Addendum To The
Plaza Linda Verde Final Environmental Impact Report
State Clearinghouse No. 2009011040

Complete Streets Scenario

SAN DIEGO STATE UNIVERSITY

Prepared For:
California State University, San Diego State University
CSU Board of Trustees

September 2014

Table of Contents

Section **Page**

1.0 INTRODUCTION 1

1.1 Supplemental or Subsequent EIR Not Required 5

2.0 ANALYSIS 7

2.1 Project Description 7

2.2 Environmental Analysis 19

2.3 Conclusion 42

List of Tables

2.0-1 Approved Project Land Use Statistical Summary 8

2.0-2 CO Hotspots Modeling Results - College Avenue and Montezuma Road Intersection 23

2.0-3 Future Traffic Volumes and Estimated Traffic Noise Increases - Approved Project vs. Complete Streets Scenario 31

2.0-4 Long-Term (2035) Intersection Operations 39

2.0-5 Long-Term (2035) Corridor Queue Summary 40

2.0-6 Long-Term Diversion Traffic 40

2.0-7 Long-Term Intersection Diversion Analysis 41

List of Figures

1.0-1 Approved Site Plan 3

2.0-1 Existing College Avenue Roadway Configuration With Approved Project..........11

2.0-2 Stepner College Avenue Roadway Configuration 13

2.0-3 Complete Streets College Avenue Roadway Configuration 15

Appendices

A Air Quality

San Diego State University Complete Streets Addendum to the Plaza Linda Verde Final EIR - Air Quality and Greenhouse Gas Technical Memorandum, DUDEK, June 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR - Air Quality and Greenhouse Gas Technical Memorandum – Diversion Analysis Review, DUDEK, August 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR - Air Quality and Greenhouse Gas Technical Memorandum – Queuing Analysis Review, DUDEK, August 2014

B Noise

San Diego State University Complete Streets Addendum to the Plaza Linda Verde Final EIR - Noise Analysis Technical Memorandum, DUDEK, June 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Noise Analysis Technical Memorandum Update – Diversion Analysis Review, DUDEK, August 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Noise Analysis Technical Memorandum Update – Queuing Analysis Review, DUDEK, August 2014

C Transportation/Circulation and Parking

Plaza Linda Verde Complete Streets Design Analyses, Linscott Law & Greenspan, June 2014

Plaza Linda Verde – Diversion Analysis, Linscott Law & Greenspan, July 2014

Plaza Linda Verde – Complete Streets Design Analyses (Revised), Linscott Law & Greenspan, August 2014

E-mail, from Jamie Frye, Sundt Construction, Inc., to Robert Schulz, SDSU, August 14, 2014, Subject: 131450 – SDSU South Campus Plaza – TCP-12 Mitigation Measure, cost estimate

Plaza Linda Verde Final Environmental Impact Report (May 2011), Table 3.12-23A, Traffic Mitigation Costs and Fair-Share Amount Apportioned Based on Type Use (Revised August 2014)

1.0 INTRODUCTION

This document is an Addendum to the Final Environmental Impact Report (EIR) for San Diego State University's (SDSU) Plaza Linda Verde Project, State Clearinghouse No. 2009011040 (May 2011), and has been prepared pursuant to the California Environmental Quality Act (CEQA; Pub. Resources Code, §21000 et seq.). The Project's Final EIR was certified as adequate by the Board of Trustees of the California State University (CSU) on May 9-10, 2011. A previous Addendum to the Final EIR was approved by CSU on May 20, 2014.

Concurrent with certification of the Final EIR, CSU approved the Plaza Linda Verde Project. The Project is a mixed-use development – located on an approximately 18-acre site – featuring ground-floor retail and upper-floor student housing, parking facilities, and a campus green and pedestrian malls that link the Project site to the main SDSU campus. The Project entails construction of seven buildings and related infrastructure, as illustrated in **Figure 1.0-1**, **Approved Site Plan**. The previous Addendum analyzed the potential effects associated with an increase in the height of three of the seven buildings that comprise the approved Project.

Subsequent to approval of the Plaza Linda Verde Project, SDSU identified a discrete number of proposed modifications to the approved Project and new information became available about changes to the circumstances under which the approved Project will be built. More specifically, SDSU and the City of San Diego recently collaborated to develop a comprehensive strategy for addressing roadway, bikeway and pedestrian design along a limited segment of College Avenue located north of Montezuma Road and south of the existing suspended pedestrian bridge. Based on the two agencies' discussions, SDSU now proposes to slightly modify the approved Project's bike lane and sidewalk design along the subject segment of College Avenue, and modify certain traffic-related mitigation measures for that same segment. These proposed Project modifications and changed circumstances are collectively referred to as the "Complete Streets Scenario."

In accordance with CEQA, this Addendum provides an analysis of the potential environmental effects associated with the Complete Streets Scenario for the subject segment of College Avenue, as compared to the analysis contained in the previously certified Final EIR. For the reasons explained below, the Complete Streets Scenario would not result in new significant environmental effects or a substantial increase in the severity of previously identified significant effects and, therefore, the proposed Project modifications and changed circumstances do not trigger the need for further environmental analysis in a subsequent or supplemental EIR under the requirements of CEQA and the State CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et seq.).

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Complete Streets Scenario
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Figure 1.0-1

Approved Site Plan

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Plaza Linda Verde Addendum
Complete Streets Scenario
September 2014

1.1 Supplemental or Subsequent EIR Not Required

Under CEQA, a lead agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary to the EIR but none of the conditions described in State CEQA Guidelines section 15162 calling for preparation of a subsequent EIR have occurred. (State CEQA Guidelines, §15164(a).)

State CEQA Guidelines section 15162 provides that when an EIR has been certified for a project, a subsequent EIR shall be prepared for that project if the lead agency determines one or more of the following have occurred:

(1) Substantial changes are proposed in the project which will require major revisions of the previous EIR … due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;

(2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR … due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or

(3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete … shows any of the following:

- (A) The project will have one or more significant effects not discussed in the previous EIR …;
- (B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;
- (C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or
- (D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.

As explained below in **Section 2.0**, there is no substantial evidence in light of the whole record that the Complete Streets Scenario would result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect. Additionally, there is no new information not previously known that shows new significant environmental effects or an increase in the severity of previously identified significant effects. For these reasons, preparation of an addendum is appropriate under these circumstances. An addendum need not be circulated for public review and can be attached to the Final EIR. (State CEQA Guidelines, §15164(c).)

2.0 ANALYSIS

This section describes the previously approved Plaza Linda Verde Project that was analyzed in the Final EIR, and the proposed modifications to the approved Project and changed circumstances that have arisen due to the development of the Complete Streets Scenario for the limited segment of College Avenue located north of Montezuma Road and south of the suspended pedestrian bridge. The section also presents a summary of the environmental analysis contained in the Final EIR, followed by a comparative analysis of the environmental impacts attributable to the proposed Project modifications and changed circumstances relating to the subject segment of College Avenue.

2.1 Project Description

Approved Plaza Linda Verde Project

The approved Plaza Linda Verde Project, as illustrated in **Figure 1.0-1** of this Addendum, is comprised of the following five components located on an approximately 18-acre site within the Campus Master Plan boundary:

Mixed-Use Retail/Student Housing. This component consists of four ground-floor retail and upper-floor residential buildings (Buildings 1, 2, 4 and 5) located south of Hardy Avenue, north of Montezuma Road, and west and east of College Avenue.

Student Apartments. This component consists of two buildings (Buildings 6 and 7) located west of Campanile Drive, north of Montezuma Road, and south of Lindo Paseo.

Parking Facilities. This component consists of a free-standing parking structure (Building 3) located at the northwest corner of Lindo Paseo and Montezuma Place. In addition to Building 3, Buildings 4 and 5 also contain underground parking.

Campus Green. The approved Project also includes a campus green, which is planned for development south of the existing SDSU Transit Center, and would consist of active and passive recreational areas for public use.

Pedestrian Malls. The approved Project also includes two pedestrian malls, in place of existing streets/alleys, to be located along the western and eastern flanks of the main mixed-use building area. These corridors would facilitate non-motorized movement between the Project site and main campus, and would support meeting/resting space and outdoor eating facilities associated with the adjacent retail shops.

Specific to College Avenue, the approved Project includes large trees and planters that would be installed adjacent to College Avenue and Montezuma Road; in addition, the existing median in College Avenue would be landscaped with low-maintenance, drought-tolerant plant materials. The approved Project also includes sufficient right-of-way on College Avenue for the ultimate development of Class 2 bicycle lanes (i.e., dedicated bicycle lanes within the right-of-way) in the areas fronting the Project. In May 2014, CSU approved modifications to the approved Project that increased the height of Buildings 1, 2 and 3.

Table 2.0-1, **Approved Project Land Use Statistical Summary**, provides a quantitative overview of the attributes of the approved Buildings 1 through 7.

Table 2.0-1
Approved Project Land Use Statistical Summary

Project Component	Total Size	Rentable Retail Space	Student Beds	Parking Spaces	Building Stories
Building 1	139,329	19,902	359	0	6
Building 2	117,387	14,056	300	0	6
Building 3	143,693	0	0	392	7
Building 4	123,004	13,445	256	69-110	5
Building 5	157,971	19,634	344	91-110	5
Building 6	48,070	0	192	0	4
Building 7	55,300	0	224	0	4
Totals	784,754	67,037	1,675	552-612	N/A

Table Sources:

(1) Final Environmental Impact Report, Plaza Linda Verde, SCH No. 200911040, Volume III of IV (May 2011)
(2) Addendum To The Final Environmental Impact Report For The San Diego State University Plaza Linda Verde Project, SCH. No. 2009011040, Appendix A (April 2014)

Proposed Project Modifications and Changed Circumstances:
The Complete Streets Scenario

As shown on **Figure 1.0-1**, a portion of the approved Project fronts the segment of College Avenue located north of Montezuma Road and south of the suspended pedestrian bridge.

In the certified Final EIR, the analysis of Project-related impacts along College Avenue was based on the roadway's existing 4-lane design (see **Figure 2.0-1**, **Existing College Avenue Roadway Configuration With Approved Project**) and the City of San Diego's long-term circulation plan, which assumes a six-lane roadway with three lanes in each direction. The EIR's traffic assessment also included a supplemental long-term analysis based on a more pedestrian-friendly, 4-lane configuration of College Avenue from Montezuma Road north to Canyon Crest Drive – a configuration put forth by Michael Stepner, a former City of San Diego planner (see **Figure 2.0-2**, **Stepner College Avenue Roadway Configuration**). For various reasons, the Stepner configuration was not pursued beyond the Draft EIR stage.

Recently, SDSU has coordinated with the City of San Diego on the development of a variation to the Stepner configuration, referred to as the Complete Streets Scenario, for implementation on the limited segment of College Avenue north of Montezuma Road and south of the suspended pedestrian bridge (see **Figure 2.0-3, Complete Streets College Avenue Roadway Configuration**). As shown on **Figure 2.0-3**, under this configuration, this segment of College Avenue would be modified to include two travel lanes in each direction (one 10 feet wide and the other 11 feet wide), a 5-foot wide bike lane in the southbound direction and a 6 to 7 ½-foot wide bike lane in the northbound direction with intervening 3-foot buffers adjacent to segments of the bike lanes, and a 13-foot wide sidewalk on the west side of the street.[1] The revised road configuration would be accomplished by replacing the existing median with a landscaped median; replacing the existing street curb on the west side with new curbing to facilitate a 13-foot wide sidewalk; and re-striping College Avenue to provide the identified bike and vehicle travel lanes. SDSU would fund and construct the subject improvements following issuance of a Public Right-of-Way Permit by the City.

The approved Plaza Linda Verde Project will revitalize the College Area by increasing student housing within walking distance of SDSU, and providing retail opportunities for students, faculty/staff, and College Area residents. The Complete Streets Scenario would further this revitalization by providing substantial improvements to the campus' southern gateway at the intersection of College Avenue and Montezuma Road. More specifically, the Complete Streets Scenario includes several multi-modal elements, the intent and effect of which is to promote the interaction of various uses and enhance the overall safety of non-vehicular mobility in the College Area surrounding SDSU. In short, Complete Streets means moving people, not cars – with the result being cleaner

[1] The primary differences between the Complete Streets and Stepner configurations are the elimination of on-street parking and the provision of a sidewalk exclusively on the west side of the street; in all other respects, the differences between the two plans are relatively minor (e.g., 11-foot v. 10-foot wide travel lanes, 5-foot v. 6-foot wide bike lanes, and 13-foot v. 16-foot wide sidewalks).

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SOURCE: SDSU

Plaza Linda Verde Addendum
Complete Streets Scenario
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Figure 2.0-1
Existing College Avenue Roadway Configuration With Approved Project

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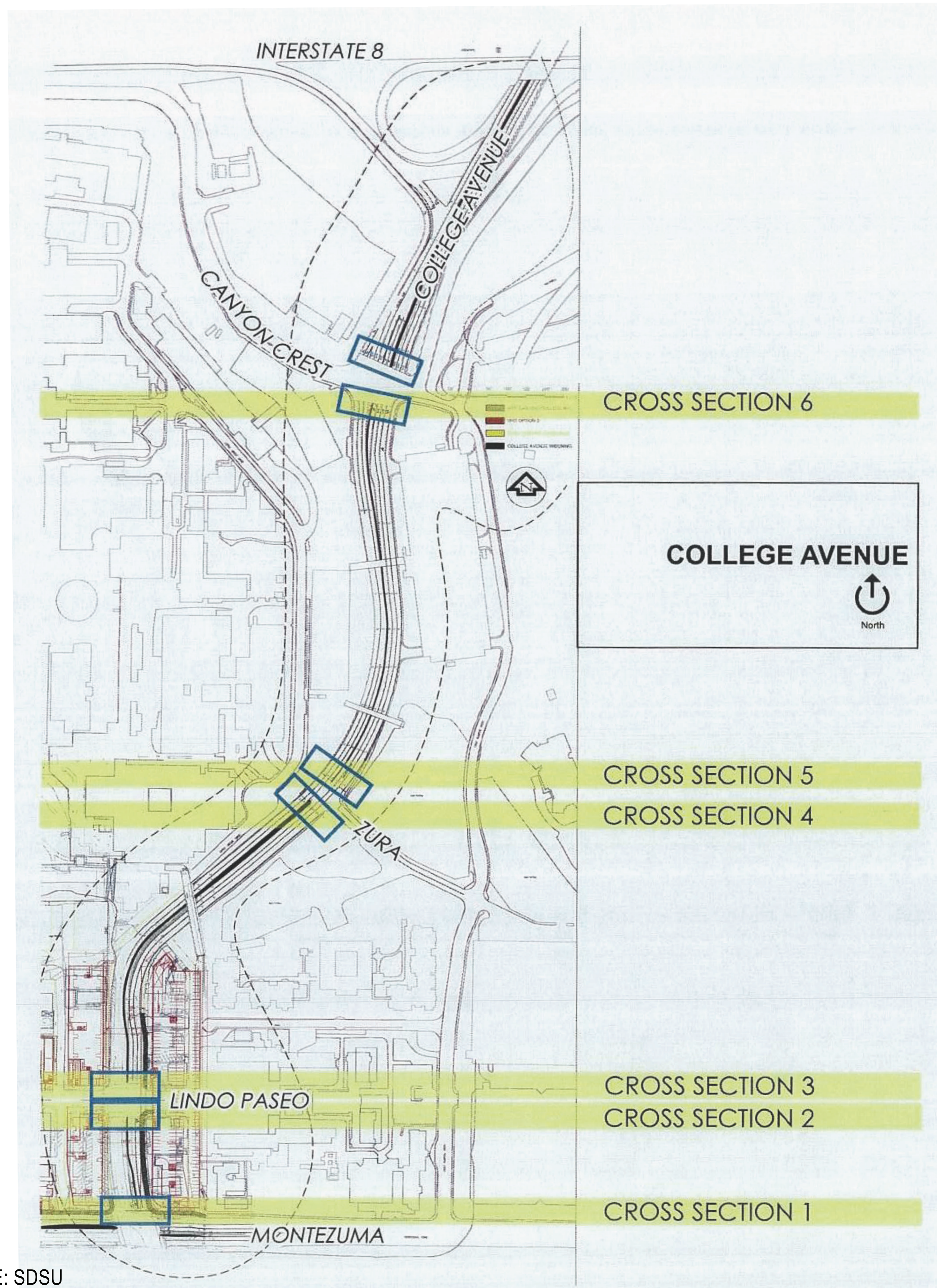
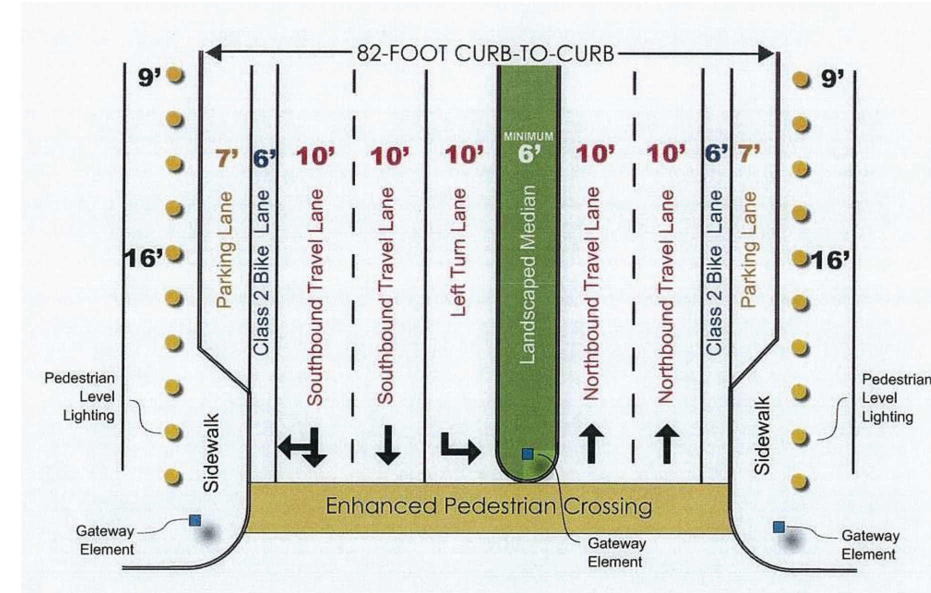
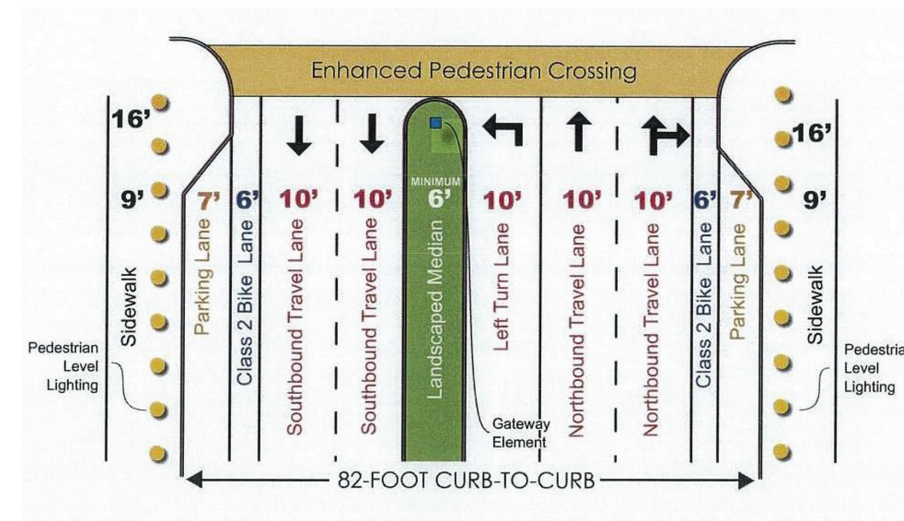


SOURCE: SDSU



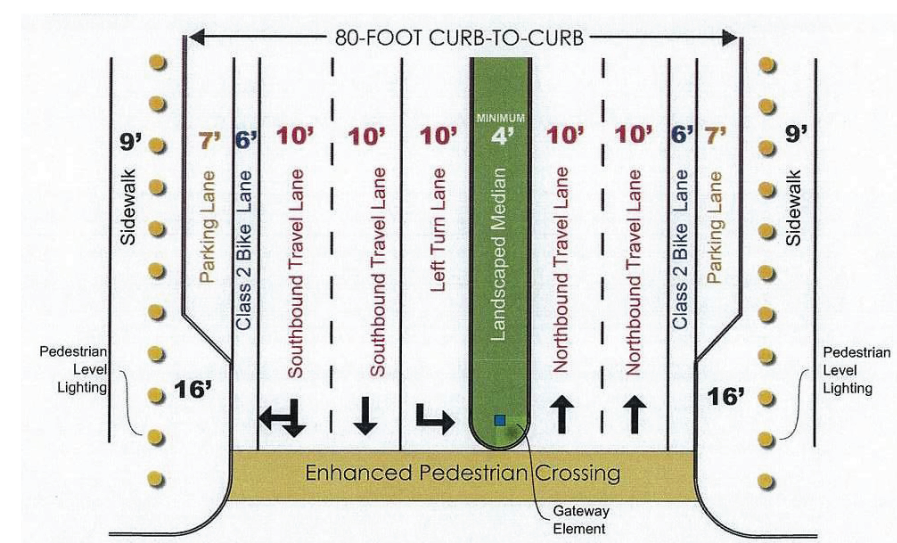
CROSS SECTION 1
COLLEGE AVENUE AT MONTEZUMA RD

NOT TO SCALE



CROSS SECTION 2
COLLEGE AVENUE SOUTH OF LINDO PASEO

NOT TO SCALE



CROSS SECTION 3
COLLEGE AVENUE NORTH OF LINDO PASEO

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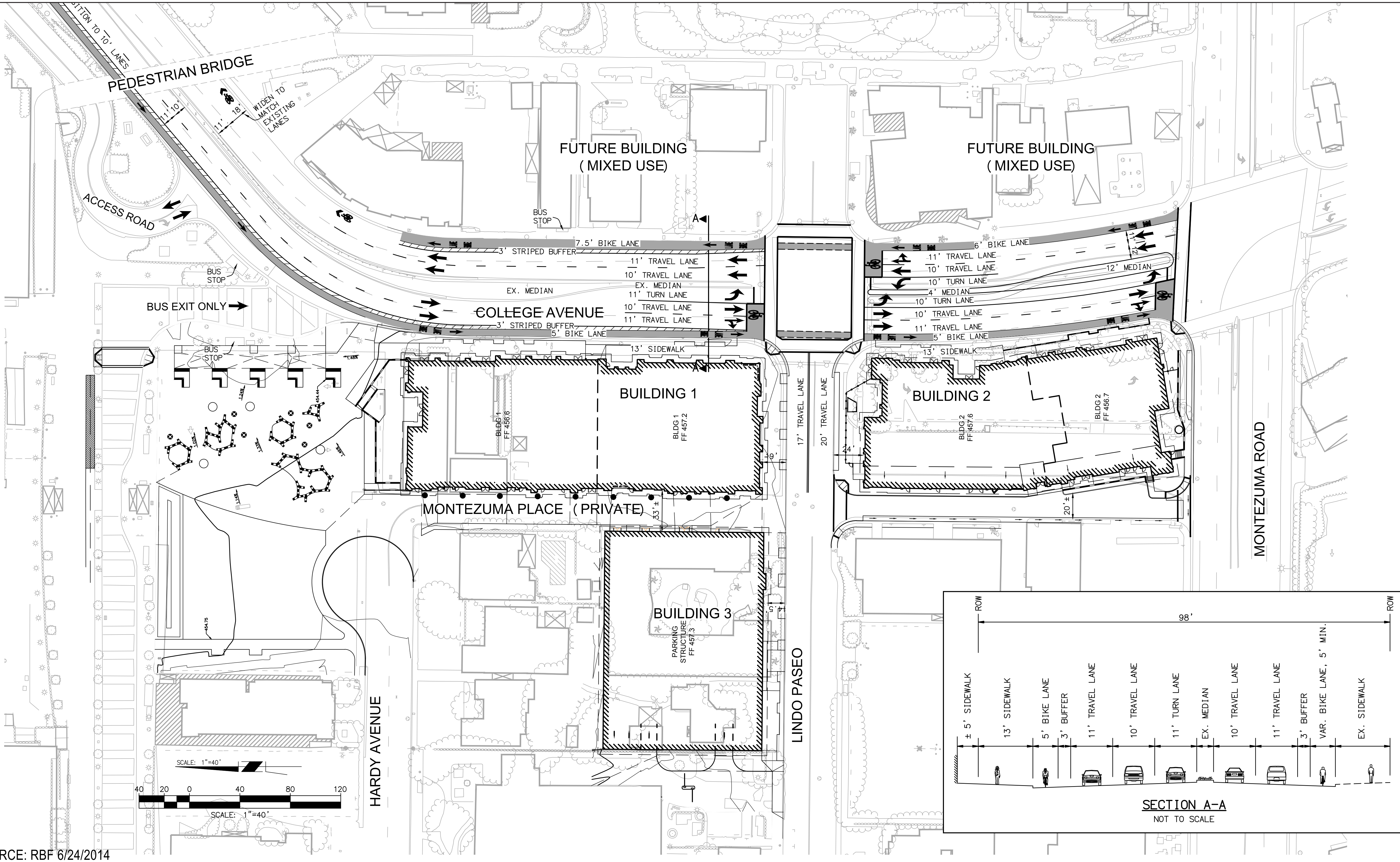

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Complete Streets Scenario
(September 2014)

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Figure 2.0-3
Complete Streets College Avenue Roadway Configuration

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air, a safer environment, an improved economy, and a higher quality of life. Areas that incorporate complete streets gain quality of life benefits, such as increased bicycling and walking that are indicative of vibrant and active living.

