URBAN | CROSSROADS

VILLA SERENA SPECIFIC PLAN (TRACT NO. 20245)

TRAFFIC ANALYSIS

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Reference Number	Agency	Date
14896-04 TA Report	City of Upland	April 23, 2024

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
CAMUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
CMP	Congestion Management Program
DIF	Development Impact Fee
DU	Dwelling Units
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
N/A	Not Applicable
NP	No Project or Without Project
PHF	Peak Hour Factor
Project	Villa Serena Specific Plan
RTP	Regional Transportation Plan
RV	Recreational Vehicle
SBCTA	San Bernardino County Transportation Authority
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
TA	Traffic Analysis
v/c	Volume to Capacity
vphgpl	Vehicles per Hour Green per Lane
WP	With Project

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1 INTRODUCTION

This report presents the results of the Traffic Analysis (TA) for Villa Serena Specific Plan development ("Project"), which is located on the northeast corner of Fernando Avenue and 15th Street in the City of Upland, as shown on Exhibit 1-1. The purpose of this TA is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project, and where necessary recommend improvements to achieve acceptable operations consistent with the City's General Plan level of service goals and policies. This TA has been prepared in accordance with the City's Traffic Impact Analysis Guidelines (dated July 2020) (**City Guidelines**). (1) The Project traffic study scoping agreement is provided in Appendix 1.1 of this TA, which has been reviewed and approved by the City of Upland.

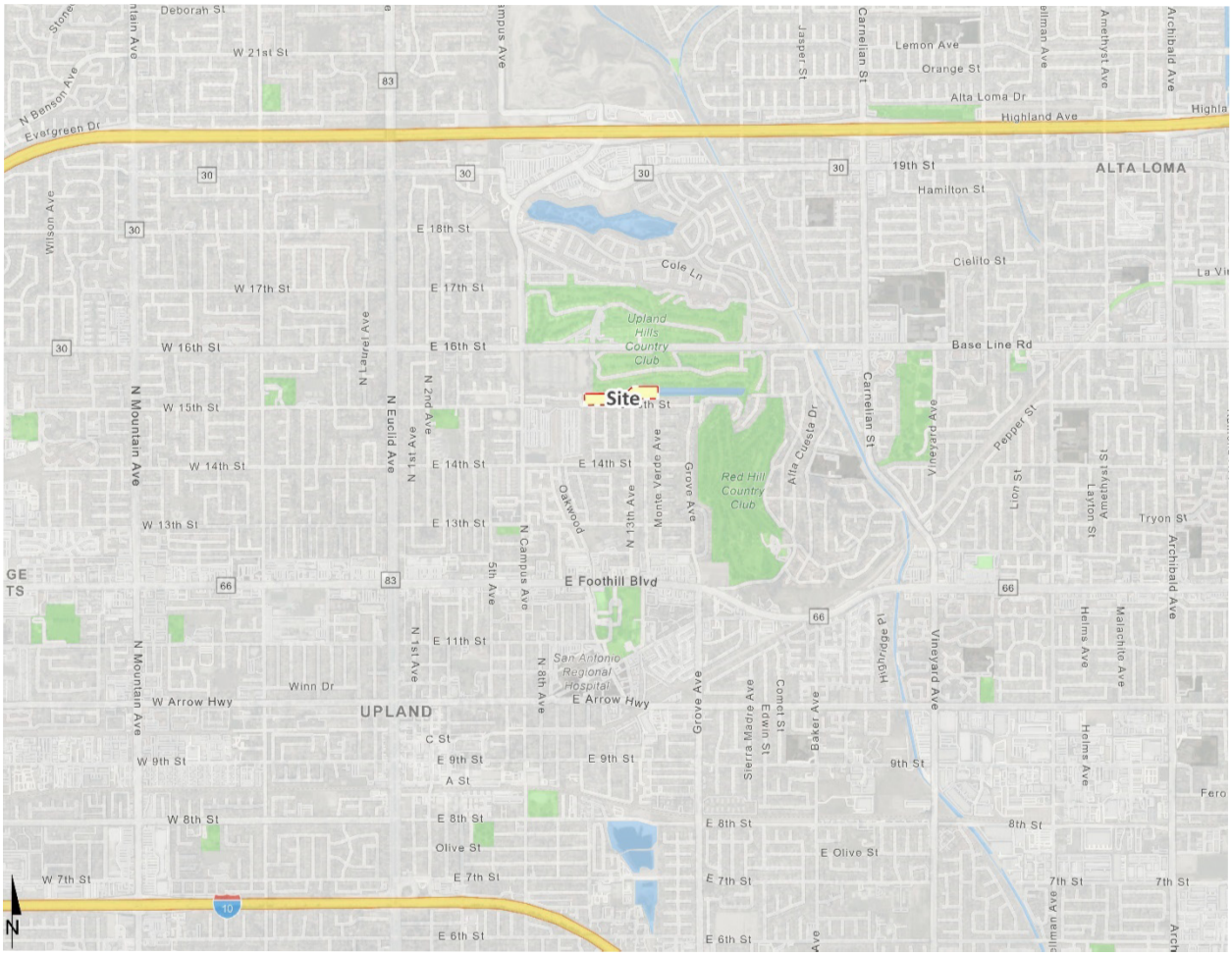
1.1 SUMMARY OF FINDINGS

The Project is to construct the following improvements as design features in conjunction with development of the site:

- Project to construct Coyote Run Drive West (private driveway) to curve and connect with a new westerly alignment of 15th Street. Project to construct the new westerly alignment of 15th Street between Coyote Run Drive West and the existing westerly terminus (which occurs just east of Campus Avenue). Project to construct 15th Street with 26-feet of pavement to accommodate two-way traffic consistent with the City's standards. Improvements will include curb and gutter improvements to both sides and a sidewalk along the south side which will join with the existing sidewalk adjacent to the existing recreational vehicle (RV) storage.
- Project to construct the ultimate half-section of 15th Street as a local (66-foot right-of-way) along the Project's frontage between Fernando Avenue and the Project's eastern boundary consistent with the City's standards. Frontage improvements include pavement, curb-and-gutter, sidewalk, and landscaping improvements. The proposed sidewalk on the north side of 15th Street will join the proposed sidewalk within the Project to the existing sidewalk on Fernando Avenue. Project will also construct a knuckle on 15th Street at Fernando Avenue.
- A secondary Project access is proposed to 15th Street east of 13th Avenue (Coyote Run Drive East). This driveway will accommodate egress only via a gated entry.

Additional details and intersection lane geometrics are provided in Section 1.6 *Recommendations* of this report. The Project is not anticipated to require the construction any off-site improvements. As such, the Project Applicant's responsibility for the Project's contributions towards future off-site improvements is fulfilled through payment into pre-existing fee programs (if applicable). The Project Applicant would be required to pay requisite fees consistent with the City's requirements (see Section 6 *Local and Regional Funding Mechanisms*).

EXHIBIT 1-1: LOCATION MAP



1.2 PROJECT OVERVIEW

A preliminary site plan for the proposed Project is shown on Exhibit 1-2. The Project is proposed to consist of the development of 65 single family detached residential dwelling units. The proposed Project is anticipated to have an opening year of 2025. As indicated on Exhibit 1-2, vehicular access will be provided to 15th Street to the west along a new westerly alignment of 15th Street (via Coyote Run Drive West) and a secondary egress only access to the existing 15th Street (at Coyote Run Drive East). The extension of 15th Street will be separated from the existing 15th Street alignment via a proposed knuckle at Fernando Avenue where the existing 15th Street would terminate. Coyote Run Drive is a private internal roadway proposed within the Project. In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition, 2021) have been used. (2) The Project is anticipated to generate a total of 614 two-way trips per day with 46 AM peak hour trips and 61 PM peak hour trips (actual vehicles). The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

1.3 ANALYSIS SCENARIOS

For the purposes of this traffic study, potential deficiencies to traffic and circulation have been assessed for each of the following conditions:

- Existing (2022) Conditions
- Opening Year Cumulative (2025) Without Project
- Opening Year Cumulative (2025) With Project

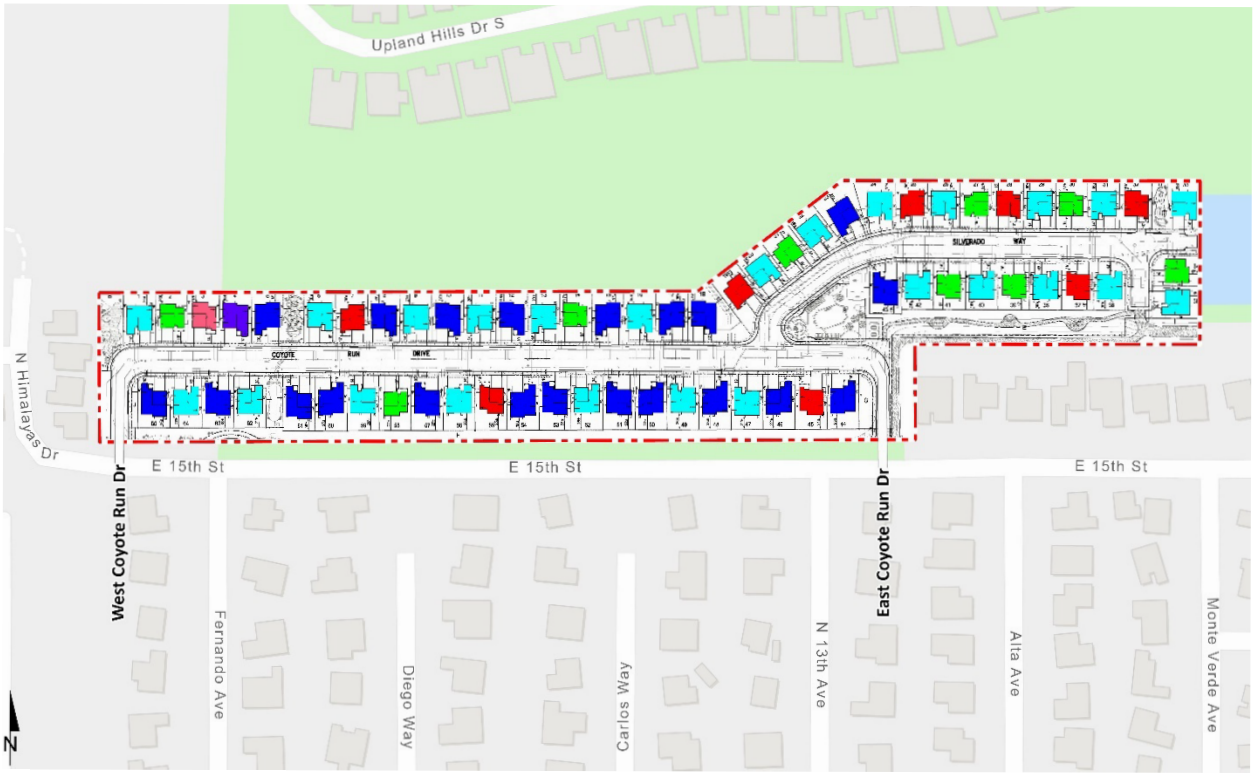
1.3.1 EXISTING (2022) CONDITIONS

Information for Existing (2022) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared. For a detailed discussion on the existing traffic counts, see Section 3.5 *Existing Traffic Counts*.

1.3.2 OPENING YEAR CUMULATIVE (2025) CONDITIONS

The Opening Year Cumulative (2025) traffic conditions analysis determines the potential near-term cumulative circulation system deficiencies. The roadway network is similar to Existing conditions except for new connections to be constructed by the Project. To account for background traffic growth, an ambient growth factor from Existing (2022) conditions of 6.12% (2 percent per year, compounded over 3 years) is included for Opening Year Cumulative (2025) traffic conditions. Conservatively, this TA estimates the area ambient traffic growth and then adds traffic generated by other known or probable related projects. These related projects are at least in part already accounted for in the assumed ambient growth rates; and some of these related projects may not be implemented and operational within the 2025 Opening Year time frame assumed for the Project. The resulting traffic growth utilized in the TA (ambient growth factor plus traffic generated by related projects) would therefore tend to overstate rather than understate background cumulative traffic deficiencies under 2025 conditions.

EXHIBIT 1-2: PRELIMINARY SITE PLAN



1.4 STUDY AREA

To ensure that this TA satisfies the City of Upland's traffic study requirements, Urban Crossroads, Inc. prepared a Project traffic study scoping package for review by City of Upland staff prior to the preparation of this report. This agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The agreement approved by the City is included in Appendix 1.1 of this TA.

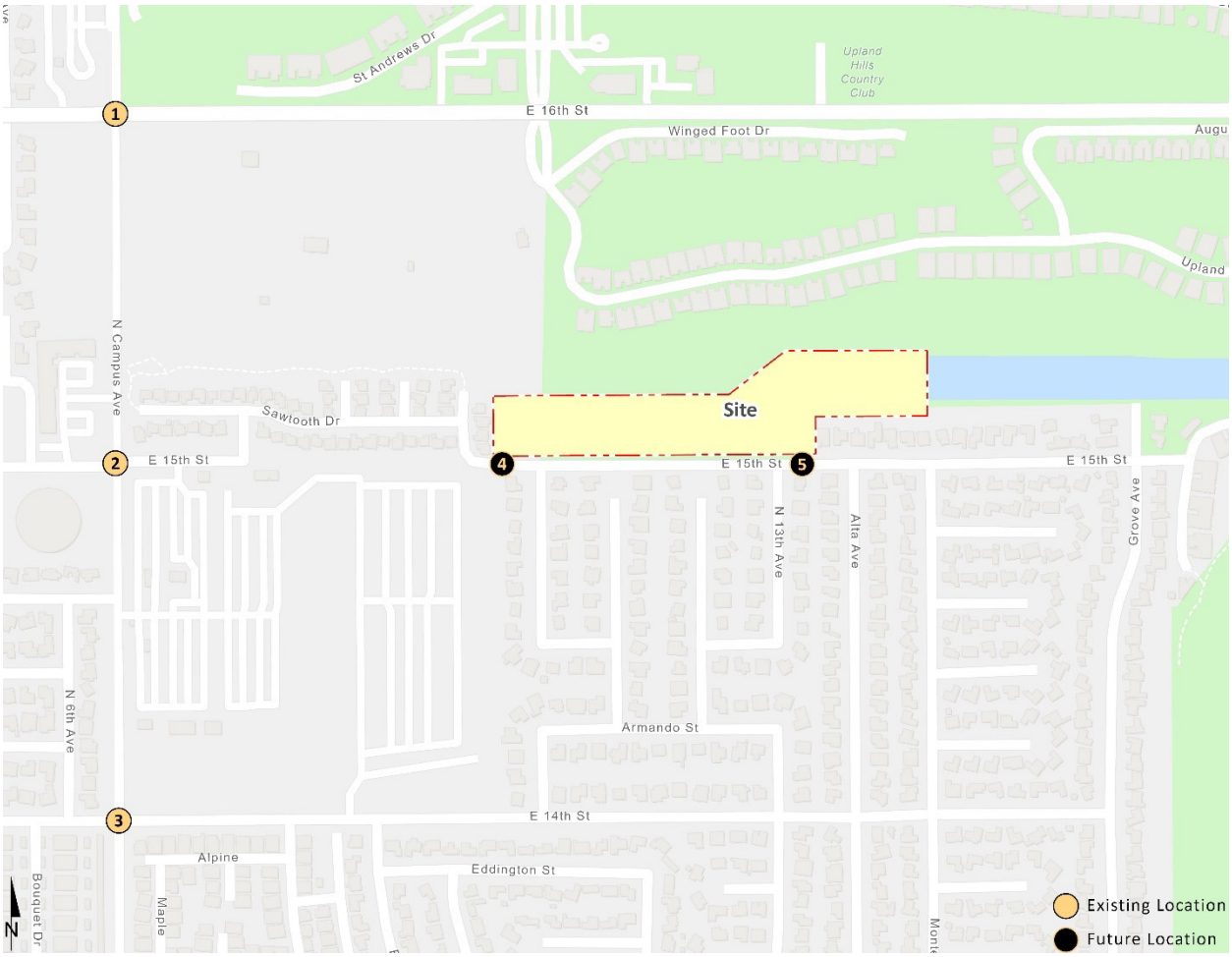
The 5 study area intersections shown on Exhibit 1-3 and listed in Table 1-1 were selected for evaluation in this TA based on consultation with City of Upland staff. At a minimum, the study area includes intersections where the Project is anticipated to contribute 50 or more peak hour trips per the City's Guidelines. (1) The "50 peak hour trip" criterion represents a minimum number of trips at which a typical intersection would have the potential to be affected by a given development proposal. The 50 peak hour trip criterion is a traffic engineering rule of thumb that is accepted and used throughout the City for the purposes of estimating a potential area of influence (i.e., study area). Some study area intersections have been added at the request of City staff through the scoping process, although the Project is anticipated to contribute less than 50 peak hour trips.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

#	Intersection	Jurisdiction	CMP Intersection?
1	Campus Av. & 16th St.	Upland	No
2	Campus Av. & 15th St.	Upland	No
3	Campus Av. & 14th St.	Upland	No
4	Coyote Run Dr. West & 15th St.	Upland	No
5	Coyote Run Dr. East & 15th St.	Upland	No

The intent of a Congestion Management Program (CMP) is to more directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related impacts, and improve air quality. Counties within California have developed CMPs with varying methods and strategies to meet the intent of the CMP legislation. The County of San Bernardino CMP became effective with the passage of Proposition 111 in 1990 and updated most recently in 2016. The San Bernardino County Transportation Authority (SBCTA) adopted the 2016 CMP for the County of San Bernardino in June 2016. (3) There are no study area intersections identified as a San Bernardino County CMP intersection.

EXHIBIT 1-3: STUDY AREA



1.5 DEFICIENCIES

This section provides a summary of deficiencies by analysis scenario. Section 2 *Methodologies* provides information on the methodologies used in the analysis and Section 5 *Opening Year Cumulative (2025) Traffic Conditions* includes the detailed analysis. A summary of LOS results for all analysis scenarios is presented on Table 1-2.

TABLE 1-2: SUMMARY OF LOS

		Existing		2025 NP		2025 WP	
#	Intersection	AM	PM	AM	PM	AM	PM
1	Campus Av. & 16th St.	●	●	●	●	●	●
2	Campus Av. & 15th St.	●	●	●	●	●	●
3	Campus Av. & 14th St.	●	●	●	●	●	●
4	Coyote Run Dr. West & 15th St.	N/A	N/A	N/A	N/A	●	●
5	Coyote Run Dr. East & 15th St.	N/A	N/A	N/A	N/A	●	●

● = A - D ● = E ● = F

1.5.1 EXISTING (2022) CONDITIONS

The study area intersections are currently operating at an acceptable LOS during the peak hours.

1.5.2 OPENING YEAR CUMULATIVE (2025) CONDITIONS

All study area intersections are anticipated to continue to operate at an acceptable LOS during the peak hours under Opening Year Cumulative (2025) Without and With Project traffic conditions. As such, no improvements are necessary.

1.6 RECOMMENDATIONS

The following recommendations are based on the minimum improvements needed to accommodate site access and maintain acceptable peak hour operations for the proposed Project. The site adjacent recommendations are shown on Exhibit 1-4. Exhibit 1-5 illustrates the concept striping plan for the site adjacent roadways of Rider Street and Patterson Avenue.

- Project to construct the ultimate half-section of 15th Street as a local (66-foot right-of-way) along the Project's frontage between Fernando Avenue and the Project's eastern boundary consistent with the City's standards. Frontage improvements include pavement, curb-and-gutter, sidewalk, and landscaping improvements. The proposed sidewalk on the north side of 15th Street will join the proposed sidewalk within the Project to the existing sidewalk on Fernando Avenue.

Recommendation 1 – Coyote Run Drive West & 15th Street (#4) – Project to construct Coyote Run Drive West (private driveway) to curve and connect with a new westerly alignment of 15th Street.

Recommendation 2 – Fernando Avenue & 15th Street – Project will construct a knuckle on 15th Street at Fernando Avenue consistent with City standards.

Recommendation 3 – Coyote Run Drive East & 15th Street (#5) – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the southbound approach (egress Project traffic) to implement a cross-street stop-controlled intersection. Driveway be restricted to egress only. This driveway will serve as a secondary access point and will be gated.

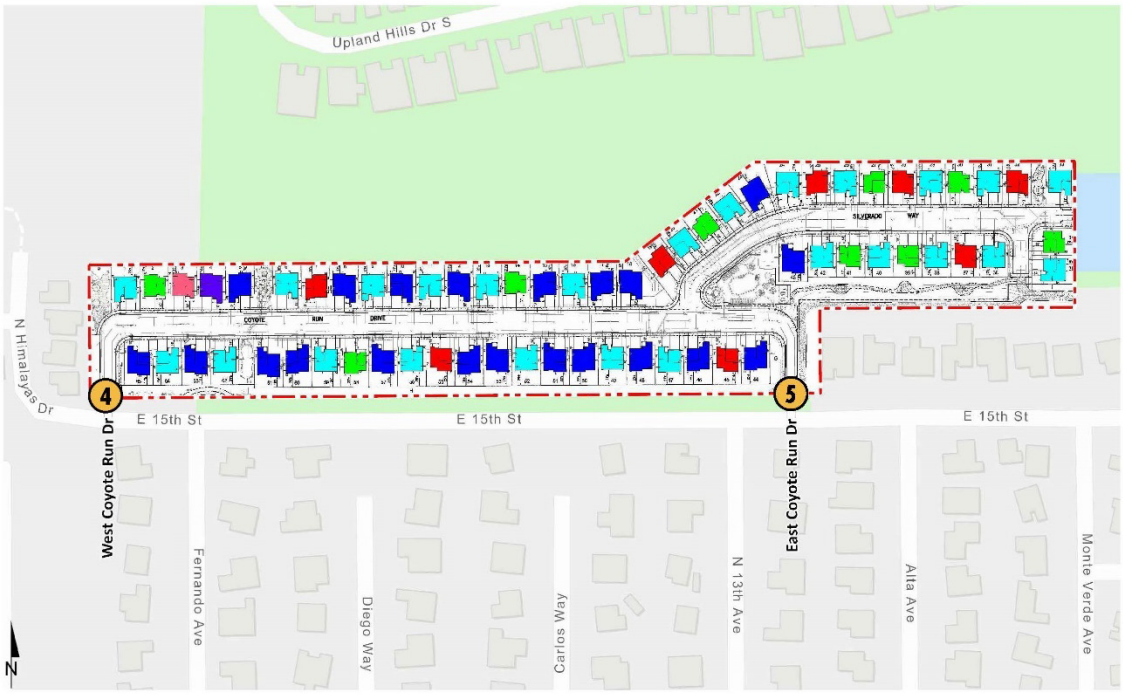
Recommendation 4 – Western Alignment of 15th Street – Project to construct the new westerly alignment of 15th Street between Coyote Run Drive West and the existing westerly terminus (which occurs just east of Campus Avenue). Project to construct 15th Street with 26-feet of pavement to accommodate two-way traffic consistent with the City's standards. Improvements will include curb and gutter improvements to both sides and a sidewalk along the south side which will join with the existing sidewalk adjacent to the existing RV storage. Three speed tables are proposed along 15th Street as a traffic calming measure. A concept striping plan is provided on Exhibit 1-5.

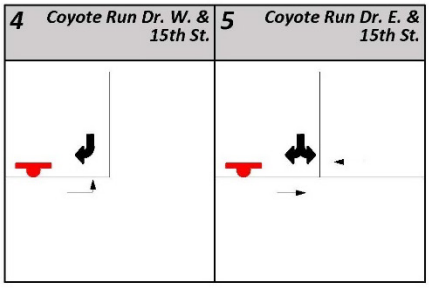
Recommendation 5 – 15th Street – Project to construct the ultimate half-section of 15th Street as a local (66-foot right-of-way) along the Project's frontage between Fernando Avenue and the Project's eastern boundary consistent with the City's standards. Frontage improvements include pavement, curb-and-gutter, sidewalk, and landscaping improvements. The proposed sidewalk on the north side of 15th Street will join the proposed sidewalk within the Project to the existing sidewalk on Fernando Avenue.

On-site traffic signing and striping should be implemented agreeable with the provisions of the California Manual on Uniform Traffic Control Devices (CA MUTCD) and in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City of Upland sight distance standards at the time of preparation of final grading, landscape, and street improvement plans.

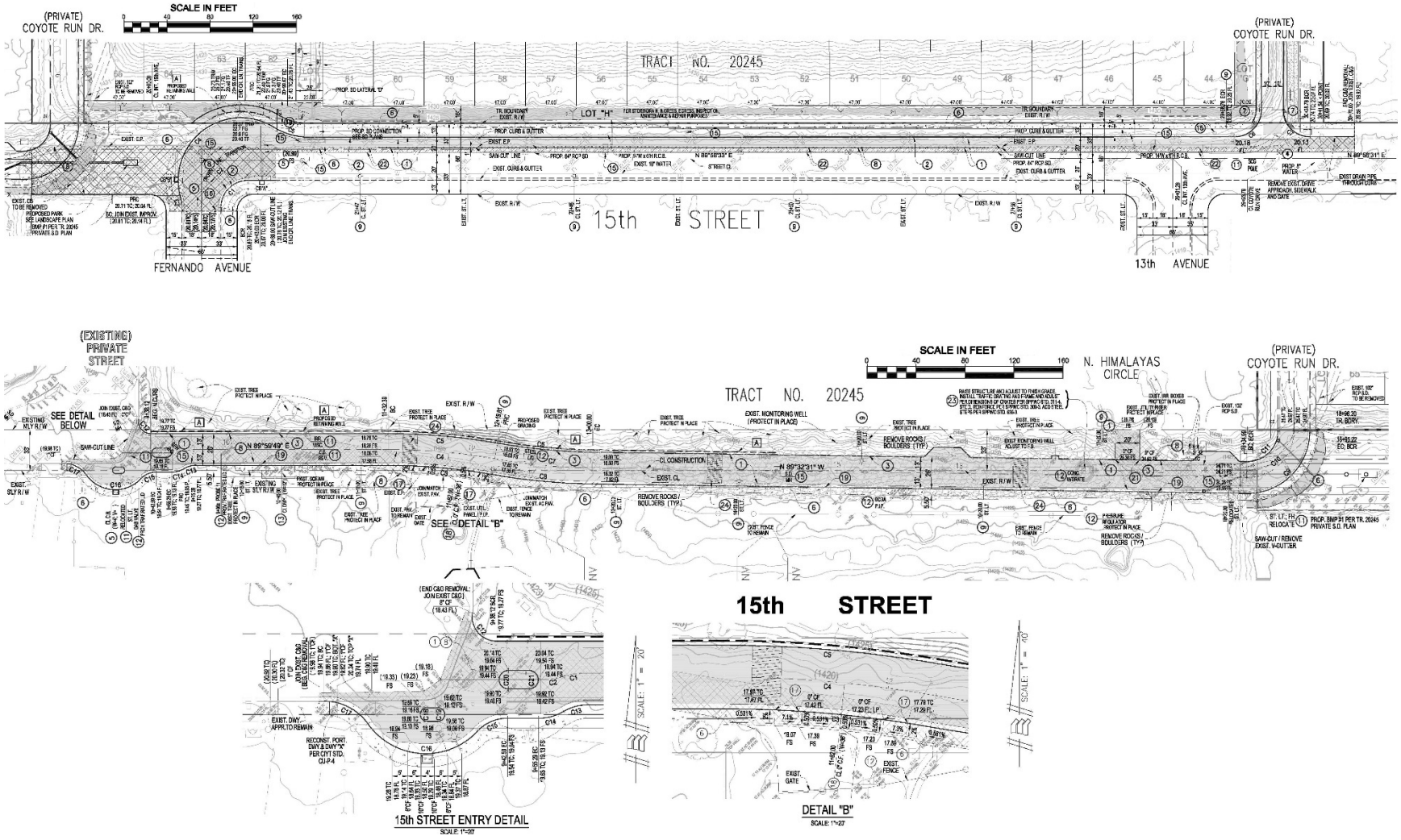
EXHIBIT 1-4: SITE ACCESS RECOMMENDATIONS





= Stop Sign Improvement
= Existing Lane
= Lane Improvement

EXHIBIT 1-5: CONCEPT STRIPING PLAN



1.7 QUEUING ANALYSIS

The traffic modeling and signal timing optimization software package SimTraffic has been utilized to assess the queues. SimTraffic is designed to model networks of signalized and unsignalized intersections, with the primary purpose of checking and fine-tuning signal operations. SimTraffic uses the input parameters from Synchro to generate random simulations. These random simulations generated by SimTraffic have been utilized to determine the 95th percentile queue lengths observed for each applicable turn lane. A SimTraffic simulation has been recorded up to 5 times, during the weekday AM and weekday PM peak hours, and has been seeded for 15-minute periods with 60-minute recording intervals. The results of the queuing analysis are provided in Appendix 1.2 of this report for Opening Year Cumulative (2025) traffic conditions. No site adjacent queues are anticipated with the proposed improvements.

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2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with City of Upland's Traffic Study Guidelines.

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors, such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The 6th Edition Highway Capacity Manual (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (4) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The City of Upland requires signalized intersection operations analysis based on the methodology described in the HCM. (4) Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections LOS is related to the average control delay per vehicle and is correlated to a LOS designation as described on Table 2-1.

The traffic modeling and signal timing optimization software package Synchro (Version 11) has been utilized to analyze signalized intersections. Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0[1]
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	80.01 and up	F

Source: HCM, 6th Edition

[1] If V/C is greater than 1.0 then LOS is F per HCM.

A saturation flow rate of 1700 has been utilized for single left turn lanes and 1800 for through and right turn lanes at all study area intersections consistent with the City's Guidelines. The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. Customary practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g., PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (4)

2.2.2 UNSIGNALIZED INTERSECTIONS

The City of Upland requires the operations of unsignalized intersections be evaluated using the methodology described in the HCM. (4) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2). At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. Delay for the intersection is reported for the worst individual movement at a two-way stop-controlled intersection. For all-way stop controlled intersections, LOS is computed for the intersection as a whole (average delay).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0[1]
Little or no delays.	0 to 10.00	A
Short traffic delays.	10.01 to 15.00	B
Average traffic delays.	15.01 to 25.00	C
Long traffic delays.	25.01 to 35.00	D
Very long traffic delays.	35.01 to 50.00	E
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F

Source: HCM, 6th Edition

[1] If V/C is greater than 1.0 then LOS is F per HCM.

2.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by the California Department of Transportation (Caltrans) and other public agencies to quantitatively justify or determine the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TA uses the signal warrant criteria presented in the latest edition of the Caltrans California Manual on Uniform Traffic Control Devices (CA MUTCD). (5)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CA MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (5) Specifically, this TA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions and for all future analysis scenarios for existing unsignalized intersections. Warrant 3 is appropriate to use for this TA because it provides specialized warrant criteria for intersections with rural characteristics. For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection. Rural warrants have been used as posted speed limits on the major roadways with unsignalized intersections are over 40 miles per hour while urban warrants have been used where speeds are 40 miles per hour or below.

