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December 19, 2016

Ms. Laura Shinn
San Diego State University
5500 Campanile Drive
San Diego, CA 92182

LLG Reference: 3-16-2682

Subject: **San Diego State University Tula / Tenochca Project – Transportation Impact Analysis**

Linscott, Law & Greenspan, Engineers (LLG) has prepared this technical memorandum to document an analysis of potential traffic-related impacts associated with the proposed San Diego State University Tula/Tenochca project.

Included in this analysis are the following:

- Project Description
- Study Area Description/Existing Conditions
- Trip Generation/Route Assumption/Distribution Summary
- Analysis Methodology and Results
- Conclusion

PROJECT DESCRIPTION

SDSU proposes to demolish the existing two-story Tula/Tenochca Community Center (approximately 20,000 gross square feet (gsf) in size) and construct in its place the Tenochca Community Space and the nearby Tula Pavilion. The total gsf to be demolished is approximately 20,000 gsf, and the total gsf to be constructed is approximately 25,000 gsf of interior space. Because the new buildings would replace an existing building and its associated uses, upon completion the project would not generate new or additional students, staff, or visitors to the SDSU campus and, therefore, would not generate any additional vehicle trips beyond the existing condition. Demolition of the existing building would result in generating approximately 4,000 cubic yards (cy) of debris. Each of the project components are separately described below.

Proposed Tenochca Community Space: The proposed Tenochca Community Space (TCS) would be two-stories in height and approximately 13,000 gsf in size, with approximately 9,000 square feet (sf) allocated to the first floor and 4,000 sf allocated to the second floor. The proposed TCS would be constructed on the site of the

demolished Tula/Tenochca Community Center, which is located on the corner of Montezuma Road and East Campus Drive, in the south-southeast portion of the main campus, in the area west of Parking Structures 3 and 4. Construction of the proposed Tenochca Community Space would require approximately 8,700 sf of concrete and approximately 850 cy of structural fill.

Proposed Tula Pavilion: The proposed Tula Pavilion would be a one-story building approximately 12,000 gsf in size constructed to the northwest of the TCS on the site of a paved walking path at the north end of a service vehicle parking lot. Construction would require approximately 10,000 sf of concrete and approximately 2,000 cy of backfill.

Proposed Schedule: The anticipated start date for demolition of the existing Tula/Tenochca Community Center and construction of the proposed Tenochca Community Space and Tula Pavilion is June 2017, with an anticipated duration for construction of 15 months.

Because the new TCS and Tula Pavilion would be used by SDSU staff, students, and others already on campus for classes or other events, operation of the proposed project would not generate any additional vehicle trips, and would not require, or include, parking facilities. However, construction of the proposed project would generate construction-related vehicle trips since approximately 4,000 cy of debris will be hauled from the site. As a result, this memorandum analyzes the potential traffic impacts from these truck trips.

Based on the project description outlined above, the demolition phase of the project would be the most intensive traffic generating portion of the project. Thus, the analysis in this memorandum focuses on the demolition phase.

STUDY AREA DESCRIPTION/EXISTING CONDITIONS

As previously explained, because operation of the proposed project would not generate new vehicle trips, there would be no traffic-related operational impacts. However, construction of the proposed project would generate vehicle trips and, therefore, the construction phase of the project is the focus of this analysis.

The study area for the analysis was determined based on the traffic routes expected to be utilized by construction-related vehicles. Heavy vehicles hauling debris from the site would principally utilize Montezuma Road to Fairmount Avenue to access Interstate 8 (I-8). This route is generally a less-congested route than College Avenue to I-8, and also better accommodates truck traffic. Construction workers commuting to the worksite, as well as other miscellaneous trips in passenger cars and light trucks, would also utilize these roadways, as well as College Avenue. ***Figure 1*** shows the Project Location and Study Area.

The following is a description of the study area Circulation Element Roadways:

Interstate 8 is an interstate freeway operated by CALTRANS. I-8 is an east-west facility spanning San Diego and Imperial Counties. This facility provides access to the Fairmount Avenue, Waring Road, College Avenue and Lake Murray / 70th Street interchanges within the project vicinity.

Montezuma Road is classified as a Major Arterial according to the College Area Community Plan. It is a four-lane, divided roadway located south of the SDSU Main campus. The posted speed limit ranges between 40-50 mph, bus stops are provided, and curbside parking is permitted along the roadway.

College Avenue is classified as a Major Arterial according to the College Area Community Plan. It is a four-lane intermittently divided roadway within the project vicinity. The speed limit is generally 35 mph, parking is prohibited and intermittent bus stops are provided.

Collwood Boulevard is classified as a Major Arterial according to the College Area Community Plan. It is a three lane undivided roadway located south of Montezuma Road with two northbound lanes and one southbound lane. Parking is permitted and bike lanes are provided at frequent locations. The posted speed limit is 35 mph.

Figure 2 depicts the existing study area road configuration.

LLG recently conducted counts in the SDSU area while SDSU and other local schools were in session. These counts were used as the basis of this analysis and were deemed adequate since no new development had occurred within the area in the past year and therefore reflect current conditions. ***Appendix A*** contains the intersection and segment counts sheets.

Figure 3 shows the Existing Traffic Volumes.

TRIP GENERATION

Construction of the proposed project would occur in several different phases with the demolition phase generating the most traffic based on the project description outlined above. This determination was based on several factors including utilization of heavy vehicles, duration of demolition and intensity of construction traffic (trucks and employee's) during this time period. A more detailed description is provided below.

The total amount of debris (e.g., asphalt) to be removed from the site during demolition is calculated to be approximately 3,361 cy. Based on information provided by campus staff, the demolition phase would take place over an approximate 1 month period (i.e., approximately 20 work days, excluding weekends) and require 20 on-site workers. Based on a capacity of approximately 10 cy of debris per truck, a total of approximately

337 truckloads would be required to haul the asphalt waste from the site. This averages out to approximately 17 truckloads per day (i.e., 337 truckloads/20 work days).

Truck Trips

As noted, the demolition phase would take place over an approximate 1 month (20 working days) period. Given that the construction of the proposed project would require the removal of a total of 3,361 cy of debris and assuming approximately 10 cy per truck, each work day would require 17 truck loads. A Passenger Car Equivalence (PCE) factor of 3.0 was applied to these trips to account for the diminished performance characteristics of trucks in traffic flow (as compared to passenger vehicles) based on data contained in the Highway Capacity Manual (HCM). Therefore, it is calculated that the trucks would generate 102 average daily trips (ADT) [17 truckloads x 2 x 3.0 PCE = 102 ADT].

As previously explained, it is expected that the trucks would utilize Montezuma Road to access the I-8/Fairmount Avenue interchange. Based on typical practice, it is expected that the construction truck trips would be evenly distributed throughout the day.

Figure 4 shows the Truck Traffic Distribution and ***Figure 6*** shows the Truck Traffic Volumes based on this distribution.

Construction Worker and Vendor Trips

In addition to the haul truck trips, traffic to/from the site during the demolition phase would be generated by construction workers using passenger vehicles and light trucks commuting to the work site. A total of 20 employees and 2 miscellaneous/vendors are expected to access the project site on a typical day. To estimate the employee trips, LLG conservatively assumed 100% of the employees would enter the work area during the AM peak hour and 100% would leave the work area during the PM peak hour. For the purpose of the traffic analysis, employees and vendor trips were combined together, for a total trip generation of 44 ADT [22 employees/vendors x 2 trips].

Because it is the most direct route, it is expected that the non-truck trips (workers and vendors) would utilize Montezuma Road and College Avenue to and from the I-8 corridor, and College Avenue. Montezuma Road also provides access to El Cajon Boulevard east of the project site.

Figure 5 shows the Employee/ Vendor Traffic Distribution and ***Figure 7*** shows the Employee/ Vendor Traffic Volumes based on this distribution.

Table 1 summarizes the Proposed Project trip generation based on the discussion above.

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TABLE 1
PROPOSED PROJECT TRIP GENERATION

Number and Type of Trips	Daily Trips			AM Peak Hour (w/PCE)			PM Peak Hour (w/PCE)		
	ADT	PCE	PCE Adjusted ADT	In	Out	Total	In	Out	Total
17 Truck Trips[a]	34	3.0[b]	102	6	6	12	6	6	12
20 Employees[c]	40	1.0	40	20	0	20	0	20	20
2 Misc Trips[c]	4	1.0	4	1	0	1	0	1	1
Total Construction Trips Analyzed:			***146***	***27***	***6***	***33***	***6***	***27***	***33***

Footnotes:

a. The AM/PM peak hour trips are assumed to be the ADT divided by an 8-hour work day (average distribution) with AM splits as 50:50 (In:Out) and PM splits as 50:50 (In:Out).
b. Passenger-Car Equivalent of 3.0 represents tractor-trailers on "rolling" terrain.
c. Miscellaneous trips represent vendor trips and or deliveries assumed to occur during peak periods.

ANALYSIS METHODOLOGY & SIGNIFICANCE CRITERIA

The following scenarios are addressed in this analysis. The addition of cumulative projects is not necessary since construction would occur in the near-term over a relatively short 15-month timeframe, with the demolition phase lasting approximately one month.

- Existing
- Existing + Project (Construction Traffic Trips)

Level of service (LOS) is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis taking into account factors such as roadway geometries, signal phasing, speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. Level of service designation is reported differently for signalized and unsignalized intersections.

In this analysis, signalized intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Chapter 18 of the *2010 Highway Capacity Manual (HCM),* with the assistance of the *Synchro* (version 9) computer software. The delay values (represented in seconds) were qualified with a corresponding intersection LOS. Signalized intersection calculation worksheets are attached in ***Appendix B***.

Street segments were analyzed based on a comparison of ADT volumes to the City of San Diego's published *Roadway Classification, Level of Service, and ADT Table*. This table provides segment capacities for different street classifications, based on traffic volumes and roadway characteristics.

Although California State University/SDSU is a state agency and, therefore, not subject to local regulation, for the limited purpose of this analysis, the City of San Diego's *Significance Determination Thresholds* document, dated July 2016, was used as guidance to measure the Proposed Project's potential impacts within the study area. Under these thresholds, LOS D is considered an acceptable LOS; a resulting LOS of E or F would signal a significant impact *if* the vehicle capacity (V/C) ratio or intersection delay exceeds the specified amount. ***Table 2*** defines the thresholds for study area intersections and street segments.

TABLE 2
CITY OF SAN DIEGO
TRAFFIC IMPACT SIGNIFICANT THRESHOLDS

Level of Service with Project [b]	**Allowable Increase Due to Project Impacts** [a]	
	Roadway Segments *V/C*	**Intersections** *Delay (sec.)*
E	0.02	2.0
F	0.01	1.0

Footnotes:

a. If a proposed project's traffic causes the values shown in the table to be exceeded, the impacts are determined to be significant. The project applicant shall then identify feasible improvements (within the Traffic Impact Study) that will restore/and maintain the traffic facility at an acceptable LOS. If the LOS with the proposed project becomes unacceptable (see note b), or if the project adds a significant amount of peak-hour trips to cause any traffic queues to exceed on- or off-ramp storage capacities, the project applicant shall be responsible for mitigating the project's direct significant and/or cumulatively considerable traffic impacts.

b. All LOS measurements are based upon Highway Capacity Manual procedures for peak-hour conditions. However, V/C ratios for roadway segments are estimated on an ADT/24-hour traffic volume basis (using Table 2 of the City's Traffic Impact Study Manual). The acceptable LOS for freeways, roadways, and intersections is generally "D" ("C" for undeveloped locations). For metered freeway ramps, LOS does not apply. However, ramp meter delays above 15 minutes are considered excessive.