As described above, implementation of the Complete Streets Scenario would modify College Avenue on the segment that includes the Lindo Paseo and Montezuma Road intersections. Implementation of these modifications would negate the need for certain roadway improvement mitigation measures previously adopted by CSU in connection with its approval of the Plaza Linda Verde Project. Specifically, implementation of the Complete Streets improvements would require a minor modification to one of the previously adopted mitigation measures (TCP-3), the elimination of another mitigation measure that required widening of the College/Montezuma intersection (TCP-8), and the addition of a new mitigation measure to implement a portion of the Complete Streets configuration (TCP-12). These mitigation measure revisions are shown below (deleted text is indicated in ~~double-strikeout~~; additional text is indicated in double-underline):

TCP-3 Impact B-3: College Avenue/ Montezuma Road.

Retail

CSU/SDSU shall pay to the City of San Diego its fair share of the costs attributable to the retail component of the project (3.21%) to widen the College Avenue/Montezuma Road intersection to provide an additional (second) left-turn lane on the ~~southbound and~~ westbound approach~~es~~ to the intersection, provided that the City's share of the mitigation improvement cost has been allocated and is available for expenditure, thereby triggering CSU's fair-share contribution payment.

Student Housing

CSU/SDSU shall pay to the City of San Diego its fair share of the costs attributable to the student housing component of the project (1.80%) to widen the College Avenue/Montezuma Road intersection to provide an additional (second) left-turn lane on the ~~southbound and~~ westbound approach~~es~~ to the intersection, provided that: (a) the City's share of the mitigation improvement cost has been allocated and is available for expenditure, thereby triggering CSU's fair-share contribution payment; and (b) the state Legislature appropriates the funds for said improvements as requested by CSU in the state budget process.

~~**TCP-8** Impact F-2: College Avenue: Zura Way to Montezuma Road.~~

~~*Retail*~~

~~CSU/SDSU shall pay to the City of San Diego its fair-share of the costs attributable to the retail component of the project (2.14%) to: (i) widen the southbound approach of College Avenue to Montezuma Road to provide a second left turn lane (the extra lane would result in a 7-lane cross-section on College Avenue between Montezuma Road and Lindo Paseo); and (ii) provide a third northbound through lane on College Avenue between Lindo Paseo and Zura Way, provided that the City's share of the mitigation improvement cost has been allocated and is available for expenditure, thereby triggering CSU's fair-share contribution payment.~~

~~*Student Housing*~~

~~CSU/SDSU shall pay to the City of San Diego its fair-share of the costs attributable to the student housing component of the project (0.40%) to: (i) widen the southbound approach of College Avenue to Montezuma Road to provide a second left turn lane (the extra lane would result in a 7-lane cross-section on College Avenue between Montezuma Road and Lindo Paseo); and (ii) provide a third northbound through lane on College Avenue between Lindo Paseo and Zura Way, provided that: (a) the City's share of the mitigation improvement cost has been allocated and is available for expenditure, thereby triggering CSU's fair-share contribution payment; and (b) the state Legislature appropriates the funds for said improvements as requested by CSU in the state budget process.~~

TCP-12 Following issuance by the City of San Diego of a Public Right-of-Way Permit authorizing CSU/SDSU to undertake the following work, CSU/SDSU, or its designee, shall implement at its own cost the following improvements on the segment of College Avenue between Montezuma Road north to the pedestrian over-crossing:

(1) Re-stripe College Avenue at Lindo Paseo to provide a left-turn lane, a through-lane, and a shared through/right-turn lane in the northbound and southbound directions;
(2) Re-stripe College Avenue at Montezuma Road to provide a left-turn lane, a through-lane, and a shared through/right-turn lane in the southbound direction; and,

(3) Re-stripe Lindo Paseo at College Avenue to provide a 20-foot wide travel lane on eastbound Lindo Paseo to enable right-turning vehicles to bypass stopped left-turning vehicles unimpeded.[2]

The Complete Streets Scenario would result in improved roadway, bikeway, and pedestrian design and access along a segment of College Avenue fronting the Project site, and, therefore, would provide substantial benefits to both the SDSU campus and the local transportation network. Because of these mutual benefits and because CSU/SDSU and the City of San Diego have worked cooperatively to achieve these mutually beneficial results, CSU will fully fund the costs of the TCP-12 road improvements contingent only upon the City's issuance of the necessary right-of-way permit. CSU's payment is limited to mitigation measure TCP-12, is not intended to have any precedential value due to the unique circumstances surrounding the Complete Streets project, and does not constitute a concession or admission relative to the litigation presently pending before the California Supreme Court (*City of San Diego, et al. v. The Board of Trustees of California State University*, Case No. S199557).

While the certified Final EIR previously addressed the potential environmental impacts of the approved Project, including consideration of the 4-lane Stepner configuration for College Avenue, this Addendum provides a supplemental analysis to consider the potential effects associated with implementation of the Complete Streets Scenario.

2.2 Environmental Analysis

The following is an analysis of the potential environmental effects associated with the Complete Streets Scenario, including the proposed Project modifications and mitigation measure revisions, relative to the analysis provided in the previously certified Final EIR.

Aesthetics and Visual Quality

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would not have a substantial adverse effect on a scenic vista or result in substantial damage to scenic resources located within a state scenic highway. (Draft EIR (September 2010), pp. 3.1-17 to 3.1-18.) The EIR also found that the Project would not substantially degrade the existing visual character or quality of the site and its surroundings; rather, the Project's impacts would

[2] The estimated cost to implement Mitigation Measure TCP-12 is $2,500. (See Appendix C.) See also revised Final EIR Table 3.12-23A, Traffic Mitigation Costs and Fair-Share Amount Apportioned Based on Type Use (Revised August 2014), revised to reflect the revised cost of the subject improvements. (Appendix C.)

be positive relative to building height, architectural style, and public, private and campus views. (*Id.* at pp. 3.1-18 to 3.1-29.) Finally, the EIR found that potentially significant lighting impacts attributable to construction- and operational-related activities would be effectively mitigated through adoption of Mitigation Measures AVQ-1 through AVQ-3. (*Id.* at pp. 3.1-29 to 3.1-32.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not adversely alter the visual character of the Project site and its surroundings. The proposed Project modifications and changed circumstances do not alter the architectural style or design of the approved Project, and would serve to further enhance the visual environment by creating a more pedestrian-friendly neighborhood environment. Additionally, the previously adopted aesthetics and visual quality mitigation measures would continue to apply. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to aesthetics and visual quality.

Air Quality and Global Climate Change

Approved Plaza Linda Verde Project

As to air quality, the certified EIR found that the Plaza Linda Verde Project would not conflict with or obstruct implementation of the applicable air quality plan. (Final EIR (May 2011), pp. 3.2-29 to 3.2-30.) The EIR also found that the Project's construction- and operational-related emissions would not violate any air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations. (*Id.* at pp. 3.2-30 to 3.2-41.)

The EIR also found that the Project would not create objectionable odors affecting a substantial number of people or expose sensitive receptors to substantial pollutant concentrations. (*Id.* at p. 3.2-41.) In summary, the Project would not result in potentially significant impacts to air quality.

As to global climate change, the certified EIR found that the Plaza Linda Verde Project's construction- and operational-related greenhouse gas (GHG) emissions would not be significant as the emissions quantities would be below the draft thresholds of agencies with expertise on the subject matter (i.e., the California Air Resources Board and South Coast Air Quality Management District) and consistent with the State of California's mandate to reduce GHG emissions to 1990 levels by 2020 (see Health & Saf. Code, §38550). (Final EIR (May 2011), pp. 3.2-45 to 3.2-52.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The analysis that follows addresses air quality and greenhouse gases separately, and is based on three technical memoranda prepared by Dudek, which are included in their entirety in Appendix A to this Addendum.

Air Quality

Consistency with Applicable Air Quality Plans

The Complete Streets Scenario would reduce the travel lanes on College Avenue near the Montezuma Road intersection from 6 lanes to 4 lanes, and include additional streetscape improvements to increase walkability and pedestrian/bicycle circulation in the project area. No change is proposed for the approved project buildings. In light of these limited modifications, the modifications would not result in a conflict with or obstruct implementation of the applicable air quality plan. No change in significance determination would occur as a result.

Construction-Related Emissions

The construction methods and type of construction equipment would remain the same as for the approved project. However, with implementation of more stringent standards for in-use off-road equipment and heavy-duty trucks, as well as fleet turnover replacing older equipment and vehicles, the emissions from equipment and vehicles likely would be lower than for the approved project. Since the original estimated construction emissions were well below all applicable significance thresholds, the street modifications are not anticipated to result in new significant impacts nor result in a substantial change in the previously identified impacts. No change in significance determination would occur as a result.

Operational-Related Emissions

The proposed modifications could result in fewer vehicle trips coming in and out of the College area as students would be provided with greater walking and biking access to campus facilities and a redistribution of project-related traffic would occur. The length of some vehicle trips between the project area and I-8 could increase, which could in turn increase vehicle-miles traveled and the associated air emissions. However, because operational emissions under the approved project were well below the significance thresholds, and given that pedestrian and biking activity likely would increase, potentially reducing the number of vehicle trips in and out of the College area, operation of the approved project under the changed circumstances would not exceed the significance thresholds. No change in significance determination would occur as a result.

Cumulative Net Increase in Criteria Pollutants

Since no changes to the building footprints or project area would result from the modifications, and construction and operational emissions would be similar to those analyzed in the EIR, the changed circumstances under which the approved project would be built would not result in a cumulative net increase in criteria pollutants. No change in significance determination would occur as a result.

Odors

Similar to the approved project, any odors associated with construction activities would be temporary. The approved land uses (residential and retail uses), which are not land uses that would be sources of nuisance odors, would be unchanged. Thus, impacts related to odors would remain less than significant. No change in significance determination would occur as a result.

CO Hotspots Analysis

As previously noted, the EIR identified significant traffic impacts to several roads in the area, including the segment of College Avenue between Montezuma Road and Canyon Crest Drive, which includes the segment of College Avenue where the Complete Streets Scenario would be implemented. The EIR also identified significant impacts at the College Avenue intersections at Montezuma Road, Zura Way, Canyon Crest Drive, and the I-8 Eastbound Ramp. Implementation of the Complete Streets Scenario would not result in any additional impacted locations beyond those previously identified in the Final EIR (LLG 2014).

Pursuant to the City of San Diego's *Significance Determination Thresholds* (City of San Diego 2011), a site-specific CO hotspot analysis was performed for the intersection of College Avenue and Montezuma Road as analyzed in the LLG traffic memo (LLG 2014). The potential impact of the changed circumstances on local CO levels was assessed at this intersection with the Caltrans CL4 interface based on CALINE4, which allows microscale CO concentrations to be estimated along each roadway corridor or near intersections. (For additional information regarding the methodology utilized to conduct the analysis, please see Appendix A.)

The results of the analysis are shown in **Table 2.0-2, CO Hotspots Modeling Results - College Avenue and Montezuma Road Intersection**.

Table 2.0-2
CO Hotspots Modeling Results
College Avenue and Montezuma Road Intersection

Peak Hour	Maximum Modeled Impact Year 2035 with Project		Approved Project Near Term[b]		Approved Project Long Term[b]	
	1-Hour (ppm)	*8-Hour (ppm)[a]*	*1-Hour (ppm)*	*8-Hour (ppm)[a]*	*1-Hour (ppm)*	*8-Hour (ppm)[a]*
AM	3.0	2.1	6.5	4.5	5.8	3.8
PM	3.0	2.1	7.0	4.5	6.0	3.8

Source: Caltrans 1998 (see Attachment A).
[a] 8-hour concentrations were obtained by multiplying the 1-hour concentration by a factor of 0.7, as referenced in Caltrans 1997, Table B.15.
[b] Source: Final EIR Table 3.2-10.

As shown in Table 2.0-2, maximum CO concentrations predicted for the AM peak hour 1-hour averaging period would be 3.0 ppm and the PM peak hour 1-hour averaging period would be 3.0 ppm, both of which are below the state 1-hour CO standard of 20 ppm. Maximum predicted 8-hour CO concentrations of 2.1 ppm in the AM peak hour and 2.1 ppm in the PM peak hour would be below the state CO standard of 9.0 ppm. As also shown in the Table, CO concentrations are forecast to be substantially lower than previously forecast for the approved project. This is due to several factors including that future background concentrations are forecast to be significantly lower than previously forecast as a result of federal and state regulatory requirements regarding fuel and vehicle emission limits. In sum, under the Complete Streets Scenario, because neither the state 1-hour standard nor the 8-hour standard would be equaled or exceeded at the intersection of College Avenue and Montezuma Road, potential CO hotspot impacts would be less than significant. Therefore, no change in significance determination would occur as a result.

Greenhouse Gas Emissions

Construction GHG Emissions

The approved project's construction activities would generate approximately 3,576 metric tons of CO_2 emissions, which the EIR found to be less than significant. (Final EIR (May 2011), pp. 3.2-45 to 3.2-52.) The proposed modifications would include additional streetscape improvements but would not result in modification of the approved buildings. Therefore, GHG emissions from construction would remain less than significant. No change in significance determination would occur as a result.

Operational GHG Emissions

As the changed circumstances under which the approved Project would be built would not involve changes to the approved buildings, no changes to building-related operational GHG emissions would occur, including area sources (landscaping and natural gas consumption), water use, wastewater, electricity, and solid waste. The approved Project would still incorporate a LEED Silver rating, and GHG emissions would reflect the federal and state mobile source regulatory framework and 20% RPS (currently 33% RPS), thus surpassing existing efficiency requirements and reducing the project's demand for electricity, natural gas, and water—all of which would further reduce the GHG emissions associated with the Project.

The enhanced biking and pedestrian opportunities that would result from the Complete Streets Scenario potentially could serve to reduce the number of vehicle trips. However, the length of some vehicle trips between the project area and I-8 could increase due to the changed circumstances, which could in turn increase vehicle-miles traveled and the associated GHG emissions. The potential increase in vehicle miles-traveled would be reflected under both the BAU and Project conditions. Further, the state and federal GHG reduction measures would continue to apply to the vehicle emissions associated with the changed circumstances, thereby resulting in reductions from the BAU condition comparable to those identified in the EIR.

Accordingly, it is anticipated that the Project would still achieve a minimum of 28.35% below BAU conditions, and the project would remain consistent with the goal of AB 32. Since the project-related emissions would be consistent with AB 32, GHG impacts would remain less than significant. No change in significance determination would occur as a result of the street modifications.

Additionally, as previously mentioned, the approved project would result in an increase in GHG emissions of only 1,707 metric tons of CO_2E per year when compared to existing annual emission levels associated with the project site; this finding provided additional support for the conclusion that the project's GHG impacts would be less than significant. Because the street modifications would not substantially change the operational GHG emissions, no change in significance determination would occur as a result of the changed circumstances.

Consistency with Greenhouse Gas Plans, Policies, and Regulations

As discussed previously, project-related emissions inclusive of the street modifications would be consistent with AB 32.

At present, neither California State University, SDSU, nor the San Diego Air Pollution Control District has adopted any GHG reduction measures that would apply to the

GHG emissions associated with the changed circumstances. Further, no mandatory and applicable GHG regulations or finalized agency guidelines would apply to implementation of the changed circumstances, and no conflict would occur. Therefore, this impact would be less than significant. No change in significance determination would occur as a result of the street modifications.

In summary then, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to air quality and global climate change.

Historical Resources

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would not impact any historical resources due to the absence of qualifying historic buildings on the Project site. (Draft EIR (September 2010), pp. 3.3-11 to 3.3-12.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project, which does not contain qualifying historic buildings. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to historical resources.

Geotechnical/Soils

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would result in potentially significant impacts attributable to slope instability, erosion, unconsolidated soils, expansive soils, groundwater/seepage, seismic shaking, and mudflows. (Draft EIR (September 2010), pp. 3.4-8 to 3.4-11.) The EIR found that these impacts would be effectively mitigated through adoption of Mitigation Measures GEO-1 through GEO-7. (*Id.* at pp. 3.4-11 to 3.4-11.) The EIR also found that the Project would result in less-than-significant impacts relative to landslides, excavatability, flood inundation, liquefaction, fault rupture, tsunami, and seiche. (*Id.* at pp. 3.4-8 to 3.4-11.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project. Additionally, the previously adopted geotechnical and soils mitigation measures would continue to apply. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to geotechnical/soils.

Hazards and Hazardous Materials

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would not create a significant hazard to the public or environment arising from the routine transport, use, or disposal of hazardous materials. (Draft EIR (September 2010), p. 3.5-31.) The EIR also found that, because the Project site is not located within proximity to a public use airport or private airstrip, the Project would not result in an aviation-related safety hazard. (*Id*. at pp. 3.5-36 to 3.5-37.) Similarly, because the Project site is located within an existing urban area, the Project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires. (*Id*. at p. 3.5-37.)

The EIR did, however, identify potentially significant hazards arising from the release of hazardous materials (i.e., contaminated soils, contaminated groundwater, and/or asbestos-containing material and lead paint) into the environment at certain parcels located within the physical impact footprint. (*Id*. at p. 3.5-31 to 3.5-33.) Certain parcels also are located on lists of hazardous materials sites due to the utilization of the sites as former gas stations. (*Id*. at pp. 3.5-34 to 3.5-35.) Inclusion of such parcels in these database lists indicates that potentially hazardous conditions associated with soil contamination may result in the exposure of hazardous materials, a potentially significant impact. (*Ibid*.) The EIR found that each of these impacts would be effectively mitigated through adoption of Mitigation Measures HAZ-1 through HAZ-6. (*Id.* at pp. 3.5-38 to 3.5-45; Final EIR (May 2011), pp. 3.5-38 to 3.5-39.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project. Additionally, the previously adopted hazards and hazardous materials mitigation measures would continue to apply. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to hazards and hazardous materials.

Hydrology and Water Quality

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would result in a potentially significant impact to water quality during construction as (i) site disturbance would involve more than one acre, and (ii) certain areas within the Project's physical footprint contain potentially contaminated soil and groundwater that could be exposed. (Draft EIR (September 2010), pp. 3.6-16 to 3.6-17.) As for the Project's operational-related activities, the EIR found that impacts would be potentially significant because the Project could contribute pollutants to receiving water bodies currently impaired for those pollutants. (*Id*. at pp. 3.6-17 to 3.6-20.) The EIR also found that the Project could create or contribute runoff that would exceed the capacity of existing or planned stormwater drainage systems, and substantially alter the existing drainage pattern of the site or substantially increase the amount of surface runoff. (*Id*. at pp. 3.6-21 to 3.6-24.) The EIR found that these impacts would be effectively mitigated through adoption of Mitigation Measures HWQ-1 through HWQ-6. (*Id.* at pp. 3.6-26 to 3.6-29.)

With respect to groundwater, the EIR found that the Project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge. (Draft EIR (September 2010), pp. 3.6-20 to 3.6-21.) The EIR also found that the Project would not (i) substantially alter the existing drainage pattern in a manner resulting in substantial erosion, (ii) place housing within a 100-year flood hazard area, (iii) place structures within a 100-year flood hazard area so as to impede or redirect flood flows, (iv) expose people or structures to hazards associated with the failure of a levee or dam, and (v) be at risk of inundation by seiche, tsunami, or mudflow. (*Id*. at pp. 3.6-24 to 3.6-26.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project, or the type of allowable land uses. Additionally, the previously adopted mitigation measures would continue to apply. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to hydrology and water quality.

Land Use and Planning

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would not conflict with any applicable plan, policy or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect because no such applicable plans, policies or regulations exist. (Draft EIR (September 2010), p. 3.7-18.) That being said, for informational disclosure purposes, the EIR evaluated the Project's consistency with the land use plans of the City of San Diego and its Redevelopment Agency and concluded as follows:

- The Project is consistent with the basic principles of the City of San Diego General Plan (*id.* at pp. 3.7-18 to 3.7-22);
- The Project generally is consistent with the goals and objectives of the College Area Community Plan (*id.* at pp. 3.7-22 to 3.7-28). However, the Project would be inconsistent with the Community Plan recommendation that the university not expand beyond its present campus boundary. Because the Community Plan, as a local plan, is not applicable to CSU, a state agency, any potential inconsistency would not result in a significant impact within the meaning of CEQA (*id.* at p. 3.7-27);
- Certain buildings allowed by the Project exceed the allowable densities and/or maximum structure heights identified in the City of San Diego Land Development Code; however, the impact is not significant because SDSU is not subject to the City's Land Development Code (*id.* at pp. 3.7-28 to 3.7-29);
- The Project is consistent with the City of San Diego's Transit-Oriented Development Design Guidelines (*id.* at pp. 3.7-29 to 3.7-32);
- The Project is consistent with the College Community Redevelopment Plan, College Community Redevelopment Project – Master Project Plan and Core Subarea Design Manual, and the Third Five-Year Implementation Plan for the College Community Redevelopment Project Area (*id.* at pp. 3.7-32 to 3.7-40);
- The Project is consistent with the Public Facilities Financing Plan for the College Area (*id.* at p. 3.7-41); and,
- The Project is consistent with the City of San Diego Bicycle Master Plan (*id.* at pp. 3.7-41 to 3.7-42).

The EIR also found that the Project would not physically divide an established community and not conflict with any applicable habitat conservation plan or natural community conservation plan due to its location within an urbanized, developed area. (*Id.* at p. 3.7-42.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project, or the type of allowable land uses. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to land use. Furthermore, as a state entity, CSU/SDSU is not subject to local government planning such as the City of San Diego General Plan and related planning documents. Therefore, any inconsistency resulting from the Complete Streets Scenario would not be a significant impact within the meaning of CEQA.

