

Draft Traffic Impact Study Report

Churchill Avenue Closure

City of Palo Alto, California

August 07, 2019

This report is superseded by Traffic Analysis Memo prepared by Hexagon and dated November 26, 2019.

NOTE: This document is referenced as an Appendix to the Traffic Analysis Memo since the analysis uses much of the data from this report. However, the Traffic Analysis Memo identifies alternative mitigations for the potential impacts at the Embarcadero and Alma interchange.



TABLE OF CONTENTS

Executive Summary.....	1
Project Overview	1
Study Intersections and Scenarios.....	1
Study Methodology	4
Level of Service (LOS) Analysis Methodology.....	4
Significant Impact Criteria/Level of Service Standards.....	5
Traffic Infusion on Residential Environment (TIRE).....	7
Existing Conditions	9
Existing Roadway Network	9
Existing Pedestrian Facilities	12
Existing Bicycle Facilities.....	12
Existing Transit Facilities.....	15
Data Collection.....	19
Average Daily Traffic (ADT) Data.....	19
Intersection Turning Movement Counts (TMC)	22
Existing Signal Timing	22
Origin-Destination (O-D) Data.....	22
Existing Conditions LOS & 95 th Percentile Queue Length Analysis.....	27
Pedestrian and Bicycle Facilities	32
Origin-Destination (O-D) Analysis.....	35
Existing Plus Project Conditions.....	39
Project Trip Distribution and Assignment	39
Existing (2018) Plus Project Conditions LOS & 95 th Percentile Queue Length Analysis.....	39
Pedestrian, Bicycle, and Transit Impacts	53
Mitigation Measures	54
Cumulative (2030) Conditions	57
Cumulative (2030) Conditions LOS & 95 th Percentile Queue Length Analysis	57
Cumulative (2030) Plus Project Conditions	65
Cumulative (2030) Plus Project LOS & 95 th Percentile Queue Length Analysis.....	65

Pedestrian, Bicycle and Transit Impacts	74
Mitigation Measures	74
TIRE Index (Traffic Infusion On Residential Environment) Analysis	77
Conclusion.....	79

Tables

Table 1: Signalized Intersection LOS Criteria.....	4
Table 2: Unsignalized Intersection LOS Criteria	5
Table 3: TIRE Index Thresholds based on ADT	8
Table 4: Existing Transit Services.....	18
Table 5: Existing Services Provided by Caltrain	18
Table 6: Average Weekday Daily Traffic Summary for Existing Conditions	20
Table 7: Existing Conditions LOS & Delay	28
Table 8: Existing Conditions 95th Percentile Queue Lengths (ft.)	30
Table 9: Origin-Destination Results.....	36
Table 10: Existing Plus Project Conditions LOS & Delay.....	49
Table 11: Existing Plus Project 95th Percentile Queue Lengths (ft.).....	51
Table 12: Existing Plus Project with Mitigation LOS & Delay.....	56
Table 13: Cumulative Conditions (2030) LOS & Delay	60
Table 14: Cumulative Conditions 95th Percentile Queue Lengths (ft.)	62
Table 15: Cumulative (2030) Plus Project LOS & Delay.....	70
Table 16: Cumulative (2030) Plus Project 95th Percentile Queue Lengths (ft.).....	72
Table 17: Existing Plus Project with Mitigation LOS & Delay.....	75
Table 18: TIRE Analysis – Existing Plus Project.....	77
Table 19: TIRE Analysis – Cumulative (2030) Plus Project	78

Figures

Figure 1: Project Study Area.....	3
Figure 2a: Existing Lane Geometry and Traffic Controls.....	10
Figure 2b: Existing Lane Geometry and Traffic Controls.....	11
Figure 3: Existing Pedestrian Facilities.....	14

Figure 4: Existing Bicycle Facilities	16
Figure 5: Existing Transit Facilities	17
Figure 6: Average Daily Traffic Volumes Map	21
Figure 7a: Existing Peak Hour Traffic Volumes	23
Figure 7b: Existing Peak Hour Traffic Volumes	24
Figure 8a: Existing Peak Hour Pedestrian & Bicycle Volumes	25
Figure 8b: Existing Peak Hour Pedestrian & Bicycle Volumes	26
Figure 9a: Origin-Destination Analysis – A.M. Results	37
Figure 9b: Origin-Destination Analysis – P.M. Results	38
Figure 10: Alma Street/Churchill Avenue Conceptual Layout	41
Figure 11: Alma Street/Churchill Avenue Conceptual Rendering	42
Figure 12: Alma Street/Churchill Avenue Conceptual Rendering	43
Figure 13: Trip Distribution	44
Figure 14a: Rerouted Trips during Churchill Avenue Closure	45
Figure 14b: Rerouted Trips during Churchill Avenue Closure	46
Figure 15a: Existing Plus Project Conditions Traffic Volumes	47
Figure 15b: Existing Plus Project Conditions Traffic Volumes	48
Figure 16a: Cumulative (2030) Peak Hour Traffic Volumes	58
Figure 16b: Cumulative (2030) Peak Hour Traffic Volumes	59
Figure 17a: Rerouted Trips during Cumulative Plus Churchill Avenue Closure	66
Figure 17b: Rerouted Trips during Cumulative Plus Churchill Avenue Closure	67
Figure 18a: Cumulative (2030) Plus Churchill Avenue Closure Peak Hour Traffic Volumes	68
Figure 18b: Cumulative (2030) Plus Churchill Avenue Closure Peak Hour Traffic Volumes	69

Appendices

Appendix A – TIRE Index Methodology

Appendix B – Traffic Counts

Appendix C – Origin-Destination Data

Appendix D – Existing Conditions Synchro Reports

Appendix E – Existing Plus Project Synchro Reports

Appendix F – Peak Hour Signal Warrants

Appendix G – Existing Plus Project Conditions with Mitigations Synchro Reports

Appendix H – Cumulative Conditions (2030) Synchro Reports

Appendix I – Cumulative (2030) Plus Project Conditions Synchro Reports

Appendix J – Cumulative (2030) Plus Project Conditions with Mitigations Synchro Reports

Appendix K – Alma Street and Embarcadero Road Conceptual Improvements

EXECUTIVE SUMMARY

This report describes the results of the Traffic Impact Study for the proposed closure of Churchill Avenue near the at-grade crossing to begin the construction of a grade-separated crossing as Caltrain begins to modernize and the California High Speed Rail is proposed to use the existing Caltrain right-of-way.

To evaluate the impacts on the transportation infrastructure due to the rerouted traffic from the intersection of Alma Street/Churchill Avenue, the study intersections were evaluated in accordance with the standards set forth by the level of service (LOS) policies of the City of Palo Alto and the Santa Clara Valley Transportation Authority (VTA).

This report contains a summary of the roadway network near the vicinity of Churchill Avenue, as well as existing pedestrian, bicycle, and transit facilities. Methods used for existing conditions analysis include data collection and development of traffic simulation models using Synchro software to report existing level of service (LOS), delay, and 95th percentile queue at the selected study intersections. The following sections of the report explain the analysis methodology and results in detail. Data collected for the analyses and traffic simulation model outputs are provided in the appendices.

Average daily traffic (ADT) and intersection turning movement counts (TMC) were collected for existing conditions during a typical weekday with normal weather conditions and when schools were in session.

Roadway System operations were evaluated under the following scenarios:

Existing Conditions

Under this scenario, several intersections operate with unacceptable level-of-service (LOS) E/F (Palo Alto or VTA CMP) during both a.m. and p.m. peak hours, which are listed below.

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)
- Alma Street/Churchill Avenue (a.m. peak hour)
- Embarcadero Road/Cowper Street (all peak hours)
- Embarcadero Road/Middlefield Road (a.m. peak hour)
- El Camino Real/Churchill Avenue (p.m. peak hour)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/Oregon Expressway EB Off Ramp (all peak hours)

Consequently, several 95th percentile queue lengths exceeded existing storage lengths. In addition to the LOS and 95th percentile queue length analysis, an Origin-Destination (O-D) study was conducted to determine the percentage of traffic that uses Churchill Avenue to cut across the City of Palo Alto. The results of the O-D study suggest that several zones make up the majority of traffic that uses Churchill Avenue to cut across the City. Detailed results are explained in the following sections of the report.

Existing Plus Project Conditions

The closure of Churchill Avenue is expected to reroute 706 vehicles in the a.m. peak and 776 vehicles in the p.m. peak period. Under this scenario, many of the same intersections in Existing Conditions continue

to operate with unacceptable LOS and several major intersections, such as El Camino Real/Embarcadero Road and El Camino Real/Oregon Expressway-Page Mill Road, degrade to unacceptable LOS during both a.m. and p.m. peak hours. However, mitigation measures presented for the intersections that are operating at unacceptable LOS are upgraded to acceptable LOS thresholds.

While the proposed underpass at Churchill Avenue is constructed, pedestrians and bicyclists will have to use other crossings within the study area to cross the Caltrain train tracks. Other crossings include the California Avenue Bike/Pedestrian Underpass and the Embarcadero Road underpass. Both crossings are less than a mile from Churchill Avenue, however the travel time for pedestrians and bicyclists will increase during construction. Transit impacts will be seen at the intersections where there is a degradation of LOS due to the rerouting of traffic.

Cumulative (2030) Conditions

Under this scenario, the study intersections that operate at unacceptable LOS are:

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)
- Embarcadero Road/Cowper Street (all peak hours)
- Middlefield Road/Embarcadero Road (a.m. peak hour)
- El Camino Real/Embarcadero Road (p.m. peak hour)
- El Camino Real/Churchill Avenue (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road (a.m. peak hour)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/Oregon Expressway EB Off Ramp (all peak hours)
- Oregon Expressway/Middlefield Road (all peak hours)

Cumulative (2030) Plus Project Conditions

Under this scenario, the intersections listed above in the Cumulative Conditions section continue to operate at an unacceptable LOS due to the added delay caused by rerouted traffic. Pedestrian, bicycle, and transit impacts are expected to be similar to Existing Plus Project Conditions.

Analysis on the mitigation measures for the intersections impacted by the rerouted traffic show that Alma Street/Lincoln Avenue, Alma Street/Embarcadero Road, Alma Street/Kingsley Avenue, Embarcadero Road/Cowper Street, El Camino Real/Embarcadero Road, Alma Street/Oregon Expressway WB Off Ramp, and Alma Street/Oregon Expressway EB Off Ramp upgrade to acceptable LOS and delay thresholds. Although the LOS is still unacceptable for El Camino Real/Oregon Expressway-Page Mill Road, the delay is significantly decreased when the mitigation is applied. Similarly, the delay for the intersection of Oregon Expressway/Middlefield Road is reduced when the mitigation is applied, but only for the a.m. peak period.

TIRE Index

The TIRE Index analysis for Existing Plus Project Conditions and Cumulative Plus Project indicates that the segments of Emerson Street from Channing Avenue to Addison Avenue and Emerson Street from Lincoln

Avenue to Kingsley Avenue would be impacted by the rerouted traffic caused by the closure of Churchill Avenue.

PROJECT OVERVIEW

The City of Palo Alto is considering to close Churchill Avenue near the at-grade crossing to begin the construction of a grade-separated crossing as Caltrain begins to modernize and the California High Speed Rail is proposed to use the existing Caltrain right-of-way. The City would like to evaluate key intersections that would be impacted by the eventual closure of Churchill Avenue near the Caltrain grade crossing.

This report contains the results of the existing conditions analysis from the *Final Existing Conditions Report (February 2019)* for the Palo Alto Rail Program Management, which was conducted by TJKM.

As a part of the project, TJKM collected intersection TMC at key study locations for the a.m. and p.m. peak period, ADT counts for focused roadways within the study area, and an Origin-Destination (O-D) study. This report summarizes the data collected, results of the analysis conducted for all scenarios, including LOS and delay, 95th percentile queue lengths at each study intersection, results of the O-D study, and results of the TIRE analysis.

STUDY INTERSECTIONS AND SCENARIOS

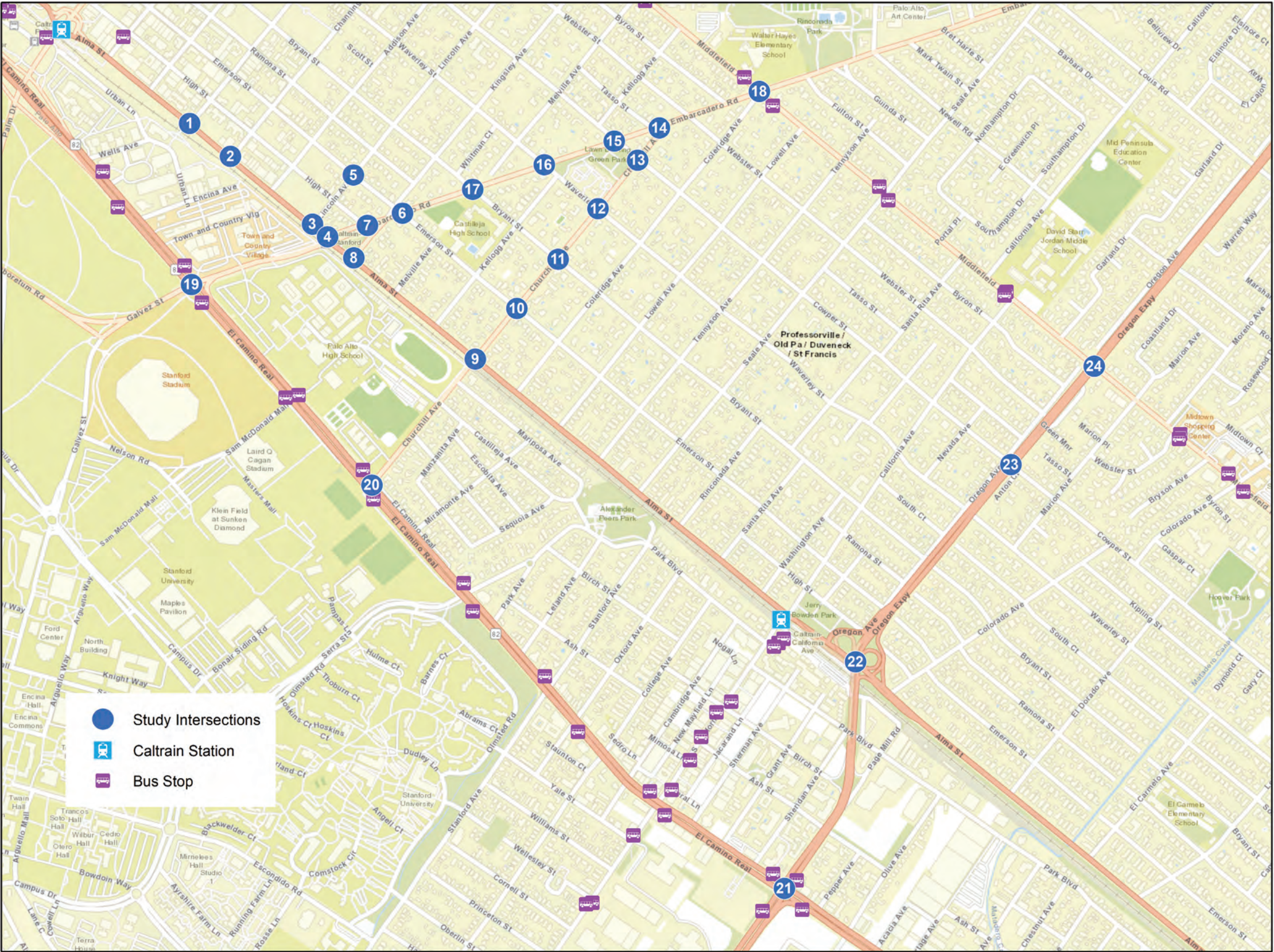
The study intersections selected for the project are listed below and illustrated in **Figure 1**.

1. Alma Street/Homer Avenue (Signalized)
2. Alma Street/Channing Avenue (No Control)
3. Alma Street/Lincoln Avenue (One-Way Stop Control)
4. Alma Street/Embarcadero Road (One-Way Stop Control)
5. Emerson Street/Lincoln Avenue (All-Way Stop Control)
6. Emerson Street/Embarcadero Road (One-Way Stop Control)
7. Embarcadero Road/High Street (One-Way Stop Control)
8. Alma Street/Kingsley Avenue (One-Way Stop Control)
9. Alma Street/Churchill Avenue (Signalized)
10. Churchill Avenue/Emerson Street (All-Way Stop Control)
11. Churchill Avenue/Bryant Street (Two-Way Stop Control)
12. Churchill Avenue/Waverly Street (All-Way Stop Control)
13. Churchill Avenue/Cowper Street (All-Way Stop Control)
14. Churchill Avenue/Embarcadero Road (One-Way Stop Control)
15. Embarcadero Road/Cowper Street (Two-Way Stop Control)
16. Embarcadero Road/Waverly Street (Signalized)
17. Embarcadero Road/Bryant Street (Signalized)
18. Middlefield Road/Embarcadero Road (Signalized)
19. El Camino Real/Embarcadero Road (Signalized)
20. El Camino Real/Churchill Avenue (Signalized)
21. El Camino Real/Oregon Expressway-Page Mill Road (Signalized)
22. Alma Street/Oregon Expressway (Stop Controlled for Off Ramps)
23. Oregon Expressway/Cowper Street (Signalized)
24. Oregon Expressway/Middlefield Road (Signalized)

The four project scenarios were analyzed and are listed below:

1. **Existing Conditions** – This scenario evaluates the study intersections based on existing traffic volumes, lane geometries, and traffic controls. Under this scenario, Churchill Avenue remains open to all traffic.
2. **Existing Plus Project Conditions** – This scenario evaluates the study intersections with existing lane geometry and traffic controls. The southbound right-turn, northbound left-turn, westbound through, and all eastbound movements were restricted at the intersection of Alma Street/Churchill Avenue. Based on the study area and existing traffic patterns, traffic volumes for the restricted movements were rerouted.
3. **Cumulative (2030) Conditions** – This scenario evaluates the study intersections with the traffic volumes projected to the year 2030. An annual growth rate of 1% was applied to the traffic volumes in the study area. Under this scenario, Churchill Avenue will remain open to all traffic.
4. **Cumulative (2030) Plus Project Conditions** – This scenario is similar to the Existing Plus Churchill Avenue Closure. An annual growth rate of 1% was applied to the traffic volumes in the study after the restricted movements were rerouted.

Vicinity Map



STUDY METHODOLOGY

LEVEL OF SERVICE (LOS) ANALYSIS METHODOLOGY

LOS is a standard measure of traffic service along a roadway or at an intersection. It ranges from A to F, with LOS A being best and LOS F being worst. In very general terms, LOS A, B, and C indicate conditions where traffic can move relatively freely. LOS D describes conditions where delay is more noticeable and average travel speeds are more unstable. LOS E indicates significant delays and average travel speeds vary greatly and are unpredictable; traffic volumes are generally at, or close to, capacity. Finally, LOS F characterizes traffic flow at very slow speeds (stop-and-go) and significant delays with queuing at unsignalized intersections, which typically means traffic demand on the roadway exceeds the roadway's capacity.

The *Highway Capacity Manual (HCM) 2000* is the standard reference published by the Transportation Research Board, and contains the specific criteria and methods to be used in assessing LOS. There are several software packages that have been developed to implement HCM. In this study, Synchro Software was used to calculate the LOS at the study intersections.

Signalized intersection LOS is based on the capacity of the intersection as a whole and average delay experienced by a driver. Unsignalized intersection LOS is defined by the average delay experienced by a driver for the minor approach worst movement or major approach critical movement. **Tables 1 and 2** provide the relationship between LOS rating and delay for signalized and unsignalized intersections respectively.

Table 1: Signalized Intersection LOS Criteria

Level of Service	Description	Average Control Delay (Seconds Per Vehicle)
A	Operations with very low delay occurring with favorable progression &/or short cycle lengths.	≤ 10.0
B	Operations with low delay occurring with good progression &/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression &/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, &/or high volume-to-capacity (V/C) ratios. Many vehicles stop & individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths & high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	> 80.0

Source: Transportation Research Board, 2000 Highway Capacity Manual

Table 2: Unsignalized Intersection LOS Criteria

<i>Level of Service</i>	<i>Description</i>	<i>Average Control Delay (Seconds Per Vehicle)</i>
A	Little or no delays	≤ 10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded (for an all-stop), or with approach/turn movement capacity exceeded (for a side street stop controlled intersection)	> 50.0

Source: Transportation Research Board, 2000 Highway Capacity Manual

SIGNIFICANT IMPACT CRITERIA/LEVEL OF SERVICE STANDARDS

Signalized Intersections

In general, the LOS standard (minimum acceptable operations for signalized intersections in the City of Palo Alto is LOS D or better. The City has also adopted LOS as the minimum overall performance measure for Congestion Management Program (CMP) monitored roadways (e.g., Middlefield Road/Oregon Expressway, El Camino Real/Oregon Expressway-Page Mill Road, and El Camino Real/Embarcadero Road), consistent with VTA guidelines.

According to the City of Palo Alto, a projected-generated increase in traffic is considered to have a significant impact at a signalized intersection if it meets any of the following criteria:

- If the intersection operations degrade from an acceptable level (LOS D or better) to an unacceptable level (LOS E or F); or
- If the critical delay increase by four seconds or more, or the volume-to-capacity (V/C) ratio increases by more than 0.01 or more at intersections with unacceptable operations (LOS E or F)

The City of Palo Alto considers a significant impact to be satisfactorily mitigated when the measure implemented would restore LOS to baseline conditions or better.

Unsignalized Intersections

LOS D is used as the minimum acceptable operating level at unsignalized intersections. A project-generated increase in traffic is considered to have a significant impact if intersection operations degrades to LOS E or LOS F and the intersection satisfies the peak hour signal warrants from the California Manual of Uniform Traffic Control Devices (CA MUTCD).

The City considers a significant impact to be satisfactorily mitigated when the measure implemented would restore LOS to background conditions or better.

VTA CMP Intersections

The LOS standard for CMP intersections is LOS E. The projected-generated increase in traffic is considered to have significant impact at a CMP intersection if it meets any of the following criteria:

- If intersection operations degrade from an acceptable level (LOS E or better) to an unacceptable level (LOS F)
- If the critical delay increases by more than four seconds and the V/C ratio increases by 0.01 or more at intersections with unacceptable operations (LOS F).
- The V/C ratio increases by 0.01 or more at an intersection with unacceptable operations (LOS F) when the change in critical delay is negative (i.e., decreases). This can occur if the critical movements change.

Pedestrian and Bicycle Impact Criteria

The City of Palo Alto *Comprehensive Plan* describes related policies necessary to ensure that pedestrian and bicycle facilities are safe and effective for City residents. Based on the *Comprehensive Plan* as a guide, significant impacts to these facilities would occur when a project or an element of a project:

- Creates a hazardous condition that currently does not exist for pedestrians and bicyclists, or otherwise interferes with pedestrian or bicycle accessibility to the site and adjoining areas; or
- Conflicts with an existing or planned pedestrian or bicycle facility; or
- Conflicts with policies related to bicycle and pedestrian activity adopted by the City of Palo Alto, Santa Clara County, VTA, or Caltrans for their respective facilities in the study area.

Transit Impact Criteria

Significant impacts to transit service would occur if the project or any part of the project:

- Creates demand for public transit services above the capacity which is provided, or planned;
- Disrupts existing transit services or facilities including disruptions caused by proposed project driveways on transit streets and impacts to transit stops/shelters; and impacts to transit operations from traffic improvements proposed or resulting from a project.
- Conflicts with an existing or planned transit facility; or
- Conflicts with transit policies adopted by the City of Palo Alto, Santa Clara County, VTA, or Caltrans for their respective facilities in the study area.

TRAFFIC INFUSION ON RESIDENTIAL ENVIRONMENT (TIRE)

Residential areas tend to be especially sensitive to traffic because relatively small increases in traffic can impact the livability of the neighborhood. TIRE is the measure of traffic impact on residents along a roadway. The TIRE Index is derived from a theory by D.K. Goodrich, based on work by Professor Appleyard of the University of California at Berkeley, and by Buchanan of the Ministry of Transport, England. TIRE is based on the hypothesis that a given increase in traffic volume has a greater impact on the residential environment along a roadway with a low traffic volume, than along a roadway with a high pre-existing volume. TIRE represents the effect of traffic on the safety and comfort of human activities, such as walking, bicycling, and playing on or near a roadway, and on the freedom to maneuver personal autos in and out of residential driveways.

The TIRE index is based on daily traffic conditions and uses average daily traffic (ADT) volumes to determine the amount of daily traffic that could be added to a roadway before residents would perceive the increase in traffic. The amount of daily traffic that can be added before residents would notice directly correlates to the amount of daily traffic already present on the roadway. The TIRE Index scale ranges from zero to five, depending on daily traffic volume. An index of zero represents the least infusion of traffic. An index of five represents the greatest traffic volume, and thereby the poorest residential environment. A roadway with a TIRE value of three or greater is considered to exhibit a significantly impaired residential environment. The projected difference between a pre and post-project TIRE value is the predicted impact of the project on a residential environment. Any projected change of 0.1 or greater would be noticeable to residents. An increase in index of 0.1 corresponds to an approximate increase in ADT of between 20% and 30%. **Appendix A** contains a detailed description of the TIRE index methodology. **Table 3** provides the TIRE Index thresholds for different ADT ranges.

Table 3: TIRE Index Thresholds based on ADT

Existing Volume Range (Vehicles Per Day)	TIRE Index	Minimum Daily Traffic Volume Increase to Produce	
		a 0.1 Change in the TIRE Index	a 0.2 Change in the TIRE Index
29-35	1.5	+6	+15
36-44	1.6	+8	+20
45-56	1.7	+10	+25
57-70	1.8	+13	+32
71-89	1.9	+17	+41
90-110	2.0	+22	+52
111-140	2.1	+29	+65
141-180	2.2	+40	+80
181-220	2.3	+52	+100
221-280	2.4	+65	+125
281-350	2.5	+79	+160
351-450	2.6	+97	+205
451-560	2.7	+114	+260
561-710	2.8	+140	+330
711-890	2.9	+170	+415
891-1,100	3.0	+220	+520
1,101-1,400	3.1	+290	+650
1,401-1,800	3.2	+380	+800
1,801-2,200	3.3	+500	+1,000
2,201-2,800	3.4	+650	+1,300
2,801-3,500	3.5	+825	+1,700
3,501-4,500	3.6	+1,025	+2,200
4,501-5,600	3.7	+1,250	+2,800
5,601-7,100	3.8	+1,500	+3,500
7,101-8,900	3.9	+1,800	+4,300
8,901-11,000	4.0	+2,300	+5,300
11,001-14,000	4.1	+3,000	+6,500
14,001-18,000	4.2	+4,000	+8,000
18,001-22,00	4.3	+5,200	+10,000
22,001-28,000	4.4	+6,600	+13,000
28,001-35,000	4.5	+8,200	+17,000
35,000-45,000	4.6	+10,000	+22,000
45,001-56,000	4.7	+12,200	+28,000
56,001-71,000	4.8	+14,800	+35,000
71,001-89,000	4.9	+18,000	+43,000

Source: Goodrich Traffic Group, based on curve shapes found in work by Donald Appleyard at the University of California, Berkeley and in consideration of earlier thoughts by Buchanan of the Ministry of Transport, England.

EXISTING CONDITIONS

EXISTING ROADWAY NETWORK

The roads in the City of Palo Alto within the project vicinity can be divided into three classifications: local/collector, residential arterial, and arterial. Key roadways within the project vicinity are described below:

Alma Street is classified as a north-south arterial which extends from Homer Avenue and Oregon Expressway. Alma Street is primarily 4-lanes wide and the speed limit within the project vicinity ranges from 25-35 mph. Alma Street also runs adjacent and parallel to Caltrain's right-of-way.

Churchill Avenue is classified as an east-west 2-lane local/collector street with limits from Embarcadero Road to El Camino Real. The posted speed limit is 25 mph. Churchill Avenue is currently an at-grade crossing with the Caltrain corridor.

El Camino Real is also classified as a north-south arterial which runs from Embarcadero Road to Oregon Expressway. Within this segment, El Camino Real is primarily 6-lanes wide with a posted speed limit ranging from 35-40 mph.

Embarcadero Road is classified as an east-west residential arterial stretching from Middlefield Road in the East and El Camino Real in the West. This arterial also provides connectivity to US 101. In this segment, Embarcadero Road consists of 4-lanes with a posted speed limit of 25 mph. Embarcadero Road is currently a grade-separated rail-crossing for vehicles, pedestrians, and bicycles.

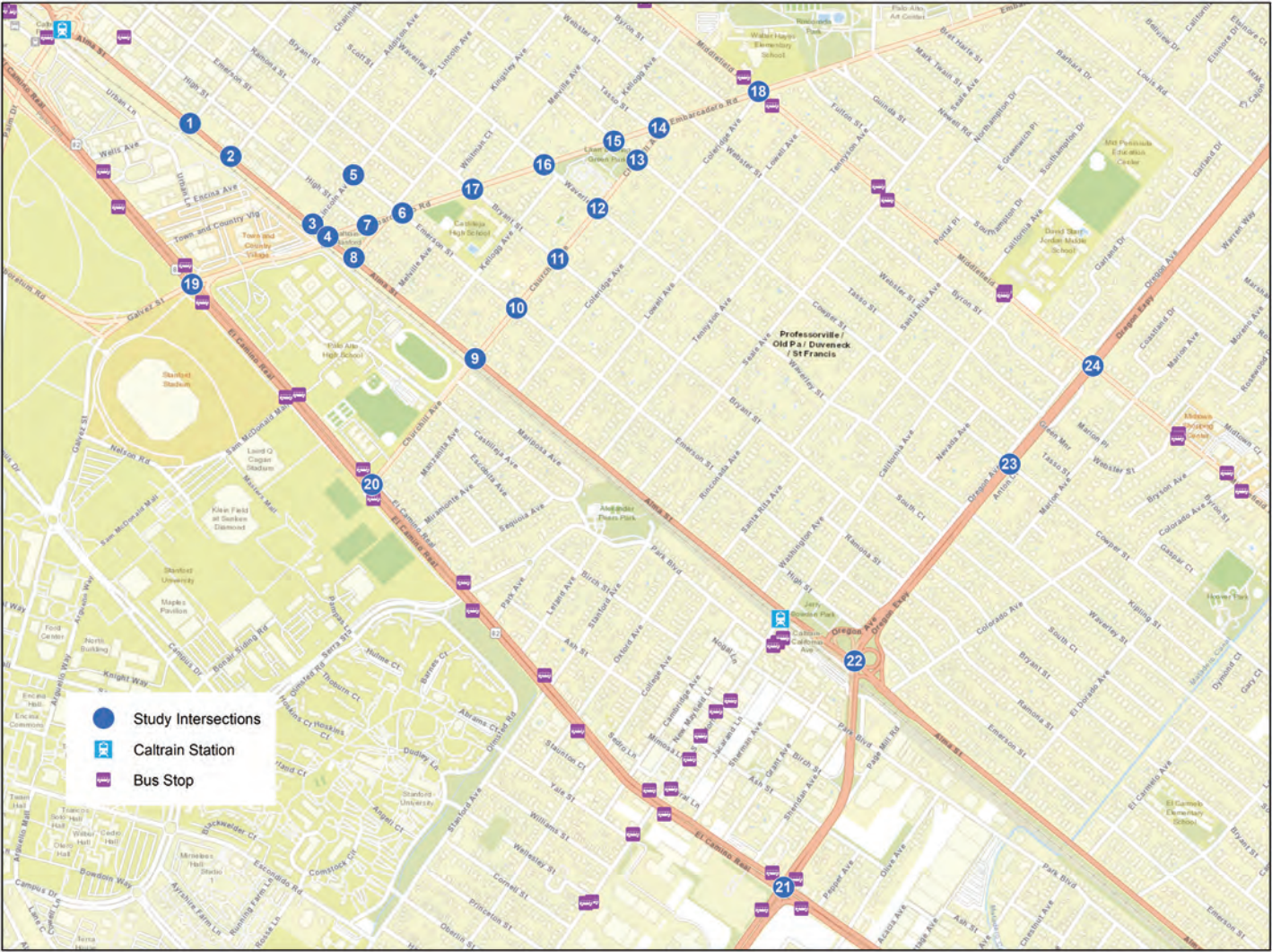
Middlefield Road is classified as a north-south residential arterial with limits from Embarcadero Road and Oregon Expressway within the project vicinity. Middlefield Road primarily consists of 2-lanes with a posted speed limit of 25 mph.

Oregon Expressway is classified as an east-west expressway that runs from Middlefield Road and El Camino Real within the project vicinity. This expressway also connects residents to US 101 in the east and I-280 in the west. Oregon Expressway consists of 4-lanes with a posted speed limit of 35 mph. Oregon Expressway is currently a grade-separated crossing primarily for vehicles.

Figures 2a and **2b** illustrates the existing lane geometry and traffic controls at the study intersections.

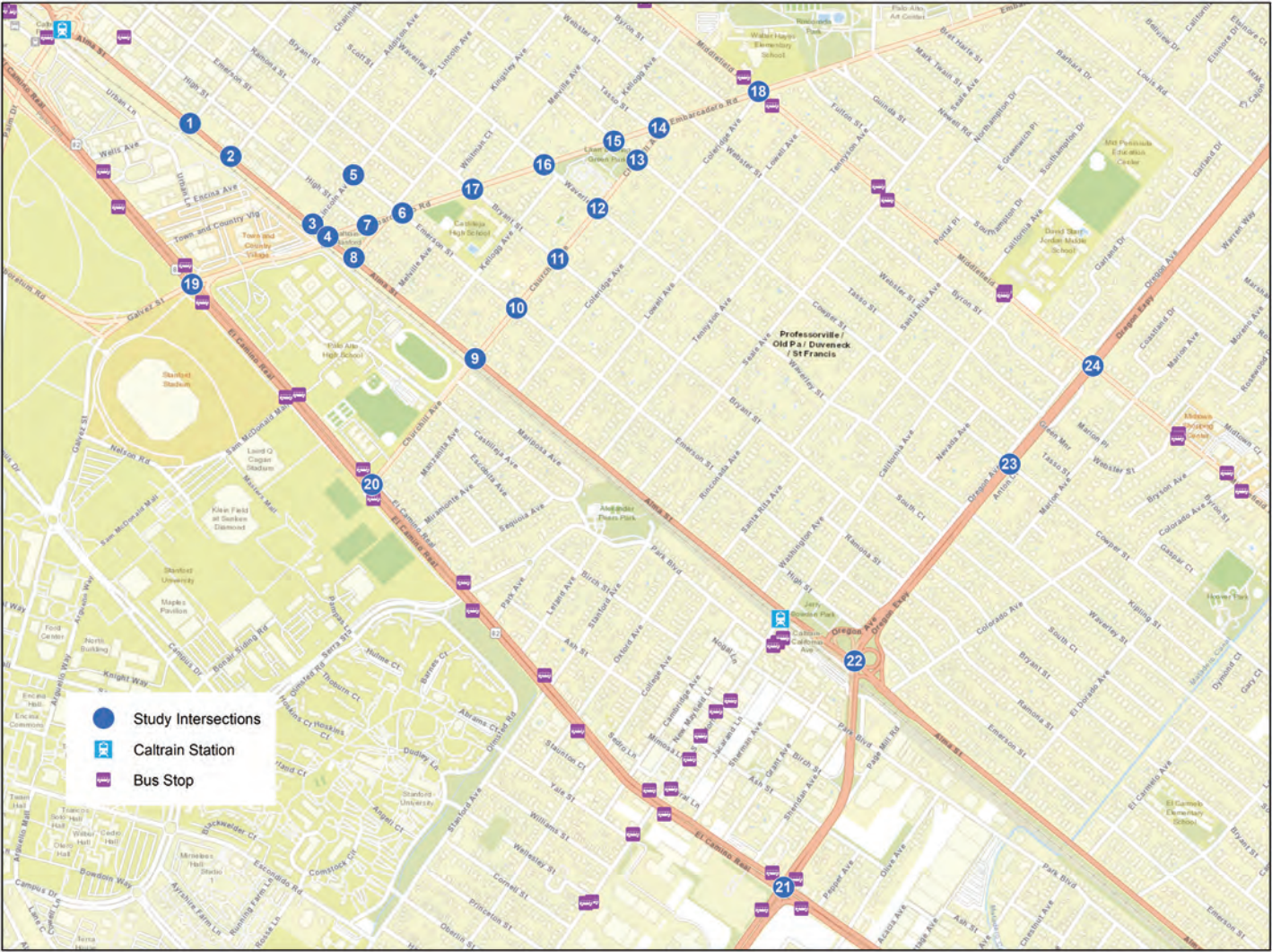
Existing Lane Geometry and Traffic Controls

Intersection #1 Alma St. / Homer Ave.	Intersection #2 Alma St. / Channing Ave.	Intersection #3 Alma St. / Lincoln Ave.	Intersection #4 Alma St. / Embarcadero Rd.
Intersection #5 Emerson St. / Lincoln Ave.	Intersection #6 Emerson St. / Embarcadero Rd.	Intersection #7 Embarcadero Rd. / High St.	Intersection #8 Alma St. / Kingsley Ave.
Intersection #9 Alma St. / Churchill Ave.	Intersection #10 Emerson St. / Churchill Ave.	Intersection #11 Bryant St. / Churchill Ave.	Intersection #12 Waverly St. / Churchill Ave.



Existing Lane Geometry and Traffic Controls

Intersection #13 Cowper St. / Churchill Ave.	Intersection #14 Churchill Ave. / Embarcadero Rd.	Intersection #15 Cowper St. / Embarcadero Rd.	Intersection #16 Waverly St. / Embarcadero Rd.
Intersection #17 Bryant St. / Embarcadero Rd.	Intersection #18 Middlefield Rd. / Embarcadero Rd.	Intersection #19 El Camino Real / Embarcadero Rd.	Intersection #20 El Camino Real / Churchill Ave.
Intersection #21 El Camino Real / Oregon Expy.	Intersection #22 Alma St. / Oregon Expy.	Intersection #23 Cowper St. / Oregon Expy.	Intersection #24 Middlefield Rd. / Oregon Expy.



EXISTING PEDESTRIAN FACILITIES

Walkability is defined as the ability to travel easily and safely between various origins and destinations without having to rely on automobiles or other motorized travel. The ideal “walkable” community includes wide sidewalks, a mix of land uses such as residential, employment, and shopping opportunities, a limited number of conflict points with vehicle traffic, and easy access to transit facilities and services.

Pedestrian facilities are comprised of crosswalks, sidewalks, pedestrian signals, and off-street paths, which provide safe and convenient routes for pedestrians to access the destinations such as institutions, businesses, public transportation, and recreation facilities. In the study area, crosswalks are primarily located at the signalized intersections chosen for the study. There is continuous pedestrian connection along majority of the arterials and local streets within the study area. Pedestrians are able to cross the Caltrain tracks along Churchill Avenue (at-grade crossing), Embarcadero Road (below-grade crossing), and the California Avenue Bike/Pedestrian Underpass. **Figure 3** illustrates the existing pedestrian facilities within the project area.

EXISTING BICYCLE FACILITIES

The City of Palo Alto Bicycle & Pedestrian Transportation Plan (July 2012) provides a list of existing and proposed bicycle facilities in the City of Palo Alto. It also contains the policy vision, design guidance, and specific recommendations to guide the development of pedestrian and bicycle facilities. Bicycle facilities include the following:

- **Bike Paths (Class I):** These provide a completely separate right of way for the exclusive use of bicycles and pedestrians with minimal roadway crossings.
- **Bike Lanes (Class II):** These provide a striped lane and signage for one-way bike travel on a street or highway and are designed for the exclusive use of cyclists with certain exceptions. For instance, right-turning vehicles must merge into the lane before turning.
- **Bike Routes/Bicycle Boulevards (Class III):** Bike routes may be identified on a local residential or collector street when the travel lane is wide enough and the traffic volume is low enough to allow both cyclists and motor vehicles. They are designated for bicycle use by signs or other markers and may not include additional pavement width for cyclists. Bicycle boulevards, a subset of Class III facilities, are signed, shared roadways with especially low motor vehicle volume, such that motorists passing bicyclists can use the full width of the roadway. In addition, all the unwarranted “stop” signs are removed from the boulevard and placed on cross streets, improving bicyclists’ average speed by minimizing unneeded stops.
- **Protected On-street Bike Lane/Cycletracks (Class IV):** A Class IV bikeway, known as a cycletrack or protected bike lane, is an on-street bike lane that is physically separated from motor-vehicle traffic by a vertical separation, such as a raised curb, bollards, or car parking. A protected bikeway is similar to a Class II buffered bike lane, but provides the vertical physical barrier, separation and associated comfort a user can experience on a Class I path.

Class I facilities exist in the form of the Embarcadero Bike Path which runs parallel to the Caltrain tracks from Palo Alto Caltrain Station to Churchill Avenue. The Homer Avenue Tunnel provides an east-west

connectivity across the train tracks, giving pedestrians and bicycles access to Downtown Palo Alto, Palo Alto Medical Foundation, Town & Country Shopping Center, and Palo Alto High School.

Existing Pedestrian Facilities



LEGEND

- Intersection
- Existing sidewalk
- No sidewalk
- Crosswalk

Class II bicycle facilities are the most common bicycle facility within the study area. The segments on which the facilities exist are listed below.

- Addison Avenue, from Bryant Street to Webster Street
- Churchill Avenue, from Bryant Street to El Camino Real
- Coleridge Avenue, from Embarcadero Road to Bryan Street
- N. California Avenue, from Middlefield Road to Alma Street
- Park Boulevard, from California Avenue to study area limits
- Stanford Avenue, from El Camino Real to study area limits
- California Avenue, from El Camino Real to study area limits

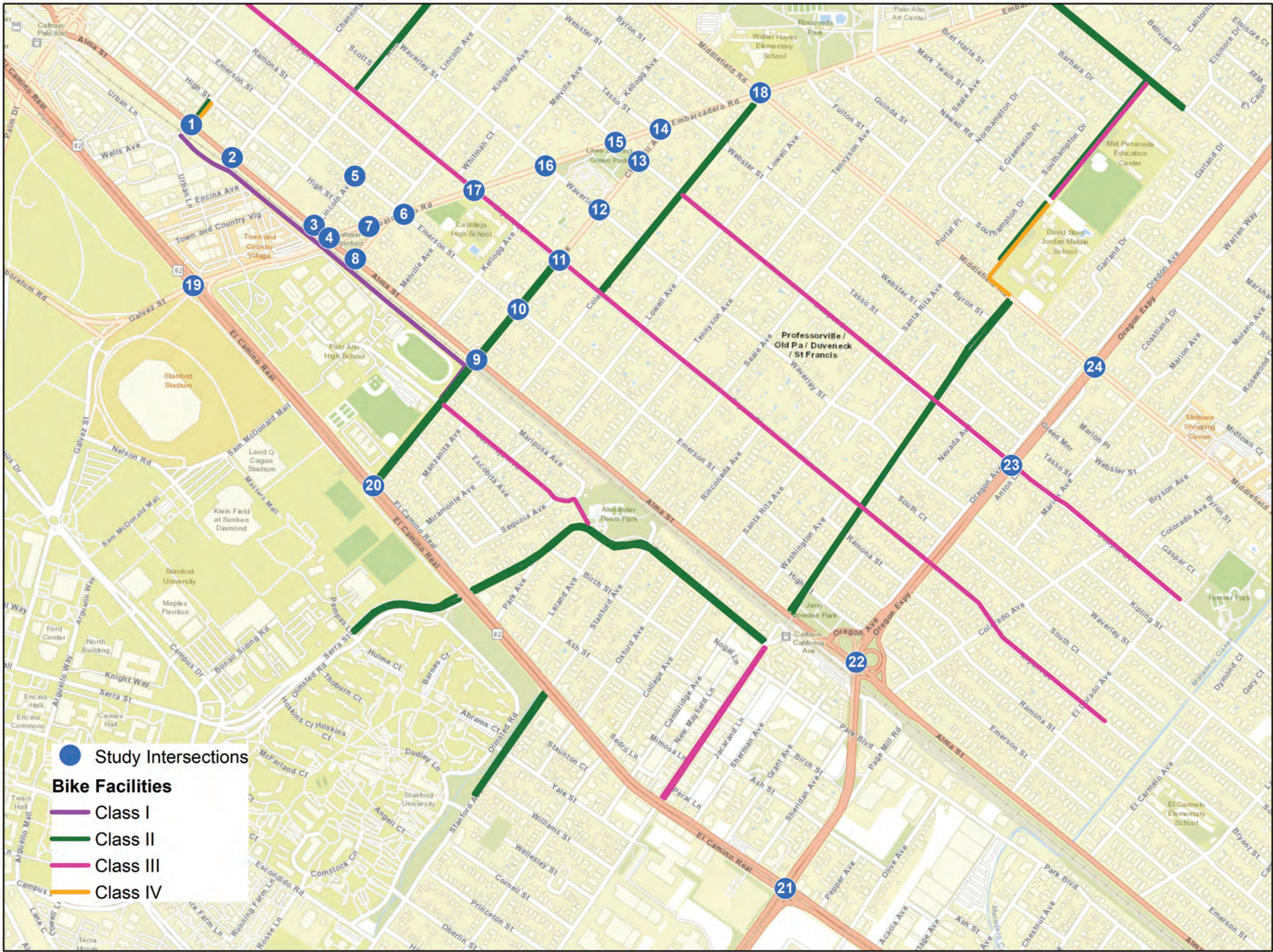
Class III bicycle facilities are present on Cowper Street from Coleridge Avenue to Oregon Expressway, Castilleja Avenue from Churchill Avenue to Park Boulevard, California Avenue from Park Boulevard to El Camino Real, and Bryant Street from Oregon Expressway to project study area limits. There is a Class IV bicycle facility located along N. California Avenue that runs until the intersection of Middlefield Road and N. California Avenue. The Homer Avenue Tunnel also provides bicycles with access to the protected contra-flow bike lane on Homer Avenue that runs from Alma Street to High Street. **Figure 4** illustrates the existing bicycle facilities in the study area.

EXISTING TRANSIT FACILITIES

Valley Transportation Authority (VTA) operates bus service in Palo Alto. Commuter rail service (Caltrain) is provided from San Francisco to Gilroy by the Peninsula Joint Powers Board. Dumbarton Express, Marguerite Shuttle, and Embarcadero Shuttle are other transit service that operate within the study area. There are no buses that currently use the Churchill Avenue-Caltrain grade crossing to connect riders from the western part of the City to the eastern part.

There are currently 16 bus stops along El Camino Real, 11 bus stops along Middlefield Road, 4 bus stops along Embarcadero Road within the study area. **Figure 5** illustrates the existing transit facilities. **Table 4** describes the services and frequency during the week and weekend for buses that operate within the study area and **Table 5** describes the services provided by Caltrain.

Existing Bicycle Facilities



Existing Transit Facilities

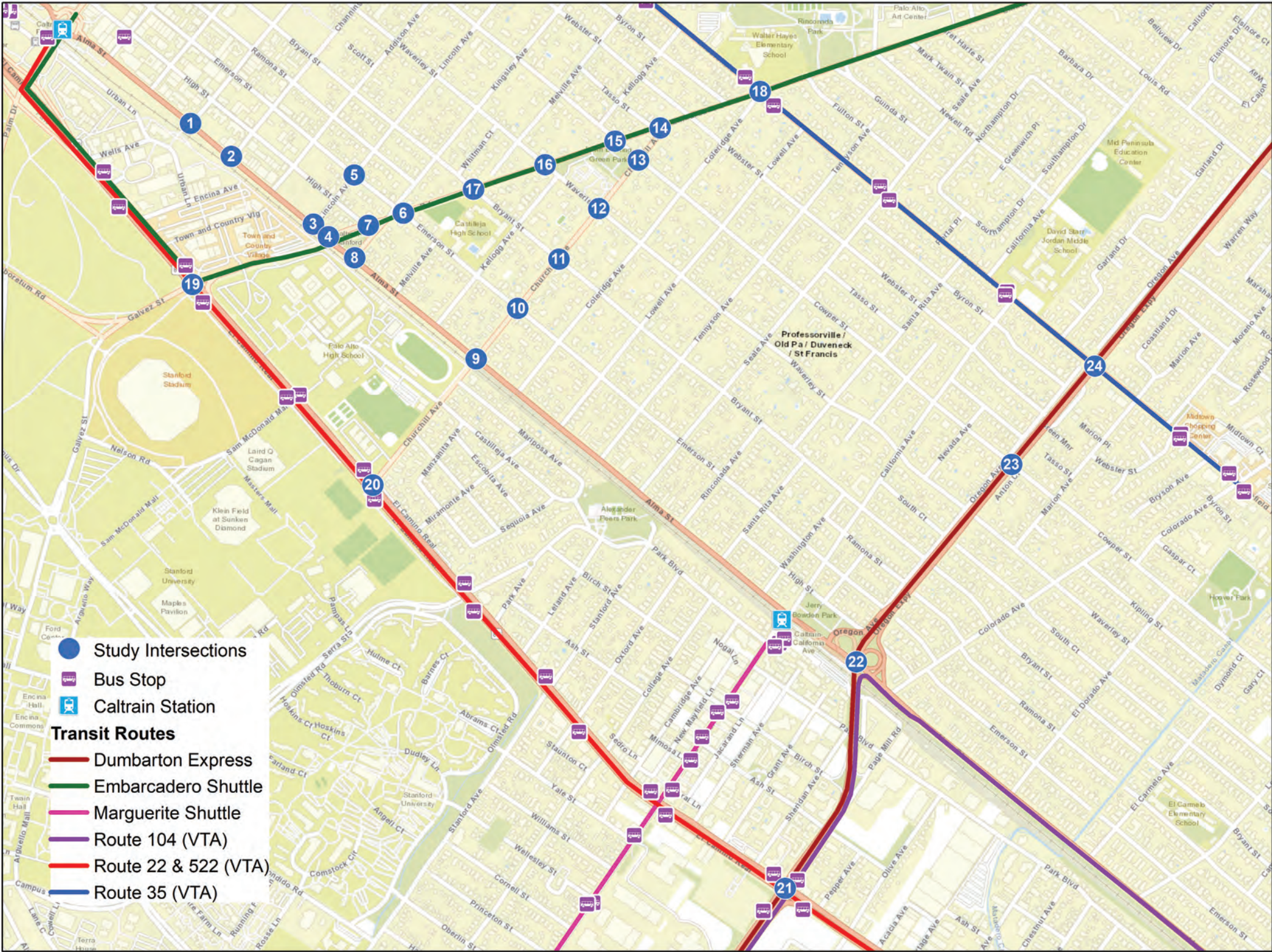


Table 4: Existing Transit Services

Route	From	To	Weekdays		Weekends	
			Operating Hours	Headway (minutes)	Operating Hours	Headway (minutes)
22	Palo Alto Transit Center	Eastridge Transit Center	24	15	24	15
522 (limited)	Palo Alto Transit Center	Eastridge Transit Center	5:30 a.m. – 12:00 a.m.	10-20 (varies)	6:00 a.m. – 11:45 p.m.	10-20 (varies)
35	Downtown Mountain View	Stanford Shopping Center	6:20 a.m. – 10:00 p.m.	30	8:15 a.m. – 9:00 p.m.	45-60 (varies)
104	Penitencia Creek Transit Center	Palo Alto	5:50 a.m. – 6:20 p.m.	30	No Service	No Service
DB1 (Dumbarton Express)	Union City BART	Stanford Research Park	5:30 a.m. – 8:30 p.m.	20-60 (varies)	No Service	No Service
Embarcadero Shuttle	Downtown Palo Alto	Palo Alto Tech Center	7:00 a.m. – 7:15 p.m.	15-30 (varies)	No Service	No Service

Source: VTA, Dumbarton Express, and City of Palo Alto websites.

Table 5: Existing Services Provided by Caltrain

Route	From	To	Weekdays		Weekends	
			Operating Hours	Headway (minutes)	Operating Hours	Headway (minutes)
Caltrain California Avenue	San Francisco	Gilroy	4:30 a.m. – 1:40 a.m.	20-60	7:00 a.m. – 1:40 a.m.	60

Source: Caltrain website.

DATA COLLECTION

AVERAGE DAILY TRAFFIC (ADT) DATA

With the input from the Palo Alto community and City Staff, TJKM collected 7-day, 24-hour bi-directional traffic volume tube counts from Wednesday, November 28, 2018 to Tuesday, December 4, 2018 at the following 17 locations:

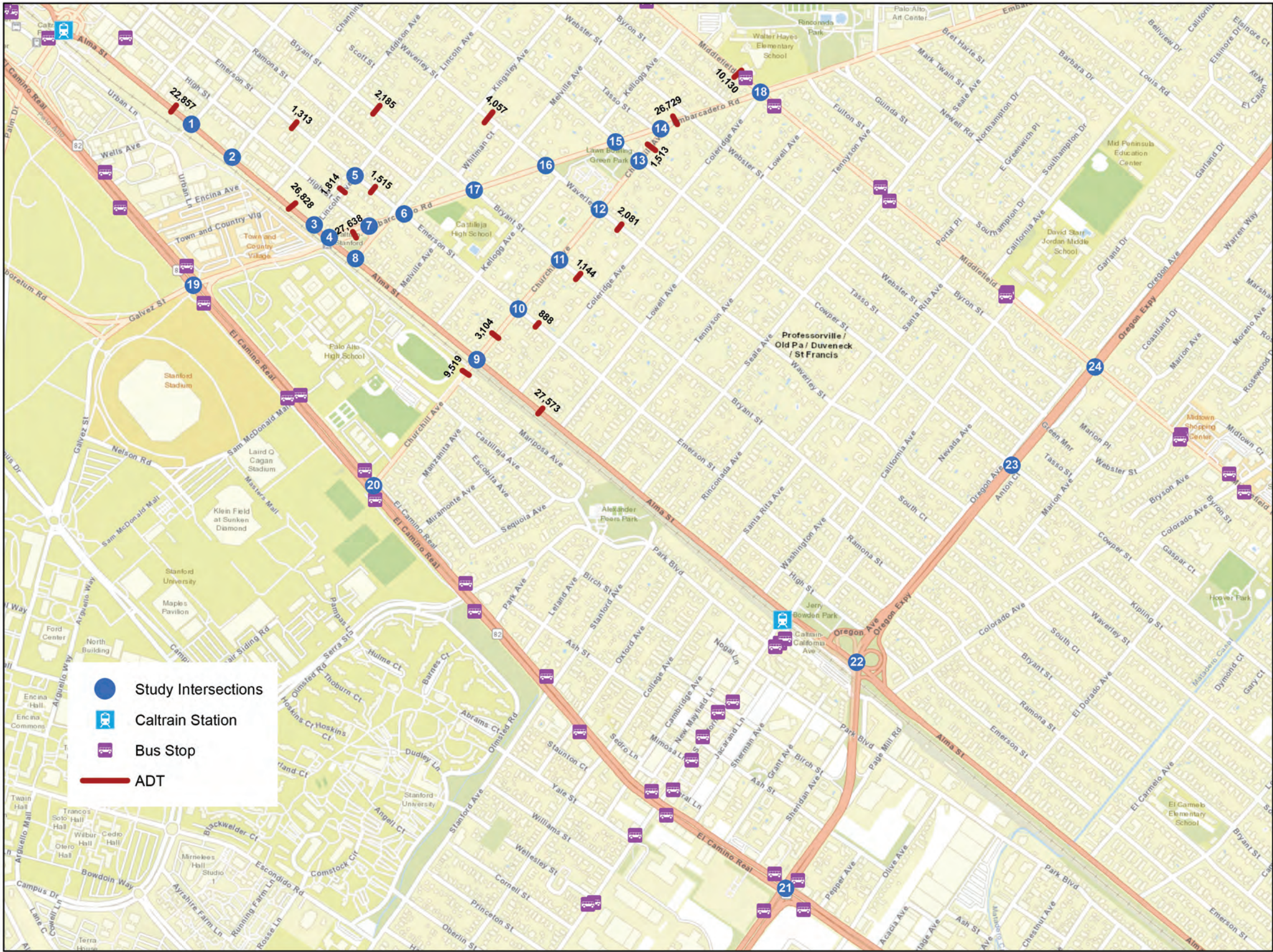
1. Alma Street, between Forest Avenue and Homer Avenue
2. Emerson Street, between Channing Avenue and Addison Avenue
3. Alma Street, between Addison Avenue and Lincoln Avenue
4. Bryant Street, between Addison Avenue and Lincoln Avenue
5. Waverly Street, between Kingsley Avenue and Whitman Court
6. Embarcadero Road, between High Street and Alma Street
7. Middlefield Road, between Walter Hays Elementary School and Embarcadero Road
8. Embarcadero Road, between Webster Street and Tasso Street
9. Churchill Avenue, between Tasso Street and Cowper Street
10. Waverly Street, between Churchill Avenue and Coleridge Avenue
11. Bryant Street, between Churchill Avenue and Coleridge Avenue
12. Emerson Street, between Churchill Avenue and Coleridge Avenue
13. Churchill Avenue, between Alma Street and Emerson Street
14. Alma Street, between Coleridge Avenue and Lowell Avenue
15. Churchill Avenue, between Mariposa Avenue and Train Tracks
16. Lincoln Street, between High Street and Emerson Street
17. Emerson Street, between Lincoln Avenue and Kingsley Avenue

Table 6 summarizes the 24-hour traffic volumes (vehicles per day (vpd)) collected, **Figure 6** illustrates the ADT volumes, and **Appendix B** contains the raw data.

Table 6: Average Weekday Daily Traffic Summary for Existing Conditions

<i>Location</i>	<i>NB Average Volumes (vpd)</i>	<i>SB Average Volumes (vpd)</i>	<i>Total (vpd)</i>
Alma Street, Between Forest Avenue and Homer Avenue	9,783	13,074	22,857
Emerson Street, Between Channing Avenue and Addison Avenue	628	685	1,313
Alma Street, Between Addison Avenue and Lincoln Avenue	14,780	12,048	26,828
Bryant Street, Between Addison Avenue and Lincoln Avenue	673	1,482	2,155
Waverly Street, Between Kingsley Avenue and Whitman Court	1,558	2,499	4,057
Middlefield Road, Between Walter Hays Elementary School and Embarcadero Road	4,516	5,614	10,130
Waverly Street, Between Churchill Avenue and Coleridge Avenue	1,054	1,027	2,081
Bryant Street, Between Churchill Avenue and Coleridge Avenue	654	490	1,144
Emerson Street, Between Churchill Avenue and Coleridge Avenue	442	446	888
Alma Street, Between Coleridge Avenue and Lowell Avenue	14,942	12,631	27,573
Emerson Street, Between Lincoln Avenue and Kingsley Avenue	1,099	416	1,515
<i>Location</i>	<i>EB Average Volumes (vpd)</i>	<i>WB Average Volumes (vpd)</i>	<i>Total (vpd)</i>
Embarcadero Road, Between High Street and Alma Street	15,252	12,386	27,638
Embarcadero Road, Between Webster Street and Tasso Street	13,380	13,349	26,729
Churchill Avenue, Between Tasso Street and Cowper Street	1,015	498	1,513
Churchill Avenue, Between Alma Street and Emerson St	1,574	1,530	3,104
Churchill Avenue, Between Mariposa Avenue and Train Tracks	4,287	5,232	9,519
Lincoln Avenue, Between High Street and Emerson Street	1,107	707	1,814

Average Daily Traffic Volumes Map



INTERSECTION TURNING MOVEMENT COUNTS (TMC)

On Thursday, December 6, 2018, TJKM collected intersection TMC for vehicles, pedestrians, and bicycles at the 24 study intersections for the weekday a.m. (7:30 a.m. – 9:30 a.m.) and p.m. (4:30 p.m. – 6:30 p.m.) peak periods, based on recommendations from City staff. TMC data was collected on a typical weekday when all schools within the study area were in session. **Figure 7a** and **7b** illustrates existing traffic volumes at all study intersections. **Figure 8a** and **8b** illustrates existing pedestrian and bicycle volumes at all study intersections. **Appendix B** contains the TMC data collected for all of the study intersections.

EXISTING SIGNAL TIMING

TJKM obtained the existing traffic signal timing sheets and phasing diagrams for the intersections of El Camino Real/Embarcadero Road, El Camino Real/Churchill Avenue, and El Camino Real/Oregon Expressway from Caltrans. TJKM also obtained traffic signal timing sheets from the City of Palo Alto for the intersections of Alma Street/Homer Avenue, Embarcadero Road/Bryant Street, Embarcadero Road/Waverly Street, Embarcadero Road/Middlefield Road, and Alma Street/Churchill Avenue. Additionally, TJKM obtained the timing sheets for Oregon Expressway/Cowper Street and Oregon Expressway/Middlefield Road from the County of Santa Clara. The timing sheets will be used for existing conditions analysis.

ORIGIN-DESTINATION (O-D) DATA

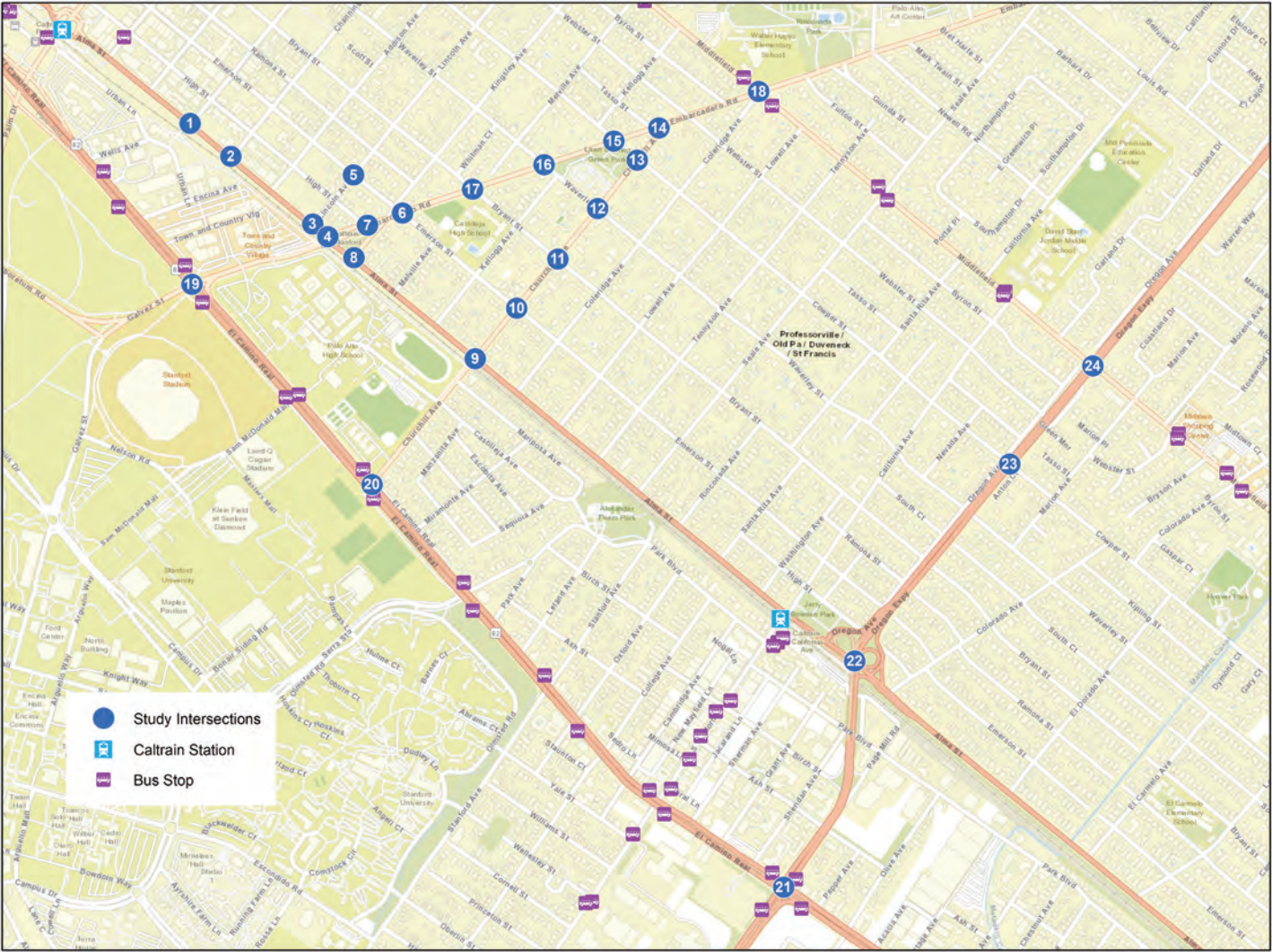
TJKM used the StreetLight Data® platform, which utilizes big data for evaluating trip patterns within the study area. TJKM processed data for 2017 for the months that school was in session (average of February, March, April, May, August, September, October, and November) for the morning (6 a.m. to 10 a.m.) and afternoon hours (3 p.m. to 7 p.m.). StreetLight Data® provides attributes for all months of the year, including historical data up to 2014, depending on the analysis conducted. For the purpose of this study, only the data on a typical Tuesday, Wednesday, and Thursday during the aforementioned months was used. **Appendix C** contains processed O-D data obtained from StreetLight Data® platform for the project.

Existing Conditions Peak Hour Traffic Volumes

Intersection #1 Alma St. / Homer Ave.	Intersection #2 Alma St. / Channing Ave.	Intersection #3 Alma St. / Lincoln Ave.	Intersection #4 Alma St. / Embarcadero Rd.
Intersection #5 Emerson St. / Lincoln Ave.	Intersection #6 Emerson St. / Embarcadero Rd.	Intersection #7 Embarcadero Rd. / High St.	Intersection #8 Alma St. / Kingsley Ave.
Intersection #9 Alma St. / Churchill Ave.	Intersection #10 Emerson St. / Churchill Ave.	Intersection #11 Bryant St. / Churchill Ave.	Intersection #12 Waverly St. / Churchill Ave.

LEGEND

XX (XX) — AM (PM) Peak Hour Volumes

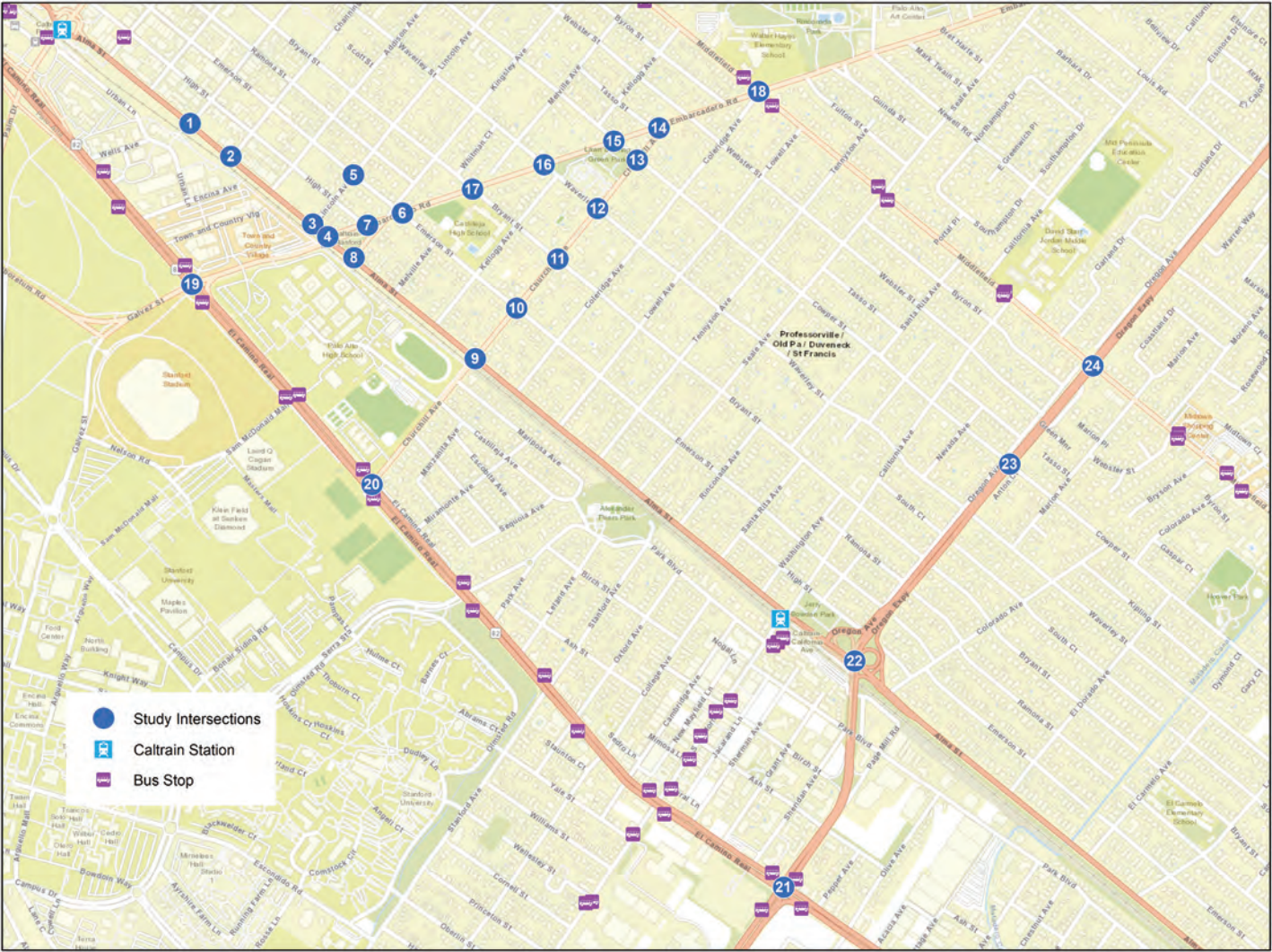


Existing Conditions Peak Hour Traffic Volumes

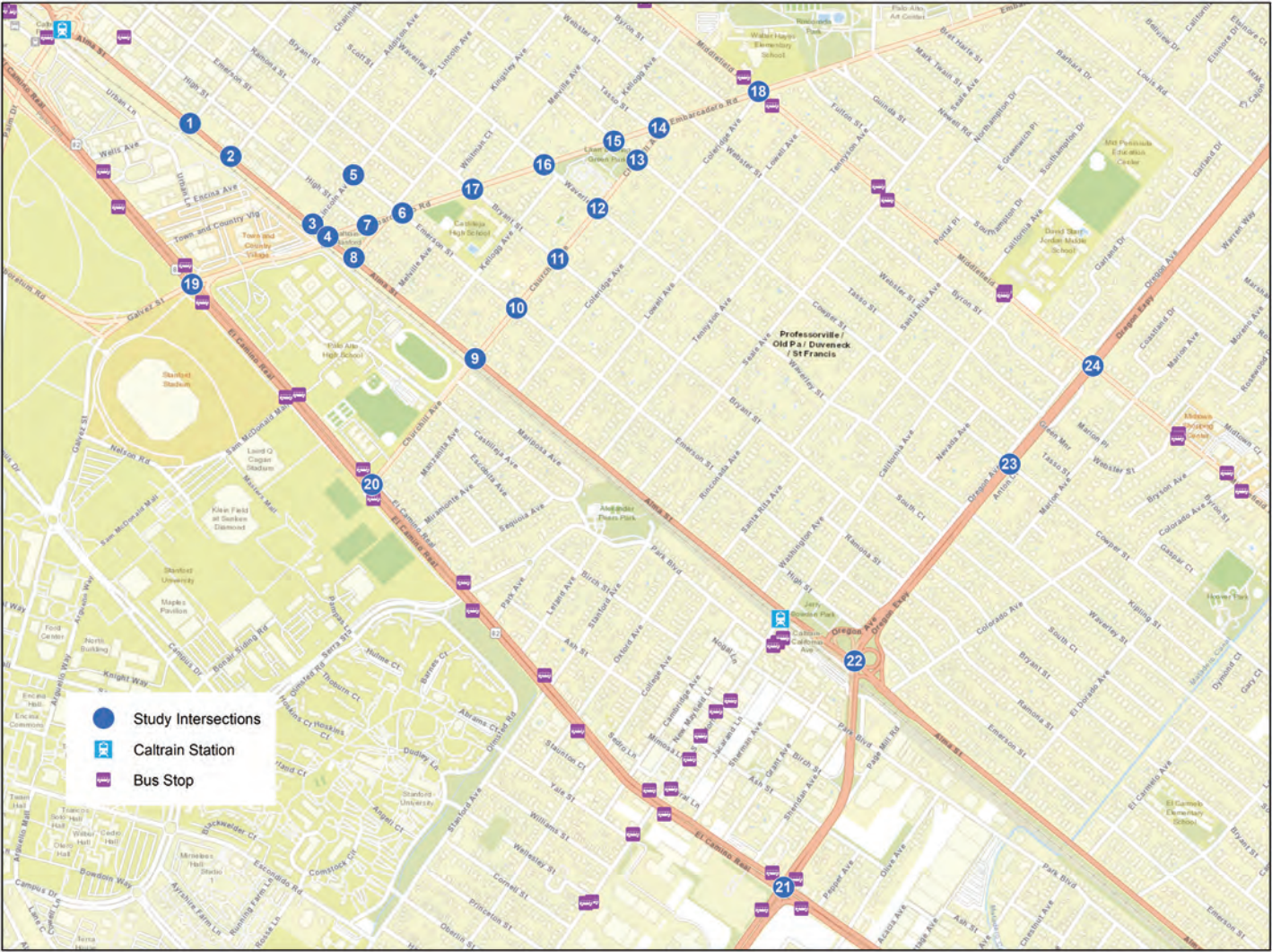
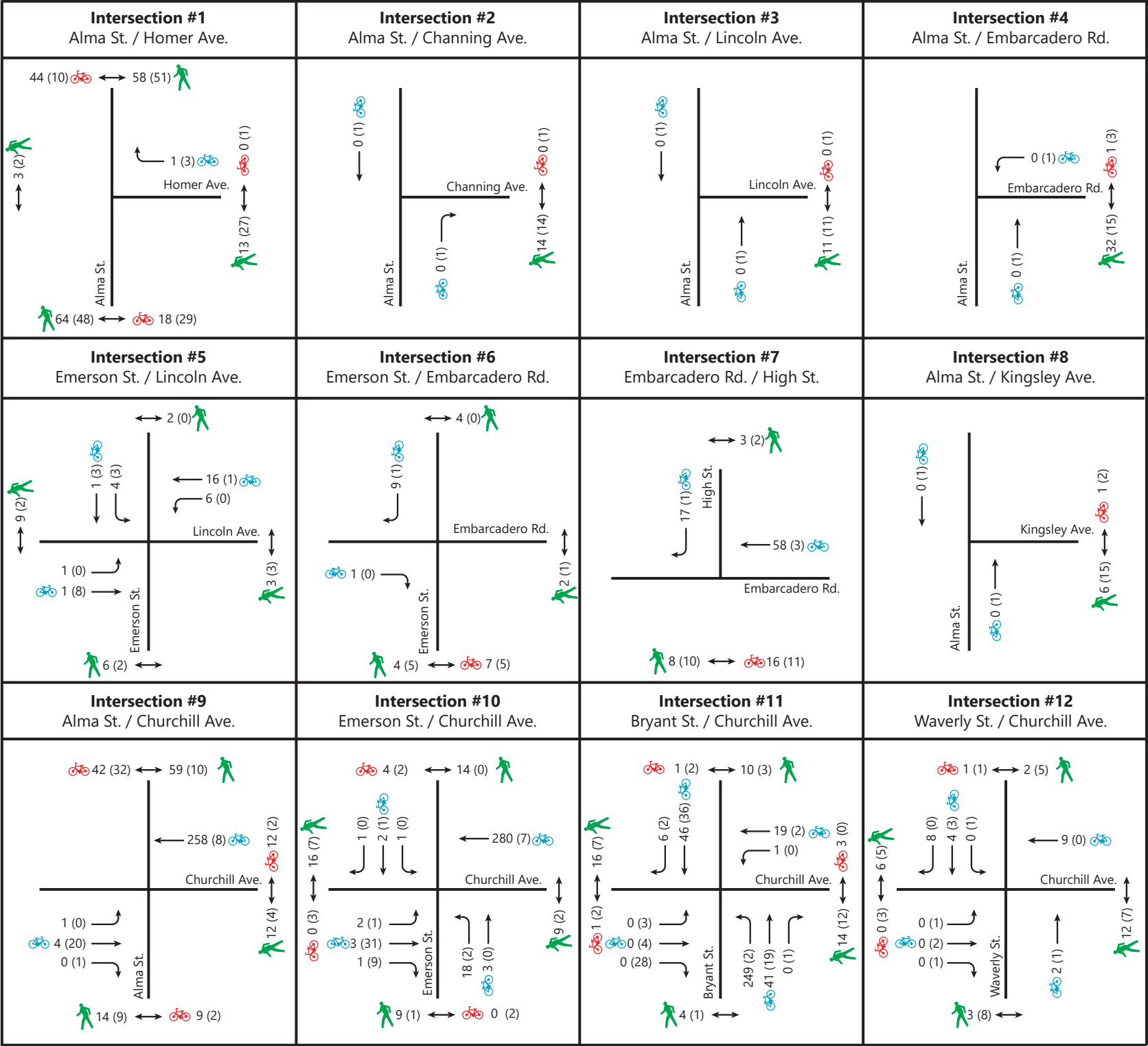
Intersection #13 Cowper St. / Churchill Ave.	Intersection #14 Churchill Ave. / Embarcadero Rd.	Intersection #15 Cowper St. / Embarcadero Rd.	Intersection #16 Waverly St. / Embarcadero Rd.
Intersection #17 Bryant St. / Embarcadero Rd.	Intersection #18 Middlefield Rd. / Embarcadero Rd.	Intersection #19 El Camino Real / Embarcadero Rd.	Intersection #20 El Camino Real / Churchill Ave.
Intersection #21 El Camino Real / Oregon Expy.	Intersection #22 Alma St. / Oregon Expy.	Intersection #23 Cowper St. / Oregon Expy.	Intersection #24 Middlefield Rd. / Oregon Expy.

LEGEND

XX (XX) — AM (PM) Peak Hour Volumes



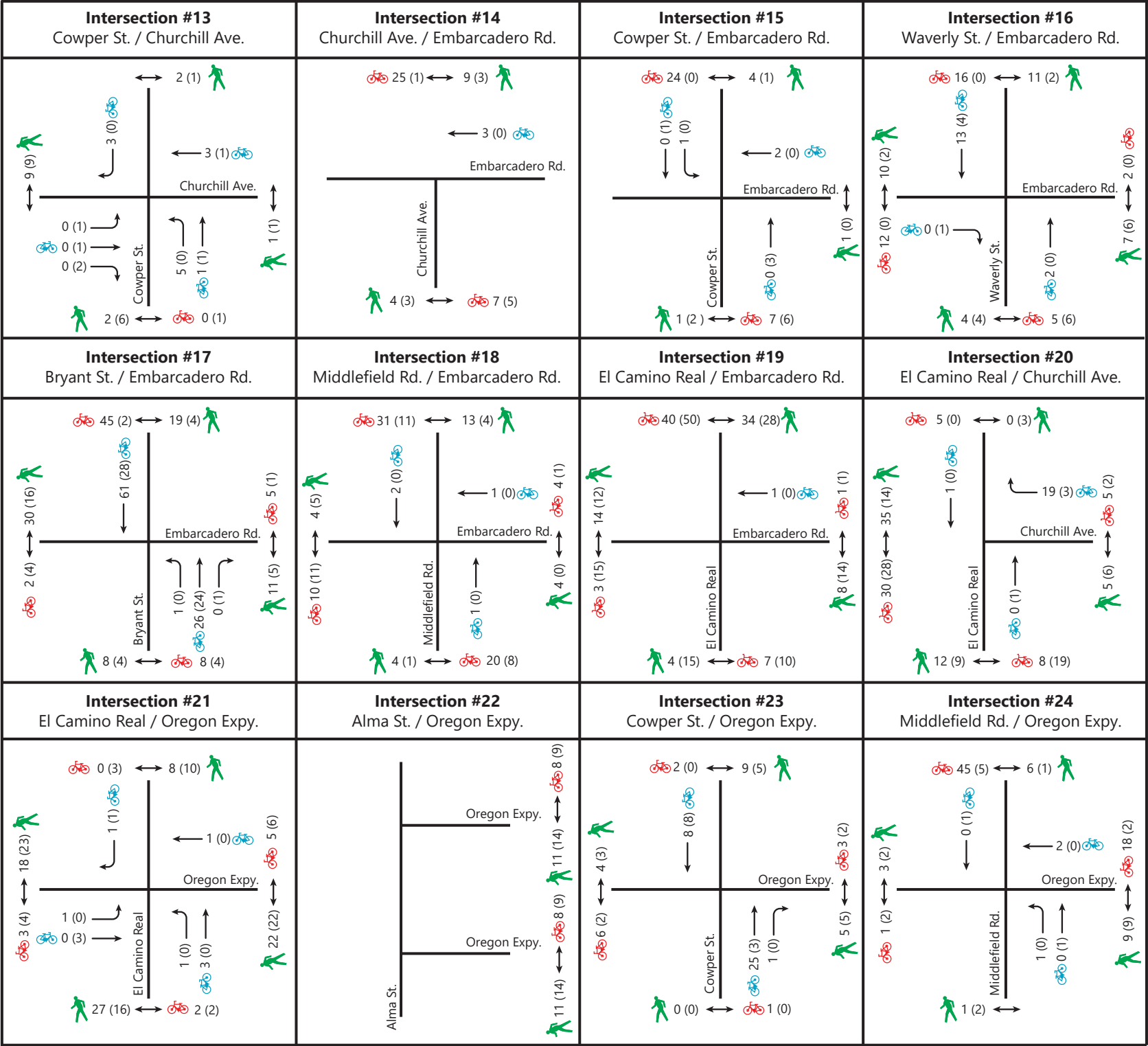
Existing Peak Hour Pedestrian and Bicycle Volumes



LEGEND

- XX (XX) — AM (PM) Peak Hour Volumes
- Pedestrians
- Bicycles on Roadway
- Bicycles on Crosswalk

Existing Peak Hour Pedestrian and Bicycle Volumes



LEGEND

XX (XX)

—

AM (PM) Peak Hour Volumes

—

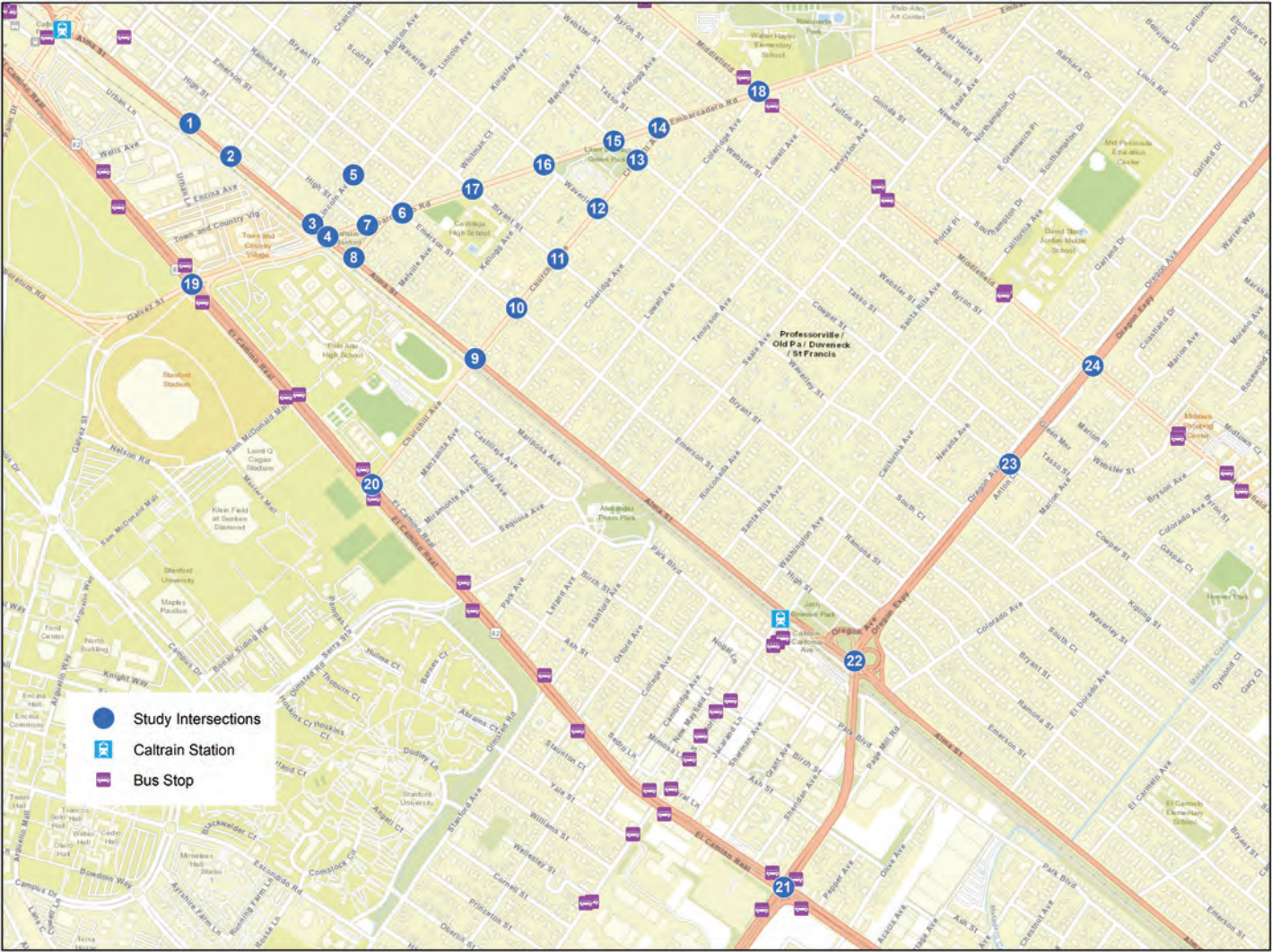
Pedestrians

—

Bicycles on Roadway

—

Bicycles on Crosswalk



EXISTING CONDITIONS LOS & 95TH PERCENTILE QUEUE LENGTH ANALYSIS

The Existing Conditions (2018) scenario evaluates all study intersections with existing lane geometry, traffic controls, and traffic volumes. The results of the LOS and delay analysis and 95th percentile queue length in feet (ft.) analysis, using Synchro software, are summarized in **Tables 7** and **8** respectively.

Appendix D contains the HCM 2000 Synchro LOS and queues reports for all study intersections. It should be noted that the intersections of Alma Street/Channing Avenue, Embarcadero Street/Emerson Street, and Embarcadero Road/High Street could not be evaluated under HCM 2000 methodology due to the lane geometry and intersection control. The following intersections operate with unacceptable LOS based on City Standards and the Congestion Management Program (CMP):

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)
- Alma Street/Churchill Avenue (a.m. peak hour)
- Embarcadero Road/Cowper Street (all peak hours)
- Embarcadero Road/Middlefield Road (a.m. peak hour)*
- El Camino Real/Churchill Avenue (p.m. peak hour)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/Oregon Expressway EB Off Ramp (all peak hours)

Note: *LOS reflects pedestrian-scramble phase during 30 minutes of the peak hour.

Table 7: Existing Conditions LOS & Delay

#	Study Intersections	Control	Peak Hour	Existing Conditions	
				Average Delay ¹ (sec)	LOS
1	Alma Street/Homer Avenue	Signalized	A.M.	19.7	B
			P.M.	20.9	C
3	Alma Street/Lincoln Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
4	Alma Street/Embarcadero Road	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
5	Emerson Street/Lincoln Avenue	All-Way Stop	A.M.	8.7	A
			P.M.	8.0	A
8	Alma Street/Kingsley Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
9	Alma Street/Churchill Avenue	Signalized	A.M.	>80.0	F
			P.M.	44.3	D
10	Churchill Avenue/Emerson Street	All-Way Stop	A.M.	8.9	A
			P.M.	8.1	A
11	Churchill Avenue/Bryant Street	Two-Way Stop	A.M.	11.7	B
			P.M.	10.6	B
12	Churchill Avenue/Waverly Street	All-Way Stop	A.M.	8.7	A
			P.M.	8.5	A
13	Churchill Avenue/Cowper Street	All-Way Stop	A.M.	7.7	A
			P.M.	7.8	A
14	Churchill Avenue/Embarcadero Road	One-Way Stop	A.M.	9.7	A
			P.M.	9.8	A
15	Embarcadero Road/Cowper Street	Two-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
16	Embarcadero Road/Waverly Street	Signalized	A.M.	29.5	C
			P.M.	47.7	D
17	Embarcadero Road/Bryant Street	Signalized	A.M.	14.5	B
			P.M.	7.2	A
18	Middlefield Road/Embarcadero Road	Signalized	A.M.	>80.0	F
			P.M.	38.1	D
19	El Camino Real/Embarcadero Road	Signalized	A.M.	60.3	E
			P.M.	67.0	E
20	El Camino Real/Churchill Avenue	Signalized	A.M.	42.1	D
			P.M.	63.4	E
21	El Camino Real/Oregon Expressway-Page Mill Road	Signalized	A.M.	72.9	E
			P.M.	66.4	E
22a	Alma Street/Oregon Expressway WB Off Ramp (Oregon Ave)	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
22b	Alma Street/Oregon Expressway EB Off Ramp	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
23	Oregon Expressway/Cowper Street	Signalized	A.M.	28.0	C

#	Study Intersections	Control	Peak Hour	Existing Conditions	
				Average Delay ¹ (sec)	LOS
			P.M.	17.0	B
24	Oregon Expressway/Middlefield Road	Signalized	A.M.	62.1	E
			P.M.	55.6	E

Notes:

¹Delay: Overall intersection delay in seconds per vehicle for signalized and unsignalized all-way stop controlled intersections. Delay for minor approach worst movement or major approach critical movements at unsignalized one-way and two-way stop controlled intersections.

Delay is reported as >50.0 for unsignalized intersections with LOS F and >80.0 for signalized intersections consistent with HCM 2000 methodology.

Bold indicates unacceptable LOS.

Table 8 summarizes the 95th percentile queue lengths for all approach movements at the study intersections for the weekday a.m. and p.m. peak hour. Existing conditions queue length analysis resulted in several intersections with 95th percentile queue lengths exceeding storage capacity.

Based on Synchro analysis results, intersections where queue lengths exceed the existing storage lengths are listed below:

- Alma Street/Churchill Avenue for NBL (all peak hours)
- Embarcadero Road/Waverly Street for EBL (p.m. peak hour)
- Embarcadero Road/Bryant Street for EBL (p.m. peak hour)
- Embarcadero Road/Middlefield Road for WBL (p.m. peak hour), NBL and SBL (all peak hours)
- El Camino Real/Embarcadero Road for WBL (all peak hours), NBL (a.m. peak hour), and SBL (all peak hours)
- El Camino Real/Churchill Avenue for NBR (all peak hours) and SBL (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road for WBL (all peak hours) and SBL (p.m. peak hour)
- Oregon Expressway/Middlefield Road for EBR (all peak hours), NBL (all peak hours), and SBL (a.m. peak hour)

Table 8: Existing Conditions 95th Percentile Queue Lengths (ft.)

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Existing Conditions	
				A.M.	P.M.
1	Alma Street/Homer Avenue (Signalized)	WBL	-	100	189
		NBT	-	327	343
		SBT	-	154	277
3	Alma Street/Lincoln Avenue (One-Way Stop Control)	WBLR	-	105	154
		NBT	-	<25	<25
		NBTL	-	<25	<25
		SBTL	-	<25	<25
		SBT	-	<25	<25
4	Alma Street/Embarcadero Road (One-Way Stop Control)	WBR	-	245	293
		NBT	-	<25	<25
		SBT	-	<25	<25
8	Alma Street/Kingsley Avenue (One-Way Stop Control)	WBL	-	38	143
		NBT	-	<25	<25
		SBT	-	<25	<25
9	Alma Street/Churchill Avenue (Signalized)	EBT	-	274	335
		EBR	-	37	82
		WBT	-	#269	191
		NBL	300	#654	#407
		NBT	-	620	840
		SBL	60	27	29
		SBT	-	225	681
		SBR	100	57	62
11	Churchill Avenue/Bryant Street (Two-Way Stop Control)	EBLTR	-	<25	<25
		WBLTR	-	<25	<25
		NBLTR	-	<25	<25
		SBLTR	-	<25	<25
14	Churchill Avenue54/Embarcadero Road (One-Way Stop Control)	EBT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
		WBT	-	<25	<25
		NBR	-	<25	<25
15	Embarcadero Road/Cowper Street (Two-Way Stop Control)	EBLT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
		WBTR	-	<25	<25
		NBLTR	-	26	29
		SBLTR	-	63	40
16	Embarcadero Road/Waverly Street (Signalized)	EBL	95	#92	#187
		EBT	-	356	#518
		WBL	75	39	38
		WBT	-	424	372
		NBT	-	119	73
		SBT	-	172	124
17	Embarcadero Road/Bryant Street (Signalized)	EBL	80	29	106
		EBT	-	203	244
		WBL	60	m44	m4
		WBT	-	m464	390

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Existing Conditions	
				A.M.	P.M.
18	Embarcadero Road/Middlefield Road (Signalized)	NBR	-	<25	<25
		SBR	-	<25	<25
		EBL	115	78	66
		EBT	-	#687	#517
		WBL	100	90	111
		WBT	-	#817	392
		NBL	115	#245	134
		NBT	-	198	179
		SBL	100	174	#190
		SBT	-	334	#426
19	El Camino Real/Embarcadero Road (Signalized)	EBL	-	113	#349
		EBT	-	157	#426
		WBL	200	#290	#409
		WBT	-	345	353
		NBL	382	m#424	m#326
		NBT	-	348	m198
		SBL	300	#509	#462
		SBT	-	401	515
20	El Camino Real/Churchill Avenue (Signalized)	WBL	-	#457	#542
		NBT	-	#824	#989
		NBR	100	194	194
		SBL	170	m128	m320
		SBT	-	489	m556
21	El Camino Real/Oregon Expressway-Page Mill Road (Signalized)	EBL	350	#307	237
		EBT	-	508	668
		EBR	-	132	219
		WBL	100	188	278
		WBT	-	794	642
		NBL	300	253	147
		NBT	-	#945	#655
		SBL	350	247	#413
		SBT	-	300	631
22a	Alma Street/Oregon Expressway WB Ramps (Oregon Ave) (One-Way Stop Control)	SBR	350	98	95
		WBL	-	26	106
		WBR	-	25	<25
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBT	-	<25	<25
22b	Alma Street/Oregon Expressway EB Ramps (One-Way Stop Control)	SBTR	-	<25	<25
		WBR	-	253	263
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBL	-	<25	<25
23	Oregon Expressway/Cowper Street (Signalized)	SBT	-	<25	<25
		EBL	115	48	60
		EBT	-	785	771
		EBR	50	<25	26
		WBL	115	m27	m40

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Existing Conditions	
				A.M.	P.M.
		WBT	-	m825	807
		NBL	-	#185	84
		NBT	-	106	55
		SBL	-	60	29
		SBT	-	73	86
24	Oregon Expressway/Middlefield Road (Signalized)	EBL	360	m#191	#260
		EBT	-	#844	421
		EBR	100	m147	146
		WBL	390	182	#305
		WBT	-	#774	559
		WBR	100	<25	<25
		NBL	230	#489	#375
		NBT	-	#534	#782
		NBR	-	95	77
		SBL	145	154	91
		SBT	-	235	348

Notes:

EB, WB, NB, SB – Eastbound, Westbound, Northbound, Southbound respectively.

L, T, R – Left, Through, Right respectively.

Queue lengths taken from Synchro reports.

#: 95th percentile volume exceeds capacity, queue may be longer.

m: Volume for 95th percentile queue is metered by upstream signal.

Bold indicates queue lengths exceeding existing storage capacity.

PEDESTRIAN AND BICYCLE FACILITIES

Pedestrian Facilities

In the study area, Alma Street provides a sidewalk on the eastern side of the arterial with a width ranging from six to twelve feet. The intersections of Alma Street/Churchill Avenue and Alma Street/Homer Avenue provides pedestrians with marked crosswalks and pedestrian signal heads. Other locations along Alma Street where pedestrians are provided marked crosswalks are at Addison Avenue, Kellogg Avenue, Coleridge Avenue, Lowell Avenue, Tennyson Avenue, Seale Avenue, N. California Avenue, and Oregon Expressway EB and WB On/Off Ramps. Out of the 23 intersections along Alma Street in the study area, 19 of those intersections provide pedestrians with ADA compliant curb-ramps. Majority of these ADA compliant curb-ramps are located south of Embarcadero Road.

Churchill Avenue provides pedestrians with sidewalks on the northern and southern side of the arterial with a width of about six feet. Marked crosswalks are provided at the intersections at Alma Street/Churchill Avenue and Churchill Avenue/Castilleja Avenue. Locations where pedestrians are provided with ADA compliant curb-ramps include the intersections of Churchill Avenue/El Camino Real, Churchill Avenue/Madrono Avenue, Churchill Avenue/Castilleja Avenue, Churchill Avenue/Emerson Street, Churchill Avenue/Bryant Street, and Churchill Avenue/Waverly Street.

In the study area, Embarcadero Road provides pedestrians with sidewalks on the northern and southern side of the arterial with widths ranging from six to ten feet. Marked crosswalks are provided for pedestrians at the intersections of Middlefield Road, Waverly Street, Bryant Street, High Street, Palo Alto High School, and El Camino Real. The signalized intersections of Embarcadero Road/El Camino Real, Embarcadero Road/Palo Alto High School, Embarcadero Road/Bryant Street, Embarcadero Road/Waverly Street, and Embarcadero Road/Middlefield road provide pedestrian signal heads. ADA compliant curb-ramps are provided at Middlefield Road, Waverly Street, Palo Alto High School, and El Camino Real.

El Camino Real provides sidewalks with widths that are about six feet on both the eastern and western sides of the arterial. Marked crosswalks and pedestrian signal heads are provided at the study intersections of El Camino Real/Embarcadero Road, El Camino Real/Churchill Avenue, and El Camino Real/Oregon Expressway-Page Mill Road. ADA compliant curb-ramps are provided at El Camino Real/Embarcadero Road, El Camino Real/Churchill Avenue and at the southeast corner of El Camino Real/Oregon Expressway-Page Mill Road.

Oregon Expressway provides sidewalks with ranging widths of six to ten feet from El Camino Real to Birch Street on both the northern and southern side of the arterial. Also, a sidewalk is present along Oregon Avenue, which runs adjacent to Oregon Expressway and is separated by a ten-foot wide median. Additionally, a sidewalk is provided on the southern side of Oregon Expressway from Waverly Street to Middlefield Road. Marked crosswalks and ADA compliant curb-ramps are provided at the intersections at El Camino Real, Bryant Street, Cowper Street, and Middlefield Road. Pedestrian signal heads are provided at the previously mentioned intersections with the exception of Waverly Street, which is unsignalized.

Bicycle Facilities

The Embarcadero Bike Path is the only Class I facility in the study area. This particular path runs from the Palo Alto Caltrain Station to Churchill Avenue and allows pedestrians to utilize the path as well. With an approximate width of twelve feet, bicyclists and pedestrians are able to use the path unimpeded by vehicular traffic and intersection controls to access Palo Medical Foundation, Town & Country Village Shopping Center, and Palo Alto High School. Connection to the Homer Avenue Tunnel also provides access to Downtown Palo Alto.

The Class II facilities along Churchill Avenue, Coleridge Avenue, N. California Avenue, Park Boulevard, Stanford Avenue, and Addison Avenue are primarily six feet wide with no buffers from the travel lanes. Each facility has the appropriate striping to clearly indicate it as a Class II facility. The Class III facilities/Bicycle Boulevards on Bryant Street, Castilleja Avenue, and Cowper Street provide signage that identify it as a Class III facility and provide wayfinding signs to direct bicyclists to various locations around the city.

The Class IV facilities along Homer Avenue and N. California Avenue are separated from vehicular traffic by approximately a three foot buffer. The facility along Homer Avenue is an approximately six feet wide contra-flow bike lane that connects bicyclists from Homer Avenue Tunnel to Downtown Palo Alto. The Class IV facility along N. California Avenue/Middlefield road is an approximately six feet wide two-way

cycle track that allows bicyclists to safely continue their route on the Class II facilities provided on N. California Avenue.

ORIGIN-DESTINATION (O-D) ANALYSIS

StreetLight Data® platform, which utilizes big data for evaluating trip patterns within a study area was used for the O-D analysis for this project. The objective of this task was to determine the percentage of traffic that uses Churchill Avenue to cut across the City of Palo Alto. To capture this “cut-through” movement we identified and strategically placed origin and destination zones surrounding the study area. As mentioned in the Data Collection section of this report, TJKM processed the data for a typical Tuesday, Wednesday, and Thursday for the morning and afternoon hours during 2017 while schools in Palo Alto were in session.

The origins and destination zones used for the study are listed below:

1. Alma Street, north of Embarcadero Road
2. Alma Street, south of Oregon Expressway
3. Bryant Street, north of Oregon Expressway
4. Bryant Street, south of Embarcadero Road
5. Cowper Street, north of Embarcadero Road
6. Cowper Street, north of Oregon Expressway
7. El Camino Real, north of Embarcadero Road
8. El Camino Real, south of Oregon Expressway/Page Mill Road
9. Embarcadero Road, east of Middlefield Road
10. Embarcadero Road, west of El Camino Real
11. Emerson Street, south of Embarcadero Road
12. Middlefield Road, north of Embarcadero Road
13. Middlefield Road, north of Oregon Expressway
14. Page Mill Road, west of El Camino Real
15. Serra Street, west of El Camino Real
16. Stanford Avenue, west of El Camino Real
17. Waverly Street, north of Embarcadero Road
18. Waverly Street, north of Oregon Expressway
19. Webster Street, north of Embarcadero Road

Table 9 indicates the results of the O-D study conducted and **Figure 9a** and **9b** illustrates the results.

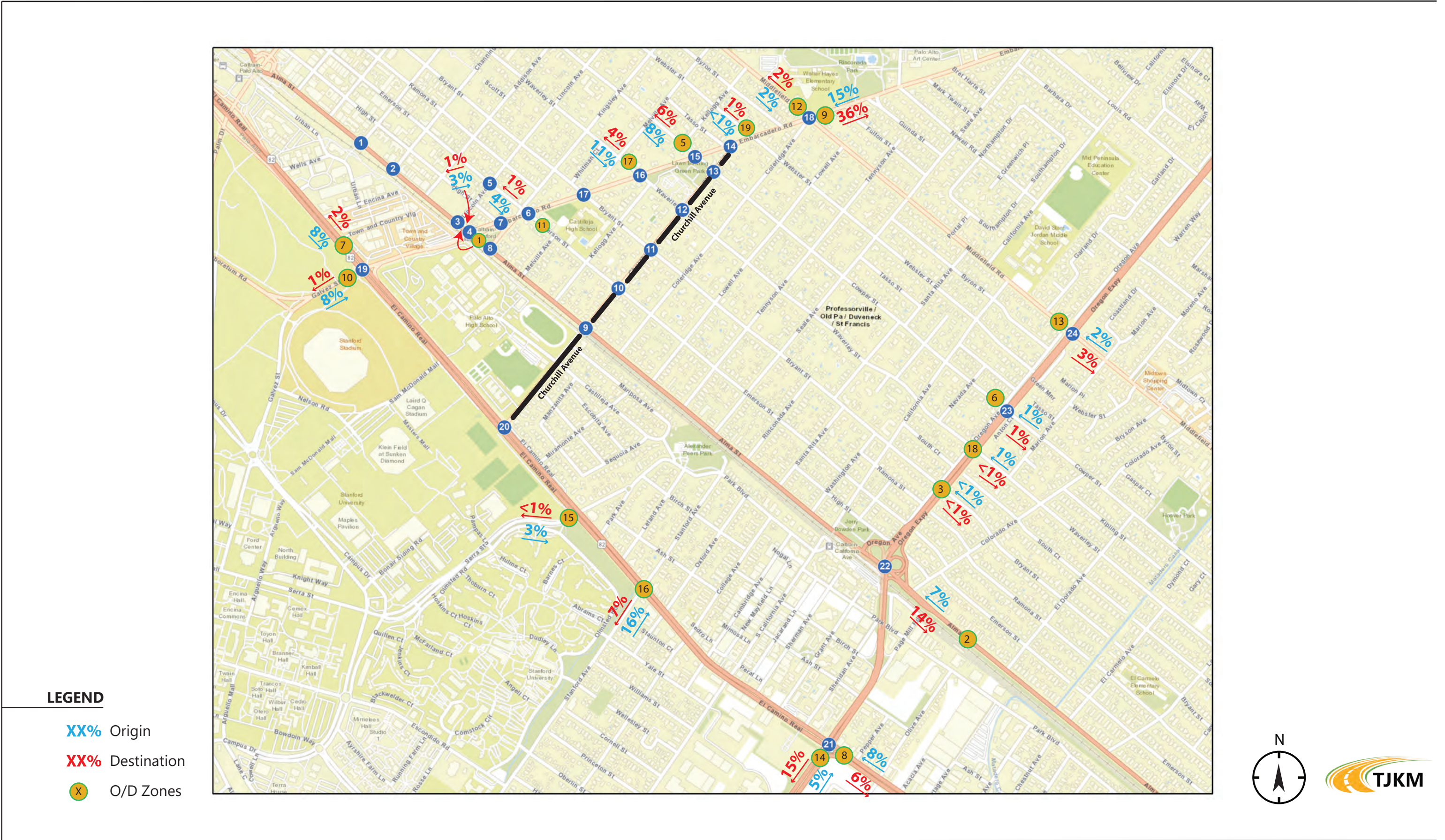
The results of the O-D study suggest that during the a.m. time period, majority of trips (42%) are originating from zones 16, 9, and 17 where each zone contributes approximately 16%, 15% and 11% respectively of total originating trips. Furthermore, during the same time period majority (65%) of the trips are destined for zones 9, 14, and 2 with each zone attracting approximately 36%, 15%, and 14% of total trips.

In the p.m. period, over a third of captured trips (37%) are originating from zones 2, 9, and 7 where each zone contributes 13%, 12% and 12%, respectively, of total originating trips. Additionally, during the same time period, majority (63%) of the trips are destined for zones 9, 2, and 5 with each zone attracting approximately 36%, 20% and 7% respectively of total trips.

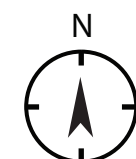
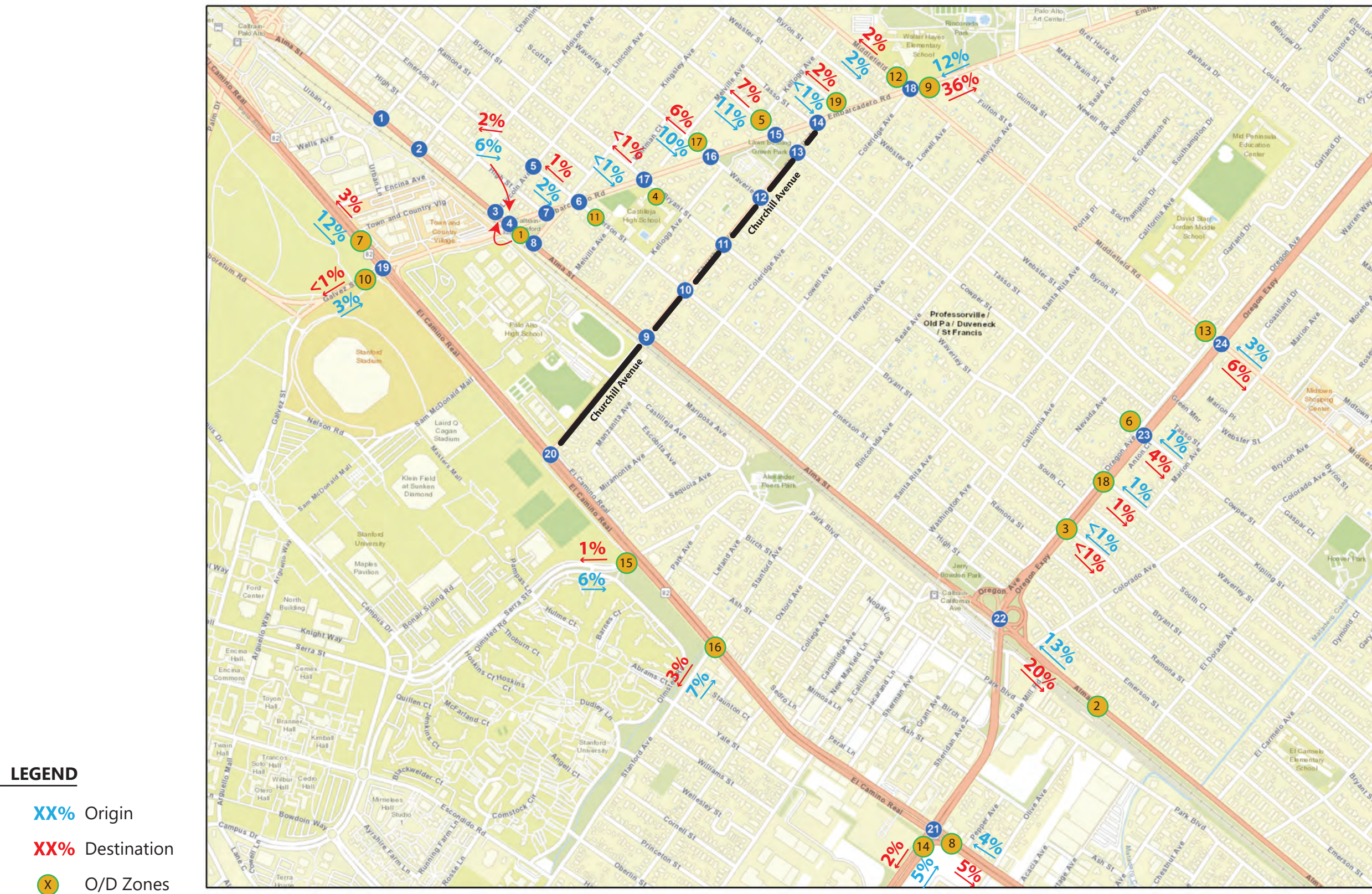
Table 9: Origin-Destination Results

#	Origin-Destination Zones	Time Period	Percentage of Trips Originating from Zone	Percentage of Trips Destined to Zone
1	Alma Street, north of Embarcadero Road	A.M.	3%	1%
		P.M.	6%	2%
2	Alma Street, south of Oregon Expressway	A.M.	7%	14%
		P.M.	13%	20%
3	Bryant Street, north of Oregon Expressway	A.M.	<1%	<1%
		P.M.	<1%	<1%
4	Bryant Street, south of Embarcadero Road	A.M.	-	-
		P.M.	<1%	<1%
5	Cowper Street, north of Embarcadero Road	A.M.	8%	6%
		P.M.	11%	7%
6	Cowper Street, north of Oregon Expressway	A.M.	1%	1%
		P.M.	1%	4%
7	El Camino Real, north of Embarcadero Road	A.M.	8%	2%
		P.M.	12%	3%
8	El Camino Real, south of Oregon Expressway/Page Mill Road	A.M.	8%	6%
		P.M.	4%	5%
9	Embarcadero Road, east of Middlefield Road	A.M.	15%	36%
		P.M.	12%	36%
10	Embarcadero Road, west of El Camino Real	A.M.	8%	1%
		P.M.	3%	<1%
11	Emerson Street, south of Embarcadero Road	A.M.	4%	1%
		P.M.	2%	1%
12	Middlefield Road, north of Embarcadero Road	A.M.	2%	2%
		P.M.	2%	2%
13	Middlefield Road, north of Oregon Expressway	A.M.	2%	3%
		P.M.	3%	6%
14	Page Mill Road, west of El Camino Real	A.M.	5%	15%
		P.M.	5%	2%
15	Serra Street, west of El Camino Real	A.M.	3%	<1%
		P.M.	6%	1%
16	Stanford Avenue, west of El Camino Real	A.M.	16%	7%
		P.M.	7%	3%
17	Waverly Street, north of Embarcadero Road	A.M.	11%	4%
		P.M.	10%	6%
18	Waverly Street, north of Oregon Expressway	A.M.	1%	<1%
		P.M.	1%	1%
19	Webster Street, north of Embarcadero Road	A.M.	<1%	1%
		P.M.	<1%	2%

Origin-Destination Analysis Through Churchill Avenue - A.M. Results



Origin-Destination Analysis Through Churchill Avenue - P.M. Results



EXISTING PLUS PROJECT CONDITIONS

This analysis scenario presents the impacts of the closure of Churchill Avenue near the railroad tracks at the study intersections and surrounding roadway system. This scenario is similar to Existing Conditions, but with the addition of traffic from the closure of Churchill Avenue.

Existing Plus Project Improvements

With the closure of Churchill Avenue, the intersection geometry of Alma Street/Churchill Avenue is proposed to undergo the following changes: With the full closure of the west leg of the intersection, the northbound left-turn lane is proposed to be removed. The southbound left-turn lane and southbound right-turn lane are also proposed to be removed and the left most through lane is to be converted to a shared left-through lane. **Figure 10, 11, and 12** illustrates the conceptual intersection layout and renderings of the intersection, all developed and prepared by AECOM.

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution is a process that determines what proportion of vehicles would be expected to travel between a project site and various destinations outside the project study area. The process of trip assignment determines the various routes that vehicles would take from the project site to each destination using trip distribution. In this case, it is the existing traffic that is being rerouted on alternate roadways in the study area due to the Churchill Avenue closure. Trip distribution assumptions for the proposed project were developed based on the Travel Demand Model and the O-D Study conducted. In total, there are approximately 706 vehicles in the a.m. peak and 776 vehicles in the p.m. peak period that will be rerouted. **Figure 13** illustrates the trip distribution percentages developed for the closure of Churchill Avenue. **Figure 14a and 14b** illustrates the rerouted traffic volumes due to the closure of Churchill Avenue and **Figure 15a and 15b** illustrates the total traffic demands under the Churchill Avenue closure for the a.m. and p.m. peak hours.

EXISTING (2018) PLUS PROJECT CONDITIONS LOS & 95TH PERCENTILE QUEUE LENGTH ANALYSIS

This scenario evaluates the study intersections with existing lane geometry and traffic controls. The southbound right-turn, northbound left-turn, westbound through, and all eastbound movements were rerouted at the intersection of Alma Street/Churchill Avenue.

Existing signal timings were maintained for signalized intersections under this scenario similar to existing conditions. The results of the LOS, delay and 95th percentile queue length in feet (ft.) analysis using Synchro software are summarized in **Tables 10 and 11** respectively. **Appendix E** contains Synchro reports for all study intersections.

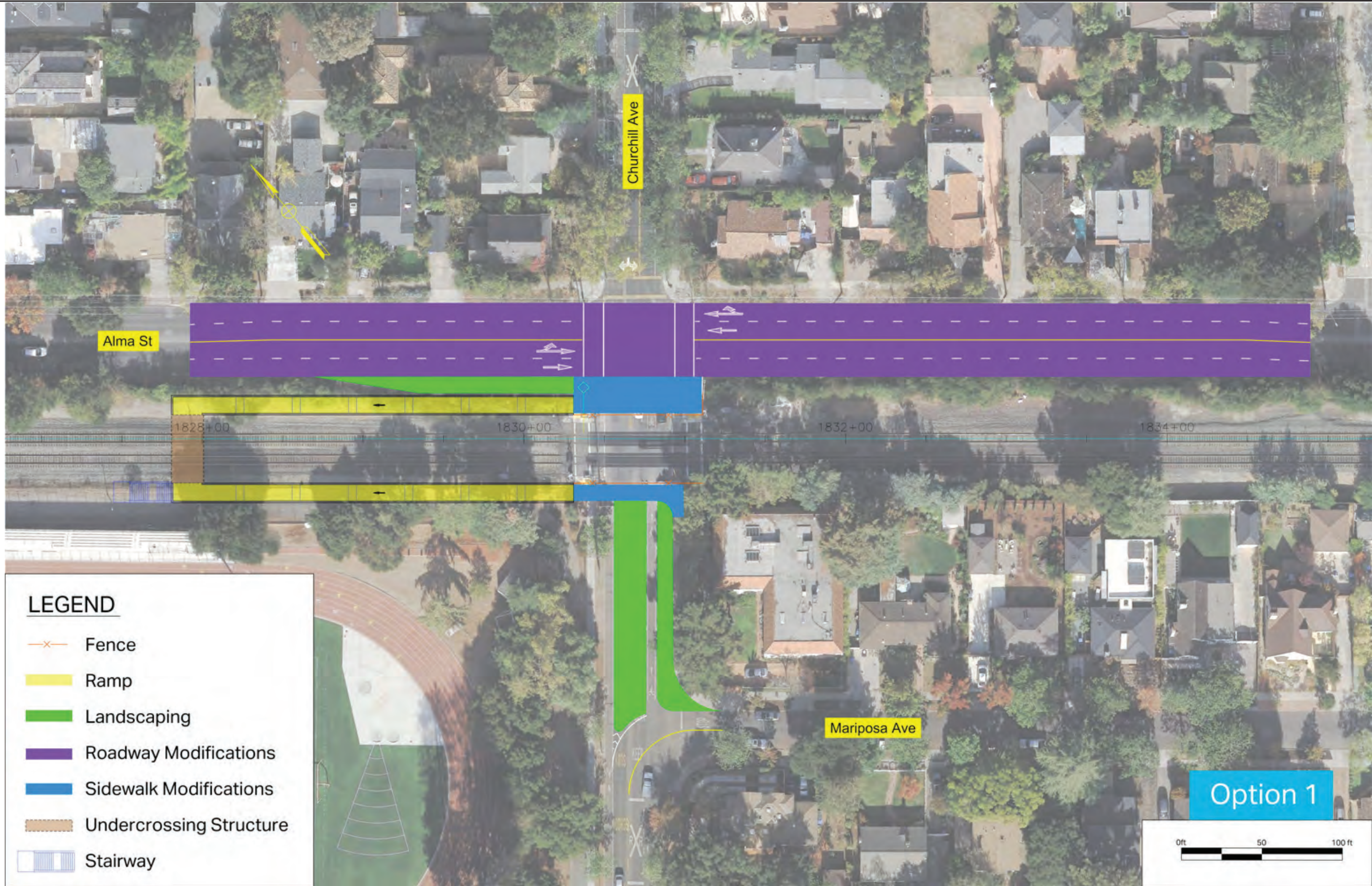
The following intersections operate with unacceptable LOS based on City Standards and the Congestion Management Program (CMP):

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)

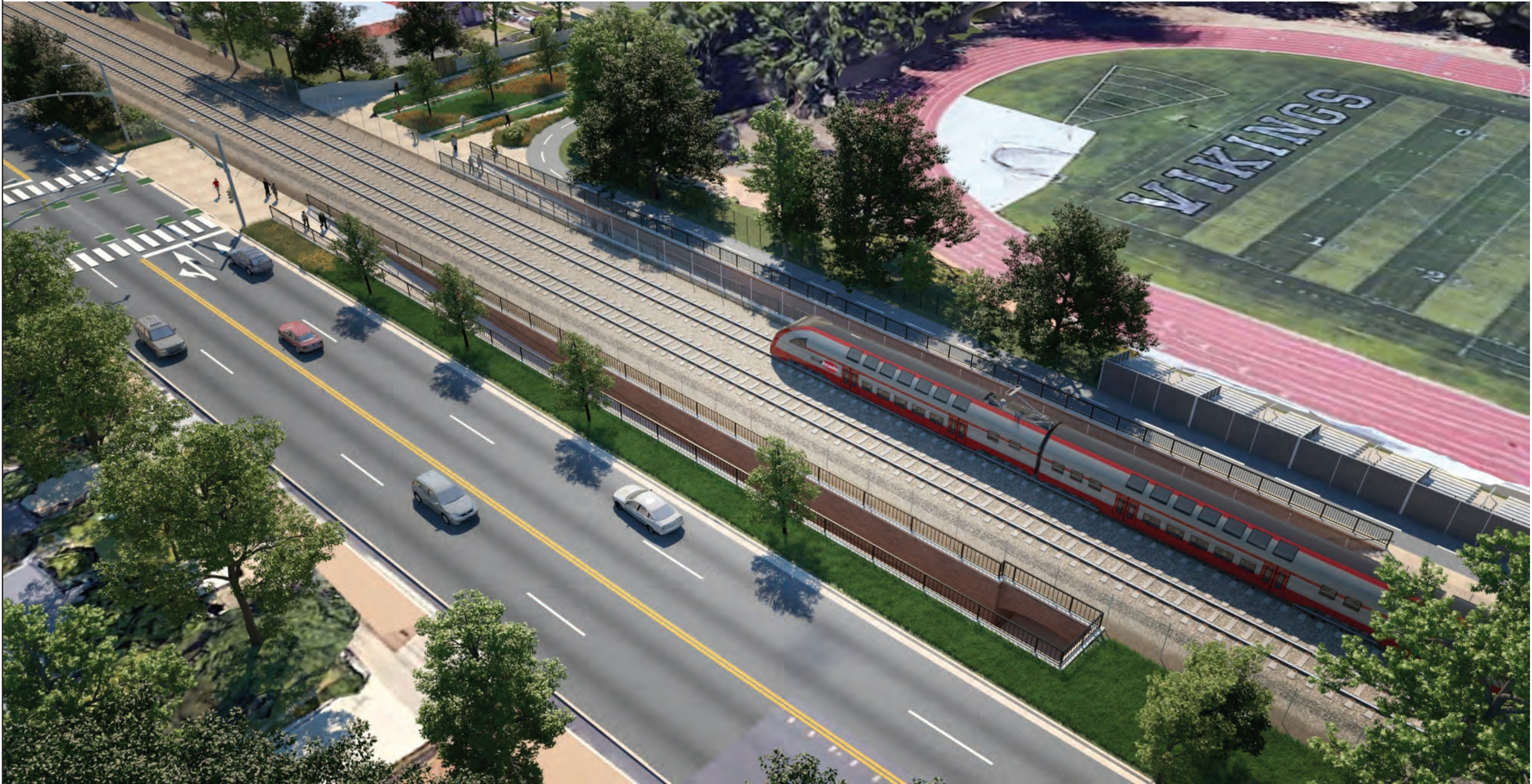
- Embarcadero Road/Cowper Street (all peak hours)
- Middlefield Road/Embarcadero Road (a.m. peak hour)*
- El Camino Real/Embarcadero Road (all peak hours)
- El Camino Real/Churchill Avenue (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road (all peak hours)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/Oregon Expressway EB Off Ramp (all peak hours)

Note: *LOS reflects pedestrian-scramble phase during 30 minutes of the a.m. peak hour.

