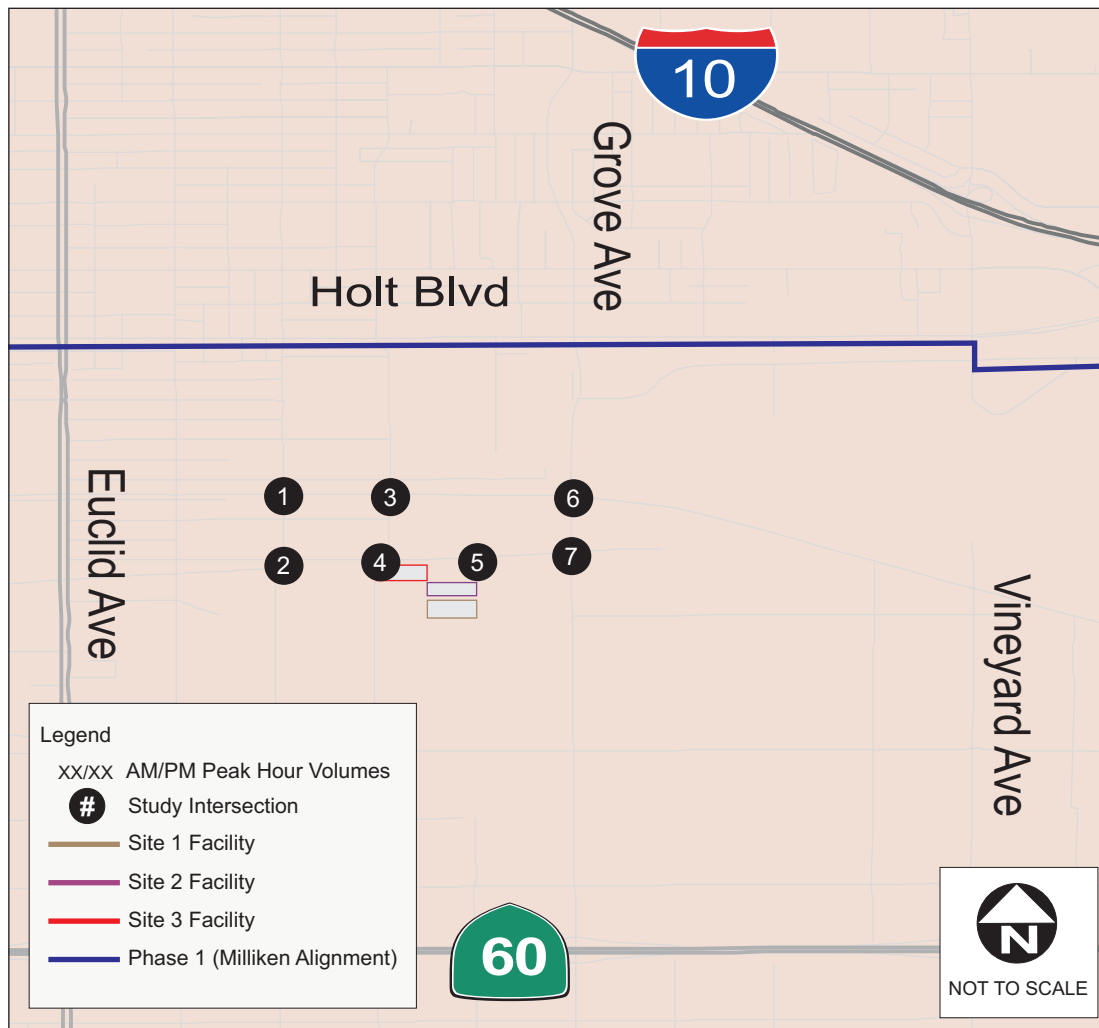
Intersection Summary

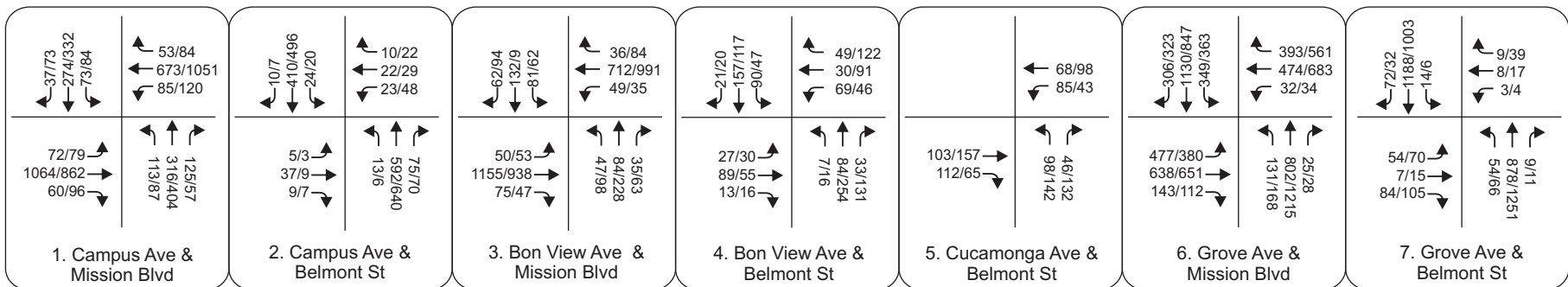
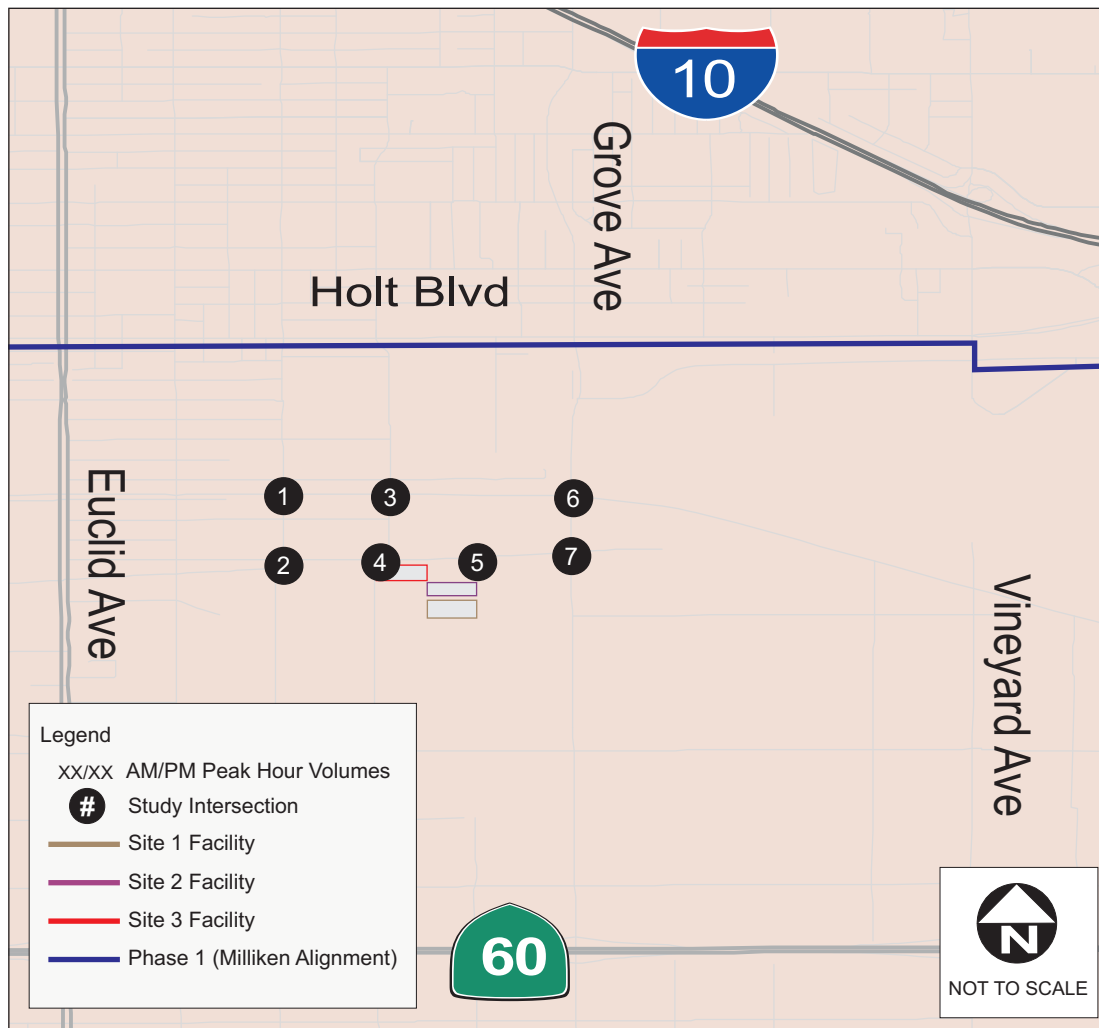