Noise

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would result in potentially significant impacts attributable to noise generated by Project-related construction activities. Mitigation was adopted requiring that construction activities comply with the relevant City of San Diego noise ordinance criteria, and that certain specified steps be taken to minimize construction-related noise and ensure that noise levels do not exceed permissible levels. With implementation of the mitigation, impacts would be reduced to less than significant. (Draft EIR (September 2010), pp. 3.8-8 to 3.8-10, and 3.8-14.)

As to off-site noise impacts attributable to increased vehicle traffic, the EIR found that under a near-term scenario, the additional Project traffic, in combination with cumulative traffic, would increase the noise along the adjacent roads by one dB CNEL or less and, as such, impacts would be less than significant. Under a long-term scenario, the increase in CNEL levels with Project traffic would be essentially the same as without Project traffic and, therefore, the Project's impacts would be less than significant. (*Id.* at pp. 3.8-10 to 3.8-11.)

As to on-site noise impacts attributable to increased vehicle traffic, the EIR found that the increased traffic would result in potentially significant impacts to a portion of the student housing units that would be built as part of the Project and, as a result, mitigation was adopted requiring that interior noise levels achieve acceptable levels. With mitigation, impacts would be less than significant. (*Id*. at pp. 3.8-12 to 3.8-13, and 3.8-15.)

The EIR also found that outdoor mechanical equipment to be installed as part of the Project potentially would result in significant impacts to existing land uses. As a result, mitigation was adopted requiring that appropriate steps be taken to ensure that noise levels do not exceed applicable City standards. With mitigation, impacts would be less than significant. (*Id.* at pp. 3.8-13 and 3.8-15.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The analysis that follows is based on three technical memoranda prepared by Dudek, which are included in their entirety in Appendix B to this Addendum. That analyses determined that the Complete Streets Scenario would not result in any new significant noise impacts, nor a substantial increase in the severity of the impacts identified in the certified EIR.

As to construction-related noise, while the proposed Project modifications would result in the construction of additional streetscape improvements, the corresponding construction activities would be of a similar nature to those addressed in the Final EIR and, as such, impacts would be similar to those previously identified. Moreover, as the previously adopted noise mitigation measures would continue to apply, any potential impacts would be reduced to less than significant.

As to off-site noise impacts attributable to increased vehicle traffic, the traffic volumes along potentially affected roadway segments associated with implementation of the approved Project, and the corresponding predicted traffic volumes resulting from the Complete Streets Scenario are summarized below in **Table 2.0-3, Future Traffic Volumes and Estimated Traffic Noise Increases – Approved Project vs. Complete Streets Scenario**.

As shown on Table 2.0-3, traffic volumes along Fairmount Avenue, 70th Street, and the segment of Montezuma Road between Collwood Boulevard and 55th Street would increase somewhat as a result of implementation of the Complete Streets Scenario as compared to the approved Project. Traffic volumes would increase approximately 25% along Fairmount Avenue between I-8 and Montezuma Road, approximately 12% along 70th Street between Alvarado Road and El Cajon Boulevard, and approximately 5% along Montezuma between Collwood and 55th Street. Conversely, traffic volumes along Montezuma Road and College Avenue would decrease approximately 14% (on Montezuma Road between 55th Street and College Avenue) to over 50% (on College Avenue north of Lindo Paseo). All of these streets are adjacent to residential and other noise-sensitive land uses.

Table 2.0-3
Future Traffic Volumes and Estimated Traffic Noise Increases
Approved Project vs. Complete Streets Scenario

Street Segment	Year 2030 6-Lane (Approved Project Scenario) ADT	Year 2035 4-Lane (Complete Streets Scenario) ADT	CNEL Increase[a] (dB)
Fairmount Avenue			
I-8 – Montezuma Road	89,000	110,800	1
Montezuma Road			
Collwood Boulevard – 55th Street	33,8500	35,500	<1
55th Street – College Avenue	35,010	30,100	1
55th Street – Catoctin Drive	28,800	25,700	<1
College Avenue			
South of Montezuma Road	40,200	31,100	-1
Montezuma Road – Lindo Paseo	56,040	38,900	3
North of Lindo Paseo	76,140	35,800	3
70th Street			
Alvarado Road – El Cajon Boulevard	33,000	37,100	1

Sources: SDSU 2011; LLG 2014.

[a] Derived from FHWA TNM 2.5.

As shown in Table 2.0-3, the difference in traffic noise between the Year 2030 six-lane College Avenue (approved Project) configuration and the Year 2035 four-lane College Avenue configuration (Complete Streets Scenario) would be relatively small, ranging from an estimated 3 dB decrease in noise levels on College Avenue between Montezuma Road and Lindo Paseo and north of Lindo Paseo, to an increase of 1 dB on 70th Street and on Fairmount Avenue. Because a change in community noise levels of 1 dB or less is not an audible change, this change would not result in an increase in the impacts previously identified in the Final EIR.

As the proposed modifications would not result in a substantial increase in roadway noise CNEL levels, impacts to the student housing that would be built as part of the approved Project would be similar to those previously identified in the Final EIR.

Lastly, as the proposed modifications do not include any changes to the mechanical equipment that would be installed as part of the approved Project, there would be no change in the impacts previously identified in the Final EIR. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to noise.

Archaeological/Paleontological Resources

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would result in potentially significant impacts to archaeological and paleontological resources, and human remains. (Draft EIR (September 2010), pp. 3.9-9 to 3.9-11.) The EIR found that these impacts would be effectively mitigated through adoption of Mitigation Measures ARCH-1, PAL-1 and NA-1. (*Id.* at pp. 3.9-11 to 3.9-13; see also Final EIR (May 2011), pp. 3.9-11 to 3.9-13.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project. Additionally, the previously adopted archaeological and paleontological mitigation measures would continue to apply. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to archaeological and paleontological resources.

Population and Housing

Approved Plaza Linda Verde Project

The certified EIR found that the Plaza Linda Verde Project would not displace substantial numbers of existing housing or people, and would beneficially decrease the demand for nuisance rentals. (Draft EIR (September 2010), pp. 3.10-10 to 3.10-13.) The EIR also found that the Project would not induce substantial population growth, but would accommodate anticipated growth attributable to the housing and commercial needs of the student population. (*Id.* at pp. 3.10-14 to 3.10-15.) Although no potentially significant impacts were identified, the EIR included a mitigation measure to facilitate coordination between SDSU staff and SANDAG regarding regional forecasting efforts. (*Id.* at pp. 3.10-15 to 3.10-16; see also Final EIR (May 2011), pp. 3.10-15 to 3.10-16.)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project, or the type of allowable land uses. Additionally, the previously adopted population and housing mitigation measure would continue to apply. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to population and housing.

Public Services and Utilities

Approved Plaza Linda Verde Project

As to fire services, the certified EIR found that the Plaza Linda Verde Project would generate a limited number of additional calls for fire and medical/rescue service and, therefore, would not result in potentially significant impacts relating to fire protection. (Final EIR (May 2011), pp. 3.11-38 to 3.11-43.)

As to police services, the Project's additional service call volume would not significantly impact police services as the Project would be served primarily by the SDSU Police Department, which operates well within identified response time goals. (*Id.* at pp. 3.11-44 to 3.11-45.)

As to schools, the Project's student housing component would not generate additional demand for elementary and secondary school education in light of the occupancy age limits, and the retail component would not foreseeably increase school enrollment levels. (*Id.* at pp. 3.11-45 to 3.11-46.) Further, all schools in the Project area generally have adequate capacity, so no potentially significant impacts would result. (*Ibid.*)

As to parks and recreation, SDSU's available park and recreation facilities exceed the requirements of the City of San Diego General Plan. (*Id.* at p. 3.11-47.) The Project's residents are expected to utilize SDSU amenities, whereas the patrons of the retail component are not expected to utilize local parks and recreation facilities due to the temporary nature of their visits. (*Id.* at p. 3.11-48.) Therefore, the Project would not result in potentially significant impacts to parks and recreation. (*Ibid.*)

As to libraries, the Project's residents are expected to utilize the SDSU campus library, and the patrons of the retail component are not expected to utilize library facilities due to the temporary nature of their visits. (*Ibid.*) Therefore, the Project would not result in potentially significant impacts to libraries. (*Ibid.*)

As to emergency medical services, the Project would not increase the student enrollment at SDSU; rather, it would provide additional housing options for existing students who already utilize on-campus emergency medical facilities. (*Id.* at p. 3.11-49.) Therefore, the Project would not result in potentially significant impacts to emergency medical services. (*Ibid.*)

As to wastewater treatment, the Project would comply with applicable requirements of the Regional Water Quality Control Board; therefore, the Project would not exceed wastewater treatment requirements and impacts would be less than significant. (*Id.* at pp. 3.11-49 to 3.11-50.) And, as to wastewater treatment capacity, because the Project is consistent with the intensification of land uses outlined in local plans, the Project would not result in a determination by the wastewater treatment provider that adequate capacity is not available. (*Id.* at pp. 3.11-64 to 3.11-65.)

As to water serving infrastructure, the Project would not require or result in the construction of new treatment facilities or the expansion of existing facilities because the Project is consistent with the intensification of land uses outlined in local plans and local treatment facilities are sized in accordance with those plans. (*Id.* at p. 3.11-50.) The Project would, however, result in a potentially significant impact to water distribution infrastructure because the existing water infrastructure is inadequately sized to serve the Project and because the Project would require additional capacity. (*Id.* at pp. 3.11-51 to 3.11-57.) The EIR found that this impact would be effectively mitigated through adoption of Mitigation Measure PSF-1. (*Id.* at p. 3.11-72.)

As to sewer, the Project's wastewater generation rate would likely exceed the capacity of the existing sewer mains, assuming they are currently operating at capacity, thereby resulting in a potentially significant impact. (*Id.* at pp. 3.11-57 to 3.11-60.) The EIR found that this impact would be effectively mitigated through adoption of Mitigation Measures PSF-2 and PSF-4. (*Id.* at pp. 3.11-72 to 3.11-73.)

As to stormwater drainage facilities, the Project would not require or result in the construction of new stormwater drainage facilities or the expansion of existing facilities because Project site runoff would not exceed existing stormwater flows. (*Id.* at pp. 3.11-60 to 3.11-61.)

As to water supply, there would be sufficient water supplies available to serve the projected demand of the Project with existing water entitlements and resources, in part, because the Project is consistent with the densities envisioned for this portion of the College Area and considered in the local urban water management plans. (*Id.* at pp. 3.11-62 to 3.11-64.) Also of note, the Project's LEED Silver commitment will maximize water efficiency relative to water reuse, irrigation systems, and indoor water use. (*Ibid.*) The Project also would not result in a potentially significant impact related to the use or distribution of recycled water as it is not available in the College Area and the City of San Diego has no plans to extend such infrastructure to the area. (*Id.* at p. 3.11-60.)

As to solid waste disposal, although the Project would comply with all applicable federal, state and local requirements pertaining to solid waste, the Project would be served by a landfill with insufficient permitted capacity to accommodate its solid waste disposal needs; this is a potentially significant impact. (*Id.* at pp. 3.11-65 to 3.11-67.) The EIR found that this impact would be effectively mitigated through adoption of Mitigation Measure PSF-3. (*Id.* at p. 3.11-73.)

As to electricity and natural gas, the Project would not result in the use of excessive amounts of energy. (*Id.* at pp. 3.11-67 to 3.11-72.) Further, the Project's LEED Silver commitment will maximize energy efficiencies associated with project design and operation. (*Ibid.*)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

The Complete Streets Scenario would not alter the physical impact footprint or location of the approved Project, or the type of allowable land uses. Additionally, the previously adopted public services and utilities mitigation measures would continue to apply. Therefore, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to public services and utilities.

Transportation/Circulation and Parking

Approved Plaza Linda Verde Project

The EIR Transportation/Circulation and Parking section was prepared based on the Plaza Linda Verde Traffic Impact Analysis (January 11, 2011) technical report ("TIA") prepared by traffic engineers Linscott Law & Greenspan. Based on the TIA, the certified Final EIR found that under the near-term scenario, which assumed College Avenue in the existing 4-lane configuration, the Plaza Linda Verde Project would result in potentially significant impacts at the following locations:

Intersections
College Avenue/Canyon Crest Drive;
College Avenue/Zura Way;
College Avenue/Montezuma Road; and
Montezuma Road/Campanile Drive.

Street Segments
College Avenue: Canyon Crest Drive to Zura Way; and
Montezuma Road: 55th Street to College Avenue. (Final EIR (May 2011), pp. 3.12-81.)

Under a long-term (2030) scenario, which assumed College Avenue as a 6-lane road, the EIR found that the Project would result in potentially significant impacts at the following locations:

Intersections
College Avenue/I-8 Eastbound Ramps;
College Avenue/Canyon Crest Drive;
College Avenue/Zura Way;

College Avenue/Montezuma Road;
Montezuma Road/55th Street; and
Montezuma Road/Campanile Drive.

Street Segments

College Avenue: Canyon Crest Drive to Zura Way;
College Avenue: Zura Way to Montezuma Road; and
Montezuma Road: 55th Street to College Avenue. (Final EIR (May 2011), pp. 3.12-81 to 3.12-82.)

The EIR included, and CSU adopted, mitigation measures TCP-1 through TCP-8, and TCP-11, each of which requires CSU/SDSU to pay its fair-share toward recommended road improvements upon the occurrence of certain triggering events. (Final EIR (May 2011) pp. 3.12-83 to 3.12-89.) Due to the uncertainty associated with the triggering events required for implementation of each of the recommended mitigation measures, the EIR found the impacts to be significant and unavoidable. (*Id.* at p. 3.12-105.)

As previously explained in Section 2.1, the EIR also included a supplemental long-term analysis based on a four-lane College Avenue from Montezuma Road north to Canyon Crest Drive, a configuration put forward by Michael Stepner, a former City of San Diego planner. (*Id.* at pp. 3.12-99 to 3.12-105; see **Figure 2.0-2, Stepner College Avenue Roadway Configuration**.) Under this scenario, instead of adding travel lanes, the existing lanes would be narrowed and parking lanes added to slow vehicle traffic, the sidewalks would be widened to accommodate more pedestrian travel, and Class 2 bicycle lanes would be provided on both northbound and southbound College Avenue. (*Id.* at pp. 3.12-99 to 3.12-101.) The EIR acknowledged that this scenario would not reduce the identified impacts on College Avenue to a level below significant, although it would provide a circulation system arguably more conducive to a university setting, i.e., a circulation system that elevates pedestrian and bicycle travel. (*Id.* at p. 3.12-99.)

The supplemental long-term analysis contained in the EIR addressed the potential impacts associated with the redistribution of vehicle trips from College Avenue to other roadways that likely would result due to the reduced (i.e., 4-lane) capacity of College Avenue under the Stepner configuration. Under this scenario, in addition to the impacted locations identified above, the EIR found that the Project would result in significant impacts at the following three street segment locations:

Fairmount Avenue from Montezuma Road to I-8;
Montezuma Road from 55th Street to College Avenue; and
Montezuma Road from College Avenue to Catoctin Drive. (*Id.* at pp. 3.12-103 to 3.12-104.)

As to mitigation, the EIR found that there are no feasible mitigation measures that would provide sufficient additional capacity on the segment of Fairmount Avenue from Montezuma Road to I-8 to accommodate the increased traffic; that is, due to existing physical constraints and lack of available right-of-way, the segment cannot be sufficiently widened to add the necessary additional travel lanes. As such, the EIR identified the impact as significant and unavoidable. (*Id.* at p. 3.12-104 to 3.12-105.)

With respect to Montezuma Road, improvements to the segment from 55th Street to College Avenue as identified in mitigation measure TCP-5 would mitigate the identified impact, although, as explained above, implementation of TCP-5 is uncertain and, therefore, the EIR identified the impact as significant and unavoidable. (*Id.* at p. 3.12-104 to 3.12-105.)

As to the segment of Montezuma Road from College Avenue to Catoctin Drive, the EIR found the necessary improvements are not feasible due to existing physical constraints, lack of available right of way, and the fact that existing structures likely would need to be demolished in order to provide the necessary improvements. (*Id.* at p. 3.12-104 to 3.12-105.) Therefore, the EIR identified the significant impacts to Montezuma Road between College Avenue and Catoctin Drive as significant and unavoidable. (*Id.*)

In addition to the above impacts, the EIR also found that the Project would result in significant impacts relating to construction traffic (*id.* at p. 3.12-61), as well as significant impacts relating to driveway access at College Avenue/Lindo Paseo. (*Id.* at pp. 3.12-62 to 3.12-65.) The EIR found that these impacts would be mitigated to less than significant through implementation of Mitigation Measures TCP-9 and TCP-10. (*Id.* at p. 3.12-90.) As to the College Avenue/Lindo Paseo driveway, mitigation requires that the subterranean garage to be constructed under Buildings 4 and 5 be designed in a manner that ensures adequate throating and appropriate entry gate controls. (*Ibid.*) Specific to construction-related impacts, Mitigation Measure TCP-9 requires that prior to the commencement of construction activities, CSU/SDSU is to prepare a traffic control plan that is to include requirements that flagmen be utilized to assist in the direction of traffic when necessary, and that construction activities, including road closures and the movement of heavy equipment, occur during off-peak periods to the maximum extent feasible. (*Ibid.*)

Effect of Complete Streets Scenario on Assessment of Environmental Impacts

While the certified EIR previously addressed the potential traffic and circulation-related impacts associated with a four-lane College Avenue, in light of the more specific project-detailed information now available and the differences, though limited, between the Stepner configuration and the Complete Streets Scenario, a supplemental traffic operational analysis was conducted to further analyze the potential effects associated with implementation of the Complete Streets Scenario. (See **Figure 2.0-3, Complete**

Streets College Avenue Roadway Configuration.) The results of that analysis are contained in technical reports presented in Appendix C, entitled Plaza Linda Verde Complete Streets Analysis (June 2014) and related revised report dated August 2014, and a separate report entitled Plaza Linda Verde – Diversion Analysis (July 2014). Each of the reports was prepared by the traffic engineering firm Linscott Law & Greenspan. A summary of the analyses contained in the reports is presented below.

In conducting the Complete Streets analysis, the traffic engineers worked with City of San Diego staff regarding the specific analysis methodology to be utilized in conducting a comparative analysis between the existing 4-lane configuration on College Avenue, as utilized in the EIR, and the Complete Streets Scenario.

Based on discussions with City staff, the traffic engineers utilized the latest SANDAG Series 12 traffic model, which is based on a 2035 horizon year; the analysis presented in the EIR utilized the then current SANDAG Series 11 traffic model, which was based on a 2035 horizon year. Traffic volumes for the Complete Streets analysis were derived from a forecast model conducted with College Avenue assumed as 4 lanes in the Project vicinity, as opposed to the 6-lane network included in the Series 12 model.

The two potentially affected intersections (College Avenue/Montezuma Road and College Avenue/Lindo Paseo) were analyzed under AM and PM peak hour conditions consistent with City standards and guidelines. Average vehicle delay was determined utilizing the methodology in the *Highway Capacity Manual*. The delay values (represented in seconds) were qualified with a corresponding intersection level of service (LOS).

In addition to the analysis of the two intersections, a corridor queuing analysis was conducted to determine intersection delay queue lengths at the College Avenue/Montezuma Road intersection; this analysis would account for upstream/downstream constraints, including short intersection spacing. The queuing analysis was conducted at the request of the City of San Diego and is provided for information purposes only as neither CEQA nor the City's CEQA traffic study guidelines require queuing analyses. Signal timing plans were obtained from the City for inclusion in the analysis. The signal timing inputs included all-red time, yellow time, walk time, flashing-don't-walk time, offsets, cycle lengths, etc.

As shown below in **Table 2.0-4, Long-Term (2035) Intersection Operations**, under long-term intersection operations, the intersection of College Avenue/Montezuma Road would operate at LOS D during the AM peak hour and LOS E during the PM peak hour under the Complete Streets configuration. The intersection of Lindo Paseo and College Avenue would operate at LOS D or better during both the AM and PM peak hours under this scenario. Also as shown on Table 2.0-4, under the Complete Streets Scenario, the intersection LOS would be the same as under the existing geometry 4-lane configuration, which was the configuration utilized in the EIR for the Stepner analysis. Table 2.0-4 also shows that the resulting LOS under the Complete Streets Scenario would be comparable to or better than under the approved Project as previously identified in the EIR; this improvement is attributable to lower long-term background traffic volumes that are now forecast than at the time the EIR was prepared (i.e., a 2035 scenario as compared to a 2030 scenario).

Table 2.0-4
Long-Term (2035) Intersection Operations

Intersection	Control Type	Peak Hour	Existing Geometry		Complete Street Design			Approved Project Long Term[d] (2030)	
			Delay[a]	LOS[b]	Delay	LOS	▲	Delay[a]	LOS[b]
College Avenue/ Lindo Paseo	Signal	AM	26.1	C	28.9	C	2.8	22.7	C
	Signal	PM	42.4	D	51.5	D	9.1	48.4	D
College Avenue/ Montezuma Road	Signal	AM	52.1	D	53.0	D	0.9	178.5	F
	Signal	PM	66.0	E	69.6	E	3.6	350.5	F

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. ▲ denotes a change in delay.
d. Final EIR Table 3.12-14.

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

In addition to the intersection analysis described above, additional analysis was conducted to assess the impacts of the Complete Streets Scenario relative to queue lengths at the intersection of College Avenue and Montezuma Road. As shown below in **Table 2.0-5, Long-Term (2035) Corridor Queue Summary**, 50th percentile queue lengths under the 4-lane scenario are calculated to be 290 feet in the southbound AM peak hour and 570 feet in the southbound PM peak hour. These queue lengths are consistent with the calculated LOS operations. As also shown on Table 2.0-5, queues under the Complete Streets Scenario would be comparable to the 4-lane scenario under the northbound AM and PM peak hours, and southbound AM peak. During the southbound PM peak, queues are calculated to increase by 330 feet, from 570 feet to 900 feet, an increase that is within acceptable limits given the benefits of the Complete Streets Scenario. Analysis of the 95th percentile queues is provided in Appendix C.

Table 2.0-5
Long-Term (2035) Corridor Queue Summary

Scenario	Northbound		Southbound	
	AM	PM	AM	PM
4-Lane with Existing Geometry	440′	450′	290′	570′
Complete Streets Scenario	390′	480′	300′	900′

General Note:

a. The queues shown in the above table are 50th percentile queues from SimTraffic. The queues shown are queues/lane.

In addition to the above analyses, a supplemental long-term intersection analysis was conducted to assess potential impacts to area intersections attributable to the diversion of traffic from College Avenue.

The EIR calculated that the number of average daily trips ("ADT") that would be diverted from College Avenue commensurate with the reduction in capacity from 6-lanes to 4-lanes was estimated to be 4,000 ADT. (Final EIR (May 2011), p. 3.12-103; TIA pp. 78-81.) These volumes would be distributed along Montezuma Road to parallel routes. **Table 2.0-6, Long-Term Diversion Traffic,** shows the diverted traffic along street segments. To assess intersection impacts, the peak hour diverted volumes were derived from these ADT volumes.

Table 2.0-6
Long-Term Diversion Traffic

Street Segment	Street Segment Diversion Traffic (ADT)[a]
College Avenue: I-8 to Montezuma Road	– 4,000
Montezuma Road: West of Collwood Boulevard	+ 3,000
Montezuma Road: Collwood Boulevard to 55th Street	+ 1,500
Montezuma Road: 55th Street to College Avenue	+ 1,500
Montezuma Road: College Avenue to Catoctin Drive	+1,350

Footnotes:

a. Source: LLG Traffic Impact Analysis, Plaza Linda Verde, January 11, 2011 (TIA), Table 19–1, pp. 80.

Similar to the analysis of the two College Avenue intersections at Montezuma Road and Lindo Paseo presented above, the intersections under diversion conditions were analyzed under AM and PM peak hour conditions consistent with the City of San Diego standards and guidelines. Average vehicle delay was determined utilizing the methodology in the *Highway Capacity Manual.* The delay values (represented in seconds) were qualified with a corresponding intersection LOS.