Alma Street/Churchill Avenue Conceptual Layout



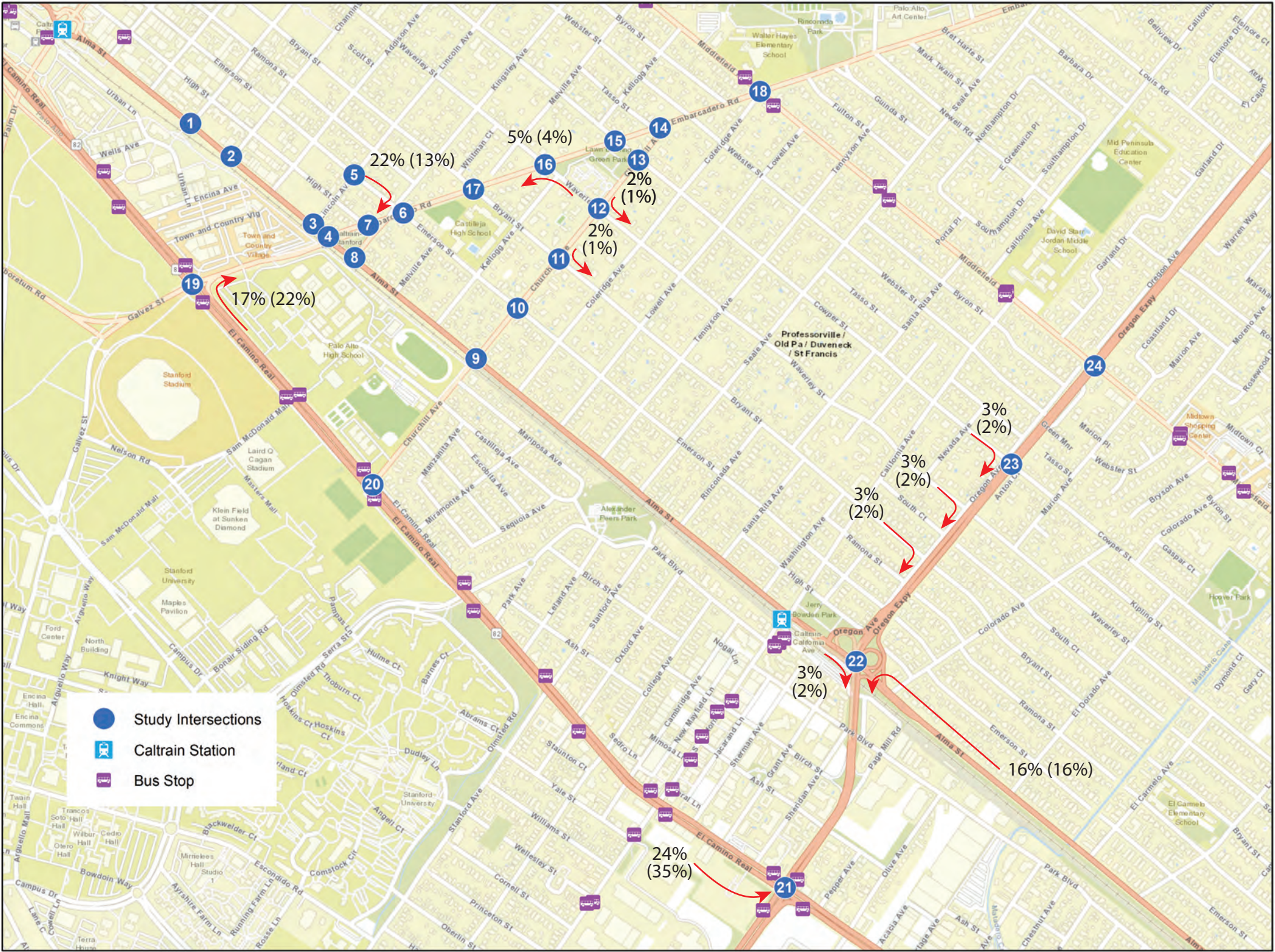
Alma Street/Churchill Avenue Conceptual Rendering



Alma Street/Churchill Avenue Conceptual Rendering



Trip Distribution

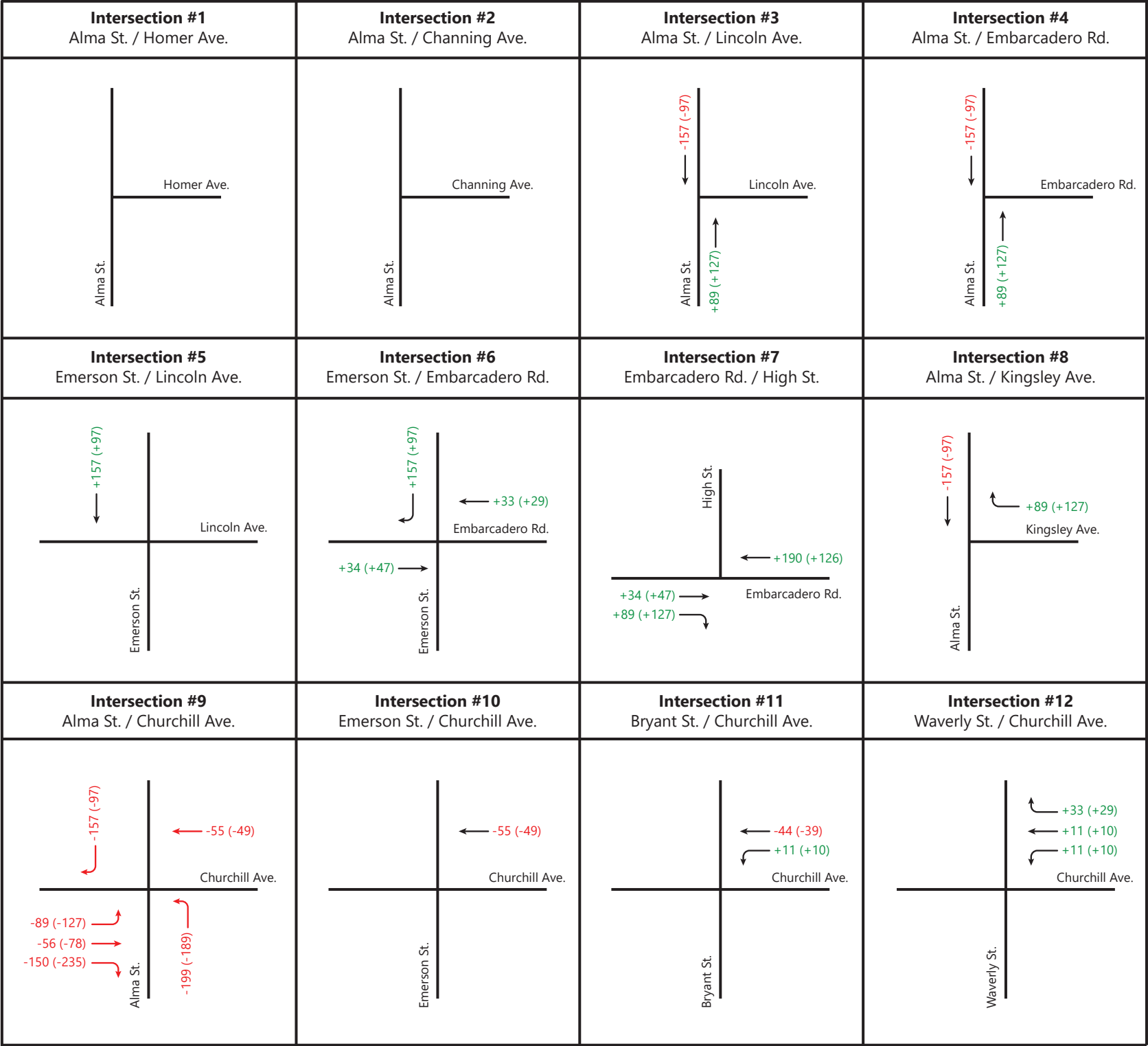


LEGEND

XX% AM Trip %
(XX%) PM Trip %



Rerouted Trips during Churchill Avenue Closure



LEGEND

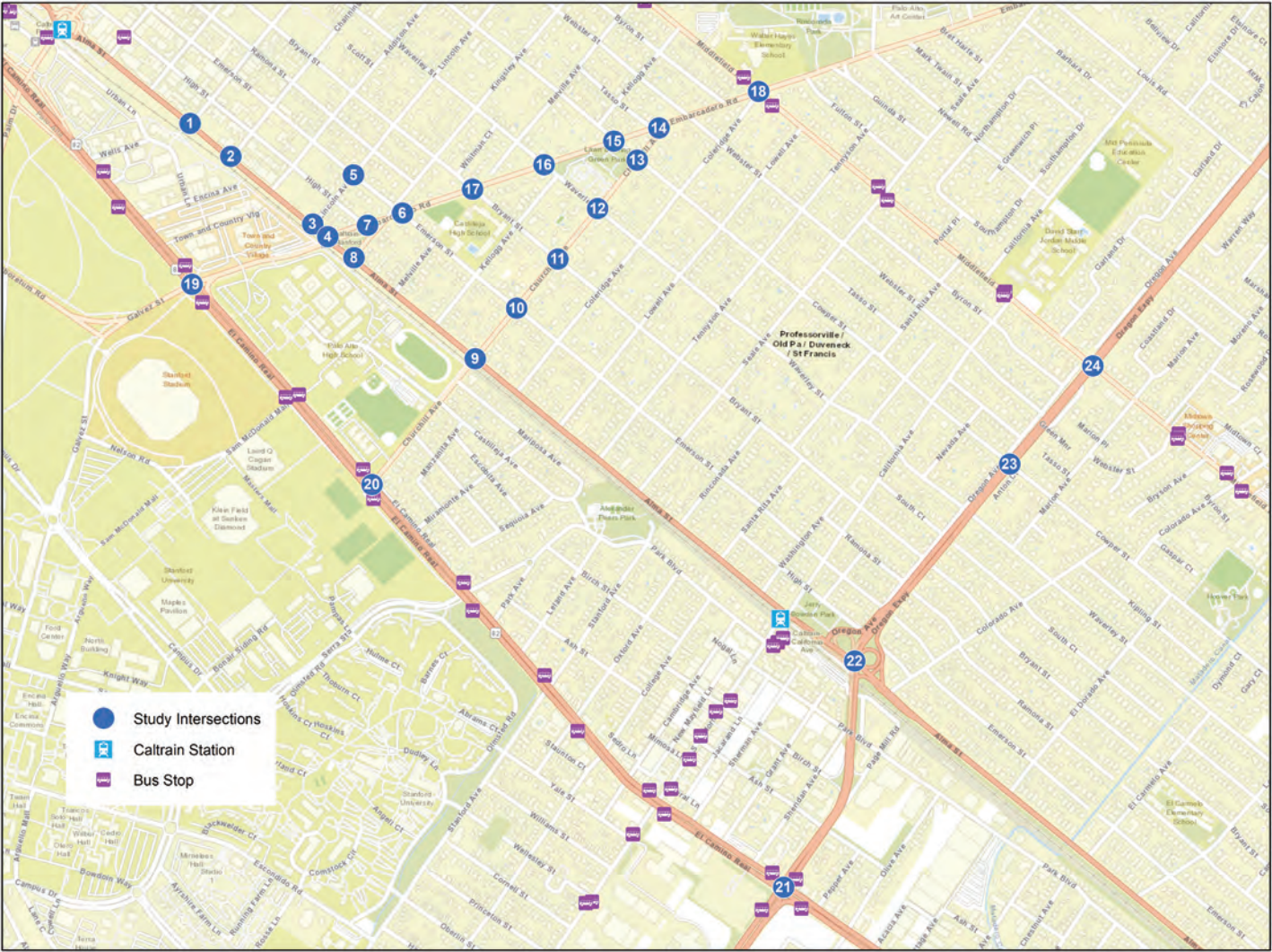
- +XX

— Increase in Trip Volume
- XX

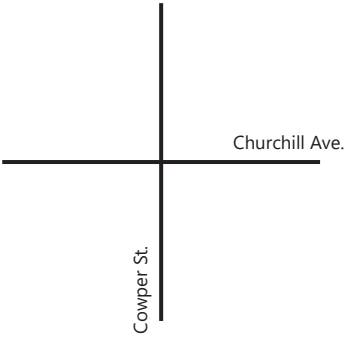
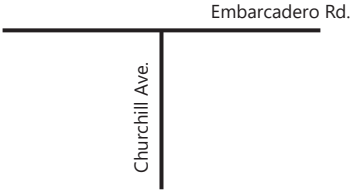
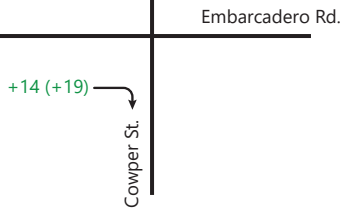
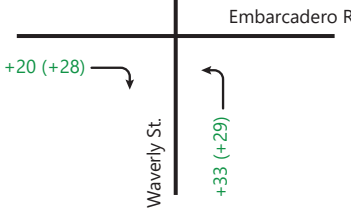
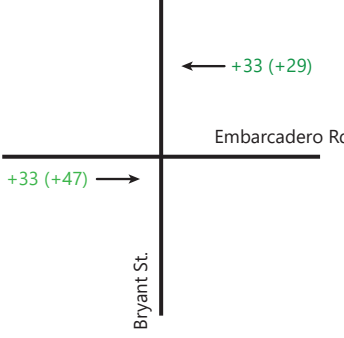
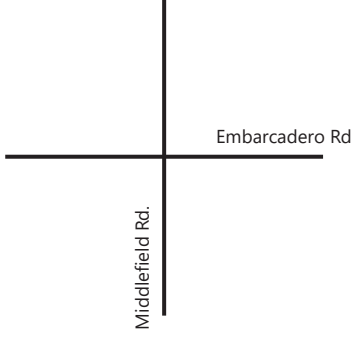
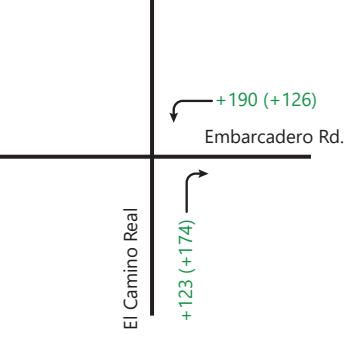
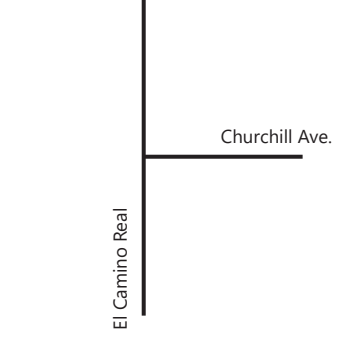
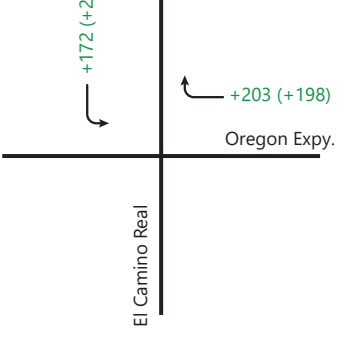
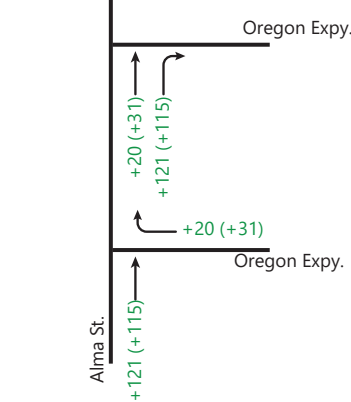
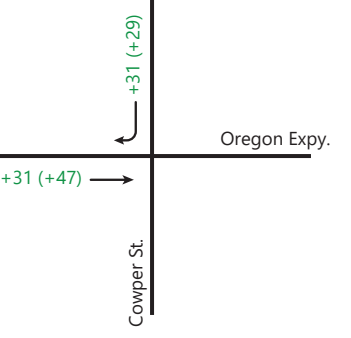
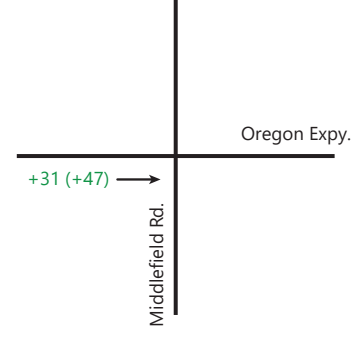
— Decrease in Trip Volume
- 

Indicates Restricted Movement
- XX (XX)

— AM (PM) Peak Hour Volumes



Rerouted Trips during Churchill Avenue Closure

Intersection #13 Cowper St. / Churchill Ave.	Intersection #14 Churchill Ave. / Embarcadero Rd.	Intersection #15 Cowper St. / Embarcadero Rd.	Intersection #16 Waverly St. / Embarcadero Rd.
			
Intersection #17 Bryant St. / Embarcadero Rd.	Intersection #18 Middlefield Rd. / Embarcadero Rd.	Intersection #19 El Camino Real / Embarcadero Rd.	Intersection #20 El Camino Real / Churchill Ave.
			
Intersection #21 El Camino Real / Oregon Expy.	Intersection #22 Alma St. / Oregon Expy.	Intersection #23 Cowper St. / Oregon Expy.	Intersection #24 Middlefield Rd. / Oregon Expy.
			

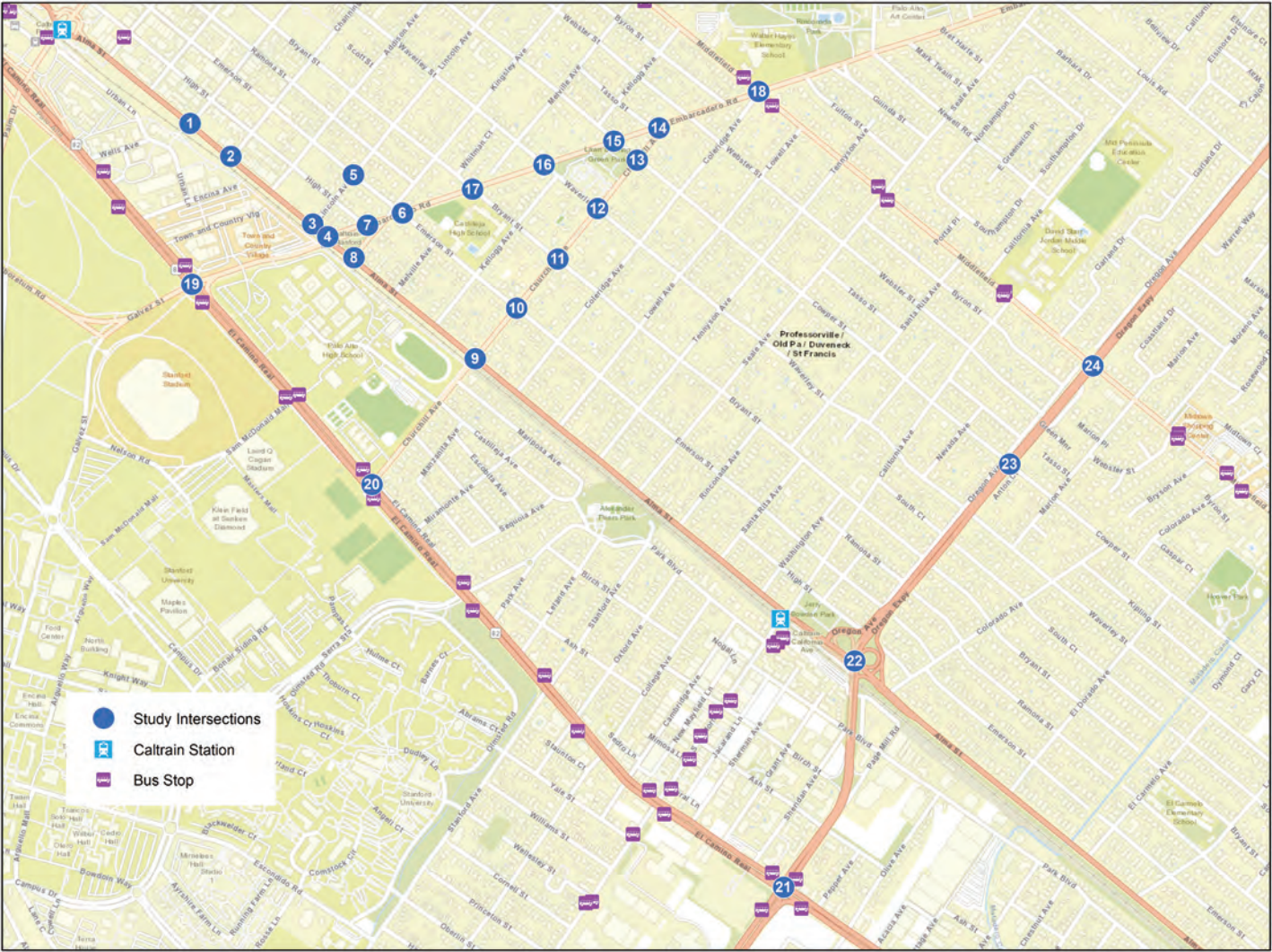
LEGEND

- +XX

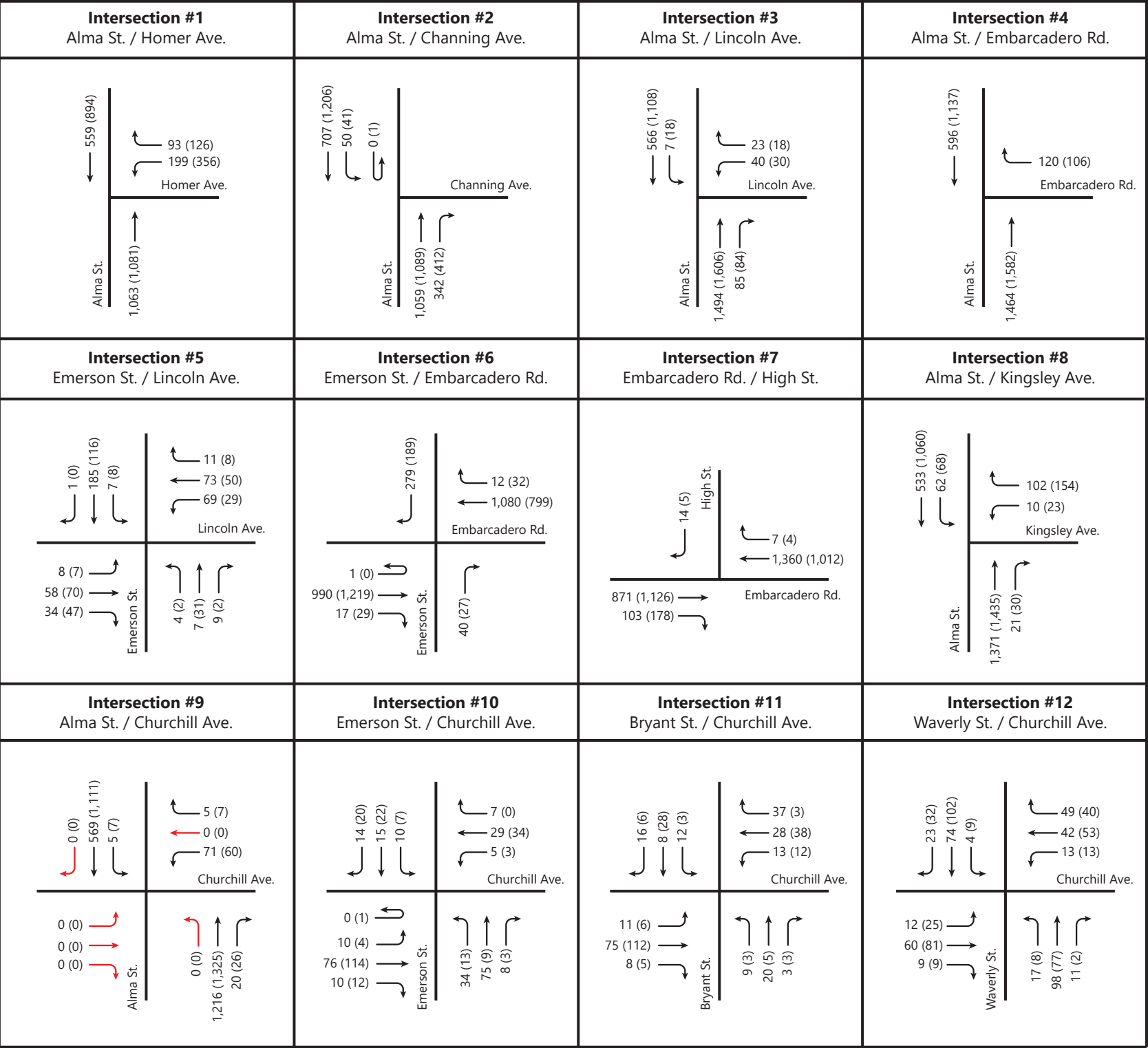
— Increase in Trip Volume
- XX

— Decrease in Trip Volume
- Indicates Restricted Movement
- XX (XX)

— AM (PM) Peak Hour Volumes

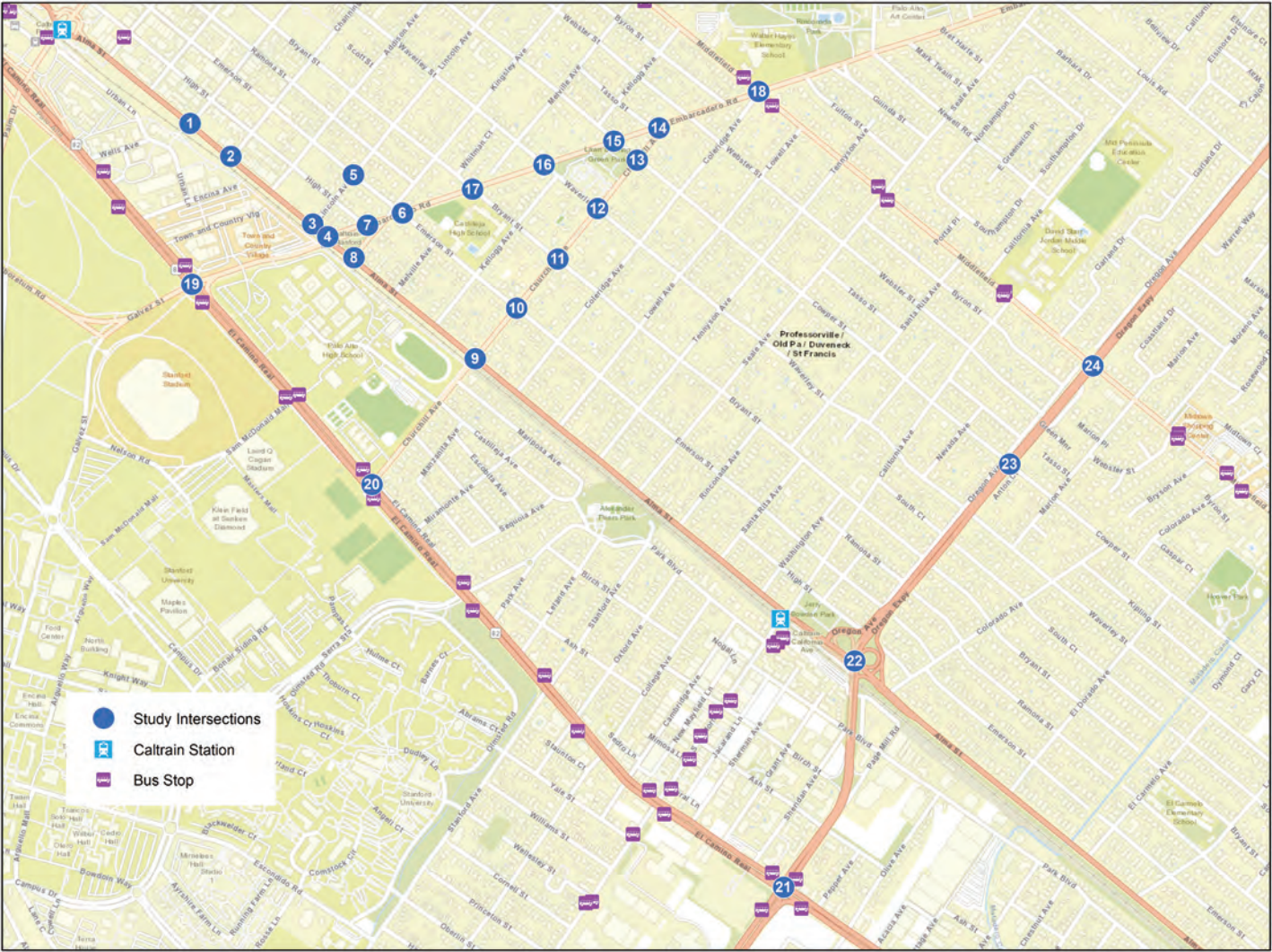


Existing Plus Churchill Avenue Closure Traffic Volumes



LEGEND

XX (XX) — AM (PM) Peak Hour Volumes
↗ ↘ ↙ — Indicates Restricted Movement



Existing Plus Churchill Avenue Closure Traffic Volumes

Intersection #13 Cowper St. / Churchill Ave.	Intersection #14 Churchill Ave. / Embarcadero Rd.	Intersection #15 Cowper St. / Embarcadero Rd.	Intersection #16 Waverly St. / Embarcadero Rd.
Intersection #17 Bryant St. / Embarcadero Rd.	Intersection #18 Middlefield Rd. / Embarcadero Rd.	Intersection #19 El Camino Real / Embarcadero Rd.	Intersection #20 El Camino Real / Churchill Ave.
Intersection #21 El Camino Real / Oregon Expy.	Intersection #22 Alma St. / Oregon Expy.	Intersection #23 Cowper St. / Oregon Expy.	Intersection #24 Middlefield Rd. / Oregon Expy.

LEGEND

XX (XX) — AM (PM) Peak Hour Volumes
↑ ↑ ↑ — Indicates Restricted Movement

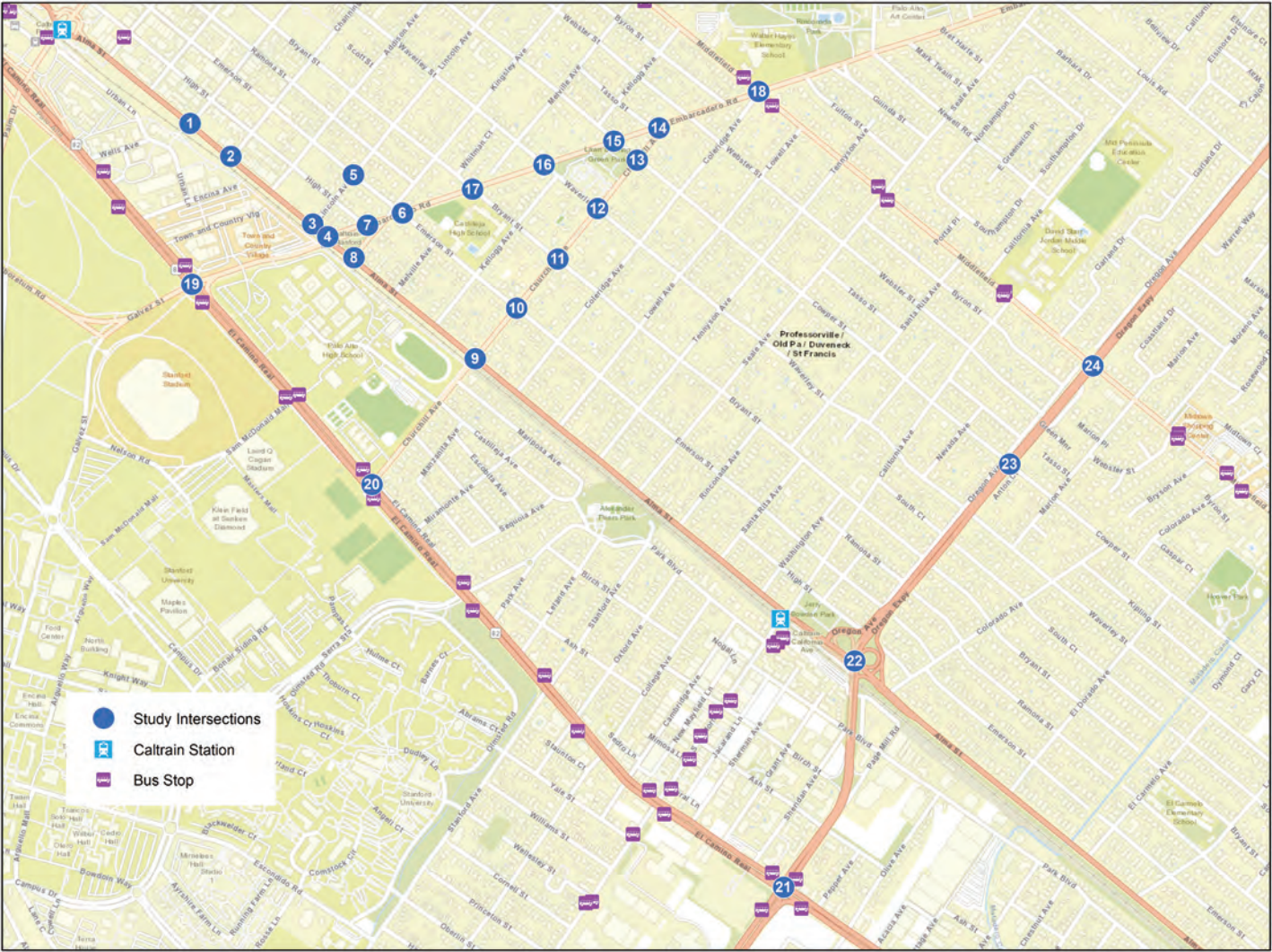


Table 10: Existing Plus Project Conditions LOS & Delay

#	Study Intersections	Control	Peak Hour	Existing Plus Project Conditions	
				Average Delay ¹ (sec)	LOS
1	Alma Street/Homer Avenue	Signalized	A.M.	19.7	B
			P.M.	20.9	C
3	Alma Street/Lincoln Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
4	Alma Street/Embarcadero Road	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
5	Emerson Street/Lincoln Avenue	All-Way Stop	A.M.	12.0	B
			P.M.	8.7	A
8	Alma Street/Kingsley Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
9	Alma Street/Churchill Avenue	Signalized	A.M.	9.2	A
			P.M.	8.8	A
10	Churchill Avenue/Emerson Street	All-Way Stop	A.M.	8.6	A
			P.M.	8.0	A
11	Churchill Avenue/Bryant Street	Two-Way Stop	A.M.	11.6	B
			P.M.	10.6	B
12	Churchill Avenue/Waverly Street	All-Way Stop	A.M.	9.0	A
			P.M.	8.7	A
13	Churchill Avenue/Cowper Street	All-Way Stop	A.M.	7.7	A
			P.M.	7.8	A
14	Churchill Avenue/Embarcadero Road	One-Way Stop	A.M.	9.7	A
			P.M.	9.9	A
15	Embarcadero Road/Cowper Street	Two-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
16	Embarcadero Road/Waverly Street	Signalized	A.M.	29.4	C
			P.M.	49.7	D
17	Embarcadero Road/Bryant Street	Signalized	A.M.	14.2	B
			P.M.	7.3	A
18	Middlefield Road/Embarcadero Road	Signalized	A.M.	>80.0	F
			P.M.	38.1	D
19	El Camino Real/Embarcadero Road	Signalized	A.M.	>80.0	F
			P.M.	>80.0	F
20	El Camino Real/Churchill Avenue	Signalized	A.M.	40.9	D
			P.M.	62.6	E
21	El Camino Real/Oregon Expressway-Page Mill Road	Signalized	A.M.	>80.0	F
			P.M.	>80.0	F
22a	Alma Street/Oregon Expressway WB Off Ramp (Oregon Ave)	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
22b	Alma Street/Oregon Expressway EB Off Ramp	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F

#	Study Intersections	Control	Peak Hour	Existing Plus Project Conditions	
				Average Delay ¹ (sec)	LOS
23	Oregon Expressway/Cowper Street	Signalized	A.M.	29.3	C
			P.M.	18.2	B
24	Oregon Expressway/Middlefield Road	Signalized	A.M.	62.9	E
			P.M.	56.1	E

Notes:

¹Delay: Overall intersection delay in seconds per vehicle for signalized and unsignalized all-way stop controlled intersections. Delay for minor approach worst movement or major approach critical movements at unsignalized one-way and two-way stop controlled intersections.

Delay is reported as >50.0 for unsignalized intersections with LOS F and >80.0 for signalized intersections consistent with HCM 2000 methodology.

Bold indicates unacceptable LOS.

Table 11 summarizes the 95th percentile queue lengths for all approach movements at the study intersections for the weekday a.m. and p.m. peak hour. Existing Plus Project queue length analysis resulted in several intersections with 95th percentile queue lengths exceeding storage capacity.

Based on Synchro analysis results, intersections where queue lengths exceed the existing storage lengths are listed below:

- Embarcadero Road/Waverly Street for EBL (p.m. peak hour)
- Embarcadero Road/Bryant Street for EBL (p.m. peak hour)
- Embarcadero Road/Middlefield Road for WBL (p.m. peak hour), NBL and SBL (all peak hours)
- El Camino Real/Embarcadero Road for WBL (all peak hours), NBL (a.m. peak hour), and SBL (all peak hours)
- El Camino Real/Churchill Avenue for NBR (all peak hours) and SBL (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road for WBL (all peak hours) and SBL (all peak hours)
- Oregon Expressway/Middlefield Road for EBR (all peak hours), NBL (all peak hours), and SBL (a.m. peak hour)

Table 11: Existing Plus Project 95th Percentile Queue Lengths (ft.)

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Existing Plus Churchill Avenue Closure Conditions	
				A.M.	P.M.
1	Alma Street/Homer Avenue (Signalized)	WBL	-	100	189
		NBT	-	327	343
		SBT	-	154	277
3	Alma Street/Lincoln Avenue (One-Way Stop Control)	WBLR	-	106	166
		NBT	-	<25	<25
		NBTL	-	<25	<25
		SBTL	-	<25	<25
		SBT	-	<25	<25
4	Alma Street/Embarcadero Road (One-Way Stop Control)	WBR	-	277	338
		NBT	-	<25	<25
		SBT	-	<25	<25
8	Alma Street/Kingsley Avenue (One-Way Stop Control)	WBL	-	228	513
		NBT	-	<25	<25
		SBT	-	<25	<25
9	Alma Street/Churchill Avenue (Signalized)	EBT	-	-	-
		EBR	-	-	-
		WBT	-	125	105
		NBL	-	-	-
		NBT	-	284	331
		SBL	-	-	-
		SBT	-	106	244
		SBR	-	-	-
11	Churchill Avenue/Bryant Street (Two-Way Stop Control)	EBLTR	-	<25	<25
		WBLTR	-	<25	<25
		NBLTR	-	<25	<25
		SBLTR	-	<25	<25
14	Churchill Avenue54/Embarcadero Road (One-Way Stop Control)	EBT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
		WBT	-	<25	<25
		NBR	-	<25	<25
15	Embarcadero Road/Cowper Street (Two-Way Stop Control)	EBLT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
		WBTR	-	<25	<25
		NBLTR	-	26	29
16	Embarcadero Road/Waverly Street (Signalized)	SBLTR	-	64	41
		EBL	95	m#87	#186
		EBT	-	367	#543
		WBL	75	40	38
		WBT	-	424	372
		NBT	-	148	90
17	Embarcadero Road/Bryant Street (Signalized)	SBT	-	173	125
		EBL	80	29	110
		EBT	-	213	261

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Existing Plus Churchill Avenue Closure Conditions	
				A.M.	P.M.
		WBL	60	m43	m4
		WBT	-	m477	391
		NBR	-	<25	<25
		SBR	-	<25	<25
18	Embarcadero Road/Middlefield Road (Signalized)	EBL	115	78	66
		EBT	-	#687	#517
		WBL	100	90	111
		WBT	-	#817	392
		NBL	115	#245	134
		NBT	-	198	179
		SBL	100	174	#190
		SBT	-	334	#426
19	El Camino Real/Embarcadero Road (Signalized)	EBL	-	113	#349
		EBT	-	157	#426
		WBL	200	#747	#714
		WBT	-	345	353
		NBL	382	m#424	m#340
		NBT	-	375	m#323
		SBL	300	#509	#462
		SBT	-	401	515
20	El Camino Real/Churchill Avenue (Signalized)	WBL	-	#457	#542
		NBT	-	#824	#989
		NBR	100	194	194
		SBL	170	m104	m295
		SBT	-	m437	m484
21	El Camino Real/Oregon Expressway-Page Mill Road (Signalized)	EBL	350	#325	237
		EBT	-	508	668
		EBR	-	132	219
		WBL	100	188	278
		WBT	-	#1016	#907
		NBL	300	253	147
		NBT	-	#945	#655
		SBL	350	#480	#797
		SBT	-	300	631
		SBR	350	98	95
22a	Alma Street/Oregon Expressway WB Ramps (Oregon Ave) (One-Way Stop Control)	WBL	-	27	108
		WBR	-	25	<25
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBT	-	<25	<25
		SBTR	-	<25	<25
22b	Alma Street/Oregon Expressway EB Ramps (One-Way Stop Control)	WBR	-	347	381
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBL	-	26	<25
		SBT	-	<25	<25
23		EBL	115	48	60

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Existing Plus Churchill Avenue Closure Conditions	
				A.M.	P.M.
	Oregon Expressway/Cowper Street (Signalized)	EBT	-	815	817
		EBR	50	<25	26
		WBL	115	m27	m40
		WBT	-	m825	807
		NBL	-	#185	84
		NBT	-	106	55
		SBL	-	60	29
		SBT	-	88	104
24	Oregon Expressway/Middlefield Road (Signalized)	EBL	360	m#175	#260
		EBT	-	#881	486
		EBR	100	m141	146
		WBL	390	182	#305
		WBT	-	#774	559
		WBR	100	<25	<25
		NBL	230	#489	#375
		NBT	-	#534	#782
		NBR	-	95	77
		SBL	145	154	91
		SBT	-	235	348

Notes:

EB, WB, NB, SB – Eastbound, Westbound, Northbound, Southbound respectively.

L, T, R – Left, Through, Right respectively.

Queue lengths taken from Synchro reports.

#: 95th percentile volume exceeds capacity, queue may be longer.

m: Volume for 95th percentile queue is metered by upstream signal.

Bold indicates queue lengths exceeding existing storage capacity.

PEDESTRIAN, BICYCLE, AND TRANSIT IMPACTS

Pedestrian Impacts

Under existing conditions, pedestrians are able to cross the Churchill Avenue grade crossing by using the provided pedestrian facilities at and near the signalized intersection of Alma Street/Churchill Avenue. Pedestrians are provided with marked crosswalks to cross Alma Street and the train tracks. Currently, approximately 73 pedestrians in the a.m. peak period cross Alma Street at Churchill Avenue and it is assumed that majority of the 73 pedestrians will also cross the train tracks. In the p.m. peak period, 19 pedestrians cross Alma Street and it is assumed that the pedestrians also cross the train tracks. While the proposed underpass at Churchill Avenue is constructed, pedestrians will have to utilize other pedestrian facilities near the vicinity.

One alternative pedestrians can use if Churchill Avenue is closed is the California Avenue Bike/Pedestrian Underpass that is approximately 0.66 miles south of Alma Street/Churchill Avenue. Alternatively, pedestrians can use the Embarcadero Road underpass that is approximately 0.30 miles north of Alma Street/Churchill Avenue. The detour will ultimately increase the travel time of pedestrians who use the

Churchill Avenue grade crossing to access Palo Alto High School, El Camino Field, and Stanford University. Providing wayfinding signs can assist pedestrians with navigating through the study area and using the alternative crossings previously mentioned.

Bicycle Impacts

Similar to the pedestrians, bicycles are able to cross the Churchill Avenue grade crossing by using the provided bicycle facilities at and near the signalized intersection of Alma Street/Churchill Avenue. Bicycles are provided with Class II facilities to cross Alma Street and the train tracks. Currently, a total of 314 bicycles in the a.m. peak period cross Alma Street at Churchill Avenue and it is assumed that majority of the 314 bicycles will also cross the train tracks. In the p.m. peak period, 63 bicycles cross Alma Street and it is assumed that the bicycles also cross the train tracks. Similar to pedestrians, bicyclists will have to utilize other bicycle facilities to cross the train tracks while the proposed underpass at Churchill Avenue is constructed.

Bicyclists can elect to use the California Avenue Bike/Pedestrian Underpass that is approximately 0.66 miles south of Alma Street/Churchill Avenue. Alternatively, bicyclists can use the Embarcadero Road underpass that is approximately 0.30 miles north of Alma Street/Churchill Avenue. The detour will increase the travel time of bicyclists who use the Churchill Avenue grade crossing to access Palo Alto High School, El Camino Field, and Stanford University. Similar to pedestrians, providing wayfinding signs can assist bicyclists with navigating through the study area and using the alternative crossings previously mentioned.

Transit Impacts

Currently, there are no bus routes that use Churchill Avenue to cross the Caltrain train tracks. However, the closure of Churchill Avenue will cause the existing volumes that cross Churchill Avenue to use alternate routes, which will increase the delay at the intersections where buses are present. Routes that will be affected due to the rerouting of traffic will be VTA Route 22 and 522, VTA Route 104, Dumbarton Express, and the Embarcadero Shuttle.

MITIGATION MEASURES

Based on the LOS and delay analyses conducted at the study intersections, it was observed that several intersections would be impacted by the closure of Churchill Avenue during the Existing Plus Project scenario in both a.m. and p.m. peak periods. The intersections that experience an increase in delay or degrade from acceptable LOS to unacceptable LOS under the Existing Plus Project scenario:

- Alma Street/Lincoln Avenue
- Alma Street/Embarcadero Road
- Alma Street/Kingsley Avenue
- Embarcadero Road/Cowper Street
- El Camino Real/Embarcadero Road
- El Camino Real/Oregon Expressway-Page Mill Road
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue)
- Alma Street/Oregon Expressway EB Off Ramp

While introducing the potential mitigation measures, it should be noted that the intersections of Alma Street/Lincoln Avenue, Alma Street/Embarcadero Road, and Alma Street/Kingsley Avenue were mitigated as a group since individual mitigations did not provide as much benefit as group mitigation. Potential mitigation measures to alleviate the delay experienced at the intersections during the Existing Plus Project scenario could include the following:

1. At Alma Street/Lincoln Avenue, convert the westbound approach into a right-turn only lane and divert the left-turn movement onto Embarcadero Road. Additionally, at Alma Street/Embarcadero Road, convert the westbound movement from a right-turn only lane into a right-turn lane and left-turn lane. This would require the removal of a few parking spaces, restriping of the westbound approach, and signalizing the intersection of Alma Street/Embarcadero Road. Finally, the intersection of Alma Street/Kingsley Avenue would also be signalized. Both of these newly signalized intersections would operate on one controller. Both intersections of Alma Street/Embarcadero Road and Alma Street/Kingsley Avenue satisfy the peak hour signal warrants. Signal warrant sheets can be found in **Appendix F**.
2. At Embarcadero Road/Cowper Street, convert the northbound and southbound approaches into a right turn only lane and divert the through and left turn movements to the adjacent signalized intersection of Embarcadero Road/Waverly Street. Appropriate signing and striping would be required for the northbound and southbound approaches of Cowper Street.
3. At El Camino Real/Embarcadero Road, installing an additional westbound left-turn lane and an exclusive northbound right-turn lane. Changing the lane geometry of this intersection would also require optimization of the signal timings.
4. At El Camino Real/Oregon Expressway-Page Mill Road, installing a westbound right-turn lane from Oregon Expressway to El Camino Real and optimizing the signal timings would mitigate the additional delay caused by the project.
5. At Alma Street/Oregon Expressway WB Off Ramp and Alma Street/Oregon Expressway EB Off Ramp, signalizing both off ramps operating with one controller. Under this scenario, Alma Street/Oregon Expressway EB Off Ramp satisfies the peak hour signal warrant. Signal warrant sheets can be found in **Appendix F**.

TJKM evaluated the mitigation measures at the above intersections to ascertain the impact on LOS and delay. Based on the analysis conducted for the mitigation measures at the above intersections, all intersections upgrade to acceptable LOS and delay thresholds. **Table 12** summarizes the LOS and delay for the mitigation measures presented. **Appendix G** contains the Synchro LOS reports.

Table 12: Existing Plus Project with Mitigation LOS & Delay

#	Study Intersections	Existing Control	Peak Hour	Existing Conditions		Existing Plus Project		Existing Plus Project with Mitigations	
				Delay	LOS	Delay	LOS	Delay	LOS
3	Alma Street/Lincoln Avenue	One-Way Stop	A.M.	>50.0	F	>50.0	F	17.5	C
			P.M.	>50.0	F	>50.0	F	19.4	C
4	Alma Street/Embarcadero Road	One-Way Stop	A.M.	>50.0	F	>50.0	F	25.1	C
			P.M.	>50.0	F	>50.0	F	30.7	C
8	Alma Street/Kingsley Avenue	One-Way Stop	A.M.	>50.0	F	>50.0	F	23.6	C
			P.M.	>50.0	F	>50.0	F	28.3	C
15	Embarcadero Road/Cowper Street	One-Way Stop	A.M.	>50.0	F	>50.0	F	14.9	B
			P.M.	>50.0	F	>50.0	F	11.8	B
19	El Camino Real/Embarcadero Road	Signalized	A.M.	60.3	E	>80.0	F	67.1	E
			P.M.	67.0	E	>80.0	F	61.1	E
21	El Camino Real/Oregon Expressway-Page Mill Road	Signalized	A.M.	72.9	E	>80.0	F	72.5	E
			P.M.	66.4	E	>80.0	F	73.5	E
22a	Alma Street/Oregon Expressway WB Off Ramp (Oregon Ave)	One-Way Stop	A.M.	>50.0	F	>50.0	F	6.0	A
			P.M.	>50.0	F	>50.0	F	6.7	A
22b	Alma Street/Oregon Expressway EB Off Ramp	One-Way Stop	A.M.	>50.0	F	>50.0	F	17.9	B
			P.M.	>50.0	F	>50.0	F	16.0	B

Notes:

¹Delay: Overall intersection delay in seconds per vehicle for signalized intersections.

Delay for minor approach worst movement or major approach critical movements at unsignalized one-way stop controlled intersections.

Delay is reported as >50.0 for unsignalized intersections with LOS F and >80.0 for signalized intersections consistent with HCM 2000 methodology.

Bold indicates unacceptable LOS.

CUMULATIVE (2030) CONDITIONS

This section details expected traffic conditions at the study intersections under Cumulative Year 2030 (No Project) Conditions. This analysis scenario is defined as baseline conditions without the proposed project in year 2030. The Cumulative Year 2030 traffic volumes were estimated using the City of Palo Alto Travel Demand Forecasting Model, as well as input from City staff. Based on the model and input from City staff, a growth rate of 1% was applied to existing volumes. **Figures 16a** and **16b** summarize the peak hour intersection traffic demands for Cumulative Conditions (2030).

Cumulative Roadway Improvements

The improvements at the intersections listed below are planned and funded. Therefore, the intersections were analyzed based on the listed modifications:

- El Camino Real/Oregon Expressway-Page Mill Road – extending the westbound left turn lanes from westbound Oregon Expressway to southbound El Camino Real.

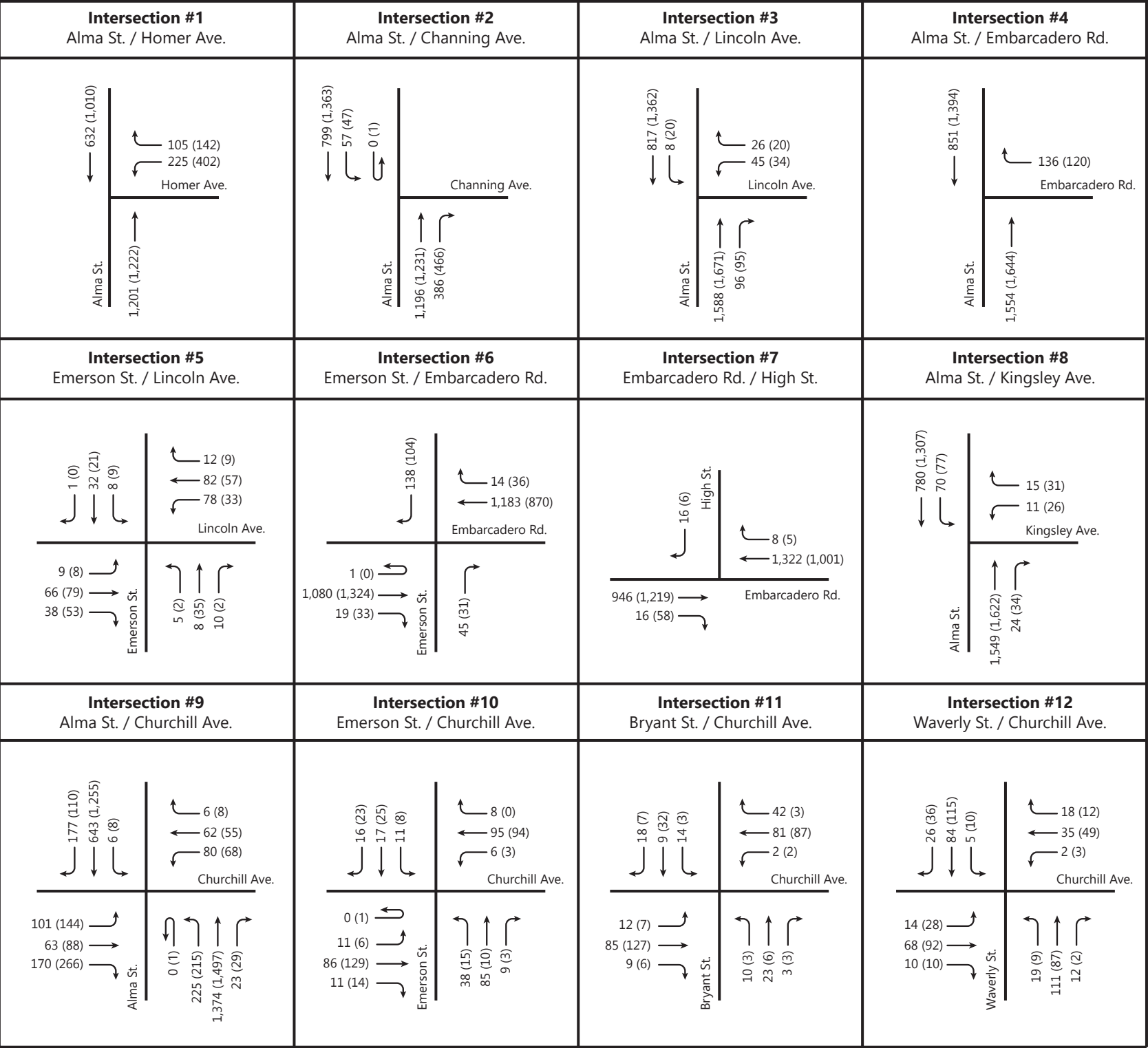
CUMULATIVE (2030) CONDITIONS LOS & 95TH PERCENTILE QUEUE LENGTH ANALYSIS

Existing signal timings were optimized for signalized intersections under this scenario. The results of the LOS and delay analysis and 95th percentile queue length in feet (ft.) analysis, using Synchro software, are summarized in **Tables 13** and **14** respectively. **Appendix H** contains the Synchro reports for all study intersections. The following intersections operate with unacceptable LOS based on City Standards and the Congestion Management Program (CMP):

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)
- Embarcadero Road/Cowper Street (all peak hours)
- Middlefield Road/Embarcadero Road (a.m. peak hour)*
- El Camino Real/Embarcadero Road (p.m. peak hour)
- El Camino Real/Churchill Avenue (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road (a.m. peak hour)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/Oregon Expressway EB Off Ramp (all peak hours)
- Oregon Expressway/Middlefield Road (all peak hours)

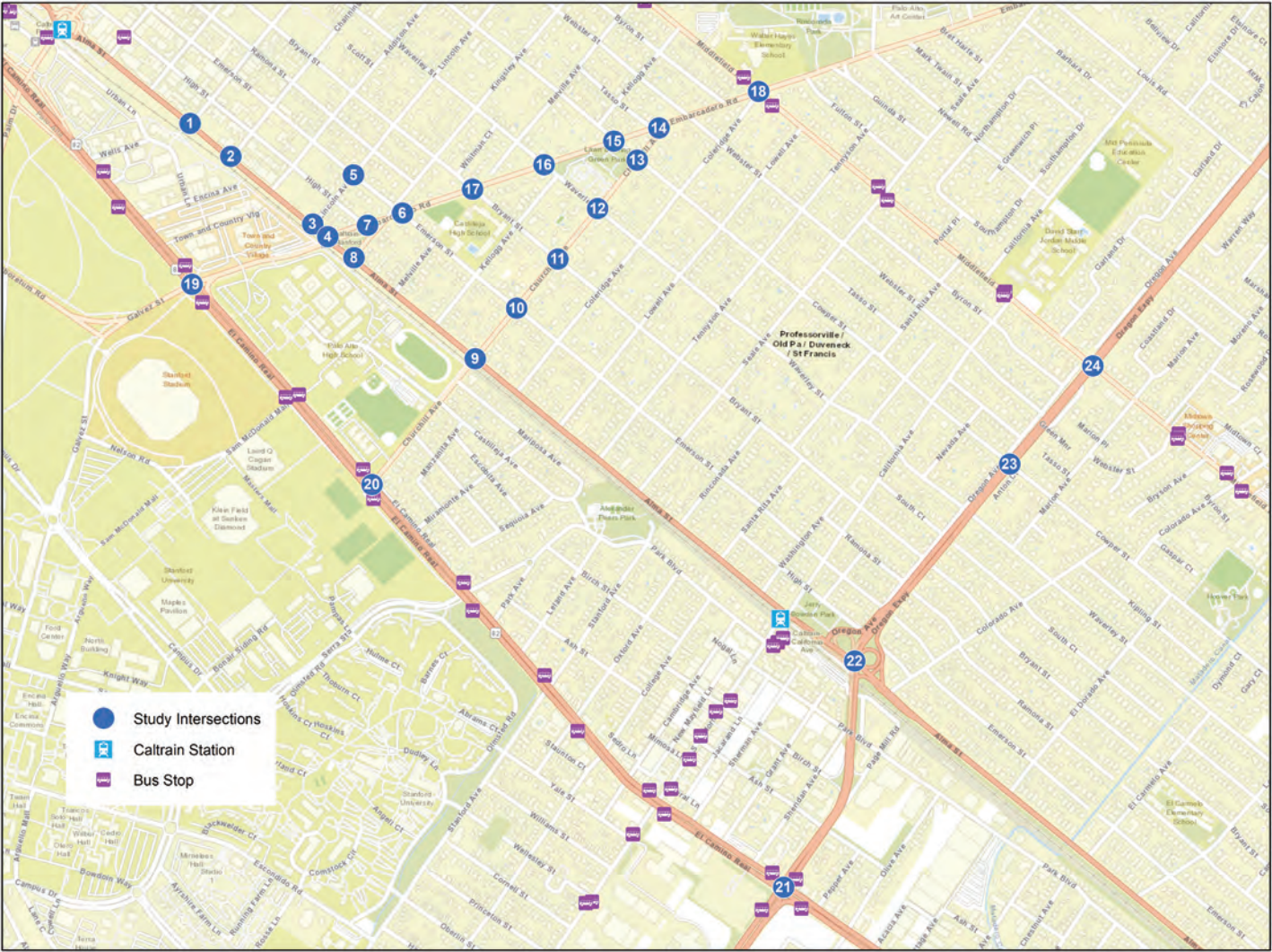
Note: *LOS reflects pedestrian-scramble phase during 30 minutes of the a.m. peak hour.

Cumulative Conditions (2030) Peak Hour Traffic Volumes



LEGEND

XX (XX) — AM (PM) Peak Hour Volumes



Cumulative Conditions (2030) Peak Hour Traffic Volumes

Intersection #13 Cowper St. / Churchill Ave.	Intersection #14 Churchill Ave. / Embarcadero Rd.	Intersection #15 Cowper St. / Embarcadero Rd.	Intersection #16 Waverly St. / Embarcadero Rd.
Intersection #17 Bryant St. / Embarcadero Rd.	Intersection #18 Middlefield Rd. / Embarcadero Rd.	Intersection #19 El Camino Real / Embarcadero Rd.	Intersection #20 El Camino Real / Churchill Ave.
Intersection #21 El Camino Real / Oregon Expy.	Intersection #22 Alma St. / Oregon Expy.	Intersection #23 Cowper St. / Oregon Expy.	Intersection #24 Middlefield Rd. / Oregon Expy.

LEGEND

XX (XX) — AM (PM) Peak Hour Volumes

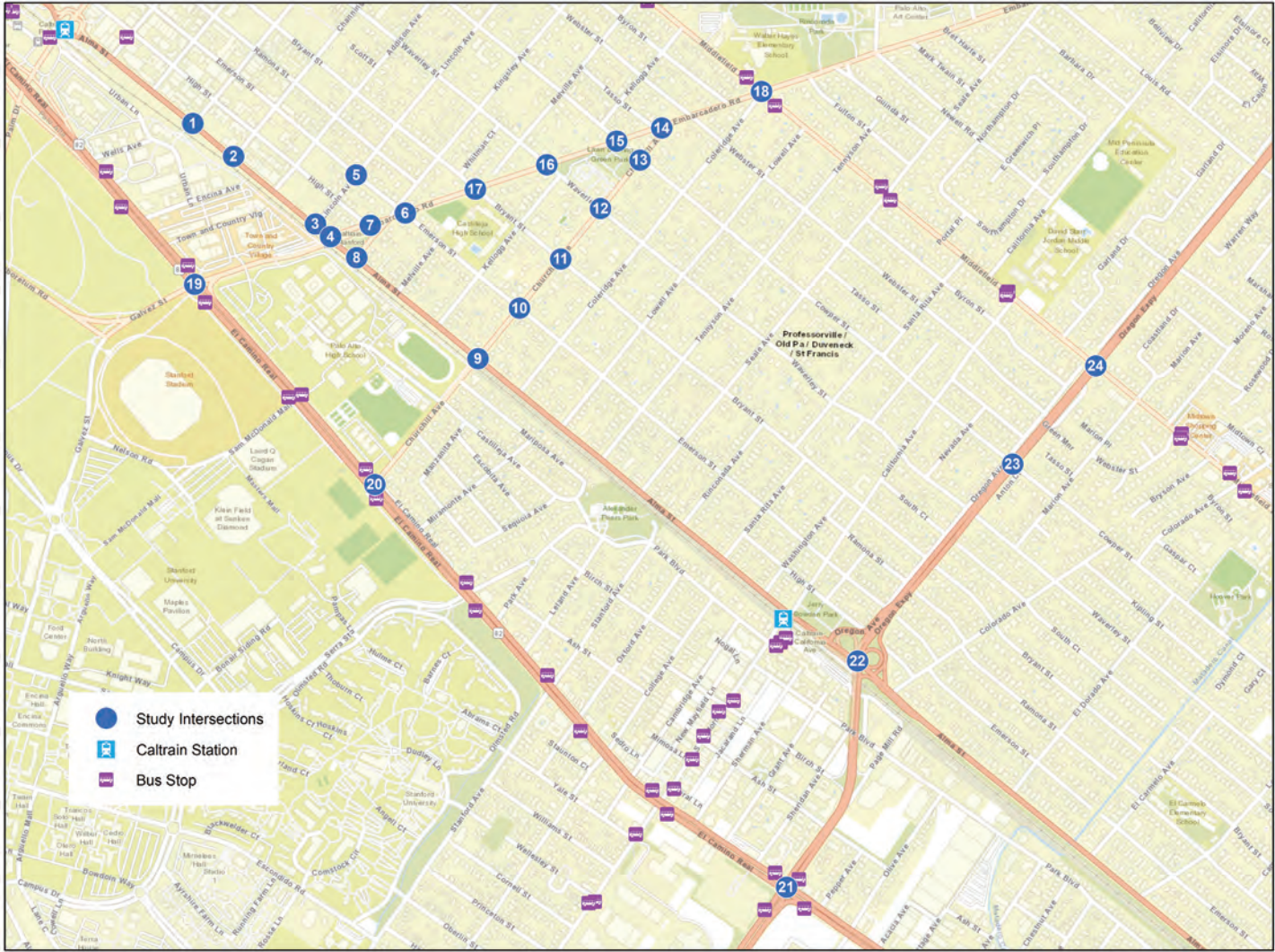


Table 13: Cumulative Conditions (2030) LOS & Delay

#	Study Intersections	Control	Peak Hour	Cumulative Conditions	
				Average Delay ¹ (sec)	LOS
1	Alma Street/Homer Avenue	Signalized	A.M.	20.8	C
			P.M.	27.2	C
3	Alma Street/Lincoln Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
4	Alma Street/Embarcadero Road	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
5	Emerson Street/Lincoln Avenue	All-Way Stop	A.M.	8.5	A
			P.M.	7.9	A
8	Alma Street/Kingsley Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
9	Alma Street/Churchill Avenue	Signalized	A.M.	42.4	D
			P.M.	49.3	D
10	Churchill Avenue/Emerson Street	All-Way Stop	A.M.	8.6	A
			P.M.	8.2	A
11	Churchill Avenue/Bryant Street	Two-Way Stop	A.M.	10.9	B
			P.M.	10.6	A
12	Churchill Avenue/Waverly Street	All-Way Stop	A.M.	8.5	A
			P.M.	8.7	A
13	Churchill Avenue/Cowper Street	All-Way Stop	A.M.	7.7	A
			P.M.	7.8	A
14	Churchill Avenue/Embarcadero Road	One-Way Stop	A.M.	9.6	A
			P.M.	9.6	A
15	Embarcadero Road/Cowper Street	Two-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
16	Embarcadero Road/Waverly Street	Signalized	A.M.	26.1	C
			P.M.	23.8	C
17	Embarcadero Road/Bryant Street	Signalized	A.M.	12.6	B
			P.M.	7.1	A
18	Middlefield Road/Embarcadero Road	Signalized	A.M.	>80.0	F
			P.M.	43.4	D
19	El Camino Real/Embarcadero Road	Signalized	A.M.	70.6	E
			P.M.	>80.0	F
20	El Camino Real/Churchill Avenue	Signalized	A.M.	53.1	D
			P.M.	>80.0	F
21	El Camino Real/Oregon Expressway-Page Mill Road	Signalized	A.M.	>80.0	F
			P.M.	76.8	E
22a	Alma Street/Oregon Expressway WB Off Ramp (Oregon Ave)	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
22b	Alma Street/Oregon Expressway EB Off Ramp	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
23	Oregon Expressway/Cowper Street	Signalized	A.M.	25.2	C

#	Study Intersections	Control	Peak Hour	Cumulative Conditions	
				Average Delay ¹ (sec)	LOS
			P.M.	18.8	B
24	Oregon Expressway/Middlefield Road	Signalized	A.M.	>80.0	F
			P.M.	>80.0	F

Notes:

¹Delay: Overall intersection delay in seconds per vehicle for signalized and unsignalized all-way stop controlled intersections. Delay for minor approach worst movement or major approach critical movements at unsignalized one-way and two-way stop controlled intersections.

Delay is reported as >50.0 for unsignalized intersections with LOS F and >80.0 for signalized intersections consistent with HCM 2000 methodology.

Bold indicates unacceptable LOS.

Table 14 summarizes the 95th percentile queue lengths for all approach movements at the study intersections for the weekday a.m. and p.m. peak hour. Cumulative conditions queue length analysis resulted in several intersections with 95th percentile queue lengths exceeding storage capacity.

Based on Synchro analysis results, intersections where queue lengths exceed the existing storage lengths are listed below:

- Alma Street/Churchill Avenue for NBL (all peak hours) and SBR (a.m. peak hour)
- Embarcadero Road/Waverly Street for EBL (p.m. peak hour)
- Embarcadero Road/Bryant Street for EBL (p.m. peak hour)
- Embarcadero Road/Middlefield Road for WBL (all peak hours), NBL and SBL (all peak hours)
- El Camino Real/Embarcadero Road for WBL (all peak hours), NBL (a.m. peak hour), and SBL (all peak hours)
- El Camino Real/Churchill Avenue for NBR (p.m. peak hour) and SBL (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road for EBL (a.m. peak hour), WBL (all peak hours), and SBL (p.m. peak hour)
- Oregon Expressway/Middlefield Road for EBL (p.m. peak hour), EBR (all peak hours), WBL (p.m. peak hour), NBL (all peak hours), and SBL (a.m. peak hour)

Table 14: Cumulative Conditions 95th Percentile Queue Lengths (ft.)

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Cumulative Conditions	
				A.M.	P.M.
1	Alma Street/Homer Avenue (Signalized)	WBL	-	127	#237
		NBT	-	382	410
		SBT	-	170	326
3	Alma Street/Lincoln Avenue (One-Way Stop Control)	WBLR	-	166	175
		NBT	-	<25	<25
		NBTL	-	<25	<25
		SBTL	-	<25	<25
		SBT	-	<25	<25
4	Alma Street/Embarcadero Road (One-Way Stop Control)	WBR	-	315	269
		NBT	-	<25	<25
		SBT	-	<25	<25
8	Alma Street/Kingsley Avenue (One-Way Stop Control)	WBL	-	55	182
		NBT	-	<25	<25
		SBT	-	<25	<25
9	Alma Street/Churchill Avenue (Signalized)	EBT	-	300	#460
		EBR	-	80	102
		WBT	-	279	256
		NBL	300	388	#440
		NBT	-	863	1008
		SBL	60	28	34
		SBT	-	416	908
		SBR	100	156	67
11	Churchill Avenue/Bryant Street (Two-Way Stop Control)	EBLTR	-	<25	<25
		WBLTR	-	<25	<25
		NBLTR	-	<25	<25
		SBLTR	-	<25	<25
14	Churchill Avenue/Embarcadero Road (One-Way Stop Control)	EBT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
		WBT	-	<25	<25
		NBR	-	<25	<25
15	Embarcadero Road/Cowper Street (Two-Way Stop Control)	EBLT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
		WBTR	-	<25	<25
		NBLTR	-	<25	30
16	Embarcadero Road/Waverly Street (Signalized)	SBLTR	-	58	43
		EBL	95	79	104
		EBT	-	464	416
		WBL	75	30	25
		WBT	-	361	272
		NBT	-	195	141
17	Embarcadero Road/Bryant Street (Signalized)	SBT	-	263	251
		EBL	80	37	145
		EBT	-	239	288
		WBL	60	m61	m7

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Cumulative Conditions	
				A.M.	P.M.
		WBT	-	500	338
		NBR	-	<25	<25
		SBR	-	<25	<25
18	Embarcadero Road/Middlefield Road (Signalized)	EBL	115	#95	73
		EBT	-	#664	486
		WBL	100	#124	#166
		WBT	-	#814	392
		NBL	115	#352	#210
		NBT	-	227	212
		SBL	100	#275	#267
		SBT	-	#426	#505
19	El Camino Real/Embarcadero Road (Signalized)	EBL	-	127	#387
		EBT	-	168	#475
		WBL	200	#385	#488
		WBT	-	382	402
		NBL	382	m#401	m250
		NBT	-	m#657	m324
		SBL	300	#505	#525
		SBT	-	502	#705
20	El Camino Real/Churchill Avenue (Signalized)	WBL	-	#594	#682
		NBT	-	#842	#1031
		NBR	100	189	196
		SBL	170	m#154	m#371
		SBT	-	m563	m643
21	El Camino Real/Oregon Expressway-Page Mill Road (Signalized)	EBL	350	#393	#324
		EBT	-	682	#889
		EBR	-	178	274
		WBL	100	210	#367
		WBT	-	#1150	#764
		NBL	300	281	#179
		NBT	-	#878	#657
		SBL	350	#342	#503
		SBT	-	311	641
22a	Alma Street/Oregon Expressway WB Ramps (Oregon Ave) (One-Way Stop Control)	SBR	350	137	84
		WBL	-	38	138
		WBR	-	35	31
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBT	-	<25	<25
22b	Alma Street/Oregon Expressway EB Ramps (One-Way Stop Control)	SBTR	-	<25	<25
		WBR	-	410	448
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBL	-	31	<25
23	Oregon Expressway/Cowper Street (Signalized)	SBT	-	<25	<25
		EBL	115	53	66
		EBT	-	#1048	#1008
		EBR	50	<25	34

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Cumulative Conditions	
				A.M.	P.M.
		WBL	115	m26	m42
		WBT	-	m#872	m837
		NBL	-	#250	100
		NBT	-	114	63
		SBL	-	74	33
		SBT	-	82	88
24	Oregon Expressway/Middlefield Road (Signalized)	EBL	360	m#245	m#371
		EBT	-	#998	#855
		EBR	100	m167	217
		WBL	390	#310	#417
		WBT	-	#1036	#765
		WBR	100	<25	<25
		NBL	230	#606	#462
		NBT	-	514	687
		NBR	-	119	81
		SBL	145	#187	104
		SBT	-	225	344

Notes:

EB, WB, NB, SB – Eastbound, Westbound, Northbound, Southbound respectively.

L, T, R – Left, Through, Right respectively.

Queue lengths taken from Synchro reports.

#: 95th percentile volume exceeds capacity, queue may be longer.

m: Volume for 95th percentile queue is metered by upstream signal.

Bold indicates queue lengths exceeding existing storage capacity.

CUMULATIVE (2030) PLUS PROJECT CONDITIONS

This scenario is similar to the Cumulative Conditions, with the addition of rerouted traffic from the closure of Churchill Avenue. Trip distribution and assignment for the proposed project are identical to that assumed under Existing Plus Project Conditions. **Figures 17a** and **17b** illustrates the projected rerouted trips due to the closure of Churchill Avenue and **Figures 18a** and **18b** illustrates the total traffic demand under the Cumulative Plus Project scenario for the a.m. and p.m. peak hours.

CUMULATIVE (2030) PLUS PROJECT LOS & 95TH PERCENTILE QUEUE LENGTH ANALYSIS

Existing signal timings were optimized for signalized intersections under this scenario. The proposed intersection geometry of Alma Street/Churchill Avenue that was previously discussed in the Existing Plus Project scenario will also be analyzed in this scenario. The results of the LOS, delay and 95th percentile queue length in feet (ft.) analysis using Synchro software are summarized in **Tables 15** and **16** respectively. **Appendix I** contains Synchro reports for all study intersections.

The following intersections operate with unacceptable LOS based on City Standards and the Congestion Management Program (CMP):

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)
- Embarcadero Road/Cowper Street (all peak hours)
- Middlefield Road/Embarcadero Road (a.m. peak hour)*
- El Camino Real/Embarcadero Road (all peak hours)
- El Camino Real/Churchill Avenue (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road (all peak hours)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/ Oregon Expressway EB Off Ramp (all peak hours)
- Oregon Expressway/Middlefield Road (all peak hours)

Note: *LOS reflects pedestrian-scramble phase during 30 minutes of the a.m. peak hour.

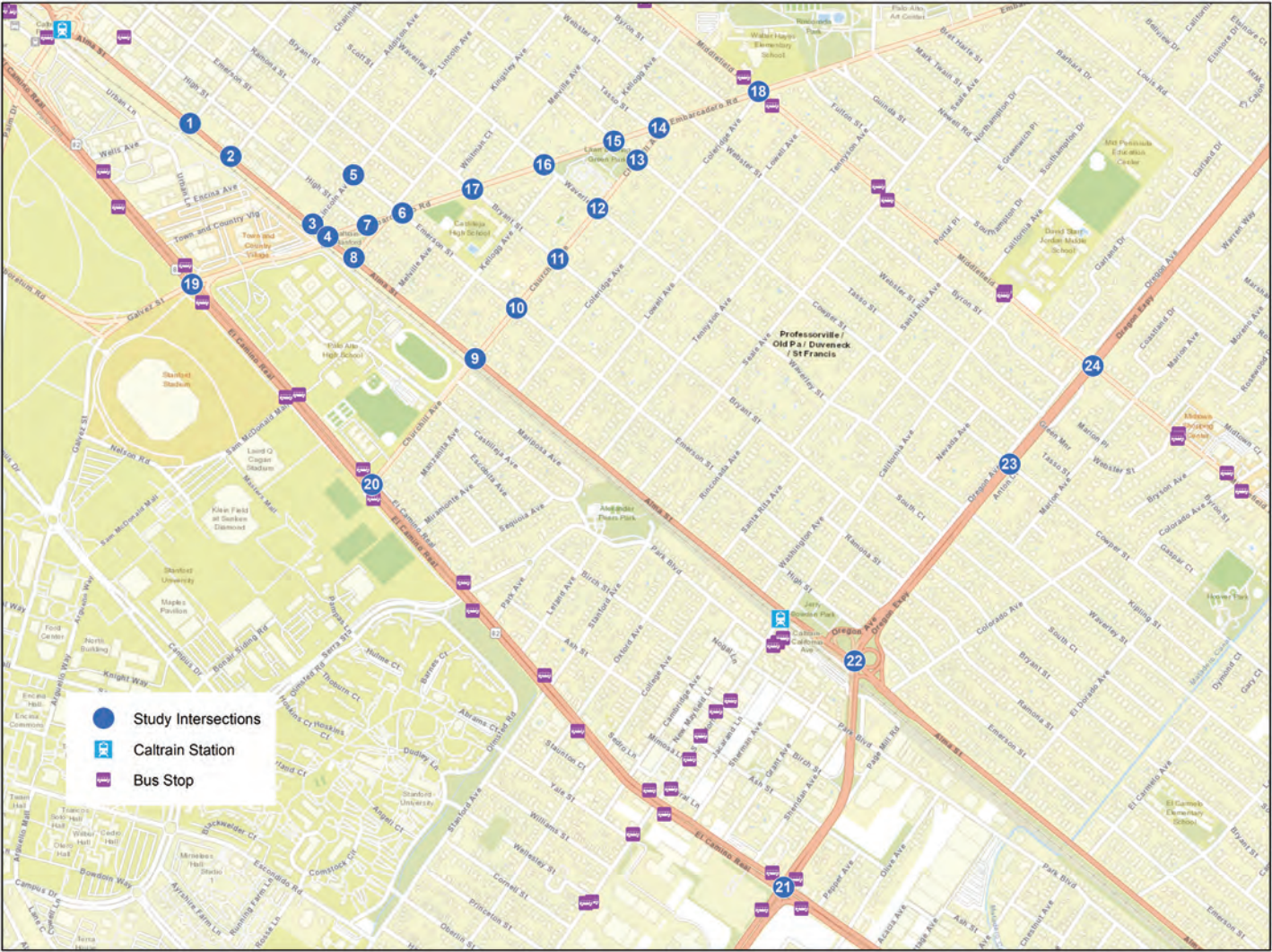
Rerouted Trips during Cumulative Plus Churchill Avenue Closure

Intersection #1 Alma St. / Homer Ave.	Intersection #2 Alma St. / Channing Ave.	Intersection #3 Alma St. / Lincoln Ave.	Intersection #4 Alma St. / Embarcadero Rd.
Intersection #5 Emerson St. / Lincoln Ave.	Intersection #6 Emerson St. / Embarcadero Rd.	Intersection #7 Embarcadero Rd. / High St.	Intersection #8 Alma St. / Kingsley Ave.
Intersection #9 Alma St. / Churchill Ave.	Intersection #10 Emerson St. / Churchill Ave.	Intersection #11 Bryant St. / Churchill Ave.	Intersection #12 Waverly St. / Churchill Ave.

LEGEND

+XX — Increase in Trip Volume
-XX — Decrease in Trip Volume

— Indicates Restricted Movement
XX (XX) — AM (PM) Peak Hour Volumes



Rerouted Trips during Cumulative Plus Churchill Avenue Closure

Intersection #13 Cowper St. / Churchill Ave.	Intersection #14 Churchill Ave. / Embarcadero Rd.	Intersection #15 Cowper St. / Embarcadero Rd.	Intersection #16 Waverly St. / Embarcadero Rd.
Intersection #17 Bryant St. / Embarcadero Rd.	Intersection #18 Middlefield Rd. / Embarcadero Rd.	Intersection #19 El Camino Real / Embarcadero Rd.	Intersection #20 El Camino Real / Churchill Ave.
Intersection #21 El Camino Real / Oregon Expy.	Intersection #22 Alma St. / Oregon Expy.	Intersection #23 Cowper St. / Oregon Expy.	Intersection #24 Middlefield Rd. / Oregon Expy.

LEGEND

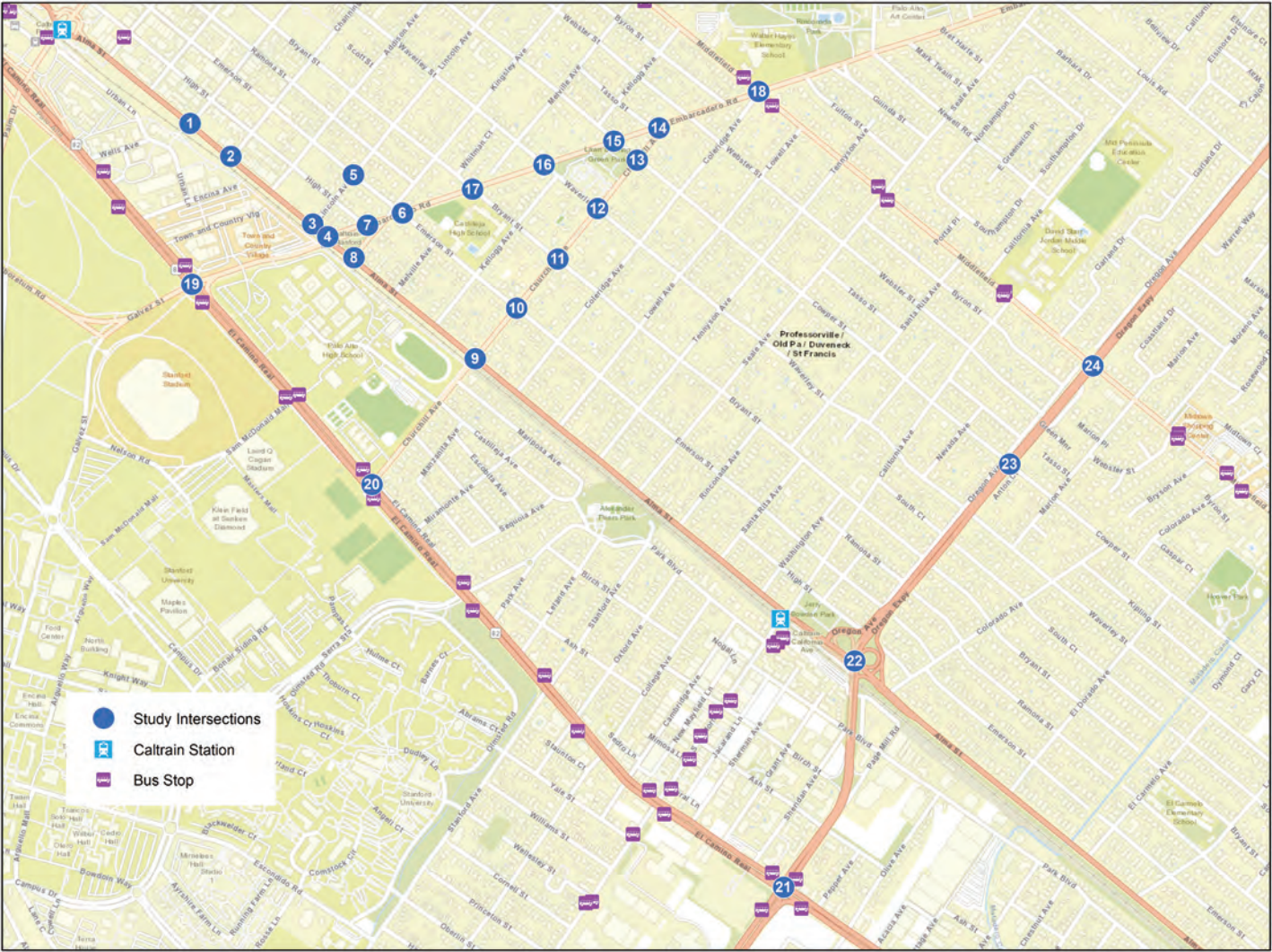
- +XX

— Increase in Trip Volume
- XX

— Decrease in Trip Volume
-   

Indicates Restricted Movement
- XX (XX)

— AM (PM) Peak Hour Volumes



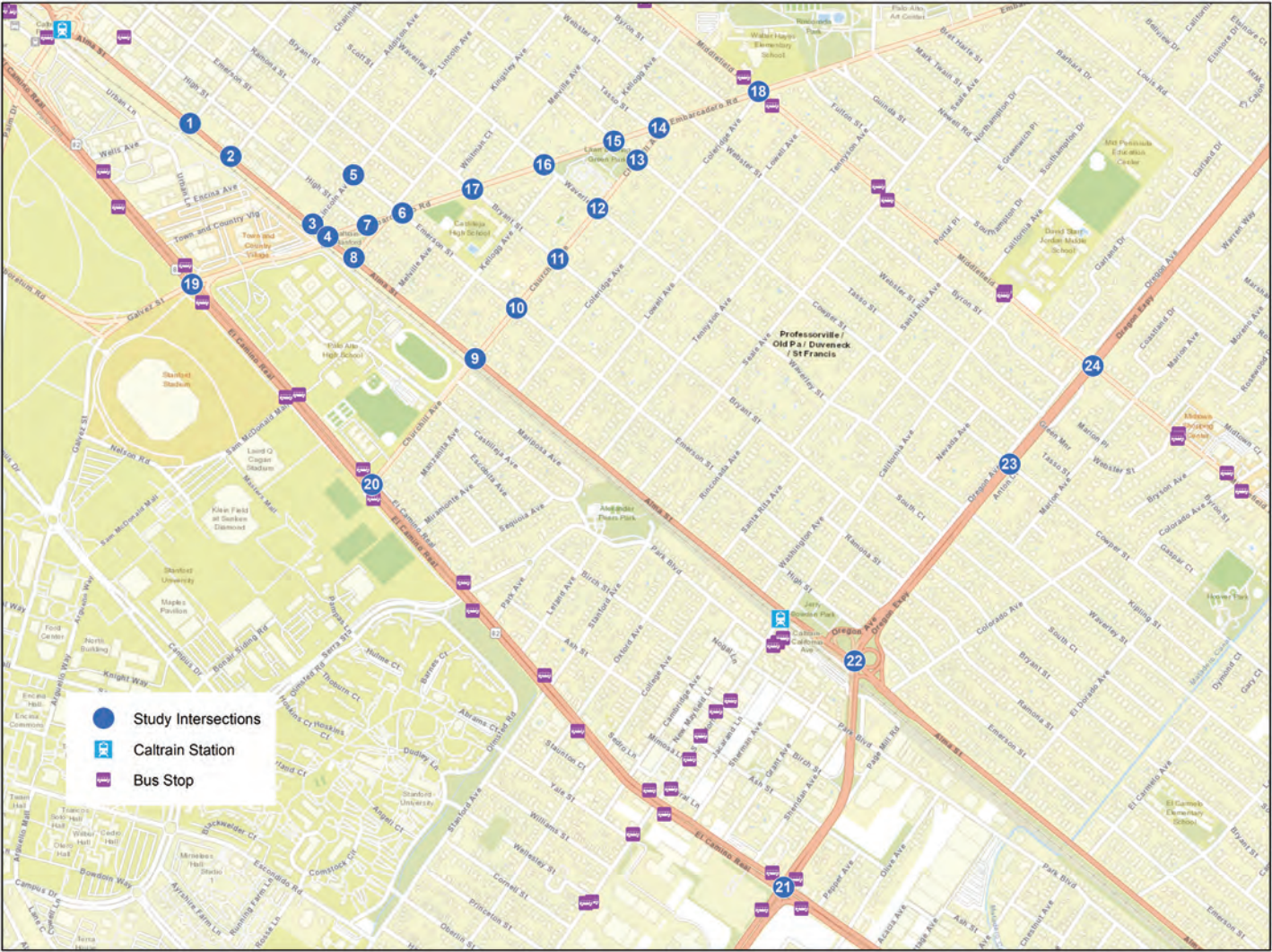
Cumulative Plus Churchill Avenue Closure Traffic Volumes

Intersection #1 Alma St. / Homer Ave.	Intersection #2 Alma St. / Channing Ave.	Intersection #3 Alma St. / Lincoln Ave.	Intersection #4 Alma St. / Embarcadero Rd.
Intersection #5 Emerson St. / Lincoln Ave.	Intersection #6 Emerson St. / Embarcadero Rd.	Intersection #7 Embarcadero Rd. / High St.	Intersection #8 Alma St. / Kingsley Ave.
Intersection #9 Alma St. / Churchill Ave.	Intersection #10 Emerson St. / Churchill Ave.	Intersection #11 Bryant St. / Churchill Ave.	Intersection #12 Waverly St. / Churchill Ave.

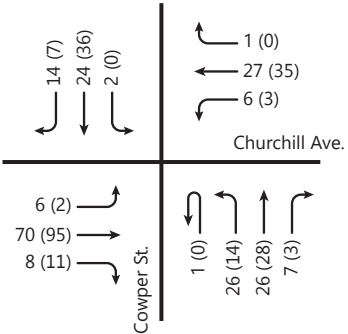
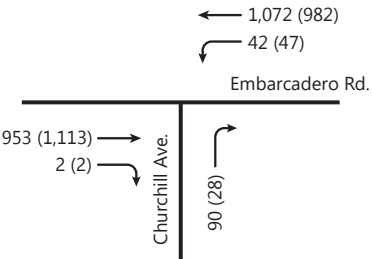
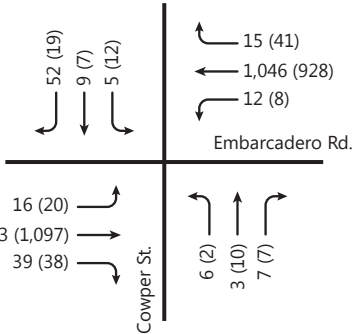
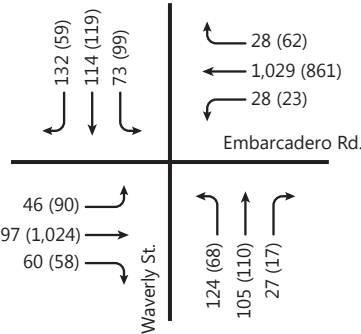
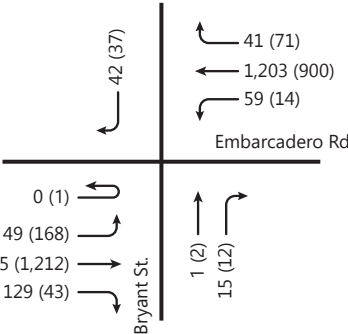
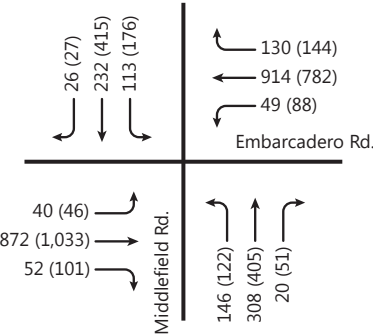
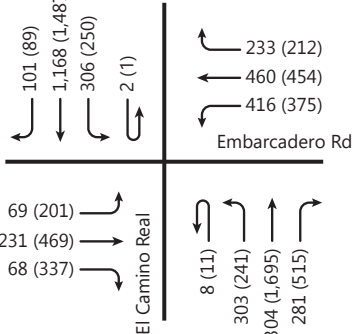
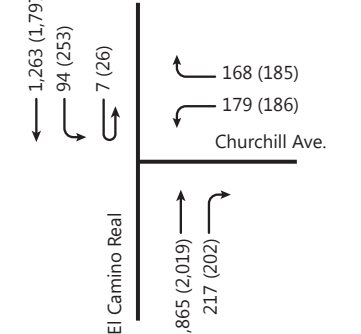
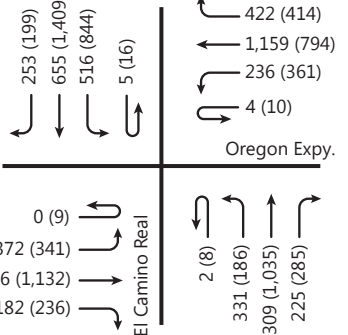
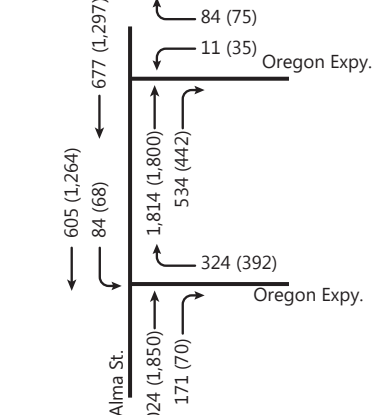
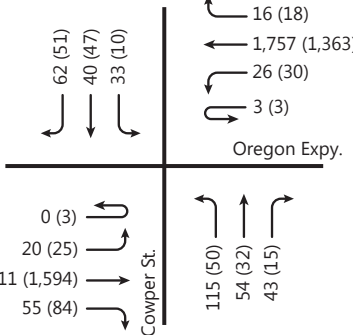
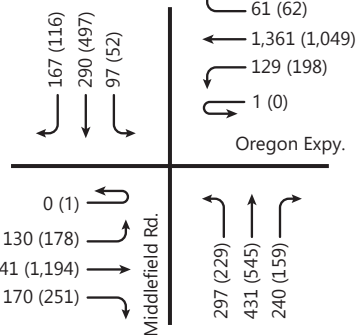
LEGEND

XX (XX) — AM (PM) Peak Hour Volumes

↑ ↑ ↑ — Indicates Restricted Movement



Cumulative Plus Churchill Avenue Closure Traffic Volumes

Intersection #13 Cowper St. / Churchill Ave.	Intersection #14 Churchill Ave. / Embarcadero Rd.	Intersection #15 Cowper St. / Embarcadero Rd.	Intersection #16 Waverly St. / Embarcadero Rd.
			
Intersection #17 Bryant St. / Embarcadero Rd.	Intersection #18 Middlefield Rd. / Embarcadero Rd.	Intersection #19 El Camino Real / Embarcadero Rd.	Intersection #20 El Camino Real / Churchill Ave.
			
Intersection #21 El Camino Real / Oregon Expy.	Intersection #22 Alma St. / Oregon Expy.	Intersection #23 Cowper St. / Oregon Expy.	Intersection #24 Middlefield Rd. / Oregon Expy.
			

LEGEND

XX (XX) — AM (PM) Peak Hour Volumes
↑↑↑ — Indicates Restricted Movement

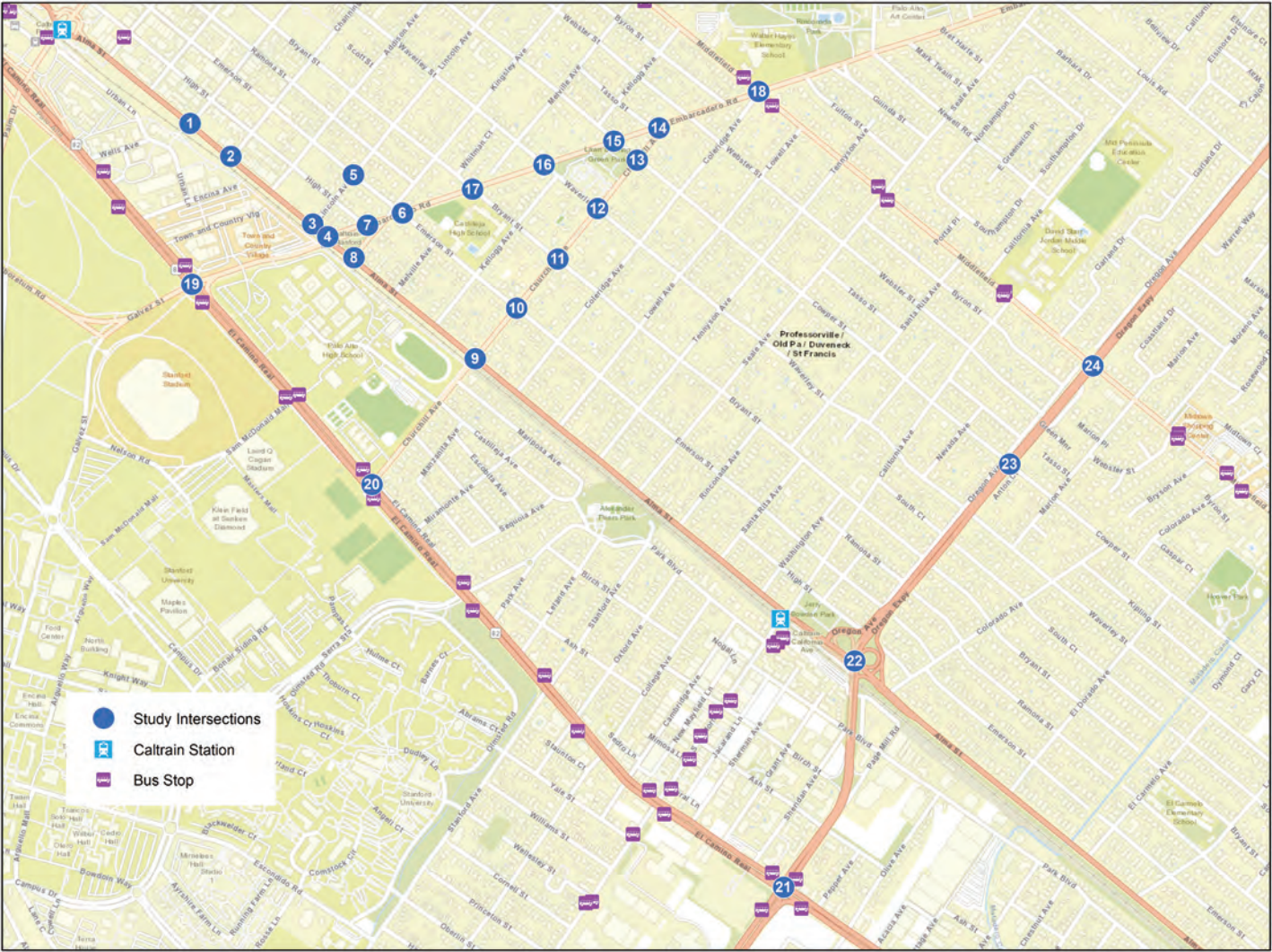


Table 15: Cumulative (2030) Plus Project LOS & Delay

#	Study Intersections	Control	Peak Hour	Cumulative Plus Project	
				Average Delay ¹ (sec)	LOS
1	Alma Street/Homer Avenue	Signalized	A.M.	20.8	C
			P.M.	27.2	C
3	Alma Street/Lincoln Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
4	Alma Street/Embarcadero Road	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
5	Emerson Street/Lincoln Avenue	All-Way Stop	A.M.	9.9	A
			P.M.	8.7	A
8	Alma Street/Kingsley Avenue	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
9	Alma Street/Churchill Avenue	Signalized	A.M.	9.3	A
			P.M.	8.6	A
10	Churchill Avenue/Emerson Street	All-Way Stop	A.M.	8.3	A
			P.M.	8.1	A
11	Churchill Avenue/Bryant Street	Two-Way Stop	A.M.	10.8	B
			P.M.	10.6	A
12	Churchill Avenue/Waverly Street	All-Way Stop	A.M.	8.7	A
			P.M.	8.9	A
13	Churchill Avenue/Cowper Street	All-Way Stop	A.M.	7.7	A
			P.M.	7.8	A
14	Churchill Avenue/Embarcadero Road	One-Way Stop	A.M.	9.6	A
			P.M.	9.7	A
15	Embarcadero Road/Cowper Street	Two-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
16	Embarcadero Road/Waverly Street	Signalized	A.M.	24.2	C
			P.M.	24.9	C
17	Embarcadero Road/Bryant Street	Signalized	A.M.	14.1	B
			P.M.	7.2	A
18	Middlefield Road/Embarcadero Road	Signalized	A.M.	>80.0	F
			P.M.	43.4	D
19	El Camino Real/Embarcadero Road	Signalized	A.M.	>80.0	F
			P.M.	>80.0	F
20	El Camino Real/Churchill Avenue	Signalized	A.M.	50.8	D
			P.M.	>80.0	F
21	El Camino Real/Oregon Expressway-Page Mill Road	Signalized	A.M.	>80.0	F
			P.M.	>80.0	F
22a	Alma Street/Oregon Expressway WB Off Ramp (Oregon Ave)	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
22b	Alma Street/Oregon Expressway EB Off Ramp	One-Way Stop	A.M.	>50.0	F
			P.M.	>50.0	F
23	Oregon Expressway/Cowper Street	Signalized	A.M.	26.1	C

#	Study Intersections	Control	Peak Hour	Cumulative Plus Project	
				Average Delay ¹ (sec)	LOS
			P.M.	20.1	C
24	Oregon Expressway/Middlefield Road	Signalized	A.M.	>80.0	F
			P.M.	>80.0	F

Notes:

¹Delay: Overall intersection delay in seconds per vehicle for signalized and unsignalized all-way stop controlled intersections. Delay for minor approach worst movement or major approach critical movements at unsignalized one-way and two-way stop controlled intersections.

Delay is reported as >50.0 for unsignalized intersections with LOS F and >80.0 for signalized intersections consistent with HCM 2000 methodology.

Bold indicates unacceptable LOS.

Table 16 summarizes the 95th percentile queue lengths for all approach movements at the study intersections for the weekday a.m. and p.m. peak hour. Cumulative conditions queue length analysis resulted in several intersections with 95th percentile queue lengths exceeding storage capacity.

Based on Synchro analysis results, intersections where queue lengths exceed the existing storage lengths are listed below:

- Embarcadero Road/Waverly Street for EBL (p.m. peak hour)
- Embarcadero Road/Bryant Street for EBL (p.m. peak hour)
- Embarcadero Road/Middlefield Road for WBL (p.m. peak hour), NBL and SBL (all peak hours)
- El Camino Real/Embarcadero Road for WBL (all peak hours), NBL (a.m. peak hour), and SBL (all peak hours)
- El Camino Real/Churchill Avenue for NBR (all peak hours) and SBL (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road for EBL (all peak hours), WBL (all peak hours), and SBL (all peak hours)
- Oregon Expressway/Middlefield Road for EBL (p.m. peak hour), EBR (all peak hours), WBL (p.m. peak hour), NBL (all peak hours), and SBL (a.m. peak hour)

Table 16: Cumulative (2030) Plus Project 95th Percentile Queue Lengths (ft.)

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Cumulative Plus Project	
				A.M.	P.M.
1	Alma Street/Homer Avenue (Signalized)	WBL	-	127	#237
		NBT	-	382	410
		SBT	-	170	326
3	Alma Street/Lincoln Avenue (One-Way Stop Control)	WBLR	-	168	184
		NBT	-	<25	<25
		NBTL	-	<25	<25
		SBTL	-	<25	<25
		SBT	-	<25	<25
4	Alma Street/Embarcadero Road (One-Way Stop Control)	WBR	-	345	307
		NBT	-	<25	<25
		SBT	-	<25	<25
8	Alma Street/Kingsley Avenue (One-Way Stop Control)	WBL	-	292	Err
		NBT	-	<25	<25
		SBT	-	<25	<25
9	Alma Street/Churchill Avenue (Signalized)	EBT	-	-	-
		EBR	-	-	-
		WBT	-	141	122
		NBL	-	-	-
		NBT	-	338	397
		SBL	-	-	-
		SBT	-	121	296
11	Churchill Avenue/Bryant Street (Two-Way Stop Control)	SBR	-	-	-
		EBLTR	-	<25	<25
		WBLTR	-	<25	<25
		NBLTR	-	<25	<25
		SBLTR	-	<25	<25
14	Churchill Avenue/Embarcadero Road (One-Way Stop Control)	EBT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
		WBT	-	<25	<25
		NBR	-	<25	<25
15	Embarcadero Road/Cowper Street (Two-Way Stop Control)	NBLTR	-	<25	<25
		SBLTR	-	58	44
		EBLT	-	<25	<25
		EBTR	-	<25	<25
		WBLT	-	<25	<25
16	Embarcadero Road/Waverly Street (Signalized)	WBTR	-	<25	<25
		NBLTR	-	<25	30
		EBL	95	m78	108
		EBT	-	428	442
		WBL	75	34	26
		WBT	-	392	278
17	Embarcadero Road/Bryant Street (Signalized)	NBT	-	229	172
		SBT	-	245	249
		EBL	80	38	154
		EBT	-	252	308
17	Embarcadero Road/Bryant Street (Signalized)	WBL	60	m57	m7

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Cumulative Plus Project	
				A.M.	P.M.
		WBT	-	511	345
		NBR	-	<25	<25
		SBR	-	<25	<25
18	Embarcadero Road/Middlefield Road (Signalized)	EBL	115	#95	73
		EBT	-	#664	486
		WBL	100	#124	#166
		WBT	-	#814	392
		NBL	115	#352	#210
		NBT	-	227	212
		SBL	100	#275	#267
		SBT	-	#426	#505
19	El Camino Real/Embarcadero Road (Signalized)	EBL	-	119	#339
		EBT	-	168	#475
		WBL	200	#775	#769
		WBT	-	374	397
		NBL	382	m#463	m266
		NBT	-	m#785	m#911
		SBL	300	#588	#537
		SBT	-	#575	#769
20	El Camino Real/Churchill Avenue (Signalized)	WBL	-	#594	#704
		NBT	-	#842	#1005
		NBR	100	189	191
		SBL	170	m102	m#307
		SBT	-	m513	m562
21	El Camino Real/Oregon Expressway-Page Mill Road (Signalized)	EBL	350	#434	#370
		EBT	-	690	#934
		EBR	-	181	276
		WBL	100	211	#383
		WBT	-	#1453	#1081
		NBL	300	281	164
		NBT	-	#934	#718
		SBL	350	#556	#805
		SBT	-	308	628
		SBR	350	171	79
22a	Alma Street/Oregon Expressway WB Ramps (Oregon Ave) (One-Way Stop Control)	WBL	-	39	140
		WBR	-	36	32
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBT	-	<25	<25
		SBTR	-	<25	<25
22b	Alma Street/Oregon Expressway EB Ramps (One-Way Stop Control)	WBR	-	533	614
		NBT	-	<25	<25
		NBR	-	<25	<25
		SBL	-	36	<25
		SBT	-	<25	<25
23	Oregon Expressway/Cowper Street (Signalized)	EBL	115	53	66
		EBT	-	#1087	#1068
		EBR	50	<25	34

#	Study Intersection	Lane Group	Storage Length per lane (ft.)	Cumulative Plus Project	
				A.M.	P.M.
		WBL	115	m26	m43
		WBT	-	m#886	m852
		NBL	-	#255	101
		NBT	-	114	63
		SBL	-	74	33
		SBT	-	102	108
24	Oregon Expressway/Middlefield Road (Signalized)	EBL	360	m#238	m#362
		EBT	-	#1038	#891
		EBR	100	m162	209
		WBL	390	#310	#429
		WBT	-	#1036	#740
		WBR	100	<25	<25
		NBL	230	#606	#474
		NBT	-	511	#705
		NBR	-	122	82
		SBL	145	#194	104
		SBT	-	225	344

Notes:

EB, WB, NB, SB – Eastbound, Westbound, Northbound, Southbound respectively.

L, T, R – Left, Through, Right respectively.

Queue lengths taken from Synchro reports.

#: 95th percentile volume exceeds capacity, queue may be longer.

m: Volume for 95th percentile queue is metered by upstream signal.

Bold indicates queue lengths exceeding existing storage capacity.

PEDESTRIAN, BICYCLE AND TRANSIT IMPACTS

The impact of the closure of Churchill Avenue to pedestrian, bicycle, and transit are discussed in the Existing Plus Project Conditions, and the results are expected to be similar under this scenario.

MITIGATION MEASURES

Based on the LOS and delay analyses conducted at the study intersections, it was observed that all of the intersections impacted by the closure of Churchill Avenue in the Existing Plus Project scenario would also be impacted in the Cumulative Plus Project scenario. Additionally, the intersection of Oregon Expressway/Middlefield Road would be impacted in the Cumulative Plus Project scenario. Below are the list of intersections that are impacted by the closure of Churchill Avenue.

- Alma Street/Lincoln Avenue
- Alma Street/Embarcadero Road
- Alma Street/Kingsley Avenue
- Embarcadero Road/Cowper Street
- El Camino Real/Embarcadero Road
- El Camino Real/Oregon Expressway-Page Mill Road
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue)

- Alma Street/Oregon Expressway EB Off Ramp
- Oregon Expressway/Middlefield Road

The same mitigation measures discussed in the Existing Plus Project section would be utilized for the first 8 intersections in the list. Below is the potential mitigation measure to alleviate the delay experienced at Oregon Expressway/Middlefield Road:

1. Convert the southbound shared through/right lane into an exclusive right turn lane and convert the northbound right-turn lane into a shared through/right lane. Additionally, add an additional northbound receiving for a short distance and then merge the two lanes into one. Finally, optimize the signal timings and modify the signal phasing to include overlaps for the southbound right-turn and eastbound right-turn.

TJKM evaluated the mitigation measures at the above intersections to ascertain the impact on LOS and delay. **Table 17** summarizes the LOS and delay for the mitigation measures presented. **Appendix J** contains the Synchro LOS reports.

Table 17: Existing Plus Project with Mitigation LOS & Delay

#	Study Intersections	Existing Control	Peak Hour	Cumulative Conditions		Cumulative Plus Project		Cumulative Plus Project with Mitigations	
				Delay	LOS	Delay	LOS	Delay	LOS
3	Alma Street/Lincoln Avenue	One-Way Stop	A.M.	>50.0	F	>50.0	F	20.1	C
			P.M.	>50.0	F	>50.0	F	22.4	C
4	Alma Street/Embarcadero Road	One-Way Stop	A.M.	>50.0	F	>50.0	F	51.3	D
			P.M.	>50.0	F	>50.0	F	54.9	D
8	Alma Street/Kingsley Avenue	One-Way Stop	A.M.	>50.0	F	>50.0	F	43.4	D
			P.M.	>50.0	F	>50.0	F	52.3	D
15	Embarcadero Road/Cowper Street	One-Way Stop	A.M.	>50.0	F	>50.0	F	14.7	B
			P.M.	>50.0	F	>50.0	F	12.3	B
19	El Camino Real/Embarcadero Road	Signalized	A.M.	70.6	E	>80.0	F	73.6	E
			P.M.	>80.0	F	>80.0	F	76.2	E
21	El Camino Real/Oregon Expressway-Page Mill Road	Signalized	A.M.	>80.0	F	120.3	F	91.8	F
			P.M.	76.8	E	108.4	F	92.7	F
22a	Alma Street/Oregon Expressway WB Off Ramp (Oregon Ave)	One-Way Stop	A.M.	>50.0	F	>50.0	F	7.8	A
			P.M.	>50.0	F	>50.0	F	9.1	A
22b	Alma Street/Oregon Expressway EB Off Ramp	One-Way Stop	A.M.	>50.0	F	>50.0	F	24.9	C
			P.M.	>50.0	F	>50.0	F	21.5	C
24	Oregon Expressway/Middlefield Road	Signalized	A.M.	>80.0	F	104.0	F	93.7	F
			P.M.	>80.0	F	85.9	F	88.6	F

Notes:

¹Delay: Overall intersection delay in seconds per vehicle for signalized intersections.

Delay for minor approach worst movement or major approach critical movements at unsignalized one-way stop controlled

intersections.

Delay is reported as >50.0 for unsignalized intersections with LOS F and >80.0 for signalized intersections consistent with HCM 2000 methodology.

Bold indicates unacceptable LOS.

Based on the analysis of the proposed mitigations, it was observed that the intersections of Alma Street/Lincoln Avenue, Alma Street/Embarcadero Road, Alma Street/Kingsley Avenue, Embarcadero Road/Cowper Street, El Camino Real/Embarcadero Road, Alma Street/Oregon Expressway WB Off Ramp, and Alma Street/Oregon Expressway EB Off Ramp upgrade to acceptable LOS and delay thresholds with the mitigations applied. Although the LOS is still unacceptable for El Camino Real/Oregon Expressway-Page Mill Road, the delay is significantly decrease when the mitigation is applied. Similarly, the delay for the intersection of Oregon Expressway/Middlefield Road is reduced when the mitigation is applied, but only for the a.m. peak period.

Alma Street/Embarcadero Road Concepts

In addition to the mitigation measures developed for the impacted intersections, TJKM developed near term and long term improvements for Alma Street/Embarcadero Road and the surrounding vicinity. Conceptual drawings can be seen in **Appendix K**. The near term improvement is the mitigation that is described in the Existing Plus Project and Cumulative Plus Project scenarios, which is signalizing the intersections of Alma Street/Embarcadero Road and Alma Street/Kingsley Avenue. The long term improvement is constructing a new Embarcadero Road westbound off ramp and an eastbound on/off ramp that converges onto Alma Street. It should be noted that the conceptual drawings are for discussion purposes only and that the cost and feasibility of these improvements has not been developed yet.

TIRE INDEX (TRAFFIC INFUSION ON RESIDENTIAL ENVIRONMENT) ANALYSIS

ADT for seventeen roadway segments were collected, as mentioned in the Data Collection section of the report. A TIRE analysis for Existing Plus Project Conditions and Cumulative Plus Project Conditions was conducted. The results of the TIRE analysis for the Existing Plus Project and Cumulative Plus Project are shown in **Table 18** and **19**, respectively.

The results indicated that the Churchill Avenue Closure will not significantly impact majority of the segments chosen for the study. However, the segments of Emerson Street from Channing Avenue to Addison Avenue and Emerson Street from Lincoln Avenue and Kingsley Avenue will be significantly impacted in both the Existing Plus Project and Cumulative Plus Project conditions. Potential mitigation measures include speed humps, speed tables, chokers, bulb-outs, etc. However, TJKM will collaborate with the City and community to determine which traffic calming measure is most feasible for these roadway segments.

Table 18: TIRE Analysis – Existing Plus Project

Segment	Existing		Project Trips ¹	0.1 Change in TIRE Index	
	ADT	TIRE Index		Volume	Impact
Alma Street from Forest Avenue to Homer Avenue	22,857	4.4	0	6,600	No
Emerson Street from Channing Avenue to Addison Avenue	1,313	3.1	1,270	290	Yes
Alma Street from Addison Avenue to Lincoln Avenue	26,828	4.4	0	6,600	No
Bryant Street from Addison Avenue to Lincoln Avenue	2,155	3.3	0	500	No
Waverly Street from Kingsley Avenue to Whitman Court	4,057	3.6	0	1,025	No
Middlefield Road from Walter Hays Elementary School Entrance to Embarcadero Road	10,130	4.0	0	2,300	No
Waverly Street from Churchill Avenue and Coleridge Avenue	2,081	3.3	105	500	No
Bryant Street from Churchill Avenue to Coleridge Avenue	1,144	3.1	105	290	No
Emerson Street from Churchill Avenue to Coleridge Avenue	888	2.9	0	170	No
Alma Street from Coleridge Avenue to Lowell Avenue	27,573	4.4	0	6,600	No
Emerson Street from Lincoln Avenue and Kingsley Avenue	1,515	3.2	1,270	380	Yes
Embarcadero Road from High Street and Alma Street	27,638	4.4	1,580	6,600	No
Embarcadero Road from Webster Street to Tasso Street	26,729	4.4	0	6,600	No
Churchill Avenue from Tasso Street to Cowper Street	1,513	3.2	0	380	No
Churchill Avenue from Alma Street to Emerson Street	3,104	3.5	0	825	No

Draft Traffic Impact Study Report

Segment	Existing		Project Trips ¹	0.1 Change in TIRE Index	
	ADT	TIRE Index		Volume	Impact
Churchill Avenue from Mariposa Avenue and Caltrain Train Tracks	9,519	4.0	0	2,300	No
Lincoln Avenue from High Street to Emerson Street	1,814	3.3	0	500	No

Notes:

¹Project Trips determined by rerouting of vehicles during Churchill Avenue Closure. Project Trips = (A.M. + P.M. Peak Hour Trips)*5

Table 19: TIRE Analysis – Cumulative (2030) Plus Project

Segment	Cumulative		Project Trips ²	0.1 Change in TIRE Index	
	ADT ¹	TIRE Index		Volume	Impact
Alma Street from Forest Avenue to Homer Avenue	25,756	4.4	0	6,600	No
Emerson Street from Channing Avenue to Addison Avenue	1,480	3.2	1,431	380	Yes
Alma Street from Addison Avenue to Lincoln Avenue	30,230	4.5	0	8,200	No
Bryant Street from Addison Avenue to Lincoln Avenue	2,428	3.4	0	650	No
Waverly Street from Kingsley Avenue to Whitman Court	4,572	3.7	0	1,250	No
Middlefield Road from Walter Hays Elementary School Entrance to Embarcadero Road	11,415	4.1	0	3,000	No
Waverly Street from Churchill Avenue and Coleridge Avenue	2,345	3.4	118	650	No
Bryant Street from Churchill Avenue to Coleridge Avenue	1,289	3.1	118	290	No
Emerson Street from Churchill Avenue to Coleridge Avenue	1,001	3.0	0	220	No
Alma Street from Coleridge Avenue to Lowell Avenue	31,070	4.5	0	8,200	No
Emerson Street from Lincoln Avenue and Kingsley Avenue	1,707	3.2	1,431	380	Yes
Embarcadero Road from High Street and Alma Street	31,143	4.5	1,780	8,200	No
Embarcadero Road from Webster Street to Tasso Street	30,119	4.5	0	8,200	No
Churchill Avenue from Tasso Street to Cowper Street	1,705	3.2	0	380	No
Churchill Avenue from Alma Street to Emerson Street	3,498	3.6	0	1,025	No
Churchill Avenue from Mariposa Avenue and Caltrain Train Tracks	10,726	4.1	0	3,000	No
Lincoln Avenue from High Street to Emerson Street	2,044	3.3	0	500	No

Notes:

¹Existing ADT Projected to Year 2030 Conditions.

²Existing Project Trips Projected to Year 2030 Conditions.

CONCLUSION

This project evaluates traffic operations within the City of Palo Alto for Existing, Existing Plus Project, Cumulative, and Cumulative Plus Project Conditions and determines the impact the possible closure of the Churchill Avenue-Caltrain at-grade rail crossing will have on the neighboring streets and intersections within the vicinity of the closure.

Existing Traffic Conditions

Under this scenario, the following intersections operate with unacceptable LOS based on City of Palo Alto Standards and Congestion Management Program (CMP):

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)
- Alma Street/Churchill Avenue (a.m. peak hour)
- Embarcadero Road/Cowper Street (all peak hours)
- Embarcadero Road/Middlefield Road (a.m. peak hour)
- El Camino Real/Churchill Avenue (p.m. peak hour)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/Oregon Expressway EB Off Ramp (all peak hours)

Synchro analysis was conducted to determine the 95th percentile queue lengths at the study intersections. Intersections where queue lengths exceed the existing storage lengths are listed below:

- Alma Street/Churchill Avenue for NBL (all peak hours)
- Embarcadero Road/Waverly Street for EBL (p.m. peak hour)
- Embarcadero Road/Bryant Street for EBL (p.m. peak hour)
- Embarcadero Road/Middlefield Road for WBL (p.m. peak hour), NBL and SBL (all peak hours)
- El Camino Real/Embarcadero Road for WBL (all peak hours), NBL (a.m. peak hour), and SBL (all peak hours)
- El Camino Real/Churchill Avenue for NBR (all peak hours) and SBL (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road for WBL (all peak hours) and SBL (p.m. peak hour)
- Oregon Expressway/Middlefield Road for EBR (all peak hours), NBL (all peak hours), and SBL (a.m. peak hour)

The results of the O-D study suggest that during the a.m. time period, majority of trips (42%) are originating from zones 16, 9, and 17 where each zone contributes approximately 16%, 15% and 11% respectively of total originating trips. Furthermore, during the same time period majority (65%) of the trips are destined for zones 9, 14, and 2 with each zone attracting approximately 36%, 15%, and 14% of total trips. In the p.m. period, over a third of captured trips (37%) are originating from zones 2, 9, and 7 where each zone contributes 13%, 12% and 12%, respectively, of total originating trips. Additionally, during the same time period, majority (63%) of the trips are destined for zones 9, 2, and 5 with each zone attracting approximately 36%, 20% and 7% respectively of total trips.

Existing Plus Project Traffic Conditions

Under this scenario, the intersections listed above continue to operate at an unacceptable LOS with the exception of Alma Street/Churchill Avenue. However with the rerouting of traffic, the intersections of El Camino Real/Embarcadero Road and El Camino Real/Oregon Expressway-Page Mill Road both degrade to unacceptable LOS during both a.m. and p.m. peak hours.

While the proposed underpass at Churchill Avenue is constructed, pedestrians and bicyclists will have to use other crossings within the study area to cross the Caltrain train tracks. Other crossings include the California Avenue Bike/Pedestrian Underpass and the Embarcadero Road underpass. Both crossings are less than a mile from Churchill Avenue, however the travel time for pedestrians and bicyclists will increase as a result of the closure. Transit impacts will be seen at the intersections where there is a degradation of LOS due to the rerouting of traffic.

The mitigation measures presented in the report upgrade the intersections that are impacted by the closure of Churchill Avenue to acceptable LOS and delay thresholds.

Cumulative Traffic Conditions (2030)

Under this scenario, the study intersections that operate at unacceptable LOS are:

- Alma Street/Lincoln Avenue (all peak hours)
- Alma Street/Embarcadero Road (all peak hours)
- Alma Street/Kingsley Avenue (all peak hours)
- Embarcadero Road/Cowper Street (all peak hours)
- Middlefield Road/Embarcadero Road (a.m. peak hour)
- El Camino Real/Embarcadero Road (p.m. peak hour)
- El Camino Real/Churchill Avenue (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road (a.m. peak hour)
- Alma Street/Oregon Expressway WB Off Ramp (Oregon Avenue) (all peak hours)
- Alma Street/Oregon Expressway EB Off Ramp (all peak hours)
- Oregon Expressway/Middlefield Road (all peak hours)

Intersections where queue lengths exceed storage lengths under the Cumulative Conditions scenario are listed below:

- Alma Street/Churchill Avenue for NBL (all peak hours) and SBR (a.m. peak hour)
- Embarcadero Road/Waverly Street for EBL (p.m. peak hour)
- Embarcadero Road/Bryant Street for EBL (p.m. peak hour)
- Embarcadero Road/Middlefield Road for WBL (all peak hours), NBL and SBL (all peak hours)
- El Camino Real/Embarcadero Road for WBL (all peak hours), NBL (a.m. peak hour), and SBL (all peak hours)
- El Camino Real/Churchill Avenue for NBR (p.m. peak hour) and SBL (p.m. peak hour)
- El Camino Real/Oregon Expressway-Page Mill Road for EBL (a.m. peak hour), WBL (all peak hours), and SBL (p.m. peak hour)

- Oregon Expressway/Middlefield Road for EBL (p.m. peak hour), EBR (all peak hours), WBL (p.m. peak hour), NBL (all peak hours), and SBL (a.m. peak hour)

Cumulative (2030) Plus Project Traffic Conditions

Under this scenario, the intersections listed above in the Cumulative Conditions section continue to operate at an unacceptable LOS due to the added delay caused by the rerouted traffic. Pedestrian, bicycle, and transit impacts are expected to be similar to Existing Plus Project Conditions.

Analysis on the mitigation measures for the intersections impacted by the rerouted traffic show that Alma Street/Lincoln Avenue, Alma Street/Embarcadero Road, Alma Street/Kingsley Avenue, Embarcadero Road/Cowper Street, El Camino Real/Embarcadero Road, Alma Street/Oregon Expressway WB Off Ramp, and Alma Street/Oregon Expressway EB Off Ramp upgrade to acceptable LOS and delay thresholds. Although the LOS is still unacceptable for El Camino Real/Oregon Expressway-Page Mill Road, the delay is significantly decrease when the mitigation is applied. Similarly, the delay for the intersection of Oregon Expressway/Middlefield Road is reduced when the mitigation is applied, but only for the a.m. peak period.