If the addition of project construction-related traffic exceeds the thresholds in Table 2, then the project may be considered to have a temporary significant impact. A significant impact can also occur if project traffic causes the LOS to degrade from D to E, even if the allowable increases in Table 2 are not exceeded. If the addition of project-related traffic were to cause the Table 2 thresholds to be exceeded, feasible mitigation would need to be identified to return the impact within the City thresholds, or the impact would be considered significant and unmitigated.

ANALYSIS RESULTS

As shown in the tables provided below, under the Existing and Existing plus Project scenarios, each of the study area intersections are calculated to operate at acceptable LOS D or better operations.

As to segment operations, the study area street segments are calculated to operate at acceptable LOS C, with the exception of the following:

- Montezuma Road: Fairmount Avenue to Collwood Boulevard (LOS F)

This street segment presently operates at LOS F and would continue to operate at LOS F with the addition of the Proposed Project construction traffic. However, the project V/C contribution on this street segment would not exceed the allowable 0.01 increase (as shown in Table 2); therefore, the proposed project would not cause or result in significant impacts at this study area street segment. It should also be noted that these same project trips would add a nominal amount of temporary vehicle trips to I-8. These trips would be less than the day-to-day fluctuation of traffic on I-8 and therefore would not adversely affect operations.

Table 3 and ***Table 4*** show the intersection and street segment analysis results, respectively. ***Figure 8*** shows the Total Project Traffic Volumes. ***Figure 9*** shows the Existing + Project Traffic Volumes. ***Appendix B*** contains copies of the Synchro LOS worksheets.

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TABLE 3
EXISTING + PROJECT INTERSECTION OPERATIONS

Intersection	Traffic Control	Peak Hour	Existing		Existing + Project		Δ [c]	Impact Type
			Delay [a]	LOS [b]	Delay	LOS		
1. Montezuma Rd / Collwood Blvd	Signal	AM	23.0	C	23.3	C	0.3	None
		PM	26.8	C	27.1	C	0.3	None
2. Montezuma Rd / 55th St	Signal	AM	32.8	C	33.5	C	0.7	None
		PM	35.5	D	35.6	D	0.1	None
3. Montezuma Rd / College Ave	Signal	AM	50.5	D	51.5	D	1.0	None
		PM	54.5	D	54.8	D	0.3	None

Footnotes:
a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Δ denotes an increase in delay due to project.

General Notes:
1. Existing volumes reflect SDSU classes in session

SIGNALIZED

DELAY/LOS THRESHOLDS

Delay	LOS
0.0 ≤ 10.0	A
10.1 to 20.0	B
20.1 to 35.0	C
35.1 to 55.0	D
55.1 to 80.0	E
≥ 80.1	F

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TABLE 4
EXISTING + PROJECT STREET SEGMENT OPERATIONS

Segment	LOS E Capacity[a]	Existing			Existing + Project				Impact Type
		Volume	LOS[b]	V/C[c]	Volume	LOS	V/C	Δ[d]	
Montezuma Road									
Fairmount Ave to Collwood Blvd	40,000	52,330	F	1.308	52,456	*F*	*1.311*	*0.003*	None
Collwood Blvd to 55th St	40,000	28,950	C	0.724	29,078	C	0.727	0.003	None
55th St to College Ave	40,000	32,570	C	0.814	32,698	C	0.817	0.003	None

Footnotes:
a. Capacities based on City of San Diego's Roadway Classification & LOS table.
b. Level of Service
c. Volume to Capacity ratio
d. Δ denotes a project-induced increase in the Volume to Capacity ratio

General Notes:
1. Existing volumes reflect SDSU classes in session

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CONCLUSION

At peak construction activity levels, construction of the proposed project is expected to generate 102 truck, 40 worker, and 4 vendor trips per day for an approximately one month period. The number of ADT produced by the haul truck operations (34 daily truckloads) was tripled using a PCE adjustment factor of 3.0 to account for the additional impacts trucks impose upon the roadway system as compared to passenger cars with respect to acceleration, deceleration and handling characteristics. With the inclusion of PCE adjusted truck trips per day and the expected amount of employee and vendor trips, construction of the proposed project is expected to generate 146 short-term (i.e., temporary), construction-related ADT with 33 trips occurring during the AM peak hour and 33 trips during the PM peak hour. Based on City of San Diego criteria, the Proposed Project would not cause or result in significant impacts at any of the study area intersections or segments. Mitigation measures would not be necessary.

Sincerely,

Linscott, Law & Greenspan, Engineers

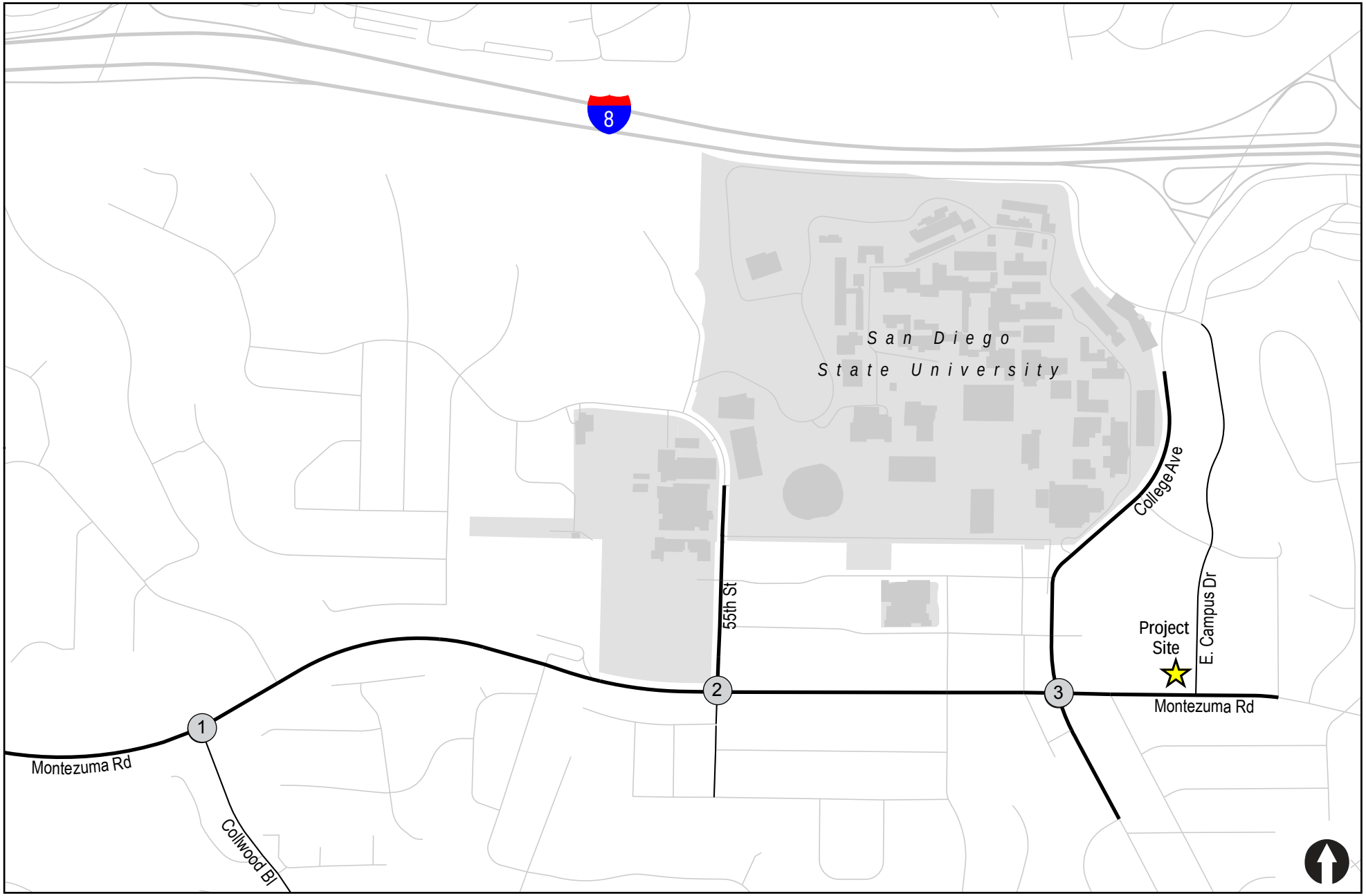
John Boarman, P.E.
Principal

Amelia Giacalone
Transportation Planner III

cc: File

Attachments: Figure 1: Project Location
Figure 2: Existing Conditions Diagram
Figure 3: Existing Traffic Volumes
Figure 4: Truck Traffic Distribution
Figure 5: Employee/ Vendor Traffic Distribution
Figure 6: Truck Traffic Volumes
Figure 7: Employee/ Vendor Traffic Volumes
Figure 8: Total Project Traffic Volumes
Figure 9: Existing + Project Traffic Volumes