The study area intersections were chosen based on the locations where College Avenue traffic would divert, principally along Montezuma Road both east and west of College Avenue. Intersections along College Avenue were not considered as part of this analysis since traffic would decrease along this roadway as a result of the downsizing of College Avenue between the pedestrian bridge and Montezuma Road and, therefore, impacts necessarily would be less than reported in the EIR. Moreover, the intersections of College Avenue/Montezuma Road and College Avenue/Lindo Paseo were addressed as part of the intersection analysis presented above. (See Table 2.0-4.)

Table 2.0-7, Long-Term Intersection Diversion Analysis, shows the forecast long-term AM and PM peak hour intersection operations at the affected intersections for both the Complete Streets Scenario and the approved Project as presented in the EIR.

Table 2.0-7
Long-Term Intersection Diversion Analysis

Intersection	Control Type	Peak Hour	Complete Streets Long-Term (2035)[d]		Approved Project Long-Term (2030)[a]	
			Delay[b]	LOS[c]	Delay	LOS
Montezuma Road/ Collwood Road	Signal	AM	43.0	D	44.9	D
		PM	155.1	F	158.0	F
Montezuma Road/ 55th Street	Signal	AM	113.8	F	136.6	F
		PM	133.3	F	151.7	F
Montezuma Road/ Campanile Drive	Signal	AM	52.2	D	85.3	F
		PM	116.5	F	226.5	F
Montezuma Road/ Catocin Drive	Signal	AM	20.0	C	25.7	C
		PM	20.9	C	33.1	C
Montezuma Road/ El Cajon Boulevard	Signal	AM	75.4	E	76.2	E
		PM	79.1	E	80.6	F

Footnotes:

a. *Source*: LLG Traffic Impact Analysis, Plaza Linda Verde, January 11, 2011 (TIA), Table 10–1, p. 56; EIR Table 3.12-14.
b. Average delay expressed in seconds per vehicle.
c. Level of Service.
d. Year 2035 Traffic Volumes based on SANDAG Series 12 Traffic Model.

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

As shown in **Table 2.0-7**, intersection LOS under the Complete Streets Scenario is calculated to be equal to or lower than (i.e., better than) the LOS forecasted for the approved Project as presented in the EIR. This is due to several reasons, including available capacity on the surrounding roads, and lower long-term background traffic volumes presently forecast by SANDAG as compared to those forecast at the time the PLV EIR was prepared. Hence, under the Complete Streets Scenario, there would be no additional significantly impacted locations beyond those reported in the EIR, nor an increase in the severity of a previously identified significant impact as a result of the diversion of traffic from College Avenue to other area roadways.[3]

With respect to construction-related traffic, construction activities under the Complete Streets Scenario would be similar to those under the approved Project. Therefore, any potential impacts would be comparable to those under the approved Project and reduced to less than significant with implementation of mitigation measure TCP-9.

In summary, the proposed Project modifications and changed circumstances would not result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to transportation/circulation and parking.

2.3 Conclusion

Based on the analysis presented above, there is no substantial evidence in light of the whole record that the Complete Streets Scenario would result in new significant environmental effects or a substantial increase in the severity of a previously identified significant effect relative to the previously approved Project. Additionally, there is no new information not previously know that shows new significant environmental effects or an increase in the severity of previously identified significant effects. For these reasons, preparation of a supplemental or subsequent EIR is not required and an addendum is appropriate.

[3] For information purposes only, it is noted that draft CEQA Guidelines currently circulating for public review provide that development projects such as Plaza Linda Verde that locate within one-half mile of either an existing major transit stop or a stop along an existing high quality transit corridor generally may be considered to have a less than significant transportation impact. (*Updating Transportation Impacts Analysis in the CEQA Guidelines*, Governor's Office of Planning and Research, August 6, 2014, text of proposed new Section 15064.3, subsection (b)(1).)

Appendix A Air Quality

San Diego State University Complete Streets Addendum to the Plaza Linda Verde Final EIR - Air Quality and Greenhouse Gas Technical Memorandum, DUDEK, June 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR - Air Quality and Greenhouse Gas Technical Memorandum – Diversion Analysis Review, DUDEK, August 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR - Air Quality and Greenhouse Gas Technical Memorandum – Queuing Analysis Review, DUDEK, August 2014

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TECHNICAL MEMORANDUM

To:	Laura Shinn, Director, Facilities Planning, San Diego State University
From:	Jennifer Longabaugh, Environmental Planner David Deckman, Director of Air Quality Services
Cc:	Michael Haberkorn, Gatzke Dillon & Ballance LLP
Subject:	San Diego State University – Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Air Quality and Greenhouse Gas Technical Memorandum
Date:	June 25, 2014

This memorandum (1) summarizes the relevant portions of the air quality and greenhouse gas (GHG) emission impacts analysis presented in the certified Final Environmental Impact Report (SCH No. 2009011040) (EIR; 2011 Final EIR) for the approved Plaza Linda Verde Project and (2) discusses whether modifications to a limited segment of College Avenue (referred to as "changed circumstances" or "street modifications") would result in new significant environmental effects or a substantial increase in the severity of significant effects previously identified in the 2011 Final EIR.

1 PROJECT LOCATION AND DESCRIPTION

The approved project is located on the San Diego State University (SDSU) campus, within the College Area of the City of San Diego, San Diego County, California (see Figure 1, Regional Map, and Figure 2, Vicinity Map). Specifically, the project site is located generally between Aztec Walk and Montezuma Road in the southeastern portion of campus.

The approved project is a mixed-use project that would straddle both the east and west sides of College Avenue between the SDSU Transit Center / Pedestrian Bridge and Montezuma Road (see Figure 3, Approved Site Plan). The approved project will include commercial/retail uses on the first floor of several buildings and residential uses on the upper floors. A stand-alone parking structure will also be constructed west of College Avenue. The approved project was analyzed in the Plaza Linda Verde Final EIR, which was certified by the Board of Trustees of California State University in May 2011.

The 2011 Final EIR analyzed the potential impacts of the project on the environment. Specific to traffic and circulation, the primary analysis was based on both the existing four-lane design for

College Avenue and the City of San Diego's long-term circulation plan for College Avenue, which assumed a six-lane roadway with three lanes in each direction. The 2011 Final EIR identified significant impacts to several roads in the area, including the segment of College Avenue between Canyon Crest Drive and Montezuma Road, and the College Avenue intersections at the Interstate 8 (I-8) Eastbound Ramp, Canyon Crest Drive, Zura Way, and Montezuma Road.

In addition to the primary analysis, the 2011 Final EIR included a supplemental analysis based on a more pedestrian-friendly four-lane segment of College Avenue from Montezuma Road north to Canyon Crest Drive, a scenario (referred to as the Stepner Scenario) put forth by Michael Stepner, a former City of San Diego planner (see Figure 4, Stepner Scenario). The supplemental analysis addressed the potential impacts associated with the redistribution of vehicle trips from College Avenue to other roadways (i.e., Fairmount Avenue, 70th Street, and Montezuma Road) that likely would result due to the reduced capacity of College Avenue. The analysis presented in the 2011 Final EIR identified additional significant traffic impacts to Fairmount Avenue and Montezuma Road. For various reasons, the Stepner Scenario was not pursued beyond the 2011 Final EIR.

Recently, however, SDSU and the City of San Diego have entered into discussions to implement a variation of the Stepner Scenario, referred to as the "Complete Streets Scenario," on the limited segment of College Avenue located north of Montezuma Road and south of the existing suspended pedestrian bridge. Under the Complete Streets Scenario, this segment of College Avenue would be modified to include two travel lanes in each direction (one 10 feet wide and the other 11 feet wide), a 5-foot-wide bike lane in the southbound direction and a 6- to 7.5-foot-wide bike lane in the northbound direction with intervening 3-foot-wide buffers over a portion, and 13-foot-wide sidewalks on each side of the street (see Figure 5, Complete Streets Scenario).[1]

Because of the modifications to the subject segment of College Avenue, this technical memorandum studies the air quality and GHG ramifications (if any) of the changed circumstances on the previously certified environmental analysis contained in the 2011 Final EIR.

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[1] The primary difference between the Complete Streets Scenario and the Stepner Scenario is the elimination of on-street parking and the possible addition of a signalized pedestrian crossing; in all other respects, the differences between the Complete Streets and Stepner Scenarios are relatively minor (e.g., 10- and 11-foot wide travel lanes vs. 10-foot-wide travel lanes; 5-foot-wide and 6- to 7.5-foot-wide bike lanes vs. 6-foot-wide bike lanes; and 13- vs. 16-foot-wide sidewalks, respectively).

2 METHODS

In preparing this analysis, the 2011 Final EIR's Air Quality and Global Climate Change section was reviewed, and the impacts and significance conclusions identified from the approved project are briefly summarized below. This technical memorandum will discuss air quality and GHG impacts that would result from the changed circumstances under which the approved project would be built. That is, the street modifications would result in the redistribution of traffic from College Avenue to Montezuma Road / Fairmount Avenue and Montezuma Road / 70th Street, and this memorandum qualitatively evaluates the potential changes in construction emissions and operational emissions relative to the analysis provided in the 2011 Final EIR. The memorandum also presents an assessment of carbon monoxide (CO) "hotspots."

Redistributed traffic volumes provided in the 2011 Final EIR were utilized to form the basis for the impact analysis provided in this memorandum. Although the original analysis was performed with the URBEMIS2007 land use and air emissions model, the basic methodologies used in the current California Emissions Estimator Model (CalEEMod) are not substantially different, and an updated quantitative assessment would likely show the same order of magnitude in operational emissions, which were originally found to be less than the significance thresholds identified in the 2011 Final EIR. No element of the operational aspects of the approved project buildings would change as a result of the Complete Streets Scenario along the subject segment of College Avenue. Trip lengths, however, may increase compared to those associated with the approved project. As reported in the 2011 Final EIR, since the College Avenue capacity would reduce from six lanes to four lanes under this scenario, some trips on College Avenue would be diverted to the adjacent, parallel routes to the west and east, which are Fairmount Avenue and 70th Street, respectively, to access I-8 (SDSU 2011, pp. 3.12-102 to 3.12-103). Accordingly, trip lengths for a portion of the vehicle trips could increase under the Complete Streets Scenario.

The 2011 Final EIR's analysis of CO hotspots also was reviewed, and the CO hotspot impacts and significance conclusions identified from the approved project are briefly summarized below. Updated traffic estimates in the Plaza Linda Verde *Complete Streets Design* Analyses prepared by Linscott, Law and Greenspan (LLG 2014) were utilized to evaluate the potential for CO hotspots associated with increased congestion resulting from the redistribution of vehicle trips from College Avenue to other roadways. The analysis of CO hotspots was conducted using the California Department of Transportation (Caltrans) CL4 interface based on the California Line Source Dispersion Model (CALINE4; Caltrans 1998). The 2014 updated traffic analysis evaluated three intersections. One of these intersections—College Avenue and Montezuma Road—was quantitatively evaluated in the 2011 Final EIR CO hotspot analysis and was also determined to require an updated quantitative hotspot analysis per the CO hotspot criteria, discussed below, based on the 2014 traffic data. As explained further below, the other two intersections would not require a site-specific CO hotspot analysis. The same link geometry and receptors as those in the original analysis for the College Avenue and Montezuma Road intersection were used in the updated analysis. Emission factors and temperature and humidity parameters were updated for the updated comparison analysis. For modeling 1-hour impacts, the worst-case AM and PM traffic levels were evaluated for the College Avenue and Montezuma Road intersection, as the original analysis evaluated both AM and PM conditions. The outcome of this updated analysis is compared below to the conclusions stated in the 2011 Final EIR.

3 SUMMARY OF CERTIFIED 2011 FINAL EIR IMPACTS AND CONCLUSIONS

3.1 Air Quality

3.1.1 Consistency with Applicable Air Quality Plans

The 2011 Final EIR determined that the approved project would be consistent with the City of San Diego General Plan and the San Diego Regional Air Quality Strategy and Attainment Plan. The 2011 Final EIR concluded that the approved project would be consistent with applicable air quality plans.

3.1.2 Air Pollutant Emissions

Construction-Related Emissions

Tables 1 and 2 (based on 2011 Final EIR Tables 3.2-7 and 3.2-8) present a summary of the estimated maximum daily construction emissions for Phase I and Phase II construction activities of the approved project, respectively, based on application of construction-related project design features required by the San Diego Air Pollution Control District.

Table 1
Phase I Construction Emissions(lb/day)

	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Maximum simultaneous construction emissions[a]	45.82	83.88	68.15	0.03	21.36	6.32
Significance threshold	137	250	550	250	100	100
Above threshold?	No	No	No	No	No	No

Source: SDSU 2011.
[a] Maximum simultaneous emissions for all pollutants except PM_{10} and $PM_{2.5}$ would occur during simultaneous building construction, parking structure construction, parking area construction, and architectural coatings application. Maximum simultaneous emissions of PM_{10} and $PM_{2.5}$ would occur during grading and soil export.
VOC = volatile organic compounds; NO_x = oxides of nitrogen; CO = carbon monoxide; SO_x = sulfur oxides; PM_{10} = particulate matter with aerodynamic diameter less than or equal to 10 microns; $PM_{2.5}$ = particulate matter with aerodynamic diameter less than or equal to 2.5 microns

Table 2
Phase II Construction Emissions (lb/day)

Construction Project/Phase	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Maximum simultaneous construction emissions[a]	55.60	47.62	47.76	0.06	50.78	12.12
Significance threshold	137	250	550	250	100	100
Above threshold?	No	No	No	No	No	No

Source: SDSU 2011.
[a] Maximum simultaneous emissions for VOC and CO occur during simultaneous building construction, paving, and architectural coatings use. Maximum simultaneous emissions of NO_x, SO_x, PM_{10}, and $PM_{2.5}$ occur during demolition activities.
VOC = volatile organic compounds; NO_x = oxides of nitrogen; CO = carbon monoxide; SO_x = sulfur oxides; PM_{10} = particulate matter with aerodynamic diameter less than or equal to 10 microns; $PM_{2.5}$ = particulate matter with aerodynamic diameter less than or equal to 2.5 microns

As shown in Tables 1 and 2, emissions of all criteria pollutants were determined to be below the significance thresholds. Accordingly, the 2011 Final EIR concluded that construction emissions from Phase I and Phase II of the approved project would be less than significant and no mitigation would be required.

Operational-Related Emissions

Two project design features were considered in the analysis: (1) the Leadership in Energy and Environmental Design (LEED) Silver rating and (2) the use of low-volatile organic compound (VOC) architectural coatings. Table 3 (based on 2011 Final EIR Table 3.2-9) presents a summary of the maximum daily emissions for the approved project and reflects the two project design features.

Table 3
Operational Emissions (lb/day)

	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Summer Day						
Total emissions	39.57	23.45	192.99	0.19	33.91	6.59
Significance threshold	137	250	550	250	100	55
Above threshold?	No	No	No	No	No	No
Winter Day						
Total emissions	38.27	32.74	204.45	0.17	33.9	6.58
Significance threshold	137	250	550	250	100	55
Above threshold?	No	No	No	No	No	No

Source: SDSU 2011.
VOC = volatile organic compounds; NO_x = oxides of nitrogen; CO = carbon monoxide; SO_x = sulfur oxides; PM_{10} = particulate matter with aerodynamic diameter less than or equal to 10 microns; $PM_{2.5}$ = particulate matter with aerodynamic diameter less than or equal to 2.5 microns

As shown in Table 3, the approved project's operational emissions were determined to not exceed the significance thresholds. Accordingly, the 2011 Final EIR concluded that air quality impacts would be considered less than significant for Phase I and Phase II operational emissions and mitigation would not be required.

3.1.3 Cumulative Net Increase in Criteria Pollutants

The 2011 Final EIR determined that construction-related emissions associated with the approved project would be substantially below the screening criteria (see Tables 1 and 2). Accordingly, the 2011 Final EIR concluded that these construction-related emissions would be short term and would not result in cumulatively considerable impacts to the ambient air quality.

With respect to operational-related emissions, it was determined that the approved project would be consistent with current San Diego Association of Governments (SANDAG) growth forecasts for the area and would not increase student enrollment. Since the approved project would not increase enrollment, emissions were determined to be consistent with the attainment demonstration in the State Implementation Plan and would not be cumulatively considerable.

3.1.4 Odors

Project construction may result in the emission of minor amounts of odor compounds associated with diesel heavy-duty equipment exhaust. However, any odors associated with construction activities would be temporary. The approved project includes residential and retail uses that are not land uses that would be sources of nuisance odors. Thus, impacts related to odors would be less than significant.

3.1.5 CO Hotspots Analysis

As stated in the 2011 Final EIR, projects that involve traffic impacts may create the potential for CO hotspots (i.e., high concentrations of CO at intersections). To evaluate the potential for CO hotspots, the procedures in the Caltrans Institute of Transportation Studies *Transportation Project-Level Carbon Monoxide Protocol* (CO Protocol; Caltrans 1997) were used.

The 2011 Final EIR traffic impact analysis identified intersections for the near-term and long-term scenarios for which project-related traffic, in combination with projected future traffic reflecting cumulative projects, would cause or contribute to a significant impact. CO hotspots may occur for intersections that operate at level of service (LOS) E or F. The EIR traffic impact analysis identified six intersections that were predicted to operate at LOS E or worse in near-term conditions. The College Avenue and Montezuma Road intersection, one of those six intersections, was projected to operate at an unacceptable LOS in the AM and PM peak hours. Under the long-term scenario, the EIR traffic impact analysis identified six intersections that were predicted to operate at LOS E or worse; the College Avenue and Montezuma Road intersection was also included as one of those six intersections and was projected to operate at an unacceptable LOS in the AM and PM peak hours. The 2011 Final EIR included a CALINE4 modeling analysis for the six intersections projected to operate at an unacceptable LOS for the Project Plus Cumulative traffic scenario under near-term and long-term operating conditions, including the College Avenue and Montezuma Road intersection.

The 2011 Final EIR traffic analysis determined that the intersection of College Avenue and Lindo Paseo, an intersection affected by the changed circumstances, would operate at LOS B in the AM and LOS C in the PM under Existing Plus Near-Term Cumulative Plus Project conditions. Under the long-term (2030) Plus Project Scenario, the College Avenue and Lindo Paseo intersection was projected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour. Accordingly, a quantitative CO hotspot analysis was not performed for either the near-term or the long-term scenario.

The intersection of College Avenue and the signalized pedestrian crossing was not analyzed in the 2011 Final EIR traffic analysis as it is a new component of the Complete Streets Scenario; as such, a CO hotspot analysis was not conducted for the pedestrian crosswalk intersection with College Avenue.

Table 4, CO Hotspots Modeling Results College Avenue and Montezuma Road Intersection (based on Final EIR Table 3.2-10), presents a summary of the predicted CO concentrations for the College Avenue and Montezuma Road intersection. The maximum 1-hour and 8-hour CO concentrations plus background CO concentrations in parts per million (ppm) are presented in Table 4.

Table 4
CO Hotspots Modeling Results
College Avenue and Montezuma Road Intersection

Near-Term Conditions	
Maximum 1-Hour Concentration Plus Background (ppm) *CAAQS = 20 ppm, NAAQS = 35 ppm, Background 5.3 ppm*	
Maximum AM	6.5
Maximum PM	7.0
Maximum 8-Hour Concentration Plus Background (ppm) *CAAQS= 9.0 ppm; NAAQS = 9 ppm; Background 3.27 ppm*	
Maximum	4.46

Table 4
CO Hotspots Modeling Results
College Avenue and Montezuma Road Intersection

Long-Term Conditions	
Maximum 1-Hour Concentration Plus Background (ppm) *CAAQS = 20 ppm; NAAQS = 35 ppm; Background 5.3 ppm*	
Maximum AM	5.8
Maximum PM	6.0
Maximum 8-Hour Concentration Plus Background (ppm) *CAAQS = 9.0 ppm; NAAQS = 9 ppm; Background 3.27 ppm*	
Maximum	3.76

Source: SRA 2011, Table 6 CO Hotspots Modeling Results.
CO = carbon monoxide; ppm = parts per million; NAAQS = National Ambient Air Quality Standards; CAAQS = California Ambient Air Quality Standards

As shown in Table 4, the predicted CO concentrations would be substantially below the 1-hour and 8-hour National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) for CO. Therefore, the 2011 Final EIR concluded no exceedances of the air quality standards for CO are predicted, and the approved project would not cause or contribute to a violation of the CO standards.

3.2 Greenhouse Gases

3.2.1 Greenhouse Gas Emissions

Construction-Related Emissions

Table 5 (based on 2011 Final EIR Table 3.2-12) presents the GHG emissions inventory results for the approved project's construction-related activities.

Table 5
Construction GHG Emissions

Construction Phase	CO_2 Emissions (metric tons)
Phase I construction	1,712
Phase II construction	1,864
Total GHG emissions	3,576

Source: SDSU 2011.
GHG = greenhouse gas; CO_2 = carbon dioxide

As shown in Table 5, the approved project's construction activities would generate approximately 3,576 metric tons of carbon dioxide (CO_2) emissions. The 2011 Final EIR concluded that the construction-related GHG emissions would not be significant.

Operational-Related Emissions

The 2011 Final EIR evaluated consistency of the approved project with the mandate of Assembly Bill (AB) 32 to return California's GHG emissions level to the 1990 level by 2020; specifically, the 2011 Final EIR considered whether the approved project would reduce operational GHGs by 28.35% relative to a "business-as-usual" (BAU) scenario to achieve the statewide goal of AB 32. GHG emissions were estimated for the BAU and project scenarios, and the two values were compared.

Table 6 (based on 2011 Final EIR Table 3.2-13) presents the summary of estimated BAU operational GHG emissions.

Table 6
Summary of Estimated BAU Operational GHG Emissions

	Annual Emissions (MT CO_2E)
Total GHG emissions	8,282

Source: SDSU 2011.
BAU = business as usual; GHG = greenhouse gas; MT = metric tons; CO_2E = carbon dioxide equivalent

Table 7 (based on 2011 Final EIR Table 3.2-14) presents the estimated GHG emissions for the approved project with implementation of the GHG reduction measures, including the LEED Silver rating; the federal and state mobile source regulatory framework for Corporate Average Fuel Economy (CAFE) / Pavley fuel efficiency and motor vehicle standards; the California Air Resources Board's low carbon fuel standard; and the 20% renewable portfolio standard (RPS).

Table 7
Summary of Estimated Project Operational GHG Emissions

	Annual Emissions
Total GHG emissions, with GHG reductions	5,878 MT CO_2E
BAU emissions	8,282 MT CO_2E
Percent reduction below BAU	28.8%
Existing emission levels on the project site	4,171 MT CO_2E
Net increase in emission levels	1,707 MT CO_2E

Source: SDSU 2011.
GHG = greenhouse gas; MT = metric tons; CO_2E = carbon dioxide equivalent; BAU = business as usual

As shown in Table 7, the approved project's GHG emissions would be approximately 29% below BAU conditions; therefore, the project would be consistent with AB 32. Since the project-related emissions would be consistent with AB 32, impacts would be less than significant.

Additionally, as shown in Table 7, the approved project would result in a net increase of only 1,707 metric tons CO_2 equivalent (CO_2E) per year in GHG emissions when compared to existing annual emission levels associated with the project site, which provided additional support for the conclusion that the project's GHG impacts would be less than significant.

3.2.2 Consistency with Greenhouse Gas Plans, Policies, and Regulations

The 2011 Final EIR evaluated the approved project's GHG emissions against AB 32's reduction mandate. As discussed previously and shown in Table 7, the approved project-related emissions would be consistent with AB 32.

