

APPENDIX H
Traffic Impact Study

**COVINA iTEC / PARK & RIDE / TOD
TRAFFIC IMPACT STUDY**

DRAFT

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SECTION 1.0 INTRODUCTION

The Covina Innovation, Technology, and Event Center (iTEC) / Transit Center Park & Ride Facility / Transit Oriented Development (TOD) Traffic Impact Study is an analysis of traffic-related impacts associated with implementation of the project. This study includes an analysis of potential traffic impacts on the surrounding circulation system, along with assumptions, methodology, findings and recommendations.

1.1 PROJECT DESCRIPTION

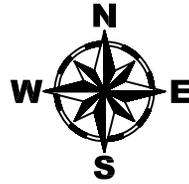
The proposed project is located approximately 23 miles east of Downtown Los Angeles in the City of Covina. Figure 1.1-1 shows the regional location map. The project site is located on the northeast corner of Citrus Avenue at Covina Boulevard approximately midway between the Interstate-10 (I-10) and Interstate-210 (I-210) Freeways. The proposed project will replace the former Kmart site and supplementary automobile service facility with a mixed-use development. The former Kmart site had approximately 100,000 square feet (SF); and the supplementary automobile service facility had approximately 12 service stalls. There is also a local shopping plaza with approximately 21,719 SF that is not a part of the project.

The proposed Covina iTEC / Park & Ride / TOD project is mixed-use development has that residential, office, retail and transit facilities. Figure 1.1-2 shows the conceptual site plan for the proposed project. The residential component is proposed to be 120 townhomes located on the north end of the project site. Access to the residential component of the project will be from Citrus Avenue and will be restricted to left-in, right-in and right-out movements.

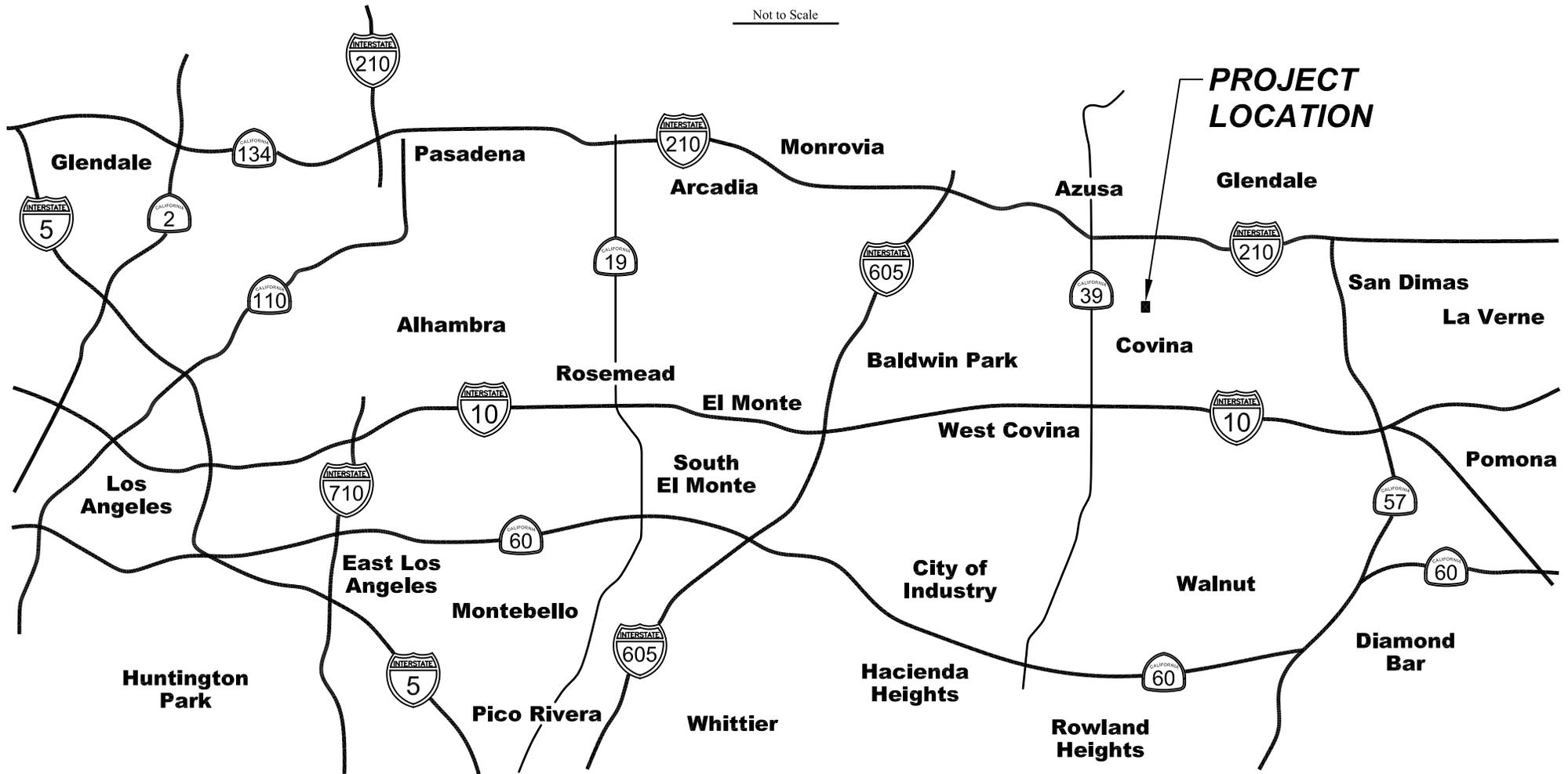
The proposed Covina iTEC consists of approximately 12,000 SF of office space; 5,200 SF for a business incubator; and 21,000 SF for an event center. The business incubator is a complimentary use to the proposed office space. The proposed capacity for the event center is approximately 700 guests. However, the proposed operations of the event center would generally be during the midday, the evening or on the weekend, which are outside of the AM and PM peak periods because of the lack of available on-site parking. For special events during the evening or on the weekend, the parking spaces in the proposed Transit Center Park & Ride facility parking structure would be made available for the event center. The City of Covina would own and operate the Covina iTEC facility.

The proposed Transit Center Park & Ride facility would provide a parking structure with approximately 400 parking spaces and approximately 4,800 SF of complimentary transit-oriented retail kiosks. The proposed Transit Center Park & Ride facility would be owned and operated by Foothill Transit.

Finally, the proposed access to the Covina iTEC and Transit Center Park & Ride facilities would be shared between the two facilities. The access on Citrus Avenue will be restricted to left-in, right-in and right-out movements. However, the access on Covina Boulevard will not be restricted.



Not to Scale



**PROJECT
LOCATION**

REGIONAL LOCATION MAP

CITY OF COVINA

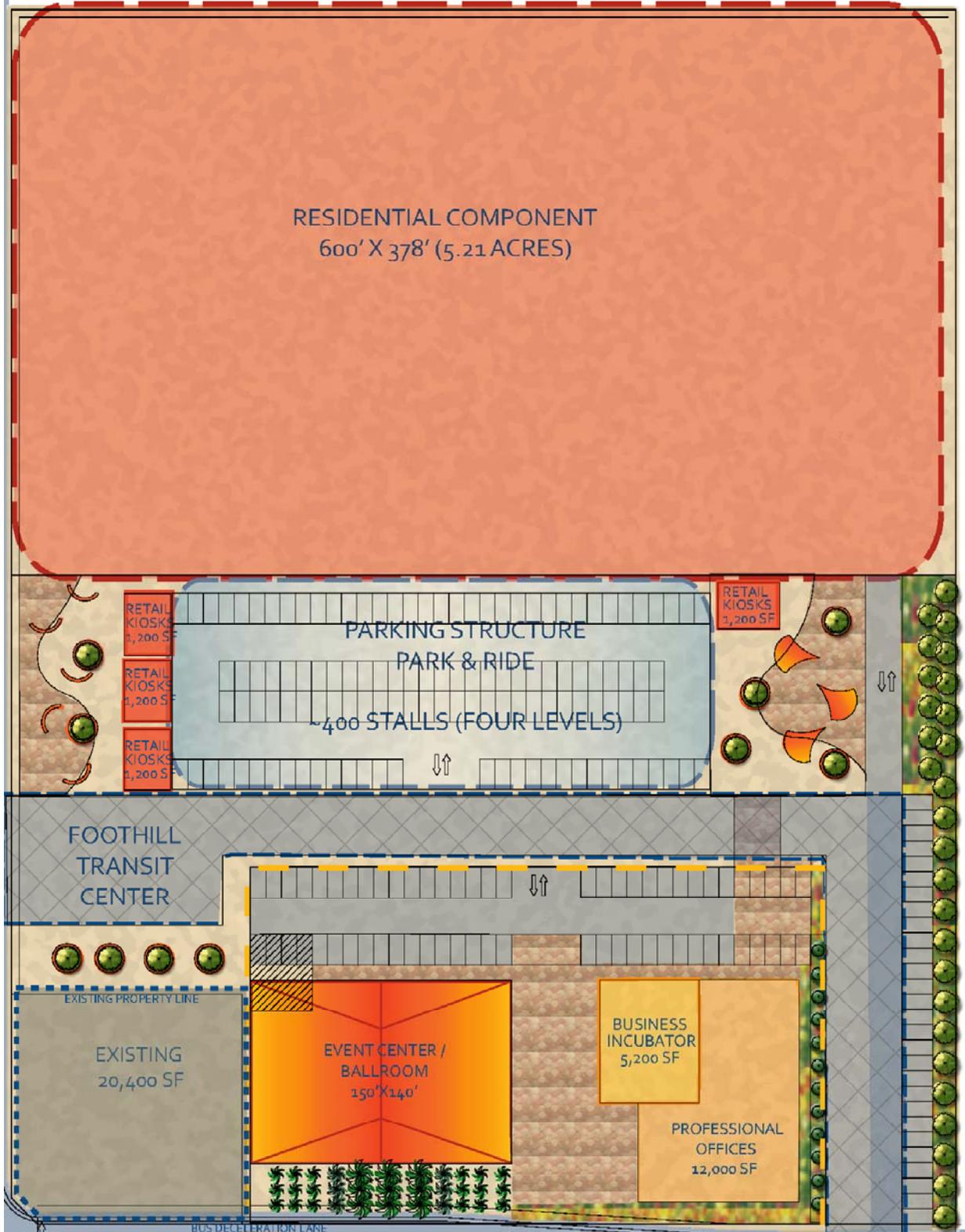
Figure 1.1-1



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COVINA iTEC / PARK & RIDE / TOD PROJECT

LAYOUT 1



SITE PLAN

CITY OF COVINA

Figure 1.1-2

1.2 SCOPE OF ANALYSIS

This traffic study examines existing traffic conditions, analyzes future conditions and identifies potentially significant adverse traffic impacts for future conditions and potential mitigation measures for improving traffic circulation. The anticipated completion and occupancy of the proposed project is 2017. For this analysis, 2017 was used as the project opening year. It assumed that General Plan buildout of the area would occur 20 years later in 2036. The following scenarios were analyzed in the traffic study:

- 2016 existing conditions
- 2017 without the proposed project
- 2017 with the proposed project
- 2036 without the proposed project
- 2036 with the proposed project

The scope of this study included the following key components:

- field observations to document and field verify existing conditions
- forecasting of future traffic conditions
- Level of Service (LOS) analysis
- improvement recommendations

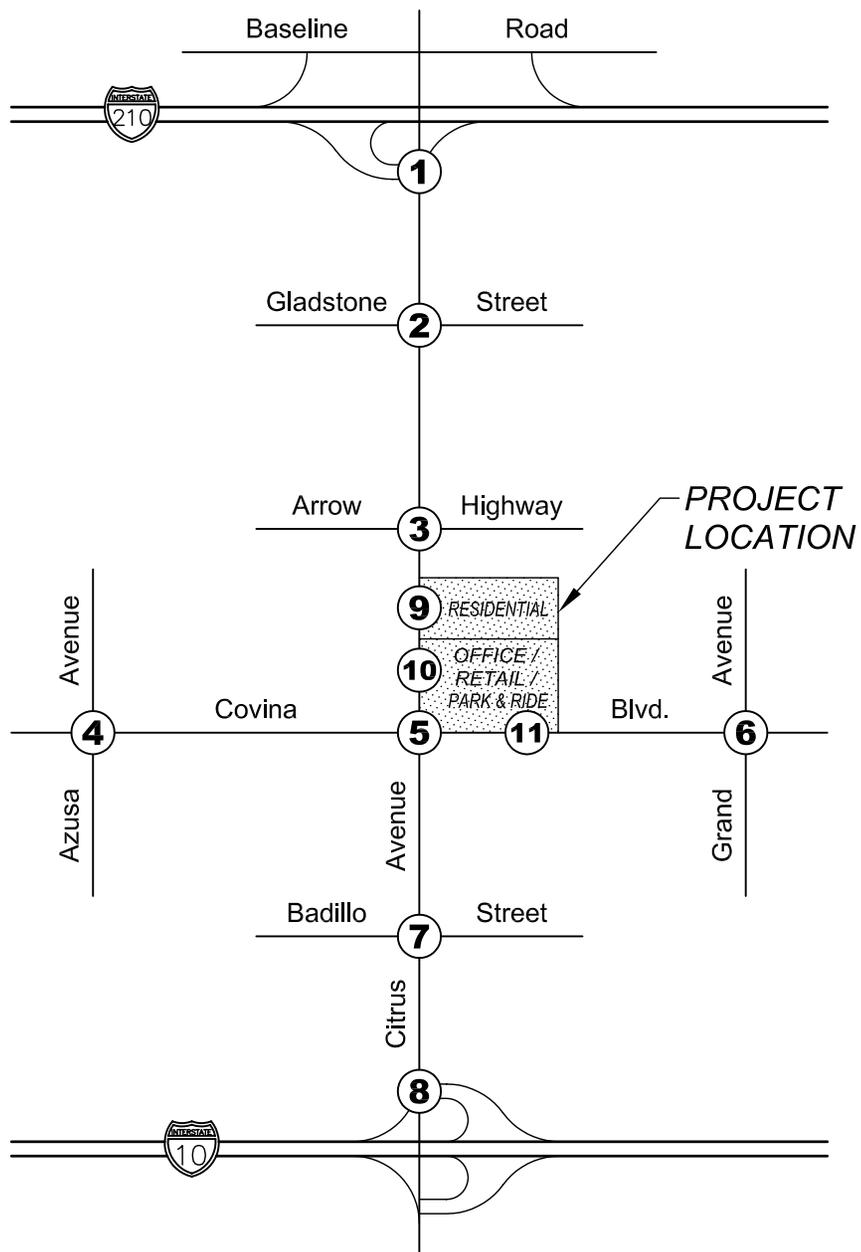
1.3 STUDY AREA

Based on consultation with the City of Covina, the study area selected for this project included eight intersections that may be adversely impacted by implementation of the proposed project. Table 1.3-1 lists the study intersections. Figure 1.3-1 shows the study area for the traffic impact analysis.

**TABLE 1.3-1
STUDY INTERSECTIONS**

Index Code^[1]	Intersection
1	Citrus Avenue at I-210 eastbound ramps
2	Citrus Avenue at Gladstone Street
3	Citrus Avenue at Arrow Highway
4	Azusa Avenue at Covina Boulevard
5	Citrus Avenue at Covina Boulevard
6	Grand Avenue at Covina Boulevard
7	Citrus Avenue at Badillo Street
8	Citrus Avenue at I-10 westbound ramps

[1] The Index Code refers to the numbers used to identify the intersection on the circulation network and is used throughout the analysis in this Traffic Impact Study. These intersection locations are shown in Figure 1.3-1.



PROJECT STUDY AREA
CITY OF COVINA

Figure 1.3-1

SECTION 2.0 METHODOLOGY

This section describes the procedures and methodologies used to forecast project traffic and to analyze potential project impacts on the circulation system in the study area. Topics in this section include traffic forecasting assumptions, traffic counts, trip generation, trip distribution, traffic assignment, and LOS.

2.1 ASSUMPTIONS

The expected opening year for the project is 2017. An annual ambient growth rate of one percent per year was used to forecast 2017 traffic conditions from existing traffic conditions. It was assumed that General Plan buildout of the region would occur 20 years later in the year 2036.

As part of the *City of Covina Bicycle Master Plan* (Alta Planning + Design, 2011), it was proposed to install striped bike lanes on Citrus Avenue within the existing curb-to-curb road width. In addition, it was proposed that Covina Boulevard be modified from a four-lane road with no striped bike lanes to a two-lane road with striped bike lanes, an application commonly referred as a “road diet.” Although there is no near-term project to implement these proposed bike facility improvements near the proposed project, it was assumed that by 2036 that striped bike lanes would be installed on Citrus Avenue and that the proposed “road diet” would be implemented for Covina Boulevard.

2.2 TRAFFIC COUNTS

Traffic counts were collected in March and April 2016 during both the AM peak period of 7:00 AM to 9:00 AM and the PM peak period of 4:00 PM to 6:00 PM for the following intersections listed below. The detailed traffic counts are provided in Appendix A.

1. Citrus Avenue at the I-210 eastbound ramps
2. Citrus Avenue at Gladstone Street
3. Citrus Avenue at Arrow Highway
4. Azusa Avenue at Covina Boulevard
5. Citrus Avenue at Covina Boulevard
6. Grand Avenue at Covina Boulevard
7. Citrus Avenue at Badillo Street
8. Citrus Avenue at the I-10 westbound ramps

2.3 FUTURE BACKGROUND TRAFFIC VOLUMES

Future background traffic volumes for year 2017 without the proposed project were determined by applying an ambient growth rate of one percent per year and adding cumulative project traffic. Cumulative project traffic is traffic generated by other projects that currently do not exist but which will exist when the proposed project is completed.

Future daily traffic volumes for year 2036 were determined by applying the projected growth factor provided in the *2010 Congestion Management Program* (Los Angeles County Metropolitan Transportation Authority (Metro), 2010). For the West Covina subregion, which includes the City of Covina and surrounding cities and communities, the expected growth factor from 2016 to 2036 was approximately 8.1 percent. To establish the AM and PM peak hour intersection turning volumes in 2036, the daily traffic volumes were post-processed according to the procedures outlined in the National Cooperative Highway Research Program (NCHRP) Report 255.

2.4 PROJECT TRIP GENERATION

Project trip generation is defined as the number of trips that originate or terminate at a project site. The amount of traffic generated is a function of the extent and type of land use. Trip generation is usually estimated using trip generation rates which indicate the amount of traffic generated per unit of land use. Trip generation for different land uses documented in the Institute of Transportation Engineers (ITE) *Trip Generation* and related publications are typically used in traffic studies.

The ITE *Trip Generation* provided trip generation rates for all proposed land uses except for the proposed event center. To estimate the daily trip generation for the proposed event center, it was separated into two types of trip generators, the guests and the employees such as the hostesses, servers, bartenders and kitchen help. For the guests, it was assumed that the average vehicle occupancy was two guests per vehicle. Therefore, each guest would generate 0.5 one-way trips, or one trip per guest. For the employees, it was assumed that each employee would generate two trips.

Based on the proposed operations of the event center, it would generally have events during the midday, the evening or on the weekend, which are outside of the AM and PM peak periods. The event center would not have events during the AM and PM peak periods because of the lack of available on-site parking during these times. Therefore, nominal traffic is anticipated for the event center during the AM peak hour and for the guests during the PM peak hour. However, it was assumed that the employees for a special event during the evening would arrive during the PM peak hour, which would provide the employees with a couple of hours to prepare for the special event.

For special events during the evening or the weekend, the special events can have up to 700 guests because of the unused parking in the Transit Center Park & Ride parking structure would be made available. To estimate the number of employees, it was conciliated with the Event Coordinator for the Richard Nixon Library in the City of Yorba Linda that approximately 1.5 employees were needed per 15 guests. Based on this ratio, it was estimated that approximately 70 employees such as hostesses, servers, bartenders and kitchen help would be needed for a special event for 700 guests.

Table 2.4-1 shows the trip generation rates for the existing permitted land uses and the proposed project. As shown in Table 2.4-1, a pass-by trip reduction was applied for the Department Store land use. A pass-by trip occurs when a person makes an intermediate stop at a commercial site, but the commercial site is not the primary destination. The pass-by trips are also not diverted from another road. Data collected by ITE on pass-by trips for various commercial land uses are presented in the *ITE Trip Generation Handbook*. However, the *Trip Generation Handbook* did not have pass-by rates specifically for a Department Store land use. Because of the similar characteristics between a Department Store and Shopping Center land uses, the pass-by rate of 34 percent for a Shopping Center land use was applied to the Department Store land use.

**TABLE 2.4-1
PROJECT TRIP GENERATION RATES**

Land Use	ITE Code	Unit Size	Trip Generation Rates per Unit Size ^[1]								
			Daily			AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
Park & Ride Lot with Bus Service	090	PS ^[4]	2.25	2.25	4.50	0.56	0.15	0.71	0.16	0.46	0.62
Condominium/Townhouse	230	DU ^[5]	2.91	2.91	5.81	0.07	0.37	0.44	0.35	0.17	0.52
Office	710	kSF ^[6]	5.52	5.52	11.03	1.37	0.19	1.56	0.25	1.24	1.49
Retail	820	kSF	21.35	21.35	42.70	0.60	0.36	0.96	1.78	1.93	3.71
Department Store	875	kSF	11.44	11.44	22.88	0.37	0.21	0.58	0.95	0.92	1.87
Pass-by Trips ^[2]			-3.89	-3.89	-7.78	-0.13	-0.07	-0.20	-0.32	-0.31	-0.63
Automobile Care Center ^[3]	942	SS ^[7]	6.24	6.24	12.48	1.03	0.49	1.52	1.09	1.09	2.17
Event Center	N/A	Attendee	0.50	0.50	1.00	Nom. ^[8]	Nom.	Nom.	Nom.	Nom.	Nom.
		Employee	1.00	1.00	2.00	Nom.	Nom.	Nom.	1.00	0.00	1.00

Sources: Institute of Transportation Engineers (ITE), *Trip Generation*, 9th Edition, 2012 and *ITE Trip Generation Handbook*, 2nd Edition, 2001.

^[1] The average trip generation rates from *ITE Trip Generation* were used. Trip generation rates were for weekdays. AM and PM rates were peak hour rates of adjacent street traffic.

^[2] A pass-by trip rate of 34 percent from *ITE Trip Generation Handbook* was used.

^[3] The Saturday daily trip generation rate was used because no weekday daily trip generation rate was available.

^[4] PS: parking space.

^[5] DU: dwelling unit.

^[6] kSF: 1,000 square feet.

^[7] SS: service stall.

^[8] Nom.: Nominal.

Table 2.4-2 shows the daily and AM and PM peak hour trip generations for the proposed project based on the trip generation rates listed in Table 2.4-1. As shown in Table 2.4-2, a trip generation credit was applied for the existing 100,000 SF Department Store land use and the Automobile Care Center land use with 12 service stalls because these land uses would be replaced by the proposed project. After applying the trip generation credit, the proposed project would generate a net total of 2,072 daily trips with 313 trips occurring during the AM peak hour and 275 trips occurring during the PM peak hour.

**TABLE 2.4-2
PROJECT TRIP GENERATION**

Land Use	Size	Trip Generation								
		Daily			AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
Project Trip Generation										
Park & Ride Lot with Bus Service	400 PS ^[1]	900	900	1,800	224	60	284	62	186	248
Condominium/Townhouse	120 DU ^[2]	349	349	698	9	44	53	42	21	63
Office	17.2 kSF ^[3]	95	985	190	24	3	27	4	21	25
Retail	4.8 kSF	102	102	204	3	2	5	9	9	18
Event Center	700 Guests	350	350	700	Nom. ^[5]	Nom.	Nom.	Nom.	Nom.	Nom.
	70 Employees	70	70	140	Nom.	Nom.	Nom.	70	0	70
Project Trip Generation Credits										
Department Store	100 kSF	-755	-755	-1,510	-24	-14	-38	-63	-60	-123
Automobile Care Center	12 SS ^[4]	-75	-75	-150	-12	-6	-18	-13	-13	-26
Net Total		1,036	1,036	2,072	224	89	313	111	164	275

Source: Hartzog & Crabill, Inc., 2016.

^[1] PS: parking space.

^[2] DU: dwelling unit.

^[3] kSF: 1,000 square feet.

^[4] SS: service stall.

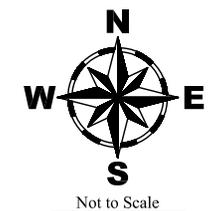
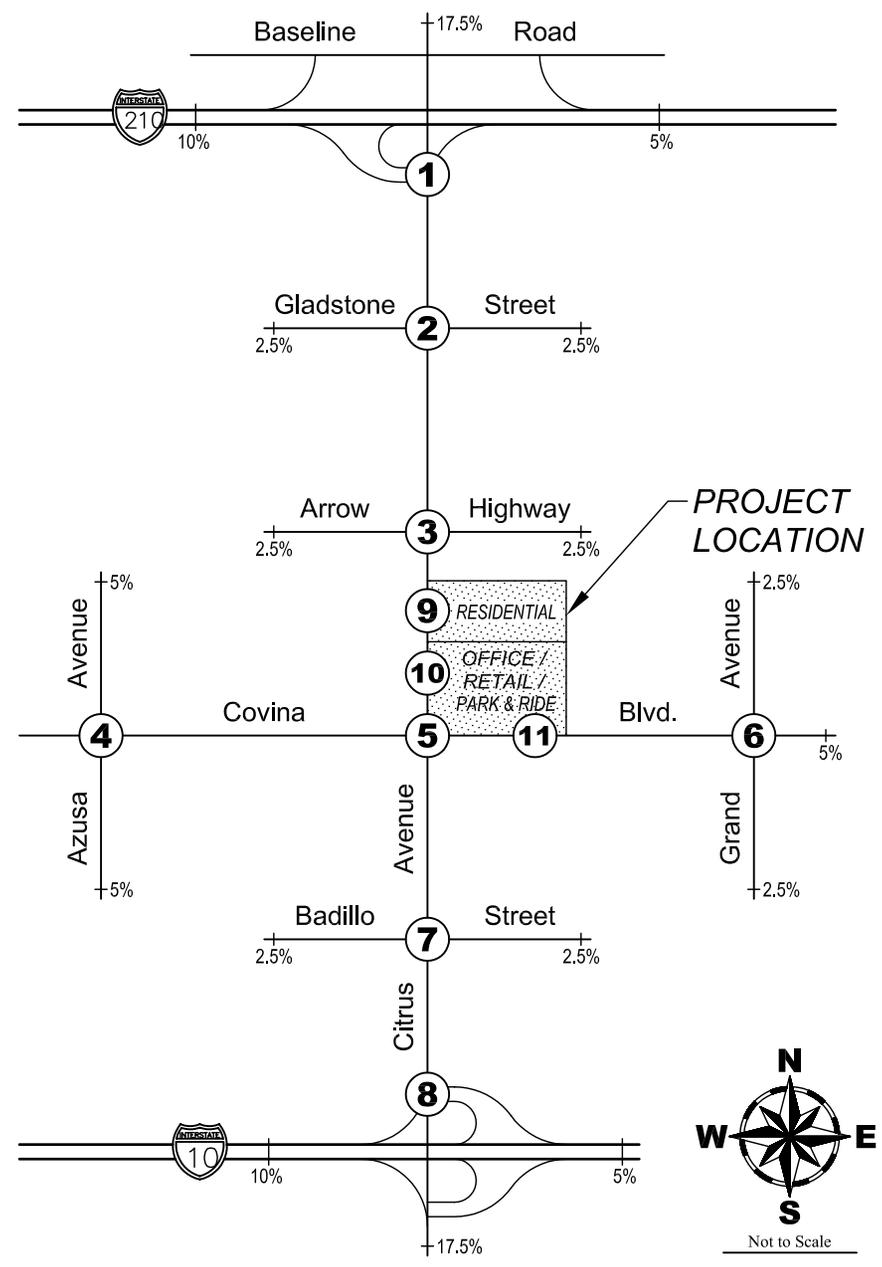
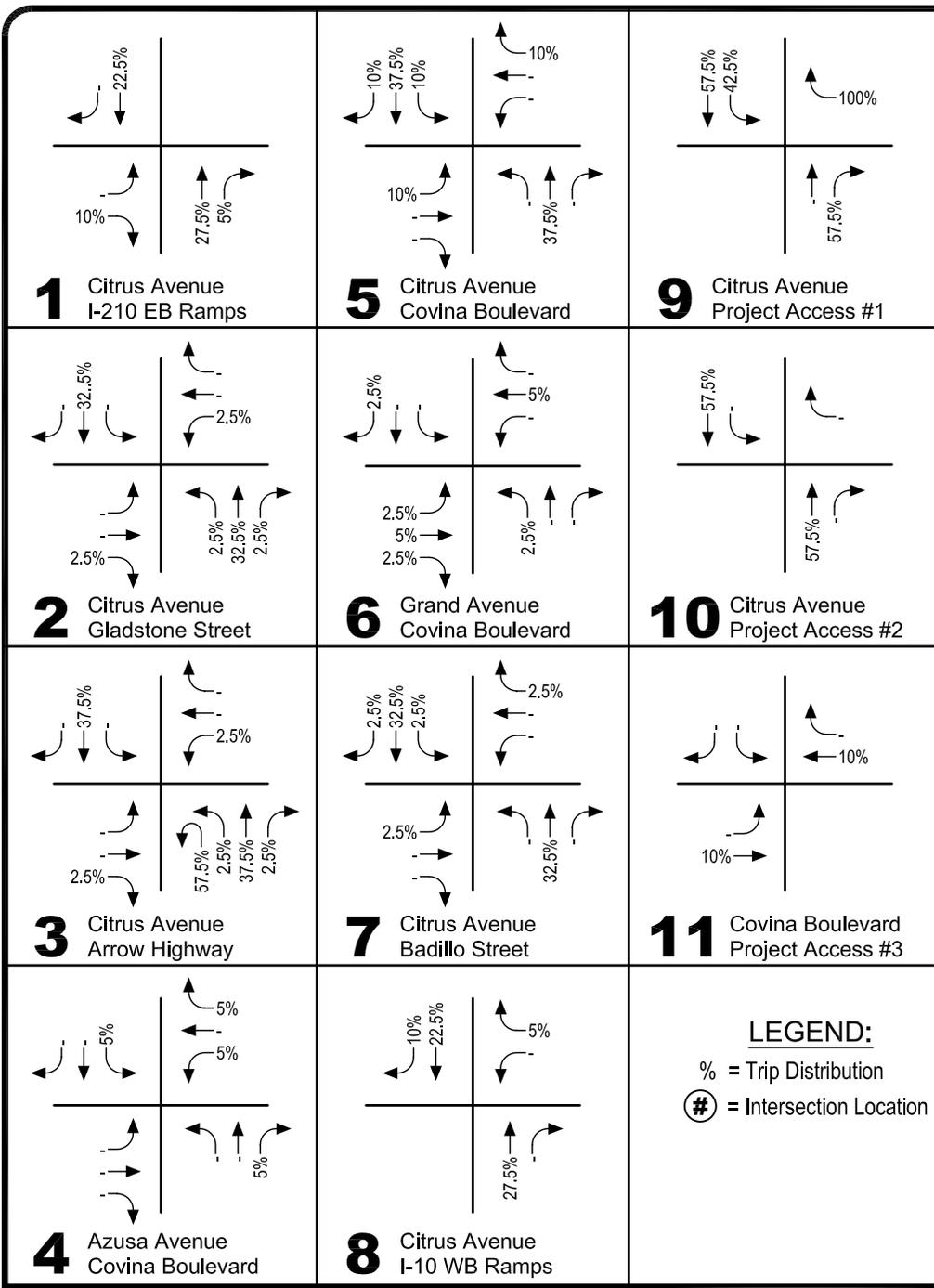
^[5] Nom.: Nominal.