Future intersections that do not currently exist have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets. Similarly, the speed limit has been used as the basis for determining the use of Urban and Rural warrants. Traffic signal warrant analyses were performed at Coyote Run East at 15th Street only as there are no other applicable unsignalized study area intersections.

The traffic signal warrant analyses for future conditions are presented in Section 5 *Opening Year Cumulative (2025) Traffic Conditions* of this report. It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.4 MINIMUM ACCEPTABLE LEVELS OF SERVICE (LOS)

Minimum Acceptable LOS and associated definitions of intersection deficiencies has been obtained from each of the applicable surrounding jurisdictions. Consistent with the City's Guidelines, the following criteria will be applied for the traffic analysis: Strive to maintain LOS D at all intersections outside of the Downtown Specific Plan area and the Transit Priority Roadways except where such improvements are physically infeasible or would negatively affect bicyclists, pedestrians, or transit users (Policy CIR-1.1 of the General Plan).

- Any study intersection operating at an acceptable LOS D or better without project traffic in which the addition of project traffic causes the intersection to degrade to a LOS E or F shall identify improvements to improve operations to LOS D or better.
- Any study intersection that is operating at LOS E or F without project traffic shall improve the intersection operations to LOS D or better.

2.5 DEFICIENCY CRITERIA

To determine whether the addition of Project traffic at a study intersection result in a deficiency, the following thresholds will be utilized:

- Any study intersection that is operating at a LOS A, B, C, or D for any study scenario without Project traffic in which the addition of Project traffic causes the intersection to degrade to LOS E or LOS F shall improve that deficiency so as to bring the intersection back to at least LOS D.
- Any study intersection that is operating at LOS E or LOS F for any study scenario without Project traffic shall improve any deficiency so as to bring the intersection back to at least LOS D.

3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the City of Upland General Plan Circulation Network, and a review of existing peak hour intersection operations analysis.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the scoping agreement with City of Upland staff (Appendix 1.1), the study area includes a total of 5 existing and future intersections as shown previously on Exhibit 1-3, where the Project is anticipated to contribute 50 or more peak hour trips or were added at the City's request during the scoping process. Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 CITY OF UPLAND GENERAL PLAN CIRCULATION ELEMENT

As noted previously, the Project site is located within the City of Upland. The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on City of Upland General Plan Circulation Element, are described subsequently. Exhibit 3-2 shows the City of Upland General Plan Circulation Element and Exhibit 3-3 illustrates the City of Upland General Plan roadway cross-sections.

The following study area roadways within the City of Upland is classified as a Secondary Arterial:

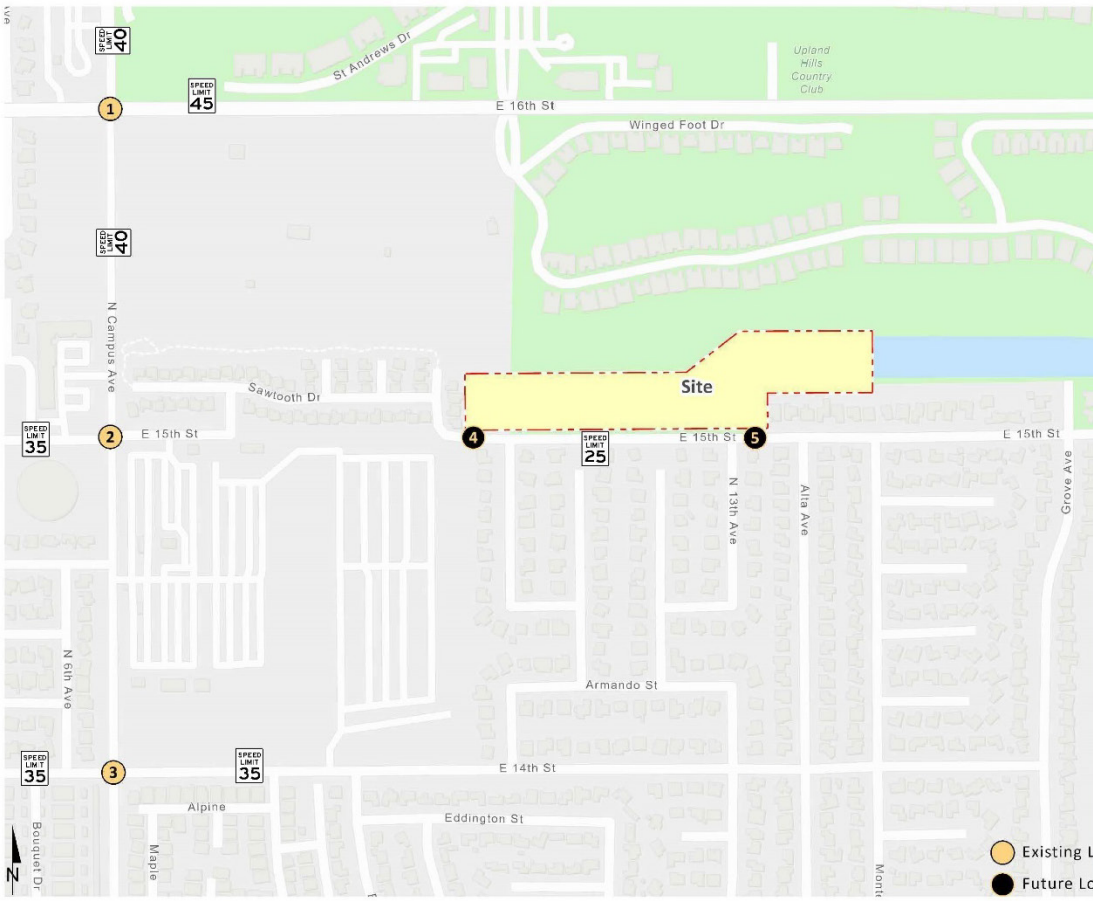
- Campus Avenue
- 16th Street

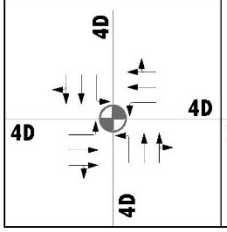
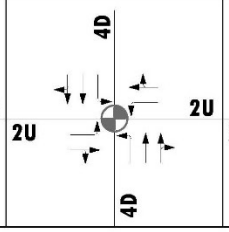
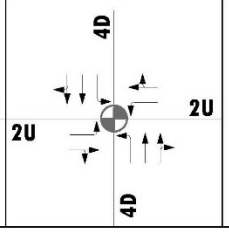
3.3 BICYCLE & PEDESTRIAN FACILITIES

The City of Upland bike network is shown on Exhibit 3-4. 16th Street within the study area is a Class II (on-street, striped) bike facility which currently exists. Campus Avenue is identified as an existing Class III (shared on-street, signed but not striped) that is proposed to be upgraded to a Class II bike facility as priority bike lanes.

Campus Avenue is identified as a pedestrian needs priority area between 15th Street and 16th Street. Exhibit 3-5 illustrates the existing crosswalks and sidewalks throughout the study area. Development of the proposed Project would connect the Project to existing pedestrian facilities from those constructed by the Project along its frontage 15th Street. The sidewalk improvements along 15th Street will either connect with the existing sidewalk in front of the existing RV storage and also along the Project frontage to the existing sidewalk along the western side of Fernando Avenue.

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



1 Campus Av. & 16th St.	2 Campus Av. & 15th St.	3 Campus Av. & 14th St.	4 Coyote Run Dr. W. & 15th St.	5 Coyote Run Dr. E. & 15th St.
			Future Intersection	Future Intersection

= *Traffic Signal*
4 = *Number of Lanes*
D = *Divided*
U = *Undivided*
= *Speed Limit (MPH)*

EXHIBIT 3-2: CITY OF UPLAND GENERAL PLAN CIRCULATION ELEMENT

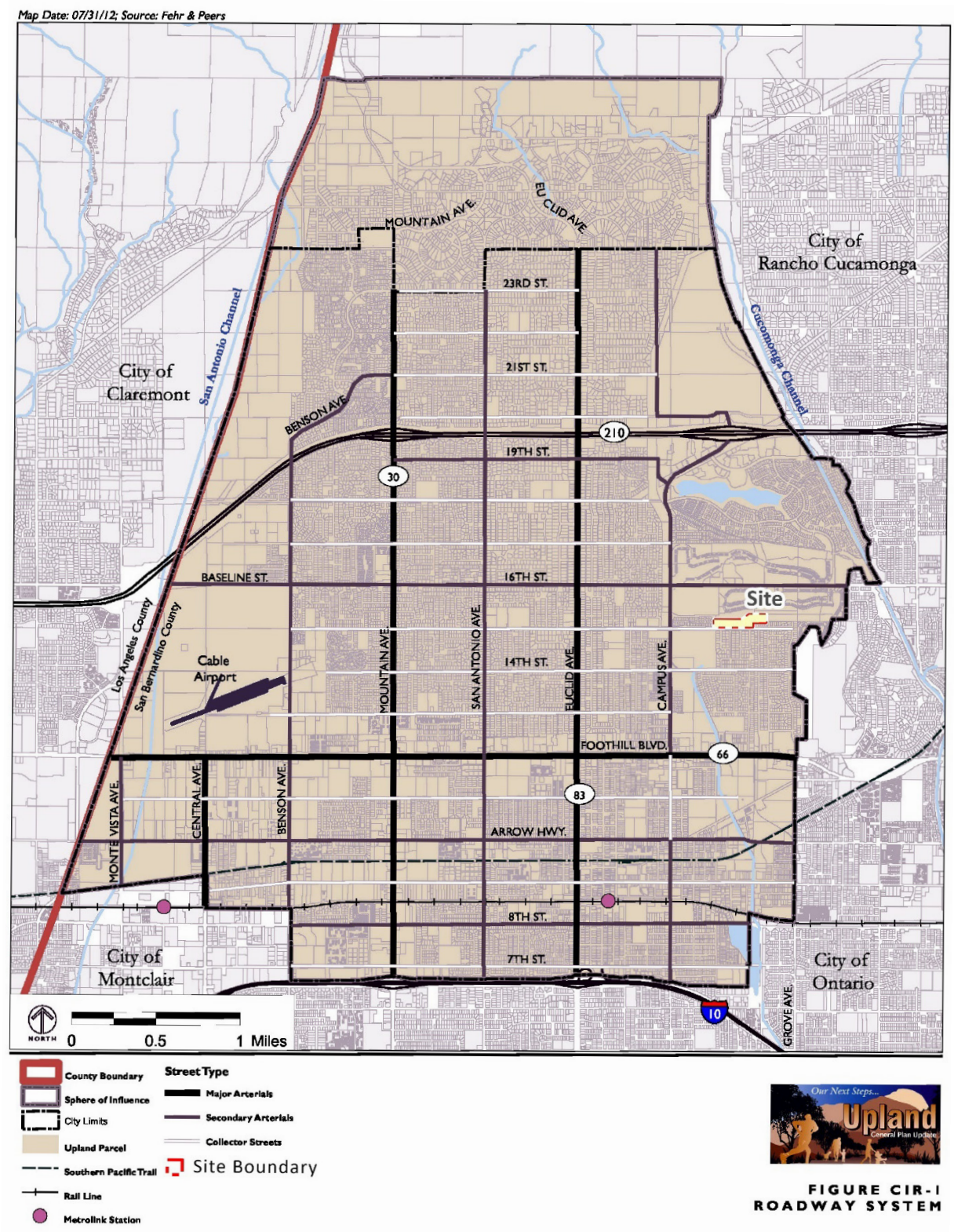
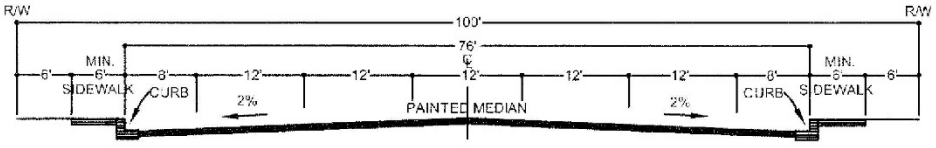
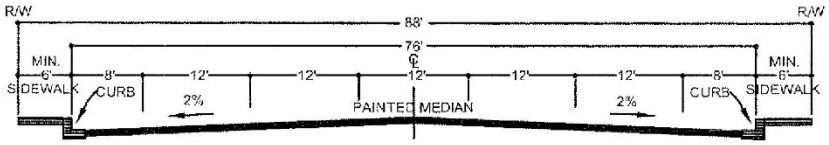


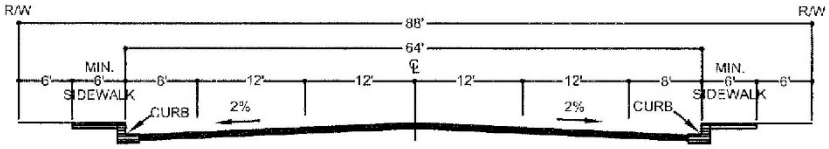
EXHIBIT 3-3: CITY OF UPLAND GENERAL PLAN ROADWAY CROSS-SECTIONS



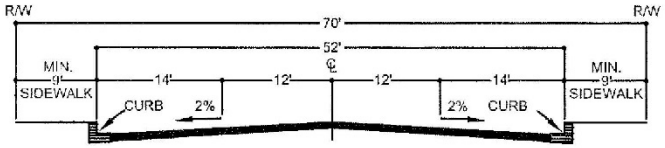
MAJOR (A)



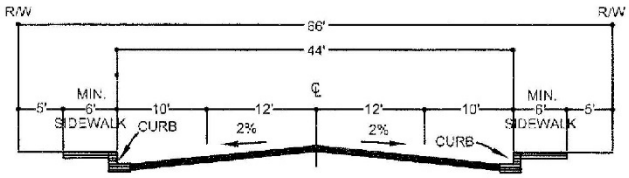
MAJOR (B)



SECONDARY (A)



SECONDARY (B)



COLLECTOR

SOURCE: CITY OF UPLAND

EXHIBIT 3-4: CITY OF UPLAND GENERAL PLAN BIKE NETWORK

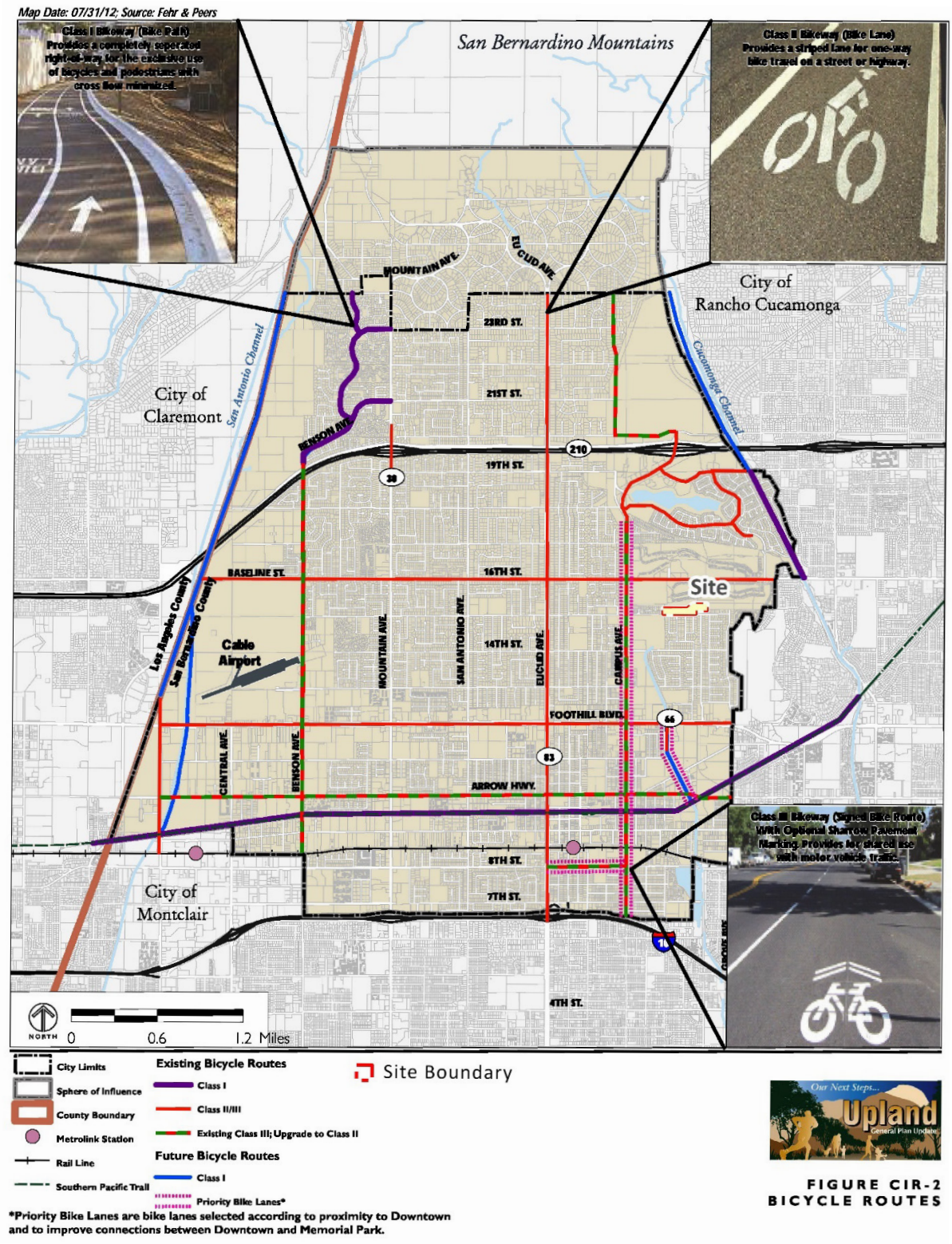
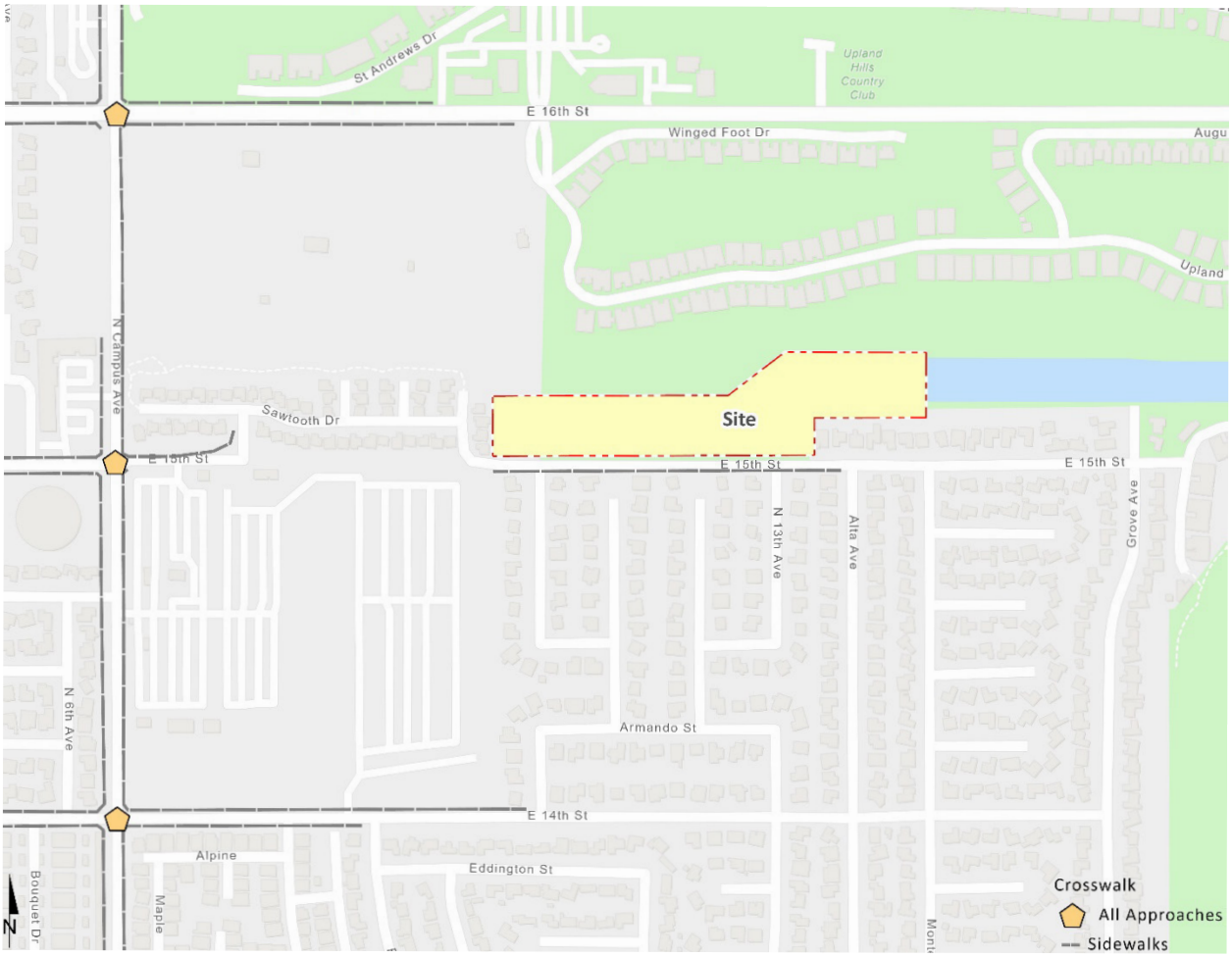


FIGURE CIR-2
BICYCLE ROUTES

EXHIBIT 3-5: EXISTING PEDESTRIAN FACILITIES



3.4 TRANSIT SERVICE

The study area is currently served by Omnitrans, a public transit agency serving various jurisdictions within San Bernardino County, with existing bus service along Foothill Road (SR-66) (and a portion of Campus Avenue south of Foothill Boulevard) via Omnitrans Route 66 and Route 86. Transit service is reviewed and updated by Omnitrans periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

3.5 EXISTING (2022) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in January and August 2022 when local schools were in session and operating on normal bell schedules. The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

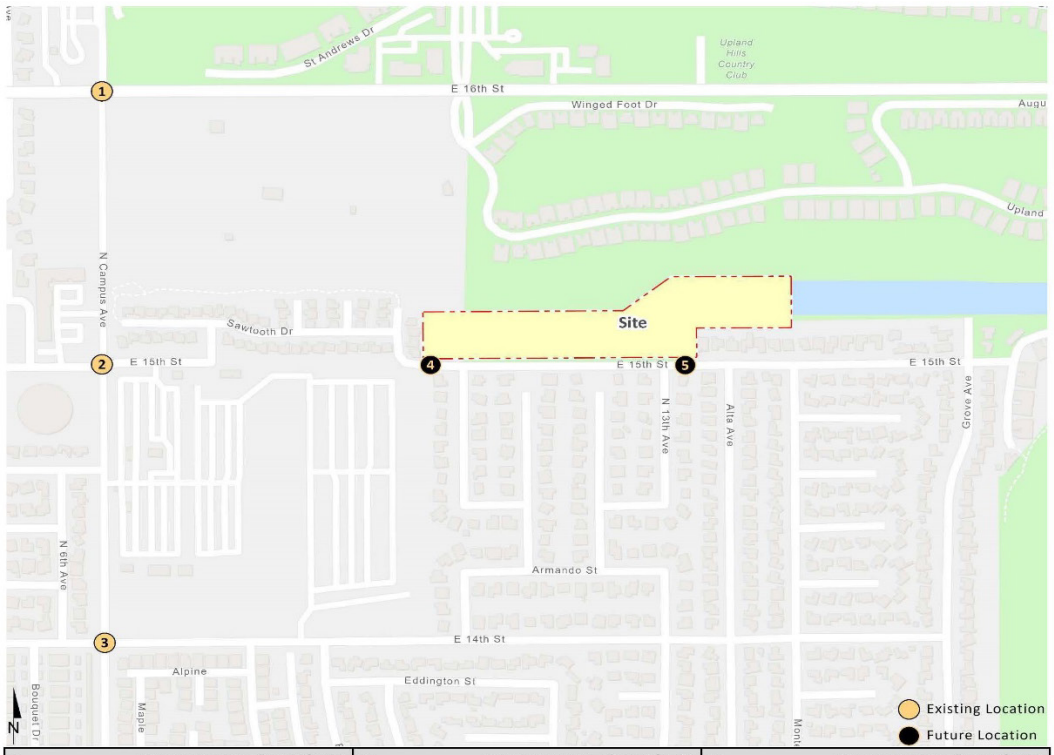
There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1.

Existing weekday ADT volumes on arterial highways throughout the study area are shown on Exhibit 3-6. Existing ADT volumes were based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 12.7 = Leg Volume

A comparison of the PM peak hour and daily traffic volumes of various roadway segments within the study area indicated that the peak-to-daily relationship is approximately 7.9 percent. As such, the above equation utilizing a factor of 12.7 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 6.8 percent (i.e., 1/0.079 = 12.7) and was assumed to sufficiently estimate ADT volumes for planning-level analyses. This factor is consistent with that used for other traffic studies within the study area. Existing weekday AM and weekday PM peak hour intersection volumes are shown on Exhibit 3-6.

EXHIBIT 3-6: EXISTING (2022) TRAFFIC VOLUMES



1 Campus Av. & 16th St.

20,900 | 23,450

198(171) ↓ 512(453) ↓ 51(134) ↓

42(71) ← 533(326) ← 166(99) ←

160(190) → 318(944) → 56(82) →

73(68) ↑ 546(627) ↑ 116(274) ↑

22,600 | 20,350

2 Campus Av. & 15th St.

19,550 | 550

31(31) ↓ 706(609) ↓ 6(6) ↓

11(4) ← 14(0) ← 10(1) ←

43(121) → 7(6) → 74(43) →

48(25) ↑ 680(838) ↑ 6(4) ↑

2,850 | 19,300

3 Campus Av. & 14th St.

19,450 | 6,200

51(29) ↓ 588(502) ↓ 146(119) ↓

201(142) ← 108(66) ← 32(24) ←

34(51) → 49(90) → 27(28) →

34(18) ↑ 493(687) ↑ 40(49) ↑

3,600 | 16,600

4 Coyote Run Dr. West & 15th St.

5 Coyote Run Dr. East & 15th St.

150

6(6) ←

2(4) →

100

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

3.6 INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized on Table 3-1, which indicates that all existing study area intersections are currently operating at acceptable LOS during the peak hours. The intersection operations analysis worksheets are included in Appendix 3.2 of this TA.

TABLE 3-1: INTERSECTION ANALYSIS FOR EXISTING (2022) CONDITIONS

#	Intersection	Traffic Control[2]	Delay[1] (secs.)		Level of Service	
			AM	PM	AM	PM
1	Campus Av. & 16th St.	TS	24.5	41.2	C	D
2	Campus Av. & 15th St.	TS	11.0	11.2	B	B
3	Campus Av. & 14th St.	TS	9.5	8.4	A	A
4	Coyote Run Dr. West & 15th St.		Future Intersection			
5	Coyote Run Dr. East & 15th St.		Future Intersection			

[1] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] TS = Traffic Signal

3.7 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no unsignalized study area intersections. As such, traffic signal warrant analysis was not conducted for Existing traffic conditions.

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4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. The Project is proposed to consist of the development of 65 single family detached residential dwelling units. The proposed Project is anticipated to have an opening year of 2025. Vehicular access will be provided to 15th Street to the west along a new westerly alignment of 15th Street (via Coyote Run Drive West) and a secondary egress only access to the existing 15th Street (at Coyote Run Drive East). The extension of 15th Street will be separated from the existing 15th Street alignment via a proposed knuckle at Fernando Avenue where the existing 15th Street would terminate. Coyote Run Drive is a private internal roadway proposed within the Project.

4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development. In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published in the ITE Trip Generation Manual (11th Edition, 2021) were used to estimate the Project's trip generation. (2) The trip generation summary illustrating daily and peak hour trip generation estimates for the Project in actual vehicles are also shown on Table 4-1. The proposed Project is anticipated to generate 614 two-way trip-ends per day with 46 AM peak hour trips and 61 PM peak hour trips.

TABLE 4-1: TRIP GENERATION SUMMARY

Land Use[1]	ITE LU Code	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Trip Generation Rates:									
Single Family Residential	210	DU	0.18	0.52	0.70	0.59	0.35	0.94	9.43

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 11th Edition (2021).

[2] DU = Dwelling Units

Land Use	Quantity	Units[1]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Trip Generation Summary:									
Tract No. 20245	65	DU	12	34	46	38	23	61	614

[1] DU = Dwelling Units

4.2 PROJECT TRIP DISTRIBUTION

The Project trip distribution represents the directional orientation of traffic to and from the Project site. Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. In addition, truck routes for neighboring agencies have been taken into consideration in the development of the trip distribution patterns for heavy trucks. Exhibit 4-1 shows the Project trip distribution patterns.

4.3 MODAL SPLIT

The potential for Project trips to be reduced by the use of public transit, walking or bicycling have not been included as part of the Project's estimated trip generation. Essentially, the Project's traffic projections are "conservative" in that these alternative travel modes would reduce the forecasted traffic volumes.

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, the Project only ADT and peak hour intersection turning movement volumes are shown on Exhibit 4-2.

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon background (ambient) growth at 2% per year, compounded annually, for 2025 conditions. The total ambient growth is 6.12% for 2025 traffic conditions (compounded growth of 2 percent per year over 3 years or $1.02^{3\ years}$). The ambient growth factor is intended to approximate regional traffic growth. This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies.