TIRE Index

The TIRE Index analysis for Existing Plus Project Conditions and Cumulative (2030) Plus Project indicates that the segments of Emerson Street from Channing Avenue to Addison Avenue and Emerson Street from Lincoln Avenue to Kingsley Avenue would be impacted by the rerouted traffic caused by the closure of Churchill Avenue.

Appendix A – TIRE Index Methodology

TRAFFIC INFUSION ON RESIDENTIAL ENVIRONMENT (TIRE)

TIRE is a measure of the impact of traffic on residents along a street. The TIRE Index Scale ranges from 0 to 5 depending on daily traffic volume. An index of 0 represents the least infusion of traffic. An index of 5 represents the greatest traffic volume, and thereby the poorest residential environment.

TIRE Index Scale

0	1	2	3	4	5
Very Low	Low	Moderate	High	Very High	

Typical street types associates with the various index levels are shown below:

TIRE Index Levels

<u>TIRE Index</u>	<u>Daily Traffic Volume</u>	<u>Residential Environment Typical of:</u>
0	1	A cul-de-sac street with one home
1	10	A cul-de-sac street with two homes
2	100	A two-lane minor street
3	1,000	A two-lane collector or arterial street
4	10,000	A two to six-lane arterial street
5	100,000	

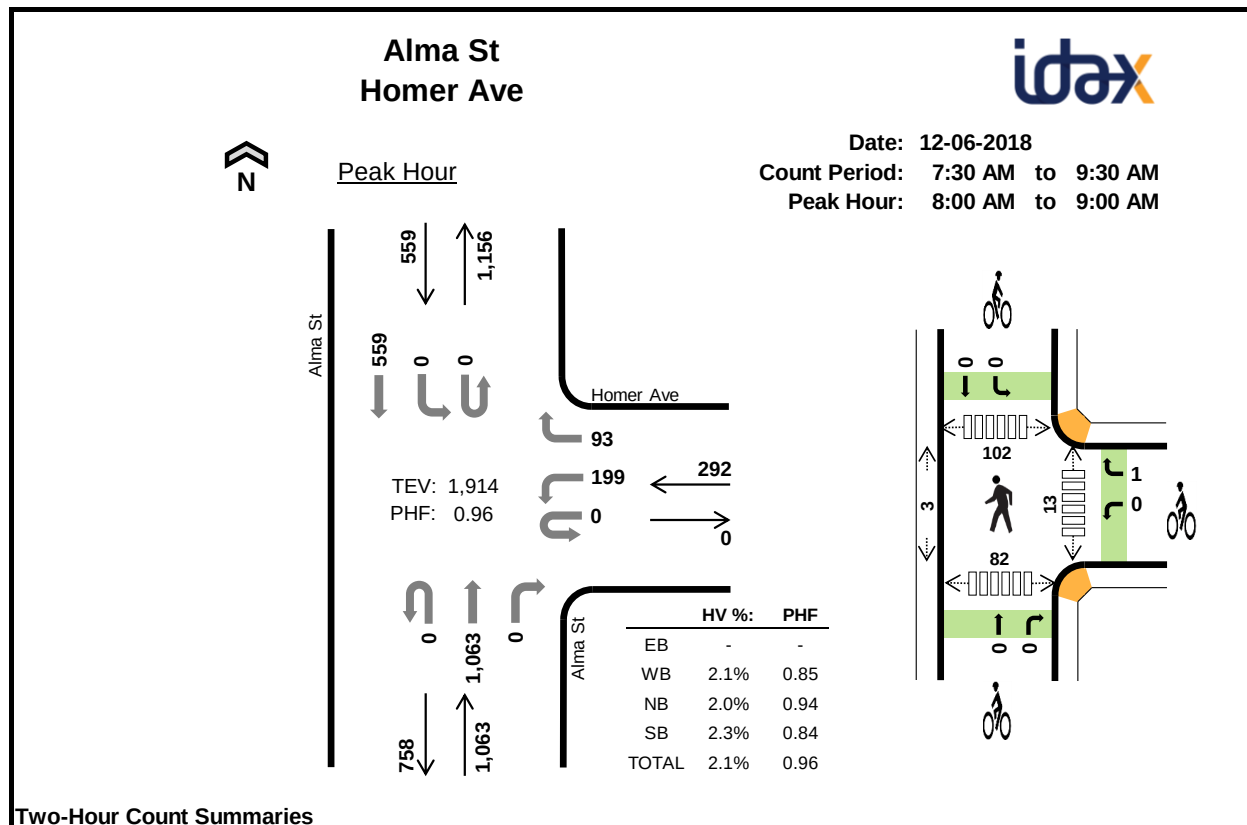
The TIRE Index is derived from a theory by D.K. Goodrich based on work by Appleyard of the University of California at Berkeley, and by Buchanan of the Ministry of Transport, England. TIRE is based on the hypothesis that a given increase in traffic volume has a greater impact on residential environment along a residential street with a low traffic volume than along a street with a high pre-existing volume. TIRE effects are separate from noise and air pollution impacts. TIRE represents the effect of traffic on the safety and comfort of human activities such as walking, bicycling and playing on or near a street and on the freedom to maneuver personal autos in and out of residential driveways.

The TIRE Index table gives TIRE values associated with various daily traffic volume ranges. The mathematical relationships are logarithmic. A street with a TIRE value of 3 or greater is considered to function primarily as a traffic street and to exhibit significantly impaired residential environment. The projected difference between a pre and post-project TIRE value is the predicted impact of the project on residential environment. Any projected change of 0.1 or greater would be noticeable to residents.

Table 1 TIRE Index			
Existing Volume Range (Vehicles Per Day)	TIRE Index	Minimum Daily Traffic Volume Increase to Produce	
		a 0.1 Change in the TIRE Index	a 0.2 Change in the TIRE Index
29-35	1.5	+6	+15
36-44	1.6	+8	+20
45-56	1.7	+10	+25
57-70	1.8	+13	+32
71-89	1.9	+17	+41
90-110	2.0	+22	+52
111-140	2.1	+29	+65
141-180	2.2	+40	+80
181-220	2.3	+52	+100
221-280	2.4	+65	+125
281-350	2.5	+79	+160
351-450	2.6	+97	+205
451-560	2.7	+114	+260
561-710	2.8	+140	+330
711-890	2.9	+170	+415
891-1,100	3.0	+220	+520
1,101-1,400	3.1	+290	+650
1,401-1,800	3.2	+380	+800
1,801-2,200	3.3	+500	+1,000
2,201-2,800	3.4	+650	+1,300
2,801-3,500	3.5	+825	+1,700
3,501-4,500	3.6	+1,025	+2,200
4,501-5,600	3.7	+1,250	+2,800
5,601-7,100	3.8	+1,500	+3,500
7,101-8,900	3.9	+1,800	+4,300
8,901-11,000	4.0	+2,300	+5,300
11,001-14,000	4.1	+3,000	+6,500
14,001-18,000	4.2	+4,000	+8,000
18,001-22,00	4.3	+5,200	+10,000
22,001-28,000	4.4	+6,600	+13,000
28,001-35,000	4.5	+8,200	+17,000
35,000-45,000	4.6	+10,000	+22,000
45,001-56,000	4.7	+12,200	+28,000
56,001-71,000	4.8	+14,800	+35,000
71,001-89,000	4.9	+18,00	+43,000
Source: Goodrich Traffic Group, based on curve shapes found in work by Donald Appleyard at the University of California at Berkeley and consideration of earlier thoughts by Buchanan of the Ministry of Transport, England.			

Appendix B – Traffic Counts

- ADT Counts
- Turning Movement Vehicles, Bicyclists and Pedestrian Counts

**Two-Hour Count Summaries**

Interval Start		0				Homer Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	0	0	0	41	0	18	0	0	243	0	0	0	104	0	406	0
7:45 AM		0	0	0	0	0	54	0	12	0	0	255	0	0	0	143	0	464	0
8:00 AM		0	0	0	0	0	50	0	36	0	0	242	0	0	0	166	0	494	0
8:15 AM		0	0	0	0	0	50	0	15	0	0	265	0	0	0	116	0	446	1,810
8:30 AM		0	0	0	0	0	54	0	22	0	0	274	0	0	0	146	0	496	1,900
8:45 AM		0	0	0	0	0	45	0	20	0	0	282	0	0	0	131	0	478	1,914
9:00 AM		0	0	0	0	0	45	0	17	0	0	223	0	0	0	128	0	413	1,833
9:15 AM		0	0	0	0	0	34	0	25	0	0	221	0	0	0	115	0	395	1,782
Count Total		0	0	0	0	0	373	0	165	0	0	2,005	0	0	0	1,049	0	3,592	0
Peak Hour	All	0	0	0	0	0	199	0	93	0	0	1,063	0	0	0	559	0	1,914	0
	HV	0	0	0	0	0	3	0	3	0	0	21	0	0	0	13	0	40	0
	HV%	-	-	-	-	-	2%	-	3%	-	-	2%	-	-	-	2%	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	2	5	2	9	0	1	0	0	1	3	1	14	11	29
7:45 AM	0	1	5	6	12	0	0	0	0	0	3	1	13	7	24
8:00 AM	0	1	5	1	7	0	0	0	0	0	3	0	33	22	58
8:15 AM	0	1	6	5	12	0	0	0	0	0	4	0	24	27	55
8:30 AM	0	2	8	3	13	0	1	0	0	1	4	3	30	17	54
8:45 AM	0	2	2	4	8	0	0	0	0	0	2	0	15	16	33
9:00 AM	0	4	2	4	10	0	0	0	0	0	2	0	21	7	30
9:15 AM	0	1	3	2	6	0	0	0	0	0	2	1	30	4	37
Count Total	0	14	36	27	77	0	2	0	0	2	23	6	180	111	320
Peak Hr	0	6	21	13	40	0	1	0	0	1	13	3	102	82	200

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	0				Homer Ave				Alma St				Alma St				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:30 AM	0	0	0	0	0	2	0	0	0	0	0	5	0	0	0	2	0	9	0
7:45 AM	0	0	0	0	0	1	0	0	0	0	0	5	0	0	0	6	0	12	0
8:00 AM	0	0	0	0	0	1	0	0	0	0	0	5	0	0	0	1	0	7	0
8:15 AM	0	0	0	0	0	0	0	0	1	0	0	6	0	0	0	5	0	12	40
8:30 AM	0	0	0	0	0	2	0	0	0	0	0	8	0	0	0	3	0	13	44
8:45 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	4	0	8	40
9:00 AM	0	0	0	0	0	1	0	0	3	0	0	2	0	0	0	4	0	10	43
9:15 AM	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	2	0	6	37
Count Total	0	0	0	0	0	8	0	6	0	0	0	36	0	0	0	27	0	77	0
Peak Hour	0	0	0	0	0	3	0	3	0	0	0	21	0	0	0	13	0	40	0

Two-Hour Count Summaries - Bikes

Interval Start	0			Homer Ave			Alma St			Alma St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	1	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	1	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	0	0	0	2	0	0	0	0	0	0	2	0
Peak Hour	0	0	0	0	0	1	0	0	0	0	0	0	1	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Alma St Homer Ave

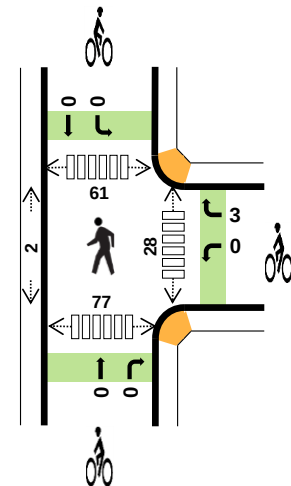
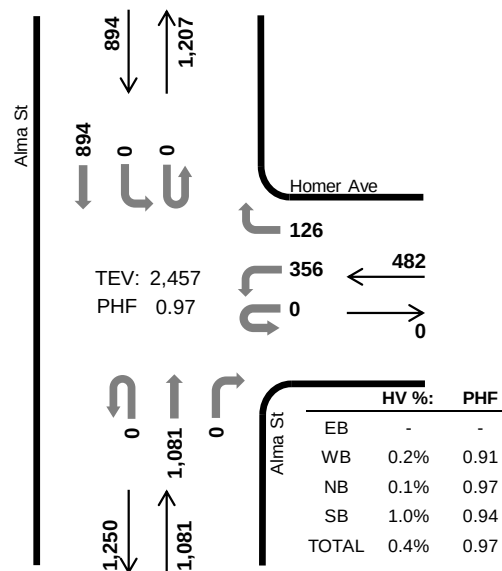


Peak Hour

Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:30 PM to 6:30 PM



Two-Hour Count Summaries

Interval Start		0				Homer Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	0	0	0	71	0	29	0	0	243	0	0	0	232	0	575	0
4:45 PM		0	0	0	0	0	90	0	26	0	0	193	0	0	0	255	0	564	0
5:00 PM		0	0	0	0	0	110	0	34	0	0	214	0	0	0	252	0	610	0
5:15 PM		0	0	0	0	0	79	0	35	0	0	263	0	0	0	213	0	590	2,339
5:30 PM		0	0	0	0	0	85	0	40	0	0	257	0	0	0	215	0	597	2,361
5:45 PM		0	0	0	0	0	84	0	25	0	0	275	0	0	0	238	0	622	2,419
6:00 PM		0	0	0	0	0	101	0	31	0	0	279	0	0	0	220	0	631	2,440
6:15 PM		0	0	0	0	0	86	0	30	0	0	270	0	0	0	221	0	607	2,457
Count Total		0	0	0	0	0	706	0	250	0	0	1,994	0	0	0	1,846	0	4,796	0
Peak Hour	All	0	0	0	0	0	356	0	126	0	0	1,081	0	0	0	894	0	2,457	0
	HV	0	0	0	0	0	1	0	0	0	0	1	0	0	0	9	0	11	0
	HV%	-	-	-	-	-	0%	-	0%	-	-	0%	-	-	-	1%	-	0%	0

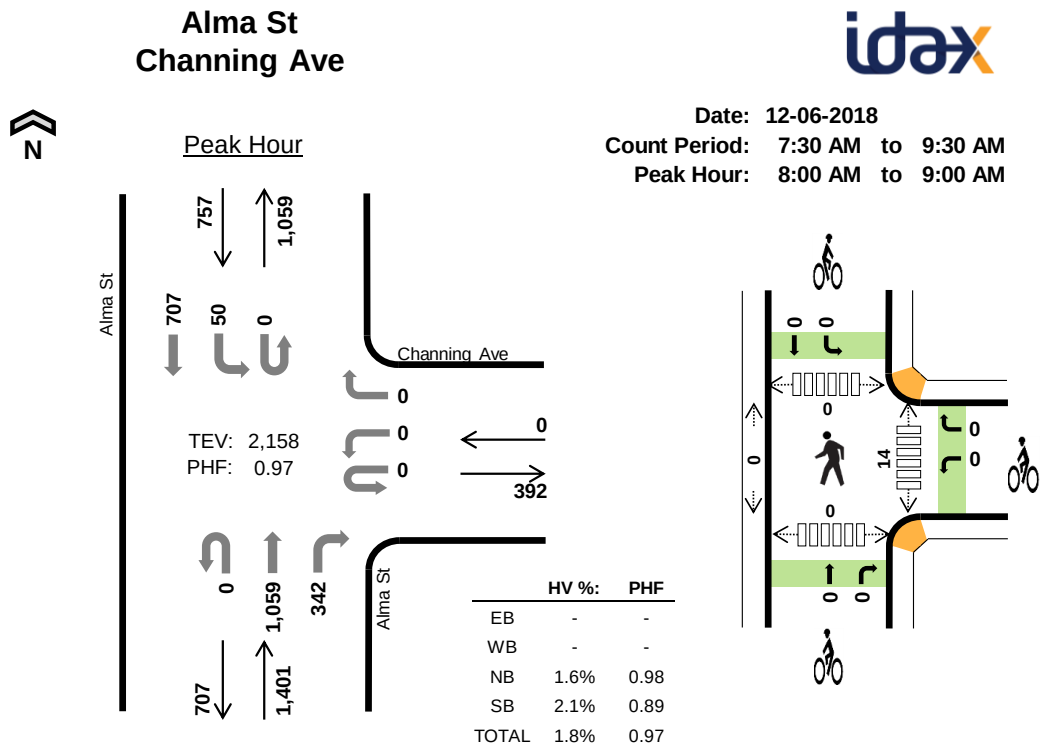
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	0	1	1	2	0	0	0	0	0	3	0	18	11	32
4:45 PM	0	0	2	3	5	0	0	0	0	0	13	0	30	16	59
5:00 PM	0	0	2	2	4	0	0	0	0	0	9	0	30	9	48
5:15 PM	0	0	2	1	3	0	1	0	0	1	3	0	14	13	30
5:30 PM	0	0	0	3	3	0	1	0	0	1	9	0	12	24	45
5:45 PM	0	0	0	1	1	0	2	0	0	2	3	1	12	16	32
6:00 PM	0	1	0	2	3	0	0	0	0	0	10	0	12	19	41
6:15 PM	0	0	1	3	4	0	0	0	0	0	6	1	25	18	50
Count Total	0	1	8	16	25	0	4	0	0	4	56	2	153	126	337
Peak Hr	0	1	1	9	11	0	3	0	0	3	28	2	61	77	168

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	0				Homer Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	14
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	15
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	11
6:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	3	10
6:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	11
Count Total	0	0	0	0	0	1	0	0	0	0	8	0	0	0	16	0	25	0
Peak Hour	0	0	0	0	0	1	0	0	0	0	1	0	0	0	9	0	11	0

Two-Hour Count Summaries - Bikes																		
Interval Start	0			Homer Ave			Alma St			Alma St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	1	1				
5:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	1	2				
5:45 PM	0	0	0	0	0	2	0	0	0	0	0	0	2	4				
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	4				
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3				
Count Total	0	0	0	0	0	4	0	0	0	0	0	0	4	0				
Peak Hour	0	0	0	0	0	3	0	0	0	0	0	0	3	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



Two-Hour Count Summaries

Interval Start		0				Channing Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	0	0	0	0	0	0	0	0	247	39	0	6	141	0	433	0
7:45 AM		0	0	0	0	0	0	0	0	0	0	273	61	0	8	187	0	529	0
8:00 AM		0	0	0	0	0	0	0	0	0	0	244	87	0	12	201	0	544	0
8:15 AM		0	0	0	0	0	0	0	0	0	0	268	84	0	11	156	0	519	2,025
8:30 AM		0	0	0	0	0	0	0	0	0	0	279	80	0	14	186	0	559	2,151
8:45 AM		0	0	0	0	0	0	0	0	0	0	268	91	0	13	164	0	536	2,158
9:00 AM		0	0	0	0	0	0	0	0	0	0	223	69	0	11	163	0	466	2,080
9:15 AM		0	0	0	0	0	0	0	0	0	0	222	85	0	9	140	0	456	2,017
Count Total		0	0	0	0	0	0	0	0	0	0	2,024	596	0	84	1,338	0	4,042	0
Peak Hour	All	0	0	0	0	0	0	0	0	0	0	1,059	342	0	50	707	0	2,158	0
	HV	0	0	0	0	0	0	0	0	0	0	19	4	0	1	15	0	39	0
	HV%	-	-	-	-	-	-	-	-	-	-	2%	1%	-	2%	2%	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	6	5	11	0	0	0	0	0	4	0	0	0	4
7:45 AM	0	0	6	6	12	0	0	0	0	0	7	0	0	0	7
8:00 AM	0	0	5	2	7	0	0	0	0	0	1	0	0	0	1
8:15 AM	0	0	8	5	13	0	0	0	0	0	4	0	0	0	4
8:30 AM	0	0	7	6	13	0	0	0	0	0	8	0	0	0	8
8:45 AM	0	0	3	3	6	0	0	0	0	0	1	0	0	0	1
9:00 AM	0	0	2	5	7	0	0	0	0	0	4	0	0	0	4
9:15 AM	0	0	2	3	5	0	0	0	0	0	3	0	0	0	3
Count Total	0	0	39	35	74	0	0	0	0	0	32	0	0	0	32
Peak Hr	0	0	23	16	39	0	0	0	0	0	14	0	0	0	14

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	0				Channing Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	5	1	0	0	5	0	11	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	2	0	1	5	0	12	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	4	1	0	0	2	0	7	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	6	2	0	0	5	0	13	43
8:30 AM	0	0	0	0	0	0	0	0	0	0	7	0	0	1	5	0	13	45
8:45 AM	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3	0	6	39
9:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5	0	7	39
9:15 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	31
Count Total	0	0	0	0	0	0	0	0	0	0	32	7	0	2	33	0	74	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	19	4	0	1	15	0	39	0

Two-Hour Count Summaries - Bikes

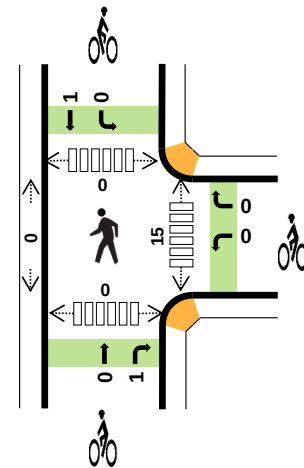
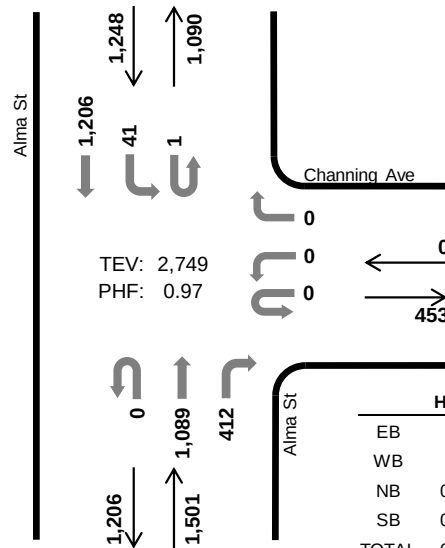
Interval Start	0			Channing Ave			Alma St			Alma St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:30 PM to 6:30 PM

Peak Hour

	HV %:	PHF
EB	-	-
WB	-	-
NB	0.1%	0.96
SB	0.7%	0.98
TOTAL	0.4%	0.97

Two-Hour Count Summaries

Interval Start		0				Channing Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	0	0	0	0	0	0	0	0	231	66	0	4	294	0	595	0
4:45 PM		0	0	0	0	0	0	0	0	0	0	190	79	1	11	336	0	617	0
5:00 PM		0	0	0	0	0	0	0	0	0	0	227	91	0	16	347	0	681	0
5:15 PM		0	0	0	0	0	0	0	1	1	0	255	112	0	10	280	0	659	2,552
5:30 PM		0	0	0	0	0	0	0	0	0	0	266	93	0	9	297	0	665	2,622
5:45 PM		0	0	0	0	0	0	0	0	0	0	269	113	0	9	303	0	694	2,699
6:00 PM		0	0	0	0	0	0	0	0	0	0	283	107	0	7	313	0	710	2,728
6:15 PM		0	0	0	0	0	0	0	0	0	0	271	99	1	16	293	0	680	2,749
Count Total		0	0	0	0	0	0	0	1	1	0	1,992	760	2	82	2,463	0	5,301	0
Peak Hour	All	0	0	0	0	0	0	0	0	0	0	1,089	412	1	41	1,206	0	2,749	0
	HV	0	0	0	0	0	0	0	0	0	0	1	0	0	0	9	0	10	0
	HV%	-	-	-	-	-	-	-	-	-	-	0%	0%	0%	0%	1%	-	0%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	0	1	1	2	0	0	0	0	0	4	0	0	0	4
4:45 PM	0	0	2	3	5	0	0	0	0	0	6	0	0	0	6
5:00 PM	0	0	2	2	4	0	0	0	0	0	6	0	0	0	6
5:15 PM	0	0	2	1	3	0	0	0	1	1	2	0	0	0	2
5:30 PM	0	0	0	2	2	0	0	0	0	0	5	0	0	0	5
5:45 PM	0	0	0	1	1	0	0	0	0	0	2	0	0	0	2
6:00 PM	0	0	0	3	3	0	0	0	0	0	5	0	0	0	5
6:15 PM	0	0	1	3	4	0	0	1	1	2	3	0	0	0	3
Count Total	0	0	8	16	24	0	0	1	2	3	33	0	0	0	33
Peak Hr	0	0	1	9	10	0	0	1	1	2	15	0	0	0	15

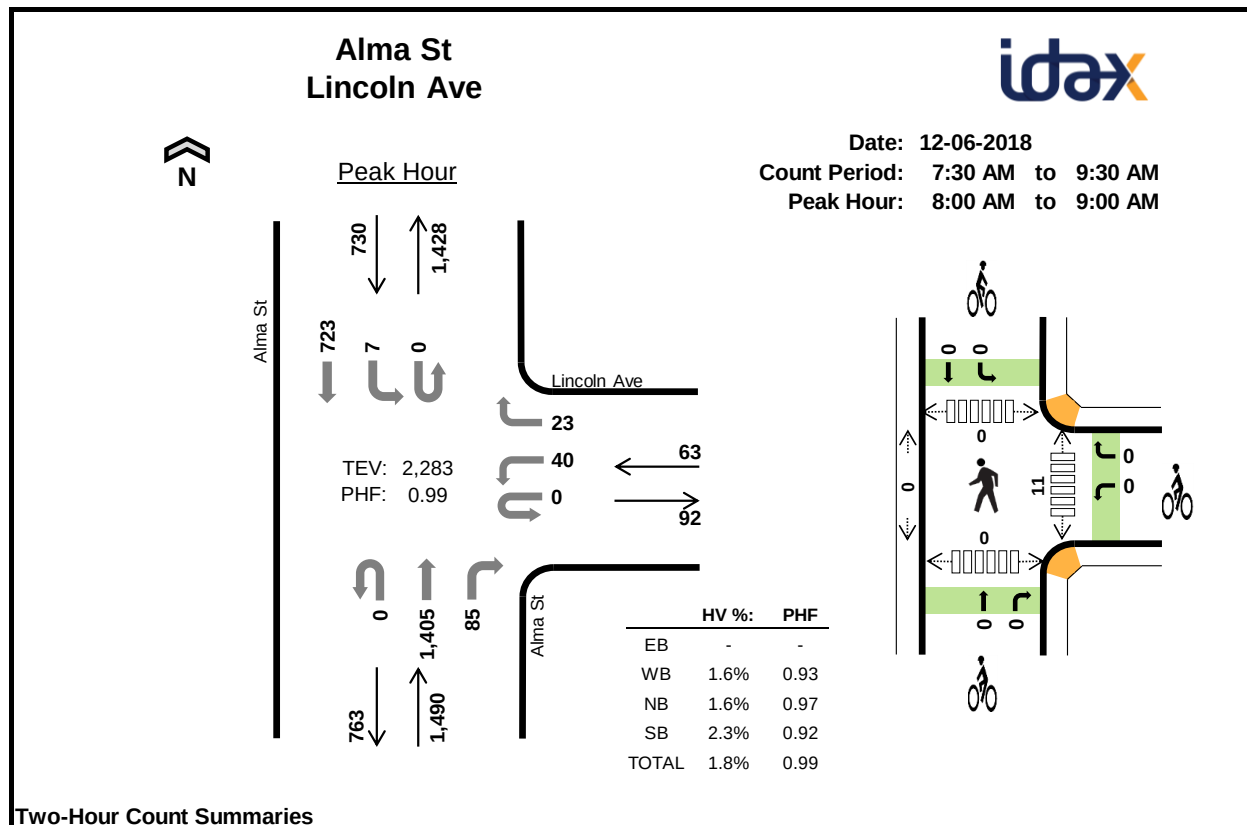
Two-Hour Count Summaries - Heavy Vehicles

Interval Start	0				Channing Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	14
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	14
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	10
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	9
6:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	10
Count Total	0	0	0	0	0	0	0	0	0	0	8	0	0	0	16	0	24	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	1	0	0	0	9	0	10	0

Two-Hour Count Summaries - Bikes

Interval Start	0			Channing Ave			Alma St			Alma St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:15 PM	0	0	0	0	0	0	0	0	1	0	1	0	2	2
Count Total	0	0	0	0	0	0	0	0	1	0	2	0	3	0
Peak Hour	0	0	0	0	0	0	0	0	1	0	1	0	2	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		0				Lincoln Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	0	0	0	7	0	7	0	0	272	17	0	1	134	0	438	0
7:45 AM		0	0	0	0	0	8	0	3	0	0	336	19	0	1	188	0	555	0
8:00 AM		0	0	0	0	0	8	0	7	0	0	334	31	0	1	198	0	579	0
8:15 AM		0	0	0	0	0	11	0	5	0	0	359	24	0	2	165	0	566	2,138
8:30 AM		0	0	0	0	0	9	0	6	0	0	347	10	0	3	187	0	562	2,262
8:45 AM		0	0	0	0	0	12	0	5	0	0	365	20	0	1	173	0	576	2,283
9:00 AM		0	0	0	0	0	4	0	2	0	0	302	6	0	3	165	0	482	2,186
9:15 AM		0	0	0	0	0	3	0	0	0	0	313	16	0	0	139	0	471	2,091
Count Total		0	0	0	0	0	62	0	35	0	0	2,628	143	0	12	1,349	0	4,229	0
Peak Hour	All	0	0	0	0	0	40	0	23	0	0	1,405	85	0	7	723	0	2,283	0
	HV	0	0	0	0	0	0	0	1	0	0	24	0	0	1	16	0	42	0
	HV%	-	-	-	-	-	0%	-	4%	-	-	2%	0%	-	14%	2%	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	5	4	9	0	0	0	1	1	2	0	0	0	2
7:45 AM	0	1	7	6	14	0	0	0	0	0	3	0	0	0	3
8:00 AM	0	0	5	2	7	0	0	0	0	0	4	0	0	0	4
8:15 AM	0	0	7	6	13	0	0	0	0	0	2	0	0	0	2
8:30 AM	0	0	8	4	12	0	0	0	0	0	4	0	0	0	4
8:45 AM	0	1	4	5	10	0	0	0	0	0	1	0	0	0	1
9:00 AM	0	1	2	5	8	0	0	0	0	0	2	0	0	0	2
9:15 AM	0	0	3	3	6	0	0	0	0	0	3	0	0	0	3
Count Total	0	3	41	35	79	0	0	0	1	1	21	0	0	0	21
Peak Hr	0	1	24	17	42	0	0	0	0	0	11	0	0	0	11

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	0				Lincoln Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	4	1	0	0	4	0	9	0
7:45 AM	0	0	0	0	0	1	0	0	0	0	6	1	0	0	6	0	14	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	2	0	7	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	7	0	0	1	5	0	13	43
8:30 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	4	0	12	46
8:45 AM	0	0	0	0	0	0	0	1	0	0	4	0	0	0	5	0	10	42
9:00 AM	0	0	0	0	0	1	0	0	0	0	2	0	0	0	5	0	8	43
9:15 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	6	36
Count Total	0	0	0	0	0	2	0	1	0	0	39	2	0	1	34	0	79	0
Peak Hour	0	0	0	0	0	0	0	1	0	0	24	0	0	1	16	0	42	0

Two-Hour Count Summaries - Bikes																		
Interval Start	0			Lincoln Ave			Alma St			Alma St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0				
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Count Total	0	0	0	0	0	0	0	0	0	0	1	0	1	0				
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Alma St Lincoln Ave

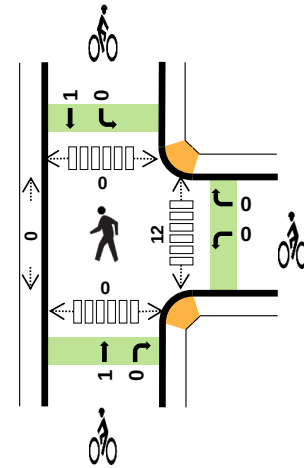
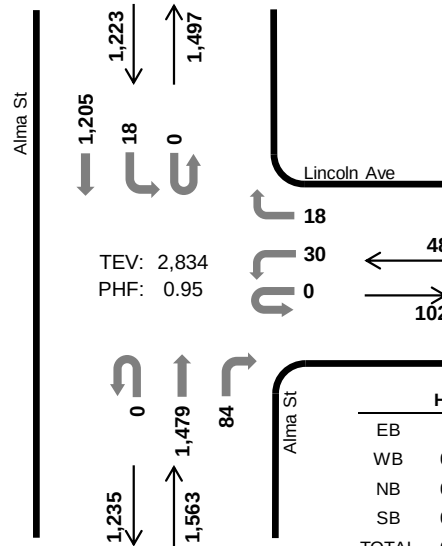


Peak Hour

Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:30 PM to 6:30 PM



	HV %:	PHF
EB	-	-
WB	0.0%	0.75
NB	0.1%	0.94
SB	0.7%	0.95
TOTAL	0.3%	0.95

Two-Hour Count Summaries

Interval Start		0				Lincoln Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	0	0	0	9	0	0	0	0	309	14	0	0	306	0	638	0
4:45 PM		0	0	0	0	0	11	0	4	0	0	252	22	0	1	330	0	620	0
5:00 PM		0	0	0	0	0	4	0	3	0	0	317	23	0	2	350	0	699	0
5:15 PM		0	0	0	0	0	10	0	5	0	0	366	14	0	5	288	0	688	2,645
5:30 PM		0	0	0	0	0	8	0	3	0	0	354	15	0	2	296	0	678	2,685
5:45 PM		0	0	0	0	0	8	0	8	0	0	373	18	0	11	294	0	712	2,777
6:00 PM		0	0	0	0	0	3	0	3	0	0	389	28	0	1	320	0	744	2,822
6:15 PM		0	0	0	0	0	11	0	4	0	0	363	23	0	4	295	0	700	2,834
Count Total		0	0	0	0	0	64	0	30	0	0	2,723	157	0	26	2,479	0	5,479	0
Peak Hour	All	0	0	0	0	0	30	0	18	0	0	1,479	84	0	18	1,205	0	2,834	0
	HV	0	0	0	0	0	0	0	0	0	0	1	0	0	1	7	0	9	0
	HV%	-	-	-	-	-	0%	-	0%	-	-	0%	0%	-	6%	1%	-	0%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	1	1	1	3	0	0	0	0	0	2	0	0	0	2
4:45 PM	0	0	2	3	5	0	0	0	0	0	3	0	0	0	3
5:00 PM	0	0	2	2	4	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	2	1	3	0	0	1	1	2	1	0	0	0	1
5:30 PM	0	0	0	2	2	0	0	0	0	0	7	0	0	0	7
5:45 PM	0	0	0	1	1	0	0	0	0	0	2	0	0	0	2
6:00 PM	0	0	0	2	2	0	0	0	0	0	2	0	0	0	2
6:15 PM	0	0	1	3	4	0	0	1	1	2	1	0	0	0	1
Count Total	0	1	8	15	24	0	0	2	2	4	18	0	0	0	18
Peak Hr	0	0	1	8	9	0	0	1	1	2	12	0	0	0	12

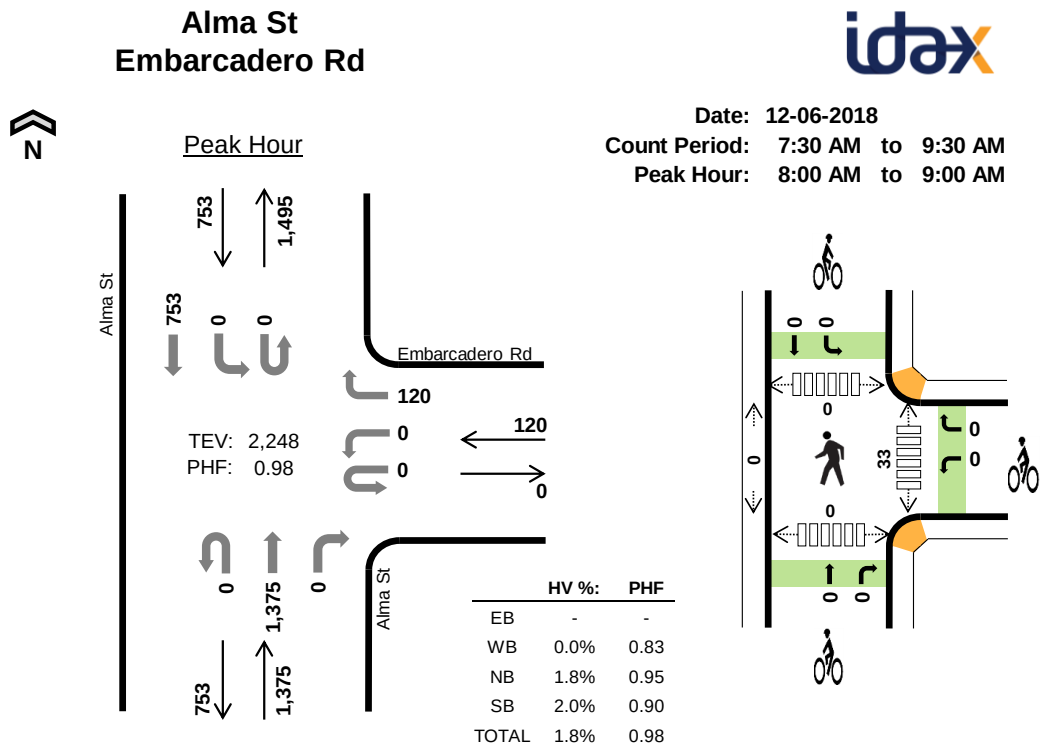
Two-Hour Count Summaries - Heavy Vehicles

Interval Start	0				Lincoln Ave				Alma St				Alma St				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:30 PM	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	3	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	15
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	14
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	10
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	8
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	9
Count Total	0	0	0	0	0	1	0	0	0	0	0	8	0	0	1	14	0	24	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	7	0	9	0

Two-Hour Count Summaries - Bikes

Interval Start	0			Lincoln Ave			Alma St			Alma St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	1	0	0	1	0	2	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6:15 PM	0	0	0	0	0	0	0	1	0	0	1	0	2	2
Count Total	0	0	0	0	0	0	0	2	0	0	2	0	4	0
Peak Hour	0	0	0	0	0	0	0	1	0	0	1	0	2	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



Two-Hour Count Summaries

Interval Start		0				Embarcadero Rd				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	0	0	0	0	0	30	0	0	275	0	0	0	145	0	450	0
7:45 AM		0	0	0	0	0	0	0	32	0	0	315	0	0	0	201	0	548	0
8:00 AM		0	0	0	0	0	0	0	36	0	0	313	0	0	0	209	0	558	0
8:15 AM		0	0	0	0	0	0	0	23	0	0	359	0	0	0	168	0	550	2,106
8:30 AM		0	0	0	0	0	0	0	32	0	0	343	0	0	0	200	0	575	2,231
8:45 AM		0	0	0	0	0	0	0	29	0	0	360	0	0	0	176	0	565	2,248
9:00 AM		0	0	0	0	0	0	0	36	0	0	267	0	0	0	169	0	472	2,162
9:15 AM		0	0	0	0	0	0	0	25	0	0	302	0	0	0	146	0	473	2,085
Count Total		0	0	0	0	0	0	0	243	0	0	2,534	0	0	0	1,414	0	4,191	0
Peak Hour	All	0	0	0	0	0	0	0	120	0	0	1,375	0	0	0	753	0	2,248	0
	HV	0	0	0	0	0	0	0	0	0	0	25	0	0	0	15	0	40	0
	HV%	-	-	-	-	-	-	-	0%	-	-	2%	-	-	-	2%	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	6	4	10	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	2	5	8	15	0	0	0	0	0	5	0	0	0	5
8:00 AM	0	0	5	2	7	0	0	0	0	0	18	0	0	0	18
8:15 AM	0	0	8	4	12	0	0	0	0	0	9	0	0	0	9
8:30 AM	0	0	8	4	12	0	0	0	0	0	5	0	0	0	5
8:45 AM	0	0	4	5	9	0	0	0	0	0	1	0	0	0	1
9:00 AM	0	0	2	6	8	0	0	0	0	0	2	0	0	0	2
9:15 AM	0	1	1	3	5	0	0	0	0	0	4	0	0	0	4
Count Total	0	3	39	36	78	0	0	0	0	0	44	0	0	0	44
Peak Hr	0	0	25	15	40	0	0	0	0	0	33	0	0	0	33

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	0				Embarcadero Rd				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	10	0
7:45 AM	0	0	0	0	0	0	0	2	0	0	5	0	0	0	8	0	15	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	2	0	7	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	4	0	12	44
8:30 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	4	0	12	46
8:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	9	40
9:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	8	41
9:15 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	3	0	5	34
Count Total	0	0	0	0	0	0	0	3	0	0	39	0	0	0	36	0	78	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	25	0	0	0	15	0	40	0

Two-Hour Count Summaries - Bikes

Interval Start	0			Embarcadero Rd			Alma St			Alma St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Alma St Embarcadero Rd

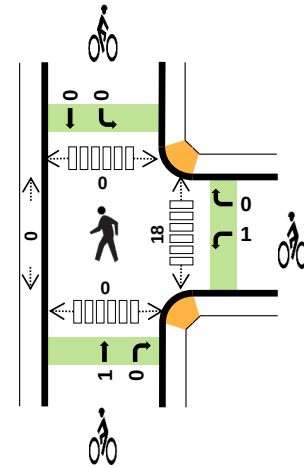
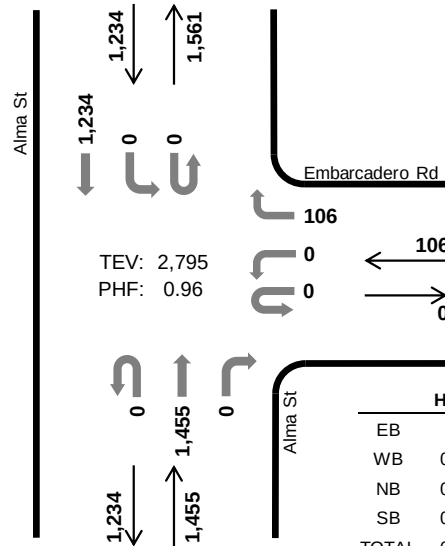


Peak Hour

Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:30 PM to 6:30 PM



	HV %:	PHF
EB	-	-
WB	0.0%	0.66
NB	0.1%	0.98
SB	0.6%	0.98
TOTAL	0.3%	0.96

Two-Hour Count Summaries

Interval Start		0				Embarcadero Rd				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	0	0	0	0	0	26	0	0	272	0	0	0	314	0	612	0
4:45 PM		0	0	0	0	0	0	0	19	0	0	258	0	0	0	348	0	625	0
5:00 PM		0	0	0	0	0	0	0	19	0	0	341	0	0	0	353	0	713	0
5:15 PM		0	0	0	0	0	0	0	23	0	0	360	0	0	0	295	0	678	2,628
5:30 PM		0	0	0	0	0	0	0	21	0	0	351	0	0	0	303	0	675	2,691
5:45 PM		0	0	0	0	0	0	0	20	0	0	360	0	0	0	314	0	694	2,760
6:00 PM		0	0	0	0	0	0	0	40	0	0	373	0	0	0	312	0	725	2,772
6:15 PM		0	0	0	0	0	0	0	25	0	0	371	0	0	0	305	0	701	2,795
Count Total		0	0	0	0	0	0	0	193	0	0	2,686	0	0	0	2,544	0	5,423	0
Peak Hour	All	0	0	0	0	0	0	0	106	0	0	1,455	0	0	0	1,234	0	2,795	0
	HV	0	0	0	0	0	0	0	0	0	0	1	0	0	0	7	0	8	0
	HV%	-	-	-	-	-	-	-	0%	-	-	0%	-	-	-	1%	-	0%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	0	1	2	3	0	0	0	0	0	4	0	0	0	4
4:45 PM	0	0	2	3	5	0	0	0	0	0	1	0	0	0	1
5:00 PM	0	0	2	2	4	0	0	0	0	0	2	0	0	0	2
5:15 PM	0	0	2	1	3	0	0	0	1	1	1	0	0	0	1
5:30 PM	0	0	0	2	2	0	0	0	0	0	8	0	0	0	8
5:45 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4
6:00 PM	0	0	0	2	2	0	0	0	0	0	4	0	0	0	4
6:15 PM	0	0	1	3	4	0	1	1	0	2	2	0	0	0	2
Count Total	0	0	8	15	23	0	1	1	1	3	26	0	0	0	26
Peak Hr	0	0	1	7	8	0	1	1	0	2	18	0	0	0	18

Two-Hour Count Summaries - Heavy Vehicles

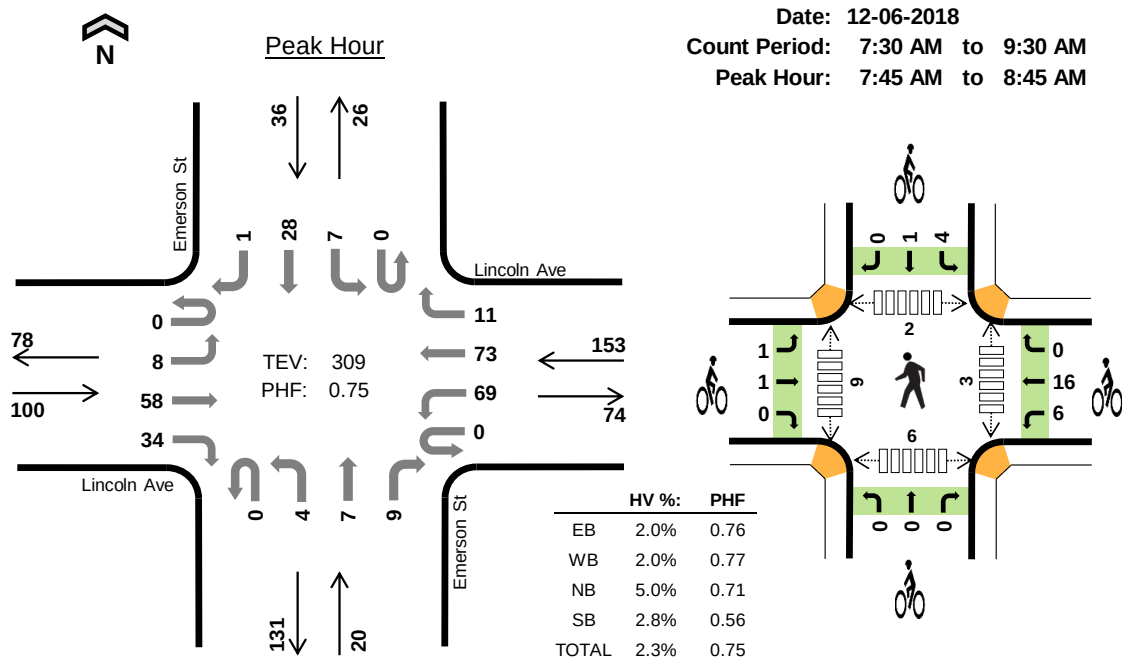
Interval Start	0				Embarcadero Rd				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	3	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	15
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	14
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	7
6:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	8
Count Total	0	0	0	0	0	0	0	0	0	0	8	0	0	0	15	0	23	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	1	0	0	0	7	0	8	0

Two-Hour Count Summaries - Bikes

Interval Start	0			Embarcadero Rd			Alma St			Alma St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:15 PM	0	0	0	1	0	0	0	1	0	0	0	0	2	2
Count Total	0	0	0	1	0	0	0	1	0	0	1	0	3	0
Peak Hour	0	0	0	1	0	0	0	1	0	0	0	0	2	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Emerson St Lincoln Ave



Two-Hour Count Summaries

Interval Start		Lincoln Ave				Lincoln Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	1	8	8	0	15	12	4	0	0	3	0	0	1	1	2	55	0
7:45 AM		0	2	13	8	0	20	13	1	0	0	1	3	0	0	4	1	66	0
8:00 AM		0	1	20	12	0	16	30	4	0	0	1	3	0	5	11	0	103	0
8:15 AM		0	2	19	8	0	19	16	4	0	3	2	2	0	1	5	0	81	305
8:30 AM		0	3	6	6	0	14	14	2	0	1	3	1	0	1	8	0	59	309
8:45 AM		0	3	11	14	0	12	15	2	0	1	3	0	0	1	2	0	64	307
9:00 AM		0	1	6	5	0	3	3	1	0	0	1	3	0	0	7	3	33	237
9:15 AM		0	0	10	5	0	1	2	1	0	1	8	1	0	2	8	0	39	195
Count Total		0	13	93	66	0	100	105	19	0	6	22	13	0	11	46	6	500	0
Peak Hour	All	0	8	58	34	0	69	73	11	0	4	7	9	0	7	28	1	309	0
	HV	0	0	2	0	0	1	1	1	0	0	0	1	0	0	1	0	7	0
	HV%	-	0%	3%	0%	-	1%	1%	9%	-	0%	0%	11%	-	0%	4%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

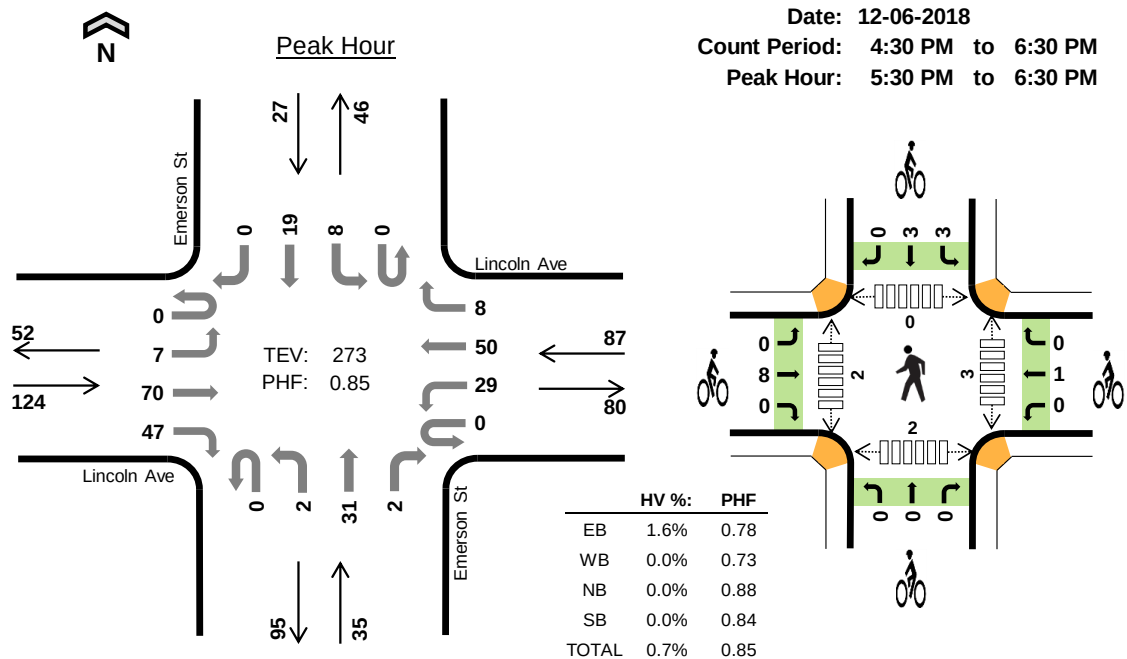
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
7:45 AM	1	2	0	0	3	1	4	0	1	6	0	3	1	1	5
8:00 AM	0	0	0	0	0	0	9	0	3	12	2	3	0	1	6
8:15 AM	0	0	1	1	2	0	6	0	0	6	1	1	1	2	5
8:30 AM	1	1	0	0	2	1	3	0	1	5	0	2	0	2	4
8:45 AM	0	0	0	0	0	0	1	0	0	1	0	2	4	1	7
9:00 AM	0	0	0	2	2	0	0	1	0	1	0	3	4	1	8
9:15 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	2	2
Count Total	2	3	1	3	9	3	23	1	5	32	3	15	10	11	39
Peak Hour	2	3	1	1	7	2	22	0	5	29	3	9	2	6	20

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Lincoln Ave				Lincoln Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	3	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	
8:30 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Count Total	0	0	2	0	0	1	1	1	0	0	0	1	0	0	1	2	9	
Peak Hour	0	0	2	0	0	1	1	1	0	0	0	1	0	0	1	0	7	

Two-Hour Count Summaries - Bikes																	
Interval Start	Lincoln Ave			Lincoln Ave			Emerson St			Emerson St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7:45 AM	0	1	0	0	4	0	0	0	0	0	1	0	6	0			
8:00 AM	0	0	0	5	4	0	0	0	0	3	0	0	12	0			
8:15 AM	0	0	0	0	6	0	0	0	0	0	0	0	6	24			
8:30 AM	1	0	0	1	2	0	0	0	0	1	0	0	5	29			
8:45 AM	0	0	0	1	0	0	0	0	0	0	0	0	1	24			
9:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	1	13			
9:15 AM	1	0	0	0	0	0	0	0	0	0	0	0	1	8			
Count Total	2	1	0	7	16	0	1	0	0	4	1	0	32	0			
Peak Hour	1	1	0	6	16	0	0	0	0	4	1	0	29	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Emerson St Lincoln Ave



Two-Hour Count Summaries

Interval Start		Lincoln Ave				Lincoln Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	1	9	5	0	10	12	1	0	1	4	0	0	1	7	2	53	0
4:45 PM		0	0	14	11	0	7	11	4	0	0	4	1	0	5	4	2	63	0
5:00 PM		0	0	15	8	0	9	6	3	0	0	4	1	0	0	2	0	48	0
5:15 PM		0	0	14	13	0	13	10	3	0	0	7	1	0	2	1	1	65	229
5:30 PM		0	4	12	7	0	3	12	1	0	0	8	0	0	2	4	0	53	229
5:45 PM		0	1	14	13	0	13	13	4	0	0	5	2	0	2	5	0	72	238
6:00 PM		0	2	23	15	0	6	17	1	0	0	10	0	0	2	4	0	80	270
6:15 PM		0	0	21	12	0	7	8	2	0	2	8	0	0	2	6	0	68	273
Count Total		0	8	122	84	0	68	89	19	0	3	50	5	0	16	33	5	502	0
Peak Hour	All	0	7	70	47	0	29	50	8	0	2	31	2	0	8	19	0	273	0
	HV	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	HV%	-	0%	1%	2%	-	0%	0%	0%	-	0%	0%	0%	-	0%	0%	-	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

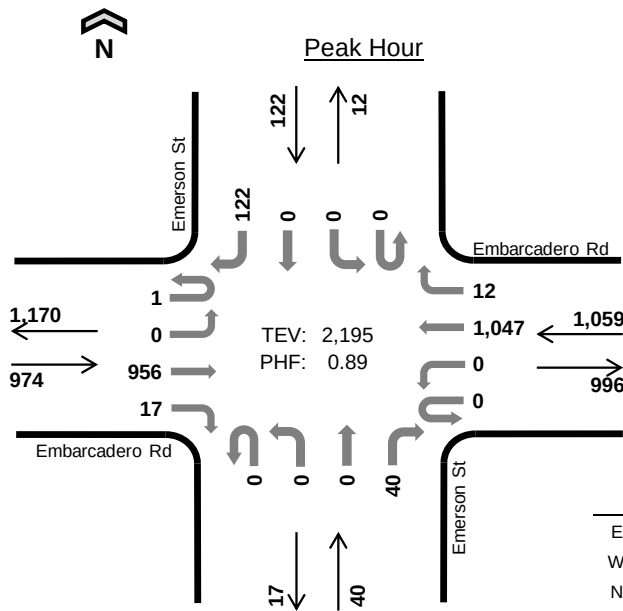
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	1	0	0	1	1	1	0	0	2	4	1	0	2	7
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	2	0	0	1	3	2	2	1	2	7
5:15 PM	0	0	0	0	0	2	1	2	0	5	1	1	0	0	2
5:30 PM	0	0	0	0	0	3	0	0	3	6	0	0	0	1	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
6:00 PM	1	0	0	0	1	3	0	0	2	5	0	0	0	0	0
6:15 PM	1	0	0	0	1	2	1	0	1	4	2	2	0	1	5
Count Total	2	1	0	0	3	13	3	2	7	25	10	6	1	6	23
Peak Hour	2	0	0	0	2	8	1	0	6	15	3	2	0	2	7

Two-Hour Count Summaries - Heavy Vehicles																			
Interval Start	Lincoln Ave				Lincoln Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
6:15 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Count Total	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0
Peak Hour	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0

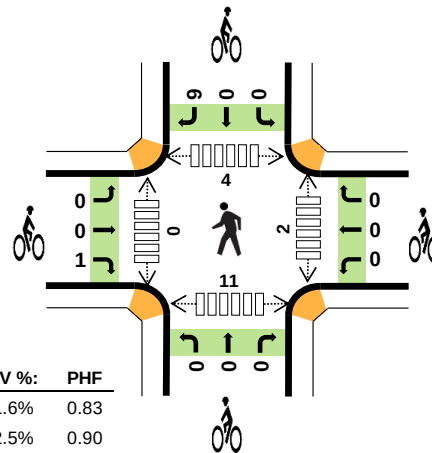
Two-Hour Count Summaries - Bikes																	
Interval Start	Lincoln Ave			Lincoln Ave			Emerson St			Emerson St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	2	0			
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
5:00 PM	0	2	0	0	0	0	0	0	0	0	1	0	3	0			
5:15 PM	1	1	0	0	1	0	0	1	1	0	0	0	5	10			
5:30 PM	0	3	0	0	0	0	0	0	0	1	2	0	6	14			
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	14			
6:00 PM	0	3	0	0	0	0	0	0	0	2	0	0	5	16			
6:15 PM	0	2	0	0	1	0	0	0	0	0	1	0	4	15			
Count Total	1	12	0	0	2	1	0	1	1	3	4	0	25	0			
Peak Hour	0	8	0	0	1	0	0	0	0	3	3	0	15	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Emerson St Embarcadero Rd



Date: 12-06-2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 7:30 AM to 8:30 AM



	HV %:	PHF
EB	1.6%	0.83
WB	2.5%	0.90
NB	0.0%	0.56
SB	0.8%	0.78
TOTAL	2.0%	0.89

Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Emerson St				Emerson St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		1	0	217	0	0	0	275	3	0	0	0	5	0	0	0	21	522	0
7:45 AM		0	0	292	3	0	0	272	1	0	0	0	18	0	0	0	31	617	0
8:00 AM		0	0	233	6	0	0	291	3	0	0	0	12	0	0	0	39	584	0
8:15 AM		0	0	214	8	0	0	209	5	0	0	0	5	0	0	0	31	472	2,195
8:30 AM		0	0	185	3	0	0	224	3	0	0	0	14	0	0	0	28	457	2,130
8:45 AM		0	0	177	5	0	0	232	3	0	0	0	5	0	0	0	29	451	1,964
9:00 AM		0	0	163	3	0	0	224	3	0	0	0	4	0	0	0	11	408	1,788
9:15 AM		0	0	190	2	0	0	214	9	0	0	0	1	0	0	0	14	430	1,746
Count Total		1	0	1,671	30	0	0	1,941	30	0	0	0	64	0	0	0	204	3,941	0
Peak Hour	All	1	0	956	17	0	0	1,047	12	0	0	0	40	0	0	0	122	2,195	0
	HV	0	0	15	1	0	0	26	1	0	0	0	0	0	0	0	1	44	0
	HV%	0%	-	2%	6%	-	-	2%	8%	-	-	-	0%	-	-	-	1%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

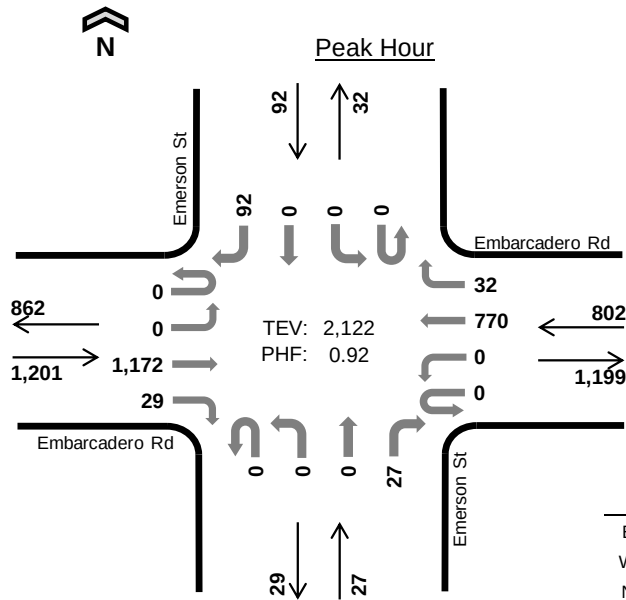
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	4	6	0	0	10	0	0	0	0	0	0	0	2	0	2
7:45 AM	6	7	0	0	13	1	0	0	2	3	0	0	0	5	5
8:00 AM	3	7	0	0	10	0	0	0	6	6	1	0	1	4	6
8:15 AM	3	7	0	1	11	0	0	0	1	1	1	0	1	2	4
8:30 AM	6	7	0	1	14	0	0	0	2	2	0	0	1	2	3
8:45 AM	7	6	0	0	13	0	1	0	0	1	2	0	1	1	4
9:00 AM	5	8	0	0	13	0	0	0	0	0	0	0	0	3	3
9:15 AM	6	7	0	0	13	0	2	0	0	2	0	0	0	2	2
Count Total	40	55	0	2	97	1	3	0	11	15	4	0	6	19	29
Peak Hour	16	27	0	1	44	1	0	0	9	10	2	0	4	11	17

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Emerson St				Emerson St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	4	0	0	0	6	0	0	0	0	0	0	0	0	0	10	0
7:45 AM	0	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	13	0
8:00 AM	0	0	2	1	0	0	7	0	0	0	0	0	0	0	0	0	10	0
8:15 AM	0	0	3	0	0	0	6	1	0	0	0	0	0	0	0	1	11	44
8:30 AM	0	0	6	0	0	0	7	0	0	0	0	0	0	0	0	1	14	48
8:45 AM	0	0	7	0	0	0	6	0	0	0	0	0	0	0	0	0	13	48
9:00 AM	0	0	5	0	0	0	8	0	0	0	0	0	0	0	0	0	13	51
9:15 AM	0	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	13	53
Count Total	0	0	39	1	0	0	54	1	0	0	0	0	0	0	0	2	97	0
Peak Hour	0	0	15	1	0	0	26	1	0	0	0	0	0	0	0	1	44	0

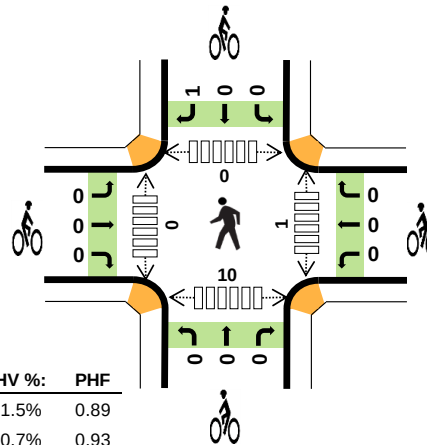
Two-Hour Count Summaries - Bikes																	
Interval Start	Embarcadero Rd			Embarcadero Rd			Emerson St			Emerson St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7:45 AM	0	0	1	0	0	0	0	0	0	0	0	2	3	0			
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	6	6	0			
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	1	10			
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	2	2	12			
8:45 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	10			
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	4			
9:15 AM	0	0	0	0	2	0	0	0	0	0	0	0	2	5			
Count Total	0	0	1	0	3	0	0	0	0	0	0	11	15	0			
Peak Hour	0	0	1	0	0	0	0	0	0	0	0	9	10	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Emerson St Embarcadero Rd



Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 5:30 PM to 6:30 PM



	HV %:	PHF
EB	1.5%	0.89
WB	0.7%	0.93
NB	0.0%	0.68
SB	1.1%	0.82
TOTAL	1.2%	0.92

Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Emerson St				Emerson St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	300	12	0	0	160	4	0	1	0	4	0	0	0	18	499	0
4:45 PM		0	0	281	7	0	0	145	5	0	0	0	1	0	0	0	22	461	0
5:00 PM		0	0	272	10	0	0	168	3	0	0	0	2	0	0	0	20	475	0
5:15 PM		0	0	264	10	0	0	192	7	0	0	0	2	0	0	0	25	500	1,935
5:30 PM		0	0	327	10	0	0	207	8	0	0	0	9	0	0	0	15	576	2,012
5:45 PM		0	0	275	7	0	0	199	5	0	0	0	6	0	0	0	28	520	2,071
6:00 PM		0	0	279	7	0	0	197	10	0	0	0	2	0	0	0	25	520	2,116
6:15 PM		0	0	291	5	0	0	167	9	0	0	0	10	0	0	0	24	506	2,122
Count Total		0	0	2,289	68	0	0	1,435	51	0	1	0	36	0	0	0	177	4,057	0
Peak Hour	All	0	0	1,172	29	0	0	770	32	0	0	0	27	0	0	0	92	2,122	0
	HV	0	0	18	0	0	0	6	0	0	0	0	0	0	0	0	1	25	0
	HV%	-	-	2%	0%	-	-	1%	0%	-	-	-	0%	-	-	-	1%	0	0

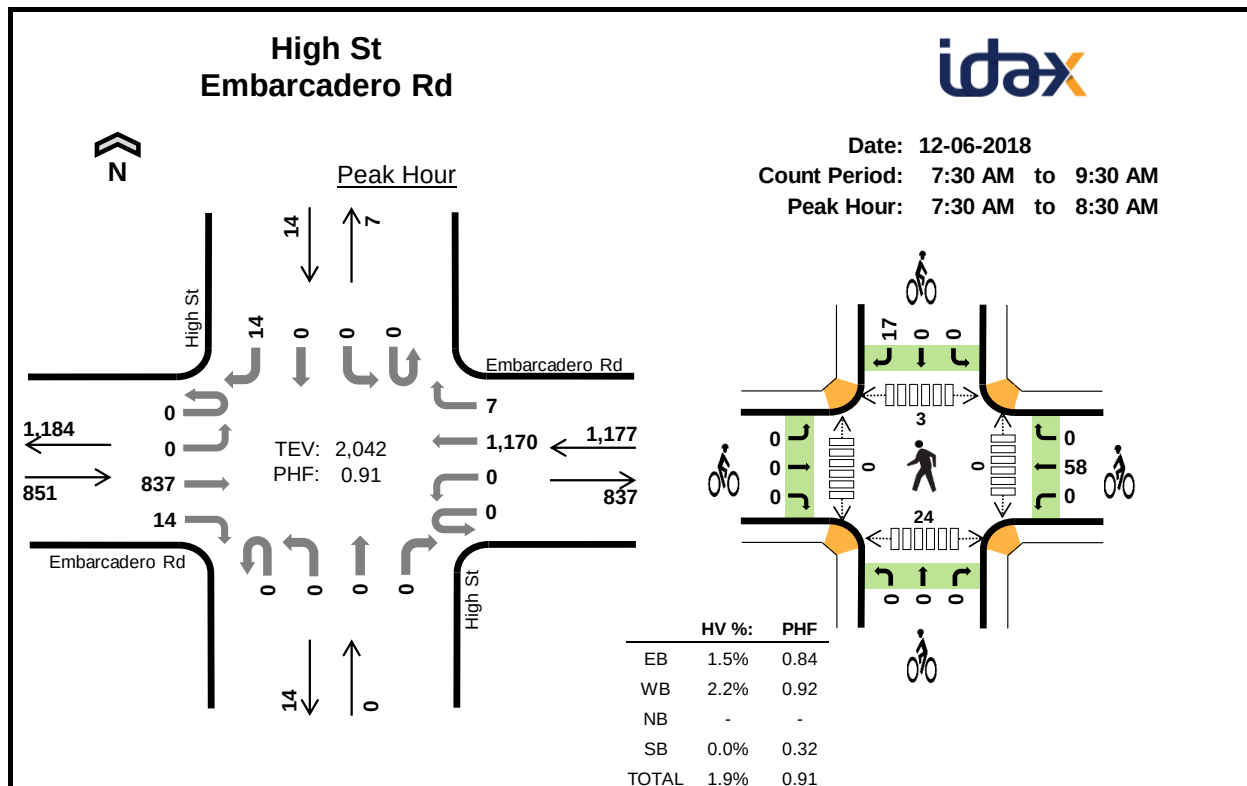
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	4	1	1	0	6	0	0	0	0	0	1	0	1	3	5
4:45 PM	10	0	0	0	10	0	0	0	0	0	0	0	1	2	3
5:00 PM	4	4	0	0	8	0	0	0	0	0	0	0	0	2	2
5:15 PM	7	1	0	0	8	0	1	0	0	1	0	0	1	5	6
5:30 PM	4	1	0	0	5	0	0	0	1	1	1	0	0	2	3
5:45 PM	5	0	0	0	5	0	0	0	0	0	0	0	0	3	3
6:00 PM	3	3	0	0	6	0	0	0	0	0	0	0	0	3	3
6:15 PM	6	2	0	1	9	0	0	0	0	0	0	0	0	2	2
Count Total	43	12	1	1	57	0	1	0	1	2	2	0	3	22	27
Peak Hour	18	6	0	1	25	0	0	0	1	1	1	0	0	10	11

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Emerson St				Emerson St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	4	0	0	0	1	0	0	0	0	1	0	0	0	0	6	0
4:45 PM	0	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0	10	0
5:00 PM	0	0	3	1	0	0	4	0	0	0	0	0	0	0	0	0	8	0
5:15 PM	0	0	7	0	0	0	1	0	0	0	0	0	0	0	0	0	8	32
5:30 PM	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	5	31
5:45 PM	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	26
6:00 PM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	6	24
6:15 PM	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	1	9	25
Count Total	0	0	40	3	0	0	12	0	0	0	0	1	0	0	0	1	57	0
Peak Hour	0	0	18	0	0	0	6	0	0	0	0	0	0	0	0	1	25	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			Emerson St			Emerson St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	1	1				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	2				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2				
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2				
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
Count Total	0	0	0	0	0	1	0	0	0	0	0	1	2	0				
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	1	1	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

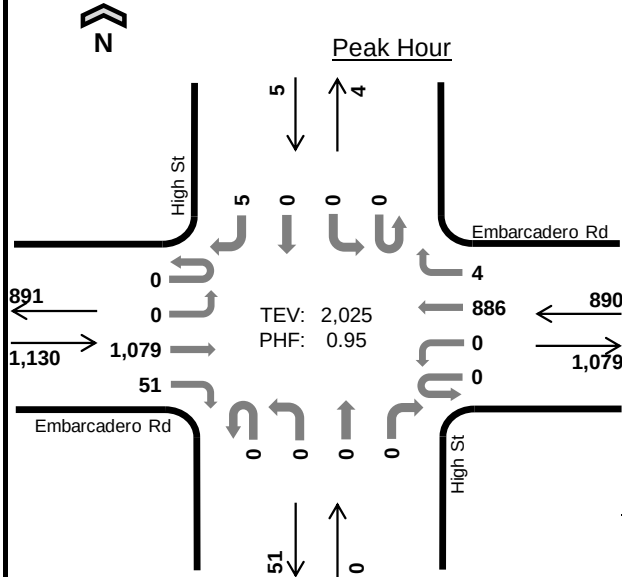
Interval Start		Embarcadero Rd				Embarcadero Rd				High St				High St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	175	1	0	0	295	2	0	0	0	0	0	0	0	0	473	0
7:45 AM		0	0	251	2	0	0	304	0	0	0	0	0	0	0	0	1	558	0
8:00 AM		0	0	204	4	0	0	316	4	0	0	0	0	0	0	0	11	539	0
8:15 AM		0	0	207	7	0	0	255	1	0	0	0	0	0	0	0	2	472	2,042
8:30 AM		0	0	168	6	0	0	248	1	0	0	0	0	0	0	0	4	427	1,996
8:45 AM		0	0	156	5	0	0	255	2	0	0	0	0	0	0	0	0	418	1,856
9:00 AM		0	0	154	4	0	0	233	3	0	0	0	0	0	0	0	1	395	1,712
9:15 AM		0	0	164	3	0	0	226	1	0	0	0	0	0	0	0	1	395	1,635
Count Total		0	0	1,479	32	0	0	2,132	14	0	0	0	0	0	0	0	20	3,677	0
Peak Hour	All	0	0	837	14	0	0	1,170	7	0	0	0	0	0	0	0	14	2,042	0
	HV	0	0	13	0	0	0	26	0	0	0	0	0	0	0	0	0	39	0
	HV%	-	-	2%	0%	-	-	2%	0%	-	-	-	-	-	-	-	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

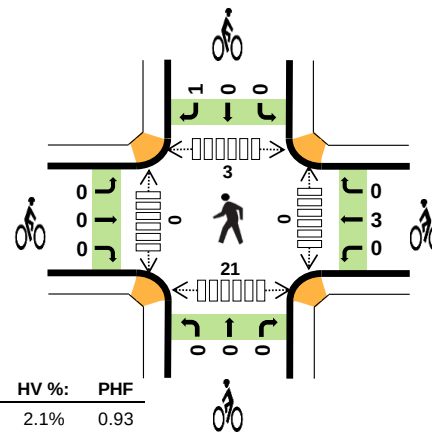
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	4	6	0	0	10	0	1	0	0	1	0	0	2	0	2
7:45 AM	6	6	0	0	12	0	3	0	0	3	0	0	1	7	8
8:00 AM	2	8	0	0	10	0	30	0	9	39	0	0	0	14	14
8:15 AM	1	6	0	0	7	0	24	0	8	32	0	0	0	3	3
8:30 AM	7	7	0	0	14	0	6	0	2	8	0	0	1	3	4
8:45 AM	7	6	0	0	13	0	3	0	3	6	0	0	0	4	4
9:00 AM	5	7	0	0	12	0	1	0	1	2	0	0	0	1	1
9:15 AM	6	7	0	0	13	0	3	0	0	3	0	0	0	3	3
Count Total	38	53	0	0	91	0	71	0	23	94	0	0	4	35	39
Peak Hour	13	26	0	0	39	0	58	0	17	75	0	0	3	24	27

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				High St				High St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	4	0	0	0	6	0	0	0	0	0	0	0	0	0	10	0
7:45 AM	0	0	6	0	0	0	6	0	0	0	0	0	0	0	0	0	12	0
8:00 AM	0	0	2	0	0	0	8	0	0	0	0	0	0	0	0	0	10	0
8:15 AM	0	0	1	0	0	0	6	0	0	0	0	0	0	0	0	0	7	39
8:30 AM	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0	0	14	43
8:45 AM	0	0	7	0	0	0	6	0	0	0	0	0	0	0	0	0	13	44
9:00 AM	0	0	5	0	0	0	7	0	0	0	0	0	0	0	0	0	12	46
9:15 AM	0	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	13	52
Count Total	0	0	38	0	0	0	53	0	0	0	0	0	0	0	0	0	91	0
Peak Hour	0	0	13	0	0	0	26	0	0	0	0	0	0	0	0	0	39	0
Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			High St			High St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	0				
7:45 AM	0	0	0	0	3	0	0	0	0	0	0	0	3	0				
8:00 AM	0	0	0	0	30	0	0	0	0	0	9	9	39	0				
8:15 AM	0	0	0	0	24	0	0	0	0	0	8	8	32	75				
8:30 AM	0	0	0	0	6	0	0	0	0	0	2	2	8	82				
8:45 AM	0	0	0	0	3	0	0	0	0	0	3	3	6	85				
9:00 AM	0	0	0	0	1	0	0	0	0	0	1	1	2	48				
9:15 AM	0	0	0	0	3	0	0	0	0	0	0	0	3	19				
Count Total	0	0	0	0	71	0	0	0	0	0	23	23	94	0				
Peak Hour	0	0	0	0	58	0	0	0	0	0	17	17	75	0				
Note: U-Turn volumes for bikes are included in Left-Turn, if any.																		

High St Embarcadero Rd



Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 5:15 PM to 6:15 PM



	HV %:	PHF
EB	2.1%	0.93
WB	0.8%	0.97
NB	-	-
SB	0.0%	0.42
TOTAL	1.5%	0.95

Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				High St				High St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	297	29	0	0	177	2	0	0	0	0	0	0	0	2	507	0
4:45 PM		0	0	270	22	0	0	167	0	0	0	0	0	0	0	0	0	459	0
5:00 PM		0	0	261	22	0	0	185	0	0	0	0	0	0	0	0	1	469	0
5:15 PM		0	0	253	8	0	0	214	1	0	0	0	0	0	0	0	0	476	1,911
5:30 PM		0	0	294	9	0	0	228	1	0	0	0	0	0	0	0	0	532	1,936
5:45 PM		0	0	261	15	0	0	222	1	0	0	0	0	0	0	0	2	501	1,978
6:00 PM		0	0	271	19	0	0	222	1	0	0	0	0	0	0	0	3	516	2,025
6:15 PM		0	0	266	14	0	0	185	3	0	0	0	0	0	0	0	2	470	2,019
Count Total		0	0	2,173	138	0	0	1,600	9	0	0	0	0	0	0	0	10	3,930	0
Peak Hour	All	0	0	1,079	51	0	0	886	4	0	0	0	0	0	0	0	5	2,025	0
	HV	0	0	24	0	0	0	7	0	0	0	0	0	0	0	0	0	31	0
	HV%	-	-	2%	0%	-	-	1%	0%	-	-	-	-	-	-	-	0%	2%	0

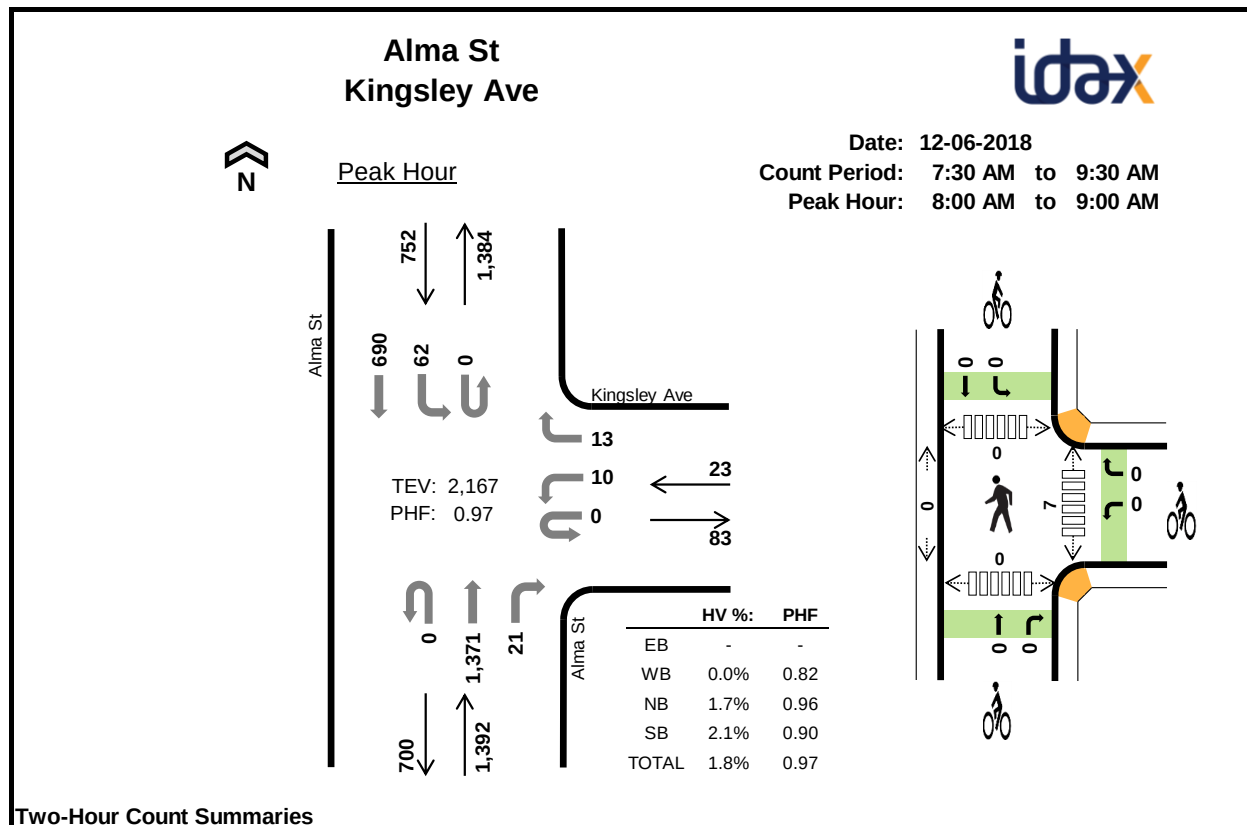
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	4	1	0	0	5	0	0	0	0	0	0	0	1	6	7
4:45 PM	8	0	0	0	8	0	0	0	1	1	0	0	2	5	7
5:00 PM	3	3	0	0	6	0	0	0	0	0	0	0	1	8	9
5:15 PM	7	2	0	0	9	0	0	0	1	1	0	0	0	9	9
5:30 PM	5	1	0	0	6	0	1	0	0	1	0	0	1	5	6
5:45 PM	7	1	0	0	8	0	0	0	0	0	0	0	1	4	5
6:00 PM	5	3	0	0	8	0	2	0	0	2	0	0	1	3	4
6:15 PM	6	3	0	0	9	0	0	0	1	1	0	0	1	4	5
Count Total	45	14	0	0	59	0	3	0	3	6	0	0	8	44	52
Peak Hour	24	7	0	0	31	0	3	0	1	4	0	0	3	21	24

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				High St				High St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	5	0
4:45 PM	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0
5:00 PM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	6	0
5:15 PM	0	0	7	0	0	0	2	0	0	0	0	0	0	0	0	0	9	28
5:30 PM	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	6	29
5:45 PM	0	0	7	0	0	0	1	0	0	0	0	0	0	0	0	0	8	29
6:00 PM	0	0	5	0	0	0	3	0	0	0	0	0	0	0	0	0	8	31
6:15 PM	0	0	6	0	0	0	3	0	0	0	0	0	0	0	0	0	9	31
Count Total	0	0	45	0	0	0	14	0	0	0	0	0	0	0	0	0	59	0
Peak Hour	0	0	24	0	0	0	7	0	0	0	0	0	0	0	0	0	31	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			High St			High St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	1	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	2				
5:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	3				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2				
6:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	2	4				
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	4				
Count Total	0	0	0	0	3	0	0	0	0	1	0	2	6	0				
Peak Hour	0	0	0	0	3	0	0	0	0	0	0	1	4	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		0				Kingsley Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	0	0	0	0	0	0	0	0	280	12	0	30	114	0	436	0
7:45 AM		0	0	0	0	0	1	0	0	0	0	307	14	0	38	166	0	526	0
8:00 AM		0	0	0	0	0	1	0	4	0	0	311	5	0	20	189	0	530	0
8:15 AM		0	0	0	0	0	4	0	3	0	0	356	5	0	8	160	0	536	2,028
8:30 AM		0	0	0	0	0	3	0	3	0	0	348	5	0	19	181	0	559	2,151
8:45 AM		0	0	0	0	0	2	0	3	0	0	356	6	0	15	160	0	542	2,167
9:00 AM		0	0	0	0	0	2	0	2	0	0	264	4	0	11	159	0	442	2,079
9:15 AM		0	0	0	0	0	1	0	3	0	0	294	7	0	24	121	0	450	1,993
Count Total		0	0	0	0	0	14	0	18	0	0	2,516	58	0	165	1,250	0	4,021	0
Peak Hour	All	0	0	0	0	0	10	0	13	0	0	1,371	21	0	62	690	0	2,167	0
	HV	0	0	0	0	0	0	0	0	0	0	24	0	0	3	13	0	40	0
	HV%	-	-	-	-	-	0%	-	0%	-	-	2%	0%	-	5%	2%	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	5	4	9	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	8	7	15	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	5	2	7	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	7	5	12	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	8	4	12	0	0	0	0	0	4	0	0	0	4
8:45 AM	0	0	4	5	9	0	0	0	0	0	3	0	0	0	3
9:00 AM	0	0	2	6	8	0	0	0	0	0	1	0	0	0	1
9:15 AM	0	0	2	3	5	0	0	0	0	0	3	0	0	0	3
Count Total	0	0	41	36	77	0	0	0	0	0	11	0	0	0	11
Peak Hr	0	0	24	16	40	0	0	0	0	0	7	0	0	0	7

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	0				Kingsley Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	1	3	0	9	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	7	1	0	0	7	0	15	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	1	1	0	7	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	7	0	0	2	3	0	12	43
8:30 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	4	0	12	46
8:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	9	40
9:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	8	41
9:15 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	1	2	0	5	34
Count Total	0	0	0	0	0	0	0	0	0	0	40	1	0	5	31	0	77	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	24	0	0	3	13	0	40	0

Two-Hour Count Summaries - Bikes																		
Interval Start	0				Kingsley Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	LT	TH	RT		LT	TH	RT		LT	TH	RT		LT	TH	RT			
7:30 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
7:45 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:00 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:15 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:30 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:45 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
9:00 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
9:15 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
Count Total	0	0	0		0	0	0		0	0	0		0	0	0		0	0
Peak Hour	0	0	0		0	0	0		0	0	0		0	0	0		0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Alma St Kingsley Ave

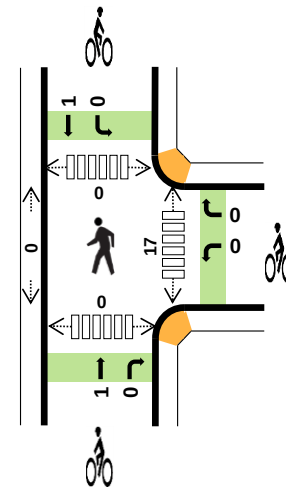
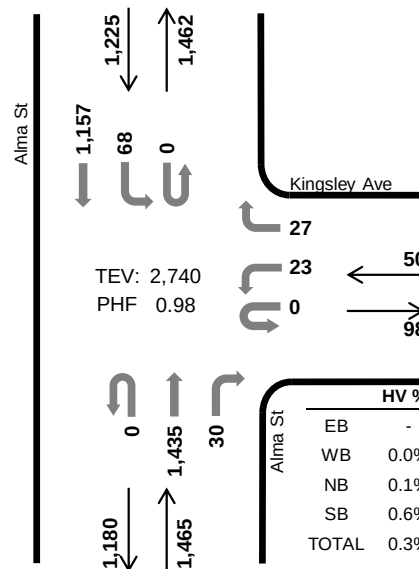


Peak Hour

Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:30 PM to 6:30 PM



Two-Hour Count Summaries

Interval Start		0				Kingsley Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	0	0	0	21	0	7	0	0	259	1	0	13	302	0	603	0
4:45 PM		0	0	0	0	0	15	0	7	0	0	250	4	0	13	335	0	624	0
5:00 PM		0	0	0	0	0	11	0	8	0	0	336	5	0	9	340	0	709	0
5:15 PM		0	0	0	0	0	4	0	5	0	0	358	7	0	14	280	0	668	2,604
5:30 PM		0	0	0	0	0	4	0	4	0	0	348	14	0	23	276	0	669	2,670
5:45 PM		0	0	0	0	0	5	0	10	0	0	352	5	0	14	296	0	682	2,728
6:00 PM		0	0	0	0	0	6	0	8	0	0	364	3	0	13	306	0	700	2,719
6:15 PM		0	0	0	0	0	8	0	5	0	0	371	8	0	18	279	0	689	2,740
Count Total		0	0	0	0	0	74	0	54	0	0	2,638	47	0	117	2,414	0	5,344	0
Peak Hour	All	0	0	0	0	0	23	0	27	0	0	1,435	30	0	68	1,157	0	2,740	0
	HV	0	0	0	0	0	0	0	0	0	0	1	0	0	1	6	0	8	0
	HV%	-	-	-	-	-	0%	-	0%	-	-	0%	0%	-	1%	1%	-	0%	0

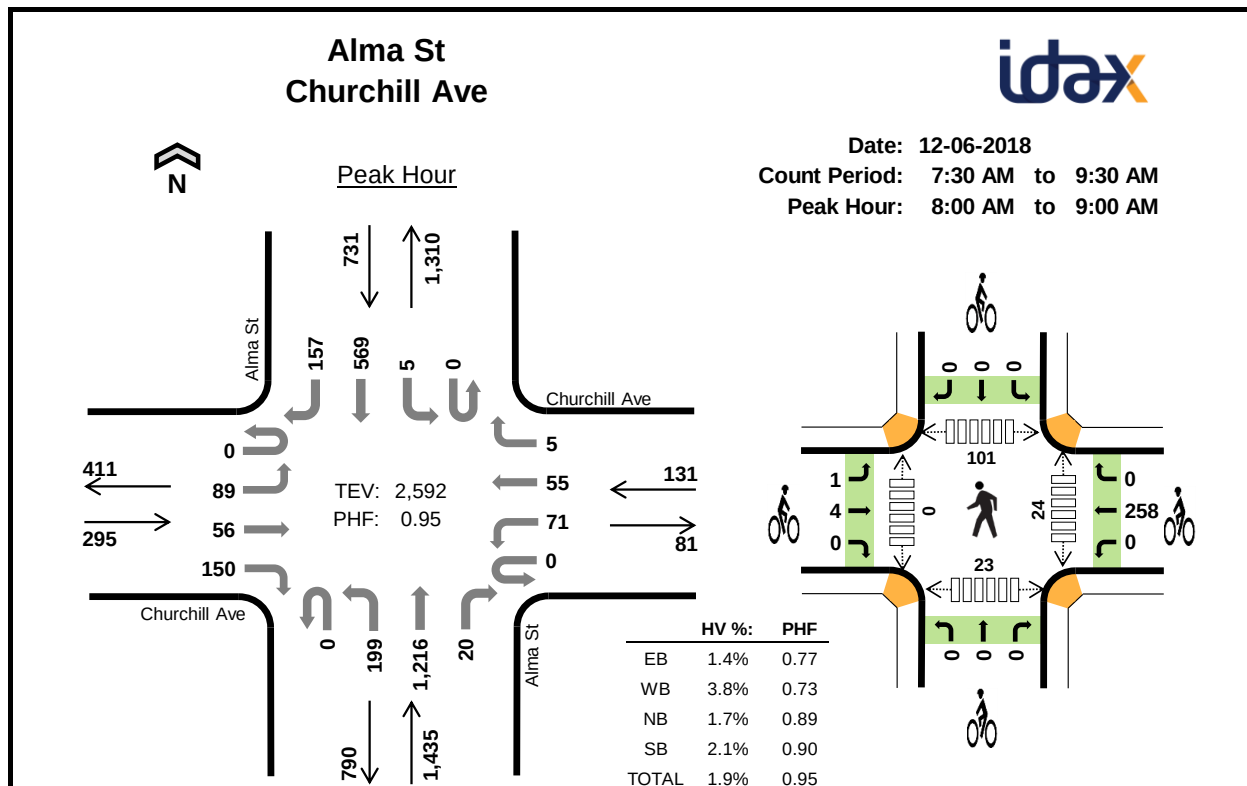
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	0	2	2	4	0	0	0	0	0	3	0	0	0	3
4:45 PM	0	0	4	3	7	0	0	0	0	0	2	0	0	0	2
5:00 PM	0	0	2	2	4	0	0	0	0	0	1	0	0	0	1
5:15 PM	0	0	2	1	3	0	0	0	1	1	1	0	0	0	1
5:30 PM	0	0	0	2	2	0	0	0	0	0	7	0	0	0	7
5:45 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4
6:00 PM	0	0	0	2	2	0	0	0	0	0	4	0	0	0	4
6:15 PM	0	0	1	3	4	0	0	1	1	2	2	0	0	0	2
Count Total	0	0	11	15	26	0	0	1	2	3	24	0	0	0	24
Peak Hr	0	0	1	7	8	0	0	1	1	2	17	0	0	0	17

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	0				Kingsley Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	4	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	2	2	0	0	3	0	7	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	18
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	16
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	7
6:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	4	8
Count Total	0	0	0	0	0	0	0	0	0	0	8	3	0	1	14	0	26	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	1	0	0	1	6	0	8	0

Two-Hour Count Summaries - Bikes																		
Interval Start	0			Kingsley Ave			Alma St			Alma St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	1	1				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
6:15 PM	0	0	0	0	0	0	0	1	0	0	1	0	2	2				
Count Total	0	0	0	0	0	0	0	1	0	1	1	0	3	0				
Peak Hour	0	0	0	0	0	0	0	1	0	0	1	0	2	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		Churchill Ave				Churchill Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	9	6	26	0	7	10	1	0	56	248	9	0	1	78	14	465	0
7:45 AM		0	15	17	36	0	16	8	0	0	62	310	10	0	3	141	31	649	0
8:00 AM		0	16	17	35	0	21	3	2	0	61	285	6	0	0	138	65	649	0
8:15 AM		0	33	16	47	0	22	8	1	0	43	301	2	0	1	144	38	656	2,419
8:30 AM		0	21	9	32	0	15	28	2	0	34	298	2	0	0	135	30	606	2,560
8:45 AM		0	19	14	36	0	13	16	0	0	61	332	10	0	4	152	24	681	2,592
9:00 AM		0	25	18	25	0	14	15	0	0	55	253	6	0	0	140	20	571	2,514
9:15 AM		0	17	8	28	0	5	9	1	0	40	286	1	0	1	106	23	525	2,383
Count Total		0	155	105	265	0	113	97	7	0	412	2,313	46	0	10	1,034	245	4,802	0
Peak Hour	All	0	89	56	150	0	71	55	5	0	199	1,216	20	0	5	569	157	2,592	0
	HV	0	2	0	2	0	0	5	0	0	5	19	0	0	0	12	3	48	0
	HV%	-	2%	0%	1%	-	0%	9%	0%	-	3%	2%	0%	-	0%	2%	2%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

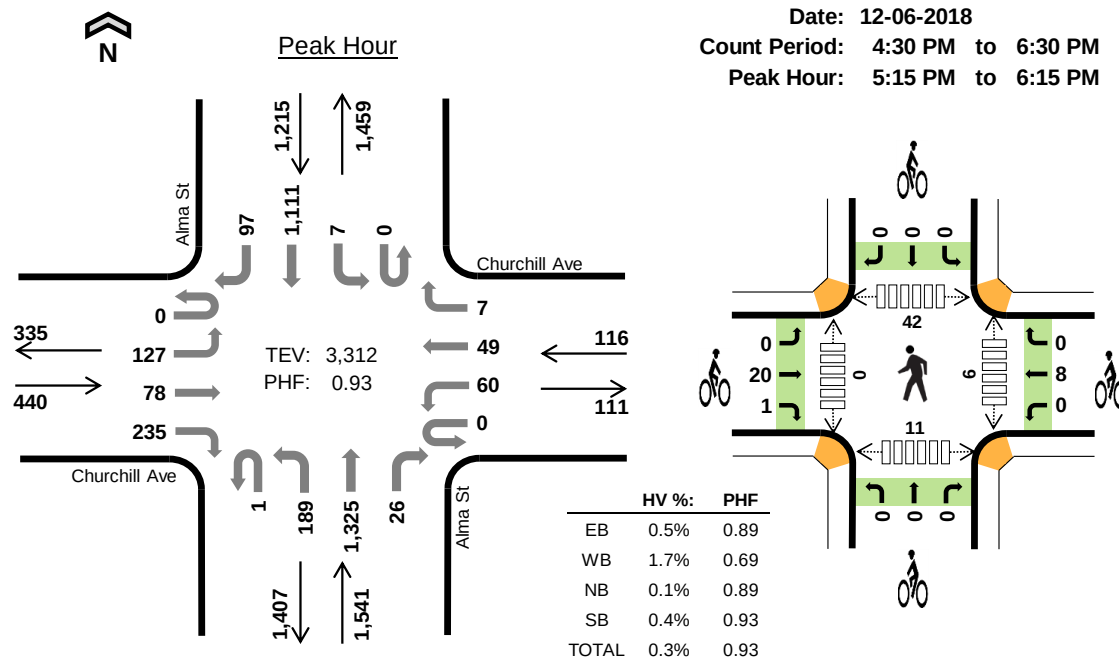
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	5	2	7	0	1	0	0	1	0	0	2	0	2
7:45 AM	1	0	7	8	16	8	13	0	0	21	1	0	11	11	23
8:00 AM	1	0	6	2	9	2	165	0	0	167	15	0	41	11	67
8:15 AM	1	0	6	3	10	1	81	0	0	82	7	0	38	10	55
8:30 AM	1	1	8	4	14	1	8	0	0	9	1	0	10	1	12
8:45 AM	1	4	4	6	15	1	4	0	0	5	1	0	12	1	14
9:00 AM	0	1	2	5	8	1	7	0	0	8	2	0	1	3	6
9:15 AM	2	1	2	4	9	1	7	0	0	8	3	0	10	4	17
Count Total	7	7	40	34	88	15	286	0	0	301	30	0	125	41	196
Peak Hour	4	5	24	15	48	5	258	0	0	263	24	0	101	23	148

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	2	0	7	0
7:45 AM	0	1	0	0	0	0	0	0	0	0	7	0	0	0	8	0	16	0
8:00 AM	0	0	0	1	0	0	0	0	0	1	5	0	0	0	1	1	9	0
8:15 AM	0	1	0	0	0	0	0	0	0	2	4	0	0	0	3	0	10	42
8:30 AM	0	0	0	1	0	0	1	0	0	1	7	0	0	0	3	1	14	49
8:45 AM	0	1	0	0	0	0	4	0	0	1	3	0	0	0	5	1	15	48
9:00 AM	0	0	0	0	0	0	1	0	0	0	2	0	0	0	3	2	8	47
9:15 AM	0	2	0	0	0	0	1	0	0	2	0	0	0	0	3	1	9	46
Count Total	0	5	0	2	0	0	7	0	0	7	33	0	0	0	28	6	88	0
Peak Hour	0	2	0	2	0	0	5	0	0	5	19	0	0	0	12	3	48	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Churchill Ave			Churchill Ave			Alma St			Alma St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	0				
7:45 AM	0	8	0	0	13	0	0	0	0	0	0	0	21	0				
8:00 AM	0	2	0	0	165	0	0	0	0	0	0	0	167	0				
8:15 AM	0	1	0	0	81	0	0	0	0	0	0	0	82	271				
8:30 AM	1	0	0	0	8	0	0	0	0	0	0	0	9	279				
8:45 AM	0	1	0	0	4	0	0	0	0	0	0	0	5	263				
9:00 AM	0	1	0	0	7	0	0	0	0	0	0	0	8	104				
9:15 AM	0	1	0	0	7	0	0	0	0	0	0	0	8	30				
Count Total	1	14	0	0	286	0	0	0	0	0	0	0	301	0				
Peak Hour	1	4	0	0	258	0	0	0	0	0	0	0	263	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Alma St Churchill Ave



Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	12	16	75	0	12	7	0	0	40	273	5	0	2	307	27	776	0
4:45 PM		0	16	22	85	0	22	19	0	0	59	231	9	0	1	297	24	785	0
5:00 PM		0	22	19	76	0	11	12	3	0	48	297	10	0	5	311	27	841	0
5:15 PM		0	38	28	46	0	11	14	2	1	40	299	7	0	1	275	26	788	3,190
5:30 PM		0	37	21	66	0	17	9	1	0	55	325	8	0	2	240	21	802	3,216
5:45 PM		0	18	16	62	0	23	16	3	0	31	333	8	0	2	296	27	835	3,266
6:00 PM		0	34	13	61	0	9	10	1	0	63	368	3	0	2	300	23	887	3,312
6:15 PM		0	34	20	65	0	14	21	1	0	44	326	2	0	1	228	32	788	3,312
Count Total		0	211	155	536	0	119	108	11	1	380	2,452	52	0	16	2,254	207	6,502	0
Peak Hour	All	0	127	78	235	0	60	49	7	1	189	1,325	26	0	7	1,111	97	3,312	0
	HV	0	0	1	1	0	0	2	0	0	0	2	0	0	0	5	0	11	0
	HV%	-	0%	1%	0%	-	0%	4%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

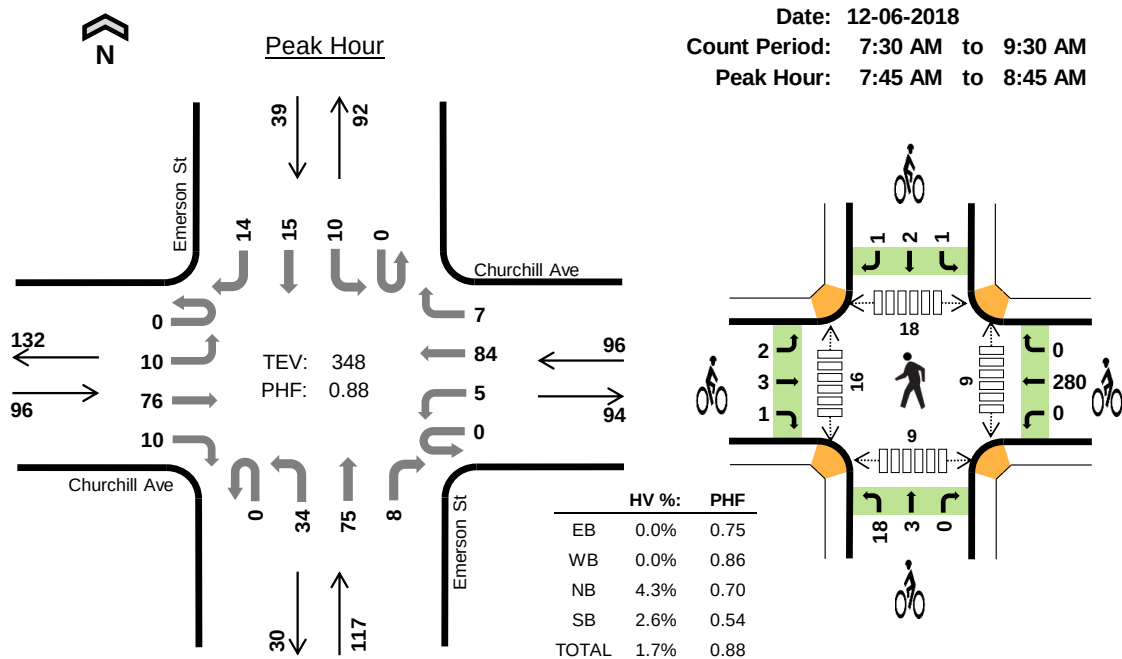
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	1	2	2	5	4	3	0	0	7	0	0	10	2	12
4:45 PM	1	1	2	4	8	7	0	0	0	7	2	1	7	2	12
5:00 PM	0	1	2	2	5	8	2	0	0	10	1	0	11	2	14
5:15 PM	0	0	2	1	3	5	1	0	0	6	4	0	11	2	17
5:30 PM	1	1	0	2	4	4	3	0	0	7	2	0	12	2	16
5:45 PM	1	1	0	0	2	4	2	0	0	6	0	0	11	2	13
6:00 PM	0	0	0	2	2	8	2	0	0	10	0	0	8	5	13
6:15 PM	0	1	1	1	3	5	1	0	0	6	0	0	6	6	12
Count Total	3	6	9	14	32	45	14	0	0	59	9	1	76	23	109
Peak Hour	2	2	2	5	11	21	8	0	0	29	6	0	42	11	59

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	1	0	0	0	2	0	0	0	2	0	5	0
4:45 PM	0	0	0	1	0	0	1	0	0	1	1	0	0	0	4	0	8	0
5:00 PM	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	1	5	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	21
5:30 PM	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2	0	4	20
5:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	14
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	11
6:15 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	3	11
Count Total	0	0	1	2	0	0	6	0	0	1	8	0	0	0	13	1	32	0
Peak Hour	0	0	1	1	0	0	2	0	0	0	2	0	0	0	5	0	11	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Churchill Ave			Churchill Ave			Alma St			Alma St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	4	0	0	3	0	0	0	0	0	0	0	7	0				
4:45 PM	0	7	0	0	0	0	0	0	0	0	0	0	7	0				
5:00 PM	0	8	0	0	2	0	0	0	0	0	0	0	10	0				
5:15 PM	0	5	0	0	1	0	0	0	0	0	0	0	6	30				
5:30 PM	0	4	0	0	3	0	0	0	0	0	0	0	7	30				
5:45 PM	0	4	0	0	2	0	0	0	0	0	0	0	6	29				
6:00 PM	0	7	1	0	2	0	0	0	0	0	0	0	10	29				
6:15 PM	0	5	0	0	1	0	0	0	0	0	0	0	6	29				
Count Total	0	44	1	0	14	0	0	0	0	0	0	0	59	0				
Peak Hour	0	20	1	0	8	0	0	0	0	0	0	0	29	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Emerson St Churchill Ave



Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	1	14	0	0	0	17	4	0	1	4	1	0	2	1	3	48	0
7:45 AM		0	5	24	3	0	1	22	3	0	2	18	3	0	6	9	3	99	0
8:00 AM		0	2	23	3	0	1	12	3	0	16	24	2	0	2	4	4	96	0
8:15 AM		0	3	15	3	0	3	24	1	0	6	16	2	0	0	2	3	78	321
8:30 AM		0	0	14	1	0	0	26	0	0	10	17	1	0	2	0	4	75	348
8:45 AM		1	1	18	3	0	1	23	3	0	1	6	3	0	0	3	2	65	314
9:00 AM		0	0	20	4	0	0	19	2	0	6	2	1	0	0	4	2	60	278
9:15 AM		0	0	8	2	0	0	14	1	0	2	2	1	0	1	1	13	45	245
Count Total		1	12	136	19	0	6	157	17	0	44	89	14	0	13	24	34	566	0
Peak Hour	All	0	10	76	10	0	5	84	7	0	34	75	8	0	10	15	14	348	0
	HV	0	0	0	0	0	0	0	0	0	1	4	0	0	1	0	0	6	0
	HV%	-	0%	0%	0%	-	0%	0%	0%	-	3%	5%	0%	-	10%	0%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

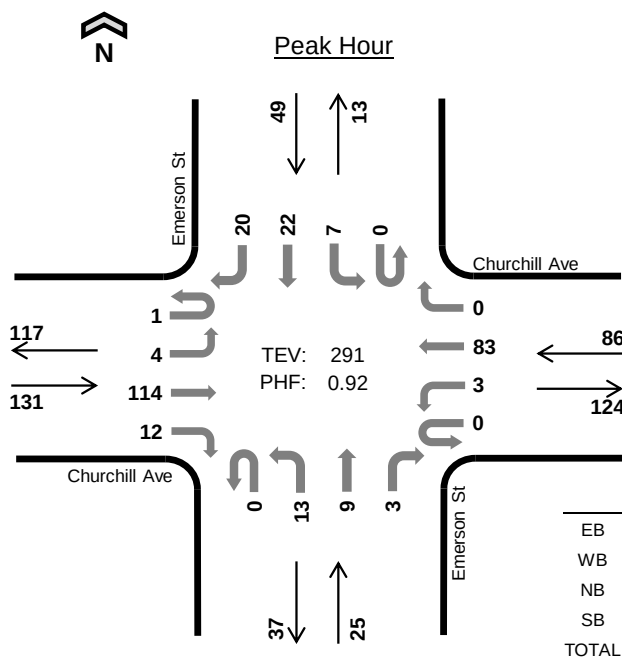
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	0	1	1	0	1	2	0	3	0	1	0	0	1
7:45 AM	0	0	0	1	1	2	27	3	3	35	3	3	1	6	13
8:00 AM	0	0	1	0	1	3	205	15	0	223	3	8	12	0	23
8:15 AM	0	0	1	0	1	1	40	0	0	41	2	2	1	1	6
8:30 AM	0	0	3	0	3	0	8	3	1	12	1	3	4	2	10
8:45 AM	0	2	1	1	4	2	4	1	0	7	1	0	2	1	4
9:00 AM	0	0	0	0	0	1	8	0	0	9	0	1	0	2	3
9:15 AM	0	1	0	0	1	2	5	1	0	8	1	0	5	2	8
Count Total	0	3	6	3	12	11	298	25	4	338	11	18	25	14	68
Peak Hour	0	0	5	1	6	6	280	21	4	311	9	16	18	9	52

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	4
8:30 AM	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	3	6
8:45 AM	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	1	4	9
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
9:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	8
Count Total	0	0	0	0	0	0	3	0	0	2	4	0	0	2	0	1	12	0
Peak Hour	0	0	0	0	0	0	0	0	0	1	4	0	0	1	0	0	6	0

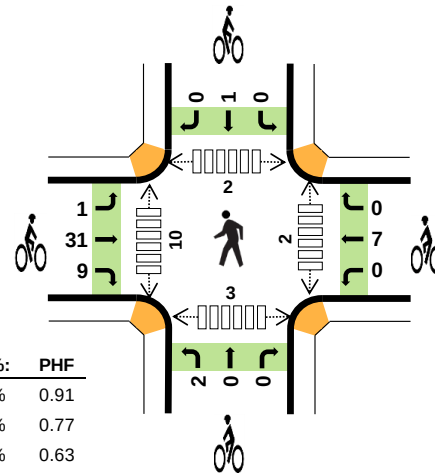
Two-Hour Count Summaries - Bikes																	
Interval Start	Churchill Ave			Churchill Ave			Emerson St			Emerson St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	1	0	2	0	0	0	0	0	3	0			
7:45 AM	0	1	1	0	27	0	1	2	0	1	1	1	35	0			
8:00 AM	1	2	0	0	205	0	15	0	0	0	0	0	223	0			
8:15 AM	1	0	0	0	40	0	0	0	0	0	0	0	41	302			
8:30 AM	0	0	0	0	8	0	2	1	0	0	1	0	12	311			
8:45 AM	0	2	0	0	4	0	1	0	0	0	0	0	7	283			
9:00 AM	0	1	0	0	8	0	0	0	0	0	0	0	9	69			
9:15 AM	0	2	0	0	5	0	1	0	0	0	0	0	8	36			
Count Total	2	8	1	0	298	0	22	3	0	1	2	1	338	0			
Peak Hour	2	3	1	0	280	0	18	3	0	1	2	1	311	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Emerson St Churchill Ave



Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 4:45 PM to 5:45 PM



	HV %:	PHF
EB	0.0%	0.91
WB	3.5%	0.77
NB	4.0%	0.63
SB	2.0%	0.77
TOTAL	1.7%	0.92

Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	18	4	0	0	22	2	0	3	1	1	0	0	6	8	65	0
4:45 PM		1	0	28	2	0	0	28	0	0	3	6	1	0	2	3	5	79	0
5:00 PM		0	1	30	5	0	1	13	0	0	4	3	2	0	3	4	5	71	0
5:15 PM		0	3	30	0	0	0	20	0	0	3	0	0	0	1	6	4	67	282
5:30 PM		0	0	26	5	0	2	22	0	0	3	0	0	0	1	9	6	74	291
5:45 PM		1	1	19	5	0	1	27	1	0	6	5	1	0	2	6	3	78	290
6:00 PM		0	2	14	1	0	1	17	2	0	5	1	1	0	2	2	7	55	274
6:15 PM		0	3	19	1	0	0	25	0	0	2	2	1	0	1	4	6	64	271
Count Total		2	10	184	23	0	5	174	5	0	29	18	7	0	12	40	44	553	0
Peak Hour	All	1	4	114	12	0	3	83	0	0	13	9	3	0	7	22	20	291	0
	HV	0	0	0	0	0	0	3	0	0	0	1	0	0	1	0	0	5	0
	HV%	0%	0%	0%	0%	-	0%	4%	-	-	0%	11%	0%	-	14%	0%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	1	0	0	1	8	3	0	1	12	3	3	4	3	13
4:45 PM	0	1	1	0	2	9	1	1	0	11	1	5	0	1	7
5:00 PM	0	1	0	1	2	13	1	0	1	15	0	3	1	0	4
5:15 PM	0	0	0	0	0	9	2	1	0	12	0	2	0	2	4
5:30 PM	0	1	0	0	1	10	3	0	0	13	1	0	1	0	2
5:45 PM	1	1	0	0	2	12	2	1	0	15	4	1	1	1	7
6:00 PM	0	1	0	0	1	11	1	1	1	14	2	1	1	2	6
6:15 PM	0	1	0	0	1	8	1	0	0	9	1	4	2	0	7
Count Total	1	7	1	1	10	80	14	4	3	101	12	19	10	9	50
Peak Hour	0	3	1	1	5	41	7	2	1	51	2	10	2	3	17

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Emerson St				Emerson St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	0
5:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	2	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
5:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	5
6:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	4
6:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
Count Total	0	0	1	0	0	0	7	0	0	0	1	0	0	1	0	0	10	0
Peak Hour	0	0	0	0	0	0	3	0	0	0	1	0	0	1	0	0	5	0

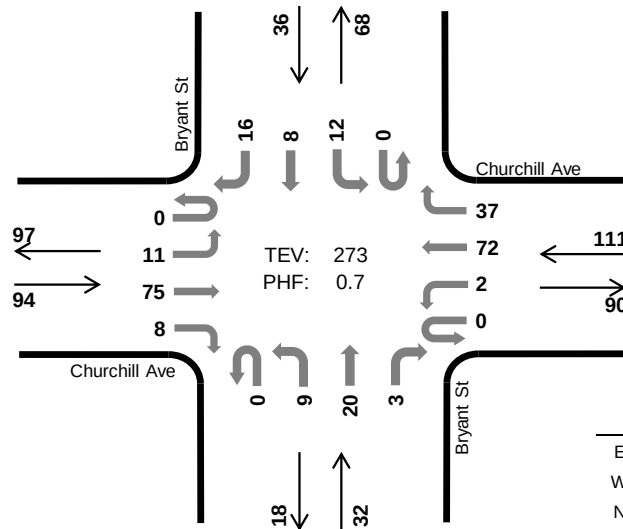
Two-Hour Count Summaries - Bikes																		
Interval Start	Churchill Ave			Churchill Ave			Emerson St			Emerson St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	7	1	0	3	0	0	0	0	0	0	1	12	0				
4:45 PM	0	7	2	0	1	0	1	0	0	0	0	0	11	0				
5:00 PM	0	11	2	0	1	0	0	0	0	0	1	0	15	0				
5:15 PM	1	5	3	0	2	0	1	0	0	0	0	0	12	50				
5:30 PM	0	8	2	0	3	0	0	0	0	0	0	0	13	51				
5:45 PM	0	12	0	0	2	0	1	0	0	0	0	0	15	55				
6:00 PM	0	9	2	0	1	0	0	1	0	0	1	0	14	54				
6:15 PM	0	4	4	0	1	0	0	0	0	0	0	0	9	51				
Count Total	1	63	16	0	14	0	3	1	0	0	2	1	101	0				
Peak Hour	1	31	9	0	7	0	2	0	0	0	1	0	51	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Bryant St Churchill Ave

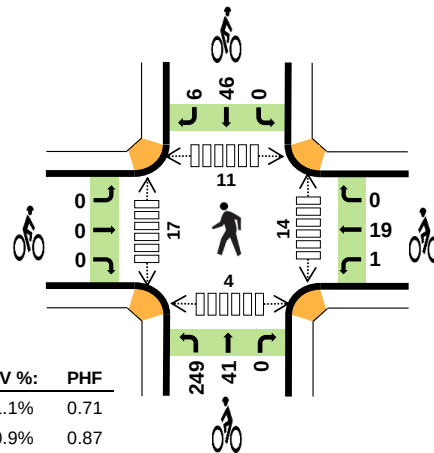


Peak Hour



TEV: 273
PHF: 0.7

Date: 12-06-2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 7:45 AM to 8:45 AM



	HV %:	PHF
EB	1.1%	0.71
WB	0.9%	0.87
NB	3.1%	0.57
SB	0.0%	0.47
TOTAL	1.1%	0.70

Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Bryant St				Bryant St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		1	2	12	1	0	0	17	2	0	0	4	0	0	1	4	2	46	0
7:45 AM		0	9	22	2	0	0	15	17	0	1	12	1	0	5	5	9	98	0
8:00 AM		0	1	23	5	0	0	11	12	0	2	6	1	0	4	1	5	71	0
8:15 AM		0	0	16	1	0	1	23	6	0	4	1	1	0	2	1	0	56	271
8:30 AM		0	1	14	0	0	1	23	2	0	2	1	0	0	1	1	2	48	273
8:45 AM		0	0	19	2	0	1	20	0	0	3	3	4	0	1	3	2	58	233
9:00 AM		0	0	21	0	0	0	18	1	0	1	2	1	0	4	6	4	58	220
9:15 AM		1	0	7	3	0	1	14	1	0	0	3	1	0	4	3	0	38	202
Count Total		2	13	134	14	0	4	141	41	0	13	32	9	0	22	24	24	473	0
Peak Hour	All	0	11	75	8	0	2	72	37	0	9	20	3	0	12	8	16	273	0
	HV	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	3	0
	HV%	-	0%	1%	0%	-	0%	0%	3%	-	0%	5%	0%	-	0%	0%	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

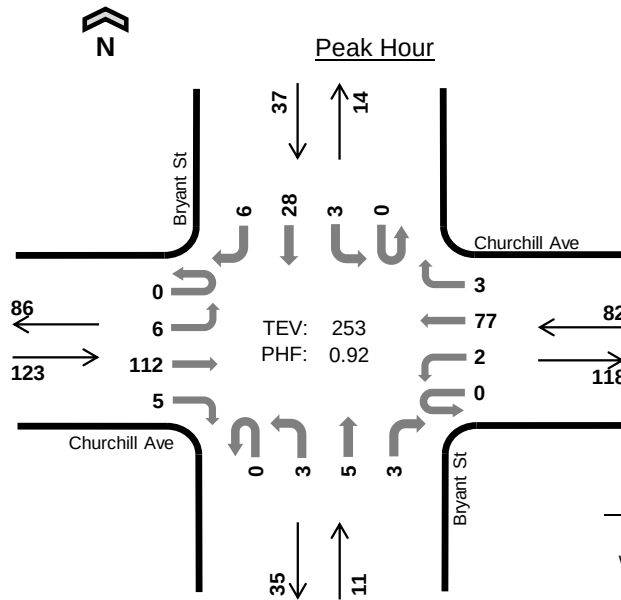
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	1	0	0	0	1	0	1	9	16	26	0	1	0	0	1
7:45 AM	1	1	0	0	2	0	2	41	28	71	6	9	4	0	19
8:00 AM	0	0	1	0	1	0	15	189	9	213	5	2	1	1	9
8:15 AM	0	0	0	0	0	0	3	43	4	50	2	3	2	1	8
8:30 AM	0	0	0	0	0	0	0	17	11	28	1	3	4	2	10
8:45 AM	0	2	0	0	2	2	0	15	11	28	1	3	2	2	8
9:00 AM	0	0	0	0	0	1	1	17	2	21	4	3	0	0	7
9:15 AM	0	1	0	0	1	2	3	12	2	19	0	0	0	4	4
Count Total	2	4	1	0	7	5	25	343	83	456	19	24	13	10	66
Peak Hour	1	1	1	0	3	0	20	290	52	362	14	17	11	4	46

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Bryant St				Bryant St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7:45 AM	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
8:45 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	3
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
9:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	3
Count Total	0	0	2	0	0	0	3	1	0	0	1	0	0	0	0	0	7	0
Peak Hour	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	3	0

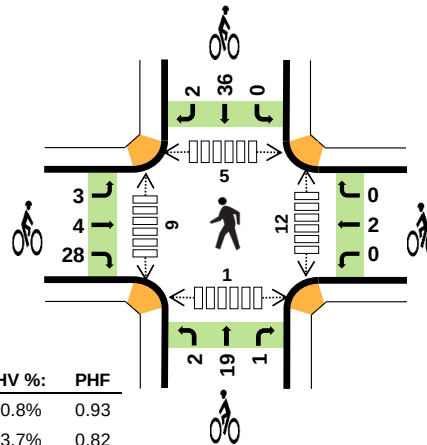
Two-Hour Count Summaries - Bikes																	
Interval Start	Churchill Ave			Churchill Ave			Bryant St			Bryant St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	1	0	0	9	0	0	16	0	26	0			
7:45 AM	0	0	0	0	2	0	27	14	0	0	26	2	71	0			
8:00 AM	0	0	0	1	14	0	182	7	0	0	6	3	213	0			
8:15 AM	0	0	0	0	3	0	31	12	0	0	3	1	50	360			
8:30 AM	0	0	0	0	0	0	9	8	0	0	11	0	28	362			
8:45 AM	1	0	1	0	0	0	3	12	0	0	9	2	28	319			
9:00 AM	0	1	0	1	0	0	7	10	0	0	2	0	21	127			
9:15 AM	0	0	2	1	2	0	2	10	0	0	2	0	19	96			
Count Total	1	1	3	3	22	0	261	82	0	0	75	8	456	0			
Peak Hour	0	0	0	1	19	0	249	41	0	0	46	6	362	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Bryant St Churchill Ave



Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 4:45 PM to 5:45 PM



	HV %:	PHF
EB	0.8%	0.93
WB	3.7%	0.82
NB	9.1%	0.39
SB	0.0%	0.84
TOTAL	2.0%	0.92

Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Bryant St				Bryant St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	3	15	2	0	0	18	0	0	4	4	1	0	0	11	2	60	0
4:45 PM		0	1	29	1	0	1	24	0	0	1	0	1	0	0	9	2	69	0
5:00 PM		0	4	27	2	0	0	15	0	0	0	2	0	0	2	7	0	59	0
5:15 PM		0	0	32	0	0	1	16	1	0	0	0	0	0	0	6	2	58	246
5:30 PM		0	1	24	2	0	0	22	2	0	2	3	2	0	1	6	2	67	253
5:45 PM		0	2	20	1	0	2	23	0	0	2	2	0	0	0	3	2	57	241
6:00 PM		0	4	11	1	0	0	18	1	0	1	1	0	0	1	5	2	45	227
6:15 PM		0	1	19	2	0	0	22	3	0	1	2	0	0	0	2	0	52	221
Count Total		0	16	177	11	0	4	158	7	0	11	14	4	0	4	49	12	467	0
Peak Hour	All	0	6	112	5	0	2	77	3	0	3	5	3	0	3	28	6	253	0
	HV	0	0	1	0	0	0	3	0	0	0	1	0	0	0	0	0	5	0
	HV%	-	0%	1%	0%	-	0%	4%	0%	-	0%	20%	0%	-	0%	0%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