4 ANALYSIS OF STREET MODIFICATIONS

4.1 Air Quality

4.1.1 Consistency with Applicable Air Quality Plans

The Complete Streets Scenario under which the approved project would be built would reduce the travel lanes on College Avenue near the Montezuma Road intersection from six lanes to four lanes, and include additional streetscape improvements to increase walkability and pedestrian/bicycle circulation in the project area. No change is proposed for the approved project buildings. In light of these limited modifications, the project would not result in a conflict with or obstruct implementation of the applicable air quality plan. No change in significance determination would occur as a result of the changed circumstances.

4.1.2 Air Pollutant Emissions

Construction-Related Emissions

As previously noted, the street modifications would include streetscape improvements to increase walkability and pedestrian/bicycle circulation in the project area. No change is proposed for the project buildings or building footprints.

It is understood that the construction methods and type of construction equipment would remain the same as for the approved project. However, with implementation of more stringent standards for in-use off-road equipment and heavy-duty trucks, as well as fleet turnover replacing older equipment and vehicles, the emissions from equipment and vehicles would likely be lower. Since the original estimated construction emissions were below the significance thresholds as shown in Tables 1 and 2, the street modifications are not anticipated to result in new significant impacts nor result in a substantial change in the previously identified impacts. No change in significance determination would occur as a result of the changed circumstances.

Operational-Related Emissions

The changed circumstances under which the approved project would be built would consist of roadway and streetscape improvements intended to increase pedestrian activity. These changes could result in fewer vehicle trips coming in and out of the College Area as students would be provided with greater walking and biking access to campus facilities and a redistribution of project-related traffic would occur. As indicated in Section 2, the length of some trips between the project area and I-8 could increase due to the changed circumstances, which could in turn increase vehicle miles traveled and the associated air emissions. However, because the original estimated operational emissions were well below the significance thresholds as shown in Table 3, and given that pedestrian and biking activity likely would increase, potentially reducing the number of vehicle trips in and out of the College Area, operation of the approved project under the changed circumstances would not exceed the significance thresholds. No change in significance determination would occur as a result of the street modifications.

4.1.3 Cumulative Net Increase in Criteria Pollutants

Since no changes to the building footprints or project area would result from the street modifications and construction and operational emissions would be similar to those analyzed in the 2011 Final EIR, the changed circumstances under which the approved project would be built would not result in a cumulative net increase in criteria pollutants. No change in significance determination would occur as a result of the changed circumstances.

4.1.4 Odors

Similar to the approved project, any odors associated with construction activities would be temporary. The approved land uses (residential and retail uses), which are not land uses that would be sources of nuisance odors, would be unchanged. Thus, impacts related to odors would remain less than significant. No change in significance determination would occur as a result of the changed circumstances.

4.1.5 CO Hotspots Analysis

As previously noted, the 2011 Final EIR analysis identified significant traffic impacts to several roads in the area, including the segment of College Avenue between Montezuma Road and Canyon Crest Drive, which includes the segment of College Avenue where the Complete Streets Scenario would be implemented. The 2011 Final EIR also identified significant impacts at the College Avenue intersections at Montezuma Road, Zura Way, Canyon Crest Drive, and the I-8 Eastbound Ramp. Implementation of the Complete Streets Scenario would not result in any additional impacted locations beyond those previously identified in the 2011 Final EIR (LLG 2014).

The 2014 traffic analysis, assuming implementation of the Complete Streets Scenario, projected that the intersection of College Avenue and Lindo Paseo would operate at LOS C in the AM peak hour and LOS D in the PM peak hour under long-term (Year 2035) intersection operating conditions. The 2014 LLG updated traffic analysis also determined that the intersection of the mid-block pedestrian crosswalk and College Avenue would operate at LOS B during both the AM and PM peak hour under the long-term (2035) intersection operation scenario. Per the CO hotspot intersection selection criteria utilized in the 2011 Final EIR, a quantitative CO hotspot analysis is not required to be performed for the updated long-term traffic scenario for either the College Avenue and Lindo Paseo or the College Avenue and pedestrian signal intersection.

Pursuant to the City of San Diego's *Significance Determination Thresholds* (City of San Diego 2011), a site-specific CO hotspot analysis should be performed for the intersection of College Avenue and Montezuma Road as analyzed in the LLG traffic memo (LLG 2014). The potential impact of the changed circumstances on local CO levels was assessed at this intersection with the Caltrans CL4 interface based on CALINE4, which allows microscale CO concentrations to be estimated along each roadway corridor or near intersections.

The modeling analysis was performed for worst-case wind angle, in which the model selects the wind angles that produce the highest CO concentrations at each of the receptors. The suburban land classification of 100 centimeters (40 inches) was used for the aerodynamic roughness coefficient, which determines the amount of local air turbulence that affects plume spreading. The at-grade option was used in the analysis; for at-grade sections, CALINE4 does not permit the plume to mix below ground level. The mixing zone width was based on the inputs utilized in the 2011 Air Quality Technical Report for the Plaza Linda Verde Project (SRA 2011). The calculations assume a mixing height of 1,000 meters, a flat topographical condition between the source and the receptor (link height of 0 meters), and a meteorological condition of little to almost no wind (1.0 meter (3.3 feet) per second), consistent with U.S. Environmental Protection Agency (EPA) guidance.

The hourly traffic volume anticipated to travel on each link, in units of vehicles per hour (vph), was based on the 2014 LLG traffic analysis (LLG 2014). The CO emission factor represents the weighted average emission rate of the local San Diego County vehicle fleet expressed in grams per mile per vehicle. Consistent with the LLG traffic report, emission factors for Year 2035 representing long-term operating conditions were used in the CALINE4 model and were predicted by the California Air Resources Board's EMFAC2011 motor vehicle inventory model. Emission factors were based on a temperature of 47°F[2] and an average humidity of 55%.

The speed limit on College Avenue is 40 miles per hour (mph) and the speed limit on Montezuma Road is 35 mph. Traffic lane volume on College Avenue is an average of 343 vph in the AM peak hour and an average of 357 vph in the PM peak hour. Average approach speed for traffic volumes between 300 and 400 vph, at a cruise speed of 31 mph (free-flow speed of 40 mph) and an assumption of 50% red time, is approximately 10.5 mph and average departure speed is approximately 24.5 mph (Caltrans 1998). Traffic lane volume on Montezuma Road is an average of 268 traffic vph in the AM peak hour and an average of 472 vph in the PM peak hour. Average approach speed for traffic volumes between 200 and 500 vph, at a cruise speed of 28 mph (free-flow speed of 35 mph) and an assumption of 50% red time, is approximately 9.5 mph and average departure speed is approximately 22 mph (Caltrans 1998). The estimated emission factor using EMFAC2011 was based on a conservative average speed of 15 mph, which was assumed to reasonably represent vehicles traveling through the intersection of College Avenue and Montezuma Road.

The downtown San Diego ambient air quality monitoring station, located at 1110 Beardsley Street, San Diego, is the nearest monitoring location to the project site where CO concentrations are monitored. The maximum 1-hour CO background concentration at the Beardsley monitoring station was 2.8 ppm in 2011, 2.6 ppm in 2012, and 2.4 ppm in 2013 (EPA 2013). The maximum 1-hour CO background concentration of 2.8 ppm was assumed in the CALINE4 model. The model provides predicted concentrations in ppm at each of the receptor locations. To estimate an 8-hour average CO concentration, a persistence factor of 0.7 recommended for urban locations was applied to the output values.

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2 January is usually the coldest month of the year in San Diego, with an average minimum temperature of 49.7°F (NOAA 2014). The CO protocol guidance is use the smallest mean minimum temperature observed in January over the past three years plus the temperature adjustment for the geographic location and time period. The smallest mean minimum at the San Diego WSO airport station was 47.1°F in January 2013 (WRCC 2014). Assuming a 5°F correction factor for PM traffic conditions, average evening temperature would be approximately 52°F (Caltrans 1997). However, because these meteorological readings are for Lindbergh Field in San Diego, and as CO concentrations generally increase with a decrease in temperature, a temperature of 47°F (8.3°C) was conservatively used to determine the emission factors in EMFAC and CO concentrations in CALINE4.

The results of the model are shown in Table 8, CALINE4 Predicted CO Concentrations College Avenue and Montezuma Road Intersection. Model input and output data are provided in Attachment A.

Table 8
CALINE4 Predicted CO Concentrations
College Avenue and Montezuma Road Intersection

Peak Hour	Maximum Modeled Impact Year 2035 with Project	
	1-Hour (ppm)	*8-Hour (ppm)*[a]
AM	3.0	2.1
PM	3.0	2.1

Source: Caltrans 1998 (see Attachment A).
[a] Eight-hour concentrations were obtained by multiplying the 1-hour concentration by a factor of 0.7, as referenced in Caltrans 1997, Table B.15.
CO = carbon monoxide; ppm = parts per million

As shown in Table 8, maximum CO concentrations predicted for the AM peak hour 1-hour averaging period would be 3.0 ppm and for the PM peak hour 1-hour averaging period would be 3.0 ppm, both of which are below the state 1-hour CO standard of 20 ppm. Maximum predicted 8-hour CO concentrations of 2.1 ppm in the AM peak hour and 2.1 ppm in the PM peak hour would be below the state CO standard of 9.0 ppm. Because neither the state 1-hour standard nor the state 8-hour standard would be equaled or exceeded at the intersection of College Avenue and Montezuma Road, potential CO hotspot impacts would be less than significant. Therefore, no change in significance determination would occur as a result of the changed circumstances.

4.2 Greenhouse Gases

4.2.1 Greenhouse Gas Emissions

Construction GHG Emissions

As previously mentioned, the approved project's construction activities would generate approximately 3,576 metric tons of CO_2 emissions, which were found to be less than significant in the 2011 Final EIR. The changed circumstances would include additional streetscape improvements but would not result in the modification of the approved buildings. GHG emissions from construction would remain less than significant. No change in significance determination would occur as a result of the changed circumstances.

Operational GHG Emissions

As the changed circumstances under which the approved project would be built would not involve changes to the approved buildings, no changes to building-related operational GHG emissions would occur, including area sources (landscaping and natural gas consumption), water use, wastewater, electricity, and solid waste. The approved project would still incorporate a LEED Silver rating and GHG emissions would reflect the federal and state mobile source regulatory framework and 20% RPS (currently 33% RPS), thus surpassing existing efficiency requirements and reducing the project's demand for electricity, natural gas, and water—all of which would further reduce the GHG emissions associated with the project.

As indicated in Section 2, the intent of the Complete Streets Scenario is to enhance biking and pedestrian opportunities, which potentially could serve to reduce the number of vehicle trips. However, the length of some vehicle trips between the project area and I-8 could increase due to the changed circumstances, which could in turn increase vehicle miles traveled and the associated GHG emissions. The potential increase in vehicle miles traveled would be reflected under both the BAU and project conditions. Further, the state and federal GHG reduction measures would continue to apply to the vehicle emissions associated with the changed circumstances, thereby resulting in reductions from the BAU condition comparable to those identified in the 2011 Final EIR. Accordingly, it is anticipated that the project would still achieve a minimum of 28.35% below BAU conditions, and the project would remain consistent with the goal of AB 32. Since the project-related emissions would be consistent with AB 32, GHG impacts would remain less than significant. No change in significance determination would occur as a result of the street modifications.

Additionally, as previously mentioned, the approved project would result in an increase in GHG emissions of only 1,707 metric tons of CO_2E per year when compared to existing annual emission levels associated with the project site; this finding provided additional support for the conclusion that the project's GHG impacts would be less than significant. Because the street modifications would not substantially change the operational GHG emissions, no change in significance determination would occur as a result of the changed circumstances.

4.2.2 Consistency with Greenhouse Gas Plans, Policies, and Regulations

As discussed previously, project-related emissions inclusive of the street modifications would be consistent with AB 32.

At present, neither California State University, SDSU, nor the San Diego Air Pollution Control District has adopted any GHG reduction measures that would apply to the GHG emissions associated with the changed circumstances. Further, no mandatory and applicable GHG regulations or finalized agency guidelines would apply to implementation of the changed circumstances, and no conflict would occur. Therefore, this impact would be less than significant. No change in significance determination would occur as a result of the street modifications.

5 CONCLUSIONS

Based on a review of the 2011 Final EIR and the potential street modifications (i.e., the Complete Streets Scenario), the changed circumstances would not result in any new significant air quality or GHG effects, nor would they result in a substantial increase in the severity of significant effects previously identified.

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Att: *A, CALINE4 Output*
Figure 1, Regional Map
Figure 2, Vicinity Map
Figure 3, Approved Site Plan
Figure 4, Stepner Scenario
Figure 5, Complete Streets Scenario

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ATTACHMENT A

CALINE4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: College Ave & Montezuma Rd CSP AM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U=	1.0 M/S	Z0=	100. CM	ALT=	0. (M)
BRG=	WORST CASE	VD=	0.0 CM/S		
CLAS=	7 (G)	VS=	0.0 CM/S		
MIXH=	1000. M	AMB=	2.8 PPM		
SIGTH=	10. DEGREES	TEMP=	8.3 DEGREE (C)		

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Mont EBLA	150	0	0	0	AG	230	1.0	0.0	10.0
B. Mont EBTA	150	-4	0	-4	AG	390	1.0	0.0	10.0
C. Mont EBRA	150	-6	0	-6	AG	80	1.0	0.0	10.0
D. Mont EBD	0	-4	-150	-4	AG	660	1.0	0.0	10.0
E. Mont WBLA	-150	0	0	0	AG	30	1.0	0.0	10.0
F. Mont WBTA	-150	4	0	4	AG	660	1.0	0.0	10.0
G. Mont WBRA	-150	6	0	6	AG	220	1.0	0.0	10.0
H. Mont WBD	0	4	150	4	AG	1190	1.0	0.0	10.0
I. Coll NBLA	63	-138	0	0	AG	420	1.0	0.0	10.0
J. Coll NBTA	67	-138	4	0	AG	800	1.0	0.0	10.0
K. Coll NBRA	69	-138	6	0	AG	130	1.0	0.0	10.0
L. Coll NBD	4	0	-4	150	AG	1250	1.0	0.0	10.0
M. Coll SBLA	-8	150	0	0	AG	140	1.0	0.0	10.0
N. Coll SBTA	-12	150	-4	0	AG	460	1.0	0.0	10.0
O. Coll SBRA	-13	150	-6	0	AG	110	1.0	0.0	10.0
P. Coll SBD	-4	0	60	-138	AG	570	1.0	0.0	10.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: College Ave & Montezuma Rd CSP AM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-16	-16	1.8
2. Recpt 2	-36	-16	1.8
3. Recpt 3	-56	-16	1.8
4. Recpt 4	-9	-36	1.8
5. Recpt 5	-2	-56	1.8
6. Recpt 6	-16	16	1.8
7. Recpt 7	-36	16	1.8
8. Recpt 8	-56	16	1.8
9. Recpt 9	-17	36	1.8
10. Recpt 10	-18	56	1.8
11. Recpt 11	14	14	1.8
12. Recpt 12	13	34	1.8
13. Recpt 13	12	54	1.8
14. Recpt 14	34	14	1.8
15. Recpt 15	54	14	1.8
16. Recpt 16	20	-16	1.8
17. Recpt 17	30	-36	1.8
18. Recpt 18	40	-56	1.8
19. Recpt 19	40	-16	1.8
20. Recpt 20	60	-16	1.8

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: College Ave & Montezuma Rd CSP AM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	74.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Recpt 2	74.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. Recpt 3	77.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	8.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Recpt 5	3.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	146.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. Recpt 7	105.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. Recpt 8	103.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	153.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	156.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	255.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12. Recpt 12	202.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13. Recpt 13	200.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14. Recpt 14	254.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	255.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	291.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17. Recpt 17	312.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18. Recpt 18	316.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	286.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20. Recpt 20	286.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: College Ave & Montezuma Rd CSP AM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	*	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Recpt 2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. Recpt 3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Recpt 5	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. Recpt 7	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. Recpt 8	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12. Recpt 12	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13. Recpt 13	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
14. Recpt 14	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17. Recpt 17	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18. Recpt 18	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20. Recpt 20	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: College Ave & Montezuma Rd CSP PM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U=	1.0 M/S	Z0=	100. CM	ALT=	0. (M)
BRG=	WORST CASE	VD=	0.0 CM/S		
CLAS=	7 (G)	VS=	0.0 CM/S		
MIXH=	1000. M	AMB=	2.8 PPM		
SIGTH=	10. DEGREES	TEMP=	8.3 DEGREE (C)		

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Mont EBLA	150	0	0	0	AG	320	1.0	0.0	10.0
B. Mont EBTA	150	-4	0	-4	AG	900	1.0	0.0	10.0
C. Mont EBRA	150	-6	0	-6	AG	430	1.0	0.0	10.0
D. Mont EBD	0	-4	-150	-4	AG	1230	1.0	0.0	10.0
E. Mont WBLA	-150	0	0	0	AG	250	1.0	0.0	10.0
F. Mont WBTA	-150	4	0	4	AG	640	1.0	0.0	10.0
G. Mont WBRA	-150	6	0	6	AG	290	1.0	0.0	10.0
H. Mont WBD	0	4	150	4	AG	1100	1.0	0.0	10.0
I. Coll NBLA	63	-138	0	0	AG	320	1.0	0.0	10.0
J. Coll NBTA	67	-138	4	0	AG	630	1.0	0.0	10.0
K. Coll NBRA	69	-138	6	0	AG	60	1.0	0.0	10.0
L. Coll NBD	4	0	-4	150	AG	1240	1.0	0.0	10.0
M. Coll SBLA	-8	150	0	0	AG	270	1.0	0.0	10.0
N. Coll SBTA	-12	150	-4	0	AG	720	1.0	0.0	10.0
O. Coll SBRA	-13	150	-6	0	AG	140	1.0	0.0	10.0
P. Coll SBD	-4	0	60	-138	AG	1400	1.0	0.0	10.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: College Ave & Montezuma Rd CSP PM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-16	-16	1.8
2. Recpt 2	-36	-16	1.8
3. Recpt 3	-56	-16	1.8
4. Recpt 4	-9	-36	1.8
5. Recpt 5	-2	-56	1.8
6. Recpt 6	-16	16	1.8
7. Recpt 7	-36	16	1.8
8. Recpt 8	-56	16	1.8
9. Recpt 9	-17	36	1.8
10. Recpt 10	-18	56	1.8
11. Recpt 11	14	14	1.8
12. Recpt 12	13	34	1.8
13. Recpt 13	12	54	1.8
14. Recpt 14	34	14	1.8
15. Recpt 15	54	14	1.8
16. Recpt 16	20	-16	1.8
17. Recpt 17	30	-36	1.8
18. Recpt 18	40	-56	1.8
19. Recpt 19	40	-16	1.8
20. Recpt 20	60	-16	1.8

JOB: College Ave & Montezuma Rd CSP PM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	75.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Recpt 2	76.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. Recpt 3	77.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	8.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Recpt 5	3.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	147.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. Recpt 7	106.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. Recpt 8	105.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	154.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	157.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	255.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12. Recpt 12	202.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13. Recpt 13	200.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14. Recpt 14	255.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	255.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	290.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17. Recpt 17	312.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18. Recpt 18	315.	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	286.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20. Recpt 20	286.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

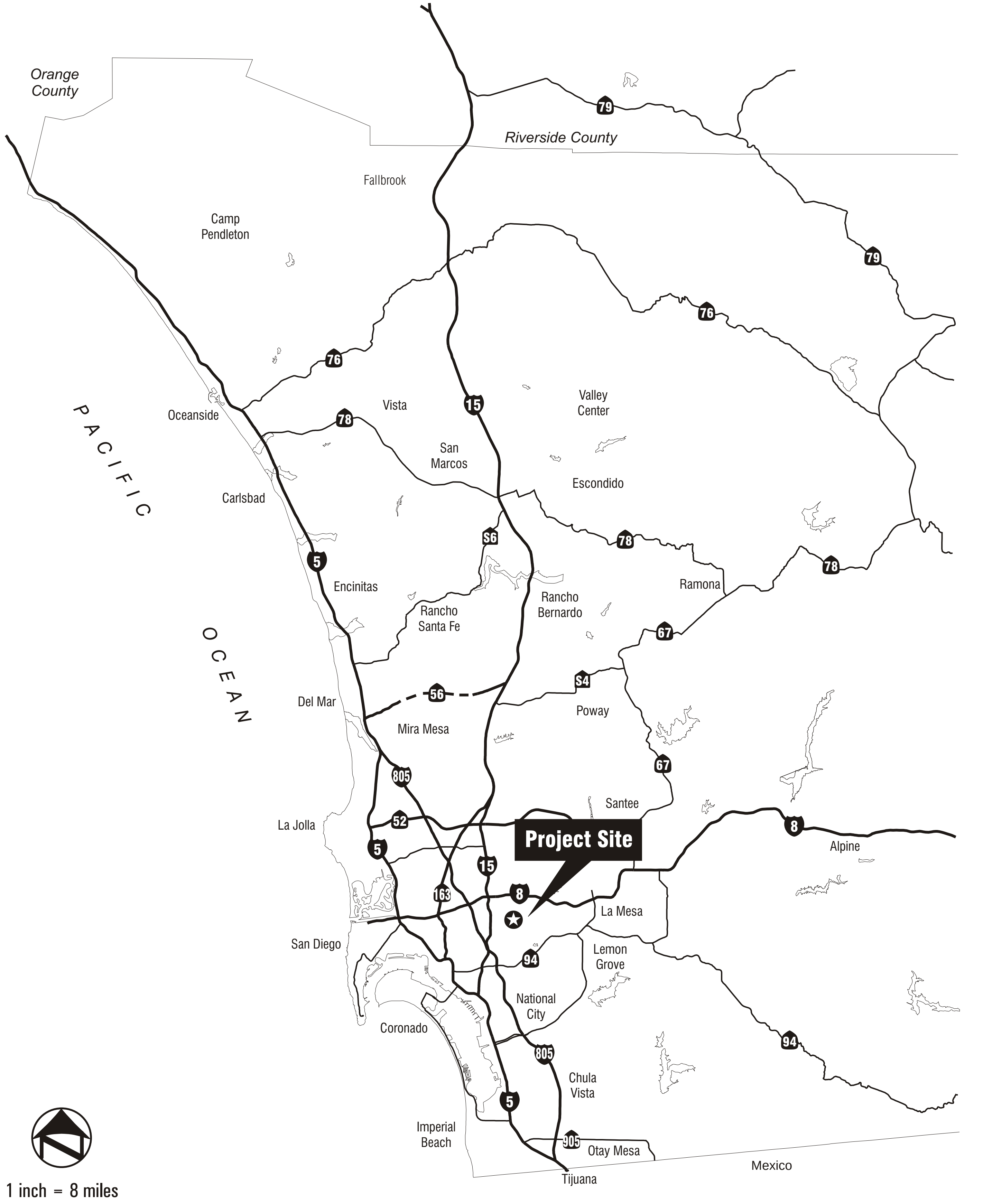
JOB: College Ave & Montezuma Rd CSP PM 2035
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Recpt 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. Recpt 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
7. Recpt 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. Recpt 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12. Recpt 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13. Recpt 13	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
14. Recpt 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17. Recpt 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18. Recpt 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FIGURES