EXHIBIT 4-1: PROJECT TRIP DISTRIBUTION

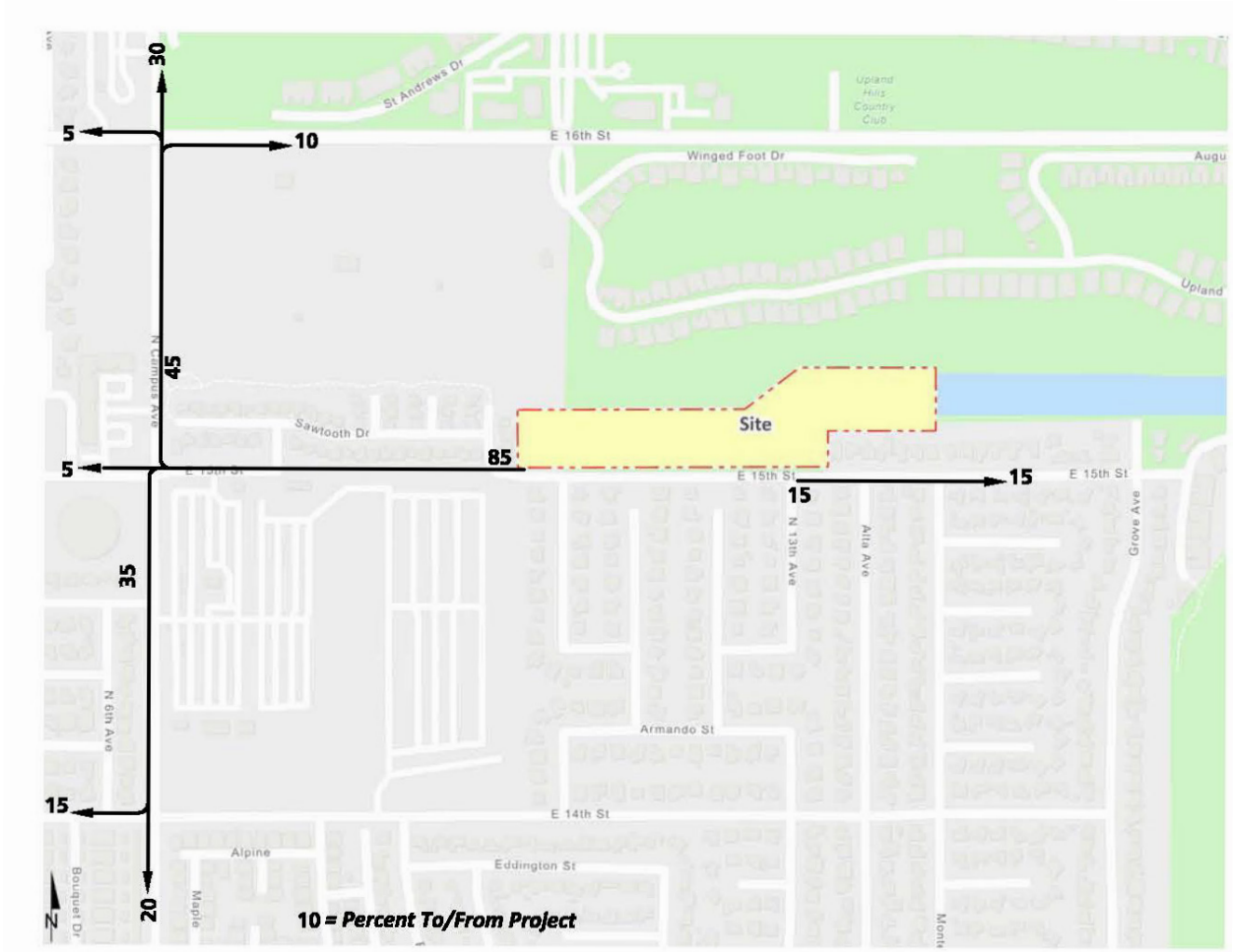
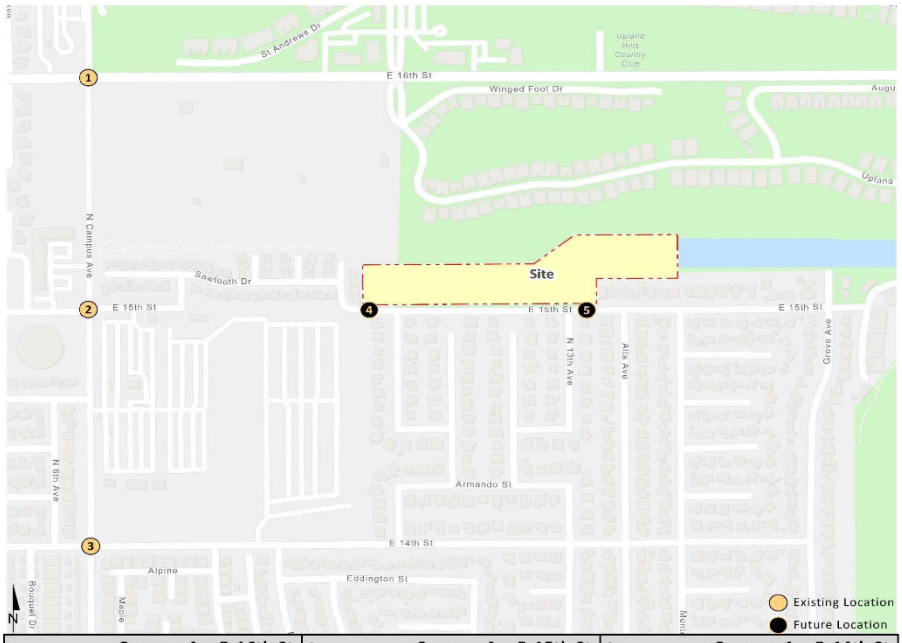
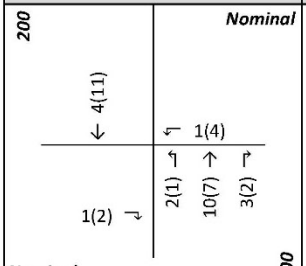


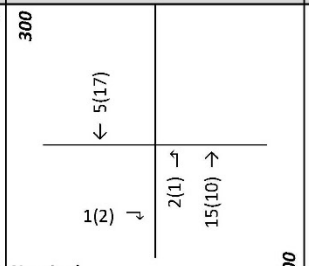
EXHIBIT 4-2: PROJECT ONLY TRAFFIC VOLUMES



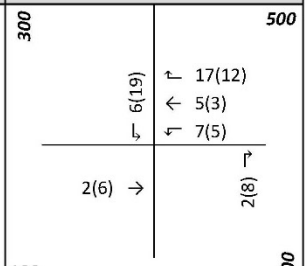
1 Campus Av. & 16th St.



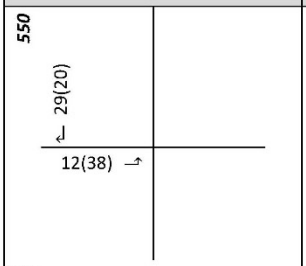
2 Campus Av. & 15th St.



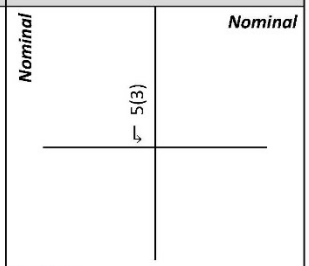
3 Campus Av. & 14th St.



4 Coyote Run Dr. West & 15th St.



5 Coyote Run Dr. East & 15th St.



##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

The currently adopted Southern California Association of Governments (SCAG) 2020 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) growth forecasts for the City of Upland identifies projected growth in population of 76,400 in 2016 to 93,000 in 2045, or a 21.7 percent increase over the 29-year period. (6) The change in population equates to roughly a 0.68 percent growth rate, compounded annually. Similarly, growth over the same 29-year period in households is projected to increase by 25.7 percent, or 0.79 percent annual growth rate. Finally, growth in employment over the same 29-year period is projected to increase by 17.6 percent, or a 0.56 percent annual growth rate. This results in an average of 0.68 percent annual growth rate. As such, the 2.0 percent per year ambient growth rate utilized in this TA would appear to conservatively estimate annual traffic growth and overstate as opposed to understate future traffic forecasts.

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the City of Upland. The cumulative project list includes known and foreseeable projects that are anticipated to contribute traffic to the study area intersections. Where applicable, cumulative projects anticipated to contribute measurable traffic (i.e., 50 or more peak hour trips) to study area intersections have been manually added to the study area network to generate Opening Year Cumulative forecasts. In other words, this list of cumulative development projects has been reviewed to determine which projects would likely contribute measurable traffic through the study area intersections (e.g., those cumulative projects in close proximity to the proposed Project). For the purposes of this analysis, the cumulative projects that were determined to affect one or more of the study area intersections are shown on Exhibit 4-3, listed in Table 4-2, and have been considered for inclusion. Any additional traffic generated by other projects not on the cumulative projects list is likely accounted for through background ambient growth factors that have been applied to the peak hour volumes at study area intersections as discussed in Section 4.5 *Background Traffic*. Cumulative development projects shown in Exhibit 4-3 and listed in Table 4-2. Cumulative Only ADT and peak hour intersection turning movement volumes are shown on Exhibit 4-4.

TABLE 4-2: CUMULATIVE DEVELOPMENT LAND USE SUMMARY

#	Project Name	Land Use[1]	Quantity	Units[1]
1	Colony Condos	Multifamily (Mid-Rise) Residential	60	DU
2	Colonies Campus Center	Gasoline Station w/ Market	4.565	TSF
3	Colonies Campus Center	Mixed Use (Food and Retail)	8.825	TSF
4	Planet Car Wash	Car Wash	2.972	TSF
5	Colonies Self Storage	Self Storage	164.570	TSF
6	Mesa Court Apartments	Multifamily (Low-Rise) Residential	60	DU
7	Starbucks	Coffee Shop w/ Drive-Thru	2.049	TSF
8	Amazon Fresh at Upland Village Center	Grocery/Supermarket	35.000	TSF
9	Foothill Self Storage	Self Storage & Retail	5.900	TSF
10	Rally's Hamburgers	Fast-Food Restaurant	1.300	TSF
11	Rose Glen Specific Plan	Single Family Detached	64	DU

[1] DU = Dwelling Units; TSF = Thousand Square Feet

EXHIBIT 4-3: CUMULATIVE DEVELOPMENT LOCATION MAP

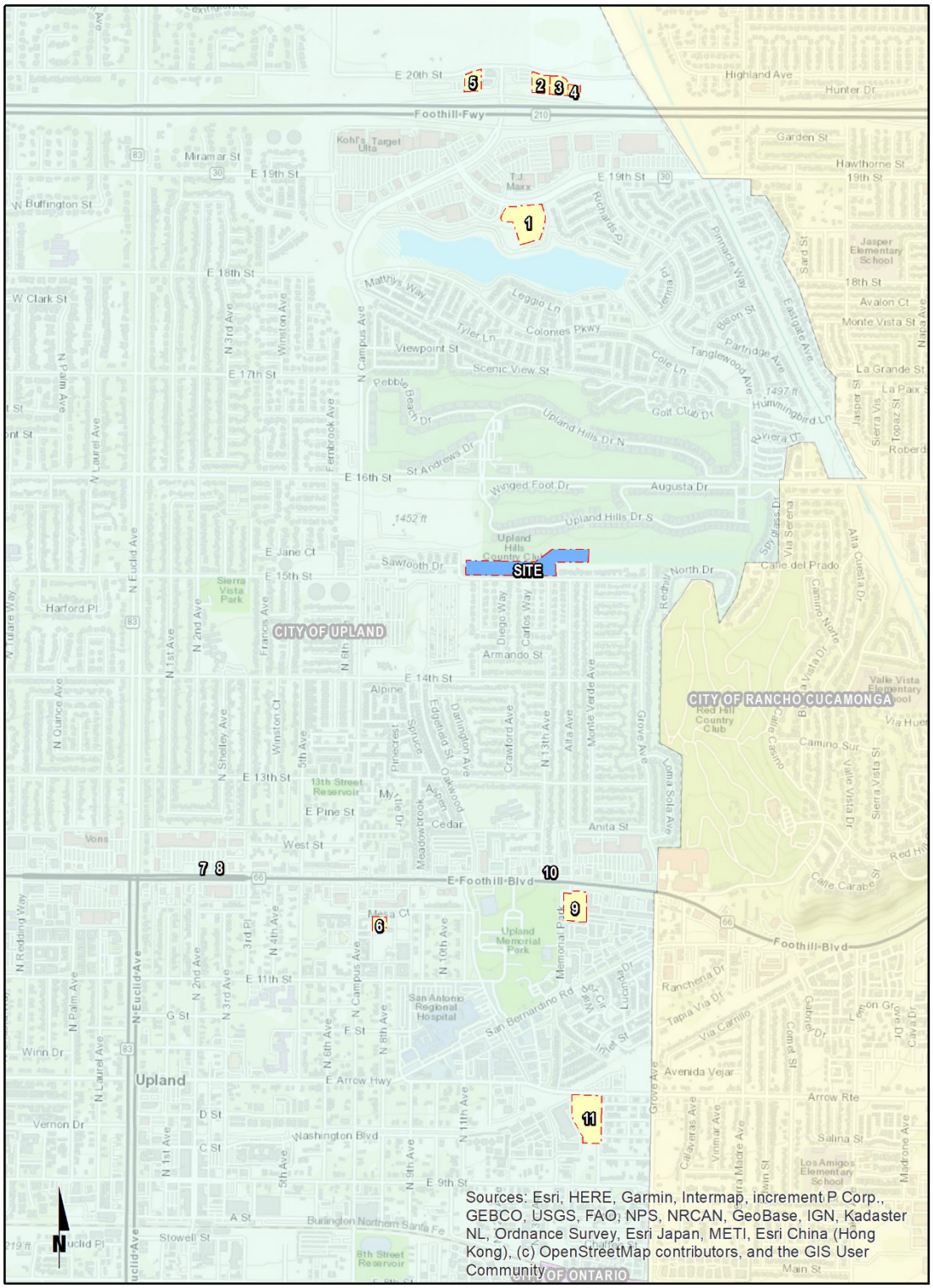
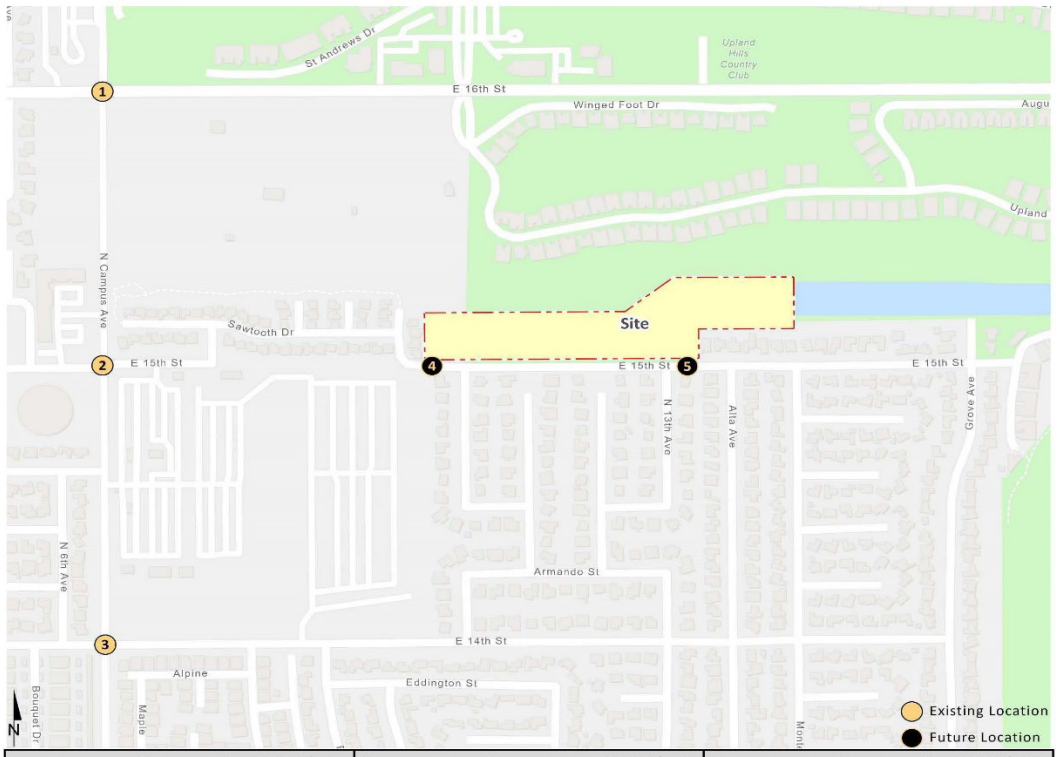


EXHIBIT 4-4: CUMULATIVE ONLY TRAFFIC VOLUMES



1 Campus Av. & 16th St.	2 Campus Av. & 15th St.	3 Campus Av. & 14th St.
700 / 22(33) ↓ / 9(15) ↰ / 300 / 9(15) ↑ / 8(14) ↰ 17(32) ↑ 8(14) ↱ / 300 / 1,350	1,350 / 40(63) ↓ / 9(15) ↰ / 8(14) ↰ 34(60) ↑ / 300 / 1,650	1,650 / 49(78) ↓ / 9(15) ↰ / 8(14) ↰ 42(74) ↑ / 300 / 2,000
4 Coyote Run Dr. West & 15th St.	**5 Coyote Run Dr. East & 15th St.**	

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

4.7 NEAR-TERM TRAFFIC CONDITIONS

The "buildup" approach combines existing traffic counts with a background ambient growth factor to forecast Opening Year Cumulative (2025) traffic conditions. An ambient growth factor accounts for background (area-wide) traffic increases that occur over time up to the year 2025 from the year 2022. Traffic volumes generated by the Project are then added to assess the near-term traffic conditions. The 2025 roadway network is similar to the Existing conditions roadway network, with the exception of future driveways proposed to be developed by the Project. The near-term traffic analysis includes the following traffic conditions, with the various traffic components:

- Opening Year Cumulative (2025) Without Project
    - Existing 2022 counts
    - Ambient growth traffic (6.12%)
    - Cumulative Development traffic
- Opening Year Cumulative (2025) With Project
    - Existing 2022 counts
    - Ambient growth traffic (6.12%)
    - Cumulative Development traffic
    - Project traffic

5 OPENING YEAR CUMULATIVE (2025) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Opening Year Cumulative (2025) conditions and the resulting intersection operations and traffic signal warrant analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2025) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements at the Project's frontage and driveways). This includes the proposed extension of 15th Street from its existing terminus east of Campus Avenue to Coyote Run Drive West and other frontage improvements along 15th Street east of Fernando Avenue.
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements along the cumulative development's frontages).

5.2 WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing (2022) traffic volumes plus an ambient growth factor of 6.12% and traffic from pending and approved cumulative development projects. The weekday ADT volumes and peak hour volumes which can be expected for Opening Year Cumulative (2025) Without Project traffic conditions are shown on Exhibit 5-1.

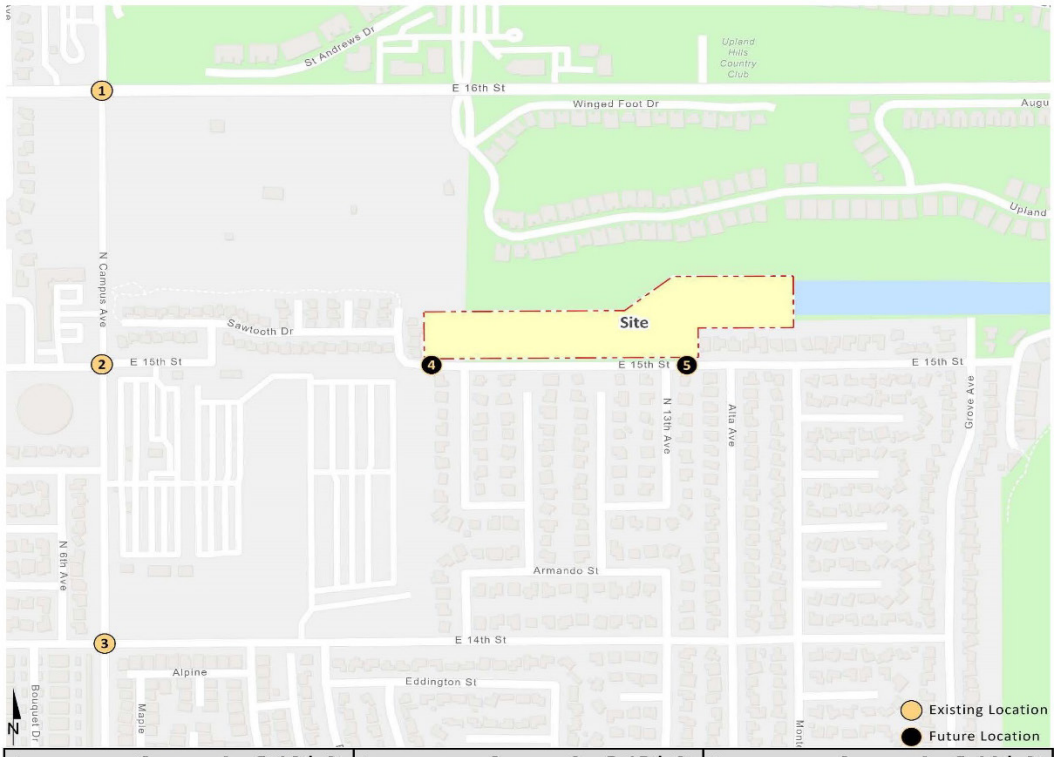
5.3 WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing (2022) traffic volumes plus an ambient growth factor of 6.12%, traffic from pending and approved cumulative development projects, and the addition of Project traffic. The weekday ADT volumes and peak hour volumes which can be expected for Opening Year Cumulative (2025) With Project traffic conditions are shown on Exhibit 5-2.

5.4 INTERSECTION OPERATIONS ANALYSIS

Opening Year Cumulative (2025) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TA. The intersection analysis results are summarized on Table 5-1 for Opening Year Cumulative traffic conditions, which indicate the study area intersections are anticipated to continue to operate at an acceptable LOS under Opening Year Cumulative (2025) Without and With Project traffic conditions. The intersection operations analysis worksheets for Opening Year Cumulative (2025) Without and With Project traffic conditions are included in Appendix 5.1 and Appendix 5.2 of this TA, respectively.

EXHIBIT 5-1: OPENING YEAR CUMULATIVE (2025) WITHOUT PROJECT TRAFFIC VOLUMES



1 Campus Av. & 16th St.

								25,200
22,900								
	210(181)	565(514)	54(142)		↰	45(75)		
	↲	↓	↳		←	566(346)		
					↖	185(120)		
170(202)	→			↰	↑	↱		
337(1002)	→			85(86)	596(697)	131(305)		
68(102)	↲							
24,300								***22,950***

2 Campus Av. & 15th St.

								550
22,100								
	33(33)	789(709)	6(6)		↰	12(4)		
	↲	↓	↳		←	15(0)		
					↖	11(1)		
46(128)	→			↰	↑	↱		
7(6)	→			59(41)	756(949)	6(4)		
88(61)	↲							
3,350								***22,150***

3 Campus Av. & 14th St.

								6,600
22,300								
	54(31)	673(611)	155(126)		↰	213(151)		
	↲	↓	↳		←	115(70)		
					↖	34(25)		
36(54)	→			↰	↑	↱		
52(96)	→			44(33)	565(803)	42(52)		
38(45)	↲							
4,100								***19,600***

4 Coyote Run Dr. West & 15th St.

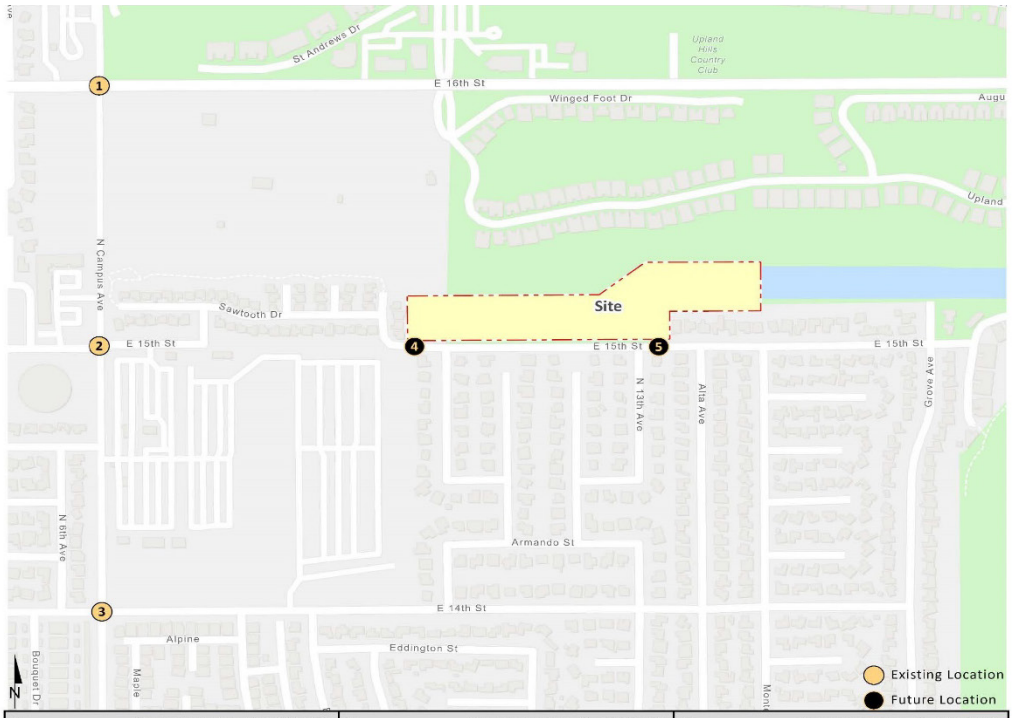
5 Coyote Run Dr. East & 15th St.

								150
					←	6(6)		
2(4)	→							
100								

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

EXHIBIT 5-2: OPENING YEAR CUMULATIVE (2025) WITH PROJECT TRAFFIC VOLUMES



1 Campus Av. & 16th St.

23,050								25,300
	210(181)	569(525)	54(142)				↰ 45(75)	
	↲	↓	↳				← 566(346)	
					↰	↑	↱	↰ 186(124)
170(202)	→			↰	↑	↱		
337(1002)	→			87(87)	606(704)	134(307)		23,200
69(104)	↴							
24,350								

2 Campus Av. & 15th St.

22,350								550
	33(33)	794(726)	6(6)				↰ 12(4)	
	↲	↓	↳				← 15(0)	
					↰	↑	↱	↰ 11(1)
46(128)	→			↰	↑	↱		
7(6)	→			61(42)	771(959)	6(4)		22,450
89(63)	↴							
3,400								

3 Campus Av. & 14th St.

22,600								7,100
	54(31)	673(611)	161(145)				↰ 230(163)	
	↲	↓	↳				← 120(73)	
					↰	↑	↱	↰ 41(30)
36(54)	→			↰	↑	↱		
54(102)	→			44(33)	565(803)	44(60)		19,750
38(45)	↴							
4,200								

4 Coyote Run Dr. West & 15th St.

550								
	29(20)							
	↲							
12(38)	→							
550								

5 Coyote Run Dr. East & 15th St.

Nominal								250
			5(3)				← 6(6)	
			↳					
2(4)	→							

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

TABLE 5-1: INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2025) CONDITIONS

#	Intersection	Traffic Control[2]	2025 Without Project Delay[1] (secs.) AM	2025 Without Project Delay[1] (secs.) PM	2025 Without Project Level of Service AM	2025 Without Project Level of Service PM	2025 With Project Delay[1] (secs.) AM	2025 With Project Delay[1] (secs.) PM	2025 With Project Level of Service AM	2025 With Project Level of Service PM
1	Campus Av. & 16th St.	TS	27.9	51.2	C	D	28.1	52.2	C	D
2	Campus Av. & 15th St.	TS	11.5	11.8	B	B	11.5	11.8	B	B
3	Campus Av. & 14th St.	TS	10.3	8.8	B	A	10.9	9.1	B	A
4	Coyote Run Dr. West & 15th St.	**UC**	Future Intersection				0.0	0.0	A	A
5	Coyote Run Dr. East & 15th St.	**CSS**	Future Intersection				8.6	8.6	A	A

1 Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

2 CSS = Cross-street Stop; UC = Uncontrolled; TS = Traffic Signal; **CSS** = Improvement

5.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

No traffic signal warrants have been conducted for Opening Year Cumulative (2025) Without Project traffic conditions as all of the existing intersections are currently signalized. The traffic signal warrant analysis for Opening Year Cumulative (2025) With Project traffic conditions are based on the planning level ADT volume-based traffic signal warrants for the intersection of Coyote Run Drive East on 15th Street. The intersection is not anticipated to warrant a traffic signal (see Appendix 5.3).

5.6 PROJECT DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

This section provides a summary of Project deficiencies and recommended improvements. There are no study area intersections anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2025) traffic conditions. As such, no intersection improvements have been recommended.

6 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the City of Upland are funded through a combination of improvements constructed by the Project, development impact fee programs. Fee programs applicable to the Project are described below.

6.1 MEASURE "I" FUNDS

In 2004, the voters of San Bernardino County approved the 30-year extension of Measure "I", a one-half of one percent sales tax on retail transactions, through the year 2040, for transportation projects including, but not limited to, infrastructure improvements, commuter rail, public transit, and other identified improvements. The Measure "I" extension requires that a regional traffic impact fee be created to ensure development is paying its fair share. A regional Nexus study was prepared by SBCTA and concluded that each jurisdiction should include a regional fee component in their local programs to meet the Measure "I" requirement. The regional component assigns specific facilities and cost sharing formulas to each jurisdiction and was most recently updated in September 2017. Revenues collected through these programs are used in tandem with Measure "I" funds to deliver projects identified in the Nexus Study.

While Measure "I" is a self-executing sales tax administered by SBCTA, it bears discussion here because the funds raised through Measure "I" have funded in the past, and will continue to fund, new transportation facilities in San Bernardino County, including within the City of Upland.

6.2 CITY OF UPLAND DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The City of Upland adopted the latest update to their DIF program in November 2017. Fees from new residential, commercial and industrial development are collected to fund Measure "I" compliant regional facilities as well as local facilities. Under the City's DIF program, the City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

After the City's DIF fees are collected, they are placed in a separate restricted use account pursuant to the requirements of Government Code sections 66000 *et seq*. The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Engineering Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the City are also periodically performed by City staff and consultants. The City uses this data to determine the timing of the improvements listed in its facilities list. The City also uses this data to ensure that the improvements listed on the facilities list are constructed before the LOS falls below the LOS performance standards adopted by the City. In this way, the improvements are constructed before the LOS falls below the City's LOS performance thresholds. The City's DIF program establishes a timeline to fund, design, and build the improvements.

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7 REFERENCES

1. **Fehr & Peers.** *City of Upland Traffic Impact Analysis Guidelines.* Upland : s.n., July 2020.
2. **Institute of Transportation Engineers.** *Trip Generation Manual.* 11th Edition. 2021.
3. **San Bernardino County Transportation Authority.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated June 2016.
4. **Transportation Research Board.** *Highway Capacity Manual (HCM).* 6th Edition. s.l. : National Academy of Sciences, 2016.
5. **California Department of Transportation.** California Manual on Uniform Traffic Control Devices (CA MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CA MUTCD).* 2014, Updated March 30, 2021 (Revision 6).
6. **Southern California Association of Governments (SCAG).** *2020 Regional Transportation Plan / Sustainable Communities Strategy.* Adopted September 2020.