HCM 2000 Control Delay	74.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		

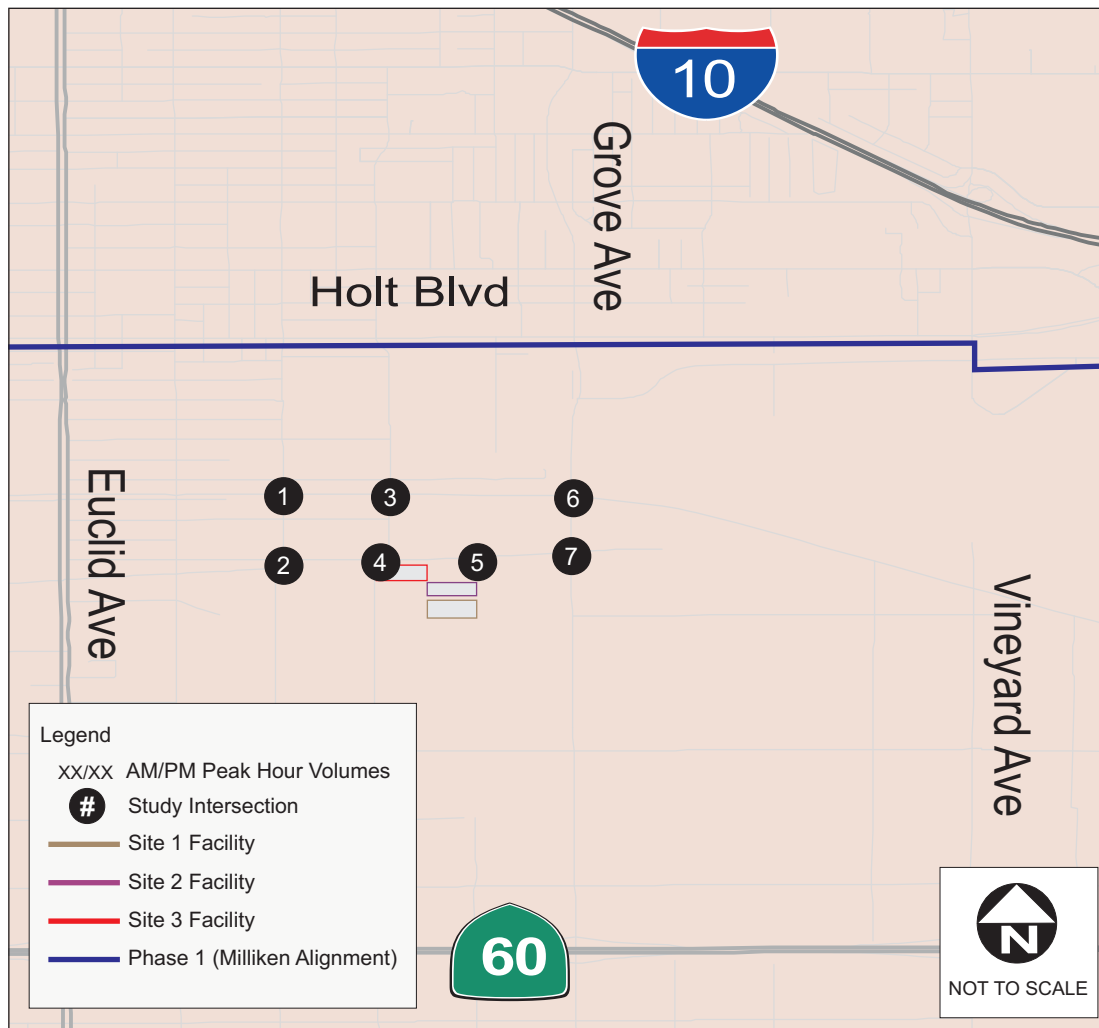
c Critical Lane Group

**APPENDIX C:
FORECAST INTERSECTION