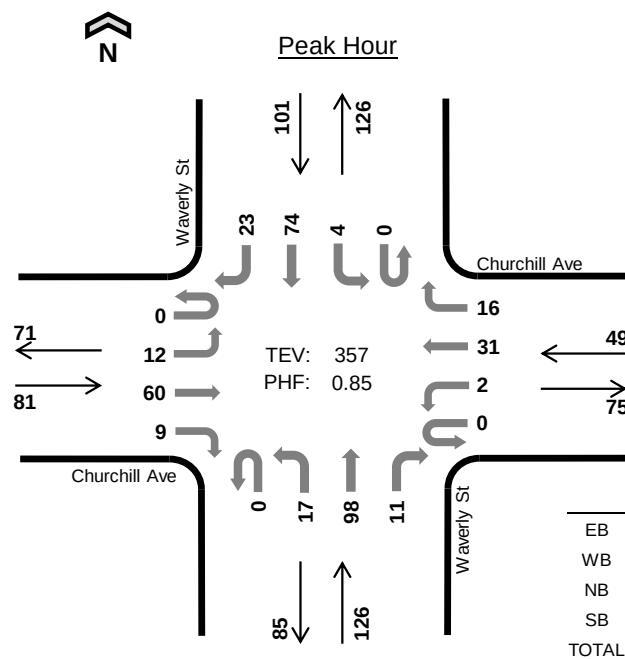
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	1	0	0	1	8	0	8	13	29	5	10	2	0	17
4:45 PM	0	1	0	0	1	7	0	7	14	28	5	2	1	0	8
5:00 PM	1	1	1	0	3	12	0	6	5	23	2	2	1	0	5
5:15 PM	0	0	0	0	0	7	2	4	10	23	2	3	1	1	7
5:30 PM	0	1	0	0	1	9	0	5	9	23	3	2	2	0	7
5:45 PM	1	1	0	1	3	12	0	9	10	31	1	4	1	2	8
6:00 PM	0	1	0	0	1	8	1	5	7	21	0	0	1	0	1
6:15 PM	0	2	0	0	2	6	0	3	7	16	1	2	1	0	4
Count Total	2	8	1	1	12	69	3	47	75	194	19	25	10	3	57
Peak Hour	1	3	1	0	5	35	2	22	38	97	12	9	5	1	27

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Bryant St				Bryant St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
5:00 PM	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	3	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
5:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	3	7
6:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
6:15 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	7
Count Total	0	0	2	0	0	0	7	1	0	0	1	0	0	0	1	0	12	0
Peak Hour	0	0	1	0	0	0	3	0	0	0	1	0	0	0	0	0	5	0

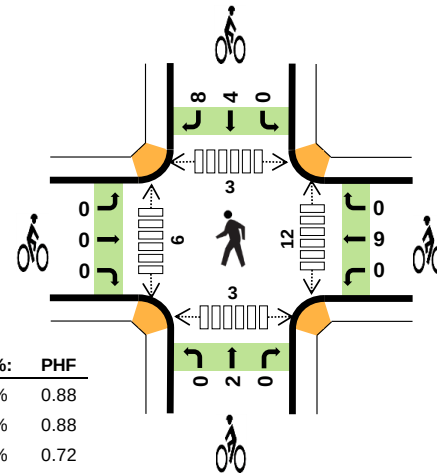
Two-Hour Count Summaries - Bikes																		
Interval Start	Churchill Ave			Churchill Ave			Bryant St			Bryant St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	2	6	0	0	0	1	7	0	0	12	1	29	0				
4:45 PM	1	1	5	0	0	0	1	6	0	0	14	0	28	0				
5:00 PM	1	0	11	0	0	0	0	5	1	0	5	0	23	0				
5:15 PM	1	1	5	0	2	0	1	3	0	0	10	0	23	103				
5:30 PM	0	2	7	0	0	0	0	5	0	0	7	2	23	97				
5:45 PM	4	0	8	0	0	0	2	7	0	0	10	0	31	100				
6:00 PM	2	1	5	0	1	0	0	5	0	0	7	0	21	98				
6:15 PM	1	2	3	0	0	0	0	3	0	0	6	1	16	91				
Count Total	10	9	50	0	3	0	5	41	1	0	71	4	194	0				
Peak Hour	3	4	28	0	2	0	2	19	1	0	36	2	97	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Waverly St Churchill Ave



Date: 12-12-2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:30 AM to 8:30 AM



	HV %:	PHF
EB	2.5%	0.88
WB	0.0%	0.88
NB	0.8%	0.72
SB	1.0%	0.62
TOTAL	1.1%	0.85

Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Waverly St				Waverly St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	0	13	0	0	0	11	4	0	1	15	0	0	2	4	7	57	0
7:15 AM		0	2	14	1	0	0	4	2	0	1	34	1	0	0	21	5	85	0
7:30 AM		0	2	18	3	0	1	4	8	0	10	32	2	0	1	20	4	105	0
7:45 AM		0	3	18	2	0	1	4	6	0	1	27	2	0	2	30	9	105	352
8:00 AM		0	3	8	1	0	0	11	0	0	1	20	2	0	1	10	3	60	355
8:15 AM		0	4	16	3	0	0	12	2	0	5	19	5	0	0	14	7	87	357
8:30 AM		0	3	14	1	0	0	8	4	0	3	17	1	0	1	10	5	67	319
8:45 AM		0	1	14	1	0	1	11	1	0	0	12	1	0	3	6	6	57	271
Count Total		0	18	115	12	0	3	65	27	0	22	176	14	0	10	115	46	623	0
Peak Hour	All	0	12	60	9	0	2	31	16	0	17	98	11	0	4	74	23	357	0
	HV	0	0	2	0	0	0	0	0	0	1	0	0	0	0	1	0	4	0
	HV%	-	0%	3%	0%	-	0%	0%	0%	-	6%	0%	0%	-	0%	1%	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

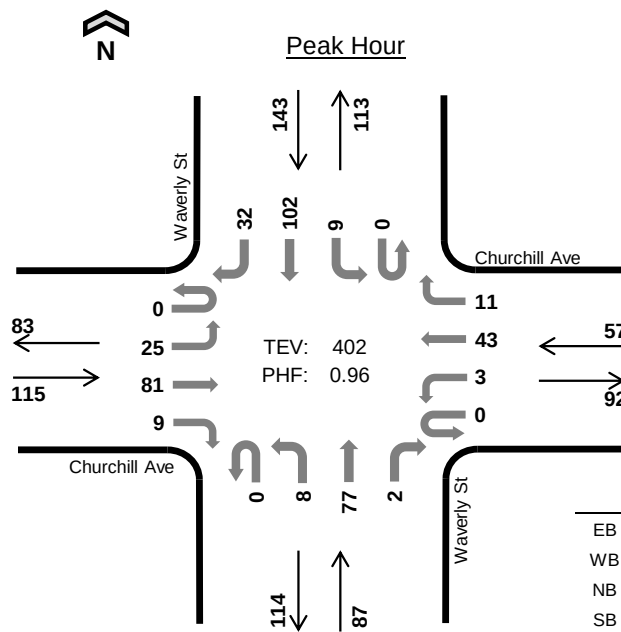
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	1	0	1	0	2	0	1	3	0	1	0	0	1
7:15 AM	1	0	0	0	1	0	2	1	2	5	0	2	0	0	2
7:30 AM	0	0	0	1	1	0	7	0	9	16	1	0	1	0	2
7:45 AM	0	0	0	0	0	0	0	0	2	2	5	5	1	1	12
8:00 AM	1	0	1	0	2	0	0	2	0	2	1	1	0	0	2
8:15 AM	1	0	0	0	1	0	2	0	1	3	5	0	1	2	8
8:30 AM	0	3	0	0	3	0	0	1	1	2	0	0	0	2	2
8:45 AM	2	0	0	0	2	1	0	1	2	4	0	1	1	2	4
Count Total	5	3	2	1	11	1	13	5	18	37	12	10	4	7	33
Peak Hour	2	0	1	1	4	0	9	2	12	23	12	6	3	3	24

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Waverly St				Waverly St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
7:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
8:00 AM	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2	4
8:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
8:30 AM	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	6
8:45 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8
Count Total	0	0	5	0	0	0	3	0	0	1	1	0	0	0	1	0	11	0
Peak Hour	0	0	2	0	0	0	0	0	0	1	0	0	0	0	1	0	4	0

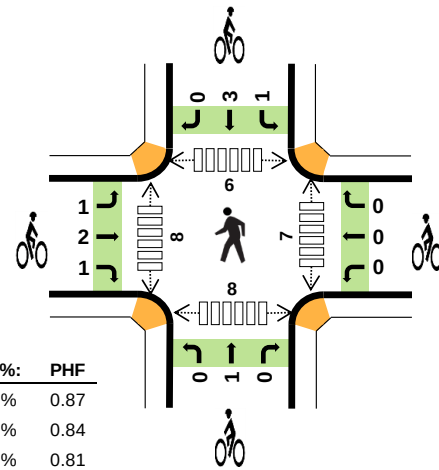
Two-Hour Count Summaries - Bikes																		
Interval Start	Churchill Ave			Churchill Ave			Waverly St			Waverly St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:00 AM	0	0	0	0	2	0	0	0	0	1	0	0	3	0				
7:15 AM	0	0	0	0	0	2	0	1	0	0	2	0	5	0				
7:30 AM	0	0	0	0	7	0	0	0	0	0	3	6	16	0				
7:45 AM	0	0	0	0	0	0	0	0	0	0	1	1	2	26				
8:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	2	25				
8:15 AM	0	0	0	0	2	0	0	0	0	0	0	1	3	23				
8:30 AM	0	0	0	0	0	0	1	0	0	0	0	1	2	9				
8:45 AM	1	0	0	0	0	0	0	1	0	1	1	0	4	11				
Count Total	1	0	0	0	11	2	1	4	0	2	7	9	37	0				
Peak Hour	0	0	0	0	9	0	0	2	0	0	4	8	23	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Waverly St Churchill Ave



Date: 12-12-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	3.5%	0.87
WB	1.8%	0.84
NB	1.1%	0.81
SB	0.0%	0.97
TOTAL	1.5%	0.96

Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Waverly St				Waverly St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	6	22	2	0	1	5	2	0	1	13	1	0	2	30	9	94	0
4:15 PM		0	4	27	2	0	0	8	5	0	2	19	0	0	1	24	10	102	0
4:30 PM		0	8	16	1	0	3	7	2	0	0	23	1	0	4	23	10	98	0
4:45 PM		0	7	17	3	0	0	15	2	0	3	23	1	0	2	26	6	105	399
5:00 PM		0	6	21	3	0	0	13	2	0	3	12	0	0	2	29	6	97	402
5:15 PM		0	7	11	1	0	0	12	1	0	3	20	1	0	1	25	8	90	390
5:30 PM		0	7	9	1	0	1	7	4	0	1	17	2	0	0	21	8	78	370
5:45 PM		0	4	19	2	0	0	10	4	0	4	25	0	0	1	21	12	102	367
Count Total		0	49	142	15	0	5	77	22	0	17	152	6	0	13	199	69	766	0
Peak Hour	All	0	25	81	9	0	3	43	11	0	8	77	2	0	9	102	32	402	0
	HV	0	0	4	0	0	0	1	0	0	1	0	0	0	0	0	0	6	0
	HV%	-	0%	5%	0%	-	0%	2%	0%	-	13%	0%	0%	-	0%	0%	0%	1%	0

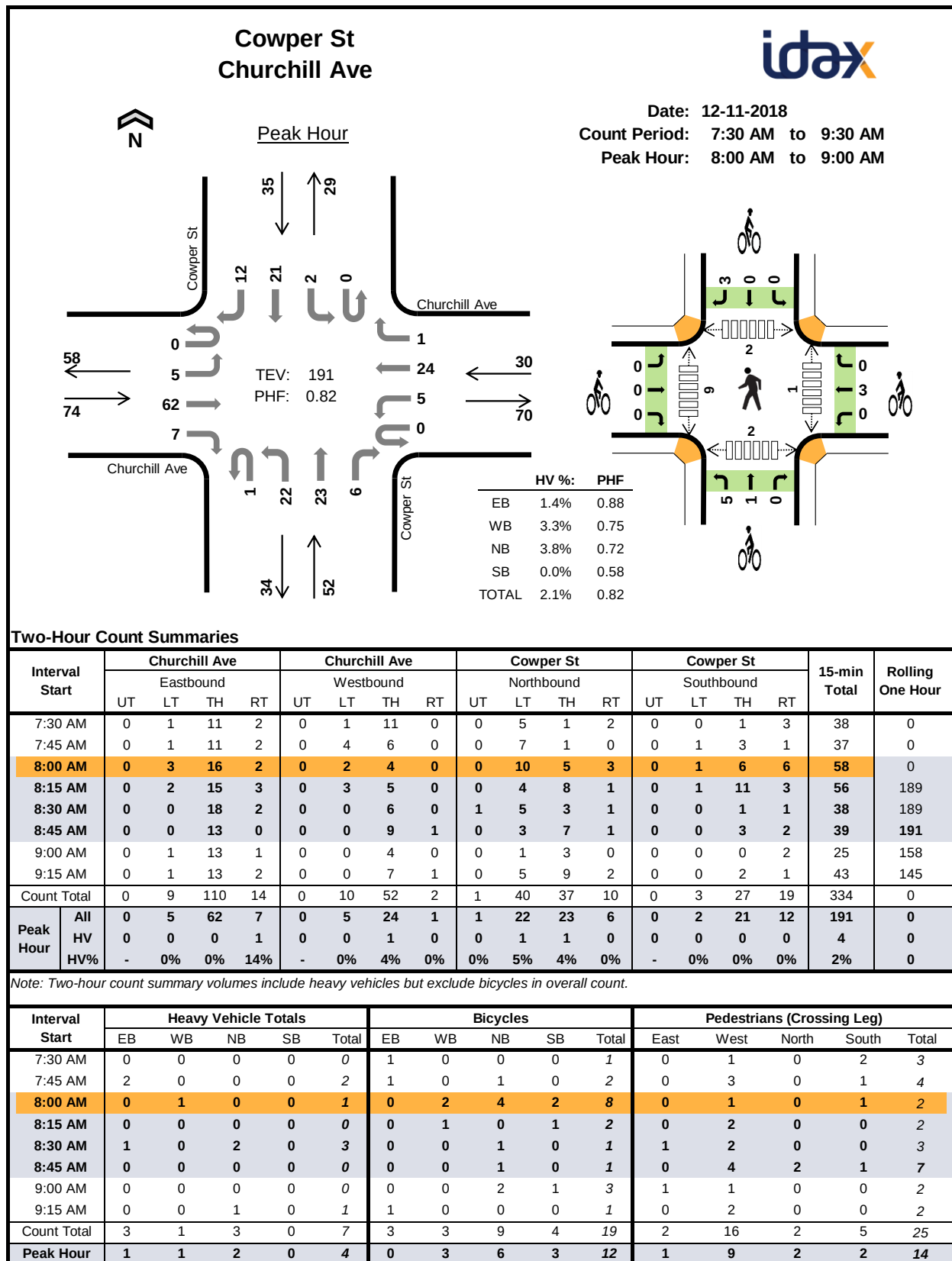
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	1	0	1	2	2	0	2	2	6	0	5	2	2	9
4:15 PM	3	0	1	0	4	1	0	0	0	1	3	2	0	3	8
4:30 PM	0	0	0	0	0	1	0	0	1	2	3	4	5	4	16
4:45 PM	1	0	0	0	1	1	0	0	2	3	1	2	1	1	5
5:00 PM	0	1	0	0	1	1	0	1	1	3	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	4	4
5:30 PM	1	1	0	0	2	0	0	0	0	0	1	2	5	0	8
5:45 PM	0	0	1	0	1	1	0	1	1	3	0	0	0	0	0
Count Total	5	3	2	1	11	7	0	4	9	20	8	15	13	14	50
Peak Hour	4	1	1	0	6	4	0	1	4	9	7	8	6	8	29

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Waverly St				Waverly St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2	0
4:15 PM	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	4	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7
5:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	4
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	4
Count Total	0	0	5	0	0	0	3	0	0	1	1	0	0	0	1	0	11	0
Peak Hour	0	0	4	0	0	0	1	0	0	1	0	0	0	0	0	0	6	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Churchill Ave			Churchill Ave			Waverly St			Waverly St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	1	1	0	0	0	0	2	0	0	1	1	6	0			
4:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	1	0			
4:30 PM	0	1	0	0	0	0	0	0	0	0	1	0	2	0			
4:45 PM	1	0	0	0	0	0	0	0	0	1	1	0	3	12			
5:00 PM	0	1	0	0	0	0	0	1	0	0	1	0	3	9			
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	2	10			
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	8			
5:45 PM	0	1	0	0	0	0	0	1	0	0	0	1	3	8			
Count Total	1	4	2	0	0	0	0	4	0	1	4	4	20	0			
Peak Hour	1	2	1	0	0	0	0	1	0	1	3	0	9	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Cowper St				Cowper St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
8:30 AM	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	3	6
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
9:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	4
Count Total	0	0	2	1	0	0	1	0	0	2	1	0	0	0	0	0	7	0
Peak Hour	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	4	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Churchill Ave			Churchill Ave			Cowper St			Cowper St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0				
7:45 AM	0	0	1	0	0	0	1	0	0	0	0	0	2	0				
8:00 AM	0	0	0	0	2	0	3	1	0	0	0	2	8	0				
8:15 AM	0	0	0	0	1	0	0	0	0	0	0	1	2	13				
8:30 AM	0	0	0	0	0	0	1	0	0	0	0	0	1	13				
8:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	1	12				
9:00 AM	0	0	0	0	0	0	0	2	0	0	1	0	3	7				
9:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	6				
Count Total	0	0	3	0	3	0	6	3	0	0	1	3	19	0				
Peak Hour	0	0	0	0	3	0	5	1	0	0	0	3	12	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Cowper St Churchill Ave

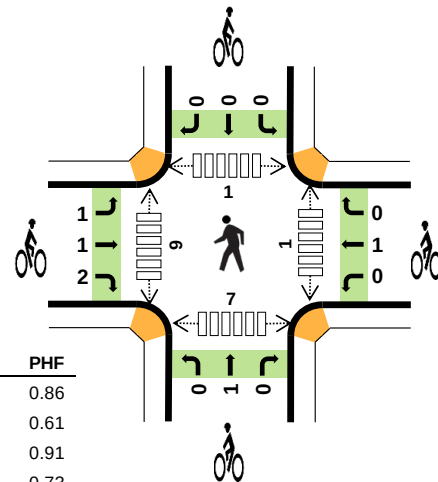
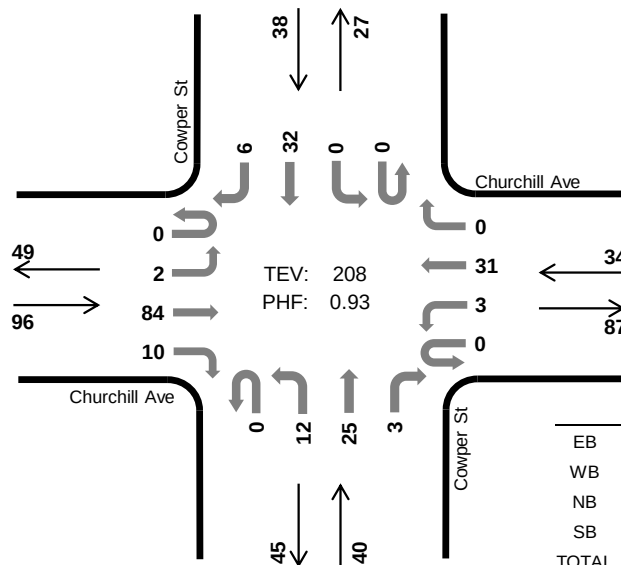


Peak Hour

Date: 12-11-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	1.0%	0.86
WB	8.8%	0.61
NB	2.5%	0.91
SB	0.0%	0.73
TOTAL	2.4%	0.93

Two-Hour Count Summaries

Interval Start		Churchill Ave				Churchill Ave				Cowper St				Cowper St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	2	18	3	0	2	5	0	0	4	7	0	0	0	7	1	49	0
4:45 PM		0	0	18	3	0	0	14	0	0	2	6	0	0	0	10	3	56	0
5:00 PM		0	0	23	1	0	0	5	0	0	3	6	2	0	0	8	1	49	0
5:15 PM		0	0	25	3	0	1	7	0	0	3	6	1	0	0	7	1	54	208
5:30 PM		0	0	13	2	0	0	10	0	0	1	3	0	0	0	7	2	38	197
5:45 PM		0	2	10	2	0	3	8	0	0	5	5	0	0	0	6	2	43	184
6:00 PM		0	0	11	1	0	0	8	0	0	4	5	4	0	1	7	0	41	176
6:15 PM		0	2	9	2	0	2	9	0	0	1	3	0	0	0	2	1	31	153
Count Total		0	6	127	17	0	8	66	0	0	23	41	7	0	1	54	11	361	0
Peak Hour	All	0	2	84	10	0	3	31	0	0	12	25	3	0	0	32	6	208	0
	HV	0	1	0	0	0	0	3	0	0	0	0	1	0	0	0	0	5	0
	HV%	-	50%	0%	0%	-	0%	10%	-	-	0%	0%	33%	-	-	0%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	1	0	0	0	1	1	0	1	0	2	0	0	1	1	2
4:45 PM	0	2	0	0	2	1	0	0	0	1	1	2	0	4	7
5:00 PM	0	0	1	0	1	0	0	0	0	0	0	6	0	2	8
5:15 PM	0	1	0	0	1	2	1	0	0	3	0	1	0	0	1
5:30 PM	0	1	1	0	2	1	0	2	0	3	0	1	0	0	1
5:45 PM	1	0	0	0	1	1	0	0	1	2	0	0	0	4	4
6:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
6:15 PM	0	2	0	0	2	2	0	0	0	2	0	0	0	0	0
Count Total	2	7	2	0	11	8	1	3	1	13	1	11	1	11	24
Peak Hour	1	3	1	0	5	4	1	1	0	6	1	9	1	7	18

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Churchill Ave				Churchill Ave				Cowper St				Cowper St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
5:30 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	6
5:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
6:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
6:15 PM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	6
Count Total	0	1	1	0	0	0	7	0	0	0	1	1	0	0	0	0	11	0
Peak Hour	0	1	0	0	0	0	3	0	0	0	0	1	0	0	0	0	5	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Churchill Ave			Churchill Ave			Cowper St			Cowper St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	1	0	0	0	0	1	0	0	0	0	2	0				
4:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	1	0	1	0	1	0	0	0	0	0	0	0	3	6				
5:30 PM	0	1	0	0	0	0	1	1	0	0	0	0	3	7				
5:45 PM	0	1	0	0	0	0	0	0	0	0	1	0	2	8				
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	8				
6:15 PM	2	0	0	0	0	0	0	0	0	0	0	0	2	7				
Count Total	3	3	2	0	1	0	1	2	0	0	1	0	13	0				
Peak Hour	1	1	2	0	1	0	0	1	0	0	0	0	6	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Churchill Ave Embarcadero Rd

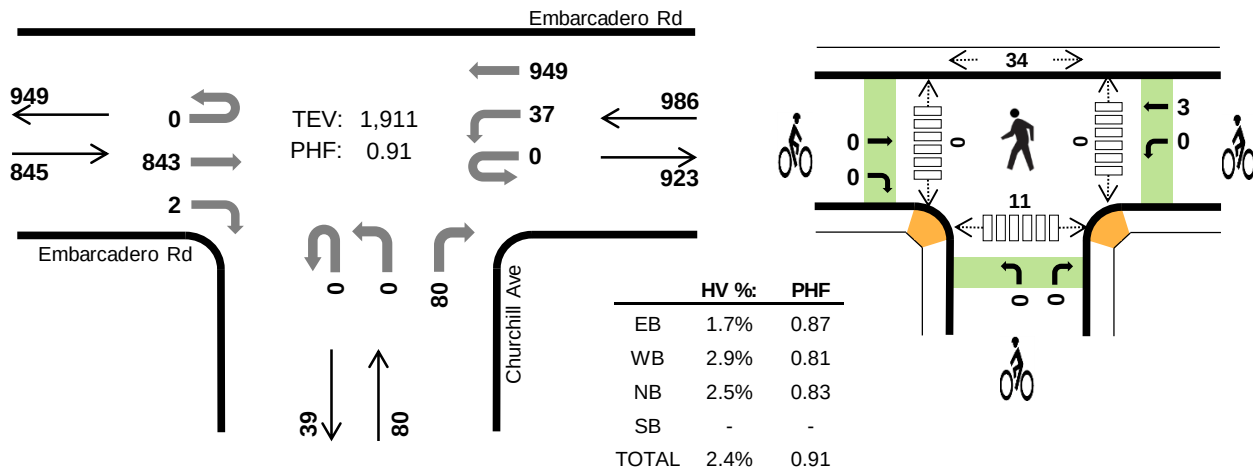


Peak Hour

Date: 12-06-2018

Count Period: 7:30 AM to 9:30 AM

Peak Hour: 7:30 AM to 8:30 AM



Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Churchill Ave				0				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	199	0	0	14	290	0	0	0	0	15	0	0	0	0	518	0
7:45 AM		0	0	242	0	0	9	254	0	0	0	0	19	0	0	0	0	524	0
8:00 AM		0	0	213	2	0	3	222	0	0	0	0	22	0	0	0	0	462	0
8:15 AM		0	0	189	0	0	11	183	0	0	0	0	24	0	0	0	0	407	1,911
8:30 AM		0	0	169	3	0	9	203	0	0	0	0	10	0	0	0	0	394	1,787
8:45 AM		0	0	182	0	0	11	217	0	0	0	0	22	0	0	0	0	432	1,695
9:00 AM		0	0	189	0	0	6	218	0	0	0	0	18	0	0	0	0	431	1,664
9:15 AM		0	0	196	0	0	9	226	0	0	0	0	10	0	0	0	0	441	1,698
Count Total		0	0	1,579	5	0	72	1,813	0	0	0	0	140	0	0	0	0	3,609	0
Peak Hour	All	0	0	843	2	0	37	949	0	0	0	0	80	0	0	0	0	1,911	0
	HV	0	0	14	0	0	1	28	0	0	0	0	2	0	0	0	0	45	0
	HV%	-	-	2%	0%	-	3%	3%	-	-	-	-	3%	-	-	-	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	2	7	1	0	10	0	0	0	0	0	0	0	3	0	3
7:45 AM	4	7	1	0	12	0	0	0	0	0	0	0	4	3	7
8:00 AM	4	8	0	0	12	0	0	0	0	0	0	0	17	7	24
8:15 AM	4	7	0	0	11	0	3	0	0	3	0	0	10	1	11
8:30 AM	6	6	0	0	12	0	0	0	0	0	0	0	2	0	2
8:45 AM	7	8	0	0	15	0	0	0	0	0	0	0	2	0	2
9:00 AM	7	8	0	0	15	0	0	0	0	0	0	0	1	1	2
9:15 AM	6	8	0	0	14	0	1	0	0	1	0	0	1	1	2
Count Total	40	59	2	0	101	0	4	0	0	4	0	0	40	13	53
Peak Hr	14	29	2	0	45	0	3	0	0	3	0	0	34	11	45

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Embarcadero Rd				Embarcadero Rd				Churchill Ave				0				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	2	0	0	0	7	0	0	0	0	1	0	0	0	0	10	0
7:45 AM	0	0	4	0	0	0	7	0	0	0	0	1	0	0	0	0	12	0
8:00 AM	0	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	12	0
8:15 AM	0	0	4	0	0	1	6	0	0	0	0	0	0	0	0	0	11	45
8:30 AM	0	0	6	0	0	1	5	0	0	0	0	0	0	0	0	0	12	47
8:45 AM	0	0	7	0	0	0	8	0	0	0	0	0	0	0	0	0	15	50
9:00 AM	0	0	7	0	0	0	8	0	0	0	0	0	0	0	0	0	15	53
9:15 AM	0	0	6	0	0	1	7	0	0	0	0	0	0	0	0	0	14	56
Count Total	0	0	40	0	0	3	56	0	0	0	0	2	0	0	0	0	101	0
Peak Hour	0	0	14	0	0	1	28	0	0	0	0	2	0	0	0	0	45	0

Two-Hour Count Summaries - Bikes

Interval Start	Embarcadero Rd			Embarcadero Rd			Churchill Ave			0			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	3	0	0	0	0	0	0	0	3	3
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3
9:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	1
Count Total	0	0	0	0	4	0	0	0	0	0	0	0	4	0
Peak Hour	0	0	0	0	3	0	0	0	0	0	0	0	3	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Churchill Ave Embarcadero Rd

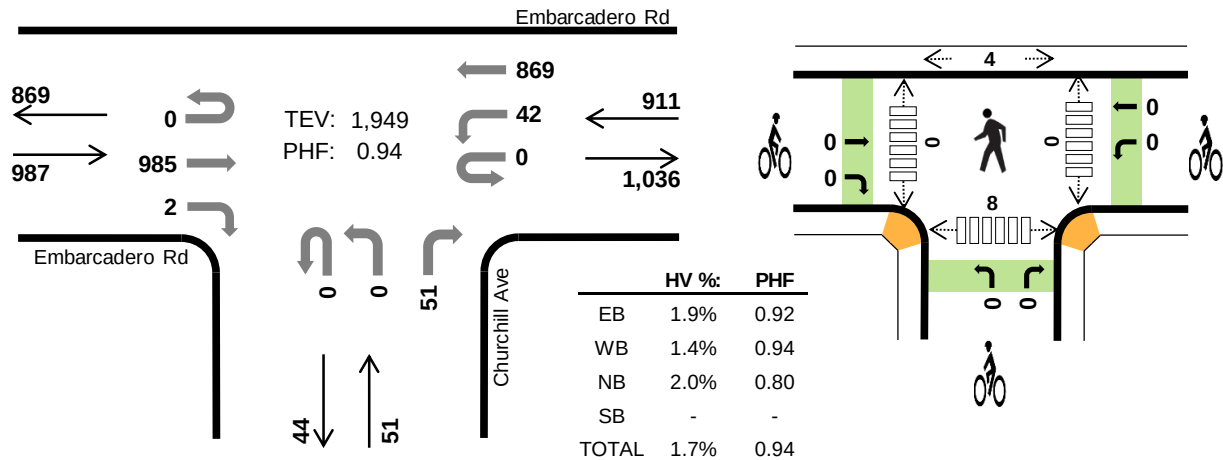


Peak Hour

Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:30 PM to 6:30 PM



Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Churchill Ave				0				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	264	0	0	6	154	0	0	0	0	20	0	0	0	0	444	0
4:45 PM		0	0	260	1	0	10	164	0	0	0	0	17	0	0	0	0	452	0
5:00 PM		0	0	239	0	0	8	162	0	0	0	0	22	0	0	0	0	431	0
5:15 PM		0	0	240	1	0	6	179	0	0	0	0	26	0	0	0	0	452	1,779
5:30 PM		0	0	268	0	0	10	223	0	0	0	0	16	0	0	0	0	517	1,852
5:45 PM		0	0	254	1	0	12	231	0	0	0	0	11	0	0	0	0	509	1,909
6:00 PM		0	0	209	0	0	9	210	0	0	0	0	16	0	0	0	0	444	1,922
6:15 PM		0	0	254	1	0	11	205	0	0	0	0	8	0	0	0	0	479	1,949
Count Total		0	0	1,988	4	0	72	1,528	0	0	0	0	136	0	0	0	0	3,728	0
Peak Hour	All	0	0	985	2	0	42	869	0	0	0	0	51	0	0	0	0	1,949	0
	HV	0	0	19	0	0	5	8	0	0	0	0	1	0	0	0	0	33	0
	HV%	-	-	2%	0%	-	12%	1%	-	-	-	-	2%	-	-	-	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	6	2	0	0	8	0	0	0	0	0	0	0	2	6	8
4:45 PM	9	2	0	0	11	0	0	0	0	0	0	0	0	2	2
5:00 PM	2	5	1	0	8	0	0	0	0	0	0	0	4	0	4
5:15 PM	6	0	0	0	6	0	0	0	0	0	0	0	1	2	3
5:30 PM	4	3	0	0	7	0	0	0	0	0	0	0	2	2	4
5:45 PM	6	1	1	0	8	0	0	0	0	0	0	0	0	1	1
6:00 PM	3	4	0	0	7	0	0	0	0	0	0	0	1	1	2
6:15 PM	6	5	0	0	11	0	0	0	0	0	0	0	1	4	5
Count Total	42	22	2	0	66	0	0	0	0	0	0	0	11	18	29
Peak Hr	19	13	1	0	33	0	0	0	0	0	0	0	4	8	12

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Embarcadero Rd				Embarcadero Rd				Churchill Ave				0				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	8	0
4:45 PM	0	0	9	0	0	1	1	0	0	0	0	0	0	0	0	0	11	0
5:00 PM	0	0	2	0	0	1	4	0	0	0	0	1	0	0	0	0	8	0
5:15 PM	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	33
5:30 PM	0	0	4	0	0	1	2	0	0	0	0	0	0	0	0	0	7	32
5:45 PM	0	0	6	0	0	1	0	0	0	0	0	1	0	0	0	0	8	29
6:00 PM	0	0	3	0	0	1	3	0	0	0	0	0	0	0	0	0	7	28
6:15 PM	0	0	6	0	0	2	3	0	0	0	0	0	0	0	0	0	11	33
Count Total	0	0	42	0	0	7	15	0	0	0	0	2	0	0	0	0	66	0
Peak Hour	0	0	19	0	0	5	8	0	0	0	0	1	0	0	0	0	33	0

Two-Hour Count Summaries - Bikes

Interval Start	Embarcadero Rd			Embarcadero Rd			Churchill Ave			0			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

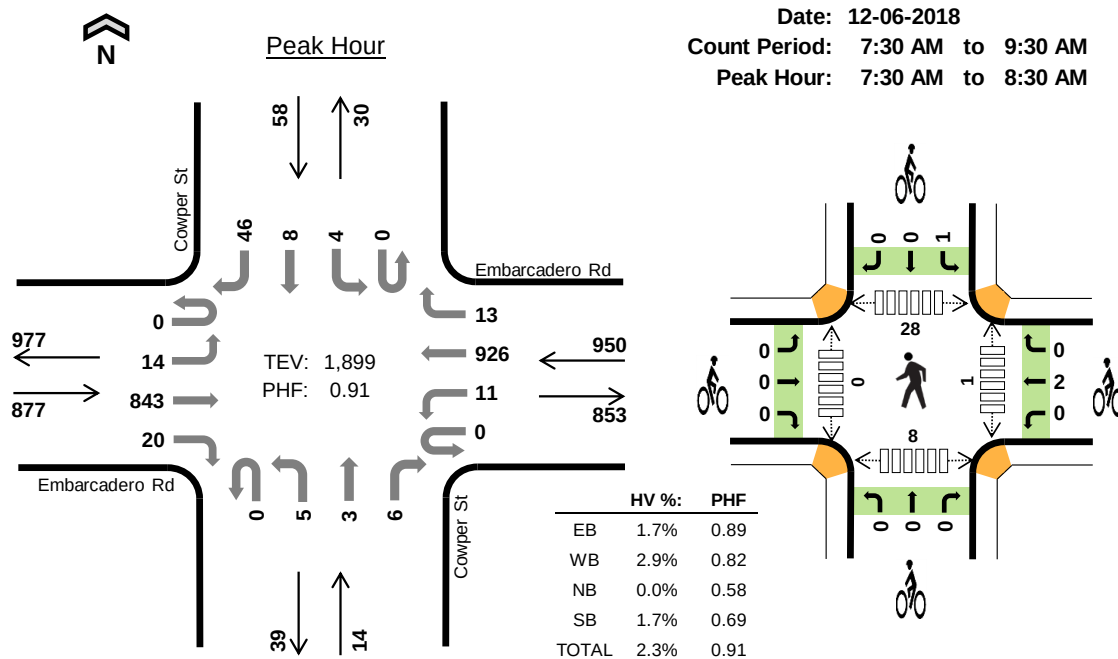
Cowper St Embarcadero Rd



Date: 12-06-2018

Count Period: 7:30 AM to 9:30 AM

Peak Hour: 7:30 AM to 8:30 AM



Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Cowper St				Cowper St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	3	197	1	0	2	285	4	0	4	0	2	0	0	1	4	503	0
7:45 AM		0	2	239	6	0	2	252	2	0	0	2	2	0	1	2	9	519	0
8:00 AM		0	3	227	6	0	3	216	4	0	1	1	2	0	1	1	19	484	0
8:15 AM		0	6	180	7	0	4	173	3	0	0	0	0	0	2	4	14	393	1,899
8:30 AM		0	3	170	2	0	2	195	7	0	0	0	0	0	2	0	5	386	1,782
8:45 AM		0	0	180	3	1	0	215	5	0	0	1	0	0	4	1	6	416	1,679
9:00 AM		0	1	187	2	0	1	214	3	0	0	0	0	0	2	0	4	414	1,609
9:15 AM		0	1	194	1	0	1	219	4	0	1	1	0	0	2	0	5	429	1,645
Count Total		0	19	1,574	28	1	15	1,769	32	0	6	5	6	0	14	9	66	3,544	0
Peak Hour	All	0	14	843	20	0	11	926	13	0	5	3	6	0	4	8	46	1,899	0
	HV	0	0	15	0	0	1	27	0	0	0	0	0	0	0	1	44	0	0
	HV%	-	0%	2%	0%	-	9%	3%	0%	-	0%	0%	0%	-	0%	0%	2%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	3	7	0	0	10	0	0	0	0	0	0	0	3	0	3
7:45 AM	4	7	0	0	11	0	0	0	1	1	0	0	3	5	8
8:00 AM	5	8	0	0	13	0	0	0	0	0	1	0	13	2	16
8:15 AM	3	6	0	1	10	0	2	0	0	2	0	0	9	1	10
8:30 AM	6	5	0	0	11	0	0	0	0	0	0	3	2	1	6
8:45 AM	6	8	0	1	15	0	0	0	0	0	0	0	2	0	2
9:00 AM	7	8	0	0	15	0	0	0	1	1	0	0	1	1	2
9:15 AM	6	7	0	0	13	0	1	0	1	2	0	1	2	1	4
Count Total	40	56	0	2	98	0	3	0	3	6	1	4	35	11	51
Peak Hour	15	28	0	1	44	0	2	0	1	3	1	0	28	8	37

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Cowper St				Cowper St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	3	0	0	0	7	0	0	0	0	0	0	0	0	0	10	0
7:45 AM	0	0	4	0	0	0	7	0	0	0	0	0	0	0	0	0	11	0
8:00 AM	0	0	5	0	0	1	7	0	0	0	0	0	0	0	0	0	13	0
8:15 AM	0	0	3	0	0	0	6	0	0	0	0	0	0	0	0	1	10	44
8:30 AM	0	0	6	0	0	0	5	0	0	0	0	0	0	0	0	0	11	45
8:45 AM	0	0	6	0	0	0	8	0	0	0	0	0	0	0	1	0	15	49
9:00 AM	0	0	7	0	0	0	8	0	0	0	0	0	0	0	0	0	15	51
9:15 AM	0	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	13	54
Count Total	0	0	40	0	0	1	55	0	0	0	0	0	0	1	0	1	98	0
Peak Hour	0	0	15	0	0	1	27	0	0	0	0	0	0	0	0	1	44	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Embarcadero Rd			Embarcadero Rd			Cowper St			Cowper St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
9:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	3	
9:15 AM	0	0	0	0	1	0	0	0	0	0	1	0	2	0	0	3	
Count Total	0	0	0	0	3	0	0	0	0	1	2	0	6	0	0	0	
Peak Hour	0	0	0	0	2	0	0	0	0	1	0	0	3	0	0	0	

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

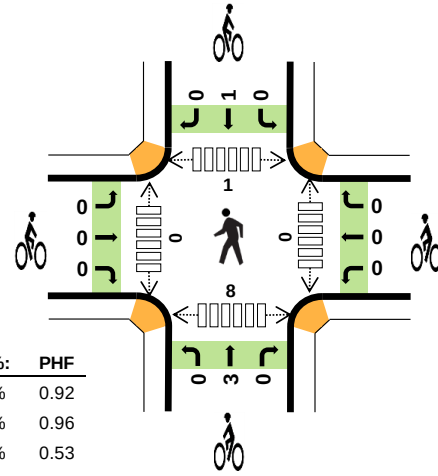
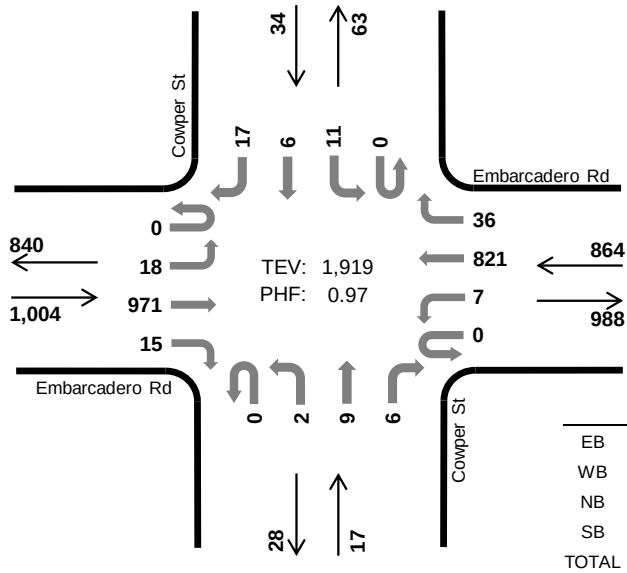
Cowper St
Embarcadero Rd



Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:30 PM to 6:30 PM



	HV %:	PHF
EB	2.0%	0.92
WB	0.9%	0.96
NB	5.9%	0.53
SB	0.0%	0.53
TOTAL	1.5%	0.97

Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Cowper St				Cowper St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	2	242	1	0	2	152	5	0	3	2	2	0	6	3	8	428	0
4:45 PM		0	5	249	5	0	2	162	5	0	1	2	4	0	7	8	1	451	0
5:00 PM		0	5	235	4	0	3	158	4	0	1	3	1	1	5	1	3	424	0
5:15 PM		0	3	235	4	0	0	171	9	0	1	3	4	0	3	5	6	444	1,747
5:30 PM		0	4	266	3	0	3	210	6	0	0	1	0	0	0	1	2	496	1,815
5:45 PM		0	5	248	2	0	3	203	12	0	1	3	4	0	3	4	9	497	1,861
6:00 PM		0	8	206	6	0	1	217	6	0	0	5	0	0	3	1	1	454	1,891
6:15 PM		0	1	251	4	0	0	191	12	0	1	0	2	0	5	0	5	472	1,919
Count Total		0	33	1,932	29	0	14	1,464	59	0	8	19	17	1	32	23	35	3,666	0
Peak Hour	All	0	18	971	15	0	7	821	36	0	2	9	6	0	11	6	17	1,919	0
	HV	0	0	20	0	0	0	8	0	0	0	1	0	0	0	0	0	29	0
	HV%	-	0%	2%	0%	-	0%	1%	0%	-	0%	11%	0%	-	0%	0%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

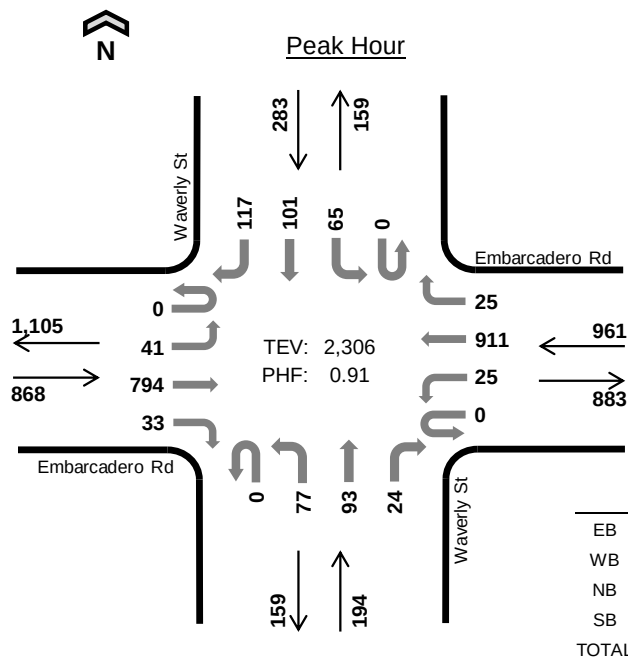
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	3	2	1	0	6	0	0	0	0	0	0	0	0	6	6
4:45 PM	9	1	0	0	10	0	0	1	0	1	0	0	0	1	1
5:00 PM	2	4	0	0	6	0	0	0	0	0	0	0	3	0	3
5:15 PM	6	0	0	0	6	0	0	0	0	0	0	1	1	3	5
5:30 PM	5	2	1	0	8	0	0	1	0	1	0	0	0	2	2
5:45 PM	5	0	0	0	5	0	0	0	0	0	0	0	0	1	1
6:00 PM	3	3	0	0	6	0	0	0	1	1	0	0	1	1	2
6:15 PM	7	3	0	0	10	0	0	2	0	2	0	0	0	4	4
Count Total	40	15	2	0	57	0	0	4	1	5	0	1	5	18	24
Peak Hour	20	8	1	0	29	0	0	3	1	4	0	0	1	8	9

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Cowper St				Cowper St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	3	0	0	0	2	0	0	0	0	1	0	0	0	0	6	0
4:45 PM	0	0	9	0	0	0	1	0	0	0	0	0	0	0	0	0	10	0
5:00 PM	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	6	0
5:15 PM	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	28
5:30 PM	0	0	5	0	0	0	2	0	0	0	1	0	0	0	0	0	8	30
5:45 PM	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	25
6:00 PM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	6	25
6:15 PM	0	0	7	0	0	0	3	0	0	0	0	0	0	0	0	0	10	29
Count Total	0	0	40	0	0	0	15	0	0	0	1	1	0	0	0	0	57	0
Peak Hour	0	0	20	0	0	0	8	0	0	0	1	0	0	0	0	0	29	0

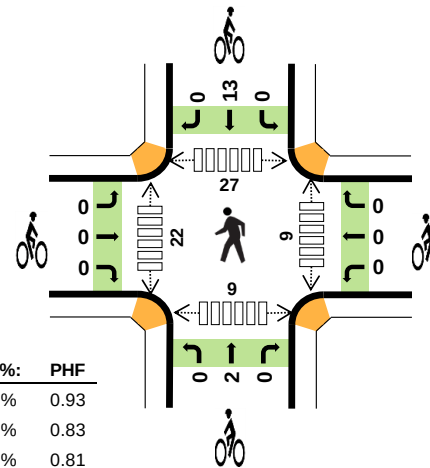
Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			Cowper St			Cowper St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	2				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
6:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	2				
6:15 PM	0	0	0	0	0	0	0	2	0	0	0	0	2	4				
Count Total	0	0	0	0	0	0	0	4	0	0	1	0	5	0				
Peak Hour	0	0	0	0	0	0	0	3	0	0	1	0	4	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Waverly St Embarcadero Rd



Date: 12-06-2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 7:30 AM to 8:30 AM



Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Waverly St				Waverly St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	1	173	8	0	1	278	10	0	8	3	7	0	16	15	19	539	0
7:45 AM		0	5	223	5	0	7	247	6	0	17	34	9	0	17	33	32	635	0
8:00 AM		0	16	212	6	0	9	217	4	0	31	24	4	0	19	24	48	614	0
8:15 AM		0	19	186	14	0	8	169	5	0	21	32	4	0	13	29	18	518	2,306
8:30 AM		0	9	142	2	0	2	194	9	0	15	26	6	0	18	21	16	460	2,227
8:45 AM		0	3	163	3	0	6	206	10	0	14	29	2	0	19	14	14	483	2,075
9:00 AM		0	4	165	6	0	4	201	11	0	7	9	2	0	18	22	26	475	1,936
9:15 AM		0	5	179	1	0	3	212	9	0	7	14	3	0	15	19	23	490	1,908
Count Total		0	62	1,443	45	0	40	1,724	64	0	120	171	37	0	135	177	196	4,214	0
Peak Hour	All	0	41	794	33	0	25	911	25	0	77	93	24	0	65	101	117	2,306	0
	HV	0	0	15	1	0	0	25	1	0	1	1	0	0	0	4	0	48	0
	HV%	-	0%	2%	3%	-	0%	3%	4%	-	1%	1%	0%	-	0%	4%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

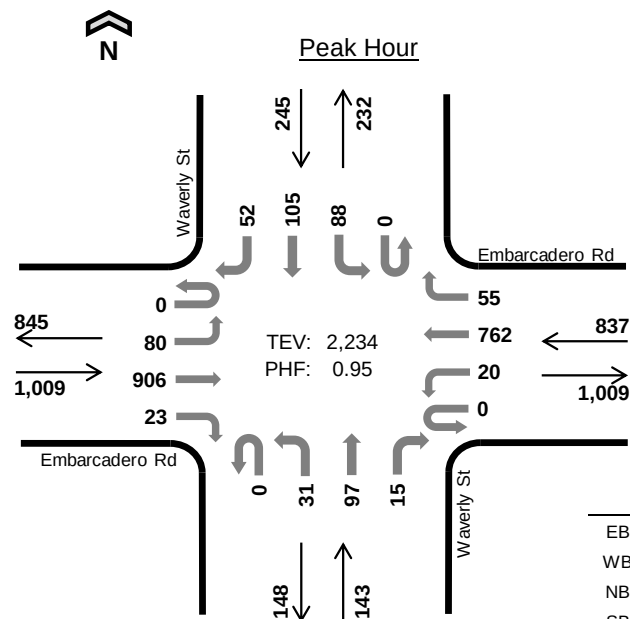
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	3	7	1	1	12	0	0	0	2	2	2	3	3	0	8
7:45 AM	5	6	0	1	12	0	0	1	1	2	6	3	4	6	19
8:00 AM	5	7	1	0	13	0	0	0	10	10	0	15	10	2	27
8:15 AM	3	6	0	2	11	0	0	1	0	1	1	1	10	1	13
8:30 AM	6	6	2	1	15	0	0	1	0	1	3	1	3	0	7
8:45 AM	5	8	1	0	14	0	0	0	0	0	2	0	2	0	4
9:00 AM	6	8	0	1	15	0	0	3	0	3	3	2	3	1	9
9:15 AM	6	7	1	2	16	0	1	0	3	4	3	4	1	1	9
Count Total	39	55	6	8	108	0	1	6	16	23	20	29	36	11	96
Peak Hour	16	26	2	4	48	0	0	2	13	15	9	22	27	9	67

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Waverly St				Waverly St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	3	0	0	0	6	1	0	0	1	0	0	0	1	0	12	0
7:45 AM	0	0	4	1	0	0	6	0	0	0	0	0	0	0	1	0	12	0
8:00 AM	0	0	5	0	0	0	7	0	0	1	0	0	0	0	0	0	13	0
8:15 AM	0	0	3	0	0	0	6	0	0	0	0	0	0	0	2	0	11	48
8:30 AM	0	0	6	0	0	1	5	0	0	0	1	1	0	0	0	1	15	51
8:45 AM	0	0	5	0	0	0	8	0	0	0	1	0	0	0	0	0	14	53
9:00 AM	0	0	6	0	0	0	7	1	0	0	0	0	0	1	0	0	15	55
9:15 AM	0	0	6	0	0	0	7	0	0	0	1	0	0	0	0	2	16	60
Count Total	0	0	38	1	0	1	52	2	0	1	4	1	0	1	4	3	108	0
Peak Hour	0	0	15	1	0	0	25	1	0	1	1	0	0	0	4	0	48	0

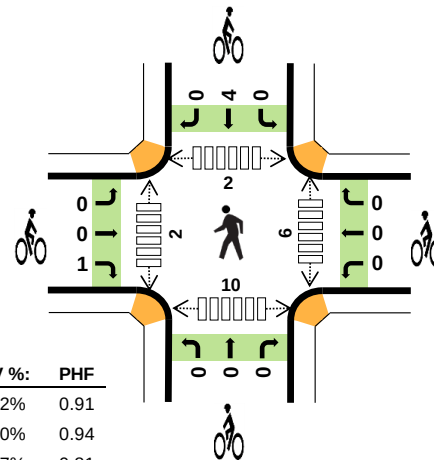
Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			Waverly St			Waverly St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	2	0				
7:45 AM	0	0	0	0	0	0	0	1	0	0	1	0	2	0				
8:00 AM	0	0	0	0	0	0	0	0	0	0	10	0	10	0				
8:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	15				
8:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	14				
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	12				
9:00 AM	0	0	0	0	0	0	0	3	0	0	0	0	3	5				
9:15 AM	0	0	0	0	1	0	0	0	0	0	3	0	4	8				
Count Total	0	0	0	0	1	0	0	6	0	0	16	0	23	0				
Peak Hour	0	0	0	0	0	0	0	2	0	0	13	0	15	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Waverly St Embarcadero Rd



Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 5:30 PM to 6:30 PM



	HV %:	PHF
EB	2.2%	0.91
WB	1.0%	0.94
NB	0.7%	0.81
SB	0.8%	0.82
TOTAL	1.5%	0.95

Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Waverly St				Waverly St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	13	222	4	0	4	145	8	0	9	20	4	0	20	17	13	479	0
4:45 PM		0	12	246	4	0	10	151	9	0	5	14	1	0	19	30	5	506	0
5:00 PM		0	15	217	5	0	2	150	10	0	8	15	2	0	24	18	13	479	0
5:15 PM		0	8	216	6	0	3	168	8	0	12	22	1	0	17	26	20	507	1,971
5:30 PM		0	18	256	4	0	4	196	12	0	10	31	2	0	19	24	9	585	2,077
5:45 PM		0	28	220	5	0	7	187	11	0	12	25	7	0	24	34	17	577	2,148
6:00 PM		0	20	202	5	0	5	202	16	0	7	25	3	0	18	27	14	544	2,213
6:15 PM		0	14	228	9	0	4	177	16	0	2	16	3	0	27	20	12	528	2,234
Count Total		0	128	1,807	42	0	39	1,376	90	0	65	168	23	0	168	196	103	4,205	0
Peak Hour	All	0	80	906	23	0	20	762	55	0	31	97	15	0	88	105	52	2,234	0
	HV	0	1	21	0	0	1	7	0	0	0	1	0	0	0	1	1	33	0
	HV%	-	1%	2%	0%	-	5%	1%	0%	-	0%	1%	0%	-	0%	1%	2%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	4	2	0	0	6	0	0	2	1	3	0	4	0	6	10
4:45 PM	10	1	0	0	11	0	0	0	2	2	7	4	4	0	15
5:00 PM	3	4	0	0	7	0	0	2	1	3	9	2	3	2	16
5:15 PM	6	0	0	0	6	0	0	0	1	1	1	3	1	6	11
5:30 PM	6	2	0	0	8	0	0	0	0	0	1	1	0	5	7
5:45 PM	6	0	1	0	7	1	0	0	0	1	2	1	0	1	4
6:00 PM	3	3	0	2	8	0	0	0	3	3	2	0	1	1	4
6:15 PM	7	3	0	0	10	0	0	0	1	1	1	0	1	3	5
Count Total	45	15	1	2	63	1	0	4	9	14	23	15	10	24	72
Peak Hour	22	8	1	2	33	1	0	0	4	5	6	2	2	10	20

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Waverly St				Waverly St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	1	3	0	0	0	1	1	0	0	0	0	0	0	0	0	6	0
4:45 PM	0	1	9	0	0	0	1	0	0	0	0	0	0	0	0	0	11	0
5:00 PM	0	0	2	1	0	0	4	0	0	0	0	0	0	0	0	0	7	0
5:15 PM	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	6	30
5:30 PM	0	0	6	0	0	1	1	0	0	0	0	0	0	0	0	0	8	32
5:45 PM	0	1	5	0	0	0	0	0	0	0	1	0	0	0	0	0	7	28
6:00 PM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	1	1	8	29
6:15 PM	0	0	7	0	0	0	3	0	0	0	0	0	0	0	0	0	10	33
Count Total	0	3	40	2	0	1	13	1	0	0	1	0	0	0	1	1	63	0
Peak Hour	0	1	21	0	0	1	7	0	0	0	1	0	0	0	1	1	33	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			Waverly St			Waverly St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	2	0	0	1	0	3	0				
4:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	2	0				
5:00 PM	0	0	0	0	0	0	0	2	0	0	1	0	3	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	9				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	6				
5:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	1	5				
6:00 PM	0	0	0	0	0	0	0	0	0	0	3	0	3	5				
6:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	5				
Count Total	0	0	1	0	0	0	0	4	0	0	9	0	14	0				
Peak Hour	0	0	1	0	0	0	0	0	0	0	4	0	5	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

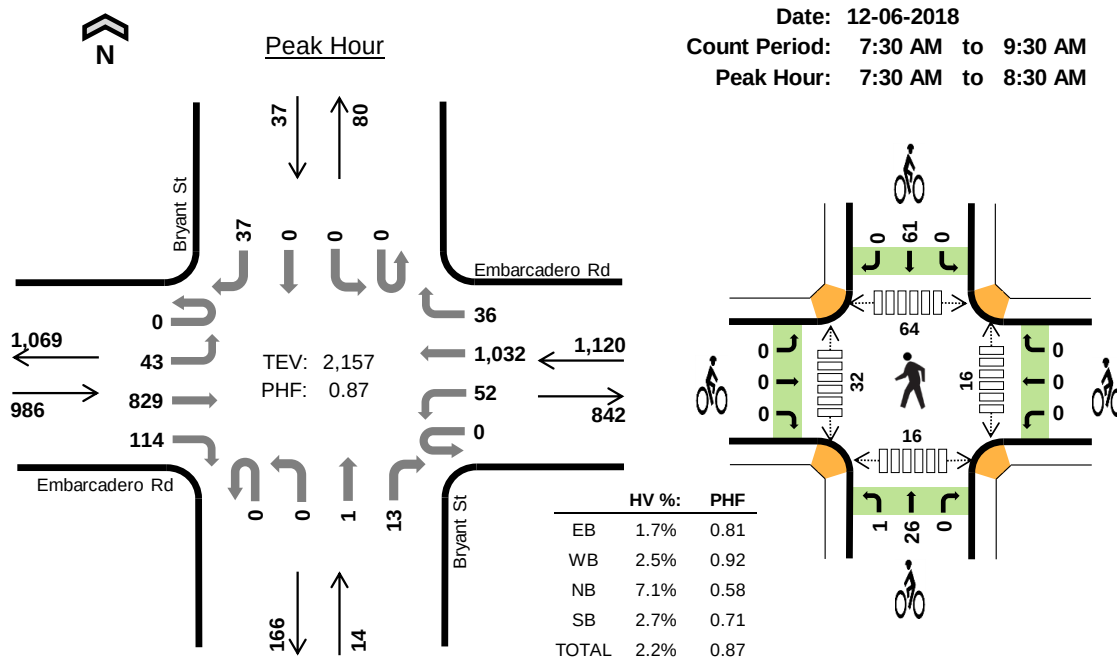
Bryant St Embarcadero Rd



Date: 12-06-2018

Count Period: 7:30 AM to 9:30 AM

Peak Hour: 7:30 AM to 8:30 AM



Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Bryant St				Bryant St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	7	176	41	0	22	268	16	0	0	0	0	0	0	0	6	536	0
7:45 AM		0	9	236	59	0	25	271	8	0	0	1	2	0	0	0	8	619	0
8:00 AM		0	12	231	11	0	5	283	6	0	0	0	6	0	0	0	13	567	0
8:15 AM		0	15	186	3	0	0	210	6	0	0	0	5	0	0	0	10	435	2,157
8:30 AM		0	17	173	8	0	1	209	5	0	0	0	2	0	0	0	8	423	2,044
8:45 AM		0	15	163	4	0	6	214	7	0	0	0	3	0	0	0	11	423	1,848
9:00 AM		0	6	166	5	0	3	223	15	0	0	0	3	0	0	1	2	424	1,705
9:15 AM		0	10	171	4	0	5	218	20	0	0	0	9	0	0	0	8	445	1,715
Count Total		0	91	1,502	135	0	67	1,896	83	0	0	1	30	0	0	1	66	3,872	0
Peak Hour	All	0	43	829	114	0	52	1,032	36	0	0	1	13	0	0	0	37	2,157	0
	HV	0	0	16	1	0	0	28	0	0	0	0	1	0	0	0	1	47	0
	HV%	-	0%	2%	1%	-	0%	3%	0%	-	-	0%	8%	-	-	-	3%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	5	6	0	0	11	0	0	2	27	29	0	9	6	0	15
7:45 AM	7	7	0	0	14	0	0	9	28	37	11	13	9	11	44
8:00 AM	2	8	1	1	12	0	0	9	2	11	2	4	35	3	44
8:15 AM	3	7	0	0	10	0	0	7	4	11	3	6	14	2	25
8:30 AM	7	4	0	0	11	0	0	10	11	21	3	3	6	0	12
8:45 AM	7	9	0	0	16	0	0	12	10	22	2	5	2	1	10
9:00 AM	5	7	0	0	12	0	0	10	2	12	2	0	2	1	5
9:15 AM	6	9	1	0	16	0	1	9	2	12	1	0	0	1	2
Count Total	42	57	2	1	102	0	1	68	86	155	24	40	74	19	157
Peak Hour	17	28	1	1	47	0	0	27	61	88	16	32	64	16	128

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Bryant St				Bryant St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	4	1	0	0	6	0	0	0	0	0	0	0	0	0	11	0
7:45 AM	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0	0	14	0
8:00 AM	0	0	2	0	0	0	8	0	0	0	0	1	0	0	0	1	12	0
8:15 AM	0	0	3	0	0	0	7	0	0	0	0	0	0	0	0	0	10	47
8:30 AM	0	0	7	0	0	0	4	0	0	0	0	0	0	0	0	0	11	47
8:45 AM	0	0	7	0	0	1	8	0	0	0	0	0	0	0	0	0	16	49
9:00 AM	0	1	4	0	0	0	7	0	0	0	0	0	0	0	0	0	12	49
9:15 AM	0	1	5	0	0	1	8	0	0	0	0	1	0	0	0	0	16	55
Count Total	0	2	39	1	0	2	55	0	0	0	0	2	0	0	0	1	102	0
Peak Hour	0	0	16	1	0	0	28	0	0	0	0	1	0	0	0	1	47	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Embarcadero Rd			Embarcadero Rd			Bryant St			Bryant St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	0	0	0	2	0	0	27	0	29	0			
7:45 AM	0	0	0	0	0	0	1	8	0	0	28	0	37	0			
8:00 AM	0	0	0	0	0	0	0	9	0	0	2	0	11	0			
8:15 AM	0	0	0	0	0	0	0	7	0	0	4	0	11	88			
8:30 AM	0	0	0	0	0	0	1	9	0	0	11	0	21	80			
8:45 AM	0	0	0	0	0	0	0	12	0	0	10	0	22	65			
9:00 AM	0	0	0	0	0	0	1	9	0	0	2	0	12	66			
9:15 AM	0	0	0	1	0	0	0	9	0	0	2	0	12	67			
Count Total	0	0	0	1	0	0	3	65	0	0	86	0	155	0			
Peak Hour	0	0	0	0	0	0	1	26	0	0	61	0	88	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	6	1	0	0	7	0	0	6	10	16	6	7	2	5	20
4:45 PM	8	1	0	0	9	0	0	7	12	19	4	7	3	0	14
5:00 PM	3	5	0	0	8	0	0	7	6	13	6	5	5	2	18
5:15 PM	6	0	0	0	6	0	0	4	7	11	2	4	1	4	11
5:30 PM	5	1	0	0	6	0	0	4	11	15	3	2	4	2	11
5:45 PM	6	0	0	0	6	0	0	9	9	18	2	6	0	1	9
6:00 PM	5	4	0	0	9	0	0	7	3	10	0	6	1	2	9
6:15 PM	6	3	1	0	10	0	0	5	5	10	1	6	1	3	11
Count Total	45	15	1	0	61	0	0	49	63	112	24	43	17	19	103
Peak Hour	22	8	1	0	31	0	0	25	28	53	6	20	6	8	40

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Bryant St				Bryant St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	5	1	0	0	1	0	0	0	0	0	0	0	0	0	7	0
4:45 PM	0	0	8	0	0	0	1	0	0	0	0	0	0	0	0	0	9	0
5:00 PM	0	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0	8	0
5:15 PM	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	30
5:30 PM	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	6	29
5:45 PM	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	26
6:00 PM	0	0	5	0	0	0	3	1	0	0	0	0	0	0	0	0	9	27
6:15 PM	0	0	6	0	0	0	3	0	0	0	1	0	0	0	0	0	10	31
Count Total	0	0	44	1	0	0	14	1	0	0	1	0	0	0	0	0	61	0
Peak Hour	0	0	22	0	0	0	7	1	0	0	1	0	0	0	0	0	31	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			Bryant St			Bryant St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	6	0	0	10	0	16	0				
4:45 PM	0	0	0	0	0	0	0	7	0	0	12	0	19	0				
5:00 PM	0	0	0	0	0	0	0	6	1	0	6	0	13	0				
5:15 PM	0	0	0	0	0	0	0	4	0	0	7	0	11	59				
5:30 PM	0	0	0	0	0	0	0	4	0	0	11	0	15	58				
5:45 PM	0	0	0	0	0	0	0	9	0	0	9	0	18	57				
6:00 PM	0	0	0	0	0	0	0	7	0	0	3	0	10	54				
6:15 PM	0	0	0	0	0	0	0	4	1	0	5	0	10	53				
Count Total	0	0	0	0	0	0	0	47	2	0	63	0	112	0				
Peak Hour	0	0	0	0	0	0	0	24	1	0	28	0	53	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

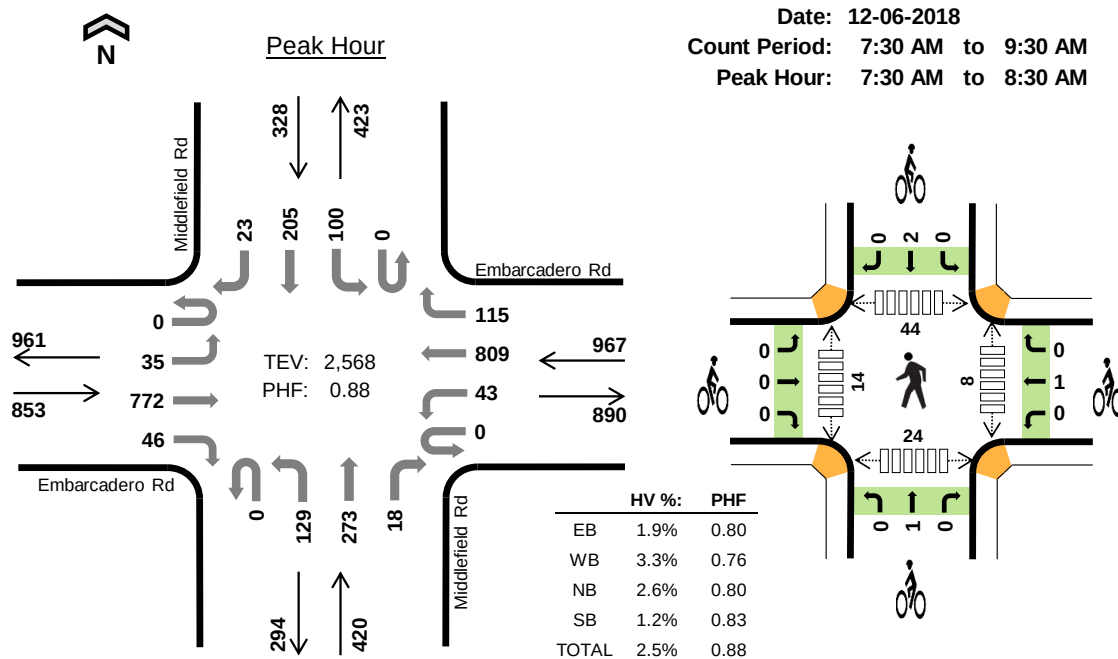
Middlefield Rd Embarcadero Rd



Date: 12-06-2018

Count Period: 7:30 AM to 9:30 AM

Peak Hour: 7:30 AM to 8:30 AM



Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	2	180	9	0	11	279	28	0	24	52	3	0	20	36	8	652	0
7:45 AM		0	10	240	15	0	12	214	38	0	34	63	3	0	22	70	7	728	0
8:00 AM		0	8	155	10	0	13	170	24	0	34	68	8	0	28	49	6	573	0
8:15 AM		0	15	197	12	0	7	146	25	0	37	90	4	0	30	50	2	615	2,568
8:30 AM		0	13	171	11	0	14	162	16	0	42	90	8	0	30	60	5	622	2,538
8:45 AM		0	13	164	13	0	14	191	13	0	30	86	9	0	26	81	17	657	2,467
9:00 AM		0	16	181	12	0	10	207	35	0	19	58	8	0	29	57	4	636	2,530
9:15 AM		0	6	198	11	0	13	202	30	0	28	37	6	0	25	48	8	612	2,527
Count Total		0	83	1,486	93	0	94	1,571	209	0	248	544	49	0	210	451	57	5,095	0
Peak Hour	All	0	35	772	46	0	43	809	115	0	129	273	18	0	100	205	23	2,568	0
	HV	0	0	16	0	0	1	26	5	0	1	10	0	0	0	4	0	63	0
	HV%	-	0%	2%	0%	-	2%	3%	4%	-	1%	4%	0%	-	0%	2%	0%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

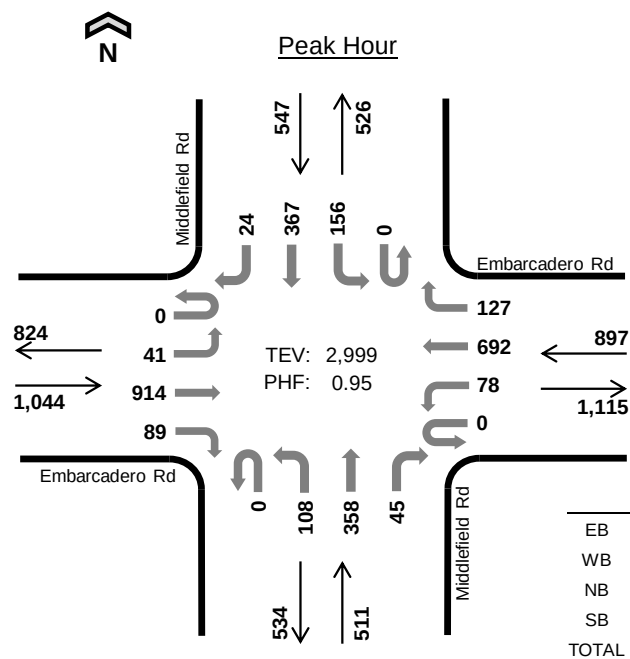
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	3	8	1	0	12	0	1	0	0	1	1	2	4	2	9
7:45 AM	6	6	1	1	14	0	0	1	1	2	1	7	6	11	25
8:00 AM	3	10	6	1	20	0	0	0	1	1	6	5	19	10	40
8:15 AM	4	8	3	2	17	0	0	0	0	0	0	0	15	1	16
8:30 AM	7	6	2	1	16	0	0	0	0	0	0	7	10	6	23
8:45 AM	6	11	6	1	24	0	0	0	0	0	0	1	1	0	2
9:00 AM	8	9	1	2	20	0	1	1	0	2	0	0	1	1	2
9:15 AM	6	8	0	3	17	0	0	1	0	1	0	1	2	0	3
Count Total	43	66	20	11	140	0	2	3	2	7	8	23	58	31	120
Peak Hour	16	32	11	4	63	0	1	1	2	4	8	14	44	24	90

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	3	0	0	1	7	0	0	0	1	0	0	0	0	0	12	0
7:45 AM	0	0	6	0	0	0	5	1	0	0	1	0	0	0	1	0	14	0
8:00 AM	0	0	3	0	0	0	7	3	0	1	5	0	0	0	1	0	20	0
8:15 AM	0	0	4	0	0	0	7	1	0	0	3	0	0	0	2	0	17	63
8:30 AM	0	0	7	0	0	0	6	0	0	0	2	0	0	0	1	0	16	67
8:45 AM	0	0	6	0	0	1	9	1	0	0	6	0	0	0	0	1	24	77
9:00 AM	0	0	6	2	0	0	9	0	0	0	1	0	0	1	1	0	20	77
9:15 AM	0	0	6	0	0	1	7	0	0	0	0	0	0	1	2	0	17	77
Count Total	0	0	41	2	0	3	57	6	0	1	19	0	0	2	8	1	140	0
Peak Hour	0	0	16	0	0	1	26	5	0	1	10	0	0	0	4	0	63	0

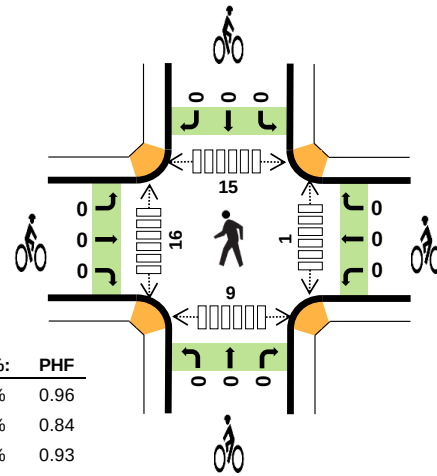
Two-Hour Count Summaries - Bikes																	
Interval Start	Embarcadero Rd			Embarcadero Rd			Middlefield Rd			Middlefield Rd			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	0			
7:45 AM	0	0	0	0	0	0	0	1	0	0	1	0	2	0			
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0			
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	4			
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3			
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
9:00 AM	0	0	0	1	0	0	0	1	0	0	0	0	2	2			
9:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	3			
Count Total	0	0	0	1	1	0	0	3	0	0	2	0	7	0			
Peak Hour	0	0	0	0	1	0	0	1	0	0	2	0	4	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Middlefield Rd Embarcadero Rd



Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 5:00 PM to 6:00 PM



Two-Hour Count Summaries

Interval Start		Embarcadero Rd				Embarcadero Rd				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	13	256	17	0	17	130	34	0	21	73	11	0	35	108	2	717	0
4:45 PM		0	9	221	24	0	19	150	18	0	13	68	4	0	40	113	9	688	0
5:00 PM		0	8	224	17	0	27	136	21	0	27	95	15	0	38	96	5	709	0
5:15 PM		0	12	227	19	0	15	157	26	0	18	91	11	0	47	91	9	723	2,837
5:30 PM		0	12	236	17	0	22	203	42	0	29	76	11	0	41	88	2	779	2,899
5:45 PM		0	9	227	36	0	14	196	38	0	34	96	8	0	30	92	8	788	2,999
6:00 PM		0	9	181	25	0	12	180	32	0	30	85	12	0	32	73	9	680	2,970
6:15 PM		0	13	194	29	0	10	165	25	0	32	97	18	0	36	89	14	722	2,969
Count Total		0	85	1,766	184	0	136	1,317	236	0	204	681	90	0	299	750	58	5,806	0
Peak Hour	All	0	41	914	89	0	78	692	127	0	108	358	45	0	156	367	24	2,999	0
	HV	0	0	20	0	0	0	8	0	0	0	3	0	0	0	4	1	36	0
	HV%	-	0%	2%	0%	-	0%	1%	0%	-	0%	1%	0%	-	0%	1%	4%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

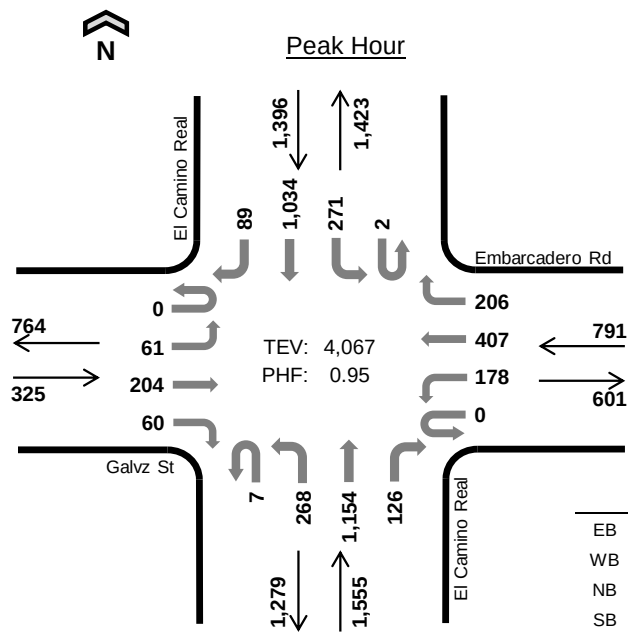
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	5	2	2	2	11	0	0	0	1	1	7	6	2	10	25
4:45 PM	8	2	0	1	11	0	0	0	0	0	3	1	3	1	8
5:00 PM	2	5	1	1	9	0	0	0	0	0	0	8	9	2	19
5:15 PM	6	0	1	2	9	0	0	0	0	0	1	2	3	4	10
5:30 PM	4	3	1	1	9	0	0	0	0	0	0	4	3	1	8
5:45 PM	8	0	0	1	9	0	0	0	0	0	0	2	0	2	4
6:00 PM	3	4	1	0	8	0	0	0	0	0	0	0	3	2	5
6:15 PM	6	4	0	2	12	0	0	1	1	2	0	0	0	2	2
Count Total	42	20	6	10	78	0	0	1	2	3	11	23	23	24	81
Peak Hour	20	8	3	5	36	0	0	0	0	0	1	16	15	9	41

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Embarcadero Rd				Embarcadero Rd				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	1	4	0	0	0	2	0	0	0	2	0	0	0	2	0	11	0
4:45 PM	0	0	7	1	0	0	2	0	0	0	0	0	0	1	0	0	11	0
5:00 PM	0	0	2	0	0	0	5	0	0	0	1	0	0	0	1	0	9	0
5:15 PM	0	0	6	0	0	0	0	0	0	0	1	0	0	0	1	1	9	40
5:30 PM	0	0	4	0	0	0	3	0	0	0	1	0	0	0	1	0	9	38
5:45 PM	0	0	8	0	0	0	0	0	0	0	0	0	0	0	1	0	9	36
6:00 PM	0	0	3	0	0	0	4	0	0	0	1	0	0	0	0	0	8	35
6:15 PM	0	0	6	0	0	0	4	0	0	0	0	0	0	0	1	1	12	38
Count Total	0	1	40	1	0	0	20	0	0	0	6	0	0	1	7	2	78	0
Peak Hour	0	0	20	0	0	0	8	0	0	0	3	0	0	0	4	1	36	0

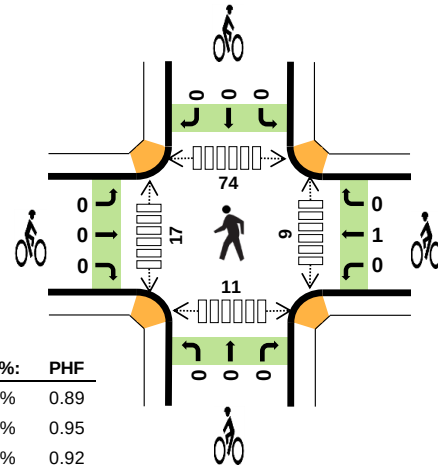
Two-Hour Count Summaries - Bikes																		
Interval Start	Embarcadero Rd			Embarcadero Rd			Middlefield Rd			Middlefield Rd			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	0				
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
6:15 PM	0	0	0	0	0	0	0	1	0	0	1	0	2	2				
Count Total	0	0	0	0	0	0	0	1	0	0	2	0	3	0				
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

El Camino Real Embarcadero Rd



Date: 12-06-2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 8:30 AM to 9:30 AM



	HV %:	PHF
EB	5.5%	0.89
WB	3.8%	0.95
NB	2.7%	0.92
SB	5.4%	0.99
TOTAL	4.1%	0.95

Two-Hour Count Summaries

Interval Start		Galvz St				Embarcadero Rd				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	12	86	25	0	46	140	52	5	71	215	12	0	75	181	20	940	0
7:45 AM		0	14	75	26	0	52	108	52	2	64	246	27	0	71	243	24	1,004	0
8:00 AM		0	13	45	32	0	37	66	38	0	52	262	38	1	64	192	21	861	0
8:15 AM		0	8	31	12	0	68	100	49	9	68	295	43	0	57	209	16	965	3,770
8:30 AM		0	18	45	14	0	42	108	43	3	87	299	32	1	66	253	21	1,032	3,862
8:45 AM		0	17	49	21	0	54	110	45	1	68	319	34	0	61	268	24	1,071	3,929
9:00 AM		0	17	61	13	0	38	107	59	3	56	265	28	0	74	252	25	998	4,066
9:15 AM		0	9	49	12	0	44	82	59	0	57	271	32	1	70	261	19	966	4,067
Count Total		0	108	441	155	0	381	821	397	23	523	2,172	246	3	538	1,859	170	7,837	0
Peak Hour	All	0	61	204	60	0	178	407	206	7	268	1,154	126	2	271	1,034	89	4,067	0
	HV	0	8	8	2	0	6	14	10	0	8	33	1	0	12	57	6	165	0
	HV%	-	13%	4%	3%	-	3%	3%	5%	0%	3%	3%	1%	0%	4%	6%	7%	4%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

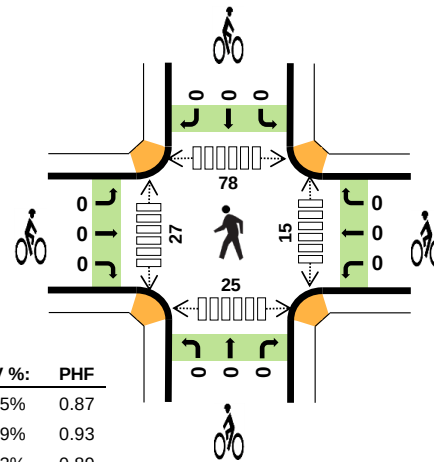
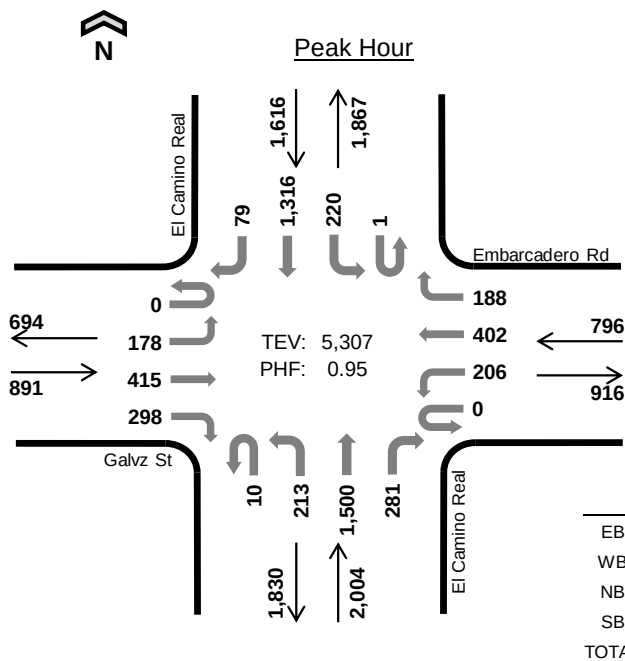
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	4	7	12	13	36	0	0	0	0	0	1	1	6	1	9
7:45 AM	6	4	7	11	28	0	0	0	0	0	1	9	6	4	20
8:00 AM	3	6	11	17	37	0	1	0	0	1	2	8	19	3	32
8:15 AM	2	10	12	9	33	0	0	0	0	0	3	6	24	6	39
8:30 AM	6	7	5	17	35	0	0	0	0	0	3	5	24	4	36
8:45 AM	4	5	12	22	43	0	0	0	0	0	1	1	20	4	26
9:00 AM	3	11	14	17	45	0	0	0	0	0	5	3	16	2	26
9:15 AM	5	7	11	19	42	0	1	0	0	1	0	8	14	1	23
Count Total	33	57	84	125	299	0	2	0	0	2	16	41	129	25	211
Peak Hour	18	30	42	75	165	0	1	0	0	1	9	17	74	11	111

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Galvz St				Embarcadero Rd				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	1	1	2	0	2	2	3	0	1	11	0	0	3	9	1	36	0
7:45 AM	0	3	1	2	0	0	2	2	0	0	7	0	0	5	6	0	28	0
8:00 AM	0	2	0	1	0	0	2	4	0	3	8	0	0	2	13	2	37	0
8:15 AM	0	1	1	0	0	3	4	3	0	1	11	0	0	0	8	1	33	134
8:30 AM	0	3	2	1	0	2	2	3	0	0	5	0	0	3	12	2	35	133
8:45 AM	0	1	3	0	0	0	3	2	0	4	8	0	0	3	18	1	43	148
9:00 AM	0	2	1	0	0	1	5	5	0	2	12	0	0	3	13	1	45	156
9:15 AM	0	2	2	1	0	3	4	0	0	2	8	1	0	3	14	2	42	165
Count Total	0	15	11	7	0	11	24	22	0	13	70	1	0	22	93	10	299	0
Peak Hour	0	8	8	2	0	6	14	10	0	8	33	1	0	12	57	6	165	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Galvz St			Embarcadero Rd			El Camino Real			El Camino Real			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	
Count Total	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	
Peak Hour	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

El Camino Real Embarcadero Rd



Two-Hour Count Summaries

Interval Start		Galvz St				Embarcadero Rd				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	38	130	79	0	50	67	48	6	35	326	69	1	55	319	13	1,236	0
4:45 PM		0	37	134	90	0	45	79	45	2	46	314	70	0	54	318	20	1,254	0
5:00 PM		1	55	120	84	0	33	70	42	6	54	335	48	1	39	319	21	1,228	0
5:15 PM		0	38	70	53	0	53	78	49	1	40	389	60	1	56	366	16	1,270	4,988
5:30 PM		0	31	124	89	0	48	101	47	6	60	421	75	0	57	312	20	1,391	5,143
5:45 PM		0	59	102	70	0	54	119	41	2	60	340	73	0	58	381	22	1,381	5,270
6:00 PM		0	50	119	86	0	51	104	51	1	53	350	73	0	49	257	21	1,265	5,307
6:15 PM		0	45	107	71	0	57	74	41	3	58	350	55	1	54	305	17	1,238	5,275
Count Total		1	353	906	622	0	391	692	364	27	406	2,825	523	4	422	2,577	150	10,263	0
Peak Hour	All	0	178	415	298	0	206	402	188	10	213	1,500	281	1	220	1,316	79	5,307	0
	HV	0	7	6	0	0	0	2	5	0	2	21	3	0	7	17	3	73	0
	HV%	-	4%	1%	0%	-	0%	0%	3%	0%	1%	1%	1%	0%	3%	1%	4%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	5	2	9	11	27	0	1	0	0	1	12	9	22	16	59
4:45 PM	5	0	7	8	20	0	0	0	0	0	15	15	36	11	77
5:00 PM	4	2	6	7	19	0	0	0	0	0	9	9	15	7	40
5:15 PM	3	3	5	5	16	0	0	0	0	0	3	7	23	7	40
5:30 PM	3	1	6	5	15	0	0	0	0	0	1	7	16	2	26
5:45 PM	5	0	6	8	19	0	0	0	0	0	4	7	21	5	37
6:00 PM	2	3	9	9	23	0	0	0	0	0	7	6	18	11	42
6:15 PM	3	2	6	6	17	0	0	0	0	0	1	5	14	3	23
Count Total	30	13	54	59	156	0	1	0	0	1	52	65	165	62	344
Peak Hour	13	7	26	27	73	0	0	0	0	0	15	27	78	25	145

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Galvz St				Embarcadero Rd				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	3	2	0	0	0	0	2	0	0	9	0	0	2	8	1	27	0
4:45 PM	0	1	3	1	0	0	0	0	0	0	6	1	0	2	6	0	20	0
5:00 PM	0	2	2	0	0	0	1	1	0	0	5	1	0	1	5	1	19	0
5:15 PM	0	1	2	0	0	0	1	2	0	0	4	1	0	1	3	1	16	82
5:30 PM	0	2	1	0	0	0	0	1	0	0	6	0	0	2	3	0	15	70
5:45 PM	0	2	3	0	0	0	0	0	0	0	5	1	0	3	4	1	19	69
6:00 PM	0	2	0	0	0	0	1	2	0	2	6	1	0	1	7	1	23	73
6:15 PM	0	1	2	0	0	0	0	2	0	0	5	1	0	1	4	1	17	74
Count Total	0	14	15	1	0	0	3	10	0	2	46	6	0	13	40	6	156	0
Peak Hour	0	7	6	0	0	0	2	5	0	2	21	3	0	7	17	3	73	0

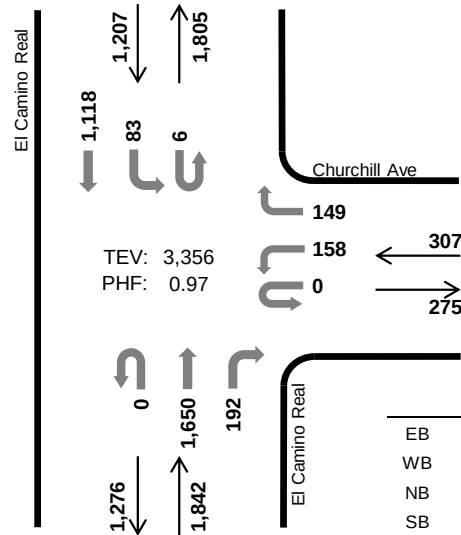
Two-Hour Count Summaries - Bikes																		
Interval Start	Galvz St			Embarcadero Rd			El Camino Real			El Camino Real			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	0				
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Count Total	0	0	0	0	1	0	0	0	0	0	0	0	1	0				
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

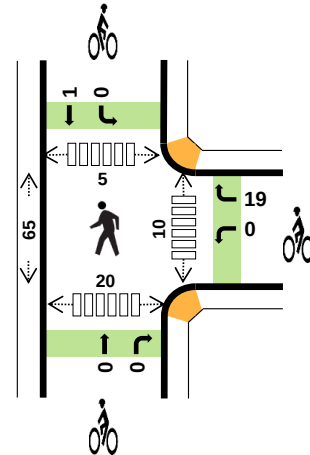
El Camino Real Churchill Ave



Peak Hour



Date: 12-06-2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	-	-
WB	1.3%	0.92
NB	2.7%	0.88
SB	5.0%	0.92
TOTAL	3.4%	0.97

Two-Hour Count Summaries

Interval Start		0				Churchill Ave				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	0	0	0	0	36	0	46	0	0	282	10	2	23	224	0	623	0
7:45 AM		0	0	0	0	0	42	0	40	0	0	348	48	2	31	290	0	801	0
8:00 AM		0	0	0	0	0	31	0	46	0	0	454	69	3	22	241	0	866	0
8:15 AM		0	0	0	0	0	48	0	34	0	0	425	42	0	17	291	0	857	3,147
8:30 AM		0	0	0	0	0	37	0	28	0	0	407	41	2	16	286	0	817	3,341
8:45 AM		0	0	0	0	0	42	0	41	0	0	364	40	1	28	300	0	816	3,356
9:00 AM		0	0	0	0	0	36	0	51	0	0	312	34	0	19	304	0	756	3,246
9:15 AM		0	0	0	0	0	29	0	39	0	0	321	34	3	22	292	0	740	3,129
Count Total		0	0	0	0	0	301	0	325	0	0	2,913	318	13	178	2,228	0	6,276	0
Peak Hour	All	0	0	0	0	0	158	0	149	0	0	1,650	192	6	83	1,118	0	3,356	0
	HV	0	0	0	0	0	2	0	2	0	0	39	11	0	2	58	0	114	0
	HV%	-	-	-	-	-	1%	-	1%	-	-	2%	6%	0%	2%	5%	-	3%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	0	0	10	15	25	0	4	0	0	4	1	9	0	0	10
7:45 AM	0	0	11	8	19	0	5	0	0	5	3	14	0	6	23
8:00 AM	0	1	13	14	28	0	7	0	0	7	4	16	2	8	30
8:15 AM	0	1	13	11	25	0	4	0	0	4	3	11	1	1	16
8:30 AM	0	0	12	14	26	0	7	0	0	7	3	16	0	6	25
8:45 AM	0	2	12	21	35	0	1	0	1	2	0	22	2	5	29
9:00 AM	0	3	15	14	32	0	5	0	0	5	2	10	0	7	19
9:15 AM	0	2	12	21	35	0	8	0	0	8	2	16	1	2	21
Count Total	0	9	98	118	225	0	41	0	1	42	18	114	6	35	173
Peak Hr	0	4	50	60	114	0	19	0	1	20	10	65	5	20	100

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	0				Churchill Ave				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	15	0	25	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	8	3	0	0	8	0	19	0
8:00 AM	0	0	0	0	0	0	0	1	0	0	11	2	0	1	13	0	28	0
8:15 AM	0	0	0	0	0	0	0	1	0	0	10	3	0	1	10	0	25	97
8:30 AM	0	0	0	0	0	0	0	0	0	0	7	5	0	0	14	0	26	98
8:45 AM	0	0	0	0	0	2	0	0	0	0	11	1	0	0	21	0	35	114
9:00 AM	0	0	0	0	0	3	0	0	0	0	14	1	0	1	13	0	32	118
9:15 AM	0	0	0	0	0	2	0	0	0	0	10	2	0	0	21	0	35	128
Count Total	0	0	0	0	0	7	0	2	0	0	81	17	0	3	115	0	225	0
Peak Hour	0	0	0	0	0	2	0	2	0	0	39	11	0	2	58	0	114	0

Two-Hour Count Summaries - Bikes																		
Interval Start	0			Churchill Ave			El Camino Real			El Camino Real			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	0	0	0	4	0	0	0	0	0	0	4	0				
7:45 AM	0	0	0	0	0	5	0	0	0	0	0	0	5	0				
8:00 AM	0	0	0	0	0	7	0	0	0	0	0	0	7	0				
8:15 AM	0	0	0	0	0	4	0	0	0	0	0	0	4	20				
8:30 AM	0	0	0	0	0	7	0	0	0	0	0	0	7	23				
8:45 AM	0	0	0	0	0	1	0	0	0	0	1	0	2	20				
9:00 AM	0	0	0	1	0	4	0	0	0	0	0	0	5	18				
9:15 AM	0	0	0	0	0	8	0	0	0	0	0	0	8	22				
Count Total	0	0	0	1	0	40	0	0	0	0	1	0	42	0				
Peak Hour	0	0	0	0	0	19	0	0	0	0	1	0	20	0				

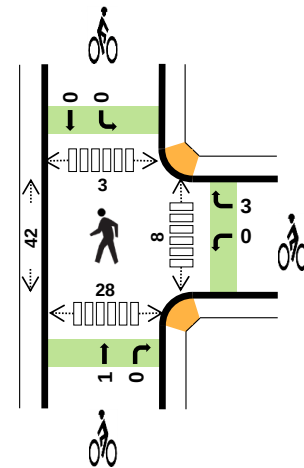
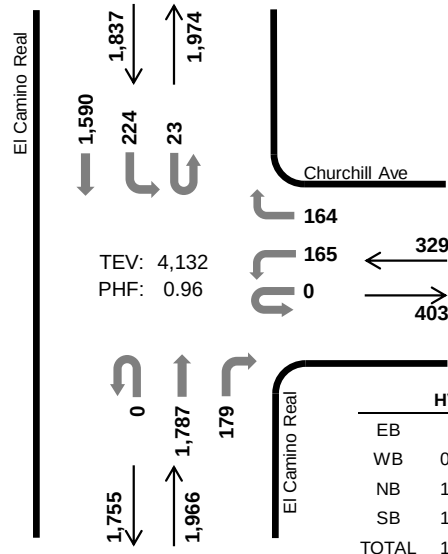
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

El Camino Real Churchill Ave



Peak Hour

Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 5:15 PM to 6:15 PM



Two-Hour Count Summaries

Interval Start		0				Churchill Ave				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	0	0	0	0	38	0	51	0	0	363	38	5	55	399	0	949	0
4:45 PM		0	0	0	0	0	43	0	64	0	0	373	44	9	50	400	0	983	0
5:00 PM		0	0	0	0	0	40	0	52	1	0	359	48	5	63	382	0	950	0
5:15 PM		0	0	0	0	0	41	0	43	0	0	441	42	3	53	415	0	1,038	3,920
5:30 PM		0	0	0	0	0	33	0	41	0	0	474	48	4	59	417	0	1,076	4,047
5:45 PM		0	0	0	0	0	47	0	27	0	0	452	40	11	54	409	0	1,040	4,104
6:00 PM		0	0	0	0	0	44	0	53	0	0	420	49	5	58	349	0	978	4,132
6:15 PM		0	0	0	0	0	54	0	31	0	0	349	32	6	46	394	0	912	4,006
Count Total		0	0	0	0	0	340	0	362	1	0	3,231	341	48	438	3,165	0	7,926	0
Peak Hour	All	0	0	0	0	0	165	0	164	0	0	1,787	179	23	224	1,590	0	4,132	0
	HV	0	0	0	0	0	0	0	1	0	0	28	2	0	0	21	0	52	0
	HV%	-	-	-	-	-	0%	-	1%	-	-	2%	1%	0%	0%	1%	-	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

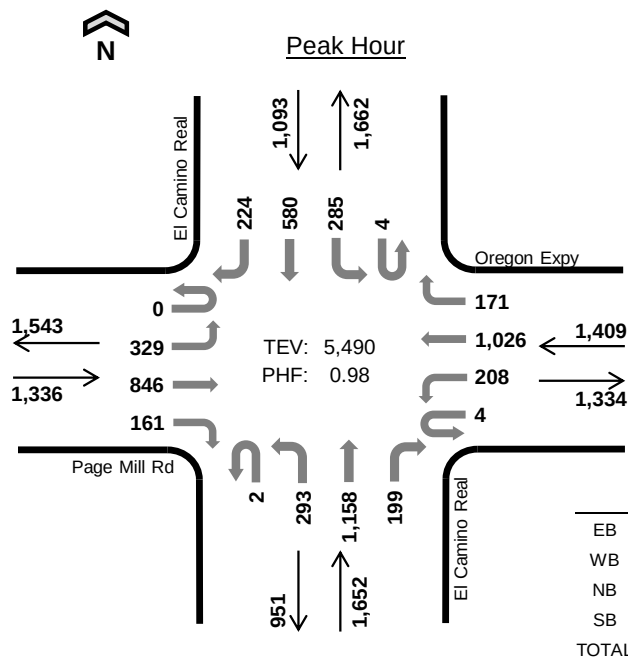
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	0	1	10	12	23	0	1	0	0	1	1	11	3	3	18
4:45 PM	0	1	6	7	14	0	1	1	0	2	0	24	7	11	42
5:00 PM	0	1	8	5	14	0	3	0	0	3	3	15	0	8	26
5:15 PM	0	0	6	4	10	0	0	0	0	0	0	13	0	8	21
5:30 PM	0	0	10	5	15	0	0	0	0	0	2	11	1	5	19
5:45 PM	0	0	6	5	11	0	1	1	0	2	4	11	2	9	26
6:00 PM	0	1	8	7	16	0	2	0	0	2	2	7	0	6	15
6:15 PM	0	0	5	5	10	0	2	1	0	3	0	17	2	11	30
Count Total	0	4	59	50	113	0	10	3	0	13	12	109	15	61	197
Peak Hr	0	1	30	21	52	0	3	1	0	4	8	42	3	28	81

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	0				Churchill Ave				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	0	0	0	0	0	1	0	0	10	0	0	0	12	0	23	0
4:45 PM	0	0	0	0	0	1	0	0	0	0	6	0	0	0	7	0	14	0
5:00 PM	0	0	0	0	0	1	0	0	0	0	8	0	0	0	5	0	14	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	10	61
5:30 PM	0	0	0	0	0	0	0	0	0	0	8	2	0	0	5	0	15	53
5:45 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	5	0	11	50
6:00 PM	0	0	0	0	0	0	0	1	0	0	8	0	0	0	7	0	16	52
6:15 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	10	52
Count Total	0	0	0	0	0	2	0	2	0	0	57	2	0	0	50	0	113	0
Peak Hour	0	0	0	0	0	0	0	1	0	0	28	2	0	0	21	0	52	0

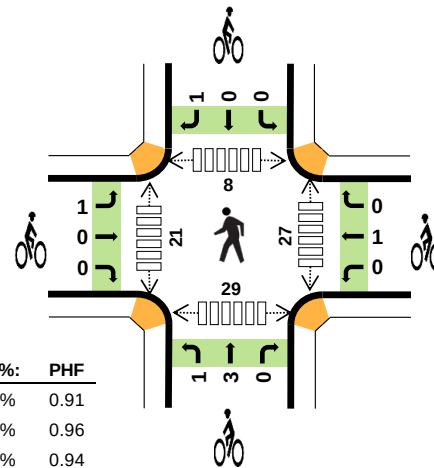
Two-Hour Count Summaries - Bikes																		
Interval Start	0			Churchill Ave			El Camino Real			El Camino Real			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	1	0				
4:45 PM	0	0	0	1	0	0	0	0	1	0	0	0	2	0				
5:00 PM	0	0	0	1	0	2	0	0	0	0	0	0	3	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	6				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	5				
5:45 PM	0	0	0	0	0	1	0	1	0	0	0	0	2	5				
6:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	2	4				
6:15 PM	0	0	0	0	0	2	0	1	0	0	0	0	3	7				
Count Total	0	0	0	2	0	8	0	2	1	0	0	0	13	0				
Peak Hour	0	0	0	0	0	3	0	1	0	0	0	0	4	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

El Camino Real Page Mill Rd



Date: 12-06-2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	3.4%	0.91
WB	1.8%	0.96
NB	2.3%	0.94
SB	4.9%	0.96
TOTAL	3.0%	0.98

Two-Hour Count Summaries

Interval Start		Page Mill Rd				Oregon Expy				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	86	169	39	2	56	260	41	0	79	216	57	2	56	105	42	1,210	0
7:45 AM		0	92	195	26	2	68	275	52	1	88	214	47	0	86	111	57	1,314	0
8:00 AM		0	89	244	35	0	62	246	58	1	55	259	47	0	76	150	60	1,382	0
8:15 AM		0	71	201	42	0	54	252	46	1	87	274	52	3	82	120	50	1,335	5,241
8:30 AM		0	78	210	38	3	51	277	37	0	79	307	55	0	58	152	60	1,405	5,436
8:45 AM		0	91	191	46	1	41	251	30	0	72	318	45	1	69	158	54	1,368	5,490
9:00 AM		0	78	192	43	3	47	270	31	0	59	213	48	0	60	148	49	1,241	5,349
9:15 AM		1	107	182	40	7	54	219	31	0	70	209	67	1	64	141	51	1,244	5,258
Count Total		1	692	1,584	309	18	433	2,050	326	3	589	2,010	418	7	551	1,085	423	10,499	0
Peak Hour	All	0	329	846	161	4	208	1,026	171	2	293	1,158	199	4	285	580	224	5,490	0
	HV	0	12	26	8	0	3	16	6	0	5	25	8	0	9	31	14	163	0
	HV%	-	4%	3%	5%	0%	1%	2%	4%	0%	2%	2%	4%	0%	3%	5%	6%	3%	0

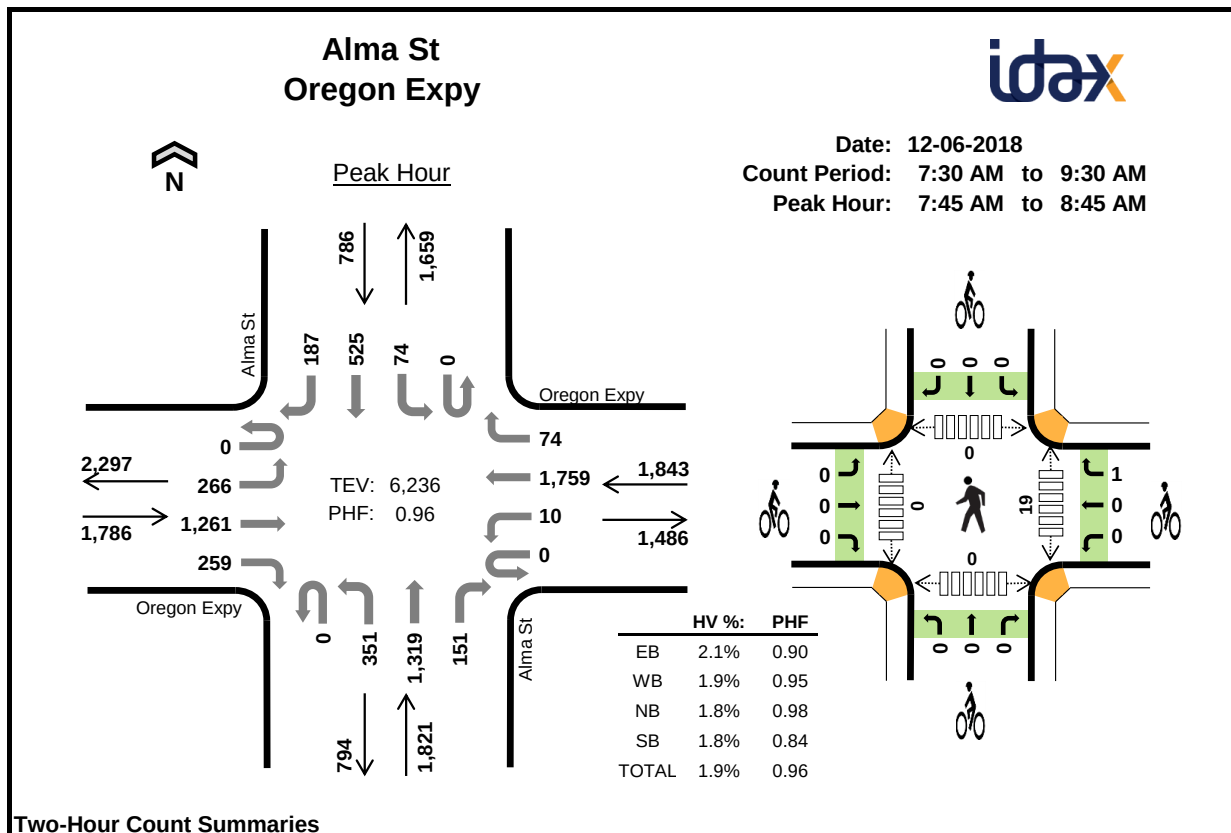
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	12	11	14	11	48	2	0	0	0	2	3	6	3	1	13
7:45 AM	9	6	7	5	27	0	0	0	0	0	5	4	4	4	17
8:00 AM	10	9	9	14	42	0	0	1	0	1	5	3	1	7	16
8:15 AM	15	7	7	7	36	1	0	1	0	2	6	6	3	3	18
8:30 AM	8	4	10	10	32	0	1	1	0	2	5	3	1	4	13
8:45 AM	13	5	12	23	53	0	0	1	1	2	11	9	3	15	38
9:00 AM	13	12	13	15	53	0	1	0	0	1	7	6	4	3	20
9:15 AM	10	9	12	17	48	0	1	1	0	2	7	5	1	5	18
Count Total	90	63	84	102	339	3	3	5	1	12	49	42	20	42	153
Peak Hour	46	25	38	54	163	1	1	4	1	7	27	21	8	29	85

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Page Mill Rd				Oregon Expy				El Camino Real				El Camino Real				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	1	8	3	0	2	5	4	0	2	9	3	0	2	7	2	48	0
7:45 AM	0	4	4	1	0	1	4	1	0	1	5	1	0	0	2	3	27	0
8:00 AM	0	4	6	0	0	0	6	3	0	1	5	3	0	3	7	4	42	0
8:15 AM	0	3	9	3	0	1	3	3	0	1	5	1	0	2	5	0	36	153
8:30 AM	0	3	5	0	0	1	3	0	0	1	7	2	0	0	8	2	32	137
8:45 AM	0	2	6	5	0	1	4	0	0	2	8	2	0	4	11	8	53	163
9:00 AM	0	5	5	3	0	0	8	4	0	2	8	3	0	2	10	3	53	174
9:15 AM	0	6	4	0	1	2	3	3	0	3	6	3	0	4	11	2	48	186
Count Total	0	28	47	15	1	8	36	18	0	13	53	18	0	17	61	24	339	0
Peak Hour	0	12	26	8	0	3	16	6	0	5	25	8	0	9	31	14	163	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Page Mill Rd			Oregon Expy			El Camino Real			El Camino Real			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	1	1	0	0	0	0	0	0	0	0	0	2	0				
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	0				
8:15 AM	1	0	0	0	0	0	0	1	0	0	0	0	2	5				
8:30 AM	0	0	0	0	1	0	0	1	0	0	0	0	2	5				
8:45 AM	0	0	0	0	0	0	1	0	0	0	0	1	2	7				
9:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	7				
9:15 AM	0	0	0	0	1	0	0	1	0	0	0	0	2	7				
Count Total	1	1	1	0	3	0	1	4	0	0	0	1	12	0				
Peak Hour	1	0	0	0	1	0	1	3	0	0	0	1	7	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		Oregon Expy				Oregon Expy				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	55	225	52	0	5	437	17	0	57	263	32	0	8	88	34	1,273	0
7:45 AM		0	75	267	61	0	1	421	20	0	90	326	40	0	16	129	46	1,492	0
8:00 AM		0	77	356	64	0	3	461	21	0	77	344	45	0	19	119	42	1,628	0
8:15 AM		0	55	339	68	0	2	422	19	0	92	306	37	0	26	157	51	1,574	5,967
8:30 AM		0	59	299	66	0	4	455	14	0	92	343	29	0	13	120	48	1,542	6,236
8:45 AM		2	70	272	46	0	8	340	8	0	91	298	34	0	11	160	42	1,382	6,126
9:00 AM		0	43	303	37	0	5	339	6	0	75	285	25	0	6	135	45	1,304	5,802
9:15 AM		0	52	273	47	0	7	409	17	0	91	310	25	0	8	98	43	1,380	5,608
Count Total		2	486	2,334	441	0	35	3,284	122	0	665	2,475	267	0	107	1,006	351	11,575	0
Peak Hour	All	0	266	1,261	259	0	10	1,759	74	0	351	1,319	151	0	74	525	187	6,236	0
	HV	0	2	33	2	0	0	32	3	0	0	32	1	0	1	9	4	119	0
	HV%	-	1%	3%	1%	-	0%	2%	4%	-	0%	2%	1%	-	1%	2%	2%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	17	8	6	3	34	1	0	0	0	1	9	0	0	0	9
7:45 AM	4	5	10	7	26	0	0	0	0	0	1	0	0	0	1
8:00 AM	11	12	8	1	32	0	0	0	0	0	7	0	0	0	7
8:15 AM	14	8	13	3	38	0	0	0	0	0	5	0	0	0	5
8:30 AM	8	10	2	3	23	0	1	0	0	1	6	0	0	0	6
8:45 AM	15	6	3	6	30	0	0	0	0	0	7	0	0	0	7
9:00 AM	9	9	6	3	27	0	0	2	0	2	5	0	0	0	5
9:15 AM	13	11	3	3	30	0	1	1	0	2	7	0	0	0	7
Count Total	91	69	51	29	240	1	2	3	0	6	47	0	0	0	47
Peak Hour	37	35	33	14	119	0	1	0	0	1	19	0	0	0	19

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Oregon Expy				Oregon Expy				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	9	8	0	0	8	0	0	2	3	1	0	1	2	0	34	0
7:45 AM	0	0	4	0	0	0	5	0	0	0	9	1	0	0	5	2	26	0
8:00 AM	0	0	10	1	0	0	10	2	0	0	8	0	0	0	1	0	32	0
8:15 AM	0	0	14	0	0	0	8	0	0	0	13	0	0	1	2	0	38	130
8:30 AM	0	2	5	1	0	0	9	1	0	0	2	0	0	0	1	2	23	119
8:45 AM	0	1	12	2	0	1	5	0	0	0	3	0	0	0	3	3	30	123
9:00 AM	0	0	8	1	0	0	9	0	0	1	4	1	0	0	2	1	27	118
9:15 AM	0	0	12	1	0	0	11	0	0	1	1	1	0	1	2	0	30	110
Count Total	0	3	74	14	0	1	65	3	0	4	43	4	0	3	18	8	240	0
Peak Hour	0	2	33	2	0	0	32	3	0	0	32	1	0	1	9	4	119	0

Two-Hour Count Summaries - Bikes																	
Interval Start	Oregon Expy			Oregon Expy			Alma St			Alma St			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0			
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
8:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	1	1			
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
9:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	2	3			
9:15 AM	0	0	0	1	0	0	0	1	0	0	0	0	2	5			
Count Total	0	0	1	1	0	1	0	3	0	0	0	0	6	0			
Peak Hour	0	0	0	0	0	1	0	0	0	0	0	0	1	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Alma St Oregon Expy

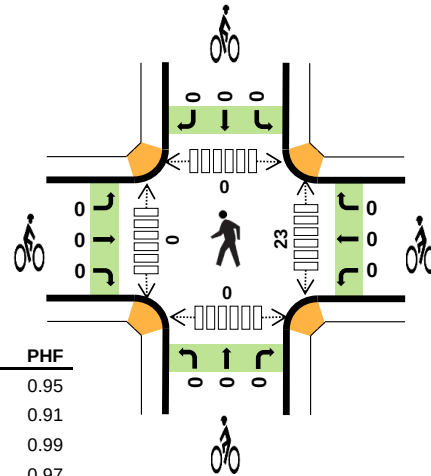
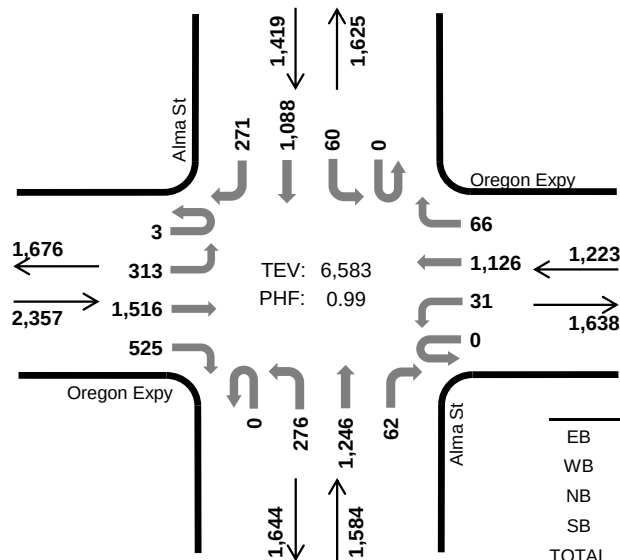


Peak Hour

Date: 12-06-2018

Count Period: 4:30 PM to 6:30 PM

Peak Hour: 5:15 PM to 6:15 PM



	HV %:	PHF
EB	1.0%	0.95
WB	0.6%	0.91
NB	0.1%	0.99
SB	0.5%	0.97
TOTAL	0.6%	0.99

Two-Hour Count Summaries

Interval Start		Oregon Expy				Oregon Expy				Alma St				Alma St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		1	74	412	131	0	6	215	16	0	50	241	19	0	25	315	45	1,550	0
4:45 PM		1	73	389	116	0	8	257	10	0	56	232	14	0	23	313	45	1,537	0
5:00 PM		0	85	285	126	0	6	257	18	0	47	295	16	0	16	326	67	1,544	0
5:15 PM		0	70	340	120	0	5	313	17	0	76	308	15	0	18	276	70	1,628	6,259
5:30 PM		0	81	420	120	0	6	256	23	0	68	317	15	0	14	246	64	1,630	6,339
5:45 PM		2	81	393	139	0	8	262	13	0	66	321	10	0	19	276	70	1,660	6,462
6:00 PM		1	81	363	146	0	12	295	13	0	66	300	22	0	9	290	67	1,665	6,583
6:15 PM		0	90	386	121	0	10	275	14	0	73	277	14	0	9	254	69	1,592	6,547
Count Total		5	635	2,988	1,019	0	61	2,130	124	0	502	2,291	125	0	133	2,296	497	12,806	0
Peak Hour	All	3	313	1,516	525	0	31	1,126	66	0	276	1,246	62	0	60	1,088	271	6,583	0
	HV	0	1	18	5	0	0	7	0	0	1	0	1	0	0	5	2	40	0
	HV%	0%	0%	1%	1%	-	0%	1%	0%	-	0%	0%	2%	-	0%	0%	1%	1%	0

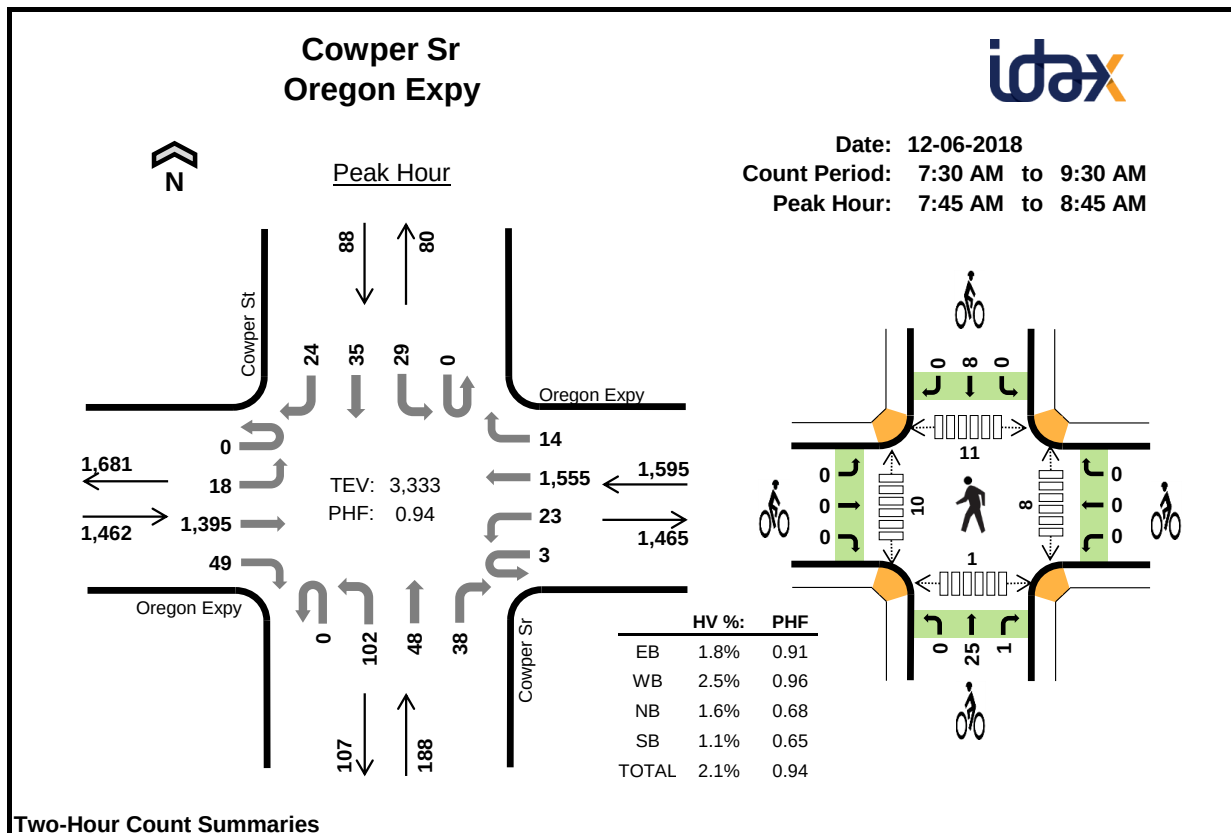
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	8	3	3	2	16	0	0	0	0	0	1	0	0	0	1
4:45 PM	6	3	4	3	16	0	0	0	0	0	5	0	0	0	5
5:00 PM	5	5	1	2	13	0	0	0	0	0	6	0	0	0	6
5:15 PM	5	2	1	2	10	0	0	0	0	0	7	0	0	0	7
5:30 PM	6	0	1	3	10	0	0	0	0	0	6	0	0	0	6
5:45 PM	7	3	0	0	10	0	0	0	0	0	6	0	0	0	6
6:00 PM	6	2	0	2	10	0	0	0	0	0	4	0	0	0	4
6:15 PM	7	2	1	1	11	0	0	0	0	0	8	0	0	0	8
Count Total	50	20	11	15	96	0	0	0	0	0	43	0	0	0	43
Peak Hour	24	7	2	7	40	0	0	0	0	0	23	0	0	0	23

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Oregon Expy				Oregon Expy				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	6	2	0	0	3	0	0	0	3	0	0	0	0	2	16	0
4:45 PM	0	0	5	1	0	0	3	0	0	1	3	0	0	2	1	0	16	0
5:00 PM	0	1	4	0	0	0	5	0	0	0	1	0	0	0	1	1	13	0
5:15 PM	0	1	4	0	0	0	2	0	0	0	0	1	0	0	2	0	10	55
5:30 PM	0	0	3	3	0	0	0	0	0	1	0	0	0	0	1	2	10	49
5:45 PM	0	0	6	1	0	0	3	0	0	0	0	0	0	0	0	0	10	43
6:00 PM	0	0	5	1	0	0	2	0	0	0	0	0	0	0	2	0	10	40
6:15 PM	0	1	6	0	0	0	1	1	0	1	0	0	0	0	0	1	11	41
Count Total	0	3	39	8	0	0	19	1	0	3	7	1	0	2	7	6	96	0
Peak Hour	0	1	18	5	0	0	7	0	0	1	0	1	0	0	5	2	40	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Oregon Expy				Oregon Expy				Alma St				Alma St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	LT	TH	RT		LT	TH	RT		LT	TH	RT		LT	TH	RT			
4:30 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
4:45 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
5:00 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
5:15 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
5:30 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
5:45 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
6:00 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
6:15 PM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
Count Total	0	0	0		0	0	0		0	0	0		0	0	0		0	0
Peak Hour	0	0	0		0	0	0		0	0	0		0	0	0		0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



Two-Hour Count Summaries

Interval Start		Oregon Expy				Oregon Expy				Cowper Sr				Cowper St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		1	0	256	3	0	1	405	1	0	3	2	8	0	2	2	1	685	0
7:45 AM		0	4	318	7	1	5	408	2	0	21	10	9	0	8	8	5	806	0
8:00 AM		0	3	385	14	1	5	371	2	0	42	21	6	0	13	12	9	884	0
8:15 AM		0	5	342	10	0	6	385	3	0	27	11	8	0	4	11	7	819	3,194
8:30 AM		0	6	350	18	1	7	391	7	0	12	6	15	0	4	4	3	824	3,333
8:45 AM		0	7	316	6	0	2	294	1	0	9	8	11	0	3	5	3	665	3,192
9:00 AM		0	4	329	6	0	2	342	3	0	6	7	8	0	4	8	3	722	3,030
9:15 AM		0	3	302	6	2	4	359	2	0	12	4	11	0	3	5	1	714	2,925
Count Total		1	32	2,598	70	5	32	2,955	21	0	132	69	76	0	41	55	32	6,119	0
Peak Hour	All	0	18	1,395	49	3	23	1,555	14	0	102	48	38	0	29	35	24	3,333	0
	HV	0	0	26	0	0	4	36	0	0	2	0	1	0	0	1	0	70	0
	HV%	-	0%	2%	0%	0%	17%	2%	0%	-	2%	0%	3%	-	0%	3%	0%	2%	0