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APPENDIX 1.1: APPROVED TRAFFIC STUDY SCOPING AGREEMENT

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July 7, 2022

Mr. Robert Dalquest
City of Upland
460 N. Euclid Avenue
Upland, CA 91786

VILLA SERNA (TRACT NO. 20245) FOCUSED TRAFFIC ANALYSIS SCOPING AGREEMENT

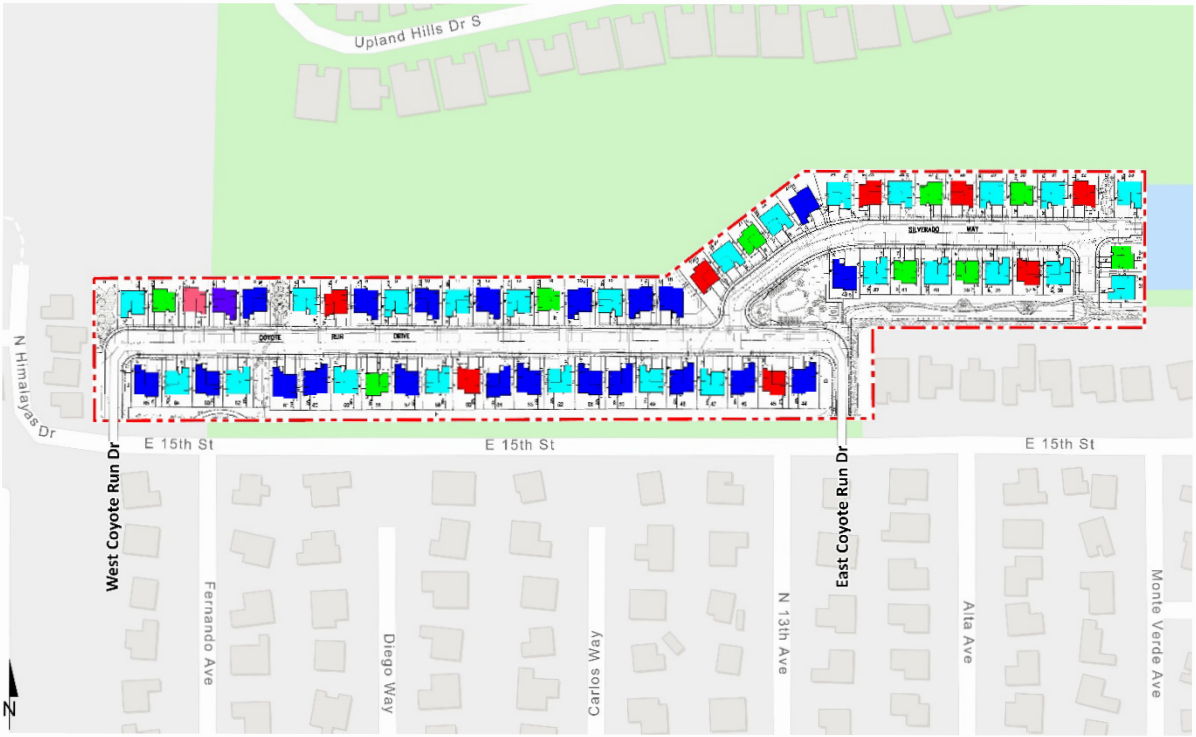
Mr. Robert Dalquest,

The firm of Urban Crossroads, Inc. is pleased to submit this scoping letter regarding the focused traffic analysis for Villa Serna development (**Project**), which is located northeast of Fernando Avenue and 15th Street Baxter in the City of Upland. This letter describes the proposed Project trip generation, trip distribution, and analysis methodology, which have been used to establish the draft proposed Project study area and analysis locations. The following scope of work is based on the City's Traffic Impact Analysis Guidelines (dated July 2020) (**City Guidelines**).

PROPOSED PROJECT

The Project is proposed to consist of 65 single family detached residential dwelling units (see Exhibit 1). The proposed Project is anticipated to have an opening year of 2025. Access is proposed via two connections of Coyote Run Drive (private internal road) to the west and east on 15th Street. The Project will also construct a western extension of 15th Street to the existing terminus east of Campus Avenue, which will serve as the primary access for the Project.

EXHIBIT 1: PRELIMINARY SITE PLAN



TRIP GENERATION

Trip generation represents the amount of traffic that is attracted and produced by a development and is based upon the specific land uses planned for a given project. In order to develop the traffic characteristics of the proposed project, trip-generation statistics published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition, 2021) was used to estimate the trip generation. Trip generation rates are summarized on Table 1.

The trip generation summary illustrating daily and peak hour trip generation estimates for the proposed Project are shown on Table 1. The proposed Project is anticipated to generate 614 two-way vehicle trip-ends per day with 46 AM peak hour trips and 61 PM peak hour (see Table 1).

TABLE 1: PROJECT TRIP GENERATION SUMMARY

Land Use[1]	ITE LU Code	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Trip Generation Rates:									
Single Family Residential	210	DU	0.18	0.52	0.70	0.59	0.35	0.94	9.43

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 11th Edition (2021).

[2] DU = Dwelling Units

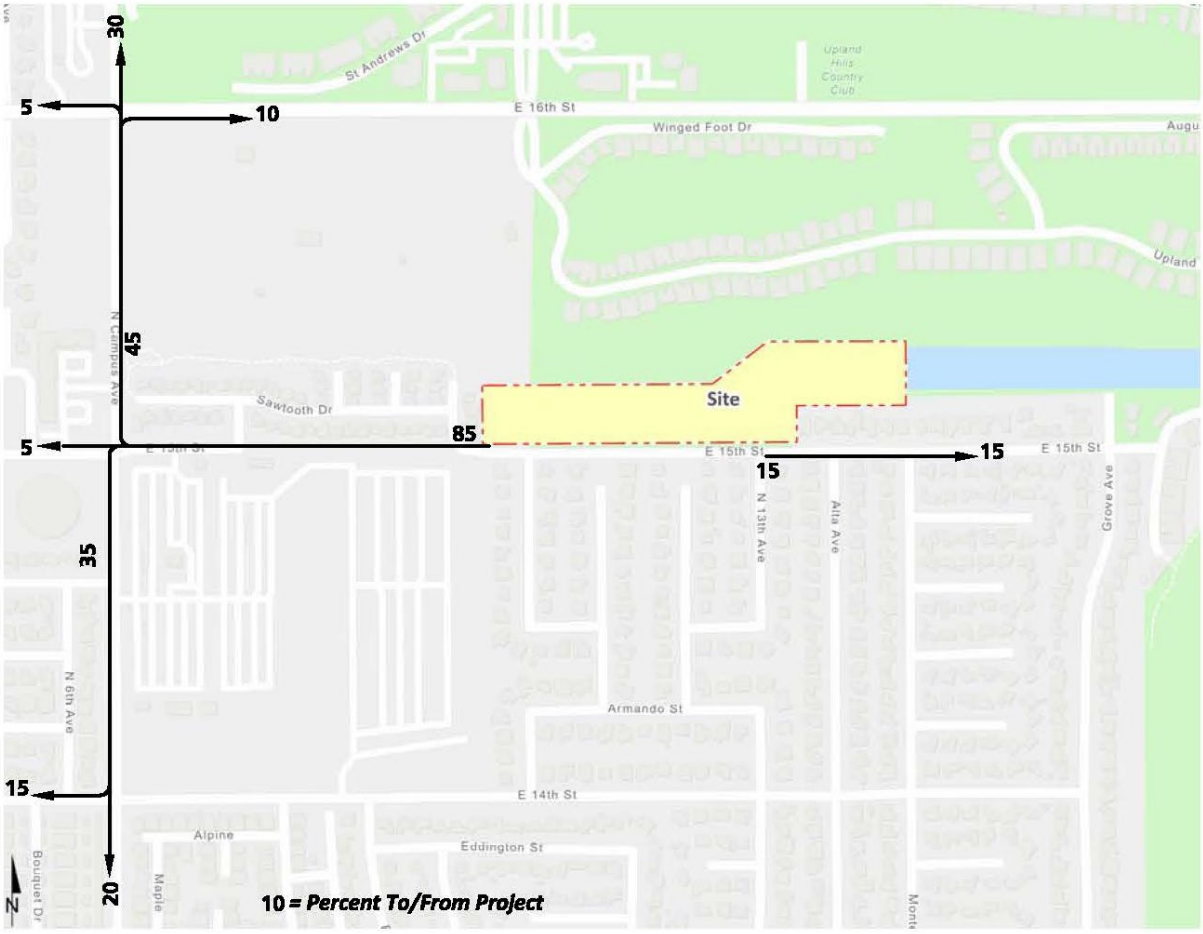
Land Use	Quantity	Units[1]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Trip Generation Summary:									
Tract No. 20245	65	DU	12	34	46	38	23	61	614

[1] DU = Dwelling Units

TRIP DISTRIBUTION

The Project trip distribution represents the directional orientation of traffic to and from the Project site. Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. Exhibit 2 shows the Project trip distribution patterns.

EXHIBIT 2: PROJECT TRIP DISTRIBUTION



ANALYSIS SCENARIOS

Consistent with the City's TIA Guidelines, intersection analysis will be provided for the following scenarios:

- Existing (2022) Conditions
- Opening Year Cumulative (2025) Without Project
- Opening Year Cumulative (2025) With Project

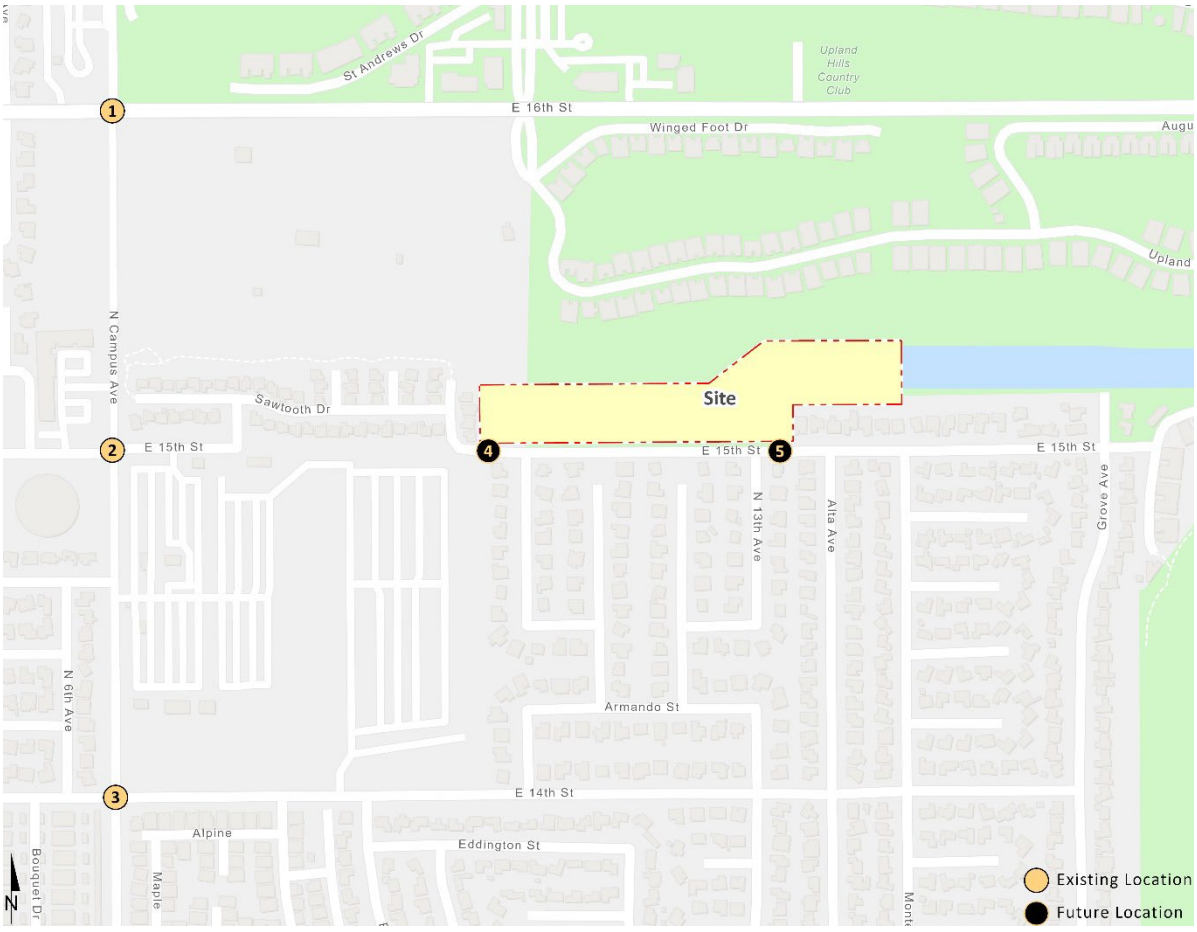
All study area intersections will be evaluated using the Highway Capacity Manual (HCM) 6th Edition analysis methodology.

STUDY AREA INTERSECTIONS

Based on the Project's anticipated travel patterns and trip generation characteristics, the following study area intersection locations shown on Exhibit 3 and listed below were selected for analysis:

#	Intersection
1	Campus Av. & 16th St.
2	Campus Av. & 15th St.
3	Campus Av. & 14th St.
4	Coyote Run Dr. West & 15th St.
5	Coyote Run Dr. East & 15th St.

EXHIBIT 3: STUDY AREA



EXISTING COUNT DATA

We are proposing to conduct new traffic counts on a typical weekday when local schools are open and operating on normal bell schedules (after August 22, 2022). No additional adjustments are proposed for the purposes of establishing the existing baseline conditions.

GENERAL PLAN CONSISTENCY REQUIREMENTS

Consistent with the City's TIA Guidelines, the following criteria will be applied for the traffic analysis: Strive to maintain LOS D at all intersections outside of the Downtown Specific Plan area and the Transit Priority Roadways except where such improvements are physically infeasible or would negatively affect bicyclists, pedestrians, or transit users (Policy CIR-1.1 of the General Plan).

- Any study intersection operating at an acceptable LOS D or better without project traffic in which the addition of project traffic causes the intersection to degrade to a LOS E or F shall identify improvements to improve operations to LOS D or better.
- Any study intersection that is operating at LOS E or F without project traffic shall improve the intersection operations to LOS D or better.

AMBIENT GROWTH

Consistent with other studies performed in the area, an ambient growth rate of 2.0% per year is proposed for the study area intersections to approximate background traffic growth not identified by nearby cumulative development projects. The rate will be compounded over a 3-year period (i.e., $1.02^{3\text{years}} = 1.0612$ or 6.12% for 2025).

SIGNAL TIMING

It is requested that the City provide any signal timing that should be considered for signalized study area intersections within the City.

CUMULATIVE PROJECTS

The cumulative projects are listed on Table 2 and are shown graphically on Exhibit 4. It is requested that the City provide an updated list of cumulative development projects for inclusion in the traffic study.

SPECIAL ISSUES

The following special issues will also be addressed:

- *Traffic Signal Warrant Analysis*: Traffic signal warrant analysis will be performed for all full-access unsignalized study area intersections utilizing the California MUTCD peak-hour warrants for existing intersections, and the Caltrans daily (Planning level) warrant for new intersections.
- *Site Access Evaluation*: The turn pocket lengths will be determined through peak hour traffic simulations developed using Synchro and SimTraffic software in an effort to identify the required storage capacity for turn lanes at each Project driveway.

TABLE 2: CUMULATIVE DEVELOPMENT LAND USE SUMMARY

#	Project Name	Land Use[1]	Quantity	Units[1]
1	Colony Condos	Multifamily (Mid-Rise) Residential	60	DU
2	Colonies Campus Center	Gasoline Station w/ Market	4.565	TSF
3	Colonies Campus Center	Mixed Use (Food and Retail)	8.825	TSF
4	Planet Car Wash	Car Wash	2.972	TSF
5	Colonies Self Storage	Self Storage	164.570	TSF
6	Mesa Court Apartments	Multifamily (Low-Rise) Residential	60	DU
7	Starbucks	Coffee Shop w/ Drive-Thru	2.049	TSF
8	Amazon Fresh at Upland Village Center	Grocery/Supermarket	35.000	TSF
9	Foothill Self Storage	Self Storage & Retail	5.900	TSF
10	Rally's Hamburgers	Fast-Food Restaurant	1.300	TSF
11	Rose Glen Specific Plan	Single Family Detached	64	DU

[1] DU = Dwelling Units; TSF = Thousand Square Feet

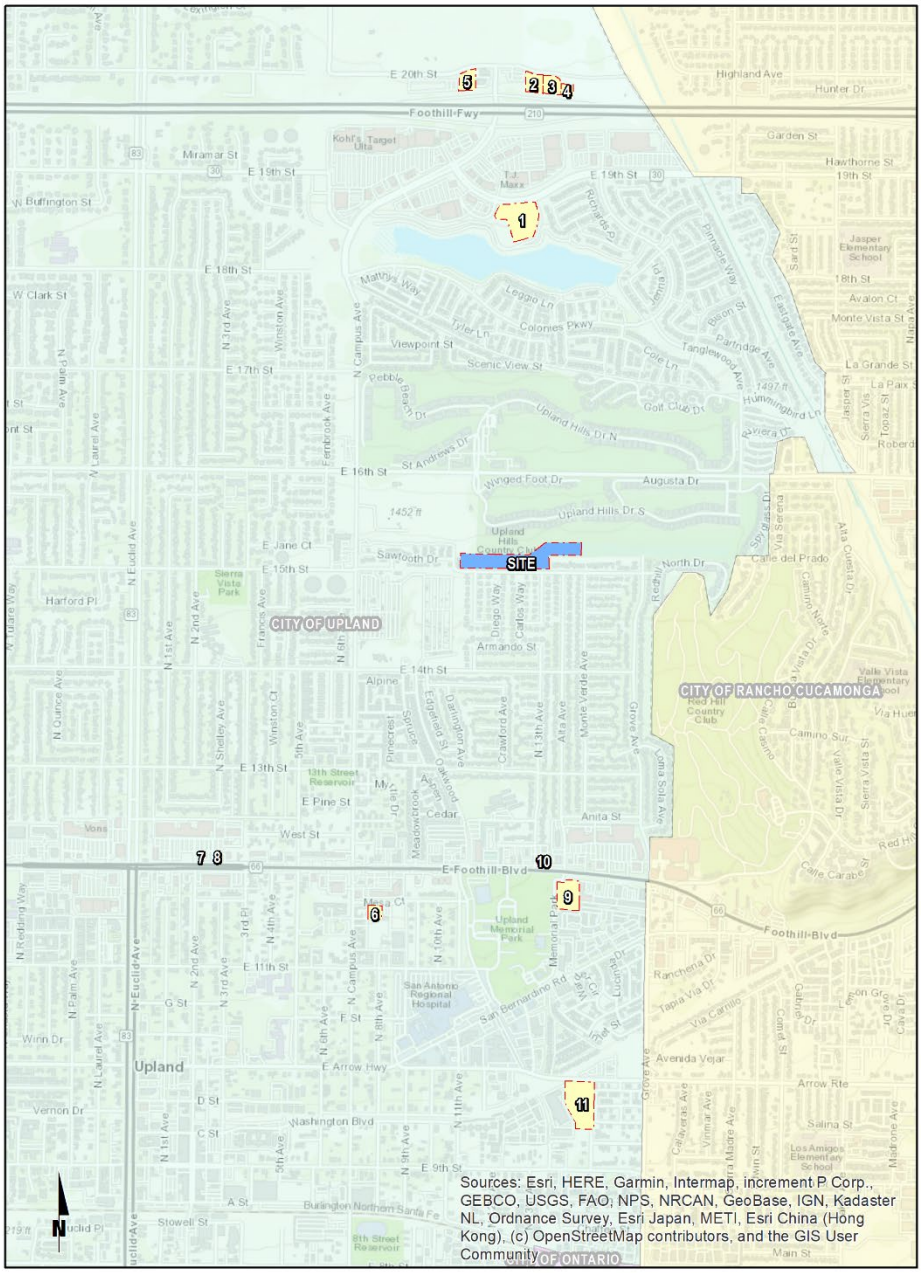
If you have any questions or comments, I can be reached at cso@urbanxroads.com.

Respectfully submitted,

URBAN CROSSROADS, INC.

Charlene So, PE
Principal

EXHIBIT 4: CUMULATIVE DEVELOPMENT LOCATION MAP



APPENDIX 1.2: SITE ADJACENT QUEUES

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Intersection: 4: 15th St. & Coyote Run Dr. West

Movement	SB
Directions Served	R
Maximum Queue (ft)	43
Average Queue (ft)	20
95th Queue (ft)	43
Link Distance (ft)	98
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: 15th St. & Coyote Run Dr. East

Movement	SB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	4
95th Queue (ft)	21
Link Distance (ft)	194
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 0

Intersection: 4: 15th St. & Coyote Run Dr. West

Movement	EB	SB
Directions Served	L	R
Maximum Queue (ft)	57	40
Average Queue (ft)	22	14
95th Queue (ft)	53	37
Link Distance (ft)	173	98
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: 15th St. & Coyote Run Dr. East

Movement	SB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	3
95th Queue (ft)	19
Link Distance (ft)	194
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 0

APPENDIX 3.1: TRAFFIC COUNTS

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INTERSECTION TURNING MOVEMENT COUNTS

T218

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Aug 23, 22

LOCATION: Upland
NORTH & SOUTH: Campus
EAST & WEST: 16th

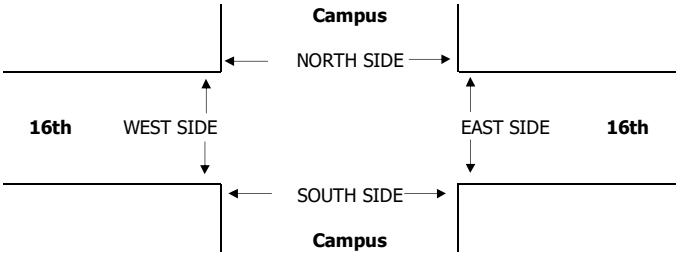
PROJECT #: SC3596
LOCATION #: 1
CONTROL: SIGNAL

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

☑ Add U-Turns to Left Turns

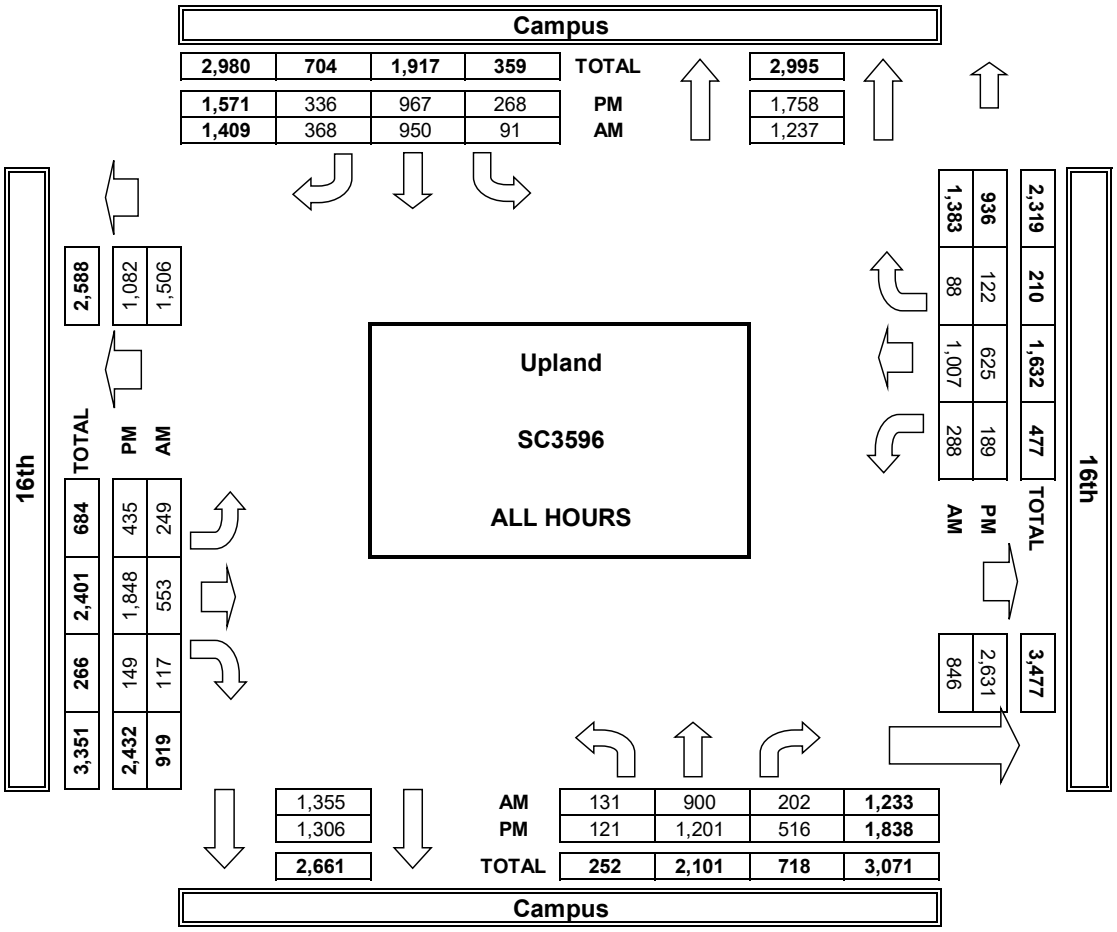
		NORTHBOUND Campus			SOUTHBOUND Campus			EASTBOUND 16th			WESTBOUND 16th				U-TURNS				
	LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	8	80	13	8	93	43	21	46	14	26	94	8	454	0	0	0	0	0
	7:15 AM	22	89	20	7	124	38	12	58	12	42	138	8	570	0	0	0	0	0
	7:30 AM	20	147	22	14	150	59	36	72	18	43	158	9	748	0	0	0	0	0
	7:45 AM	18	162	27	10	125	48	51	100	16	49	136	12	754	0	0	0	0	0
	8:00 AM	13	127	36	11	136	41	41	79	10	35	115	10	654	0	0	0	0	0
	8:15 AM	22	110	31	16	101	50	32	67	12	39	124	11	615	0	0	0	0	0
	8:30 AM	16	107	29	17	110	53	29	59	18	26	116	16	596	0	0	0	0	0
	8:45 AM	12	78	24	8	111	36	27	72	17	28	126	14	553	0	0	0	0	0
	VOLUMES	131	900	202	91	950	368	249	553	117	288	1,007	88	4,944	0	0	0	0	0
	APPROACH %	11%	73%	16%	6%	67%	26%	27%	60%	13%	21%	73%	6%						
	APP/DEPART	1,233	/	1,237	1,409	/	1,355	919	/	846	1,383	/	1,506	0					
	BEGIN PEAK HR		7:30 AM																
	VOLUMES	73	546	116	51	512	198	160	318	56	166	533	42	2,771					
	APPROACH %	10%	74%	16%	7%	67%	26%	30%	60%	10%	22%	72%	6%						
	PEAK HR FACTOR		0.888			0.853			0.799			0.882		0.919					
	APP/DEPART	735	/	748	761	/	734	534	/	485	741	/	804	0					
PM	4:00 PM	13	139	61	38	108	39	78	225	17	22	66	12	818	0	0	1	0	1
	4:15 PM	16	132	66	35	144	37	60	241	14	21	75	13	854	0	0	0	0	0
	4:30 PM	10	153	56	34	120	33	62	216	18	21	64	14	801	0	0	0	0	0
	4:45 PM	14	150	59	27	142	56	45	222	18	26	94	12	865	0	0	0	0	0
	5:00 PM	18	162	56	31	108	32	45	239	18	22	80	11	822	0	0	0	0	0
	5:15 PM	18	171	64	41	121	40	41	223	14	31	88	24	876	1	1	0	0	2
	5:30 PM	16	147	77	31	112	50	52	241	25	23	79	18	871	0	0	0	0	0
	5:45 PM	16	147	77	31	112	49	52	241	25	23	79	18	870	0	0	0	0	0
	VOLUMES	121	1,201	516	268	967	336	435	1,848	149	189	625	122	6,777	1	1	1	0	3
	APPROACH %	7%	65%	28%	17%	62%	21%	18%	76%	6%	20%	67%	13%						
	APP/DEPART	1,838	/	1,758	1,571	/	1,306	2,432	/	2,631	936	/	1,082	0					
	BEGIN PEAK HR		5:00 PM																
	VOLUMES	68	627	274	134	453	171	190	944	82	99	326	71	3,439					
	APPROACH %	7%	65%	28%	18%	60%	23%	16%	78%	7%	20%	66%	14%						
	PEAK HR FACTOR		0.958			0.938			0.956			0.867		0.981					
	APP/DEPART	969	/	889	758	/	635	1,216	/	1,351	496	/	564	0					

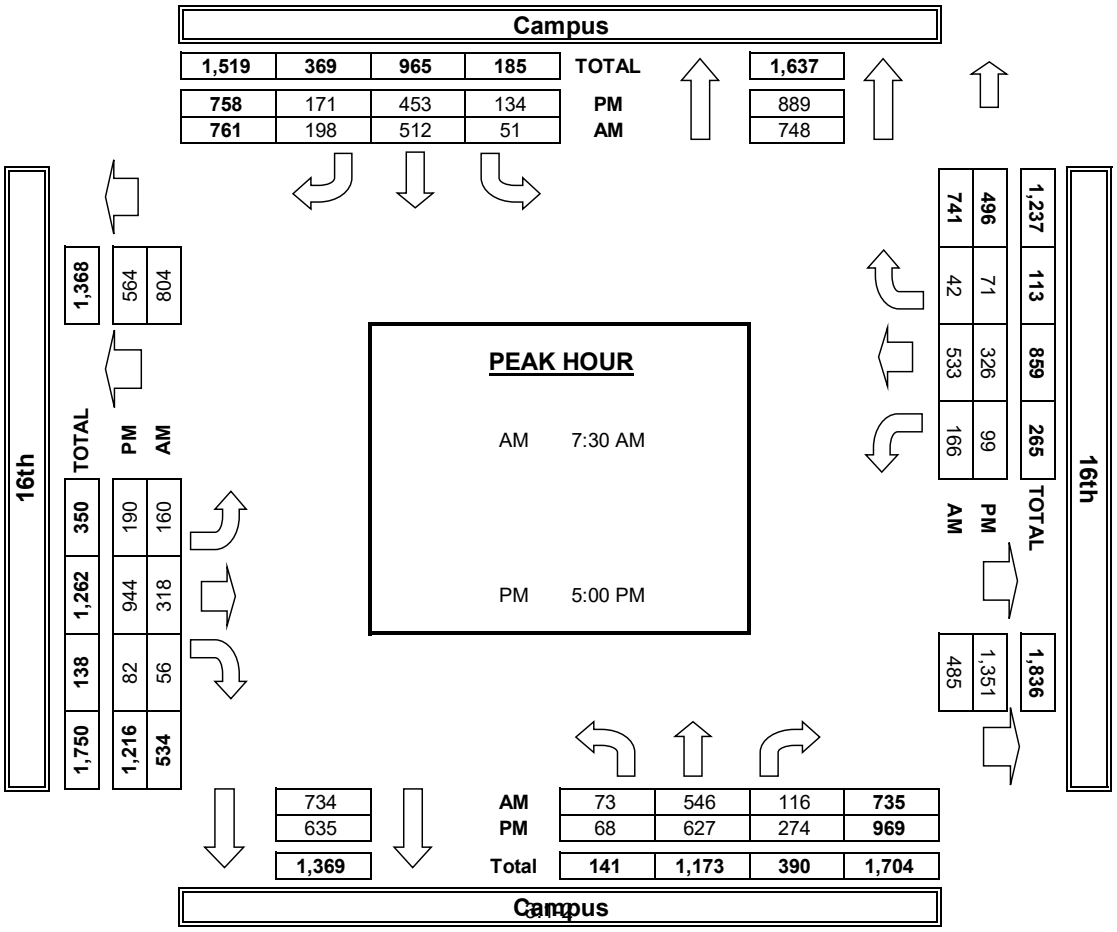


		PEDESTRIAN + BIKE CROSSINGS					PEDESTRIAN CROSSINGS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1
	7:15 AM	1	1	1	0	3	0	0	0	0	0	1	1	1	0	3
	7:30 AM	5	0	2	1	8	2	0	2	0	4	3	0	0	1	4
	7:45 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	8:00 AM	0	5	0	0	5	0	1	0	0	1	0	4	0	0	4
	8:15 AM	0	1	0	1	2	0	1	0	0	1	0	0	0	1	1
	8:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	8:45 AM	2	0	2	0	4	2	0	2	0	4	0	0	0	0	0
	TOTAL	9	9	5	2	25	4	2	4	0	10	5	7	1	2	15
	AM BEGIN PEAK HR	7:30 AM					2	2	2	0	6					
PM	4:00 PM	1	0	1	1	3	0	0	1	1	2	1	0	0	0	1
	4:15 PM	1	0	0	1	2	1	0	0	1	2	0	0	0	0	0
	4:30 PM	1	0	0	1	2	0	0	0	1	1	1	0	0	0	1
	4:45 PM	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1
	5:00 PM	2	2	1	0	5	0	0	0	0	0	2	2	1	0	5
	5:15 PM	3	0	2	0	5	0	0	0	0	0	3	0	2	0	5
	5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	9	2	4	3	18	1	0	1	3	5	8	2	3	0	13
	PM BEGIN PEAK HR	5:00 PM					0	0	0	0	0					