Appendix A: Existing Traffic Counts
Appendix B: Synchro Analysis Sheets



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Date: 11/08/16

Figure 1

Project Location

SDSU Tula / Tenochca Facility

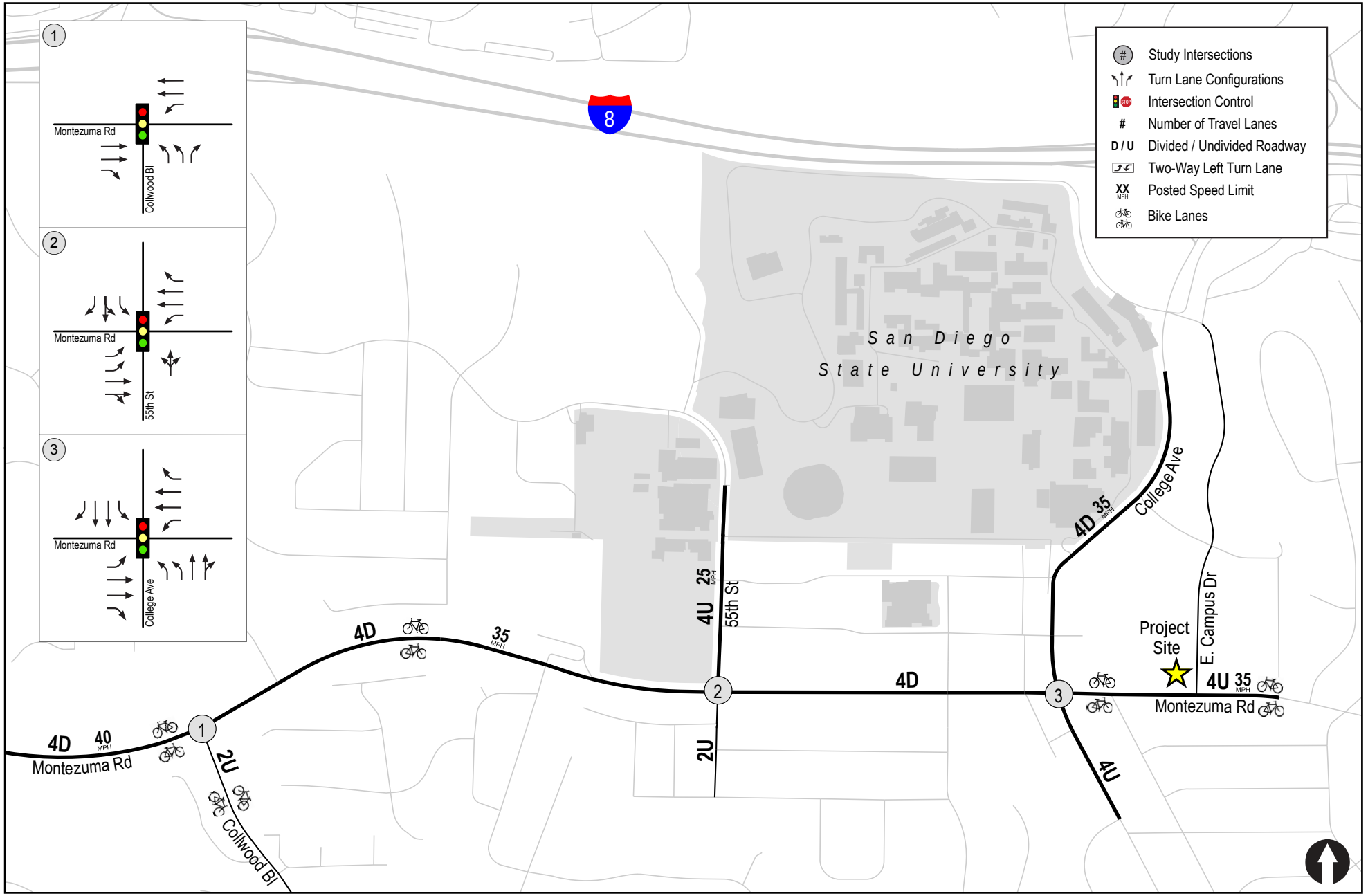

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Figure 2

Existing Conditions Diagram

SDSU TULA / TENOCHCA FACILITY

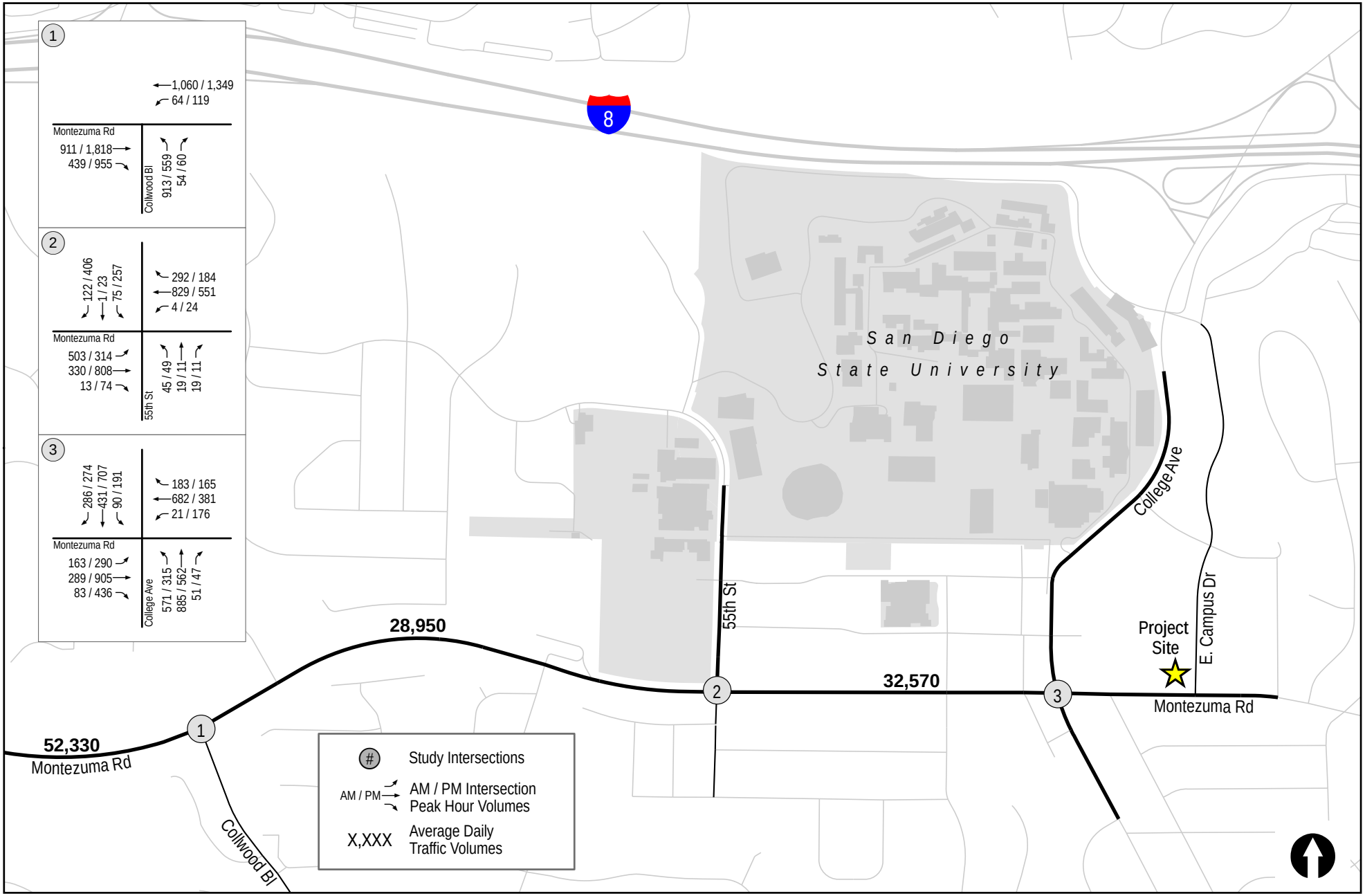

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Figure 3

Existing Traffic Volumes

SDSU Tula / Tenochca Facility

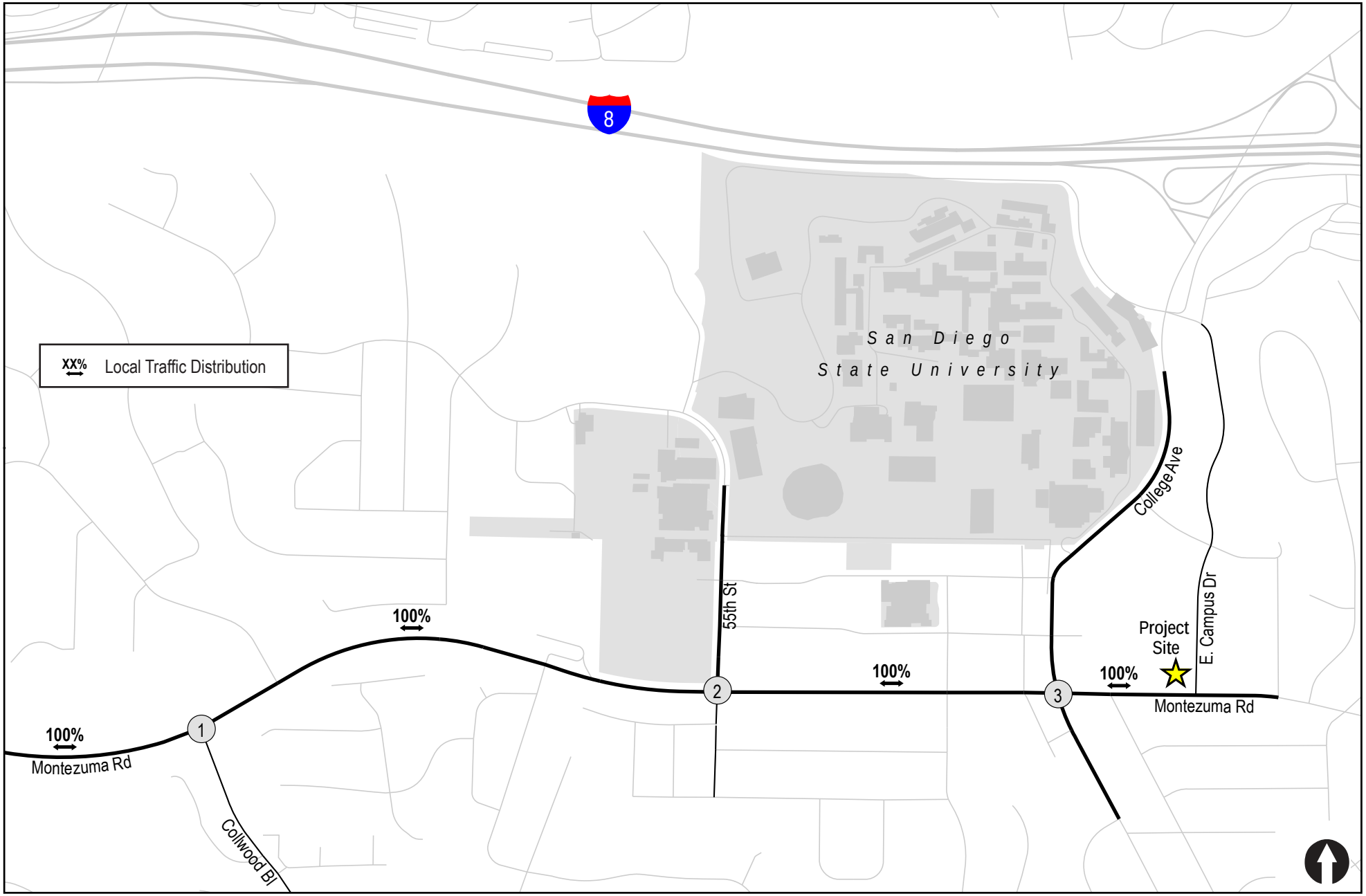

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Figure 4

Truck Traffic Distribution

SDSU TUNA / TENOCHCA FACILITY

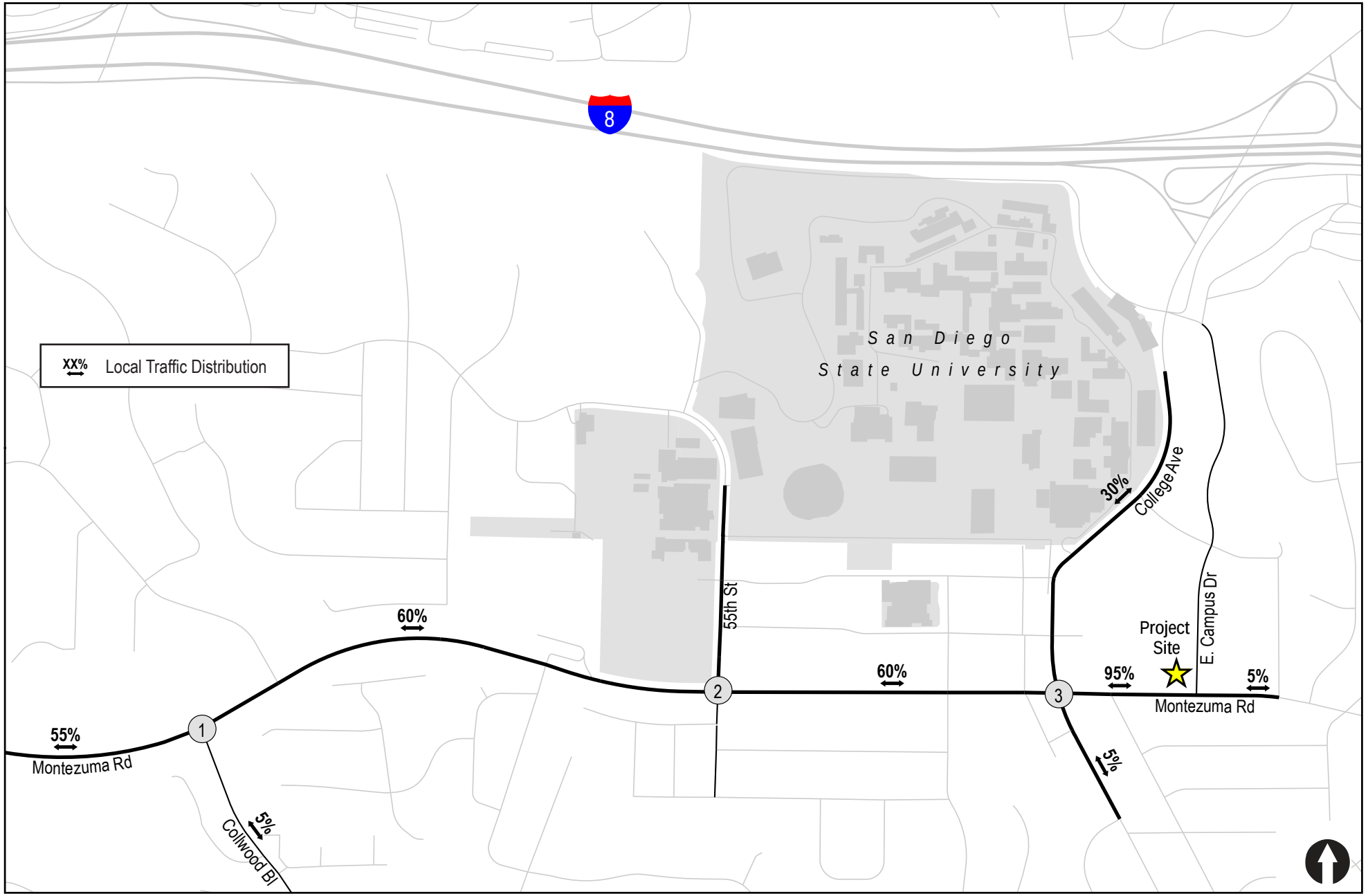