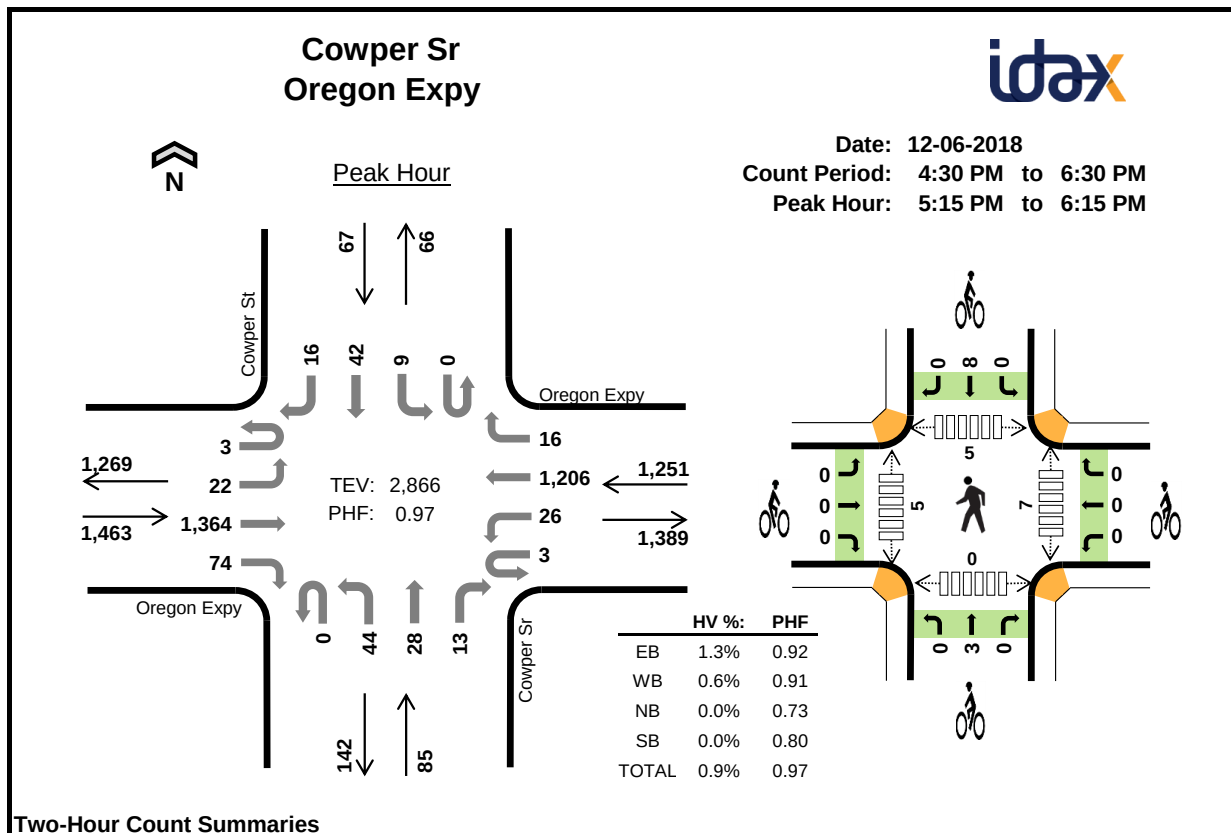
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	9	6	0	0	15	0	2	4	2	8	1	2	1	0	4
7:45 AM	2	10	0	0	12	0	0	3	3	6	1	2	5	0	8
8:00 AM	7	13	0	1	21	0	0	11	1	12	4	5	3	1	13
8:15 AM	13	10	1	0	24	0	0	4	2	6	3	2	3	0	8
8:30 AM	4	7	2	0	13	0	0	8	2	10	0	1	0	0	1
8:45 AM	11	11	0	0	22	0	0	3	2	5	0	0	1	0	1
9:00 AM	9	8	1	0	18	0	0	4	3	7	0	1	1	0	2
9:15 AM	16	15	1	0	32	0	0	2	0	2	1	0	0	0	1
Count Total	71	80	5	1	157	0	2	39	15	56	10	13	14	1	38
Peak Hour	26	40	3	1	70	0	0	26	8	34	8	10	11	1	30

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Oregon Expy				Oregon Expy				Cowper Sr				Cowper St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	0	9	0	0	0	6	0	0	0	0	0	0	0	0	0	15	0
7:45 AM	0	0	2	0	0	2	8	0	0	0	0	0	0	0	0	0	12	0
8:00 AM	0	0	7	0	0	0	13	0	0	0	0	0	0	0	0	1	21	0
8:15 AM	0	0	13	0	0	2	8	0	0	1	0	0	0	0	0	0	24	72
8:30 AM	0	0	4	0	0	0	7	0	0	1	0	1	0	0	0	0	13	70
8:45 AM	0	0	11	0	0	0	11	0	0	0	0	0	0	0	0	0	22	80
9:00 AM	0	1	8	0	0	0	8	0	0	0	1	0	0	0	0	0	18	77
9:15 AM	0	0	15	1	0	0	14	1	0	0	0	1	0	0	0	0	32	85
Count Total	0	1	69	1	0	4	75	1	0	2	1	2	0	0	1	0	157	0
Peak Hour	0	0	26	0	0	4	36	0	0	2	0	1	0	0	1	0	70	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Oregon Expy			Oregon Expy			Cowper Sr			Cowper St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:30 AM	0	0	0	0	2	0	0	4	0	0	2	0	8	0				
7:45 AM	0	0	0	0	0	0	0	3	0	0	3	0	6	0				
8:00 AM	0	0	0	0	0	0	0	10	1	0	1	0	12	0				
8:15 AM	0	0	0	0	0	0	0	4	0	0	2	0	6	32				
8:30 AM	0	0	0	0	0	0	0	8	0	0	2	0	10	34				
8:45 AM	0	0	0	0	0	0	0	3	0	0	2	0	5	33				
9:00 AM	0	0	0	0	0	0	0	4	0	0	3	0	7	28				
9:15 AM	0	0	0	0	0	0	0	2	0	0	0	0	2	24				
Count Total	0	0	0	0	2	0	0	38	1	0	15	0	56	0				
Peak Hour	0	0	0	0	0	0	0	25	1	0	8	0	34	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		Oregon Expy				Oregon Expy				Cowper Sr				Cowper St				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	11	366	20	0	5	219	1	0	3	8	5	0	2	12	4	656	0
4:45 PM		0	7	336	10	2	3	248	2	0	5	4	11	0	6	14	5	653	0
5:00 PM		2	3	241	3	1	6	270	3	0	12	6	11	0	5	13	3	579	0
5:15 PM		2	4	336	11	1	9	308	4	0	18	10	1	0	5	13	3	725	2,613
5:30 PM		1	7	375	14	0	5	259	2	0	10	9	4	0	2	9	5	702	2,659
5:45 PM		0	4	315	32	1	4	309	5	0	10	5	5	0	1	8	0	699	2,705
6:00 PM		0	7	338	17	1	8	330	5	0	6	4	3	0	1	12	8	740	2,866
6:15 PM		1	4	334	23	2	3	284	5	0	4	4	4	0	2	9	3	682	2,823
Count Total		6	47	2,641	130	8	43	2,227	27	0	68	50	44	0	24	90	31	5,436	0
Peak Hour	All	3	22	1,364	74	3	26	1,206	16	0	44	28	13	0	9	42	16	2,866	0
	HV	0	1	18	0	0	1	6	0	0	0	0	0	0	0	0	0	26	0
	HV%	0%	5%	1%	0%	0%	4%	0%	0%	-	0%	0%	0%	-	0%	0%	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

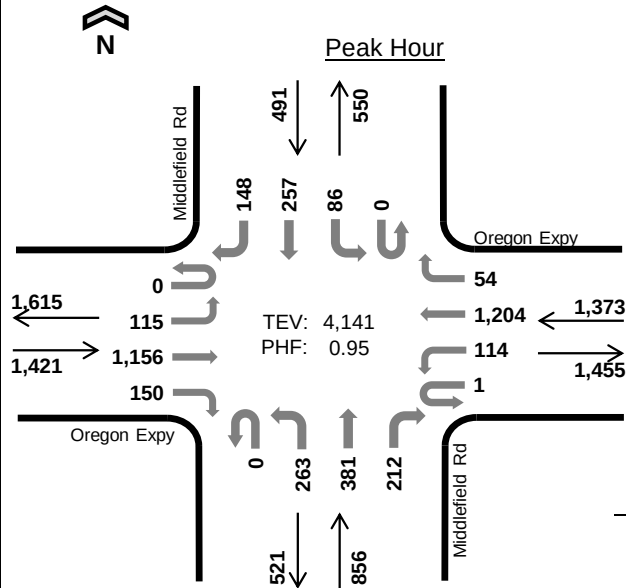
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	6	1	0	1	8	0	0	3	1	4	3	1	2	0	6
4:45 PM	5	2	0	0	7	0	0	3	3	6	2	6	3	0	11
5:00 PM	3	5	0	0	8	0	0	1	3	4	0	3	2	0	5
5:15 PM	4	2	0	0	6	0	0	0	3	3	4	2	1	0	7
5:30 PM	4	2	0	0	6	0	0	2	0	2	3	3	3	0	9
5:45 PM	5	2	0	0	7	0	0	0	3	3	0	0	1	0	1
6:00 PM	6	1	0	0	7	0	0	1	2	3	0	0	0	0	0
6:15 PM	6	1	1	0	8	1	1	1	3	6	0	3	1	2	6
Count Total	39	16	1	1	57	1	1	11	18	31	12	18	13	2	45
Peak Hour	19	7	0	0	26	0	0	3	8	11	7	5	5	0	17

Two-Hour Count Summaries - Heavy Vehicles																			
Interval Start	Oregon Expy				Oregon Expy				Cowper Sr				Cowper St				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:30 PM	0	0	5	1	0	0	1	0	0	0	0	0	0	0	0	0	1	8	0
4:45 PM	0	0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	7	0
5:00 PM	0	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0	0	8	0
5:15 PM	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	6	29
5:30 PM	0	1	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	6	27
5:45 PM	0	0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	7	27
6:00 PM	0	0	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	7	26
6:15 PM	0	0	6	0	0	0	1	0	0	0	0	0	1	0	0	0	0	8	28
Count Total	0	1	37	1	0	1	15	0	0	0	0	1	0	0	0	1	0	57	0
Peak Hour	0	1	18	0	0	1	6	0	0	0	0	0	0	0	0	0	0	26	0

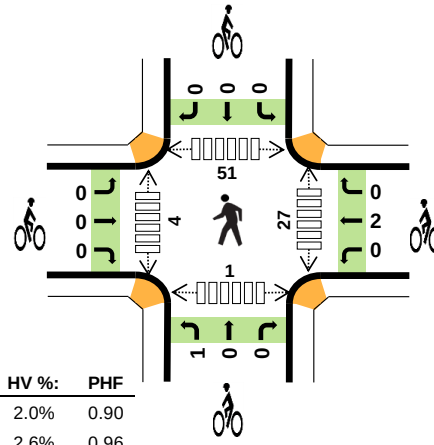
Two-Hour Count Summaries - Bikes																		
Interval Start	Oregon Expy			Oregon Expy			Cowper Sr			Cowper St			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	3	0	0	1	0	4	0				
4:45 PM	0	0	0	0	0	0	0	3	0	0	3	0	6	0				
5:00 PM	0	0	0	0	0	0	0	1	0	0	3	0	4	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	3	17				
5:30 PM	0	0	0	0	0	0	0	2	0	0	0	0	2	15				
5:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	3	12				
6:00 PM	0	0	0	0	0	0	0	1	0	0	2	0	3	11				
6:15 PM	0	1	0	0	1	0	0	1	0	0	3	0	6	14				
Count Total	0	1	0	0	1	0	0	11	0	0	18	0	31	0				
Peak Hour	0	0	0	0	0	0	0	3	0	0	8	0	11	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Middlefield Rd Oregon Expy



Date: 12-06-2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 7:45 AM to 8:45 AM



	HV %:	PHF
EB	2.0%	0.90
WB	2.6%	0.96
NB	2.0%	0.89
SB	1.4%	0.88
TOTAL	2.1%	0.95

Two-Hour Count Summaries

Interval Start		Oregon Expy				Oregon Expy				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM		0	36	202	24	0	24	313	11	0	44	60	38	0	8	28	29	817	0
7:45 AM		0	43	229	30	0	28	308	23	0	64	79	33	0	16	45	41	939	0
8:00 AM		0	34	308	52	0	22	296	16	0	66	77	64	0	27	64	37	1,063	0
8:15 AM		0	14	314	37	0	34	303	10	0	69	119	45	0	22	72	46	1,085	3,904
8:30 AM		0	24	305	31	1	30	297	5	0	64	106	70	0	21	76	24	1,054	4,141
8:45 AM		0	22	320	17	0	19	225	3	0	44	90	49	0	16	84	36	925	4,127
9:00 AM		0	32	274	23	0	11	270	1	0	44	62	36	0	11	68	29	861	3,925
9:15 AM		0	13	277	31	0	22	306	9	0	33	54	58	0	11	61	35	910	3,750
Count Total		0	218	2,229	245	1	190	2,318	78	0	428	647	393	0	132	498	277	7,654	0
Peak Hour	All	0	115	1,156	150	1	114	1,204	54	0	263	381	212	0	86	257	148	4,141	0
	HV	0	2	23	3	0	1	33	2	0	4	8	5	0	0	6	1	88	0
	HV%	-	2%	2%	2%	0%	1%	3%	4%	-	2%	2%	2%	-	0%	2%	1%	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

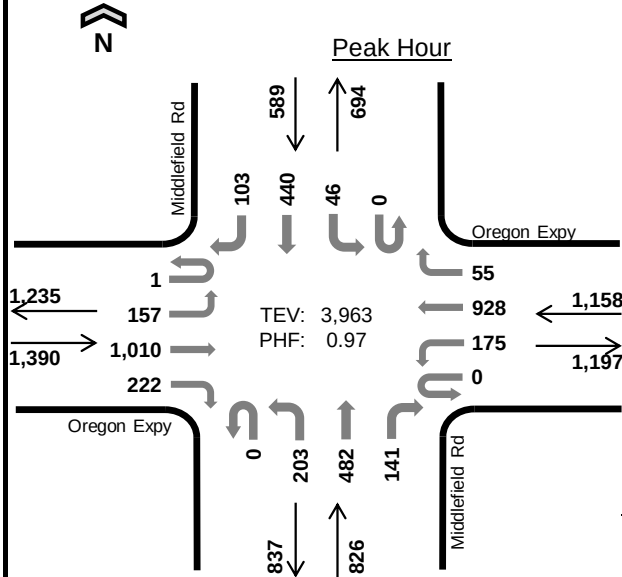
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	9	5	2	0	16	0	2	2	0	4	0	2	6	0	8
7:45 AM	2	9	2	2	15	0	0	0	0	0	16	3	10	0	29
8:00 AM	9	11	6	2	28	0	1	0	0	1	7	0	29	1	37
8:15 AM	11	8	5	2	26	0	1	1	0	2	2	1	9	0	12
8:30 AM	6	8	4	1	19	0	0	0	0	0	2	0	3	0	5
8:45 AM	12	9	7	2	30	0	1	0	0	1	5	1	6	1	13
9:00 AM	8	7	1	2	18	0	0	1	1	2	1	3	4	0	8
9:15 AM	16	14	5	2	37	0	1	0	0	1	2	0	3	0	5
Count Total	73	71	32	13	189	0	6	4	1	11	35	10	70	2	117
Peak Hour	28	36	17	7	88	0	2	1	0	3	27	4	51	1	83

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Oregon Expy				Oregon Expy				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	1	8	0	0	0	5	0	0	0	0	2	0	0	0	0	16	0
7:45 AM	0	1	1	0	0	0	9	0	0	0	1	1	0	0	1	1	15	0
8:00 AM	0	1	7	1	0	0	10	1	0	2	3	1	0	0	2	0	28	0
8:15 AM	0	0	11	0	0	1	7	0	0	2	1	2	0	0	2	0	26	85
8:30 AM	0	0	4	2	0	0	7	1	0	0	3	1	0	0	1	0	19	88
8:45 AM	0	0	12	0	0	0	9	0	0	0	5	2	0	0	2	0	30	103
9:00 AM	0	0	7	1	0	0	7	0	0	0	1	0	0	0	2	0	18	93
9:15 AM	0	0	15	1	0	0	14	0	0	2	1	2	0	1	1	0	37	104
Count Total	0	3	65	5	0	1	68	2	0	6	15	11	0	1	11	1	189	0
Peak Hour	0	2	23	3	0	1	33	2	0	4	8	5	0	0	6	1	88	0

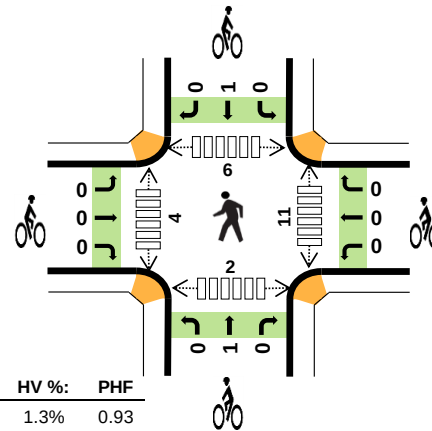
Two-Hour Count Summaries - Bikes																	
Interval Start	Oregon Expy			Oregon Expy			Middlefield Rd			Middlefield Rd			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:30 AM	0	0	0	0	2	0	0	2	0	0	0	0	4	0			
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	0			
8:15 AM	0	0	0	0	1	0	1	0	0	0	0	0	2	7			
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3			
8:45 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	4			
9:00 AM	0	0	0	0	0	0	0	1	0	0	1	0	2	5			
9:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	4			
Count Total	0	0	0	0	6	0	1	3	0	0	1	0	11	0			
Peak Hour	0	0	0	0	2	0	1	0	0	0	0	0	3	0			

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Middlefield Rd Oregon Expy



Date: 12-06-2018
Count Period: 4:30 PM to 6:30 PM
Peak Hour: 5:15 PM to 6:15 PM



	HV %:	PHF
EB	1.3%	0.93
WB	0.5%	0.87
NB	0.7%	0.92
SB	0.7%	0.93
TOTAL	0.9%	0.97

Two-Hour Count Summaries

Interval Start		Oregon Expy				Oregon Expy				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM		0	33	320	51	0	20	162	10	0	35	87	32	0	21	97	25	893	0
4:45 PM		0	25	274	43	0	37	203	11	0	35	90	40	0	11	104	22	895	0
5:00 PM		0	21	201	37	0	38	196	10	0	55	122	43	0	20	122	26	891	0
5:15 PM		0	21	241	59	0	42	232	6	0	58	125	41	0	10	123	25	983	3,662
5:30 PM		0	44	276	53	0	52	179	11	0	51	126	35	0	11	102	28	968	3,737
5:45 PM		0	43	253	56	0	47	266	21	0	44	113	37	0	9	110	18	1,017	3,859
6:00 PM		1	49	240	54	0	34	251	17	0	50	118	28	0	16	105	32	995	3,963
6:15 PM		0	41	214	76	0	39	211	7	0	46	97	33	0	9	107	36	916	3,896
Count Total		1	277	2,019	429	0	309	1,700	93	0	374	878	289	0	107	870	212	7,558	0
Peak Hour	All	1	157	1,010	222	0	175	928	55	0	203	482	141	0	46	440	103	3,963	0
	HV	0	1	16	1	0	1	5	0	0	0	3	3	0	0	3	1	34	0
	HV%	0%	1%	2%	0%	-	1%	1%	0%	-	0%	1%	2%	-	0%	1%	1%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:30 PM	4	0	6	3	13	0	0	0	1	1	3	5	4	0	12
4:45 PM	5	3	1	1	10	0	0	0	0	0	2	3	2	0	7
5:00 PM	3	5	4	1	13	0	0	0	0	0	8	2	6	1	17
5:15 PM	4	1	2	1	8	0	0	0	0	0	4	0	1	0	5
5:30 PM	2	1	1	2	6	0	0	1	0	1	3	2	3	0	8
5:45 PM	6	3	2	1	12	0	0	0	0	0	3	0	2	2	7
6:00 PM	6	1	1	0	8	0	0	0	1	1	1	2	0	0	3
6:15 PM	7	1	0	1	9	0	0	0	3	3	6	0	4	1	11
Count Total	37	15	17	10	79	0	0	1	5	6	30	14	22	4	70
Peak Hour	18	6	6	4	34	0	0	1	1	2	11	4	6	2	23

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	Oregon Expy				Oregon Expy				Middlefield Rd				Middlefield Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:30 PM	0	0	4	0	0	0	0	0	0	2	3	1	0	0	2	1	13	0
4:45 PM	0	0	5	0	0	1	2	0	0	0	0	1	0	0	1	0	10	0
5:00 PM	0	1	2	0	0	0	5	0	0	0	2	2	0	0	1	0	13	0
5:15 PM	0	0	4	0	0	0	1	0	0	0	1	1	0	0	1	0	8	44
5:30 PM	0	1	1	0	0	0	1	0	0	0	1	0	0	0	1	1	6	37
5:45 PM	0	0	5	1	0	1	2	0	0	0	0	2	0	0	1	0	12	39
6:00 PM	0	0	6	0	0	0	1	0	0	0	1	0	0	0	0	0	8	34
6:15 PM	0	1	6	0	0	0	1	0	0	0	0	0	0	0	1	0	9	35
Count Total	0	3	33	1	0	2	13	0	0	2	8	7	0	0	8	2	79	0
Peak Hour	0	1	16	1	0	1	5	0	0	0	3	3	0	0	3	1	34	0

Two-Hour Count Summaries - Bikes																		
Interval Start	Oregon Expy			Oregon Expy			Middlefield Rd			Middlefield Rd			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	0				
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	1				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
6:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	2				
6:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	3	5				
Count Total	0	0	0	0	0	0	0	1	0	0	5	0	6	0				
Peak Hour	0	0	0	0	0	0	0	1	0	0	1	0	2	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Location: Alma St B/W Forest Ave & Homer Ave
Date Range: 12/11/2018 - 12/17/2018
Site Code: 03

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	12/11/2018			12/12/2018			12/13/2018			12/14/2018			12/15/2018			12/16/2018			12/17/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	42	34	76	53	28	81	83	29	112	86	51	137	138	93	231	140	84	224	42	26	68	59	30	90
1:00 AM	28	20	48	29	15	44	38	15	53	45	25	70	96	62	158	84	40	124	17	15	32	32	17	48
2:00 AM	13	14	27	20	7	27	16	13	29	20	18	38	52	32	84	38	19	57	12	8	20	16	11	28
3:00 AM	12	15	27	6	20	26	12	24	36	11	17	28	19	15	34	15	14	29	10	15	25	10	20	30
4:00 AM	26	42	68	23	43	66	24	36	60	18	34	52	16	31	47	9	16	25	22	42	64	24	40	65
5:00 AM	60	164	224	64	141	205	47	154	201	58	159	217	21	58	79	17	42	59	47	165	212	57	153	210
6:00 AM	171	385	556	125	380	505	129	365	494	134	350	484	35	137	172	40	91	131	111	341	452	142	377	518
7:00 AM	404	829	1,233	401	796	1,197	409	867	1,276	322	759	1,081	107	250	357	68	165	233	378	800	1,178	405	831	1,235
8:00 AM	513	1,101	1,614	555	1,091	1,646	491	1,034	1,525	501	1,049	1,550	213	380	593	143	284	427	440	1,087	1,527	520	1,075	1,595
9:00 AM	456	1,076	1,532	502	1,001	1,503	424	958	1,382	413	1,018	1,431	263	538	801	256	486	742	459	915	1,374	461	1,012	1,472
10:00 AM	443	883	1,326	420	890	1,310	446	937	1,383	435	936	1,371	379	683	1,062	310	516	826	409	862	1,271	436	903	1,340
11:00 AM	481	833	1,314	431	869	1,300	486	923	1,409	503	873	1,376	449	790	1,239	394	711	1,105	492	781	1,273	466	875	1,341
12:00 PM	452	742	1,194	510	768	1,278	494	862	1,356	538	863	1,401	479	805	1,284	429	703	1,132	515	787	1,302	485	791	1,276
1:00 PM	535	689	1,224	522	733	1,255	591	785	1,376	632	793	1,425	577	817	1,394	441	726	1,167	565	797	1,362	549	736	1,285
2:00 PM	602	811	1,413	690	758	1,448	652	761	1,413	700	834	1,534	550	858	1,408	506	725	1,231	642	703	1,345	648	777	1,425
3:00 PM	758	827	1,585	763	908	1,671	811	929	1,740	793	950	1,743	619	777	1,396	521	632	1,153	807	855	1,662	777	888	1,665
4:00 PM	897	947	1,844	948	881	1,829	930	972	1,902	829	951	1,780	550	710	1,260	493	643	1,136	891	861	1,752	925	933	1,858
5:00 PM	828	1,018	1,846	896	997	1,893	776	1,096	1,872	773	1,049	1,822	570	699	1,269	485	597	1,082	889	1,011	1,900	833	1,037	1,870
6:00 PM	837	1,072	1,909	776	1,034	1,810	802	1,045	1,847	734	956	1,690	504	642	1,146	434	540	974	823	818	1,641	805	1,050	1,855
7:00 PM	741	701	1,442	638	685	1,323	861	606	1,467	596	683	1,279	451	540	991	353	382	735	624	546	1,170	747	664	1,411
8:00 PM	574	380	954	544	397	941	661	444	1,105	502	442	944	364	364	728	318	257	575	442	339	781	593	407	1,000
9:00 PM	436	321	757	423	310	733	479	298	777	454	339	793	459	280	739	327	205	532	362	276	638	446	310	756
10:00 PM	351	163	514	316	149	465	281	184	465	375	226	601	355	231	586	181	107	288	257	144	401	316	165	481
11:00 PM	155	76	231	156	95	251	205	94	299	285	159	444	219	153	372	102	59	161	128	72	200	172	88	260
Total	9,815	13,143	22,958	9,811	12,996	22,807	10,148	13,431	23,579	9,757	13,534	23,291	7,485	9,945	17,430	6,104	8,044	14,148	9,384	12,266	21,650	9,925	13,190	23,115
Percent	43%	57%	-	43%	57%	-	43%	57%	-	42%	58%	-	43%	57%	-	43%	57%	-	43%	57%	-	43%	57%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	11:00	08:00	08:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	08:00	08:00	08:00	08:00	08:00
Vol.	513	1,101	1,614	555	1,091	1,646	491	1,034	1,525	503	1,049	1,550	449	790	1,239	394	711	1,105	492	1,087	1,527	520	1,075	1,595
PM Peak	16:00	18:00	18:00	16:00	18:00	17:00	16:00	17:00	16:00	16:00	17:00	17:00	15:00	14:00	14:00	15:00	13:00	14:00	16:00	17:00	17:00	16:00	18:00	17:00
Vol.	897	1,072	1,909	948	1,034	1,893	930	1,096	1,902	829	1,049	1,822	619	858	1,408	521	726	1,231	891	1,011	1,900	925	1,050	1,870

1. Mid-week average includes data between Tuesday and Thursday.

Location: Emerson St, B/W Channing Ave & Addison Ave
Date Range: 11/28/2018 - 12/4/2018
Site Code: 04

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	1	0	1	3	2	5	1	3	4	2	10	12	1	1	2	0	0	0	0	2	2	1	1	3
1:00 AM	0	3	3	2	1	3	1	3	4	0	2	2	0	0	0	0	1	1	0	0	0	1	1	2
2:00 AM	1	0	1	1	0	1	1	0	1	0	2	2	1	0	1	0	0	0	1	1	2	1	0	1
3:00 AM	3	0	3	0	0	0	0	0	0	3	0	3	2	1	3	0	0	0	1	0	1	1	0	1
4:00 AM	3	1	4	3	0	3	1	2	3	2	2	4	0	4	4	2	0	2	2	1	3	3	1	3
5:00 AM	7	5	12	4	1	5	8	2	10	1	1	2	3	0	3	10	3	13	11	1	12	7	2	10
6:00 AM	15	7	22	19	3	22	13	4	17	8	3	11	3	1	4	14	5	19	15	3	18	16	4	21
7:00 AM	32	11	43	31	19	50	40	13	53	7	3	10	2	8	10	36	18	54	36	11	47	33	14	47
8:00 AM	46	33	79	60	54	114	42	42	84	18	13	31	18	13	31	61	48	109	51	43	94	52	43	96
9:00 AM	43	33	76	54	34	88	42	37	79	30	26	56	22	19	41	50	34	84	47	37	84	48	35	83
10:00 AM	45	44	89	44	41	85	38	34	72	35	47	82	18	24	42	44	53	97	50	47	97	46	44	90
11:00 AM	38	52	90	54	52	106	51	42	93	47	56	103	22	19	41	49	49	98	55	58	113	49	54	103
12:00 PM	51	64	115	51	65	116	38	64	102	52	53	105	25	36	61	45	51	96	49	54	103	50	61	111
1:00 PM	48	59	107	40	57	97	34	49	83	41	50	91	25	45	70	41	44	85	49	51	100	46	56	101
2:00 PM	39	50	89	41	71	112	39	62	101	53	49	102	28	48	76	31	53	84	43	65	108	41	62	103
3:00 PM	58	62	120	46	67	113	46	72	118	39	50	89	28	51	79	42	63	105	40	62	102	48	64	112
4:00 PM	40	63	103	49	58	107	41	49	90	31	43	74	37	41	78	31	59	90	50	54	104	46	58	105
5:00 PM	41	40	81	43	65	108	40	48	88	41	41	82	33	34	67	33	49	82	54	57	111	46	54	100
6:00 PM	53	57	110	50	54	104	57	47	104	37	40	77	23	19	42	34	43	77	56	54	110	53	55	108
7:00 PM	27	22	49	23	34	57	31	31	62	15	17	32	19	16	35	24	24	48	24	31	55	25	29	54
8:00 PM	11	24	35	7	24	31	20	33	53	15	16	31	6	24	30	19	20	39	16	17	33	11	22	33
9:00 PM	19	15	34	10	21	31	18	23	41	12	11	23	9	10	19	8	10	18	16	21	37	15	19	34
10:00 PM	5	15	20	6	10	16	4	20	24	4	14	18	1	10	11	6	15	21	8	16	24	6	14	20
11:00 PM	1	4	5	2	2	4	4	11	15	6	16	22	1	3	4	2	0	2	4	6	10	2	4	6
Total	627	664	1,291	643	735	1,378	610	691	1,301	499	565	1,064	327	427	754	582	642	1,224	678	692	1,370	649	697	1,346
Percent	49%	51%	-	47%	53%	-	47%	53%	-	47%	53%	-	43%	57%	-	48%	52%	-	49%	51%	-	48%	52%	-
AM Peak	08:00	11:00	11:00	08:00	08:00	08:00	11:00	08:00	11:00	11:00	11:00	11:00	09:00	10:00	10:00	08:00	10:00	08:00	11:00	11:00	11:00	08:00	11:00	11:00
Vol.	46	52	90	60	54	114	51	42	93	47	56	103	22	24	42	61	53	109	55	58	113	52	54	103
PM Peak	15:00	12:00	15:00	12:00	14:00	12:00	18:00	15:00	15:00	14:00	12:00	12:00	16:00	15:00	15:00	12:00	15:00	15:00	18:00	14:00	17:00	18:00	15:00	15:00
Vol.	58	64	120	51	71	116	57	72	118	53	53	105	37	51	79	45	63	105	56	65	111	53	64	112

1. Mid-week average includes data between Tuesday and Thursday.

Location: Alma St, B/W Addison Ave & Lincoln Ave
 Date Range: 11/28/2018 - 12/4/2018
 Site Code: 05

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	30	53	83	39	72	111	54	93	147	98	165	263	89	121	210	30	40	70	23	60	83	31	62	92
1:00 AM	22	30	52	16	37	53	38	58	96	54	76	130	74	88	162	16	28	44	15	40	55	18	36	53
2:00 AM	11	10	21	12	16	28	15	13	28	31	57	88	30	66	96	17	12	29	10	32	42	11	19	30
3:00 AM	15	10	25	24	14	38	26	12	38	18	24	42	11	20	31	18	8	26	18	18	36	19	14	33
4:00 AM	61	25	86	54	23	77	72	19	91	32	19	51	25	9	34	63	17	80	72	32	104	62	27	89
5:00 AM	143	68	211	152	80	232	149	61	210	67	23	90	62	31	93	188	67	255	159	60	219	151	69	221
6:00 AM	389	151	540	385	157	542	429	165	594	131	57	188	133	39	172	467	162	629	403	175	578	392	161	553
7:00 AM	960	443	1,403	974	521	1,495	1,024	457	1,481	243	124	367	234	106	340	1,067	475	1,542	1,016	530	1,546	983	498	1,481
8:00 AM	1,394	722	2,116	1,329	706	2,035	1,390	632	2,022	514	268	782	401	216	617	1,410	636	2,046	1,447	667	2,114	1,390	698	2,088
9:00 AM	1,201	599	1,800	1,231	600	1,831	1,161	610	1,771	705	419	1,124	565	379	944	1,178	621	1,799	1,255	604	1,859	1,229	601	1,830
10:00 AM	1,013	571	1,584	979	572	1,551	992	501	1,493	772	530	1,302	680	411	1,091	1,071	540	1,611	993	544	1,537	995	562	1,557
11:00 AM	792	619	1,411	843	638	1,481	894	648	1,542	850	533	1,383	791	550	1,341	827	594	1,421	830	635	1,465	822	631	1,452
12:00 PM	748	604	1,352	859	608	1,467	811	712	1,523	838	673	1,511	829	547	1,376	750	650	1,400	806	649	1,455	804	620	1,425
1:00 PM	771	640	1,411	797	633	1,430	815	733	1,548	836	697	1,533	795	622	1,417	685	648	1,333	770	670	1,440	779	648	1,427
2:00 PM	603	696	1,299	807	747	1,554	863	774	1,637	855	696	1,551	752	688	1,440	717	725	1,442	801	727	1,528	737	723	1,460
3:00 PM	844	933	1,777	976	938	1,914	1,006	950	1,956	793	761	1,554	766	690	1,456	902	878	1,780	1,013	917	1,930	944	929	1,874
4:00 PM	1,052	1,107	2,159	1,037	1,000	2,037	1,219	1,151	2,370	823	732	1,555	744	704	1,448	949	1,057	2,006	1,232	1,106	2,338	1,107	1,071	2,178
5:00 PM	1,150	1,220	2,370	1,297	1,150	2,447	1,347	1,238	2,585	708	704	1,412	708	705	1,413	1,195	1,263	2,458	1,391	1,230	2,621	1,279	1,200	2,479
6:00 PM	1,104	1,007	2,111	1,225	1,042	2,267	1,143	1,027	2,170	769	617	1,386	553	630	1,183	1,148	1,052	2,200	1,336	1,116	2,452	1,222	1,055	2,277
7:00 PM	636	723	1,359	711	789	1,500	858	796	1,654	558	525	1,083	399	515	914	653	702	1,355	794	874	1,668	714	795	1,509
8:00 PM	375	615	990	429	611	1,040	554	578	1,132	399	425	824	295	382	677	391	545	936	403	616	1,019	402	614	1,016
9:00 PM	294	492	786	287	540	827	424	532	956	295	445	740	218	342	560	254	416	670	334	529	863	305	520	825
10:00 PM	169	317	486	185	363	548	279	461	740	269	387	656	103	191	294	132	259	391	200	339	539	185	340	524
11:00 PM	84	138	222	86	192	278	151	284	435	155	238	393	60	114	174	62	150	212	79	178	257	83	169	252
Total	13,861	11,793	25,654	14,734	12,049	26,783	15,714	12,505	28,219	10,813	9,195	20,008	9,317	8,166	17,483	14,190	11,545	25,735	15,400	12,348	27,748	14,665	12,063	26,728
Percent	54%	46%	-	55%	45%	-	56%	44%	-	54%	46%	-	53%	47%	-	55%	45%	-	55%	45%	-	55%	45%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	08:00	11:00	08:00	11:00	11:00	11:00	11:00	11:00	11:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00
Vol.	1,394	722	2,116	1,329	706	2,035	1,390	648	2,022	850	533	1,383	791	550	1,341	1,410	636	2,046	1,447	667	2,114	1,390	698	2,088
PM Peak	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	14:00	15:00	16:00	12:00	17:00	15:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00
Vol.	1,150	1,220	2,370	1,297	1,150	2,447	1,347	1,238	2,585	855	761	1,555	829	705	1,456	1,195	1,263	2,458	1,391	1,230	2,621	1,279	1,200	2,479

1. Mid-week average includes data between Tuesday and Thursday.

Location: Bryant St Between Addison Ave & Lincoln Ave
Date Range: 12/11/2018 - 12/17/2018
Site Code: 06

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	12/11/2018			12/12/2018			12/13/2018			12/14/2018			12/15/2018			12/16/2018			12/17/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	3	1	4	3	4	7	5	6	11	6	5	11	4	13	17	6	9	15	3	5	8	4	4	7
1:00 AM	1	1	2	0	2	2	0	1	1	0	4	4	2	7	9	3	4	7	2	1	3	0	1	2
2:00 AM	1	1	2	0	1	1	0	3	3	1	1	2	3	1	4	2	4	6	0	4	4	0	2	2
3:00 AM	0	3	3	0	2	2	1	2	3	0	2	2	0	2	2	1	2	3	1	2	3	0	2	3
4:00 AM	0	8	8	1	6	7	0	6	6	1	9	10	0	5	5	0	4	4	0	4	4	0	7	7
5:00 AM	2	19	21	2	16	18	3	20	23	4	17	21	3	3	6	2	4	6	2	19	21	2	18	21
6:00 AM	6	52	58	5	45	50	2	41	43	5	41	46	2	11	13	3	14	17	6	40	46	4	46	50
7:00 AM	21	51	72	20	67	87	23	56	79	15	49	64	4	27	31	3	18	21	9	57	66	21	58	79
8:00 AM	24	89	113	39	83	122	27	96	123	33	82	115	18	30	48	7	17	24	35	104	139	30	89	119
9:00 AM	30	108	138	32	118	150	34	110	144	32	105	137	26	69	95	17	38	55	28	113	141	32	112	144
10:00 AM	38	123	161	29	139	168	28	102	130	32	132	164	45	101	146	21	69	90	32	118	150	32	121	153
11:00 AM	44	107	151	38	105	143	39	90	129	51	120	171	46	121	167	30	92	122	48	106	154	40	101	141
12:00 PM	45	78	123	40	109	149	46	101	147	59	105	164	57	108	165	30	91	121	36	91	127	44	96	140
1:00 PM	47	85	132	43	74	117	48	75	123	54	113	167	47	111	158	33	96	129	45	82	127	46	78	124
2:00 PM	42	105	147	57	85	142	59	92	151	55	69	124	46	109	155	55	75	130	65	87	152	53	94	147
3:00 PM	44	93	137	48	103	151	33	85	118	49	87	136	58	88	146	46	68	114	55	90	145	42	94	135
4:00 PM	56	81	137	49	92	141	50	82	132	52	108	160	56	90	146	33	78	111	52	80	132	52	85	137
5:00 PM	47	124	171	63	121	184	49	155	204	59	136	195	39	115	154	26	69	95	61	103	164	53	133	186
6:00 PM	69	144	213	61	118	179	52	150	202	62	106	168	35	110	145	26	64	90	49	115	164	61	137	198
7:00 PM	62	85	147	48	87	135	48	90	138	26	98	124	37	81	118	29	49	78	33	65	98	53	87	140
8:00 PM	36	58	94	53	55	108	42	51	93	30	57	87	25	52	77	19	29	48	31	53	84	44	55	98
9:00 PM	36	36	72	30	27	57	43	47	90	30	45	75	28	40	68	15	15	30	33	30	63	36	37	73
10:00 PM	13	28	41	29	23	52	16	24	40	25	36	61	21	35	56	6	7	13	14	20	34	19	25	44
11:00 PM	3	7	10	1	11	12	12	10	22	18	12	30	13	12	25	4	8	12	6	8	14	5	9	15
Total	670	1,487	2,157	691	1,493	2,184	660	1,495	2,155	699	1,539	2,238	615	1,341	1,956	417	924	1,341	646	1,397	2,043	674	1,492	2,165
Percent	31%	69%	-	32%	68%	-	31%	69%	-	31%	69%	-	31%	69%	-	31%	69%	-	32%	68%	-	31%	69%	-
AM Peak	11:00	10:00	10:00	08:00	10:00	10:00	11:00	09:00	09:00	11:00	10:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	10:00	11:00	11:00	10:00	10:00
Vol.	44	123	161	39	139	168	39	110	144	51	132	171	46	121	167	30	92	122	48	118	154	40	121	153
PM Peak	18:00	18:00	18:00	17:00	17:00	17:00	14:00	17:00	17:00	18:00	17:00	17:00	15:00	17:00	12:00	14:00	13:00	14:00	14:00	18:00	17:00	18:00	18:00	18:00
Vol.	69	144	213	63	121	184	59	155	204	62	136	195	58	115	165	55	96	130	65	115	164	61	137	198

1. Mid-week average includes data between Tuesday and Thursday.

Location: Waverley St, B/W Kingsley Ave & Whitman Ct
 Date Range: 11/28/2018 - 12/4/2018
 Site Code: 07

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	5	12	17	3	11	14	1	7	8	2	12	14	8	16	24	3	10	13	1	12	13	3	12	15
1:00 AM	3	8	11	2	6	8	2	8	10	4	11	15	4	11	15	0	3	3	0	10	10	2	8	10
2:00 AM	2	1	3	1	1	2	1	1	2	5	6	11	2	6	8	0	1	1	0	0	0	1	1	2
3:00 AM	1	0	1	2	3	5	1	2	3	4	8	12	0	7	7	1	0	1	1	2	3	1	2	3
4:00 AM	5	8	13	3	4	7	5	2	7	0	4	4	1	3	4	4	8	12	3	4	7	4	5	9
5:00 AM	10	11	21	7	11	18	11	17	28	5	4	9	4	4	8	14	9	23	6	12	18	8	11	19
6:00 AM	24	25	49	31	33	64	24	33	57	8	14	22	7	5	12	33	26	59	24	37	61	26	32	58
7:00 AM	60	124	184	63	165	228	74	136	210	19	33	52	26	16	42	72	139	211	73	147	220	65	145	211
8:00 AM	141	186	327	188	161	349	134	160	294	53	69	122	36	51	87	114	137	251	155	140	295	161	162	324
9:00 AM	108	140	248	114	143	257	128	165	293	92	89	181	41	63	104	115	150	265	122	151	273	115	145	259
10:00 AM	86	119	205	109	145	254	125	135	260	113	152	265	69	90	159	118	130	248	119	162	281	105	142	247
11:00 AM	129	144	273	97	141	238	100	154	254	133	169	302	91	117	208	119	126	245	116	153	269	114	146	260
12:00 PM	104	142	246	103	160	263	102	187	289	119	178	297	87	118	205	93	142	235	87	173	260	98	158	256
1:00 PM	87	197	284	82	147	229	99	223	322	84	152	236	88	126	214	110	183	293	124	160	284	98	168	266
2:00 PM	175	178	353	82	195	277	107	170	277	83	135	218	68	133	201	90	176	266	106	200	306	121	191	312
3:00 PM	123	196	319	130	178	308	114	168	282	95	168	263	91	125	216	112	158	270	117	196	313	123	190	313
4:00 PM	128	174	302	121	201	322	110	169	279	75	166	241	80	141	221	112	187	299	112	200	312	120	192	312
5:00 PM	130	196	326	129	211	340	134	169	303	87	97	184	81	114	195	115	202	317	135	219	354	131	209	340
6:00 PM	114	180	294	105	164	269	117	185	302	75	102	177	55	118	173	89	175	264	123	163	286	114	169	283
7:00 PM	77	128	205	86	135	221	76	153	229	68	85	153	38	51	89	56	166	222	74	215	289	79	159	238
8:00 PM	48	107	155	57	140	197	54	98	152	37	63	100	30	55	85	37	109	146	50	93	143	52	113	165
9:00 PM	21	69	90	27	95	122	39	86	125	24	86	110	20	49	69	18	54	72	25	93	118	24	86	110
10:00 PM	17	48	65	12	53	65	19	92	111	23	58	81	9	43	52	14	42	56	11	59	70	13	53	67
11:00 PM	2	24	26	8	25	33	15	38	53	18	49	67	7	22	29	3	23	26	8	33	41	6	27	33
Total	1,600	2,417	4,017	1,562	2,528	4,090	1,592	2,558	4,150	1,226	1,910	3,136	943	1,484	2,427	1,442	2,356	3,798	1,592	2,634	4,226	1,585	2,526	4,111
Percent	40%	60%	-	38%	62%	-	38%	62%	-	39%	61%	-	39%	61%	-	38%	62%	-	38%	62%	-	39%	61%	-
AM Peak	08:00	08:00	08:00	08:00	07:00	08:00	08:00	09:00	08:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	09:00	09:00	08:00	10:00	08:00	08:00	08:00	08:00
Vol.	141	186	327	188	165	349	134	165	294	133	169	302	91	117	208	119	150	265	155	162	295	161	162	324
PM Peak	14:00	13:00	14:00	15:00	17:00	17:00	17:00	13:00	13:00	12:00	12:00	12:00	15:00	16:00	16:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00
Vol.	175	197	353	130	211	340	134	223	322	119	178	297	91	141	221	115	202	317	135	219	354	131	209	340

1. Mid-week average includes data between Tuesday and Thursday.

Location: Embarcadero Rd, B/W High St & Alma St
 Date Range: 11/28/2018 - 12/4/2018
 Site Code: 08

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	100	40	140	103	39	142	124	39	163	153	54	207	112	49	161	76	47	123	78	35	113	94	38	132
1:00 AM	59	29	88	60	31	91	55	30	85	60	40	100	51	41	92	32	25	57	60	17	77	60	26	85
2:00 AM	60	23	83	58	19	77	67	19	86	51	24	75	49	34	83	35	18	53	54	18	72	57	20	77
3:00 AM	30	42	72	25	42	67	33	42	75	33	31	64	28	20	48	26	54	80	33	51	84	29	45	74
4:00 AM	42	177	219	39	176	215	36	181	217	23	98	121	18	35	53	29	159	188	41	168	209	41	174	214
5:00 AM	64	523	587	82	543	625	63	526	589	50	195	245	34	117	151	63	483	546	82	549	631	76	538	614
6:00 AM	204	859	1,063	177	826	1,003	200	846	1,046	118	340	458	70	240	310	179	821	1,000	193	846	1,039	191	844	1,035
7:00 AM	666	1,032	1,698	709	1,022	1,731	786	997	1,783	326	353	679	234	261	495	589	966	1,555	636	991	1,627	670	1,015	1,685
8:00 AM	772	1,116	1,888	854	1,003	1,857	982	1,035	2,017	371	515	886	224	390	614	759	1,014	1,773	715	997	1,712	780	1,039	1,819
9:00 AM	730	857	1,587	686	806	1,492	796	909	1,705	536	770	1,306	425	667	1,092	655	904	1,559	625	799	1,424	680	821	1,501
10:00 AM	700	834	1,534	844	784	1,628	847	860	1,707	822	857	1,679	551	786	1,337	644	706	1,350	679	779	1,458	741	799	1,540
11:00 AM	877	822	1,699	864	858	1,722	1,000	879	1,879	857	834	1,691	648	815	1,463	795	766	1,561	787	823	1,610	843	834	1,677
12:00 PM	1,018	765	1,783	1,087	806	1,893	870	867	1,737	966	913	1,879	725	831	1,556	797	780	1,577	828	850	1,678	978	807	1,785
1:00 PM	912	744	1,656	1,183	790	1,973	955	824	1,779	881	869	1,750	747	837	1,584	860	798	1,658	792	809	1,601	962	781	1,743
2:00 PM	1,192	724	1,916	1,045	842	1,887	1,161	703	1,864	935	823	1,758	744	826	1,570	959	769	1,728	989	662	1,651	1,075	743	1,818
3:00 PM	1,144	778	1,922	1,237	749	1,986	1,073	636	1,709	898	778	1,676	854	734	1,588	1,112	745	1,857	953	803	1,756	1,111	777	1,888
4:00 PM	1,459	609	2,068	1,283	616	1,899	1,217	565	1,782	956	722	1,678	919	677	1,596	1,215	582	1,797	1,199	567	1,766	1,314	597	1,911
5:00 PM	1,435	635	2,070	1,354	692	2,046	1,398	625	2,023	965	727	1,692	932	555	1,487	1,196	636	1,832	1,220	610	1,830	1,336	646	1,982
6:00 PM	1,142	811	1,953	1,102	695	1,797	1,062	758	1,820	953	637	1,590	757	480	1,237	1,013	667	1,680	1,059	623	1,682	1,101	710	1,811
7:00 PM	933	478	1,411	1,057	380	1,437	943	356	1,299	847	397	1,244	617	322	939	836	375	1,211	826	422	1,248	939	427	1,365
8:00 PM	849	283	1,132	997	292	1,289	1,055	338	1,393	623	254	877	463	211	674	673	301	974	863	310	1,173	903	295	1,198
9:00 PM	863	232	1,095	845	202	1,047	838	223	1,061	589	197	786	278	179	457	632	209	841	556	234	790	755	223	977
10:00 PM	383	154	537	524	161	685	369	229	598	315	209	524	160	142	302	294	158	452	346	160	506	418	158	576
11:00 PM	282	73	355	349	72	421	303	127	430	286	110	396	163	71	234	237	68	305	228	58	286	286	68	354
Total	15,916	12,640	28,556	16,564	12,446	29,010	16,233	12,614	28,847	12,614	10,747	23,361	9,803	9,320	19,123	13,706	12,051	25,757	13,842	12,181	26,023	15,441	12,422	27,863
Percent	56%	44%	-	57%	43%	-	56%	44%	-	54%	46%	-	51%	49%	-	53%	47%	-	53%	47%	-	55%	45%	-
AM Peak	11:00	08:00	08:00	11:00	07:00	08:00	11:00	08:00	08:00	11:00	10:00	11:00	11:00	11:00	11:00	11:00	08:00	08:00	11:00	08:00	08:00	11:00	08:00	08:00
Vol.	877	1,116	1,888	864	1,022	1,857	1,000	1,035	2,017	857	857	1,691	648	815	1,463	795	1,014	1,773	787	997	1,712	843	1,039	1,819
PM Peak	16:00	18:00	17:00	17:00	14:00	17:00	17:00	12:00	17:00	12:00	12:00	17:00	13:00	16:00	16:00	13:00	15:00	17:00	12:00	17:00	17:00	12:00	17:00	17:00
Vol.	1,459	811	2,070	1,354	842	2,046	1,398	867	2,023	966	913	1,879	932	837	1,596	1,215	798	1,857	1,220	850	1,830	1,336	807	1,982

1. Mid-week average includes data between Tuesday and Thursday.

Location: Middlefield Rd, B/W Walter Hays Elementary School & Embarcadero Rd
Date Range: 11/28/2018 - 12/4/2018
Site Code: 09

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	12	10	22	15	21	36	19	16	35	20	27	47	24	36	60	11	8	19	16	63	79	14	31	46
1:00 AM	5	8	13	8	15	23	9	14	23	10	23	33	16	14	30	6	3	9	5	74	79	6	32	38
2:00 AM	9	10	19	2	3	5	4	4	8	8	4	12	12	14	26	6	4	10	4	36	40	5	16	21
3:00 AM	1	4	5	2	8	10	6	5	11	5	8	13	8	3	11	1	1	2	6	32	38	3	15	18
4:00 AM	8	9	17	9	11	20	10	12	22	5	5	10	4	3	7	9	16	25	11	76	87	9	32	41
5:00 AM	25	31	56	22	26	48	28	20	48	9	9	18	8	7	15	27	29	56	30	48	78	26	35	61
6:00 AM	91	79	170	77	81	158	83	77	160	14	40	54	13	20	33	95	87	182	105	90	195	91	83	174
7:00 AM	226	279	505	231	310	541	184	292	476	64	64	128	48	40	88	232	271	503	242	271	513	233	287	520
8:00 AM	340	424	764	327	420	747	299	358	657	118	139	257	112	98	210	311	385	696	290	400	690	319	415	734
9:00 AM	311	371	682	301	389	690	306	318	624	190	207	397	220	223	443	299	371	670	331	362	693	314	374	688
10:00 AM	269	302	571	296	353	649	244	310	554	266	269	535	220	218	438	331	296	627	291	332	623	285	329	614
11:00 AM	281	286	567	245	359	604	271	343	614	308	296	604	244	246	490	278	288	566	259	312	571	262	319	581
12:00 PM	261	281	542	248	292	540	299	305	604	274	363	637	231	291	522	243	278	521	250	276	526	253	283	536
1:00 PM	296	354	650	273	281	554	271	347	618	291	325	616	346	263	609	267	279	546	286	281	567	285	305	590
2:00 PM	298	331	629	255	399	654	274	377	651	250	304	554	244	273	517	278	348	626	239	365	604	264	365	629
3:00 PM	311	466	777	312	476	788	339	436	775	228	304	532	244	237	481	277	450	727	310	491	801	311	478	789
4:00 PM	320	517	837	376	528	904	356	579	935	287	296	583	224	338	562	332	536	868	343	514	857	346	520	866
5:00 PM	398	585	983	422	514	936	391	559	950	265	258	523	267	226	493	368	548	916	445	579	1,024	422	559	981
6:00 PM	405	469	874	395	380	775	390	449	839	198	216	414	204	361	565	449	436	885	462	522	984	421	457	878
7:00 PM	341	287	628	318	253	571	288	284	572	209	179	388	184	164	348	237	232	469	356	325	681	338	288	627
8:00 PM	180	154	334	156	190	346	180	193	373	117	136	253	105	101	206	141	184	325	163	198	361	166	181	347
9:00 PM	120	136	256	94	124	218	137	104	241	124	158	282	82	157	239	101	112	213	106	167	273	107	142	249
10:00 PM	65	124	189	60	139	199	85	188	273	73	177	250	46	43	89	39	81	120	48	107	155	58	123	181
11:00 PM	24	52	76	36	31	67	45	66	111	56	67	123	22	26	48	17	41	58	32	38	70	31	40	71
Total	4,597	5,569	10,166	4,480	5,603	10,083	4,518	5,656	10,174	3,389	3,874	7,263	3,128	3,402	6,530	4,355	5,284	9,639	4,630	5,959	10,589	4,569	5,710	10,279
Percent	45%	55%	-	44%	56%	-	44%	56%	-	47%	53%	-	48%	52%	-	45%	55%	-	44%	56%	-	44%	56%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	09:00	08:00	08:00	11:00	11:00	11:00	11:00	11:00	11:00	10:00	08:00	08:00	09:00	08:00	09:00	08:00	08:00	08:00
Vol.	340	424	764	327	420	747	306	358	657	308	296	604	244	246	490	331	385	696	331	400	693	319	415	734
PM Peak	18:00	17:00	17:00	17:00	16:00	17:00	17:00	16:00	17:00	13:00	12:00	12:00	13:00	18:00	13:00	18:00	17:00	17:00	18:00	17:00	17:00	17:00	17:00	17:00
Vol.	405	585	983	422	528	936	391	579	950	291	363	637	346	361	609	449	548	916	462	579	1,024	422	559	981

1. Mid-week average includes data between Tuesday and Thursday.

Location: Embarcadero Rd, B/W Webster St & Tasso St
Date Range: 11/28/2018 - 12/4/2018
Site Code: 10

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	54	113	167	52	124	176	58	115	173	92	175	267	91	138	229	59	88	147	41	88	129	49	108	157
1:00 AM	37	63	100	31	73	104	43	61	104	51	75	126	63	84	147	27	40	67	25	68	93	31	68	99
2:00 AM	24	62	86	22	57	79	25	60	85	37	73	110	44	58	102	23	40	63	21	55	76	22	58	80
3:00 AM	57	29	86	61	28	89	57	34	91	43	46	89	25	40	65	64	24	88	61	36	97	60	31	91
4:00 AM	215	46	261	221	41	262	212	28	240	106	28	134	48	24	72	196	44	240	206	47	253	214	45	259
5:00 AM	577	79	656	597	96	693	593	81	674	222	52	274	128	46	174	548	80	628	579	86	665	584	87	671
6:00 AM	932	198	1,130	935	200	1,135	937	213	1,150	385	97	482	271	73	344	925	203	1,128	947	218	1,165	938	205	1,143
7:00 AM	1,050	578	1,628	1,036	692	1,728	1,056	596	1,652	410	271	681	296	223	519	1,025	584	1,609	1,052	670	1,722	1,046	647	1,693
8:00 AM	896	774	1,670	797	715	1,512	865	711	1,576	639	293	932	453	221	674	854	718	1,572	804	725	1,529	832	738	1,570
9:00 AM	941	676	1,617	894	623	1,517	905	731	1,636	847	418	1,265	703	400	1,103	921	628	1,549	910	640	1,550	915	646	1,561
10:00 AM	933	597	1,530	908	695	1,603	987	659	1,646	878	612	1,490	846	453	1,299	883	649	1,532	913	688	1,601	918	660	1,578
11:00 AM	935	722	1,657	855	815	1,670	1,014	799	1,813	916	643	1,559	938	566	1,504	855	722	1,577	980	745	1,725	923	761	1,684
12:00 PM	898	813	1,711	861	786	1,647	938	836	1,774	975	745	1,720	917	695	1,612	863	800	1,663	989	813	1,802	916	804	1,720
1:00 PM	704	774	1,478	838	855	1,693	885	984	1,869	933	725	1,658	987	755	1,742	842	883	1,725	892	910	1,802	811	846	1,658
2:00 PM	794	946	1,740	774	968	1,742	762	956	1,718	918	773	1,691	956	793	1,749	767	961	1,728	744	951	1,695	771	955	1,726
3:00 PM	875	996	1,871	613	870	1,483	638	873	1,511	858	882	1,740	821	892	1,713	690	898	1,588	656	850	1,506	715	905	1,620
4:00 PM	606	979	1,585	666	992	1,658	594	985	1,579	899	943	1,842	794	941	1,735	601	1,029	1,630	618	1,008	1,626	630	993	1,623
5:00 PM	653	946	1,599	748	993	1,741	599	1,035	1,634	873	866	1,739	741	893	1,634	709	1,045	1,754	644	964	1,608	682	968	1,649
6:00 PM	869	878	1,747	756	854	1,610	783	880	1,663	747	848	1,595	539	790	1,329	724	916	1,640	712	946	1,658	779	893	1,672
7:00 PM	600	756	1,356	507	825	1,332	454	784	1,238	452	820	1,272	385	630	1,015	539	868	1,407	555	966	1,521	554	849	1,403
8:00 PM	391	769	1,160	378	819	1,197	423	828	1,251	360	563	923	265	496	761	422	694	1,116	421	846	1,267	397	811	1,208
9:00 PM	297	685	982	271	673	944	342	713	1,055	284	519	803	265	330	595	271	587	858	315	660	975	294	673	967
10:00 PM	220	413	633	212	485	697	270	486	756	299	391	690	182	227	409	188	363	551	214	415	629	215	438	653
11:00 PM	95	299	394	102	327	429	193	339	532	186	319	505	102	192	294	85	269	354	99	331	430	99	319	418
Total	13,653	13,191	26,844	13,135	13,606	26,741	13,633	13,787	27,420	12,410	11,177	23,587	10,860	9,960	20,820	13,081	13,133	26,214	13,398	13,726	27,124	13,395	13,508	26,903
Percent	51%	49%	-	49%	51%	-	50%	50%	-	53%	47%	-	52%	48%	-	50%	50%	-	49%	51%	-	50%	50%	-
AM Peak	07:00	08:00	08:00	07:00	11:00	07:00	07:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	07:00	11:00	07:00	07:00	11:00	11:00	07:00	11:00	07:00
Vol.	1,050	774	1,670	1,036	815	1,728	1,056	799	1,813	916	643	1,559	938	566	1,504	1,025	722	1,609	1,052	745	1,725	1,046	761	1,693
PM Peak	12:00	15:00	15:00	12:00	17:00	14:00	12:00	17:00	13:00	12:00	16:00	16:00	13:00	16:00	14:00	12:00	17:00	17:00	12:00	16:00	12:00	16:00	16:00	14:00
Vol.	898	996	1,871	861	993	1,742	938	1,035	1,869	975	943	1,842	987	941	1,749	863	1,045	1,754	989	1,008	1,802	916	993	1,726

1. Mid-week average includes data between Tuesday and Thursday.

Location: Churchill Ave B/W Tasso St & Cowper St
Date Range: 12/11/2018 - 12/17/2018
Site Code: 11

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	12/11/2018			12/12/2018			12/13/2018			12/14/2018			12/15/2018			12/16/2018			12/17/2018					
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	1	1	2	6	2	8	4	1	5	2	5	7	11	3	14	9	7	16	7	2	9	4	1	5
1:00 AM	2	1	3	4	3	7	2	0	2	4	1	5	2	2	4	3	3	6	2	2	4	3	1	4
2:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	4	3	7	6	1	7	1	0	1	0	0	0
3:00 AM	0	1	1	0	1	1	0	0	0	0	1	1	1	0	1	1	0	1	0	3	3	0	1	1
4:00 AM	1	3	4	2	5	7	2	3	5	3	4	7	4	1	5	0	0	0	2	3	5	2	4	5
5:00 AM	9	12	21	5	11	16	3	11	14	7	12	19	8	7	15	1	2	3	8	14	22	6	11	17
6:00 AM	25	28	53	16	27	43	30	22	52	19	25	44	11	5	16	4	2	6	13	21	34	24	26	49
7:00 AM	42	37	79	37	34	71	49	39	88	39	34	73	19	15	34	15	14	29	37	35	72	43	37	79
8:00 AM	70	34	104	66	29	95	70	39	109	65	41	106	41	30	71	26	23	49	65	31	96	69	34	103
9:00 AM	51	25	76	57	33	90	58	36	94	55	37	92	59	25	84	45	20	65	71	32	103	55	31	87
10:00 AM	57	23	80	56	27	83	58	27	85	58	23	81	68	28	96	63	36	99	67	26	93	57	26	83
11:00 AM	42	33	75	58	45	103	63	36	99	58	38	96	73	53	126	57	42	99	45	38	83	54	38	92
12:00 PM	56	36	92	67	29	96	74	29	103	74	32	106	97	36	133	69	41	110	73	35	108	66	31	97
1:00 PM	58	25	83	73	24	97	80	39	119	73	39	112	64	33	97	94	38	132	59	33	92	70	29	100
2:00 PM	83	30	113	83	30	113	88	41	129	100	31	131	105	40	145	82	29	111	105	29	134	85	34	118
3:00 PM	100	23	123	106	34	140	72	19	91	80	32	112	79	26	105	61	24	85	91	28	119	93	25	118
4:00 PM	78	26	104	99	21	120	75	24	99	65	28	93	87	33	120	51	29	80	82	28	110	84	24	108
5:00 PM	55	45	100	66	43	109	81	29	110	76	25	101	66	23	89	49	27	76	77	36	113	67	39	106
6:00 PM	61	29	90	58	35	93	81	30	111	63	32	95	66	28	94	51	20	71	48	34	82	67	31	98
7:00 PM	58	21	79	64	27	91	72	31	103	49	13	62	53	16	69	37	8	45	45	18	63	65	26	91
8:00 PM	38	14	52	49	12	61	51	27	78	31	11	42	40	6	46	28	16	44	40	19	59	46	18	64
9:00 PM	37	16	53	27	16	43	38	14	52	50	18	68	40	19	59	24	10	34	26	13	39	34	15	49
10:00 PM	21	3	24	18	4	22	24	14	38	24	20	44	28	18	46	8	5	13	17	15	32	21	7	28
11:00 PM	13	2	15	6	5	11	9	8	17	27	8	35	20	12	32	11	5	16	7	3	10	9	5	14
Total	958	468	1,426	1,023	497	1,520	1,084	519	1,603	1,023	510	1,533	1,046	462	1,508	795	402	1,197	988	498	1,486	1,022	495	1,516
Percent	67%	33%	-	67%	33%	-	68%	32%	-	67%	33%	-	69%	31%	-	66%	34%	-	66%	34%	-	67%	33%	-
AM Peak	08:00	07:00	08:00	08:00	11:00	11:00	08:00	07:00	08:00	08:00	08:00	08:00	11:00	11:00	11:00	10:00	11:00	10:00	09:00	11:00	09:00	08:00	11:00	08:00
Vol.	70	37	104	66	45	103	70	39	109	65	41	106	73	53	126	63	42	99	71	38	103	69	38	103
PM Peak	15:00	17:00	15:00	15:00	17:00	15:00	14:00	14:00	14:00	14:00	13:00	14:00	14:00	14:00	14:00	13:00	12:00	13:00	14:00	17:00	14:00	15:00	17:00	14:00
Vol.	100	45	123	106	43	140	88	41	129	100	39	131	105	40	145	94	41	132	105	36	134	93	39	118

1. Mid-week average includes data between Tuesday and Thursday.

Location: Waverley St, B/W Churchill Ave & Coleridge Ave
Date Range: 11/28/2018 - 12/4/2018
Site Code: 12

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	1	0	1	1	1	2	1	1	2	3	3	6	3	2	5	0	2	2	1	2	3	1	1	2
1:00 AM	2	2	4	0	2	2	0	1	1	4	2	6	3	0	3	0	0	0	1	1	2	1	2	3
2:00 AM	0	1	1	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM	1	2	3	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2
5:00 AM	4	2	6	4	1	5	3	1	4	3	2	5	2	0	2	6	1	7	4	2	6	4	2	6
6:00 AM	21	7	28	16	5	21	17	4	21	4	1	5	1	1	2	16	5	21	16	8	24	18	7	24
7:00 AM	52	30	82	75	53	128	73	43	116	14	11	25	12	4	16	59	28	87	64	43	107	64	42	106
8:00 AM	165	85	250	207	115	322	132	92	224	40	19	59	31	18	49	116	85	201	151	78	229	174	93	267
9:00 AM	65	54	119	77	50	127	91	46	137	54	41	95	29	30	59	87	54	141	71	53	124	71	52	123
10:00 AM	55	45	100	49	60	109	72	59	131	74	49	123	50	33	83	61	48	109	70	52	122	58	52	110
11:00 AM	74	52	126	57	61	118	76	66	142	70	56	126	44	47	91	68	49	117	84	66	150	72	60	131
12:00 PM	63	58	121	62	52	114	62	71	133	65	75	140	49	46	95	57	54	111	48	67	115	58	59	117
1:00 PM	64	95	159	50	70	120	58	81	139	38	64	102	50	57	107	49	74	123	66	59	125	60	75	135
2:00 PM	146	76	222	58	85	143	76	94	170	46	50	96	55	62	117	73	75	148	77	91	168	94	84	178
3:00 PM	113	114	227	105	146	251	83	108	191	35	57	92	51	42	93	86	113	199	109	111	220	109	124	233
4:00 PM	73	107	180	88	82	170	82	93	175	37	57	94	36	69	105	79	108	187	77	98	175	79	96	175
5:00 PM	81	102	183	64	103	167	68	101	169	48	52	100	59	59	118	77	106	183	88	130	218	78	112	189
6:00 PM	68	76	144	70	63	133	68	74	142	30	30	60	35	37	72	53	76	129	76	69	145	71	69	141
7:00 PM	34	46	80	36	51	87	39	47	86	31	30	61	43	25	68	25	49	74	35	46	81	35	48	83
8:00 PM	16	33	49	30	39	69	30	28	58	9	23	32	20	21	41	16	20	36	19	28	47	22	33	55
9:00 PM	8	12	20	13	25	38	18	24	42	13	19	32	14	13	27	7	11	18	13	22	35	11	20	31
10:00 PM	5	8	13	4	4	8	7	13	20	7	18	25	4	3	7	6	6	12	4	11	15	4	8	12
11:00 PM	2	2	4	1	0	1	6	6	12	8	10	18	2	2	4	4	2	6	6	3	9	3	2	5
Total	1,113	1,009	2,122	1,068	1,068	2,136	1,063	1,053	2,116	634	671	1,305	593	571	1,164	945	966	1,911	1,080	1,041	2,121	1,087	1,039	2,126
Percent	52%	48%	-	50%	50%	-	50%	50%	-	49%	51%	-	51%	49%	-	49%	51%	-	51%	49%	-	51%	49%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	10:00	11:00	11:00	10:00	11:00	11:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00
Vol.	165	85	250	207	115	322	132	92	224	74	56	126	50	47	91	116	85	201	151	78	229	174	93	267
PM Peak	14:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	12:00	12:00	12:00	17:00	16:00	17:00	15:00	15:00	15:00	15:00	17:00	15:00	15:00	15:00	15:00
Vol.	146	114	227	105	146	251	83	108	191	65	75	140	59	69	118	86	113	199	109	130	220	109	124	233

1. Mid-week average includes data between Tuesday and Thursday.

Location: Bryant St B/W Churchill Ave & Coleridge Ave
Date Range: 12/11/2018 - 12/17/2018
Site Code: 13

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	12/11/2018			12/12/2018			12/13/2018			12/14/2018			12/15/2018			12/16/2018			12/17/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	0	0	0	1	0	1	1	1	2	1	1	2	6	1	7	3	0	3	0	0	0	1	0	1
1:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
4:00 AM	0	0	0	1	0	1	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	1	0	1
5:00 AM	1	1	2	5	7	12	4	5	9	3	3	6	1	1	2	0	1	1	3	3	6	3	4	8
6:00 AM	6	5	11	3	9	12	8	7	15	5	11	16	4	4	8	3	4	7	2	10	12	6	7	13
7:00 AM	27	31	58	36	35	71	34	46	80	35	43	78	6	9	15	1	5	6	24	29	53	32	37	70
8:00 AM	35	63	98	54	141	195	41	115	156	56	99	155	7	11	18	11	4	15	48	132	180	43	106	150
9:00 AM	27	26	53	21	52	73	20	53	73	22	44	66	25	25	50	18	13	31	28	39	67	23	44	66
10:00 AM	31	16	47	28	32	60	28	46	74	26	28	54	25	25	50	22	10	32	21	31	52	29	31	60
11:00 AM	25	19	44	29	27	56	40	29	69	36	29	65	41	29	70	34	9	43	46	22	68	31	25	56
12:00 PM	36	16	52	30	24	54	30	29	59	28	15	43	44	22	66	22	13	35	37	28	65	32	23	55
1:00 PM	28	22	50	44	23	67	50	19	69	36	21	57	40	23	63	35	10	45	34	27	61	41	21	62
2:00 PM	65	32	97	47	32	79	57	37	94	53	18	71	33	14	47	20	16	36	54	22	76	56	34	90
3:00 PM	99	33	132	101	35	136	102	52	154	108	46	154	34	23	57	19	10	29	124	50	174	101	40	141
4:00 PM	47	25	72	75	37	112	65	20	85	66	31	97	32	17	49	24	10	34	52	34	86	62	27	90
5:00 PM	61	21	82	55	28	83	73	32	105	53	36	89	19	12	31	20	14	34	72	24	96	63	27	90
6:00 PM	53	33	86	51	16	67	64	38	102	39	20	59	19	10	29	11	10	21	50	24	74	56	29	85
7:00 PM	26	14	40	27	16	43	27	13	40	24	9	33	18	3	21	15	5	20	34	13	47	27	14	41
8:00 PM	22	4	26	20	6	26	40	12	52	19	7	26	16	5	21	8	5	13	18	9	27	27	7	35
9:00 PM	9	7	16	9	10	19	20	12	32	6	6	12	25	9	34	5	0	5	9	5	14	13	10	22
10:00 PM	4	4	8	5	2	7	12	1	13	11	4	15	2	4	6	2	2	4	9	2	11	7	2	9
11:00 PM	1	0	1	1	0	1	6	0	6	4	3	7	4	2	6	3	0	3	4	2	6	3	0	3
Total	603	372	975	643	533	1,176	723	567	1,290	634	474	1,108	402	249	651	279	141	420	669	506	1,175	656	491	1,147
Percent	62%	38%	-	55%	45%	-	56%	44%	-	57%	43%	-	62%	38%	-	66%	34%	-	57%	43%	-	57%	43%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	11:00	11:00	11:00	11:00	09:00	11:00	08:00	08:00	08:00	08:00	08:00	08:00
Vol.	35	63	98	54	141	195	41	115	156	56	99	155	41	29	70	34	13	43	48	132	180	43	106	150
PM Peak	15:00	15:00	15:00	15:00	16:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	12:00	13:00	12:00	13:00	14:00	13:00	15:00	15:00	15:00	15:00	15:00	15:00
Vol.	99	33	132	101	37	136	102	52	154	108	46	154	44	23	66	35	16	45	124	50	174	101	40	141

1. Mid-week average includes data between Tuesday and Thursday.

Location: Emerson St, B/W Churchill Ave & Coleridge Ave
Date Range: 11/28/2018 - 12/4/2018
Site Code: 14

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	0	0	0	0	1	1	0	0	0	2	1	3	2	6	8	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
4:00 AM	2	0	2	0	0	0	0	0	0	0	0	0	1	1	2	1	0	1	1	0	1	1	0	1
5:00 AM	0	0	0	1	0	1	4	1	5	0	2	2	0	0	0	0	0	0	2	1	3	1	0	1
6:00 AM	3	5	8	7	6	13	3	4	7	2	1	3	1	2	3	7	7	14	5	4	9	5	5	10
7:00 AM	29	16	45	68	36	104	47	26	73	8	5	13	3	1	4	38	25	63	46	25	71	48	26	73
8:00 AM	108	40	148	168	62	230	64	26	90	15	11	26	6	5	11	61	24	85	79	25	104	118	42	161
9:00 AM	23	26	49	24	17	41	33	27	60	20	13	33	9	13	22	29	21	50	21	19	40	23	21	43
10:00 AM	21	16	37	15	18	33	22	20	42	37	25	62	11	13	24	17	24	41	18	20	38	18	18	36
11:00 AM	27	33	60	28	16	44	24	25	49	10	13	23	14	23	37	13	22	35	22	13	35	26	21	46
12:00 PM	22	29	51	27	22	49	21	18	39	22	29	51	30	30	60	16	21	37	19	20	39	23	24	46
1:00 PM	17	22	39	15	24	39	12	21	33	17	31	48	11	25	36	15	23	38	19	25	44	17	24	41
2:00 PM	123	24	147	32	30	62	24	40	64	15	18	33	16	20	36	15	38	53	21	37	58	59	30	89
3:00 PM	59	79	138	32	63	95	37	75	112	13	28	41	8	19	27	32	63	95	24	59	83	38	67	105
4:00 PM	23	47	70	30	35	65	29	55	84	12	39	51	15	34	49	23	46	69	33	44	77	29	42	71
5:00 PM	19	41	60	46	36	82	18	36	54	11	17	28	11	25	36	31	47	78	31	47	78	32	41	73
6:00 PM	28	45	73	30	29	59	29	33	62	7	21	28	8	20	28	12	30	42	36	39	75	31	38	69
7:00 PM	12	20	32	7	17	24	13	18	31	7	16	23	11	10	21	10	13	23	10	18	28	10	18	28
8:00 PM	12	12	24	10	17	27	4	8	12	4	14	18	7	12	19	5	16	21	6	15	21	9	15	24
9:00 PM	5	12	17	2	11	13	11	9	20	6	3	9	1	4	5	3	7	10	6	12	18	4	12	16
10:00 PM	0	3	3	1	4	5	7	6	13	2	8	10	1	1	2	3	7	10	1	7	8	1	5	5
11:00 PM	0	1	1	0	0	0	2	2	4	0	3	3	1	0	1	0	1	1	0	0	0	0	0	0
Total	533	471	1,004	543	444	987	404	450	854	211	299	510	168	264	432	331	435	766	400	430	830	492	448	940
Percent	53%	47%	-	55%	45%	-	47%	53%	-	41%	59%	-	39%	61%	-	43%	57%	-	48%	52%	-	52%	48%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	08:00	09:00	08:00	10:00	10:00	10:00	11:00	11:00	11:00	08:00	07:00	08:00	08:00	07:00	08:00	08:00	08:00	08:00
Vol.	108	40	148	168	62	230	64	27	90	37	25	62	14	23	37	61	25	85	79	25	104	118	42	161
PM Peak	14:00	15:00	14:00	17:00	15:00	15:00	15:00	15:00	15:00	12:00	16:00	12:00	12:00	16:00	12:00	15:00	15:00	15:00	18:00	15:00	15:00	14:00	15:00	15:00
Vol.	123	79	147	46	63	95	37	75	112	22	39	51	30	34	60	32	63	95	36	59	83	59	67	105

1. Mid-week average includes data between Tuesday and Thursday.

Location: Churchill Ave B/W Alma St & Emerson St
Date Range: 12/11/2018 - 12/17/2018
Site Code: 15

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	12/11/2018			12/12/2018			12/13/2018			12/14/2018			12/15/2018			12/16/2018			12/17/2018					
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	2	2	4	6	4	10	5	3	8	4	6	10	12	6	18	16	9	25	8	2	10	4	3	7
1:00 AM	3	1	4	3	3	6	3	0	3	5	2	7	6	7	13	5	2	7	2	2	4	3	1	4
2:00 AM	2	0	2	0	0	0	0	2	2	3	0	3	5	6	11	5	3	8	2	2	4	1	1	1
3:00 AM	0	1	1	0	1	1	0	0	0	0	0	0	1	0	1	1	1	2	1	2	3	0	1	1
4:00 AM	1	3	4	1	5	6	2	3	5	2	4	6	5	1	6	0	0	0	2	3	5	1	4	5
5:00 AM	8	21	29	3	10	13	3	18	21	7	16	23	7	14	21	0	2	2	8	17	25	5	16	21
6:00 AM	24	29	53	21	28	49	32	34	66	22	32	54	13	11	24	7	8	15	21	25	46	26	30	56
7:00 AM	60	88	148	58	92	150	75	88	163	64	88	152	15	34	49	13	16	29	49	65	114	64	89	154
8:00 AM	85	150	235	99	142	241	91	160	251	86	154	240	49	49	98	34	47	81	92	132	224	92	151	242
9:00 AM	71	84	155	68	102	170	72	73	145	62	89	151	63	62	125	49	50	99	71	82	153	70	86	157
10:00 AM	79	94	173	85	69	154	71	57	128	76	91	167	79	77	156	74	75	149	89	83	172	78	73	152
11:00 AM	69	96	165	80	108	188	94	86	180	89	94	183	97	97	194	85	88	173	77	90	167	81	97	178
12:00 PM	85	71	156	113	73	186	100	80	180	96	88	184	120	93	213	91	88	179	97	85	182	99	75	174
1:00 PM	72	83	155	104	77	181	110	83	193	116	85	201	87	86	173	103	102	205	76	93	169	95	81	176
2:00 PM	156	115	271	142	105	247	160	128	288	171	100	271	137	95	232	112	77	189	187	113	300	153	116	269
3:00 PM	192	161	353	230	182	412	161	181	342	158	186	344	122	82	204	94	56	150	184	174	358	194	175	369
4:00 PM	139	103	242	169	127	296	140	115	255	124	118	242	137	74	211	69	74	143	123	124	247	149	115	264
5:00 PM	112	167	279	146	140	286	142	143	285	119	122	241	105	74	179	74	65	139	140	126	266	133	150	283
6:00 PM	114	152	266	123	121	244	136	109	245	104	92	196	102	51	153	68	55	123	97	79	176	124	127	252
7:00 PM	94	55	149	82	71	153	91	88	179	76	43	119	75	24	99	41	27	68	65	50	115	89	71	160
8:00 PM	61	41	102	69	35	104	67	73	140	50	33	83	59	19	78	39	24	63	50	34	84	66	50	115
9:00 PM	45	45	90	39	34	73	39	40	79	59	27	86	50	44	94	31	22	53	33	31	64	41	40	81
10:00 PM	25	10	35	23	13	36	26	18	44	29	23	52	35	23	58	18	15	33	15	18	33	25	14	38
11:00 PM	14	5	19	7	5	12	12	4	16	31	10	41	22	10	32	13	3	16	14	4	18	11	5	16
Total	1,513	1,577	3,090	1,671	1,547	3,218	1,632	1,586	3,218	1,553	1,503	3,056	1,403	1,039	2,442	1,042	909	1,951	1,503	1,436	2,939	1,605	1,570	3,175
Percent	49%	51%	-	52%	48%	-	51%	49%	-	51%	49%	-	57%	43%	-	53%	47%	-	51%	49%	-	51%	49%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	11:00	08:00	08:00	11:00	08:00	08:00	11:00	11:00	11:00	11:00	11:00	11:00	08:00	08:00	08:00	08:00	08:00	08:00
Vol.	85	150	235	99	142	241	94	160	251	89	154	240	97	97	194	85	88	173	92	132	224	92	151	242
PM Peak	15:00	17:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	14:00	15:00	15:00	14:00	14:00	14:00	14:00	13:00	13:00	14:00	15:00	15:00	15:00	15:00	15:00
Vol.	192	167	353	230	182	412	161	181	342	171	186	344	137	95	232	112	102	205	187	174	358	194	175	369

1. Mid-week average includes data between Tuesday and Thursday.

Location: Alma St, B/W Coleridge Ave & Lowell Ave
 Date Range: 11/28/2018 - 12/4/2018
 Site Code: 16

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	33	50	83	28	55	83	44	80	124	65	134	199	66	102	168	28	34	62	20	68	88	27	58	85
1:00 AM	21	27	48	16	30	46	28	48	76	43	67	110	41	64	105	11	26	37	12	30	42	16	29	45
2:00 AM	11	14	25	8	16	24	12	18	30	21	40	61	21	55	76	12	9	21	10	36	46	10	22	32
3:00 AM	20	9	29	18	10	28	21	6	27	18	16	34	11	18	29	14	11	25	18	16	34	19	12	30
4:00 AM	47	21	68	47	22	69	57	23	80	34	13	47	14	9	23	59	15	74	56	37	93	50	27	77
5:00 AM	167	67	234	176	70	246	154	48	202	73	22	95	47	18	65	163	60	223	152	58	210	165	65	230
6:00 AM	438	140	578	467	139	606	475	154	629	144	51	195	120	27	147	466	153	619	487	149	636	464	143	607
7:00 AM	1,124	398	1,522	1,160	424	1,584	1,036	440	1,476	244	129	373	197	109	306	1,053	459	1,512	1,120	425	1,545	1,135	416	1,550
8:00 AM	1,480	719	2,199	1,307	804	2,111	1,384	659	2,043	494	257	751	367	225	592	1,477	669	2,146	1,473	686	2,159	1,420	736	2,156
9:00 AM	1,231	566	1,797	1,186	611	1,797	1,139	584	1,723	665	443	1,108	561	347	908	1,224	583	1,807	1,196	570	1,766	1,204	582	1,787
10:00 AM	919	600	1,519	972	517	1,489	994	513	1,507	778	510	1,288	716	392	1,108	1,000	572	1,572	1,049	526	1,575	980	548	1,528
11:00 AM	801	597	1,398	836	594	1,430	891	628	1,519	863	533	1,396	754	571	1,325	853	603	1,456	971	632	1,603	869	608	1,477
12:00 PM	755	575	1,330	789	645	1,434	746	667	1,413	865	669	1,534	774	617	1,391	712	620	1,332	897	631	1,528	814	617	1,431
1:00 PM	777	669	1,446	764	638	1,402	791	741	1,532	784	666	1,450	772	597	1,369	699	627	1,326	852	715	1,567	798	674	1,472
2:00 PM	443	678	1,121	872	767	1,639	819	894	1,713	740	712	1,452	714	675	1,389	768	727	1,495	889	910	1,799	735	785	1,520
3:00 PM	911	1,018	1,929	947	1,170	2,117	1,056	1,146	2,202	745	732	1,477	759	702	1,461	891	1,157	2,048	1,102	1,270	2,372	987	1,153	2,139
4:00 PM	1,061	1,323	2,384	1,093	1,231	2,324	1,125	1,324	2,449	748	674	1,422	674	743	1,417	945	1,274	2,219	1,314	1,367	2,681	1,156	1,307	2,463
5:00 PM	1,255	1,345	2,600	1,342	1,285	2,627	1,301	1,347	2,648	668	698	1,366	625	704	1,329	1,225	1,386	2,611	1,572	1,404	2,976	1,390	1,345	2,734
6:00 PM	1,138	1,110	2,248	1,117	1,140	2,257	1,151	1,153	2,304	669	604	1,273	493	656	1,149	1,179	1,096	2,275	1,434	1,300	2,734	1,230	1,183	2,413
7:00 PM	608	773	1,381	654	862	1,516	851	761	1,612	488	516	1,004	373	495	868	599	686	1,285	843	819	1,662	702	818	1,520
8:00 PM	364	612	976	398	601	999	469	558	1,027	335	411	746	255	327	582	362	550	912	408	614	1,022	390	609	999
9:00 PM	265	484	749	272	482	754	398	481	879	227	430	657	172	303	475	235	410	645	328	515	843	288	494	782
10:00 PM	117	290	407	152	342	494	235	385	620	224	338	562	95	166	261	126	232	358	208	342	550	159	325	484
11:00 PM	73	117	190	72	169	241	126	244	370	120	191	311	40	105	145	55	140	195	86	209	295	77	165	242
Total	14,059	12,202	26,261	14,693	12,624	27,317	15,303	12,902	28,205	10,055	8,856	18,911	8,661	8,027	16,688	14,156	12,099	26,255	16,497	13,329	29,826	15,083	12,718	27,801
Percent	54%	46%	-	54%	46%	-	54%	46%	-	53%	47%	-	52%	48%	-	54%	46%	-	55%	45%	-	54%	46%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	11:00	11:00	11:00	11:00	11:00	11:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00
Vol.	1,480	719	2,199	1,307	804	2,111	1,384	659	2,043	863	533	1,396	754	571	1,325	1,477	669	2,146	1,473	686	2,159	1,420	736	2,156
PM Peak	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	12:00	15:00	12:00	12:00	16:00	15:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00
Vol.	1,255	1,345	2,600	1,342	1,285	2,627	1,301	1,347	2,648	865	732	1,534	774	743	1,461	1,225	1,386	2,611	1,572	1,404	2,976	1,390	1,345	2,734

1. Mid-week average includes data between Tuesday and Thursday.

Location: Churchill Ave, B/W Mariposa Ave & Train Tracks
Date Range: 11/28/2018 - 12/4/2018
Site Code: 17

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	11/28/2018			11/29/2018			11/30/2018			12/1/2018			12/2/2018			12/3/2018			12/4/2018					
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	20	15	35	14	9	23	22	24	46	34	31	65	22	30	52	20	8	28	19	7	26	18	10	28
1:00 AM	9	12	21	12	10	22	8	10	18	22	16	38	23	23	46	3	4	7	11	13	24	11	12	22
2:00 AM	8	3	11	8	1	9	6	4	10	9	7	16	8	13	21	3	5	8	6	4	10	7	3	10
3:00 AM	4	9	13	1	9	10	2	7	9	6	9	15	2	7	9	3	6	9	2	11	13	2	10	12
4:00 AM	9	20	29	8	18	26	7	20	27	6	16	22	7	3	10	9	29	38	13	23	36	10	20	30
5:00 AM	18	80	98	18	88	106	21	76	97	20	32	52	6	25	31	21	72	93	21	84	105	19	84	103
6:00 AM	68	193	261	59	196	255	64	219	283	27	58	85	11	35	46	64	188	252	56	199	255	61	196	257
7:00 AM	160	346	506	194	342	536	166	333	499	59	94	153	51	72	123	162	306	468	142	337	479	165	342	507
8:00 AM	255	451	706	308	491	799	214	435	649	128	169	297	96	138	234	253	462	715	264	490	754	276	477	753
9:00 AM	207	431	638	252	392	644	238	385	623	179	227	406	169	240	409	233	408	641	212	363	575	224	395	619
10:00 AM	231	325	556	203	329	532	219	323	542	209	287	496	196	292	488	187	315	502	219	347	566	218	334	551
11:00 AM	237	327	564	221	361	582	288	352	640	263	324	587	238	336	574	239	336	575	240	306	546	233	331	564
12:00 PM	249	313	562	279	327	606	298	357	655	249	340	589	277	320	597	266	335	601	252	310	562	260	317	577
1:00 PM	325	349	674	293	312	605	298	341	639	230	292	522	281	353	634	237	326	563	278	319	597	299	327	625
2:00 PM	316	339	655	343	375	718	408	312	720	241	324	565	237	408	645	317	334	651	326	316	642	328	343	672
3:00 PM	334	354	688	424	381	805	326	401	727	266	298	564	281	317	598	417	356	773	354	379	733	371	371	742
4:00 PM	404	298	702	387	328	715	389	368	757	300	328	628	344	337	681	431	312	743	388	336	724	393	321	714
5:00 PM	365	340	705	354	363	717	338	331	669	285	309	594	317	260	577	226	341	567	315	346	661	345	350	694
6:00 PM	314	356	670	315	313	628	310	317	627	273	258	531	281	200	481	281	345	626	364	372	736	331	347	678
7:00 PM	259	264	523	226	259	485	235	237	472	218	165	383	186	198	384	230	231	461	281	318	599	255	280	536
8:00 PM	216	157	373	222	158	380	231	193	424	152	123	275	100	117	217	186	148	334	248	186	434	229	167	396
9:00 PM	154	115	269	133	118	251	149	134	283	114	103	217	85	87	172	136	90	226	150	119	269	146	117	263
10:00 PM	78	63	141	91	77	168	91	89	180	94	89	183	47	62	109	72	67	139	88	75	163	86	72	157
11:00 PM	44	25	69	57	40	97	69	65	134	54	52	106	38	25	63	39	24	63	48	37	85	50	34	84
Total	4,284	5,185	9,469	4,422	5,297	9,719	4,397	5,333	9,730	3,438	3,951	7,389	3,303	3,898	7,201	4,035	5,048	9,083	4,297	5,297	9,594	4,334	5,260	9,594
Percent	45%	55%	-	45%	55%	-	45%	55%	-	47%	53%	-	46%	54%	-	44%	56%	-	45%	55%	-	45%	55%	-
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	11:00	08:00	08:00	11:00	11:00	11:00	11:00	11:00	11:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00
Vol.	255	451	706	308	491	799	288	435	649	263	324	587	238	336	574	253	462	715	264	490	754	276	477	753
PM Peak	16:00	18:00	17:00	15:00	15:00	15:00	14:00	15:00	16:00	16:00	12:00	16:00	16:00	14:00	16:00	16:00	15:00	15:00	16:00	15:00	18:00	16:00	15:00	15:00
Vol.	404	356	705	424	381	805	408	401	757	300	340	628	344	408	681	431	356	773	388	379	736	393	371	742

1. Mid-week average includes data between Tuesday and Thursday.

Location: Lincoln St B/W High St & Emerson St
 Date Range: 12/5/2018 - 12/11/2018
 Site Code: 18

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	12/5/2018			12/6/2018			12/7/2018			12/8/2018			12/9/2018			12/10/2018			12/11/2018					
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	2	0	2	0	4	4	6	3	9	4	5	9	-	-	-	-	-	-	-	-	-	1	2	3
1:00 AM	1	2	3	0	1	1	3	0	3	4	6	10	-	-	-	-	-	-	-	-	1	2	2	
2:00 AM	1	0	1	1	1	2	0	0	0	2	6	8	-	-	-	-	-	-	-	-	1	1	2	
3:00 AM	1	1	2	1	0	1	1	0	1	2	1	3	-	-	-	-	-	-	-	-	1	1	2	
4:00 AM	1	2	3	2	3	5	3	2	5	1	2	3	-	-	-	-	-	-	-	-	2	3	4	
5:00 AM	6	9	15	2	4	6	5	6	11	3	0	3	-	-	-	-	-	-	-	-	4	7	11	
6:00 AM	19	22	41	24	17	41	20	15	35	7	5	12	-	-	-	-	-	-	-	-	22	20	41	
7:00 AM	65	35	100	64	45	109	64	28	92	17	15	32	-	-	-	-	-	-	-	-	65	40	105	
8:00 AM	90	87	177	99	83	182	110	73	183	25	22	47	-	-	-	-	-	-	-	-	95	85	180	
9:00 AM	80	43	123	36	12	48	72	22	94	36	20	56	-	-	-	-	-	-	-	-	58	28	86	
10:00 AM	53	56	109	58	14	72	45	36	81	43	47	90	-	-	-	-	-	-	-	-	56	35	91	
11:00 AM	52	46	98	58	23	81	57	55	112	60	52	112	-	-	-	-	-	-	-	-	55	35	90	
12:00 PM	59	58	117	56	13	69	56	56	112	59	61	120	-	-	-	-	-	-	-	-	58	36	93	
1:00 PM	64	42	106	61	26	87	54	51	105	60	40	100	-	-	-	-	-	-	-	-	63	34	97	
2:00 PM	66	54	120	67	29	96	59	74	133	51	54	105	-	-	-	-	-	-	-	-	67	42	108	
3:00 PM	74	56	130	77	58	135	76	62	138	53	36	89	-	-	-	-	-	-	-	-	76	57	133	
4:00 PM	105	60	165	104	46	150	91	60	151	57	52	109	-	-	-	-	-	-	-	-	105	53	158	
5:00 PM	100	43	143	109	42	151	86	56	142	61	51	112	-	-	-	-	-	-	-	-	105	43	147	
6:00 PM	95	48	143	146	41	187	102	59	161	55	47	102	-	-	-	-	-	-	-	-	121	45	165	
7:00 PM	68	34	102	84	32	116	66	49	115	42	25	67	-	-	-	-	-	-	-	-	76	33	109	
8:00 PM	53	28	81	55	30	85	43	32	75	22	17	39	-	-	-	-	-	-	-	-	54	29	83	
9:00 PM	18	22	40	25	19	44	35	27	62	33	17	50	-	-	-	-	-	-	-	-	22	21	42	
10:00 PM	10	9	19	17	14	31	19	18	37	22	15	37	-	-	-	-	-	-	-	-	14	12	25	
11:00 PM	6	2	8	5	5	10	8	16	24	8	2	10	-	-	-	-	-	-	-	-	6	4	9	
Total	1,089	759	1,848	1,151	562	1,713	1,081	800	1,881	727	598	1,325	-	-	-	-	-	-	-	-	1,120	661	1,781	
Percent	59%	41%	-	67%	33%	-	57%	43%	-	55%	45%	-	-	-	-	-	-	-	-	-	63%	37%	-	
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	11:00	11:00	11:00	-	-	-	-	-	-	-	-	08:00	08:00	08:00	
Vol.	90	87	177	99	83	182	110	73	183	60	52	112	-	-	-	-	-	-	-	-	95	85	180	
PM Peak	16:00	16:00	16:00	18:00	15:00	18:00	18:00	14:00	18:00	17:00	12:00	12:00	-	-	-	-	-	-	-	-	18:00	15:00	18:00	
Vol.	105	60	165	146	58	187	102	74	161	61	61	120	-	-	-	-	-	-	-	-	121	57	165	

1. Mid-week average includes data between Tuesday and Thursday.

Location: Emerson St B/W Lincoln Ave & Kingly Ave
Date Range: 12/5/2018 - 12/11/2018
Site Code: 19

Time	Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Tuesday			Mid-Week Average		
	12/5/2018			12/6/2018			12/7/2018			12/8/2018			12/9/2018			12/10/2018			12/11/2018					
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	1	3	4	3	3	6	3	1	4	6	0	6	-	-	-	-	-	-	-	-	-	2	3	5
1:00 AM	0	1	1	1	0	1	1	0	1	2	3	5	-	-	-	-	-	-	-	-	-	1	1	1
2:00 AM	1	1	2	1	0	1	1	3	4	1	0	1	-	-	-	-	-	-	-	-	-	1	1	2
3:00 AM	1	2	3	0	0	0	0	1	1	1	1	2	-	-	-	-	-	-	-	-	-	1	1	2
4:00 AM	2	1	3	2	5	7	4	4	8	4	3	7	-	-	-	-	-	-	-	-	-	2	3	5
5:00 AM	13	10	23	15	6	21	14	5	19	4	2	6	-	-	-	-	-	-	-	-	-	14	8	22
6:00 AM	38	6	44	39	8	47	43	7	50	8	6	14	-	-	-	-	-	-	-	-	-	39	7	46
7:00 AM	104	26	130	106	16	122	85	15	100	22	4	26	-	-	-	-	-	-	-	-	-	105	21	126
8:00 AM	120	30	150	124	21	145	128	24	152	34	19	53	-	-	-	-	-	-	-	-	-	122	26	148
9:00 AM	119	22	141	48	25	73	88	24	112	60	25	85	-	-	-	-	-	-	-	-	-	84	24	107
10:00 AM	82	29	111	45	26	71	72	15	87	53	26	79	-	-	-	-	-	-	-	-	-	64	28	91
11:00 AM	68	33	101	31	41	72	71	48	119	70	28	98	-	-	-	-	-	-	-	-	-	50	37	87
12:00 PM	72	29	101	31	35	66	75	33	108	72	20	92	-	-	-	-	-	-	-	-	-	52	32	84
1:00 PM	79	20	99	50	30	80	56	26	82	72	14	86	-	-	-	-	-	-	-	-	-	65	25	90
2:00 PM	70	21	91	42	19	61	57	33	90	74	20	94	-	-	-	-	-	-	-	-	-	56	20	76
3:00 PM	54	25	79	63	21	84	90	25	115	47	17	64	-	-	-	-	-	-	-	-	-	59	23	82
4:00 PM	66	23	89	75	23	98	86	19	105	59	27	86	-	-	-	-	-	-	-	-	-	71	23	94
5:00 PM	81	23	104	91	26	117	77	30	107	39	30	69	-	-	-	-	-	-	-	-	-	86	25	111
6:00 PM	87	45	132	91	36	127	84	38	122	57	32	89	-	-	-	-	-	-	-	-	-	89	41	130
7:00 PM	42	27	69	49	30	79	50	32	82	40	25	65	-	-	-	-	-	-	-	-	-	46	29	74
8:00 PM	31	13	44	45	23	68	36	18	54	15	22	37	-	-	-	-	-	-	-	-	-	38	18	56
9:00 PM	16	13	29	21	8	29	23	13	36	16	10	26	-	-	-	-	-	-	-	-	-	19	11	29
10:00 PM	10	4	14	8	6	14	4	8	12	11	7	18	-	-	-	-	-	-	-	-	-	9	5	14
11:00 PM	1	1	2	6	1	7	4	8	12	10	1	11	-	-	-	-	-	-	-	-	-	4	1	5
Total	1,158	408	1,566	987	409	1,396	1,152	430	1,582	777	342	1,119	-	-	-	-	-	-	-	-	-	1,073	409	1,481
Percent	74%	26%	-	71%	29%	-	73%	27%	-	69%	31%	-	-	-	-	-	-	-	-	-	-	72%	28%	-
AM Peak	08:00	11:00	08:00	08:00	11:00	08:00	08:00	11:00	08:00	11:00	11:00	11:00	-	-	-	-	-	-	-	-	-	08:00	11:00	08:00
Vol.	120	33	150	124	41	145	128	48	152	70	28	98	-	-	-	-	-	-	-	-	-	122	37	148
PM Peak	18:00	18:00	18:00	17:00	18:00	18:00	15:00	18:00	18:00	14:00	18:00	14:00	-	-	-	-	-	-	-	-	-	18:00	18:00	18:00
Vol.	87	45	132	91	36	127	90	38	122	74	32	94	-	-	-	-	-	-	-	-	-	89	41	130

1. Mid-week average includes data between Tuesday and Thursday.

Appendix C – Origin-Destination Data

		AM Peak																	
Zone ID	Row Labels	Origin	Destination	9 14 2 16 5 8 18 13 7 12 6 19 10 18 4															
				Embarcadero n/o Middlefield	Pagemill WB	Alma S of Oregon	Stanford@ El Camino	Copwer N/S @ Embarcadero	Waverly N/S @ Churchill	Middlefield S of Embarcadero	NB El Camino N of Embarcadero	Middlefield N of Embarcadero	Emerson @ Embarcadero	Almba N of Churchill	Copwer N/S @ Oregon	Webster @ Oregon Expy	WB Embarcadero	Sierra @ El Camino	Waverly N/S @ El Camino
16	Stanford@ El Camino		9%	0%	0%	0%	3%	0%	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	15%
9	Embarcadero n/o Middlefield		0%	2%	6%	5%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%
17	Waverly N/S @ Embarcadero		1%	4%	3%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%
5	Copwer N/S @ Embarcadero		0%	0%	4%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
7	SB El Camino N of Embarcadero		6%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
8	NB El Camino S of Churchill		6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
10	EB Embarcadero s/o El Camino		1%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
2	Alma S of Oregon		4%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	7%
14	Pagemill EB		2%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	5%
11	Emerson @ Embarcadero		1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
1	Alma N of Churchill		1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	3%
15	Sierra @ El Camino		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
13	Middlefield S of Embarcadero		0%	0%	0%	0%	0%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	2%
12	Middlefield N of Embarcadero		0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
6	Copwer N/S @ Oregon Expy		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
18	Waverly N/S @ Oregon Expy		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
3	Bryant N/S @ Oregon Expy		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	Webster @ Embarcadero		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Grand Total			36%	15%	14%	7%	6%	6%	4%	3%	2%	2%	1%	1%	1%	1%	0%	0%	100%

PM Peak

Sum of O-M-D Traffic (StL Index)		Column Labels																				
Zone ID	Origin	Destination	Row Labels																			
			Embarcadero n/o Middlefield 9	Alma S of Oregon 2	Copwer N/S @ Embarcadero 5	Waverly N/S @ Embarcadero 17	SB El Camino S of Embarcadero 13	Copwer N/S @ Churchill 8	Stanford@ El Camino 6	NB El Camino N of Embarcadero 7	Middlefield N of Embarcadero 12	Pagemill WB 14	Webster @ Embarcadero 19	Almba N of Churchill 1	Sierra @ El Camino 15	Emerson @ Embarcadero 11	Waverly N/S @ Oregon Expy 18	Bryant @ Embarcadero 3	WB Embarcadero s/o El Camino 10			
2	Alma S of Oregon	5%	0%	4%	1%	0%	0%	0%	0%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	13%	
9	Embarcadero n/o Middlefield	0%	5%	0%	0%	1%	1%	1%	1%	1%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	12%	
7	SB El Camino N of Embarcadero	8%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%	
5	Copwer N/S @ Embarcadero	0%	8%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	
17	Waverly N/S @ Embarcadero	1%	4%	0%	0%	0%	1%	1%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	10%	
16	Stanford@ El Camino	4%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	
1	Alma N of Churchill	4%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	
15	Sierra @ El Camino	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	
14	Pagemill EB	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	
8	NB El Camino S of Churchill	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	
13	Middlefield S of Embarcadero	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	
10	EB Embarcadero s/o El Camino	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	
11	Emerson @ Embarcadero	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	
12	Middlefield N of Embarcadero	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	
18	Waverly N/S @ Oregon Expy	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	
6	Copwer N/S @ Oregon Expy	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	
19	Webster @ Embarcadero	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
4	Bryant @ Embarcadero	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
3	Bryant N/S @ Oregon Expy	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Grand Total		36%	20%	7%	6%	6%	5%	4%	3%	3%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%	100%	

Appendix D – Existing Conditions Synchro Reports

- HCM Delay and LOS Reports
- 95th Percentile Queue Length Reports

Queues
1: Alma Street & Homer Ave

Existing Conditions
Timing Plan: A.M. Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	343	1131	665
v/c Ratio	0.65	0.71	0.42
Control Delay	29.9	20.2	15.5
Queue Delay	0.0	0.0	0.0
Total Delay	29.9	20.2	15.5
Queue Length 50th (ft)	64	221	108
Queue Length 95th (ft)	100	327	154
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	830	1841	1841
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.41	0.61	0.36
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Existing Conditions

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	199	93	1063	0	0	559
Future Volume (vph)	199	93	1063	0	0	559
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.90		1.00			1.00
Flpb, ped/bikes	0.84		1.00			1.00
Frt	0.95		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	2506		3539			3539
Flt Permitted	0.97		1.00			1.00
Satd. Flow (perm)	2506		3539			3539
Peak-hour factor, PHF	0.85	0.85	0.94	0.25	0.25	0.84
Adj. Flow (vph)	234	109	1131	0	0	665
RTOR Reduction (vph)	65	0	0	0	0	0
Lane Group Flow (vph)	278	0	1131	0	0	665
Confl. Peds. (#/hr)	82	102		13		
Confl. Bikes (#/hr)		1				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	13.3		35.3			35.3
Effective Green, g (s)	13.3		35.3			35.3
Actuated g/C Ratio	0.17		0.45			0.45
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	428		1605			1605
v/s Ratio Prot			c0.32			0.19
v/s Ratio Perm	c0.11					
v/c Ratio	0.65		0.70			0.41
Uniform Delay, d1	30.1		17.1			14.3
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	3.4		1.5			0.2
Delay (s)	33.4		18.6			14.5
Level of Service	C		B			B
Approach Delay (s)	33.4		18.6			14.5
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			19.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.52			
Actuated Cycle Length (s)			77.8		Sum of lost time (s)	13.0
Intersection Capacity Utilization			47.4%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

Existing Conditions
Timing Plan: A.M. Peak

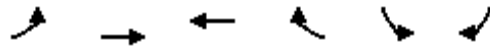
						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	40	23	1405	85	7	723
Future Volume (Veh/h)	40	23	1405	85	7	723
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	43	25	1448	88	8	786
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1912	779			1547	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1912	779			1547	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	26	93			98	
cM capacity (veh/h)	58	335			420	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	68	965	571	270	524	
Volume Left	43	0	0	8	0	
Volume Right	25	0	88	0	0	
cSH	83	1700	1700	420	1700	
Volume to Capacity	0.82	0.57	0.34	0.02	0.31	
Queue Length 95th (ft)	105	0	0	1	0	
Control Delay (s)	139.3	0.0	0.0	0.7	0.0	
Lane LOS	F			A		
Approach Delay (s)	139.3	0.0		0.2		
Approach LOS	F					
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			51.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Existing Conditions

Timing Plan: A.M. Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑			↗
Traffic Volume (veh/h)	0	753	1375	0	0	120
Future Volume (Veh/h)	0	753	1375	0	0	120
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.90	0.95	0.25	0.25	0.83
Hourly flow rate (vph)	0	837	1447	0	0	145
Pedestrians					33	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					3	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1480				1898	1480
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1480				1898	1480
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	437				59	111
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	418	418	1447	145		
Volume Left	0	0	0	0		
Volume Right	0	0	0	145		
cSH	1700	1700	1700	111		
Volume to Capacity	0.25	0.25	0.85	1.31		
Queue Length 95th (ft)	0	0	0	245		
Control Delay (s)	0.0	0.0	0.0	260.6		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	260.6		
Approach LOS				F		
Intersection Summary						
Average Delay			15.6			
Intersection Capacity Utilization			86.5%		ICU Level of Service	E
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Emerson St & Lincoln Ave

Existing Conditions
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	58	34	69	73	11	4	7	9	7	28	1
Future Volume (vph)	8	58	34	69	73	11	4	7	9	7	28	1
Peak Hour Factor	0.76	0.76	0.76	0.77	0.77	0.77	0.71	0.71	0.71	0.56	0.56	0.56
Hourly flow rate (vph)	11	76	45	90	95	14	6	10	13	13	50	2
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	132	199	29	65								
Volume Left (vph)	11	90	6	13								
Volume Right (vph)	45	14	13	2								
Hadj (s)	-0.15	0.08	-0.19	0.06								
Departure Headway (s)	4.2	4.4	4.5	4.7								
Degree Utilization, x	0.15	0.24	0.04	0.09								
Capacity (veh/h)	830	797	730	702								
Control Delay (s)	7.9	8.7	7.7	8.2								
Approach Delay (s)	7.9	8.7	7.7	8.2								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.3									
Level of Service			A									
Intersection Capacity Utilization			27.6%	ICU Level of Service		A						
Analysis Period (min)			15									

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

8: Alma Street & Kingsley Ave

Existing Conditions

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	13	1371	21	62	690
Future Volume (Veh/h)	10	13	1371	21	62	690
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.82	0.82	0.96	0.96	0.90	0.90
Hourly flow rate (vph)	12	16	1428	22	69	767
Pedestrians	7					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1968	1446			1457	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1968	1446			1457	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	74	87			85	
cM capacity (veh/h)	46	120			457	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	28	1450	325	511		
Volume Left	12	0	69	0		
Volume Right	16	22	0	0		
cSH	71	1700	457	1700		
Volume to Capacity	0.39	0.85	0.15	0.30		
Queue Length 95th (ft)	38	0	13	0		
Control Delay (s)	85.0	0.0	5.0	0.0		
Lane LOS	F		A			
Approach Delay (s)	85.0	0.0	2.0			
Approach LOS	F					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			83.4%		ICU Level of Service	E
Analysis Period (min)			15			

Queues
9: Alma St & Churchill Ave

Existing Conditions
Timing Plan: A.M. Peak



Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	189	195	179	224	1388	6	632	174
v/c Ratio	0.86	0.56	0.95	2.36	0.59	0.08	0.29	0.17
Control Delay	111.7	14.7	132.7	674.9	18.6	88.4	17.8	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	111.7	14.7	132.7	674.9	18.6	88.4	17.8	4.8
Queue Length 50th (ft)	229	0	221	~473	459	7	188	22
Queue Length 95th (ft)	274	37	#269	#654	620	27	225	57
Internal Link Dist (ft)	340		479		698		387	
Turn Bay Length (ft)				300		60		100
Base Capacity (vph)	241	364	189	95	2372	302	2157	1015
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.54	0.95	2.36	0.59	0.02	0.29	0.17

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	56	150	71	55	5	199	1216	20	5	569	157
Future Volume (vph)	89	56	150	71	55	5	199	1216	20	5	569	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.92		0.98		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1807	1463		1767		1770	3529		1770	3539	1583
Flt Permitted		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1807	1463		1767		1770	3529		1770	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.73	0.73	0.73	0.89	0.89	0.89	0.90	0.90	0.90
Adj. Flow (vph)	116	73	195	97	75	7	224	1366	22	6	632	174
RTOR Reduction (vph)	0	0	171	0	1	0	0	0	0	0	0	50
Lane Group Flow (vph)	0	189	24	0	178	0	224	1388	0	6	632	124
Confl. Peds. (#/hr)			23			101			24			
Confl. Bikes (#/hr)			4			258						
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			8									2
Actuated Green, G (s)		22.9	22.9		20.0		10.1	122.5		1.6	114.0	114.0
Effective Green, g (s)		22.9	22.9		20.0		10.1	122.5		1.6	114.0	114.0
Actuated g/C Ratio		0.12	0.12		0.11		0.05	0.66		0.01	0.61	0.61
Clearance Time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	6.0		3.0	6.0	6.0
Lane Grp Cap (vph)		221	179		188		95	2311		15	2157	965
v/s Ratio Prot		c0.10			c0.10		c0.13	c0.39		0.00	0.18	
v/s Ratio Perm			0.02									0.08
v/c Ratio		0.86	0.13		0.95		2.36	0.60		0.40	0.29	0.13
Uniform Delay, d1		80.4	73.2		83.0		88.5	18.3		92.2	17.3	15.5
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		26.1	0.3		50.0		642.4	0.8		16.6	0.3	0.3
Delay (s)		106.5	73.5		133.0		730.8	19.1		108.8	17.7	15.7
Level of Service		F	E		F		F	B		F	B	B
Approach Delay (s)		89.8			133.0			118.0			17.9	
Approach LOS		F			F			F			B	
Intersection Summary												
HCM 2000 Control Delay			88.1				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			187.0				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			74.1%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

10: Emerson St & Churchill Ave

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	76	10	5	84	7	34	75	8	10	15	14
Future Volume (vph)	10	76	10	5	84	7	34	75	8	10	15	14
Peak Hour Factor	0.75	0.75	0.75	0.86	0.86	0.86	0.70	0.70	0.70	0.54	0.54	0.54
Hourly flow rate (vph)	13	101	13	6	98	8	49	107	11	19	28	26
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	127	112	167	73								
Volume Left (vph)	13	6	49	19								
Volume Right (vph)	13	8	11	26								
Hadj (s)	-0.01	0.00	0.05	-0.13								
Departure Headway (s)	4.6	4.6	4.6	4.6								
Degree Utilization, x	0.16	0.14	0.21	0.09								
Capacity (veh/h)	728	725	738	733								
Control Delay (s)	8.5	8.4	8.9	8.0								
Approach Delay (s)	8.5	8.4	8.9	8.0								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				8.5								
Level of Service				A								
Intersection Capacity Utilization				26.2%	ICU Level of Service		A					
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	75	8	2	72	37	9	20	3	12	8	16
Future Volume (Veh/h)	11	75	8	2	72	37	9	20	3	12	8	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.87	0.87	0.87	0.57	0.57	0.57	0.47	0.47	0.47
Hourly flow rate (vph)	15	106	11	2	83	43	16	35	5	26	17	34
Pedestrians		17			14			4			11	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		2			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	268	189	55	238	204	62	68			54		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	268	189	55	238	204	62	68			54		
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	84	99	100	87	96	99			98		
cM capacity (veh/h)	551	666	992	586	654	979	1508			1531		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	132	128	56	77								
Volume Left	15	2	16	26								
Volume Right	11	43	5	34								
cSH	669	735	1508	1531								
Volume to Capacity	0.20	0.17	0.01	0.02								
Queue Length 95th (ft)	18	16	1	1								
Control Delay (s)	11.7	10.9	2.2	2.6								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.7	10.9	2.2	2.6								
Approach LOS	B	B										
Intersection Summary												
Average Delay			8.3									
Intersection Capacity Utilization			25.6%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Existing Conditions
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	12	60	9	2	31	16	17	98	11	4	74	23
Future Volume (vph)	12	60	9	2	31	16	17	98	11	4	74	23
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.72	0.72	0.72	0.62	0.62	0.62
Hourly flow rate (vph)	14	68	10	2	35	18	24	136	15	6	119	37
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	92	55	175	162								
Volume Left (vph)	14	2	24	6								
Volume Right (vph)	10	18	15	37								
Hadj (s)	0.00	-0.16	0.01	-0.10								
Departure Headway (s)	4.7	4.6	4.5	4.4								
Degree Utilization, x	0.12	0.07	0.22	0.20								
Capacity (veh/h)	700	709	774	783								
Control Delay (s)	8.4	8.0	8.7	8.4								
Approach Delay (s)	8.4	8.0	8.7	8.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.5									
Level of Service			A									
Intersection Capacity Utilization			29.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

13: Cowper St & Churchill Ave

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	62	7	5	24	1	23	23	6	2	21	12
Future Volume (vph)	5	62	7	5	24	1	23	23	6	2	21	12
Peak Hour Factor	0.88	0.88	0.88	0.75	0.75	0.75	0.72	0.72	0.72	0.58	0.58	0.58
Hourly flow rate (vph)	6	70	8	7	32	1	32	32	8	3	36	21
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	84	40	72	60								
Volume Left (vph)	6	7	32	3								
Volume Right (vph)	8	1	8	21								
Hadj (s)	-0.01	0.05	0.06	-0.17								
Departure Headway (s)	4.2	4.3	4.3	4.1								
Degree Utilization, x	0.10	0.05	0.09	0.07								
Capacity (veh/h)	822	789	805	848								
Control Delay (s)	7.7	7.5	7.7	7.4								
Approach Delay (s)	7.7	7.5	7.7	7.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.6								
Level of Service				A								
Intersection Capacity Utilization				21.3%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

14: Churchill Ave & Embarcadero Rd

Existing Conditions
Timing Plan: A.M. Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	843	2	37	949	0	80
Future Volume (Veh/h)	843	2	37	949	0	80
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.81	0.81	0.25	0.83
Hourly flow rate (vph)	969	2	46	1172	0	96
Pedestrians					11	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.81		0.81	0.81
vC, conflicting volume			980		1659	496
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			500		1340	0
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		100	89
cM capacity (veh/h)			848		109	867
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	646	325	437	781	96	
Volume Left	0	0	46	0	0	
Volume Right	0	2	0	0	96	
cSH	1700	1700	848	1700	867	
Volume to Capacity	0.38	0.19	0.05	0.46	0.11	
Queue Length 95th (ft)	0	0	4	0	9	
Control Delay (s)	0.0	0.0	1.6	0.0	9.7	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.6		9.7	
Approach LOS					A	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			56.6%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

15: Cowper St & Embarcadero Rd

Existing Conditions
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	843	20	11	926	13	5	3	6	4	8	46
Future Volume (Veh/h)	14	843	20	11	926	13	5	3	6	4	8	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.82	0.82	0.82	0.58	0.58	0.58	0.69	0.69	0.69
Hourly flow rate (vph)	16	947	22	13	1129	16	9	5	10	6	12	67
Pedestrians					1			8			28	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			1			3	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.79			0.79	0.79	0.79	0.79	0.79	
vC, conflicting volume	1173			977			1662	2197	494	1710	2200	600
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1173			440			1306	1984	0	1367	1988	600
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			85	89	99	91	73	84
cM capacity (veh/h)	575			876			58	44	849	69	44	432
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	490	496	578	580	24	85						
Volume Left	16	0	13	0	9	6						
Volume Right	0	22	0	16	10	67						
cSH	575	1700	876	1700	86	165						
Volume to Capacity	0.03	0.29	0.01	0.34	0.28	0.51						
Queue Length 95th (ft)	2	0	1	0	26	63						
Control Delay (s)	0.8	0.0	0.4	0.0	62.4	47.8						
Lane LOS	A		A		F	E						
Approach Delay (s)	0.4		0.2		62.4	47.8						
Approach LOS					F	E						
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			44.2%		ICU Level of Service		A					
Analysis Period (min)			15									

Queues

16: Waverly St & Embarcadero Rd

Existing Conditions

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	44	889	30	1128	240	362
v/c Ratio	0.66	0.69	0.27	0.88	0.32	0.44
Control Delay	66.0	26.2	32.9	42.1	14.6	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.0	26.2	32.9	42.1	14.6	16.3
Queue Length 50th (ft)	26	282	15	387	85	139
Queue Length 95th (ft)	#92	356	39	424	119	172
Internal Link Dist (ft)		572		576	78	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	67	1280	110	1281	754	830
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.69	0.27	0.88	0.32	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	794	33	25	911	25	77	93	24	65	101	117
Future Volume (vph)	41	794	33	25	911	25	77	93	24	65	101	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.98			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3513		1763	3518			1787			1716	
Flt Permitted	0.10	1.00		0.16	1.00			0.75			0.87	
Satd. Flow (perm)	186	3513		303	3518			1374			1509	
Peak-hour factor, PHF	0.93	0.93	0.93	0.83	0.83	0.83	0.81	0.81	0.81	0.78	0.78	0.78
Adj. Flow (vph)	44	854	35	30	1098	30	95	115	30	83	129	150
RTOR Reduction (vph)	0	3	0	0	2	0	0	5	0	0	6	0
Lane Group Flow (vph)	44	886	0	30	1126	0	0	235	0	0	356	0
Confl. Peds. (#/hr)	27		9	9		27	22		9	9		22
Confl. Bikes (#/hr)									2			13
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	40.0	40.0		40.0	40.0			60.0			60.0	
Effective Green, g (s)	40.0	40.0		40.0	40.0			60.0			60.0	
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.55			0.55	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	67	1277		110	1279			749			823	
v/s Ratio Prot		0.25			c0.32							
v/s Ratio Perm	0.24			0.10				0.17			c0.24	
v/c Ratio	0.66	0.69		0.27	0.88			0.31			0.43	
Uniform Delay, d1	29.3	29.8		24.7	32.8			13.7			14.9	
Progression Factor	0.75	0.78		1.00	1.00			1.00			1.00	
Incremental Delay, d2	19.1	1.5		1.3	7.4			1.1			1.7	
Delay (s)	41.2	24.7		26.1	40.1			14.8			16.5	
Level of Service	D	C		C	D			B			B	
Approach Delay (s)		25.5			39.8			14.8			16.5	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay	29.5			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			10.0					
Intersection Capacity Utilization	61.3%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Existing Conditions
Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	53	1164	57	1161	22	52
v/c Ratio	0.19	0.46	0.20	0.45	0.05	0.14
Control Delay	9.4	8.6	23.3	24.2	0.2	2.7
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	9.4	8.6	23.3	24.5	0.2	2.7
Queue Length 50th (ft)	13	193	33	400	0	0
Queue Length 95th (ft)	29	203	m44	m464	0	0
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	278	2529	281	2560	475	422
Starvation Cap Reductn	0	0	0	667	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.46	0.20	0.61	0.05	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

17: Bryant St & Embarcadero Rd

Existing Conditions

Timing Plan: A.M. Peak

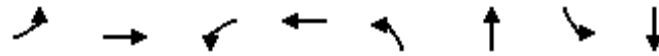
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	829	114	52	1032	36	0	0	13	0	0	37
Future Volume (vph)	43	829	114	52	1032	36	0	0	13	0	0	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99				0.94			0.89
Flpb, ped/bikes	0.98	1.00		0.99	1.00				1.00			1.00
Frt	1.00	0.98		1.00	0.99				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1729	3451		1759	3501				1515			1426
Flt Permitted	0.21	1.00		0.21	1.00				1.00			1.00
Satd. Flow (perm)	380	3451		386	3501				1515			1426
Peak-hour factor, PHF	0.81	0.81	0.81	0.92	0.92	0.92	0.25	0.25	0.58	0.25	0.25	0.71
Adj. Flow (vph)	53	1023	141	57	1122	39	0	0	22	0	0	52
RTOR Reduction (vph)	0	8	0	0	2	0	0	0	18	0	0	42
Lane Group Flow (vph)	53	1156	0	57	1159	0	0	0	4	0	0	10
Confl. Peds. (#/hr)	64		16	16		64			16			32
Confl. Bikes (#/hr)									26			61
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	78.4	78.4		78.4	78.4				21.6			21.6
Effective Green, g (s)	78.4	78.4		78.4	78.4				21.6			21.6
Actuated g/C Ratio	0.71	0.71		0.71	0.71				0.20			0.20
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	270	2459		275	2495				297			280
v/s Ratio Prot		c0.33			0.33							
v/s Ratio Perm	0.14			0.15					0.00			c0.01
v/c Ratio	0.20	0.47		0.21	0.46				0.01			0.04
Uniform Delay, d1	5.3	6.8		5.3	6.8				35.6			35.8
Progression Factor	1.00	1.00		2.82	2.96				1.00			1.00
Incremental Delay, d2	1.6	0.6		1.0	0.4				0.0			0.1
Delay (s)	6.9	7.5		16.0	20.5				35.6			35.8
Level of Service	A	A		B	C				D			D
Approach Delay (s)		7.4			20.2			35.6			35.8	
Approach LOS		A			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			14.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			55.8%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

18: Middlefield Rd & Embarcadero Rd

Existing Conditions

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	44	1023	57	1215	161	364	120	275
v/c Ratio	0.44	1.06	0.55	1.26	0.90	0.55	0.75	0.85
Control Delay	84.0	97.4	89.9	171.0	112.3	59.7	94.9	84.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.0	97.4	89.9	171.0	112.3	59.7	94.9	84.3
Queue Length 50th (ft)	44	~646	56	~850	162	175	118	268
Queue Length 95th (ft)	78	#687	90	#817	#245	198	174	334
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	115	966	115	961	184	718	184	375
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	1.06	0.50	1.26	0.88	0.51	0.65	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