2.5 PROJECT TRIP DISTRIBUTION

Project trip distribution is the process of identifying the general directions that traffic associated with a project would use to travel into and out of the study area. Trip distributions for the proposed project were determined by examining the location of surrounding employment centers, retail centers and other trip attractors/producers. Figures 2.5-1, 2.5-2 and 2.5-3 show the proposed trip distributions for the residential, office/retail and transit center land uses, respectively.

2.6 PROJECT TRIP ASSIGNMENT

Project trip assignment is defined as the specific routes or travel paths the project-related traffic will use based on the trip distribution. The major factors affecting route selection are the minimum-time path and minimum-distance path. Often, the minimum-time and distance paths are the same. When the two paths are different, the minimum-time path will usually take precedence, assuming all other factors are equal. Project trips were assigned to the road system based on the results of the trip distribution for the various land uses as determined in Section 2.5. Figure 2.6-1 shows the results of the net project trip assignment, which incorporated the trip generation credit from the existing land uses.

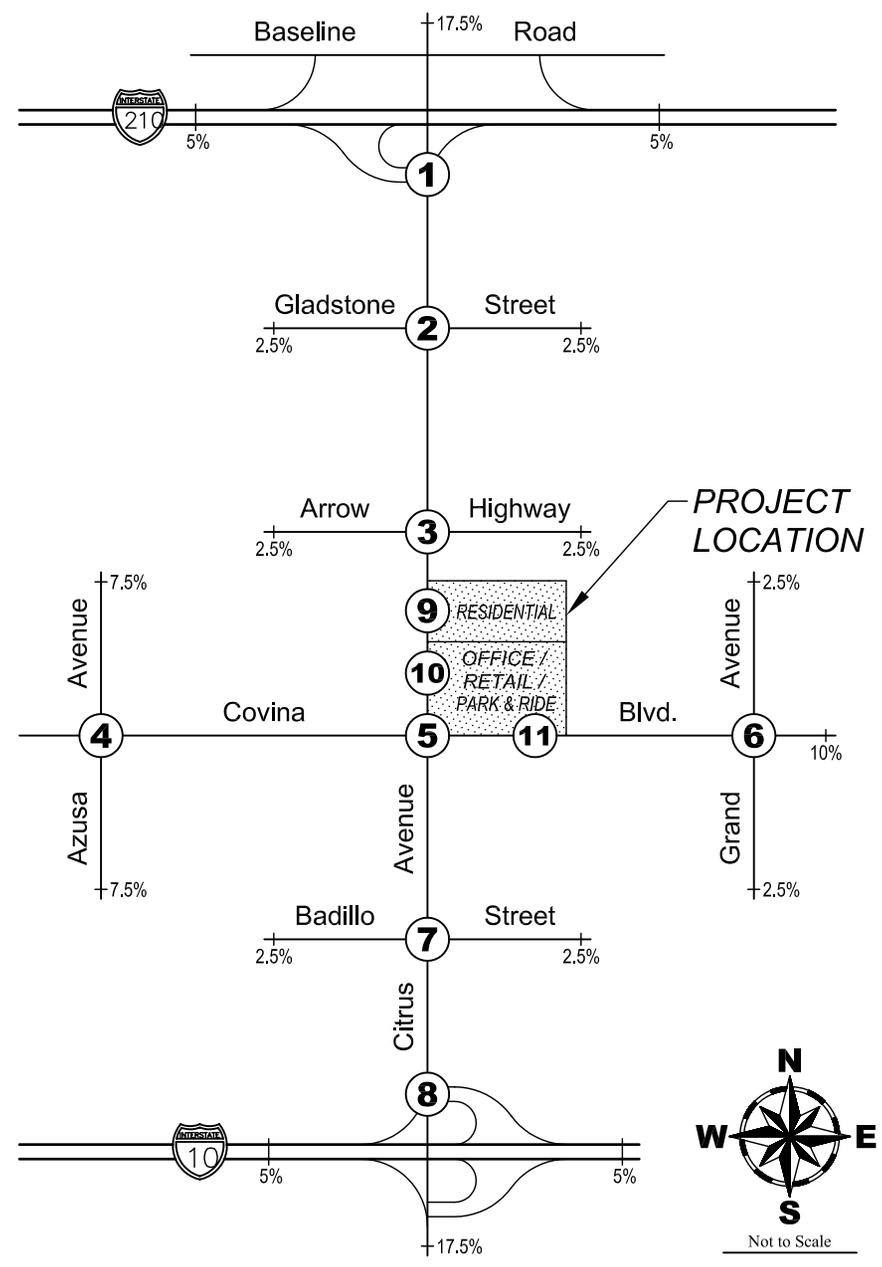
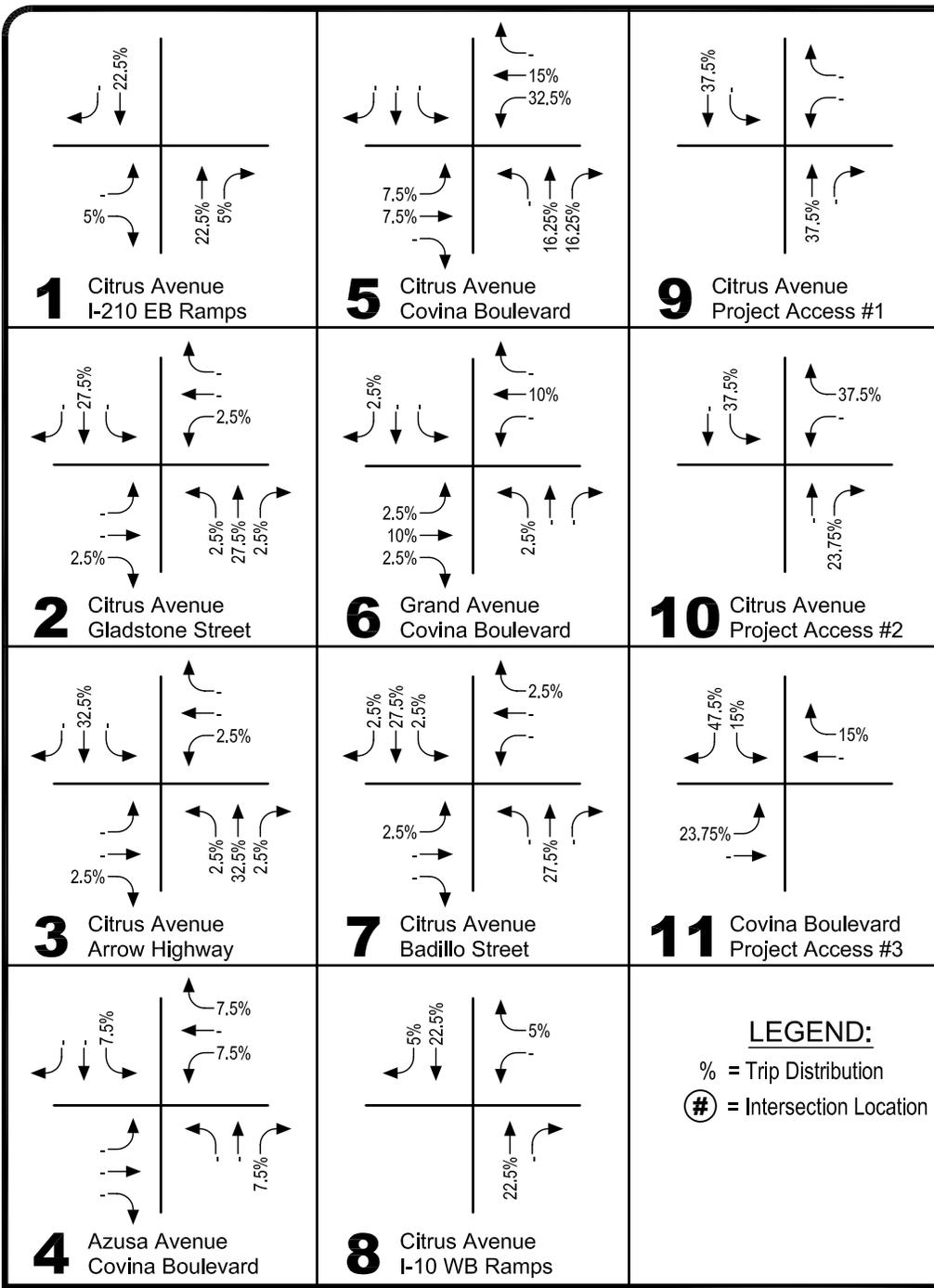


PROJECT TRIP DISTRIBUTION
Residential
CITY OF COVINA

Figure 2.5-1

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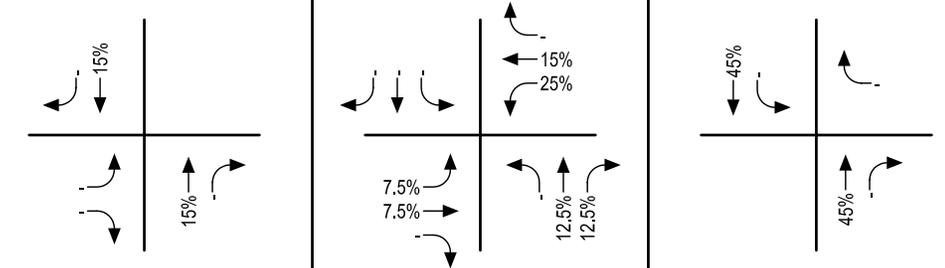




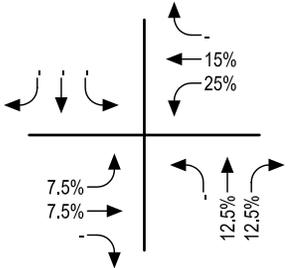
PROJECT TRIP DISTRIBUTION
Office / Retail
CITY OF COVINA

Figure 2.5-2

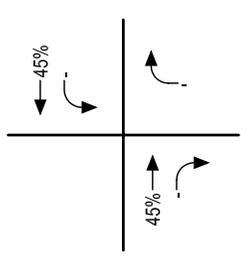




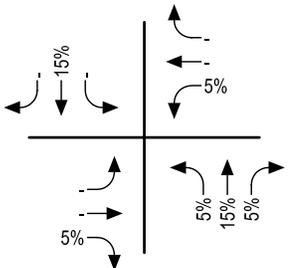
1 Citrus Avenue I-210 EB Ramps



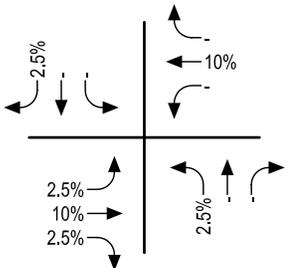
5 Citrus Avenue Covina Boulevard



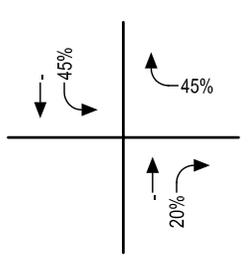
9 Citrus Avenue Project Access #1



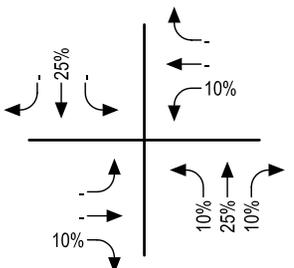
2 Citrus Avenue Gladstone Street



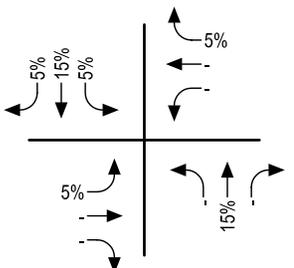
6 Grand Avenue Covina Boulevard



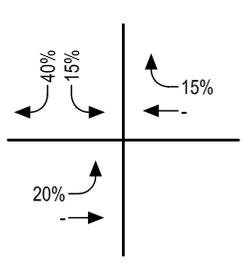
10 Citrus Avenue Project Access #2



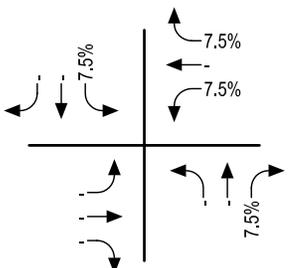
3 Citrus Avenue Arrow Highway



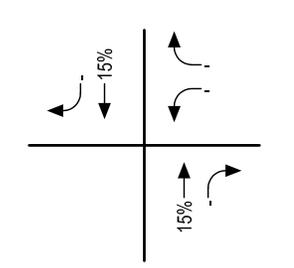
7 Citrus Avenue Badillo Street



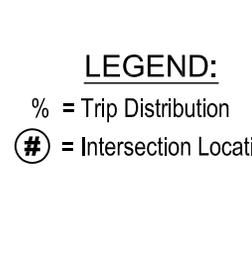
11 Covina Boulevard Project Access #3



4 Azusa Avenue Covina Boulevard

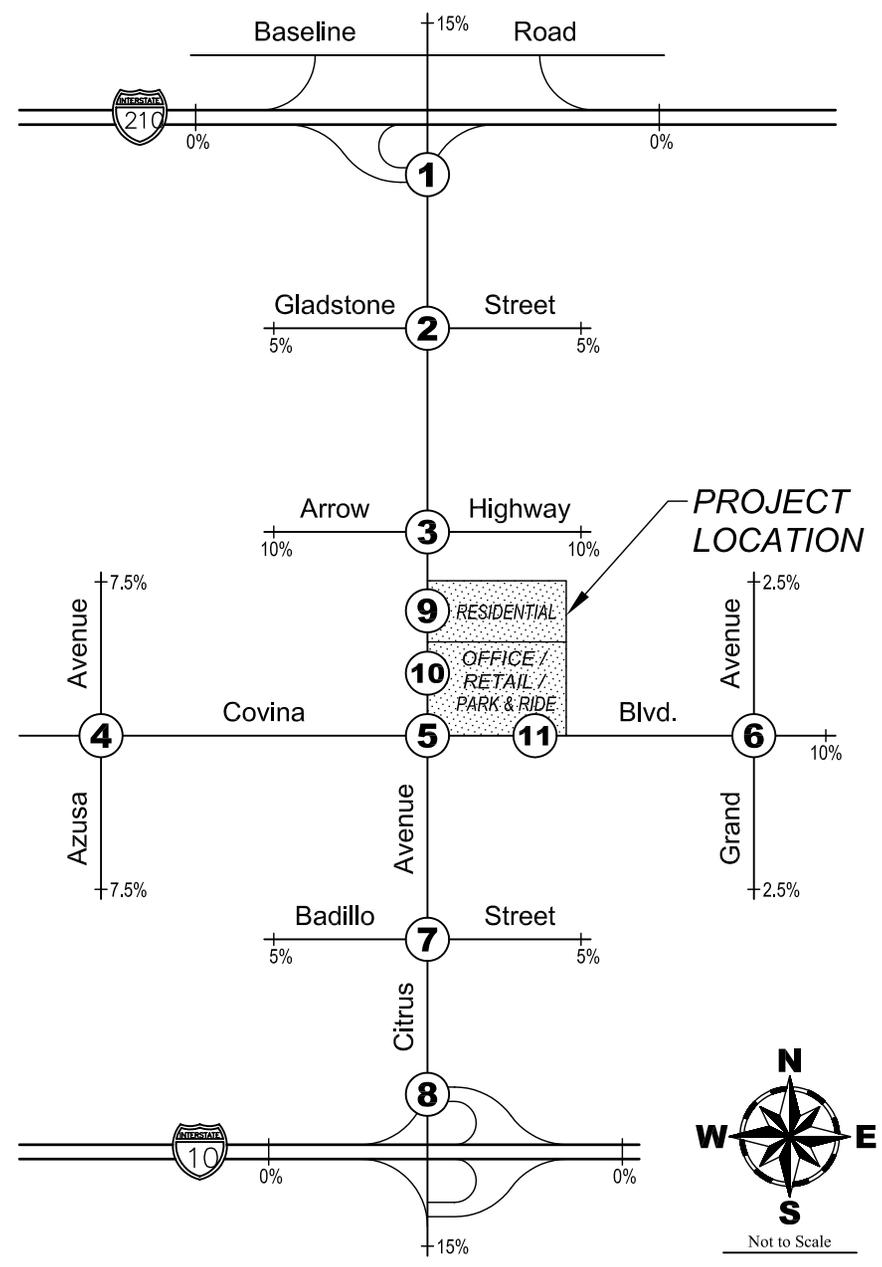


8 Citrus Avenue I-10 WB Ramps



11 Covina Boulevard Project Access #3

LEGEND:
 % = Trip Distribution
 # = Intersection Location

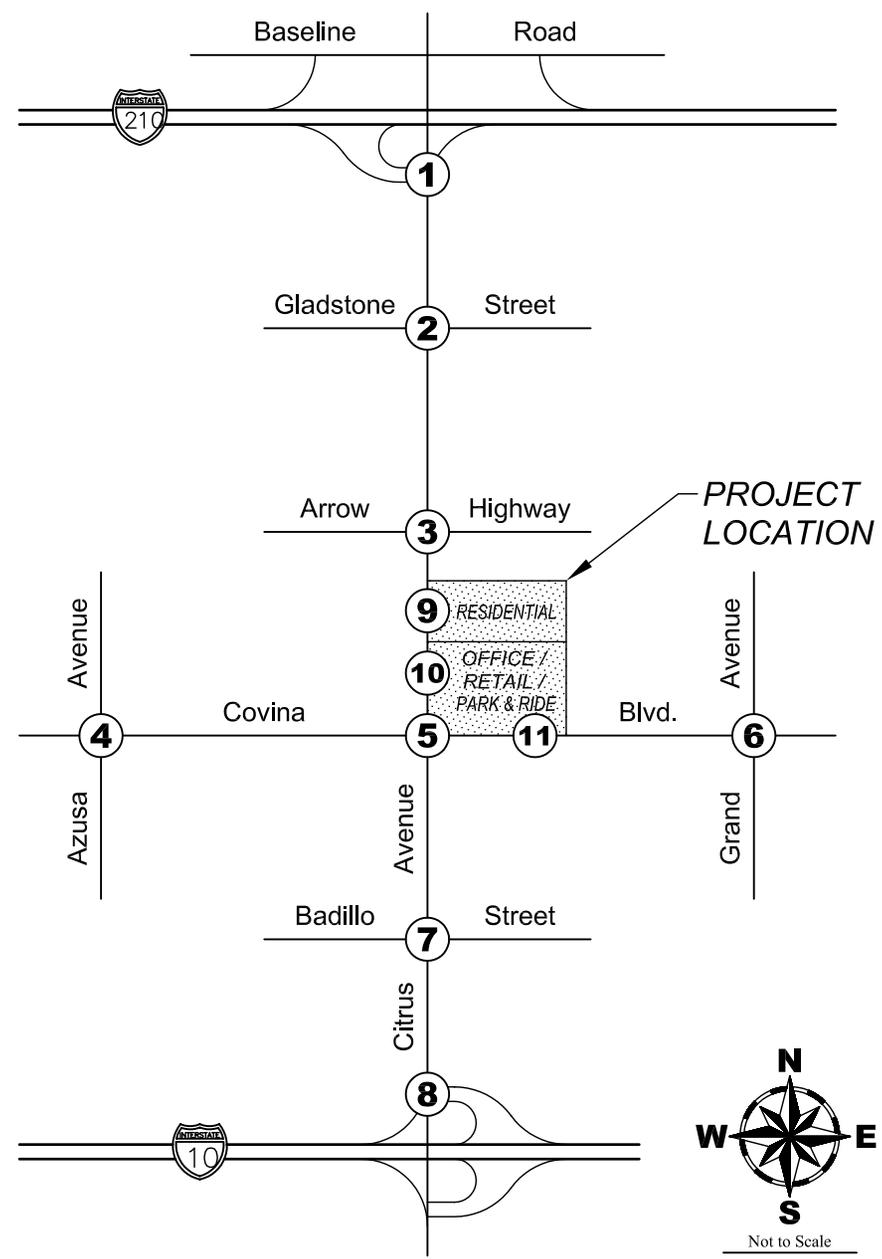
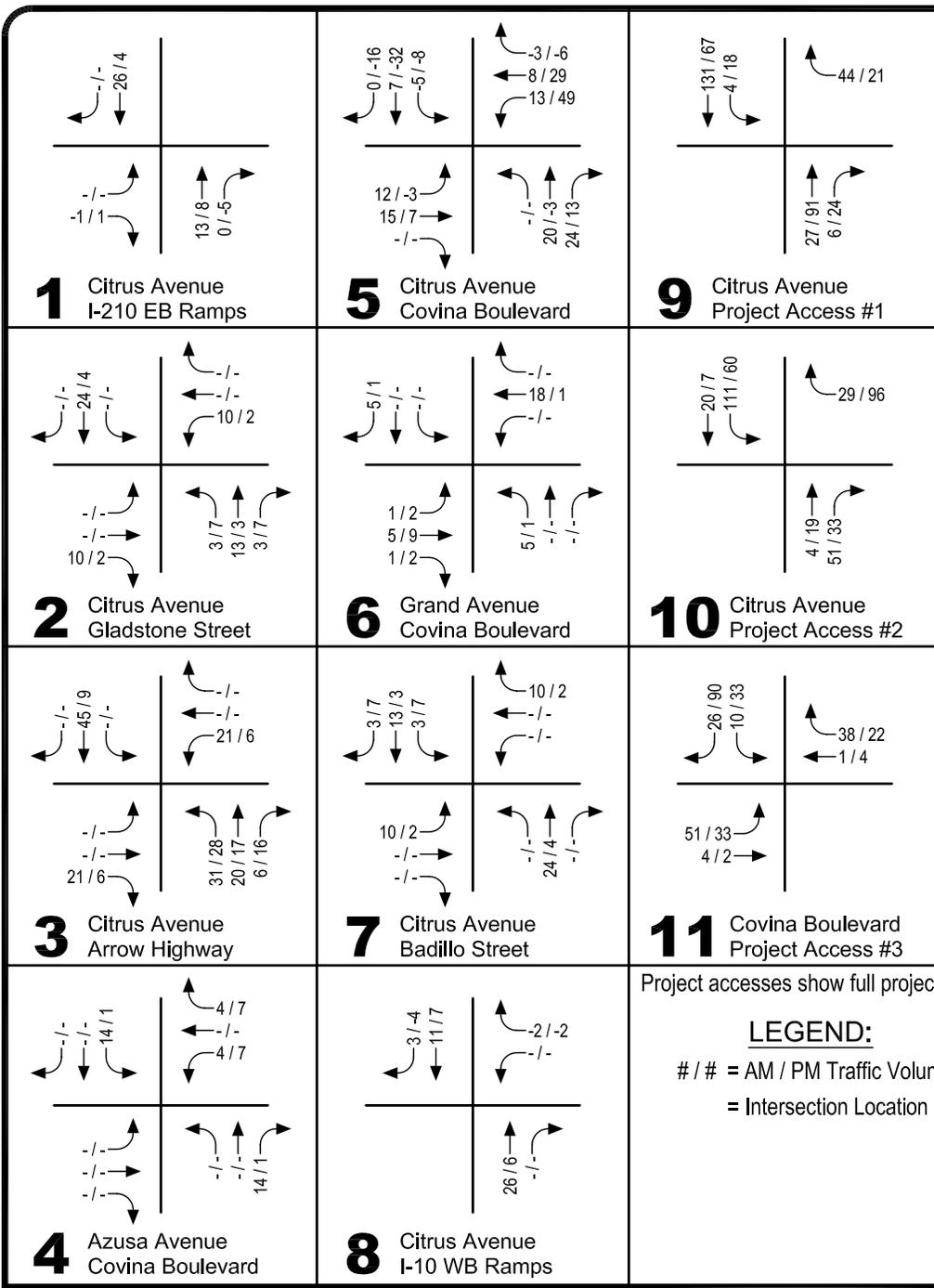


PROJECT TRIP DISTRIBUTION
 Transit Park & Ride
CITY OF COVINA

Figure 2.5-3

FILE: FIG2.5-3.dwg





PROJECT TRIP ASSIGNMENT
Traffic Volumes
CITY OF COVINA

Figure 2.6-1

FILE: FIG2.6-1.dwg



2.7 LEVEL OF SERVICE

The concept of LOS was developed to evaluate the operating conditions of the circulation network. The Highway Capacity Manual (HCM) defines LOS as a qualitative measure which describes the operational conditions of a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. LOS is rated A through F, with LOS A representing the best operating conditions and LOS F representing the worst. Specific criteria are used to define LOS for different types of facilities as discussed below. These criteria can also vary among cities and transportation agencies.

Signalized intersections were analyzed using the Intersection Capacity Utilization (ICU) methodology adopted by the City of Covina. The ICU value is a quantitative ratio which compares intersection volume to capacity. Based on the ICU, intersection LOS is defined as shown in Table 2.7-1.

The ICU methodology for this study used standard parameters currently followed by the City of Covina. These standard parameters include default saturation flow rates defined as the maximum number of vehicles that can pass through a lane per hour of green time at a signalized intersection. The parameters also include clearance interval defined as a percentage of the overall intersection capacity utilized by vehicles to clear the intersection during the amber or yellow signal. The City of Covina uses a default saturation flow rate of 1,600 vehicles per hour per lane (vphpl) for all lanes and saturation flow rate of 2,880 vehicles per hour for dual left-turn lanes. A clearance interval of ten percent was used for all signalized intersections.