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Figure 5

Employee / Vendor Traffic Distribution

SDSU Tula / Tenochca Facility

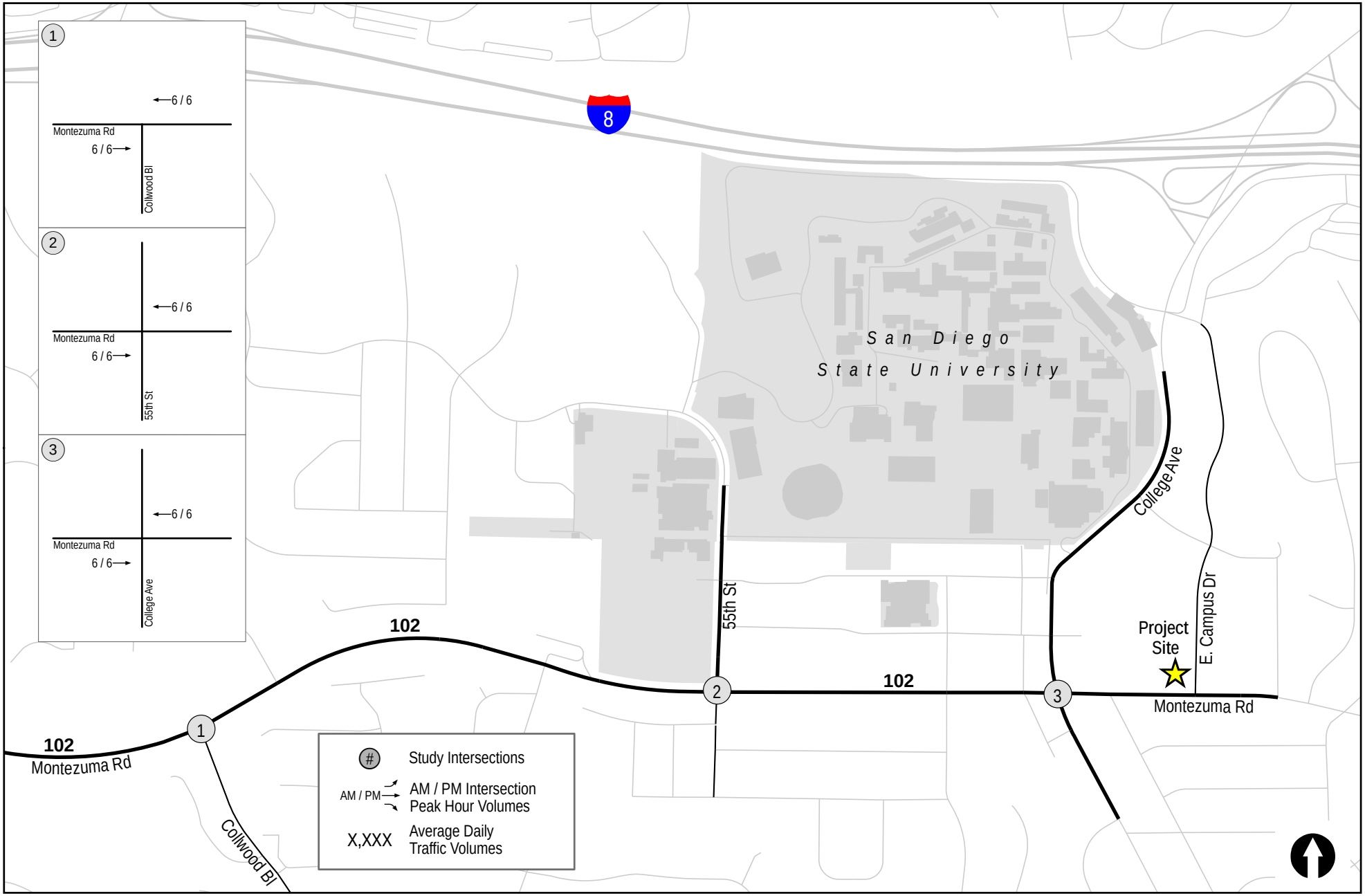

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Figure 6

Truck Traffic Volumes

SDSU Tula / Tenochca Facility

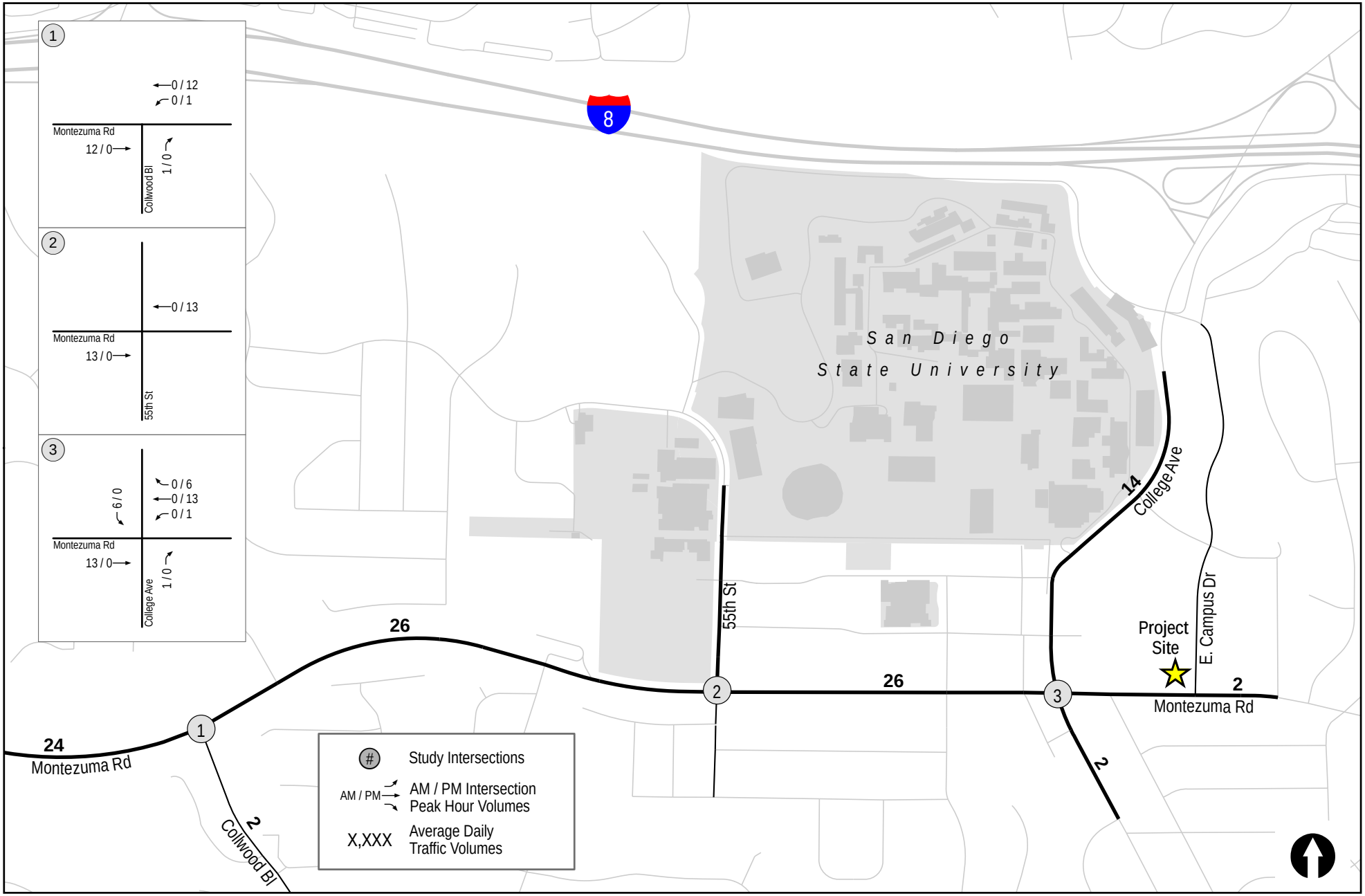

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Figure 7

Employee / Vendor Traffic Volumes

SDSU Tula / Tenochca Facility

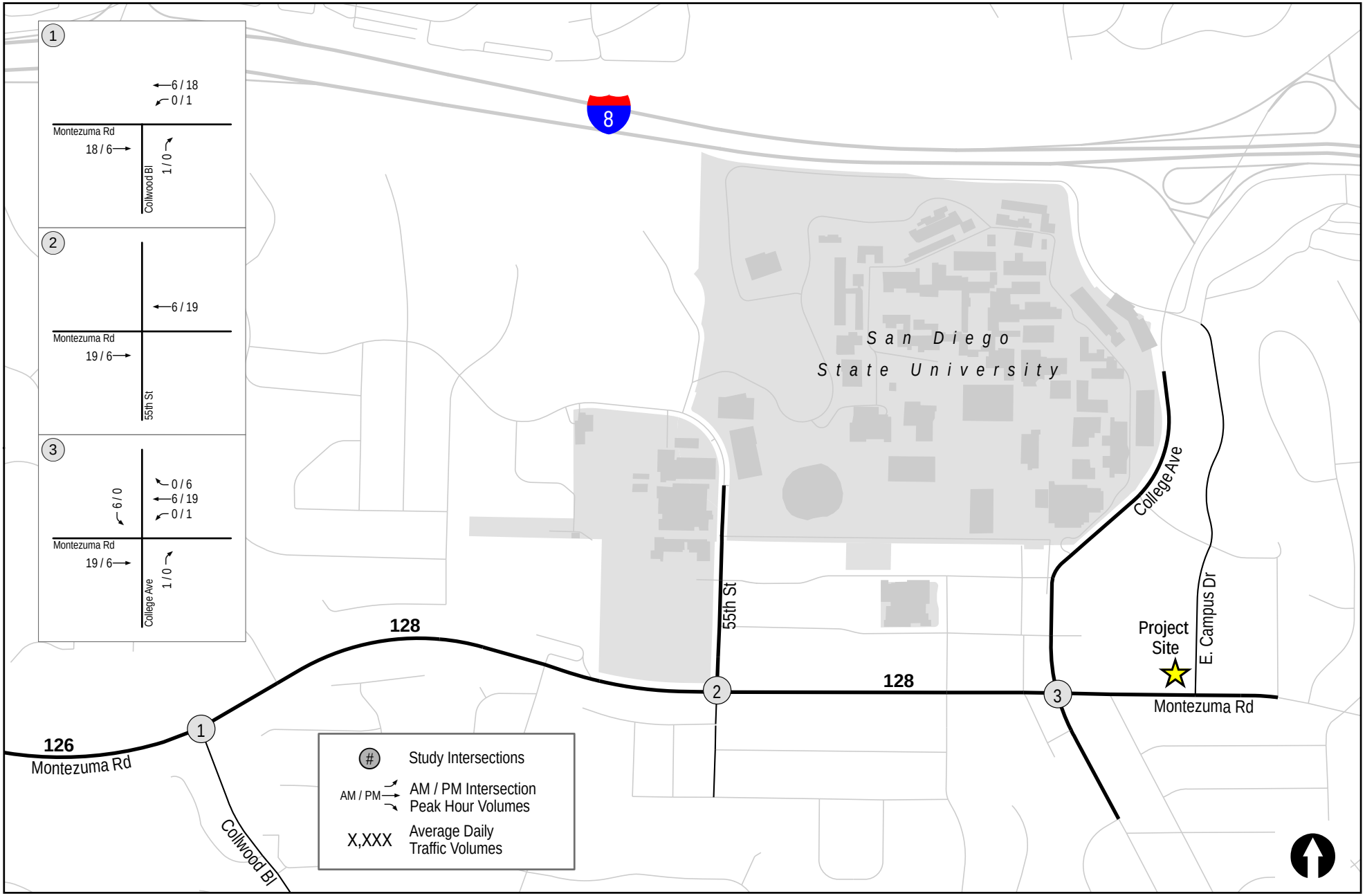

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Figure 8

Total Project Traffic Volumes

SDSU Tula / Tenochca Facility

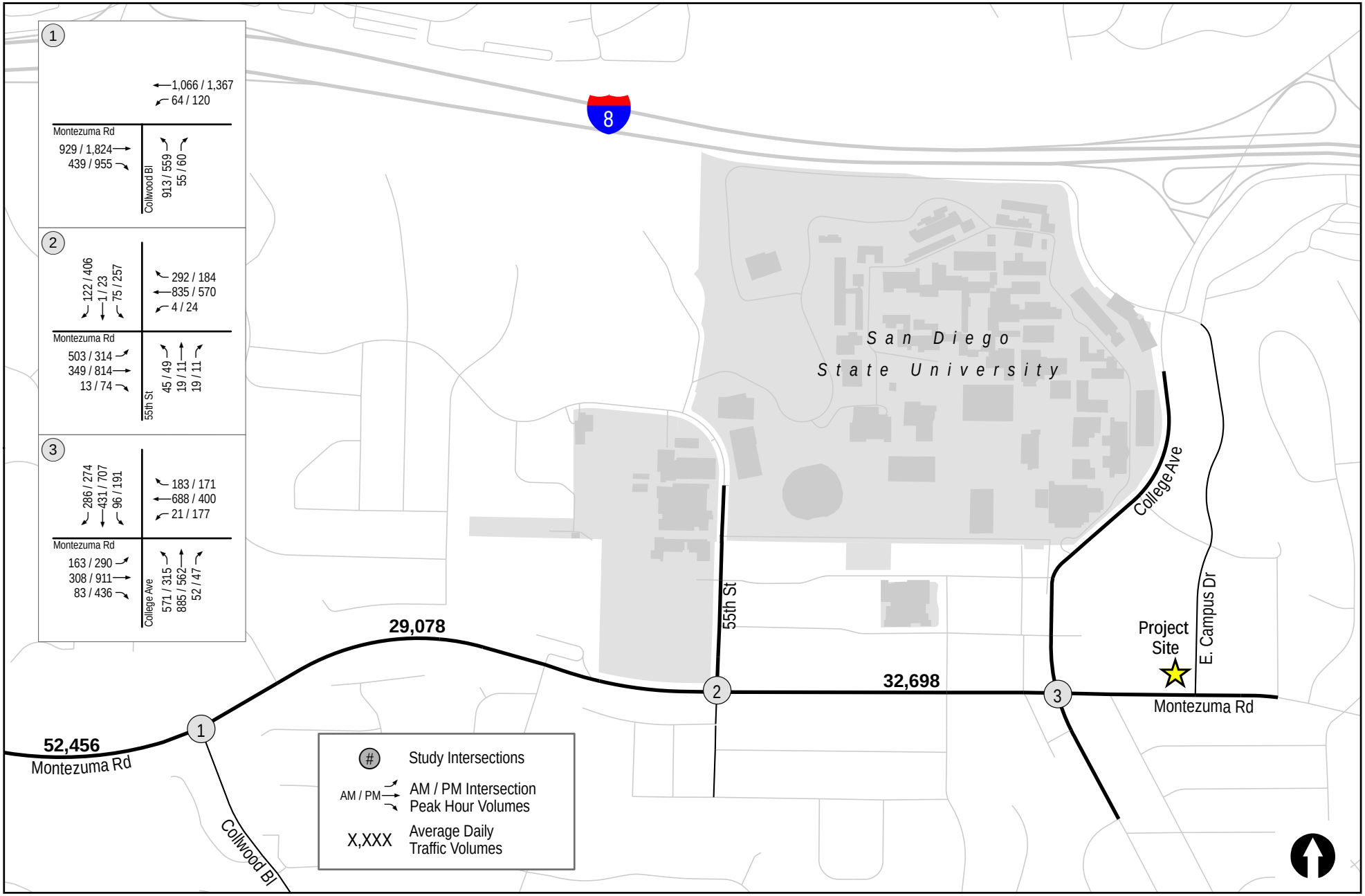

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Figure 9