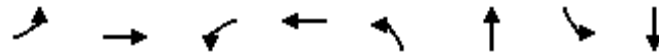
18: Middlefield Rd & Embarcadero Rd

Existing Conditions
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	772	46	43	809	115	129	273	18	100	205	23
Future Volume (vph)	35	772	46	43	809	115	129	273	18	100	205	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3497		1770	3447		1770	3500		1770	1827	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3497		1770	3447		1770	3500		1770	1827	
Peak-hour factor, PHF	0.80	0.80	0.80	0.76	0.76	0.76	0.80	0.80	0.80	0.83	0.83	0.83
Adj. Flow (vph)	44	965	58	57	1064	151	161	341	22	120	247	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	44	1023	0	57	1215	0	161	364	0	120	275	0
Confl. Peds. (#/hr)			24			44			8			14
Confl. Bikes (#/hr)						1			1			2
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.2	41.6		7.6	42.0		15.6	28.9		13.9	27.2	
Effective Green, g (s)	7.2	41.6		7.6	42.0		15.6	28.9		13.9	27.2	
Actuated g/C Ratio	0.05	0.27		0.05	0.27		0.10	0.19		0.09	0.18	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	83	947		87	943		179	658		160	323	
v/s Ratio Prot	0.02	0.29		c0.03	c0.35		c0.09	0.10		0.07	c0.15	
v/s Ratio Perm												
v/c Ratio	0.53	1.08		0.66	1.29		0.90	0.55		0.75	0.85	
Uniform Delay, d1	71.5	55.9		71.7	55.8		68.2	56.4		68.1	61.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.0	53.4		14.7	137.8		39.5	1.0		17.0	18.9	
Delay (s)	76.5	109.4		86.4	193.6		107.7	57.5		85.1	80.1	
Level of Service	E	F		F	F		F	E		F	F	
Approach Delay (s)		108.0			188.8			72.9			81.6	
Approach LOS		F			F			E			F	
Intersection Summary												
HCM 2000 Control Delay		130.7			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		0.73										
Actuated Cycle Length (s)		153.5			Sum of lost time (s)			22.5				
Intersection Capacity Utilization		66.8%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Existing Conditions
Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	276	1134	299	1391	69	296	187	645
v/c Ratio	1.17	0.67	0.86	0.70	0.42	0.36	0.85	0.70
Control Delay	166.5	44.7	101.1	44.2	70.7	45.1	94.8	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	166.5	44.7	101.1	44.2	70.7	45.1	94.8	49.3
Queue Length 50th (ft)	~321	347	311	292	66	123	179	274
Queue Length 95th (ft)	#509	401	m#424	348	113	157	#290	345
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	236	1692	346	2000	166	879	247	1106
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.67	0.86	0.70	0.42	0.34	0.76	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Existing Conditions
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	1034	89	275	1154	126	61	204	60	178	407	206
Future Volume (vph)	273	1034	89	275	1154	126	61	204	60	178	407	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5009		1770	4998		1770	3401		1770	3254	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5009		1770	4998		1770	3401		1770	3254	
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.89	0.89	0.89	0.95	0.95	0.95
Adj. Flow (vph)	276	1044	90	299	1254	137	69	229	67	187	428	217
RTOR Reduction (vph)	0	7	0	0	8	0	0	18	0	0	46	0
Lane Group Flow (vph)	276	1127	0	299	1383	0	69	278	0	187	599	0
Confl. Peds. (#/hr)			17			9			11			74
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	20.0	50.5		29.3	59.8		14.1	35.4		18.8	40.1	
Effective Green, g (s)	20.0	50.5		29.3	59.8		14.1	35.4		18.8	40.1	
Actuated g/C Ratio	0.13	0.34		0.20	0.40		0.09	0.24		0.13	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	236	1686		345	1992		166	802		221	869	
v/s Ratio Prot	c0.16	0.23		c0.17	c0.28		c0.04	0.08		c0.11	c0.18	
v/s Ratio Perm												
v/c Ratio	1.17	0.67		0.87	0.69		0.42	0.35		0.85	0.69	
Uniform Delay, d1	65.0	42.6		58.5	37.5		64.1	47.7		64.2	49.4	
Progression Factor	1.00	1.00		1.57	1.14		1.00	1.00		1.00	1.00	
Incremental Delay, d2	112.1	2.1		10.7	1.0		1.2	0.1		23.7	1.8	
Delay (s)	177.1	44.7		102.7	43.7		65.3	47.8		87.9	51.2	
Level of Service	F	D		F	D		E	D		F	D	
Approach Delay (s)		70.6			54.2			51.1			59.4	
Approach LOS		E			D			D			E	
Intersection Summary												
HCM 2000 Control Delay		60.3			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		0.78										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		95.6%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Existing Conditions
Timing Plan: A.M. Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	334	1875	218	90	1215
v/c Ratio	0.92	0.85	0.32	0.62	0.44
Control Delay	84.2	45.7	26.4	61.6	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	84.2	45.7	26.4	61.6	32.5
Queue Length 50th (ft)	292	~678	116	87	439
Queue Length 95th (ft)	#457	#824	194	m128	489
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	392	2200	691	259	2749
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.85	0.85	0.32	0.35	0.44
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Existing Conditions
Timing Plan: A.M. Peak

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T	T	T	T
Traffic Volume (vph)	158	149	1650	192	83	1118
Future Volume (vph)	158	149	1650	192	83	1118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1681		5085	1534	1770	5085
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1681		5085	1534	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.88	0.88	0.92	0.92
Adj. Flow (vph)	172	162	1875	218	90	1215
RTOR Reduction (vph)	23	0	0	31	0	0
Lane Group Flow (vph)	311	0	1875	187	90	1215
Confl. Peds. (#/hr)		5		10		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	30.3		64.3	64.3	12.2	80.5
Effective Green, g (s)	30.3		64.3	64.3	12.2	80.5
Actuated g/C Ratio	0.20		0.43	0.43	0.08	0.54
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	339		2179	657	143	2728
v/s Ratio Prot	c0.18		c0.37		c0.05	0.24
v/s Ratio Perm				0.12		
v/c Ratio	0.92		0.86	0.28	0.63	0.45
Uniform Delay, d1	58.6		38.8	27.9	66.7	21.2
Progression Factor	1.00		1.00	1.00	0.71	1.36
Incremental Delay, d2	28.2		4.7	1.1	4.6	0.4
Delay (s)	86.9		43.5	29.0	52.2	29.2
Level of Service	F		D	C	D	C
Approach Delay (s)	86.9		42.0			30.8
Approach LOS	F		D			C
Intersection Summary						
HCM 2000 Control Delay			42.1		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			66.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing Conditions

Timing Plan: A.M. Peak

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	301	604	233	314	1444	362	930	177	221	1247
v/c Ratio	0.85	0.43	0.41	0.84	1.03	0.82	0.59	0.19	0.78	0.90
Control Delay	104.8	59.8	10.3	102.0	94.2	95.0	40.7	18.9	103.8	61.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	104.8	59.8	10.3	102.0	94.2	95.0	40.7	18.9	103.8	61.7
Queue Length 50th (ft)	193	233	10	202	~734	228	445	100	142	755
Queue Length 95th (ft)	247	300	98	253	#945	#307	508	132	188	794
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			100	
Base Capacity (vph)	424	1403	574	496	1399	451	1583	966	749	1578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.43	0.41	0.63	1.03	0.80	0.59	0.18	0.30	0.79

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing Conditions
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  		 	 		 	 	
Traffic Volume (vph)	289	580	224	295	1158	199	329	846	161	212	1026	171
Future Volume (vph)	289	580	224	295	1158	199	329	846	161	212	1026	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3449	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3449	
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.91	0.91	0.91	0.96	0.96	0.96
Adj. Flow (vph)	301	604	233	314	1232	212	362	930	177	221	1069	178
RTOR Reduction (vph)	0	0	161	0	11	0	0	0	0	0	8	0
Lane Group Flow (vph)	301	604	72	314	1433	0	362	930	177	221	1239	0
Confl. Peds. (#/hr)			21			27			29			8
Confl. Bikes (#/hr)						3						1
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	19.7	52.4	52.4	20.8	53.5		24.6	85.1	110.4	15.7	76.2	
Effective Green, g (s)	19.7	52.4	52.4	20.8	53.5		24.6	85.1	110.4	15.7	76.2	
Actuated g/C Ratio	0.10	0.28	0.28	0.11	0.28		0.13	0.45	0.58	0.08	0.40	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	355	1402	413	375	1386		444	1585	919	283	1383	
v/s Ratio Prot	0.09	0.12		c0.09	c0.29		c0.11	0.26	0.11	0.06	c0.36	
v/s Ratio Perm			0.05									
v/c Ratio	0.85	0.43	0.17	0.84	1.03		0.82	0.59	0.19	0.78	0.90	
Uniform Delay, d1	83.7	56.5	52.4	82.9	68.2		80.5	39.3	18.8	85.5	53.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	16.3	1.0	0.9	14.3	33.3		11.0	0.4	0.0	12.1	7.7	
Delay (s)	99.9	57.5	53.3	97.3	101.5		91.5	39.6	18.8	97.6	60.9	
Level of Service	F	E	D	F	F		F	D	B	F	E	
Approach Delay (s)		67.9			100.8			49.9			66.4	
Approach LOS		E			F			D			E	
Intersection Summary												
HCM 2000 Control Delay			72.9			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			92.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	10	0	74	0	1585	351	0	599	187
Future Volume (Veh/h)	0	0	0	10	0	74	0	1585	351	0	599	187
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.95	0.25	0.95	0.92	0.98	0.98	0.25	0.84	0.84
Hourly flow rate (vph)	0	0	0	11	0	78	0	1617	358	0	713	223
Pedestrians	19											
Lane Width (ft)	12.0											
Walking Speed (ft/s)	3.5											
Percent Blockage	2											
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1711	2818	468	1992	2572	828	936				1994	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1711	2818	468	1992	2572	828	936				1994	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	68	100	75	100				100	
cM capacity (veh/h)	43	17	542	35	25	309	727				279	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	11	78	808	808	358	475	461					
Volume Left	11	0	0	0	0	0	0					
Volume Right	0	78	0	0	358	0	223					
cSH	35	309	1700	1700	1700	1700	1700					
Volume to Capacity	0.32	0.25	0.48	0.48	0.21	0.28	0.27					
Queue Length 95th (ft)	26	25	0	0	0	0	0					
Control Delay (s)	151.3	20.6	0.0	0.0	0.0	0.0	0.0					
Lane LOS	F	C										
Approach Delay (s)	36.7	0.0		0.0								
Approach LOS	E											
Intersection Summary												
Average Delay	1.1											
Intersection Capacity Utilization	55.1%			ICU Level of Service				B				
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

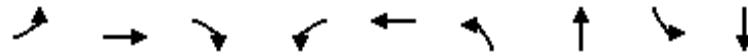
22b: Alma St & Oregon Expy EB Ramps

Existing Conditions
Timing Plan: A.M. Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	266	1670	151	74	535	
Future Volume (Veh/h)	0	266	1670	151	74	535	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.90	0.98	0.98	0.84	0.84	
Hourly flow rate (vph)	0	296	1704	154	88	637	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2198	852			1704		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2198	852			1704		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	2			76		
cM capacity (veh/h)	29	303			369		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	296	852	852	154	88	318	318
Volume Left	0	0	0	0	88	0	0
Volume Right	296	0	0	154	0	0	0
cSH	303	1700	1700	1700	369	1700	1700
Volume to Capacity	0.98	0.50	0.50	0.09	0.24	0.19	0.19
Queue Length 95th (ft)	253	0	0	0	23	0	0
Control Delay (s)	84.2	0.0	0.0	0.0	17.8	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	84.2	0.0			2.2		
Approach LOS	F						
Intersection Summary							
Average Delay			9.2				
Intersection Capacity Utilization			69.3%		ICU Level of Service		C
Analysis Period (min)			15				

Queues
23: Cowper St & Oregon Expy

Existing Conditions
Timing Plan: A.M. Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	1533	54	27	1635	150	127	45	91
v/c Ratio	0.21	0.70	0.05	0.27	0.75	0.80	0.40	0.36	0.40
Control Delay	72.7	24.6	1.1	85.3	20.9	93.7	48.4	73.9	48.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	24.6	1.1	85.3	20.9	93.7	48.4	73.9	48.5
Queue Length 50th (ft)	19	463	0	28	771	149	99	43	67
Queue Length 95th (ft)	48	785	8	m27	m825	#185	106	60	73
Internal Link Dist (ft)		1547			1028		66		60
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	156	2177	984	154	2186	188	370	165	372
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.70	0.05	0.18	0.75	0.80	0.34	0.27	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	1395	49	26	1555	14	102	48	38	29	35	24
Future Volume (vph)	18	1395	49	26	1555	14	102	48	38	29	35	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.93		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1546	1770	3533		1770	1700		1770	1722	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1546	1770	3533		1770	1700		1770	1722	
Peak-hour factor, PHF	0.91	0.91	0.91	0.96	0.96	0.96	0.68	0.68	0.68	0.65	0.65	0.65
Adj. Flow (vph)	20	1533	54	27	1620	15	150	71	56	45	54	37
RTOR Reduction (vph)	0	0	22	0	0	0	0	20	0	0	18	0
Lane Group Flow (vph)	20	1533	32	27	1635	0	150	107	0	45	73	0
Confl. Peds. (#/hr)			1			11			8			10
Confl. Bikes (#/hr)									25			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	5.1	89.4	89.4	5.4	89.9		16.0	26.2		8.9	19.3	
Effective Green, g (s)	5.1	89.4	89.4	5.4	89.9		16.0	26.2		8.9	19.3	
Actuated g/C Ratio	0.03	0.60	0.60	0.04	0.60		0.11	0.17		0.06	0.13	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	60	2109	921	63	2117		188	296		105	221	
v/s Ratio Prot	0.01	0.43		c0.02	c0.46		c0.08	c0.06		0.03	0.04	
v/s Ratio Perm			0.02									
v/c Ratio	0.33	0.73	0.03	0.43	0.77		0.80	0.36		0.43	0.33	
Uniform Delay, d1	70.8	21.6	12.5	70.8	22.4		65.4	54.5		68.1	59.5	
Progression Factor	1.00	1.00	1.00	1.22	0.85		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	2.2	0.1	2.0	1.2		23.2	0.8		3.8	0.9	
Delay (s)	74.1	23.8	12.6	88.3	20.2		88.6	55.3		71.9	60.3	
Level of Service	E	C	B	F	C		F	E		E	E	
Approach Delay (s)		24.1			21.3			73.3			64.2	
Approach LOS		C			C			E			E	
Intersection Summary												
HCM 2000 Control Delay			28.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			20.1			
Intersection Capacity Utilization			69.2%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

Queues
24: Middlefield Rd & Oregon Expy

Existing Conditions
Timing Plan: A.M. Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	128	1284	167	120	1254	56	296	428	238	98	460
v/c Ratio	0.67	0.90	0.24	0.68	0.90	0.09	1.02	0.86	0.43	0.64	0.66
Control Delay	89.1	57.0	23.2	83.7	53.5	0.3	117.7	69.0	10.8	84.3	51.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.1	57.0	23.2	83.7	53.5	0.3	117.7	69.0	10.8	84.3	51.5
Queue Length 50th (ft)	111	402	25	115	625	0	~305	385	24	94	182
Queue Length 95th (ft)	m#191	#844	m147	182	#774	0	#489	#534	95	154	235
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	191	1420	707	224	1386	601	291	527	578	184	788
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.90	0.24	0.54	0.90	0.09	1.02	0.81	0.41	0.53	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Existing Conditions

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	115	1156	150	115	1204	54	263	381	212	86	257	148
Future Volume (vph)	115	1156	150	115	1204	54	263	381	212	86	257	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.83	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Peak-hour factor, PHF	0.90	0.90	0.90	0.96	0.96	0.96	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	128	1284	167	120	1254	56	296	428	238	98	292	168
RTOR Reduction (vph)	0	0	81	0	0	34	0	0	149	0	57	0
Lane Group Flow (vph)	128	1284	86	120	1254	22	296	428	89	98	403	0
Confl. Peds. (#/hr)			1			51			27			4
Confl. Bikes (#/hr)						2						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	16.2	60.2	60.2	15.0	58.8	58.8	24.7	40.3	40.3	13.1	28.8	
Effective Green, g (s)	16.2	60.2	60.2	15.0	58.8	58.8	24.7	40.3	40.3	13.1	28.8	
Actuated g/C Ratio	0.11	0.40	0.40	0.10	0.39	0.39	0.16	0.27	0.27	0.09	0.19	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	191	1420	626	177	1387	517	291	500	409	154	638	
v/s Ratio Prot	0.07	c0.36		0.07	c0.35		c0.17	c0.23		0.06	0.12	
v/s Ratio Perm			0.06			0.02			0.06			
v/c Ratio	0.67	0.90	0.14	0.68	0.90	0.04	1.02	0.86	0.22	0.64	0.63	
Uniform Delay, d1	64.3	42.2	28.5	65.2	42.9	28.2	62.6	52.1	42.6	66.1	55.7	
Progression Factor	1.18	1.17	2.69	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.5	7.4	0.3	9.9	9.9	0.2	57.2	14.7	0.6	8.3	2.1	
Delay (s)	82.2	56.6	76.8	75.0	52.9	28.3	119.9	66.8	43.2	74.5	57.8	
Level of Service	F	E	E	E	D	C	F	E	D	E	E	
Approach Delay (s)		60.8			53.8			77.3			60.7	
Approach LOS		E			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			62.1		HCM 2000 Level of Service				E			
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			150.0		Sum of lost time (s)				21.6			
Intersection Capacity Utilization			97.7%		ICU Level of Service				F			
Analysis Period (min)			15									
c Critical Lane Group												

c Critical Lane Group

Queues
1: Alma Street & Homer Ave

Existing Conditions
Timing Plan: P.M.Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	529	1114	951
v/c Ratio	0.74	0.68	0.58
Control Delay	34.6	21.5	19.5
Queue Delay	0.0	0.0	0.0
Total Delay	34.6	21.5	19.5
Queue Length 50th (ft)	131	258	207
Queue Length 95th (ft)	189	343	277
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	852	1864	1864
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.62	0.60	0.51
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Existing Conditions

Timing Plan: P.M.Peak

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Volume (vph)	356	126	1081	0	0	894
Future Volume (vph)	356	126	1081	0	0	894
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.96		1.00			1.00
Flpb, ped/bikes	0.88		1.00			1.00
Frt	0.96		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	2832		3539			3539
Flt Permitted	0.96		1.00			1.00
Satd. Flow (perm)	2832		3539			3539
Peak-hour factor, PHF	0.91	0.91	0.97	0.25	0.25	0.94
Adj. Flow (vph)	391	138	1114	0	0	951
RTOR Reduction (vph)	38	0	0	0	0	0
Lane Group Flow (vph)	491	0	1114	0	0	951
Confl. Peds. (#/hr)	77	61		28		
Confl. Bikes (#/hr)		3				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	19.2		37.0			37.0
Effective Green, g (s)	19.2		37.0			37.0
Actuated g/C Ratio	0.24		0.46			0.46
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	672		1618			1618
v/s Ratio Prot			c0.31			0.27
v/s Ratio Perm	c0.17					
v/c Ratio	0.73		0.69			0.59
Uniform Delay, d1	28.5		17.4			16.3
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	4.1		1.3			0.7
Delay (s)	32.5		18.7			16.9
Level of Service	C		B			B
Approach Delay (s)	32.5		18.7			16.9
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			20.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			80.9		Sum of lost time (s)	13.0
Intersection Capacity Utilization			52.7%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

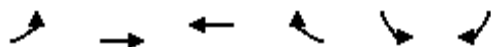
Existing Conditions
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	18	1479	84	18	1205
Future Volume (Veh/h)	30	18	1479	84	18	1205
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.94	0.94	0.95	0.95
Hourly flow rate (vph)	40	24	1573	89	19	1268
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2302	843			1674	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2302	843			1674	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	92			95	
cM capacity (veh/h)	30	304			375	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	64	1049	613	442	845	
Volume Left	40	0	0	19	0	
Volume Right	24	0	89	0	0	
cSH	46	1700	1700	375	1700	
Volume to Capacity	1.39	0.62	0.36	0.05	0.50	
Queue Length 95th (ft)	154	0	0	4	0	
Control Delay (s)	410.1	0.0	0.0	1.6	0.0	
Lane LOS	F			A		
Approach Delay (s)	410.1	0.0		0.6		
Approach LOS	F					
Intersection Summary						
Average Delay			8.9			
Intersection Capacity Utilization			56.0%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Existing Conditions
Timing Plan: P.M.Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑			↗
Traffic Volume (veh/h)	0	1234	1455	0	0	106
Future Volume (Veh/h)	0	1234	1455	0	0	106
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.98	0.98	0.25	0.25	0.66
Hourly flow rate (vph)	0	1259	1485	0	0	161
Pedestrians					18	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1503				2132	1503
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1503				2132	1503
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	434				42	109
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	630	630	1485	161		
Volume Left	0	0	0	0		
Volume Right	0	0	0	161		
cSH	1700	1700	1700	109		
Volume to Capacity	0.37	0.37	0.87	1.48		
Queue Length 95th (ft)	0	0	0	293		
Control Delay (s)	0.0	0.0	0.0	330.5		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	330.5		
Approach LOS				F		
Intersection Summary						
Average Delay			18.3			
Intersection Capacity Utilization			89.8%		ICU Level of Service	
Analysis Period (min)			15			
					E	

HCM Unsignalized Intersection Capacity Analysis

5: Emerson St & Lincoln Ave

Existing Conditions

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	70	47	29	50	8	2	31	2	8	19	0
Future Volume (vph)	7	70	47	29	50	8	2	31	2	8	19	0
Peak Hour Factor	0.78	0.78	0.78	0.73	0.73	0.73	0.88	0.88	0.88	0.84	0.84	0.84
Hourly flow rate (vph)	9	90	60	40	68	11	2	35	2	10	23	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	159	119	39	33								
Volume Left (vph)	9	40	2	10								
Volume Right (vph)	60	11	2	0								
Hadj (s)	-0.18	0.05	0.01	0.09								
Departure Headway (s)	4.0	4.3	4.6	4.6								
Degree Utilization, x	0.18	0.14	0.05	0.04								
Capacity (veh/h)	874	821	737	718								
Control Delay (s)	7.9	8.0	7.8	7.8								
Approach Delay (s)	7.9	8.0	7.8	7.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.9									
Level of Service			A									
Intersection Capacity Utilization			22.7%	ICU Level of Service		A						
Analysis Period (min)			15									

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis 8: Alma Street & Kingsley Ave

Existing Conditions
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	23	27	1435	30	68	1157
Future Volume (Veh/h)	23	27	1435	30	68	1157
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.97	0.97	0.96	0.96
Hourly flow rate (vph)	28	33	1479	31	71	1205
Pedestrians	17					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	2					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2256	1512			1527	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2256	1512			1527	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	2	69			83	
cM capacity (veh/h)	29	107			425	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	61	1510	473	803		
Volume Left	28	0	71	0		
Volume Right	33	31	0	0		
cSH	47	1700	425	1700		
Volume to Capacity	1.29	0.89	0.17	0.47		
Queue Length 95th (ft)	143	0	15	0		
Control Delay (s)	365.1	0.0	5.1	0.0		
Lane LOS	F		A			
Approach Delay (s)	365.1	0.0	1.9			
Approach LOS	F					
Intersection Summary						
Average Delay		8.7				
Intersection Capacity Utilization		92.8%		ICU Level of Service		F
Analysis Period (min)		15				

Queues
9: Alma St & Churchill Ave

Existing Conditions
Timing Plan: P.M.Peak

								
Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	231	264	168	213	1518	8	1195	104
v/c Ratio	0.78	0.57	0.65	0.92	0.75	0.09	0.78	0.14
Control Delay	81.8	11.3	76.2	109.3	29.6	77.0	43.1	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.8	11.3	76.2	109.3	29.6	77.0	43.1	11.6
Queue Length 50th (ft)	237	0	168	230	608	8	570	22
Queue Length 95th (ft)	335	82	191	#407	840	29	681	62
Internal Link Dist (ft)	340		479		698		387	
Turn Bay Length (ft)				300		60		
Base Capacity (vph)	354	502	293	231	2020	520	2197	1008
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.53	0.57	0.92	0.75	0.02	0.54	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Existing Conditions

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	78	235	60	49	7	190	1325	26	7	1111	97
Future Volume (vph)	127	78	235	60	49	7	190	1325	26	7	1111	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.94		0.99		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1807	1486		1790		1770	3527		1770	3539	1583
Flt Permitted		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1807	1486		1790		1770	3527		1770	3539	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.69	0.69	0.69	0.89	0.89	0.89	0.93	0.93	0.93
Adj. Flow (vph)	143	88	264	87	71	10	213	1489	29	8	1195	104
RTOR Reduction (vph)	0	0	222	0	1	0	0	0	0	0	0	38
Lane Group Flow (vph)	0	231	42	0	167	0	213	1518	0	8	1195	66
Confl. Peds. (#/hr)			11			42			6			
Confl. Bikes (#/hr)			20			8						
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			8									2
Actuated Green, G (s)		25.4	25.4		22.3		20.2	88.7		1.5	70.0	70.0
Effective Green, g (s)		25.4	25.4		22.3		20.2	88.7		1.5	70.0	70.0
Actuated g/C Ratio		0.16	0.16		0.14		0.13	0.56		0.01	0.44	0.44
Clearance Time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	6.0		3.0	6.0	6.0
Lane Grp Cap (vph)		290	239		252		226	1981		16	1568	701
v/s Ratio Prot		c0.13			c0.09		c0.12	c0.43		0.00	0.34	
v/s Ratio Perm			0.03									0.04
v/c Ratio		0.80	0.18		0.66		0.94	0.77		0.50	0.76	0.09
Uniform Delay, d1		63.8	57.2		64.2		68.3	26.6		77.8	37.0	25.5
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		14.0	0.4		6.4		43.8	2.4		22.5	2.9	0.2
Delay (s)		77.8	57.6		70.7		112.1	29.0		100.3	39.9	25.7
Level of Service		E	E		E		F	C		F	D	C
Approach Delay (s)		67.0			70.7			39.2			39.1	
Approach LOS		E			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			44.3				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			157.9				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			77.8%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 10: Emerson St & Churchill Ave

Existing Conditions
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	114	12	3	83	0	13	9	3	7	22	20
Future Volume (vph)	5	114	12	3	83	0	13	9	3	7	22	20
Peak Hour Factor	0.91	0.91	0.91	0.77	0.77	0.77	0.63	0.63	0.63	0.77	0.77	0.77
Hourly flow rate (vph)	5	125	13	4	108	0	21	14	5	9	29	26
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	143	112	40	64								
Volume Left (vph)	5	4	21	9								
Volume Right (vph)	13	0	5	26								
Hadj (s)	-0.01	0.04	0.06	-0.18								
Departure Headway (s)	4.3	4.3	4.6	4.3								
Degree Utilization, x	0.17	0.13	0.05	0.08								
Capacity (veh/h)	822	794	730	771								
Control Delay (s)	8.1	8.0	7.9	7.7								
Approach Delay (s)	8.1	8.0	7.9	7.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.0									
Level of Service			A									
Intersection Capacity Utilization			22.1%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Existing Conditions

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	112	5	2	77	3	3	5	3	3	28	6
Future Volume (Veh/h)	6	112	5	2	77	3	3	5	3	3	28	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.39	0.39	0.39	0.84	0.84	0.84
Hourly flow rate (vph)	6	120	5	2	94	4	8	13	8	4	33	7
Pedestrians		9			12			1			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	142	102	46	156	102	34	49			33		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	142	102	46	156	102	34	49			33		
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 %	99	84	100	100	88	100	99			100		
cM capacity (veh/h)	721	766	1013	687	766	1022	1544			1561		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	131	100	29	44								
Volume Left	6	2	8	4								
Volume Right	5	4	8	7								
cSH	771	772	1544	1561								
Volume to Capacity	0.17	0.13	0.01	0.00								
Queue Length 95th (ft)	15	11	0	0								
Control Delay (s)	10.6	10.4	2.1	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.6	10.4	2.1	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay			8.3									
Intersection Capacity Utilization			22.5%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Existing Conditions
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	81	9	3	43	11	8	77	2	9	102	32
Future Volume (vph)	25	81	9	3	43	11	8	77	2	9	102	32
Peak Hour Factor	0.87	0.87	0.87	0.84	0.84	0.84	0.81	0.81	0.81	0.97	0.97	0.97
Hourly flow rate (vph)	29	93	10	4	51	13	10	95	2	9	105	33
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	132	68	107	147								
Volume Left (vph)	29	4	10	9								
Volume Right (vph)	10	13	2	33								
Hadj (s)	0.03	-0.07	0.04	-0.09								
Departure Headway (s)	4.6	4.6	4.6	4.4								
Degree Utilization, x	0.17	0.09	0.14	0.18								
Capacity (veh/h)	730	726	740	767								
Control Delay (s)	8.5	8.0	8.3	8.4								
Approach Delay (s)	8.5	8.0	8.3	8.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.4									
Level of Service			A									
Intersection Capacity Utilization			30.2%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

13: Cowper St & Churchill Ave

Existing Conditions

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	84	10	3	31	0	12	25	3	0	32	6
Future Volume (vph)	2	84	10	3	31	0	12	25	3	0	32	6
Peak Hour Factor	0.86	0.86	0.86	0.61	0.61	0.61	0.91	0.91	0.91	0.73	0.73	0.73
Hourly flow rate (vph)	2	98	12	5	51	0	13	27	3	0	44	8
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	112	56	43	52								
Volume Left (vph)	2	5	13	0								
Volume Right (vph)	12	0	3	8								
Hadj (s)	-0.03	0.05	0.05	-0.06								
Departure Headway (s)	4.1	4.3	4.4	4.3								
Degree Utilization, x	0.13	0.07	0.05	0.06								
Capacity (veh/h)	844	815	781	808								
Control Delay (s)	7.8	7.6	7.6	7.5								
Approach Delay (s)	7.8	7.6	7.6	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.7									
Level of Service			A									
Intersection Capacity Utilization			22.8%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

14: Churchill Ave & Embarcadero Rd

Existing Conditions
Timing Plan: P.M.Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	985	2	42	869	0	51
Future Volume (Veh/h)	985	2	42	869	0	51
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.25	0.80
Hourly flow rate (vph)	1071	2	45	924	0	64
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.75		0.75	0.75
vC, conflicting volume			1079		1632	544
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			437		1175	0
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		100	92
cM capacity (veh/h)			833		130	806
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	714	359	353	616	64	
Volume Left	0	0	45	0	0	
Volume Right	0	2	0	0	64	
cSH	1700	1700	833	1700	806	
Volume to Capacity	0.42	0.21	0.05	0.36	0.08	
Queue Length 95th (ft)	0	0	4	0	6	
Control Delay (s)	0.0	0.0	1.8	0.0	9.8	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.6		9.8	
Approach LOS					A	
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			58.4%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

15: Cowper St & Embarcadero Rd

Existing Conditions
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	971	15	7	821	36	2	9	6	11	6	17
Future Volume (Veh/h)	18	971	15	7	821	36	2	9	6	11	6	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.53	0.53	0.53	0.53	0.53	0.53
Hourly flow rate (vph)	20	1055	16	7	855	38	4	17	11	21	11	32
Pedestrians								8			1	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								3.5			3.5	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.73			0.73	0.73	0.73	0.73	0.73	
vC, conflicting volume	894			1079			1590	2019	544	1476	2008	448
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	894			358			1061	1651	0	904	1636	448
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			96	75	99	84	84	94
cM capacity (veh/h)	754			864			103	68	782	130	70	558
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	548	544	434	466	32	64						
Volume Left	20	0	7	0	4	21						
Volume Right	0	16	0	38	11	32						
cSH	754	1700	864	1700	106	170						
Volume to Capacity	0.03	0.32	0.01	0.27	0.30	0.38						
Queue Length 95th (ft)	2	0	1	0	29	40						
Control Delay (s)	0.7	0.0	0.2	0.0	53.2	38.5						
Lane LOS	A		A		F	E						
Approach Delay (s)	0.4		0.1		53.2	38.5						
Approach LOS					F	E						
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			51.0%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

16: Waverly St & Embarcadero Rd

Existing Conditions

Timing Plan: P.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	88	1021	21	870	177	298
v/c Ratio	1.22	0.94	0.31	0.80	0.18	0.33
Control Delay	213.8	58.8	43.8	41.3	9.8	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	213.8	58.8	43.8	41.3	9.8	11.3
Queue Length 50th (ft)	~80	410	11	293	49	90
Queue Length 95th (ft)	#187	#518	38	372	73	124
Internal Link Dist (ft)		572		576	43	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	72	1090	68	1086	984	901
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.22	0.94	0.31	0.80	0.18	0.33

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Existing Conditions

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	906	23	20	762	55	31	97	15	88	105	52
Future Volume (vph)	80	906	23	20	762	55	31	97	15	88	105	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.99			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1768	3523		1770	3497			1813			1771	
Flt Permitted	0.13	1.00		0.12	1.00			0.89			0.83	
Satd. Flow (perm)	233	3523		219	3497			1633			1488	
Peak-hour factor, PHF	0.91	0.91	0.91	0.94	0.94	0.94	0.81	0.81	0.81	0.82	0.82	0.82
Adj. Flow (vph)	88	996	25	21	811	59	38	120	19	107	128	63
RTOR Reduction (vph)	0	1	0	0	5	0	0	4	0	0	9	0
Lane Group Flow (vph)	88	1020	0	21	865	0	0	173	0	0	289	0
Confl. Peds. (#/hr)	2		10	10		2	2		6	6		2
Confl. Bikes (#/hr)												4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	34.0	34.0		34.0	34.0			66.0			66.0	
Effective Green, g (s)	34.0	34.0		34.0	34.0			66.0			66.0	
Actuated g/C Ratio	0.31	0.31		0.31	0.31			0.60			0.60	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	72	1088		67	1080			979			892	
v/s Ratio Prot		0.29			0.25							
v/s Ratio Perm	c0.38			0.10				0.11			c0.19	
v/c Ratio	1.22	0.94		0.31	0.80			0.18			0.32	
Uniform Delay, d1	38.0	37.0		29.1	34.9			9.8			10.9	
Progression Factor	1.22	1.19		1.00	1.00			1.00			1.00	
Incremental Delay, d2	173.0	13.6		2.7	4.4			0.4			1.0	
Delay (s)	219.2	57.4		31.7	39.2			10.2			11.9	
Level of Service	F	E		C	D			B			B	
Approach Delay (s)		70.3			39.1			10.2			11.9	
Approach LOS		E			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		47.7			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.63										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		65.2%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Existing Conditions
Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	164	1169	13	922	14	40
v/c Ratio	0.40	0.44	0.04	0.35	0.04	0.09
Control Delay	11.3	7.5	4.7	8.7	0.2	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.3	7.5	4.7	8.7	0.2	0.4
Queue Length 50th (ft)	51	196	3	330	0	0
Queue Length 95th (ft)	106	244	m4	390	0	0
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	409	2681	303	2663	463	521
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.44	0.04	0.35	0.03	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

17: Bryant St & Embarcadero Rd

Existing Conditions

Timing Plan: P.M. Peak

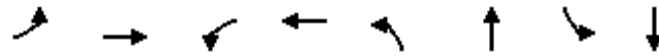
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	1026	38	12	767	63	0	0	11	0	0	33
Future Volume (vph)	149	1026	38	12	767	63	0	0	11	0	0	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00				0.95			0.93
Flpb, ped/bikes	1.00	1.00		1.00	1.00				1.00			1.00
Frt	1.00	0.99		1.00	0.99				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1763	3515		1764	3490				1529			1495
Flt Permitted	0.29	1.00		0.21	1.00				1.00			1.00
Satd. Flow (perm)	537	3515		397	3490				1529			1495
Peak-hour factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90	0.25	0.25	0.81	0.25	0.25	0.83
Adj. Flow (vph)	164	1127	42	13	852	70	0	0	14	0	0	40
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	12	0	0	33
Lane Group Flow (vph)	164	1167	0	13	918	0	0	0	2	0	0	7
Confl. Peds. (#/hr)	6		8	8		6			6			20
Confl. Bikes (#/hr)									24			28
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	81.8	81.8		81.8	81.8				18.2			18.2
Effective Green, g (s)	81.8	81.8		81.8	81.8				18.2			18.2
Actuated g/C Ratio	0.74	0.74		0.74	0.74				0.17			0.17
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	399	2613		295	2595				252			247
v/s Ratio Prot		c0.33			0.26							
v/s Ratio Perm	0.31			0.03					0.00			c0.00
v/c Ratio	0.41	0.45		0.04	0.35				0.01			0.03
Uniform Delay, d1	5.2	5.4		3.7	4.9				38.4			38.5
Progression Factor	1.00	1.00		0.67	1.36				1.00			1.00
Incremental Delay, d2	3.1	0.6		0.2	0.3				0.0			0.0
Delay (s)	8.3	6.0		2.7	6.9				38.4			38.5
Level of Service	A	A		A	A				D			D
Approach Delay (s)		6.3			6.8			38.4			38.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		7.2			HCM 2000 Level of Service				A			
HCM 2000 Volume to Capacity ratio		0.37										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)				10.0			
Intersection Capacity Utilization		48.8%			ICU Level of Service				A			
Analysis Period (min)		15										
c Critical Lane Group												

Queues

18: Middlefield Rd & Embarcadero Rd

Existing Conditions

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	1045	93	975	116	433	168	421
v/c Ratio	0.33	0.75	0.62	0.66	0.61	0.51	0.75	0.87
Control Delay	55.0	35.3	66.9	30.6	59.9	37.5	66.7	57.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.0	35.3	66.9	30.6	59.9	37.5	66.7	57.3
Queue Length 50th (ft)	30	356	64	309	79	138	114	278
Queue Length 95th (ft)	66	#517	111	392	134	179	#190	#426
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	160	1393	162	1485	257	994	257	534
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.75	0.57	0.66	0.45	0.44	0.65	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

18: Middlefield Rd & Embarcadero Rd

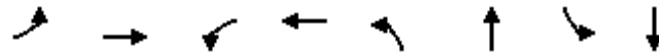
Existing Conditions

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	914	89	78	692	127	108	358	45	156	367	24
Future Volume (vph)	41	914	89	78	692	127	108	358	45	156	367	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3480		1770	3441		1770	3475		1770	1842	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3480		1770	3441		1770	3475		1770	1842	
Peak-hour factor, PHF	0.96	0.96	0.96	0.84	0.84	0.84	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	952	93	93	824	151	116	385	48	168	395	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	43	1045	0	93	975	0	116	433	0	168	421	0
Confl. Peds. (#/hr)			9			15			1			16
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	5.3	43.2		7.9	45.8		11.9	27.0		13.9	29.0	
Effective Green, g (s)	5.3	43.2		7.9	45.8		11.9	27.0		13.9	29.0	
Actuated g/C Ratio	0.05	0.39		0.07	0.42		0.11	0.25		0.13	0.26	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	85	1366		127	1432		191	852		223	485	
v/s Ratio Prot	0.02	c0.30		c0.05	c0.28		0.07	0.12		c0.09	c0.23	
v/s Ratio Perm												
v/c Ratio	0.51	0.77		0.73	0.68		0.61	0.51		0.75	0.87	
Uniform Delay, d1	51.1	29.0		50.0	26.1		46.8	35.8		46.4	38.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	4.1		18.4	2.6		4.5	0.5		12.8	15.1	
Delay (s)	54.5	33.1		68.4	28.8		51.4	36.3		59.2	53.8	
Level of Service	D	C		E	C		D	D		E	D	
Approach Delay (s)		34.0			32.2			39.4			55.3	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			38.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			76.9%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Existing Conditions
Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	251	1585	251	2001	205	820	222	634
v/c Ratio	1.18	0.75	1.42	1.00	0.97	0.90	1.05	0.73
Control Delay	174.8	39.4	258.4	37.3	118.3	59.8	136.4	53.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.8	39.4	258.4	37.3	118.3	59.8	136.4	53.1
Queue Length 50th (ft)	~294	475	~338	~189	203	361	~235	280
Queue Length 95th (ft)	#462	515	m#326	m198	#349	#426	#409	353
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	212	2114	177	1992	212	913	212	863
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	0.75	1.42	1.00	0.97	0.90	1.05	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Existing Conditions
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			 			 	
Traffic Volume (vph)	221	1316	79	223	1500	281	178	415	298	206	402	188
Future Volume (vph)	221	1316	79	223	1500	281	178	415	298	206	402	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5026		1770	4939		1770	3264		1770	3265	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5026		1770	4939		1770	3264		1770	3265	
Peak-hour factor, PHF	0.88	0.88	0.88	0.89	0.89	0.89	0.87	0.87	0.87	0.93	0.93	0.93
Adj. Flow (vph)	251	1495	90	251	1685	316	205	477	343	222	432	202
RTOR Reduction (vph)	0	5	0	0	18	0	0	87	0	0	37	0
Lane Group Flow (vph)	251	1580	0	251	1983	0	205	733	0	222	597	0
Confl. Peds. (#/hr)			27			15			25			78
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	18.0	63.0		15.0	60.0		18.0	38.0		18.0	38.0	
Effective Green, g (s)	18.0	63.0		15.0	60.0		18.0	38.0		18.0	38.0	
Actuated g/C Ratio	0.12	0.42		0.10	0.40		0.12	0.25		0.12	0.25	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	212	2110		177	1975		212	826		212	827	
v/s Ratio Prot	c0.14	0.31		c0.14	c0.40		0.12	c0.22		c0.13	0.18	
v/s Ratio Perm												
v/c Ratio	1.18	0.75		1.42	1.00		0.97	0.89		1.05	0.72	
Uniform Delay, d1	66.0	36.8		67.5	45.0		65.7	53.9		66.0	51.2	
Progression Factor	1.00	1.00		1.49	0.57		1.00	1.00		1.00	1.00	
Incremental Delay, d2	120.4	2.5		196.7	11.3		51.8	11.1		74.8	2.7	
Delay (s)	186.4	39.3		297.0	36.8		117.5	65.0		140.8	53.8	
Level of Service	F	D		F	D		F	E		F	D	
Approach Delay (s)		59.4			65.8			75.5			76.4	
Approach LOS		E			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			67.0			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			103.2%			ICU Level of Service				G		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Existing Conditions
Timing Plan: P.M.Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	387	1901	190	257	1656
v/c Ratio	1.04	1.06	0.33	0.87	0.59
Control Delay	110.3	84.3	32.8	64.0	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	110.3	84.3	32.8	64.0	22.4
Queue Length 50th (ft)	~384	~846	112	252	515
Queue Length 95th (ft)	#542	#989	194	m320	m556
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	371	1796	568	354	2786
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.04	1.06	0.33	0.73	0.59
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Existing Conditions
Timing Plan: P.M.Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T	T	T	T
Traffic Volume (vph)	165	164	1787	179	247	1590
Future Volume (vph)	165	164	1787	179	247	1590
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.98		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1681		5085	1532	1770	5085
Flt Permitted	0.98		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1681		5085	1532	1770	5085
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.96	0.96
Adj. Flow (vph)	194	193	1901	190	257	1656
RTOR Reduction (vph)	24	0	0	29	0	0
Lane Group Flow (vph)	363	0	1901	161	257	1656
Confl. Peds. (#/hr)		3		8		
Confl. Bikes (#/hr)				1		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	31.0		52.4	52.4	25.2	81.6
Effective Green, g (s)	31.0		52.4	52.4	25.2	81.6
Actuated g/C Ratio	0.21		0.35	0.35	0.17	0.54
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	347		1776	535	297	2766
v/s Ratio Prot	c0.22		c0.37		c0.15	0.33
v/s Ratio Perm				0.10		
v/c Ratio	1.05		1.07	0.30	0.87	0.60
Uniform Delay, d1	59.5		48.8	35.5	60.7	23.1
Progression Factor	1.00		1.00	1.00	0.78	0.88
Incremental Delay, d2	61.0		43.0	1.4	13.4	0.5
Delay (s)	120.5		91.8	36.9	60.6	21.0
Level of Service	F		F	D	E	C
Approach Delay (s)	120.5		86.8			26.3
Approach LOS	F		F			C
Intersection Summary						
HCM 2000 Control Delay			63.4		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			77.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Queues

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing Conditions

Timing Plan: P.M.Peak

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	555	1401	198	174	1180	320	1033	215	364	969
v/c Ratio	0.92	0.69	0.29	0.73	0.82	0.66	0.91	0.33	0.87	0.93
Control Delay	93.1	49.0	10.2	99.4	62.8	79.7	70.4	36.5	98.6	74.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.1	49.0	10.2	99.4	62.8	79.7	70.4	36.5	98.6	74.9
Queue Length 50th (ft)	334	509	24	106	476	187	615	172	220	575
Queue Length 95th (ft)	#413	631	95	147	#655	237	668	219	278	642
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			100	
Base Capacity (vph)	647	2025	690	371	1439	581	1287	709	486	1158
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.69	0.29	0.47	0.82	0.55	0.80	0.30	0.75	0.84

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing Conditions
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	494	1247	176	172	916	252	310	1002	209	328	703	169
Future Volume (vph)	494	1247	176	172	916	252	310	1002	209	328	703	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3412	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3412	
Peak-hour factor, PHF	0.89	0.89	0.89	0.99	0.99	0.99	0.97	0.97	0.97	0.90	0.90	0.90
Adj. Flow (vph)	555	1401	198	174	925	255	320	1033	215	364	781	188
RTOR Reduction (vph)	0	0	99	0	25	0	0	0	0	0	13	0
Lane Group Flow (vph)	555	1401	99	174	1155	0	320	1033	215	364	956	0
Confl. Peds. (#/hr)			27			28			18			13
Confl. Bikes (#/hr)									3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	31.8	71.7	71.7	12.5	52.4		25.4	57.9	74.9	21.9	54.4	
Effective Green, g (s)	31.8	71.7	71.7	12.5	52.4		25.4	57.9	74.9	21.9	54.4	
Actuated g/C Ratio	0.18	0.40	0.40	0.07	0.29		0.14	0.32	0.42	0.12	0.30	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	606	2025	591	238	1412		484	1138	658	417	1031	
v/s Ratio Prot	c0.16	0.28		0.05	c0.24		0.09	c0.29	0.14	0.11	c0.28	
v/s Ratio Perm			0.07									
v/c Ratio	0.92	0.69	0.17	0.73	0.82		0.66	0.91	0.33	0.87	0.93	
Uniform Delay, d1	72.8	45.0	34.9	82.1	59.4		73.2	58.5	35.5	77.7	60.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	18.3	2.0	0.6	9.5	5.4		3.4	10.2	0.1	17.4	13.5	
Delay (s)	91.1	46.9	35.5	91.6	64.7		76.6	68.7	35.6	95.1	74.4	
Level of Service	F	D	D	F	E		E	E	D	F	E	
Approach Delay (s)		57.3			68.2			65.8			80.1	
Approach LOS		E			E			E			F	
Intersection Summary												
HCM 2000 Control Delay			66.4			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			180.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			89.5%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Existing Conditions

Timing Plan: P.M.Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	31	0	66	0	1562	276	0	1148	271	
Future Volume (Veh/h)	0	0	0	31	0	66	0	1562	276	0	1148	271	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.91	0.25	0.91	0.25	0.99	0.99	0.25	0.97	0.97	
Hourly flow rate (vph)	0	0	0	34	0	73	0	1578	279	0	1184	279	
Pedestrians	23												
Lane Width (ft)	12.0												
Walking Speed (ft/s)	3.5												
Percent Blockage	2												
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	2186	3204	732	2193	3064	812	1463						1880
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	2186	3204	732	2193	3064	812	1463						1880
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	0	100	77	100						100
cM capacity (veh/h)	19	10	364	24	12	315	458						308
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2						
Volume Total	34	73	789	789	279	789	674						
Volume Left	34	0	0	0	0	0	0						
Volume Right	0	73	0	0	279	0	279						
cSH	24	315	1700	1700	1700	1700	1700						
Volume to Capacity	1.41	0.23	0.46	0.46	0.16	0.46	0.40						
Queue Length 95th (ft)	106	22	0	0	0	0	0						
Control Delay (s)	565.5	19.8	0.0	0.0	0.0	0.0	0.0						
Lane LOS	F	C											
Approach Delay (s)	193.2			0.0	0.0								
Approach LOS	F												
Intersection Summary													
Average Delay				6.0									
Intersection Capacity Utilization				53.9%	ICU Level of Service				A				
Analysis Period (min)				15									

HCM Unsignalized Intersection Capacity Analysis

22b: Alma St & Oregon Expy EB Ramps

Existing Conditions
Timing Plan: P.M.Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	316	1522	62	60	1119	
Future Volume (Veh/h)	0	316	1522	62	60	1119	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.95	0.99	0.99	0.97	0.97	
Hourly flow rate (vph)	0	333	1537	63	62	1154	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2238	768			1537		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2238	768			1537		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	3			86		
cM capacity (veh/h)	31	344			429		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	333	768	768	63	62	577	577
Volume Left	0	0	0	0	62	0	0
Volume Right	333	0	0	63	0	0	0
cSH	344	1700	1700	1700	429	1700	1700
Volume to Capacity	0.97	0.45	0.45	0.04	0.14	0.34	0.34
Queue Length 95th (ft)	263	0	0	0	13	0	0
Control Delay (s)	76.1	0.0	0.0	0.0	14.8	0.0	0.0
Lane LOS	F				B		
Approach Delay (s)	76.1	0.0			0.8		
Approach LOS	F						
Intersection Summary							
Average Delay			8.3				
Intersection Capacity Utilization			68.3%		ICU Level of Service		C
Analysis Period (min)			15				

Queues
23: Cowper St & Oregon Expy

Existing Conditions
Timing Plan: P.M.Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	1483	80	32	1343	60	56	11	73
v/c Ratio	0.27	0.61	0.07	0.30	0.55	0.42	0.20	0.10	0.41
Control Delay	74.0	18.7	3.1	89.8	9.6	73.8	41.1	69.0	58.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.0	18.7	3.1	89.8	9.6	73.8	41.1	69.0	58.3
Queue Length 50th (ft)	26	421	0	33	157	57	35	10	60
Queue Length 95th (ft)	60	771	26	m40	807	84	55	29	86
Internal Link Dist (ft)		1547			1028		48		36
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	180	2416	1108	178	2420	179	387	177	373
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.61	0.07	0.18	0.55	0.34	0.14	0.06	0.20
Intersection Summary									
m Volume for 95th percentile queue is metered by upstream signal.									

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Existing Conditions

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1364	74	29	1206	16	44	28	13	9	42	16
Future Volume (vph)	25	1364	74	29	1206	16	44	28	13	9	42	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.95		1.00	0.96	
Flt Protected	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	3531		1770	1759		1770	1768	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3531		1770	1759		1770	1768	
Peak-hour factor, PHF	0.92	0.92	0.92	0.91	0.91	0.91	0.73	0.73	0.73	0.80	0.80	0.80
Adj. Flow (vph)	27	1483	80	32	1325	18	60	38	18	11	52	20
RTOR Reduction (vph)	0	0	27	0	0	0	0	12	0	0	10	0
Lane Group Flow (vph)	27	1483	53	32	1343	0	60	44	0	11	63	0
Confl. Peds. (#/hr)						5			7			5
Confl. Bikes (#/hr)									3			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	5.4	99.3	99.3	5.7	99.8		10.5	21.3		3.6	14.6	
Effective Green, g (s)	5.4	99.3	99.3	5.7	99.8		10.5	21.3		3.6	14.6	
Actuated g/C Ratio	0.04	0.66	0.66	0.04	0.67		0.07	0.14		0.02	0.10	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	63	2342	1047	67	2349		123	249		42	172	
v/s Ratio Prot	0.02	c0.42		c0.02	0.38		c0.03	0.03		0.01	c0.04	
v/s Ratio Perm			0.03									
v/c Ratio	0.43	0.63	0.05	0.48	0.57		0.49	0.18		0.26	0.37	
Uniform Delay, d1	70.8	14.8	8.9	70.7	13.6		67.2	56.6		71.9	63.4	
Progression Factor	1.00	1.00	1.00	1.27	0.57		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	1.3	0.1	2.8	0.5		6.2	0.3		4.5	1.3	
Delay (s)	75.4	16.1	9.0	92.8	8.3		73.4	57.0		76.4	64.7	
Level of Service	E	B	A	F	A		E	E		E	E	
Approach Delay (s)		16.7			10.2			65.5			66.2	
Approach LOS		B			B			E			E	
Intersection Summary												
HCM 2000 Control Delay			17.0			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			20.1			
Intersection Capacity Utilization			60.4%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

Queues

24: Middlefield Rd & Oregon Expy

Existing Conditions

Timing Plan: P.M.Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	170	1086	239	201	1067	63	221	524	153	49	584
v/c Ratio	0.70	0.84	0.37	0.86	0.84	0.10	0.91	0.90	0.27	0.40	0.75
Control Delay	67.6	42.4	14.9	95.6	51.6	0.3	100.9	70.2	11.0	76.3	59.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.6	42.4	14.9	95.6	51.6	0.3	100.9	70.2	11.0	76.3	59.6
Queue Length 50th (ft)	163	517	22	194	497	0	216	506	17	47	276
Queue Length 95th (ft)	#260	421	146	#305	559	0	#375	#782	77	91	348
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	243	1289	653	247	1295	645	244	580	570	172	780
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.84	0.37	0.81	0.82	0.10	0.91	0.90	0.27	0.28	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Existing Conditions
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	158	1010	222	175	928	55	203	482	141	46	440	103
Future Volume (vph)	158	1010	222	175	928	55	203	482	141	46	440	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3427	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3427	
Peak-hour factor, PHF	0.93	0.93	0.93	0.87	0.87	0.87	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	170	1086	239	201	1067	63	221	524	153	49	473	111
RTOR Reduction (vph)	0	0	87	0	0	41	0	0	89	0	13	0
Lane Group Flow (vph)	170	1086	152	201	1067	22	221	524	64	49	571	0
Confl. Peds. (#/hr)			2			6			11			4
Confl. Bikes (#/hr)									1			1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	20.7	53.6	53.6	19.8	52.5	52.5	20.7	46.7	46.7	8.5	34.6	
Effective Green, g (s)	20.7	53.6	53.6	19.8	52.5	52.5	20.7	46.7	46.7	8.5	34.6	
Actuated g/C Ratio	0.14	0.36	0.36	0.13	0.35	0.35	0.14	0.31	0.31	0.06	0.23	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	244	1264	556	233	1238	533	244	580	481	100	790	
v/s Ratio Prot	0.10	c0.31		0.11	c0.30		c0.12	c0.28		0.03	0.17	
v/s Ratio Perm			0.10			0.01			0.04			
v/c Ratio	0.70	0.86	0.27	0.86	0.86	0.04	0.91	0.90	0.13	0.49	0.72	
Uniform Delay, d1	61.7	44.7	34.3	63.8	45.4	32.2	63.7	49.5	37.1	68.6	53.3	
Progression Factor	0.88	0.83	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.8	6.3	1.0	26.4	8.0	0.1	35.0	18.4	0.3	3.7	3.3	
Delay (s)	60.9	43.5	32.3	90.2	53.4	32.3	98.7	67.9	37.4	72.4	56.6	
Level of Service	E	D	C	F	D	C	F	E	D	E	E	
Approach Delay (s)		43.7			58.0			70.2			57.8	
Approach LOS		D			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			55.6				HCM 2000 Level of Service		E			
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)		21.6			
Intersection Capacity Utilization			92.6%				ICU Level of Service		F			
Analysis Period (min)			15									
c Critical Lane Group												

Appendix E – Existing Plus Project Synchro Reports

- HCM Delay and LOS Reports
- 95th Percentile Queue Length Reports

Queues
1: Alma Street & Homer Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	343	1131	665
v/c Ratio	0.65	0.71	0.42
Control Delay	29.9	20.2	15.5
Queue Delay	0.0	0.0	0.0
Total Delay	29.9	20.2	15.5
Queue Length 50th (ft)	64	221	108
Queue Length 95th (ft)	100	327	154
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	830	1841	1841
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.41	0.61	0.36
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	199	93	1063	0	0	559
Future Volume (vph)	199	93	1063	0	0	559
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.90		1.00			1.00
Flpb, ped/bikes	0.84		1.00			1.00
Frt	0.95		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	2506		3539			3539
Flt Permitted	0.97		1.00			1.00
Satd. Flow (perm)	2506		3539			3539
Peak-hour factor, PHF	0.85	0.85	0.94	0.25	0.25	0.84
Adj. Flow (vph)	234	109	1131	0	0	665
RTOR Reduction (vph)	65	0	0	0	0	0
Lane Group Flow (vph)	278	0	1131	0	0	665
Confl. Peds. (#/hr)	82	102		13		
Confl. Bikes (#/hr)		1				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	13.3		35.3			35.3
Effective Green, g (s)	13.3		35.3			35.3
Actuated g/C Ratio	0.17		0.45			0.45
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	428		1605			1605
v/s Ratio Prot			c0.32			0.19
v/s Ratio Perm	c0.11					
v/c Ratio	0.65		0.70			0.41
Uniform Delay, d1	30.1		17.1			14.3
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	3.4		1.5			0.2
Delay (s)	33.4		18.6			14.5
Level of Service	C		B			B
Approach Delay (s)	33.4		18.6			14.5
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			19.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.52			
Actuated Cycle Length (s)			77.8		Sum of lost time (s)	13.0
Intersection Capacity Utilization			47.4%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

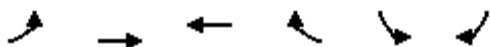
Existing + Churchill Closure
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	40	23	1494	85	7	566
Future Volume (Veh/h)	40	23	1494	85	7	566
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	43	25	1540	88	8	615
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1918	825			1639	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1918	825			1639	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	25	92			98	
cM capacity (veh/h)	57	312			387	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	68	1027	601	213	410	
Volume Left	43	0	0	8	0	
Volume Right	25	0	88	0	0	
cSH	82	1700	1700	387	1700	
Volume to Capacity	0.83	0.60	0.35	0.02	0.24	
Queue Length 95th (ft)	106	0	0	2	0	
Control Delay (s)	144.4	0.0	0.0	0.9	0.0	
Lane LOS	F			A		
Approach Delay (s)	144.4	0.0		0.3		
Approach LOS	F					
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization			54.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Existing + Churchill Closure
Timing Plan: A.M. Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑			↗
Traffic Volume (veh/h)	0	596	1464	0	0	120
Future Volume (Veh/h)	0	596	1464	0	0	120
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.90	0.95	0.25	0.25	0.83
Hourly flow rate (vph)	0	662	1541	0	0	145
Pedestrians					33	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					3	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1574				1905	1574
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1574				1905	1574
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	402				59	96
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	331	331	1541	145		
Volume Left	0	0	0	0		
Volume Right	0	0	0	145		
cSH	1700	1700	1700	96		
Volume to Capacity	0.19	0.19	0.91	1.51		
Queue Length 95th (ft)	0	0	0	277		
Control Delay (s)	0.0	0.0	0.0	355.7		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	355.7		
Approach LOS				F		
Intersection Summary						
Average Delay			22.0			
Intersection Capacity Utilization			91.1%		ICU Level of Service	F
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Emerson St & Lincoln Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	58	34	69	73	11	4	7	9	7	185	1
Future Volume (vph)	8	58	34	69	73	11	4	7	9	7	185	1
Peak Hour Factor	0.76	0.76	0.76	0.77	0.77	0.77	0.71	0.71	0.71	0.56	0.56	0.56
Hourly flow rate (vph)	11	76	45	90	95	14	6	10	13	13	330	2
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	132	199	29	345								
Volume Left (vph)	11	90	6	13								
Volume Right (vph)	45	14	13	2								
Hadj (s)	-0.15	0.08	-0.19	0.04								
Departure Headway (s)	5.0	5.1	5.1	4.8								
Degree Utilization, x	0.18	0.28	0.04	0.46								
Capacity (veh/h)	658	651	635	706								
Control Delay (s)	9.1	10.1	8.3	12.0								
Approach Delay (s)	9.1	10.1	8.3	12.0								
Approach LOS	A	B	A	B								
Intersection Summary												
Delay				10.8								
Level of Service				B								
Intersection Capacity Utilization				33.0%	ICU Level of Service	A						
Analysis Period (min)				15								

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

8: Alma Street & Kingsley Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	102	1371	21	62	533
Future Volume (Veh/h)	10	102	1371	21	62	533
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.82	0.82	0.96	0.96	0.90	0.90
Hourly flow rate (vph)	12	124	1428	22	69	592
Pedestrians	7					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1880	1446			1457	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1880	1446			1457	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	0			85	
cM capacity (veh/h)	53	120			457	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	136	1450	266	395		
Volume Left	12	0	69	0		
Volume Right	124	22	0	0		
cSH	108	1700	457	1700		
Volume to Capacity	1.26	0.85	0.15	0.23		
Queue Length 95th (ft)	228	0	13	0		
Control Delay (s)	245.9	0.0	5.5	0.0		
Lane LOS	F		A			
Approach Delay (s)	245.9	0.0	2.2			
Approach LOS	F					
Intersection Summary						
Average Delay		15.5				
Intersection Capacity Utilization		87.0%		ICU Level of Service		E
Analysis Period (min)		15				

Queues
9: Alma St & Churchill Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	104	1388	638
v/c Ratio	0.38	0.51	0.25
Control Delay	62.5	7.6	5.4
Queue Delay	0.0	0.0	0.0
Total Delay	62.5	7.6	5.4
Queue Length 50th (ft)	95	250	86
Queue Length 95th (ft)	125	284	106
Internal Link Dist (ft)	479	698	387
Turn Bay Length (ft)			
Base Capacity (vph)	351	2721	2561
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	0.51	0.25
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T	R		T
Traffic Volume (vph)	71	5	1216	20	5	569
Future Volume (vph)	71	5	1216	20	5	569
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		6.0			6.0
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.97		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.99		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	1711		3529			3538
Flt Permitted	0.96		1.00			0.94
Satd. Flow (perm)	1711		3529			3324
Peak-hour factor, PHF	0.73	0.73	0.89	0.89	0.90	0.90
Adj. Flow (vph)	97	7	1366	22	6	632
RTOR Reduction (vph)	2	0	1	0	0	0
Lane Group Flow (vph)	102	0	1387	0	0	638
Confl. Peds. (#/hr)		101		24		
Confl. Bikes (#/hr)		258				
Turn Type	Perm		NA		Perm	NA
Protected Phases			6			2
Permitted Phases	7				2	
Actuated Green, G (s)	25.0		121.0			121.0
Effective Green, g (s)	25.0		121.0			121.0
Actuated g/C Ratio	0.16		0.77			0.77
Clearance Time (s)	5.0		6.0			6.0
Vehicle Extension (s)	3.0		6.0			6.0
Lane Grp Cap (vph)	272		2719			2561
v/s Ratio Prot			c0.39			
v/s Ratio Perm	c0.06					0.19
v/c Ratio	0.38		0.51			0.25
Uniform Delay, d1	59.0		6.8			5.1
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	0.9		0.4			0.2
Delay (s)	59.9		7.2			5.3
Level of Service	E		A			A
Approach Delay (s)	59.9		7.2			5.3
Approach LOS	E		A			A
Intersection Summary						
HCM 2000 Control Delay			9.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			157.0		Sum of lost time (s)	11.0
Intersection Capacity Utilization			63.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

10: Emerson St & Churchill Ave

Existing + Churchill Closure

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	76	10	5	29	7	34	75	8	10	15	14
Future Volume (vph)	10	76	10	5	29	7	34	75	8	10	15	14
Peak Hour Factor	0.75	0.75	0.75	0.86	0.86	0.86	0.70	0.70	0.70	0.54	0.54	0.54
Hourly flow rate (vph)	13	101	13	6	34	8	49	107	11	19	28	26
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	127	48	167	73								
Volume Left (vph)	13	6	49	19								
Volume Right (vph)	13	8	11	26								
Hadj (s)	-0.01	-0.04	0.05	-0.13								
Departure Headway (s)	4.5	4.6	4.5	4.4								
Degree Utilization, x	0.16	0.06	0.21	0.09								
Capacity (veh/h)	748	731	773	771								
Control Delay (s)	8.4	7.9	8.6	7.8								
Approach Delay (s)	8.4	7.9	8.6	7.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.3									
Level of Service			A									
Intersection Capacity Utilization			25.1%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Existing + Churchill Closure

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	75	8	13	28	37	9	20	3	12	8	16
Future Volume (Veh/h)	11	75	8	13	28	37	9	20	3	12	8	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.87	0.87	0.87	0.57	0.57	0.57	0.47	0.47	0.47
Hourly flow rate (vph)	15	106	11	15	32	43	16	35	5	26	17	34
Pedestrians		17			14			4			11	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		2			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	242	189	55	238	204	62	68			54		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	242	189	55	238	204	62	68			54		
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 %	98	84	99	97	95	96	99			98		
cM capacity (veh/h)	610	666	992	586	654	979	1508			1531		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	132	90	56	77								
Volume Left	15	15	16	26								
Volume Right	11	43	5	34								
cSH	678	760	1508	1531								
Volume to Capacity	0.19	0.12	0.01	0.02								
Queue Length 95th (ft)	18	10	1	1								
Control Delay (s)	11.6	10.4	2.2	2.6								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.6	10.4	2.2	2.6								
Approach LOS	B	B										
Intersection Summary												
Average Delay			7.8									
Intersection Capacity Utilization			23.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	12	60	9	13	42	49	17	98	11	4	74	23
Future Volume (vph)	12	60	9	13	42	49	17	98	11	4	74	23
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.72	0.72	0.72	0.62	0.62	0.62
Hourly flow rate (vph)	14	68	10	15	48	56	24	136	15	6	119	37
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	92	119	175	162								
Volume Left (vph)	14	15	24	6								
Volume Right (vph)	10	56	15	37								
Hadj (s)	0.00	-0.22	0.01	-0.10								
Departure Headway (s)	4.9	4.6	4.6	4.5								
Degree Utilization, x	0.12	0.15	0.22	0.20								
Capacity (veh/h)	680	719	738	745								
Control Delay (s)	8.5	8.4	9.0	8.7								
Approach Delay (s)	8.5	8.4	9.0	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				8.7								
Level of Service				A								
Intersection Capacity Utilization				28.1%	ICU Level of Service				A			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis 13: Cowper St & Churchill Ave

Existing + Churchill Closure

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	62	7	5	24	1	23	23	6	2	21	12
Future Volume (vph)	5	62	7	5	24	1	23	23	6	2	21	12
Peak Hour Factor	0.88	0.88	0.88	0.75	0.75	0.75	0.72	0.72	0.72	0.58	0.58	0.58
Hourly flow rate (vph)	6	70	8	7	32	1	32	32	8	3	36	21
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	84	40	72	60								
Volume Left (vph)	6	7	32	3								
Volume Right (vph)	8	1	8	21								
Hadj (s)	-0.01	0.05	0.06	-0.17								
Departure Headway (s)	4.2	4.3	4.3	4.1								
Degree Utilization, x	0.10	0.05	0.09	0.07								
Capacity (veh/h)	822	789	805	848								
Control Delay (s)	7.7	7.5	7.7	7.4								
Approach Delay (s)	7.7	7.5	7.7	7.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			21.3%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

14: Churchill Ave & Embarcadero Rd

Existing + Churchill Closure
Timing Plan: A.M. Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	843	2	37	949	0	80
Future Volume (Veh/h)	843	2	37	949	0	80
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.81	0.81	0.25	0.83
Hourly flow rate (vph)	969	2	46	1172	0	96
Pedestrians					11	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.81		0.81	0.81
vC, conflicting volume			980		1659	496
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			505		1343	0
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		100	89
cM capacity (veh/h)			846		108	869
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	646	325	437	781	96	
Volume Left	0	0	46	0	0	
Volume Right	0	2	0	0	96	
cSH	1700	1700	846	1700	869	
Volume to Capacity	0.38	0.19	0.05	0.46	0.11	
Queue Length 95th (ft)	0	0	4	0	9	
Control Delay (s)	0.0	0.0	1.6	0.0	9.7	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.6		9.7	
Approach LOS					A	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			56.6%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

15: Cowper St & Embarcadero Rd

Existing + Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	843	34	11	926	13	5	3	6	4	8	46
Future Volume (Veh/h)	14	843	34	11	926	13	5	3	6	4	8	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.82	0.82	0.82	0.58	0.58	0.58	0.69	0.69	0.69
Hourly flow rate (vph)	16	947	38	13	1129	16	9	5	10	6	12	67
Pedestrians					1			8			28	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			1			3	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.79			0.79	0.79	0.79	0.79	0.79	
vC, conflicting volume	1173			993			1670	2205	502	1710	2216	600
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1173			445			1306	1988	0	1358	2002	600
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			98			84	89	99	91	72	84
cM capacity (veh/h)	575			867			57	44	844	70	43	432
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	490	512	578	580	24	85						
Volume Left	16	0	13	0	9	6						
Volume Right	0	38	0	16	10	67						
cSH	575	1700	867	1700	85	163						
Volume to Capacity	0.03	0.30	0.02	0.34	0.28	0.52						
Queue Length 95th (ft)	2	0	1	0	26	64						
Control Delay (s)	0.8	0.0	0.4	0.0	63.4	48.8						
Lane LOS	A		A		F	E						
Approach Delay (s)	0.4		0.2		63.4	48.8						
Approach LOS					F	E						
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			44.7%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

16: Waverly St & Embarcadero Rd

Existing + Churchill Closure

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	44	911	30	1128	281	362
v/c Ratio	0.66	0.71	0.29	0.88	0.41	0.44
Control Delay	65.2	26.1	34.3	42.1	16.5	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.2	26.1	34.3	42.1	16.5	16.4
Queue Length 50th (ft)	26	291	15	387	107	140
Queue Length 95th (ft)	m#87	367	40	424	148	173
Internal Link Dist (ft)		572		576	78	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	67	1276	103	1281	679	819
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.71	0.29	0.88	0.41	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Existing + Churchill Closure

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	794	53	25	911	25	110	93	24	65	101	117
Future Volume (vph)	41	794	53	25	911	25	110	93	24	65	101	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.99			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3498		1764	3518			1783			1716	
Flt Permitted	0.10	1.00		0.15	1.00			0.68			0.86	
Satd. Flow (perm)	186	3498		285	3518			1239			1491	
Peak-hour factor, PHF	0.93	0.93	0.93	0.83	0.83	0.83	0.81	0.81	0.81	0.78	0.78	0.78
Adj. Flow (vph)	44	854	57	30	1098	30	136	115	30	83	129	150
RTOR Reduction (vph)	0	4	0	0	2	0	0	4	0	0	6	0
Lane Group Flow (vph)	44	907	0	30	1126	0	0	277	0	0	356	0
Confl. Peds. (#/hr)	27		9	9		27	22		9	9		22
Confl. Bikes (#/hr)									2			13
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	40.0	40.0		40.0	40.0			60.0			60.0	
Effective Green, g (s)	40.0	40.0		40.0	40.0			60.0			60.0	
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.55			0.55	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	67	1272		103	1279			675			813	
v/s Ratio Prot		0.26			c0.32							
v/s Ratio Perm	0.24			0.11				0.22			c0.24	
v/c Ratio	0.66	0.71		0.29	0.88			0.41			0.44	
Uniform Delay, d1	29.3	30.1		24.9	32.8			14.6			14.9	
Progression Factor	0.74	0.76		1.00	1.00			1.00			1.00	
Incremental Delay, d2	18.9	1.7		1.6	7.4			1.8			1.7	
Delay (s)	40.6	24.7		26.5	40.1			16.5			16.6	
Level of Service	D	C		C	D			B			B	
Approach Delay (s)		25.4			39.8			16.5			16.6	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		29.4			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		66.6%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Existing + Churchill Closure
Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	53	1206	57	1197	22	52
v/c Ratio	0.20	0.48	0.21	0.47	0.05	0.14
Control Delay	9.7	8.8	22.9	23.5	0.2	3.5
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	9.7	8.8	22.9	23.7	0.2	3.5
Queue Length 50th (ft)	13	204	32	410	0	0
Queue Length 95th (ft)	29	213	m43	m477	0	1
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	265	2530	267	2561	466	417
Starvation Cap Reductn	0	0	0	645	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.48	0.21	0.62	0.05	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Existing + Churchill Closure

17: Bryant St & Embarcadero Rd

Timing Plan: A.M. Peak

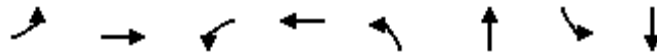
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	863	114	52	1065	36	0	0	13	0	0	37
Future Volume (vph)	43	863	114	52	1065	36	0	0	13	0	0	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99				0.94			0.89
Flpb, ped/bikes	0.98	1.00		0.99	1.00				1.00			1.00
Frt	1.00	0.98		1.00	1.00				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1732	3454		1760	3502				1515			1426
Flt Permitted	0.20	1.00		0.20	1.00				1.00			1.00
Satd. Flow (perm)	363	3454		365	3502				1515			1426
Peak-hour factor, PHF	0.81	0.81	0.81	0.92	0.92	0.92	0.25	0.25	0.58	0.25	0.25	0.71
Adj. Flow (vph)	53	1065	141	57	1158	39	0	0	22	0	0	52
RTOR Reduction (vph)	0	8	0	0	2	0	0	0	18	0	0	42
Lane Group Flow (vph)	53	1198	0	57	1195	0	0	0	4	0	0	10
Confl. Peds. (#/hr)	64		16	16		64			16			32
Confl. Bikes (#/hr)									26			61
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	78.4	78.4		78.4	78.4				21.6			21.6
Effective Green, g (s)	78.4	78.4		78.4	78.4				21.6			21.6
Actuated g/C Ratio	0.71	0.71		0.71	0.71				0.20			0.20
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	258	2461		260	2495				297			280
v/s Ratio Prot		c0.35			0.34							
v/s Ratio Perm	0.15			0.16					0.00			c0.01
v/c Ratio	0.21	0.49		0.22	0.48				0.01			0.04
Uniform Delay, d1	5.3	7.0		5.4	6.9				35.6			35.8
Progression Factor	1.00	1.00		2.71	2.81				1.00			1.00
Incremental Delay, d2	1.8	0.7		1.1	0.4				0.0			0.1
Delay (s)	7.1	7.6		15.7	19.8				35.6			35.8
Level of Service	A	A		B	B				D			D
Approach Delay (s)		7.6			19.6			35.6			35.8	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			14.2			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			56.7%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

18: Middlefield Rd & Embarcadero Rd

Existing + Churchill Closure

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	44	1023	57	1215	161	364	120	275
v/c Ratio	0.44	1.06	0.55	1.26	0.90	0.55	0.75	0.85
Control Delay	84.0	97.4	89.9	171.0	112.3	59.7	94.9	84.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.0	97.4	89.9	171.0	112.3	59.7	94.9	84.3
Queue Length 50th (ft)	44	~646	56	~850	162	175	118	268
Queue Length 95th (ft)	78	#687	90	#817	#245	198	174	334
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	115	966	115	961	184	718	184	375
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	1.06	0.50	1.26	0.88	0.51	0.65	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

18: Middlefield Rd & Embarcadero Rd

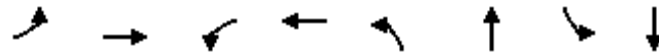
Existing + Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	772	46	43	809	115	129	273	18	100	205	23
Future Volume (vph)	35	772	46	43	809	115	129	273	18	100	205	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3497		1770	3447		1770	3500		1770	1827	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3497		1770	3447		1770	3500		1770	1827	
Peak-hour factor, PHF	0.80	0.80	0.80	0.76	0.76	0.76	0.80	0.80	0.80	0.83	0.83	0.83
Adj. Flow (vph)	44	965	58	57	1064	151	161	341	22	120	247	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	44	1023	0	57	1215	0	161	364	0	120	275	0
Confl. Peds. (#/hr)			24			44			8			14
Confl. Bikes (#/hr)						1			1			2
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.2	41.6		7.6	42.0		15.6	28.9		13.9	27.2	
Effective Green, g (s)	7.2	41.6		7.6	42.0		15.6	28.9		13.9	27.2	
Actuated g/C Ratio	0.05	0.27		0.05	0.27		0.10	0.19		0.09	0.18	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	83	947		87	943		179	658		160	323	
v/s Ratio Prot	0.02	0.29		c0.03	c0.35		c0.09	0.10		0.07	c0.15	
v/s Ratio Perm												
v/c Ratio	0.53	1.08		0.66	1.29		0.90	0.55		0.75	0.85	
Uniform Delay, d1	71.5	55.9		71.7	55.8		68.2	56.4		68.1	61.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.0	53.4		14.7	137.8		39.5	1.0		17.0	18.9	
Delay (s)	76.5	109.4		86.4	193.6		107.7	57.5		85.1	80.1	
Level of Service	E	F		F	F		F	E		F	F	
Approach Delay (s)		108.0			188.8			72.9			81.6	
Approach LOS		F			F			E			F	
Intersection Summary												
HCM 2000 Control Delay		130.7			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		0.73										
Actuated Cycle Length (s)		153.5			Sum of lost time (s)			22.5				
Intersection Capacity Utilization		66.8%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Existing + Churchill Closure

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	276	1134	299	1525	69	296	388	645
v/c Ratio	1.17	0.67	0.86	0.77	0.42	0.38	1.57	0.70
Control Delay	166.5	44.7	101.1	44.8	70.7	46.5	315.6	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	166.5	44.7	101.1	44.8	70.7	46.5	315.6	49.3
Queue Length 50th (ft)	~321	347	311	317	66	123	~536	274
Queue Length 95th (ft)	#509	401	m#424	375	113	157	#747	345
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	236	1692	346	1985	166	879	247	1106
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.67	0.86	0.77	0.42	0.34	1.57	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Existing + Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	1034	89	275	1154	249	61	204	60	369	407	206
Future Volume (vph)	273	1034	89	275	1154	249	61	204	60	369	407	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5009		1770	4928		1770	3401		1770	3254	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5009		1770	4928		1770	3401		1770	3254	
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.89	0.89	0.89	0.95	0.95	0.95
Adj. Flow (vph)	276	1044	90	299	1254	271	69	229	67	388	428	217
RTOR Reduction (vph)	0	7	0	0	22	0	0	19	0	0	46	0
Lane Group Flow (vph)	276	1127	0	299	1503	0	69	277	0	388	599	0
Confl. Peds. (#/hr)			17			9			11			74
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	20.0	50.5		29.3	59.8		14.1	33.2		21.0	40.1	
Effective Green, g (s)	20.0	50.5		29.3	59.8		14.1	33.2		21.0	40.1	
Actuated g/C Ratio	0.13	0.34		0.20	0.40		0.09	0.22		0.14	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	236	1686		345	1964		166	752		247	869	
v/s Ratio Prot	c0.16	0.23		c0.17	c0.31		0.04	c0.08		c0.22	c0.18	
v/s Ratio Perm												
v/c Ratio	1.17	0.67		0.87	0.77		0.42	0.37		1.57	0.69	
Uniform Delay, d1	65.0	42.6		58.5	39.0		64.1	49.5		64.5	49.4	
Progression Factor	1.00	1.00		1.57	1.11		1.00	1.00		1.00	1.00	
Incremental Delay, d2	112.1	2.1		10.7	1.5		1.2	0.1		275.6	1.8	
Delay (s)	177.1	44.7		102.7	44.9		65.3	49.6		340.1	51.2	
Level of Service	F	D		F	D		E	D		F	D	
Approach Delay (s)		70.6			54.4			52.6			159.7	
Approach LOS		E			D			D			F	
Intersection Summary												
HCM 2000 Control Delay			82.7			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			97.8%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	334	1875	218	90	1215
v/c Ratio	0.92	0.85	0.32	0.62	0.44
Control Delay	84.2	45.7	26.4	61.1	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	84.2	45.7	26.4	61.1	28.1
Queue Length 50th (ft)	292	~678	116	86	443
Queue Length 95th (ft)	#457	#824	194	m104	m437
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	392	2200	691	259	2749
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.85	0.85	0.32	0.35	0.44
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Existing + Churchill Closure
Timing Plan: A.M. Peak

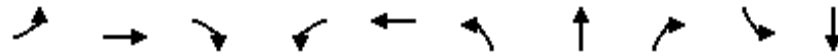
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		↑↑↑	↑	↑	↑↑↑
Traffic Volume (vph)	158	149	1650	192	83	1118
Future Volume (vph)	158	149	1650	192	83	1118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1681		5085	1534	1770	5085
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1681		5085	1534	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.88	0.88	0.92	0.92
Adj. Flow (vph)	172	162	1875	218	90	1215
RTOR Reduction (vph)	23	0	0	31	0	0
Lane Group Flow (vph)	311	0	1875	187	90	1215
Confl. Peds. (#/hr)		5		10		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	30.3		64.3	64.3	12.2	80.5
Effective Green, g (s)	30.3		64.3	64.3	12.2	80.5
Actuated g/C Ratio	0.20		0.43	0.43	0.08	0.54
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	339		2179	657	143	2728
v/s Ratio Prot	c0.18		c0.37		c0.05	0.24
v/s Ratio Perm				0.12		
v/c Ratio	0.92		0.86	0.28	0.63	0.45
Uniform Delay, d1	58.6		38.8	27.9	66.7	21.2
Progression Factor	1.00		1.00	1.00	0.79	1.18
Incremental Delay, d2	28.2		4.7	1.1	2.7	0.2
Delay (s)	86.9		43.5	29.0	55.6	25.2
Level of Service	F		D	C	E	C
Approach Delay (s)	86.9		42.0			27.3
Approach LOS	F		D			C
Intersection Summary						
HCM 2000 Control Delay			40.9		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			66.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues

Existing + Churchill Closure

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	480	604	233	314	1444	362	930	177	221	1459
v/c Ratio	1.04	0.49	0.44	0.84	1.33	0.90	0.55	0.18	0.78	0.96
Control Delay	127.9	64.4	10.8	102.0	206.3	106.8	36.4	16.6	103.8	64.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	127.9	64.4	10.8	102.0	206.3	106.8	36.4	16.6	103.8	64.7
Queue Length 50th (ft)	~356	243	11	202	~849	234	418	92	142	892
Queue Length 95th (ft)	#480	300	98	253	#945	#325	508	132	188	#1016
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			100	
Base Capacity (vph)	461	1238	533	496	1088	411	1699	1018	749	1554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.49	0.44	0.63	1.33	0.88	0.55	0.17	0.30	0.94

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing + Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	461	580	224	295	1158	199	329	846	161	212	1026	374
Future Volume (vph)	461	580	224	295	1158	199	329	846	161	212	1026	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3371	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3371	
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.91	0.91	0.91	0.96	0.96	0.96
Adj. Flow (vph)	480	604	233	314	1232	212	362	930	177	221	1069	390
RTOR Reduction (vph)	0	0	168	0	13	0	0	0	0	0	20	0
Lane Group Flow (vph)	480	604	65	314	1431	0	362	930	177	221	1439	0
Confl. Peds. (#/hr)			21			27			29			8
Confl. Bikes (#/hr)						3						1
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	25.6	46.2	46.2	20.8	41.4		22.4	91.3	116.6	15.7	84.6	
Effective Green, g (s)	25.6	46.2	46.2	20.8	41.4		22.4	91.3	116.6	15.7	84.6	
Actuated g/C Ratio	0.13	0.24	0.24	0.11	0.22		0.12	0.48	0.61	0.08	0.45	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	462	1236	364	375	1073		404	1700	971	283	1500	
v/s Ratio Prot	c0.14	0.12		0.09	c0.29		c0.11	0.26	0.11	0.06	c0.43	
v/s Ratio Perm			0.04									
v/c Ratio	1.04	0.49	0.18	0.84	1.33		0.90	0.55	0.18	0.78	0.96	
Uniform Delay, d1	82.2	61.8	56.9	82.9	74.3		82.7	34.8	16.0	85.5	51.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	52.3	1.4	1.1	14.3	156.8		21.6	0.2	0.0	12.1	14.4	
Delay (s)	134.5	63.1	58.0	97.3	231.1		104.3	35.0	16.0	97.6	65.4	
Level of Service	F	E	E	F	F		F	C	B	F	E	
Approach Delay (s)		88.2			207.2			49.8			69.7	
Approach LOS		F			F			D			E	
Intersection Summary												
HCM 2000 Control Delay			107.7			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			104.4%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Existing + Churchill Closure
Timing Plan: A.M. Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	10	0	74	0	1605	472	0	599	207	
Future Volume (Veh/h)	0	0	0	10	0	74	0	1605	472	0	599	207	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.95	0.25	0.95	0.92	0.98	0.98	0.25	0.84	0.84	
Hourly flow rate (vph)	0	0	0	11	0	78	0	1638	482	0	713	246	
Pedestrians	19												
Lane Width (ft)	12.0												
Walking Speed (ft/s)	3.5												
Percent Blockage	2												
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	1733	2975	480	2014	2616	838	959						2139
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1733	2975	480	2014	2616	838	959						2139
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	67	100	74	100						100
cM capacity (veh/h)	41	14	532	33	23	304	713						245
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2						
Volume Total	11	78	819	819	482	475	484						
Volume Left	11	0	0	0	0	0	0						
Volume Right	0	78	0	0	482	0	246						
cSH	33	304	1700	1700	1700	1700	1700						
Volume to Capacity	0.33	0.26	0.48	0.48	0.28	0.28	0.28						
Queue Length 95th (ft)	27	25	0	0	0	0	0						
Control Delay (s)	158.7	20.9	0.0	0.0	0.0	0.0	0.0						
Lane LOS	F	C											
Approach Delay (s)	37.9			0.0	0.0								
Approach LOS	E												
Intersection Summary													
Average Delay				1.1									
Intersection Capacity Utilization				55.6%	ICU Level of Service				B				
Analysis Period (min)				15									

HCM Unsignalized Intersection Capacity Analysis

22b: Alma St & Oregon Expy EB Ramps

Existing + Churchill Closure
Timing Plan: A.M. Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	286	1791	151	74	535	
Future Volume (Veh/h)	0	286	1791	151	74	535	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.90	0.98	0.98	0.84	0.84	
Hourly flow rate (vph)	0	318	1828	154	88	637	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2322	914			1828		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2322	914			1828		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	0			73		
cM capacity (veh/h)	23	276			330		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	318	914	914	154	88	318	318
Volume Left	0	0	0	0	88	0	0
Volume Right	318	0	0	154	0	0	0
cSH	276	1700	1700	1700	330	1700	1700
Volume to Capacity	1.15	0.54	0.54	0.09	0.27	0.19	0.19
Queue Length 95th (ft)	347	0	0	0	26	0	0
Control Delay (s)	142.1	0.0	0.0	0.0	19.8	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	142.1	0.0			2.4		
Approach LOS	F						
Intersection Summary							
Average Delay			15.5				
Intersection Capacity Utilization			73.9%		ICU Level of Service		D
Analysis Period (min)			15				

Queues
23: Cowper St & Oregon Expy

Existing + Churchill Closure

Timing Plan: A.M. Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	1567	54	27	1635	150	127	45	139
v/c Ratio	0.21	0.73	0.06	0.27	0.75	0.80	0.39	0.36	0.55
Control Delay	72.7	25.6	1.1	85.8	21.6	93.7	47.6	73.9	45.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	25.6	1.1	85.8	21.6	93.7	47.6	73.9	45.8
Queue Length 50th (ft)	19	503	0	28	771	149	97	43	88
Queue Length 95th (ft)	48	815	8	m27	m825	#185	106	60	88
Internal Link Dist (ft)		1547			1028		66		60
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	156	2159	976	154	2168	188	370	165	379
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.73	0.06	0.18	0.75	0.80	0.34	0.27	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Existing + Churchill Closure

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	1426	49	26	1555	14	102	48	38	29	35	55
Future Volume (vph)	18	1426	49	26	1555	14	102	48	38	29	35	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1546	1770	3533		1770	1700		1770	1653	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1546	1770	3533		1770	1700		1770	1653	
Peak-hour factor, PHF	0.91	0.91	0.91	0.96	0.96	0.96	0.68	0.68	0.68	0.65	0.65	0.65
Adj. Flow (vph)	20	1567	54	27	1620	15	150	71	56	45	54	85
RTOR Reduction (vph)	0	0	22	0	0	0	0	20	0	0	42	0
Lane Group Flow (vph)	20	1567	32	27	1635	0	150	107	0	45	97	0
Confl. Peds. (#/hr)			1			11			8			10
Confl. Bikes (#/hr)									25			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	5.1	88.6	88.6	5.4	89.1		16.0	27.0		8.9	20.1	
Effective Green, g (s)	5.1	88.6	88.6	5.4	89.1		16.0	27.0		8.9	20.1	
Actuated g/C Ratio	0.03	0.59	0.59	0.04	0.59		0.11	0.18		0.06	0.13	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	60	2090	913	63	2098		188	306		105	221	
v/s Ratio Prot	0.01	0.44		c0.02	c0.46		c0.08	0.06		0.03	c0.06	
v/s Ratio Perm			0.02									
v/c Ratio	0.33	0.75	0.03	0.43	0.78		0.80	0.35		0.43	0.44	
Uniform Delay, d1	70.8	22.6	12.8	70.8	23.0		65.4	53.8		68.1	59.8	
Progression Factor	1.00	1.00	1.00	1.23	0.86		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	2.5	0.1	2.0	1.3		23.2	0.7		3.8	1.4	
Delay (s)	74.1	25.1	12.9	88.9	21.1		88.6	54.5		71.9	61.2	
Level of Service	E	C	B	F	C		F	D		E	E	
Approach Delay (s)		25.3			22.2			73.0			63.8	
Approach LOS		C			C			E			E	
Intersection Summary												
HCM 2000 Control Delay			29.3			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)				20.1		
Intersection Capacity Utilization			69.2%			ICU Level of Service				C		
Analysis Period (min)			15									

c Critical Lane Group

Queues
24: Middlefield Rd & Oregon Expy

Existing + Churchill Closure

Timing Plan: A.M. Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	128	1319	167	120	1254	56	296	428	238	98	460
v/c Ratio	0.67	0.93	0.24	0.68	0.90	0.09	1.02	0.86	0.43	0.64	0.66
Control Delay	89.4	59.3	23.8	83.7	53.5	0.3	117.7	69.0	10.8	84.3	51.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.4	59.3	23.8	83.7	53.5	0.3	117.7	69.0	10.8	84.3	51.5
Queue Length 50th (ft)	111	~479	32	115	625	0	~305	385	24	94	182
Queue Length 95th (ft)	m#175	#881	m141	182	#774	0	#489	#534	95	154	235
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	191	1420	707	224	1386	601	291	527	578	184	788
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.93	0.24	0.54	0.90	0.09	1.02	0.81	0.41	0.53	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Existing + Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	1187	150	115	1204	54	263	381	212	86	257	148
Future Volume (vph)	115	1187	150	115	1204	54	263	381	212	86	257	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.83	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Peak-hour factor, PHF	0.90	0.90	0.90	0.96	0.96	0.96	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	128	1319	167	120	1254	56	296	428	238	98	292	168
RTOR Reduction (vph)	0	0	81	0	0	34	0	0	149	0	57	0
Lane Group Flow (vph)	128	1319	86	120	1254	22	296	428	89	98	403	0
Confl. Peds. (#/hr)			1			51			27			4
Confl. Bikes (#/hr)						2						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	16.2	60.2	60.2	15.0	58.8	58.8	24.7	40.3	40.3	13.1	28.8	
Effective Green, g (s)	16.2	60.2	60.2	15.0	58.8	58.8	24.7	40.3	40.3	13.1	28.8	
Actuated g/C Ratio	0.11	0.40	0.40	0.10	0.39	0.39	0.16	0.27	0.27	0.09	0.19	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	191	1420	626	177	1387	517	291	500	409	154	638	
v/s Ratio Prot	0.07	c0.37		0.07	c0.35		c0.17	c0.23		0.06	0.12	
v/s Ratio Perm			0.06			0.02			0.06			
v/c Ratio	0.67	0.93	0.14	0.68	0.90	0.04	1.02	0.86	0.22	0.64	0.63	
Uniform Delay, d1	64.3	42.9	28.5	65.2	42.9	28.2	62.6	52.1	42.6	66.1	55.7	
Progression Factor	1.19	1.18	2.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.3	9.0	0.3	9.9	9.9	0.2	57.2	14.7	0.6	8.3	2.1	
Delay (s)	82.7	59.4	78.9	75.0	52.9	28.3	119.9	66.8	43.2	74.5	57.8	
Level of Service	F	E	E	E	D	C	F	E	D	E	E	
Approach Delay (s)		63.3			53.8			77.3			60.7	
Approach LOS		E			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			62.9				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			21.6		
Intersection Capacity Utilization			97.7%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
1: Alma Street & Homer Ave

Existing + Churchill Closure
Timing Plan: P.M.Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	529	1114	951
v/c Ratio	0.74	0.68	0.58
Control Delay	34.6	21.5	19.5
Queue Delay	0.0	0.0	0.0
Total Delay	34.6	21.5	19.5
Queue Length 50th (ft)	131	258	207
Queue Length 95th (ft)	189	343	277
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	852	1864	1864
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.62	0.60	0.51
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Existing + Churchill Closure
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	356	126	1081	0	0	894
Future Volume (vph)	356	126	1081	0	0	894
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.96		1.00			1.00
Flpb, ped/bikes	0.88		1.00			1.00
Frt	0.96		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	2832		3539			3539
Flt Permitted	0.96		1.00			1.00
Satd. Flow (perm)	2832		3539			3539
Peak-hour factor, PHF	0.91	0.91	0.97	0.25	0.25	0.94
Adj. Flow (vph)	391	138	1114	0	0	951
RTOR Reduction (vph)	38	0	0	0	0	0
Lane Group Flow (vph)	491	0	1114	0	0	951
Confl. Peds. (#/hr)	77	61		28		
Confl. Bikes (#/hr)		3				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	19.2		37.0			37.0
Effective Green, g (s)	19.2		37.0			37.0
Actuated g/C Ratio	0.24		0.46			0.46
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	672		1618			1618
v/s Ratio Prot			c0.31			0.27
v/s Ratio Perm	c0.17					
v/c Ratio	0.73		0.69			0.59
Uniform Delay, d1	28.5		17.4			16.3
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	4.1		1.3			0.7
Delay (s)	32.5		18.7			16.9
Level of Service	C		B			B
Approach Delay (s)	32.5		18.7			16.9
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			20.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			80.9		Sum of lost time (s)	13.0
Intersection Capacity Utilization			52.7%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

Existing + Churchill Closure

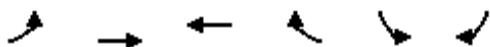
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	18	1606	84	18	1108
Future Volume (Veh/h)	30	18	1606	84	18	1108
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.94	0.94	0.95	0.95
Hourly flow rate (vph)	40	24	1709	89	19	1166
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2386	911			1810	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2386	911			1810	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	91			94	
cM capacity (veh/h)	26	274			332	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	64	1139	659	408	777	
Volume Left	40	0	0	19	0	
Volume Right	24	0	89	0	0	
cSH	40	1700	1700	332	1700	
Volume to Capacity	1.60	0.67	0.39	0.06	0.46	
Queue Length 95th (ft)	166	0	0	5	0	
Control Delay (s)	518.5	0.0	0.0	1.9	0.0	
Lane LOS	F			A		
Approach Delay (s)	518.5	0.0		0.7		
Approach LOS	F					
Intersection Summary						
Average Delay			11.2			
Intersection Capacity Utilization			57.1%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Existing + Churchill Closure
Timing Plan: P.M.Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑			↗
Traffic Volume (veh/h)	0	1137	1582	0	0	106
Future Volume (Veh/h)	0	1137	1582	0	0	106
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.98	0.98	0.25	0.25	0.66
Hourly flow rate (vph)	0	1160	1614	0	0	161
Pedestrians					18	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1632				2212	1632
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1632				2212	1632
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	387				37	89
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	580	580	1614	161		
Volume Left	0	0	0	0		
Volume Right	0	0	0	161		
cSH	1700	1700	1700	89		
Volume to Capacity	0.34	0.34	0.95	1.82		
Queue Length 95th (ft)	0	0	0	338		
Control Delay (s)	0.0	0.0	0.0	487.5		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	487.5		
Approach LOS				F		
Intersection Summary						
Average Delay			26.7			
Intersection Capacity Utilization			96.5%	ICU Level of Service		F
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Emerson St & Lincoln Ave

Existing + Churchill Closure

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	70	47	29	50	8	2	31	2	8	116	0
Future Volume (vph)	7	70	47	29	50	8	2	31	2	8	116	0
Peak Hour Factor	0.78	0.78	0.78	0.73	0.73	0.73	0.88	0.88	0.88	0.84	0.84	0.84
Hourly flow rate (vph)	9	90	60	40	68	11	2	35	2	10	138	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	159	119	39	148								
Volume Left (vph)	9	40	2	10								
Volume Right (vph)	60	11	2	0								
Hadj (s)	-0.18	0.05	0.01	0.05								
Departure Headway (s)	4.3	4.6	4.7	4.6								
Degree Utilization, x	0.19	0.15	0.05	0.19								
Capacity (veh/h)	795	740	702	726								
Control Delay (s)	8.3	8.4	8.0	8.7								
Approach Delay (s)	8.3	8.4	8.0	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.5									
Level of Service			A									
Intersection Capacity Utilization			27.0%	ICU Level of Service					A			
Analysis Period (min)			15									

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis 8: Alma Street & Kingsley Ave

Existing + Churchill Closure
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	23	154	1435	30	68	1060
Future Volume (Veh/h)	23	154	1435	30	68	1060
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.97	0.97	0.96	0.96
Hourly flow rate (vph)	28	186	1479	31	71	1104
Pedestrians	17					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	2					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2206	1512			1527	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2206	1512			1527	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	10	0			83	
cM capacity (veh/h)	31	107			425	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	214	1510	439	736		
Volume Left	28	0	71	0		
Volume Right	186	31	0	0		
cSH	81	1700	425	1700		
Volume to Capacity	2.64	0.89	0.17	0.43		
Queue Length 95th (ft)	513	0	15	0		
Control Delay (s)	852.0	0.0	5.2	0.0		
Lane LOS	F		A			
Approach Delay (s)	852.0	0.0	1.9			
Approach LOS	F					
Intersection Summary						
Average Delay			63.7			
Intersection Capacity Utilization			97.9%	ICU Level of Service		F
Analysis Period (min)			15			

Queues
9: Alma St & Churchill Ave

Existing + Churchill Closure
Timing Plan: P.M.Peak



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	97	1518	1203
v/c Ratio	0.32	0.59	0.49
Control Delay	48.9	9.1	7.9
Queue Delay	0.0	0.0	0.0
Total Delay	48.9	9.1	7.9
Queue Length 50th (ft)	61	291	206
Queue Length 95th (ft)	105	331	244
Internal Link Dist (ft)	479	698	387
Turn Bay Length (ft)			
Base Capacity (vph)	457	3257	3075
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.21	0.47	0.39
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Existing + Churchill Closure
Timing Plan: P.M.Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	R	T	R	T	T
Traffic Volume (vph)	60	7	1325	26	7	1111
Future Volume (vph)	60	7	1325	26	7	1111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		6.0			6.0
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.99		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.99		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	1743		3527			3538
Flt Permitted	0.96		1.00			0.94
Satd. Flow (perm)	1743		3527			3329
Peak-hour factor, PHF	0.69	0.69	0.89	0.89	0.93	0.93
Adj. Flow (vph)	87	10	1489	29	8	1195
RTOR Reduction (vph)	2	0	1	0	0	0
Lane Group Flow (vph)	95	0	1517	0	0	1203
Confl. Peds. (#/hr)		42		6		
Confl. Bikes (#/hr)		8				
Turn Type	Perm		NA		Perm	NA
Protected Phases			6			2
Permitted Phases	7				2	
Actuated Green, G (s)	20.7		88.1			88.1
Effective Green, g (s)	20.7		88.1			88.1
Actuated g/C Ratio	0.17		0.74			0.74
Clearance Time (s)	5.0		6.0			6.0
Vehicle Extension (s)	3.0		6.0			6.0
Lane Grp Cap (vph)	301		2593			2448
v/s Ratio Prot			c0.43			
v/s Ratio Perm	c0.05					0.36
v/c Ratio	0.31		0.59			0.49
Uniform Delay, d1	43.3		7.4			6.6
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	0.6		0.7			0.4
Delay (s)	43.9		8.0			7.0
Level of Service	D		A			A
Approach Delay (s)	43.9		8.0			7.0
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			8.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			119.8		Sum of lost time (s)	11.0
Intersection Capacity Utilization			63.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 10: Emerson St & Churchill Ave

Existing + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	114	12	3	34	0	13	9	3	7	22	20
Future Volume (vph)	5	114	12	3	34	0	13	9	3	7	22	20
Peak Hour Factor	0.91	0.91	0.91	0.77	0.77	0.77	0.63	0.63	0.63	0.77	0.77	0.77
Hourly flow rate (vph)	5	125	13	4	44	0	21	14	5	9	29	26
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	143	48	40	64								
Volume Left (vph)	5	4	21	9								
Volume Right (vph)	13	0	5	26								
Hadj (s)	-0.01	0.05	0.06	-0.18								
Departure Headway (s)	4.2	4.3	4.5	4.2								
Degree Utilization, x	0.17	0.06	0.05	0.07								
Capacity (veh/h)	839	802	764	818								
Control Delay (s)	8.0	7.6	7.7	7.5								
Approach Delay (s)	8.0	7.6	7.7	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.8								
Level of Service				A								
Intersection Capacity Utilization				21.3%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Existing + Churchill Closure

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	112	5	12	38	3	3	5	3	3	28	6
Future Volume (Veh/h)	6	112	5	12	38	3	3	5	3	3	28	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.39	0.39	0.39	0.84	0.84	0.84
Hourly flow rate (vph)	6	120	5	15	46	4	8	13	8	4	33	7
Pedestrians		9			12			1			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	118	102	46	156	102	34	49			33		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	118	102	46	156	102	34	49			33		
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 %	99	84	100	98	94	100	99			100		
cM capacity (veh/h)	787	766	1013	687	766	1022	1544			1561		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	131	65	29	44								
Volume Left	6	15	8	4								
Volume Right	5	4	8	7								
cSH	774	758	1544	1561								
Volume to Capacity	0.17	0.09	0.01	0.00								
Queue Length 95th (ft)	15	7	0	0								
Control Delay (s)	10.6	10.2	2.1	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.6	10.2	2.1	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay			8.0									
Intersection Capacity Utilization			21.3%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Existing + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	81	9	13	53	40	8	77	2	9	102	32
Future Volume (vph)	25	81	9	13	53	40	8	77	2	9	102	32
Peak Hour Factor	0.87	0.87	0.87	0.84	0.84	0.84	0.81	0.81	0.81	0.97	0.97	0.97
Hourly flow rate (vph)	29	93	10	15	63	48	10	95	2	9	105	33
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	132	126	107	147								
Volume Left (vph)	29	15	10	9								
Volume Right (vph)	10	48	2	33								
Hadj (s)	0.03	-0.17	0.04	-0.09								
Departure Headway (s)	4.7	4.5	4.7	4.6								
Degree Utilization, x	0.17	0.16	0.14	0.19								
Capacity (veh/h)	713	743	710	736								
Control Delay (s)	8.7	8.4	8.5	8.6								
Approach Delay (s)	8.7	8.4	8.5	8.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.5									
Level of Service			A									
Intersection Capacity Utilization			28.2%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

13: Cowper St & Churchill Ave

Existing + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	84	10	3	31	0	12	25	3	0	32	6
Future Volume (vph)	2	84	10	3	31	0	12	25	3	0	32	6
Peak Hour Factor	0.86	0.86	0.86	0.61	0.61	0.61	0.91	0.91	0.91	0.73	0.73	0.73
Hourly flow rate (vph)	2	98	12	5	51	0	13	27	3	0	44	8
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	112	56	43	52								
Volume Left (vph)	2	5	13	0								
Volume Right (vph)	12	0	3	8								
Hadj (s)	-0.03	0.05	0.05	-0.06								
Departure Headway (s)	4.1	4.3	4.4	4.3								
Degree Utilization, x	0.13	0.07	0.05	0.06								
Capacity (veh/h)	844	815	781	808								
Control Delay (s)	7.8	7.6	7.6	7.5								
Approach Delay (s)	7.8	7.6	7.6	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.7									
Level of Service			A									
Intersection Capacity Utilization			22.8%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

14: Churchill Ave & Embarcadero Rd

Existing + Churchill Closure
Timing Plan: P.M.Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	985	2	42	869	0	51
Future Volume (Veh/h)	985	2	42	869	0	51
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.25	0.80
Hourly flow rate (vph)	1071	2	45	924	0	64
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.75		0.75	0.75
vC, conflicting volume			1079		1632	544
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			428		1169	0
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		100	92
cM capacity (veh/h)			836		131	804
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	714	359	353	616	64	
Volume Left	0	0	45	0	0	
Volume Right	0	2	0	0	64	
cSH	1700	1700	836	1700	804	
Volume to Capacity	0.42	0.21	0.05	0.36	0.08	
Queue Length 95th (ft)	0	0	4	0	6	
Control Delay (s)	0.0	0.0	1.8	0.0	9.9	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.6		9.9	
Approach LOS					A	
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			58.4%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

15: Cowper St & Embarcadero Rd

Existing + Churchill Closure
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	971	34	7	821	36	2	9	6	11	6	17
Future Volume (Veh/h)	18	971	34	7	821	36	2	9	6	11	6	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.53	0.53	0.53	0.53	0.53	0.53
Hourly flow rate (vph)	20	1055	37	7	855	38	4	17	11	21	11	32
Pedestrians								8			1	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								3.5			3.5	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.72			0.72	0.72	0.72	0.72	0.72	
vC, conflicting volume	894			1100			1600	2030	554	1476	2029	448
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	894			361			1056	1652	0	883	1651	448
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			96	75	99	84	84	94
cM capacity (veh/h)	754			853			102	67	775	133	67	558
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	548	564	434	466	32	64						
Volume Left	20	0	7	0	4	21						
Volume Right	0	37	0	38	11	32						
cSH	754	1700	853	1700	105	169						
Volume to Capacity	0.03	0.33	0.01	0.27	0.31	0.38						
Queue Length 95th (ft)	2	0	1	0	29	41						
Control Delay (s)	0.7	0.0	0.2	0.0	53.9	38.8						
Lane LOS	A		A		F	E						
Approach Delay (s)	0.4		0.1		53.9	38.8						
Approach LOS					F	E						
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			51.7%		ICU Level of Service		A					
Analysis Period (min)			15									

Queues

Existing + Churchill Closure

16: Waverly St & Embarcadero Rd

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	88	1052	21	870	213	298
v/c Ratio	1.22	0.97	0.31	0.80	0.24	0.34
Control Delay	213.1	63.7	43.8	41.3	10.7	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	213.1	63.7	43.8	41.3	10.7	11.4
Queue Length 50th (ft)	~79	421	11	293	63	91
Queue Length 95th (ft)	#186	#543	38	372	90	125
Internal Link Dist (ft)		572		576	43	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	72	1086	68	1086	889	886
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.22	0.97	0.31	0.80	0.24	0.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Existing + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	906	51	20	762	55	60	97	15	88	105	52
Future Volume (vph)	80	906	51	20	762	55	60	97	15	88	105	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.99			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1768	3503		1770	3497			1806			1771	
Flt Permitted	0.13	1.00		0.12	1.00			0.80			0.81	
Satd. Flow (perm)	233	3503		219	3497			1478			1464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.94	0.94	0.94	0.81	0.81	0.81	0.82	0.82	0.82
Adj. Flow (vph)	88	996	56	21	811	59	74	120	19	107	128	63
RTOR Reduction (vph)	0	3	0	0	5	0	0	3	0	0	9	0
Lane Group Flow (vph)	88	1049	0	21	865	0	0	210	0	0	289	0
Confl. Peds. (#/hr)	2		10	10		2	2		6	6		2
Confl. Bikes (#/hr)												4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	34.0	34.0		34.0	34.0			66.0			66.0	
Effective Green, g (s)	34.0	34.0		34.0	34.0			66.0			66.0	
Actuated g/C Ratio	0.31	0.31		0.31	0.31			0.60			0.60	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	72	1082		67	1080			886			878	
v/s Ratio Prot		0.30			0.25							
v/s Ratio Perm	c0.38			0.10				0.14			c0.20	
v/c Ratio	1.22	0.97		0.31	0.80			0.24			0.33	
Uniform Delay, d1	38.0	37.5		29.1	34.9			10.3			11.0	
Progression Factor	1.21	1.18		1.00	1.00			1.00			1.00	
Incremental Delay, d2	172.4	18.8		2.7	4.4			0.6			1.0	
Delay (s)	218.6	63.1		31.7	39.2			10.9			12.0	
Level of Service	F	E		C	D			B			B	
Approach Delay (s)		75.1			39.1			10.9			12.0	
Approach LOS		E			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			49.7			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			63.9%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Existing + Churchill Closure

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	164	1221	13	954	14	40
v/c Ratio	0.42	0.46	0.05	0.36	0.04	0.09
Control Delay	11.9	7.7	4.7	8.6	0.2	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	7.7	4.7	8.6	0.2	0.4
Queue Length 50th (ft)	52	211	3	332	0	0
Queue Length 95th (ft)	110	261	m4	391	0	0
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	393	2681	283	2664	454	511
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.46	0.05	0.36	0.03	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

17: Bryant St & Embarcadero Rd

Existing + Churchill Closure

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	1073	38	12	796	63	0	0	11	0	0	33
Future Volume (vph)	149	1073	38	12	796	63	0	0	11	0	0	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00				0.95			0.93
Flpb, ped/bikes	1.00	1.00		1.00	1.00				1.00			1.00
Frt	1.00	0.99		1.00	0.99				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1764	3516		1765	3492				1529			1495
Flt Permitted	0.28	1.00		0.20	1.00				1.00			1.00
Satd. Flow (perm)	517	3516		371	3492				1529			1495
Peak-hour factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90	0.25	0.25	0.81	0.25	0.25	0.83
Adj. Flow (vph)	164	1179	42	13	884	70	0	0	14	0	0	40
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	12	0	0	33
Lane Group Flow (vph)	164	1219	0	13	950	0	0	0	2	0	0	7
Confl. Peds. (#/hr)	6		8	8		6			6			20
Confl. Bikes (#/hr)									24			28
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	81.8	81.8		81.8	81.8				18.2			18.2
Effective Green, g (s)	81.8	81.8		81.8	81.8				18.2			18.2
Actuated g/C Ratio	0.74	0.74		0.74	0.74				0.17			0.17
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	384	2614		275	2596				252			247
v/s Ratio Prot		c0.35			0.27							
v/s Ratio Perm	0.32			0.04					0.00			c0.00
v/c Ratio	0.43	0.47		0.05	0.37				0.01			0.03
Uniform Delay, d1	5.3	5.5		3.7	5.0				38.4			38.5
Progression Factor	1.00	1.00		0.68	1.32				1.00			1.00
Incremental Delay, d2	3.4	0.6		0.2	0.3				0.0			0.0
Delay (s)	8.7	6.1		2.8	6.8				38.4			38.5
Level of Service	A	A		A	A				D			D
Approach Delay (s)		6.4			6.8			38.4			38.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			7.3			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			50.1%			ICU Level of Service			A			
Analysis Period (min)			15									

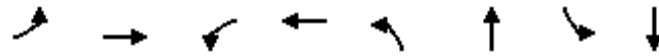
c Critical Lane Group

Queues

Existing + Churchill Closure

18: Middlefield Rd & Embarcadero Rd

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	1045	93	975	116	433	168	421
v/c Ratio	0.33	0.75	0.62	0.66	0.61	0.51	0.75	0.87
Control Delay	55.0	35.3	66.9	30.6	59.9	37.5	66.7	57.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.0	35.3	66.9	30.6	59.9	37.5	66.7	57.3
Queue Length 50th (ft)	30	356	64	309	79	138	114	278
Queue Length 95th (ft)	66	#517	111	392	134	179	#190	#426
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	160	1393	162	1485	257	994	257	534
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.75	0.57	0.66	0.45	0.44	0.65	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

18: Middlefield Rd & Embarcadero Rd

Existing + Churchill Closure

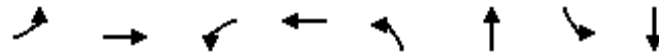
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	914	89	78	692	127	108	358	45	156	367	24
Future Volume (vph)	41	914	89	78	692	127	108	358	45	156	367	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3480		1770	3441		1770	3475		1770	1842	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3480		1770	3441		1770	3475		1770	1842	
Peak-hour factor, PHF	0.96	0.96	0.96	0.84	0.84	0.84	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	952	93	93	824	151	116	385	48	168	395	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	43	1045	0	93	975	0	116	433	0	168	421	0
Confl. Peds. (#/hr)			9			15			1			16
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	5.3	43.2		7.9	45.8		11.9	27.0		13.9	29.0	
Effective Green, g (s)	5.3	43.2		7.9	45.8		11.9	27.0		13.9	29.0	
Actuated g/C Ratio	0.05	0.39		0.07	0.42		0.11	0.25		0.13	0.26	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	85	1366		127	1432		191	852		223	485	
v/s Ratio Prot	0.02	c0.30		c0.05	c0.28		0.07	0.12		c0.09	c0.23	
v/s Ratio Perm												
v/c Ratio	0.51	0.77		0.73	0.68		0.61	0.51		0.75	0.87	
Uniform Delay, d1	51.1	29.0		50.0	26.1		46.8	35.8		46.4	38.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	4.1		18.4	2.6		4.5	0.5		12.8	15.1	
Delay (s)	54.5	33.1		68.4	28.8		51.4	36.3		59.2	53.8	
Level of Service	D	C		E	C		D	D		E	D	
Approach Delay (s)		34.0			32.2			39.4			55.3	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			38.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			76.9%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Existing + Churchill Closure

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	251	1585	251	2196	205	820	357	634
v/c Ratio	1.18	0.75	1.42	1.11	0.97	0.90	1.68	0.73
Control Delay	174.8	39.4	261.7	76.3	118.3	59.8	365.2	53.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.8	39.4	261.7	76.3	118.3	59.8	365.2	53.1
Queue Length 50th (ft)	~294	475	~337	~852	203	361	~509	280
Queue Length 95th (ft)	#462	515	m#340	m#323	#349	#426	#714	353
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	212	2114	177	1984	212	913	212	863
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	0.75	1.42	1.11	0.97	0.90	1.68	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Existing + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	1316	79	223	1500	455	178	415	298	332	402	188
Future Volume (vph)	221	1316	79	223	1500	455	178	415	298	332	402	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5026		1770	4870		1770	3264		1770	3265	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5026		1770	4870		1770	3264		1770	3265	
Peak-hour factor, PHF	0.88	0.88	0.88	0.89	0.89	0.89	0.87	0.87	0.87	0.93	0.93	0.93
Adj. Flow (vph)	251	1495	90	251	1685	511	205	477	343	357	432	202
RTOR Reduction (vph)	0	5	0	0	37	0	0	87	0	0	37	0
Lane Group Flow (vph)	251	1580	0	251	2159	0	205	733	0	357	597	0
Confl. Peds. (#/hr)			27			15			25			78
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	18.0	63.0		15.0	60.0		18.0	38.0		18.0	38.0	
Effective Green, g (s)	18.0	63.0		15.0	60.0		18.0	38.0		18.0	38.0	
Actuated g/C Ratio	0.12	0.42		0.10	0.40		0.12	0.25		0.12	0.25	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	212	2110		177	1948		212	826		212	827	
v/s Ratio Prot	c0.14	0.31		c0.14	c0.44		0.12	c0.22		c0.20	0.18	
v/s Ratio Perm												
v/c Ratio	1.18	0.75		1.42	1.11		0.97	0.89		1.68	0.72	
Uniform Delay, d1	66.0	36.8		67.5	45.0		65.7	53.9		66.0	51.2	
Progression Factor	1.00	1.00		1.45	0.54		1.00	1.00		1.00	1.00	
Incremental Delay, d2	120.4	2.5		201.3	52.4		51.8	11.1		327.4	2.7	
Delay (s)	186.4	39.3		299.0	76.8		117.5	65.0		393.4	53.8	
Level of Service	F	D		F	E		F	E		F	D	
Approach Delay (s)		59.4			99.6			75.5			176.2	
Approach LOS		E			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			96.0			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.15									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			112.8%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Existing + Churchill Closure
Timing Plan: P.M.Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	387	1901	190	257	1656
v/c Ratio	1.04	1.06	0.33	0.87	0.59
Control Delay	110.3	84.3	32.8	62.9	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	110.3	84.3	32.8	62.9	20.1
Queue Length 50th (ft)	~384	~846	112	254	478
Queue Length 95th (ft)	#542	#989	194	m295	m484
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	371	1796	568	354	2786
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.04	1.06	0.33	0.73	0.59
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Existing + Churchill Closure
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			  			  
Traffic Volume (vph)	165	164	1787	179	247	1590
Future Volume (vph)	165	164	1787	179	247	1590
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.98		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1681		5085	1532	1770	5085
Flt Permitted	0.98		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1681		5085	1532	1770	5085
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.96	0.96
Adj. Flow (vph)	194	193	1901	190	257	1656
RTOR Reduction (vph)	24	0	0	29	0	0
Lane Group Flow (vph)	363	0	1901	161	257	1656
Confl. Peds. (#/hr)		3		8		
Confl. Bikes (#/hr)				1		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	31.0		52.4	52.4	25.2	81.6
Effective Green, g (s)	31.0		52.4	52.4	25.2	81.6
Actuated g/C Ratio	0.21		0.35	0.35	0.17	0.54
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	347		1776	535	297	2766
v/s Ratio Prot	c0.22		c0.37		c0.15	0.33
v/s Ratio Perm				0.10		
v/c Ratio	1.05		1.07	0.30	0.87	0.60
Uniform Delay, d1	59.5		48.8	35.5	60.7	23.1
Progression Factor	1.00		1.00	1.00	0.84	0.80
Incremental Delay, d2	61.0		43.0	1.4	9.3	0.4
Delay (s)	120.5		91.8	36.9	60.5	18.8
Level of Service	F		F	D	E	B
Approach Delay (s)	120.5		86.8			24.4
Approach LOS	F		F			C
Intersection Summary						
HCM 2000 Control Delay			62.6		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			77.6%		ICU Level of Service	D
Analysis Period (min)			15			

c Critical Lane Group

Queues

Existing + Churchill Closure

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: P.M.Peak

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	855	1401	198	174	1180	320	1033	215	364	1189
v/c Ratio	1.09	0.73	0.30	0.73	1.08	0.73	0.85	0.32	0.87	1.03
Control Delay	122.0	51.9	10.3	99.4	113.6	85.1	63.0	34.5	98.6	89.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	122.0	51.9	10.3	99.4	113.6	85.1	63.0	34.5	98.6	89.4
Queue Length 50th (ft)	~572	516	25	106	~556	192	607	169	220	~764
Queue Length 95th (ft)	#797	631	95	147	#655	237	668	219	278	#907
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			100	
Base Capacity (vph)	782	1920	663	371	1092	581	1287	742	486	1152
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.73	0.30	0.47	1.08	0.55	0.80	0.29	0.75	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing + Churchill Closure
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	761	1247	176	172	916	252	310	1002	209	328	703	367
Future Volume (vph)	761	1247	176	172	916	252	310	1002	209	328	703	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3315	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3315	
Peak-hour factor, PHF	0.89	0.89	0.89	0.99	0.99	0.99	0.97	0.97	0.97	0.90	0.90	0.90
Adj. Flow (vph)	855	1401	198	174	925	255	320	1033	215	364	781	408
RTOR Reduction (vph)	0	0	103	0	27	0	0	0	0	0	37	0
Lane Group Flow (vph)	855	1401	95	174	1153	0	320	1033	215	364	1152	0
Confl. Peds. (#/hr)			27			28			18			13
Confl. Bikes (#/hr)									3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	41.0	68.0	68.0	12.5	39.5		23.0	61.6	78.6	21.9	60.5	
Effective Green, g (s)	41.0	68.0	68.0	12.5	39.5		23.0	61.6	78.6	21.9	60.5	
Actuated g/C Ratio	0.23	0.38	0.38	0.07	0.22		0.13	0.34	0.44	0.12	0.34	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	781	1921	561	238	1064		438	1211	691	417	1114	
v/s Ratio Prot	c0.25	0.28		0.05	c0.24		0.09	c0.29	0.14	0.11	c0.35	
v/s Ratio Perm			0.06									
v/c Ratio	1.09	0.73	0.17	0.73	1.08		0.73	0.85	0.31	0.87	1.03	
Uniform Delay, d1	69.5	48.1	37.2	82.1	70.2		75.5	55.0	33.1	77.7	59.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	61.2	2.5	0.7	9.5	53.1		6.2	5.8	0.1	17.4	36.1	
Delay (s)	130.7	50.6	37.9	91.6	123.3		81.7	60.8	33.1	95.1	95.9	
Level of Service	F	D	D	F	F		F	E	C	F	F	
Approach Delay (s)		77.5			119.2			61.3			95.7	
Approach LOS		E			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			86.0			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			180.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			100.5%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Existing + Churchill Closure

Timing Plan: P.M. Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	31	0	66	0	1593	391	0	1148	290	
Future Volume (Veh/h)	0	0	0	31	0	66	0	1593	391	0	1148	290	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.91	0.25	0.91	0.25	0.99	0.99	0.25	0.97	0.97	
Hourly flow rate (vph)	0	0	0	34	0	73	0	1609	395	0	1184	299	
Pedestrians	23												
Lane Width (ft)	12.0												
Walking Speed (ft/s)	3.5												
Percent Blockage	2												
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	2211	3360	742	2224	3115	828	1483						2027
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	2211	3360	742	2224	3115	828	1483						2027
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	0	100	76	100						100
cM capacity (veh/h)	18	8	358	23	11	308	450						270
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2						
Volume Total	34	73	804	804	395	789	694						
Volume Left	34	0	0	0	0	0	0						
Volume Right	0	73	0	0	395	0	299						
cSH	23	308	1700	1700	1700	1700	1700						
Volume to Capacity	1.49	0.24	0.47	0.47	0.23	0.46	0.41						
Queue Length 95th (ft)	108	23	0	0	0	0	0						
Control Delay (s)	613.6	20.3	0.0	0.0	0.0	0.0	0.0						
Lane LOS	F	C											
Approach Delay (s)	208.8			0.0	0.0								
Approach LOS	F												
Intersection Summary													
Average Delay				6.2									
Intersection Capacity Utilization				54.8%	ICU Level of Service				A				
Analysis Period (min)				15									

HCM Unsignalized Intersection Capacity Analysis

22b: Alma St & Oregon Expy EB Ramps

Existing + Churchill Closure

Timing Plan: P.M.Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	347	1637	62	60	1119	
Future Volume (Veh/h)	0	347	1637	62	60	1119	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.95	0.99	0.99	0.97	0.97	
Hourly flow rate (vph)	0	365	1654	63	62	1154	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2355	827			1654		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2355	827			1654		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	0			84		
cM capacity (veh/h)	25	315			386		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	365	827	827	63	62	577	577
Volume Left	0	0	0	0	62	0	0
Volume Right	365	0	0	63	0	0	0
cSH	315	1700	1700	1700	386	1700	1700
Volume to Capacity	1.16	0.49	0.49	0.04	0.16	0.34	0.34
Queue Length 95th (ft)	381	0	0	0	14	0	0
Control Delay (s)	137.6	0.0	0.0	0.0	16.1	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	137.6	0.0			0.8		
Approach LOS	F						
Intersection Summary							
Average Delay		15.5					
Intersection Capacity Utilization		73.4%		ICU Level of Service		D	
Analysis Period (min)		15					

Queues
23: Cowper St & Oregon Expy

Existing + Churchill Closure

Timing Plan: P.M.Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	1534	80	32	1343	60	56	11	109
v/c Ratio	0.27	0.64	0.07	0.30	0.56	0.42	0.19	0.10	0.54
Control Delay	74.0	19.8	3.1	90.9	10.1	73.8	40.3	69.0	52.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.0	19.8	3.1	90.9	10.1	73.8	40.3	69.0	52.9
Queue Length 50th (ft)	26	462	0	32	170	57	34	10	74
Queue Length 95th (ft)	60	817	26	m40	807	84	55	29	104
Internal Link Dist (ft)		1547			1028		48		36
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	180	2394	1099	178	2398	179	387	177	374
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.64	0.07	0.18	0.56	0.34	0.14	0.06	0.29
Intersection Summary									
m Volume for 95th percentile queue is metered by upstream signal.									