**TABLE 2.7-1
LEVEL OF SERVICE CRITERIA – SIGNALIZED INTERSECTIONS**

LOS	Description	ICU
A	At LOS A, there are no cycles that are fully loaded, and few are even close to loaded. No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turning movements are easily made, and nearly all drivers find freedom of operation.	0.00 to 0.60
B	LOS B represents stable operation. An occasional approach phase is fully utilized, and a substantial number are approaching full use. Many drivers begin to feel somewhat restricted within platoons of vehicles.	0.61 to 0.70
C	In LOS C stable operation continues. Full signal cycle loading is still intermittent, but more frequent. Occasionally drivers may have to wait through more than one red signal indication, and back-ups may develop behind turning vehicles.	0.71 to 0.80
D	LOS D encompasses a zone of increasing restriction, approaching instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but enough cycles with lower demand to permit periodic clearance of developing queues, thus preventing excessive back-ups.	0.81 to 0.90
E	LOS E represents the most vehicles that any particular intersection approach can accommodate. At capacity (V/C=1.00) there may be long queues of vehicles waiting upstream of the intersection and delays may be great (up to several signal cycles).	0.90 to 1.00
F	LOS F represents jammed conditions. Back-ups from locations downstream or on the cross street may restrict or prevent movement of vehicles out of the approach under consideration, hence, volumes carried are not predictable. V/C values are highly variable because full utilization of the approach may be prevented by outside conditions.	Above 1.00

Source: Los Angeles County Metropolitan Transportation Authority, 2010 Congestion Management Program, 2010.

Unsignalized intersections were analyzed using the HCM methodology for unsignalized intersections. The HCM established procedures for analyzing one-way stop-controlled (OWSC) intersections. LOS for OWSC intersections was determined by the computed or measured control delay and was defined for each minor movement. The LOS criteria for unsignalized intersections are shown in table 2.7-2.

**TABLE 2.7-2
 LEVEL OF SERVICE CRITERIA – UNSIGNALIZED INTERSECTIONS**

LOS	Description	Delay (sec/veh)^[1]
A	Very low delay. Most vehicles do not stop at the intersection.	≤ 10
B	More vehicles stop than with LOS A, causing higher delays.	> 10 – 15
C	The number of vehicles stopping becomes significant, though many pass through the intersection without stopping.	> 15 – 25
D	The influence of congestion becomes more noticeable. Many vehicles stop and the proposed of vehicles not stopping declines.	> 25 – 35
E	Results in delay considered to be unacceptable.	> 35 – 50
F	Considered unacceptable to most drivers, often occurs with oversaturation, when arriving traffic exceeds the capacity of the intersection.	> 50

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

^[1] sec/veh: seconds per vehicle.

2.8 REGULATORY FRAMEWORK

The City of Covina has established LOS D or better as the acceptable LOS for intersections within the City. For this traffic study, any intersection within the City operating at LOS E or F was considered to be deficient. The California Department of Transportation (Caltrans) has established LOS E or better as the acceptable LOS for within Caltrans facilities. For this traffic study, any intersection on Caltrans facilities operating at LOS F was considered to be deficient.

A significant adverse traffic impact would occur in the City of Covina if the implementation of the proposed project would result in one or more of the following:

- The intersection that would operate at an acceptable LOS without the proposed project, but would operate at unacceptable LOS with the proposed project.
- The intersection to operate at an unacceptable LOS with an increase in the ICU of 0.02 or greater.

SECTION 3.0 EXISTING CONDITIONS

This section describes the existing conditions in the study area, including major land uses, parking facilities, vehicular volumes, road segments and intersection operational characteristics, and existing LOS.

3.1 EXISTING MAJOR LAND USES

The proposed project is located on a site that was formerly occupied by the Kmart department store. This Kmart location also provided supplementary automotive services. The existing 100,000 SF building and automotive services facility will be demolished to accommodate the proposed project.

Land uses to the north, east and west of the propose project consists of residential homes and condominiums/townhomes. Land uses to the south consisted of a gas station and retail shops and restaurants in a neighborhood shopping plaza.

3.2 EXISTING CIRCULATION NETWORK

The following describes the current road operational characteristics in the study area.

Interstate-10 (I-10) Freeway is an eight-lane east-west freeway located south of the City of Covina. The I-10 Freeway provides four general purpose lanes in each direction with an auxiliary lane between the on-ramps and off-ramps. The I-10 Freeway is currently under construction to add one High Occupancy Vehicle (HOV) lane in each direction between the Interstate-605 (I-605) Freeway and the State Route 57 (SR 57) Freeway. The I-10 Freeway connects to major destination hubs such as Downtown Los Angeles to the west and the Cities of Ontario and San Bernardino to the east. Freeway ramps are provided at Azusa Avenue, Citrus Avenue and Grand Avenue.

Interstate-210 (I-10) Freeway is a ten-lane east-west freeway located north of the City of Covina. The I-210 Freeway provides four general purpose lanes and one HOV lane in each direction. The I-210 Freeway connects to major destination hubs such as the City of Pasadena to the west and the City of San Bernardino to the east. Freeway ramps are provided at Azusa Avenue, Citrus Avenue and Grand Avenue.

Citrus Avenue is generally a four-lane north-south Secondary Arterial Street. The road has a mixture of raised medians, two-way left-turn lane (TWLTL) painted medians and no medians. On-street parking is generally permitted on both sides of Citrus Avenue. The posted speed limit varies from 25 to 40 miles per hour (mph). For the road segment between San Bernardino Road to Badillo Street that goes through Downtown Covina, Citrus Avenue is a two-lane road with no median and has angled on-street parking. The posted speed limit on Citrus Avenue through Downtown Covina is 25 mph.

Azusa Avenue is a four-lane north-south Primary Arterial Street. The road has a raised median. On-street parking is generally permitted on both sides of Azusa Avenue. The posted speed limit is 40 mph.

Grand Avenue is a four-lane north-south Primary Arterial Street. The road has a raised median. On-street parking is generally permitted on both sides of Grand Avenue. The posted speed limit is 40 mph.

Gladstone Street is a four-lane east-west Secondary Arterial Street. The road has a TWLTL painted median east of Citrus Avenue and no median west of Citrus Avenue. On-street parking is generally permitted on both sides of Gladstone Street. The posted speed limit is 40 mph and is reduced to 25 mph in the vicinity of schools when children are present.

Arrow Highway is a four-lane east-west Primary Arterial Street. The road has a TWLTL painted median. On-street parking is generally permitted on both sides of Arrow Highway. The posted speed limit is 45 mph.

Covina Boulevard is a four-lane east-west Collector Street. The road has a mixture of raised medians, two-way left-turn lane (TWLTL) painted medians and no medians. On-street parking is generally permitted on both sides of Covina Boulevard. The posted speed limit varies between 35 to 40 mph and is reduced to 25 mph in the vicinity of schools when children are present.

Badillo Street is an east-west Secondary Arterial Street. Badillo Street is a four-lane road east of Citrus Street and is a two-lane road west of Citrus Street. The road has a TWLTL painted median. On-street parking is generally permitted on both sides of Badillo Street. The posted speed limit is 30 mph.

The following describes the current intersection lane configurations in the study area.

1. Citrus Avenue at the I-210 eastbound ramps is a signalized three-legged intersection. The northbound approach has two through lanes. The southbound approach has two through lanes and one free right-turn lane. The eastbound approach has one left-turn lane and one right-turn lane. Marked white crosswalks are provided on the south and west legs of the intersection.
2. Citrus Avenue at Gladstone Street is a signalized four-legged intersection. All approaches to the intersection have one left-turn lane, one through lane and one shared through/right-turn lane. A protected left-turn phase is provided on all approaches to the intersection. Marked yellow crosswalks are provided on all legs of the intersection.
3. Citrus Avenue at Arrow Highway is a signalized four-legged intersection. All approaches to the intersection have one left-turn lane, one through lane and one shared through/right-turn lane. A protected left-turn phase is provided on all approaches to the intersection. Marked white crosswalks are provided on all legs of the intersection.
4. Azusa Avenue at Covina Boulevard is a signalized four-legged intersection. The northbound and southbound approaches have one left-turn lane, one through lane and one shared through/right-turn lane. The eastbound approach has one shared through/left-/right-turn lane. The westbound approach has one shared through/left-turn lane and one right-turn lane. A protected left-turn phase is provided for the northbound and southbound approaches. Marked white crosswalks are provided on the north and east legs of the intersection.

5. Citrus Avenue at Covina Boulevard is a signalized four-legged intersection. All approaches to the intersection have one left-turn lane, one through lane and one shared through/right-turn lane. Marked white crosswalks are provided on all legs of the intersection.
6. Citrus Avenue at Badillo Street is a signalized four-legged intersection. The northbound, eastbound and westbound approaches have one left-turn lane, one through lane and one right-turn lane. The southbound approach has one shared through/left-/right-turn lane. Marked white crosswalks are provided on all legs of the intersection.
7. Citrus Avenue at the I-10 westbound ramps is a signalized three-legged intersection. The northbound approach has three through lanes and one free right-turn lane. The southbound approach has two through lanes and one free right-turn lane. The westbound approach has one shared left-/right-turn lane and one right-turn lane. Marked white crosswalks are provided on the east and west legs of the intersection.
8. Grand Avenue at Covina Boulevard is a signalized four-legged intersection. All approaches to the intersection have one left-turn lane, one through lane and one shared through/right-turn lane. Marked white crosswalks are provided on all legs of the intersection.

The existing circulation network is shown in Figure 3.2-1.

3.3 EXISTING VEHICULAR TRAFFIC VOLUMES

The existing traffic counts used in this study were taken in March and April 2016. Intersection turning movement counts were conducted at the study intersections during the AM peak period of 7:00 AM to 9:00 AM and the PM peak period of 4:00 PM to 6:00 PM. These traffic counts represent existing traffic conditions and are shown in Figure 3.3-1.

3.4 EXISTING TRANSIT SERVICES

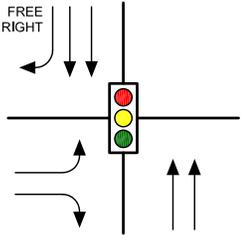
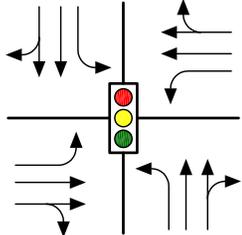
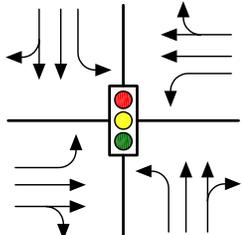
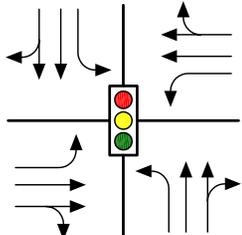
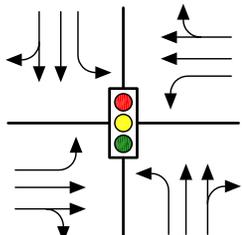
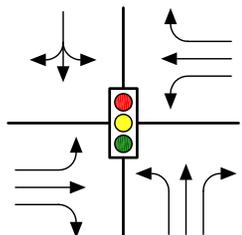
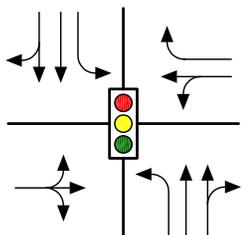
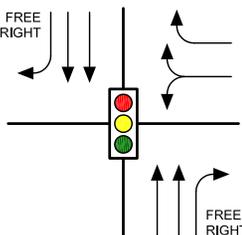
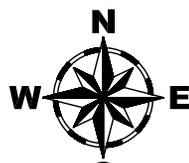
Foothill Transit provides fixed and express bus lines through the City of Covina in the vicinity of the proposed project:

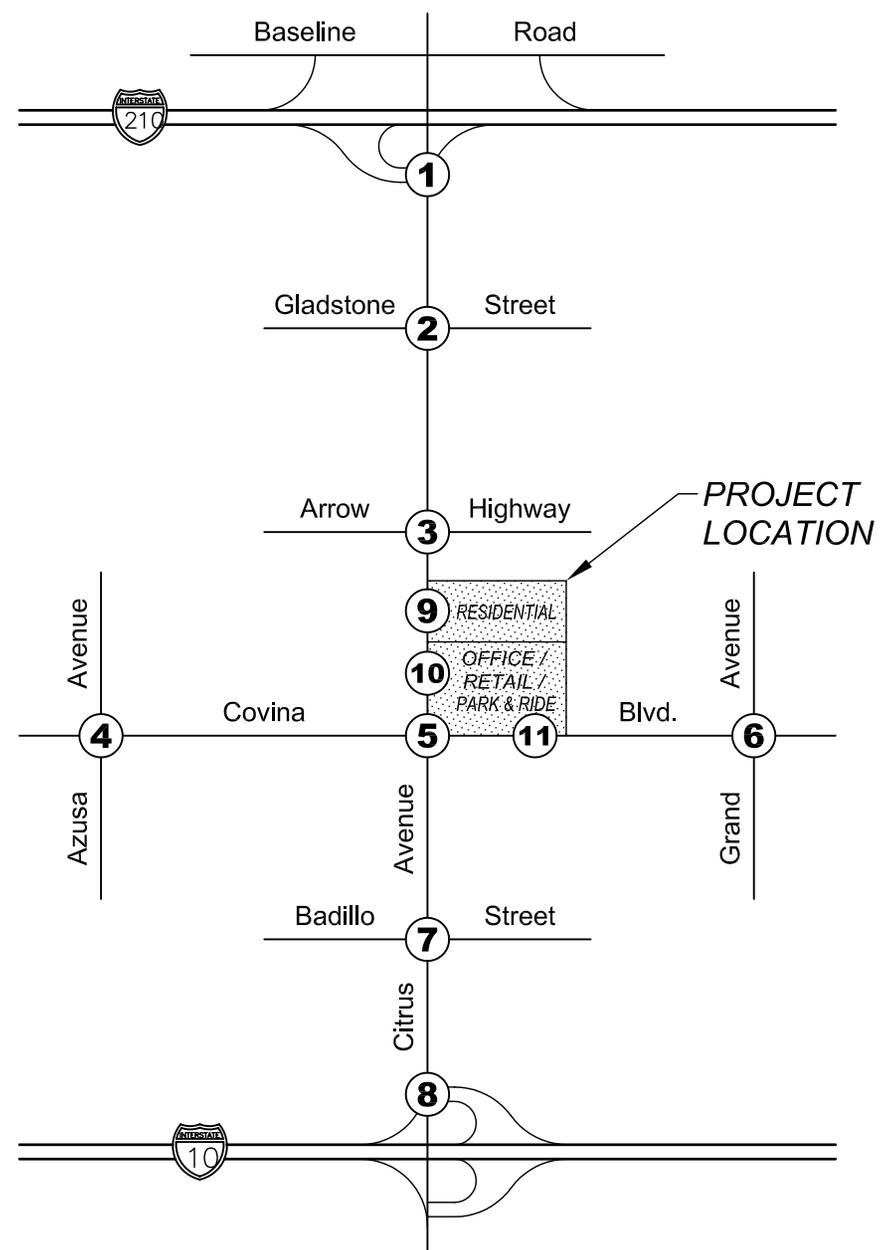
- Line 281: Glendora – West Covina – Puente Hills Mall
- Line 498: Azusa – West Covina – Express Service to Downtown Los Angeles

Line 281 provides local bus service on Citrus Avenue. Line 498 provides express bus service on Grand Avenue to Downtown Los Angeles. However, with the proposed Transit Center Park & Ride, Line 498 is under consideration to be rerouted to provide direct service to the proposed Transit Center Park & Ride.

3.5 EXISTING LEVEL OF SERVICE

Table 3.5-1 summarizes the existing LOS for the intersections during the AM and PM peak hours based on the ICU methodology discussed in Section 2.7. As shown in Table 3.5-1, all intersections are operating at an acceptable LOS except for the intersection of Citrus Avenue at Badillo Street during the PM peak hour. The intersection of Citrus Avenue at Badillo Street operates at unacceptable LOS E during the PM peak hour. The detailed LOS calculation worksheets are included in Appendix B.

 <p>1 Citrus Avenue I-210 EB Ramps</p>	 <p>5 Citrus Avenue Covina Boulevard</p>	<p>DOES NOT EXIST</p> <p>9 Citrus Avenue Project Access #1</p>
 <p>2 Citrus Avenue Gladstone Street</p>	 <p>6 Grand Avenue Covina Boulevard</p>	<p>DOES NOT EXIST</p> <p>10 Citrus Avenue Project Access #2</p>
 <p>3 Citrus Avenue Arrow Highway</p>	 <p>7 Citrus Avenue Badillo Street</p>	<p>DOES NOT EXIST</p> <p>11 Citrus Avenue Project Access #3</p>
 <p>4 Azusa Avenue Covina Boulevard</p>	 <p>8 Citrus Avenue I-10 WB Ramps</p>	 <p>Not to Scale</p>

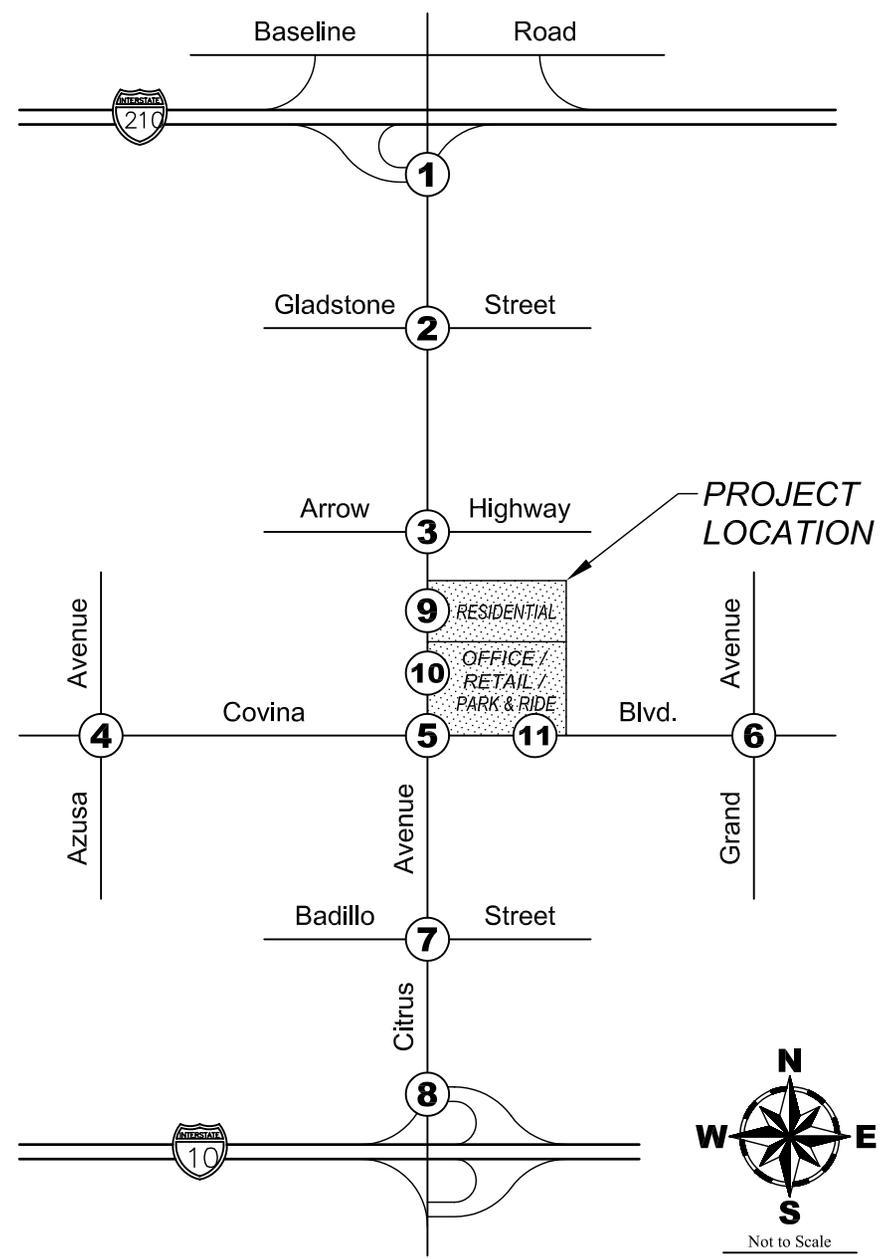
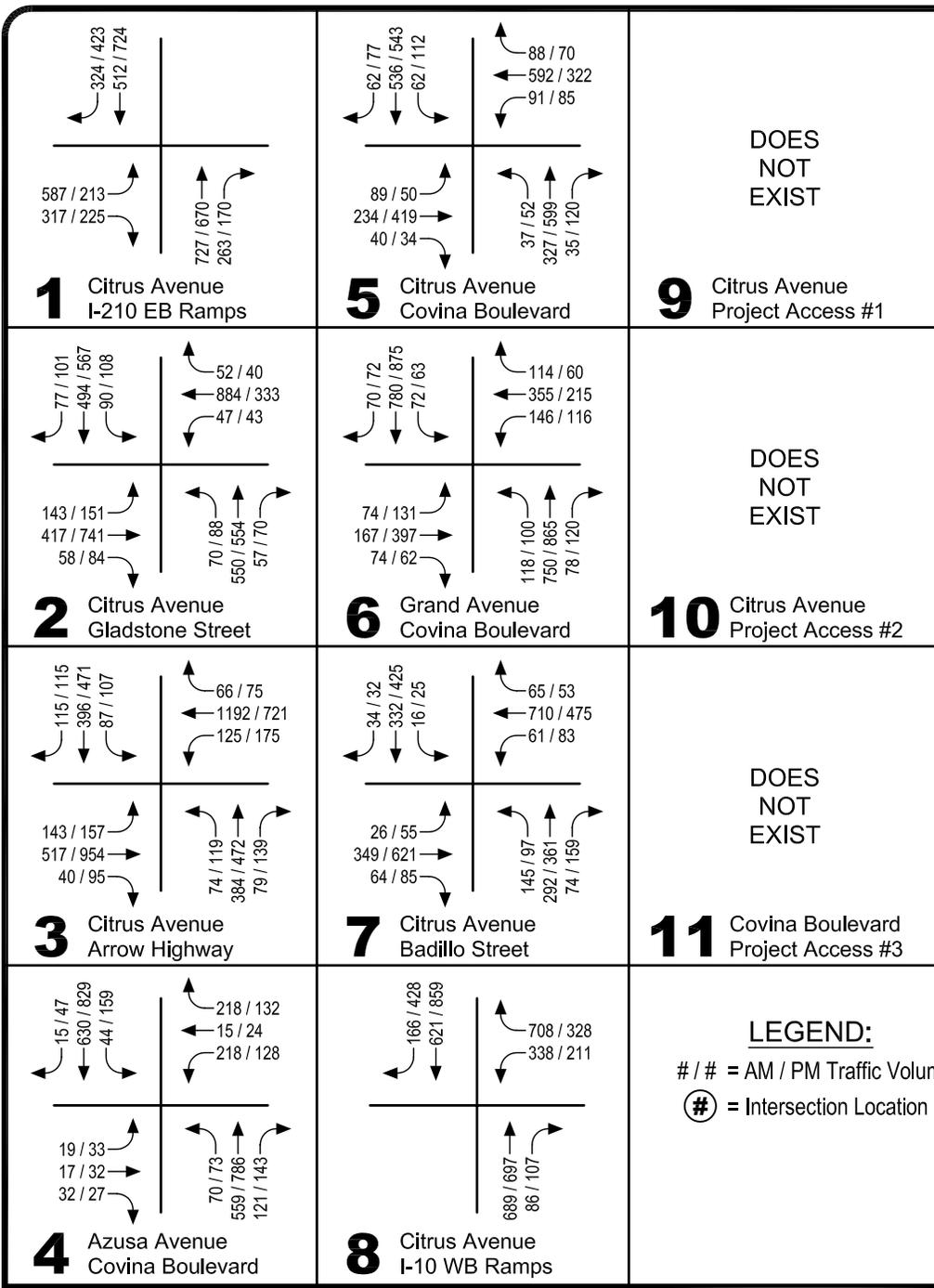


EXISTING CONDITIONS
Circulation Network
CITY OF COVINA

Figure 3.2-1

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EXISTING CONDITIONS
Traffic Volumes
CITY OF COVINA

Figure 3.3-1

FILE: FIG3.3-1.dwg



**TABLE 3.5-1
 INTERSECTION LEVELS OF SERVICE – 2016 EXISTING CONDITIONS**

Index	Intersection	AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
1	Citrus Avenue at I-210 eastbound ramps	0.776	C	0.503	A
2	Citrus Avenue at Gladstone Street	0.728	C	0.648	B
3	Citrus Avenue at Arrow Highway	0.788	C	0.795	C
4	Azusa Avenue at Covina Boulevard	0.491	A	0.585	A
5	Citrus Avenue at Covina Boulevard	0.578	A	0.589	A
6	Grand Avenue at Covina Boulevard	0.632	B	0.674	B
7	Citrus Avenue at Badillo Street	0.889	D	0.902	E
8	Citrus Avenue at I-10 westbound ramps	0.621	B	0.537	A

Source: Hartzog & Crabill, Inc., 2016.

Bolded items indicate intersection operates at below-standard LOS.

SECTION 4.0 2017 TRAFFIC IMPACT ANALYSIS

This section describes the 2017 traffic impacts of the proposed project. This section includes: an analysis of traffic conditions without and with the proposed project in 2017 by determining the LOS and significant adverse traffic impacts based on a comparison of those conditions.

4.1 TRAFFIC CONDITIONS

Traffic volumes for 2017 without the proposed project were calculated by applying an ambient growth rate of one percent per year to the existing traffic volumes and adding cumulative project traffic as discussed in Section 2.3. Figure 4.1-1 shows the total cumulative project traffic for the Downtown Mixed Use project and One Charter project. Figures 4.1-2 and 4.1-3 show the traffic volumes in 2017 without and with the proposed project, respectively.

4.2 TRAFFIC IMPACT ANALYSIS

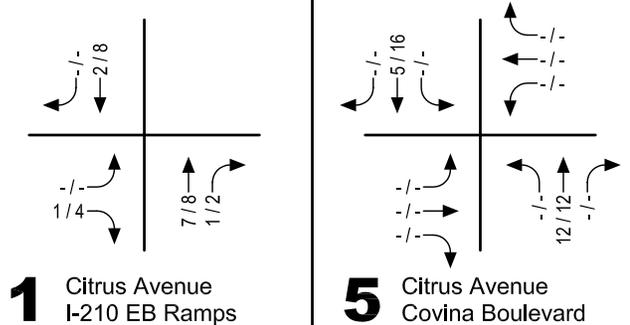
Project-related traffic impacts were determined by comparing the intersection LOS without and with the proposed project. Significant adverse traffic impacts were identified based on the City of Covina’s criteria for significant adverse project impacts previously described in Section 2.8

Table 4.2-1 summarizes the LOS for the intersections in 2017 without the proposed project during the AM and PM peak hours. As shown in Table 4.2-1, all intersections will operate at an acceptable LOS except for the intersection of Citrus Avenue at Badillo Street during the AM and PM peak hours. The intersection of Citrus Avenue at Badillo Street will operate at unacceptable LOS E during the AM and PM peak hours. The detailed LOS calculation worksheets are included in Appendix C.

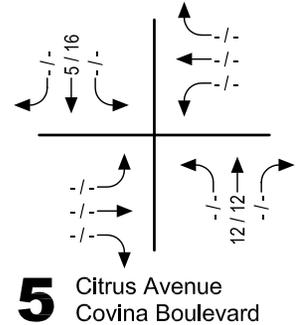
**TABLE 4.2-1
INTERSECTION LEVELS OF SERVICE – 2017 WITHOUT PROJECT**

Index	Intersection	AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
1	Citrus Avenue at I-210 eastbound ramps	0.788	C	0.522	A
2	Citrus Avenue at Gladstone Street	0.739	C	0.667	B
3	Citrus Avenue at Arrow Highway	0.802	D	0.820	D
4	Azusa Avenue at Covina Boulevard	0.496	A	0.598	A
5	Citrus Avenue at Covina Boulevard	0.590	A	0.612	B
6	Grand Avenue at Covina Boulevard	0.641	B	0.686	B
7	Citrus Avenue at Badillo Street	0.914	E	0.937	E
8	Citrus Avenue at I-10 westbound ramps	0.631	B	0.551	A

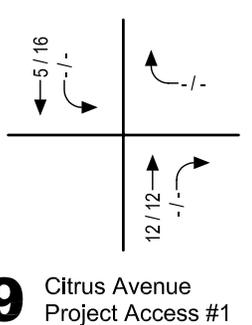
Source: Hartzog & Crabill, Inc., 2016. **Bolded** items indicate intersection will operate at below-standard LOS.