Figures 1–5



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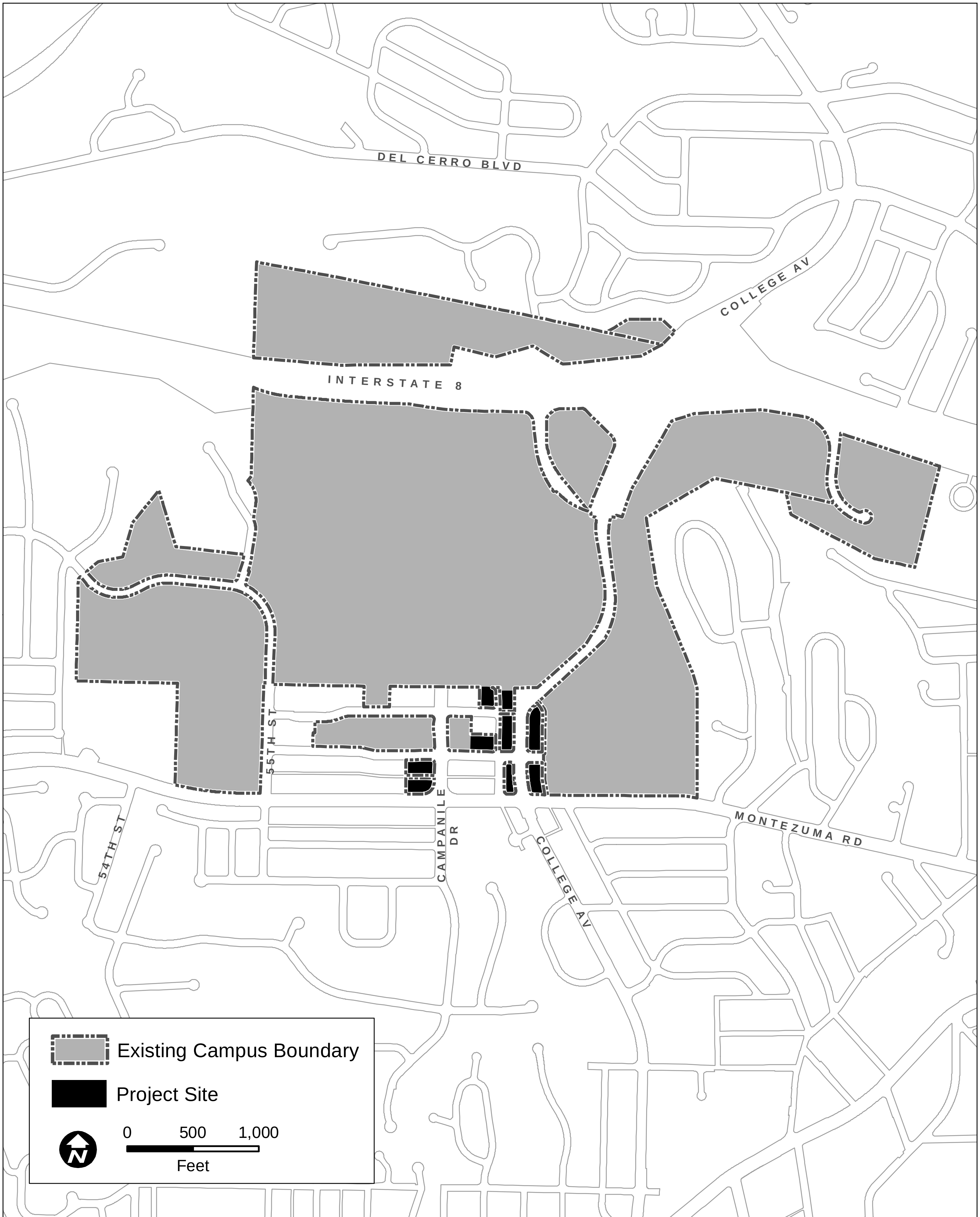
SDSU Complete Streets Addendum to 2011 Plaza Linda Verde Final EIR Air Quality and Greenhouse Gas Technical Memorandum

SAN DIEGO STATE UNIVERSITY

Figure 1

Regional Map



SDSU Complete Streets Addendum to 2011 Plaza Linda Verde Final EIR Air Quality and Greenhouse Gas Technical Memorandum

SAN DIEGO STATE UNIVERSITY

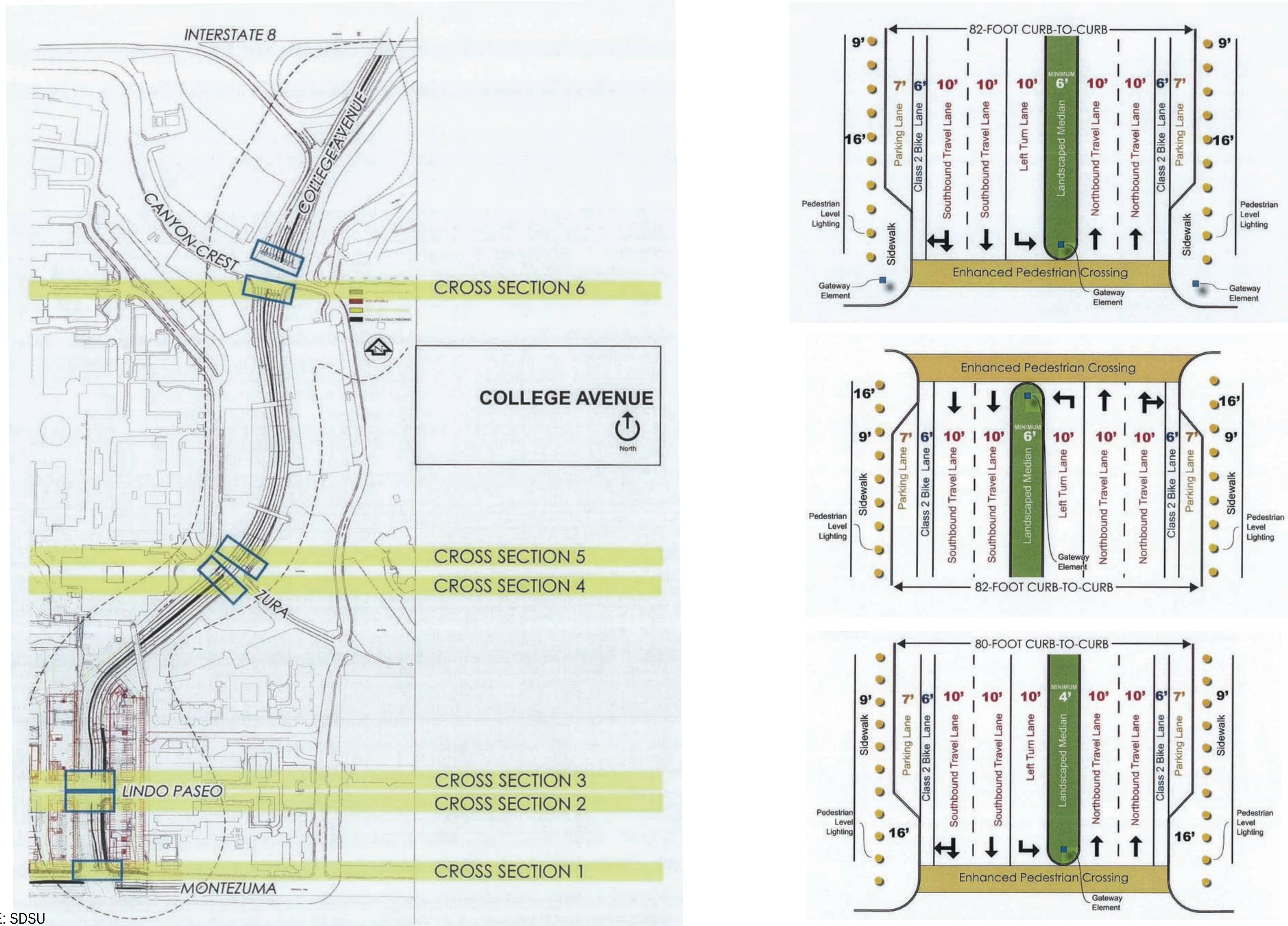
Figure 2

Vicinity Map

SDSU Complete Streets Addendum to
2011 Plaza Linda Verde Final EIR
Air Quality and Greenhouse Gas Technical Memorandum

SAN DIEGO STATE UNIVERSITY

Figure 3
Approved Site Plan



CROSS SECTION 1
COLLEGE AVENUE AT MONTEZUMA RD

NOT TO SCALE

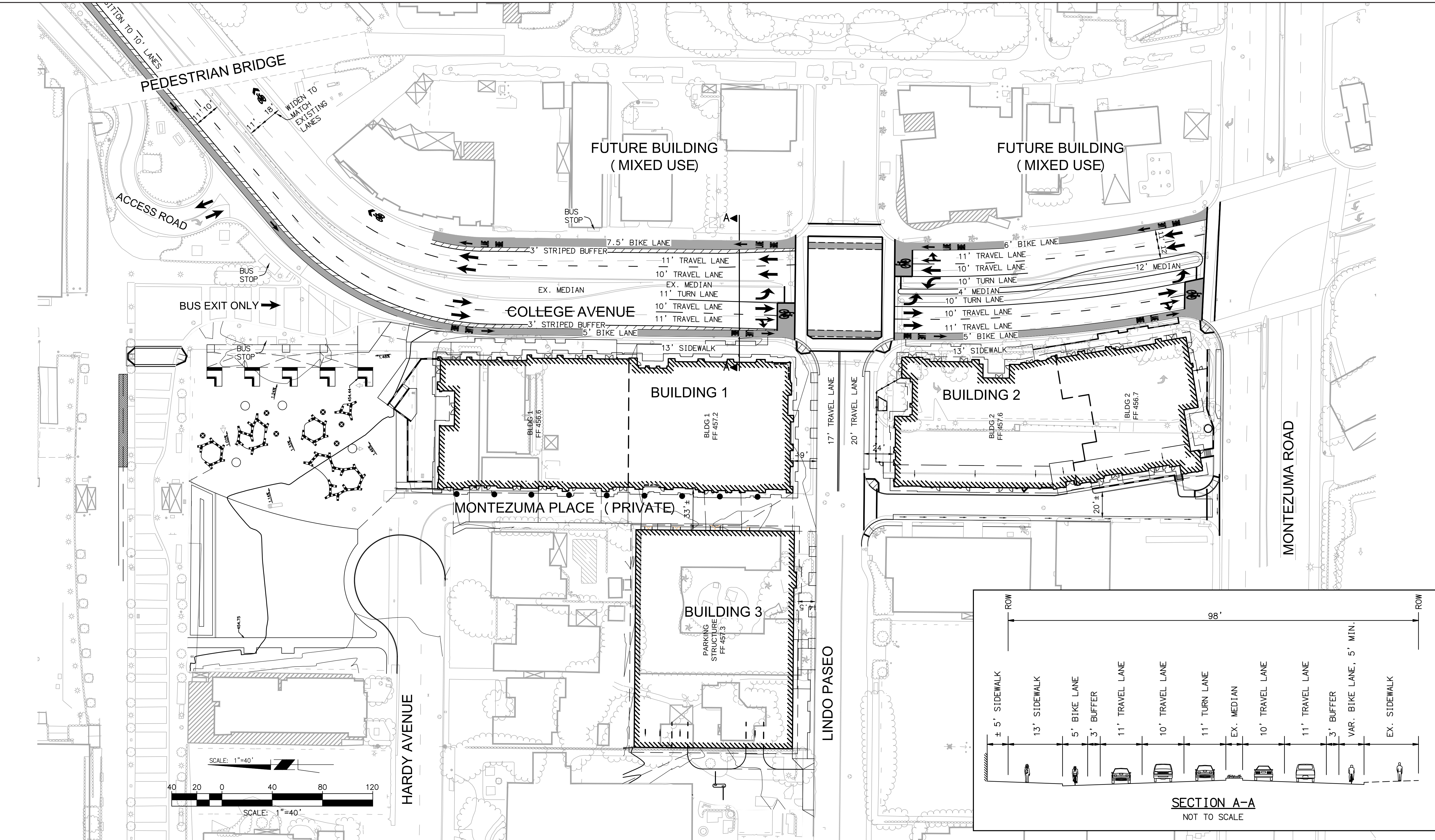
CROSS SECTION 2
COLLEGE AVENUE SOUTH OF LINDO PASEO

NOT TO SCALE

CROSS SECTION 3
COLLEGE AVENUE NORTH OF LINDO PASEO

NOT TO SCALE

SOURCE: SDSU



SOURCE: RBF 6/24/2014

Figure 5
Complete Streets Scenario

DUDEK

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TECHNICAL MEMORANDUM

To:	Laura Shinn, Director, Facilities Planning, San Diego State University
From:	David Deckman, Senior Air Quality Specialist
cc:	Michael Haberkorn, Gatzke Dillon & Ballance LLP
Subject:	San Diego State University – Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Air Quality and Greenhouse Gas Technical Memorandum – Diversion Analysis Review
Date:	August 14, 2014

Dudek was asked to review the July 14, 2014, Plaza Linda Verde Diversion Analysis Memorandum prepared by Linscott, Law and Greenspan (LLG). This memorandum provides a supplemental long-term intersection analysis to account for the potential diversion of traffic from College Avenue if it were retained in its current 4-lane configuration instead of being widened to 6 lanes as planned per the City's General Plan Circulation Element. Dudek was asked to review LLG's diversion analysis memorandum to determine if any of the conclusions contained in our June 25, 2014, Air Quality and Greenhouse Gas Analysis Technical Memorandum would change as a result of the additional information contained in the LLG memorandum.

Dudek has reviewed LLG's diversion analysis memorandum, and we confirm that the information in this most recent analysis does not alter the conclusions contained in our June 25, 2014, Air Quality and Greenhouse Gas Technical Memorandum. The following factors support this conclusion:

- The LLG diversion analysis evaluated traffic impacts (delay and Level of Service (LOS)) at five intersections along Montezuma Road. The Final EIR included a carbon monoxide (CO) hotspots analysis for numerous intersections near the proposed project, two of which were Montezuma Road at 55th Street and Montezuma Road at Campanile Drive. The Final EIR hotspots analysis at these two intersections concluded that the ambient CO concentrations would be less than the 1-hour and 8-hour CAAQS of 20 parts per million (ppm) and 9.0 ppm, respectively. The maximum estimated concentrations at these two intersections, including both background concentrations and the project's contribution, were 5.8 and 3.6 ppm for the 1-hour and 8-hour averaging periods, respectively.

- The maximum 1-hour and 8-hour background (without project emissions) CO concentrations have decreased from 5.3 ppm and 3.3 ppm, respectively, as used in the CO hotspot analysis in the Final EIR, to 2.8 ppm and 2.0 ppm, respectively, as used in Dudek's June 25, 2014, Air Quality and Greenhouse Gas Technical Memorandum. Thus, any supplemental CO hotspots analysis would reflect this substantial reduction in the background concentrations.
- Table 2 of LLG's diversion analysis shows that in comparison to the original traffic analysis in the Final EIR, the LOS at the Montezuma Road intersections would not worsen and the delay time would improve at all intersections under the Complete Streets Scenario. These improvements suggest better traffic flow and a corresponding reduction in air quality impacts.
- LLG's diversion analysis indicates "lower long-term background traffic volumes presently forecast by SANDAG as compared to those used for the PLV TIA [traffic impact analysis]." That is, fewer total vehicles would travel through the subject intersections, and the associated air pollutant emissions would be lower.

For these reasons, an updated or expanded CO hotspots analysis would not demonstrate new exceedances of the CAAQS at the Montezuma Road intersections and would likely demonstrate that updated CO impacts would be much less for these intersections. Accordingly, the findings of the LLG diversion analysis do not necessitate revisions to our June 25, 2014, Air Quality and Greenhouse Gas Technical Memorandum, which concluded that the modifications of College Avenue under the Complete Streets Scenario would not result in any new significant air quality effects, nor would they result in a substantial increase in the severity of significant effects previously identified.

Sincerely,

David Deckman

David Deckman
Senior Air Quality Specialist

cc: Sarah Lozano, AICP, Principal

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TECHNICAL MEMORANDUM

To:	Laura Shinn, Director, Facilities Planning, San Diego State University
From:	David Deckman, Senior Air Quality Specialist
cc:	Michael Haberkorn, Gatzke Dillon & Ballance LLP
Subject:	San Diego State University – Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Air Quality and Greenhouse Gas Technical Memorandum – Queuing Analysis Review
Date:	August 14, 2014

Dudek was asked to review the revised August 12, 2014, Plaza Linda Verde – Complete Streets Design Analyses Revised Memorandum prepared by Linscott, Law and Greenspan (LLG). This memorandum provides a traffic analysis of the long-term traffic operations associated with the "Complete Streets" design for the segment of College Avenue north of the Montezuma Road intersection. The initial memorandum, which included a queuing analysis for a 50th percentile scenario, was revised to include a supplemental queuing analysis for a 95th percentile scenario. Dudek was asked to review LLG's revised memorandum to determine if any of the conclusions contained in our June 25, 2014, Air Quality and Greenhouse Gas Analysis Technical Memorandum would change.

Dudek has reviewed LLG's revised memorandum, and we confirm that the information in this most recent analysis does not alter the conclusions contained in our June 25, 2014, Air Quality and Greenhouse Gas Technical Memorandum. The following factors support this conclusion:

- The June 25, 2014, Air Quality and Greenhouse Gas Technical Memorandum included a carbon monoxide (CO) "hotspots" analysis to evaluate whether the cumulative traffic-related emissions would cause an exceedance of the California Ambient Air Quality Standards (CAAQS). The CO hotspots analysis did not rely on queuing information from LLG's June 24, 2014, traffic memorandum because such information is not necessary in conducting a hotspots analysis.

- A CO hotspots analysis considers lane geometry; hourly traffic volume; meteorological conditions (e.g., wind speed, temperature, relative humidity); background CO concentrations; and motor vehicle emission factors, which are a function of speed as vehicles travel through an intersection. While the degree of queuing could potentially affect vehicle speeds, a conservative average vehicle speed of 15 miles per hour was utilized for the CO hotspots analysis presented in the June 25, 2014, Air Quality and Greenhouse Gas Technical Memorandum. The CO hotspots analysis included in that memo concluded that the resultant CO concentrations would be well below the CAAQS. As such, minor changes in modeled conditions would not result in a different conclusion.

Accordingly, the addition of the 95th percentile queuing analysis to LLG's memorandum would not necessitate revisions to the Dudek-prepared June 25, 2014 Air Quality and Greenhouse Gas Technical Memorandum, which concluded that the modifications of College Avenue under the Complete Streets Scenario would not result in any new significant air quality effects, nor would they result in a substantial increase in the severity of significant effects previously identified.

Sincerely,

David Deckman

David Deckman
Senior Air Quality Specialist

cc: Sarah Lozano, AICP, Principal

Appendix B Noise

San Diego State University Complete Streets Addendum to the Plaza Linda Verde Final EIR - Noise Analysis Technical Memorandum, DUDEK, June 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Noise Analysis Technical Memorandum Update – Diversion Analysis Review, DUDEK, August 2014

San Diego State University - Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Noise Analysis Technical Memorandum Update – Queuing Analysis Review, DUDEK, August 2014

DUDEK

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TECHNICAL MEMORANDUM

To: Laura Shinn, Director, Facilities Planning, San Diego State University
From: Mike Greene, Environmental Specialist/Acoustician
Cc: Michael Haberkorn, Gatzke Dillon & Ballance LLP
Subject: San Diego State University – Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Noise Analysis Technical Memorandum
Date: June 25, 2014

This memorandum (1) summarizes the relevant portions of the noise impacts analysis presented in the certified Final Environmental Impact Report (SCH No. 2009011040) (EIR; 2011 Final EIR) for the approved Plaza Linda Verde project and (2) discusses whether modifications to a limited segment of College Avenue (referred to as "changed circumstances" or "street modifications") would result in new significant environmental effects or a substantial increase in the severity of significant effects previously identified in the 2011 Final EIR.

1 PROJECT LOCATION AND DESCRIPTION

The approved project is located on the San Diego State University (SDSU) campus, within the College Area of the City of San Diego, San Diego County, California (see Figure 1, Regional Map, and Figure 2, Vicinity Map). Specifically, the project site is located generally between Aztec Walk and Montezuma Road in the southeastern portion of campus.

The approved project is a mixed-use project that would straddle both the east and west sides of College Avenue between the SDSU Transit Center / Pedestrian Bridge and Montezuma Road (see Figure 3, Approved Site Plan). The approved project will include commercial/retail uses on the first floor of several buildings and residential uses on the upper floors. A stand-alone parking structure will also be constructed west of College Avenue. The approved project was analyzed in the Plaza Linda Verde Final EIR, which was certified by the Board of Trustees of California State University in May 2011.

The 2011 Final EIR analyzed the potential impacts of the project on the environment. Specific to traffic and circulation, the primary analysis was based on the existing four-lane design for College Avenue and the City of San Diego's long-term circulation plan for College Avenue, which assumes a six-lane roadway with three lanes in each direction. The 2011 Final EIR identified significant impacts to several roads in the area, including the segment of College Avenue between Canyon Crest Drive and Montezuma Road, and the College Avenue intersections at the Interstate 8 (I-8) Eastbound Ramp, Canyon Crest Drive, Zura Way, and Montezuma Road.

In addition to the primary analysis, the 2011 Final EIR also included a supplemental analysis based on a more pedestrian-friendly four-lane segment of College Avenue from Montezuma Road north to Canyon Crest Drive a scenario (referred to as the Stepner Scenario) put forth by Michael Stepner, a former City of San Diego planner (see Figure 4, Stepner Scenario). The supplemental analysis addressed the potential impacts associated with the redistribution of vehicle trips from College Avenue to other roadways (i.e., Fairmount Avenue, 70th Street, and Montezuma Road) that likely would result due to the reduced capacity of College Avenue. The analysis presented in the 2011 Final EIR identified additional significant traffic impacts to Fairmount Avenue and Montezuma Road. For various reasons, the Stepner Scenario was not pursued beyond the 2011 Final EIR.

Recently, however, SDSU and the City of San Diego have entered into discussions to implement a variation of the Stepner Scenario, referred to as the "Complete Streets Scenario," on the limited segment of College Avenue located north of Montezuma Road and south of the existing suspended pedestrian bridge. Under the Complete Streets Scenario, this segment of College Avenue would be modified to include two travel lanes in each direction (one 10 feet wide and the other 11 feet wide), a 5-foot-wide bike lane in the southbound direction and a 6- to 7.5-foot-wide bike lane in the northbound direction with intervening 3-foot-wide striped buffers over a portion, and 13-foot-wide sidewalks on each side of the street (see Figure 5, Complete Streets Scenario).[1]

2 METHODS

As noted above, for the 2011 Final EIR the project's traffic engineers (Linscott, Law & Greenspan (LLG)) calculated the volume of traffic that would be redistributed in the College Area as a result of the Stepner Scenario. LLG has subsequently conducted a focused supplemental analysis to reflect 2014 existing and long-term cumulative traffic conditions on College Avenue, Montezuma Road / 70th Street, and Montezuma Road / Fairmount Avenue

[1] The primary difference between the Complete Streets Scenario and the Stepner Scenario is the elimination of on-street parking and the possible addition of a signalized pedestrian crossing; in all other respects, the differences between the Complete Streets and Stepner Scenarios are relatively minor (e.g., 10- and 11-foot-wide travel lanes vs. 10-foot-wide travel lanes; 5-foot-wide and 6- to 7.5-foot-wide bike lanes vs. 6-foot-wide bike lanes; and 13- vs. 16-foot-wide sidewalks, respectively).

under a Complete Streets Scenario as incorporated into the latest San Diego Association of Governments (SANDAG) regional model.

Additionally, ambient noise measurements were conducted in order to provide a representative sample of the existing (Year 2014) noise baseline along Fairmount Avenue, Montezuma Road, College Avenue, and 70th Street, and to calibrate the traffic noise model. Dudek has reviewed the redistributed traffic volumes provided in the 2011 Final EIR, the ambient noise measurements, and the updated traffic volumes prepared by LLG in conducting the analysis presented here.

3 SUMMARY OF AMBIENT NOISE MEASUREMENTS

Ambient noise measurements were conducted on Monday, June 9, 2014, to provide a representative sample of the existing (Year 2014) noise baseline along Fairmount Avenue, Montezuma Road, College Avenue, and 70th Street, and to calibrate the Federal Highway Administration's (FHWA's) Traffic Noise Model (TNM) 2.5 used for the subsequent traffic noise modeling. Table 1 summarizes the noise measurement results (see Figure 6, Noise Measurement Locations).