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Existing + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1411	74	29	1206	16	44	28	13	9	42	45
Future Volume (vph)	25	1411	74	29	1206	16	44	28	13	9	42	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.95		1.00	0.92	
Flt Protected	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	3531		1770	1759		1770	1688	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3531		1770	1759		1770	1688	
Peak-hour factor, PHF	0.92	0.92	0.92	0.91	0.91	0.91	0.73	0.73	0.73	0.80	0.80	0.80
Adj. Flow (vph)	27	1534	80	32	1325	18	60	38	18	11	52	56
RTOR Reduction (vph)	0	0	28	0	0	0	0	12	0	0	29	0
Lane Group Flow (vph)	27	1534	52	32	1343	0	60	44	0	11	80	0
Confl. Peds. (#/hr)						5			7			5
Confl. Bikes (#/hr)									3			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	5.4	98.4	98.4	5.7	98.9		10.5	22.2		3.6	15.5	
Effective Green, g (s)	5.4	98.4	98.4	5.7	98.9		10.5	22.2		3.6	15.5	
Actuated g/C Ratio	0.04	0.66	0.66	0.04	0.66		0.07	0.15		0.02	0.10	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	63	2321	1038	67	2328		123	260		42	174	
v/s Ratio Prot	0.02	c0.43		c0.02	0.38		c0.03	0.03		0.01	c0.05	
v/s Ratio Perm			0.03									
v/c Ratio	0.43	0.66	0.05	0.48	0.58		0.49	0.17		0.26	0.46	
Uniform Delay, d1	70.8	15.7	9.2	70.7	14.0		67.2	55.8		71.9	63.3	
Progression Factor	1.00	1.00	1.00	1.29	0.58		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	1.5	0.1	2.8	0.6		6.2	0.3		4.5	1.9	
Delay (s)	75.4	17.2	9.3	93.9	8.7		73.4	56.2		76.4	65.3	
Level of Service	E	B	A	F	A		E	E		E	E	
Approach Delay (s)		17.7			10.7			65.1			66.3	
Approach LOS		B			B			E			E	
Intersection Summary												
HCM 2000 Control Delay			18.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			20.1			
Intersection Capacity Utilization			61.7%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

Queues

24: Middlefield Rd & Oregon Expy

Existing + Churchill Closure

Timing Plan: P.M.Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	170	1137	239	201	1067	63	221	524	153	49	584
v/c Ratio	0.68	0.89	0.37	0.86	0.86	0.10	0.91	0.90	0.27	0.40	0.74
Control Delay	65.0	44.3	14.5	95.6	52.8	0.3	100.9	69.5	11.0	76.3	59.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.0	44.3	14.5	95.6	52.8	0.3	100.9	69.5	11.0	76.3	59.3
Queue Length 50th (ft)	162	552	26	194	497	0	216	506	17	47	276
Queue Length 95th (ft)	#260	486	146	#305	559	0	#375	#782	77	91	348
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	249	1284	651	247	1295	645	244	583	572	172	785
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.89	0.37	0.81	0.82	0.10	0.91	0.90	0.27	0.28	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Existing + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	158	1057	222	175	928	55	203	482	141	46	440	103
Future Volume (vph)	158	1057	222	175	928	55	203	482	141	46	440	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3427	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3427	
Peak-hour factor, PHF	0.93	0.93	0.93	0.87	0.87	0.87	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	170	1137	239	201	1067	63	221	524	153	49	473	111
RTOR Reduction (vph)	0	0	87	0	0	41	0	0	89	0	13	0
Lane Group Flow (vph)	170	1137	152	201	1067	22	221	524	64	49	571	0
Confl. Peds. (#/hr)			2			6			11			4
Confl. Bikes (#/hr)									1			1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	21.2	53.4	53.4	19.8	51.8	51.8	20.7	46.9	46.9	8.5	34.8	
Effective Green, g (s)	21.2	53.4	53.4	19.8	51.8	51.8	20.7	46.9	46.9	8.5	34.8	
Actuated g/C Ratio	0.14	0.36	0.36	0.13	0.35	0.35	0.14	0.31	0.31	0.06	0.23	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	250	1259	554	233	1222	526	244	582	483	100	795	
v/s Ratio Prot	0.10	c0.32		0.11	c0.30		c0.12	c0.28		0.03	0.17	
v/s Ratio Perm			0.10			0.01			0.04			
v/c Ratio	0.68	0.90	0.27	0.86	0.87	0.04	0.91	0.90	0.13	0.49	0.72	
Uniform Delay, d1	61.2	45.8	34.5	63.8	46.0	32.6	63.7	49.3	37.0	68.6	53.1	
Progression Factor	0.87	0.81	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.8	8.6	0.9	26.4	8.8	0.1	35.0	18.0	0.3	3.7	3.1	
Delay (s)	58.7	45.9	31.6	90.2	54.8	32.8	98.7	67.3	37.2	72.4	56.2	
Level of Service	E	D	C	F	D	C	F	E	D	E	E	
Approach Delay (s)		45.1			59.1			69.9			57.5	
Approach LOS		D			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			56.1				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			21.6		
Intersection Capacity Utilization			93.9%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Appendix F – Peak Hour Signal Warrants

Signal Warrant Analysis
Existing Plus Project Conditions
Alma Street and Embarcadero Road
City of Palo Alto

WARRANT 3 - Peak Hours

PART A or PART B SATISFIED

YES ☒ NO ☐

PART A

SATISFIED

YES ☐ NO ☒

(All parts, 1, 2 and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND
3. The total entering volume services during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches.

YES ☐ NO ☒

YES ☒ NO ☐

YES ☒ NO ☐

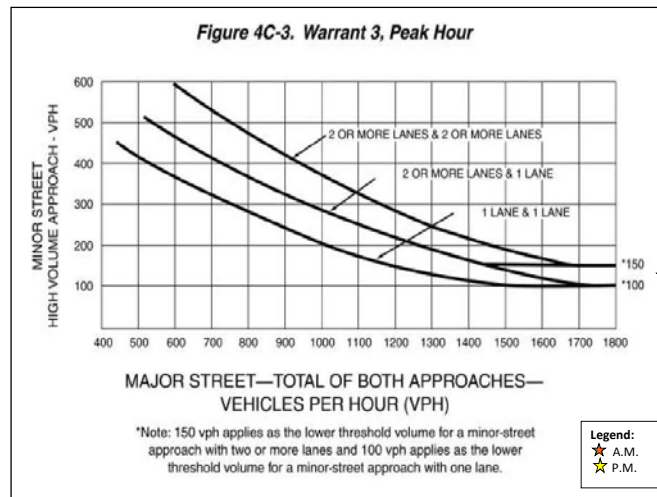
Part A is not met for the A.M. and P.M. Peak Hours

YES ☒ NO ☐

PART B

APPROACH LANES			SATISFIED		Hour
	One	2 or More	8:00-9:00	7:30-8:30	
Both Approaches - Major Street		2	2060	2719	
Highest Approaches - Minor Street	1		120	106	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any 4 consecutive 15 minute intervals)



Part B is met for the A.M. and P.M. Peak Hours

Signal Warrant Analysis
Existing Plus Project Conditions
Alma Street and Kingsley Avenue
City of Palo Alto

WARRANT 3 - Peak Hours

PART A or PART B SATISFIED

YES ☒ NO ☐

PART A

SATISFIED

YES ☐ NO ☒

(All parts, 1, 2 and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND
3. The total entering volume services during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches.

YES ☐ NO ☒

YES ☒ NO ☐

YES ☒ NO ☐

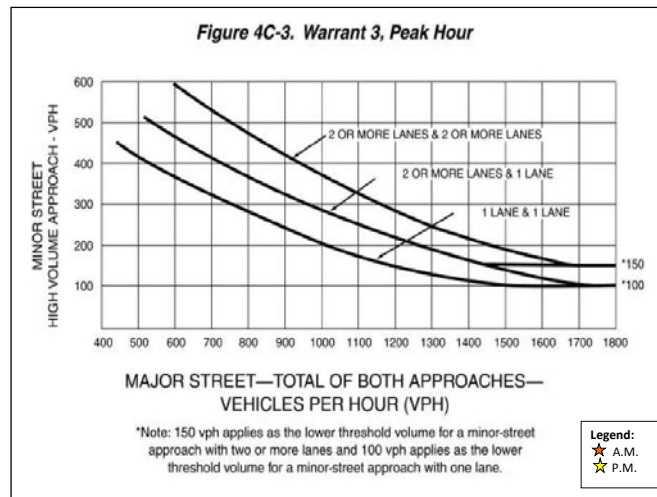
Part A is not met for the A.M. and P.M. Peak Hours

YES ☒ NO ☐

PART B

APPROACH LANES			SATISFIED		Hour
	One	2 or More	6:00-9:00	7:00-8:30	
Both Approaches - Major Street		2	1987	2593	
Highest Approaches - Minor Street	1		112	117	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any 4 consecutive 15 minute intervals)



Part B is met for the A.M. and P.M. Peak Hours

Signal Warrant Analysis
Existing Plus Project Conditions
Alma Street and Oregon Expressway EB Ramps
City of Palo Alto

WARRANT 3 - Peak Hours

PART A or PART B SATISFIED

YES ☒ NO ☐

PART A

SATISFIED

YES ☐ NO ☒

(All parts, 1, 2 and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND
3. The total entering volume services during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches.

YES ☐ NO ☒

YES ☒ NO ☐

YES ☒ NO ☐

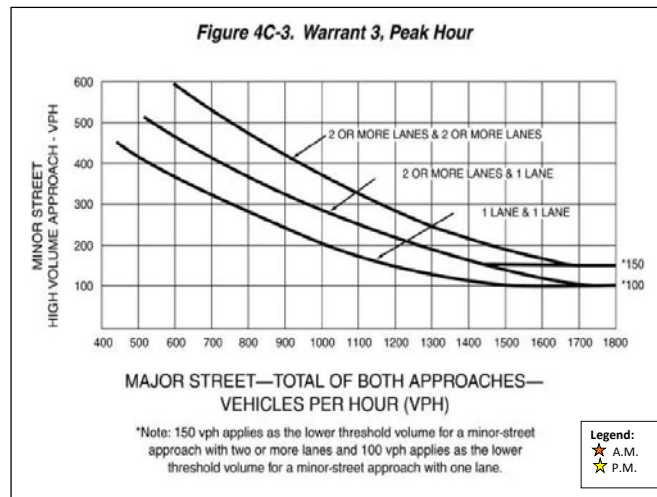
Part A is not met for the A.M. and P.M. Peak Hours

YES ☒ NO ☐

PART B

APPROACH LANES			SATISFIED		Hour
	One	2 or More	07:15-08:45	17:15-18:45	
Both Approaches - Major Street		2	2551	2878	
Highest Approaches - Minor Street	1		286	347	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any 4 consecutive 15 minute intervals)



Part B is met for the A.M. and P.M. Peak Hours

Appendix G – Existing Plus Project Conditions with Mitigations Synchro Reports

- HCM Delay and LOS Reports

HCM Unsignalized Intersection Capacity Analysis Existing + Churchill Closure with Mitigation

3: Alma Street & Lincoln Ave

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	23	1494	85	7	566
Future Volume (Veh/h)	0	23	1494	85	7	566
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	0	25	1540	88	8	615
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			175			
pX, platoon unblocked						
vC, conflicting volume	1918	825			1639	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1918	825			1639	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	92			98	
cM capacity (veh/h)	57	312			387	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	25	1027	601	213	410	
Volume Left	0	0	0	8	0	
Volume Right	25	0	88	0	0	
cSH	312	1700	1700	387	1700	
Volume to Capacity	0.08	0.60	0.35	0.02	0.24	
Queue Length 95th (ft)	6	0	0	2	0	
Control Delay (s)	17.5	0.0	0.0	0.9	0.0	
Lane LOS	C			A		
Approach Delay (s)	17.5	0.0		0.3		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			54.1%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

4: Alma Street & Embarcadero Rd

Existing + Churchill Closure with Mitigation

Timing Plan: A.M. Peak



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	160	145	1541	662
v/c Ratio	0.71	0.55	1.04	0.24
Control Delay	66.7	33.0	33.1	3.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	66.7	33.0	33.1	3.4
Queue Length 50th (ft)	117	52	~1269	55
Queue Length 95th (ft)	48	104	m#1382	80
Internal Link Dist (ft)	166		189	95
Turn Bay Length (ft)				
Base Capacity (vph)	270	302	1483	2817
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	81
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.48	1.04	0.24

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Existing + Churchill Closure with Mitigation

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	40	120	1464	0	0	596
Future Volume (vph)	40	120	1464	0	0	596
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5			4.5
Lane Util. Factor	1.00	1.00	1.00			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1583	1863			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	1583	1863			3539
Peak-hour factor, PHF	0.25	0.83	0.95	0.25	0.25	0.90
Adj. Flow (vph)	160	145	1541	0	0	662
RTOR Reduction (vph)	0	62	0	0	0	0
Lane Group Flow (vph)	160	83	1541	0	0	662
Confl. Peds. (#/hr)				22	33	
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	15.0	15.0	93.7			93.7
Effective Green, g (s)	15.0	15.0	93.7			93.7
Actuated g/C Ratio	0.13	0.13	0.80			0.80
Clearance Time (s)	4.5	4.5	4.5			4.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	225	201	1483			2817
v/s Ratio Prot	c0.09		c0.83			0.19
v/s Ratio Perm		0.05				
v/c Ratio	0.71	0.41	1.04			0.24
Uniform Delay, d1	49.3	47.3	12.0			3.0
Progression Factor	1.00	1.00	0.28			1.00
Incremental Delay, d2	10.1	1.4	25.4			0.0
Delay (s)	59.4	48.7	28.8			3.1
Level of Service	E	D	C			A
Approach Delay (s)	54.3		28.8			3.1
Approach LOS	D		C			A
Intersection Summary						
HCM 2000 Control Delay			25.1		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.99			
Actuated Cycle Length (s)			117.7		Sum of lost time (s)	9.0
Intersection Capacity Utilization			92.0%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

Queues
8: Alma Street & Kingsley Ave

Existing + Churchill Closure with Mitigation
Timing Plan: A.M. Peak



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	136	1450	661
v/c Ratio	0.47	0.98	1.10dl
Control Delay	23.2	32.2	6.3
Queue Delay	0.0	11.5	0.3
Total Delay	23.2	43.7	6.6
Queue Length 50th (ft)	30	863	128
Queue Length 95th (ft)	76	#1445	180
Internal Link Dist (ft)	142	24	189
Turn Bay Length (ft)			
Base Capacity (vph)	326	1480	1504
Starvation Cap Reductn	0	0	297
Spillback Cap Reductn	3	67	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.42	1.03	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM Signalized Intersection Capacity Analysis

8: Alma Street & Kingsley Ave

Existing + Churchill Closure with Mitigation

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	102	1371	21	62	533
Future Volume (vph)	10	102	1371	21	62	533
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5			4.5
Lane Util. Factor	1.00		1.00			0.95
Frpb, ped/bikes	1.00		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.88		1.00			1.00
Flt Protected	1.00		1.00			0.99
Satd. Flow (prot)	1626		1858			3521
Flt Permitted	1.00		1.00			0.53
Satd. Flow (perm)	1626		1858			1890
Peak-hour factor, PHF	0.82	0.82	0.96	0.96	0.90	0.90
Adj. Flow (vph)	12	124	1428	22	69	592
RTOR Reduction (vph)	80	0	0	0	0	0
Lane Group Flow (vph)	56	0	1450	0	0	661
Confl. Peds. (#/hr)				7	7	
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		2			6
Permitted Phases					6	
Actuated Green, G (s)	15.0		93.7			93.7
Effective Green, g (s)	15.0		93.7			93.7
Actuated g/C Ratio	0.13		0.80			0.80
Clearance Time (s)	4.5		4.5			4.5
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	207		1479			1504
v/s Ratio Prot	c0.03		c0.78			
v/s Ratio Perm						0.35
v/c Ratio	0.27		0.98			1.10dl
Uniform Delay, d1	46.4		11.1			3.8
Progression Factor	1.00		1.00			1.30
Incremental Delay, d2	0.7		18.8			0.2
Delay (s)	47.1		29.9			5.1
Level of Service	D		C			A
Approach Delay (s)	47.1		29.9			5.1
Approach LOS	D		C			A
Intersection Summary						
HCM 2000 Control Delay			23.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.88			
Actuated Cycle Length (s)			117.7		Sum of lost time (s)	9.0
Intersection Capacity Utilization			87.8%		ICU Level of Service	E
Analysis Period (min)			15			
dl Defacto Left Lane. Recode with 1 though lane as a left lane.						
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis Existing + Churchill Closure with Mitigation 15: Cowper St & Embarcadero Rd

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	843	34	11	926	13	0	0	6	0	0	46
Future Volume (Veh/h)	14	843	34	11	926	13	0	0	6	0	0	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.82	0.82	0.82	0.58	0.58	0.58	0.69	0.69	0.69
Hourly flow rate (vph)	16	947	38	13	1129	16	0	0	10	0	0	67
Pedestrians					1			8			28	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			1			3	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.79			0.79	0.79	0.79	0.79	0.79	
vC, conflicting volume	1173			993			1664	2205	502	1708	2216	600
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1173			445			1298	1988	0	1354	2002	600
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			98			100	100	99	100	100	84
cM capacity (veh/h)	575			867			74	44	844	77	43	432
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	490	512	578	580	10	67						
Volume Left	16	0	13	0	0	0						
Volume Right	0	38	0	16	10	67						
cSH	575	1700	867	1700	844	432						
Volume to Capacity	0.03	0.30	0.02	0.34	0.01	0.16						
Queue Length 95th (ft)	2	0	1	0	1	14						
Control Delay (s)	0.8	0.0	0.4	0.0	9.3	14.9						
Lane LOS	A		A		A	B						
Approach Delay (s)	0.4		0.2		9.3	14.9						
Approach LOS					A	B						
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			37.7%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

Existing + Churchill Closure with Mitigation

19: Galvez St/Embarcadero Rd & El Camino Real

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	276	1134	299	1254	271	69	296	388	645
v/c Ratio	1.12	0.69	0.84	0.63	0.37	0.34	0.38	0.80	0.70
Control Delay	149.0	47.8	97.0	62.3	34.2	63.0	45.5	74.6	48.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	149.0	47.8	97.0	62.3	34.2	63.0	45.5	74.6	48.7
Queue Length 50th (ft)	~309	347	311	378	141	66	123	192	270
Queue Length 95th (ft)	#497	#476	m#382	456	m203	104	151	241	342
Internal Link Dist (ft)		1237		1007			755		481
Turn Bay Length (ft)	300		382		250			200	
Base Capacity (vph)	247	1652	357	1985	734	212	970	663	1323
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.12	0.69	0.84	0.63	0.37	0.33	0.31	0.59	0.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Existing + Churchill Closure with Mitigation
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	1034	89	275	1154	249	61	204	60	369	407	206
Future Volume (vph)	273	1034	89	275	1154	249	61	204	60	369	407	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5009		1770	5085	1544	1770	3401		3433	3254	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5009		1770	5085	1544	1770	3401		3433	3254	
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.89	0.89	0.89	0.95	0.95	0.95
Adj. Flow (vph)	276	1044	90	299	1254	271	69	229	67	388	428	217
RTOR Reduction (vph)	0	6	0	0	0	133	0	19	0	0	51	0
Lane Group Flow (vph)	276	1128	0	299	1254	138	69	277	0	388	594	0
Confl. Peds. (#/hr)			17			9			11			74
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						
Actuated Green, G (s)	21.0	48.5		30.3	57.8	57.8	15.2	33.9		21.3	40.0	
Effective Green, g (s)	21.0	48.5		30.3	57.8	57.8	15.2	33.9		21.3	40.0	
Actuated g/C Ratio	0.14	0.32		0.20	0.39	0.39	0.10	0.23		0.14	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	247	1619		357	1959	594	179	768		487	867	
v/s Ratio Prot	c0.16	c0.23		c0.17	0.25		0.04	c0.08		c0.11	c0.18	
v/s Ratio Perm						0.09						
v/c Ratio	1.12	0.70		0.84	0.64	0.23	0.39	0.36		0.80	0.68	
Uniform Delay, d1	64.5	44.3		57.5	37.6	31.1	63.0	48.9		62.3	49.3	
Progression Factor	1.00	1.00		1.52	1.57	3.74	1.00	1.00		1.00	1.00	
Incremental Delay, d2	92.5	2.5		8.0	0.8	0.5	1.0	0.1		8.2	1.8	
Delay (s)	157.0	46.8		95.6	59.8	116.7	64.0	49.0		70.5	51.1	
Level of Service	F	D		F	E	F	E	D		E	D	
Approach Delay (s)		68.4			74.1			51.9			58.4	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM 2000 Control Delay			67.1			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			95.6%			ICU Level of Service			F			
Analysis Period (min)			15									

c Critical Lane Group

Queues

Existing + Churchill Closure with Mitigation

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: A.M. Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	480	604	233	314	1444	362	930	177	221	1108	351
v/c Ratio	0.96	0.33	0.34	0.84	0.91	0.93	0.71	0.23	0.79	0.98	0.66
Control Delay	109.8	45.6	6.1	102.9	70.3	112.9	55.7	28.1	105.6	83.4	46.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.8	45.6	6.1	102.9	70.3	112.9	55.7	28.1	105.6	83.4	46.7
Queue Length 50th (ft)	310	202	2	202	633	235	527	125	142	757	317
Queue Length 95th (ft)	#420	249	69	254	698	#335	630	179	189	#919	460
Internal Link Dist (ft)		611			978		1346			917	
Turn Bay Length (ft)	350		350	300		350			100		100
Base Capacity (vph)	514	1821	685	460	1604	392	1301	823	348	1136	530
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.33	0.34	0.68	0.90	0.92	0.71	0.22	0.64	0.98	0.66

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing + Churchill Closure with Mitigation

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	461	580	224	295	1158	199	329	846	161	212	1026	374
Future Volume (vph)	461	580	224	295	1158	199	329	846	161	212	1026	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	4.5
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3369	1400
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3369	1400
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.91	0.91	0.91	0.96	0.96	0.96
Adj. Flow (vph)	480	604	233	314	1232	212	362	930	177	221	1069	390
RTOR Reduction (vph)	0	0	148	0	13	0	0	0	0	0	1	58
Lane Group Flow (vph)	480	604	85	314	1431	0	362	930	177	221	1107	293
Confl. Peds. (#/hr)			21			27			29			8
Confl. Bikes (#/hr)						3						1
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									4
Actuated Green, G (s)	27.8	68.0	68.0	20.6	60.8		21.6	69.9	95.0	15.5	63.8	63.8
Effective Green, g (s)	27.8	68.0	68.0	20.6	60.8		21.6	69.9	95.0	15.5	63.8	63.8
Actuated g/C Ratio	0.15	0.36	0.36	0.11	0.32		0.11	0.37	0.50	0.08	0.34	0.34
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	4.5
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	502	1819	536	372	1576		390	1301	791	280	1131	470
v/s Ratio Prot	c0.14	0.12		0.09	c0.29		c0.11	0.26	0.11	0.06	c0.33	
v/s Ratio Perm			0.06									0.21
v/c Ratio	0.96	0.33	0.16	0.84	0.91		0.93	0.71	0.22	0.79	0.98	0.62
Uniform Delay, d1	80.5	44.5	41.5	83.1	61.9		83.4	51.5	26.7	85.6	62.4	53.0
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	28.9	0.5	0.6	15.3	9.2		27.9	1.6	0.1	12.7	21.4	1.8
Delay (s)	109.4	44.9	42.1	98.4	71.1		111.3	53.1	26.8	98.4	83.8	54.8
Level of Service	F	D	D	F	E		F	D	C	F	F	D
Approach Delay (s)		67.9			76.0			64.3			79.7	
Approach LOS		E			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			72.5			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			96.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
22a: Oregon Ave & Alma St

Existing + Churchill Closure with Mitigation

Timing Plan: A.M. Peak



Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	11	78	1638	482	959
v/c Ratio	0.04	0.25	0.72	0.45	0.37
Control Delay	33.8	10.6	7.7	1.9	4.3
Queue Delay	0.0	0.0	0.3	0.2	0.0
Total Delay	33.8	10.6	7.9	2.1	4.3
Queue Length 50th (ft)	6	0	118	3	80
Queue Length 95th (ft)	21	39	184	m29	103
Internal Link Dist (ft)			473		363
Turn Bay Length (ft)				150	
Base Capacity (vph)	352	377	2268	1067	2666
Starvation Cap Reductn	0	0	164	128	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.21	0.78	0.51	0.36

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Existing + Churchill Closure with Mitigation

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	 
Traffic Volume (vph)	0	0	0	10	0	74	0	1605	472	0	599	207
Future Volume (vph)	0	0	0	10	0	74	0	1605	472	0	599	207
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	
Lane Util. Factor				1.00		1.00		0.95	1.00		0.95	
Frpb, ped/bikes				1.00		1.00		1.00	0.93		1.00	
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	
Frt				1.00		0.85		1.00	0.85		0.96	
Flt Protected				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)				1770		1583		3539	1474		3403	
Flt Permitted				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)				1770		1583		3539	1474		3403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.25	0.95	0.92	0.98	0.98	0.25	0.84	0.84
Adj. Flow (vph)	0	0	0	11	0	78	0	1638	482	0	713	246
RTOR Reduction (vph)	0	0	0	0	0	66	0	0	127	0	31	0
Lane Group Flow (vph)	0	0	0	11	0	12	0	1638	355	0	928	0
Confl. Peds. (#/hr)									19			
Turn Type				Prot		Perm		NA	Perm		NA	
Protected Phases				8				2			6	
Permitted Phases						8			2			
Actuated Green, G (s)				14.6		14.6		60.1	60.1		71.1	
Effective Green, g (s)				14.6		14.6		60.1	60.1		71.1	
Actuated g/C Ratio				0.15		0.15		0.63	0.63		0.75	
Clearance Time (s)				4.5		4.5		4.5	4.5		4.5	
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)				272		244		2245	935		2554	
v/s Ratio Prot				0.01				c0.46			c0.27	
v/s Ratio Perm						c0.01			0.24			
v/c Ratio				0.04		0.05		0.73	0.38		0.36	
Uniform Delay, d1				34.1		34.1		11.8	8.3		4.0	
Progression Factor				1.00		1.00		0.49	0.36		1.00	
Incremental Delay, d2				0.1		0.1		0.7	0.1		0.1	
Delay (s)				34.1		34.2		6.4	3.2		4.1	
Level of Service				C		C		A	A		A	
Approach Delay (s)		0.0			34.2			5.7			4.1	
Approach LOS		A			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			6.0			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			94.7			Sum of lost time (s)			13.5			
Intersection Capacity Utilization			56.4%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Existing + Churchill Closure with Mitigation

22b: Alma St & Oregon Expy EB Ramps

Timing Plan: A.M. Peak



Lane Group	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	318	1828	154	88	637
v/c Ratio	0.84	0.81	0.15	0.58	0.24
Control Delay	40.2	18.2	5.2	74.8	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.2	18.2	5.2	74.8	2.8
Queue Length 50th (ft)	100	454	20	59	31
Queue Length 95th (ft)	#225	597	48	104	36
Internal Link Dist (ft)		386			473
Turn Bay Length (ft)			100	50	
Base Capacity (vph)	442	2268	1040	162	2742
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.72	0.81	0.15	0.54	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

22b: Alma St & Oregon Expy EB Ramps

Existing + Churchill Closure with Mitigation

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↗	↗	↘	↗↗
Traffic Volume (vph)	0	286	1791	151	74	535
Future Volume (vph)	0	286	1791	151	74	535
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	0.95	1.00	1.00	0.95
Frt		0.86	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1611	3539	1583	1770	3539
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1611	3539	1583	1770	3539
Peak-hour factor, PHF	0.25	0.90	0.98	0.98	0.84	0.84
Adj. Flow (vph)	0	318	1828	154	88	637
RTOR Reduction (vph)	0	129	0	26	0	0
Lane Group Flow (vph)	0	189	1828	128	88	637
Turn Type		Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)		14.6	60.1	60.1	6.5	71.1
Effective Green, g (s)		14.6	60.1	60.1	6.5	71.1
Actuated g/C Ratio		0.15	0.63	0.63	0.07	0.75
Clearance Time (s)		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		248	2245	1004	121	2657
v/s Ratio Prot			c0.52		c0.05	0.18
v/s Ratio Perm		c0.12		0.08		
v/c Ratio		0.76	0.81	0.13	0.73	0.24
Uniform Delay, d1		38.4	13.1	6.9	43.2	3.6
Progression Factor		1.00	1.00	1.00	1.38	0.64
Incremental Delay, d2		13.0	2.4	0.1	18.6	0.0
Delay (s)		51.4	15.5	6.9	78.2	2.3
Level of Service		D	B	A	E	A
Approach Delay (s)	51.4		14.8			11.5
Approach LOS	D		B			B
Intersection Summary						
HCM 2000 Control Delay			17.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			94.7		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 Existing + Churchill Closure with Mitigation

3: Alma Street & Lincoln Ave

Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	18	1606	84	18	1108
Future Volume (Veh/h)	0	18	1606	84	18	1108
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.94	0.94	0.95	0.95
Hourly flow rate (vph)	0	24	1709	89	19	1166
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			175			
pX, platoon unblocked						
vC, conflicting volume	2386	911			1810	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2386	911			1810	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	91			94	
cM capacity (veh/h)	26	274			332	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	24	1139	659	408	777	
Volume Left	0	0	0	19	0	
Volume Right	24	0	89	0	0	
cSH	274	1700	1700	332	1700	
Volume to Capacity	0.09	0.67	0.39	0.06	0.46	
Queue Length 95th (ft)	7	0	0	5	0	
Control Delay (s)	19.4	0.0	0.0	1.9	0.0	
Lane LOS	C			A		
Approach Delay (s)	19.4	0.0		0.7		
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			57.1%	ICU Level of Service		B
Analysis Period (min)			15			

Queues

4: Alma Street & Embarcadero Rd

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	120	161	1614	1160
v/c Ratio	0.56	0.66	1.08	0.41
Control Delay	58.1	42.3	51.1	4.2
Queue Delay	0.0	0.0	7.4	0.1
Total Delay	58.1	42.3	58.5	4.3
Queue Length 50th (ft)	86	70	~1377	115
Queue Length 95th (ft)	38	87	m#1427	161
Internal Link Dist (ft)	166		189	95
Turn Bay Length (ft)				
Base Capacity (vph)	273	294	1491	2834
Starvation Cap Reductn	0	0	29	0
Spillback Cap Reductn	0	0	0	362
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.55	1.10	0.47

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	106	1582	0	0	1137
Future Volume (vph)	30	106	1582	0	0	1137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5			4.5
Lane Util. Factor	1.00	1.00	1.00			0.95
Frpb, ped/bikes	1.00	0.99	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1561	1863			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	1561	1863			3539
Peak-hour factor, PHF	0.25	0.66	0.98	0.25	0.25	0.98
Adj. Flow (vph)	120	161	1614	0	0	1160
RTOR Reduction (vph)	0	55	0	0	0	0
Lane Group Flow (vph)	120	106	1614	0	0	1160
Confl. Peds. (#/hr)				18		
Confl. Bikes (#/hr)		1				
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	14.2	14.2	93.3			93.3
Effective Green, g (s)	14.2	14.2	93.3			93.3
Actuated g/C Ratio	0.12	0.12	0.80			0.80
Clearance Time (s)	4.5	4.5	4.5			4.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	215	190	1491			2834
v/s Ratio Prot	c0.07		c0.87			0.33
v/s Ratio Perm		0.07				
v/c Ratio	0.56	0.56	1.08			0.41
Uniform Delay, d1	48.2	48.2	11.6			3.4
Progression Factor	1.00	1.00	0.48			1.00
Incremental Delay, d2	3.1	3.5	41.0			0.1
Delay (s)	51.3	51.7	46.5			3.5
Level of Service	D	D	D			A
Approach Delay (s)	51.5		46.5			3.5
Approach LOS	D		D			A
Intersection Summary						
HCM 2000 Control Delay			30.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			1.01			
Actuated Cycle Length (s)			116.5		Sum of lost time (s)	9.0
Intersection Capacity Utilization			97.3%		ICU Level of Service	F
Analysis Period (min)			15			

c Critical Lane Group

Queues
8: Alma Street & Kingsley Ave

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	214	1510	1175
v/c Ratio	0.79	1.02	1.11dl
Control Delay	51.6	41.5	11.2
Queue Delay	1.9	31.8	0.0
Total Delay	53.5	73.3	11.2
Queue Length 50th (ft)	98	~1220	273
Queue Length 95th (ft)	162	#1546	414
Internal Link Dist (ft)	142	24	189
Turn Bay Length (ft)			
Base Capacity (vph)	321	1485	1508
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	33	126	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.74	1.11	0.78

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis

8: Alma Street & Kingsley Ave

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	23	154	1435	30	68	1060
Future Volume (vph)	23	154	1435	30	68	1060
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5			4.5
Lane Util. Factor	1.00		1.00			0.95
Frpb, ped/bikes	1.00		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.88		1.00			1.00
Flt Protected	0.99		1.00			1.00
Satd. Flow (prot)	1633		1855			3529
Flt Permitted	0.99		1.00			0.53
Satd. Flow (perm)	1633		1855			1882
Peak-hour factor, PHF	0.83	0.83	0.97	0.97	0.96	0.96
Adj. Flow (vph)	28	186	1479	31	71	1104
RTOR Reduction (vph)	71	0	1	0	0	0
Lane Group Flow (vph)	143	0	1509	0	0	1175
Confl. Peds. (#/hr)				17	17	
Confl. Bikes (#/hr)				1		
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		2			6
Permitted Phases					6	
Actuated Green, G (s)	14.2		93.3			93.3
Effective Green, g (s)	14.2		93.3			93.3
Actuated g/C Ratio	0.12		0.80			0.80
Clearance Time (s)	4.5		4.5			4.5
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	199		1485			1507
v/s Ratio Prot	c0.09		c0.81			
v/s Ratio Perm						0.62
v/c Ratio	0.72		1.02			1.11dl
Uniform Delay, d1	49.2		11.6			6.2
Progression Factor	1.00		1.00			0.98
Incremental Delay, d2	11.7		27.5			2.4
Delay (s)	60.9		39.1			8.4
Level of Service	E		D			A
Approach Delay (s)	60.9		39.1			8.4
Approach LOS	E		D			A
Intersection Summary						
HCM 2000 Control Delay			28.3		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.98			
Actuated Cycle Length (s)			116.5		Sum of lost time (s)	9.0
Intersection Capacity Utilization			98.7%		ICU Level of Service	F
Analysis Period (min)			15			
dl Defacto Left Lane. Recode with 1 though lane as a left lane.						
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis Existing + Churchill Closure with Mitigation 15: Cowper St & Embarcadero Rd

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	971	34	7	821	36	0	0	6	0	0	17
Future Volume (Veh/h)	18	971	34	7	821	36	0	0	6	0	0	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.53	0.53	0.53	0.53	0.53	0.53
Hourly flow rate (vph)	20	1055	37	7	855	38	0	0	11	0	0	32
Pedestrians								8			1	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								3.5			3.5	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.72			0.72	0.72	0.72	0.72	0.72	
vC, conflicting volume	894			1100			1595	2030	554	1468	2029	448
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	894			361			1048	1652	0	871	1651	448
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			100	100	99	100	100	94
cM capacity (veh/h)	754			853			119	67	775	168	67	558
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	548	564	434	466	11	32						
Volume Left	20	0	7	0	0	0						
Volume Right	0	37	0	38	11	32						
cSH	754	1700	853	1700	775	558						
Volume to Capacity	0.03	0.33	0.01	0.27	0.01	0.06						
Queue Length 95th (ft)	2	0	1	0	1	5						
Control Delay (s)	0.7	0.0	0.2	0.0	9.7	11.8						
Lane LOS	A		A		A	B						
Approach Delay (s)	0.4		0.1		9.7	11.8						
Approach LOS					A	B						
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			44.1%		ICU Level of Service		A					
Analysis Period (min)			15									

Queues

Existing + Churchill Closure with Mitigation

19: Galvez St/Embarcadero Rd & El Camino Real

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	251	1585	251	1685	511	205	820	357	634
v/c Ratio	0.93	0.91	0.91	0.95	0.69	0.93	0.82	0.92	0.70
Control Delay	100.6	55.6	111.8	49.0	24.0	108.9	50.9	95.7	50.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	100.6	55.6	111.8	49.0	24.0	108.9	50.9	95.7	50.3
Queue Length 50th (ft)	246	551	258	317	141	201	345	180	274
Queue Length 95th (ft)	#402	599	m260	m324	m156	#337	407	#275	345
Internal Link Dist (ft)		1237		1007			755		481
Turn Bay Length (ft)	300		382		250			200	
Base Capacity (vph)	271	1742	295	1772	737	224	1000	389	907
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.91	0.85	0.95	0.69	0.92	0.82	0.92	0.70

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			 		 	 	
Traffic Volume (vph)	221	1316	79	223	1500	455	178	415	298	332	402	188
Future Volume (vph)	221	1316	79	223	1500	455	178	415	298	332	402	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5026		1770	5085	1531	1770	3264		3433	3265	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5026		1770	5085	1531	1770	3264		3433	3265	
Peak-hour factor, PHF	0.88	0.88	0.88	0.89	0.89	0.89	0.87	0.87	0.87	0.93	0.93	0.93
Adj. Flow (vph)	251	1495	90	251	1685	511	205	477	343	357	432	202
RTOR Reduction (vph)	0	5	0	0	0	204	0	87	0	0	37	0
Lane Group Flow (vph)	251	1580	0	251	1685	307	205	733	0	357	597	0
Confl. Peds. (#/hr)			27			15			25			78
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						
Actuated Green, G (s)	23.0	51.9		23.4	52.3	52.3	18.7	41.8		16.9	40.0	
Effective Green, g (s)	23.0	51.9		23.4	52.3	52.3	18.7	41.8		16.9	40.0	
Actuated g/C Ratio	0.15	0.35		0.16	0.35	0.35	0.12	0.28		0.11	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	271	1738		276	1772	533	220	909		386	870	
v/s Ratio Prot	0.14	c0.31		0.14	c0.33		c0.12	c0.22		0.10	0.18	
v/s Ratio Perm						0.20						
v/c Ratio	0.93	0.91		0.91	0.95	0.58	0.93	0.81		0.92	0.69	
Uniform Delay, d1	62.7	46.8		62.3	47.6	39.8	65.0	50.3		65.9	49.4	
Progression Factor	1.00	1.00		1.54	0.90	1.39	1.00	1.00		1.00	1.00	
Incremental Delay, d2	34.8	8.6		15.8	6.2	1.9	41.9	5.0		27.2	1.8	
Delay (s)	97.5	55.4		111.6	48.9	57.3	107.0	55.3		93.1	51.2	
Level of Service	F	E		F	D	E	F	E		F	D	
Approach Delay (s)		61.1			57.1			65.7			66.3	
Approach LOS		E			E			E			E	
Intersection Summary												
HCM 2000 Control Delay		61.1			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		0.92										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		96.7%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

Existing + Churchill Closure with Mitigation

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: P.M.Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	855	1401	198	174	1180	320	1033	215	364	830	359
v/c Ratio	0.98	0.63	0.26	0.75	0.96	0.67	0.98	0.35	0.95	0.92	0.77
Control Delay	92.2	41.8	4.6	101.4	80.8	81.2	85.6	40.9	113.5	79.4	50.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	92.2	41.8	4.6	101.4	80.8	81.2	85.6	40.9	113.5	79.4	50.2
Queue Length 50th (ft)	521	475	0	106	500	188	640	180	224	524	292
Queue Length 95th (ft)	#645	533	52	149	#603	#266	#787	251	#328	596	428
Internal Link Dist (ft)		611			978		1346			917	
Turn Bay Length (ft)	350		350	300		350			100		100
Base Capacity (vph)	879	2208	757	289	1235	480	1059	630	387	1002	502
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.63	0.26	0.60	0.96	0.67	0.98	0.34	0.94	0.83	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	761	1247	176	172	916	252	310	1002	209	328	703	367
Future Volume (vph)	761	1247	176	172	916	252	310	1002	209	328	703	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	4.5
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3353	1388
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3353	1388
Peak-hour factor, PHF	0.89	0.89	0.89	0.99	0.99	0.99	0.97	0.97	0.97	0.90	0.90	0.90
Adj. Flow (vph)	855	1401	198	174	925	255	320	1033	215	364	781	408
RTOR Reduction (vph)	0	0	112	0	27	0	0	0	0	0	2	92
Lane Group Flow (vph)	855	1401	86	174	1153	0	320	1033	215	364	828	267
Confl. Peds. (#/hr)			27			28			18			13
Confl. Bikes (#/hr)									3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									4
Actuated Green, G (s)	45.6	78.2	78.2	12.3	44.9		25.2	53.5	70.3	20.0	48.3	48.3
Effective Green, g (s)	45.6	78.2	78.2	12.3	44.9		25.2	53.5	70.3	20.0	48.3	48.3
Actuated g/C Ratio	0.25	0.43	0.43	0.07	0.25		0.14	0.30	0.39	0.11	0.27	0.27
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	4.5
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	869	2209	645	234	1210		480	1051	618	381	899	372
v/s Ratio Prot	c0.25	0.28		0.05	c0.24		0.09	c0.29	0.14	0.11	c0.25	
v/s Ratio Perm			0.06									0.19
v/c Ratio	0.98	0.63	0.13	0.74	0.95		0.67	0.98	0.35	0.96	0.92	0.72
Uniform Delay, d1	66.8	39.7	30.6	82.3	66.5		73.4	62.8	38.7	79.6	64.0	59.7
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	26.3	1.4	0.4	10.6	16.8		3.5	23.4	0.1	34.1	14.2	5.4
Delay (s)	93.2	41.1	31.0	92.9	83.3		76.9	86.2	38.8	113.7	78.2	65.1
Level of Service	F	D	C	F	F		E	F	D	F	E	E
Approach Delay (s)		58.4			84.5			77.8			83.5	
Approach LOS		E			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			73.5			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			180.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			97.1%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
22a: Oregon Ave & Alma St

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak

					
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	34	73	1609	395	1483
v/c Ratio	0.11	0.22	0.72	0.39	0.59
Control Delay	34.8	10.4	7.6	1.3	6.9
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	34.8	10.4	7.9	1.3	6.9
Queue Length 50th (ft)	18	0	132	2	191
Queue Length 95th (ft)	45	38	164	m14	243
Internal Link Dist (ft)			473		363
Turn Bay Length (ft)				150	
Base Capacity (vph)	347	369	2226	1021	2643
Starvation Cap Reductn	0	0	134	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.10	0.20	0.77	0.39	0.56
Intersection Summary					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Existing + Churchill Closure with Mitigation

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Traffic Volume (vph)	0	0	0	31	0	66	0	1593	391	0	1148	290
Future Volume (vph)	0	0	0	31	0	66	0	1593	391	0	1148	290
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	
Lane Util. Factor				1.00		1.00		0.95	1.00		0.95	
Frpb, ped/bikes				1.00		1.00		1.00	0.92		1.00	
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	
Frt				1.00		0.85		1.00	0.85		0.97	
Flt Protected				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)				1770		1583		3539	1457		3432	
Flt Permitted				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)				1770		1583		3539	1457		3432	
Peak-hour factor, PHF	0.92	0.92	0.92	0.91	0.25	0.91	0.25	0.99	0.99	0.25	0.97	0.97
Adj. Flow (vph)	0	0	0	34	0	73	0	1609	395	0	1184	299
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	109	0	21	0
Lane Group Flow (vph)	0	0	0	34	0	12	0	1609	286	0	1462	0
Confl. Peds. (#/hr)									23			
Turn Type				Prot		Perm		NA	Perm		NA	
Protected Phases				8				2			6	
Permitted Phases						8			2			
Actuated Green, G (s)				16.4		16.4		59.7	59.7		70.5	
Effective Green, g (s)				16.4		16.4		59.7	59.7		70.5	
Actuated g/C Ratio				0.17		0.17		0.62	0.62		0.74	
Clearance Time (s)				4.5		4.5		4.5	4.5		4.5	
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)				302		270		2203	907		2523	
v/s Ratio Prot				c0.02				c0.45			c0.43	
v/s Ratio Perm						0.01			0.20			
v/c Ratio				0.11		0.05		0.73	0.31		0.58	
Uniform Delay, d1				33.6		33.2		12.5	8.5		5.9	
Progression Factor				1.00		1.00		0.46	0.22		1.00	
Incremental Delay, d2				0.2		0.1		0.8	0.1		0.3	
Delay (s)				33.8		33.3		6.6	2.0		6.2	
Level of Service				C		C		A	A		A	
Approach Delay (s)		0.0			33.4			5.7			6.2	
Approach LOS		A			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			6.7			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			95.9			Sum of lost time (s)			13.5			
Intersection Capacity Utilization			55.7%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
22b: Alma St & Oregon Expy EB Ramps

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak



Lane Group	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	365	1654	63	62	1154
v/c Ratio	0.89	0.74	0.06	0.44	0.45
Control Delay	47.2	16.4	5.2	67.8	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.1
Total Delay	47.2	16.4	5.2	67.8	3.4
Queue Length 50th (ft)	130	391	8	42	58
Queue Length 95th (ft)	#290	488	25	m76	67
Internal Link Dist (ft)		386			473
Turn Bay Length (ft)			100	50	
Base Capacity (vph)	444	2226	1007	159	2705
Starvation Cap Reductn	0	0	0	0	329
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.82	0.74	0.06	0.39	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22b: Alma St & Oregon Expy EB Ramps

Existing + Churchill Closure with Mitigation

Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	347	1637	62	60	1119
Future Volume (vph)	0	347	1637	62	60	1119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	0.95	1.00	1.00	0.95
Frt		0.86	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1611	3539	1583	1770	3539
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1611	3539	1583	1770	3539
Peak-hour factor, PHF	0.25	0.95	0.99	0.99	0.97	0.97
Adj. Flow (vph)	0	365	1654	63	62	1154
RTOR Reduction (vph)	0	132	0	12	0	0
Lane Group Flow (vph)	0	233	1654	51	62	1154
Turn Type		Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)		16.4	59.7	59.7	6.3	70.5
Effective Green, g (s)		16.4	59.7	59.7	6.3	70.5
Actuated g/C Ratio		0.17	0.62	0.62	0.07	0.74
Clearance Time (s)		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		275	2203	985	116	2601
v/s Ratio Prot			c0.47		0.04	c0.33
v/s Ratio Perm		c0.14		0.03		
v/c Ratio		0.85	0.75	0.05	0.53	0.44
Uniform Delay, d1		38.5	12.8	7.1	43.4	5.0
Progression Factor		1.00	1.00	1.00	1.36	0.54
Incremental Delay, d2		20.8	1.5	0.0	3.9	0.1
Delay (s)		59.4	14.3	7.1	63.1	2.8
Level of Service		E	B	A	E	A
Approach Delay (s)	59.4		14.0			5.9
Approach LOS	E		B			A
Intersection Summary						
HCM 2000 Control Delay			16.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			95.9		Sum of lost time (s)	13.5
Intersection Capacity Utilization			74.2%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Appendix H – Cumulative Conditions (2030) Synchro Reports

- HCM Delay and LOS Reports
- 95th Percentile Queue Length Reports

Queues
1: Alma Street & Homer Ave

Cumulative + No Project
Timing Plan: A.M. Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	359	1278	687
v/c Ratio	0.72	0.74	0.40
Control Delay	35.8	21.1	15.0
Queue Delay	0.0	0.0	0.0
Total Delay	35.8	21.1	15.0
Queue Length 50th (ft)	79	281	119
Queue Length 95th (ft)	127	382	170
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	606	1911	1911
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.59	0.67	0.36
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Cumulative + No Project

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	225	105	1201	0	0	632
Future Volume (vph)	225	105	1201	0	0	632
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.90		1.00			1.00
Flpb, ped/bikes	0.84		1.00			1.00
Frt	0.95		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	2503		3539			3539
Flt Permitted	0.97		1.00			1.00
Satd. Flow (perm)	2503		3539			3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.25	0.25	0.92
Adj. Flow (vph)	245	114	1278	0	0	687
RTOR Reduction (vph)	61	0	0	0	0	0
Lane Group Flow (vph)	298	0	1278	0	0	687
Confl. Peds. (#/hr)	82	102		13		
Confl. Bikes (#/hr)		1				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	14.5		41.4			41.4
Effective Green, g (s)	14.5		41.4			41.4
Actuated g/C Ratio	0.17		0.49			0.49
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	426		1721			1721
v/s Ratio Prot			c0.36			0.19
v/s Ratio Perm	c0.12					
v/c Ratio	0.70		0.74			0.40
Uniform Delay, d1	33.2		17.6			13.9
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	5.0		1.9			0.2
Delay (s)	38.2		19.5			14.1
Level of Service	D		B			B
Approach Delay (s)	38.2		19.5			14.1
Approach LOS	D		B			B
Intersection Summary						
HCM 2000 Control Delay			20.8		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			85.1		Sum of lost time (s)	13.0
Intersection Capacity Utilization			52.3%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

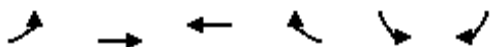
Cumulative + No Project
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	45	26	1588	96	8	817
Future Volume (Veh/h)	45	26	1588	96	8	817
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	48	28	1637	99	9	888
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2160	879			1747	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2160	879			1747	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	90			97	
cM capacity (veh/h)	39	288			352	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	76	1091	645	305	592	
Volume Left	48	0	0	9	0	
Volume Right	28	0	99	0	0	
cSH	57	1700	1700	352	1700	
Volume to Capacity	1.32	0.64	0.38	0.03	0.35	
Queue Length 95th (ft)	166	0	0	2	0	
Control Delay (s)	347.1	0.0	0.0	0.9	0.0	
Lane LOS	F			A		
Approach Delay (s)	347.1	0.0		0.3		
Approach LOS	F					
Intersection Summary						
Average Delay			9.8			
Intersection Capacity Utilization			57.8%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Cumulative + No Project
Timing Plan: A.M. Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑			↗
Traffic Volume (veh/h)	0	851	1554	0	0	136
Future Volume (Veh/h)	0	851	1554	0	0	136
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.92	0.95	0.25	0.25	0.92
Hourly flow rate (vph)	0	925	1636	0	0	148
Pedestrians					33	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					3	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1669				2132	1669
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1669				2132	1669
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	369				41	82
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	462	462	1636	148		
Volume Left	0	0	0	0		
Volume Right	0	0	0	148		
cSH	1700	1700	1700	82		
Volume to Capacity	0.27	0.27	0.96	1.80		
Queue Length 95th (ft)	0	0	0	315		
Control Delay (s)	0.0	0.0	0.0	487.0		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	487.0		
Approach LOS				F		
Intersection Summary						
Average Delay			26.6			
Intersection Capacity Utilization			96.9%		ICU Level of Service	
Analysis Period (min)			15			
					F	

HCM Unsignalized Intersection Capacity Analysis 5: Emerson St & Lincoln Ave

Cumulative + No Project
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	66	38	78	82	12	5	8	10	8	32	1
Future Volume (vph)	9	66	38	78	82	12	5	8	10	8	32	1
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)	10	72	41	85	89	13	5	9	11	9	35	1
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	123	187	25	45								
Volume Left (vph)	10	85	5	9								
Volume Right (vph)	41	13	11	1								
Hadj (s)	-0.15	0.08	-0.19	0.06								
Departure Headway (s)	4.1	4.3	4.4	4.7								
Degree Utilization, x	0.14	0.22	0.03	0.06								
Capacity (veh/h)	851	824	747	711								
Control Delay (s)	7.8	8.5	7.6	8.0								
Approach Delay (s)	7.8	8.5	7.6	8.0								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.1									
Level of Service			A									
Intersection Capacity Utilization			28.6%	ICU Level of Service					A			
Analysis Period (min)			15									

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis 8: Alma Street & Kingsley Ave

Cumulative + No Project
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	15	1549	24	70	780
Future Volume (Veh/h)	11	15	1549	24	70	780
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.96	0.96	0.92	0.92
Hourly flow rate (vph)	12	16	1614	25	76	848
Pedestrians	7					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2210	1634			1646	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2210	1634			1646	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	60	82			80	
cM capacity (veh/h)	30	89			386	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	28	1639	359	565		
Volume Left	12	0	76	0		
Volume Right	16	25	0	0		
cSH	48	1700	386	1700		
Volume to Capacity	0.58	0.96	0.20	0.33		
Queue Length 95th (ft)	55	0	18	0		
Control Delay (s)	153.5	0.0	6.6	0.0		
Lane LOS	F		A			
Approach Delay (s)	153.5	0.0	2.6			
Approach LOS	F					
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			93.0%	ICU Level of Service	F	
Analysis Period (min)			15			

Queues
9: Alma St & Churchill Ave

Cumulative + No Project
Timing Plan: A.M. Peak

								
Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	178	185	161	245	1518	7	699	192
v/c Ratio	0.79	0.54	0.67	0.84	0.67	0.09	0.42	0.24
Control Delay	102.6	14.1	90.8	99.2	24.6	89.0	35.9	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	102.6	14.1	90.8	99.2	24.6	89.0	35.9	18.7
Queue Length 50th (ft)	216	0	191	296	571	8	298	73
Queue Length 95th (ft)	300	80	279	388	863	28	416	156
Internal Link Dist (ft)	340		479		698		387	
Turn Bay Length (ft)				300		60		100
Base Capacity (vph)	289	390	255	369	2261	75	1652	786
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.47	0.63	0.66	0.67	0.09	0.42	0.24
Intersection Summary								

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Cumulative + No Project

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	63	170	80	62	6	225	1374	23	6	643	177
Future Volume (vph)	101	63	170	80	62	6	225	1374	23	6	643	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.92		0.98		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1807	1463		1764		1770	3528		1770	3539	1583
Flt Permitted		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1807	1463		1764		1770	3528		1770	3539	1583
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)	110	68	185	87	67	7	245	1493	25	7	699	192
RTOR Reduction (vph)	0	0	162	0	1	0	0	0	0	0	0	47
Lane Group Flow (vph)	0	178	23	0	160	0	245	1518	0	7	699	145
Confl. Peds. (#/hr)			23			101			24			
Confl. Bikes (#/hr)			4			258						
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			8									2
Actuated Green, G (s)		23.4	23.4		25.4		30.8	116.6		1.6	87.4	87.4
Effective Green, g (s)		23.4	23.4		25.4		30.8	116.6		1.6	87.4	87.4
Actuated g/C Ratio		0.13	0.13		0.14		0.16	0.62		0.01	0.47	0.47
Clearance Time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	6.0		3.0	6.0	6.0
Lane Grp Cap (vph)		226	183		239		291	2199		15	1654	739
v/s Ratio Prot		c0.10			c0.09		c0.14	c0.43		0.00	0.20	
v/s Ratio Perm			0.02									0.09
v/c Ratio		0.79	0.13		0.67		0.84	0.69		0.47	0.42	0.20
Uniform Delay, d1		79.4	72.7		76.8		75.7	23.3		92.3	33.1	29.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		16.4	0.3		7.2		19.3	1.4		21.2	0.8	0.6
Delay (s)		95.8	73.0		84.0		95.0	24.7		113.5	33.8	29.8
Level of Service		F	E		F		F	C		F	C	C
Approach Delay (s)		84.2			84.0			34.5			33.6	
Approach LOS		F			F			C			C	
Intersection Summary												
HCM 2000 Control Delay			42.4				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			187.0				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			78.5%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

10: Emerson St & Churchill Ave

Cumulative + No Project

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	11	86	11	6	95	8	38	85	9	11	17	16
Future Volume (vph)	11	86	11	6	95	8	38	85	9	11	17	16
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)	12	93	12	7	103	9	41	92	10	12	18	17
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	117	119	143	47								
Volume Left (vph)	12	7	41	12								
Volume Right (vph)	12	9	10	17								
Hadj (s)	-0.01	0.00	0.05	-0.13								
Departure Headway (s)	4.5	4.5	4.6	4.5								
Degree Utilization, x	0.15	0.15	0.18	0.06								
Capacity (veh/h)	764	755	748	742								
Control Delay (s)	8.3	8.3	8.6	7.8								
Approach Delay (s)	8.3	8.3	8.6	7.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.3									
Level of Service			A									
Intersection Capacity Utilization			27.7%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Cumulative + No Project

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	85	9	2	81	42	10	23	3	14	9	18
Future Volume (Veh/h)	12	85	9	2	81	42	10	23	3	14	9	18
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)	13	92	10	2	88	46	11	25	3	15	10	20
Pedestrians		17			14			4			11	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		2			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	216	131	41	172	140	52	47			42		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	216	131	41	172	140	52	47			42		
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 %	98	87	99	100	88	95	99			99		
cM capacity (veh/h)	601	725	1009	671	717	992	1535			1546		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	115	136	39	45								
Volume Left	13	2	11	15								
Volume Right	10	46	3	20								
cSH	726	791	1535	1546								
Volume to Capacity	0.16	0.17	0.01	0.01								
Queue Length 95th (ft)	14	15	1	1								
Control Delay (s)	10.9	10.5	2.1	2.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.9	10.5	2.1	2.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			8.6									
Intersection Capacity Utilization			27.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Cumulative + No Project
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	68	10	2	35	18	19	111	12	5	84	26
Future Volume (vph)	14	68	10	2	35	18	19	111	12	5	84	26
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)	15	74	11	2	38	20	21	121	13	5	91	28
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	100	60	155	124								
Volume Left (vph)	15	2	21	5								
Volume Right (vph)	11	20	13	28								
Hadj (s)	0.00	-0.16	0.01	-0.09								
Departure Headway (s)	4.6	4.5	4.4	4.4								
Degree Utilization, x	0.13	0.08	0.19	0.15								
Capacity (veh/h)	725	737	776	779								
Control Delay (s)	8.3	7.9	8.5	8.1								
Approach Delay (s)	8.3	7.9	8.5	8.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.3									
Level of Service			A									
Intersection Capacity Utilization			31.6%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

13: Cowper St & Churchill Ave

Cumulative + No Project

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	70	8	6	27	1	26	26	7	2	24	14
Future Volume (vph)	6	70	8	6	27	1	26	26	7	2	24	14
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)	7	76	9	7	29	1	28	28	8	2	26	15
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	92	37	64	43								
Volume Left (vph)	7	7	28	2								
Volume Right (vph)	9	1	8	15								
Hadj (s)	-0.01	0.06	0.05	-0.17								
Departure Headway (s)	4.2	4.3	4.3	4.1								
Degree Utilization, x	0.11	0.04	0.08	0.05								
Capacity (veh/h)	838	812	808	847								
Control Delay (s)	7.7	7.5	7.6	7.3								
Approach Delay (s)	7.7	7.5	7.6	7.3								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			22.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

14: Churchill Ave & Embarcadero Rd

Cumulative + No Project
Timing Plan: A.M. Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	953	2	42	1072	0	90
Future Volume (Veh/h)	953	2	42	1072	0	90
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1036	2	46	1165	0	98
Pedestrians					11	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			1047		1722	530
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			635		1453	9
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		100	89
cM capacity (veh/h)			772		93	875
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	691	347	434	777	98	
Volume Left	0	0	46	0	0	
Volume Right	0	2	0	0	98	
cSH	1700	1700	772	1700	875	
Volume to Capacity	0.41	0.20	0.06	0.46	0.11	
Queue Length 95th (ft)	0	0	5	0	9	
Control Delay (s)	0.0	0.0	1.7	0.0	9.6	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.6		9.6	
Approach LOS					A	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			63.7%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 15: Cowper St & Embarcadero Rd

Cumulative + No Project
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	953	23	12	1046	15	6	3	7	5	9	52
Future Volume (Veh/h)	16	953	23	12	1046	15	6	3	7	5	9	52
Sign Control		Free			Free			Stop			Stop	
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)	17	1036	25	13	1137	16	7	3	8	5	10	57
Pedestrians					1			8			28	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			1			3	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.80			0.80	0.80	0.80	0.80	0.80	
vC, conflicting volume	1181			1069			1747	2298	540	1762	2302	604
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1181			600			1443	2127	0	1461	2132	604
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			98			85	92	99	92	72	87
cM capacity (veh/h)	571			777			48	36	865	62	36	429
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	535	543	582	584	18	72						
Volume Left	17	0	13	0	7	5						
Volume Right	0	25	0	16	8	57						
cSH	571	1700	777	1700	76	147						
Volume to Capacity	0.03	0.32	0.02	0.34	0.24	0.49						
Queue Length 95th (ft)	2	0	1	0	21	58						
Control Delay (s)	0.8	0.0	0.5	0.0	66.9	51.1						
Lane LOS	A		A		F	F						
Approach Delay (s)	0.4		0.2		66.9	51.1						
Approach LOS					F	F						
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			49.2%		ICU Level of Service		A					
Analysis Period (min)			15									

Queues

16: Waverly St & Embarcadero Rd

Cumulative + No Project

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	49	1005	30	1148	238	346
v/c Ratio	0.36	0.57	0.17	0.65	0.45	0.54
Control Delay	37.7	31.9	16.9	21.9	27.1	26.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.7	31.9	16.9	21.9	27.1	26.5
Queue Length 50th (ft)	31	376	11	291	120	167
Queue Length 95th (ft)	79	464	30	361	195	263
Internal Link Dist (ft)		572		576	78	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	139	1823	186	1824	528	635
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.55	0.16	0.63	0.45	0.54
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Cumulative + No Project

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	897	37	28	1029	28	87	105	27	73	114	132
Future Volume (vph)	46	897	37	28	1029	28	87	105	27	73	114	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.98			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1758	3513		1764	3518			1786			1712	
Flt Permitted	0.15	1.00		0.19	1.00			0.71			0.87	
Satd. Flow (perm)	271	3513		360	3518			1291			1512	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	965	40	30	1118	30	95	114	29	79	124	143
RTOR Reduction (vph)	0	3	0	0	2	0	0	4	0	0	23	0
Lane Group Flow (vph)	49	1002	0	30	1146	0	0	234	0	0	323	0
Confl. Peds. (#/hr)	27		9	9		27	22		9	9		22
Confl. Bikes (#/hr)									2			13
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	55.4	55.4		55.4	55.4			44.6			44.6	
Effective Green, g (s)	55.4	55.4		55.4	55.4			44.6			44.6	
Actuated g/C Ratio	0.50	0.50		0.50	0.50			0.41			0.41	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	136	1769		181	1771			523			613	
v/s Ratio Prot		0.29			c0.33							
v/s Ratio Perm	0.18			0.08				0.18			c0.21	
v/c Ratio	0.36	0.57		0.17	0.65			0.45			0.53	
Uniform Delay, d1	16.6	19.0		14.8	20.1			23.7			24.7	
Progression Factor	1.74	1.63		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.5	0.4		0.4	0.8			2.8			3.2	
Delay (s)	30.3	31.3		15.2	20.9			26.5			28.0	
Level of Service	C	C		B	C			C			C	
Approach Delay (s)		31.3			20.8			26.5			28.0	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		26.1			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		67.7%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Cumulative + No Project
Timing Plan: A.M. Peak

						
Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	53	1158	64	1312	16	46
v/c Ratio	0.23	0.46	0.23	0.51	0.04	0.13
Control Delay	10.8	8.5	17.4	19.3	0.1	5.6
Queue Delay	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	10.8	8.5	17.4	19.7	0.1	5.6
Queue Length 50th (ft)	14	192	33	437	0	0
Queue Length 95th (ft)	37	239	m61	500	0	20
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	228	2529	284	2560	486	416
Starvation Cap Reductn	0	0	0	626	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.46	0.23	0.68	0.03	0.11
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

HCM Signalized Intersection Capacity Analysis

17: Bryant St & Embarcadero Rd

Cumulative + No Project

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	937	129	59	1166	41	0	0	15	0	0	42
Future Volume (vph)	49	937	129	59	1166	41	0	0	15	0	0	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99				0.94			0.89
Flpb, ped/bikes	0.98	1.00		0.99	1.00				1.00			1.00
Frt	1.00	0.98		1.00	0.99				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1740	3451		1759	3500				1515			1426
Flt Permitted	0.17	1.00		0.21	1.00				1.00			1.00
Satd. Flow (perm)	312	3451		389	3500				1515			1426
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.92	0.25	0.25	0.92
Adj. Flow (vph)	53	1018	140	64	1267	45	0	0	16	0	0	46
RTOR Reduction (vph)	0	8	0	0	2	0	0	0	13	0	0	37
Lane Group Flow (vph)	53	1150	0	64	1310	0	0	0	3	0	0	9
Confl. Peds. (#/hr)	64		16	16		64			16			32
Confl. Bikes (#/hr)									26			61
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	78.4	78.4		78.4	78.4				21.6			21.6
Effective Green, g (s)	78.4	78.4		78.4	78.4				21.6			21.6
Actuated g/C Ratio	0.71	0.71		0.71	0.71				0.20			0.20
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	222	2459		277	2494				297			280
v/s Ratio Prot		0.33			c0.37							
v/s Ratio Perm	0.17			0.16					0.00			c0.01
v/c Ratio	0.24	0.47		0.23	0.53				0.01			0.03
Uniform Delay, d1	5.5	6.8		5.4	7.3				35.6			35.7
Progression Factor	1.00	1.00		1.98	2.16				1.00			1.00
Incremental Delay, d2	2.5	0.6		1.6	0.6				0.0			0.0
Delay (s)	8.0	7.4		12.3	16.3				35.6			35.8
Level of Service	A	A		B	B				D			D
Approach Delay (s)		7.5			16.1			35.6			35.8	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			12.6			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			59.7%			ICU Level of Service			B			
Analysis Period (min)			15									

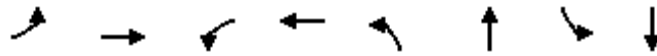
c Critical Lane Group

Queues

18: Middlefield Rd & Embarcadero Rd

Cumulative + No Project

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	1005	53	1134	159	357	123	280
v/c Ratio	0.53	0.89	0.64	1.01	1.26	0.57	1.07	0.89
Control Delay	94.9	60.5	103.7	80.7	220.5	61.5	168.4	91.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.9	60.5	103.7	80.7	220.5	61.5	168.4	91.9
Queue Length 50th (ft)	43	523	53	~674	~199	172	~136	274
Queue Length 95th (ft)	#95	#664	#124	#814	#352	227	#275	#426
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	81	1131	83	1120	126	661	115	333
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.89	0.64	1.01	1.26	0.54	1.07	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

18: Middlefield Rd & Embarcadero Rd

Cumulative + No Project
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	872	52	49	914	130	146	308	20	113	232	26
Future Volume (vph)	40	872	52	49	914	130	146	308	20	113	232	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3498		1770	3450		1770	3501		1770	1828	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3498		1770	3450		1770	3501		1770	1828	
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)	43	948	57	53	993	141	159	335	22	123	252	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	43	1005	0	53	1134	0	159	357	0	123	280	0
Confl. Peds. (#/hr)			24			44			8			14
Confl. Bikes (#/hr)						1			1			2
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	5.7	48.9		5.8	49.0		11.0	27.3		10.0	26.3	
Effective Green, g (s)	5.7	48.9		5.8	49.0		11.0	27.3		10.0	26.3	
Actuated g/C Ratio	0.04	0.32		0.04	0.32		0.07	0.18		0.07	0.17	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	65	1114		66	1101		126	622		115	313	
v/s Ratio Prot	0.02	0.29		c0.03	c0.33		c0.09	0.10		0.07	c0.15	
v/s Ratio Perm												
v/c Ratio	0.66	0.90		0.80	1.03		1.26	0.57		1.07	0.89	
Uniform Delay, d1	72.9	50.0		73.3	52.2		71.2	57.8		71.8	62.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.4	11.8		47.7	35.1		166.6	1.3		103.8	26.0	
Delay (s)	93.4	61.8		121.0	87.3		237.8	59.1		175.6	88.2	
Level of Service	F	E		F	F		F	E		F	F	
Approach Delay (s)		63.1			88.8			114.1			114.9	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		87.7			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		153.5			Sum of lost time (s)			22.5				
Intersection Capacity Utilization		72.7%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative + No Project
Timing Plan: A.M. Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	311	1282	338	1571	75	325	212	729
v/c Ratio	0.98	0.80	0.92	0.90	0.47	0.38	1.00	0.78
Control Delay	105.5	51.2	95.9	77.5	74.4	44.3	126.4	52.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	105.5	51.2	95.9	77.5	74.4	44.3	126.4	52.1
Queue Length 50th (ft)	307	420	352	574	72	133	211	325
Queue Length 95th (ft)	#505	502	m#401	m#657	127	168	#385	382
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	318	1612	378	1752	172	970	212	1062
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.80	0.89	0.90	0.44	0.34	1.00	0.69
Intersection Summary								
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.								
m Volume for 95th percentile queue is metered by upstream signal.								

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative + No Project
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			 			 	
Traffic Volume (vph)	308	1168	101	311	1304	142	69	231	68	201	460	233
Future Volume (vph)	308	1168	101	311	1304	142	69	231	68	201	460	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5009		1770	4998		1770	3400		1770	3254	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5009		1770	4998		1770	3400		1770	3254	
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	311	1180	102	338	1417	154	75	251	74	212	484	245
RTOR Reduction (vph)	0	6	0	0	8	0	0	19	0	0	45	0
Lane Group Flow (vph)	311	1276	0	338	1563	0	75	306	0	212	684	0
Confl. Peds. (#/hr)			17			9			11			74
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	27.0	48.0		31.3	52.3		13.5	36.7		18.0	41.2	
Effective Green, g (s)	27.0	48.0		31.3	52.3		13.5	36.7		18.0	41.2	
Actuated g/C Ratio	0.18	0.32		0.21	0.35		0.09	0.24		0.12	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	318	1602		369	1742		159	831		212	893	
v/s Ratio Prot	c0.18	0.25		0.19	c0.31		c0.04	0.09		c0.12	c0.21	
v/s Ratio Perm												
v/c Ratio	0.98	0.80		0.92	0.90		0.47	0.37		1.00	0.77	
Uniform Delay, d1	61.2	46.5		58.1	46.3		64.9	47.0		66.0	50.0	
Progression Factor	1.00	1.00		1.42	1.65		1.00	1.00		1.00	1.00	
Incremental Delay, d2	43.8	4.2		13.5	3.4		1.6	0.1		61.8	3.6	
Delay (s)	105.0	50.7		96.0	79.8		66.5	47.1		127.8	53.5	
Level of Service	F	D		F	E		E	D		F	D	
Approach Delay (s)		61.3			82.7			50.8			70.3	
Approach LOS		E			F			D			E	
Intersection Summary												
HCM 2000 Control Delay		70.6			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		100.4%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Cumulative + No Project
Timing Plan: A.M. Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	378	2027	236	102	1373
v/c Ratio	1.06	0.89	0.33	0.91	0.50
Control Delay	114.9	45.7	22.8	92.7	51.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	114.9	45.7	22.8	92.7	51.5
Queue Length 50th (ft)	~380	720	115	105	520
Queue Length 95th (ft)	#594	#842	189	m#154	m563
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	358	2280	722	112	2738
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.06	0.89	0.33	0.91	0.50
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Cumulative + No Project
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			  			  
Traffic Volume (vph)	179	168	1865	217	94	1263
Future Volume (vph)	179	168	1865	217	94	1263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1681		5085	1534	1770	5085
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1681		5085	1534	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	195	183	2027	236	102	1373
RTOR Reduction (vph)	22	0	0	36	0	0
Lane Group Flow (vph)	356	0	2027	200	102	1373
Confl. Peds. (#/hr)		5		10		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	30.0		66.7	66.7	9.5	80.2
Effective Green, g (s)	30.0		66.7	66.7	9.5	80.2
Actuated g/C Ratio	0.20		0.44	0.44	0.06	0.53
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	336		2261	682	112	2718
v/s Ratio Prot	c0.21		c0.40		c0.06	0.27
v/s Ratio Perm				0.13		
v/c Ratio	1.06		0.90	0.29	0.91	0.51
Uniform Delay, d1	60.0		38.5	26.6	69.8	22.2
Progression Factor	1.00		1.00	1.00	0.67	2.13
Incremental Delay, d2	65.3		6.1	1.1	39.8	0.4
Delay (s)	125.3		44.6	27.7	86.4	47.7
Level of Service	F		D	C	F	D
Approach Delay (s)	125.3		42.8			50.4
Approach LOS	F		D			D
Intersection Summary						
HCM 2000 Control Delay			53.1		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			73.2%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Queues

21: Page Mill Rd/Oregon Expy & El Camino Real

Cumulative + No Project

Timing Plan: A.M. Peak

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	341	682	264	354	1632	404	1039	198	250	1408
v/c Ratio	1.01	0.45	0.44	0.86	1.03	1.02	0.72	0.23	0.81	1.06
Control Delay	133.8	55.7	13.6	101.6	90.6	130.6	51.2	23.1	105.2	98.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	133.8	55.7	13.6	101.6	90.6	130.6	51.2	23.1	105.2	98.1
Queue Length 50th (ft)	~226	255	43	227	~785	~274	574	126	160	~1011
Queue Length 95th (ft)	#342	311	137	281	#878	#393	682	178	210	#1150
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			250	
Base Capacity (vph)	337	1518	599	507	1591	395	1441	907	379	1323
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.45	0.44	0.70	1.03	1.02	0.72	0.22	0.66	1.06

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Cumulative + No Project
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑	↗	↔↔	↑↑↑		↔↔	↑↑	↗	↔↔	↑↑	
Traffic Volume (vph)	327	655	253	333	1309	225	372	956	182	240	1159	193
Future Volume (vph)	327	655	253	333	1309	225	372	956	182	240	1159	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1500	3433	4926		3433	3539	1583	3433	3449	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1500	3433	4926		3433	3539	1583	3433	3449	
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	341	682	264	354	1393	239	404	1039	198	250	1207	201
RTOR Reduction (vph)	0	0	152	0	13	0	0	0	0	0	7	0
Lane Group Flow (vph)	341	682	112	354	1619	0	404	1039	198	250	1401	0
Confl. Peds. (#/hr)			21			27			29			8
Confl. Bikes (#/hr)						3						1
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	18.7	56.7	56.7	22.9	60.9		21.9	77.4	104.8	17.0	72.5	
Effective Green, g (s)	18.7	56.7	56.7	22.9	60.9		21.9	77.4	104.8	17.0	72.5	
Actuated g/C Ratio	0.10	0.30	0.30	0.12	0.32		0.12	0.41	0.55	0.09	0.38	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	337	1517	447	413	1578		395	1441	873	307	1316	
v/s Ratio Prot	c0.10	0.13		c0.10	c0.33		c0.12	0.29	0.13	0.07	c0.41	
v/s Ratio Perm			0.07									
v/c Ratio	1.01	0.45	0.25	0.86	1.03		1.02	0.72	0.23	0.81	1.06	
Uniform Delay, d1	85.7	54.0	50.5	81.9	64.5		84.0	47.2	21.8	85.0	58.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	52.1	1.0	1.3	15.4	29.5		51.2	1.5	0.0	14.4	44.0	
Delay (s)	137.7	55.0	51.9	97.3	94.1		135.3	48.8	21.9	99.4	102.8	
Level of Service	F	D	D	F	F		F	D	C	F	F	
Approach Delay (s)		76.3			94.7			66.8			102.3	
Approach LOS		E			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			86.0			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			103.1%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Cumulative + No Project

Timing Plan: A.M. Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	11	0	84	0	1791	397	0	677	211	
Future Volume (Veh/h)	0	0	0	11	0	84	0	1791	397	0	677	211	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.95	0.25	0.95	0.92	0.98	0.98	0.25	0.92	0.92	
Hourly flow rate (vph)	0	0	0	12	0	88	0	1828	405	0	736	229	
Pedestrians	19												
Lane Width (ft)	12.0												
Walking Speed (ft/s)	3.5												
Percent Blockage	2												
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	1852	3102	482	2215	2812	933	965						2252
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1852	3102	482	2215	2812	933	965						2252
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	49	100	67	100						100
cM capacity (veh/h)	30	11	530	23	17	263	709						221
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2						
Volume Total	12	88	914	914	405	491	474						
Volume Left	12	0	0	0	0	0	0						
Volume Right	0	88	0	0	405	0	229						
cSH	23	263	1700	1700	1700	1700	1700						
Volume to Capacity	0.51	0.33	0.54	0.54	0.24	0.29	0.28						
Queue Length 95th (ft)	38	35	0	0	0	0	0						
Control Delay (s)	267.0	25.4	0.0	0.0	0.0	0.0	0.0						
Lane LOS	F	D											
Approach Delay (s)	54.4			0.0	0.0								
Approach LOS	F												
Intersection Summary													
Average Delay				1.7									
Intersection Capacity Utilization				61.4%	ICU Level of Service				B				
Analysis Period (min)				15									

HCM Unsignalized Intersection Capacity Analysis 22b: Alma St & Oregon Expy EB Ramps

Cumulative + No Project
Timing Plan: A.M. Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	301	1887	171	84	605	
Future Volume (Veh/h)	0	301	1887	171	84	605	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.92	0.98	0.98	0.92	0.92	
Hourly flow rate (vph)	0	327	1926	174	91	658	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2437	963			1926		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2437	963			1926		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	0			70		
cM capacity (veh/h)	18	256			302		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	327	963	963	174	91	329	329
Volume Left	0	0	0	0	91	0	0
Volume Right	327	0	0	174	0	0	0
cSH	256	1700	1700	1700	302	1700	1700
Volume to Capacity	1.28	0.57	0.57	0.10	0.30	0.19	0.19
Queue Length 95th (ft)	410	0	0	0	31	0	0
Control Delay (s)	191.7	0.0	0.0	0.0	21.9	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	191.7	0.0			2.7		
Approach LOS	F						
Intersection Summary							
Average Delay			20.4				
Intersection Capacity Utilization			77.5%		ICU Level of Service		D
Analysis Period (min)			15				

Queues
23: Cowper St & Oregon Expy

Cumulative + No Project
Timing Plan: A.M. Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	1713	60	30	1847	125	106	36	72
v/c Ratio	0.23	0.77	0.06	0.31	0.82	0.89	0.34	0.34	0.29
Control Delay	74.2	26.4	1.7	89.0	16.7	117.5	41.9	76.8	39.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.2	26.4	1.7	89.0	16.7	117.5	41.9	76.8	39.4
Queue Length 50th (ft)	21	530	0	31	88	123	77	35	48
Queue Length 95th (ft)	53	#1048	12	m26	m#872	#250	114	74	82
Internal Link Dist (ft)		1547			1028		66		60
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	95	2237	1009	97	2241	141	474	106	445
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.77	0.06	0.31	0.82	0.89	0.22	0.34	0.16
Intersection Summary									
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.									
m Volume for 95th percentile queue is metered by upstream signal.									

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Cumulative + No Project

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1576	55	29	1757	16	115	54	43	33	40	27
Future Volume (vph)	20	1576	55	29	1757	16	115	54	43	33	40	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.93		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1546	1770	3533		1770	1698		1770	1724	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1546	1770	3533		1770	1698		1770	1724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1713	60	30	1830	17	125	59	47	36	43	29
RTOR Reduction (vph)	0	0	23	0	0	0	0	22	0	0	19	0
Lane Group Flow (vph)	22	1713	37	30	1847	0	125	84	0	36	53	0
Confl. Peds. (#/hr)			1			11			8			10
Confl. Bikes (#/hr)									25			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	4.9	91.9	91.9	5.0	92.2		12.0	25.8		7.2	21.2	
Effective Green, g (s)	4.9	91.9	91.9	5.0	92.2		12.0	25.8		7.2	21.2	
Actuated g/C Ratio	0.03	0.61	0.61	0.03	0.61		0.08	0.17		0.05	0.14	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	57	2168	947	59	2171		141	292		84	243	
v/s Ratio Prot	0.01	0.48		c0.02	c0.52		c0.07	c0.05		0.02	0.03	
v/s Ratio Perm			0.02									
v/c Ratio	0.39	0.79	0.04	0.51	0.85		0.89	0.29		0.43	0.22	
Uniform Delay, d1	71.1	21.8	11.5	71.3	23.3		68.3	54.1		69.4	57.1	
Progression Factor	1.00	1.00	1.00	1.28	0.60		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	3.0	0.1	0.6	0.4		46.0	0.6		4.7	0.5	
Delay (s)	75.4	24.8	11.6	92.1	14.4		114.3	54.7		74.1	57.5	
Level of Service	E	C	B	F	B		F	D		E	E	
Approach Delay (s)		25.0			15.6			86.9			63.1	
Approach LOS		C			B			F			E	
Intersection Summary												
HCM 2000 Control Delay			25.2			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			20.1			
Intersection Capacity Utilization			75.4%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

Queues
24: Middlefield Rd & Oregon Expy

Cumulative + No Project
Timing Plan: A.M. Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	141	1420	185	135	1418	64	323	468	261	105	497
v/c Ratio	1.11	1.15	0.29	0.68	1.03	0.11	1.32	0.80	0.43	0.73	0.54
Control Delay	166.3	126.3	27.6	80.2	77.6	0.4	219.1	57.1	12.5	95.6	40.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	166.3	126.3	27.6	80.2	77.6	0.4	219.1	57.1	12.5	95.6	40.9
Queue Length 50th (ft)	~154	~857	39	129	~798	0	~407	417	50	102	184
Queue Length 95th (ft)	m#245	#998	m167	#310	#1036	0	#606	514	119	#187	225
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	127	1231	630	200	1372	595	244	690	684	153	1118
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.11	1.15	0.29	0.68	1.03	0.11	1.32	0.68	0.38	0.69	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Cumulative + No Project
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1306	170	130	1361	61	297	431	240	97	290	167
Future Volume (vph)	130	1306	170	130	1361	61	297	431	240	97	290	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.83	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1420	185	135	1418	64	323	468	261	105	315	182
RTOR Reduction (vph)	0	0	88	0	0	39	0	0	130	0	59	0
Lane Group Flow (vph)	141	1420	97	135	1418	25	323	468	131	105	438	0
Confl. Peds. (#/hr)			1			51			27			4
Confl. Bikes (#/hr)						2						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	10.8	52.2	52.2	17.0	58.2	58.2	20.7	47.3	47.3	12.1	38.8	
Effective Green, g (s)	10.8	52.2	52.2	17.0	58.2	58.2	20.7	47.3	47.3	12.1	38.8	
Actuated g/C Ratio	0.07	0.35	0.35	0.11	0.39	0.39	0.14	0.32	0.32	0.08	0.26	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	127	1231	543	200	1373	512	244	587	480	142	860	
v/s Ratio Prot	0.08	c0.40		0.08	c0.40		c0.18	c0.25		0.06	0.13	
v/s Ratio Perm			0.06			0.02			0.09			
v/c Ratio	1.11	1.15	0.18	0.68	1.03	0.05	1.32	0.80	0.27	0.74	0.51	
Uniform Delay, d1	69.6	48.9	34.0	63.8	45.9	28.6	64.7	47.0	38.5	67.4	47.5	
Progression Factor	1.18	1.20	2.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	97.0	75.6	0.5	8.7	33.1	0.2	171.3	8.5	0.6	18.1	0.5	
Delay (s)	179.1	134.4	84.7	72.5	79.0	28.8	236.0	55.5	39.1	85.5	47.9	
Level of Service	F	F	F	E	E	C	F	E	D	F	D	
Approach Delay (s)		132.8			76.5			106.8			54.5	
Approach LOS		F			E			F			D	
Intersection Summary												
HCM 2000 Control Delay			99.8				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			21.6		
Intersection Capacity Utilization			103.1%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
1: Alma Street & Homer Ave

Cumulative + No Project
Timing Plan: P.M.Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	591	1260	1074
v/c Ratio	0.85	0.81	0.69
Control Delay	43.1	27.0	23.0
Queue Delay	0.0	0.0	0.0
Total Delay	43.1	27.0	23.0
Queue Length 50th (ft)	153	321	253
Queue Length 95th (ft)	#237	410	326
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	742	1608	1608
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.80	0.78	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Cumulative + No Project

Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	402	142	1222	0	0	1010
Future Volume (vph)	402	142	1222	0	0	1010
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.96		1.00			1.00
Flpb, ped/bikes	0.88		1.00			1.00
Frt	0.96		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	2821		3539			3539
Flt Permitted	0.96		1.00			1.00
Satd. Flow (perm)	2821		3539			3539
Peak-hour factor, PHF	0.92	0.92	0.97	0.25	0.25	0.94
Adj. Flow (vph)	437	154	1260	0	0	1074
RTOR Reduction (vph)	38	0	0	0	0	0
Lane Group Flow (vph)	553	0	1260	0	0	1074
Confl. Peds. (#/hr)	77	61		28		
Confl. Bikes (#/hr)		3				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	20.5		38.7			38.7
Effective Green, g (s)	20.5		38.7			38.7
Actuated g/C Ratio	0.23		0.44			0.44
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	654		1551			1551
v/s Ratio Prot			c0.36			0.30
v/s Ratio Perm	c0.20					
v/c Ratio	0.84		0.81			0.69
Uniform Delay, d1	32.4		21.6			20.0
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	9.8		3.5			1.5
Delay (s)	42.2		25.2			21.5
Level of Service	D		C			C
Approach Delay (s)	42.2		25.2			21.5
Approach LOS	D		C			C
Intersection Summary						
HCM 2000 Control Delay			27.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.65			
Actuated Cycle Length (s)			88.3		Sum of lost time (s)	13.0
Intersection Capacity Utilization			58.4%		ICU Level of Service	B
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

Cumulative + No Project

Timing Plan: P.M.Peak

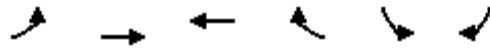
						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	34	20	1671	95	20	1362
Future Volume (Veh/h)	34	20	1671	95	20	1362
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.94	0.94	0.95	0.95
Hourly flow rate (vph)	37	22	1778	101	21	1434
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2600	952			1891	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2600	952			1891	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	91			93	
cM capacity (veh/h)	19	257			309	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	59	1185	694	499	956	
Volume Left	37	0	0	21	0	
Volume Right	22	0	101	0	0	
cSH	28	1700	1700	309	1700	
Volume to Capacity	2.07	0.70	0.41	0.07	0.56	
Queue Length 95th (ft)	175	0	0	5	0	
Control Delay (s)	792.8	0.0	0.0	2.3	0.0	
Lane LOS	F			A		
Approach Delay (s)	792.8	0.0		0.8		
Approach LOS	F					
Intersection Summary						
Average Delay			14.1			
Intersection Capacity Utilization			61.8%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Cumulative + No Project

Timing Plan: P.M.Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑			↗
Traffic Volume (veh/h)	0	1394	1644	0	0	120
Future Volume (Veh/h)	0	1394	1644	0	0	120
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.98	0.98	0.25	0.25	0.92
Hourly flow rate (vph)	0	1422	1678	0	0	130
Pedestrians					18	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1696				2407	1696
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1696				2407	1696
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	365				27	80
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	711	711	1678	130		
Volume Left	0	0	0	0		
Volume Right	0	0	0	130		
cSH	1700	1700	1700	80		
Volume to Capacity	0.42	0.42	0.99	1.62		
Queue Length 95th (ft)	0	0	0	269		
Control Delay (s)	0.0	0.0	0.0	418.6		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	418.6		
Approach LOS				F		
Intersection Summary						
Average Delay			16.8			
Intersection Capacity Utilization			100.6%		ICU Level of Service	G
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Emerson St & Lincoln Ave

Cumulative + No Project
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	79	53	33	57	9	2	35	2	9	21	0
Future Volume (vph)	8	79	53	33	57	9	2	35	2	9	21	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)	9	86	58	36	62	10	2	38	2	10	23	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	153	108	42	33								
Volume Left (vph)	9	36	2	10								
Volume Right (vph)	58	10	2	0								
Hadj (s)	-0.18	0.05	0.01	0.09								
Departure Headway (s)	4.0	4.3	4.5	4.6								
Degree Utilization, x	0.17	0.13	0.05	0.04								
Capacity (veh/h)	875	820	746	726								
Control Delay (s)	7.8	7.9	7.8	7.8								
Approach Delay (s)	7.8	7.9	7.8	7.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.8									
Level of Service			A									
Intersection Capacity Utilization			28.5%	ICU Level of Service		A						
Analysis Period (min)			15									

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

8: Alma Street & Kingsley Ave

Cumulative + No Project
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	26	31	1622	34	77	1307
Future Volume (Veh/h)	26	31	1622	34	77	1307
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.97	0.97	0.96	0.96
Hourly flow rate (vph)	28	34	1672	35	80	1361
Pedestrians	17					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	2					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2547	1706			1724	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2547	1706			1724	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	57			78	
cM capacity (veh/h)	17	79			357	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	62	1707	534	907		
Volume Left	28	0	80	0		
Volume Right	34	35	0	0		
cSH	30	1700	357	1700		
Volume to Capacity	2.10	1.00	0.22	0.53		
Queue Length 95th (ft)	182	0	21	0		
Control Delay (s)	794.7	0.0	7.4	0.0		
Lane LOS	F		A			
Approach Delay (s)	794.7	0.0	2.7			
Approach LOS	F					
Intersection Summary						
Average Delay		16.6				
Intersection Capacity Utilization		103.7%		ICU Level of Service	G	
Analysis Period (min)		15				

Queues
9: Alma St & Churchill Ave

Cumulative + No Project
Timing Plan: P.M.Peak

								
Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	253	289	143	234	1659	9	1349	118
v/c Ratio	0.87	0.60	0.65	0.87	0.79	0.11	0.85	0.16
Control Delay	101.4	12.6	90.0	105.1	32.5	90.9	51.4	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.4	12.6	90.0	105.1	32.5	90.9	51.4	10.7
Queue Length 50th (ft)	311	3	170	288	766	11	804	23
Queue Length 95th (ft)	#460	102	256	#440	1008	34	908	67
Internal Link Dist (ft)	340		479		698		387	
Turn Bay Length (ft)				300		60		
Base Capacity (vph)	328	503	254	301	2182	80	1667	791
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.57	0.56	0.78	0.76	0.11	0.81	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Cumulative + No Project

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	88	266	68	55	8	215	1497	29	8	1255	110
Future Volume (vph)	144	88	266	68	55	8	215	1497	29	8	1255	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.93		0.99		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1807	1480		1787		1770	3527		1770	3539	1583
Flt Permitted		0.97	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1807	1480		1787		1770	3527		1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	157	96	289	74	60	9	234	1627	32	9	1349	118
RTOR Reduction (vph)	0	0	240	0	1	0	0	1	0	0	0	47
Lane Group Flow (vph)	0	253	49	0	142	0	234	1658	0	9	1349	71
Confl. Peds. (#/hr)			11			42			6			
Confl. Bikes (#/hr)			20			8						
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	8	8		7	7		1	6		5	2	
Permitted Phases			8									2
Actuated Green, G (s)		28.9	28.9		22.0		27.2	107.0		3.0	82.8	82.8
Effective Green, g (s)		28.9	28.9		22.0		27.2	107.0		3.0	82.8	82.8
Actuated g/C Ratio		0.16	0.16		0.12		0.15	0.59		0.02	0.46	0.46
Clearance Time (s)		5.0	5.0		5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	6.0		3.0	6.0	6.0
Lane Grp Cap (vph)		288	236		217		266	2086		29	1619	724
v/s Ratio Prot		c0.14			c0.08		c0.13	0.47		0.01	c0.38	
v/s Ratio Perm			0.03									0.05
v/c Ratio		0.88	0.21		0.65		0.88	0.79		0.31	0.83	0.10
Uniform Delay, d1		74.3	66.0		75.8		75.2	28.5		87.9	43.0	27.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		24.7	0.4		6.9		26.4	2.7		6.0	4.5	0.2
Delay (s)		98.9	66.5		82.8		101.6	31.1		94.0	47.5	28.0
Level of Service		F	E		F		F	C		F	D	C
Approach Delay (s)		81.6			82.8			39.9			46.2	
Approach LOS		F			F			D			D	
Intersection Summary												
HCM 2000 Control Delay			49.3				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			180.9				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			83.4%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

10: Emerson St & Churchill Ave

Cumulative + No Project

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	129	14	3	94	0	15	10	3	8	25	23
Future Volume (vph)	6	129	14	3	94	0	15	10	3	8	25	23
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)	7	140	15	3	102	0	16	11	3	9	27	25
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	162	105	30	61								
Volume Left (vph)	7	3	16	9								
Volume Right (vph)	15	0	3	25								
Hadj (s)	-0.01	0.04	0.08	-0.18								
Departure Headway (s)	4.2	4.3	4.6	4.3								
Degree Utilization, x	0.19	0.13	0.04	0.07								
Capacity (veh/h)	832	799	723	768								
Control Delay (s)	8.2	7.9	7.8	7.7								
Approach Delay (s)	8.2	7.9	7.8	7.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.0									
Level of Service			A									
Intersection Capacity Utilization			23.6%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Cumulative + No Project

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	127	6	2	87	3	3	6	3	3	32	7
Future Volume (Veh/h)	7	127	6	2	87	3	3	6	3	3	32	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	137	6	2	95	3	3	7	3	3	35	8
Pedestrians		9			12			1			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	124	82	49	147	84	26	52			22		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	124	82	49	147	84	26	52			22		
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 %	99	83	99	100	88	100	100			100		
cM capacity (veh/h)	746	789	1010	687	787	1034	1541			1575		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	151	100	13	46								
Volume Left	8	2	3	3								
Volume Right	6	3	3	8								
cSH	794	790	1541	1575								
Volume to Capacity	0.19	0.13	0.00	0.00								
Queue Length 95th (ft)	17	11	0	0								
Control Delay (s)	10.6	10.2	1.7	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.6	10.2	1.7	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			8.6									
Intersection Capacity Utilization			24.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Cumulative + No Project
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	28	92	10	3	49	12	9	87	2	10	115	36
Future Volume (vph)	28	92	10	3	49	12	9	87	2	10	115	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.97	0.97
Hourly flow rate (vph)	30	100	11	3	53	13	10	95	2	10	119	37
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	141	69	107	166								
Volume Left (vph)	30	3	10	10								
Volume Right (vph)	11	13	2	37								
Hadj (s)	0.03	-0.07	0.04	-0.09								
Departure Headway (s)	4.7	4.7	4.7	4.5								
Degree Utilization, x	0.18	0.09	0.14	0.21								
Capacity (veh/h)	721	714	730	761								
Control Delay (s)	8.7	8.1	8.4	8.6								
Approach Delay (s)	8.7	8.1	8.4	8.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				8.5								
Level of Service				A								
Intersection Capacity Utilization				31.8%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis 13: Cowper St & Churchill Ave

Cumulative + No Project
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	95	11	3	35	0	14	28	3	0	36	7
Future Volume (vph)	2	95	11	3	35	0	14	28	3	0	36	7
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)	2	103	12	3	38	0	15	30	3	0	39	8
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	117	41	48	47								
Volume Left (vph)	2	3	15	0								
Volume Right (vph)	12	0	3	8								
Hadj (s)	-0.02	0.05	0.06	-0.07								
Departure Headway (s)	4.1	4.3	4.4	4.2								
Degree Utilization, x	0.13	0.05	0.06	0.06								
Capacity (veh/h)	847	815	787	814								
Control Delay (s)	7.8	7.5	7.6	7.5								
Approach Delay (s)	7.8	7.5	7.6	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			23.6%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 14: Churchill Ave & Embarcadero Rd

Cumulative + No Project
Timing Plan: P.M.Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	1113	2	47	982	0	58
Future Volume (Veh/h)	1113	2	47	982	0	58
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.25	0.92
Hourly flow rate (vph)	1210	2	50	1045	0	63
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.78		0.78	0.78
vC, conflicting volume			1218		1842	614
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			722		1519	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		100	93
cM capacity (veh/h)			680		79	842
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	807	405	398	697	63	
Volume Left	0	0	50	0	0	
Volume Right	0	2	0	0	63	
cSH	1700	1700	680	1700	842	
Volume to Capacity	0.47	0.24	0.07	0.41	0.07	
Queue Length 95th (ft)	0	0	6	0	6	
Control Delay (s)	0.0	0.0	2.2	0.0	9.6	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.8		9.6	
Approach LOS					A	
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			65.2%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 15: Cowper St & Embarcadero Rd

Cumulative + No Project
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1097	17	8	928	41	2	10	7	12	7	19
Future Volume (Veh/h)	20	1097	17	8	928	41	2	10	7	12	7	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	1192	18	8	967	43	2	11	8	13	8	21
Pedestrians								8			1	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								3.5			3.5	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.77			0.77	0.77	0.77	0.77	0.77	
vC, conflicting volume	1011			1218			1778	2280	613	1659	2268	506
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1011			685			1412	2065	0	1258	2049	506
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			97	72	99	82	80	96
cM capacity (veh/h)	681			691			58	39	828	73	40	511
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	618	614	492	526	21	42						
Volume Left	22	0	8	0	2	13						
Volume Right	0	18	0	43	8	21						
cSH	681	1700	691	1700	65	101						
Volume to Capacity	0.03	0.36	0.01	0.31	0.32	0.42						
Queue Length 95th (ft)	3	0	1	0	30	43						
Control Delay (s)	0.9	0.0	0.3	0.0	85.0	64.3						
Lane LOS	A		A		F	F						
Approach Delay (s)	0.4		0.2		85.0	64.3						
Approach LOS					F	F						
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			56.7%		ICU Level of Service		B					
Analysis Period (min)			15									

Queues

16: Waverly St & Embarcadero Rd

Cumulative + No Project

Timing Plan: P.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	98	1141	24	982	176	301
v/c Ratio	0.48	0.62	0.16	0.53	0.28	0.53
Control Delay	34.6	28.0	15.6	18.0	25.1	29.8
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	34.6	28.2	15.6	18.0	25.1	29.8
Queue Length 50th (ft)	56	342	8	216	85	160
Queue Length 95th (ft)	104	416	25	272	141	251
Internal Link Dist (ft)		572		576	43	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	214	1922	160	1913	625	572
Starvation Cap Reductn	0	197	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.66	0.15	0.51	0.28	0.53
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Cumulative + No Project

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1024	26	23	861	62	35	110	17	99	119	59
Future Volume (vph)	90	1024	26	23	861	62	35	110	17	99	119	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.99			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1768	3523		1765	3498			1814			1769	
Flt Permitted	0.21	1.00		0.16	1.00			0.88			0.82	
Satd. Flow (perm)	393	3523		293	3498			1619			1470	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	1113	28	24	916	66	38	120	18	108	129	64
RTOR Reduction (vph)	0	2	0	0	5	0	0	4	0	0	9	0
Lane Group Flow (vph)	98	1139	0	24	977	0	0	172	0	0	292	0
Confl. Peds. (#/hr)	2		10	10		2	2		6	6		2
Confl. Bikes (#/hr)												4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	57.8	57.8		57.8	57.8			42.2			42.2	
Effective Green, g (s)	57.8	57.8		57.8	57.8			42.2			42.2	
Actuated g/C Ratio	0.53	0.53		0.53	0.53			0.38			0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	206	1851		153	1838			621			563	
v/s Ratio Prot		c0.32			0.28							
v/s Ratio Perm	0.25			0.08				0.11			c0.20	
v/c Ratio	0.48	0.62		0.16	0.53			0.28			0.52	
Uniform Delay, d1	16.5	18.3		13.5	17.2			23.4			26.1	
Progression Factor	1.61	1.47		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.5	0.5		0.5	0.3			1.1			3.4	
Delay (s)	28.1	27.4		14.0	17.5			24.5			29.5	
Level of Service	C	C		B	B			C			C	
Approach Delay (s)		27.5			17.4			24.5			29.5	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay		23.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		73.9%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Cumulative + No Project
Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	183	1307	15	1019	13	40
v/c Ratio	0.50	0.49	0.06	0.38	0.04	0.10
Control Delay	14.9	8.0	4.7	6.9	0.2	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	8.0	4.7	6.9	0.2	0.5
Queue Length 50th (ft)	64	234	3	268	0	0
Queue Length 95th (ft)	145	288	m7	338	0	0
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	363	2681	253	2663	443	496
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.49	0.06	0.38	0.03	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

17: Bryant St & Embarcadero Rd

Cumulative + No Project

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1159	43	14	867	71	0	0	12	0	0	37
Future Volume (vph)	168	1159	43	14	867	71	0	0	12	0	0	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00				0.95			0.93
Flpb, ped/bikes	1.00	1.00		1.00	1.00				1.00			1.00
Frt	1.00	0.99		1.00	0.99				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1764	3515		1766	3490				1529			1495
Flt Permitted	0.26	1.00		0.18	1.00				1.00			1.00
Satd. Flow (perm)	478	3515		332	3490				1529			1495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.92	0.25	0.25	0.92
Adj. Flow (vph)	183	1260	47	15	942	77	0	0	13	0	0	40
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	11	0	0	33
Lane Group Flow (vph)	183	1305	0	15	1015	0	0	0	2	0	0	7
Confl. Peds. (#/hr)	6		8	8		6			6			20
Confl. Bikes (#/hr)									24			28
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	81.8	81.8		81.8	81.8				18.2			18.2
Effective Green, g (s)	81.8	81.8		81.8	81.8				18.2			18.2
Actuated g/C Ratio	0.74	0.74		0.74	0.74				0.17			0.17
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	355	2613		246	2595				252			247
v/s Ratio Prot		0.37			0.29							
v/s Ratio Perm	c0.38			0.05					0.00			c0.00
v/c Ratio	0.52	0.50		0.06	0.39				0.01			0.03
Uniform Delay, d1	5.9	5.8		3.8	5.1				38.4			38.5
Progression Factor	1.00	1.00		0.64	1.02				1.00			1.00
Incremental Delay, d2	5.3	0.7		0.4	0.4				0.0			0.0
Delay (s)	11.1	6.4		2.9	5.6				38.4			38.5
Level of Service	B	A		A	A				D			D
Approach Delay (s)		7.0			5.5			38.4			38.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		7.1			HCM 2000 Level of Service				A			
HCM 2000 Volume to Capacity ratio		0.43										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)				10.0			
Intersection Capacity Utilization		52.7%			ICU Level of Service				A			
Analysis Period (min)		15										
c Critical Lane Group												

Queues

18: Middlefield Rd & Embarcadero Rd

Cumulative + No Project

Timing Plan: P.M.Peak

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	1181	96	1007	131	490	189	475
v/c Ratio	0.43	0.83	0.81	0.68	0.91	0.58	0.91	0.92
Control Delay	61.8	35.8	96.1	29.1	105.3	39.5	91.2	63.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.8	35.8	96.1	29.1	105.3	39.5	91.2	63.5
Queue Length 50th (ft)	33	393	68	312	93	158	134	319
Queue Length 95th (ft)	73	486	#166	392	#210	212	#267	#505
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	112	1421	118	1484	144	887	209	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.83	0.81	0.68	0.91	0.55	0.90	0.88

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

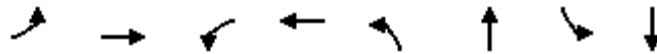
18: Middlefield Rd & Embarcadero Rd

Cumulative + No Project
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	1033	101	88	782	144	122	405	51	176	415	27
Future Volume (vph)	46	1033	101	88	782	144	122	405	51	176	415	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3480		1770	3440		1770	3474		1770	1842	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3480		1770	3440		1770	3474		1770	1842	
Peak-hour factor, PHF	0.96	0.96	0.96	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	48	1076	105	96	850	157	131	435	55	189	446	29
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	48	1181	0	96	1007	0	131	490	0	189	475	0
Confl. Peds. (#/hr)			9			15			1			16
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	5.6	44.8		7.4	46.6		9.0	26.8		13.0	30.8	
Effective Green, g (s)	5.6	44.8		7.4	46.6		9.0	26.8		13.0	30.8	
Actuated g/C Ratio	0.05	0.41		0.07	0.42		0.08	0.24		0.12	0.28	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	90	1417		119	1457		144	846		209	515	
v/s Ratio Prot	0.03	c0.34		c0.05	0.29		0.07	0.14		c0.11	c0.26	
v/s Ratio Perm												
v/c Ratio	0.53	0.83		0.81	0.69		0.91	0.58		0.90	0.92	
Uniform Delay, d1	50.9	29.3		50.6	25.8		50.1	36.6		47.9	38.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.7	5.9		30.8	2.7		48.3	1.0		36.8	22.2	
Delay (s)	55.6	35.1		81.4	28.5		98.4	37.6		84.7	60.6	
Level of Service	E	D		F	C		F	D		F	E	
Approach Delay (s)		35.9			33.1			50.4			67.5	
Approach LOS		D			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			43.4			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			83.0%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative + No Project
Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	272	1713	274	2188	218	876	251	716
v/c Ratio	1.28	0.96	1.06	1.16	0.97	0.88	1.25	0.79
Control Delay	208.4	61.2	125.2	104.9	117.7	55.1	200.4	54.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	208.4	61.2	125.2	104.9	117.7	55.1	200.4	54.7
Queue Length 50th (ft)	~336	598	~301	~884	216	382	~306	322
Queue Length 95th (ft)	#525	#705	m250	m324	#387	#475	#488	402
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	212	1781	259	1894	224	1000	200	907
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.28	0.96	1.06	1.16	0.97	0.88	1.25	0.79

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative + No Project
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	1487	89	252	1695	318	201	469	337	233	454	212
Future Volume (vph)	250	1487	89	252	1695	318	201	469	337	233	454	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5026		1770	4938		1770	3264		1770	3265	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5026		1770	4938		1770	3264		1770	3265	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	272	1616	97	274	1842	346	218	510	366	251	488	228
RTOR Reduction (vph)	0	5	0	0	18	0	0	86	0	0	37	0
Lane Group Flow (vph)	272	1708	0	274	2170	0	218	790	0	251	679	0
Confl. Peds. (#/hr)			27			15			25			78
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	18.0	53.0		22.0	57.0		19.0	42.0		17.0	40.0	
Effective Green, g (s)	18.0	53.0		22.0	57.0		19.0	42.0		17.0	40.0	
Actuated g/C Ratio	0.12	0.35		0.15	0.38		0.13	0.28		0.11	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	212	1775		259	1876		224	913		200	870	
v/s Ratio Prot	c0.15	0.34		0.15	c0.44		0.12	c0.24		c0.14	0.21	
v/s Ratio Perm												
v/c Ratio	1.28	0.96		1.06	1.16		0.97	0.86		1.25	0.78	
Uniform Delay, d1	66.0	47.5		64.0	46.5		65.2	51.3		66.5	50.9	
Progression Factor	1.00	1.00		1.61	0.80		1.00	1.00		1.00	1.00	
Incremental Delay, d2	158.3	14.2		34.7	71.2		52.2	8.3		148.9	4.2	
Delay (s)	224.3	61.7		137.5	108.3		117.4	59.6		215.4	55.2	
Level of Service	F	E		F	F		F	E		F	E	
Approach Delay (s)		84.0			111.6			71.1			96.8	
Approach LOS		F			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			94.2			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			110.8%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Cumulative + No Project
Timing Plan: P.M.Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	403	2148	215	291	1872
v/c Ratio	1.24	1.17	0.37	0.97	0.66
Control Delay	175.6	123.2	29.4	66.6	25.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	175.6	123.2	29.4	66.6	25.3
Queue Length 50th (ft)	~464	~941	120	~355	626
Queue Length 95th (ft)	#682	#1031	196	m#371	m643
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	326	1842	586	300	2840
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.24	1.17	0.37	0.97	0.66
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Cumulative + No Project
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	186	185	2019	202	279	1797
Future Volume (vph)	186	185	2019	202	279	1797
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.98		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1681		5085	1533	1770	5085
Flt Permitted	0.98		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1681		5085	1533	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.96	0.96
Adj. Flow (vph)	202	201	2148	215	291	1872
RTOR Reduction (vph)	24	0	0	32	0	0
Lane Group Flow (vph)	379	0	2148	183	291	1872
Confl. Peds. (#/hr)		3		8		
Confl. Bikes (#/hr)				1		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	27.0		53.8	53.8	25.4	83.2
Effective Green, g (s)	27.0		53.8	53.8	25.4	83.2
Actuated g/C Ratio	0.18		0.36	0.36	0.17	0.55
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	302		1823	549	299	2820
v/s Ratio Prot	c0.23		c0.42		c0.16	0.37
v/s Ratio Perm				0.12		
v/c Ratio	1.26		1.18	0.33	0.97	0.66
Uniform Delay, d1	61.5		48.1	35.0	62.0	23.5
Progression Factor	1.00		1.00	1.00	0.69	0.98
Incremental Delay, d2	139.2		86.3	1.6	20.3	0.3
Delay (s)	200.7		134.4	36.7	63.3	23.3
Level of Service	F		F	D	E	C
Approach Delay (s)	200.7		125.5			28.7
Approach LOS	F		F			C
Intersection Summary						
HCM 2000 Control Delay			89.2		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			86.3%		ICU Level of Service	E
Analysis Period (min)			15			

c Critical Lane Group

Queues

21: Page Mill Rd/Oregon Expy & El Camino Real

Cumulative + No Project

Timing Plan: P.M.Peak

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	607	1532	216	196	1333	361	1167	243	403	1071
v/c Ratio	0.98	0.78	0.31	0.83	0.97	0.82	0.99	0.36	0.97	0.96
Control Delay	103.7	51.5	8.0	109.7	80.2	91.0	83.3	37.6	114.1	76.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	103.7	51.5	8.0	109.7	80.2	91.0	83.3	37.6	114.1	76.3
Queue Length 50th (ft)	373	581	21	119	560	222	728	195	248	635
Queue Length 95th (ft)	#503	641	84	#179	#657	#324	#889	274	#367	#764
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			250	
Base Capacity (vph)	619	1976	692	253	1389	442	1176	674	416	1162
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.78	0.31	0.77	0.96	0.82	0.99	0.36	0.97	0.92

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Cumulative + No Project
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	558	1409	199	194	1035	285	350	1132	236	371	794	191
Future Volume (vph)	558	1409	199	194	1035	285	350	1132	236	371	794	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3412	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3412	
Peak-hour factor, PHF	0.92	0.92	0.92	0.99	0.99	0.99	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	607	1532	216	196	1045	288	361	1167	243	403	863	208
RTOR Reduction (vph)	0	0	115	0	27	0	0	0	0	0	12	0
Lane Group Flow (vph)	607	1532	101	196	1306	0	361	1167	243	403	1059	0
Confl. Peds. (#/hr)			27			28			18			13
Confl. Bikes (#/hr)									3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	32.5	70.0	70.0	12.4	49.9		23.2	59.8	76.7	21.8	58.4	
Effective Green, g (s)	32.5	70.0	70.0	12.4	49.9		23.2	59.8	76.7	21.8	58.4	
Actuated g/C Ratio	0.18	0.39	0.39	0.07	0.28		0.13	0.33	0.43	0.12	0.32	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	619	1977	577	236	1345		442	1175	674	415	1107	
v/s Ratio Prot	c0.18	0.30		0.06	c0.27		0.11	c0.33	0.15	0.12	c0.31	
v/s Ratio Perm			0.07									
v/c Ratio	0.98	0.77	0.18	0.83	0.97		0.82	0.99	0.36	0.97	0.96	
Uniform Delay, d1	73.4	48.1	36.1	82.8	64.3		76.3	59.9	35.0	78.8	59.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	31.1	3.0	0.7	20.5	18.5		11.1	24.4	0.1	36.3	17.3	
Delay (s)	104.5	51.2	36.7	103.2	82.8		87.5	84.3	35.1	115.1	76.8	
Level of Service	F	D	D	F	F		F	F	D	F	E	
Approach Delay (s)		63.6			85.4			78.2			87.3	
Approach LOS		E			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			76.8			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			180.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			98.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Cumulative + No Project

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	35	0	75	0	1765	312	0	1297	306
Future Volume (Veh/h)	0	0	0	35	0	75	0	1765	312	0	1297	306
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.92	0.25	0.99	0.99	0.25	0.97	0.97
Hourly flow rate (vph)	0	0	0	38	0	82	0	1783	315	0	1337	315
Pedestrians	23											
Lane Width (ft)	12.0											
Walking Speed (ft/s)	3.5											
Percent Blockage	2											
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2468	3616	826	2474	3458	914	1652	2121				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2468	3616	826	2474	3458	914	1652	2121				
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	0	100	70	100	100				
cM capacity (veh/h)	11	5	315	15	6	269	387	248				
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	38	82	892	892	315	891	761					
Volume Left	38	0	0	0	0	0	0					
Volume Right	0	82	0	0	315	0	315					
cSH	15	269	1700	1700	1700	1700	1700					
Volume to Capacity	2.59	0.30	0.52	0.52	0.19	0.52	0.45					
Queue Length 95th (ft)	138	31	0	0	0	0	0					
Control Delay (s)	1252.6	24.1	0.0	0.0	0.0	0.0	0.0					
Lane LOS	F	C										
Approach Delay (s)	413.1	0.0		0.0								
Approach LOS	F											
Intersection Summary												
Average Delay	12.8											
Intersection Capacity Utilization	60.1%			ICU Level of Service					B			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 22b: Alma St & Oregon Expy EB Ramps

Cumulative + No Project
Timing Plan: P.M.Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	357	1720	70	68	1264	
Future Volume (Veh/h)	0	357	1720	70	68	1264	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.95	0.99	0.99	0.97	0.97	
Hourly flow rate (vph)	0	376	1737	71	70	1303	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2528	868			1737		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2528	868			1737		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	0			80		
cM capacity (veh/h)	18	295			358		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	376	868	868	71	70	652	652
Volume Left	0	0	0	0	70	0	0
Volume Right	376	0	0	71	0	0	0
cSH	295	1700	1700	1700	358	1700	1700
Volume to Capacity	1.27	0.51	0.51	0.04	0.20	0.38	0.38
Queue Length 95th (ft)	448	0	0	0	18	0	0
Control Delay (s)	182.3	0.0	0.0	0.0	17.5	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	182.3	0.0			0.9		
Approach LOS	F						
Intersection Summary							
Average Delay			19.6				
Intersection Capacity Utilization			76.3%		ICU Level of Service		D
Analysis Period (min)			15				

Queues
23: Cowper St & Oregon Expy

Cumulative + No Project
Timing Plan: P.M.Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	30	1675	91	36	1502	54	51	11	71
v/c Ratio	0.31	0.70	0.08	0.36	0.61	0.47	0.19	0.10	0.36
Control Delay	76.9	21.0	3.8	91.1	12.7	80.5	39.7	69.1	52.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.9	21.0	3.8	91.1	12.7	80.5	39.7	69.1	52.4
Queue Length 50th (ft)	29	500	2	37	175	52	30	10	56
Queue Length 95th (ft)	66	#1008	34	m42	m837	100	63	33	88
Internal Link Dist (ft)		1547			1028		48		36
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	97	2384	1094	99	2447	122	481	106	467
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.70	0.08	0.36	0.61	0.44	0.11	0.10	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Cumulative + No Project

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	1541	84	33	1363	18	50	32	15	10	47	18
Future Volume (vph)	28	1541	84	33	1363	18	50	32	15	10	47	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.95		1.00	0.96	
Flt Protected	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	3531		1770	1761		1770	1767	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3531		1770	1761		1770	1767	
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)	30	1675	91	36	1482	20	54	35	16	11	51	20
RTOR Reduction (vph)	0	0	29	0	0	0	0	13	0	0	12	0
Lane Group Flow (vph)	30	1675	62	36	1502	0	54	38	0	11	59	0
Confl. Peds. (#/hr)						5			7			5
Confl. Bikes (#/hr)									3			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	5.0	98.9	98.9	6.8	100.9		8.3	20.6		3.6	16.1	
Effective Green, g (s)	5.0	98.9	98.9	6.8	100.9		8.3	20.6		3.6	16.1	
Actuated g/C Ratio	0.03	0.66	0.66	0.05	0.67		0.06	0.14		0.02	0.11	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	59	2333	1043	80	2375		97	241		42	189	
v/s Ratio Prot	0.02	c0.47		c0.02	0.43		c0.03	c0.02		0.01	c0.03	
v/s Ratio Perm			0.04									
v/c Ratio	0.51	0.72	0.06	0.45	0.63		0.56	0.16		0.26	0.31	
Uniform Delay, d1	71.3	16.5	9.1	69.8	14.0		69.1	57.1		71.9	61.9	
Progression Factor	1.00	1.00	1.00	1.27	0.73		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.7	1.9	0.1	1.5	0.5		11.3	0.3		4.5	1.0	
Delay (s)	78.0	18.5	9.2	90.0	10.7		80.3	57.4		76.4	62.8	
Level of Service	E	B	A	F	B		F	E		E	E	
Approach Delay (s)		19.0			12.6			69.2			64.6	
Approach LOS		B			B			E			E	
Intersection Summary												
HCM 2000 Control Delay			18.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			20.1			
Intersection Capacity Utilization			65.5%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

Queues
24: Middlefield Rd & Oregon Expy

Cumulative + No Project

Timing Plan: P.M.Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	192	1227	270	215	1140	67	249	592	173	56	659
v/c Ratio	1.10	1.11	0.47	0.90	0.93	0.11	1.13	0.86	0.26	0.53	0.66
Control Delay	143.9	102.7	22.5	100.6	61.2	0.4	157.4	57.2	10.2	86.8	48.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	143.9	102.7	22.5	100.6	61.2	0.4	157.4	57.2	10.2	86.8	48.4
Queue Length 50th (ft)	~213	~733	47	~245	~625	0	~281	521	27	54	277
Queue Length 95th (ft)	m#371	#855	217	#417	#765	0	#462	687	81	104	344
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	174	1104	579	238	1227	618	220	715	673	106	1110
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	1.11	0.47	0.90	0.93	0.11	1.13	0.83	0.26	0.53	0.59

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Cumulative + No Project

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	1141	251	198	1049	62	229	545	159	52	497	116
Future Volume (vph)	179	1141	251	198	1049	62	229	545	159	52	497	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3428	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3428	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	192	1227	270	215	1140	67	249	592	173	56	534	125
RTOR Reduction (vph)	0	0	94	0	0	44	0	0	81	0	14	0
Lane Group Flow (vph)	192	1227	176	215	1140	23	249	592	92	56	645	0
Confl. Peds. (#/hr)			2			6			11			4
Confl. Bikes (#/hr)									1			1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	14.8	45.7	45.7	20.2	50.9	50.9	18.7	55.5	55.5	7.2	44.1	
Effective Green, g (s)	14.8	45.7	45.7	20.2	50.9	50.9	18.7	55.5	55.5	7.2	44.1	
Actuated g/C Ratio	0.10	0.30	0.30	0.13	0.34	0.34	0.12	0.37	0.37	0.05	0.29	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	174	1078	474	238	1200	517	220	689	572	84	1007	
v/s Ratio Prot	0.11	c0.35		0.12	c0.32		c0.14	c0.32		0.03	0.19	
v/s Ratio Perm			0.11			0.01			0.06			
v/c Ratio	1.10	1.14	0.37	0.90	0.95	0.04	1.13	0.86	0.16	0.67	0.64	
Uniform Delay, d1	67.6	52.1	40.9	63.9	48.3	33.2	65.7	43.6	31.6	70.2	46.1	
Progression Factor	0.93	0.90	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	88.0	70.8	1.6	33.5	16.5	0.2	100.7	11.4	0.3	18.2	1.4	
Delay (s)	150.6	117.6	42.7	97.5	64.8	33.4	166.3	55.0	31.9	88.4	47.5	
Level of Service	F	F	D	F	E	C	F	D	C	F	D	
Approach Delay (s)		109.4			68.2			78.4			50.7	
Approach LOS		F			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			82.1									HCM 2000 Level of Service F
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			150.0									Sum of lost time (s) 21.6
Intersection Capacity Utilization			99.7%									ICU Level of Service F
Analysis Period (min)			15									
c Critical Lane Group												

Appendix I – Cumulative (2030) Plus Project Conditions Synchro Reports

- HCM Delay and LOS Reports
- 95th Percentile Queue Length Reports

Queues
1: Alma Street & Homer Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	359	1278	687
v/c Ratio	0.72	0.74	0.40
Control Delay	35.8	21.1	15.0
Queue Delay	0.0	0.0	0.0
Total Delay	35.8	21.1	15.0
Queue Length 50th (ft)	79	281	119
Queue Length 95th (ft)	127	382	170
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	606	1911	1911
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.59	0.67	0.36
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	225	105	1201	0	0	632
Future Volume (vph)	225	105	1201	0	0	632
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.90		1.00			1.00
Flpb, ped/bikes	0.84		1.00			1.00
Frt	0.95		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	2503		3539			3539
Flt Permitted	0.97		1.00			1.00
Satd. Flow (perm)	2503		3539			3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.25	0.25	0.92
Adj. Flow (vph)	245	114	1278	0	0	687
RTOR Reduction (vph)	61	0	0	0	0	0
Lane Group Flow (vph)	298	0	1278	0	0	687
Confl. Peds. (#/hr)	82	102		13		
Confl. Bikes (#/hr)		1				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	14.5		41.4			41.4
Effective Green, g (s)	14.5		41.4			41.4
Actuated g/C Ratio	0.17		0.49			0.49
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	426		1721			1721
v/s Ratio Prot			c0.36			0.19
v/s Ratio Perm	c0.12					
v/c Ratio	0.70		0.74			0.40
Uniform Delay, d1	33.2		17.6			13.9
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	5.0		1.9			0.2
Delay (s)	38.2		19.5			14.1
Level of Service	D		B			B
Approach Delay (s)	38.2		19.5			14.1
Approach LOS	D		B			B
Intersection Summary						
HCM 2000 Control Delay			20.8		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			85.1		Sum of lost time (s)	13.0
Intersection Capacity Utilization			52.3%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