AimTD LLC

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Aug 23, 22

LOCATION: Upland
NORTH & SOUTH: Campus
EAST & WEST: 15th

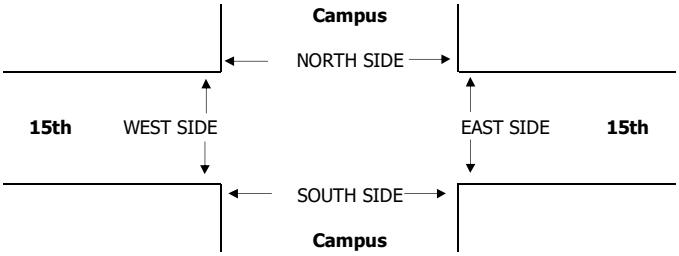
PROJECT #: SC3596
LOCATION #: 2
CONTROL: SIGNAL

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

☑ Add U-Turns to Left Turns

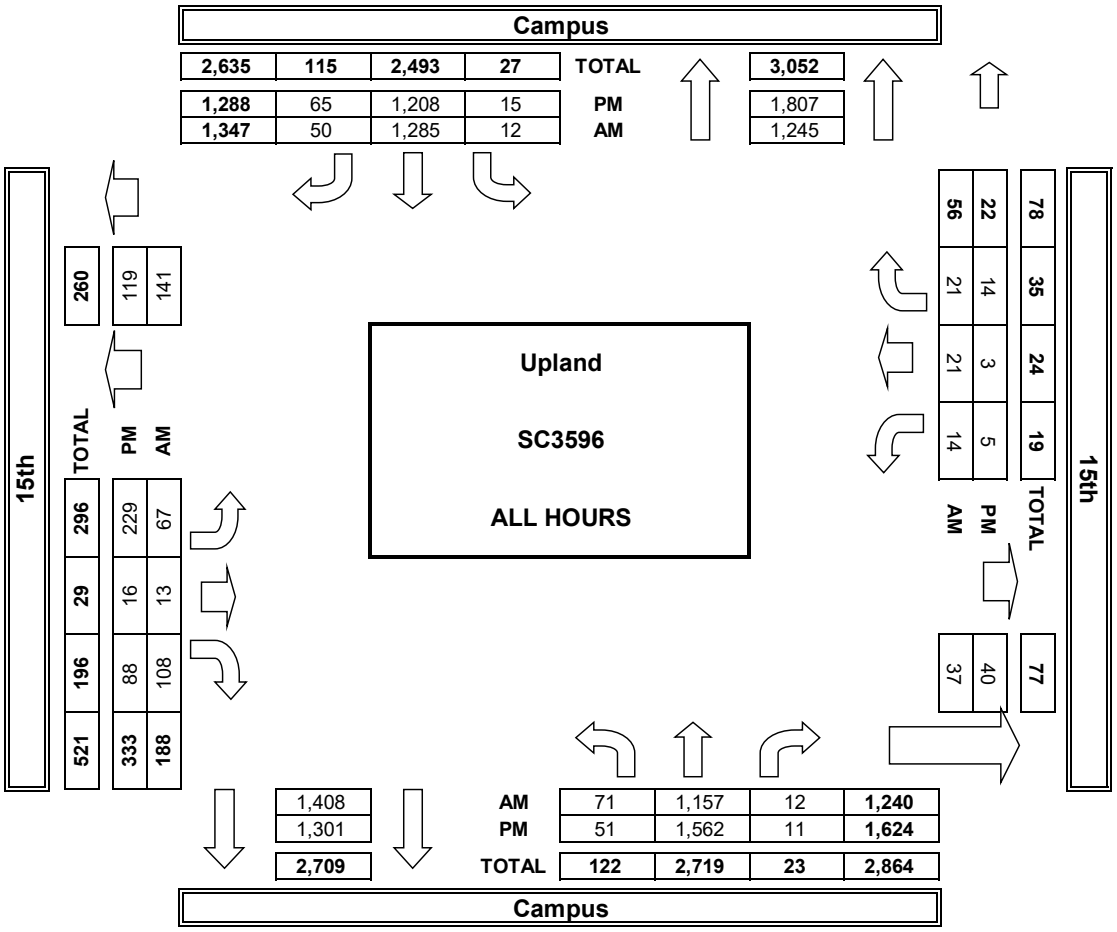
		NORTHBOUND Campus			SOUTHBOUND Campus			EASTBOUND 15th			WESTBOUND 15th				U-TURNS				
	LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 1	ER 0	WL 1	WT 1	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	9	99	2	1	125	8	5	1	4	0	2	1	257	0	0	0	0	0
	7:15 AM	6	123	1	1	154	4	5	0	9	2	3	4	312	0	0	0	0	0
	7:30 AM	19	163	1	0	212	8	7	2	5	5	6	4	432	0	0	0	0	0
	7:45 AM	14	185	1	5	177	5	18	1	37	1	2	5	451	1	0	0	0	1
	8:00 AM	7	171	2	0	165	8	14	4	20	2	3	2	398	0	0	0	0	0
	8:15 AM	8	161	2	1	152	10	4	0	12	2	3	0	355	0	0	0	0	0
	8:30 AM	4	138	3	1	154	3	10	2	15	2	0	5	337	0	0	0	0	0
	8:45 AM	4	117	0	3	146	4	4	3	6	0	2	0	289	0	0	0	0	0
	VOLUMES	71	1,157	12	12	1,285	50	67	13	108	14	21	21	2,831	1	0	0	0	1
	APPROACH %	6%	93%	1%	1%	95%	4%	36%	7%	57%	25%	38%	38%						
	APP/DEPART	1,240	/	1,245	1,347	/	1,408	188	/	37	56	/	141	0					
	BEGIN PEAK HR		7:30 AM																
	VOLUMES	48	680	6	6	706	31	43	7	74	10	14	11	1,636					
	APPROACH %	7%	93%	1%	1%	95%	4%	35%	6%	60%	29%	40%	31%						
	PEAK HR FACTOR		0.918			0.844			0.554			0.583		0.907					
	APP/DEPART	734	/	734	743	/	791	124	/	19	35	/	92	0					
PM	4:00 PM	4	187	2	3	138	8	27	4	13	0	0	4	390	0	1	0	0	1
	4:15 PM	7	182	2	1	169	6	28	1	9	2	1	1	409	0	1	0	0	1
	4:30 PM	10	192	0	3	150	11	20	4	14	1	1	0	406	0	0	0	0	0
	4:45 PM	10	192	0	0	171	10	32	0	13	1	0	1	430	0	0	0	0	0
	5:00 PM	2	210	0	3	141	4	37	5	9	0	0	1	412	0	0	0	0	0
	5:15 PM	7	230	2	0	153	9	25	0	12	0	0	1	439	0	0	0	0	0
	5:30 PM	6	206	2	3	144	8	27	1	9	0	0	1	407	0	0	0	0	0
	5:45 PM	5	163	3	2	142	9	33	1	9	1	1	5	374	0	0	0	0	0
	VOLUMES	51	1,562	11	15	1,208	65	229	16	88	5	3	14	3,267	0	2	0	0	2
	APPROACH %	3%	96%	1%	1%	94%	5%	69%	5%	26%	23%	14%	64%						
	APP/DEPART	1,624	/	1,807	1,288	/	1,301	333	/	40	22	/	119	0					
	BEGIN PEAK HR		4:45 PM																
	VOLUMES	25	838	4	6	609	31	121	6	43	1	0	4	1,688					
	APPROACH %	3%	97%	0%	1%	94%	5%	71%	4%	25%	20%	0%	80%						
	PEAK HR FACTOR		0.907			0.892			0.833			0.625		0.961					
	APP/DEPART	867	/	963	646	/	653	170	/	16	5	/	56	0					

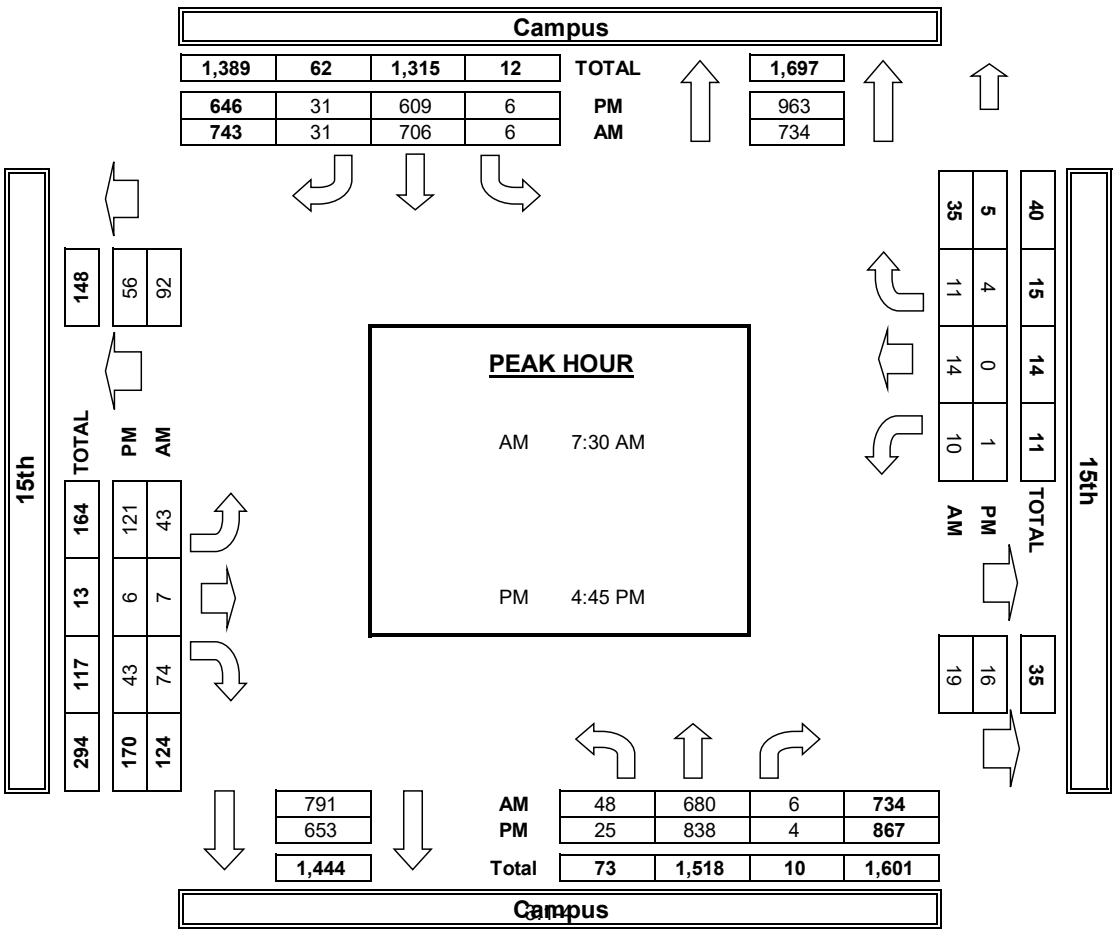


		PEDESTRIAN + BIKE CROSSINGS					PEDESTRIAN CROSSINGS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:15 AM	0	0	3	0	3	0	0	0	0	0	0	0	3	0	3
	7:30 AM	0	0	2	1	3	0	0	2	0	2	0	0	0	1	1
	7:45 AM	1	0	1	0	2	1	0	1	0	2	0	0	0	0	0
	8:00 AM	0	2	0	0	2	0	2	0	0	2	0	0	0	0	0
	8:15 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1
	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:45 AM	0	0	2	2	4	0	0	2	1	3	0	0	0	1	1
	TOTAL	1	2	8	4	15	1	2	5	1	9	0	0	3	3	6
	AM BEGIN PEAK HR			7:30 AM			1	2	3	0	6					
PM	4:00 PM	0	0	1	2	3	0	0	0	2	2	0	0	1	0	1
	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1
	5:15 PM	0	0	3	0	3	0	0	1	0	1	0	0	2	0	2
	5:30 PM	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	6	2	8	0	0	2	2	4	0	0	4	0	4
	PM BEGIN PEAK HR			4:45 PM			0	0	2	0	2					

AimTD LLC

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

T218

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Aug 23, 22

LOCATION: Upland
NORTH & SOUTH: Campus
EAST & WEST: 14th

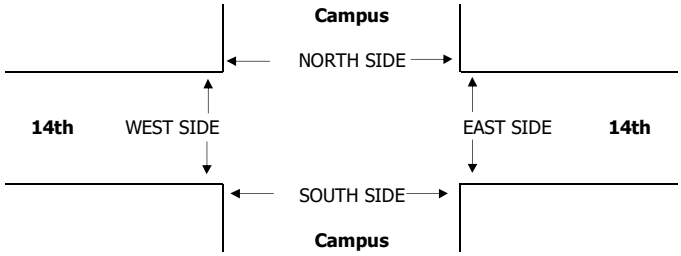
PROJECT #: SC3596
LOCATION #: 3
CONTROL: SIGNAL

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N ◄ W E ► S ▼

☑ Add U-Turns to Left Turns

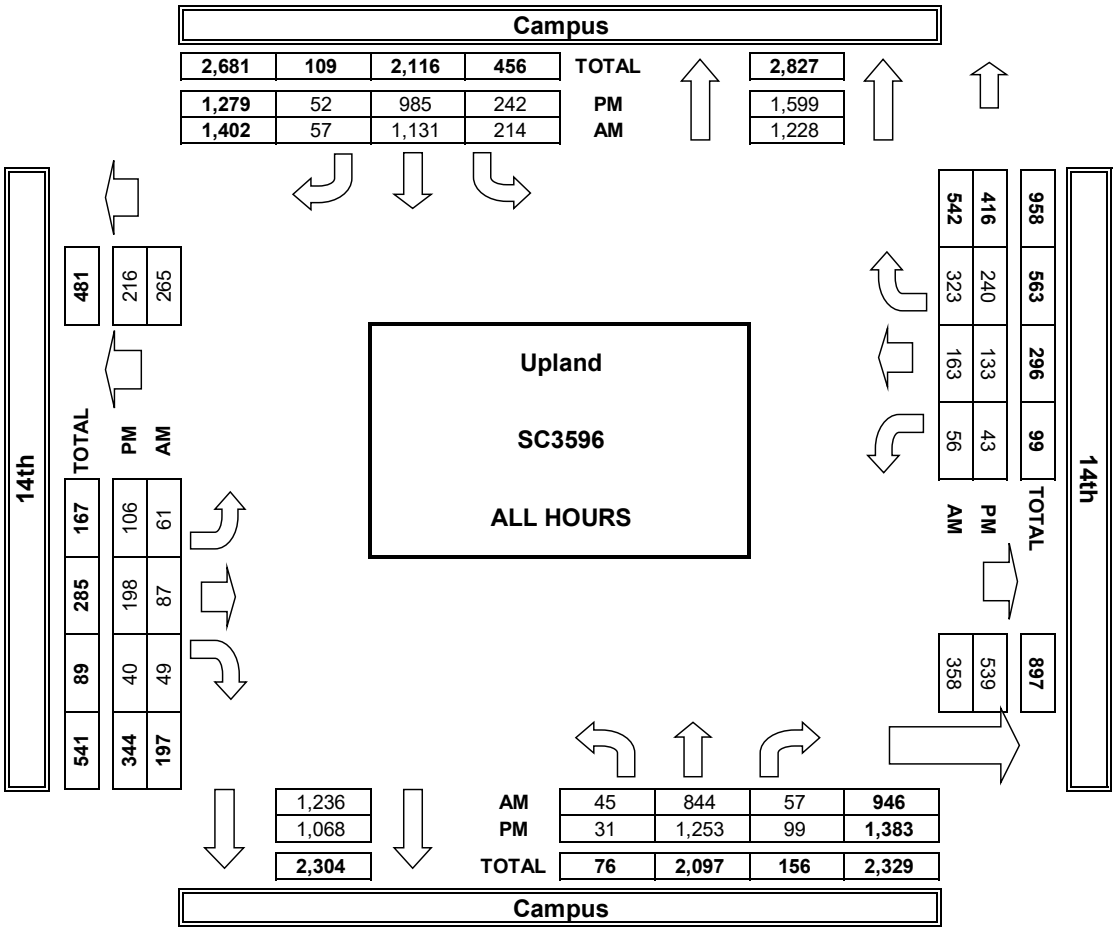
		NORTHBOUND Campus			SOUTHBOUND Campus			EASTBOUND 14th			WESTBOUND 14th				U-TURNS				
	LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 1	ER 0	WL 1	WT 1	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	2	73	5	13	113	1	7	6	2	6	12	29	269	0	0	0	0	0
	7:15 AM	3	78	3	16	155	2	5	11	7	5	14	46	345	0	0	0	0	0
	7:30 AM	11	132	3	23	183	12	8	9	8	7	40	64	500	0	0	0	0	0
	7:45 AM	12	139	10	48	155	23	8	9	10	8	28	45	495	0	0	0	0	0
	8:00 AM	6	123	11	39	124	9	8	23	9	11	22	37	422	0	0	0	0	0
	8:15 AM	5	99	16	36	126	7	10	8	0	6	18	55	386	0	0	0	0	0
	8:30 AM	4	109	5	24	141	2	6	13	10	7	18	28	367	0	0	0	0	0
	8:45 AM	2	91	4	15	134	1	9	8	3	6	11	19	303	0	0	0	0	0
	VOLUMES	45	844	57	214	1,131	57	61	87	49	56	163	323	3,087	0	0	0	0	0
	APPROACH %	5%	89%	6%	15%	81%	4%	31%	44%	25%	10%	30%	60%						
	APP/DEPART	946	/	1,228	1,402	/	1,236	197	/	358	542	/	265	0					
	BEGIN PEAK HR		7:30 AM																
	VOLUMES	34	493	40	146	588	51	34	49	27	32	108	201	1,803					
	APPROACH %	6%	87%	7%	19%	75%	6%	31%	45%	25%	9%	32%	59%						
	PEAK HR FACTOR		0.880			0.868			0.688			0.768		0.902					
	APP/DEPART	567	/	728	785	/	647	110	/	235	341	/	193	0					
PM	4:00 PM	4	144	12	43	110	8	12	32	2	2	13	21	403	0	0	0	0	0
	4:15 PM	2	147	15	34	134	3	15	25	3	7	28	25	438	0	0	0	0	0
	4:30 PM	3	177	8	31	111	7	12	25	11	4	16	29	434	0	0	0	0	0
	4:45 PM	6	164	11	30	154	9	15	19	3	8	12	22	453	0	0	0	0	0
	5:00 PM	4	164	17	23	114	4	13	26	6	6	17	45	439	0	0	0	0	0
	5:15 PM	5	182	13	35	123	9	11	20	8	6	21	46	479	0	0	0	0	0
	5:30 PM	5	147	13	22	124	7	16	27	5	4	12	29	411	0	0	0	0	0
	5:45 PM	2	128	10	24	115	5	12	24	2	6	14	23	365	0	0	0	0	0
	VOLUMES	31	1,253	99	242	985	52	106	198	40	43	133	240	3,422	0	0	0	0	0
	APPROACH %	2%	91%	7%	19%	77%	4%	31%	58%	12%	10%	32%	58%						
	APP/DEPART	1,383	/	1,599	1,279	/	1,068	344	/	539	416	/	216	0					
	BEGIN PEAK HR		4:30 PM																
	VOLUMES	18	687	49	119	502	29	51	90	28	24	66	142	1,805					
	APPROACH %	2%	91%	6%	18%	77%	4%	30%	53%	17%	10%	28%	61%						
	PEAK HR FACTOR		0.943			0.842			0.880			0.795		0.942					
	APP/DEPART	754	/	880	650	/	554	169	/	258	232	/	113	0					

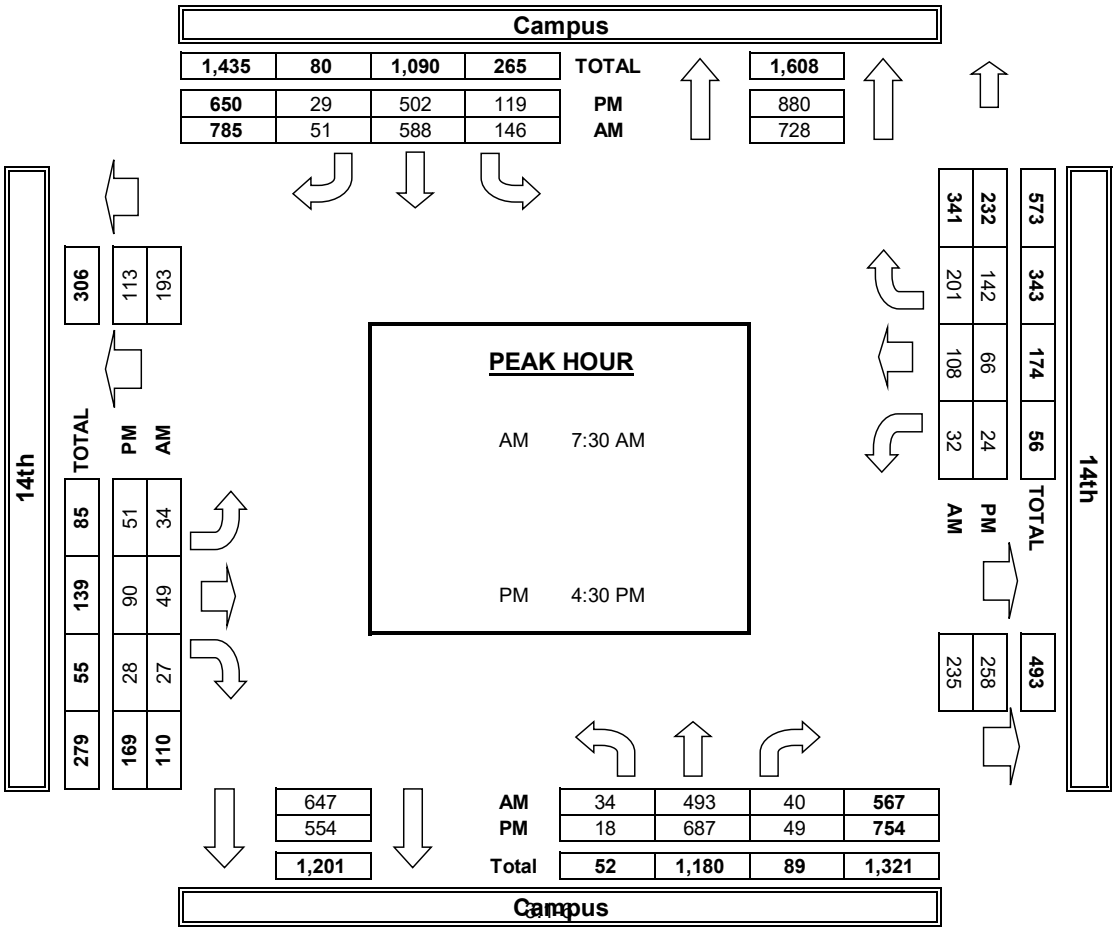


		PEDESTRIAN + BIKE CROSSINGS					PEDESTRIAN CROSSINGS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1
	7:15 AM	3	1	3	0	7	3	1	3	0	7	0	0	0	0	0
	7:30 AM	0	1	0	1	2	0	0	0	0	0	0	1	0	1	2
	7:45 AM	3	2	0	0	5	3	1	0	0	4	0	1	0	0	1
	8:00 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	8:15 AM	1	1	2	1	5	1	0	2	0	3	0	1	0	1	2
	8:30 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	8:45 AM	0	1	2	3	6	0	0	2	2	4	0	1	0	1	2
	TOTAL	7	8	8	5	28	7	4	7	2	20	0	4	1	3	8
	AM BEGIN PEAK HR			7:30 AM			4	2	2	0	8					
PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	5:00 PM	1	0	2	0	3	1	0	1	0	2	0	0	1	0	1
	5:15 PM	0	0	2	0	2	0	0	0	0	0	0	0	2	0	2
	5:30 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	1	2	4	0	7	1	1	1	0	3	0	1	3	0	4
	PM BEGIN PEAK HR			4:30 PM			1	0	1	0	2					

AimTD LLC

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

T218

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Aug 23, 22

LOCATION: Upland
NORTH & SOUTH: 13th
EAST & WEST: 15th

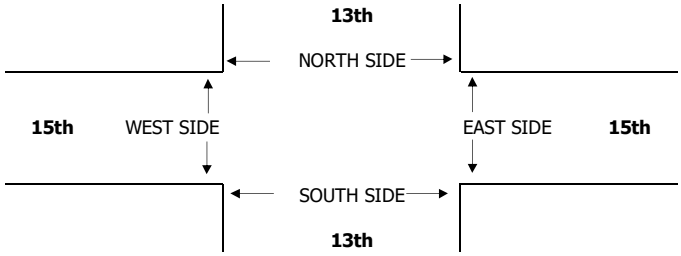
PROJECT #: SC3596
LOCATION #: 4
CONTROL: STOP N

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

☑ Add U-Turns to Left Turns

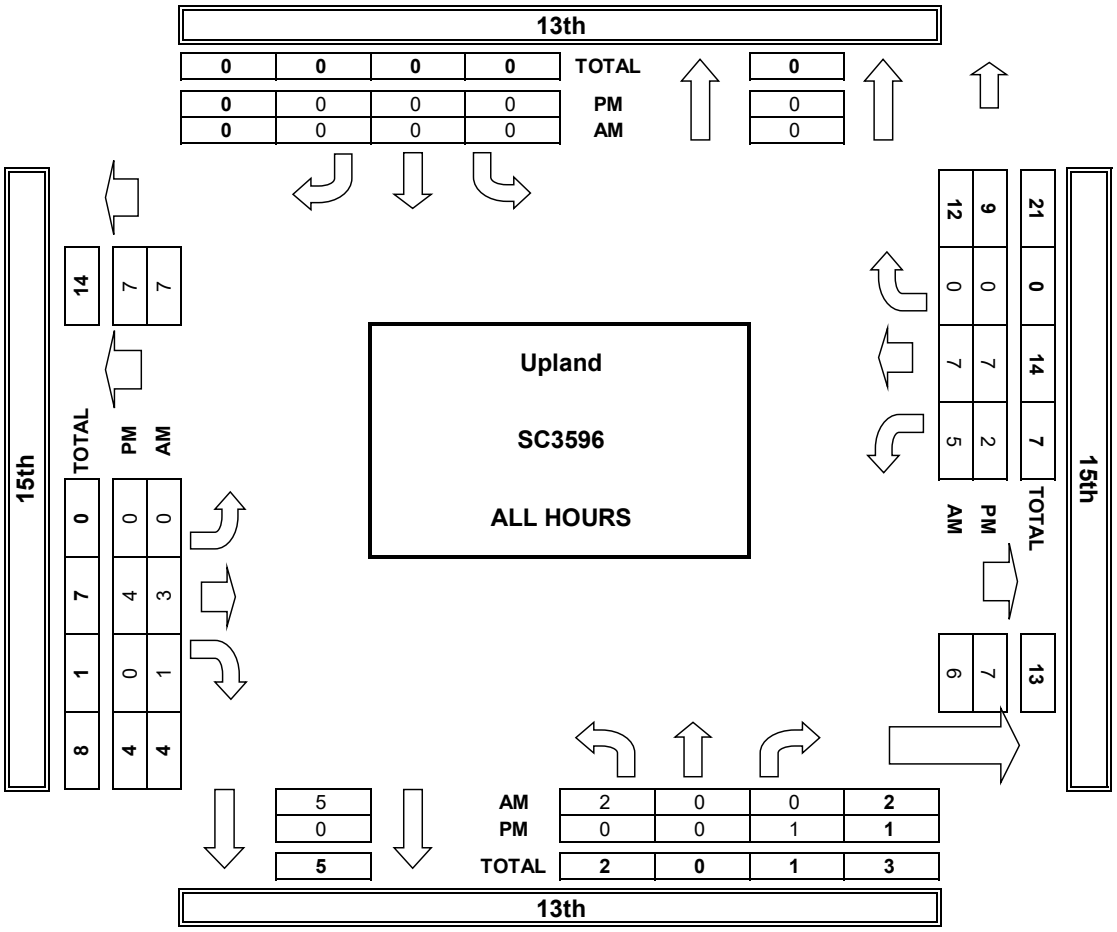
		NORTHBOUND 13th			SOUTHBOUND 13th			EASTBOUND 15th			WESTBOUND 15th				U-TURNS				
	LANES:	NL 0	NT X	NR 0	SL X	ST X	SR X	EL X	ET 1	ER 0	WL 0	WT 1	WR X	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	1	0	0	0	0	0	0	1	0	0	0	0	2	1	0	0	0	1
	7:15 AM	0	0	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0
	7:30 AM	0	0	0	0	0	0	0	0	0	2	2	0	4	0	0	0	2	2
	7:45 AM	1	0	0	0	0	0	0	0	1	1	0	0	3	1	0	0	1	2
	8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
	8:45 AM	0	0	0	0	0	0	0	0	0	1	5	0	6	0	0	0	0	0
	VOLUMES	2	0	0	0	0	0	0	3	1	5	7	0	18	2	0	0	3	5
	APPROACH %	100%	0%	0%	0%	0%	0%	0%	75%	25%	42%	58%	0%						
	APP/DEPART	2	/	0	0	/	5	4	/	6	12	/	7	0					
	BEGIN PEAK HR		7:00 AM																
	VOLUMES	2	0	0	0	0	0	0	2	1	4	2	0	11					
	APPROACH %	100%	0%	0%	0%	0%	0%	0%	67%	33%	67%	33%	0%						
	PEAK HR FACTOR		0.500			0.000			0.750			0.375		0.688					
	APP/DEPART	2	/	0	0	/	4	3	/	5	6	/	2	0					
PM	4:00 PM	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	1	1
	4:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	1	0	0	2	0	3	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:30 PM	0	0	0	0	0	0	0	2	0	1	3	0	6	0	0	0	1	1
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VOLUMES	0	0	1	0	0	0	0	4	0	2	7	0	14	0	0	0	2	2
	APPROACH %	0%	0%	100%	0%	0%	0%	0%	100%	0%	22%	78%	0%						
	APP/DEPART	1	/	0	0	/	0	4	/	7	9	/	7	0					
	BEGIN PEAK HR		4:45 PM																
	VOLUMES	0	0	0	0	0	0	0	4	0	1	5	0	10					
	APPROACH %	0%	0%	0%	0%	0%	0%	0%	100%	0%	17%	83%	0%						
	PEAK HR FACTOR		0.000			0.000			0.500			0.375		0.417					
	APP/DEPART	0	/	0	0	/	0	4	/	5	6	/	5	0					