Table 1
Measured Noise Levels and Traffic Volumes

Site	Description	Date Time	L_{eq} (dBA)	CNEL[a] (dBA)	Cars	Medium Trucks / Buses	Heavy Trucks
M1	Caminito Oscio, overlooking Fairmount Avenue between I-8 and Montezuma Road	6/9/14 12:50–1:10 p.m.	61	63	1,044	0	8
M2	Montezuma Road and 54th Street	6/9/14 1:44–2:04 p.m.	65	67	396	5	3
M3	70th Street and Saranac Street	6/9/14 3:14–3:29 p.m.	67	69	490	1	3
M4	College Avenue and Lindo Paseo	6/9/14 2:38–3:53 p.m.	65	67	414	4	4

[a] CNEL is derived by normalizing the traffic counts observed during the noise measurements per the June 2010 SDSU Plaza Linda Verde Draft EIR acoustical analysis.

L_{eq} = equivalent continuous sound level (time-averaged sound level); dBA = A-weighted decibels; CNEL = community noise equivalent level (24-hour weighted average)

To calibrate the noise model, the same traffic volume and vehicle composition ratios counted during the noise measurements were used along with the observed vehicle speeds (which generally coincided with the posted speed limits for the roadways). Using vehicle counts and observed speeds, the modeled noise values were within 1 decibel (dB) of the measured noise levels, which confirms the accuracy of the noise model (please see Section 5 for the future traffic noise model results).

4 SUMMARY OF CERTIFIED 2011 FINAL EIR NOISE IMPACTS ANALYSIS

The 2011 Final EIR determined that the approved project would result in potentially significant impacts attributable to noise generated by project construction activities. Mitigation was adopted requiring that construction activities comply with the relevant City of San Diego noise ordinance criteria, and that certain specified steps be taken to minimize construction-related noise and ensure that noise levels do not exceed permissible levels. With implementation of the adopted mitigation, impacts would be reduced to less than significant (Draft EIR (SDSU 2011), pp. 3.8-8 to 3.8-10 and 3.8-14).

As to off-site noise impacts attributable to increased vehicle traffic, as shown in Table 2 (based on SDSU 2011, Table 3.8-4), the 2011 Final EIR found that under a near-term scenario, the additional project traffic, in combination with cumulative traffic, would increase the noise along the adjacent roads by 1 dB CNEL or less and, as such, impacts would be less than significant. Under a long-term scenario, the increase in CNEL levels with project traffic would be essentially the same as without project traffic; therefore, the project's impacts would be less than significant (Draft EIR (SDSU 2011), pp. 3.8-10 to 3.8-11).

Table 2
2011 Final EIR Off-Site Traffic Noise Level Increase

Street (Segment)	Existing ADT	Project Buildout (2015) ADT	CNEL Increase[1] (dB)	Long-Term (2030) Without Project ADT	CNEL Increase[2] (dB)	Long-Term (2030) With Project ADT	CNEL Increase[3] (dB)
College Avenue							
Canyon Crest Drive to Zura Way	44,000	45,933	<1	76,140	2	76,815	2
Zura Way to Montezuma Road	30,000	31,689	<1	56,040	3	56,715	3
Montezuma Road to El Cajon Boulevard	29,100	33,336	<1	40,200	1	40,495	1
Montezuma Road							
Collwood Boulevard to 55th Street	30,600	34,832	1	33,850	<1	34,495	<1
55th Street to College Avenue	26,100	31,662	1	35,010	1	35,565	1
College Avenue to Catoctin Drive	14,800	18,757	1	28,800	3	29,050	3

Source: SDSU 2011.
ADT = average daily trips; CNEL = community noise equivalent level; dB = decibels

As to on-site noise impacts attributable to increased vehicle traffic, the 2011 Final EIR found that the increased traffic would result in potentially significant impacts to a portion of the student housing units that would be built as part of the approved project and, as a result, mitigation was adopted requiring that interior noise levels achieve acceptable levels. With mitigation, impacts would be less than significant (Draft EIR (SDSU 2011), pp. 3.8-12 to 3.8-13 and 3.8-15).

The 2011 Final EIR also found that outdoor mechanical equipment to be installed as part of the approved project potentially would result in significant noise impacts to existing land uses. As a result, mitigation was adopted requiring that appropriate steps be taken to ensure that noise levels do not exceed applicable City standards. With mitigation, impacts would be less than significant (Draft EIR (SDSU 2011), pp. 3.8-13 and 3.8-15).

5 ANALYSIS OF STREET MODIFICATIONS

Off-Site Vehicle Noise – 2014 Traffic Redistribution and Noise Impacts

The traffic volumes along potentially affected roadway segments associated with implementation of the approved project and the corresponding predicted traffic volumes resulting from the Complete Streets Scenario are summarized in Table 3. As Table 3 shows, traffic volumes along Fairmount Avenue, 70th Street, and the segment of Montezuma Road between Collwood Boulevard and 55th Street would increase somewhat as a result of implementation of the Complete Streets Scenario, compared to the approved project. Traffic volumes would increase approximately 25% along Fairmount Avenue between I-8 and Montezuma Road, approximately 12% along 70th Street between Alvarado Road and El Cajon Boulevard, and approximately 5% along Montezuma Road between Collwood Boulevard and 55th Street. Conversely, traffic volumes along Montezuma Road and College Avenue would decrease approximately 14% (on Montezuma Road between 55th Street and College Avenue) to over 50% (on College Avenue north of Lindo Paseo). It should be noted that all of these streets are adjacent to residential and other noise-sensitive land uses.

Table 3
Future Traffic Volumes and Estimated Traffic Noise Increases – Approved Project vs. Complete Streets Scenario

Street Segment	Year 2030 6-Lane (Approved Project) ADT	Year 2035 4-Lane (Complete Streets Scenario) ADT	CNEL Increase[a] (dB)
Fairmount Avenue			
I-8 – Montezuma Road	89,000	110,800	1
Montezuma Road			
Collwood Boulevard – 55th Street	33,8500	35,500	<1
55th Street – College Avenue	35,010	30,100	−1
55th Street – Catoctin Drive	28,800	25,700	<1
College Avenue			
South of Montezuma Road	40,200	31,100	-1
Montezuma Road – Lindo Paseo	56,040	38,900	−3
North of Lindo Paseo	76,140	35,800	−3
70th Street			
Alvarado Road – El Cajon Boulevard	33,000	37,100	1

Sources: SDSU 2011; LLG 2014.
[a] Derived from FHWA TNM 2.5.
ADT = average daily trips; CNEL = community noise equivalent level; dB = decibels

As shown in Table 3, the differences in traffic noise between the Year 2030 six-lane (approved project) College Avenue configuration and the Year 2035 four-lane (Complete Streets Scenario) College Avenue configuration would be relatively small, ranging from an estimated 3 dB decrease in noise on College Avenue between Montezuma Road and Lindo Paseo and north of Lindo Paseo, to an increase of 1 dB on 70th Street and on Fairmount Avenue. Because a change in community noise of 1 dB or less is not an audible change, this change would not result in an increase in the previously reported impacts in the 2011 Final EIR.

Construction-Related Noise

While the street modifications would result in the construction of additional streetscape improvements, the corresponding construction activities would be of a similar nature to those addressed in the 2011 Final EIR and, as such, impacts would be similar to those previously identified.

On-Site Vehicle Noise

As discussed above, the street modifications would not result in a substantial increase in roadway noise CNEL levels. Therefore, impacts to the student housing that would be built as part of the approved project would be similar to those previously identified in the 2011 Final EIR.

Mechanical Equipment

The street modifications do not include any changes to the mechanical equipment that would be installed as part of the approved project. Therefore, there would no change in the impacts previously identified in the 2011 Final EIR.

6 CONCLUSIONS

Based on a review of the 2011 Final EIR and the street modifications now being considered (i.e., the Complete Streets Scenario), the changed circumstances would not result in any new significant noise effects, nor would they result in a substantial increase in the severity of significant effects previously identified in the 2011 Final EIR.

7 REFERENCES

FHWA (Federal Highway Administration). 2004. FHWA Traffic Noise Model, Version 2.5. Washington DC: FHWA, Office of Environment and Planning. February 2004.

LLG (Linscott, Law & Greenspan). 2014. “Plaza Linda Verde – *Complete Streets Design* Analysis.” Memorandum from J. Boarman (LLG) to R. Schulz (AIA). June 24, 2014.

SDSU (San Diego State University). 2011. *Final Environmental Impact Report, Plaza Linda Verde.* State Clearinghouse No. 2009011040. Prepared for Board of Trustees of the California State University. Prepared by San Diego State University. May 2011.

8 LIST OF PREPARERS

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Sarah Lozano, AICP, Principal
Lesley Terry, GIS Analyst
Laurel Porter, Editor
Devin Brookhart, Publications Production Lead

Sincerely,

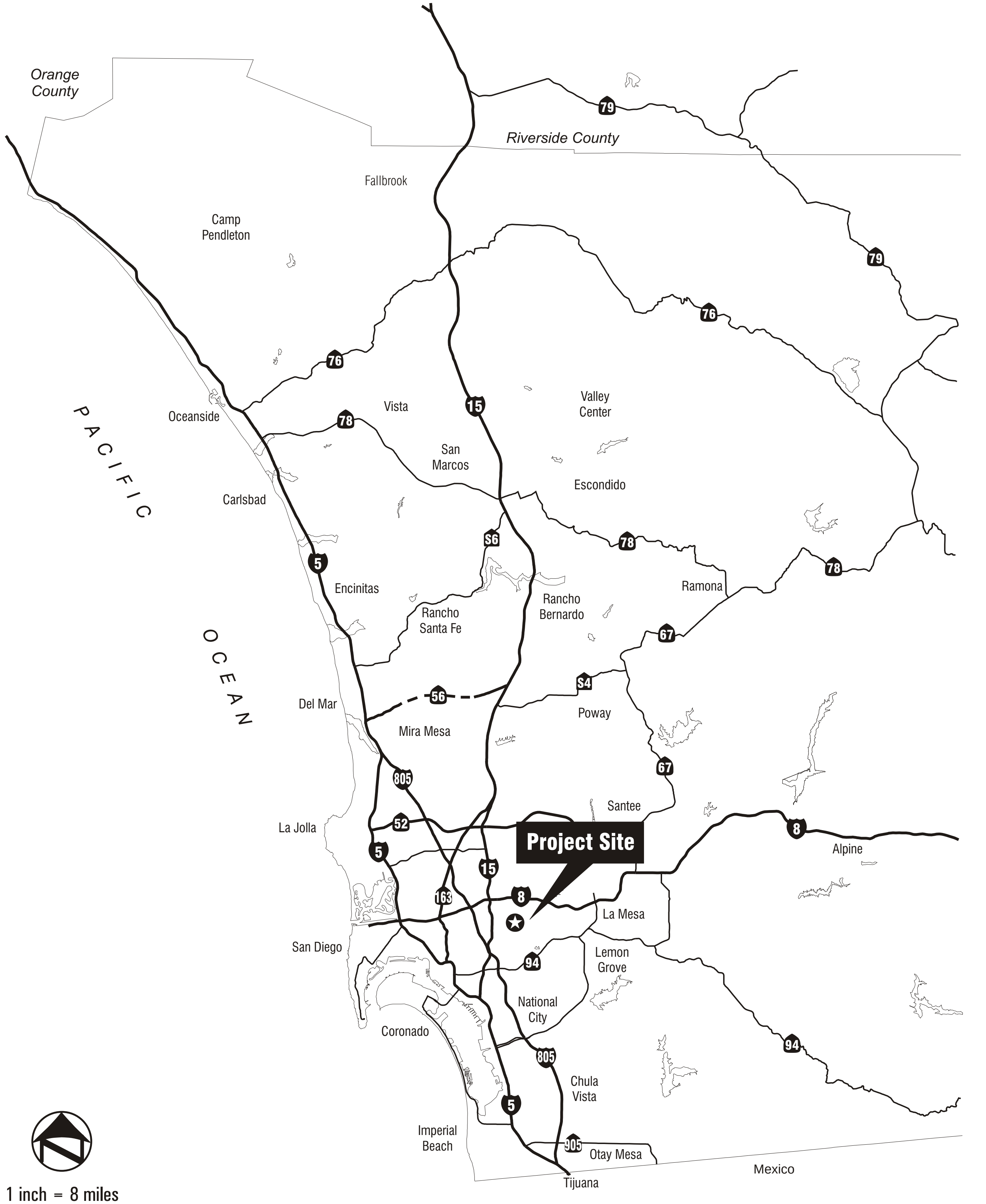
Mike Greene, INCE Bd. Cert.
Environmental Specialist/Acoustician

Att: Figure 1, Regional Map
Figure 2, Vicinity Map
Figure 3, Approved Site Plan
Figure 4, Stepner Scenario
Figure 5, Complete Streets Scenario
Figure 6, Noise Measurement Locations

cc: Sarah Lozano, AICP, Principal
Jennifer Longabaugh, AICP, LEED AP ND, Environmental Planner

FIGURES

Figures 1–6



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SDSU Complete Streets Addendum to
2011 Plaza Linda Verde Final EIR
Noise Analysis Technical Memorandum

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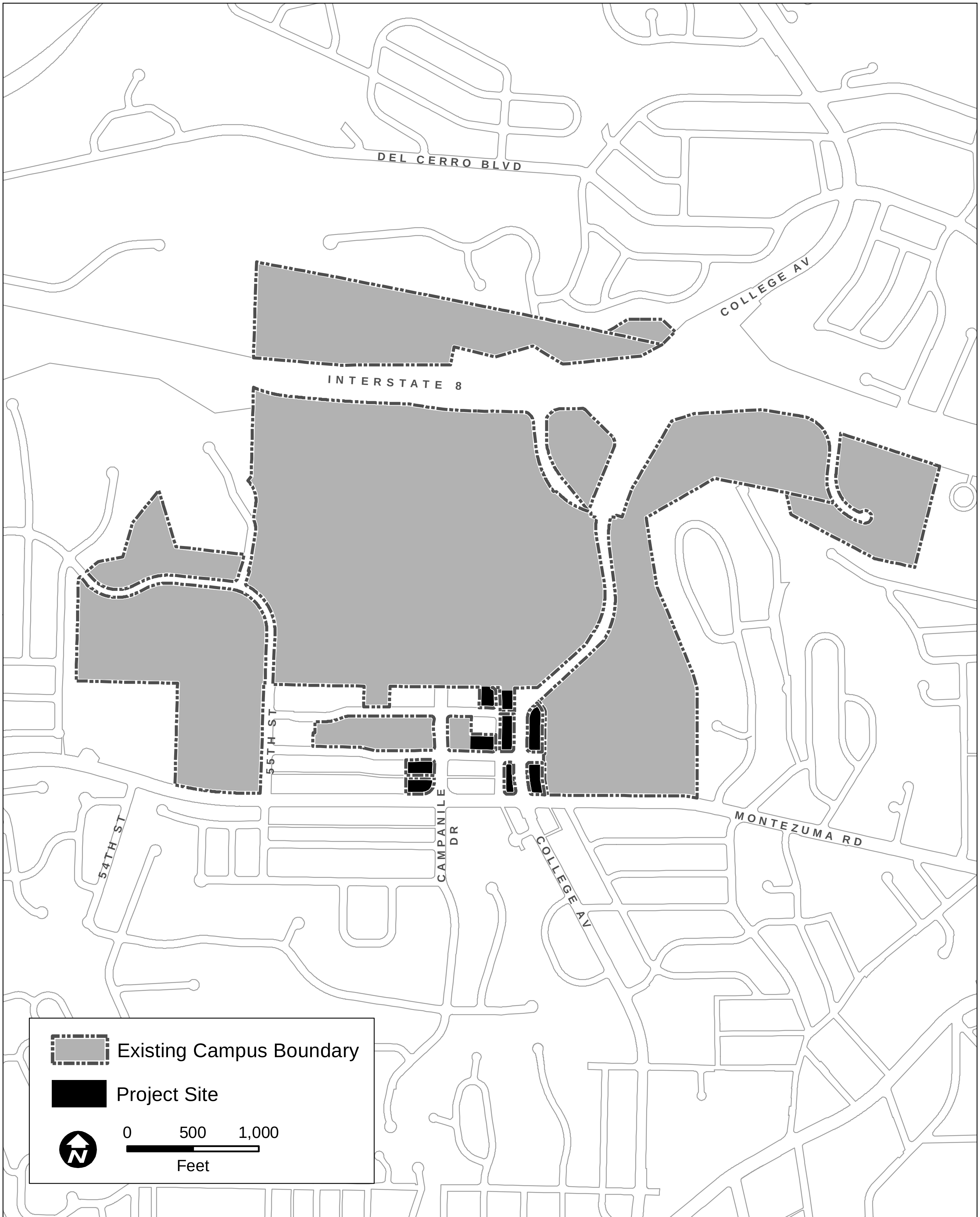
Figure 1

Regional Map



SDSU Complete Streets Addendum to
2011 Plaza Linda Verde Final EIR
Noise Analysis Technical Memorandum

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Figure 2
Vicinity Map

SDSU Complete Streets Addendum to
2011 Plaza Linda Verde Final EIR
Noise Analysis Technical Memorandum

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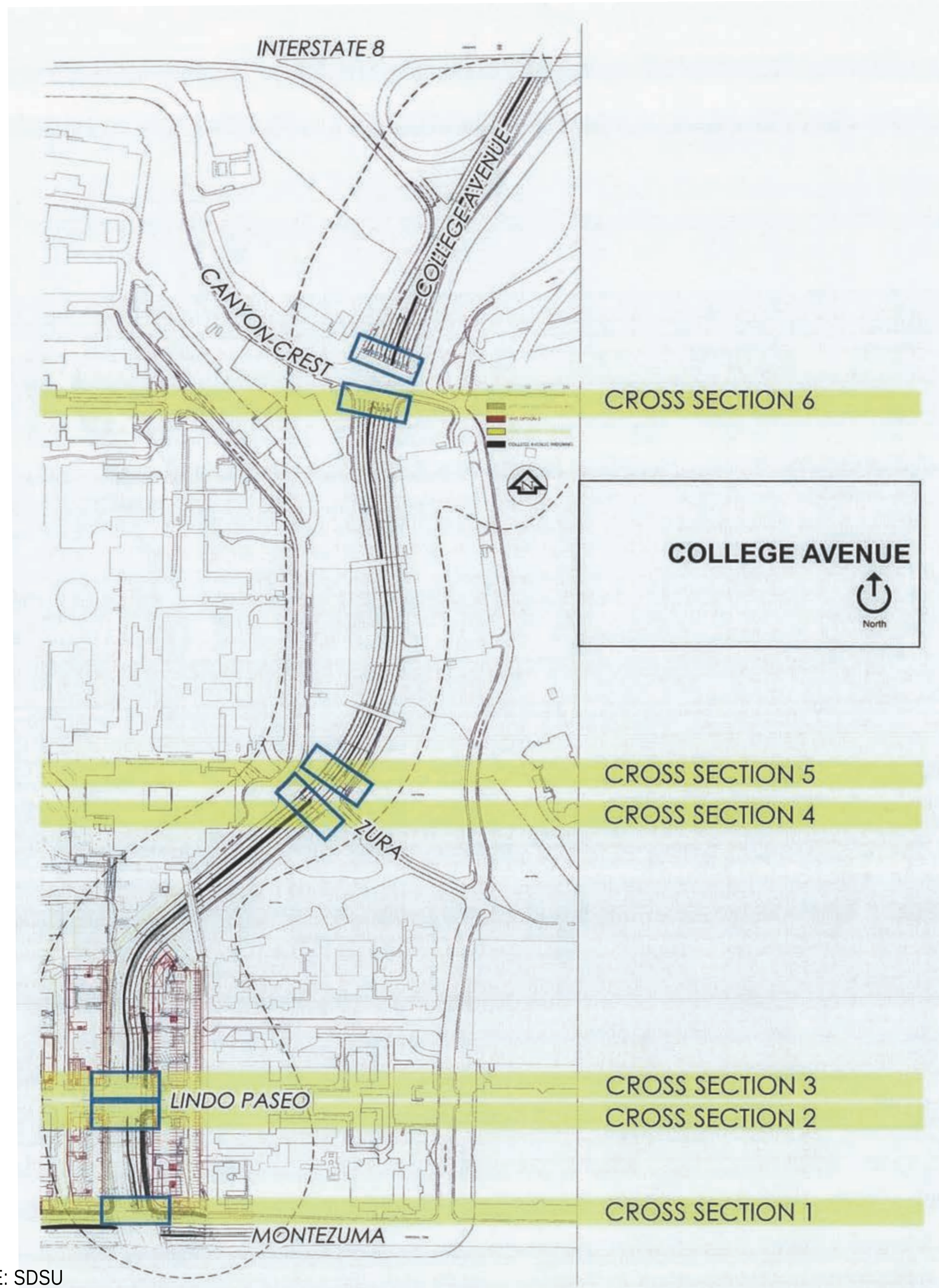
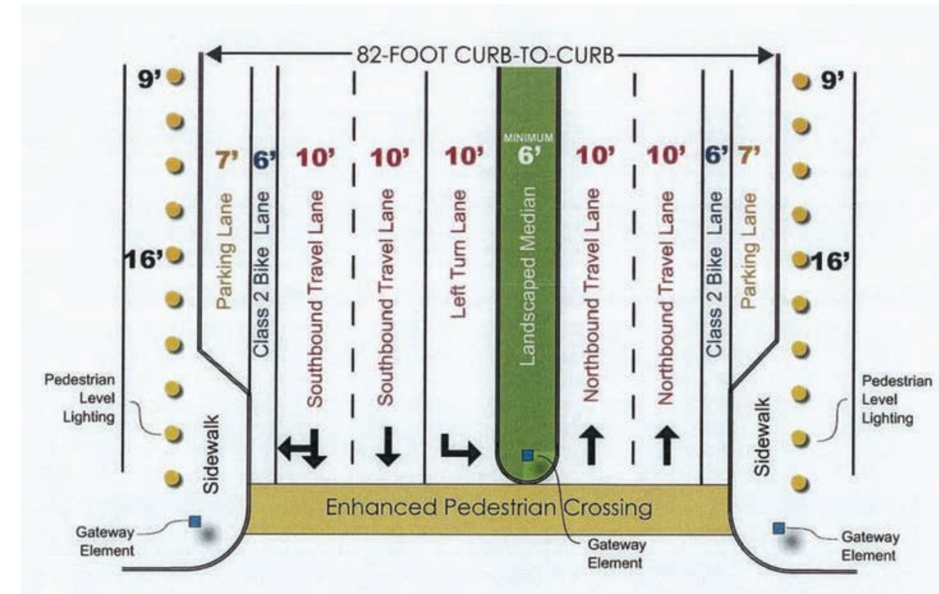
Figure 3