Cumulative+ Churchill Closure

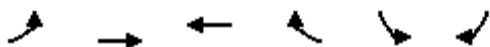
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	45	26	1688	96	8	640
Future Volume (Veh/h)	45	26	1688	96	8	640
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	48	28	1740	99	9	696
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2166	930			1850	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2166	930			1850	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	89			97	
cM capacity (veh/h)	39	266			321	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	76	1160	679	241	464	
Volume Left	48	0	0	9	0	
Volume Right	28	0	99	0	0	
cSH	56	1700	1700	321	1700	
Volume to Capacity	1.35	0.68	0.40	0.03	0.27	
Queue Length 95th (ft)	168	0	0	2	0	
Control Delay (s)	359.2	0.0	0.0	1.1	0.0	
Lane LOS	F			A		
Approach Delay (s)	359.2	0.0		0.4		
Approach LOS	F					
Intersection Summary						
Average Delay			10.5			
Intersection Capacity Utilization			60.5%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑			↗
Traffic Volume (veh/h)	0	673	1654	0	0	136
Future Volume (Veh/h)	0	673	1654	0	0	136
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.92	0.95	0.25	0.25	0.92
Hourly flow rate (vph)	0	732	1741	0	0	148
Pedestrians					33	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					3	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1774				2140	1774
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1774				2140	1774
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	336				41	70
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	366	366	1741	148		
Volume Left	0	0	0	0		
Volume Right	0	0	0	148		
cSH	1700	1700	1700	70		
Volume to Capacity	0.22	0.22	1.02	2.12		
Queue Length 95th (ft)	0	0	0	345		
Control Delay (s)	0.0	0.0	0.0	644.3		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	644.3		
Approach LOS				F		
Intersection Summary						
Average Delay			36.4			
Intersection Capacity Utilization			102.1%		ICU Level of Service	G
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Emerson St & Lincoln Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	66	38	78	82	12	5	8	10	8	209	1
Future Volume (vph)	9	66	38	78	82	12	5	8	10	8	209	1
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)	10	72	41	85	89	13	5	9	11	9	227	1
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	123	187	25	237								
Volume Left (vph)	10	85	5	9								
Volume Right (vph)	41	13	11	1								
Hadj (s)	-0.15	0.08	-0.19	0.04								
Departure Headway (s)	4.6	4.8	4.8	4.7								
Degree Utilization, x	0.16	0.25	0.03	0.31								
Capacity (veh/h)	718	706	681	716								
Control Delay (s)	8.5	9.4	8.0	9.9								
Approach Delay (s)	8.5	9.4	8.0	9.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			9.3									
Level of Service			A									
Intersection Capacity Utilization			35.0%	ICU Level of Service					A			
Analysis Period (min)			15									

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis 8: Alma Street & Kingsley Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	115	1549	24	70	602
Future Volume (Veh/h)	11	115	1549	24	70	602
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.96	0.96	0.92	0.92
Hourly flow rate (vph)	12	125	1614	25	76	654
Pedestrians	7					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2112	1634			1646	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2112	1634			1646	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	0			80	
cM capacity (veh/h)	35	89			386	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	137	1639	294	436		
Volume Left	12	0	76	0		
Volume Right	125	25	0	0		
cSH	79	1700	386	1700		
Volume to Capacity	1.74	0.96	0.20	0.26		
Queue Length 95th (ft)	292	0	18	0		
Control Delay (s)	470.2	0.0	7.1	0.0		
Lane LOS	F		A			
Approach Delay (s)	470.2	0.0	2.8			
Approach LOS	F					
Intersection Summary						
Average Delay		26.5				
Intersection Capacity Utilization		97.4%		ICU Level of Service	F	
Analysis Period (min)		15				

Queues
9: Alma St & Churchill Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	94	1518	706
v/c Ratio	0.33	0.56	0.28
Control Delay	58.7	8.4	5.7
Queue Delay	0.0	0.0	0.0
Total Delay	58.7	8.4	5.7
Queue Length 50th (ft)	82	291	98
Queue Length 95th (ft)	141	338	121
Internal Link Dist (ft)	479	698	387
Turn Bay Length (ft)			
Base Capacity (vph)	339	2694	2523
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.28	0.56	0.28
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	80	6	1374	23	6	643
Future Volume (vph)	80	6	1374	23	6	643
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		6.0			6.0
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.97		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.99		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	1705		3528			3537
Flt Permitted	0.96		1.00			0.93
Satd. Flow (perm)	1705		3528			3306
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	7	1493	25	7	699
RTOR Reduction (vph)	2	0	1	0	0	0
Lane Group Flow (vph)	92	0	1517	0	0	706
Confl. Peds. (#/hr)		101		24		
Confl. Bikes (#/hr)		258				
Turn Type	Perm		NA		Perm	NA
Protected Phases			6			2
Permitted Phases	7				2	
Actuated Green, G (s)	25.0		116.0			116.0
Effective Green, g (s)	25.0		116.0			116.0
Actuated g/C Ratio	0.16		0.76			0.76
Clearance Time (s)	5.0		6.0			6.0
Vehicle Extension (s)	3.0		6.0			6.0
Lane Grp Cap (vph)	280		2692			2523
v/s Ratio Prot			c0.43			
v/s Ratio Perm	c0.05					0.21
v/c Ratio	0.33		0.56			0.28
Uniform Delay, d1	56.1		7.5			5.4
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	0.7		0.6			0.3
Delay (s)	56.8		8.0			5.7
Level of Service	E		A			A
Approach Delay (s)	56.8		8.0			5.7
Approach LOS	E		A			A
Intersection Summary						
HCM 2000 Control Delay			9.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.52			
Actuated Cycle Length (s)			152.0		Sum of lost time (s)	11.0
Intersection Capacity Utilization			68.2%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 10: Emerson St & Churchill Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	11	86	11	6	33	8	38	85	9	11	17	16
Future Volume (vph)	11	86	11	6	33	8	38	85	9	11	17	16
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)	12	93	12	7	36	9	41	92	10	12	18	17
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	117	52	143	47								
Volume Left (vph)	12	7	41	12								
Volume Right (vph)	12	9	10	17								
Hadj (s)	-0.01	-0.04	0.05	-0.13								
Departure Headway (s)	4.4	4.4	4.4	4.3								
Degree Utilization, x	0.14	0.06	0.17	0.06								
Capacity (veh/h)	783	762	784	782								
Control Delay (s)	8.1	7.7	8.3	7.6								
Approach Delay (s)	8.1	7.7	8.3	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.1									
Level of Service			A									
Intersection Capacity Utilization			26.5%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Cumulative+ Churchill Closure

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	85	9	15	32	42	10	23	3	14	9	18
Future Volume (Veh/h)	12	85	9	15	32	42	10	23	3	14	9	18
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)	13	92	10	16	35	46	11	25	3	15	10	20
Pedestrians		17			14			4			11	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		2			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	190	131	41	172	140	52	47			42		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	190	131	41	172	140	52	47			42		
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 %	98	87	99	98	95	95	99			99		
cM capacity (veh/h)	664	725	1009	671	717	992	1535			1546		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	115	97	39	45								
Volume Left	13	16	11	15								
Volume Right	10	46	3	20								
cSH	735	815	1535	1546								
Volume to Capacity	0.16	0.12	0.01	0.01								
Queue Length 95th (ft)	14	10	1	1								
Control Delay (s)	10.8	10.0	2.1	2.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.8	10.0	2.1	2.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			8.1									
Intersection Capacity Utilization			24.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	68	10	15	47	55	19	111	12	5	84	26
Future Volume (vph)	14	68	10	15	47	55	19	111	12	5	84	26
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)	15	74	11	16	51	60	21	121	13	5	91	28
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	100	127	155	124								
Volume Left (vph)	15	16	21	5								
Volume Right (vph)	11	60	13	28								
Hadj (s)	0.00	-0.22	0.01	-0.09								
Departure Headway (s)	4.7	4.5	4.6	4.5								
Degree Utilization, x	0.13	0.16	0.20	0.16								
Capacity (veh/h)	706	747	739	741								
Control Delay (s)	8.4	8.3	8.7	8.4								
Approach Delay (s)	8.4	8.3	8.7	8.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.5									
Level of Service			A									
Intersection Capacity Utilization			30.0%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 13: Cowper St & Churchill Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	70	8	6	27	1	26	26	7	2	24	14
Future Volume (vph)	6	70	8	6	27	1	26	26	7	2	24	14
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)	7	76	9	7	29	1	28	28	8	2	26	15
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	92	37	64	43								
Volume Left (vph)	7	7	28	2								
Volume Right (vph)	9	1	8	15								
Hadj (s)	-0.01	0.06	0.05	-0.17								
Departure Headway (s)	4.2	4.3	4.3	4.1								
Degree Utilization, x	0.11	0.04	0.08	0.05								
Capacity (veh/h)	838	812	808	847								
Control Delay (s)	7.7	7.5	7.6	7.3								
Approach Delay (s)	7.7	7.5	7.6	7.3								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.6								
Level of Service				A								
Intersection Capacity Utilization				22.3%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis 14: Churchill Ave & Embarcadero Rd

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	953	2	42	1072	0	90
Future Volume (Veh/h)	953	2	42	1072	0	90
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.92
Hourly flow rate (vph)	1036	2	46	1165	0	98
Pedestrians					11	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.81		0.81	0.81
vC, conflicting volume			1047		1722	530
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			602		1431	0
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		100	89
cM capacity (veh/h)			783		95	874
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	691	347	434	777	98	
Volume Left	0	0	46	0	0	
Volume Right	0	2	0	0	98	
cSH	1700	1700	783	1700	874	
Volume to Capacity	0.41	0.20	0.06	0.46	0.11	
Queue Length 95th (ft)	0	0	5	0	9	
Control Delay (s)	0.0	0.0	1.7	0.0	9.6	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.6		9.6	
Approach LOS					A	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			63.7%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 15: Cowper St & Embarcadero Rd

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	953	38	12	1046	15	6	3	7	5	9	52
Future Volume (Veh/h)	16	953	38	12	1046	15	6	3	7	5	9	52
Sign Control		Free			Free			Stop			Stop	
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)	17	1036	41	13	1137	16	7	3	8	5	10	57
Pedestrians					1			8			28	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			1			3	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.79			0.79	0.79	0.79	0.79	0.79	
vC, conflicting volume	1181			1085			1755	2306	548	1762	2318	604
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1181			569			1420	2118	0	1428	2134	604
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			98			86	92	99	92	72	87
cM capacity (veh/h)	571			781			48	36	847	64	35	429
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	535	559	582	584	18	72						
Volume Left	17	0	13	0	7	5						
Volume Right	0	41	0	16	8	57						
cSH	571	1700	781	1700	76	146						
Volume to Capacity	0.03	0.33	0.02	0.34	0.24	0.49						
Queue Length 95th (ft)	2	0	1	0	21	58						
Control Delay (s)	0.8	0.0	0.5	0.0	66.6	51.7						
Lane LOS	A		A		F	F						
Approach Delay (s)	0.4		0.2		66.6	51.7						
Approach LOS					F	F						
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			49.7%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

Cumulative+ Churchill Closure

16: Waverly St & Embarcadero Rd

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	49	1030	30	1148	278	346
v/c Ratio	0.42	0.62	0.20	0.69	0.54	0.51
Control Delay	33.1	24.8	20.6	25.0	27.6	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	24.8	20.6	25.0	27.6	23.4
Queue Length 50th (ft)	28	342	12	316	140	155
Queue Length 95th (ft)	m78	428	34	392	229	245
Internal Link Dist (ft)		572		576	78	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	118	1690	153	1696	513	673
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	4	5
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.61	0.20	0.68	0.55	0.52

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	897	60	28	1029	28	124	105	27	73	114	132
Future Volume (vph)	46	897	60	28	1029	28	124	105	27	73	114	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.99			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1759	3497		1765	3518			1782			1713	
Flt Permitted	0.13	1.00		0.17	1.00			0.64			0.86	
Satd. Flow (perm)	245	3497		320	3518			1171			1498	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	965	65	30	1118	30	135	114	29	79	124	143
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	23	0
Lane Group Flow (vph)	49	1025	0	30	1146	0	0	274	0	0	323	0
Confl. Peds. (#/hr)	27		9	9		27	22		9	9		22
Confl. Bikes (#/hr)									2			13
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	52.2	52.2		52.2	52.2			47.8			47.8	
Effective Green, g (s)	52.2	52.2		52.2	52.2			47.8			47.8	
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.43			0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	116	1659		151	1669			508			650	
v/s Ratio Prot		0.29			c0.33							
v/s Ratio Perm	0.20			0.09				c0.23			0.22	
v/c Ratio	0.42	0.62		0.20	0.69			0.54			0.50	
Uniform Delay, d1	19.0	21.5		16.8	22.5			23.0			22.4	
Progression Factor	1.09	1.09		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.2	0.6		0.6	1.2			4.1			2.7	
Delay (s)	22.9	23.9		17.4	23.7			27.0			25.1	
Level of Service	C	C		B	C			C			C	
Approach Delay (s)		23.9			23.6			27.0			25.1	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			24.2			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			73.8%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	53	1200	64	1353	16	46
v/c Ratio	0.25	0.47	0.24	0.53	0.04	0.13
Control Delay	11.2	8.7	21.7	22.6	0.2	7.0
Queue Delay	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	11.2	8.7	21.7	23.0	0.2	7.0
Queue Length 50th (ft)	14	203	34	443	0	0
Queue Length 95th (ft)	38	252	m57	511	0	23
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	216	2530	269	2561	477	412
Starvation Cap Reductn	0	0	0	591	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.47	0.24	0.69	0.03	0.11

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

17: Bryant St & Embarcadero Rd

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	975	129	59	1203	41	0	0	15	0	0	42
Future Volume (vph)	49	975	129	59	1203	41	0	0	15	0	0	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99				0.94			0.89
Flpb, ped/bikes	0.98	1.00		0.99	1.00				1.00			1.00
Frt	1.00	0.98		1.00	1.00				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1742	3454		1760	3502				1515			1426
Flt Permitted	0.16	1.00		0.20	1.00				1.00			1.00
Satd. Flow (perm)	295	3454		368	3502				1515			1426
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.92	0.25	0.25	0.92
Adj. Flow (vph)	53	1060	140	64	1308	45	0	0	16	0	0	46
RTOR Reduction (vph)	0	8	0	0	2	0	0	0	13	0	0	37
Lane Group Flow (vph)	53	1192	0	64	1351	0	0	0	3	0	0	9
Confl. Peds. (#/hr)	64		16	16		64			16			32
Confl. Bikes (#/hr)									26			61
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	78.4	78.4		78.4	78.4				21.6			21.6
Effective Green, g (s)	78.4	78.4		78.4	78.4				21.6			21.6
Actuated g/C Ratio	0.71	0.71		0.71	0.71				0.20			0.20
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	210	2461		262	2495				297			280
v/s Ratio Prot		0.35			c0.39							
v/s Ratio Perm	0.18			0.17					0.00			c0.01
v/c Ratio	0.25	0.48		0.24	0.54				0.01			0.03
Uniform Delay, d1	5.5	6.9		5.5	7.4				35.6			35.7
Progression Factor	1.00	1.00		2.44	2.49				1.00			1.00
Incremental Delay, d2	2.9	0.7		1.7	0.7				0.0			0.0
Delay (s)	8.4	7.6		15.1	19.1				35.6			35.8
Level of Service	A	A		B	B				D			D
Approach Delay (s)		7.7			18.9			35.6			35.8	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			14.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			60.7%			ICU Level of Service			B			
Analysis Period (min)			15									

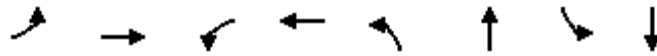
c Critical Lane Group

Queues

Cumulative+ Churchill Closure

18: Middlefield Rd & Embarcadero Rd

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	1005	53	1134	159	357	123	280
v/c Ratio	0.53	0.89	0.64	1.01	1.26	0.57	1.07	0.89
Control Delay	94.9	60.5	103.7	80.7	220.5	61.5	168.4	91.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.9	60.5	103.7	80.7	220.5	61.5	168.4	91.9
Queue Length 50th (ft)	43	523	53	~674	~199	172	~136	274
Queue Length 95th (ft)	#95	#664	#124	#814	#352	227	#275	#426
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	81	1131	83	1120	126	661	115	333
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.89	0.64	1.01	1.26	0.54	1.07	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

18: Middlefield Rd & Embarcadero Rd

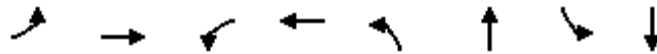
Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	872	52	49	914	130	146	308	20	113	232	26
Future Volume (vph)	40	872	52	49	914	130	146	308	20	113	232	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3498		1770	3450		1770	3501		1770	1828	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3498		1770	3450		1770	3501		1770	1828	
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)	43	948	57	53	993	141	159	335	22	123	252	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	43	1005	0	53	1134	0	159	357	0	123	280	0
Confl. Peds. (#/hr)			24			44			8			14
Confl. Bikes (#/hr)						1			1			2
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	5.7	48.9		5.8	49.0		11.0	27.3		10.0	26.3	
Effective Green, g (s)	5.7	48.9		5.8	49.0		11.0	27.3		10.0	26.3	
Actuated g/C Ratio	0.04	0.32		0.04	0.32		0.07	0.18		0.07	0.17	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	65	1114		66	1101		126	622		115	313	
v/s Ratio Prot	0.02	0.29		c0.03	c0.33		c0.09	0.10		0.07	c0.15	
v/s Ratio Perm												
v/c Ratio	0.66	0.90		0.80	1.03		1.26	0.57		1.07	0.89	
Uniform Delay, d1	72.9	50.0		73.3	52.2		71.2	57.8		71.8	62.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.4	11.8		47.7	35.1		166.6	1.3		103.8	26.0	
Delay (s)	93.4	61.8		121.0	87.3		237.8	59.1		175.6	88.2	
Level of Service	F	E		F	F		F	E		F	F	
Approach Delay (s)		63.1			88.8			114.1			114.9	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			87.7			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			153.5			Sum of lost time (s)			22.5			
Intersection Capacity Utilization			72.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative+ Churchill Closure

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	311	1282	338	1722	75	325	439	729
v/c Ratio	1.32	0.94	0.83	0.94	0.37	0.46	1.33	0.77
Control Delay	217.8	65.9	81.2	73.4	64.5	49.1	213.6	51.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	217.8	65.9	81.2	73.4	64.5	49.1	213.6	51.0
Queue Length 50th (ft)	~392	433	352	606	72	145	~555	321
Queue Length 95th (ft)	#588	#575	m#463	m#785	119	168	#775	374
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	236	1368	407	1838	210	970	330	1301
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	0.94	0.83	0.94	0.36	0.34	1.33	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	308	1168	101	311	1304	281	69	231	68	417	460	233
Future Volume (vph)	308	1168	101	311	1304	281	69	231	68	417	460	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5009		1770	4928		1770	3400		1770	3254	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5009		1770	4928		1770	3400		1770	3254	
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	311	1180	102	338	1417	305	75	251	74	439	484	245
RTOR Reduction (vph)	0	7	0	0	20	0	0	20	0	0	50	0
Lane Group Flow (vph)	311	1275	0	338	1702	0	75	305	0	439	679	0
Confl. Peds. (#/hr)			17			9			11			74
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	20.0	40.7		34.6	55.3		17.3	30.7		28.0	41.4	
Effective Green, g (s)	20.0	40.7		34.6	55.3		17.3	30.7		28.0	41.4	
Actuated g/C Ratio	0.13	0.27		0.23	0.37		0.12	0.20		0.19	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	236	1359		408	1816		204	695		330	898	
v/s Ratio Prot	c0.18	0.25		0.19	c0.35		0.04	c0.09		c0.25	c0.21	
v/s Ratio Perm												
v/c Ratio	1.32	0.94		0.83	0.94		0.37	0.44		1.33	0.76	
Uniform Delay, d1	65.0	53.4		54.9	45.7		61.3	52.1		61.0	49.7	
Progression Factor	1.00	1.00		1.39	1.64		1.00	1.00		1.00	1.00	
Incremental Delay, d2	169.7	13.6		5.5	5.1		0.8	0.2		168.1	3.3	
Delay (s)	234.7	67.0		81.9	79.9		62.1	52.3		229.1	52.9	
Level of Service	F	E		F	E		E	D		F	D	
Approach Delay (s)		99.7			80.2			54.1			119.1	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM 2000 Control Delay		92.9			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		103.6%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	378	2027	236	102	1373
v/c Ratio	1.06	0.89	0.33	0.91	0.50
Control Delay	114.9	45.7	22.8	56.9	46.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	114.9	45.7	22.8	56.9	46.8
Queue Length 50th (ft)	~380	720	115	99	523
Queue Length 95th (ft)	#594	#842	189	m102	m513
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	358	2280	722	112	2738
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.06	0.89	0.33	0.91	0.50
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	179	168	1865	217	94	1263
Future Volume (vph)	179	168	1865	217	94	1263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1681		5085	1534	1770	5085
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1681		5085	1534	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	195	183	2027	236	102	1373
RTOR Reduction (vph)	22	0	0	36	0	0
Lane Group Flow (vph)	356	0	2027	200	102	1373
Confl. Peds. (#/hr)		5		10		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	30.0		66.7	66.7	9.5	80.2
Effective Green, g (s)	30.0		66.7	66.7	9.5	80.2
Actuated g/C Ratio	0.20		0.44	0.44	0.06	0.53
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	336		2261	682	112	2718
v/s Ratio Prot	c0.21		c0.40		c0.06	0.27
v/s Ratio Perm				0.13		
v/c Ratio	1.06		0.90	0.29	0.91	0.51
Uniform Delay, d1	60.0		38.5	26.6	69.8	22.2
Progression Factor	1.00		1.00	1.00	0.62	1.94
Incremental Delay, d2	65.3		6.1	1.1	9.9	0.1
Delay (s)	125.3		44.6	27.7	53.1	43.3
Level of Service	F		D	C	D	D
Approach Delay (s)	125.3		42.8			44.0
Approach LOS	F		D			D
Intersection Summary						
HCM 2000 Control Delay			50.8		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			73.2%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Queues

Cumulative+ Churchill Closure

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: A.M. Peak

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	543	682	264	354	1632	404	1039	198	250	1648
v/c Ratio	1.23	0.44	0.45	0.86	1.10	1.21	0.73	0.23	0.81	1.23
Control Delay	185.0	54.5	18.2	101.6	116.6	185.6	52.7	23.9	105.4	156.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	185.0	54.5	18.2	101.6	116.6	185.6	52.7	23.9	105.4	156.2
Queue Length 50th (ft)	~428	252	71	227	~841	~315	581	128	160	~1320
Queue Length 95th (ft)	#556	308	171	281	#934	#434	690	181	211	#1453
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			250	
Base Capacity (vph)	442	1555	589	507	1477	334	1415	896	377	1341
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.23	0.44	0.45	0.70	1.10	1.21	0.73	0.22	0.66	1.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	521	655	253	333	1309	225	372	956	182	240	1159	423
Future Volume (vph)	521	655	253	333	1309	225	372	956	182	240	1159	423
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3371	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1500	3433	4925		3433	3539	1583	3433	3371	
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	543	682	264	354	1393	239	404	1039	198	250	1207	441
RTOR Reduction (vph)	0	0	131	0	13	0	0	0	0	0	19	0
Lane Group Flow (vph)	543	682	133	354	1619	0	404	1039	198	250	1629	0
Confl. Peds. (#/hr)			21			27			29			8
Confl. Bikes (#/hr)						3						1
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	24.5	58.1	58.1	22.9	56.5		18.5	76.0	103.4	17.0	74.5	
Effective Green, g (s)	24.5	58.1	58.1	22.9	56.5		18.5	76.0	103.4	17.0	74.5	
Actuated g/C Ratio	0.13	0.31	0.31	0.12	0.30		0.10	0.40	0.54	0.09	0.39	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	442	1554	458	413	1464		334	1415	861	307	1321	
v/s Ratio Prot	c0.16	0.13		0.10	c0.33		c0.12	0.29	0.13	0.07	c0.48	
v/s Ratio Perm			0.09									
v/c Ratio	1.23	0.44	0.29	0.86	1.11		1.21	0.73	0.23	0.81	1.23	
Uniform Delay, d1	82.8	52.9	50.3	81.9	66.8		85.8	48.4	22.6	85.0	57.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	121.4	0.9	1.6	15.4	58.3		119.0	1.7	0.0	14.4	111.5	
Delay (s)	204.1	53.8	51.9	97.3	125.0		204.7	50.2	22.6	99.4	169.3	
Level of Service	F	D	D	F	F		F	D	C	F	F	
Approach Delay (s)		108.3			120.1			84.9			160.1	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			120.2			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.18									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			116.1%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 22a: Oregon Ave & Alma St

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	11	0	84	0	1814	533	0	677	234	
Future Volume (Veh/h)	0	0	0	11	0	84	0	1814	533	0	677	234	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.95	0.25	0.95	0.92	0.98	0.98	0.25	0.92	0.92	
Hourly flow rate (vph)	0	0	0	12	0	88	0	1851	544	0	736	254	
Pedestrians	19												
Lane Width (ft)	12.0												
Walking Speed (ft/s)	3.5												
Percent Blockage	2												
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	1876	3277	495	2238	2860	944	990						2414
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1876	3277	495	2238	2860	944	990						2414
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	47	100	66	100						100
cM capacity (veh/h)	29	9	520	22	16	258	694						191
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2						
Volume Total	12	88	926	926	544	491	499						
Volume Left	12	0	0	0	0	0	0						
Volume Right	0	88	0	0	544	0	254						
cSH	22	258	1700	1700	1700	1700	1700						
Volume to Capacity	0.53	0.34	0.54	0.54	0.32	0.29	0.29						
Queue Length 95th (ft)	39	36	0	0	0	0	0						
Control Delay (s)	282.6	26.0	0.0	0.0	0.0	0.0	0.0						
Lane LOS	F	D											
Approach Delay (s)	56.8			0.0	0.0								
Approach LOS	F												
Intersection Summary													
Average Delay				1.6									
Intersection Capacity Utilization				62.0%	ICU Level of Service				B				
Analysis Period (min)				15									

HCM Unsignalized Intersection Capacity Analysis 22b: Alma St & Oregon Expy EB Ramps

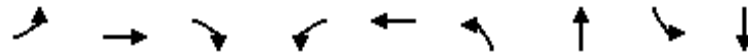
Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	323	2024	171	84	605	
Future Volume (Veh/h)	0	323	2024	171	84	605	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.92	0.98	0.98	0.92	0.92	
Hourly flow rate (vph)	0	351	2065	174	91	658	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None			None			
Median storage veh							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2576	1032			2065		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2576	1032			2065		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	0			66		
cM capacity (veh/h)	14	230			267		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	351	1032	1032	174	91	329	329
Volume Left	0	0	0	0	91	0	0
Volume Right	351	0	0	174	0	0	0
cSH	230	1700	1700	1700	267	1700	1700
Volume to Capacity	1.53	0.61	0.61	0.10	0.34	0.19	0.19
Queue Length 95th (ft)	533	0	0	0	36	0	0
Control Delay (s)	297.2	0.0	0.0	0.0	25.3	0.0	0.0
Lane LOS	F				D		
Approach Delay (s)	297.2	0.0			3.1		
Approach LOS	F						
Intersection Summary							
Average Delay			31.9				
Intersection Capacity Utilization			82.6%	ICU Level of Service		E	
Analysis Period (min)			15				

Queues
23: Cowper St & Oregon Expy

Cumulative+ Churchill Closure

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	1751	60	30	1847	125	106	36	110
v/c Ratio	0.23	0.78	0.06	0.31	0.82	0.92	0.34	0.34	0.41
Control Delay	74.2	26.9	1.7	89.0	16.7	125.4	41.9	76.8	33.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.2	26.9	1.7	89.0	16.7	125.4	41.9	76.8	33.6
Queue Length 50th (ft)	21	564	0	31	842	124	76	35	58
Queue Length 95th (ft)	53	#1087	12	m26	m#886	#255	114	74	102
Internal Link Dist (ft)		1547			1028		66		60
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	95	2239	1009	97	2243	136	474	106	453
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.78	0.06	0.31	0.82	0.92	0.22	0.34	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Cumulative+ Churchill Closure

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1611	55	29	1757	16	115	54	43	33	40	62
Future Volume (vph)	20	1611	55	29	1757	16	115	54	43	33	40	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1546	1770	3533		1770	1698		1770	1655	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1546	1770	3533		1770	1698		1770	1655	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1751	60	30	1830	17	125	59	47	36	43	67
RTOR Reduction (vph)	0	0	23	0	0	0	0	22	0	0	43	0
Lane Group Flow (vph)	22	1751	37	30	1847	0	125	84	0	36	67	0
Confl. Peds. (#/hr)			1			11			8			10
Confl. Bikes (#/hr)									25			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	4.9	92.0	92.0	5.0	92.3		11.6	25.7		7.2	21.5	
Effective Green, g (s)	4.9	92.0	92.0	5.0	92.3		11.6	25.7		7.2	21.5	
Actuated g/C Ratio	0.03	0.61	0.61	0.03	0.62		0.08	0.17		0.05	0.14	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	57	2170	948	59	2173		136	290		84	237	
v/s Ratio Prot	0.01	0.49		c0.02	c0.52		c0.07	c0.05		0.02	0.04	
v/s Ratio Perm			0.02									
v/c Ratio	0.39	0.81	0.04	0.51	0.85		0.92	0.29		0.43	0.28	
Uniform Delay, d1	71.1	22.2	11.5	71.3	23.3		68.7	54.2		69.4	57.4	
Progression Factor	1.00	1.00	1.00	1.28	0.60		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	3.3	0.1	0.6	0.4		54.7	0.6		4.7	0.7	
Delay (s)	75.4	25.5	11.6	92.1	14.5		123.4	54.8		74.1	58.0	
Level of Service	E	C	B	F	B		F	D		E	E	
Approach Delay (s)		25.7			15.7			91.9			62.0	
Approach LOS		C			B			F			E	
Intersection Summary												
HCM 2000 Control Delay			26.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			20.1			
Intersection Capacity Utilization			75.4%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

Queues
24: Middlefield Rd & Oregon Expy

Cumulative+ Churchill Closure

Timing Plan: A.M. Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	141	1458	185	135	1418	64	323	468	261	105	497
v/c Ratio	1.11	1.19	0.29	0.67	1.03	0.11	1.32	0.79	0.43	0.76	0.54
Control Delay	165.5	138.3	27.8	79.3	76.5	0.4	219.1	56.7	12.9	98.9	41.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	165.5	138.3	27.8	79.3	76.5	0.4	219.1	56.7	12.9	98.9	41.1
Queue Length 50th (ft)	~154	~898	43	128	~791	0	~407	417	53	102	185
Queue Length 95th (ft)	m#236	#1038	m162	#310	#1036	0	#606	511	122	#194	225
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	127	1230	630	202	1377	597	244	698	687	146	1118
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.11	1.19	0.29	0.67	1.03	0.11	1.32	0.67	0.38	0.72	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Cumulative+ Churchill Closure
Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	130	1341	170	130	1361	61	297	431	240	97	290	167
Future Volume (vph)	130	1341	170	130	1361	61	297	431	240	97	290	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.83	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	1770	3539	1321	1770	1863	1524	1770	3326	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1458	185	135	1418	64	323	468	261	105	315	182
RTOR Reduction (vph)	0	0	88	0	0	39	0	0	127	0	59	0
Lane Group Flow (vph)	141	1458	97	135	1418	25	323	468	134	105	438	0
Confl. Peds. (#/hr)			1			51			27			4
Confl. Bikes (#/hr)						2						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	10.8	52.1	52.1	17.2	58.3	58.3	20.7	47.5	47.5	11.8	38.7	
Effective Green, g (s)	10.8	52.1	52.1	17.2	58.3	58.3	20.7	47.5	47.5	11.8	38.7	
Actuated g/C Ratio	0.07	0.35	0.35	0.11	0.39	0.39	0.14	0.32	0.32	0.08	0.26	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	127	1229	542	202	1375	513	244	589	482	139	858	
v/s Ratio Prot	0.08	c0.41		0.08	c0.40		c0.18	c0.25		0.06	0.13	
v/s Ratio Perm			0.06			0.02			0.09			
v/c Ratio	1.11	1.19	0.18	0.67	1.03	0.05	1.32	0.79	0.28	0.76	0.51	
Uniform Delay, d1	69.6	49.0	34.1	63.7	45.9	28.6	64.7	46.8	38.4	67.7	47.5	
Progression Factor	1.18	1.21	2.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	96.0	89.4	0.5	8.1	32.7	0.2	171.3	8.3	0.7	20.6	0.5	
Delay (s)	178.4	148.4	85.7	71.8	78.5	28.7	236.0	55.1	39.1	88.2	48.1	
Level of Service	F	F	F	E	E	C	F	E	D	F	D	
Approach Delay (s)		144.3			76.0			106.7			55.1	
Approach LOS		F			E			F			E	
Intersection Summary												
HCM 2000 Control Delay			104.0			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			21.6			
Intersection Capacity Utilization			103.1%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
1: Alma Street & Homer Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	591	1260	1074
v/c Ratio	0.85	0.81	0.69
Control Delay	43.1	27.0	23.0
Queue Delay	0.0	0.0	0.0
Total Delay	43.1	27.0	23.0
Queue Length 50th (ft)	153	321	253
Queue Length 95th (ft)	#237	410	326
Internal Link Dist (ft)	443	390	481
Turn Bay Length (ft)			
Base Capacity (vph)	742	1608	1608
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.80	0.78	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1: Alma Street & Homer Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	402	142	1222	0	0	1010
Future Volume (vph)	402	142	1222	0	0	1010
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0			5.0
Lane Util. Factor	0.97		0.95			0.95
Frpb, ped/bikes	0.96		1.00			1.00
Flpb, ped/bikes	0.88		1.00			1.00
Frt	0.96		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	2821		3539			3539
Flt Permitted	0.96		1.00			1.00
Satd. Flow (perm)	2821		3539			3539
Peak-hour factor, PHF	0.92	0.92	0.97	0.25	0.25	0.94
Adj. Flow (vph)	437	154	1260	0	0	1074
RTOR Reduction (vph)	38	0	0	0	0	0
Lane Group Flow (vph)	553	0	1260	0	0	1074
Confl. Peds. (#/hr)	77	61		28		
Confl. Bikes (#/hr)		3				
Turn Type	Perm		NA			NA
Protected Phases			2			6
Permitted Phases	8					
Actuated Green, G (s)	20.5		38.7			38.7
Effective Green, g (s)	20.5		38.7			38.7
Actuated g/C Ratio	0.23		0.44			0.44
Clearance Time (s)	4.0		5.0			5.0
Vehicle Extension (s)	3.0		4.0			4.0
Lane Grp Cap (vph)	654		1551			1551
v/s Ratio Prot			c0.36			0.30
v/s Ratio Perm	c0.20					
v/c Ratio	0.84		0.81			0.69
Uniform Delay, d1	32.4		21.6			20.0
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	9.8		3.5			1.5
Delay (s)	42.2		25.2			21.5
Level of Service	D		C			C
Approach Delay (s)	42.2		25.2			21.5
Approach LOS	D		C			C
Intersection Summary						
HCM 2000 Control Delay			27.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.65			
Actuated Cycle Length (s)			88.3		Sum of lost time (s)	13.0
Intersection Capacity Utilization			58.4%		ICU Level of Service	B
Analysis Period (min)			15			

c Critical Lane Group

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

3: Alma Street & Lincoln Ave

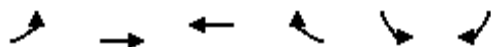
Cumulative + Churchill Closure
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	34	20	1815	95	20	1252
Future Volume (Veh/h)	34	20	1815	95	20	1252
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.94	0.94	0.95	0.95
Hourly flow rate (vph)	37	22	1931	101	21	1318
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2694	1028			2044	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2694	1028			2044	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	90			92	
cM capacity (veh/h)	16	229			269	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	59	1287	745	460	879	
Volume Left	37	0	0	21	0	
Volume Right	22	0	101	0	0	
cSH	24	1700	1700	269	1700	
Volume to Capacity	2.44	0.76	0.44	0.08	0.52	
Queue Length 95th (ft)	184	0	0	6	0	
Control Delay (s)	993.5	0.0	0.0	2.9	0.0	
Lane LOS	F			A		
Approach Delay (s)	993.5	0.0		1.0		
Approach LOS	F					
Intersection Summary						
Average Delay			17.5			
Intersection Capacity Utilization			63.3%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: Alma Street & Embarcadero Rd

Cumulative + Churchill Closure
Timing Plan: P.M.Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑			↗
Traffic Volume (veh/h)	0	1285	1788	0	0	120
Future Volume (Veh/h)	0	1285	1788	0	0	120
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.98	0.98	0.25	0.25	0.92
Hourly flow rate (vph)	0	1311	1824	0	0	130
Pedestrians					18	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1842				2498	1842
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1842				2498	1842
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	321				23	64
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	656	656	1824	130		
Volume Left	0	0	0	0		
Volume Right	0	0	0	130		
cSH	1700	1700	1700	64		
Volume to Capacity	0.39	0.39	1.07	2.04		
Queue Length 95th (ft)	0	0	0	307		
Control Delay (s)	0.0	0.0	0.0	624.2		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	624.2		
Approach LOS				F		
Intersection Summary						
Average Delay			24.9			
Intersection Capacity Utilization			108.2%		ICU Level of Service	G
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Emerson St & Lincoln Ave

Cumulative + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	79	53	33	57	9	2	35	2	9	131	0
Future Volume (vph)	8	79	53	33	57	9	2	35	2	9	131	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)	9	86	58	36	62	10	2	38	2	10	142	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	153	108	42	152								
Volume Left (vph)	9	36	2	10								
Volume Right (vph)	58	10	2	0								
Hadj (s)	-0.18	0.05	0.01	0.05								
Departure Headway (s)	4.3	4.6	4.7	4.6								
Degree Utilization, x	0.18	0.14	0.05	0.19								
Capacity (veh/h)	794	737	710	734								
Control Delay (s)	8.3	8.3	8.0	8.7								
Approach Delay (s)	8.3	8.3	8.0	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.4									
Level of Service			A									
Intersection Capacity Utilization			33.3%	ICU Level of Service					A			
Analysis Period (min)			15									

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

8: Alma Street & Kingsley Ave

Cumulative + Churchill Closure

Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	26	174	1622	34	77	1198
Future Volume (Veh/h)	26	174	1622	34	77	1198
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.97	0.97	0.96	0.96
Hourly flow rate (vph)	28	189	1672	35	80	1248
Pedestrians	17					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	2					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2490	1706			1724	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2490	1706			1724	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	0			78	
cM capacity (veh/h)	18	79			357	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	217	1707	496	832		
Volume Left	28	0	80	0		
Volume Right	189	35	0	0		
cSH	55	1700	357	1700		
Volume to Capacity	3.92	1.00	0.22	0.49		
Queue Length 95th (ft)	Err	0	21	0		
Control Delay (s)	Err	0.0	7.4	0.0		
Lane LOS	F		A			
Approach Delay (s)	Err	0.0	2.8			
Approach LOS	F					
Intersection Summary						
Average Delay		668.3				
Intersection Capacity Utilization		109.9%		ICU Level of Service		H
Analysis Period (min)		15				

Queues
9: Alma St & Churchill Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

			
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	83	1659	1358
v/c Ratio	0.31	0.62	0.54
Control Delay	54.9	8.9	7.9
Queue Delay	0.0	0.0	0.0
Total Delay	54.9	8.9	7.9
Queue Length 50th (ft)	71	342	253
Queue Length 95th (ft)	125	396	296
Internal Link Dist (ft)	479	698	387
Turn Bay Length (ft)			
Base Capacity (vph)	382	2987	2805
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.22	0.56	0.48
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

9: Alma St & Churchill Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	68	8	1497	29	8	1255
Future Volume (vph)	68	8	1497	29	8	1255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		6.0			6.0
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.99		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.99		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	1740		3527			3538
Flt Permitted	0.96		1.00			0.94
Satd. Flow (perm)	1740		3527			3314
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.93	0.93
Adj. Flow (vph)	74	9	1627	32	9	1349
RTOR Reduction (vph)	3	0	1	0	0	0
Lane Group Flow (vph)	80	0	1658	0	0	1358
Confl. Peds. (#/hr)		42		6		
Confl. Bikes (#/hr)		8				
Turn Type	Perm		NA		Perm	NA
Protected Phases			6			2
Permitted Phases	7				2	
Actuated Green, G (s)	20.7		101.4			101.4
Effective Green, g (s)	20.7		101.4			101.4
Actuated g/C Ratio	0.16		0.76			0.76
Clearance Time (s)	5.0		6.0			6.0
Vehicle Extension (s)	3.0		6.0			6.0
Lane Grp Cap (vph)	270		2686			2524
v/s Ratio Prot			c0.47			
v/s Ratio Perm	c0.05					0.41
v/c Ratio	0.30		0.62			0.54
Uniform Delay, d1	49.8		7.1			6.4
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	0.6		0.7			0.5
Delay (s)	50.4		7.9			6.9
Level of Service	D		A			A
Approach Delay (s)	50.4		7.9			6.9
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			8.6		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.56			
Actuated Cycle Length (s)			133.1		Sum of lost time (s)	11.0
Intersection Capacity Utilization			68.4%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 10: Emerson St & Churchill Ave

Cumulative + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	129	14	3	38	0	15	10	3	8	25	23
Future Volume (vph)	6	129	14	3	38	0	15	10	3	8	25	23
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)	7	140	15	3	41	0	16	11	3	9	27	25
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	162	44	30	61								
Volume Left (vph)	7	3	16	9								
Volume Right (vph)	15	0	3	25								
Hadj (s)	-0.01	0.05	0.08	-0.18								
Departure Headway (s)	4.1	4.3	4.5	4.2								
Degree Utilization, x	0.19	0.05	0.04	0.07								
Capacity (veh/h)	848	797	754	812								
Control Delay (s)	8.1	7.6	7.7	7.5								
Approach Delay (s)	8.1	7.6	7.7	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.9								
Level of Service				A								
Intersection Capacity Utilization				22.7%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

11: Bryant St & Churchill Ave

Cumulative + Churchill Closure

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	127	6	14	43	3	3	6	3	3	32	7
Future Volume (Veh/h)	7	127	6	14	43	3	3	6	3	3	32	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	137	6	15	47	3	3	7	3	3	35	8
Pedestrians		9			12			1			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											936	
pX, platoon unblocked												
vC, conflicting volume	100	82	49	147	84	26	52			22		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100	82	49	147	84	26	52			22		
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 %	99	83	99	98	94	100	100			100		
cM capacity (veh/h)	813	789	1010	687	787	1034	1541			1575		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	151	65	13	46								
Volume Left	8	15	3	3								
Volume Right	6	3	3	8								
cSH	797	769	1541	1575								
Volume to Capacity	0.19	0.08	0.00	0.00								
Queue Length 95th (ft)	17	7	0	0								
Control Delay (s)	10.6	10.1	1.7	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.6	10.1	1.7	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			8.4									
Intersection Capacity Utilization			22.1%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 12: Waverly St & Churchill Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	28	92	10	15	60	45	9	87	2	10	115	36
Future Volume (vph)	28	92	10	15	60	45	9	87	2	10	115	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.97	0.97
Hourly flow rate (vph)	30	100	11	16	65	49	10	95	2	10	119	37
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	141	130	107	166								
Volume Left (vph)	30	16	10	10								
Volume Right (vph)	11	49	2	37								
Hadj (s)	0.03	-0.17	0.04	-0.09								
Departure Headway (s)	4.8	4.6	4.8	4.6								
Degree Utilization, x	0.19	0.17	0.14	0.21								
Capacity (veh/h)	704	729	698	729								
Control Delay (s)	8.8	8.5	8.6	8.9								
Approach Delay (s)	8.8	8.5	8.6	8.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				8.7								
Level of Service				A								
Intersection Capacity Utilization				30.0%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis 13: Cowper St & Churchill Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	95	11	3	35	0	14	28	3	0	36	7
Future Volume (vph)	2	95	11	3	35	0	14	28	3	0	36	7
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)	2	103	12	3	38	0	15	30	3	0	39	8
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	117	41	48	47								
Volume Left (vph)	2	3	15	0								
Volume Right (vph)	12	0	3	8								
Hadj (s)	-0.02	0.05	0.06	-0.07								
Departure Headway (s)	4.1	4.3	4.4	4.2								
Degree Utilization, x	0.13	0.05	0.06	0.06								
Capacity (veh/h)	847	815	787	814								
Control Delay (s)	7.8	7.5	7.6	7.5								
Approach Delay (s)	7.8	7.5	7.6	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			23.6%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 14: Churchill Ave & Embarcadero Rd

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	1113	2	47	982	0	58
Future Volume (Veh/h)	1113	2	47	982	0	58
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.25	0.92
Hourly flow rate (vph)	1210	2	50	1045	0	63
Pedestrians					8	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	1093			898		
pX, platoon unblocked			0.78		0.78	0.78
vC, conflicting volume			1218		1842	614
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			709		1511	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		100	92
cM capacity (veh/h)			684		79	837
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	807	405	398	697	63	
Volume Left	0	0	50	0	0	
Volume Right	0	2	0	0	63	
cSH	1700	1700	684	1700	837	
Volume to Capacity	0.47	0.24	0.07	0.41	0.08	
Queue Length 95th (ft)	0	0	6	0	6	
Control Delay (s)	0.0	0.0	2.2	0.0	9.7	
Lane LOS			A		A	
Approach Delay (s)	0.0		0.8		9.7	
Approach LOS					A	
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			65.2%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 15: Cowper St & Embarcadero Rd

Cumulative + Churchill Closure
 Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1097	38	8	928	41	2	10	7	12	7	19
Future Volume (Veh/h)	20	1097	38	8	928	41	2	10	7	12	7	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	1192	41	8	967	43	2	11	8	13	8	21
Pedestrians								8			1	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								3.5			3.5	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.76			0.76		0.76	0.76	0.76	0.76
vC, conflicting volume	1011			1241			1789		2292	624	1659	2290
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1011			681			1403		2066	0	1232	2065
tC, single (s)	4.1			4.1			7.5		6.5	6.9	7.5	6.5
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5		4.0	3.3	3.5	4.0
p0 queue free %	97			99			97		72	99	83	79
cM capacity (veh/h)	681			683			58		39	816	75	39
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	618	637	492	526	21	42						
Volume Left	22	0	8	0	2	13						
Volume Right	0	41	0	43	8	21						
cSH	681	1700	683	1700	64	100						
Volume to Capacity	0.03	0.37	0.01	0.31	0.33	0.42						
Queue Length 95th (ft)	3	0	1	0	30	44						
Control Delay (s)	0.9	0.0	0.3	0.0	86.8	65.0						
Lane LOS	A		A		F	F						
Approach Delay (s)	0.4		0.2		86.8	65.0						
Approach LOS					F	F						
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			57.4%		ICU Level of Service				B			
Analysis Period (min)			15									

Queues

Cumulative + Churchill Closure

16: Waverly St & Embarcadero Rd

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	98	1176	24	982	212	301
v/c Ratio	0.49	0.64	0.17	0.54	0.37	0.53
Control Delay	36.8	29.9	16.8	18.4	26.6	29.5
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	36.8	30.1	16.8	18.4	26.6	29.5
Queue Length 50th (ft)	58	368	8	222	106	158
Queue Length 95th (ft)	108	442	26	278	172	249
Internal Link Dist (ft)		572		576	43	709
Turn Bay Length (ft)	95		75			
Base Capacity (vph)	208	1882	144	1880	567	567
Starvation Cap Reductn	0	185	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.69	0.17	0.52	0.37	0.53
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

16: Waverly St & Embarcadero Rd

Cumulative + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1024	58	23	861	62	68	110	17	99	119	59
Future Volume (vph)	90	1024	58	23	861	62	68	110	17	99	119	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.99			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1768	3503		1765	3498			1807			1769	
Flt Permitted	0.21	1.00		0.15	1.00			0.79			0.80	
Satd. Flow (perm)	389	3503		270	3498			1451			1438	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	1113	63	24	916	66	74	120	18	108	129	64
RTOR Reduction (vph)	0	4	0	0	5	0	0	3	0	0	9	0
Lane Group Flow (vph)	98	1172	0	24	977	0	0	209	0	0	292	0
Confl. Peds. (#/hr)	2		10	10		2	2		6	6		2
Confl. Bikes (#/hr)												4
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	57.2	57.2		57.2	57.2			42.8			42.8	
Effective Green, g (s)	57.2	57.2		57.2	57.2			42.8			42.8	
Actuated g/C Ratio	0.52	0.52		0.52	0.52			0.39			0.39	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	202	1821		140	1818			564			559	
v/s Ratio Prot		c0.33			0.28							
v/s Ratio Perm	0.25			0.09				0.14			c0.20	
v/c Ratio	0.49	0.64		0.17	0.54			0.37			0.52	
Uniform Delay, d1	16.9	19.0		13.9	17.6			24.0			25.8	
Progression Factor	1.65	1.50		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.6	0.7		0.6	0.3			1.9			3.5	
Delay (s)	29.5	29.3		14.5	17.9			25.8			29.2	
Level of Service	C	C		B	B			C			C	
Approach Delay (s)		29.4			17.8			25.8			29.2	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay		24.9			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		69.7%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
17: Bryant St & Embarcadero Rd

Cumulative + Churchill Closure

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBR	SBR
Lane Group Flow (vph)	183	1364	15	1054	13	40
v/c Ratio	0.53	0.51	0.06	0.40	0.04	0.10
Control Delay	16.1	8.3	4.9	7.0	0.2	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	8.3	4.9	7.0	0.2	0.5
Queue Length 50th (ft)	66	251	3	276	0	0
Queue Length 95th (ft)	154	308	m7	345	0	0
Internal Link Dist (ft)		579		572		
Turn Bay Length (ft)	80		60			
Base Capacity (vph)	348	2681	235	2664	436	487
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.51	0.06	0.40	0.03	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

17: Bryant St & Embarcadero Rd

Cumulative + Churchill Closure

Timing Plan: P.M.Peak

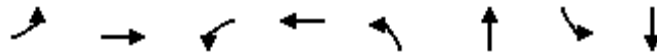
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1212	43	14	899	71	0	0	12	0	0	37
Future Volume (vph)	168	1212	43	14	899	71	0	0	12	0	0	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Lane Util. Factor	1.00	0.95		1.00	0.95				1.00			1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00				0.95			0.93
Flpb, ped/bikes	1.00	1.00		1.00	1.00				1.00			1.00
Frt	1.00	0.99		1.00	0.99				0.86			0.86
Flt Protected	0.95	1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)	1765	3516		1766	3492				1529			1495
Flt Permitted	0.25	1.00		0.17	1.00				1.00			1.00
Satd. Flow (perm)	458	3516		308	3492				1529			1495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.92	0.25	0.25	0.92
Adj. Flow (vph)	183	1317	47	15	977	77	0	0	13	0	0	40
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	11	0	0	33
Lane Group Flow (vph)	183	1362	0	15	1050	0	0	0	2	0	0	7
Confl. Peds. (#/hr)	6		8	8		6			6			20
Confl. Bikes (#/hr)									24			28
Turn Type	Perm	NA		Perm	NA				Perm			Perm
Protected Phases		2			2							
Permitted Phases	2			2					4			4
Actuated Green, G (s)	81.8	81.8		81.8	81.8				18.2			18.2
Effective Green, g (s)	81.8	81.8		81.8	81.8				18.2			18.2
Actuated g/C Ratio	0.74	0.74		0.74	0.74				0.17			0.17
Clearance Time (s)	5.0	5.0		5.0	5.0				5.0			5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0				3.0			3.0
Lane Grp Cap (vph)	340	2614		229	2596				252			247
v/s Ratio Prot		0.39			0.30							
v/s Ratio Perm	c0.40			0.05					0.00			c0.00
v/c Ratio	0.54	0.52		0.07	0.40				0.01			0.03
Uniform Delay, d1	6.0	5.9		3.8	5.2				38.4			38.5
Progression Factor	1.00	1.00		0.65	1.01				1.00			1.00
Incremental Delay, d2	6.0	0.7		0.5	0.4				0.0			0.0
Delay (s)	12.0	6.6		3.0	5.6				38.4			38.5
Level of Service	B	A		A	A				D			D
Approach Delay (s)		7.3			5.6			38.4			38.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		7.2			HCM 2000 Level of Service				A			
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)				10.0			
Intersection Capacity Utilization		54.1%			ICU Level of Service				A			
Analysis Period (min)		15										
c Critical Lane Group												

Queues

Cumulative + Churchill Closure

18: Middlefield Rd & Embarcadero Rd

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	1181	96	1007	131	490	189	475
v/c Ratio	0.43	0.83	0.81	0.68	0.91	0.58	0.91	0.92
Control Delay	61.8	35.8	96.1	29.1	105.3	39.5	91.2	63.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.8	35.8	96.1	29.1	105.3	39.5	91.2	63.5
Queue Length 50th (ft)	33	393	68	312	93	158	134	319
Queue Length 95th (ft)	73	486	#166	392	#210	212	#267	#505
Internal Link Dist (ft)		577		509		183		494
Turn Bay Length (ft)	115		100		115		100	
Base Capacity (vph)	112	1421	118	1484	144	887	209	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.83	0.81	0.68	0.91	0.55	0.90	0.88

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

18: Middlefield Rd & Embarcadero Rd

Cumulative + Churchill Closure

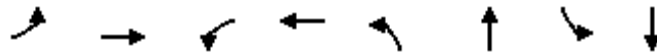
Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	1033	101	88	782	144	122	405	51	176	415	27
Future Volume (vph)	46	1033	101	88	782	144	122	405	51	176	415	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3480		1770	3440		1770	3474		1770	1842	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3480		1770	3440		1770	3474		1770	1842	
Peak-hour factor, PHF	0.96	0.96	0.96	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	48	1076	105	96	850	157	131	435	55	189	446	29
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	48	1181	0	96	1007	0	131	490	0	189	475	0
Confl. Peds. (#/hr)			9			15			1			16
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	5.6	44.8		7.4	46.6		9.0	26.8		13.0	30.8	
Effective Green, g (s)	5.6	44.8		7.4	46.6		9.0	26.8		13.0	30.8	
Actuated g/C Ratio	0.05	0.41		0.07	0.42		0.08	0.24		0.12	0.28	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	90	1417		119	1457		144	846		209	515	
v/s Ratio Prot	0.03	c0.34		c0.05	0.29		0.07	0.14		c0.11	c0.26	
v/s Ratio Perm												
v/c Ratio	0.53	0.83		0.81	0.69		0.91	0.58		0.90	0.92	
Uniform Delay, d1	50.9	29.3		50.6	25.8		50.1	36.6		47.9	38.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.7	5.9		30.8	2.7		48.3	1.0		36.8	22.2	
Delay (s)	55.6	35.1		81.4	28.5		98.4	37.6		84.7	60.6	
Level of Service	E	D		F	C		F	D		F	E	
Approach Delay (s)		35.9			33.1			50.4			67.5	
Approach LOS		D			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			43.4			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			83.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative + Churchill Closure

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	272	1713	274	2401	218	876	403	716
v/c Ratio	1.36	1.06	0.96	1.31	0.87	0.92	1.56	0.78
Control Delay	238.2	89.0	100.4	178.4	94.2	60.9	308.5	53.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	238.2	89.0	100.4	178.4	94.2	60.9	308.5	53.5
Queue Length 50th (ft)	~348	~672	~299	~1091	209	382	~554	319
Queue Length 95th (ft)	#537	#769	m266	m#911	#339	#475	#769	397
Internal Link Dist (ft)		1237		1007		755		481
Turn Bay Length (ft)	300		382				200	
Base Capacity (vph)	200	1613	285	1826	271	1000	259	929
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.36	1.06	0.96	1.31	0.80	0.88	1.56	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

19: Galvez St/Embarcadero Rd & El Camino Real

Cumulative + Churchill Closure

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			 			 	
Traffic Volume (vph)	250	1487	89	252	1695	514	201	469	337	375	454	212
Future Volume (vph)	250	1487	89	252	1695	514	201	469	337	375	454	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5026		1770	4870		1770	3264		1770	3265	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5026		1770	4870		1770	3264		1770	3265	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	272	1616	97	274	1842	559	218	510	366	403	488	228
RTOR Reduction (vph)	0	4	0	0	35	0	0	88	0	0	37	0
Lane Group Flow (vph)	272	1709	0	274	2366	0	218	788	0	403	679	0
Confl. Peds. (#/hr)			27			15			25			78
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	17.0	48.0		24.2	55.2		21.2	39.8		22.0	40.6	
Effective Green, g (s)	17.0	48.0		24.2	55.2		21.2	39.8		22.0	40.6	
Actuated g/C Ratio	0.11	0.32		0.16	0.37		0.14	0.27		0.15	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	200	1608		285	1792		250	866		259	883	
v/s Ratio Prot	c0.15	0.34		0.15	c0.49		0.12	c0.24		c0.23	0.21	
v/s Ratio Perm												
v/c Ratio	1.36	1.06		0.96	1.32		0.87	0.91		1.56	0.77	
Uniform Delay, d1	66.5	51.0		62.4	47.4		63.1	53.4		64.0	50.4	
Progression Factor	1.00	1.00		1.56	0.96		1.00	1.00		1.00	1.00	
Incremental Delay, d2	190.9	41.2		8.7	144.4		26.4	13.0		268.3	3.7	
Delay (s)	257.4	92.2		106.2	189.8		89.5	66.4		332.3	54.0	
Level of Service	F	F		F	F		F	E		F	D	
Approach Delay (s)		114.9			181.2			71.0			154.3	
Approach LOS		F			F			E			F	
Intersection Summary												
HCM 2000 Control Delay		140.1			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.24										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		123.1%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
20: El Camino Real & Churchill Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	403	2148	215	291	1872
v/c Ratio	1.33	1.12	0.35	0.97	0.64
Control Delay	210.7	106.1	28.0	57.0	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	210.7	106.1	28.0	57.0	24.6
Queue Length 50th (ft)	~486	~916	117	~352	630
Queue Length 95th (ft)	#704	#1005	191	m#307	m562
Internal Link Dist (ft)	958	687			1175
Turn Bay Length (ft)			100	170	
Base Capacity (vph)	304	1910	607	300	2908
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.33	1.12	0.35	0.97	0.64
Intersection Summary					
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.					
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

20: El Camino Real & Churchill Ave

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	186	185	2019	202	279	1797
Future Volume (vph)	186	185	2019	202	279	1797
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		0.91	1.00	1.00	0.91
Frpb, ped/bikes	0.99		1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.98		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1680		5085	1533	1770	5085
Flt Permitted	0.98		1.00	1.00	0.95	1.00
Satd. Flow (perm)	1680		5085	1533	1770	5085
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.96	0.96
Adj. Flow (vph)	202	201	2148	215	291	1872
RTOR Reduction (vph)	24	0	0	32	0	0
Lane Group Flow (vph)	379	0	2148	183	291	1872
Confl. Peds. (#/hr)		3		8		
Confl. Bikes (#/hr)				1		
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	4		6		5	2
Permitted Phases				6		
Actuated Green, G (s)	25.0		55.8	55.8	25.4	85.2
Effective Green, g (s)	25.0		55.8	55.8	25.4	85.2
Actuated g/C Ratio	0.17		0.37	0.37	0.17	0.57
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.2		4.0	4.0	2.0	4.0
Lane Grp Cap (vph)	280		1891	570	299	2888
v/s Ratio Prot	c0.23		c0.42		c0.16	0.37
v/s Ratio Perm				0.12		
v/c Ratio	1.35		1.14	0.32	0.97	0.65
Uniform Delay, d1	62.5		47.1	33.6	62.0	22.2
Progression Factor	1.00		1.00	1.00	0.71	1.01
Incremental Delay, d2	180.5		68.3	1.5	10.1	0.1
Delay (s)	243.0		115.4	35.1	54.2	22.5
Level of Service	F		F	D	D	C
Approach Delay (s)	243.0		108.1			26.8
Approach LOS	F		F			C
Intersection Summary						
HCM 2000 Control Delay			83.4		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			86.3%		ICU Level of Service	E
Analysis Period (min)			15			

c Critical Lane Group

Queues

Cumulative + Churchill Closure

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: P.M.Peak

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	935	1532	216	196	1333	361	1167	243	403	1314
v/c Ratio	1.15	0.73	0.30	0.77	1.06	1.15	1.06	0.38	1.05	1.16
Control Delay	141.6	46.9	7.1	101.3	104.5	165.5	102.9	39.5	133.8	131.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	141.6	46.9	7.1	101.3	104.5	165.5	102.9	39.5	133.8	131.6
Queue Length 50th (ft)	~667	556	17	119	~620	~256	~794	201	~266	~939
Queue Length 95th (ft)	#805	628	79	164	#718	#370	#934	276	#383	#1081
Internal Link Dist (ft)		611			978		1346			917
Turn Bay Length (ft)	350		350	300		350			250	
Base Capacity (vph)	810	2107	728	310	1254	314	1099	665	383	1133
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.15	0.73	0.30	0.63	1.06	1.15	1.06	0.37	1.05	1.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

21: Page Mill Rd/Oregon Expy & El Camino Real

Cumulative + Churchill Closure

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	860	1409	199	194	1035	285	350	1132	236	371	794	415
Future Volume (vph)	860	1409	199	194	1035	285	350	1132	236	371	794	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3315	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3315	
Peak-hour factor, PHF	0.92	0.92	0.92	0.99	0.99	0.99	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	935	1532	216	196	1045	288	361	1167	243	403	863	451
RTOR Reduction (vph)	0	0	112	0	28	0	0	0	0	0	37	0
Lane Group Flow (vph)	935	1532	104	196	1305	0	361	1167	243	403	1277	0
Confl. Peds. (#/hr)			27			28			18			13
Confl. Bikes (#/hr)									3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									
Actuated Green, G (s)	42.5	74.6	74.6	13.4	45.5		16.5	55.9	73.8	20.1	59.5	
Effective Green, g (s)	42.5	74.6	74.6	13.4	45.5		16.5	55.9	73.8	20.1	59.5	
Actuated g/C Ratio	0.24	0.41	0.41	0.07	0.25		0.09	0.31	0.41	0.11	0.33	
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	810	2107	615	255	1226		314	1099	649	383	1095	
v/s Ratio Prot	c0.27	0.30		0.06	c0.27		0.11	c0.33	0.15	0.12	c0.39	
v/s Ratio Perm			0.07									
v/c Ratio	1.15	0.73	0.17	0.77	1.06		1.15	1.06	0.37	1.05	1.17	
Uniform Delay, d1	68.8	44.2	33.2	81.8	67.2		81.8	62.0	37.0	80.0	60.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	83.3	2.2	0.6	11.8	44.8		97.7	45.2	0.1	60.4	84.8	
Delay (s)	152.1	46.4	33.8	93.6	112.1		179.5	107.2	37.1	140.3	145.0	
Level of Service	F	D	C	F	F		F	F	D	F	F	
Approach Delay (s)		82.2			109.7			112.3			143.9	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			108.4			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			180.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			111.3%			ICU Level of Service			H			
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

22a: Oregon Ave & Alma St

Cumulative + Churchill Closure

Timing Plan: P.M. Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	35	0	75	0	1800	442	0	1297	328	
Future Volume (Veh/h)	0	0	0	35	0	75	0	1800	442	0	1297	328	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.25	0.92	0.25	0.99	0.99	0.25	0.97	0.97	
Hourly flow rate (vph)	0	0	0	38	0	82	0	1818	446	0	1337	338	
Pedestrians	23												
Lane Width (ft)	12.0												
Walking Speed (ft/s)	3.5												
Percent Blockage	2												
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	2497	3793	838	2510	3516	932	1675				2287		
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	2497	3793	838	2510	3516	932	1675				2287		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	100	100	100	0	100	69	100				100		
cM capacity (veh/h)	10	4	310	14	6	262	379				213		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2						
Volume Total	38	82	909	909	446	891	784						
Volume Left	38	0	0	0	0	0	0						
Volume Right	0	82	0	0	446	0	338						
cSH	14	262	1700	1700	1700	1700	1700						
Volume to Capacity	2.76	0.31	0.53	0.53	0.26	0.52	0.46						
Queue Length 95th (ft)	140	32	0	0	0	0	0						
Control Delay (s)	1355.8	24.9	0.0	0.0	0.0	0.0	0.0						
Lane LOS	F	C											
Approach Delay (s)	446.3		0.0				0.0						
Approach LOS	F												
Intersection Summary													
Average Delay				13.2									
Intersection Capacity Utilization				61.1%	ICU Level of Service				B				
Analysis Period (min)				15									

HCM Unsignalized Intersection Capacity Analysis

22b: Alma St & Oregon Expy EB Ramps

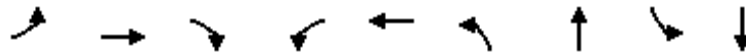
Cumulative + Churchill Closure
Timing Plan: P.M.Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	392	1850	70	68	1264	
Future Volume (Veh/h)	0	392	1850	70	68	1264	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.25	0.95	0.99	0.99	0.97	0.97	
Hourly flow rate (vph)	0	413	1869	71	70	1303	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2660	934			1869		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2660	934			1869		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	0			78		
cM capacity (veh/h)	14	267			318		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	413	934	934	71	70	652	652
Volume Left	0	0	0	0	70	0	0
Volume Right	413	0	0	71	0	0	0
cSH	267	1700	1700	1700	318	1700	1700
Volume to Capacity	1.55	0.55	0.55	0.04	0.22	0.38	0.38
Queue Length 95th (ft)	614	0	0	0	21	0	0
Control Delay (s)	298.0	0.0	0.0	0.0	19.5	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	298.0	0.0			1.0		
Approach LOS	F						
Intersection Summary							
Average Delay			33.4				
Intersection Capacity Utilization			82.1%		ICU Level of Service		E
Analysis Period (min)			15				

Queues
23: Cowper St & Oregon Expy

Cumulative + Churchill Closure

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	30	1733	91	36	1502	54	51	11	106
v/c Ratio	0.31	0.73	0.08	0.36	0.62	0.47	0.18	0.10	0.48
Control Delay	76.9	22.1	3.8	90.3	13.4	81.1	39.1	69.1	46.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.9	22.1	3.8	90.3	13.4	81.1	39.1	69.1	46.3
Queue Length 50th (ft)	29	550	2	37	190	52	30	10	68
Queue Length 95th (ft)	66	#1068	34	m43	m852	101	63	33	108
Internal Link Dist (ft)		1547			1028		48		36
Turn Bay Length (ft)	115		50	115					
Base Capacity (vph)	97	2368	1088	99	2432	120	481	106	466
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.73	0.08	0.36	0.62	0.45	0.11	0.10	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

23: Cowper St & Oregon Expy

Cumulative + Churchill Closure

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	1594	84	33	1363	18	50	32	15	10	47	51
Future Volume (vph)	28	1594	84	33	1363	18	50	32	15	10	47	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.95		1.00	0.92	
Flt Protected	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	3531		1770	1762		1770	1688	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3531		1770	1762		1770	1688	
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)	30	1733	91	36	1482	20	54	35	16	11	51	55
RTOR Reduction (vph)	0	0	30	0	0	0	0	13	0	0	31	0
Lane Group Flow (vph)	30	1733	61	36	1502	0	54	38	0	11	75	0
Confl. Peds. (#/hr)						5			7			5
Confl. Bikes (#/hr)									3			8
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6									
Actuated Green, G (s)	5.0	98.2	98.2	6.8	100.2		8.2	21.3		3.6	16.9	
Effective Green, g (s)	5.0	98.2	98.2	6.8	100.2		8.2	21.3		3.6	16.9	
Actuated g/C Ratio	0.03	0.65	0.65	0.05	0.67		0.05	0.14		0.02	0.11	
Clearance Time (s)	4.7	5.1	5.1	4.9	5.1		4.8	5.1		5.0	5.1	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0		5.0	3.0		4.0	3.0	
Lane Grp Cap (vph)	59	2316	1036	80	2358		96	250		42	190	
v/s Ratio Prot	0.02	c0.49		c0.02	0.43		c0.03	c0.02		0.01	c0.04	
v/s Ratio Perm			0.04									
v/c Ratio	0.51	0.75	0.06	0.45	0.64		0.56	0.15		0.26	0.39	
Uniform Delay, d1	71.3	17.5	9.3	69.8	14.4		69.2	56.4		71.9	61.8	
Progression Factor	1.00	1.00	1.00	1.25	0.75		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.7	2.3	0.1	1.6	0.5		11.8	0.3		4.5	1.4	
Delay (s)	78.0	19.8	9.4	89.1	11.3		81.0	56.7		76.4	63.1	
Level of Service	E	B	A	F	B		F	E		E	E	
Approach Delay (s)		20.2			13.2			69.2			64.4	
Approach LOS		C			B			E			E	
Intersection Summary												
HCM 2000 Control Delay			20.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			20.1			
Intersection Capacity Utilization			67.0%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

Queues
24: Middlefield Rd & Oregon Expy

Cumulative + Churchill Closure

Timing Plan: P.M.Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	192	1284	270	215	1140	67	249	592	173	56	659
v/c Ratio	1.17	1.13	0.46	0.92	0.90	0.11	1.20	0.87	0.27	0.53	0.66
Control Delay	163.6	110.0	21.4	104.2	57.0	0.3	179.7	59.1	10.4	86.8	48.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	163.6	110.0	21.4	104.2	57.0	0.3	179.7	59.1	10.4	86.8	48.2
Queue Length 50th (ft)	~222	~759	45	~257	584	0	~293	527	28	54	277
Queue Length 95th (ft)	m#362	#891	209	#429	#740	0	#474	#705	82	104	344
Internal Link Dist (ft)		1028			896			676			311
Turn Bay Length (ft)	360		100	390		100	230			145	
Base Capacity (vph)	164	1132	590	234	1265	633	208	702	664	106	1110
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	1.13	0.46	0.92	0.90	0.11	1.20	0.84	0.26	0.53	0.59

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

24: Middlefield Rd & Oregon Expy

Cumulative + Churchill Closure
Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	1194	251	198	1049	62	229	545	159	52	497	116
Future Volume (vph)	179	1194	251	198	1049	62	229	545	159	52	497	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
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	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3428	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1558	1770	3539	1525	1770	1863	1547	1770	3428	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	192	1284	270	215	1140	67	249	592	173	56	534	125
RTOR Reduction (vph)	0	0	93	0	0	44	0	0	82	0	14	0
Lane Group Flow (vph)	192	1284	177	215	1140	23	249	592	91	56	645	0
Confl. Peds. (#/hr)			2			6			11			4
Confl. Bikes (#/hr)									1			1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			
Actuated Green, G (s)	14.0	46.9	46.9	19.8	52.5	52.5	17.7	54.7	54.7	7.2	44.3	
Effective Green, g (s)	14.0	46.9	46.9	19.8	52.5	52.5	17.7	54.7	54.7	7.2	44.3	
Actuated g/C Ratio	0.09	0.31	0.31	0.13	0.35	0.35	0.12	0.36	0.36	0.05	0.30	
Clearance Time (s)	5.2	5.1	5.1	5.0	5.1	5.1	5.3	5.9	5.9	5.4	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	3.0	3.0	
Lane Grp Cap (vph)	165	1106	487	233	1238	533	208	679	564	84	1012	
v/s Ratio Prot	0.11	c0.36		0.12	c0.32		c0.14	c0.32		0.03	0.19	
v/s Ratio Perm			0.11			0.02			0.06			
v/c Ratio	1.16	1.16	0.36	0.92	0.92	0.04	1.20	0.87	0.16	0.67	0.64	
Uniform Delay, d1	68.0	51.5	40.0	64.3	46.8	32.2	66.2	44.4	32.2	70.2	45.9	
Progression Factor	0.92	0.89	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	109.1	79.7	1.4	38.3	12.5	0.2	125.8	12.8	0.3	18.2	1.3	
Delay (s)	171.7	125.6	41.1	102.6	59.3	32.3	191.9	57.1	32.4	88.4	47.2	
Level of Service	F	F	D	F	E	C	F	E	C	F	D	
Approach Delay (s)		117.6			64.6			86.0			50.4	
Approach LOS		F			E			F			D	
Intersection Summary												
HCM 2000 Control Delay			85.9			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.07									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			21.6			
Intersection Capacity Utilization			101.2%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Appendix J – Cumulative (2030) Plus Project Conditions with Mitigations Synchro Reports

- HCM Delay and LOS Reports

HCM Unsignalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

3: Alma Street & Lincoln Ave

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	26	1688	96	8	640
Future Volume (Veh/h)	0	26	1688	96	8	640
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	0	28	1740	99	9	696
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			175			
pX, platoon unblocked						
vC, conflicting volume	2166	930			1850	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2166	930			1850	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			97	
cM capacity (veh/h)	39	266			321	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	28	1160	679	241	464	
Volume Left	0	0	0	9	0	
Volume Right	28	0	99	0	0	
cSH	266	1700	1700	321	1700	
Volume to Capacity	0.11	0.68	0.40	0.03	0.27	
Queue Length 95th (ft)	9	0	0	2	0	
Control Delay (s)	20.1	0.0	0.0	1.1	0.0	
Lane LOS	C			A		
Approach Delay (s)	20.1	0.0		0.4		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			59.8%	ICU Level of Service		B
Analysis Period (min)			15			

Queues
4: Alma Street & Embarcadero Rd

Cumulative+ Churchill Closure with Mitigation

Timing Plan: A.M. Peak



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	180	148	1741	732
v/c Ratio	0.88	0.63	1.13	0.25
Control Delay	101.9	50.0	71.4	3.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	101.9	50.0	71.4	3.2
Queue Length 50th (ft)	175	83	~1984	71
Queue Length 95th (ft)	66	162	m#1779	86
Internal Link Dist (ft)	166		189	95
Turn Bay Length (ft)				
Base Capacity (vph)	213	242	1534	2914
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	221
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.85	0.61	1.13	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

4: Alma Street & Embarcadero Rd

Timing Plan: A.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	45	136	1654	0	0	673
Future Volume (vph)	45	136	1654	0	0	673
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5			4.5
Lane Util. Factor	1.00	1.00	1.00			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1583	1863			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	1583	1863			3539
Peak-hour factor, PHF	0.25	0.92	0.95	0.25	0.25	0.92
Adj. Flow (vph)	180	148	1741	0	0	732
RTOR Reduction (vph)	0	52	0	0	0	0
Lane Group Flow (vph)	180	96	1741	0	0	732
Confl. Peds. (#/hr)				22	33	
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	17.4	17.4	123.0			123.0
Effective Green, g (s)	17.4	17.4	123.0			123.0
Actuated g/C Ratio	0.12	0.12	0.82			0.82
Clearance Time (s)	4.5	4.5	4.5			4.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	206	184	1533			2913
v/s Ratio Prot	c0.10		c0.93			0.21
v/s Ratio Perm		0.06				
v/c Ratio	0.87	0.52	1.14			0.25
Uniform Delay, d1	64.9	62.1	13.2			2.9
Progression Factor	1.00	1.00	0.30			1.00
Incremental Delay, d2	31.0	2.6	61.9			0.0
Delay (s)	95.9	64.7	65.9			3.0
Level of Service	F	E	E			A
Approach Delay (s)	81.8		65.9			3.0
Approach LOS	F		E			A
Intersection Summary						
HCM 2000 Control Delay			51.3		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.10			
Actuated Cycle Length (s)			149.4		Sum of lost time (s)	9.0
Intersection Capacity Utilization			103.0%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

Queues
8: Alma Street & Kingsley Ave

Cumulative+ Churchill Closure with Mitigation

Timing Plan: A.M. Peak



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	137	1639	730
v/c Ratio	0.53	1.07	1.52dl
Control Delay	36.1	60.2	8.1
Queue Delay	0.9	12.1	0.3
Total Delay	37.0	72.3	8.3
Queue Length 50th (ft)	55	~1782	184
Queue Length 95th (ft)	128	#2049	235
Internal Link Dist (ft)	142	24	189
Turn Bay Length (ft)			
Base Capacity (vph)	264	1530	1468
Starvation Cap Reductn	0	22	224
Spillback Cap Reductn	27	84	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.58	1.13	0.59

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

8: Alma Street & Kingsley Ave

Timing Plan: A.M. Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	115	1549	24	70	602
Future Volume (vph)	11	115	1549	24	70	602
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5			4.5
Lane Util. Factor	1.00		1.00			0.95
Frpb, ped/bikes	1.00		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.88		1.00			1.00
Flt Protected	1.00		1.00			0.99
Satd. Flow (prot)	1626		1858			3521
Flt Permitted	1.00		1.00			0.50
Satd. Flow (perm)	1626		1858			1783
Peak-hour factor, PHF	0.92	0.92	0.96	0.96	0.92	0.92
Adj. Flow (vph)	12	125	1614	25	76	654
RTOR Reduction (vph)	68	0	0	0	0	0
Lane Group Flow (vph)	69	0	1639	0	0	730
Confl. Peds. (#/hr)				7	7	
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		2			6
Permitted Phases					6	
Actuated Green, G (s)	17.4		123.0			123.0
Effective Green, g (s)	17.4		123.0			123.0
Actuated g/C Ratio	0.12		0.82			0.82
Clearance Time (s)	4.5		4.5			4.5
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	189		1529			1467
v/s Ratio Prot	c0.04		c0.88			
v/s Ratio Perm						0.41
v/c Ratio	0.36		1.07			1.52dl
Uniform Delay, d1	60.9		13.2			4.0
Progression Factor	1.00		1.00			1.68
Incremental Delay, d2	1.2		44.9			0.3
Delay (s)	62.1		58.1			6.9
Level of Service	E		E			A
Approach Delay (s)	62.1		58.1			6.9
Approach LOS	E		E			A

Intersection Summary

HCM 2000 Control Delay	43.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	149.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

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

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation 15: Cowper St & Embarcadero Rd

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	953	38	12	1046	15	0	0	7	0	0	52
Future Volume (Veh/h)	16	953	38	12	1046	15	0	0	7	0	0	52
Sign Control		Free			Free			Stop			Stop	
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)	17	1036	41	13	1137	16	0	0	8	0	0	57
Pedestrians					1			8			28	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			1			3	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.79			0.79	0.79	0.79	0.79	0.79	
vC, conflicting volume	1181			1085			1750	2306	548	1760	2318	604
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1181			569			1413	2118	0	1426	2134	604
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			98			100	100	99	100	100	87
cM capacity (veh/h)	571			781			62	36	847	68	35	429
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	535	559	582	584	8	57						
Volume Left	17	0	13	0	0	0						
Volume Right	0	41	0	16	8	57						
cSH	571	1700	781	1700	847	429						
Volume to Capacity	0.03	0.33	0.02	0.34	0.01	0.13						
Queue Length 95th (ft)	2	0	1	0	1	11						
Control Delay (s)	0.8	0.0	0.5	0.0	9.3	14.7						
Lane LOS	A		A		A	B						
Approach Delay (s)	0.4		0.2		9.3	14.7						
Approach LOS					A	B						
Intersection Summary												
Average Delay			0.7									
Intersection Capacity Utilization			42.3%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

Cumulative+ Churchill Closure with Mitigation

19: Galvez St/Embarcadero Rd & El Camino Real

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	311	1282	338	1417	305	75	325	439	729
v/c Ratio	0.98	0.81	0.91	0.81	0.45	0.45	0.40	0.96	0.78
Control Delay	105.5	52.6	94.1	77.6	43.5	72.1	45.1	97.2	51.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	105.5	52.6	94.1	77.6	43.5	72.1	45.1	97.2	51.9
Queue Length 50th (ft)	307	423	352	528	202	72	136	223	324
Queue Length 95th (ft)	#505	#510	m#414	m#573	m238	126	168	#332	381
Internal Link Dist (ft)		1237		1007			755		481
Turn Bay Length (ft)	300		382		250			200	
Base Capacity (vph)	318	1577	376	1747	676	174	970	457	1127
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.81	0.90	0.81	0.45	0.43	0.34	0.96	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

19: Galvez St/Embarcadero Rd & El Camino Real

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			 		 	 	
Traffic Volume (vph)	308	1168	101	311	1304	281	69	231	68	417	460	233
Future Volume (vph)	308	1168	101	311	1304	281	69	231	68	417	460	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5009		1770	5085	1544	1770	3400		3433	3254	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5009		1770	5085	1544	1770	3400		3433	3254	
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	311	1180	102	338	1417	305	75	251	74	439	484	245
RTOR Reduction (vph)	0	6	0	0	0	146	0	19	0	0	46	0
Lane Group Flow (vph)	311	1276	0	338	1417	159	75	306	0	439	683	0
Confl. Peds. (#/hr)			17			9			11			74
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						
Actuated Green, G (s)	27.0	47.1		31.5	51.6	51.6	14.2	35.4		20.0	41.2	
Effective Green, g (s)	27.0	47.1		31.5	51.6	51.6	14.2	35.4		20.0	41.2	
Actuated g/C Ratio	0.18	0.31		0.21	0.34	0.34	0.09	0.24		0.13	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	318	1572		371	1749	531	167	802		457	893	
v/s Ratio Prot	c0.18	0.25		c0.19	c0.28		0.04	c0.09		c0.13	c0.21	
v/s Ratio Perm						0.10						
v/c Ratio	0.98	0.81		0.91	0.81	0.30	0.45	0.38		0.96	0.77	
Uniform Delay, d1	61.2	47.4		57.9	44.7	36.0	64.2	48.1		64.6	50.0	
Progression Factor	1.00	1.00		1.42	1.68	3.76	1.00	1.00		1.00	1.00	
Incremental Delay, d2	43.8	4.7		12.9	1.8	0.6	1.4	0.1		31.9	3.6	
Delay (s)	105.0	52.0		95.1	77.0	135.8	65.6	48.2		96.5	53.5	
Level of Service	F	D		F	E	F	E	D		F	D	
Approach Delay (s)		62.4			88.7			51.5			69.7	
Approach LOS		E			F			D			E	
Intersection Summary												
HCM 2000 Control Delay		73.6				HCM 2000 Level of Service		E				
HCM 2000 Volume to Capacity ratio		0.83										
Actuated Cycle Length (s)		150.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		97.8%				ICU Level of Service		F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

Cumulative+ Churchill Closure with Mitigation

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: A.M. Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	543	682	264	354	1632	404	1039	198	250	1251	397
v/c Ratio	1.04	0.39	0.40	0.86	1.06	1.03	0.79	0.25	0.87	1.09	0.74
Control Delay	125.3	49.0	11.1	101.6	101.9	131.8	59.1	26.9	112.5	112.3	52.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	125.3	49.0	11.1	101.6	101.9	131.8	59.1	26.9	112.5	112.3	52.1
Queue Length 50th (ft)	~375	239	36	227	~812	~275	617	139	160	~963	386
Queue Length 95th (ft)	#503	292	122	281	#905	#394	710	188	#227	#1111	548
Internal Link Dist (ft)		611			978		1346			917	
Turn Bay Length (ft)	350		350	300		350			250		100
Base Capacity (vph)	522	1734	658	507	1536	393	1308	848	312	1145	534
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.39	0.40	0.70	1.06	1.03	0.79	0.23	0.80	1.09	0.74

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	521	655	253	333	1309	225	372	956	182	240	1159	423
Future Volume (vph)	521	655	253	333	1309	225	372	956	182	240	1159	423
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	4.5
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1500	3433	4926		3433	3539	1583	3433	3369	1400
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1500	3433	4926		3433	3539	1583	3433	3369	1400
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	543	682	264	354	1393	239	404	1039	198	250	1207	441
RTOR Reduction (vph)	0	0	146	0	12	0	0	0	0	0	1	59
Lane Group Flow (vph)	543	682	118	354	1620	0	404	1039	198	250	1250	338
Confl. Peds. (#/hr)			21			27			29			8
Confl. Bikes (#/hr)						3						1
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									4
Actuated Green, G (s)	28.9	64.8	64.8	22.9	58.8		21.8	70.3	97.7	16.0	64.5	64.5
Effective Green, g (s)	28.9	64.8	64.8	22.9	58.8		21.8	70.3	97.7	16.0	64.5	64.5
Actuated g/C Ratio	0.15	0.34	0.34	0.12	0.31		0.11	0.37	0.51	0.08	0.34	0.34
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	4.5
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	522	1734	511	413	1524		393	1309	813	289	1143	475
v/s Ratio Prot	c0.16	0.13		0.10	c0.33		c0.12	0.29	0.13	0.07	c0.37	
v/s Ratio Perm			0.08									0.24
v/c Ratio	1.04	0.39	0.23	0.86	1.06		1.03	0.79	0.24	0.87	1.09	0.71
Uniform Delay, d1	80.5	47.6	44.8	81.9	65.6		84.1	53.4	25.6	85.9	62.8	54.7
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	50.2	0.7	1.1	15.4	41.7		52.8	3.2	0.1	21.9	55.9	4.2
Delay (s)	130.8	48.3	45.8	97.3	107.3		136.9	56.6	25.7	107.9	118.6	58.8
Level of Service	F	D	D	F	F		F	E	C	F	F	E
Approach Delay (s)		77.9			105.6			72.6			104.7	
Approach LOS		E			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			91.8			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.07									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			106.9%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
22a: Oregon Ave & Alma St

Cumulative+ Churchill Closure with Mitigation

Timing Plan: A.M. Peak



Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	12	88	1851	544	990
v/c Ratio	0.04	0.26	0.83	0.52	0.39
Control Delay	33.7	9.9	10.4	2.7	4.7
Queue Delay	0.0	0.0	1.0	0.3	0.0
Total Delay	33.7	9.9	11.4	3.0	4.7
Queue Length 50th (ft)	6	0	174	24	92
Queue Length 95th (ft)	22	41	m200	m28	121
Internal Link Dist (ft)			473		363
Turn Bay Length (ft)				150	
Base Capacity (vph)	347	381	2222	1052	2632
Starvation Cap Reductn	0	0	160	126	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.23	0.90	0.59	0.38

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

22a: Oregon Ave & Alma St

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	11	0	84	0	1814	533	0	677	234
Future Volume (vph)	0	0	0	11	0	84	0	1814	533	0	677	234
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	
Lane Util. Factor				1.00		1.00		0.95	1.00		0.95	
Frpb, ped/bikes				1.00		1.00		1.00	0.93		1.00	
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	
Frt				1.00		0.85		1.00	0.85		0.96	
Flt Protected				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)				1770		1583		3539	1473		3403	
Flt Permitted				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)				1770		1583		3539	1473		3403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.25	0.95	0.92	0.98	0.98	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	12	0	88	0	1851	544	0	736	254
RTOR Reduction (vph)	0	0	0	0	0	73	0	0	132	0	33	0
Lane Group Flow (vph)	0	0	0	12	0	15	0	1851	412	0	957	0
Confl. Peds. (#/hr)									19			
Turn Type				Prot		Perm		NA	Perm		NA	
Protected Phases				8				2			6	
Permitted Phases						8			2			
Actuated Green, G (s)				16.3		16.3		59.6	59.6		70.6	
Effective Green, g (s)				16.3		16.3		59.6	59.6		70.6	
Actuated g/C Ratio				0.17		0.17		0.62	0.62		0.74	
Clearance Time (s)				4.5		4.5		4.5	4.5		4.5	
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)				300		269		2199	915		2505	
v/s Ratio Prot				0.01				c0.52			c0.28	
v/s Ratio Perm						c0.01			0.28			
v/c Ratio				0.04		0.06		0.84	0.45		0.38	
Uniform Delay, d1				33.3		33.4		14.4	9.5		4.6	
Progression Factor				1.00		1.00		0.53	0.52		1.00	
Incremental Delay, d2				0.1		0.1		1.2	0.1		0.1	
Delay (s)				33.3		33.4		8.9	5.1		4.7	
Level of Service				C		C		A	A		A	
Approach Delay (s)		0.0			33.4			8.0			4.7	
Approach LOS		A			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.8				HCM 2000 Level of Service		A			
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			95.9				Sum of lost time (s)		13.5			
Intersection Capacity Utilization			62.8%				ICU Level of Service		B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
22b: Alma St & Oregon Expy EB Ramps

Cumulative+ Churchill Closure with Mitigation

Timing Plan: A.M. Peak

					
Lane Group	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	351	2065	174	91	658
v/c Ratio	0.89	0.93	0.17	0.61	0.25
Control Delay	47.7	27.0	5.8	77.1	3.0
Queue Delay	0.1	1.2	0.0	0.0	0.0
Total Delay	47.9	28.2	5.8	77.1	3.0
Queue Length 50th (ft)	130	625	26	62	33
Queue Length 95th (ft)	#283	#848	56	#126	40
Internal Link Dist (ft)		386			473
Turn Bay Length (ft)			100	50	
Base Capacity (vph)	432	2222	1020	159	2704
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	2	53	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.82	0.95	0.17	0.57	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

22b: Alma St & Oregon Expy EB Ramps

Timing Plan: A.M. Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↗	↗	↗	↗↗
Traffic Volume (vph)	0	323	2024	171	84	605
Future Volume (vph)	0	323	2024	171	84	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	0.95	1.00	1.00	0.95
Frt		0.86	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1611	3539	1583	1770	3539
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1611	3539	1583	1770	3539
Peak-hour factor, PHF	0.25	0.92	0.98	0.98	0.92	0.92
Adj. Flow (vph)	0	351	2065	174	91	658
RTOR Reduction (vph)	0	120	0	27	0	0
Lane Group Flow (vph)	0	231	2065	147	91	658
Turn Type		Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)		16.3	59.6	59.6	6.5	70.6
Effective Green, g (s)		16.3	59.6	59.6	6.5	70.6
Actuated g/C Ratio		0.17	0.62	0.62	0.07	0.74
Clearance Time (s)		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		273	2199	983	119	2605
v/s Ratio Prot			c0.58		c0.05	0.19
v/s Ratio Perm		c0.14		0.09		
v/c Ratio		0.84	0.94	0.15	0.76	0.25
Uniform Delay, d1		38.6	16.5	7.6	43.9	4.1
Progression Factor		1.00	1.00	1.00	1.38	0.62
Incremental Delay, d2		20.6	8.5	0.1	23.7	0.0
Delay (s)		59.2	25.0	7.6	84.5	2.6
Level of Service		E	C	A	F	A
Approach Delay (s)	59.2		23.7			12.5
Approach LOS	E		C			B
Intersection Summary						
HCM 2000 Control Delay			24.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.91			
Actuated Cycle Length (s)			95.9		Sum of lost time (s)	13.5
Intersection Capacity Utilization			83.4%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Queues

Cumulative+ Churchill Closure with Mitigation

24: Middlefield Rd & Oregon Expy

Timing Plan: A.M. Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	141	1458	185	135	1418	64	323	729	105	315	182
v/c Ratio	1.11	1.15	0.23	0.65	0.99	0.10	1.32	0.72	0.66	0.70	0.32
Control Delay	165.5	123.1	19.2	78.0	66.3	2.0	219.1	46.1	84.8	58.9	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	165.5	123.1	19.2	78.0	66.3	2.0	219.1	46.1	84.8	58.9	11.0
Queue Length 50th (ft)	~154	~898	33	130	~803	0	~407	294	101	272	41
Queue Length 95th (ft)	m#236	#1038	m122	#310	#1036	11	#606	347	166	353	71
Internal Link Dist (ft)		1028			896			676		311	
Turn Bay Length (ft)	360		100	390		100	230		145		
Base Capacity (vph)	127	1269	805	208	1427	633	244	1200	193	596	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.11	1.15	0.23	0.65	0.99	0.10	1.32	0.61	0.54	0.53	0.32

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative+ Churchill Closure with Mitigation

24: Middlefield Rd & Oregon Expy

Timing Plan: A.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Traffic Volume (vph)	130	1341	170	130	1361	61	297	431	240	97	290	167
Future Volume (vph)	130	1341	170	130	1361	61	297	431	240	97	290	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.3	5.0	5.1	5.1	5.3	5.9		5.4	5.9	5.2
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.90	1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		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)	1770	3539	1567	1770	3539	1426	1770	3304		1770	1863	1564
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)	1770	3539	1567	1770	3539	1426	1770	3304		1770	1863	1564
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1458	185	135	1418	64	323	468	261	105	315	182
RTOR Reduction (vph)	0	0	29	0	0	38	0	55	0	0	0	62
Lane Group Flow (vph)	141	1458	156	135	1418	26	323	674	0	105	315	120
Confl. Peds. (#/hr)			1			51			27			4
Confl. Bikes (#/hr)						2						
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	1	6	7	5	2		7	4		3	8	1
Permitted Phases			6			2						8
Actuated Green, G (s)	10.8	53.8	74.5	17.7	60.5	60.5	20.7	43.5		13.6	36.5	47.3
Effective Green, g (s)	10.8	53.8	74.5	17.7	60.5	60.5	20.7	43.5		13.6	36.5	47.3
Actuated g/C Ratio	0.07	0.36	0.50	0.12	0.40	0.40	0.14	0.29		0.09	0.24	0.32
Clearance Time (s)	5.2	5.1	5.3	5.0	5.1	5.1	5.3	5.9		5.4	5.9	5.2
Vehicle Extension (s)	3.0	4.0	5.0	3.0	4.0	4.0	5.0	5.0		3.0	3.0	3.0
Lane Grp Cap (vph)	127	1269	778	208	1427	575	244	958		160	453	493
v/s Ratio Prot	0.08	c0.41	0.03	0.08	c0.40		c0.18	c0.20		0.06	0.17	0.02
v/s Ratio Perm			0.07			0.02						0.06
v/c Ratio	1.11	1.15	0.20	0.65	0.99	0.04	1.32	0.70		0.66	0.70	0.24
Uniform Delay, d1	69.6	48.1	21.1	63.2	44.6	27.2	64.7	47.5		65.9	51.7	38.1
Progression Factor	1.18	1.20	1.40	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	96.0	73.3	0.2	6.8	22.4	0.1	171.3	3.0		9.3	4.6	0.3
Delay (s)	178.4	131.2	29.8	70.0	66.9	27.3	236.0	50.5		75.3	56.3	38.3
Level of Service	F	F	C	E	E	C	F	D		E	E	D
Approach Delay (s)		124.4			65.6			107.4			54.2	
Approach LOS		F			E			F			D	
Intersection Summary												
HCM 2000 Control Delay			93.7			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)				21.6		
Intersection Capacity Utilization			102.2%			ICU Level of Service				G		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation

3: Alma Street & Lincoln Ave

Timing Plan: P.M. Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	20	1815	95	20	1252
Future Volume (Veh/h)	0	20	1815	95	20	1252
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.94	0.94	0.95	0.95
Hourly flow rate (vph)	0	22	1931	101	21	1318
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)			175			
pX, platoon unblocked						
vC, conflicting volume	2694	1028			2044	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2694	1028			2044	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			92	
cM capacity (veh/h)	16	229			269	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	22	1287	745	460	879	
Volume Left	0	0	0	21	0	
Volume Right	22	0	101	0	0	
cSH	229	1700	1700	269	1700	
Volume to Capacity	0.10	0.76	0.44	0.08	0.52	
Queue Length 95th (ft)	8	0	0	6	0	
Control Delay (s)	22.4	0.0	0.0	2.9	0.0	
Lane LOS	C			A		
Approach Delay (s)	22.4	0.0		1.0		
Approach LOS	C					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			63.3%	ICU Level of Service		B
Analysis Period (min)			15			

Queues
4: Alma Street & Embarcadero Rd

Cumulative + Churchill Closure with Mitigation

Timing Plan: P.M.Peak



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	136	130	1824	1311
v/c Ratio	0.68	0.59	1.18	0.45
Control Delay	81.4	48.5	96.2	4.2
Queue Delay	0.0	0.0	0.0	0.1
Total Delay	81.4	48.5	96.3	4.3
Queue Length 50th (ft)	129	72	~2154	160
Queue Length 95th (ft)	53	146	m#1839	186
Internal Link Dist (ft)	166		189	95
Turn Bay Length (ft)				
Base Capacity (vph)	214	234	1540	2926
Starvation Cap Reductn	0	0	22	0
Spillback Cap Reductn	0	0	0	375
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.64	0.56	1.20	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation

4: Alma Street & Embarcadero Rd

Timing Plan: P.M.Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	120	1788	0	0	1285
Future Volume (vph)	34	120	1788	0	0	1285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5			4.5
Lane Util. Factor	1.00	1.00	1.00			0.95
Frpb, ped/bikes	1.00	0.99	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1561	1863			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	1561	1863			3539
Peak-hour factor, PHF	0.25	0.92	0.98	0.25	0.25	0.98
Adj. Flow (vph)	136	130	1824	0	0	1311
RTOR Reduction (vph)	0	46	0	0	0	0
Lane Group Flow (vph)	136	84	1824	0	0	1311
Confl. Peds. (#/hr)				18		
Confl. Bikes (#/hr)		1				
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	16.7	16.7	123.0			123.0
Effective Green, g (s)	16.7	16.7	123.0			123.0
Actuated g/C Ratio	0.11	0.11	0.83			0.83
Clearance Time (s)	4.5	4.5	4.5			4.5
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	198	175	1541			2927
v/s Ratio Prot	c0.08		c0.98			0.37
v/s Ratio Perm		0.05				
v/c Ratio	0.69	0.48	1.18			0.45
Uniform Delay, d1	63.5	61.9	12.8			3.5
Progression Factor	1.00	1.00	0.50			1.00
Incremental Delay, d2	9.5	2.1	83.3			0.1
Delay (s)	73.0	64.0	89.8			3.6
Level of Service	E	E	F			A
Approach Delay (s)	68.6		89.8			3.6
Approach LOS	E		F			A
Intersection Summary						
HCM 2000 Control Delay			54.9		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.12			
Actuated Cycle Length (s)			148.7		Sum of lost time (s)	9.0
Intersection Capacity Utilization			109.0%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

Queues
8: Alma Street & Kingsley Ave

Cumulative + Churchill Closure with Mitigation

Timing Plan: P.M.Peak



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	217	1707	1328
v/c Ratio	0.89	1.11	1.60dl
Control Delay	79.4	76.8	21.4
Queue Delay	58.9	0.2	0.0
Total Delay	138.2	77.0	21.4
Queue Length 50th (ft)	147	~1925	505
Queue Length 95th (ft)	#292	#2190	#734
Internal Link Dist (ft)	142	24	189
Turn Bay Length (ft)			
Base Capacity (vph)	257	1533	1460
Starvation Cap Reductn	0	14	0
Spillback Cap Reductn	94	102	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.33	1.19	0.91

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation

8: Alma Street & Kingsley Ave

Timing Plan: P.M.Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	174	1622	34	77	1198
Future Volume (vph)	26	174	1622	34	77	1198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5			4.5
Lane Util. Factor	1.00		1.00			0.95
Frpb, ped/bikes	1.00		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.88		1.00			1.00
Flt Protected	0.99		1.00			1.00
Satd. Flow (prot)	1633		1854			3529
Flt Permitted	0.99		1.00			0.50
Satd. Flow (perm)	1633		1854			1767
Peak-hour factor, PHF	0.92	0.92	0.97	0.97	0.96	0.96
Adj. Flow (vph)	28	189	1672	35	80	1248
RTOR Reduction (vph)	60	0	1	0	0	0
Lane Group Flow (vph)	157	0	1706	0	0	1328
Confl. Peds. (#/hr)				17	17	
Confl. Bikes (#/hr)				1		
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		2			6
Permitted Phases					6	
Actuated Green, G (s)	16.7		123.0			123.0
Effective Green, g (s)	16.7		123.0			123.0
Actuated g/C Ratio	0.11		0.83			0.83
Clearance Time (s)	4.5		4.5			4.5
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	183		1533			1461
v/s Ratio Prot	c0.10		c0.92			
v/s Ratio Perm						0.75
v/c Ratio	0.86		1.11			1.60dl
Uniform Delay, d1	64.8		12.8			9.0
Progression Factor	1.00		1.00			1.16
Incremental Delay, d2	30.3		60.6			7.8
Delay (s)	95.1		73.5			18.2
Level of Service	F		E			B
Approach Delay (s)	95.1		73.5			18.2
Approach LOS	F		E			B
Intersection Summary						
HCM 2000 Control Delay			52.3		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.08			
Actuated Cycle Length (s)			148.7		Sum of lost time (s)	9.0
Intersection Capacity Utilization			110.7%		ICU Level of Service	H
Analysis Period (min)			15			
dl Defacto Left Lane. Recode with 1 though lane as a left lane.						
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation 15: Cowper St & Embarcadero Rd

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1097	38	8	928	41	0	0	7	0	0	19
Future Volume (Veh/h)	20	1097	38	8	928	41	0	0	7	0	0	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	1192	41	8	967	43	0	0	8	0	0	21
Pedestrians								8				1
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								3.5			3.5	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		656										
pX, platoon unblocked				0.76			0.76	0.76	0.76	0.76	0.76	
vC, conflicting volume	1011			1241			1785	2292	624	1654	2290	506
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1011			681			1398	2066	0	1225	2065	506
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			100	100	99	100	100	96
cM capacity (veh/h)	681			683			70	39	816	97	39	511
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	618	637	492	526	8	21						
Volume Left	22	0	8	0	0	0						
Volume Right	0	41	0	43	8	21						
cSH	681	1700	683	1700	816	511						
Volume to Capacity	0.03	0.37	0.01	0.31	0.01	0.04						
Queue Length 95th (ft)	3	0	1	0	1	3						
Control Delay (s)	0.9	0.0	0.3	0.0	9.5	12.3						
Lane LOS	A		A		A	B						
Approach Delay (s)	0.4		0.2		9.5	12.3						
Approach LOS					A	B						
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			49.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

Cumulative + Churchill Closure with Mitigation

19: Galvez St/Embarcadero Rd & El Camino Real

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	272	1713	274	1842	559	218	876	403	716
v/c Ratio	1.36	1.06	0.96	0.99	0.72	0.87	0.89	0.86	0.78
Control Delay	238.2	89.0	100.4	50.0	22.9	94.2	56.7	81.3	53.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	238.2	89.0	100.4	50.0	22.9	94.2	56.7	81.3	53.5
Queue Length 50th (ft)	~348	~672	~299	~475	202	209	382	199	319
Queue Length 95th (ft)	#537	#769	m266	m358	m176	#339	#475	#264	397
Internal Link Dist (ft)		1237		1007			755		481
Turn Bay Length (ft)	300		382		250			200	
Base Capacity (vph)	200	1613	285	1870	776	271	1000	503	929
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.36	1.06	0.96	0.99	0.72	0.80	0.88	0.80	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation

19: Galvez St/Embarcadero Rd & El Camino Real

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	1487	89	252	1695	514	201	469	337	375	454	212
Future Volume (vph)	250	1487	89	252	1695	514	201	469	337	375	454	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5026		1770	5085	1531	1770	3264		3433	3265	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5026		1770	5085	1531	1770	3264		3433	3265	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	272	1616	97	274	1842	559	218	510	366	403	488	228
RTOR Reduction (vph)	0	4	0	0	0	214	0	87	0	0	37	0
Lane Group Flow (vph)	272	1709	0	274	1842	345	218	789	0	403	679	0
Confl. Peds. (#/hr)			27			15			25			78
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						
Actuated Green, G (s)	17.0	48.0		24.2	55.2	55.2	21.2	41.3		20.5	40.6	
Effective Green, g (s)	17.0	48.0		24.2	55.2	55.2	21.2	41.3		20.5	40.6	
Actuated g/C Ratio	0.11	0.32		0.16	0.37	0.37	0.14	0.28		0.14	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.5	2.0		2.0	2.0	
Lane Grp Cap (vph)	200	1608		285	1871	563	250	898		469	883	
v/s Ratio Prot	c0.15	c0.34		0.15	c0.36		c0.12	c0.24		0.12	0.21	
v/s Ratio Perm						0.23						
v/c Ratio	1.36	1.06		0.96	0.98	0.61	0.87	0.88		0.86	0.77	
Uniform Delay, d1	66.5	51.0		62.4	47.0	38.7	63.1	52.0		63.3	50.4	
Progression Factor	1.00	1.00		1.56	0.99	1.41	1.00	1.00		1.00	1.00	
Incremental Delay, d2	190.9	41.2		8.7	3.6	0.5	26.4	9.5		14.0	3.7	
Delay (s)	257.4	92.2		106.2	50.2	55.2	89.5	61.4		77.3	54.0	
Level of Service	F	F		F	D	E	F	E		E	D	
Approach Delay (s)		114.9			57.0			67.0			62.4	
Approach LOS		F			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			76.2									
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			150.0									
Intersection Capacity Utilization			103.5%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Cumulative + Churchill Closure with Mitigation

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: P.M.Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	935	1532	216	196	1333	361	1167	243	403	917	397
v/c Ratio	1.08	0.72	0.29	0.77	1.11	0.83	1.09	0.39	1.05	0.95	0.81
Control Delay	115.2	45.8	6.8	101.3	119.1	92.6	110.8	40.4	133.8	80.3	53.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.2	45.8	6.8	101.3	119.1	92.6	110.8	40.4	133.8	80.3	53.3
Queue Length 50th (ft)	~631	549	15	119	~642	222	~810	204	~266	574	336
Queue Length 95th (ft)	#769	621	76	164	#741	#324	#950	279	#383	#681	503
Internal Link Dist (ft)		611			978		1346			917	
Turn Bay Length (ft)	350		350	300		350			250		100
Base Capacity (vph)	867	2141	738	310	1205	435	1075	655	383	1017	508
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.72	0.29	0.63	1.11	0.83	1.09	0.37	1.05	0.90	0.78

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation

21: Page Mill Rd/Oregon Expy & El Camino Real

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	860	1409	199	194	1035	285	350	1132	236	371	794	415
Future Volume (vph)	860	1409	199	194	1035	285	350	1132	236	371	794	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5	4.5	3.5	4.5	4.5
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3353	1388
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1486	3433	4853		3433	3539	1583	3433	3353	1388
Peak-hour factor, PHF	0.92	0.92	0.92	0.99	0.99	0.99	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	935	1532	216	196	1045	288	361	1167	243	403	863	451
RTOR Reduction (vph)	0	0	112	0	27	0	0	0	0	0	2	90
Lane Group Flow (vph)	935	1532	104	196	1306	0	361	1167	243	403	915	307
Confl. Peds. (#/hr)			27			28			18			13
Confl. Bikes (#/hr)									3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8	8 1	7	4	
Permitted Phases			2									4
Actuated Green, G (s)	45.5	75.8	75.8	13.4	43.7		22.8	54.7	72.6	20.1	52.0	52.0
Effective Green, g (s)	45.5	75.8	75.8	13.4	43.7		22.8	54.7	72.6	20.1	52.0	52.0
Actuated g/C Ratio	0.25	0.42	0.42	0.07	0.24		0.13	0.30	0.40	0.11	0.29	0.29
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.5		3.5	4.5	4.5
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		3.0	1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	867	2141	625	255	1178		434	1075	638	383	968	400
v/s Ratio Prot	c0.27	0.30		0.06	c0.27		0.11	c0.33	0.15	c0.12	0.27	
v/s Ratio Perm			0.07									0.22
v/c Ratio	1.08	0.72	0.17	0.77	1.11		0.83	1.09	0.38	1.05	0.95	0.77
Uniform Delay, d1	67.2	43.2	32.4	81.8	68.2		76.7	62.6	37.9	80.0	62.6	58.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	54.0	2.1	0.6	11.8	61.2		12.8	53.7	0.1	60.4	16.9	7.7
Delay (s)	121.2	45.2	33.0	93.6	129.4		89.5	116.4	38.0	140.3	79.5	66.2
Level of Service	F	D	C	F	F		F	F	D	F	E	E
Approach Delay (s)		70.7			124.8			100.1			90.7	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			92.7			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			180.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			107.5%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

22a: Oregon Ave & Alma St

Cumulative + Churchill Closure with Mitigation

Timing Plan: P.M.Peak



Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	38	82	1818	446	1675
v/c Ratio	0.11	0.22	0.84	0.44	0.67
Control Delay	34.8	9.8	10.4	2.3	8.7
Queue Delay	0.0	0.0	0.9	0.0	0.0
Total Delay	34.8	9.8	11.3	2.3	8.7
Queue Length 50th (ft)	20	0	155	4	242
Queue Length 95th (ft)	49	40	m221	m27	305
Internal Link Dist (ft)			473		363
Turn Bay Length (ft)				150	
Base Capacity (vph)	337	368	2170	1003	2567
Starvation Cap Reductn	0	0	135	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.22	0.89	0.44	0.65

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation 22a: Oregon Ave & Alma St

Timing Plan: P.M. Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	 
Traffic Volume (vph)	0	0	0	35	0	75	0	1800	442	0	1297	328
Future Volume (vph)	0	0	0	35	0	75	0	1800	442	0	1297	328
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	
Lane Util. Factor				1.00		1.00		0.95	1.00		0.95	
Frpb, ped/bikes				1.00		1.00		1.00	0.92		1.00	
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	
Frt				1.00		0.85		1.00	0.85		0.97	
Flt Protected				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)				1770		1583		3539	1454		3432	
Flt Permitted				0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)				1770		1583		3539	1454		3432	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.25	0.92	0.25	0.99	0.99	0.25	0.97	0.97
Adj. Flow (vph)	0	0	0	38	0	82	0	1818	446	0	1337	338
RTOR Reduction (vph)	0	0	0	0	0	67	0	0	114	0	23	0
Lane Group Flow (vph)	0	0	0	38	0	15	0	1818	332	0	1652	0
Confl. Peds. (#/hr)									23			
Turn Type				Prot		Perm		NA	Perm		NA	
Protected Phases				8				2			6	
Permitted Phases						8			2			
Actuated Green, G (s)				18.5		18.5		59.7	59.7		70.7	
Effective Green, g (s)				18.5		18.5		59.7	59.7		70.7	
Actuated g/C Ratio				0.19		0.19		0.61	0.61		0.72	
Clearance Time (s)				4.5		4.5		4.5	4.5		4.5	
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)				333		298		2151	883		2470	
v/s Ratio Prot				c0.02				c0.51			c0.48	
v/s Ratio Perm						0.01			0.23			
v/c Ratio				0.11		0.05		0.85	0.38		0.67	
Uniform Delay, d1				33.1		32.7		15.5	9.8		7.4	
Progression Factor				1.00		1.00		0.51	0.44		1.00	
Incremental Delay, d2				0.2		0.1		1.5	0.1		0.7	
Delay (s)				33.2		32.7		9.5	4.5		8.1	
Level of Service				C		C		A	A		A	
Approach Delay (s)		0.0			32.9			8.5			8.1	
Approach LOS		A			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			9.1			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			98.2			Sum of lost time (s)			13.5			
Intersection Capacity Utilization			61.9%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
22b: Alma St & Oregon Expy EB Ramps

Cumulative + Churchill Closure with Mitigation

Timing Plan: P.M.Peak



Lane Group	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	413	1869	71	70	1303
v/c Ratio	0.96	0.86	0.07	0.50	0.51
Control Delay	62.5	21.7	5.6	69.0	3.6
Queue Delay	0.8	0.4	0.0	0.0	0.1
Total Delay	63.4	22.1	5.6	69.0	3.7
Queue Length 50th (ft)	176	499	10	48	65
Queue Length 95th (ft)	#373	626	28	m74	74
Internal Link Dist (ft)		386			473
Turn Bay Length (ft)			100	50	
Base Capacity (vph)	428	2170	983	155	2624
Starvation Cap Reductn	0	0	0	0	329
Spillback Cap Reductn	2	55	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.97	0.88	0.07	0.45	0.57

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation

22b: Alma St & Oregon Expy EB Ramps

Timing Plan: P.M.Peak

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↕	↗	↖	↕
Traffic Volume (vph)	0	392	1850	70	68	1264
Future Volume (vph)	0	392	1850	70	68	1264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	0.95	1.00	1.00	0.95
Frt		0.86	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1611	3539	1583	1770	3539
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1611	3539	1583	1770	3539
Peak-hour factor, PHF	0.25	0.95	0.99	0.99	0.97	0.97
Adj. Flow (vph)	0	413	1869	71	70	1303
RTOR Reduction (vph)	0	122	0	13	0	0
Lane Group Flow (vph)	0	291	1869	58	70	1303
Turn Type		Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)		18.5	59.7	59.7	6.5	70.7
Effective Green, g (s)		18.5	59.7	59.7	6.5	70.7
Actuated g/C Ratio		0.19	0.61	0.61	0.07	0.72
Clearance Time (s)		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		303	2151	962	117	2547
v/s Ratio Prot			c0.53		0.04	c0.37
v/s Ratio Perm		c0.18		0.04		
v/c Ratio		0.96	0.87	0.06	0.60	0.51
Uniform Delay, d1		39.5	16.0	7.8	44.6	6.1
Progression Factor		1.00	1.00	1.00	1.35	0.49
Incremental Delay, d2		41.1	4.0	0.0	6.2	0.1
Delay (s)		80.6	20.0	7.9	66.6	3.1
Level of Service		F	C	A	E	A
Approach Delay (s)	80.6		19.6			6.4
Approach LOS	F		B			A
Intersection Summary						
HCM 2000 Control Delay			21.5		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.87			
Actuated Cycle Length (s)			98.2		Sum of lost time (s)	13.5
Intersection Capacity Utilization			82.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Queues

Cumulative + Churchill Closure with Mitigation

24: Middlefield Rd & Oregon Expy

Timing Plan: P.M.Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	192	1284	270	215	1140	67	249	765	56	534	125
v/c Ratio	1.19	1.13	0.37	1.06	0.94	0.11	1.20	0.59	0.49	0.94	0.18
Control Delay	169.6	110.0	11.2	140.9	63.7	0.4	179.7	38.4	82.3	75.7	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	169.6	110.0	11.2	140.9	63.7	0.4	179.7	38.4	82.3	75.7	2.7
Queue Length 50th (ft)	~222	~759	30	~257	584	0	~293	306	54	499	0
Queue Length 95th (ft)	m#362	#891	122	#429	#740	0	#474	376	103	#710	25
Internal Link Dist (ft)		1028			896			676		311	
Turn Bay Length (ft)	360		100	390		100	230		145		
Base Capacity (vph)	162	1132	731	203	1207	618	208	1303	121	596	705
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	1.13	0.37	1.06	0.94	0.11	1.20	0.59	0.46	0.90	0.18

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Cumulative + Churchill Closure with Mitigation

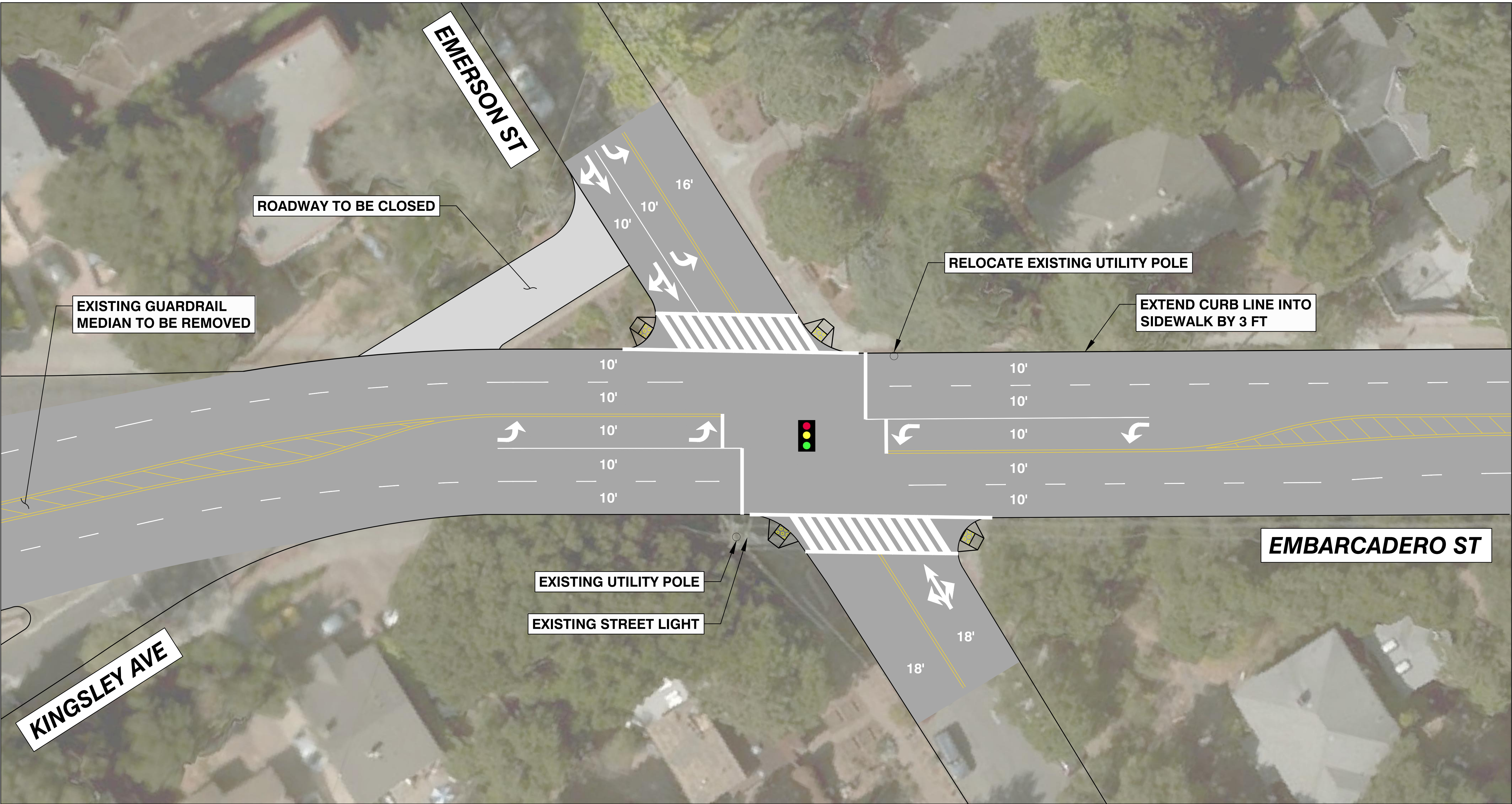
24: Middlefield Rd & Oregon Expy

Timing Plan: P.M.Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	1194	251	198	1049	62	229	545	159	52	497	116
Future Volume (vph)	179	1194	251	198	1049	62	229	545	159	52	497	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.1	5.3	5.0	5.1	5.1	5.3	5.9		5.4	5.9	5.2
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		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)	1770	3539	1565	1770	3539	1548	1770	3401		1770	1863	1563
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)	1770	3539	1565	1770	3539	1548	1770	3401		1770	1863	1563
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	192	1284	270	215	1140	67	249	592	173	56	534	125
RTOR Reduction (vph)	0	0	48	0	0	45	0	18	0	0	0	74
Lane Group Flow (vph)	192	1284	222	215	1140	22	249	747	0	56	534	51
Confl. Peds. (#/hr)			2			6			11			4
Confl. Bikes (#/hr)									1			1
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov
Protected Phases	1	6	7	5	2		7	4		3	8	1
Permitted Phases			6			2						8
Actuated Green, G (s)	13.8	46.9	64.6	17.2	50.1	50.1	17.7	56.6		7.9	46.9	60.7
Effective Green, g (s)	13.8	46.9	64.6	17.2	50.1	50.1	17.7	56.6		7.9	46.9	60.7
Actuated g/C Ratio	0.09	0.31	0.43	0.11	0.33	0.33	0.12	0.38		0.05	0.31	0.40
Clearance Time (s)	5.2	5.1	5.3	5.0	5.1	5.1	5.3	5.9		5.4	5.9	5.2
Vehicle Extension (s)	3.0	4.0	5.0	3.0	4.0	4.0	5.0	5.0		3.0	3.0	3.0
Lane Grp Cap (vph)	162	1106	673	202	1182	517	208	1283		93	582	632
v/s Ratio Prot	0.11	c0.36	0.04	0.12	c0.32		c0.14	0.22		0.03	c0.29	0.01
v/s Ratio Perm			0.10			0.01						0.02
v/c Ratio	1.19	1.16	0.33	1.06	0.96	0.04	1.20	0.58		0.60	0.92	0.08
Uniform Delay, d1	68.1	51.5	28.3	66.4	49.1	33.8	66.2	37.3		69.5	49.7	27.5
Progression Factor	0.92	0.89	0.61	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	117.5	79.7	0.4	81.4	18.9	0.2	125.8	1.0		10.5	19.4	0.1
Delay (s)	180.2	125.6	17.7	147.8	68.0	33.9	191.9	38.3		80.0	69.0	27.5
Level of Service	F	F	B	F	E	C	F	D		F	E	C
Approach Delay (s)		114.9			78.5			76.0			62.6	
Approach LOS		F			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			88.6									F
HCM 2000 Volume to Capacity ratio			1.07									
Actuated Cycle Length (s)			150.0									21.6
Intersection Capacity Utilization			102.3%									G
Analysis Period (min)			15									
c Critical Lane Group												

Appendix K – Alma Street and Embarcadero Road Conceptual Improvements

Embarcadero Street & Emerson Street Intersection Improvements



LEGEND:

-  SIGNALIZED INTERSECTION
-  EXISTING UTILITY POLE
-  ADA COMPLIANT CURB RAMP

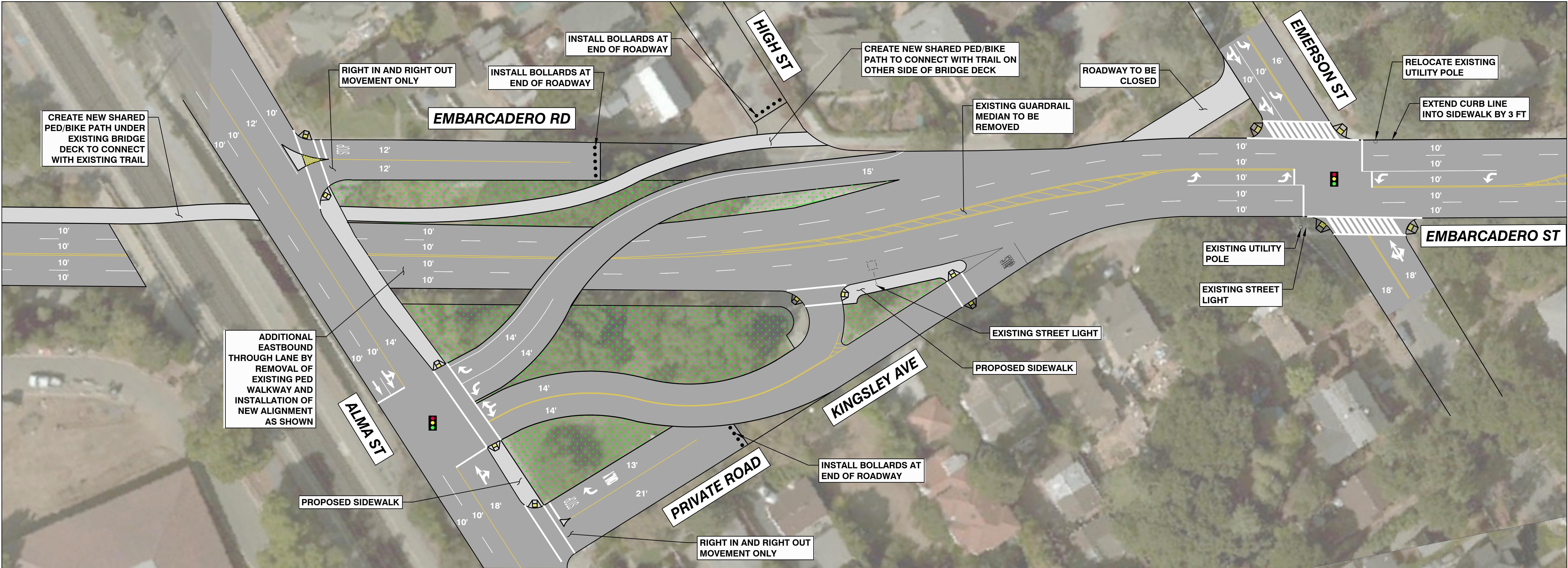
Concept 1

Alma Street - Near Term Improvements



- LEGEND:
-  SIGNALIZED INTERSECTION
 -  ADA COMPLIANT CURB RAMP
 -  EXISTING STREET LIGHT

Embarcadero Street - Long Term Improvements



- LEGEND:
-  SIGNALIZED INTERSECTION
 -  CONCRETE BOLLARD
 -  EXISTING UTILITY POLE
 -  ADA COMPLIANT CURB RAMP
 -  EXISTING STREET LIGHT