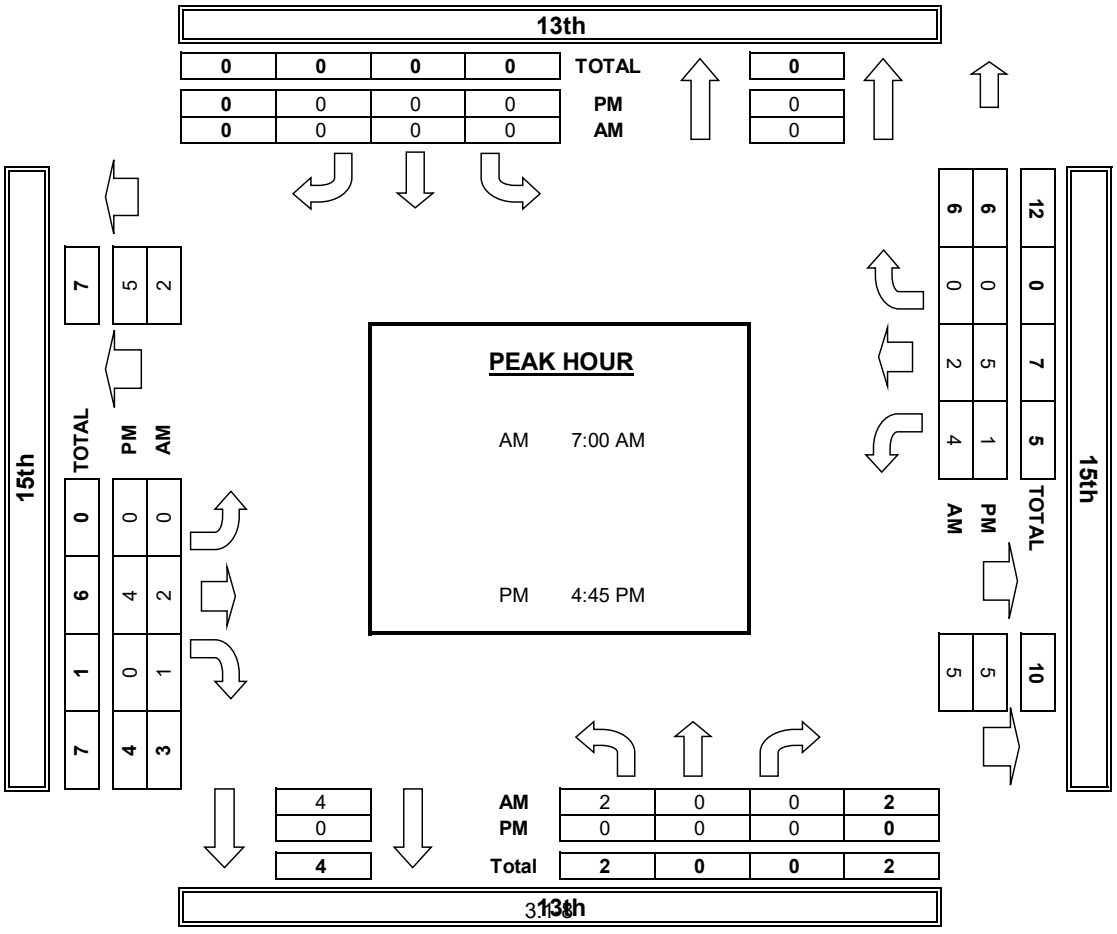


		PEDESTRIAN + BIKE CROSSINGS					PEDESTRIAN CROSSINGS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM	0	3	0	0	3	0	3	0	0	3	0	0	0	0	0
	7:15 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	7:30 AM	0	5	0	0	5	0	3	0	0	3	0	2	0	0	2
	7:45 AM	1	3	0	0	4	0	1	0	0	1	1	2	0	0	3
	8:00 AM	1	1	0	0	2	0	0	0	0	0	1	1	0	0	2
	8:15 AM	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1
	8:30 AM	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1
	8:45 AM	0	1	0	1	2	0	1	0	1	2	0	0	0	0	0
	TOTAL	4	14	0	1	19	0	9	0	1	10	4	5	0	0	9
	AM BEGIN PEAK HR			7:00 AM			0	8	0	0	8					
PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	PM BEGIN PEAK HR			4:45 PM			0	0	0	0	0					

AimTD LLC

TURNING MOVEMENT COUNTS





Tuesday, August 23, 2022 CITY: Upland PROJECT: SC3596

ADT1 Campus north of 15th.

Suhsduhg#e|#Dlp WG#DOF#Whd#:47#586#;;;

AM Period	NB		SB			PM Period	NB		SB		
0:00	12		10			12:00	167		156		
0:15	16		8			12:15	161		136		
0:30	8		12			12:30	138		151		
0:45	13	49	6	36	85	12:45	170	636	175	618	1254
1:00	5		7			13:00	158		149		
1:15	6		11			13:15	137		158		
1:30	6		4			13:30	142		154		
1:45	7	24	9	31	55	13:45	165	602	164	625	1227
2:00	6		4			14:00	161		169		
2:15	6		6			14:15	157		198		
2:30	9		3			14:30	188		186		
2:45	7	28	4	17	45	14:45	207	713	171	724	1437
3:00	6		7			15:00	171		168		
3:15	8		3			15:15	209		171		
3:30	8		7			15:30	166		166		
3:45	13	35	5	22	57	15:45	197	743	187	692	1435
4:00	11		7			16:00	219		149		
4:15	18		9			16:15	212		176		
4:30	17		13			16:30	212		164		
4:45	23	69	16	45	114	16:45	225	868	181	670	1538
5:00	36		21			17:00	248		148		
5:15	40		18			17:15	256		162		
5:30	43		24			17:30	234		155		
5:45	43	162	42	105	267	17:45	201	939	153	618	1557
6:00	55		44			18:00	172		156		
6:15	49		55			18:15	194		168		
6:30	71		62			18:30	151		127		
6:45	104	279	116	277	556	18:45	148	665	134	585	1250
7:00	105		134			19:00	136		142		
7:15	132		159			19:15	138		137		
7:30	174		220			19:30	141		126		
7:45	208	619	187	700	1319	19:45	119	534	113	518	1052
8:00	187		173			20:00	127		120		
8:15	165		163			20:15	101		101		
8:30	153		158			20:30	90		82		
8:45	121	626	153	647	1273	20:45	77	395	93	396	791
9:00	117		139			21:00	71		88		
9:15	125		111			21:15	51		86		
9:30	135		122			21:30	45		58		
9:45	107	484	143	515	999	21:45	64	231	63	295	526
10:00	130		146			22:00	45		54		
10:15	114		136			22:15	32		37		
10:30	121		145			22:30	34		47		
10:45	122	487	150	577	1064	22:45	26	137	39	177	314
11:00	131		129			23:00	28		28		
11:15	120		135			23:15	25		27		
11:30	142		169			23:30	19		20		
11:45	179	572	145	578	1150	23:45	12	84	28	103	187
Total Vol.	3434		3550		**6984**		6547		6021		**12568**

Daily Totals

NB	SB	Combined
9981	9571	**19552**

	AM			PM		
Split %	49.2%	50.8%	**35.7%**	52.1%	47.9%	**64.3%**
Peak Hour	7:30	7:30	**7:30**	16:45	14:00	**16:45**
Volume	734	743	**1477**	963	724	**1609**
P.H.F.	0.88	0.84	**0.93**	0.96	0.91	**0.96**

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Tuesday, August 23, 2022 CITY: Upland PROJECT: SC3596

ADT2 15th east of Campus.

Suhsduhg#e|#Dlp WG#DOF#Whd#:47#586#;;;

AM Period	EB		WB			PM Period	EB		WB		
0:00	1		0			12:00	3		2		
0:15	0		0			12:15	5		3		
0:30	0		0			12:30	6		5		
0:45	0	1	0	0	1	12:45	6	20	5	15	35
1:00	0		1			13:00	7		5		
1:15	1		0			13:15	2		4		
1:30	0		0			13:30	6		5		
1:45	1	2	1	2	4	13:45	5	20	3	17	37
2:00	0		0			14:00	5		5		
2:15	1		0			14:15	3		7		
2:30	0		0			14:30	9		3		
2:45	0	1	0	0	1	14:45	4	21	5	20	41
3:00	0		0			15:00	5		5		
3:15	0		0			15:15	2		3		
3:30	0		1			15:30	6		5		
3:45	1	1	1	2	3	15:45	8	21	1	14	35
4:00	2		1			16:00	8		4		
4:15	0		0			16:15	3		4		
4:30	0		1			16:30	7		2		
4:45	0	2	1	3	5	16:45	0	18	2	12	30
5:00	0		3			17:00	8		1		
5:15	0		3			17:15	2		1		
5:30	0		1			17:30	6		1		
5:45	1	1	0	7	8	17:45	6	22	7	10	32
6:00	0		3			18:00	2		5		
6:15	1		1			18:15	3		2		
6:30	0		4			18:30	1		3		
6:45	3	4	5	13	17	18:45	6	12	5	15	27
7:00	4		3			19:00	3		2		
7:15	2		9			19:15	6		2		
7:30	3		15			19:30	1		1		
7:45	7	16	8	35	51	19:45	5	15	1	6	21
8:00	6		7			20:00	9		4		
8:15	3		5			20:15	5		5		
8:30	6		7			20:30	2		7		
8:45	6	21	2	21	42	20:45	2	18	4	20	38
9:00	3		3			21:00	2		1		
9:15	0		2			21:15	3		2		
9:30	4		4			21:30	2		0		
9:45	2	9	3	12	21	21:45	3	10	2	5	15
10:00	3		3			22:00	4		2		
10:15	1		2			22:15	0		0		
10:30	5		5			22:30	1		0		
10:45	7	16	8	18	34	22:45	1	6	1	3	9
11:00	3		3			23:00	1		0		
11:15	2		2			23:15	0		0		
11:30	0		5			23:30	2		1		
11:45	4	9	6	16	25	23:45	2	5	0	1	6
Total Vol.		83		129	**212**			188		138	**326**

Daily Totals	EB	WB	**Combined**
	271	267	**538**

	AM			**PM**		
Split %	39.2%	60.8%	**39.4%**	57.7%	42.3%	**60.6%**
Peak Hour	7:45	7:15	**7:15**	15:45	13:30	**12:15**
Volume	22	39	**57**	26	20	**42**
P.H.F.	0.79	0.65	**0.79**	0.81	0.71	**0.88**

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Tuesday, August 23, 2022 CITY: Upland PROJECT: SC3596

ADT3 15th west of 13th.

Suhsduhg#e|#Dlp WG#DOF#Whd#:47#586#;;;

AM Period	EB		WB			PM Period	EB		WB		
0:00	0		0			12:00	0		2		
0:15	0		0			12:15	0		0		
0:30	0		1			12:30	1		3		
0:45	0	0	0	1	1	12:45	2	3	2	7	10
1:00	0		0			13:00	0		0		
1:15	0		0			13:15	0		1		
1:30	0		0			13:30	1		3		
1:45	0	0	0	0		13:45	0	1	1	5	6
2:00	0		0			14:00	0		2		
2:15	0		0			14:15	2		3		
2:30	0		0			14:30	0		1		
2:45	0	0	0	0		14:45	1	3	3	9	12
3:00	0		0			15:00	1		0		
3:15	0		0			15:15	0		0		
3:30	0		0			15:30	1		2		
3:45	0	0	0	0		15:45	2	4	2	4	8
4:00	0		0			16:00	0		1		
4:15	0		0			16:15	0		0		
4:30	0		0			16:30	0		1		
4:45	0	0	0	0		16:45	1	1	0	2	3
5:00	0		0			17:00	1		2		
5:15	0		0			17:15	0		0		
5:30	0		0			17:30	2		3		
5:45	0	0	0	0		17:45	0	3	0	5	8
6:00	0		0			18:00	2		0		
6:15	0		0			18:15	2		2		
6:30	1		0			18:30	0		0		
6:45	0	1	0	0	1	18:45	0	4	0	2	6
7:00	1		0			19:00	0		0		
7:15	1		0			19:15	0		0		
7:30	0		2			19:30	0		1		
7:45	1	3	0	2	5	19:45	0	0	1	2	2
8:00	0		0			20:00	1		0		
8:15	0		0			20:15	0		0		
8:30	1		0			20:30	0		1		
8:45	0	1	5	5	6	20:45	0	1	0	1	2
9:00	0		1			21:00	0		0		
9:15	1		1			21:15	0		0		
9:30	0		0			21:30	0		0		
9:45	0	1	0	2	3	21:45	0	0	0	0	
10:00	0		0			22:00	0		0		
10:15	0		5			22:15	0		2		
10:30	1		0			22:30	0		0		
10:45	1	2	2	7	9	22:45	0	0	1	3	3
11:00	0		1			23:00	0		0		
11:15	0		0			23:15	0		0		
11:30	0		1			23:30	0		0		
11:45	0	0	0	2	2	23:45	0	0	0	0	
Total Vol.		8		19	**27**			20		40	**60**

Daily Totals		
EB	WB	**Combined**
28	59	**87**

	AM			**PM**		
Split %	29.6%	70.4%	**31.0%**	33.3%	66.7%	**69.0%**
Peak Hour	6:30	10:15	**10:15**	17:30	13:30	**13:30**
Volume	3	8	**10**	6	9	**12**
P.H.F.	0.75	0.40	**0.50**	0.75	0.75	**0.60**

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APPENDIX 3.2: EXISTING (2022) CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

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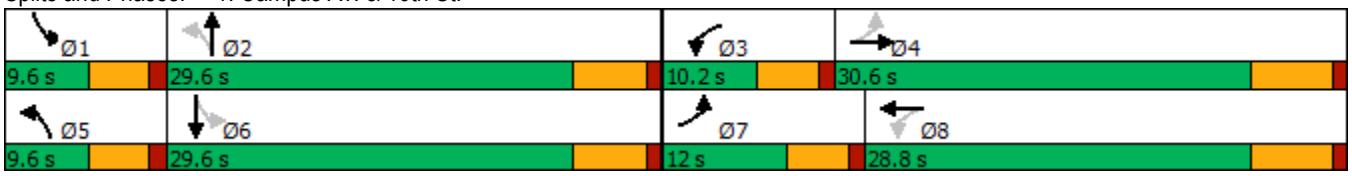
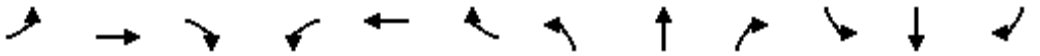
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	160	318	166	533	73	546	51	512
Future Volume (vph)	160	318	166	533	73	546	51	512
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	9.6	28.8	9.6	28.8	9.6	28.4	9.6	28.4
Total Split (s)	12.0	30.6	10.2	28.8	9.6	29.6	9.6	29.6
Total Split (%)	15.0%	38.3%	12.8%	36.0%	12.0%	37.0%	12.0%	37.0%
Yellow Time (s)	3.6	4.8	3.6	4.8	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.8	4.6	5.8	4.6	5.4	4.6	5.4
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 69.8
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Campus Av. & 16th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	318	56	166	533	42	73	546	116	51	512	198
Future Volume (veh/h)	160	318	56	166	533	42	73	546	116	51	512	198
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	174	346	61	180	579	46	79	593	126	55	557	215
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	325	744	130	379	750	59	246	831	176	256	690	266
Arrive On Green	0.11	0.26	0.26	0.08	0.24	0.24	0.06	0.30	0.30	0.05	0.29	0.29
Sat Flow, veh/h	1594	2864	500	1594	3156	250	1594	2755	584	1594	2363	909
Grp Volume(v), veh/h	174	202	205	180	308	317	79	362	357	55	396	376
Grp Sat Flow(s),veh/h/ln	1594	1683	1681	1594	1683	1723	1594	1683	1656	1594	1683	1589
Q Serve(g_s), s	5.4	6.7	6.9	5.6	11.4	11.4	2.3	12.7	12.8	1.6	14.5	14.6
Cycle Q Clear(g_c), s	5.4	6.7	6.9	5.6	11.4	11.4	2.3	12.7	12.8	1.6	14.5	14.6
Prop In Lane	1.00		0.30	1.00		0.15	1.00		0.35	1.00		0.57
Lane Grp Cap(c), veh/h	325	437	436	379	400	410	246	508	500	256	492	464
V/C Ratio(X)	0.54	0.46	0.47	0.47	0.77	0.77	0.32	0.71	0.72	0.21	0.81	0.81
Avail Cap(c_a), veh/h	333	627	626	379	582	595	273	612	602	300	612	578
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	20.7	20.8	17.6	23.7	23.7	16.6	20.7	20.7	16.2	21.8	21.8
Incr Delay (d2), s/veh	0.8	0.8	0.8	0.3	3.8	3.8	0.3	3.1	3.2	0.2	6.4	6.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	2.4	2.5	1.8	4.4	4.5	0.7	4.8	4.8	0.5	5.9	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.2	21.5	21.6	18.0	27.5	27.5	16.9	23.7	23.9	16.4	28.2	28.8
LnGrp LOS	B	C	C	B	C	C	B	C	C	B	C	C
Approach Vol, veh/h		581			805			798			827	
Approach Delay, s/veh		20.5			25.4			23.1			27.7	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	25.5	10.2	23.1	8.4	24.8	11.7	21.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.8	4.6	5.4	4.6	5.8
Max Green Setting (Gmax), s	5.0	24.2	5.6	24.8	5.0	24.2	7.4	23.0
Max Q Clear Time (g_c+I1), s	3.6	14.8	7.6	8.9	4.3	16.6	7.4	13.4
Green Ext Time (p_c), s	0.0	2.9	0.0	1.9	0.0	2.8	0.0	2.4

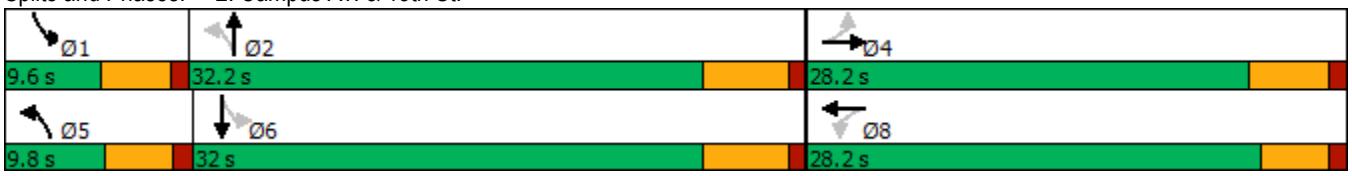
Intersection Summary	
HCM 6th Ctrl Delay	24.5
HCM 6th LOS	C

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	43	7	10	14	48	680	6	706
Future Volume (vph)	43	7	10	14	48	680	6	706
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	28.2	28.2	27.6	27.6	9.6	27.4	9.6	27.4
Total Split (s)	28.2	28.2	28.2	28.2	9.8	32.2	9.6	32.0
Total Split (%)	40.3%	40.3%	40.3%	40.3%	14.0%	46.0%	13.7%	45.7%
Yellow Time (s)	4.2	4.2	3.6	3.6	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	4.6	4.6	4.6	5.4	4.6	5.4
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 40.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Campus Av. & 15th St.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	7	74	10	14	11	48	680	6	6	706	31
Future Volume (veh/h)	43	7	74	10	14	11	48	680	6	6	706	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	47	8	81	11	15	12	53	747	7	7	776	34
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	415	28	279	359	183	146	367	1388	13	348	1182	52
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.06	0.41	0.41	0.01	0.36	0.36
Sat Flow, veh/h	1238	136	1381	1166	905	724	1594	3417	32	1594	3285	144
Grp Volume(v), veh/h	47	0	89	11	0	27	53	368	386	7	398	412
Grp Sat Flow(s),veh/h/ln	1238	0	1517	1166	0	1630	1594	1683	1766	1594	1683	1746
Q Serve(g_s), s	1.3	0.0	2.0	0.3	0.0	0.5	0.8	6.6	6.6	0.1	7.9	7.9
Cycle Q Clear(g_c), s	1.8	0.0	2.0	2.3	0.0	0.5	0.8	6.6	6.6	0.1	7.9	7.9
Prop In Lane	1.00		0.91	1.00		0.44	1.00		0.02	1.00		0.08
Lane Grp Cap(c), veh/h	415	0	307	359	0	329	367	684	717	348	606	628
V/C Ratio(X)	0.11	0.00	0.29	0.03	0.00	0.08	0.14	0.54	0.54	0.02	0.66	0.66
Avail Cap(c_a), veh/h	881	0	878	816	0	968	487	1135	1191	534	1127	1169
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.6	0.0	13.4	14.4	0.0	12.9	7.9	9.0	9.0	8.2	10.7	10.7
Incr Delay (d2), s/veh	0.1	0.0	0.5	0.0	0.0	0.1	0.1	0.7	0.6	0.0	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.6	0.1	0.0	0.2	0.2	1.6	1.7	0.0	2.1	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.7	0.0	14.0	14.4	0.0	13.0	7.9	9.6	9.6	8.2	11.9	11.8
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	B	B
Approach Vol, veh/h		136			38			807			817	
Approach Delay, s/veh		13.9			13.4			9.5			11.8	
Approach LOS		B			B			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.0	21.5		13.2	6.8	19.7		13.2				
Change Period (Y+Rc), s	4.6	5.4		5.2	4.6	5.4		* 5.2				
Max Green Setting (Gmax), s	5.0	26.8		23.0	5.2	26.6		* 24				
Max Q Clear Time (g_c+I1), s	2.1	8.6		4.0	2.8	9.9		4.3				
Green Ext Time (p_c), s	0.0	4.1		0.5	0.0	4.4		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		11.0
HCM 6th LOS		B

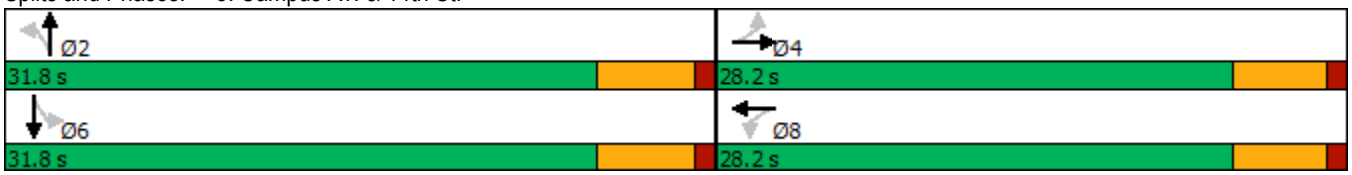
Notes

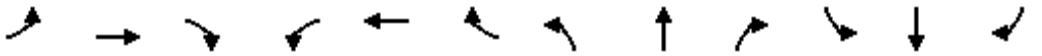
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	49	32	108	34	493	146	588
Future Volume (vph)	34	49	32	108	34	493	146	588
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.2	28.2	28.2	28.2	22.4	22.4	22.4	22.4
Total Split (s)	28.2	28.2	28.2	28.2	31.8	31.8	31.8	31.8
Total Split (%)	47.0%	47.0%	47.0%	47.0%	53.0%	53.0%	53.0%	53.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.4	4.4	4.4	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 41.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Campus Av. & 14th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	49	27	32	108	201	34	493	40	146	588	51
Future Volume (veh/h)	34	49	27	32	108	201	34	493	40	146	588	51
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	38	54	24	36	120	190	38	548	40	162	653	55
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	272	313	139	461	165	262	394	1459	106	440	1439	121
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.46	0.46	0.46	0.46	0.46	0.46
Sat Flow, veh/h	957	1161	516	1180	612	969	662	3181	232	740	3136	264
Grp Volume(v), veh/h	38	0	78	36	0	310	38	290	298	162	350	358
Grp Sat Flow(s),veh/h/ln	957	0	1678	1180	0	1582	662	1683	1729	740	1683	1717
Q Serve(g_s), s	1.5	0.0	1.4	0.9	0.0	7.0	1.6	4.4	4.4	7.2	5.6	5.6
Cycle Q Clear(g_c), s	8.4	0.0	1.4	2.3	0.0	7.0	7.2	4.4	4.4	11.6	5.6	5.6
Prop In Lane	1.00		0.31	1.00		0.61	1.00		0.13	1.00		0.15
Lane Grp Cap(c), veh/h	272	0	453	461	0	427	394	772	793	440	772	788
V/C Ratio(X)	0.14	0.00	0.17	0.08	0.00	0.73	0.10	0.37	0.38	0.37	0.45	0.45
Avail Cap(c_a), veh/h	577	0	987	837	0	931	537	1137	1168	600	1137	1160
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.8	0.0	10.9	11.8	0.0	13.0	9.7	6.9	6.9	10.7	7.2	7.2
Incr Delay (d2), s/veh	0.2	0.0	0.2	0.1	0.0	2.4	0.1	0.3	0.3	0.5	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.4	0.2	0.0	2.3	0.2	1.0	1.0	0.8	1.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.0	0.0	11.1	11.9	0.0	15.3	9.8	7.2	7.2	11.2	7.6	7.6
LnGrp LOS	B	A	B	B	A	B	A	A	A	B	A	A
Approach Vol, veh/h		116			346			626			870	
Approach Delay, s/veh		13.0			15.0			7.4			8.3	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		23.3		15.7		23.3		15.7				
Change Period (Y+Rc), s		5.4		5.2		5.4		5.2				
Max Green Setting (Gmax), s		26.4		23.0		26.4		23.0				
Max Q Clear Time (g_c+I1), s		9.2		10.4		13.6		9.0				
Green Ext Time (p_c), s		3.4		0.4		4.3		1.8				

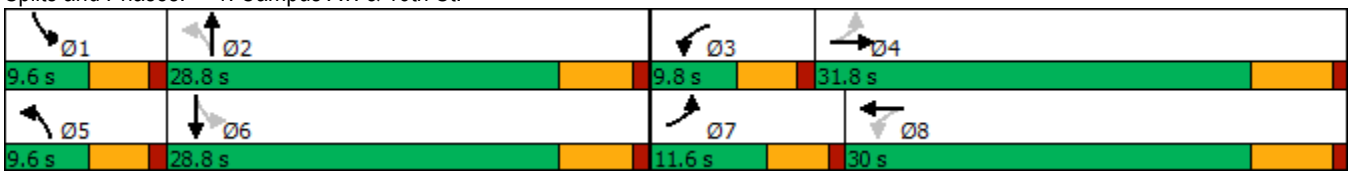
Intersection Summary												
HCM 6th Ctrl Delay			9.5									
HCM 6th LOS			A									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	190	944	99	326	68	627	134	453
Future Volume (vph)	190	944	99	326	68	627	134	453
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	9.6	28.8	9.6	28.8	9.6	28.4	9.6	28.4
Total Split (s)	11.6	31.8	9.8	30.0	9.6	28.8	9.6	28.8
Total Split (%)	14.5%	39.8%	12.3%	37.5%	12.0%	36.0%	12.0%	36.0%
Yellow Time (s)	3.6	4.8	3.6	4.8	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.8	4.6	5.8	4.6	5.4	4.6	5.4
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 77.3
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Campus Av. & 16th St.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	944	82	99	326	71	68	627	274	134	453	171
Future Volume (veh/h)	190	944	82	99	326	71	68	627	274	134	453	171
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	194	963	84	101	333	72	69	640	280	137	462	174
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	407	1020	89	200	826	176	268	666	291	199	735	274
Arrive On Green	0.09	0.33	0.33	0.06	0.30	0.30	0.05	0.29	0.29	0.06	0.31	0.31
Sat Flow, veh/h	1594	3129	273	1594	2760	589	1594	2267	991	1594	2388	892
Grp Volume(v), veh/h	194	518	529	101	201	204	69	475	445	137	324	312
Grp Sat Flow(s),veh/h/ln	1594	1683	1718	1594	1683	1666	1594	1683	1575	1594	1683	1597
Q Serve(g_s), s	6.8	23.9	23.9	3.4	7.6	7.8	2.4	22.1	22.1	4.8	13.2	13.4
Cycle Q Clear(g_c), s	6.8	23.9	23.9	3.4	7.6	7.8	2.4	22.1	22.1	4.8	13.2	13.4
Prop In Lane	1.00		0.16	1.00		0.35	1.00		0.63	1.00		0.56
Lane Grp Cap(c), veh/h	407	549	560	200	504	498	268	495	463	199	518	491
V/C Ratio(X)	0.48	0.94	0.94	0.50	0.40	0.41	0.26	0.96	0.96	0.69	0.63	0.63
Avail Cap(c_a), veh/h	407	550	561	207	512	506	290	495	463	199	518	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	26.1	26.1	20.8	22.2	22.3	19.0	27.7	27.7	21.4	23.6	23.7
Incr Delay (d2), s/veh	0.3	25.2	24.9	0.7	0.5	0.5	0.2	30.6	31.9	8.0	2.4	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	12.3	12.5	1.2	2.8	2.8	0.8	12.3	11.7	2.1	5.2	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.8	51.3	51.0	21.6	22.7	22.8	19.2	58.2	59.6	29.4	26.0	26.4
LnGrp LOS	B	D	D	C	C	C	B	E	E	C	C	C
Approach Vol, veh/h		1241			506			989			773	
Approach Delay, s/veh		46.0			22.5			56.1			26.8	
Approach LOS		D			C			E			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	28.8	9.5	31.8	8.5	29.9	11.6	29.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.8	4.6	5.4	4.6	5.8
Max Green Setting (Gmax), s	5.0	23.4	5.2	26.0	5.0	23.4	7.0	24.2
Max Q Clear Time (g_c+I1), s	6.8	24.1	5.4	25.9	4.4	15.4	8.8	9.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.1	0.0	2.3	0.0	1.8