Existing + Project Traffic Volumes

SDSU Tula / Tenochca Facility

APPENDIX A

EXISTING COUNT SHEETS

Turn Count Summary

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

Location: Montezuma Rd @ Collwood Blvd

Date of Count: *Wednesday, February 12, 2014*

Analysts: *LV/CD*

Weather: *Sunny*

AVC Proj No: *14-0162*

Turn Count Summary

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

Location: Montezuma Road @ 55th Street

Date of Count: *Tuesday, April 19, 2016*

Analysts: *LV/CD*

Weather: *Sunny*

AVC Proj No: *16-0506*

Turn Count Summary

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

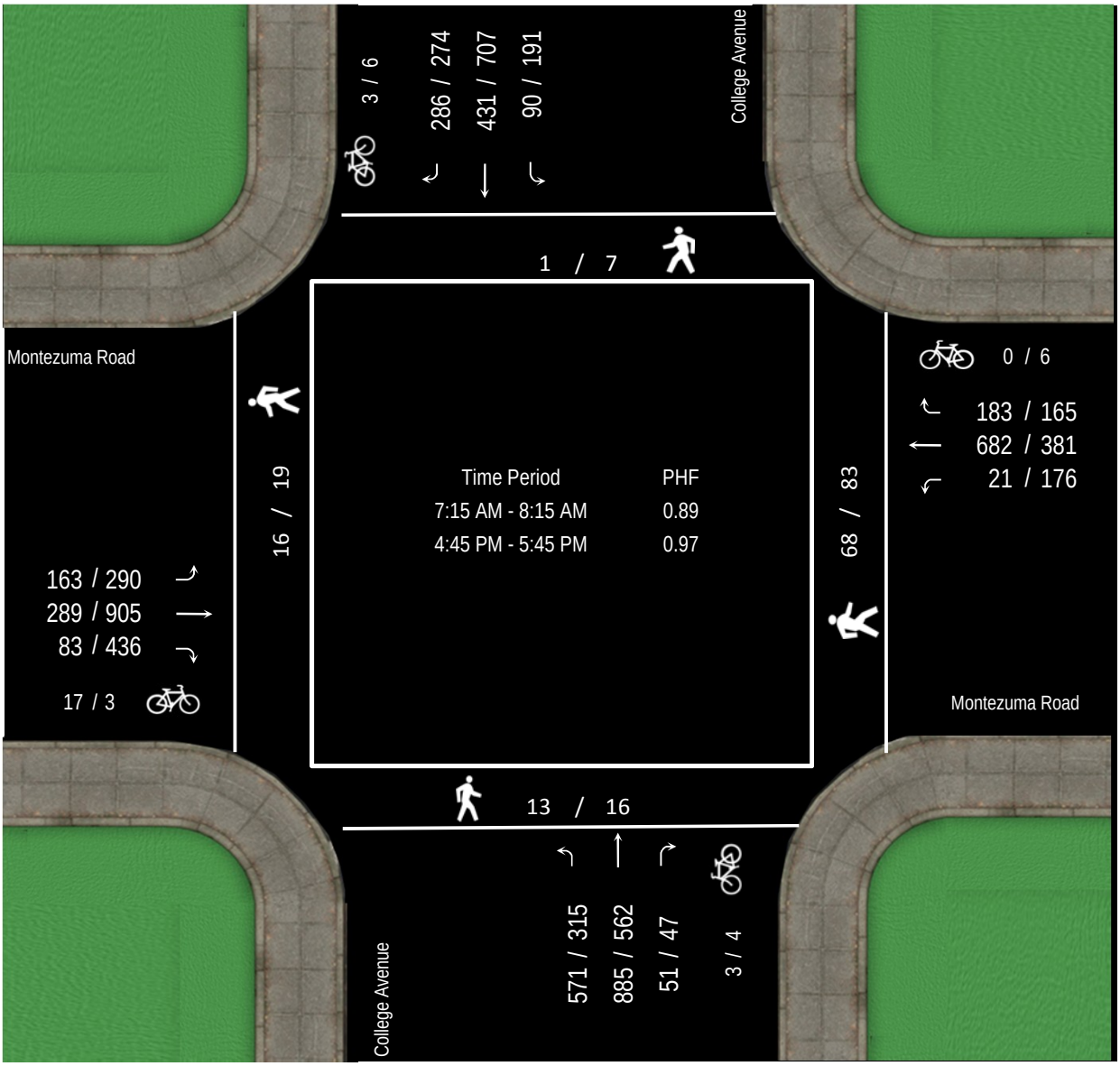
Location: Montezuma Road @ College Avenue