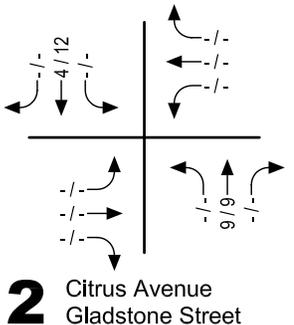
1 Citrus Avenue I-210 EB Ramps



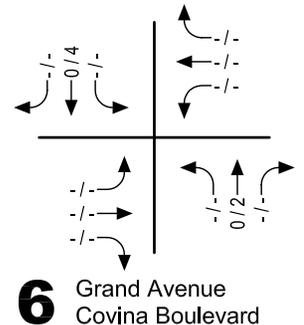
5 Citrus Avenue Covina Boulevard



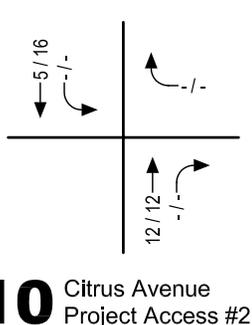
9 Citrus Avenue Project Access #1



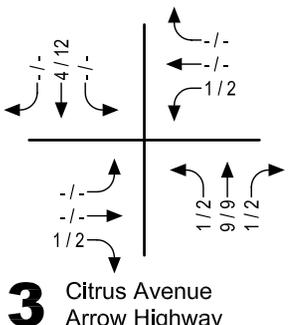
2 Citrus Avenue Gladstone Street



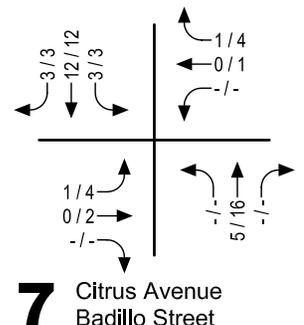
6 Grand Avenue Covina Boulevard



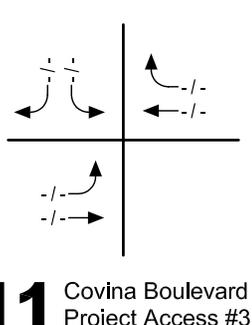
10 Citrus Avenue Project Access #2



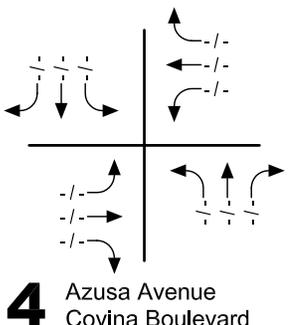
3 Citrus Avenue Arrow Highway



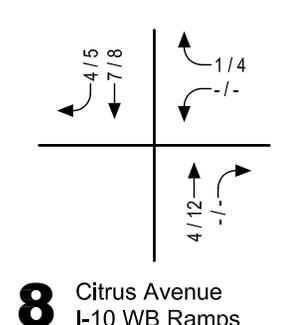
7 Citrus Avenue Badillo Street



11 Covina Boulevard Project Access #3

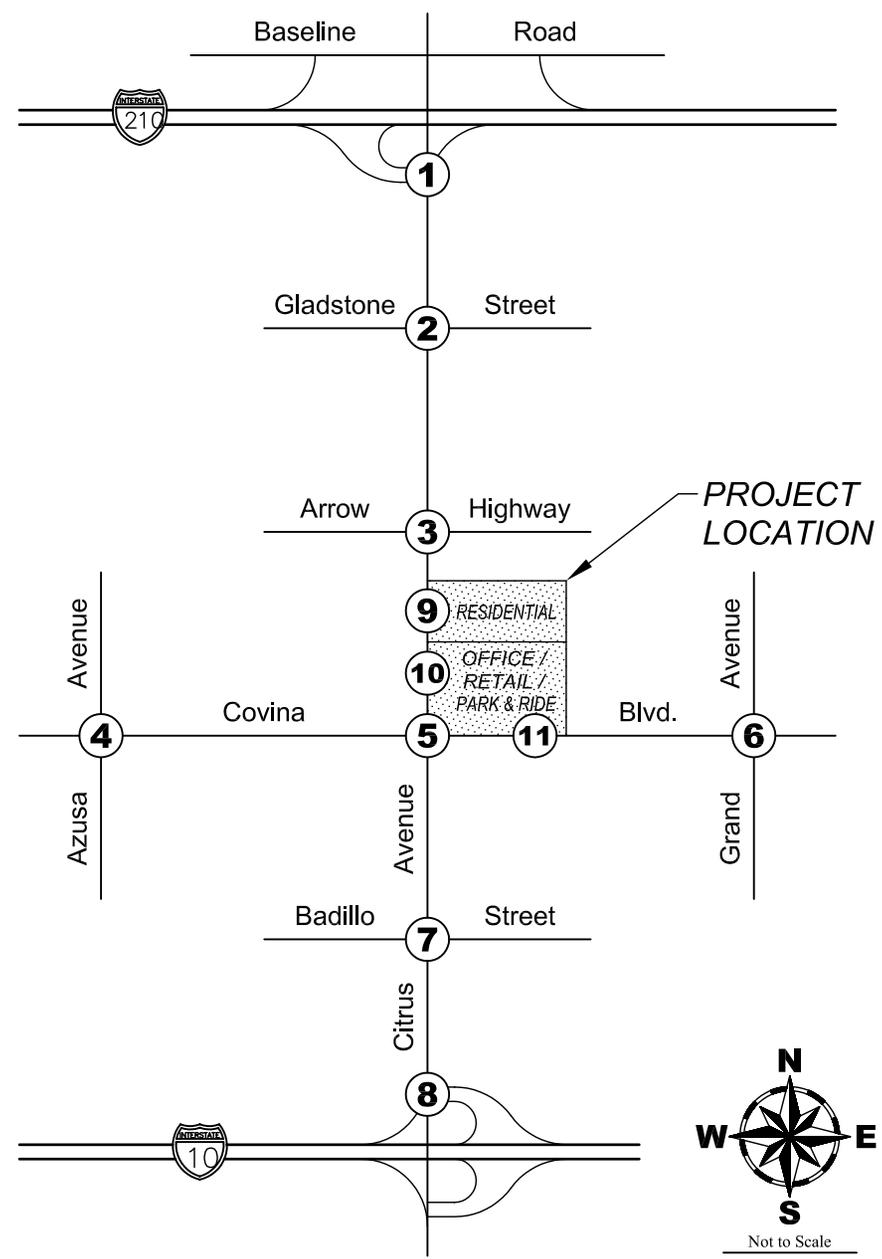


4 Azusa Avenue Covina Boulevard



8 Citrus Avenue I-10 WB Ramps

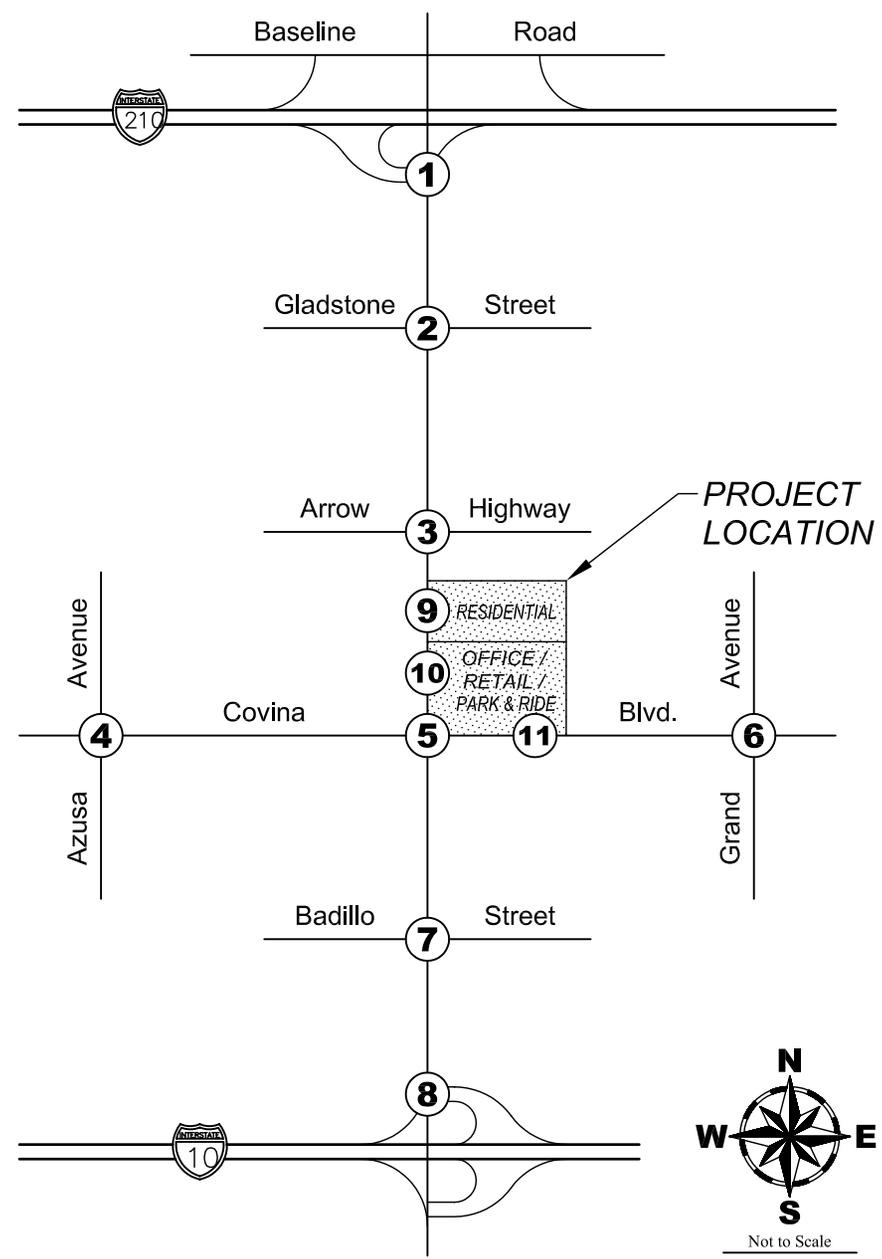
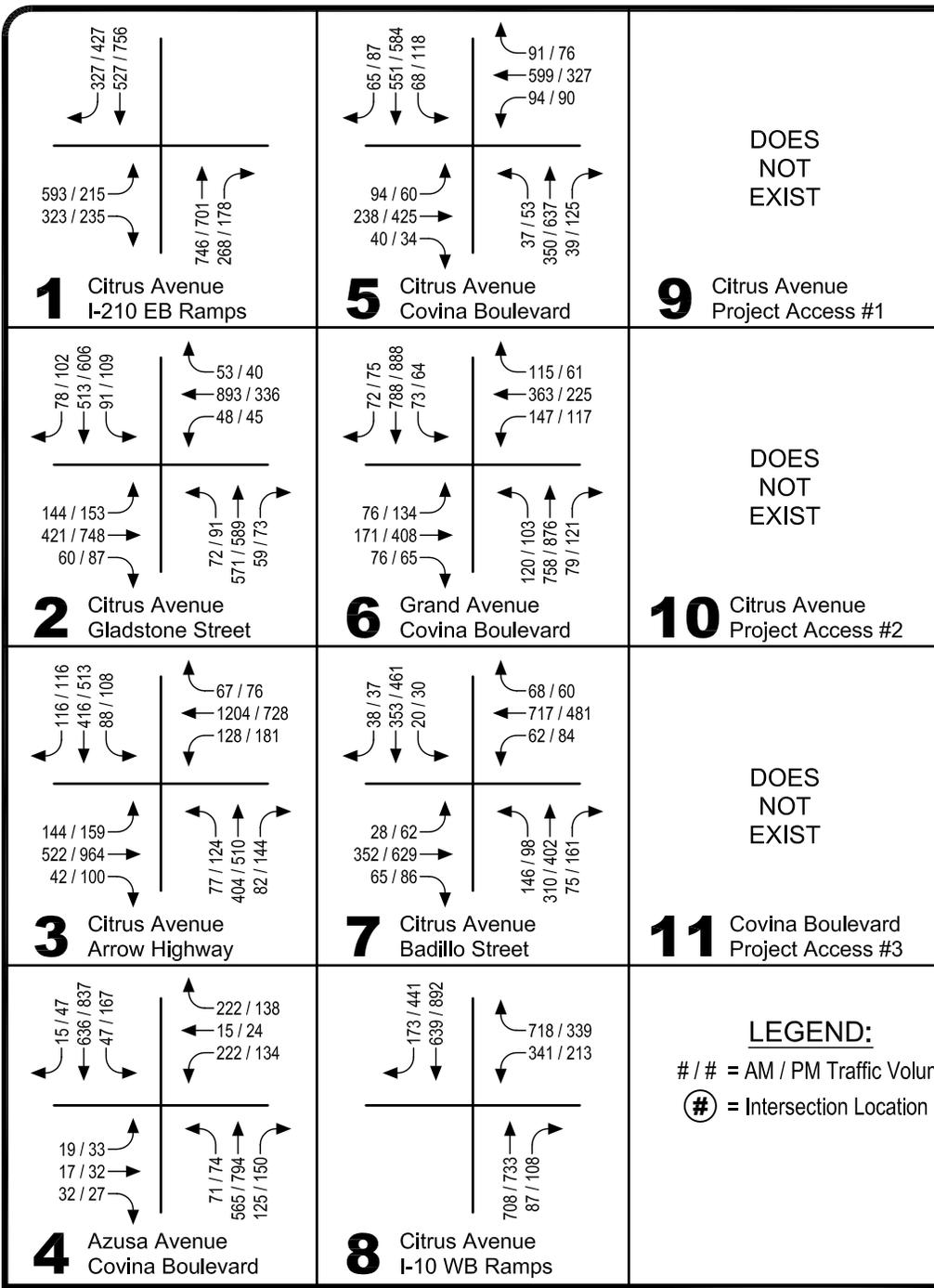
LEGEND:
 # / # = AM / PM Traffic Volumes
 (#) = Intersection Location



CUMULATIVE PROJECTS
 Traffic Volumes
CITY OF COVINA

Figure 4.1-1



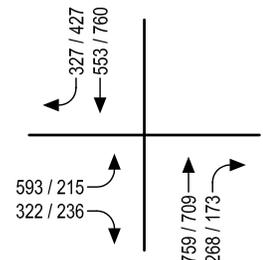


2017 WITHOUT PROJECT
Traffic Volumes
CITY OF COVINA

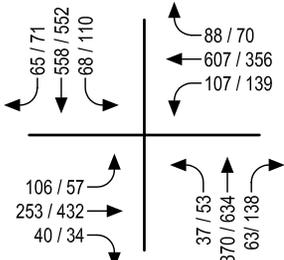
Figure 4.1-2

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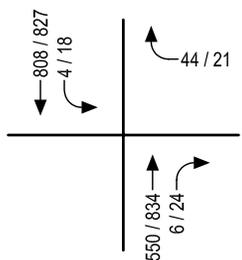




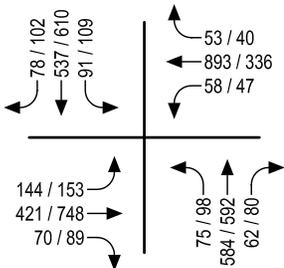
1 Citrus Avenue I-210 EB Ramps



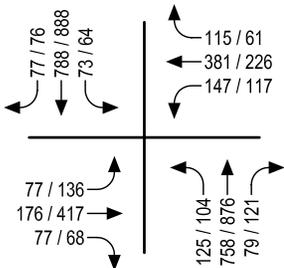
5 Citrus Avenue Covina Boulevard



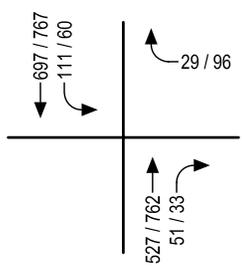
9 Citrus Avenue Project Access #1



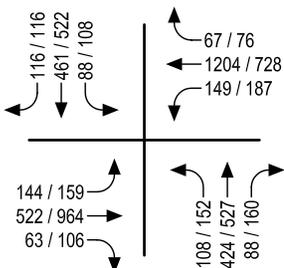
2 Citrus Avenue Gladstone Street



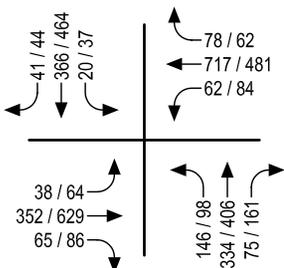
6 Grand Avenue Covina Boulevard



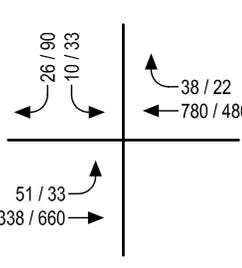
10 Citrus Avenue Project Access #2



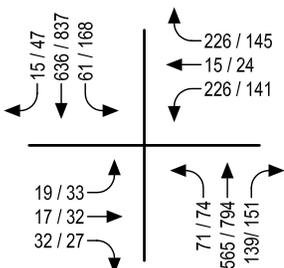
3 Citrus Avenue Arrow Highway



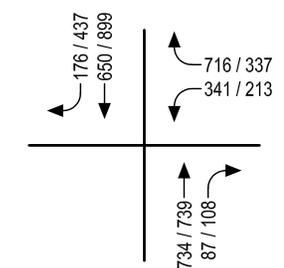
7 Citrus Avenue Badillo Street



11 Covina Boulevard Project Access #3



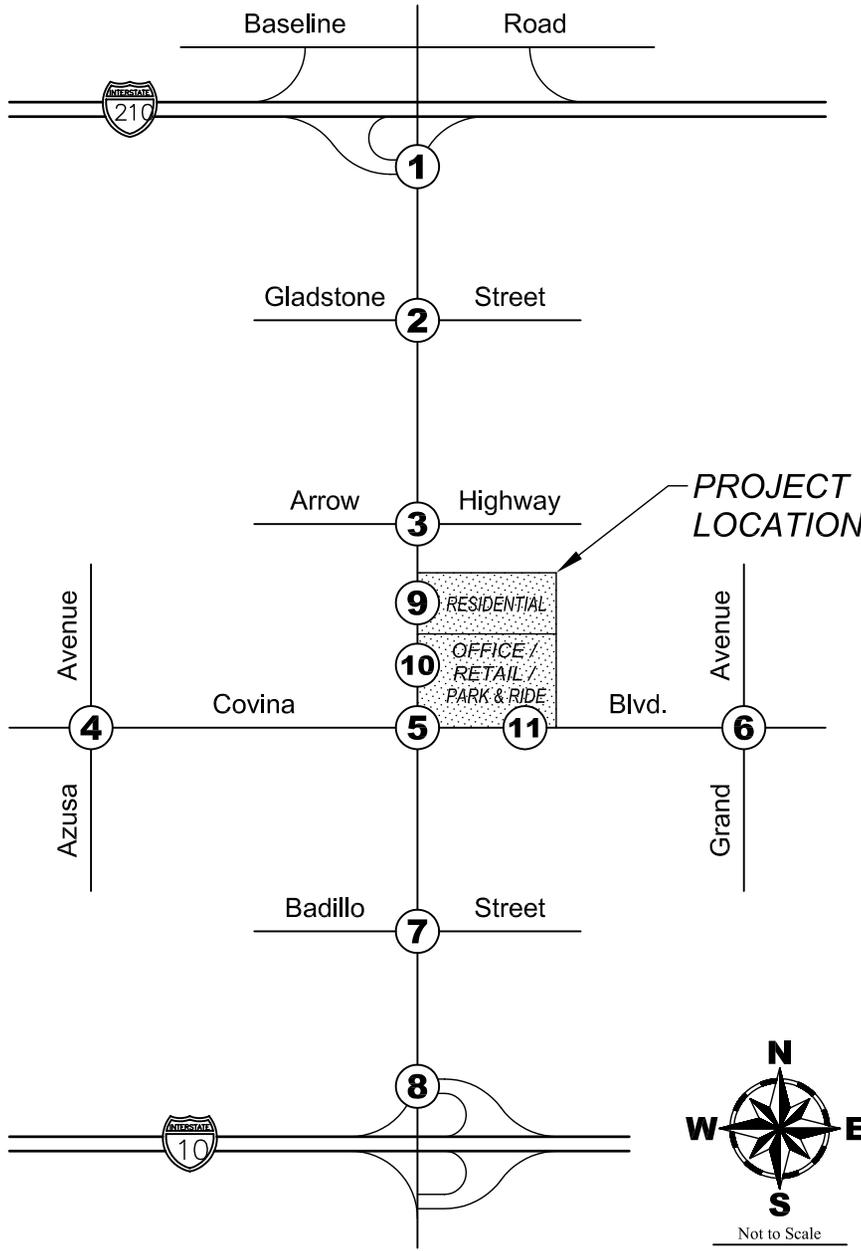
4 Azusa Avenue Covina Boulevard



8 Citrus Avenue I-10 WB Ramps

Project accesses show full project traffic.

LEGEND:
 # / # = AM / PM Traffic Volumes
 # = Intersection Location



2017 WITH PROJECT
Traffic Volumes
CITY OF COVINA

Figure 4.1-3

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Table 4.2-2 summarizes the LOS for the intersections in 2017 with the proposed project during the AM and PM peak hours. As shown in Table 4.2-2, all intersections will operate at an acceptable LOS except for the intersection of Citrus Avenue at Badillo Street during the AM and PM peak hours. The intersection of Citrus Avenue at Badillo Street will operate at unacceptable LOS E during the AM and PM peak hours. The detailed LOS calculation worksheets are included in Appendix D.

**TABLE 4.2-2
INTERSECTION LEVELS OF SERVICE – 2017 WITH PROJECT**

Index	Intersection	AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
1	Citrus Avenue at I-210 eastbound ramps	0.792	C	0.523	A
2	Citrus Avenue at Gladstone Street	0.744	C	0.675	B
3	Citrus Avenue at Arrow Highway	0.835	D	0.846	D
4	Azusa Avenue at Covina Boulevard	0.509	A	0.603	B
5	Citrus Avenue at Covina Boulevard	0.601	B	0.643	A
6	Grand Avenue at Covina Boulevard	0.652	B	0.691	B
7	Citrus Avenue at Badillo Street	0.932	E	0.948	E
8	Citrus Avenue at I-10 westbound ramps	0.633	B	0.553	A

Source: Hartzog & Crabill, Inc., 2016. **Bolded** items indicate intersection will operate at below-standard LOS.

Table 4.2-3 summarizes the intersection changes in ICU, identifies if the intersection will be operating at an unacceptable LOS, and if the intersection will be significantly adversely impacted by implementation of the proposed project. As shown in Table 4.2-3, implementation of the proposed project will not create a significant adverse impact to the intersections. Even though the intersection of Citrus Avenue at Badillo Street will operate at an unacceptable LOS E during the AM and PM peak hours, implementation of the proposed project will not create a significant adverse impact because the increase in ICU is less than 0.02. The remaining intersections will operate at an acceptable LOS in 2017 with the proposed project.

**TABLE 4.2-3
INTERSECTION SIGNIFICANT ADVERSE IMPACT SUMMARY – 2017**

Index	Intersection	AM Peak Hour			PM Peak Hour		
		Change in ICU	Unacc. LOS? ^[1]	Sig. Adv. Imp.? ^[2]	Change in ICU	Unacc. LOS?	Sig. Adv. Imp.?
1	Citrus Avenue at I-210 eastbound ramps	0.004	No	No	0.001	No	No
2	Citrus Avenue at Gladstone Street	0.005	No	No	0.008	No	No
3	Citrus Avenue at Arrow Highway	0.033	No	No	0.026	No	No
4	Azusa Avenue at Covina Boulevard	0.013	No	No	0.005	No	No
5	Citrus Avenue at Covina Boulevard	0.011	No	No	0.031	No	No
6	Grand Avenue at Covina Boulevard	0.011	No	No	0.005	No	No
7	Citrus Avenue at Badillo Street	0.018	Yes	No	0.011	Yes	No
8	Citrus Avenue at I-10 westbound ramps	0.002	No	No	0.002	No	No

Source: Hartzog & Crabill, Inc., 2016.

^[1] Unacc. LOS: Unacceptable LOS.

^[2] Sig. Adv. Imp.: Significant Adverse Impact.

SECTION 5.0 2036 TRAFFIC IMPACT ANALYSIS

This section describes the 2036 traffic impacts of the proposed project. This section includes: an analysis of traffic conditions without and with the proposed project in 2036 by determining the LOS and significant adverse traffic impacts based on a comparison of those conditions.

5.1 TRAFFIC CONDITIONS

As part of the *City of Covina Bicycle Master Plan*, it was proposed that Covina Boulevard be modified from a four-lane road with no striped bike lanes to a two-lane road with striped bike lanes, an application commonly referred as a “road diet.” It was assumed that the proposed “road diet” for Covina Boulevard would be implemented by 2036. Figure 5.1-1 shows the circulation network in 2036.

As discussed in Section 2.3, future daily traffic volumes for 2036 were determined by applying the projected growth factor of 8.1 percent to the 2016 daily traffic volumes. To establish the AM and PM peak hour intersection turning volumes in 2036, the daily traffic volumes were post-processed according to the procedures outlined in the National Cooperative Highway Research Program (NCHRP) Report 255. Figures 5.1-2 and 5.1-3 show the traffic volumes in 2036 without and with the proposed project, respectively.