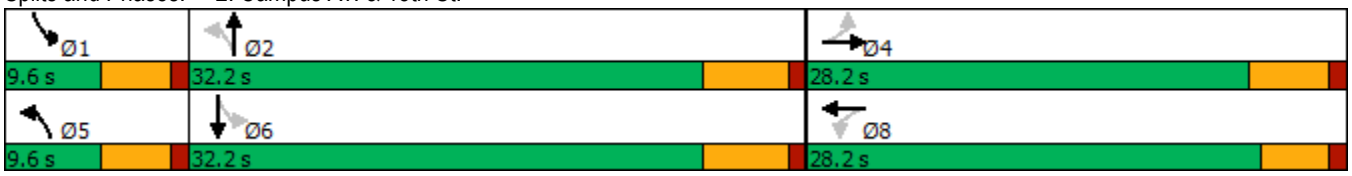
Intersection Summary	
HCM 6th Ctrl Delay	41.2
HCM 6th LOS	D

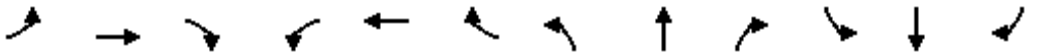
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	121	6	1	0	25	838	6	609
Future Volume (vph)	121	6	1	0	25	838	6	609
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	28.2	28.2	27.6	27.6	9.6	27.4	9.6	27.4
Total Split (s)	28.2	28.2	28.2	28.2	9.6	32.2	9.6	32.2
Total Split (%)	40.3%	40.3%	40.3%	40.3%	13.7%	46.0%	13.7%	46.0%
Yellow Time (s)	4.2	4.2	3.6	3.6	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	4.6	4.6	4.6	5.4	4.6	5.4
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 39.8
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Campus Av. & 15th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	6	43	1	0	4	25	838	4	6	609	31
Future Volume (veh/h)	121	6	43	1	0	4	25	838	4	6	609	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	126	6	45	1	0	4	26	873	4	6	634	32
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	461	39	295	418	0	333	375	1316	6	294	1173	59
Arrive On Green	0.22	0.22	0.22	0.22	0.00	0.22	0.03	0.38	0.38	0.01	0.36	0.36
Sat Flow, veh/h	1264	177	1329	1208	0	1502	1594	3437	16	1594	3261	164
Grp Volume(v), veh/h	126	0	51	1	0	4	26	428	449	6	327	339
Grp Sat Flow(s),veh/h/ln	1264	0	1506	1208	0	1502	1594	1683	1769	1594	1683	1742
Q Serve(g_s), s	3.4	0.0	1.1	0.0	0.0	0.1	0.4	8.2	8.2	0.1	6.1	6.1
Cycle Q Clear(g_c), s	3.5	0.0	1.1	1.1	0.0	0.1	0.4	8.2	8.2	0.1	6.1	6.1
Prop In Lane	1.00		0.88	1.00		1.00	1.00		0.01	1.00		0.09
Lane Grp Cap(c), veh/h	461	0	334	418	0	333	375	645	677	294	605	627
V/C Ratio(X)	0.27	0.00	0.15	0.00	0.00	0.01	0.07	0.66	0.66	0.02	0.54	0.54
Avail Cap(c_a), veh/h	921	0	882	877	0	903	528	1149	1208	484	1149	1189
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	0.0	12.3	12.7	0.0	11.9	7.9	10.0	10.0	8.6	10.0	10.0
Incr Delay (d2), s/veh	0.3	0.0	0.2	0.0	0.0	0.0	0.0	1.2	1.1	0.0	0.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.3	0.0	0.0	0.0	0.1	2.2	2.3	0.0	1.6	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.6	0.0	12.5	12.7	0.0	11.9	7.9	11.2	11.1	8.6	10.7	10.7
LnGrp LOS	B	A	B	B	A	B	A	B	B	A	B	B
Approach Vol, veh/h		177			5			903			672	
Approach Delay, s/veh		13.3			12.1			11.1			10.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.9	20.4		13.9	5.8	19.5		13.9				
Change Period (Y+Rc), s	4.6	5.4		5.2	4.6	5.4		* 5.2				
Max Green Setting (Gmax), s	5.0	26.8		23.0	5.0	26.8		* 24				
Max Q Clear Time (g_c+I1), s	2.1	10.2		5.5	2.4	8.1		3.1				
Green Ext Time (p_c), s	0.0	4.8		0.6	0.0	3.6		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		11.2	
HCM 6th LOS		B	

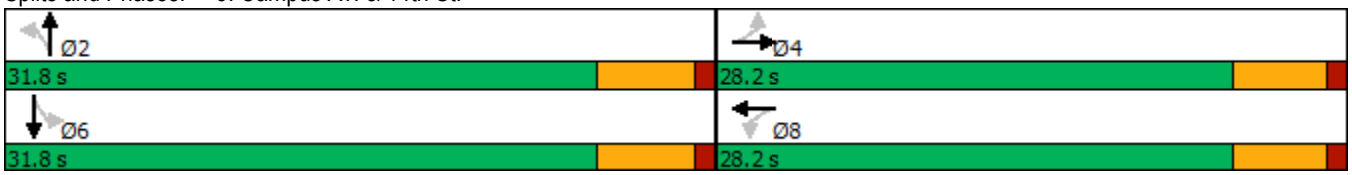
Notes

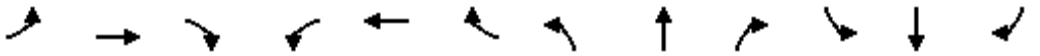
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	51	90	24	66	18	687	119	502
Future Volume (vph)	51	90	24	66	18	687	119	502
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.2	28.2	28.2	28.2	22.4	22.4	22.4	22.4
Total Split (s)	28.2	28.2	28.2	28.2	31.8	31.8	31.8	31.8
Total Split (%)	47.0%	47.0%	47.0%	47.0%	53.0%	53.0%	53.0%	53.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.4	4.4	4.4	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 37.3
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Campus Av. & 14th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	90	28	24	66	142	18	687	49	119	502	29
Future Volume (veh/h)	51	90	28	24	66	142	18	687	49	119	502	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	54	96	25	26	70	119	19	731	48	127	534	29
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	340	323	84	399	141	240	476	1524	100	392	1546	84
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	1069	1350	352	1136	589	1002	758	3202	210	620	3247	176
Grp Volume(v), veh/h	54	0	121	26	0	189	19	384	395	127	276	287
Grp Sat Flow(s),veh/h/ln	1069	0	1702	1136	0	1592	758	1683	1729	620	1683	1740
Q Serve(g_s), s	1.7	0.0	2.2	0.7	0.0	3.8	0.6	5.8	5.8	6.5	3.8	3.8
Cycle Q Clear(g_c), s	5.5	0.0	2.2	2.9	0.0	3.8	4.4	5.8	5.8	12.3	3.8	3.8
Prop In Lane	1.00		0.21	1.00		0.63	1.00		0.12	1.00		0.10
Lane Grp Cap(c), veh/h	340	0	408	399	0	381	476	801	823	392	801	828
V/C Ratio(X)	0.16	0.00	0.30	0.07	0.00	0.50	0.04	0.48	0.48	0.32	0.34	0.35
Avail Cap(c_a), veh/h	744	0	1051	829	0	983	652	1193	1225	537	1193	1234
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.6	0.0	11.6	12.8	0.0	12.2	7.5	6.6	6.6	10.8	6.1	6.1
Incr Delay (d2), s/veh	0.2	0.0	0.4	0.1	0.0	1.0	0.0	0.4	0.4	0.5	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.7	0.2	0.0	1.2	0.1	1.1	1.2	0.6	0.7	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	0.0	12.0	12.8	0.0	13.2	7.6	7.1	7.1	11.3	6.4	6.4
LnGrp LOS	B	A	B	B	A	B	A	A	A	B	A	A
Approach Vol, veh/h		175			215			798			690	
Approach Delay, s/veh		12.9			13.2			7.1			7.3	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		23.1		14.1		23.1		14.1				
Change Period (Y+Rc), s		5.4		5.2		5.4		5.2				
Max Green Setting (Gmax), s		26.4		23.0		26.4		23.0				
Max Q Clear Time (g_c+I1), s		7.8		7.5		14.3		5.8				
Green Ext Time (p_c), s		4.5		0.7		3.4		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			8.4									
HCM 6th LOS			A									

APPENDIX 5.1: OPENING YEAR CUMULATIVE (2025) WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

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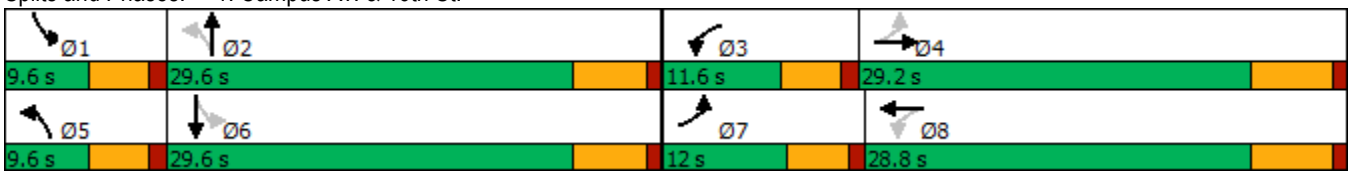
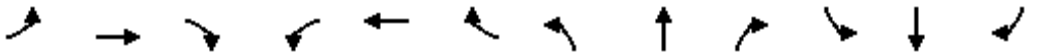
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	170	337	185	566	85	596	54	565
Future Volume (vph)	170	337	185	566	85	596	54	565
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	9.6	28.8	9.6	28.8	9.6	28.4	9.6	28.4
Total Split (s)	12.0	29.2	11.6	28.8	9.6	29.6	9.6	29.6
Total Split (%)	15.0%	36.5%	14.5%	36.0%	12.0%	37.0%	12.0%	37.0%
Yellow Time (s)	3.6	4.8	3.6	4.8	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.8	4.6	5.8	4.6	5.4	4.6	5.4
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 72.2
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Campus Av. & 16th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	337	68	185	566	45	85	596	131	54	565	210
Future Volume (veh/h)	170	337	68	185	566	45	85	596	131	54	565	210
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	185	366	74	201	615	49	92	648	142	59	614	228
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	311	699	140	375	771	61	232	857	188	241	723	268
Arrive On Green	0.10	0.25	0.25	0.10	0.24	0.24	0.06	0.31	0.31	0.05	0.30	0.30
Sat Flow, veh/h	1594	2794	559	1594	3155	251	1594	2737	599	1594	2390	887
Grp Volume(v), veh/h	185	219	221	201	328	336	92	398	392	59	432	410
Grp Sat Flow(s),veh/h/ln	1594	1683	1670	1594	1683	1723	1594	1683	1653	1594	1683	1594
Q Serve(g_s), s	6.0	7.9	8.1	6.7	12.9	12.9	2.8	15.0	15.1	1.8	17.0	17.0
Cycle Q Clear(g_c), s	6.0	7.9	8.1	6.7	12.9	12.9	2.8	15.0	15.1	1.8	17.0	17.0
Prop In Lane	1.00		0.33	1.00		0.15	1.00		0.36	1.00		0.56
Lane Grp Cap(c), veh/h	311	421	418	375	411	421	232	527	518	241	509	482
V/C Ratio(X)	0.59	0.52	0.53	0.54	0.80	0.80	0.40	0.76	0.76	0.25	0.85	0.85
Avail Cap(c_a), veh/h	311	558	554	375	549	561	251	577	567	276	577	546
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.5	22.8	22.9	17.9	25.0	25.0	17.7	21.8	21.8	17.0	23.1	23.1
Incr Delay (d2), s/veh	2.1	1.0	1.0	0.8	5.9	5.9	0.4	5.2	5.3	0.2	10.4	11.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	2.9	3.0	2.2	5.3	5.4	0.9	6.0	6.0	0.6	7.5	7.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.6	23.8	23.9	18.8	31.0	31.0	18.1	27.0	27.2	17.2	33.5	34.2
LnGrp LOS	C	C	C	B	C	C	B	C	C	B	C	C
Approach Vol, veh/h		625			865			882			901	
Approach Delay, s/veh		22.9			28.1			26.1			32.7	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	27.5	11.6	23.4	8.8	26.8	12.0	23.0
Change Period (Y+Rc), s	4.6	5.4	4.6	5.8	4.6	5.4	4.6	5.8
Max Green Setting (Gmax), s	5.0	24.2	7.0	23.4	5.0	24.2	7.4	23.0
Max Q Clear Time (g_c+I1), s	3.8	17.1	8.7	10.1	4.8	19.0	8.0	14.9
Green Ext Time (p_c), s	0.0	2.7	0.0	1.9	0.0	2.3	0.0	2.3

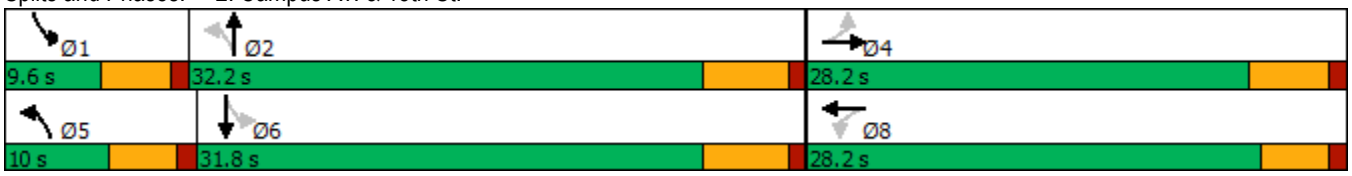
Intersection Summary	
HCM 6th Ctrl Delay	27.9
HCM 6th LOS	C

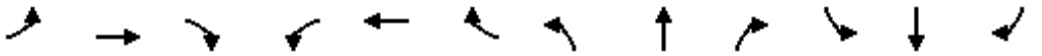
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	46	7	11	15	59	756	6	789
Future Volume (vph)	46	7	11	15	59	756	6	789
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	28.2	28.2	27.6	27.6	9.6	27.4	9.6	27.4
Total Split (s)	28.2	28.2	28.2	28.2	10.0	32.2	9.6	31.8
Total Split (%)	40.3%	40.3%	40.3%	40.3%	14.3%	46.0%	13.7%	45.4%
Yellow Time (s)	4.2	4.2	3.6	3.6	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	4.6	4.6	4.6	5.4	4.6	5.4
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 45.1
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Campus Av. & 15th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	7	88	11	15	12	59	756	6	6	789	33
Future Volume (veh/h)	46	7	88	11	15	12	59	756	6	6	789	33
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	51	8	97	12	16	13	65	831	7	7	867	36
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	401	23	284	333	182	148	355	1481	12	330	1250	52
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.06	0.43	0.43	0.01	0.38	0.38
Sat Flow, veh/h	1236	115	1398	1150	898	730	1594	3421	29	1594	3293	137
Grp Volume(v), veh/h	51	0	105	12	0	29	65	409	429	7	443	460
Grp Sat Flow(s),veh/h/ln	1236	0	1514	1150	0	1628	1594	1683	1767	1594	1683	1747
Q Serve(g_s), s	1.5	0.0	2.5	0.4	0.0	0.6	1.0	7.8	7.8	0.1	9.5	9.5
Cycle Q Clear(g_c), s	2.1	0.0	2.5	2.9	0.0	0.6	1.0	7.8	7.8	0.1	9.5	9.5
Prop In Lane	1.00		0.92	1.00		0.45	1.00		0.02	1.00		0.08
Lane Grp Cap(c), veh/h	401	0	307	333	0	331	355	729	765	330	639	663
V/C Ratio(X)	0.13	0.00	0.34	0.04	0.00	0.09	0.18	0.56	0.56	0.02	0.69	0.69
Avail Cap(c_a), veh/h	813	0	812	733	0	897	456	1053	1105	501	1037	1076
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.7	0.0	14.6	15.9	0.0	13.9	8.1	9.1	9.1	8.4	11.2	11.2
Incr Delay (d2), s/veh	0.1	0.0	0.7	0.0	0.0	0.1	0.1	0.7	0.6	0.0	1.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.8	0.1	0.0	0.2	0.2	2.0	2.1	0.0	2.7	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.9	0.0	15.3	15.9	0.0	14.0	8.2	9.8	9.7	8.4	12.6	12.5
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	B	B
Approach Vol, veh/h		156			41			903			910	
Approach Delay, s/veh		15.1			14.5			9.7			12.5	
Approach LOS		B			B			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.0	24.0		13.9	7.3	21.7		13.9				
Change Period (Y+Rc), s	4.6	5.4		5.2	4.6	5.4		* 5.2				
Max Green Setting (Gmax), s	5.0	26.8		23.0	5.4	26.4		* 24				
Max Q Clear Time (g_c+I1), s	2.1	9.8		4.5	3.0	11.5		4.9				
Green Ext Time (p_c), s	0.0	4.6		0.6	0.0	4.7		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		11.5
HCM 6th LOS		B

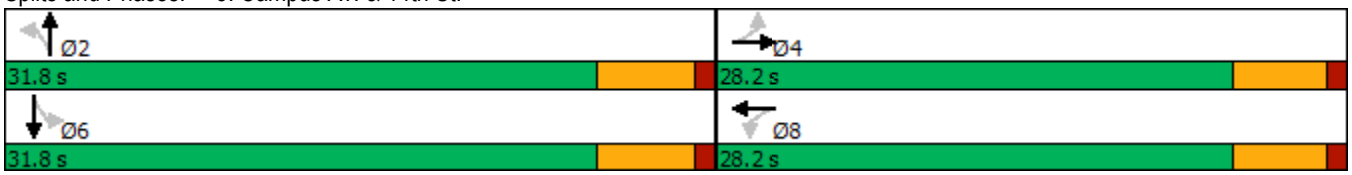
Notes

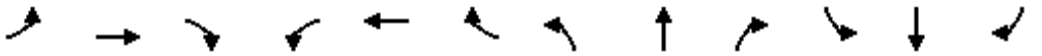
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	36	52	34	115	44	565	155	673
Future Volume (vph)	36	52	34	115	44	565	155	673
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.2	28.2	28.2	28.2	22.4	22.4	22.4	22.4
Total Split (s)	28.2	28.2	28.2	28.2	31.8	31.8	31.8	31.8
Total Split (%)	47.0%	47.0%	47.0%	47.0%	53.0%	53.0%	53.0%	53.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.4	4.4	4.4	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 44.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Campus Av. & 14th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	52	38	34	115	213	44	565	42	155	673	54
Future Volume (veh/h)	36	52	38	34	115	213	44	565	42	155	673	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	40	58	36	38	128	204	49	628	43	172	748	58
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	243	283	176	435	169	270	358	1540	105	407	1523	118
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	938	1022	634	1163	610	972	604	3196	219	685	3159	245
Grp Volume(v), veh/h	40	0	94	38	0	332	49	330	341	172	398	408
Grp Sat Flow(s),veh/h/ln	938	0	1656	1163	0	1581	604	1683	1731	685	1683	1721
Q Serve(g_s), s	1.8	0.0	1.9	1.1	0.0	8.5	2.6	5.6	5.6	9.5	7.1	7.1
Cycle Q Clear(g_c), s	10.3	0.0	1.9	3.1	0.0	8.5	9.7	5.6	5.6	15.1	7.1	7.1
Prop In Lane	1.00		0.38	1.00		0.61	1.00		0.13	1.00		0.14
Lane Grp Cap(c), veh/h	243	0	459	435	0	439	358	811	835	407	811	829
V/C Ratio(X)	0.16	0.00	0.20	0.09	0.00	0.76	0.14	0.41	0.41	0.42	0.49	0.49
Avail Cap(c_a), veh/h	473	0	865	720	0	826	429	1009	1038	487	1009	1031
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.2	0.0	12.2	13.4	0.0	14.6	11.0	7.4	7.4	12.2	7.7	7.7
Incr Delay (d2), s/veh	0.3	0.0	0.2	0.1	0.0	2.7	0.2	0.3	0.3	0.7	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.6	0.3	0.0	2.9	0.3	1.3	1.3	1.1	1.7	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.6	0.0	12.4	13.4	0.0	17.3	11.2	7.7	7.7	12.9	8.2	8.2
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		134			370			720			978	
Approach Delay, s/veh		14.5			16.9			7.9			9.0	
Approach LOS		B			B			A			A	

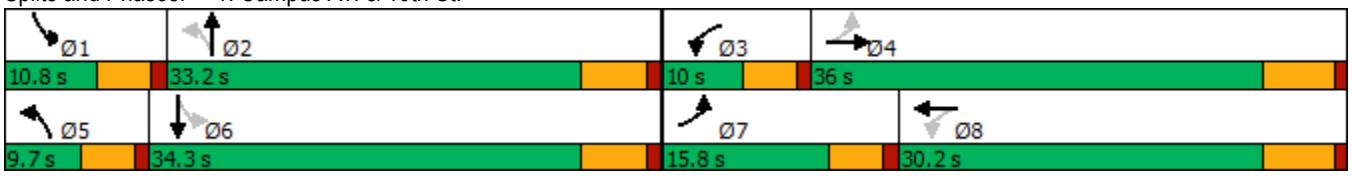
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		26.6		17.4		26.6		17.4				
Change Period (Y+Rc), s		5.4		5.2		5.4		5.2				
Max Green Setting (Gmax), s		26.4		23.0		26.4		23.0				
Max Q Clear Time (g_c+I1), s		11.7		12.3		17.1		10.5				
Green Ext Time (p_c), s		3.8		0.4		4.1		1.9				

Intersection Summary												
HCM 6th Ctrl Delay			10.3									
HCM 6th LOS			B									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	202	1002	120	346	86	697	142	514
Future Volume (vph)	202	1002	120	346	86	697	142	514
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	9.6	28.8	9.6	28.8	9.6	28.4	9.6	28.4
Total Split (s)	15.8	36.0	10.0	30.2	9.7	33.2	10.8	34.3
Total Split (%)	17.6%	40.0%	11.1%	33.6%	10.8%	36.9%	12.0%	38.1%
Yellow Time (s)	3.6	4.8	3.6	4.8	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.8	4.6	5.8	4.6	5.4	4.6	5.4
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Campus Av. & 16th St.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	1002	102	120	346	75	86	697	305	142	514	181
Future Volume (veh/h)	202	1002	102	120	346	75	86	697	305	142	514	181
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	206	1022	104	122	353	77	88	711	311	145	524	185
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	408	1034	105	178	790	170	256	700	306	190	790	278
Arrive On Green	0.11	0.34	0.34	0.06	0.29	0.29	0.05	0.31	0.31	0.07	0.32	0.32
Sat Flow, veh/h	1594	3080	313	1594	2754	594	1594	2267	991	1594	2433	855
Grp Volume(v), veh/h	206	558	568	122	214	216	88	528	494	145	362	347
Grp Sat Flow(s),veh/h/ln	1594	1683	1710	1594	1683	1665	1594	1683	1575	1594	1683	1604
Q Serve(g_s), s	7.8	29.7	29.7	4.9	9.4	9.6	3.4	27.8	27.8	5.6	16.6	16.8
Cycle Q Clear(g_c), s	7.8	29.7	29.7	4.9	9.4	9.6	3.4	27.8	27.8	5.6	16.6	16.8
Prop In Lane	1.00		0.18	1.00		0.36	1.00		0.63	1.00		0.53
Lane Grp Cap(c), veh/h	408	565	574	178	483	477	256	520	486	190	547	521
V/C Ratio(X)	0.50	0.99	0.99	0.69	0.44	0.45	0.34	1.02	1.02	0.76	0.66	0.67
Avail Cap(c_a), veh/h	433	565	574	178	483	477	262	520	486	190	547	521
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.6	29.7	29.7	24.5	26.2	26.3	20.9	31.1	31.1	23.5	26.1	26.2
Incr Delay (d2), s/veh	0.4	34.8	34.7	8.7	0.6	0.7	0.3	43.4	44.8	15.2	3.0	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	16.3	16.6	2.1	3.6	3.6	1.2	16.7	15.9	2.7	6.7	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	64.5	64.4	33.2	26.9	27.0	21.2	74.5	75.9	38.7	29.1	29.4
LnGrp LOS	B	E	E	C	C	C	C	F	F	D	C	C
Approach Vol, veh/h		1332			552			1110			854	
Approach Delay, s/veh		57.4			28.3			70.9			30.8	
Approach LOS		E			C			E			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	33.2	10.0	36.0	9.4	34.6	14.4	31.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.8	4.6	5.4	4.6	5.8
Max Green Setting (Gmax), s	6.2	27.8	5.4	30.2	5.1	28.9	11.2	24.4
Max Q Clear Time (g_c+I1), s	7.6	29.8	6.9	31.7	5.4	18.8	9.8	11.6
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.0	0.0	1.8

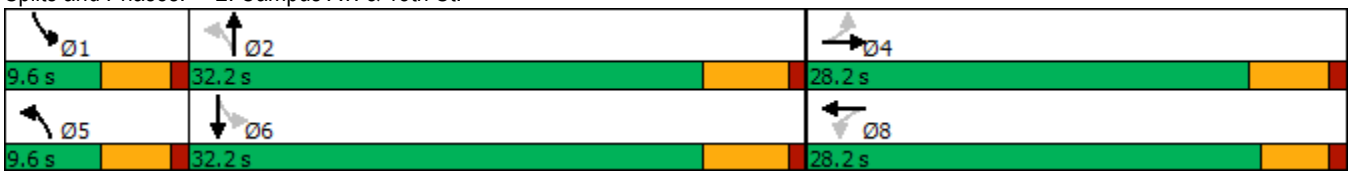
Intersection Summary	
HCM 6th Ctrl Delay	51.2
HCM 6th LOS	D

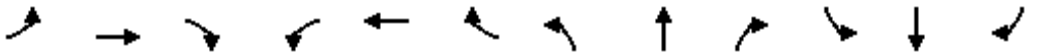
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	128	6	1	0	41	949	6	709
Future Volume (vph)	128	6	1	0	41	949	6	709
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	28.2	28.2	27.6	27.6	9.6	27.4	9.6	27.4
Total Split (s)	28.2	28.2	28.2	28.2	9.6	32.2	9.6	32.2
Total Split (%)	40.3%	40.3%	40.3%	40.3%	13.7%	46.0%	13.7%	46.0%
Yellow Time (s)	4.2	4.2	3.6	3.6	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	4.6	4.6	4.6	5.4	4.6	5.4
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 43
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Campus Av. & 15th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	128	6	61	1	0	4	41	949	4	6	709	33
Future Volume (veh/h)	128	6	61	1	0	4	41	949	4	6	709	33
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	133	6	64	1	0	4	43	989	4	6	739	34
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	446	28	301	387	0	330	364	1413	6	272	1219	56
Arrive On Green	0.22	0.22	0.22	0.22	0.00	0.22	0.05	0.41	0.41	0.01	0.37	0.37
Sat Flow, veh/h	1264	128	1369	1188	0	1502	1594	3439	14	1594	3277	151
Grp Volume(v), veh/h	133	0	70	1	0	4	43	484	509	6	379	394
Grp Sat Flow(s),veh/h/ln	1264	0	1497	1188	0	1502	1594	1683	1769	1594	1683	1745
Q Serve(g_s), s	3.9	0.0	1.6	0.0	0.0	0.1	0.7	10.0	10.0	0.1	7.7	7.7
Cycle Q Clear(g_c), s	4.0	0.0	1.6	1.6	0.0	0.1	0.7	10.0	10.0	0.1	7.7	7.7
Prop In Lane	1.00		0.91	1.00		1.00	1.00		0.01	1.00		0.09
Lane Grp Cap(c), veh/h	446	0	329	387	0	330	364	691	727	272	626	649
V/C Ratio(X)	0.30	0.00	0.21	0.00	0.00	0.01	0.12	0.70	0.70	0.02	0.61	0.61
Avail Cap(c_a), veh/h	860	0	819	793	0	843	479	1073	1128	449	1073	1112
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.4	0.0	13.4	14.1	0.0	12.8	8.1	10.2	10.2	9.0	10.7	10.7
Incr Delay (d2), s/veh	0.4	0.0	0.3	0.0	0.0	0.0	0.1	1.3	1.2	0.0	1.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.5	0.0	0.0	0.0	0.2	2.6	2.8	0.0	2.1	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	0.0	13.7	14.1	0.0	12.9	8.1	11.5	11.5	9.0	11.7	11.6
LnGrp LOS	B	A	B	B	A	B	A	B	B	A	B	B
Approach Vol, veh/h		203			5			1036			779	
Approach Delay, s/veh		14.4			13.1			11.4			11.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.9	22.7		14.4	6.6	21.0		14.4				
Change Period (Y+Rc), s	4.6	5.4		5.2	4.6	5.4		* 5.2				
Max Green Setting (Gmax), s	5.0	26.8		23.0	5.0	26.8		* 24				
Max Q Clear Time (g_c+I1), s	2.1	12.0		6.0	2.7	9.7		3.6				
Green Ext Time (p_c), s	0.0	5.3		0.7	0.0	4.2		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		11.8	
HCM 6th LOS		B	