TRAFFIC VOLUMES**



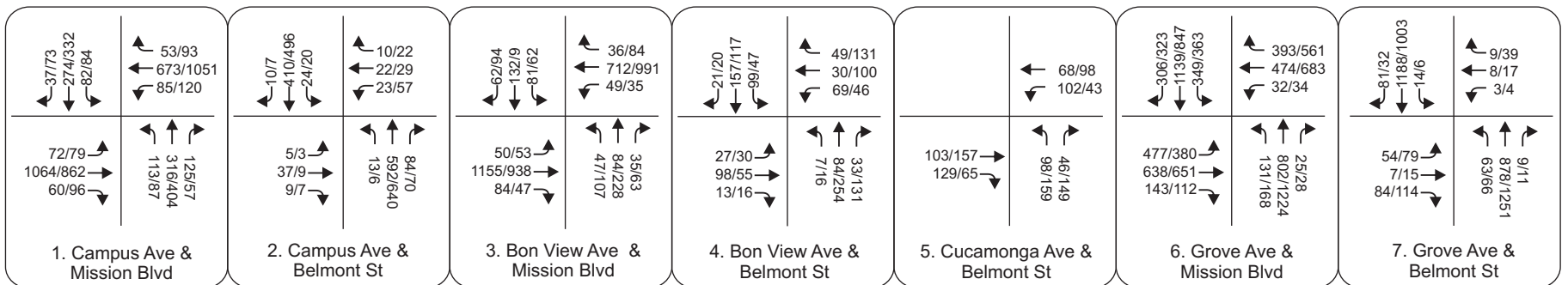


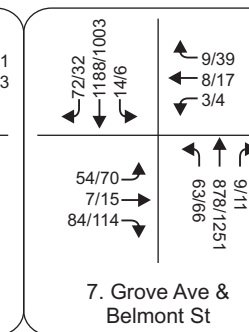
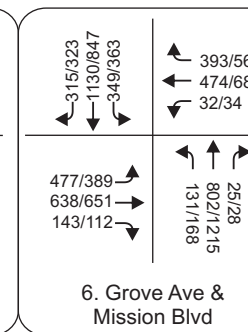