5.2 TRAFFIC IMPACT ANALYSIS

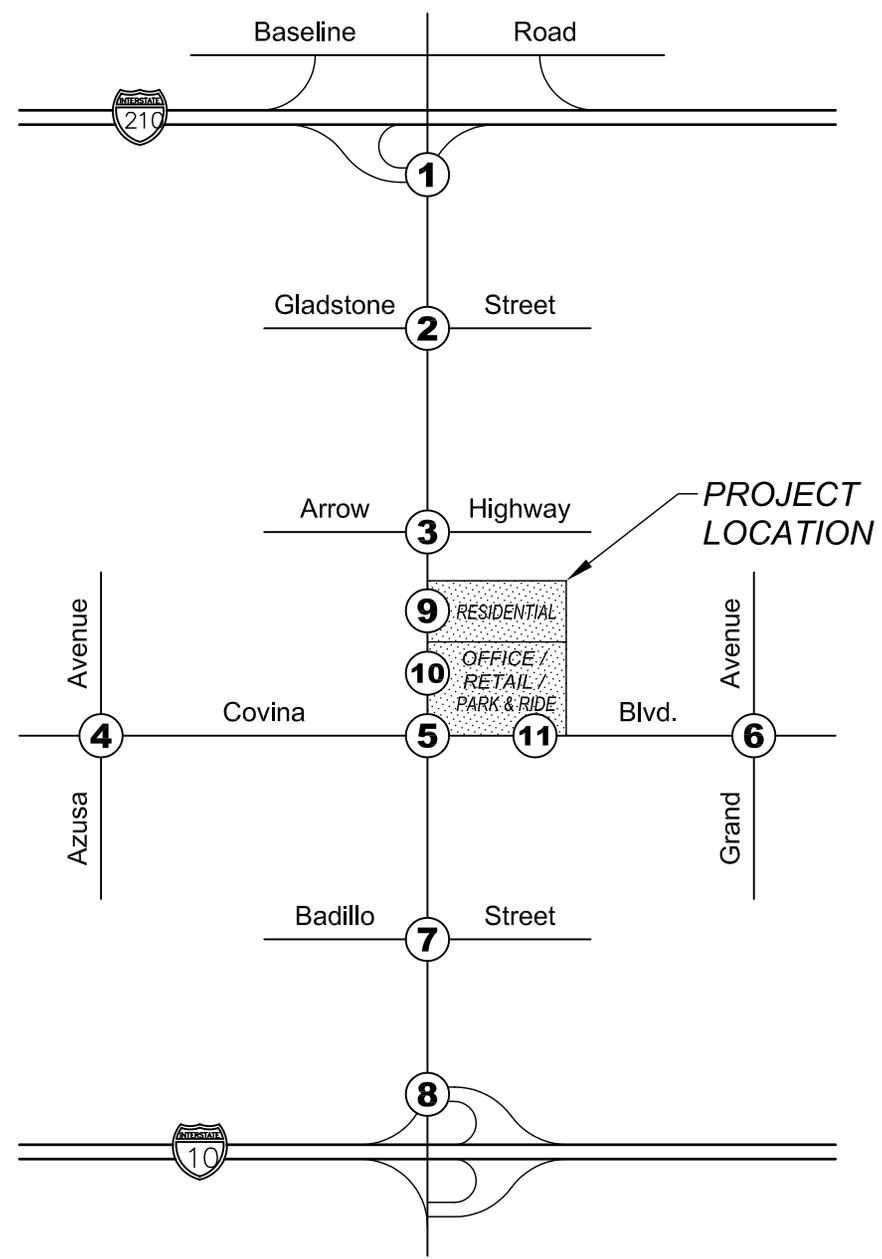
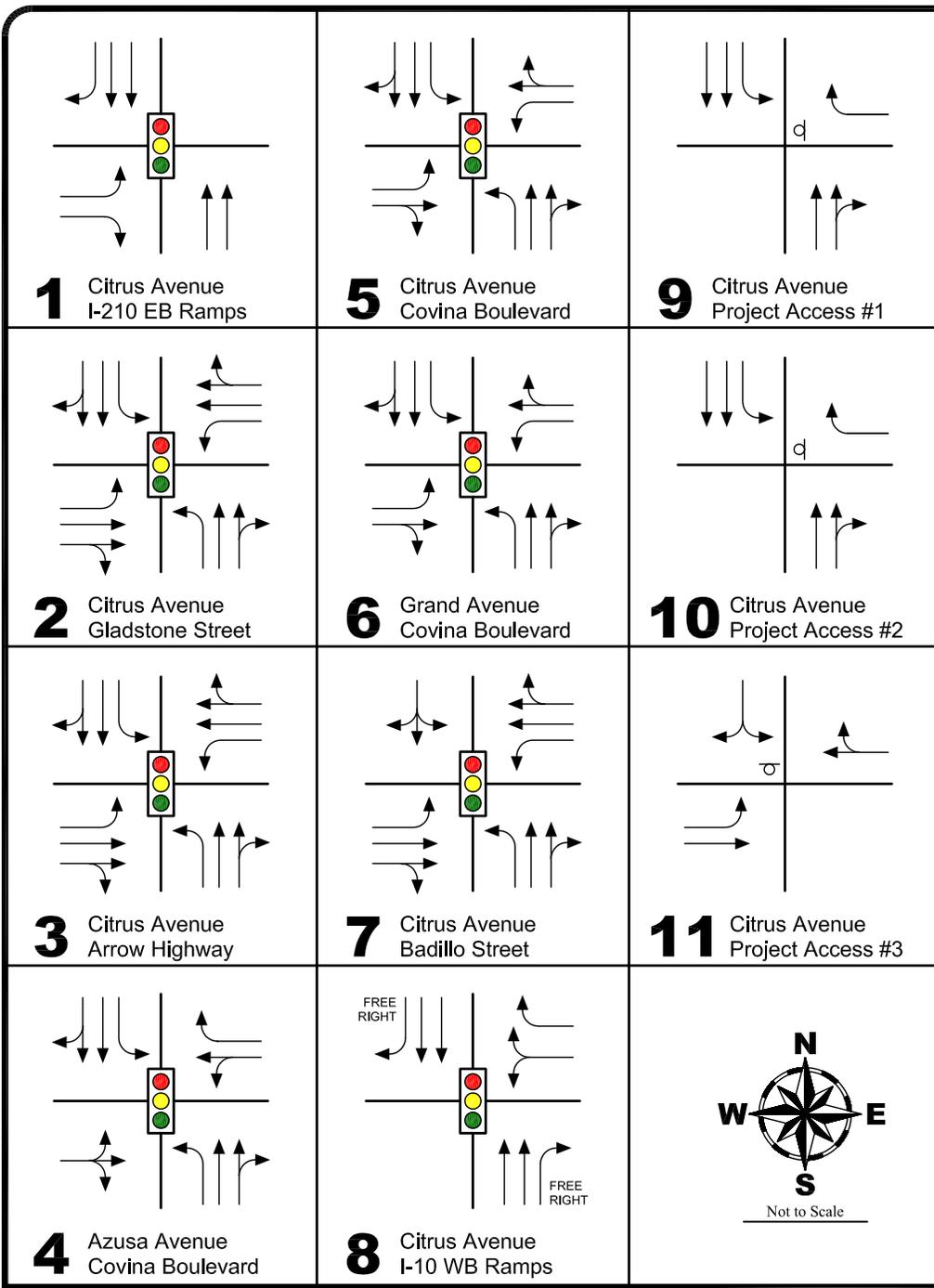
Project-related traffic impacts were determined by comparing the intersection LOS without and with the proposed project. Significant adverse traffic impacts were identified based on the City of Covina’s criteria for significant adverse project impacts previously described in Section 2.8

Table 5.2-1 summarizes the LOS for the intersections in 2036 without the proposed project during the AM or PM peak hours. As shown in Table 5.2-1, all intersections will operate at an acceptable LOS except for the intersection of Citrus Avenue at Badillo Street during the AM and PM peak hours. The intersection of Citrus Avenue at Badillo Street will operate an unacceptable LOS E during the AM and PM peak hours. The detailed LOS calculation worksheets are included in Appendix E.

**TABLE 5.2-1
INTERSECTION LEVELS OF SERVICE – 2036 WITHOUT PROJECT**

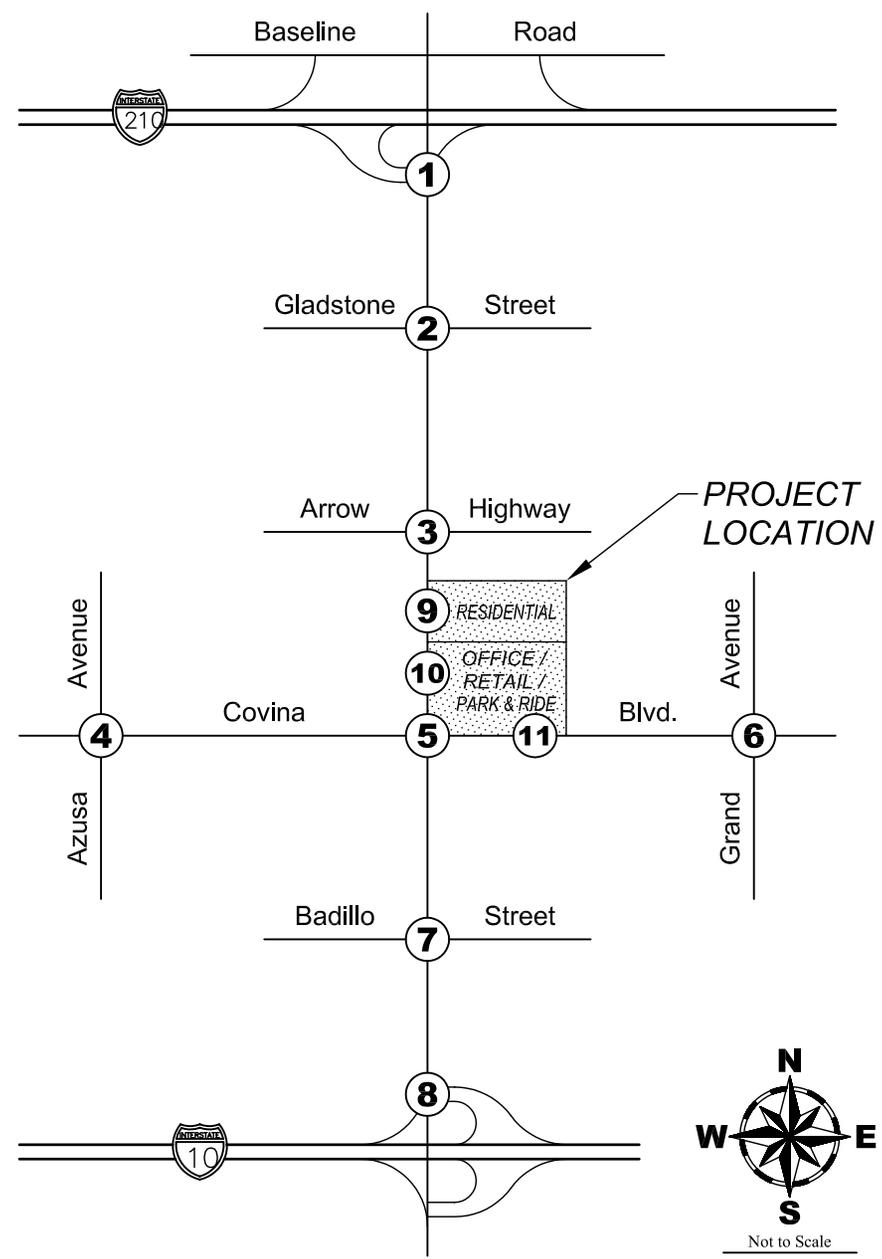
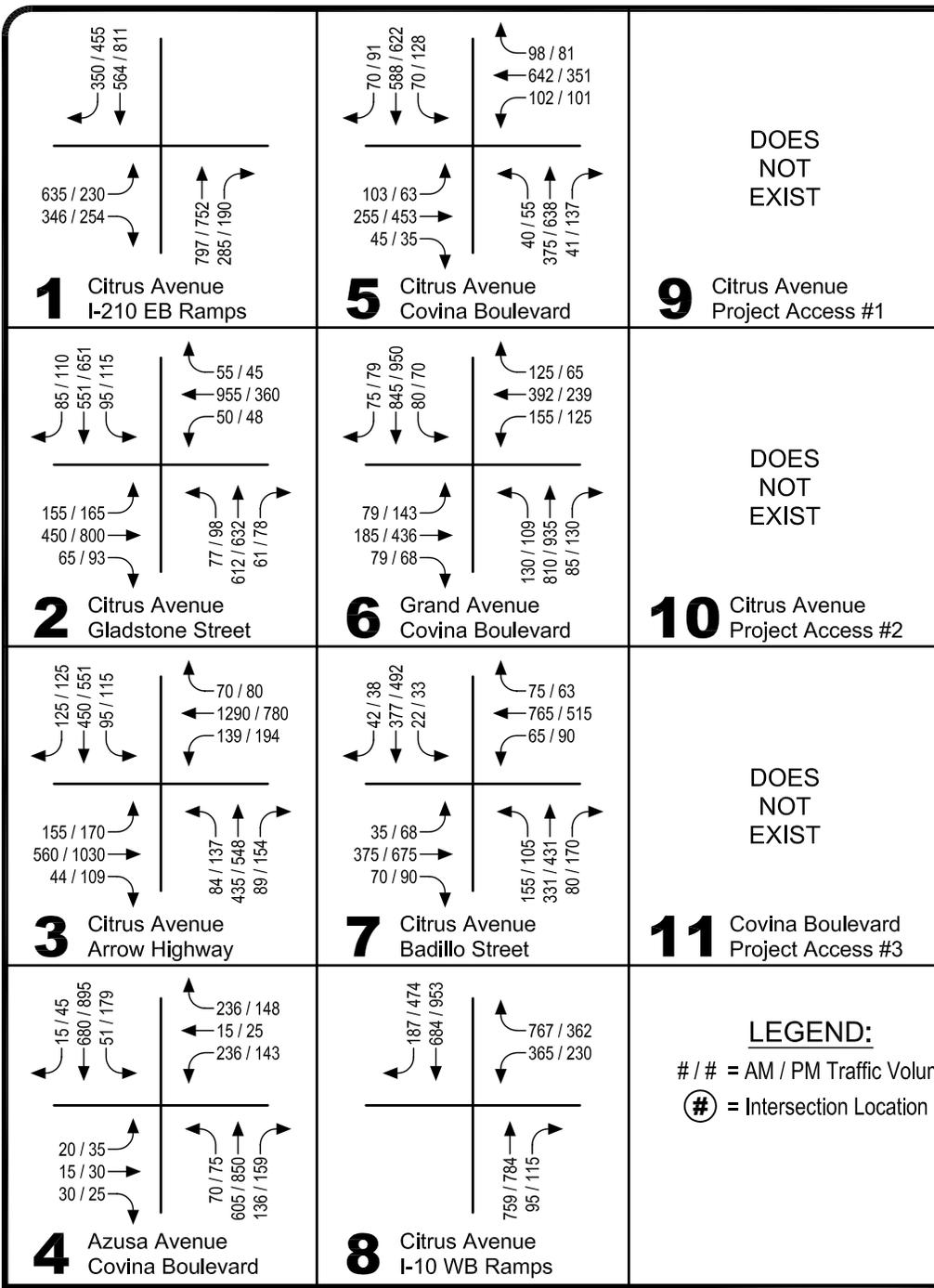
Index	Intersection	AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
1	Citrus Avenue at I-210 eastbound ramps	0.835	D	0.553	A
2	Citrus Avenue at Gladstone Street	0.783	C	0.708	C
3	Citrus Avenue at Arrow Highway	0.854	D	0.874	D
4	Azusa Avenue at Covina Boulevard	0.520	A	0.632	B
5	Citrus Avenue at Covina Boulevard	0.858	D	0.804	D
6	Grand Avenue at Covina Boulevard	0.841	D	0.883	D
7	Citrus Avenue at Badillo Street	0.969	E	0.996	E
8	Citrus Avenue at I-10 westbound ramps	0.668	B	0.583	A

Source: Hartzog & Crabill, Inc., 2016. **Bolded** items indicate intersection will operate at below-standard LOS.



GENERAL PLAN BUILDOUT CONDITIONS
Circulation Network
CITY OF COVINA

Figure 5.1-1

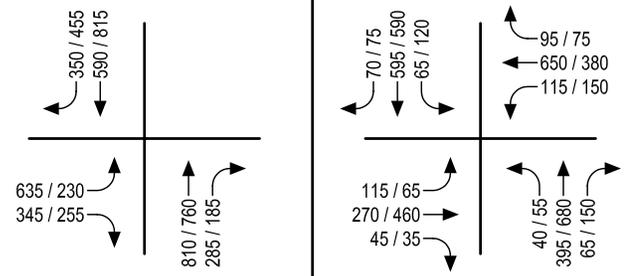


2036 WITHOUT PROJECT
Traffic Volumes
CITY OF COVINA

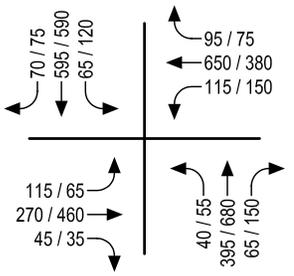
Figure 5.1-2

FILE: F051-2.dwg

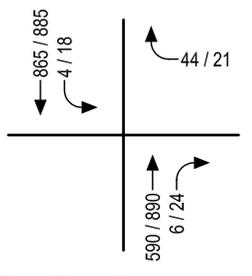




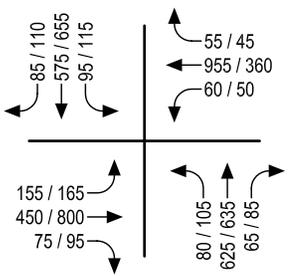
1 Citrus Avenue I-210 EB Ramps



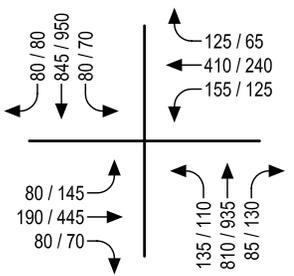
5 Citrus Avenue Covina Boulevard



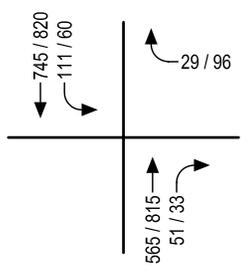
9 Citrus Avenue Project Access #1



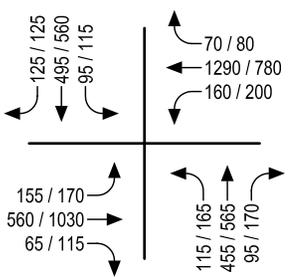
2 Citrus Avenue Gladstone Street



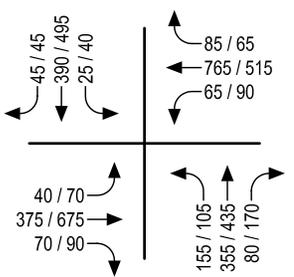
6 Grand Avenue Covina Boulevard



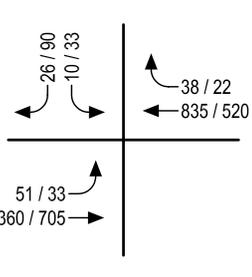
10 Citrus Avenue Project Access #2



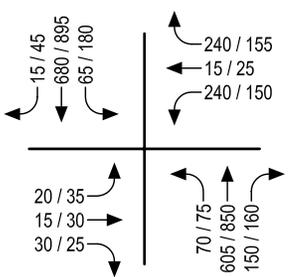
3 Citrus Avenue Arrow Highway



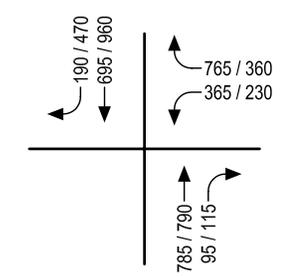
7 Citrus Avenue Badillo Street



11 Covina Boulevard Project Access #3



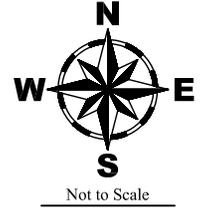
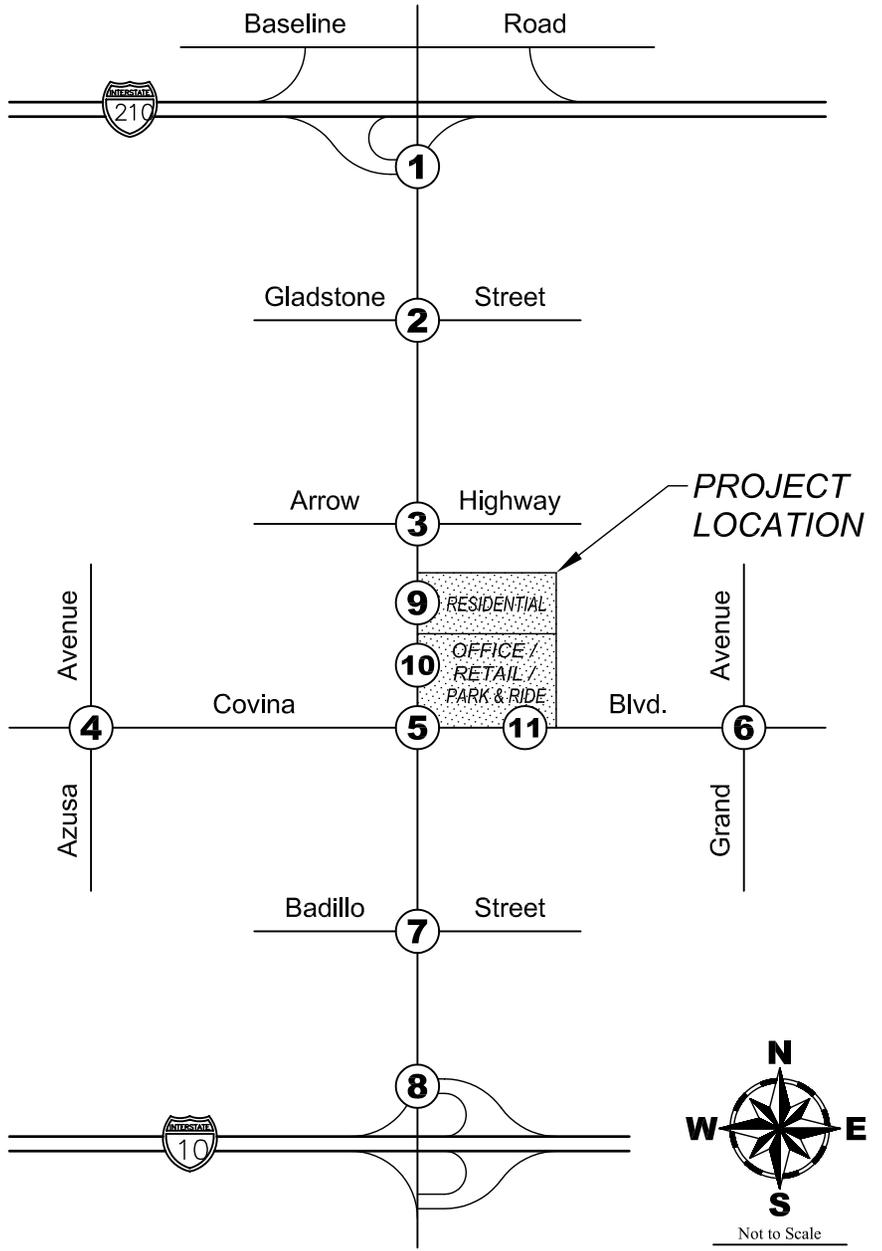
4 Azusa Avenue Covina Boulevard



8 Citrus Avenue I-10 WB Ramps

Project accesses show full project traffic.

LEGEND:
 # / # = AM / PM Traffic Volumes
 # = Intersection Location



2036 WITH PROJECT
Traffic Volumes
CITY OF COVINA

Figure 5.1-3

FILE: F1051-1-3.dwg



Table 5.2-2 summarizes the LOS for the intersections in 2036 with the proposed project during the AM or PM peak hours. As shown in Table 5.2-2, all intersections will operate at an acceptable LOS except for the intersection of Citrus Avenue at Badillo Street during the AM and PM peak hours. The intersection of Citrus Avenue at Badillo Street will operate an unacceptable LOS E and F during the AM and PM peak hours, respectively. The detailed LOS calculation worksheets are included in Appendix F.

**TABLE 5.2-2
INTERSECTION LEVELS OF SERVICE – 2036 WITH PROJECT**

Index	Intersection	AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
1	Citrus Avenue at I-210 eastbound ramps	0.839	D	0.555	A
2	Citrus Avenue at Gladstone Street	0.788	C	0.716	C
3	Citrus Avenue at Arrow Highway	0.888	D	0.900	D
4	Azusa Avenue at Covina Boulevard	0.536	A	0.638	B
5	Citrus Avenue at Covina Boulevard	0.870	D	0.838	D
6	Grand Avenue at Covina Boulevard	0.858	D	0.891	D
7	Citrus Avenue at Badillo Street	0.988	E	1.006	F
8	Citrus Avenue at I-10 westbound ramps	0.670	B	0.584	B

Source: Hartzog & Crabill, Inc., 2016. **Bolded** items indicate intersection will operate at below-standard LOS.

Table 5.2-3 summarizes the intersection changes in ICU, identifies if the intersection will be operating at an unacceptable LOS, and if the intersection will be significantly adversely impacted by implementation of the proposed project. As shown in Table 5.2-3, implementation of the proposed project will not create a significant adverse impact to the intersections. Even though the intersection of Citrus Avenue at Badillo Street will operate at an unacceptable LOS during the AM and PM peak hours, implementation of the proposed project will not create a significant adverse impact because the increase in ICU is less than 0.02. The remaining intersections will operate at an acceptable LOS in 2036 with the proposed project.

**TABLE 5.2-3
INTERSECTION SIGNIFICANT ADVERSE IMPACT SUMMARY – 2036**

Index	Intersection	AM Peak Hour			PM Peak Hour		
		Change in ICU	Unacc. LOS? ^[1]	Sig. Adv. Imp.? ^[2]	Change in ICU	Unacc. LOS?	Sig. Adv. Imp.?
1	Citrus Avenue at I-210 eastbound ramps	0.004	No	No	0.002	No	No
2	Citrus Avenue at Gladstone Street	0.005	No	No	0.008	No	No
3	Citrus Avenue at Arrow Highway	0.034	No	No	0.026	No	No
4	Azusa Avenue at Covina Boulevard	0.016	No	No	0.006	No	No
5	Citrus Avenue at Covina Boulevard	0.012	No	No	0.034	No	No
6	Grand Avenue at Covina Boulevard	0.017	No	No	0.008	No	No
7	Citrus Avenue at Badillo Street	0.019	Yes	No	0.010	Yes	No
8	Citrus Avenue at I-10 westbound ramps	0.002	No	No	0.001	No	No

Source: Hartzog & Crabill, Inc., 2016.

^[1] Unacc. LOS: Unacceptable LOS.

^[2] Sig. Adv. Imp.: Significant Adverse Impact.

**SECTION 6.0
OTHER TRAFFIC ISSUES**

This section describes other traffic issues related to the proposed project that were not covered in other sections of this report. Other traffic issues described are the project access points LOS and geometric road and intersection configurations

6.1 PROJECT ACCESS ANALYSIS

The proposed project will have two project access on Citrus Avenue and one project access on Covina Boulevard. The two project accesses on Citrus Avenue would be restricted to left-in, right-in and right-out movements. The project access on Covina Boulevard would not be restricted. Based on these conditions, the LOS was determined for the three project accesses.

As shown in Table 6.1-1, all project accesses will operate at an acceptable LOS B during the AM and PM peak hours in 2017 with the proposed project. The detailed LOS calculation worksheets are included in Appendix D.

**TABLE 6.1-1
PROJECT ACCESS LEVELS OF SERVICE – 2017 WITH PROJECT**

Index	Intersection	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh) ^[1]	LOS	Delay	LOS
9	Citrus Avenue at Project Access 1	10.6	B	11.9	B
10	Citrus Avenue at Project Access 2	10.5	B	12.7	B
11	Project Access 3 at Covina Boulevard	13.9	B	13.1	B

Source: Hartzog & Crabill, Inc., 2016.

^[1] sec/veh: seconds per vehicle.

As shown in Table 6.1-2, all project accesses will operate at an acceptable LOS C or better during the AM and PM peak hours in 2036 with the proposed project. The detailed LOS calculation worksheets are included in Appendix F.

**TABLE 6.1-2
PROJECT ACCESS LEVELS OF SERVICE – 2036 WITH PROJECT**

Index	Intersection	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh) ^[1]	LOS	Delay	LOS
9	Citrus Avenue at Project Access 1	10.8	B	12.3	B
10	Citrus Avenue at Project Access 2	10.7	B	13.1	B
11	Project Access 3 at Covina Boulevard	18.5	C	17.5	C

Source: Hartzog & Crabill, Inc., 2016.

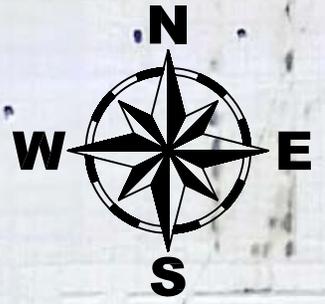
^[1] sec/veh: seconds per vehicle.

6.2 GEOMETRIC ROAD AND INTERSECTION CONFIGURATIONS

As discussed in Section 2.1, the *City of Covina Bicycle Master Plan* (Alta Planning + Design, 2011) recommended various bicycle facility improvements to Citrus Avenue and Covina Boulevard. It was proposed to install striped bike lanes on Citrus Avenue within the existing curb-to-curb road width. In addition, it was proposed that Covina Boulevard be modified from a four-lane road with no striped bike lanes to a two-lane road with striped bike lanes, an application commonly referred as a “road diet.”

As shown in Figure 6.2-1, the proposed bike lane on Citrus Avenue would conflict with the existing Foothill Transit bus stop for local bus Line 281. Consequently, when the bus is at the bus stop picking up and dropping off passengers, it would require the bicyclists to merge into the travel lanes to maneuver around the bus. To eliminate this conflict, it would require additional right-of-way on the east side of Citrus Avenue to allow for the road to be widened. However, this potential road widening on Citrus Avenue is not a part of the proposed project because it involves a separate parcel and different property owner. If the City of Covina is able to acquire the additional right-of-way on Citrus Avenue, it would be advisable to extend the road widening northerly approximately 75 feet to the proposed project access to also create a dedicated right-turn lane.

For the proposed “road diet” on Covina Boulevard, the road has inadequate right-of-way and curb-to-curb road width to create a dedicated westbound right-turn lane. Consequently, a bus making a westbound right-turn movement would be required to cross over the proposed bike lane. To eliminate this conflict, it would require additional right-of-way on the north side of Covina Boulevard to allow for the road to be widened for a dedicated westbound right-turn lane. However, this potential widening on Covina Boulevard is not a part of the proposed project because it involves a separate parcel and different property owner. If the City of Covina is able to acquire the additional right-of-way on Covina Boulevard, it would eliminate the conflict between the bicyclists and the vehicles making a right-turn movement. Figure 6.2-2 shows the conceptual road widenings on Citrus Avenue and Covina Boulevard.