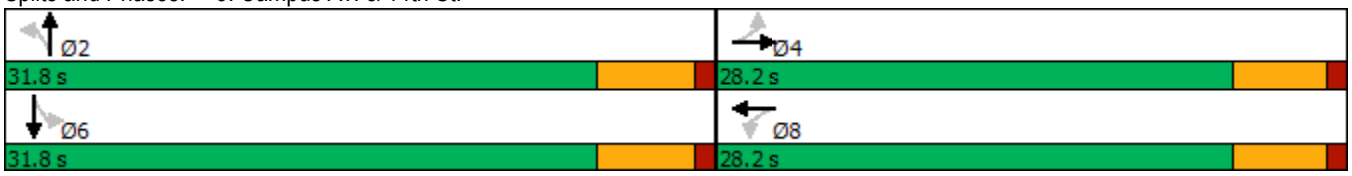
Notes

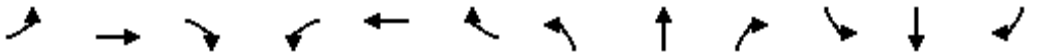
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	54	96	25	70	33	803	126	611
Future Volume (vph)	54	96	25	70	33	803	126	611
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.2	28.2	28.2	28.2	22.4	22.4	22.4	22.4
Total Split (s)	28.2	28.2	28.2	28.2	31.8	31.8	31.8	31.8
Total Split (%)	47.0%	47.0%	47.0%	47.0%	53.0%	53.0%	53.0%	53.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.4	4.4	4.4	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 42.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Campus Av. & 14th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	96	45	25	70	151	33	803	52	126	611	31
Future Volume (veh/h)	54	96	45	25	70	151	33	803	52	126	611	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	57	102	43	27	74	129	35	854	51	134	650	31
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	293	265	112	344	131	228	445	1665	99	364	1690	81
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.52	0.52	0.52	0.52	0.52	0.52
Sat Flow, veh/h	1055	1177	496	1111	580	1010	679	3223	192	551	3271	156
Grp Volume(v), veh/h	57	0	145	27	0	203	35	446	459	134	334	347
Grp Sat Flow(s),veh/h/ln	1055	0	1673	1111	0	1590	679	1683	1732	551	1683	1744
Q Serve(g_s), s	2.1	0.0	3.0	0.9	0.0	4.7	1.3	7.2	7.2	8.7	4.9	4.9
Cycle Q Clear(g_c), s	6.7	0.0	3.0	3.9	0.0	4.7	6.3	7.2	7.2	15.9	4.9	4.9
Prop In Lane	1.00		0.30	1.00		0.64	1.00		0.11	1.00		0.09
Lane Grp Cap(c), veh/h	293	0	377	344	0	359	445	870	895	364	870	901
V/C Ratio(X)	0.19	0.00	0.38	0.08	0.00	0.57	0.08	0.51	0.51	0.37	0.38	0.38
Avail Cap(c_a), veh/h	645	0	936	715	0	889	530	1080	1112	433	1080	1119
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.1	0.0	13.5	15.2	0.0	14.1	7.9	6.5	6.5	11.7	6.0	6.0
Incr Delay (d2), s/veh	0.3	0.0	0.6	0.1	0.0	1.4	0.1	0.5	0.5	0.6	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.0	0.2	0.0	1.6	0.1	1.4	1.5	0.8	1.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.5	0.0	14.1	15.3	0.0	15.5	8.0	7.0	7.0	12.4	6.3	6.3
LnGrp LOS	B	A	B	B	A	B	A	A	A	B	A	A
Approach Vol, veh/h		202			230			940			815	
Approach Delay, s/veh		15.1			15.5			7.0			7.3	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		26.7		14.5		26.7		14.5				
Change Period (Y+Rc), s		5.4		5.2		5.4		5.2				
Max Green Setting (Gmax), s		26.4		23.0		26.4		23.0				
Max Q Clear Time (g_c+I1), s		9.2		8.7		17.9		6.7				
Green Ext Time (p_c), s		5.4		0.8		3.4		1.2				

Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									

APPENDIX 5.2: OPENING YEAR CUMULATIVE (2025) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

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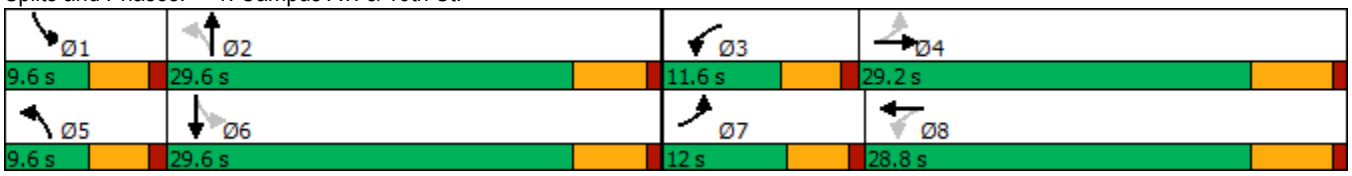
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	170	337	186	566	87	606	54	569
Future Volume (vph)	170	337	186	566	87	606	54	569
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	9.6	28.8	9.6	28.8	9.6	28.4	9.6	28.4
Total Split (s)	12.0	29.2	11.6	28.8	9.6	29.6	9.6	29.6
Total Split (%)	15.0%	36.5%	14.5%	36.0%	12.0%	37.0%	12.0%	37.0%
Yellow Time (s)	3.6	4.8	3.6	4.8	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.8	4.6	5.8	4.6	5.4	4.6	5.4
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 72.3
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Campus Av. & 16th St.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	337	69	186	566	45	87	606	134	54	569	210
Future Volume (veh/h)	170	337	69	186	566	45	87	606	134	54	569	210
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	185	366	75	202	615	49	95	659	146	59	618	228
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	310	696	141	374	770	61	232	859	190	237	726	268
Arrive On Green	0.10	0.25	0.25	0.10	0.24	0.24	0.06	0.31	0.31	0.05	0.30	0.30
Sat Flow, veh/h	1594	2787	565	1594	3155	251	1594	2731	604	1594	2395	883
Grp Volume(v), veh/h	185	220	221	202	328	336	95	406	399	59	434	412
Grp Sat Flow(s),veh/h/ln	1594	1683	1669	1594	1683	1723	1594	1683	1652	1594	1683	1594
Q Serve(g_s), s	6.1	8.0	8.1	6.7	12.9	13.0	2.9	15.4	15.5	1.8	17.1	17.2
Cycle Q Clear(g_c), s	6.1	8.0	8.1	6.7	12.9	13.0	2.9	15.4	15.5	1.8	17.1	17.2
Prop In Lane	1.00		0.34	1.00		0.15	1.00		0.37	1.00		0.55
Lane Grp Cap(c), veh/h	310	421	417	374	411	421	232	529	519	237	510	483
V/C Ratio(X)	0.60	0.52	0.53	0.54	0.80	0.80	0.41	0.77	0.77	0.25	0.85	0.85
Avail Cap(c_a), veh/h	310	557	552	374	547	560	250	576	565	272	576	545
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.6	22.9	23.0	18.0	25.1	25.1	17.8	21.9	21.9	17.1	23.1	23.2
Incr Delay (d2), s/veh	2.2	1.0	1.1	0.9	6.0	6.0	0.4	5.7	5.9	0.2	10.7	11.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	2.9	3.0	2.2	5.3	5.4	1.0	6.3	6.2	0.6	7.6	7.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.8	23.9	24.0	18.9	31.1	31.1	18.2	27.6	27.8	17.3	33.8	34.5
LnGrp LOS	C	C	C	B	C	C	B	C	C	B	C	C
Approach Vol, veh/h		626			866			900			905	
Approach Delay, s/veh		23.0			28.2			26.7			33.0	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	27.6	11.6	23.5	8.8	26.8	12.0	23.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.8	4.6	5.4	4.6	5.8
Max Green Setting (Gmax), s	5.0	24.2	7.0	23.4	5.0	24.2	7.4	23.0
Max Q Clear Time (g_c+I1), s	3.8	17.5	8.7	10.1	4.9	19.2	8.1	15.0
Green Ext Time (p_c), s	0.0	2.6	0.0	1.9	0.0	2.2	0.0	2.3

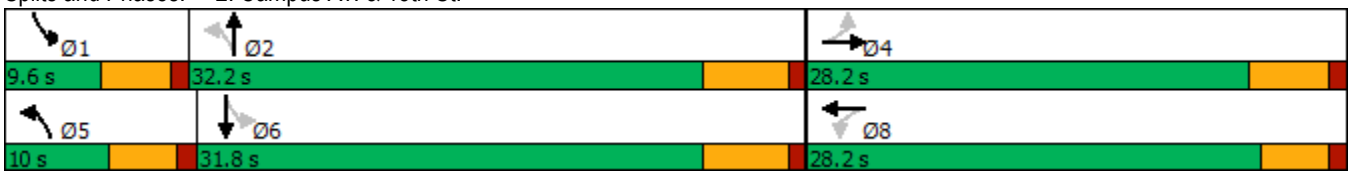
Intersection Summary	
HCM 6th Ctrl Delay	28.1
HCM 6th LOS	C

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	46	7	11	15	61	771	6	794
Future Volume (vph)	46	7	11	15	61	771	6	794
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	28.2	28.2	27.6	27.6	9.6	27.4	9.6	27.4
Total Split (s)	28.2	28.2	28.2	28.2	10.0	32.2	9.6	31.8
Total Split (%)	40.3%	40.3%	40.3%	40.3%	14.3%	46.0%	13.7%	45.4%
Yellow Time (s)	4.2	4.2	3.6	3.6	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	4.6	4.6	4.6	5.4	4.6	5.4
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 45.3
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Campus Av. & 15th St.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	7	89	11	15	12	61	771	6	6	794	33
Future Volume (veh/h)	46	7	89	11	15	12	61	771	6	6	794	33
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	51	8	98	12	16	13	67	847	7	7	873	36
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	400	23	284	331	182	148	355	1489	12	326	1254	52
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.06	0.44	0.44	0.01	0.38	0.38
Sat Flow, veh/h	1236	114	1399	1149	898	730	1594	3422	28	1594	3295	136
Grp Volume(v), veh/h	51	0	106	12	0	29	67	417	437	7	446	463
Grp Sat Flow(s),veh/h/ln	1236	0	1514	1149	0	1628	1594	1683	1767	1594	1683	1747
Q Serve(g_s), s	1.5	0.0	2.6	0.4	0.0	0.6	1.1	8.0	8.0	0.1	9.6	9.6
Cycle Q Clear(g_c), s	2.1	0.0	2.6	3.0	0.0	0.6	1.1	8.0	8.0	0.1	9.6	9.6
Prop In Lane	1.00		0.92	1.00		0.45	1.00		0.02	1.00		0.08
Lane Grp Cap(c), veh/h	400	0	307	331	0	330	355	733	769	326	641	665
V/C Ratio(X)	0.13	0.00	0.35	0.04	0.00	0.09	0.19	0.57	0.57	0.02	0.70	0.70
Avail Cap(c_a), veh/h	809	0	808	727	0	892	453	1047	1099	496	1031	1070
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	0.0	14.7	16.0	0.0	13.9	8.2	9.1	9.1	8.4	11.2	11.2
Incr Delay (d2), s/veh	0.1	0.0	0.7	0.0	0.0	0.1	0.1	0.7	0.7	0.0	1.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.8	0.1	0.0	0.2	0.2	2.0	2.1	0.0	2.7	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.9	0.0	15.4	16.0	0.0	14.1	8.3	9.8	9.8	8.4	12.6	12.6
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	B	B
Approach Vol, veh/h		157			41			921			916	
Approach Delay, s/veh		15.2			14.6			9.7			12.6	
Approach LOS		B			B			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.0	24.2		13.9	7.4	21.8		13.9				
Change Period (Y+Rc), s	4.6	5.4		5.2	4.6	5.4		* 5.2				
Max Green Setting (Gmax), s	5.0	26.8		23.0	5.4	26.4		* 24				
Max Q Clear Time (g_c+I1), s	2.1	10.0		4.6	3.1	11.6		5.0				
Green Ext Time (p_c), s	0.0	4.7		0.7	0.0	4.8		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		11.5
HCM 6th LOS		B

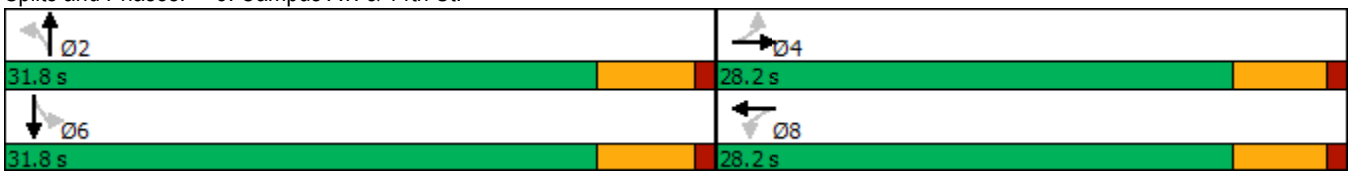
Notes

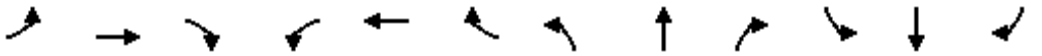
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	36	54	41	120	44	565	161	673
Future Volume (vph)	36	54	41	120	44	565	161	673
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.2	28.2	28.2	28.2	22.4	22.4	22.4	22.4
Total Split (s)	28.2	28.2	28.2	28.2	31.8	31.8	31.8	31.8
Total Split (%)	47.0%	47.0%	47.0%	47.0%	53.0%	53.0%	53.0%	53.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.4	4.4	4.4	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 45.4
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Campus Av. & 14th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	54	38	41	120	230	44	565	44	161	673	54
Future Volume (veh/h)	36	54	38	41	120	230	44	565	44	161	673	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	40	60	36	46	133	223	49	628	45	179	748	58
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	233	301	181	442	171	288	348	1530	110	396	1517	118
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	917	1037	622	1161	590	988	604	3185	228	684	3159	245
Grp Volume(v), veh/h	40	0	96	46	0	356	49	332	341	179	398	408
Grp Sat Flow(s),veh/h/ln	917	0	1658	1161	0	1578	604	1683	1730	684	1683	1721
Q Serve(g_s), s	1.9	0.0	2.0	1.4	0.0	9.6	2.8	5.9	5.9	10.6	7.5	7.5
Cycle Q Clear(g_c), s	11.5	0.0	2.0	3.5	0.0	9.6	10.3	5.9	5.9	16.6	7.5	7.5
Prop In Lane	1.00		0.38	1.00		0.63	1.00		0.13	1.00		0.14
Lane Grp Cap(c), veh/h	233	0	482	442	0	459	348	809	831	396	809	827
V/C Ratio(X)	0.17	0.00	0.20	0.10	0.00	0.78	0.14	0.41	0.41	0.45	0.49	0.49
Avail Cap(c_a), veh/h	421	0	823	681	0	783	402	959	986	458	959	980
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.3	0.0	12.4	13.7	0.0	15.0	11.7	7.8	7.8	13.2	8.2	8.2
Incr Delay (d2), s/veh	0.3	0.0	0.2	0.1	0.0	2.8	0.2	0.3	0.3	0.8	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.6	0.3	0.0	3.3	0.3	1.4	1.5	1.3	1.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.7	0.0	12.6	13.8	0.0	17.9	11.9	8.1	8.1	14.0	8.7	8.7
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		136			402			722			985	
Approach Delay, s/veh		14.9			17.4			8.4			9.6	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.7		18.7		27.7		18.7				
Change Period (Y+Rc), s		5.4		5.2		5.4		5.2				
Max Green Setting (Gmax), s		26.4		23.0		26.4		23.0				
Max Q Clear Time (g_c+I1), s		12.3		13.5		18.6		11.6				
Green Ext Time (p_c), s		3.7		0.4		3.7		2.0				

Intersection Summary												
HCM 6th Ctrl Delay			10.9									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	2	6	0	5	0
Future Vol, veh/h	0	2	6	0	5	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2	7	0	5	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	9	7
Stage 1	-	-	-	-	7	-
Stage 2	-	-	-	-	2	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	0	-	-	0	1011	1075
Stage 1	0	-	-	0	1016	-
Stage 2	0	-	-	0	1021	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	1011	1075
Mov Cap-2 Maneuver	-	-	-	-	1011	-
Stage 1	-	-	-	-	1016	-
Stage 2	-	-	-	-	1021	-

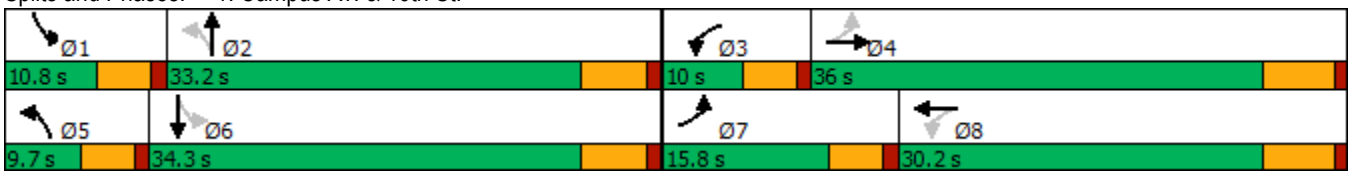
Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	1011
HCM Lane V/C Ratio	-	-	0.005
HCM Control Delay (s/veh)	-	-	8.6
HCM Lane LOS	-	-	A
HCM 95th %tile Q (veh)	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	202	1002	124	346	87	704	142	525
Future Volume (vph)	202	1002	124	346	87	704	142	525
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	9.6	28.8	9.6	28.8	9.6	28.4	9.6	28.4
Total Split (s)	15.8	36.0	10.0	30.2	9.7	33.2	10.8	34.3
Total Split (%)	17.6%	40.0%	11.1%	33.6%	10.8%	36.9%	12.0%	38.1%
Yellow Time (s)	3.6	4.8	3.6	4.8	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.8	4.6	5.8	4.6	5.4	4.6	5.4
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Campus Av. & 16th St.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	1002	104	124	346	75	87	704	307	142	525	181
Future Volume (veh/h)	202	1002	104	124	346	75	87	704	307	142	525	181
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	206	1022	106	127	353	77	89	718	313	145	536	185
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	408	1031	107	178	790	170	253	701	306	190	794	273
Arrive On Green	0.11	0.34	0.34	0.06	0.29	0.29	0.05	0.31	0.31	0.07	0.32	0.32
Sat Flow, veh/h	1594	3074	319	1594	2754	594	1594	2270	989	1594	2449	842
Grp Volume(v), veh/h	206	559	569	127	214	216	89	532	499	145	368	353
Grp Sat Flow(s),veh/h/ln	1594	1683	1709	1594	1683	1665	1594	1683	1575	1594	1683	1607
Q Serve(g_s), s	7.8	29.8	29.8	5.1	9.4	9.6	3.4	27.8	27.8	5.6	17.0	17.1
Cycle Q Clear(g_c), s	7.8	29.8	29.8	5.1	9.4	9.6	3.4	27.8	27.8	5.6	17.0	17.1
Prop In Lane	1.00		0.19	1.00		0.36	1.00		0.63	1.00		0.52
Lane Grp Cap(c), veh/h	408	565	574	178	483	477	253	520	487	190	546	521
V/C Ratio(X)	0.50	0.99	0.99	0.72	0.44	0.45	0.35	1.02	1.02	0.76	0.67	0.68
Avail Cap(c_a), veh/h	433	565	574	178	483	477	258	520	487	190	546	521
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.6	29.8	29.8	24.6	26.2	26.3	21.0	31.1	31.1	23.5	26.3	26.3
Incr Delay (d2), s/veh	0.4	35.3	35.3	11.1	0.6	0.7	0.3	45.7	47.2	15.2	3.3	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	16.5	16.7	2.3	3.6	3.6	1.2	17.1	16.2	2.7	6.9	6.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	65.1	65.0	35.7	26.9	27.0	21.3	76.8	78.3	38.7	29.5	29.8
LnGrp LOS	B	E	E	D	C	C	C	F	F	D	C	C
Approach Vol, veh/h		1334			557			1120			866	
Approach Delay, s/veh		57.9			28.9			73.1			31.2	
Approach LOS		E			C			E			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	33.2	10.0	36.0	9.4	34.6	14.4	31.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.8	4.6	5.4	4.6	5.8
Max Green Setting (Gmax), s	6.2	27.8	5.4	30.2	5.1	28.9	11.2	24.4
Max Q Clear Time (g_c+I1), s	7.6	29.8	7.1	31.8	5.4	19.1	9.8	11.6
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.0	0.0	1.8

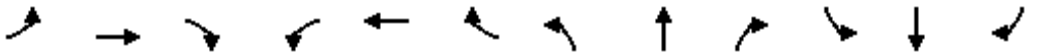
Intersection Summary	
HCM 6th Ctrl Delay	52.2
HCM 6th LOS	D

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	128	6	1	0	42	959	6	726
Future Volume (vph)	128	6	1	0	42	959	6	726
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	28.2	28.2	27.6	27.6	9.6	27.4	9.6	27.4
Total Split (s)	28.2	28.2	28.2	28.2	9.6	32.2	9.6	32.2
Total Split (%)	40.3%	40.3%	40.3%	40.3%	13.7%	46.0%	13.7%	46.0%
Yellow Time (s)	4.2	4.2	3.6	3.6	3.6	4.4	3.6	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	4.6	4.6	4.6	5.4	4.6	5.4
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 43.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Campus Av. & 15th St.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	128	6	63	1	0	4	42	959	4	6	726	33
Future Volume (veh/h)	128	6	63	1	0	4	42	959	4	6	726	33
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	133	6	66	1	0	4	44	999	4	6	756	34
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	445	27	301	383	0	329	360	1421	6	270	1225	55
Arrive On Green	0.22	0.22	0.22	0.22	0.00	0.22	0.05	0.41	0.41	0.01	0.37	0.37
Sat Flow, veh/h	1264	125	1372	1186	0	1502	1594	3439	14	1594	3281	148
Grp Volume(v), veh/h	133	0	72	1	0	4	44	489	514	6	388	402
Grp Sat Flow(s),veh/h/ln	1264	0	1497	1186	0	1502	1594	1683	1769	1594	1683	1745
Q Serve(g_s), s	3.9	0.0	1.7	0.0	0.0	0.1	0.7	10.2	10.2	0.1	7.9	7.9
Cycle Q Clear(g_c), s	4.0	0.0	1.7	1.7	0.0	0.1	0.7	10.2	10.2	0.1	7.9	7.9
Prop In Lane	1.00		0.92	1.00		1.00	1.00		0.01	1.00		0.08
Lane Grp Cap(c), veh/h	445	0	328	383	0	329	360	695	731	270	629	652
V/C Ratio(X)	0.30	0.00	0.22	0.00	0.00	0.01	0.12	0.70	0.70	0.02	0.62	0.62
Avail Cap(c_a), veh/h	855	0	814	786	0	839	473	1067	1122	446	1067	1107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.5	0.0	13.5	14.2	0.0	12.9	8.1	10.3	10.3	9.0	10.8	10.8
Incr Delay (d2), s/veh	0.4	0.0	0.3	0.0	0.0	0.0	0.1	1.3	1.2	0.0	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.5	0.0	0.0	0.0	0.2	2.7	2.8	0.0	2.2	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	0.0	13.9	14.2	0.0	12.9	8.1	11.6	11.5	9.0	11.8	11.7
LnGrp LOS	B	A	B	B	A	B	A	B	B	A	B	B
Approach Vol, veh/h		205			5			1047			796	
Approach Delay, s/veh		14.5			13.2			11.4			11.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.9	22.9		14.5	6.6	21.2		14.5				
Change Period (Y+Rc), s	4.6	5.4		5.2	4.6	5.4		* 5.2				
Max Green Setting (Gmax), s	5.0	26.8		23.0	5.0	26.8		* 24				
Max Q Clear Time (g_c+I1), s	2.1	12.2		6.0	2.7	9.9		3.7				
Green Ext Time (p_c), s	0.0	5.3		0.7	0.0	4.3		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		11.8	
HCM 6th LOS		B	

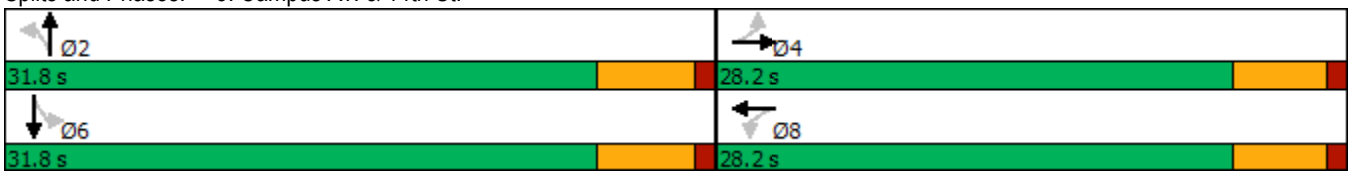
Notes

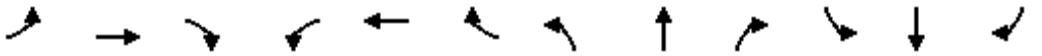
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	54	102	30	73	33	803	145	611
Future Volume (vph)	54	102	30	73	33	803	145	611
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.2	28.2	28.2	28.2	22.4	22.4	22.4	22.4
Total Split (s)	28.2	28.2	28.2	28.2	31.8	31.8	31.8	31.8
Total Split (%)	47.0%	47.0%	47.0%	47.0%	53.0%	53.0%	53.0%	53.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.4	4.4	4.4	4.4
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 48.7
Natural Cycle: 65
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Campus Av. & 14th St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	102	45	30	73	163	33	803	60	145	611	31
Future Volume (veh/h)	54	102	45	30	73	163	33	803	60	145	611	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1673	1772	1772	1673	1772	1772	1673	1772	1772	1673	1772	1772
Adj Flow Rate, veh/h	57	109	43	32	78	141	35	854	60	154	650	31
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	269	106	328	127	229	448	1695	119	363	1740	83
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.53	0.53	0.53	0.53	0.53	0.53
Sat Flow, veh/h	1040	1203	475	1104	566	1022	679	3185	224	546	3271	156
Grp Volume(v), veh/h	57	0	152	32	0	219	35	451	463	154	334	347
Grp Sat Flow(s),veh/h/ln	1040	0	1677	1104	0	1588	679	1683	1726	546	1683	1744
Q Serve(g_s), s	2.3	0.0	3.4	1.1	0.0	5.4	1.4	7.4	7.4	10.9	5.0	5.0
Cycle Q Clear(g_c), s	7.7	0.0	3.4	4.5	0.0	5.4	6.4	7.4	7.4	18.3	5.0	5.0
Prop In Lane	1.00		0.28	1.00		0.64	1.00		0.13	1.00		0.09
Lane Grp Cap(c), veh/h	269	0	375	328	0	355	448	895	918	363	895	928
V/C Ratio(X)	0.21	0.00	0.40	0.10	0.00	0.62	0.08	0.50	0.50	0.42	0.37	0.37
Avail Cap(c_a), veh/h	588	0	889	666	0	842	500	1024	1050	405	1024	1061
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.6	0.0	14.4	16.3	0.0	15.2	7.8	6.5	6.5	12.4	5.9	5.9
Incr Delay (d2), s/veh	0.4	0.0	0.7	0.1	0.0	1.7	0.1	0.4	0.4	0.8	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.1	0.3	0.0	1.9	0.1	1.5	1.6	1.0	1.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	0.0	15.1	16.4	0.0	16.9	7.9	6.9	6.9	13.1	6.2	6.2
LnGrp LOS	B	A	B	B	A	B	A	A	A	B	A	A
Approach Vol, veh/h		209			251			949			835	
Approach Delay, s/veh		16.1			16.8			7.0			7.5	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.5		14.9		28.5		14.9				
Change Period (Y+Rc), s		5.4		5.2		5.4		5.2				
Max Green Setting (Gmax), s		26.4		23.0		26.4		23.0				
Max Q Clear Time (g_c+I1), s		9.4		9.7		20.3		7.4				
Green Ext Time (p_c), s		5.4		0.8		2.8		1.3				

Intersection Summary												
HCM 6th Ctrl Delay			9.1									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↾	
Traffic Vol, veh/h	0	4	6	0	3	0
Future Vol, veh/h	0	4	6	0	3	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	4	7	0	3	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	11	7
Stage 1	-	-	-	-	7	-
Stage 2	-	-	-	-	4	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	0	-	-	0	1009	1075
Stage 1	0	-	-	0	1016	-
Stage 2	0	-	-	0	1019	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	1009	1075
Mov Cap-2 Maneuver	-	-	-	-	1009	-
Stage 1	-	-	-	-	1016	-
Stage 2	-	-	-	-	1019	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	1009
HCM Lane V/C Ratio	-	-	0.003
HCM Control Delay (s/veh)	-	-	8.6
HCM Lane LOS	-	-	A
HCM 95th %tile Q (veh)	-	-	0

APPENDIX 5.3: OPENING YEAR CUMULATIVE (2025) WITH PROJECT CONDITIONS FREEWAY TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS

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Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

DIST	CO	RTE	PM	TRAFFIC CONDITIONS			2025 WP
				CALC	CS	DATE	10/04/22
Jurisdiction:	City of Upland			CHK	CS	DATE	10/04/22
Major Street:	15th St.			Critical Approach Speed (Major)			25 mph
Minor Street:	Coyote Run Dr.-West			Critical Approach Speed (Minor)			25 mph

Major Street Approach Lanes = **1** lane Minor Street Approach Lanes **1** lane

Major Street Future ADT = **261** vpd Minor Street Future ADT = **261** vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ……..

or

In built up area of isolated community of < 10,000 population ……..

URBAN (U)

(Based on Estimated Average Daily Traffic - See Note)

URBAN	RURAL	Minimum Requirements EADT			
XX					
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **261**	*1* **261**	8,000	5,600	2,400	1,680
2 +	*1*	9,600	6,720	2,400	1,680
2 +	*2* +	9,600	6,720	3,200	2,240
1	*2* +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **261**	*1* **261**	12,000	8,400	1,200	850
2 +	*1*	14,400	10,080	1,200	850
2 +	*2* +	14,400	10,080	1,600	1,120
1	*2* +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B					
Satisfied	Not Satisfied				
	XX				
No one condition satisfied, but following conditions fulfilled 80% of more …..		2 CONDITIONS 80%		2 CONDITIONS 80%	
A	**B**				
3%	**2%**				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

DIST	CO	RTE	PM	TRAFFIC CONDITIONS		2025 WP
				CALC CS	DATE	10/04/22
Jurisdiction: City of Upland				CHK CS	DATE	10/04/22
Major Street: 15th St.				Critical Approach Speed (Major)		25 mph
Minor Street: Coyote Run Dr.-East				Critical Approach Speed (Minor)		25 mph

Major Street Approach Lanes = 1 lane Minor Street Approach Lanes 1 lane

Major Street Future ADT = 46 vpd Minor Street Future ADT = 160 vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ……..

or

In built up area of isolated community of < 10,000 population ……..

URBAN (U)

(Based on Estimated Average Daily Traffic - See Note)

URBAN	RURAL	Minimum Requirements EADT			
XX					
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **46**	*1* **160**	8,000	5,600	2,400	1,680
2 +	*1*	9,600	6,720	2,400	1,680
2 +	*2* +	9,600	6,720	3,200	2,240
1	*2* +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **46**	*1* **160**	12,000	8,400	1,200	850
2 +	*1*	14,400	10,080	1,200	850
2 +	*2* +	14,400	10,080	1,600	1,120
1	*2* +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B					
Satisfied	Not Satisfied				
	XX	2 CONDITIONS 80%		2 CONDITIONS 80%	
No one condition satisfied, but following conditions fulfilled 80% of more …..	**A** 1% **B** 0%				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.