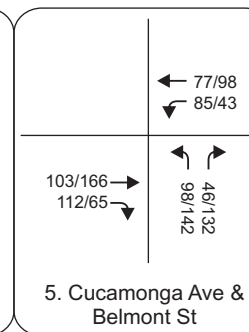
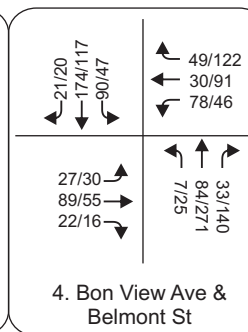
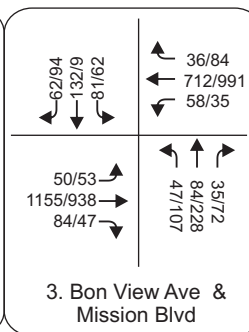
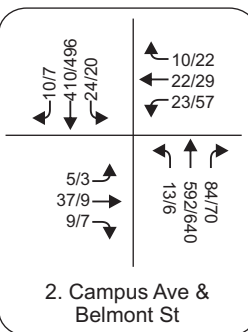
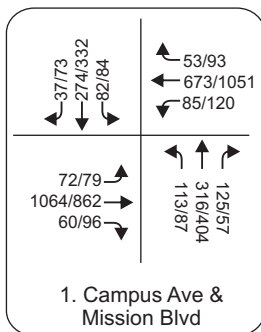