Date of Count: *Tuesday, April 19, 2016*

Analysts: *LV/CD*

Weather: *Sunny*

AVC Proj No: *16-0506*



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24 Hour Segment Count

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

AVC

Location: g. Montezuma Road btw Fairmount Avenue to Collwood Boulevard

Orientation: *East-West*

Date of Count: *Tuesday, April 19, 2016*

Analysts: *DASH*

Weather: *Sunny*

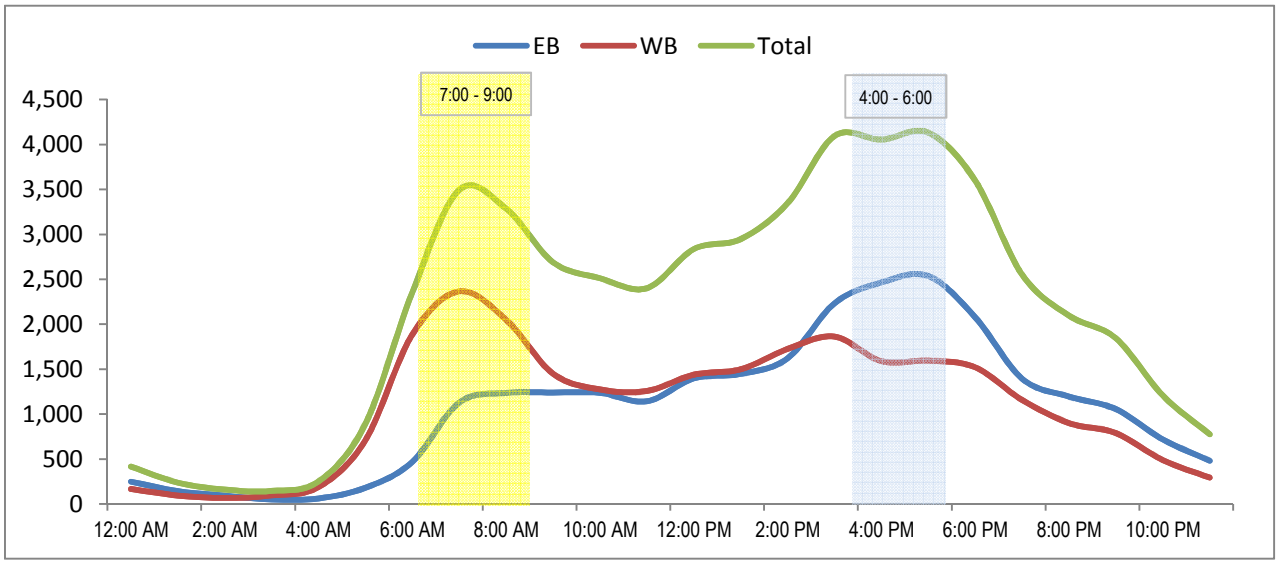
AVC Proj. No: *16-0506*

24 Hour Segment Volume			*52,329*

Time	Hourly Volume		
	EB	WB	Total
12:00 AM - 1:00 AM	249	167	416
1:00 AM - 2:00 AM	143	95	238
2:00 AM - 3:00 AM	93	67	160
3:00 AM - 4:00 AM	50	96	146
4:00 AM - 5:00 AM	63	189	252
5:00 AM - 6:00 AM	181	711	892
6:00 AM - 7:00 AM	469	1,887	2,356
7:00 AM - 8:00 AM	1,129	2,366	3,495
8:00 AM - 9:00 AM	1,236	2,050	3,286
9:00 AM - 10:00 AM	1,240	1,450	2,690
10:00 AM - 11:00 AM	1,237	1,275	2,512
11:00 AM - 12:00 PM	1,143	1,258	2401
Total	**7,233**	**11,611**	**18,844**

Time	Hourly Volume		
	EB	WB	Total
12:00 PM - 1:00 PM	1,397	1,439	2,836
1:00 PM - 2:00 PM	1,448	1,499	2,947
2:00 PM - 3:00 PM	1,621	1,725	3,346
3:00 PM - 4:00 PM	2,232	1,862	4,094
4:00 PM - 5:00 PM	2,465	1,589	4,054
5:00 PM - 6:00 PM	2,537	1,595	4,132
6:00 PM - 7:00 PM	2,078	1,521	3,599
7:00 PM - 8:00 PM	1,395	1,158	2,553
8:00 PM - 9:00 PM	1,196	901	2,097
9:00 PM - 10:00 PM	1,056	788	1,844
10:00 PM - 11:00 PM	718	489	1,207
11:00 PM - 12:00 AM	482	294	776
Total	**18,625**	**14,860**	**33,485**

24-Hour	*EB*	*Volume*	*25,858*	*24-Hour*	*WB*	*Volume*	*26,471*



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24 Hour Segment Count

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

AVC

Location: h. Montezuma Road btw Collwood Boulevard to 55th Street

Orientation: *East-West*

Date of Count: *Tuesday, April 19, 2016*

Analysts: *DASH*

Weather: *Sunny*

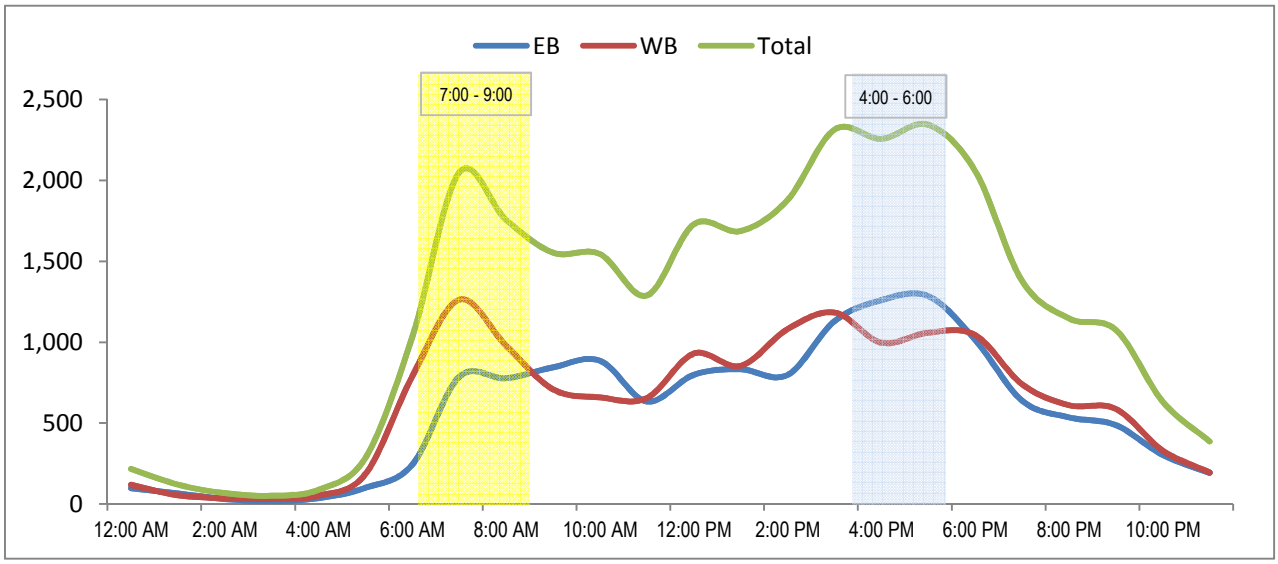
AVC Proj. No: *16-0506*

24 Hour Segment Volume			*28,946*

Time	Hourly Volume		
	EB	WB	Total
12:00 AM - 1:00 AM	98	119	217
1:00 AM - 2:00 AM	66	54	120
2:00 AM - 3:00 AM	31	36	67
3:00 AM - 4:00 AM	18	33	51
4:00 AM - 5:00 AM	36	52	88
5:00 AM - 6:00 AM	100	185	285
6:00 AM - 7:00 AM	244	790	1,034
7:00 AM - 8:00 AM	786	1,263	2,049
8:00 AM - 9:00 AM	777	979	1,756
9:00 AM - 10:00 AM	845	709	1,554
10:00 AM - 11:00 AM	886	659	1,545
11:00 AM - 12:00 PM	634	655	1289
Total	**4,521**	**5,534**	**10,055**

Time	Hourly Volume		
	EB	WB	Total
12:00 PM - 1:00 PM	799	930	1,729
1:00 PM - 2:00 PM	833	854	1,687
2:00 PM - 3:00 PM	798	1,081	1,879
3:00 PM - 4:00 PM	1,130	1,184	2,314
4:00 PM - 5:00 PM	1,260	997	2,257
5:00 PM - 6:00 PM	1,285	1,059	2,344
6:00 PM - 7:00 PM	1,015	1,044	2,059
7:00 PM - 8:00 PM	639	740	1,379
8:00 PM - 9:00 PM	536	611	1,147
9:00 PM - 10:00 PM	488	588	1,076
10:00 PM - 11:00 PM	303	330	633
11:00 PM - 12:00 AM	192	195	387
Total	**9,278**	**9,613**	**18,891**

24-Hour	*EB*	*Volume*	*13,799*	*24-Hour*	*WB*	*Volume*	*15,147*



LINSCOTT LAW & GREENSPAN engineers

24 Hour Segment Count

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

AVC

Location: i. Montezuma Road btw 55th Street to College Avenue

Orientation: *East-West*

Date of Count: *Tuesday, April 19, 2016*

Analysts: *DASH*

Weather: *Sunny*

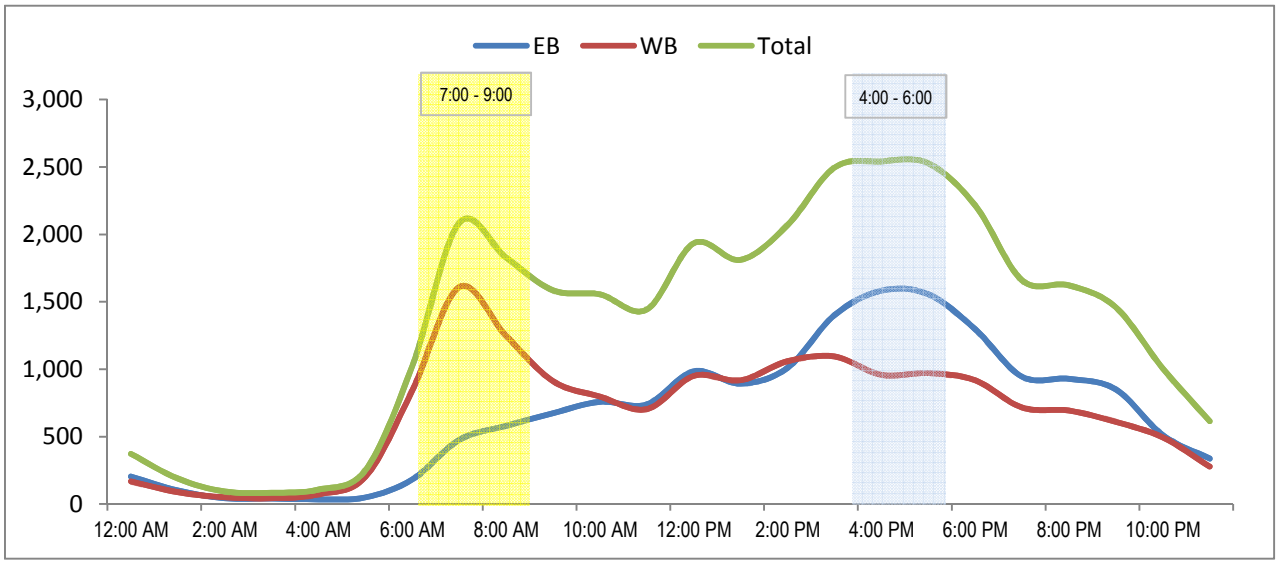
AVC Proj. No: *16-0506*

24 Hour Segment Volume			*32,570*

Time	Hourly Volume		
	EB	WB	Total
12:00 AM - 1:00 AM	204	168	372
1:00 AM - 2:00 AM	101	88	189
2:00 AM - 3:00 AM	43	50	93
3:00 AM - 4:00 AM	41	43	84
4:00 AM - 5:00 AM	35	72	107
5:00 AM - 6:00 AM	49	202	251
6:00 AM - 7:00 AM	182	843	1,025
7:00 AM - 8:00 AM	476	1,609	2,085
8:00 AM - 9:00 AM	580	1,247	1,827
9:00 AM - 10:00 AM	674	911	1,585
10:00 AM - 11:00 AM	758	797	1,555
11:00 AM - 12:00 PM	739	704	1443
Total	**3,882**	**6,734**	**10,616**