SCALE: 1" = 60'



CITRUS AVENUE

COVINA BOULEVARD

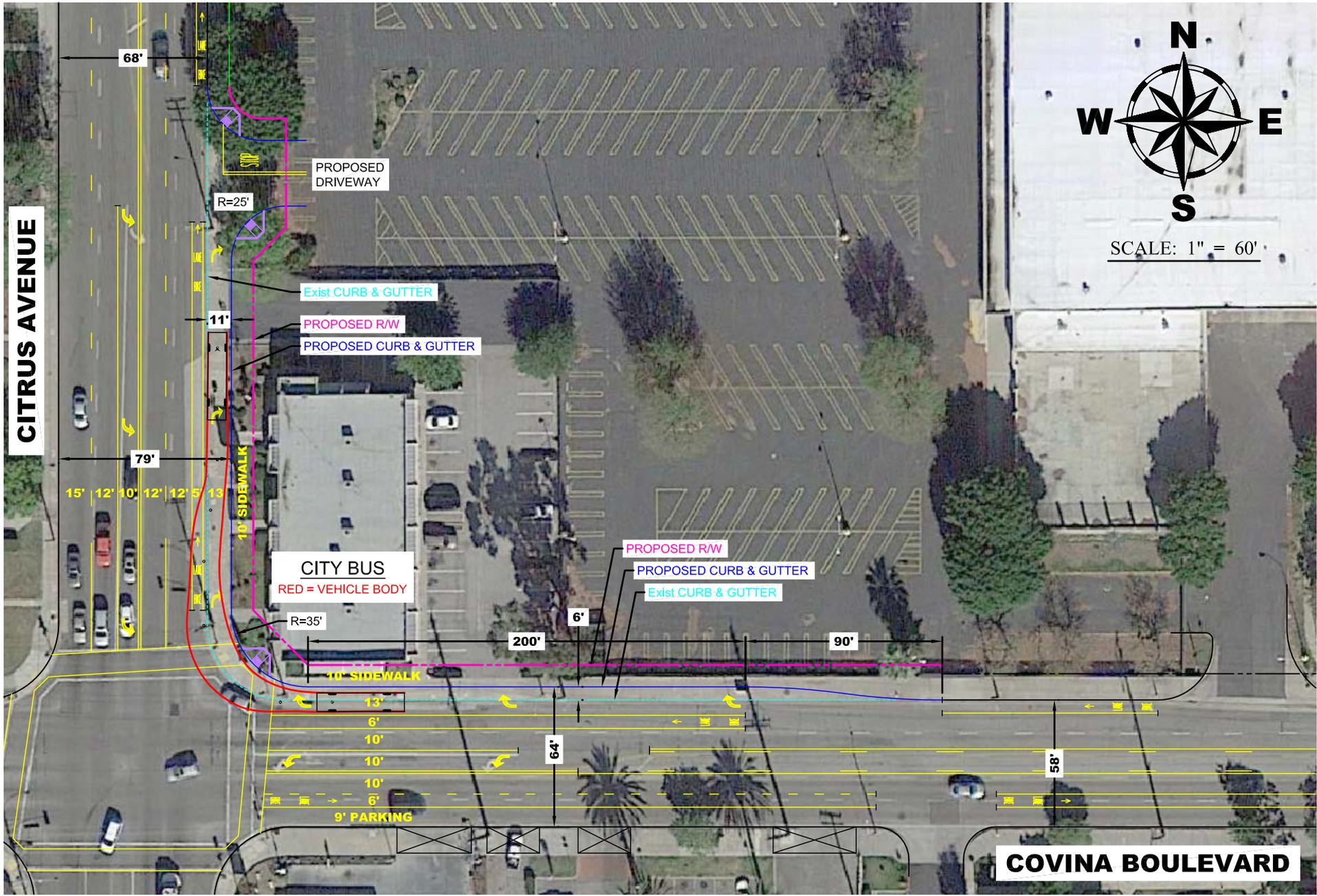
CITY BUS
RED = VEHICLE BODY

FILE: FIG6.2-1.dwg



MASTER PLAN BIKE IMPROVEMENTS
Covina Boulevard and Citrus Avenue
CITY OF COVINA

Figure 6.2-1



FILE: FIG6.2-2.dwg



CONCEPT ROAD WIDENING
Covina Boulevard and Citrus Avenue
CITY OF COVINA

Figure 6.2-2

SECTION 7.0 FINDINGS AND RECOMMENDATIONS

This section summarizes the key findings and recommendations for the proposed project.

7.1 PROPOSED PROJECT

The proposed project will generate approximately a net total 2,072 daily trips with 313 trips occurring during the AM peak hour and 275 trips occurring during the PM peak hour.

The three project accesses will operate at an acceptable LOS C or better during the AM and PM peak hours in 2017 and 2036 with the proposed project.

7.2 EXISTING CONDITIONS

The intersection of Citrus Avenue at Badillo Street operates at unacceptable LOS E during the PM peak hour. The remaining seven intersections operate at an acceptable LOS.

7.3 2017 CONDITIONS

The intersection of Citrus Avenue at Badillo Street will operate at unacceptable LOS E during the AM and PM peak hours in 2017 without and with the proposed project. However, implementation of the proposed project would not create a significant adverse impact because the increase in ICU is below the threshold of significance.

The remaining seven intersections will operate an acceptable LOS in 2017 without and with the proposed project.

7.4 2036 CONDITIONS

The intersection of Citrus Avenue at Badillo Street will operate at unacceptable LOS E and F during the AM and PM peak hours, respectively, in 2036 without and with the proposed project. However, implementation of the proposed project would not create a significant adverse impact because the increase in ICU is below the threshold of significance.

The remaining seven intersections will operate an acceptable LOS in 2017 without and with the proposed project.

7.5 GEOMETRIC ROAD AND INTERSECTION CONFIGURATIONS

Although not a part of the proposed project because it involves a separate parcel and different property owner, if the City of Covina is able to acquire additional right-of-way on the east side of Citrus Avenue just north of Covina Boulevard, Citrus Avenue could be widened to provide a dedicated northbound right-turn lane at the project access. In a similar fashion, if the City of Covina is able to acquire additional right-of-way on the north side of Covina Boulevard just east of Citrus Avenue, Covina Boulevard could be widened to provide a dedicated westbound right-turn lane at Citrus Avenue.

APPENDIX A

TRAFFIC COUNTS

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-006

Day: Wednesday

City: Citrus

Date: 3/16/2016

		AM												
NS/EW Streets:		Citrus Ave			Citrus Ave			I-210 Freeway EB Ramp			I-210 Freeway EB Ramp			
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
		0	2	0	0	2	0	1	0	1	0	0	0	
	7:00 AM	0	112	66	0	70	68	60	0	53	0	0	0	429
	7:15 AM	0	113	81	0	73	99	86	0	44	0	0	0	496
	7:30 AM	0	181	82	0	105	86	124	0	69	0	0	0	647
	7:45 AM	0	201	72	0	135	87	147	0	79	0	0	0	721
	8:00 AM	0	187	52	0	159	72	171	0	96	0	0	0	737
	8:15 AM	0	158	57	0	113	79	145	0	73	0	0	0	625
	8:30 AM	0	125	57	0	104	69	89	0	87	0	0	0	531
	8:45 AM	0	120	48	0	97	66	108	0	77	0	0	0	516
TOTAL VOLUMES :		0	1197	515	0	856	626	930	0	578	0	0	0	4702
APPROACH %'s :		0.00%	69.92%	30.08%	0.00%	57.76%	42.24%	61.67%	0.00%	38.33%	#DIV/0!	#DIV/0!	#DIV/0!	
PEAK HR START TIME :		730 AM												TOTAL
PEAK HR VOL :		0	727	263	0	512	324	587	0	317	0	0	0	2730
PEAK HR FACTOR :		0.907			0.905			0.846			0.000			0.926

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-006

Day: Wednesday

City: Citrus

Date: 3/16/2016

		PM												
NS/EW Streets:		Citrus Ave			Citrus Ave			I-210 Freeway EB Ramp			I-210 Freeway EB Ramp			
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
		0	2	0	0	2	0	1	0	1	0	0	0	
4:00 PM		0	160	45	1	136	103	59	0	44	0	0	0	548
4:15 PM		0	169	52	0	187	108	40	0	46	0	0	0	602
4:30 PM		0	152	49	0	168	105	63	0	48	0	0	0	585
4:45 PM		0	151	51	0	167	104	50	0	51	0	0	0	574
5:00 PM		0	185	42	0	180	115	63	0	57	0	0	0	642
5:15 PM		0	158	41	0	196	104	50	0	46	0	0	0	595
5:30 PM		0	153	50	0	179	105	49	0	52	0	0	0	588
5:45 PM		0	174	37	0	169	99	51	0	70	0	0	0	600
TOTAL VOLUMES :		0	1302	367	1	1382	843	425	0	414	0	0	0	4734
APPROACH %'s :		0.00%	78.01%	21.99%	0.04%	62.08%	37.87%	50.66%	0.00%	49.34%	#DIV/0!	#DIV/0!	#DIV/0!	
PEAK HR START TIME :		500 PM												TOTAL
PEAK HR VOL :		0	670	170	0	724	423	213	0	225	0	0	0	2425
PEAK HR FACTOR :		0.925		0.956			0.905			0.000			0.944	

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-005

Day: Wednesday

City: Citrus

Date: 3/16/2016

NS/EW Streets:	AM												TOTAL
	Citrus Ave			Citrus Ave			Gladstone St			Gladstone St			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
7:00 AM	15	67	6	8	80	13	28	23	10	8	318	19	595
7:15 AM	16	122	3	16	85	15	26	45	12	11	272	11	634
7:30 AM	19	144	15	14	124	16	33	80	12	15	212	5	689
7:45 AM	20	154	17	25	129	23	39	143	16	7	204	20	797
8:00 AM	15	130	22	35	156	23	45	149	18	14	196	16	819
8:15 AM	22	118	6	11	158	24	33	66	11	11	133	12	605
8:30 AM	14	115	7	22	132	26	27	52	10	16	92	12	525
8:45 AM	13	106	12	12	148	10	23	56	16	7	90	12	505
TOTAL VOLUMES :	134	956	88	143	1012	150	254	614	105	89	1517	107	5169
APPROACH %'s :	11.38%	81.15%	7.47%	10.96%	77.55%	11.49%	26.10%	63.10%	10.79%	5.20%	88.56%	6.25%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	70	550	57	90	494	77	143	417	58	47	884	52	2939
PEAK HR FACTOR :	0.886			0.772			0.729			0.836			0.897

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-005

Day: Wednesday

City: Citrus

Date: 3/16/2016

NS/EW Streets:	PM												TOTAL
	Citrus Ave			Citrus Ave			Gladstone St			Gladstone St			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
4:00 PM	22	151	11	11	121	23	35	136	24	12	71	14	631
4:15 PM	16	150	11	20	127	35	33	174	17	14	72	9	678
4:30 PM	13	136	10	21	141	24	42	164	22	16	75	11	675
4:45 PM	21	133	13	34	150	19	38	171	22	14	62	9	686
5:00 PM	26	140	11	28	133	24	37	198	14	5	78	9	703
5:15 PM	19	133	15	27	152	29	45	177	22	12	90	12	733
5:30 PM	23	138	21	21	157	24	31	177	19	12	84	12	719
5:45 PM	20	143	23	32	125	24	38	189	29	14	81	7	725
TOTAL VOLUMES :	160	1124	115	194	1106	202	299	1386	169	99	613	83	5550
APPROACH %'s :	11.44%	80.34%	8.22%	12.92%	73.64%	13.45%	16.13%	74.76%	9.12%	12.45%	77.11%	10.44%	
PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	88	554	70	108	567	101	151	741	84	43	333	40	2880
PEAK HR FACTOR :	0.957			0.933			0.953			0.912			0.982

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-004

Day: Wednesday

City: Citrus

Date: 3/16/2016

NS/EW Streets:	AM												TOTAL
	Citrus Ave			Citrus Ave			Arrow Hwy			Arrow Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
7:00 AM	7	57	10	14	69	24	11	92	4	21	302	15	626
7:15 AM	16	86	15	18	78	28	13	105	10	26	355	12	762
7:30 AM	23	100	22	20	102	32	34	123	7	32	336	23	854
7:45 AM	20	102	20	17	97	29	56	161	11	35	267	20	835
8:00 AM	15	96	22	32	119	26	40	128	12	32	234	11	767
8:15 AM	19	84	25	24	98	34	31	127	17	29	244	22	754
8:30 AM	23	83	23	26	129	26	27	122	5	24	236	20	744
8:45 AM	21	76	21	36	90	23	29	137	10	26	207	18	694
TOTAL VOLUMES :	144	684	158	187	782	222	241	995	76	225	2181	141	6036
APPROACH %'s :	14.60%	69.37%	16.02%	15.70%	65.66%	18.64%	18.37%	75.84%	5.79%	8.83%	85.63%	5.54%	
PEAK HR START TIME :	7:15 AM												TOTAL
PEAK HR VOL :	74	384	79	87	396	115	143	517	40	125	1192	66	3218
PEAK HR FACTOR :	0.926			0.845			0.768			0.880			0.942

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-004

Day: Wednesday

City: Citrus

Date: 3/16/2016

NS/EW Streets:	PM												TOTAL
	Citrus Ave			Citrus Ave			Arrow Hwy			Arrow Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
4:00 PM	22	124	27	28	100	19	37	245	18	35	161	21	837
4:15 PM	37	124	23	25	109	36	32	241	26	44	153	17	867
4:30 PM	34	90	34	23	123	23	35	230	16	39	150	25	822
4:45 PM	27	106	32	26	120	30	36	263	19	34	156	12	861
5:00 PM	27	127	31	33	123	29	45	250	25	49	176	14	929
5:15 PM	32	119	38	25	113	20	32	218	27	46	193	18	881
5:30 PM	36	98	30	22	121	32	36	241	24	38	175	22	875
5:45 PM	24	128	40	27	114	34	44	245	19	42	177	21	915
TOTAL VOLUMES :	239	916	255	209	923	223	297	1933	174	327	1341	150	6987
APPROACH %'s :	16.95%	64.96%	18.09%	15.42%	68.12%	16.46%	12.35%	80.41%	7.24%	17.99%	73.76%	8.25%	
PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	119	472	139	107	471	115	157	954	95	175	721	75	3600
PEAK HR FACTOR :	0.951			0.936			0.942			0.945			0.969

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-007

Day: Wednesday

City: Covina

Date: 3/16/2016

		AM												
NS/EW Streets:	Azusa Ave			Azusa Ave			Covina Blvd			Covina Blvd				
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 0	ET 1	ER 0	WL 0.5	WT 0.5	WR 1	TOTAL	
7:00 AM	6	92	15	10	109	1	3	1	4	58	1	70	370	
7:15 AM	7	82	13	8	137	3	4	2	6	73	1	43	379	
7:30 AM	17	134	30	9	155	6	8	7	10	76	3	56	511	
7:45 AM	15	134	39	13	195	4	5	3	10	54	3	53	528	
8:00 AM	20	140	32	13	144	3	3	2	8	48	5	63	481	
8:15 AM	18	151	20	9	136	2	3	5	4	40	4	46	438	
8:30 AM	11	139	23	8	139	3	2	2	5	38	5	39	414	
8:45 AM	11	131	15	9	151	8	6	3	5	25	1	29	394	
TOTAL VOLUMES :	105	1003	187	79	1166	30	34	25	52	412	23	399	3515	
APPROACH %'s :	8.11%	77.45%	14.44%	6.20%	91.45%	2.35%	30.63%	22.52%	46.85%	49.40%	2.76%	47.84%		
PEAK HR START TIME :	730 AM												TOTAL	
PEAK HR VOL :	70	559	121	44	630	15	19	17	32	218	15	218	1958	
PEAK HR FACTOR :	0.977			0.813			0.680			0.835			0.927	

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-007

Day: Wednesday

City: Covina

Date: 3/16/2016

NS/EW Streets:	PM												TOTAL
	Azusa Ave			Azusa Ave			Covina Blvd			Covina Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 0	ET 1	ER 0	WL 0.5	WT 0.5	WR 1	
4:00 PM	18	196	35	29	201	4	5	6	7	29	7	35	572
4:15 PM	16	174	35	45	195	7	3	3	3	35	5	27	548
4:30 PM	22	222	30	36	192	7	9	4	3	29	8	32	594
4:45 PM	24	166	48	34	205	11	5	4	12	34	6	37	586
5:00 PM	14	189	34	39	230	14	13	6	6	29	5	31	610
5:15 PM	21	202	33	43	204	8	9	8	6	36	12	34	616
5:30 PM	23	203	34	39	194	15	8	7	6	32	2	34	597
5:45 PM	15	192	42	38	201	10	3	11	9	31	5	33	590
TOTAL VOLUMES :	153	1544	291	303	1622	76	55	49	52	255	50	263	4713
APPROACH %'s :	7.70%	77.67%	14.64%	15.14%	81.06%	3.80%	35.26%	31.41%	33.33%	44.89%	8.80%	46.30%	
PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	73	786	143	159	829	47	33	32	27	128	24	132	2413
PEAK HR FACTOR :	0.963			0.914			0.920			0.866			0.979

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-003

Day: Wednesday

City: Covina

Date: 3/16/2016

		AM												
NS/EW Streets:		Citrus Ave			Citrus Ave			Covina Blvd			Covina Blvd			
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
		1	2	0	1	2	0	1	2	0	1	2	0	
7:00 AM		6	45	10	14	93	10	10	24	5	26	145	10	398
7:15 AM		9	69	7	8	96	14	9	49	14	30	181	19	505
7:30 AM		11	69	10	18	158	21	26	56	6	30	155	27	587
7:45 AM		8	102	9	14	123	16	24	65	15	15	122	21	534
8:00 AM		9	87	9	22	159	11	30	64	5	16	134	21	567
8:15 AM		7	85	7	22	119	13	22	40	12	29	96	32	484
8:30 AM		7	83	10	10	131	10	13	33	3	14	76	22	412
8:45 AM		6	94	8	22	107	8	14	42	2	16	51	22	392
TOTAL VOLUMES :		63	634	70	130	986	103	148	373	62	176	960	174	3879
APPROACH %'s :		8.21%	82.66%	9.13%	10.66%	80.89%	8.45%	25.39%	63.98%	10.63%	13.44%	73.28%	13.28%	
PEAK HR START TIME :		715 AM												TOTAL
PEAK HR VOL :		37	327	35	62	536	62	89	234	40	91	592	88	2193
PEAK HR FACTOR :		0.838			0.838			0.873			0.838			0.934

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-003

Day: Wednesday

City: Covina

Date: 3/16/2016

NS/EW Streets:	PM												TOTAL
	Citrus Ave			Citrus Ave			Covina Blvd			Covina Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
4:00 PM	10	146	29	22	112	12	20	78	10	24	71	23	557
4:15 PM	11	141	27	28	124	19	17	79	16	23	66	19	570
4:30 PM	15	131	25	22	133	12	14	95	11	15	62	20	555
4:45 PM	16	144	28	25	131	9	14	92	8	19	64	21	571
5:00 PM	13	138	29	29	130	23	19	112	15	21	75	18	622
5:15 PM	12	156	32	29	139	16	17	93	8	22	87	23	634
5:30 PM	10	139	21	27	150	21	4	99	7	25	73	14	590
5:45 PM	17	166	38	27	124	17	10	115	4	17	87	15	637
TOTAL VOLUMES :	104	1161	229	209	1043	129	115	763	79	166	585	153	4736
APPROACH %'s :	6.96%	77.71%	15.33%	15.13%	75.52%	9.34%	12.02%	79.73%	8.25%	18.36%	64.71%	16.92%	
PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	52	599	120	112	543	77	50	419	34	85	322	70	2483
PEAK HR FACTOR :	0.872			0.924			0.861			0.903			0.974

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-008

Day: Wednesday

City: Covina

Date: 3/16/2016

NS/EW Streets:	AM												TOTAL
	Grand Ave			Grand Ave			Covina Blvd			Covina Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
7:00 AM	12	112	14	7	171	10	4	28	22	29	99	7	515
7:15 AM	20	135	12	11	175	29	7	33	15	32	104	15	588
7:30 AM	17	143	16	10	184	16	16	33	17	26	94	19	591
7:45 AM	29	232	22	15	228	16	26	42	19	40	77	30	776
8:00 AM	24	197	23	23	178	18	14	40	17	37	96	39	706
8:15 AM	48	178	17	24	190	20	18	52	21	43	88	26	725
8:30 AM	22	184	10	12	181	14	20	32	12	32	47	18	584
8:45 AM	13	180	24	24	162	14	16	49	9	16	49	11	567
TOTAL VOLUMES :	185	1361	138	126	1469	137	121	309	132	255	654	165	5052
APPROACH %'s :	10.99%	80.82%	8.19%	7.27%	84.82%	7.91%	21.53%	54.98%	23.49%	23.74%	60.89%	15.36%	
PEAK HR START TIME :	730 AM												TOTAL
PEAK HR VOL :	118	750	78	72	780	70	74	167	74	146	355	114	2798
PEAK HR FACTOR :	0.836			0.890			0.865			0.894			0.901

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-008

Day: Wednesday

City: Covina

Date: 3/16/2016

NS/EW Streets:	PM												TOTAL
	Grand Ave			Grand Ave			Covina Blvd			Covina Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
4:00 PM	25	201	30	14	218	16	31	78	16	24	51	12	716
4:15 PM	25	212	31	26	198	20	24	92	13	29	43	13	726
4:30 PM	25	227	29	11	240	14	29	102	18	30	52	15	792
4:45 PM	20	215	26	12	214	10	40	105	15	29	51	17	754
5:00 PM	30	211	34	14	223	28	38	98	16	28	69	15	804
5:15 PM	19	213	24	18	204	21	29	90	15	20	56	12	721
5:30 PM	33	214	28	9	231	22	25	80	17	23	49	12	743
5:45 PM	27	211	26	18	203	17	30	89	19	18	66	10	734
TOTAL VOLUMES :	204	1704	228	122	1731	148	246	734	129	201	437	106	5990
APPROACH %'s :	9.55%	79.78%	10.67%	6.10%	86.51%	7.40%	22.18%	66.19%	11.63%	27.02%	58.74%	14.25%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	100	865	120	63	875	72	131	397	62	116	215	60	3076
PEAK HR FACTOR :	0.965			0.953			0.922			0.873			0.956

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-002

Day: Wednesday

City: Covina

Date: 3/16/2016

		AM												
NS/EW Streets:	Citrus Ave			Citrus Ave			Badillo St			Badillo St				
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	
	1	1	1	0	1	0	1	1	1	1	1	1		
7:00 AM	47	36	5	0	56	12	6	50	9	6	207	16	450	
7:15 AM	37	59	13	3	69	7	3	70	10	7	207	16	501	
7:30 AM	36	66	10	4	85	12	4	76	11	6	192	32	534	
7:45 AM	33	69	25	5	89	9	6	104	15	7	196	12	570	
8:00 AM	44	71	18	1	95	7	7	74	17	24	152	9	519	
8:15 AM	32	86	21	6	63	6	9	95	21	24	170	12	545	
8:30 AM	29	84	34	3	89	9	5	73	15	18	163	7	529	
8:45 AM	31	79	29	5	70	5	15	82	16	8	155	15	510	
TOTAL VOLUMES :	289	550	155	27	616	67	55	624	114	100	1442	119	4158	
APPROACH %'s :	29.07%	55.33%	15.59%	3.80%	86.76%	9.44%	6.94%	78.69%	14.38%	6.02%	86.82%	7.16%		
PEAK HR START TIME :	730 AM												TOTAL	
PEAK HR VOL :	145	292	74	16	332	34	26	349	64	61	710	65	2168	
PEAK HR FACTOR :	0.919			0.927			0.878			0.909			0.951	

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5152-002

Day: Wednesday

City: Covina

Date: 3/16/2016

NS/EW Streets:	PM												TOTAL
	Citrus Ave			Citrus Ave			Badillo St			Badillo St			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	1	1	1	0	1	0	1	1	1	1	1	1	
4:00 PM	24	89	35	6	85	16	10	153	32	24	116	13	603
4:15 PM	16	91	28	4	114	9	12	159	24	12	85	17	571
4:30 PM	20	86	42	4	105	11	8	154	25	14	94	16	579
4:45 PM	21	95	47	14	91	9	12	155	22	21	114	13	614
5:00 PM	25	87	43	6	115	11	20	154	20	21	127	12	641
5:15 PM	26	89	46	6	101	9	14	153	23	22	117	16	622
5:30 PM	25	87	37	5	92	7	11	164	16	18	106	11	579
5:45 PM	21	98	33	8	117	5	10	150	26	22	125	14	629
TOTAL VOLUMES :	178	722	311	53	820	77	97	1242	188	154	884	112	4838
APPROACH %'s :	14.70%	59.62%	25.68%	5.58%	86.32%	8.11%	6.35%	81.34%	12.31%	13.39%	76.87%	9.74%	
PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	97	361	159	25	425	32	55	621	85	83	475	53	2471
PEAK HR FACTOR :	0.958			0.913			0.981			0.949			0.964

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5262-001

Day: Wednesday

City: Covina

Date: 4/27/2016

NS/EW Streets:		AM												TOTAL
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	
	0	3	1	0	2	1	0	0	0	0.5	0	1.5		
7:00 AM	0	141	31	0	111	38	0	0	0	74	0	135	530	
7:15 AM	0	132	11	0	109	36	0	0	0	99	0	213	600	
7:30 AM	0	131	21	0	165	29	0	0	0	105	0	176	627	
7:45 AM	0	223	25	0	204	56	0	0	0	72	0	189	769	
8:00 AM	0	203	29	0	143	45	0	0	0	62	0	130	612	
8:15 AM	0	149	28	0	161	43	0	0	0	74	0	95	550	
8:30 AM	0	189	42	0	107	49	0	0	0	41	0	95	523	
8:45 AM	0	204	37	0	111	63	0	0	0	27	0	105	547	
TOTAL VOLUMES :	0	1372	224	0	1111	359	0	0	0	554	0	1138	4758	
APPROACH %'s :	0.00%	85.96%	14.04%	0.00%	75.58%	24.42%	#DIV/0!	#DIV/0!	#DIV/0!	32.74%	0.00%	67.26%		
PEAK HR START TIME :	7:15 AM												TOTAL	
PEAK HR VOL :	0	689	86	0	621	166	0	0	0	338	0	708	2608	
PEAK HR FACTOR :	0.781		0.757			0.000			0.838			0.848		

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-5262-001

Day: Wednesday

City: Covina

Date: 4/27/2016

		PM												
NS/EW Streets:	Citrus St			Citrus St			I-10 Fwy WB Ramp			I-10 Fwy WB Ramp				
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	
	0	3	1	0	2	1	0	0	0	0.5	0	1.5		
4:00 PM	0	165	43	0	199	118	0	0	0	46	0	85	656	
4:15 PM	0	140	29	0	178	117	0	0	0	45	0	100	609	
4:30 PM	0	161	36	0	178	102	0	0	0	53	0	62	592	
4:45 PM	0	163	25	0	183	101	0	0	0	37	0	73	582	
5:00 PM	0	151	25	0	202	112	0	0	0	33	0	86	609	
5:15 PM	0	176	25	0	228	97	0	0	0	65	0	89	680	
5:30 PM	0	177	21	0	212	106	0	0	0	78	0	86	680	
5:45 PM	0	193	36	0	217	113	0	0	0	35	0	67	661	
TOTAL VOLUMES :	0	1326	240	0	1597	866	0	0	0	392	0	648	5069	
APPROACH %'s :	0.00%	84.67%	15.33%	0.00%	64.84%	35.16%	#DIV/0!	#DIV/0!	#DIV/0!	37.69%	0.00%	62.31%		
PEAK HR START TIME :	500 PM												TOTAL	
PEAK HR VOL :	0	697	107	0	859	428	0	0	0	211	0	328	2630	
PEAK HR FACTOR :	0.878			0.975			0.000			0.822			0.967	