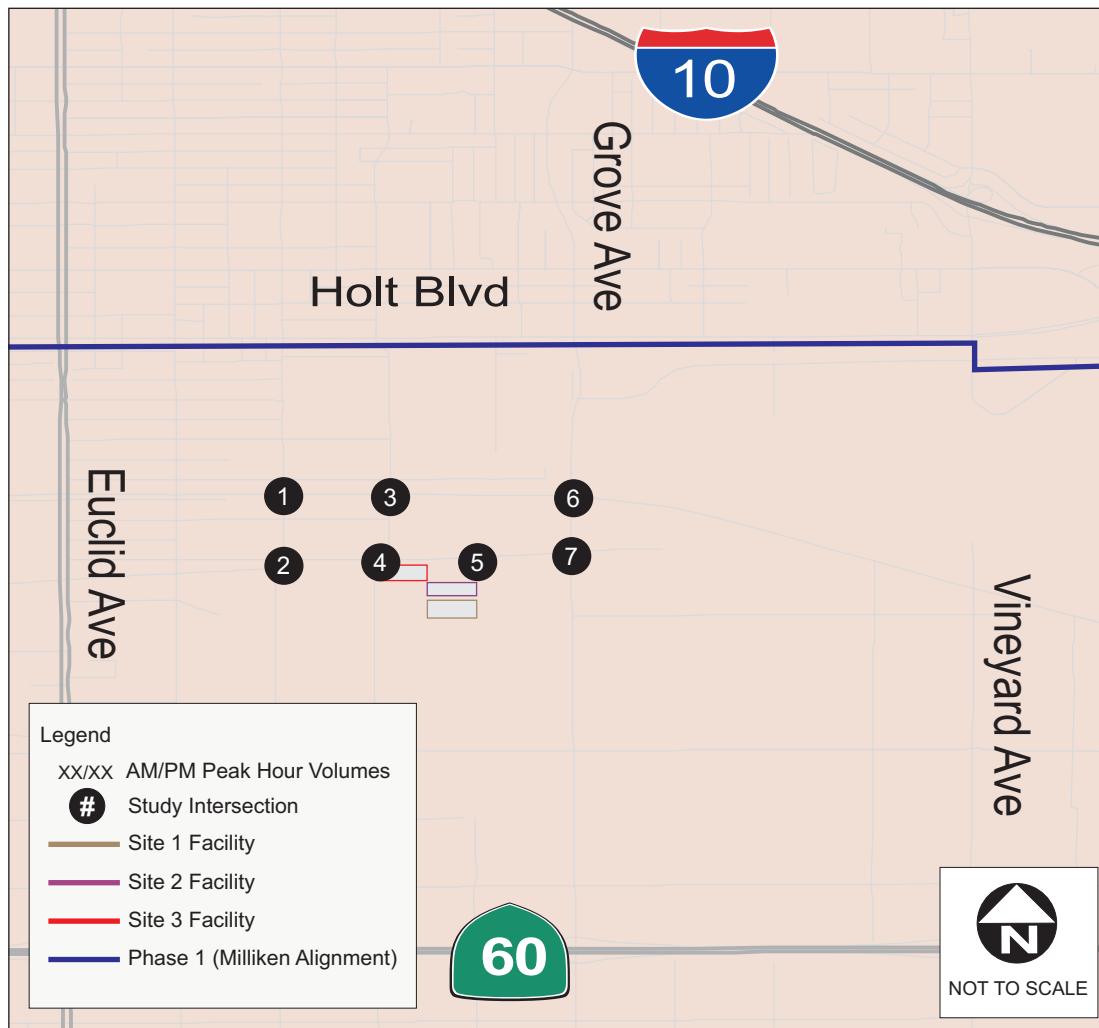


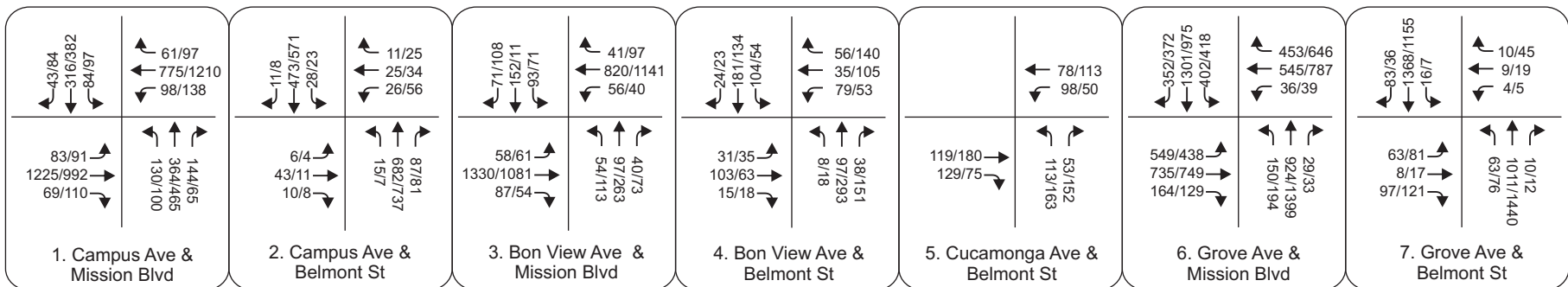
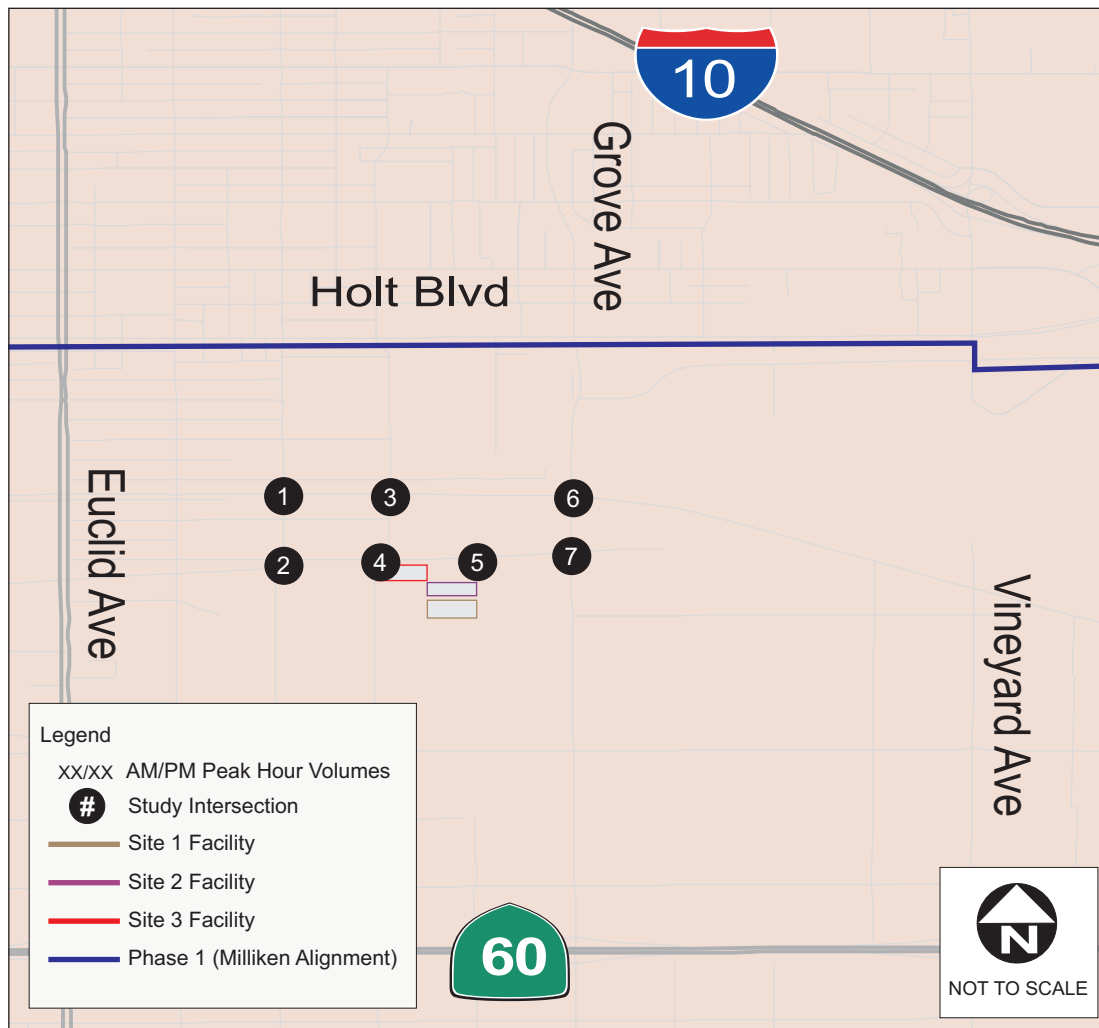