Time	Hourly Volume		
	EB	WB	Total
12:00 PM - 1:00 PM	984	950	1,934
1:00 PM - 2:00 PM	893	918	1,811
2:00 PM - 3:00 PM	1,010	1,059	2,069
3:00 PM - 4:00 PM	1,401	1,094	2,495
4:00 PM - 5:00 PM	1,583	958	2,541
5:00 PM - 6:00 PM	1,556	971	2,527
6:00 PM - 7:00 PM	1,297	918	2,215
7:00 PM - 8:00 PM	944	716	1,660
8:00 PM - 9:00 PM	929	693	1,622
9:00 PM - 10:00 PM	850	609	1,459
10:00 PM - 11:00 PM	511	495	1,006
11:00 PM - 12:00 AM	337	278	615
Total	**12,295**	**9,659**	**21,954**

24-Hour	*EB*	*Volume*	*16,177*	*24-Hour*	*WB*	*Volume*	*16,393*



APPENDIX B

SYNCHRO ANALYSIS WORKSHEETS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	911	439	64	1060	913	54
Future Volume (vph)	911	439	64	1060	913	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	1770	3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	990	477	70	1152	992	59
RTOR Reduction (vph)	0	70	0	0	0	32
Lane Group Flow (vph)	990	407	70	1152	992	27
Turn Type	NA	pt+ov	Prot	NA	Prot	Perm
Protected Phases	4	4 2	3	8	2	
Permitted Phases						2
Actuated Green, G (s)	32.6	81.0	7.1	43.7	44.4	44.4
Effective Green, g (s)	32.6	81.0	7.1	43.7	44.4	44.4
Actuated g/C Ratio	0.34	0.84	0.07	0.45	0.46	0.46
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1200	1334	130	1609	1586	731
v/s Ratio Prot	c0.28	0.26	0.04	c0.33	c0.29	
v/s Ratio Perm						0.02
v/c Ratio	0.82	0.31	0.54	0.72	0.63	0.04
Uniform Delay, d1	29.1	1.6	42.9	21.2	19.6	14.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	0.1	4.2	1.5	1.9	0.1
Delay (s)	33.9	1.7	47.2	22.7	21.4	14.2
Level of Service	C	A	D	C	C	B
Approach Delay (s)	23.4			24.1	21.0	
Approach LOS	C			C	C	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	96.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	503	330	13	4	829	292	45	19	19	75	1	122
Future Volume (vph)	503	330	13	4	829	292	45	19	19	75	1	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94		0.99		1.00	1.00	0.83
Flpb, ped/bikes	1.00	1.00		0.95	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (prot)	3433	3504		1675	3539	1490		1731		1681	1687	1314
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (perm)	3433	3504		1675	3539	1490		1731		1681	1687	1314
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	547	359	14	4	901	317	49	21	21	82	1	133
RTOR Reduction (vph)	0	1	0	0	0	170	0	10	0	0	0	124
Lane Group Flow (vph)	547	372	0	4	901	147	0	81	0	43	40	9
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	23.2	80.2		0.8	58.5	58.5		16.8		8.4	8.4	8.4
Effective Green, g (s)	23.2	80.2		0.8	58.5	58.5		16.8		8.4	8.4	8.4
Actuated g/C Ratio	0.18	0.64		0.01	0.46	0.46		0.13		0.07	0.07	0.07
Clearance Time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Vehicle Extension (s)	2.0	4.9		2.0	4.1	4.1		2.0		3.1	3.1	3.1
Lane Grp Cap (vph)	632	2230		10	1643	691		230		112	112	87
v/s Ratio Prot	c0.16	0.11		0.00	c0.25			c0.05		c0.03	0.02	
v/s Ratio Perm						0.10						0.01
v/c Ratio	0.87	0.17		0.40	0.55	0.21		0.35		0.38	0.36	0.10
Uniform Delay, d1	49.9	9.3		62.4	24.3	20.1		49.7		56.3	56.2	55.3
Progression Factor	1.00	1.00		1.01	0.73	1.44		1.00		1.00	1.00	1.00
Incremental Delay, d2	11.5	0.2		6.6	0.9	0.5		0.3		2.3	2.0	0.5
Delay (s)	61.4	9.5		69.7	18.7	29.4		50.0		58.6	58.2	55.8
Level of Service	E	A		E	B	C		D		E	E	E
Approach Delay (s)		40.3			21.6			50.0			56.8	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	289	83	21	682	183	571	885	51	90	431	286
Future Volume (vph)	163	289	83	21	682	183	571	885	51	90	431	286
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.94	1.00	1.00		1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1499	1770	3539	1495	3433	3500		1770	3539	1482
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1499	1770	3539	1495	3433	3500		1770	3539	1482
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	314	90	23	741	199	621	962	55	98	468	311
RTOR Reduction (vph)	0	0	53	0	0	121	0	3	0	0	0	164
Lane Group Flow (vph)	177	314	37	23	741	78	621	1014	0	98	468	147
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			15			15			15			15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	15.2	51.3	51.3	3.6	39.7	39.7	29.0	42.1		10.2	23.3	23.3
Effective Green, g (s)	15.2	51.3	51.3	3.6	39.7	39.7	29.0	42.1		10.2	23.3	23.3
Actuated g/C Ratio	0.12	0.41	0.41	0.03	0.32	0.32	0.23	0.33		0.08	0.18	0.18
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Vehicle Extension (s)	2.0	5.5	5.5	2.0	5.9	5.9	2.0	3.9		2.0	3.5	3.5
Lane Grp Cap (vph)	213	1440	610	50	1115	471	790	1169		143	654	274
v/s Ratio Prot	c0.10	0.09		0.01	c0.21		c0.18	c0.29		0.06	0.13	
v/s Ratio Perm			0.02			0.05						0.10
v/c Ratio	0.83	0.22	0.06	0.46	0.66	0.17	0.79	0.87		0.69	0.72	0.54
Uniform Delay, d1	54.1	24.3	22.7	60.2	37.4	31.2	45.6	39.3		56.3	48.2	46.5
Progression Factor	0.94	1.22	9.83	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.2	0.3	0.2	2.4	3.1	0.8	4.8	7.2		10.3	3.9	2.3
Delay (s)	73.1	29.9	223.3	62.7	40.5	31.9	50.4	46.5		66.7	52.1	48.7
Level of Service	E	C	F	E	D	C	D	D		E	D	D
Approach Delay (s)		73.0			39.3			48.0			52.5	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	50.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1818	955	119	1349	559	60
Future Volume (vph)	1818	955	119	1349	559	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	1770	3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1976	1038	129	1466	608	65
RTOR Reduction (vph)	0	51	0	0	0	51
Lane Group Flow (vph)	1976	987	129	1466	608	14
Turn Type	NA	pt+ov	Prot	NA	Prot	Perm
Protected Phases	4	4 2	3	8	2	
Permitted Phases						2
Actuated Green, G (s)	55.0	80.0	10.8	69.8	21.0	21.0
Effective Green, g (s)	55.0	80.0	10.8	69.8	21.0	21.0
Actuated g/C Ratio	0.56	0.81	0.11	0.71	0.21	0.21
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1970	1281	193	2500	729	336
v/s Ratio Prot	c0.56	c0.62	0.07	c0.41	0.18	
v/s Ratio Perm						0.01
v/c Ratio	1.00	0.77	0.67	0.59	0.83	0.04
Uniform Delay, d1	21.9	4.8	42.3	7.3	37.2	30.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.0	2.9	8.5	0.4	10.8	0.2
Delay (s)	42.9	7.7	50.7	7.6	48.1	31.1
Level of Service	D	A	D	A	D	C
Approach Delay (s)	30.8			11.1	46.4	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	98.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	314	808	74	24	551	184	49	11	11	257	23	406
Future Volume (vph)	314	808	74	24	551	184	49	11	11	257	23	406
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.94		0.99		1.00	1.00	0.91
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (prot)	3433	3459		1770	3539	1486		1744		1681	1698	1438
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (perm)	3433	3459		1770	3539	1486		1744		1681	1698	1438
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	341	878	80	26	599	200	53	12	12	279	25	441
RTOR Reduction (vph)	0	3	0	0	0	106	0	5	0	0	0	381
Lane Group Flow (vph)	341	955	0	26	599	94	0	72	0	145	159	60
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	17.5	75.1		4.5	62.8	62.8		15.6		18.0	18.0	18.0
Effective Green, g (s)	17.5	75.1		4.5	62.8	62.8		15.6		18.0	18.0	18.0
Actuated g/C Ratio	0.13	0.56		0.03	0.47	0.47		0.12		0.14	0.14	0.14
Clearance Time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Vehicle Extension (s)	2.0	4.9		2.0	4.1	4.1		2.0		3.1	3.1	3.1
Lane Grp Cap (vph)	451	1953		59	1671	701		204		227	229	194
v/s Ratio Prot	c0.10	c0.28		0.01	0.17			c0.04		0.09	c0.09	
v/s Ratio Perm						0.06						0.04
v/c Ratio	0.76	0.49		0.44	0.36	0.13		0.35		0.64	0.69	0.31
Uniform Delay, d1	55.7	17.4		63.0	22.3	19.8		54.0		54.4	54.9	51.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	6.3	0.9		1.9	0.6	0.4		0.4		5.8	8.9	0.9
Delay (s)	62.0	18.3		64.9	22.9	20.2		54.4		60.3	63.7	52.8
Level of Service	E	B		E	C	C		D		E	E	D
Approach Delay (s)		29.8			23.6			54.4			56.6	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	905	436	176	381	165	315	562	47	191	707	274
Future Volume (vph)	290	905	436	176	381	165	315	562	47	191	707	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00		1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1491	1770	3539	1487	3433	3481		1770	3539	1483
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1491	1770	3539	1487	3433	3481		1770	3539	1483
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	315	984	474	191	414	179	342	611	51	208	768	298
RTOR Reduction (vph)	0	0	183	0	0	86	0	5	0	0	0	129
Lane Group Flow (vph)	315	984	291	191	414	93	342	657	0	208	768	169
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			15			15			15			15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	28.0	48.9	48.9	17.8	38.7	38.7	20.0	32.4		22.1	34.5	34.5
Effective Green, g (s)	28.0	48.9	48.9	17.8	38.7	38.7	20.0	32.4		22.1	34.5	34.5
Actuated g/C Ratio	0.20	0.35	0.35	0.13	0.28	0.28	0.14	0.23		0.16	0.25	0.25
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Vehicle Extension (s)	2.0	5.5	5.5	2.0	5.9	5.9	2.0	3.9		2.0	3.5	3.5
Lane Grp Cap (vph)	354	1236	520	225	978	411	490	805		279	872	365
v/s Ratio Prot	c0.18	c0.28		0.11	0.12		0.10	0.19		c0.12	c0.22	
v/s Ratio Perm			0.20			0.06						0.11
v/c Ratio	0.89	0.80	0.56	0.85	0.42	0.23	0.70	0.82		0.75	0.88	0.46
Uniform Delay, d1	54.5	41.1	36.8	59.8	41.5	39.1	57.1	51.0		56.3	50.8	44.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.2	5.4	4.3	23.7	1.3	1.3	3.5	6.7		9.1	10.5	1.1