CONTROL : Signalized

APPENDIX B

**LEVEL OF SERVICE CALCULATION WORKSHEETS
2016 EXISTING CONDITIONS**

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		727	2	3200	0.309	*
NB Right		263	0	-	0.309	
SB Left		0	0	-	0.000	*
SB Through		512	2	3200	0.160	
SB Right	Free	324	1	1600	0.000	
EB Left	Permissive	587	1	1600	0.367	*
EB Through		0	0	-	0.000	
EB Right		317	1	1600	0.198	
WB Left		0	0	-	0.000	
WB Through		0	0	-	0.000	*
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.676
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.776
Level of Service (LOS) - Refer to table below:						C

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	70	1	1600	0.044	
NB Through		550	2	3200	0.190	*
NB Right		57	0	-	0.190	
SB Left	Protected	90	1	1600	0.056	*
SB Through		494	2	3200	0.178	
SB Right		77	0	-	0.178	
EB Left	Protected	143	1	1600	0.089	*
EB Through		417	2	3200	0.148	
EB Right		58	0	-	0.148	
WB Left	Protected	47	1	1600	0.029	
WB Through		884	2	3200	0.293	*
WB Right		52	0	-	0.293	
Total						
Sum of Critical V/C Ratios:						0.628
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.728
Level of Service (LOS) - Refer to table below:						C

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	74	1	1600	0.046	*
NB Through		384	2	3200	0.145	
NB Right		79	0	-	0.145	
SB Left	Protected	87	1	1600	0.054	
SB Through		396	2	3200	0.160	*
SB Right		115	0	-	0.160	
EB Left	Protected	143	1	1600	0.089	*
EB Through		517	2	3200	0.174	
EB Right		40	0	-	0.174	
WB Left	Protected	125	1	1600	0.078	
WB Through		1192	2	3200	0.393	*
WB Right		66	0	-	0.393	
						Total
Sum of Critical V/C Ratios:						0.688
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.788
Level of Service (LOS) - Refer to table below:						C

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	70	1	1600	0.044	*
NB Through		559	2	3200	0.213	
NB Right		121	0	-	0.213	
SB Left	Protected	44	1	1600	0.028	
SB Through		630	2	3200	0.202	*
SB Right		15	0	-	0.202	
EB Left	Permissive	19	0	-	0.000	*
EB Through		17	1	1600	0.043	
EB Right		32	0	-	0.043	
WB Left	Permissive	218	0	-	0.000	
WB Through		15	1	1600	0.146	*
WB Right		218	1	1600	0.136	
Total						
Sum of Critical V/C Ratios:						0.391
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.491
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	37	1	1600	0.023	*
NB Through		327	2	3200	0.113	
NB Right		35	0	-	0.113	
SB Left	Permissive	62	1	1600	0.039	
SB Through		536	2	3200	0.187	*
SB Right		62	0	-	0.187	
EB Left	Permissive	89	1	1600	0.056	*
EB Through		234	2	3200	0.086	
EB Right		40	0	-	0.086	
WB Left	Permissive	91	1	1600	0.057	
WB Through		592	2	3200	0.213	*
WB Right		88	0	-	0.213	
						Total
Sum of Critical V/C Ratios:						0.478
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.578
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	118	1	1600	0.074	*
NB Through		750	2	3200	0.259	
NB Right		78	0	-	0.259	
SB Left	Permissive	72	1	1600	0.045	
SB Through		780	2	3200	0.266	*
SB Right		70	0	-	0.266	
EB Left	Permissive	74	1	1600	0.046	*
EB Through		167	2	3200	0.075	
EB Right		74	0	-	0.075	
WB Left	Permissive	146	1	1600	0.091	
WB Through		355	2	3200	0.147	*
WB Right		114	0	-	0.147	
Total						
Sum of Critical V/C Ratios:						0.532
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.632
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	145	1	1600	0.091	*
NB Through		292	1	1600	0.183	
NB Right		74	1	1600	0.046	
SB Left	Permissive	16	0	-	0.000	
SB Through		332	1	1600	0.239	*
SB Right		34	0	-	0.239	
EB Left	Permissive	26	1	1600	0.016	*
EB Through		349	1	1600	0.218	
EB Right		64	1	1600	0.040	
WB Left	Permissive	61	1	1600	0.038	
WB Through		710	1	1600	0.444	*
WB Right		65	1	1600	0.041	
						Total
Sum of Critical V/C Ratios:						0.789
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.889
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2016 Existing Conditions Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		689	3	4800	0.144	
NB Right	Free	86	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		621	2	3200	0.194	*
SB Right	Free	166	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		338	0.5	-	0.000	
WB Through		0	0	3200	0.327	*
WB Right		708	1.5	-	0.327	
Total						
Sum of Critical V/C Ratios:						0.521
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.621
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		670	2	3200	0.263	*
NB Right		170	0	-	0.263	
SB Left		0	0	-	0.000	*
SB Through		724	2	3200	0.226	
SB Right	Free	423	1	1600	0.000	
EB Left	Permissive	213	1	1600	0.133	
EB Through		0	0	-	0.000	
EB Right		225	1	1600	0.141	*
WB Left		0	0	-	0.000	*
WB Through		0	0	-	0.000	
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.403
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.503
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	88	1	1600	0.055	*
NB Through		554	2	3200	0.195	
NB Right		70	0	-	0.195	
SB Left	Protected	108	1	1600	0.068	
SB Through		567	2	3200	0.209	*
SB Right		101	0	-	0.209	
EB Left	Protected	151	1	1600	0.094	
EB Through		741	2	3200	0.258	*
EB Right		84	0	-	0.258	
WB Left	Protected	43	1	1600	0.027	*
WB Through		333	2	3200	0.117	
WB Right		40	0	-	0.117	
						Total
Sum of Critical V/C Ratios:						0.548
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.648
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	119	1	1600	0.074	
NB Through		472	2	3200	0.191	*
NB Right		139	0	-	0.191	
SB Left	Protected	107	1	1600	0.067	*
SB Through		471	2	3200	0.183	
SB Right		115	0	-	0.183	
EB Left	Protected	157	1	1600	0.098	
EB Through		954	2	3200	0.328	*
EB Right		95	0	-	0.328	
WB Left	Protected	175	1	1600	0.109	*
WB Through		721	2	3200	0.249	
WB Right		75	0	-	0.249	
						Total
Sum of Critical V/C Ratios:						0.695
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.795
Level of Service (LOS) - Refer to table below:						C

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	73	1	1600	0.046	
NB Through		786	2	3200	0.290	*
NB Right		143	0	-	0.290	
SB Left	Protected	159	1	1600	0.099	*
SB Through		829	2	3200	0.274	
SB Right		47	0	-	0.274	
EB Left	Permissive	33	0	-	0.000	*
EB Through		32	1	1600	0.058	
EB Right		27	0	-	0.058	
WB Left	Permissive	128	0	-	0.000	
WB Through		24	1	1600	0.095	*
WB Right		132	1	1600	0.083	
Total						
Sum of Critical V/C Ratios:						0.485
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.585
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	52	1	1600	0.033	
NB Through		599	2	3200	0.225	*
NB Right		120	0	-	0.225	
SB Left	Permissive	112	1	1600	0.070	*
SB Through		543	2	3200	0.194	
SB Right		77	0	-	0.194	
EB Left	Permissive	50	1	1600	0.031	
EB Through		419	2	3200	0.142	*
EB Right		34	0	-	0.142	
WB Left	Permissive	85	1	1600	0.053	*
WB Through		322	2	3200	0.123	
WB Right		70	0	-	0.123	
						Total
Sum of Critical V/C Ratios:						0.489
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.589
Level of Service (LOS) - Refer to table below:						A

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	100	1	1600	0.063	*
NB Through		865	2	3200	0.308	
NB Right		120	0	-	0.308	
SB Left	Permissive	63	1	1600	0.039	
SB Through		875	2	3200	0.296	*
SB Right		72	0	-	0.296	
EB Left	Permissive	131	1	1600	0.082	
EB Through		397	2	3200	0.143	*
EB Right		62	0	-	0.143	
WB Left	Permissive	116	1	1600	0.073	*
WB Through		215	2	3200	0.086	
WB Right		60	0	-	0.086	
						Total
Sum of Critical V/C Ratios:						0.574
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.674
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	97	1	1600	0.061	*
NB Through		361	1	1600	0.226	
NB Right		159	1	1600	0.099	
SB Left	Permissive	25	0	-	0.000	
SB Through		425	1	1600	0.301	*
SB Right		32	0	-	0.301	
EB Left	Permissive	55	1	1600	0.034	
EB Through		621	1	1600	0.388	*
EB Right		85	1	1600	0.053	
WB Left	Permissive	83	1	1600	0.052	*
WB Through		475	1	1600	0.297	
WB Right		53	1	1600	0.033	
						Total
Sum of Critical V/C Ratios:						0.802
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.902
Level of Service (LOS) - Refer to table below:						E

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2016 Existing Conditions Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		697	3	4800	0.145	
NB Right	Free	107	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		859	2	3200	0.268	*
SB Right	Free	428	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		211	0.5	-	0.000	
WB Through		0	0	3200	0.168	*
WB Right		328	1.5	-	0.168	
						Total
Sum of Critical V/C Ratios:						0.437
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.537
Level of Service (LOS) - Refer to table below:						A

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

APPENDIX C

**LEVEL OF SERVICE CALCULATION WORKSHEETS
2017 WITHOUT PROJECT**

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		746	2	3200	0.317	*
NB Right		268	0	-	0.317	
SB Left		0	0	-	0.000	*
SB Through		527	2	3200	0.165	
SB Right	Free	327	1	1600	0.000	
EB Left	Permissive	593	1	1600	0.371	*
EB Through		0	0	-	0.000	
EB Right		323	1	1600	0.202	
WB Left		0	0	-	0.000	
WB Through		0	0	-	0.000	*
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.688
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.788
Level of Service (LOS) - Refer to table below:						C

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	72	1	1600	0.045	
NB Through		571	2	3200	0.197	*
NB Right		59	0	-	0.197	
SB Left	Protected	91	1	1600	0.057	*
SB Through		513	2	3200	0.185	
SB Right		78	0	-	0.185	
EB Left	Protected	144	1	1600	0.090	*
EB Through		421	2	3200	0.150	
EB Right		60	0	-	0.150	
WB Left	Protected	48	1	1600	0.030	
WB Through		893	2	3200	0.296	*
WB Right		53	0	-	0.296	
						Total
Sum of Critical V/C Ratios:						0.639
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.739
Level of Service (LOS) - Refer to table below:						C

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	77	1	1600	0.048	*
NB Through		404	2	3200	0.152	
NB Right		82	0	-	0.152	
SB Left	Protected	88	1	1600	0.055	
SB Through		416	2	3200	0.166	*
SB Right		116	0	-	0.166	
EB Left	Protected	144	1	1600	0.090	*
EB Through		522	2	3200	0.176	
EB Right		42	0	-	0.176	
WB Left	Protected	128	1	1600	0.080	
WB Through		1204	2	3200	0.397	*
WB Right		67	0	-	0.397	
						Total
Sum of Critical V/C Ratios:						0.702
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.802
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	71	1	1600	0.044	*
NB Through		565	2	3200	0.216	
NB Right		125	0	-	0.216	
SB Left	Protected	47	1	1600	0.029	
SB Through		636	2	3200	0.203	*
SB Right		15	0	-	0.203	
EB Left	Permissive	19	0	-	0.000	*
EB Through		17	1	1600	0.043	
EB Right		32	0	-	0.043	
WB Left	Permissive	222	0	-	0.000	
WB Through		15	1	1600	0.148	*
WB Right		222	1	1600	0.139	
Total						
Sum of Critical V/C Ratios:						0.396
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.496
Level of Service (LOS) - Refer to table below:						A

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	37	1	1600	0.023	*
NB Through		350	2	3200	0.122	
NB Right		39	0	-	0.122	
SB Left	Permissive	68	1	1600	0.043	
SB Through		551	2	3200	0.193	*
SB Right		65	0	-	0.193	
EB Left	Permissive	94	1	1600	0.059	*
EB Through		238	2	3200	0.087	
EB Right		40	0	-	0.087	
WB Left	Permissive	94	1	1600	0.059	
WB Through		599	2	3200	0.216	*
WB Right		91	0	-	0.216	
						Total
Sum of Critical V/C Ratios:						0.490
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.590
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	120	1	1600	0.075	*
NB Through		758	2	3200	0.262	
NB Right		79	0	-	0.262	
SB Left	Permissive	73	1	1600	0.046	
SB Through		788	2	3200	0.269	*
SB Right		72	0	-	0.269	
EB Left	Permissive	76	1	1600	0.048	*
EB Through		171	2	3200	0.077	
EB Right		76	0	-	0.077	
WB Left	Permissive	147	1	1600	0.092	
WB Through		363	2	3200	0.149	*
WB Right		115	0	-	0.149	
						Total
Sum of Critical V/C Ratios:						0.541
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.641
Level of Service (LOS) - Refer to table below:						B

Notes:
<p>1. Per Lane Capacity = 1,600 VPH</p> <p>2. Dual Left-Turn Capacity = 2,880 VPH</p>

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	146	1	1600	0.091	*
NB Through		310	1	1600	0.194	
NB Right		75	1	1600	0.047	
SB Left	Permissive	20	0	-	0.000	
SB Through		353	1	1600	0.257	*
SB Right		38	0	-	0.257	
EB Left	Permissive	28	1	1600	0.018	*
EB Through		352	1	1600	0.220	
EB Right		65	1	1600	0.041	
WB Left	Permissive	62	1	1600	0.039	
WB Through		717	1	1600	0.448	*
WB Right		68	1	1600	0.043	
						Total
Sum of Critical V/C Ratios:						0.814
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.914
Level of Service (LOS) - Refer to table below:						E

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2017 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		708	3	4800	0.148	
NB Right	Free	87	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		639	2	3200	0.200	*
SB Right	Free	173	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		341	0.5	-	0.000	
WB Through		0	0	3200	0.331	*
WB Right		718	1.5	-	0.331	
Total						
Sum of Critical V/C Ratios:						0.531
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.631
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		701	2	3200	0.275	*
NB Right		178	0	-	0.275	
SB Left		0	0	-	0.000	*
SB Through		756	2	3200	0.236	
SB Right	Free	427	1	1600	0.000	
EB Left	Permissive	215	1	1600	0.134	
EB Through		0	0	-	0.000	
EB Right		235	1	1600	0.147	*
WB Left		0	0	-	0.000	*
WB Through		0	0	-	0.000	
WB Right		0	0	-	0.000	
						Total
Sum of Critical V/C Ratios:						0.422
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.522
Level of Service (LOS) - Refer to table below:						A

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	91	1	1600	0.057	*
NB Through		589	2	3200	0.207	
NB Right		73	0	-	0.207	
SB Left	Protected	109	1	1600	0.068	
SB Through		606	2	3200	0.221	*
SB Right		102	0	-	0.221	
EB Left	Protected	153	1	1600	0.096	
EB Through		748	2	3200	0.261	*
EB Right		87	0	-	0.261	
WB Left	Protected	45	1	1600	0.028	*
WB Through		336	2	3200	0.118	
WB Right		40	0	-	0.118	
						Total
Sum of Critical V/C Ratios:						0.567
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.667
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	124	1	1600	0.078	*
NB Through		510	2	3200	0.204	
NB Right		144	0	-	0.204	
SB Left	Protected	108	1	1600	0.068	
SB Through		513	2	3200	0.197	*
SB Right		116	0	-	0.197	
EB Left	Protected	159	1	1600	0.099	
EB Through		964	2	3200	0.333	*
EB Right		100	0	-	0.333	
WB Left	Protected	181	1	1600	0.113	*
WB Through		728	2	3200	0.251	
WB Right		76	0	-	0.251	
						Total
Sum of Critical V/C Ratios:						0.720
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.820
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	74	1	1600	0.046	
NB Through		794	2	3200	0.295	*
NB Right		150	0	-	0.295	
SB Left	Protected	167	1	1600	0.104	*
SB Through		837	2	3200	0.276	
SB Right		47	0	-	0.276	
EB Left	Permissive	33	0	-	0.000	*
EB Through		32	1	1600	0.058	
EB Right		27	0	-	0.058	
WB Left	Permissive	134	0	-	0.000	
WB Through		24	1	1600	0.099	*
WB Right		138	1	1600	0.086	
						Total
Sum of Critical V/C Ratios:						0.498
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.598
Level of Service (LOS) - Refer to table below:						A

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	53	1	1600	0.033	
NB Through		637	2	3200	0.238	*
NB Right		125	0	-	0.238	
SB Left	Permissive	118	1	1600	0.074	*
SB Through		584	2	3200	0.210	
SB Right		87	0	-	0.210	
EB Left	Permissive	60	1	1600	0.038	
EB Through		425	2	3200	0.143	*
EB Right		34	0	-	0.143	
WB Left	Permissive	90	1	1600	0.056	*
WB Through		327	2	3200	0.126	
WB Right		76	0	-	0.126	
						Total
Sum of Critical V/C Ratios:						0.512
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.612
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	103	1	1600	0.064	*
NB Through		876	2	3200	0.312	
NB Right		121	0	-	0.312	
SB Left	Permissive	64	1	1600	0.040	
SB Through		888	2	3200	0.301	*
SB Right		75	0	-	0.301	
EB Left	Permissive	134	1	1600	0.084	
EB Through		408	2	3200	0.148	*
EB Right		64	0	-	0.148	
WB Left	Permissive	117	1	1600	0.073	*
WB Through		225	2	3200	0.089	
WB Right		61	0	-	0.089	
						Total
Sum of Critical V/C Ratios:						0.586
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.686
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	98	1	1600	0.061	*
NB Through		402	1	1600	0.251	
NB Right		161	1	1600	0.101	
SB Left	Permissive	30	0	-	0.000	
SB Through		461	1	1600	0.330	*
SB Right		37	0	-	0.330	
EB Left	Permissive	62	1	1600	0.039	
EB Through		629	1	1600	0.393	*
EB Right		86	1	1600	0.054	
WB Left	Permissive	84	1	1600	0.053	*
WB Through		481	1	1600	0.301	
WB Right		60	1	1600	0.038	
						Total
Sum of Critical V/C Ratios:						0.837
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.937
Level of Service (LOS) - Refer to table below:						E

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2017 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		733	3	4800	0.153	
NB Right	Free	108	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		892	2	3200	0.279	*
SB Right	Free	441	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		213	0.5	-	0.000	
WB Through		0	0	3200	0.173	*
WB Right		339	1.5	-	0.173	
Total						
Sum of Critical V/C Ratios:						0.451
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.551
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

APPENDIX D

**LEVEL OF SERVICE CALCULATION WORKSHEETS
2017 WITH PROJECT**

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		759	2	3200	0.321	*
NB Right		268	0	-	0.321	
SB Left		0	0	-	0.000	*
SB Through		553	2	3200	0.173	
SB Right	Free	327	1	1600	0.000	
EB Left	Permissive	593	1	1600	0.371	*
EB Through		0	0	-	0.000	
EB Right		322	1	1600	0.201	
WB Left		0	0	-	0.000	
WB Through		0	0	-	0.000	*
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.692
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.792
Level of Service (LOS) - Refer to table below:						C

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	75	1	1600	0.047	
NB Through		584	2	3200	0.202	*
NB Right		62	0	-	0.202	
SB Left	Protected	91	1	1600	0.057	*
SB Through		537	2	3200	0.192	
SB Right		78	0	-	0.192	
EB Left	Protected	144	1	1600	0.090	*
EB Through		421	2	3200	0.153	
EB Right		70	0	-	0.153	
WB Left	Protected	58	1	1600	0.036	
WB Through		893	2	3200	0.296	*
WB Right		53	0	-	0.296	
Total						
Sum of Critical V/C Ratios:						0.644
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.744
Level of Service (LOS) - Refer to table below:						C

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	108	1	1600	0.068	*
NB Through		424	2	3200	0.160	
NB Right		88	0	-	0.160	
SB Left	Protected	88	1	1600	0.055	
SB Through		461	2	3200	0.180	*
SB Right		116	0	-	0.180	
EB Left	Protected	144	1	1600	0.090	*
EB Through		522	2	3200	0.183	
EB Right		63	0	-	0.183	
WB Left	Protected	149	1	1600	0.093	
WB Through		1204	2	3200	0.397	*
WB Right		67	0	-	0.397	
						Total
Sum of Critical V/C Ratios:						0.735
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.835
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	71	1	1600	0.044	
NB Through		565	2	3200	0.220	*
NB Right		139	0	-	0.220	
SB Left	Protected	61	1	1600	0.038	*
SB Through		636	2	3200	0.203	
SB Right		15	0	-	0.203	
EB Left	Permissive	19	0	-	0.000	*
EB Through		17	1	1600	0.043	
EB Right		32	0	-	0.043	
WB Left	Permissive	226	0	-	0.000	
WB Through		15	1	1600	0.151	*
WB Right		226	1	1600	0.141	
						Total
Sum of Critical V/C Ratios:						0.409
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.509
Level of Service (LOS) - Refer to table below:						A

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	37	1	1600	0.023	*
NB Through		370	2	3200	0.135	
NB Right		63	0	-	0.135	
SB Left	Permissive	63	1	1600	0.039	
SB Through		558	2	3200	0.195	*
SB Right		65	0	-	0.195	
EB Left	Permissive	106	1	1600	0.066	*
EB Through		253	2	3200	0.092	
EB Right		40	0	-	0.092	
WB Left	Permissive	107	1	1600	0.067	
WB Through		607	2	3200	0.217	*
WB Right		88	0	-	0.217	
						Total
Sum of Critical V/C Ratios:						0.501
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.601
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	125	1	1600	0.078	*
NB Through		758	2	3200	0.262	
NB Right		79	0	-	0.262	
SB Left	Permissive	73	1	1600	0.046	
SB Through		788	2	3200	0.270	*
SB Right		77	0	-	0.270	
EB Left	Permissive	77	1	1600	0.048	*
EB Through		176	2	3200	0.079	
EB Right		77	0	-	0.079	
WB Left	Permissive	147	1	1600	0.092	
WB Through		381	2	3200	0.155	*
WB Right		115	0	-	0.155	
						Total
Sum of Critical V/C Ratios:						0.552
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.652
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	146	1	1600	0.091	*
NB Through		334	1	1600	0.209	
NB Right		75	1	1600	0.047	
SB Left	Permissive	23	0	-	0.000	
SB Through		366	1	1600	0.269	*
SB Right		41	0	-	0.269	
EB Left	Permissive	38	1	1600	0.024	*
EB Through		352	1	1600	0.220	
EB Right		65	1	1600	0.041	
WB Left	Permissive	62	1	1600	0.039	
WB Through		717	1	1600	0.448	*
WB Right		78	1	1600	0.049	
						Total
Sum of Critical V/C Ratios:						0.832
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.932
Level of Service (LOS) - Refer to table below:						E

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2017 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		734	3	4800	0.153	
NB Right	Free	87	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		650	2	3200	0.203	*
SB Right	Free	176	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		341	0.5	-	0.000	
WB Through		0	0	3200	0.330	*
WB Right		716	1.5	-	0.330	
						Total
Sum of Critical V/C Ratios:						0.533
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.633
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

HCM Unsignalized Intersection Capacity Analysis
 9: Project Access 1 & Citrus Avenue

AM Peak Hour
 2017 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	44	550	6	4	808
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	48	598	7	4	878
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1049	302			604	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1049	302			604	
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	93			100	
cM capacity (veh/h)	222	694			969	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	48	399	206	4	439	439
Volume Left	0	0	0	4	0	0
Volume Right	48	0	7	0	0	0
cSH	694	1700	1700	969	1700	1700
Volume to Capacity	0.07	0.23	0.12	0.00	0.26	0.26
Queue Length 95th (ft)	6	0	0	0	0	0
Control Delay (s)	10.6	0.0	0.0	8.7	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	10.6	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			25.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Project Access 2 & Citrus Avenue

AM Peak Hour
 2017 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	29	527	51	111	697
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	32	573	55	121	758
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1221	314			628	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1221	314			628	
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	95			87	
cM capacity (veh/h)	150	682			950	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	32	382	246	121	379	379
Volume Left	0	0	0	121	0	0
Volume Right	32	0	55	0	0	0
cSH	682	1700	1700	950	1700	1700
Volume to Capacity	0.05	0.22	0.14	0.13	0.22	0.22
Queue Length 95th (ft)	4	0	0	11	0	0
Control Delay (s)	10.5	0.0	0.0	9.3	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	10.5	0.0		1.3		
Approach LOS	B					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			29.0%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Covina Boulevard & Project Access 3

AM Peak Hour
 2017 with Project

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	  			 
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	51	338	780	38	10	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	367	848	41	11	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage (veh)					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	889				1163	445
vC1, stage 1 conf vol					868	
vC2, stage 2 conf vol					295	
vCu, unblocked vol	889				1163	445
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	93				96	95
cM capacity (veh/h)	758				288	561
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	55	184	184	565	324	39
Volume Left	55	0	0	0	0	11
Volume Right	0	0	0	0	41	28
cSH	758	1700	1700	1700	1700	444
Volume to Capacity	0.07	0.11	0.11	0.33	0.19	0.09
Queue Length 95th (ft)	6	0	0	0	0	7
Control Delay (s)	10.1	0.0	0.0	0.0	0.0	13.9
Lane LOS	B					B
Approach Delay (s)	1.3			0.0		13.9
Approach LOS						B
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			39.4%		ICU Level of Service	A
Analysis Period (min)			15			

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		709	2	3200	0.276	*
NB Right		173	0	-	0.276	
SB Left		0	0	-	0.000	*
SB Through		760	2	3200	0.238	
SB Right	Free	427	1	1600	0.000	
EB Left	Permissive	215	1	1600	0.134	
EB Through		0	0	-	0.000	
EB Right		236	1	1600	0.148	*
WB Left		0	0	-	0.000	*
WB Through		0	0	-	0.000	
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.423
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.523
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	98	1	1600	0.061	*
NB Through		592	2	3200	0.210	
NB Right		80	0	-	0.210	
SB Left	Protected	109	1	1600	0.068	
SB Through		610	2	3200	0.223	*
SB Right		102	0	-	0.223	
EB Left	Protected	153	1	1600	0.096	
EB Through		748	2	3200	0.262	*
EB Right		89	0	-	0.262	
WB Left	Protected	47	1	1600	0.029	*
WB Through		336	2	3200	0.118	
WB Right		40	0	-	0.118	
						Total
Sum of Critical V/C Ratios:						0.575
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.675
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	152	1	1600	0.095	*
NB Through		527	2	3200	0.215	
NB Right		160	0	-	0.215	
SB Left	Protected	108	1	1600	0.068	
SB Through		522	2	3200	0.199	*
SB Right		116	0	-	0.199	
EB Left	Protected	159	1	1600	0.099	
EB Through		964	2	3200	0.334	*
EB Right		106	0	-	0.334	
WB Left	Protected	187	1	1600	0.117	*
WB Through		728	2	3200	0.251	
WB Right		76	0	-	0.251	
						Total
Sum of Critical V/C Ratios:						0.746
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.846
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	74	1	1600	0.046	
NB Through		794	2	3200	0.295	*
NB Right		151	0	-	0.295	
SB Left	Protected	168	1	1600	0.105	*
SB Through		837	2	3200	0.276	
SB Right		47	0	-	0.276	
EB Left	Permissive	33	0	-	0.000	*
EB Through		32	1	1600	0.058	
EB Right		27	0	-	0.058	
WB Left	Permissive	141	0	-	0.000	
WB Through		24	1	1600	0.103	*
WB Right		145	1	1600	0.091	
						Total
Sum of Critical V/C Ratios:						0.503
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.603
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	53	1	1600	0.033	
NB Through		634	2	3200	0.241	*
NB Right		138	0	-	0.241	
SB Left	Permissive	110	1	1600	0.069	*
SB Through		552	2	3200	0.195	
SB Right		71	0	-	0.195	
EB Left	Permissive	57	1	1600	0.036	
EB Through		432	2	3200	0.146	*
EB Right		34	0	-	0.146	
WB Left	Permissive	139	1	1600	0.087	*
WB Through		356	2	3200	0.133	
WB Right		70	0	-	0.133	
						Total
Sum of Critical V/C Ratios:						0.543
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.643
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	104	1	1600	0.065	*
NB Through		876	2	3200	0.312	
NB Right		121	0	-	0.312	
SB Left	Permissive	64	1	1600	0.040	
SB Through		888	2	3200	0.301	*
SB Right		76	0	-	0.301	
EB Left	Permissive	136	1	1600	0.085	
EB Through		417	2	3200	0.151	*
EB Right		67	0	-	0.151	
WB Left	Permissive	117	1	1600	0.073	*
WB Through		226	2	3200	0.090	
WB Right		61	0	-	0.090	
						Total
Sum of Critical V/C Ratios:						0.591
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.691
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	98	1	1600	0.061	*
NB Through		406	1	1600	0.254	
NB Right		161	1	1600	0.101	
SB Left	Permissive	37	0	-	0.000	
SB Through		464	1	1600	0.341	*
SB Right		44	0	-	0.341	
EB Left	Permissive	64	1	1600	0.040	
EB Through		629	1	1600	0.393	*
EB Right		86	1	1600	0.054	
WB Left	Permissive	84	1	1600	0.053	*
WB Through		481	1	1600	0.301	
WB Right		62	1	1600	0.039	
						Total
Sum of Critical V/C Ratios:						0.848
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.948
Level of Service (LOS) - Refer to table below:						E