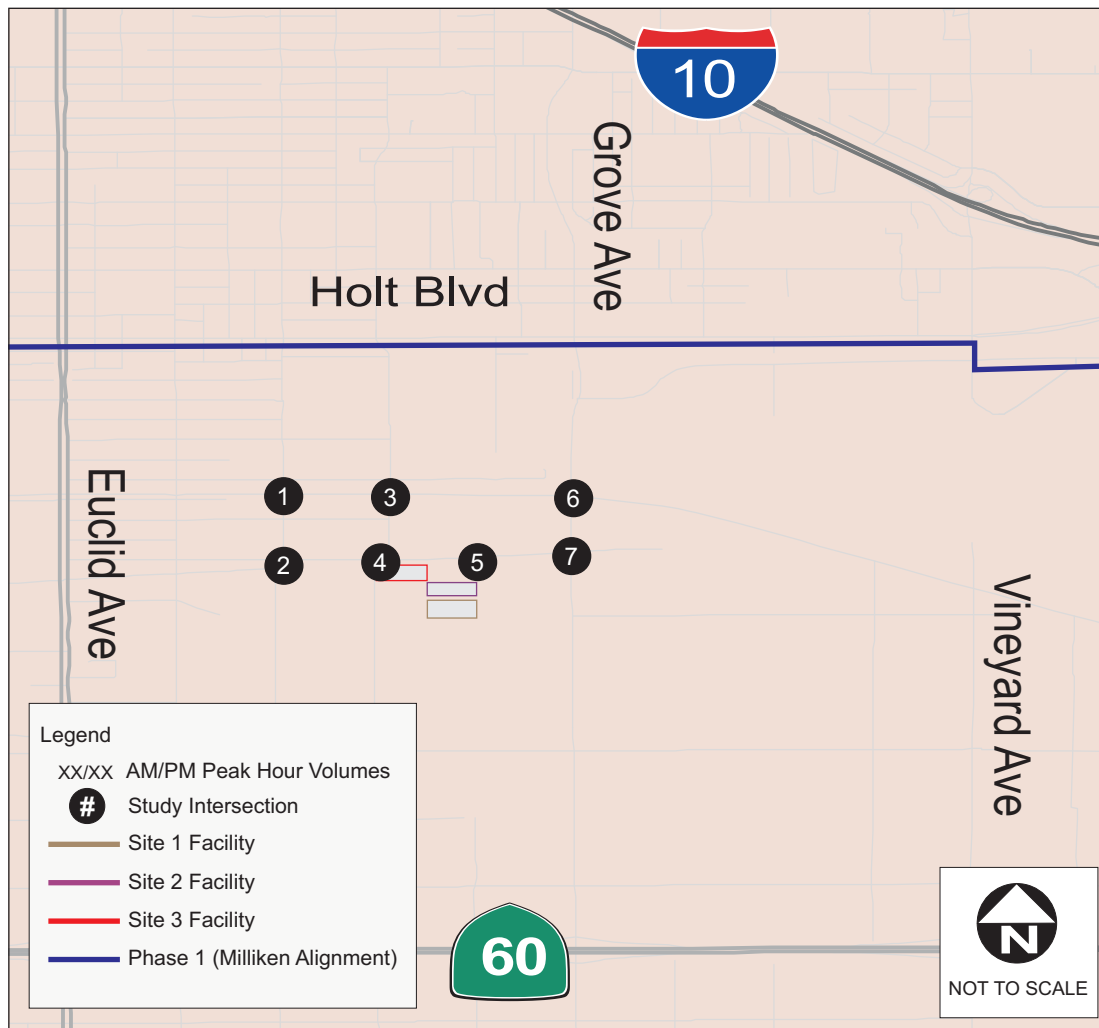
Legend

- XX/XX AM/PM Peak Hour Volumes
- # Study Intersection
- Site 1 Facility
- Site 2 Facility
- Site 3 Facility
- Phase 1 (Milliken Alignment)









Legend

- XX/XX AM/PM Peak Hour Volumes
- # Study Intersection
- Site 1 Facility
- Site 2 Facility
- Site 3 Facility
- Phase 1 (Milliken Alignment)