Delay (s)	76.7	46.4	41.2	83.5	42.8	40.4	60.6	57.7		65.4	61.3	46.0
Level of Service	E	D	D	F	D	D	E	E		E	E	D
Approach Delay (s)		50.4			52.2			58.7			58.4	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	54.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	929	439	64	1066	913	55
Future Volume (vph)	929	439	64	1066	913	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	1770	3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1010	477	70	1159	992	60
RTOR Reduction (vph)	0	70	0	0	0	32
Lane Group Flow (vph)	1010	407	70	1159	992	28
Turn Type	NA	pt+ov	Prot	NA	Prot	Perm
Protected Phases	4	4 2	3	8	2	
Permitted Phases						2
Actuated Green, G (s)	32.6	81.0	7.1	43.7	44.4	44.4
Effective Green, g (s)	32.6	81.0	7.1	43.7	44.4	44.4
Actuated g/C Ratio	0.34	0.84	0.07	0.45	0.46	0.46
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1200	1334	130	1609	1586	731
v/s Ratio Prot	c0.29	0.26	0.04	c0.33	c0.29	
v/s Ratio Perm						0.02
v/c Ratio	0.84	0.31	0.54	0.72	0.63	0.04
Uniform Delay, d1	29.4	1.6	42.9	21.2	19.6	14.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.1	4.2	1.6	1.9	0.1
Delay (s)	34.9	1.7	47.2	22.9	21.4	14.3
Level of Service	C	A	D	C	C	B
Approach Delay (s)	24.2			24.2	21.0	
Approach LOS	C			C	C	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	96.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	503	349	13	4	835	292	45	19	19	75	1	122
Future Volume (vph)	503	349	13	4	835	292	45	19	19	75	1	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94		0.99		1.00	1.00	0.83
Flpb, ped/bikes	1.00	1.00		0.95	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (prot)	3433	3506		1678	3539	1490		1731		1681	1687	1314
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (perm)	3433	3506		1678	3539	1490		1731		1681	1687	1314
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	547	379	14	4	908	317	49	21	21	82	1	133
RTOR Reduction (vph)	0	1	0	0	0	168	0	10	0	0	0	124
Lane Group Flow (vph)	547	392	0	4	908	149	0	81	0	43	40	9
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	22.6	80.5		0.5	59.1	59.1		16.8		8.4	8.4	8.4
Effective Green, g (s)	22.6	80.5		0.5	59.1	59.1		16.8		8.4	8.4	8.4
Actuated g/C Ratio	0.18	0.64		0.00	0.47	0.47		0.13		0.07	0.07	0.07
Clearance Time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Vehicle Extension (s)	2.0	4.9		2.0	4.1	4.1		2.0		3.1	3.1	3.1
Lane Grp Cap (vph)	615	2239		6	1659	698		230		112	112	87
v/s Ratio Prot	c0.16	0.11		0.00	c0.26			c0.05		c0.03	0.02	
v/s Ratio Perm						0.10						0.01
v/c Ratio	0.89	0.17		0.67	0.55	0.21		0.35		0.38	0.36	0.10
Uniform Delay, d1	50.5	9.2		62.7	23.9	19.7		49.7		56.3	56.2	55.3
Progression Factor	1.00	1.00		1.04	0.75	1.45		1.00		1.00	1.00	1.00
Incremental Delay, d2	14.3	0.2		95.7	0.9	0.5		0.3		2.3	2.0	0.5
Delay (s)	64.8	9.4		160.7	18.9	29.1		50.0		58.6	58.2	55.8
Level of Service	E	A		F	B	C		D		E	E	E
Approach Delay (s)		41.7			22.0			50.0			56.8	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	33.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	308	83	21	688	183	571	885	52	96	431	286
Future Volume (vph)	163	308	83	21	688	183	571	885	52	96	431	286
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.94	1.00	1.00		1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1498	1770	3539	1495	3433	3499		1770	3539	1482
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1498	1770	3539	1495	3433	3499		1770	3539	1482
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	335	90	23	748	199	621	962	57	104	468	311
RTOR Reduction (vph)	0	0	54	0	0	120	0	3	0	0	0	143
Lane Group Flow (vph)	177	335	36	23	748	79	621	1016	0	104	468	168
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			15			15			15			15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	14.0	50.0	50.0	4.3	40.3	40.3	29.6	42.1		10.8	23.3	23.3
Effective Green, g (s)	14.0	50.0	50.0	4.3	40.3	40.3	29.6	42.1		10.8	23.3	23.3
Actuated g/C Ratio	0.11	0.40	0.40	0.03	0.32	0.32	0.23	0.33		0.09	0.18	0.18
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Vehicle Extension (s)	2.0	5.5	5.5	2.0	5.9	5.9	2.0	3.9		2.0	3.5	3.5
Lane Grp Cap (vph)	196	1404	594	60	1131	478	806	1169		151	654	274
v/s Ratio Prot	c0.10	0.09		0.01	c0.21		c0.18	c0.29		0.06	0.13	
v/s Ratio Perm			0.02			0.05						0.11
v/c Ratio	0.90	0.24	0.06	0.38	0.66	0.16	0.77	0.87		0.69	0.72	0.61
Uniform Delay, d1	55.3	25.3	23.5	59.6	37.0	30.8	45.0	39.4		56.0	48.2	47.2
Progression Factor	0.92	1.25	10.28	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	37.5	0.4	0.2	1.5	3.0	0.7	4.2	7.3		9.9	3.9	4.3
Delay (s)	88.3	32.0	241.5	61.0	40.0	31.5	49.2	46.6		65.9	52.1	51.5
Level of Service	F	C	F	E	D	C	D	D		E	D	D
Approach Delay (s)		79.9			38.8			47.6			53.5	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	51.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1824	955	120	1367	559	60
Future Volume (vph)	1824	955	120	1367	559	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	1770	3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1983	1038	130	1486	608	65
RTOR Reduction (vph)	0	51	0	0	0	51
Lane Group Flow (vph)	1983	987	130	1486	608	14
Turn Type	NA	pt+ov	Prot	NA	Prot	Perm
Protected Phases	4	4 2	3	8	2	
Permitted Phases						2
Actuated Green, G (s)	55.1	80.1	10.8	69.9	21.0	21.0
Effective Green, g (s)	55.1	80.1	10.8	69.9	21.0	21.0
Actuated g/C Ratio	0.56	0.81	0.11	0.71	0.21	0.21
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1971	1282	193	2501	728	336
v/s Ratio Prot	c0.56	c0.62	0.07	c0.42	0.18	
v/s Ratio Perm						0.01
v/c Ratio	1.01	0.77	0.67	0.59	0.84	0.04
Uniform Delay, d1	21.9	4.7	42.4	7.3	37.3	30.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.7	2.9	8.9	0.4	10.9	0.2
Delay (s)	43.6	7.7	51.3	7.7	48.2	31.2
Level of Service	D	A	D	A	D	C
Approach Delay (s)	31.3			11.2	46.6	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	98.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	314	814	74	24	570	184	49	11	11	257	23	406
Future Volume (vph)	314	814	74	24	570	184	49	11	11	257	23	406
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.94		0.99		1.00	1.00	0.91
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (prot)	3433	3459		1770	3539	1486		1744		1681	1698	1436
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (perm)	3433	3459		1770	3539	1486		1744		1681	1698	1436
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	341	885	80	26	620	200	53	12	12	279	25	441
RTOR Reduction (vph)	0	3	0	0	0	105	0	5	0	0	0	382
Lane Group Flow (vph)	341	962	0	26	620	95	0	72	0	145	159	59
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	17.6	76.2		4.5	63.8	63.8		15.6		17.9	17.9	17.9
Effective Green, g (s)	17.6	76.2		4.5	63.8	63.8		15.6		17.9	17.9	17.9
Actuated g/C Ratio	0.13	0.57		0.03	0.48	0.48		0.12		0.13	0.13	0.13
Clearance Time (s)	4.4	5.6		4.4	4.9	4.9		4.9		4.9	4.9	4.9
Vehicle Extension (s)	2.0	4.9		2.0	4.1	4.1		2.0		3.1	3.1	3.1
Lane Grp Cap (vph)	450	1966		59	1684	707		203		224	226	191
v/s Ratio Prot	c0.10	c0.28		0.01	0.18			c0.04		0.09	c0.09	
v/s Ratio Perm						0.06						0.04
v/c Ratio	0.76	0.49		0.44	0.37	0.13		0.35		0.65	0.70	0.31
Uniform Delay, d1	56.1	17.3		63.5	22.3	19.6		54.6		55.1	55.5	52.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	6.4	0.9		1.9	0.6	0.4		0.4		6.4	9.6	1.0
Delay (s)	62.5	18.1		65.4	22.9	20.0		54.9		61.4	65.1	53.4
Level of Service	E	B		E	C	C		D		E	E	D
Approach Delay (s)		29.7			23.5			54.9			57.5	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	134.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	911	436	177	400	171	315	562	47	191	707	274
Future Volume (vph)	290	911	436	177	400	171	315	562	47	191	707	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00		1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1492	1770	3539	1489	3433	3481		1770	3539	1483
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1492	1770	3539	1489	3433	3481		1770	3539	1483
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	315	990	474	192	435	186	342	611	51	208	768	298
RTOR Reduction (vph)	0	0	207	0	0	111	0	5	0	0	0	129
Lane Group Flow (vph)	315	990	267	192	435	75	342	657	0	208	768	169
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			15			15			15			15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	28.0	52.1	52.1	17.9	42.0	42.0	16.7	30.3		20.9	34.5	34.5
Effective Green, g (s)	28.0	52.1	52.1	17.9	42.0	42.0	16.7	30.3		20.9	34.5	34.5
Actuated g/C Ratio	0.20	0.37	0.37	0.13	0.30	0.30	0.12	0.22		0.15	0.25	0.25
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	5.1	5.1
Vehicle Extension (s)	2.0	5.5	5.5	2.0	5.9	5.9	2.0	3.9		2.0	3.5	3.5
Lane Grp Cap (vph)	354	1317	555	226	1061	446	409	753		264	872	365
v/s Ratio Prot	c0.18	c0.28		0.11	0.12		0.10	0.19		c0.12	c0.22	
v/s Ratio Perm			0.18			0.05						0.11
v/c Ratio	0.89	0.75	0.48	0.85	0.41	0.17	0.84	0.87		0.79	0.88	0.46
Uniform Delay, d1	54.5	38.3	33.6	59.7	39.1	36.1	60.3	53.0		57.4	50.8	44.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.2	4.0	3.0	23.7	1.2	0.8	13.2	11.2		13.3	10.5	1.1
Delay (s)	76.7	42.3	36.6	83.4	40.3	36.9	73.5	64.2		70.7	61.3	46.0
Level of Service	E	D	D	F	D	D	E	E		E	E	D
Approach Delay (s)		46.9			49.7			67.4			59.3	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	54.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group