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2017 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		739	3	4800	0.154	
NB Right	Free	108	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		899	2	3200	0.281	*
SB Right	Free	437	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		213	0.5	-	0.000	
WB Through		0	0	3200	0.172	*
WB Right		337	1.5	-	0.172	
						Total
Sum of Critical V/C Ratios:						0.453
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.553
Level of Service (LOS) - Refer to table below:						A

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

HCM Unsignalized Intersection Capacity Analysis
 9: Project Access 1 & Citrus Avenue

PM Peak Hour
 2017 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	21	834	24	18	827
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	907	26	20	899
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1408	466			933	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1408	466			933	
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	96			97	
cM capacity (veh/h)	126	543			730	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	23	604	328	20	449	449
Volume Left	0	0	0	20	0	0
Volume Right	23	0	26	0	0	0
cSH	543	1700	1700	730	1700	1700
Volume to Capacity	0.04	0.36	0.19	0.03	0.26	0.26
Queue Length 95th (ft)	3	0	0	2	0	0
Control Delay (s)	11.9	0.0	0.0	10.1	0.0	0.0
Lane LOS	B			B		
Approach Delay (s)	11.9	0.0		0.2		
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			33.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Project Access 2 & Citrus Avenue

PM Peak Hour
 2017 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	96	762	33	60	767
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	104	828	36	65	834
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1393	432			864	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1393	432			864	
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	82			92	
cM capacity (veh/h)	121	572			774	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	104	552	312	65	417	417
Volume Left	0	0	0	65	0	0
Volume Right	104	0	36	0	0	0
cSH	572	1700	1700	774	1700	1700
Volume to Capacity	0.18	0.32	0.18	0.08	0.25	0.25
Queue Length 95th (ft)	17	0	0	7	0	0
Control Delay (s)	12.7	0.0	0.0	10.1	0.0	0.0
Lane LOS	B			B		
Approach Delay (s)	12.7	0.0		0.7		
Approach LOS	B					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			34.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Covina Boulevard & Project Access 3

PM Peak Hour
 2017 with Project

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 			 
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	33	660	486	22	33	90
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	717	528	24	36	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage (veh)					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	552				971	276
vC1, stage 1 conf vol					540	
vC2, stage 2 conf vol					430	
vCu, unblocked vol	552				971	276
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	96				90	86
cM capacity (veh/h)	1014				372	721
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	36	359	359	352	200	134
Volume Left	36	0	0	0	0	36
Volume Right	0	0	0	0	24	98
cSH	1014	1700	1700	1700	1700	576
Volume to Capacity	0.04	0.21	0.21	0.21	0.12	0.23
Queue Length 95th (ft)	3	0	0	0	0	22
Control Delay (s)	8.7	0.0	0.0	0.0	0.0	13.1
Lane LOS	A					B
Approach Delay (s)	0.4			0.0		13.1
Approach LOS						B
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			34.8%		ICU Level of Service	A
Analysis Period (min)			15			

APPENDIX E

**LEVEL OF SERVICE CALCULATION WORKSHEETS
2036 WITHOUT PROJECT**

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		797	2	3200	0.338	*
NB Right		285	0	-	0.338	
SB Left		0	0	-	0.000	*
SB Through		564	2	3200	0.176	
SB Right	Free	350	1	1600	0.000	
EB Left	Permissive	635	1	1600	0.397	*
EB Through		0	0	-	0.000	
EB Right		346	1	1600	0.216	
WB Left		0	0	-	0.000	
WB Through		0	0	-	0.000	*
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.735
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.835
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	77	1	1600	0.048	
NB Through		612	2	3200	0.211	*
NB Right		62	0	-	0.211	
SB Left	Protected	95	1	1600	0.059	*
SB Through		551	2	3200	0.199	
SB Right		85	0	-	0.199	
EB Left	Protected	155	1	1600	0.097	*
EB Through		450	2	3200	0.161	
EB Right		65	0	-	0.161	
WB Left	Protected	50	1	1600	0.031	
WB Through		955	2	3200	0.316	*
WB Right		55	0	-	0.316	
Total						
Sum of Critical V/C Ratios:						0.683
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.783
Level of Service (LOS) - Refer to table below:						C

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	84	1	1600	0.053	*
NB Through		435	2	3200	0.164	
NB Right		89	0	-	0.164	
SB Left	Protected	95	1	1600	0.059	
SB Through		450	2	3200	0.180	*
SB Right		125	0	-	0.180	
EB Left	Protected	155	1	1600	0.097	*
EB Through		560	2	3200	0.189	
EB Right		44	0	-	0.189	
WB Left	Protected	139	1	1600	0.087	
WB Through		1290	2	3200	0.425	*
WB Right		70	0	-	0.425	
Total						
Sum of Critical V/C Ratios:						0.754
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.854
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	70	1	1600	0.044	
NB Through		605	2	3200	0.232	*
NB Right		136	0	-	0.232	
SB Left	Protected	51	1	1600	0.032	*
SB Through		680	2	3200	0.217	
SB Right		15	0	-	0.217	
EB Left	Permissive	20	0	-	0.000	*
EB Through		15	1	1600	0.041	
EB Right		30	0	-	0.041	
WB Left	Permissive	236	0	-	0.000	
WB Through		15	1	1600	0.157	*
WB Right		236	1	1600	0.148	
Total						
Sum of Critical V/C Ratios:						0.420
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.520
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	40	1	1600	0.025	*
NB Through		375	2	3200	0.130	
NB Right		41	0	-	0.130	
SB Left	Permissive	70	1	1600	0.044	
SB Through		588	2	3200	0.206	*
SB Right		70	0	-	0.206	
EB Left	Permissive	103	1	1600	0.064	*
EB Through		255	1	1600	0.188	
EB Right		45	0	-	0.188	
WB Left	Permissive	102	1	1600	0.064	
WB Through		642	1	1600	0.463	*
WB Right		98	0	-	0.463	
						Total
Sum of Critical V/C Ratios:						0.758
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.858
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	130	1	1600	0.081	*
NB Through		810	2	3200	0.280	
NB Right		85	0	-	0.280	
SB Left	Permissive	80	1	1600	0.050	
SB Through		845	2	3200	0.288	*
SB Right		75	0	-	0.288	
EB Left	Permissive	79	1	1600	0.049	*
EB Through		185	1	1600	0.165	
EB Right		79	0	-	0.165	
WB Left	Permissive	155	1	1600	0.097	
WB Through		392	1	1600	0.323	*
WB Right		125	0	-	0.323	
Total						
Sum of Critical V/C Ratios:						0.741
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.841
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	155	1	1600	0.097	*
NB Through		331	1	1600	0.207	
NB Right		80	1	1600	0.050	
SB Left	Permissive	22	0	-	0.000	
SB Through		377	1	1600	0.276	*
SB Right		42	0	-	0.276	
EB Left	Permissive	30	1	1600	0.019	*
EB Through		375	1	1600	0.234	
EB Right		70	1	1600	0.044	
WB Left	Permissive	65	1	1600	0.041	
WB Through		765	1	1600	0.478	*
WB Right		75	1	1600	0.047	
						Total
Sum of Critical V/C Ratios:						0.869
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.969
Level of Service (LOS) - Refer to table below:						E

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2036 without Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		759	3	4800	0.158	
NB Right	Free	95	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		684	2	3200	0.214	*
SB Right	Free	187	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		365	0.5	-	0.000	
WB Through		0	0	3200	0.354	*
WB Right		767	1.5	-	0.354	
Total						
Sum of Critical V/C Ratios:						0.568
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.668
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		752	2	3200	0.294	*
NB Right		190	0	-	0.294	
SB Left		0	0	-	0.000	*
SB Through		811	2	3200	0.253	
SB Right	Free	455	1	1600	0.000	
EB Left	Permissive	230	1	1600	0.144	
EB Through		0	0	-	0.000	
EB Right		254	1	1600	0.159	*
WB Left		0	0	-	0.000	*
WB Through		0	0	-	0.000	
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.453
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.553
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	98	1	1600	0.061	*
NB Through		632	2	3200	0.222	
NB Right		78	0	-	0.222	
SB Left	Protected	115	1	1600	0.072	
SB Through		651	2	3200	0.238	*
SB Right		110	0	-	0.238	
EB Left	Protected	165	1	1600	0.103	
EB Through		800	2	3200	0.279	*
EB Right		93	0	-	0.279	
WB Left	Protected	48	1	1600	0.030	*
WB Through		360	2	3200	0.127	
WB Right		45	0	-	0.127	
Total						
Sum of Critical V/C Ratios:						0.608
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.708
Level of Service (LOS) - Refer to table below:						C

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	137	1	1600	0.086	*
NB Through		548	2	3200	0.219	
NB Right		154	0	-	0.219	
SB Left	Protected	115	1	1600	0.072	
SB Through		551	2	3200	0.211	*
SB Right		125	0	-	0.211	
EB Left	Protected	170	1	1600	0.106	
EB Through		1030	2	3200	0.356	*
EB Right		109	0	-	0.356	
WB Left	Protected	194	1	1600	0.121	*
WB Through		780	2	3200	0.269	
WB Right		80	0	-	0.269	
						Total
Sum of Critical V/C Ratios:						0.774
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.874
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	75	1	1600	0.047	
NB Through		850	2	3200	0.315	*
NB Right		159	0	-	0.315	
SB Left	Protected	179	1	1600	0.112	*
SB Through		895	2	3200	0.294	
SB Right		45	0	-	0.294	
EB Left	Permissive	35	0	-	0.000	*
EB Through		30	1	1600	0.056	
EB Right		25	0	-	0.056	
WB Left	Permissive	143	0	-	0.000	
WB Through		25	1	1600	0.105	*
WB Right		148	1	1600	0.093	
						Total
Sum of Critical V/C Ratios:						0.532
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.632
Level of Service (LOS) - Refer to table below:						B

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	55	1	1600	0.034	
NB Through		683	2	3200	0.256	*
NB Right		137	0	-	0.256	
SB Left	Permissive	128	1	1600	0.080	*
SB Through		622	2	3200	0.223	
SB Right		91	0	-	0.223	
EB Left	Permissive	63	1	1600	0.039	
EB Through		453	1	1600	0.305	*
EB Right		35	0	-	0.305	
WB Left	Permissive	101	1	1600	0.063	*
WB Through		351	1	1600	0.270	
WB Right		81	0	-	0.270	
						Total
Sum of Critical V/C Ratios:						0.704
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.804
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	109	1	1600	0.068	*
NB Through		935	2	3200	0.333	
NB Right		130	0	-	0.333	
SB Left	Permissive	70	1	1600	0.044	
SB Through		950	2	3200	0.322	*
SB Right		79	0	-	0.322	
EB Left	Permissive	143	1	1600	0.089	
EB Through		436	1	1600	0.315	*
EB Right		68	0	-	0.315	
WB Left	Permissive	125	1	1600	0.078	*
WB Through		239	1	1600	0.190	
WB Right		65	0	-	0.190	
						Total
Sum of Critical V/C Ratios:						0.783
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.883
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	105	1	1600	0.066	*
NB Through		431	1	1600	0.269	
NB Right		170	1	1600	0.106	
SB Left	Permissive	33	0	-	0.000	
SB Through		492	1	1600	0.352	*
SB Right		38	0	-	0.352	
EB Left	Permissive	68	1	1600	0.043	
EB Through		675	1	1600	0.422	*
EB Right		90	1	1600	0.056	
WB Left	Permissive	90	1	1600	0.056	*
WB Through		515	1	1600	0.322	
WB Right		63	1	1600	0.039	
						Total
Sum of Critical V/C Ratios:						0.896
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.996
Level of Service (LOS) - Refer to table below:						E

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2036 without Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		784	3	4800	0.163	
NB Right	Free	115	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		953	2	3200	0.298	*
SB Right	Free	474	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		230	0.5	-	0.000	
WB Through		0	0	3200	0.185	*
WB Right		362	1.5	-	0.185	
						Total
Sum of Critical V/C Ratios:						0.483
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.583
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

APPENDIX F

**LEVEL OF SERVICE CALCULATION WORKSHEETS
2036 WITH PROJECT**

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		810	2	3200	0.342	*
NB Right		285	0	-	0.342	
SB Left		0	0	-	0.000	*
SB Through		590	2	3200	0.184	
SB Right	Free	350	1	1600	0.000	
EB Left	Permissive	635	1	1600	0.397	*
EB Through		0	0	-	0.000	
EB Right		345	1	1600	0.216	
WB Left		0	0	-	0.000	
WB Through		0	0	-	0.000	*
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.739
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.839
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	80	1	1600	0.050	
NB Through		625	2	3200	0.216	*
NB Right		65	0	-	0.216	
SB Left	Protected	95	1	1600	0.059	*
SB Through		575	2	3200	0.206	
SB Right		85	0	-	0.206	
EB Left	Protected	155	1	1600	0.097	*
EB Through		450	2	3200	0.164	
EB Right		75	0	-	0.164	
WB Left	Protected	60	1	1600	0.038	
WB Through		955	2	3200	0.316	*
WB Right		55	0	-	0.316	
						Total
Sum of Critical V/C Ratios:						0.688
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.788
Level of Service (LOS) - Refer to table below:						C

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	115	1	1600	0.072	*
NB Through		455	2	3200	0.172	
NB Right		95	0	-	0.172	
SB Left	Protected	95	1	1600	0.059	
SB Through		495	2	3200	0.194	*
SB Right		125	0	-	0.194	
EB Left	Protected	155	1	1600	0.097	*
EB Through		560	2	3200	0.195	
EB Right		65	0	-	0.195	
WB Left	Protected	160	1	1600	0.100	
WB Through		1290	2	3200	0.425	*
WB Right		70	0	-	0.425	
						Total
Sum of Critical V/C Ratios:						0.788
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.888
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	70	1	1600	0.044	
NB Through		605	2	3200	0.236	*
NB Right		150	0	-	0.236	
SB Left	Protected	65	1	1600	0.041	*
SB Through		680	2	3200	0.217	
SB Right		15	0	-	0.217	
EB Left	Permissive	20	0	-	0.000	*
EB Through		15	1	1600	0.041	
EB Right		30	0	-	0.041	
WB Left	Permissive	240	0	-	0.000	
WB Through		15	1	1600	0.159	*
WB Right		240	1	1600	0.150	
Total						
Sum of Critical V/C Ratios:						0.436
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.536
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	40	1	1600	0.025	*
NB Through		395	2	3200	0.144	
NB Right		65	0	-	0.144	
SB Left	Permissive	65	1	1600	0.041	
SB Through		595	2	3200	0.208	*
SB Right		70	0	-	0.208	
EB Left	Permissive	115	1	1600	0.072	*
EB Through		270	1	1600	0.197	
EB Right		45	0	-	0.197	
WB Left	Permissive	115	1	1600	0.072	
WB Through		650	1	1600	0.466	*
WB Right		95	0	-	0.466	
Total						
Sum of Critical V/C Ratios:						0.770
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.870
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	135	1	1600	0.084	*
NB Through		810	2	3200	0.280	
NB Right		85	0	-	0.280	
SB Left	Permissive	80	1	1600	0.050	
SB Through		845	2	3200	0.289	*
SB Right		80	0	-	0.289	
EB Left	Permissive	80	1	1600	0.050	*
EB Through		190	1	1600	0.169	
EB Right		80	0	-	0.169	
WB Left	Permissive	155	1	1600	0.097	
WB Through		410	1	1600	0.334	*
WB Right		125	0	-	0.334	
						Total
Sum of Critical V/C Ratios:						0.758
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.858
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	155	1	1600	0.097	*
NB Through		355	1	1600	0.222	
NB Right		80	1	1600	0.050	
SB Left	Permissive	25	0	-	0.000	
SB Through		390	1	1600	0.288	*
SB Right		45	0	-	0.288	
EB Left	Permissive	40	1	1600	0.025	*
EB Through		375	1	1600	0.234	
EB Right		70	1	1600	0.044	
WB Left	Permissive	65	1	1600	0.041	
WB Through		765	1	1600	0.478	*
WB Right		85	1	1600	0.053	
Total						
Sum of Critical V/C Ratios:						0.888
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.988
Level of Service (LOS) - Refer to table below:						E

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2036 with Project Peak-Hour: AM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		785	3	4800	0.164	
NB Right	Free	95	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		695	2	3200	0.217	*
SB Right	Free	190	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		365	0.5	-	0.000	
WB Through		0	0	3200	0.353	*
WB Right		765	1.5	-	0.353	
Total						
Sum of Critical V/C Ratios:						0.570
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.670
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

HCM Unsignalized Intersection Capacity Analysis
 9: Project Access 1 & Citrus Avenue

AM Peak Hour
 2036 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	44	590	6	4	865
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	48	641	7	4	940
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1123	324			648	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1123	324			648	
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	93			100	
cM capacity (veh/h)	198	672			934	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	48	428	220	4	470	470
Volume Left	0	0	0	4	0	0
Volume Right	48	0	7	0	0	0
cSH	672	1700	1700	934	1700	1700
Volume to Capacity	0.07	0.25	0.13	0.00	0.28	0.28
Queue Length 95th (ft)	6	0	0	0	0	0
Control Delay (s)	10.8	0.0	0.0	8.9	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	10.8	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			27.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Project Access 2 & Citrus Avenue

AM Peak Hour
 2036 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	29	565	51	111	745
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	32	614	55	121	810
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1288	335			670	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1288	335			670	
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	95			87	
cM capacity (veh/h)	135	661			916	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	32	409	260	121	405	405
Volume Left	0	0	0	121	0	0
Volume Right	32	0	55	0	0	0
cSH	661	1700	1700	916	1700	1700
Volume to Capacity	0.05	0.24	0.15	0.13	0.24	0.24
Queue Length 95th (ft)	4	0	0	11	0	0
Control Delay (s)	10.7	0.0	0.0	9.5	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	10.7	0.0		1.2		
Approach LOS	B					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			30.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Covina Boulevard & Project Access 3

AM Peak Hour
 2036 with Project

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	51	360	835	38	10	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	391	908	41	11	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage (veh)					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	949				1430	928
vC1, stage 1 conf vol					928	
vC2, stage 2 conf vol					502	
vCu, unblocked vol	949				1430	928
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	92				96	91
cM capacity (veh/h)	724				268	325
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	55	391	949	39		
Volume Left	55	0	0	11		
Volume Right	0	0	41	28		
cSH	724	1700	1700	307		
Volume to Capacity	0.08	0.23	0.56	0.13		
Queue Length 95th (ft)	6	0	0	11		
Control Delay (s)	10.4	0.0	0.0	18.5		
Lane LOS	B			C		
Approach Delay (s)	1.3		0.0	18.5		
Approach LOS				C		
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			56.2%		ICU Level of Service	B
Analysis Period (min)			15			

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 1. Citrus Avenue at I-210 Eastbound Ramps

Scenario: 2036 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	
NB Through		760	2	3200	0.295	*
NB Right		185	0	-	0.295	
SB Left		0	0	-	0.000	*
SB Through		815	2	3200	0.255	
SB Right	Free	455	1	1600	0.000	
EB Left	Permissive	230	1	1600	0.144	
EB Through		0	0	-	0.000	
EB Right		255	1	1600	0.159	*
WB Left		0	0	-	0.000	*
WB Through		0	0	-	0.000	
WB Right		0	0	-	0.000	
Total						
Sum of Critical V/C Ratios:						0.455
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.555
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 2. Citrus Avenue at Gladstone Street

Scenario: 2036 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Azusa

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	105	1	1600	0.066	*
NB Through		635	2	3200	0.225	
NB Right		85	0	-	0.225	
SB Left	Protected	115	1	1600	0.072	
SB Through		655	2	3200	0.239	*
SB Right		110	0	-	0.239	
EB Left	Protected	165	1	1600	0.103	
EB Through		800	2	3200	0.280	*
EB Right		95	0	-	0.280	
WB Left	Protected	50	1	1600	0.031	*
WB Through		360	2	3200	0.127	
WB Right		45	0	-	0.127	
						Total
Sum of Critical V/C Ratios:						0.616
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.716
Level of Service (LOS) - Refer to table below:						C

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 3. Citrus Avenue at Arrow Highway

Scenario: 2036 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: Cities of Azusa & Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	165	1	1600	0.103	*
NB Through		565	2	3200	0.230	
NB Right		170	0	-	0.230	
SB Left	Protected	115	1	1600	0.072	
SB Through		560	2	3200	0.214	*
SB Right		125	0	-	0.214	
EB Left	Protected	170	1	1600	0.106	
EB Through		1030	2	3200	0.358	*
EB Right		115	0	-	0.358	
WB Left	Protected	200	1	1600	0.125	*
WB Through		780	2	3200	0.269	
WB Right		80	0	-	0.269	
						Total
Sum of Critical V/C Ratios:						0.800
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.900
Level of Service (LOS) - Refer to table below:						D

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 4. Azusa Avenue at Covina Boulevard

Scenario: 2036 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Protected	75	1	1600	0.047	
NB Through		850	2	3200	0.316	*
NB Right		160	0	-	0.316	
SB Left	Protected	180	1	1600	0.113	*
SB Through		895	2	3200	0.294	
SB Right		45	0	-	0.294	
EB Left	Permissive	35	0	-	0.000	*
EB Through		30	1	1600	0.056	
EB Right		25	0	-	0.056	
WB Left	Permissive	150	0	-	0.000	
WB Through		25	1	1600	0.109	*
WB Right		155	1	1600	0.097	
						Total
Sum of Critical V/C Ratios:						0.538
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.638
Level of Service (LOS) - Refer to table below:						B

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 5. Citrus Avenue at Covina Boulevard

Scenario: 2036 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	55	1	1600	0.034	
NB Through		680	2	3200	0.259	*
NB Right		150	0	-	0.259	
SB Left	Permissive	120	1	1600	0.075	*
SB Through		590	2	3200	0.208	
SB Right		75	0	-	0.208	
EB Left	Permissive	60	1	1600	0.038	
EB Through		460	1	1600	0.309	*
EB Right		35	0	-	0.309	
WB Left	Permissive	150	1	1600	0.094	*
WB Through		380	1	1600	0.284	
WB Right		75	0	-	0.284	
Total						
Sum of Critical V/C Ratios:						0.738
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.838
Level of Service (LOS) - Refer to table below:						D

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 6. Grand Avenue at Covina Boulevard

Scenario: 2036 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	110	1	1600	0.069	*
NB Through		935	2	3200	0.333	
NB Right		130	0	-	0.333	
SB Left	Permissive	70	1	1600	0.044	
SB Through		950	2	3200	0.322	*
SB Right		80	0	-	0.322	
EB Left	Permissive	145	1	1600	0.091	
EB Through		445	1	1600	0.322	*
EB Right		70	0	-	0.322	
WB Left	Permissive	125	1	1600	0.078	*
WB Through		240	1	1600	0.191	
WB Right		65	0	-	0.191	
						Total
Sum of Critical V/C Ratios:						0.791
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.891
Level of Service (LOS) - Refer to table below:						D

Notes:
<p>1. Per Lane Capacity = 1,600 VPH</p> <p>2. Dual Left-Turn Capacity = 2,880 VPH</p>

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 7. Citrus Avenue at Badillo Street

Scenario: 2036 with Project

Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc.

Agency: City of Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left	Permissive	105	1	1600	0.066	*
NB Through		435	1	1600	0.272	
NB Right		170	1	1600	0.106	
SB Left	Permissive	40	0	-	0.000	
SB Through		495	1	1600	0.363	*
SB Right		45	0	-	0.363	
EB Left	Permissive	70	1	1600	0.044	
EB Through		675	1	1600	0.422	*
EB Right		90	1	1600	0.056	
WB Left	Permissive	90	1	1600	0.056	*
WB Through		515	1	1600	0.322	
WB Right		65	1	1600	0.041	
						Total
Sum of Critical V/C Ratios:						0.906
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						1.006
Level of Service (LOS) - Refer to table below:						F

Notes:
1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

INTERSECTION CAPACITY UTILIZATION WORKSHEET

Intersection: 8. Citrus Avenue at I-10 Westbound Ramps

Scenario: 2036 with Project Peak-Hour: PM

Analyst: Hartzog & Crabill, Inc. Agency: City of West Covina

Movement	Phasing	Volume	Number of Lanes	Capacity	V/C Ratio	Critical V/C
NB Left		0	0	-	0.000	*
NB Through		790	3	4800	0.165	
NB Right	Free	115	1	1600	0.000	
SB Left		0	0	-	0.000	
SB Through		960	2	3200	0.300	*
SB Right	Free	470	1	1600	0.000	
EB Left		0	0	-	0.000	*
EB Through		0	0	-	0.000	
EB Right		0	0	-	0.000	
WB Left		230	0.5	-	0.000	
WB Through		0	0	3200	0.184	*
WB Right		360	1.5	-	0.184	
Total						
Sum of Critical V/C Ratios:						0.484
Adjustment for Lost Time:						0.100
Intersection Capacity Utilization (ICU):						0.584
Level of Service (LOS) - Refer to table below:						A

Notes:
<ol style="list-style-type: none"> 1. Per Lane Capacity = 1,600 VPH 2. Dual Left-Turn Capacity = 2,880 VPH

LOS	Maximum V/C
A	0.600
B	0.700
C	0.800
D	0.900
E	1.000
F	n/a

HCM Unsignalized Intersection Capacity Analysis
 9: Project Access 1 & Citrus Avenue

PM Peak Hour
 2036 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	21	890	24	18	885
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	967	26	20	962
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1501	497			993	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1501	497			993	
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	96			97	
cM capacity (veh/h)	110	519			692	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	23	645	349	20	481	481
Volume Left	0	0	0	20	0	0
Volume Right	23	0	26	0	0	0
cSH	519	1700	1700	692	1700	1700
Volume to Capacity	0.04	0.38	0.21	0.03	0.28	0.28
Queue Length 95th (ft)	3	0	0	2	0	0
Control Delay (s)	12.3	0.0	0.0	10.4	0.0	0.0
Lane LOS	B			B		
Approach Delay (s)	12.3	0.0		0.2		
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			35.4%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Project Access 2 & Citrus Avenue

PM Peak Hour
 2036 with Project

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	96	815	33	60	820
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	104	886	36	65	891
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1480	461			922	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1480	461			922	
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	81			91	
cM capacity (veh/h)	106	547			737	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	104	591	331	65	446	446
Volume Left	0	0	0	65	0	0
Volume Right	104	0	36	0	0	0
cSH	547	1700	1700	737	1700	1700
Volume to Capacity	0.19	0.35	0.19	0.09	0.26	0.26
Queue Length 95th (ft)	17	0	0	7	0	0
Control Delay (s)	13.1	0.0	0.0	10.4	0.0	0.0
Lane LOS	B			B		
Approach Delay (s)	13.1	0.0		0.7		
Approach LOS	B					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			36.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Covina Boulevard & Project Access 3

PM Peak Hour
 2036 with Project

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	33	705	520	22	33	90
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	766	565	24	36	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage (veh)					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	589				1415	577
vC1, stage 1 conf vol					577	
vC2, stage 2 conf vol					838	
vCu, unblocked vol	589				1415	577
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	96				87	81
cM capacity (veh/h)	986				280	516
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	36	766	589	134		
Volume Left	36	0	0	36		
Volume Right	0	0	24	98		
cSH	986	1700	1700	421		
Volume to Capacity	0.04	0.45	0.35	0.32		
Queue Length 95th (ft)	3	0	0	34		
Control Delay (s)	8.8	0.0	0.0	17.5		
Lane LOS	A			C		
Approach Delay (s)	0.4		0.0	17.5		
Approach LOS				C		
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			51.1%		ICU Level of Service	A
Analysis Period (min)			15			