Approved Site Plan

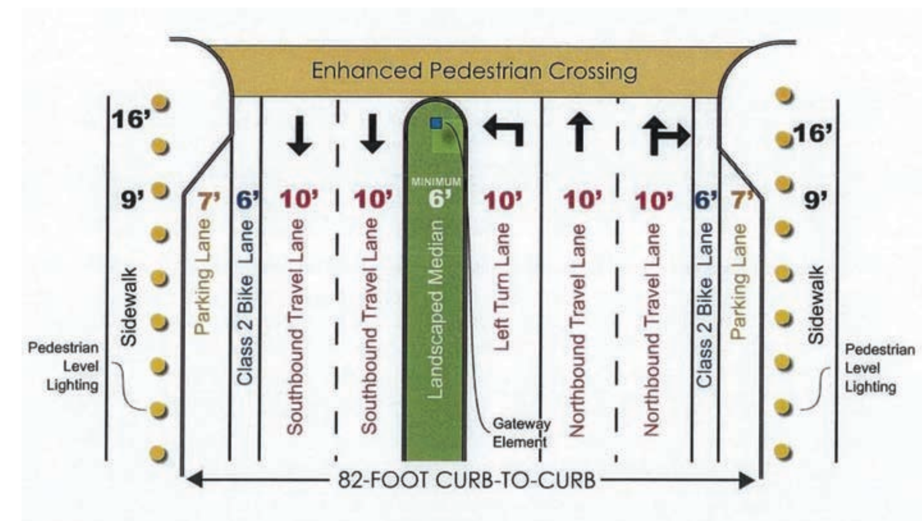


SOURCE: SDSU



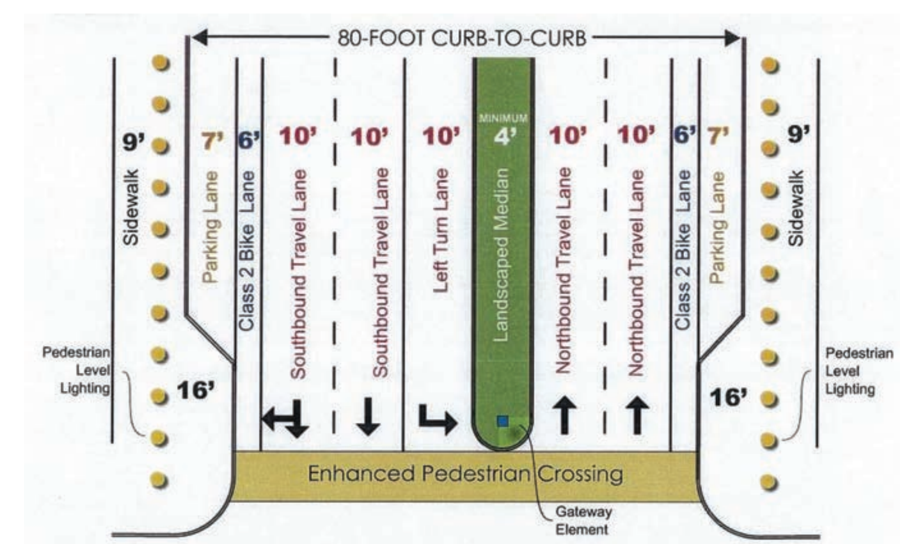
CROSS SECTION 1
COLLEGE AVENUE AT MONTEZUMA RD

NOT TO SCALE



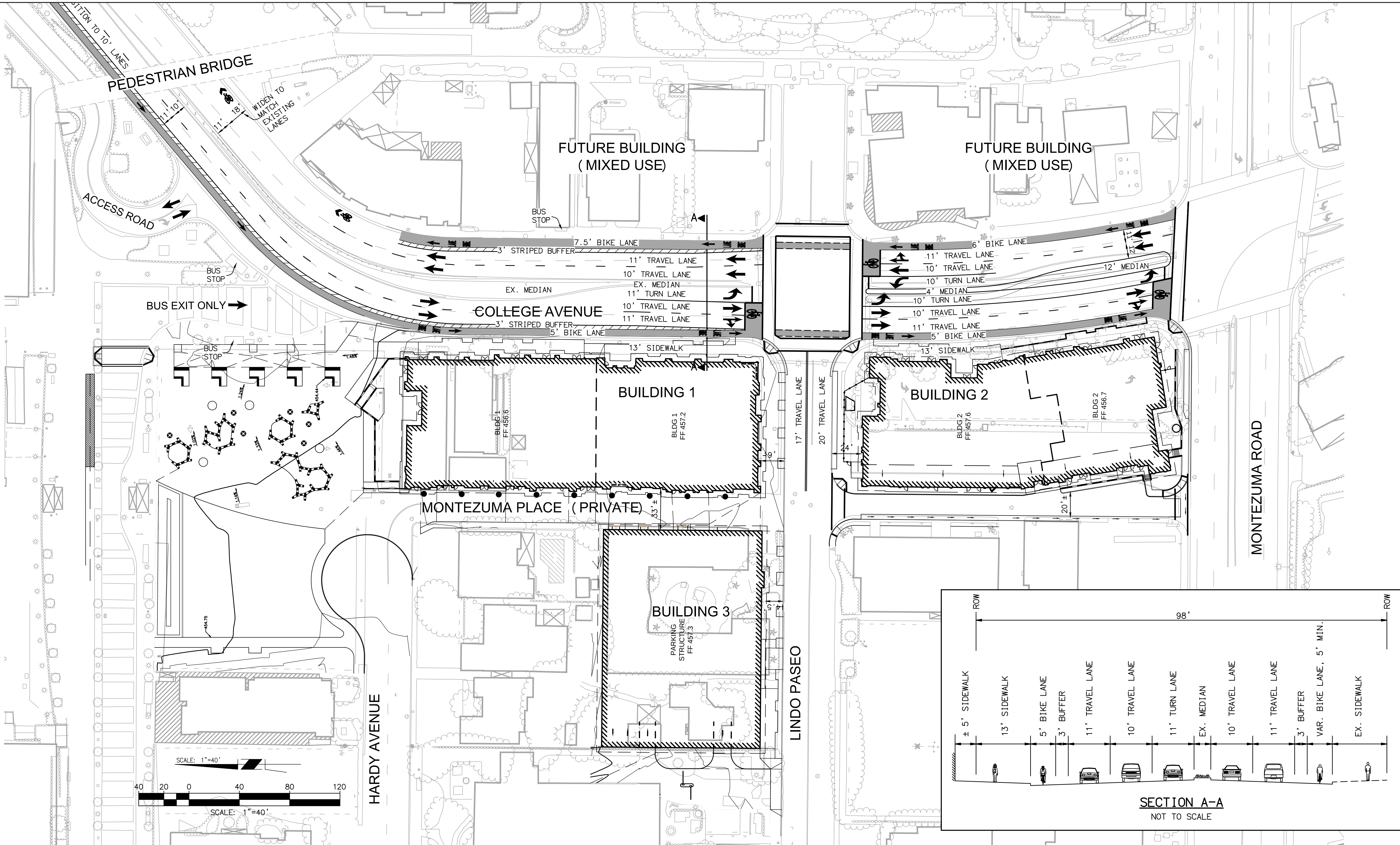
CROSS SECTION 2
COLLEGE AVENUE SOUTH OF LINDO PASEO

NOT TO SCALE



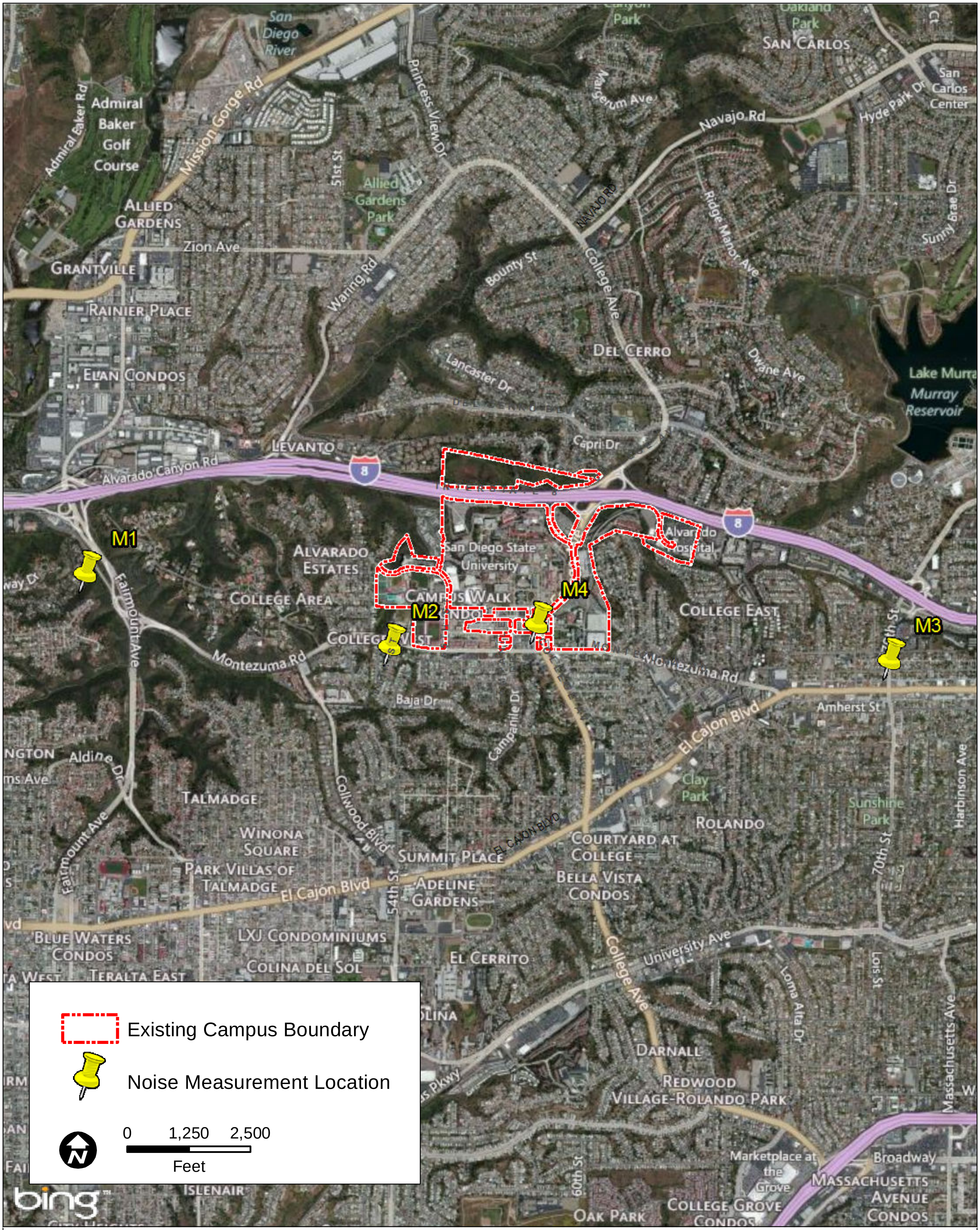
CROSS SECTION 3
COLLEGE AVENUE NORTH OF LINDO PASEO

NOT TO SCALE



SOURCE: RBF 6/24/2014

Figure 5
Complete Streets Scenario



SDSU Complete Streets Addendum to
2011 Plaza Linda Verde Final EIR
Noise Analysis Technical Memorandum

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Figure 6

Noise Measurement Locations

DUDEK

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TECHNICAL MEMORANDUM

To:	Laura Shinn, Director, Facilities Planning, San Diego State University
From:	Mike Greene, Environmental Specialist/Acoustician
Cc:	Michael Haberkorn, Gatzke Dillon & Ballance LLP
Subject:	San Diego State University – Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Noise Analysis Technical Memorandum Update – Diversion Analysis Review
Date:	August 14, 2014

Dudek was asked to review the July 14, 2014 Plaza Linda Verde Diversion Analysis Memorandum prepared by Linscott, Law and Greenspan. This July 14, 2014 LLG-prepared Memorandum provides a supplemental long-term intersection analysis to account for the potential diversion of traffic from College Avenue if it were retained in its current 4-lane configuration instead of being widened to 6-lanes as planned per the City's General Plan Circulation Element. Dudek was asked to review this July 14, 2014 Memorandum to determine if any of the conclusions contained in our June 25, 2014 Noise Analysis Technical Memorandum would change.

Dudek has reviewed the July 14, 2014 LLG Diversion Analysis and we confirm that the information in this most recent analysis does not alter the conclusions contained in our June 25, 2014 Noise Analysis Technical Memorandum. The following two factors support this conclusion:

- Table 2 of the July 14, 2014 LLG Diversion Analysis provides a summary of the impacts of the proposed Complete Streets diversion at five key intersections in the College Area. Table 2 of the July 14, 2014 Memorandum characterizes intersection impacts in the context of "delay" and "Level of Service". The noise models used in our analysis and the conclusions of these models summarized in our June 25, 2014 Noise Analysis Technical Memorandum did not utilize delay or Level of Service factors as they are not necessary factors in conducting a noise analysis and, therefore, the provision of these data in the July 14, 2014 LLG Memorandum would not necessitate revisions to the noise calculations summarized in the June 25, 2014 Dudek Noise Analysis Technical Memorandum.

- LLG utilized Average Daily Trip (ADT) estimates in their intersection analysis, the results of which are summarized in Table 2 of the July 14, 2014 Diversion Analysis Memorandum. During a phone conversation on July 23, 2014, LLG confirmed that the ADT estimates that were utilized in the intersection models summarized in the July 14, 2014 LLG Memorandum were the same ADT estimates used in Dudek's noise models, which are summarized in the June 25, 2014 Dudek-prepared Noise Analysis Technical Memorandum. These ADT values are listed in Column #3 (Year 2035 4-Lane [Complete Streets Scenario] ADT) of Table 3 of the June 25, 2014 Dudek-prepared Noise Analysis Technical Memorandum. Because Dudek and LLG confirmed that the ADT estimates utilized to generate the intersection delay and LOS estimates summarized in the July 14, 2014 LLG-prepared Diversion Analysis are the same ADT estimates Dudek utilized in the June noise calculations, the analysis and conclusions reached in the June 23, 2014 Dudek-prepared Noise Analysis Technical Memorandum are unaffected by the July 14, 2014 LLG-prepared Diversion Analysis.

Sincerely,

Mike Greene, INCE Bd. Cert.
Environmental Specialist/Acoustician

cc: Sarah Lozano, AICP, Principal

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TECHNICAL MEMORANDUM

To:	Laura Shinn, Director, Facilities Planning, San Diego State University
From:	Mike Greene, Environmental Specialist/Acoustician
Cc:	Michael Haberkorn, Gatzke Dillon & Ballance LLP
Subject:	San Diego State University – Complete Streets Addendum to the 2011 Plaza Linda Verde Final EIR – Noise Analysis Technical Memorandum Update – Queuing Analysis Review
Date:	August 13, 2014

As requested, Dudek has reviewed the Linscott, Law and Greenspan-prepared August 12, 2014 Complete Streets Design Analysis Revised Report which shows the differences in queuing lengths between the 50th Percentile and 95th Percentile for various project design alternatives. The refinement in the queuing analysis would not affect any data used in the June 25, 2014 Dudek-prepared Noise Analysis Technical Memorandum because the main determining factors related to noise modeling predictions are traffic volumes and average speeds, not queuing lengths.

Sincerely,

Mike Greene, INCE Bd. Cert.
Environmental Specialist/Acoustician

cc: Sarah Lozano, AICP, Principal

Appendix C Transportation/Circulation and Parking

Plaza Linda Verde Complete Streets Design Analyses, Linscott Law & Greenspan, June 2014

Plaza Linda Verde – Diversion Analysis, Linscott Law & Greenspan, July 2014

Plaza Linda Verde – Complete Streets Design Analyses (Revised), Linscott Law & Greenspan, August 2014

E-mail, from Jamie Frye, Sundt Construction, Inc., to Robert Schulz, SDSU, August 14, 2014, Subject: 131450 – SDSU South Campus Plaza – TCP-12 Mitigation Measure, cost estimate

Plaza Linda Verde Final Environmental Impact Report (May 2011), Table 3.12-23A, Traffic Mitigation Costs and Fair-Share Amount Apportioned Based on Type Use (Revised August 2014)

MEMORANDUM

To:	Mr. Robert Schulz, AIA Associate Vice President of Real Estate, Planning & Development	Date:	June 24, 2014
From:	John Boarman, P.E. LLG Engineers	LLG Ref:	3-14-2339
Subject:	Plaza Linda Verde – *Complete Streets Design* Analyses		

LINSCOTT LAW & GREENSPAN engineers

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Linscott, Law & Greenspan Engineers (LLG) has prepared this focused traffic analysis memo for the San Diego State University (SDSU) Plaza Linda Verde (PLV) Project. This memo presents a supplemental analysis of the long-term traffic operations associated with the "*Complete Streets*" design, a pedestrian-friendly street design proposed for the segment of College Avenue north of the Montezuma Road intersection. A summary of the relevant background, description of the proposed street design, and operational analysis, are provided below.

PROJECT HISTORY AND BACKGROUND

The PLV project is a mixed-use student housing development approved by The Board of Trustees of California State University in May 2011. The mixed-use student housing project, which is located in the College Area community of the City of San Diego, will include ground floor retail and upper floor student-housing, standalone student apartments, additional parking facilities, a Campus Green featuring a public promenade, and pedestrian malls in place of existing streets/alleys linking the proposed buildings to the main SDSU campus. ***Figure 1*** shows a conceptual site plan of the project. As shown on the Figure, a portion of the PLV project will front the segment of College Avenue north of the College Avenue / Montezuma Road intersection.

The potential impacts of the PLV project were analyzed in the certified PLV Final EIR (SCH No. 2009011040). Specific to traffic and circulation, the primary analysis of College Avenue was based on both the existing 4-Lane scenario and the City of San Diego long-term circulation plan, which calls for a six-lane roadway with three lanes in each direction. The EIR analysis identified significant impacts to several roads in the area, including the segment of College Avenue between Montezuma Road and Canyon Crest Drive, which includes the segment of College where the Complete Streets design would be implemented. The EIR also identified significant impacts at the College Avenue intersections at Montezuma Road, Zura Way, Canyon Crest Drive, and the I-8 Eastbound Ramp. (See LLG Traffic Impact Analysis, Plaza Linda Verde, January 11, 2011 (TIA), pp. 82-83; PLV Final EIR, pp. 3.12-81 to 3.12-82.)

In addition to the primary analysis, the EIR also included a supplemental long-term analysis based on a more pedestrian-friendly four-lane College Avenue from

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Montezuma Road north to Canyon Crest Drive, a scenario put forth by Michael Stepner, a former City of San Diego planner. The supplemental analysis addressed the potential impacts associated with the redistribution of vehicle trips from College Avenue to other roadways (i.e., Fairmount Avenue, 70th Street, and Montezuma Road) that likely would result due to the reduced capacity of College Avenue. In addition to the impacts identified under the primary analysis, the supplemental analysis identified additional significant impacts to Fairmount Avenue and Montezuma Road (see TIA pp. 78-81; Final EIR pp. 3.12-99 to 3.12-105). ***Figure 2*** shows a conceptual schematic of the Stepner Plan.

For various reasons, the Stepner approach was not pursued beyond the Draft EIR stage. Recently, however, SDSU has developed a variation of the Stepner plan, generally referred to here as the "Complete Streets" design, for implementation on the limited segment of College Avenue between Montezuma Road north towards the existing campus suspended pedestrian bridge. Under this design, this segment of College Avenue would be based on a 4-lane configuration modified to include narrower travel lanes in each direction (one 10 feet wide and the other 11 feet wide), a five-foot Class II bike lane in each direction with intervening three-foot striped buffers, and 13-foot sidewalks on each side of the street. In addition, a signalized dedicated mid-block pedestrian crossing would be installed at the northern end of the improved segment. The primary difference between the Complete Streets design and the Stepner plan is the elimination of on-street parking and the addition of a signalized pedestrian crossing; in all other respects, the differences between the two plans are relatively minor (e.g., 11-foot v. 10-foot wide travel lanes, 5-foot v. 6-foot wide bike lanes, and 13-foot v. 16-foot wide sidewalks). The Complete Streets design in this case also includes a 20 foot wide eastbound approach on Lindo Paseo at College Avenue such that right-turning vehicles on Lindo Paseo would not be impeded by vehicles on Lindo Paseo waiting to turn left. An analysis of the Complete Streets design is provided in this memo.

In addition to the Complete Streets design, a variation on the design referred to here as the Complete Streets Design (No Pedestrian Signal) also is addressed. Under this design, the mid-block signalized pedestrian crossing would be eliminated.

Lastly, a third design referred to here as the Complete Streets design (No Pedestrian Signal; Lengthened LT Pocket) also is addressed in this memo. The Complete Streets design (No Pedestrian Signal; Lengthened LT Pocket) is similar to the Complete Streets design described above except that the signalized pedestrian crossing is eliminated and the southbound left-turn pocket at the College Avenue/Montezuma Road intersection is retained as it exists today (i.e., it would not be shortened). Additionally, in order to maintain the southbound left-turn pocket at its original

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storage, the 3 foot bike buffers on both sides of College Avenue would be removed from the segment south of Lindo Paseo, and the median would be narrowed from 6 feet to 4 feet.

While the PLV EIR previously addressed the potential traffic and circulation-related impacts associated with a four-lane College Avenue, in light of the more specific project-detailed information that is now available and the differences, though limited, between the Stepner, and the three CS designs, a supplemental traffic analysis is presented here to further analyze the potential effects associated with implementation of the Complete Streets, Complete Streets (No Pedestrian Signal), and Complete Streets (No Pedestrian Signal; Lengthened LT Pocket) designs.

The primary objectives of this memo are to:

- Provide a comparative traffic analysis of the proposed Complete Streets designs for College Avenue relative to a 4-Lane existing scenario; and
- Quantify the difference in traffic operations between the various scenarios.

ANALYSIS SCENARIOS

This memo analyzes the following four (4) scenarios in the Year 2035 timeframe:

- **4-lane Existing:** This scenario assumes College Avenue as 4-lanes with existing geometrics and is referred to as “4-Lane” hereafter. ***Figure 3*** shows a schematic of the existing roadway configuration along College Avenue.

- **Complete Streets Design (CS)***:* This design assumes a limited segment of College Avenue as 4-lanes, from Montezuma Road north towards the existing suspended pedestrian bridge. In addition, this scenario also assumes multi-modal features on College Avenue such as reduced lane widths, bike lanes, striped buffers, wider sidewalks and a mid-block pedestrian signal as shown in *Figure 2*. Another noteworthy change (in comparison to the 4-Lane scenario described above) is the elimination of the exclusive southbound (SB) right-turn lanes at the Lindo Paseo and Montezuma Road intersections on College Avenue. On-street parking, which was a feature of the Stepner plan, is not a part of this scenario. This design is referred to as “CS” hereafter. ***Figure 4*** shows a conceptual schematic of the Complete Streets Design.

- **Complete Streets Design (No Pedestrian Signal)***:* This design is identical to the CS design except that the mid-block pedestrian signal is eliminated. This scenario is referred to as "CS (No Pedestrian Signal)." ***Figure 5*** shows a conceptual schematic of this design.

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- **Complete Streets Design (No Pedestrian Signal) with retainment of current length of College Avenue SB left-turn pocket at Montezuma Road***:* This design is identical to the CS design (No Pedestrian Signal) except that the southbound left-turn pocket at the College Avenue/Montezuma Road intersection is retained as it exists today (i.e., it would not be shortened). This scenario is referred to as "CS (No Pedestrian Signal; Lengthened LT Pocket)." ***Figure 6*** shows a conceptual schematic of this design.

Study Area

In light of the prior analyses conducted as part of the PLV Final EIR, the study area for this memo is the two intersections that would be primarily affected by the CS scenario: College Avenue / Lindo Paseo and College Avenue / Montezuma Road. In addition, the study area also includes the proposed mid-block pedestrian signal on College Avenue and its implications on traffic flow/operations.

Existing Conditions

The following is a brief description of existing roadway conditions in the study area vicinity:

College Avenue is currently built as a 4-lane Major Arterial between Montezuma Road and Zura Way. The speed limit on College Avenue is 40 mph. On-street parking is prohibited on College Avenue.

Lindo Paseo is currently built as a 2-lane Collector between Campanile Drive and College Avenue. On-street parking is permitted on Lindo Paseo.

Montezuma Road is currently built as a 4-lane Major Arterial between Campanile Drive and E. Campus Drive. The speed limit on Montezuma Road is 35 mph. Class II bike lanes and on-street parking are provided intermittently along Montezuma Road.

Analysis Approach and Methodology

LLG discussed with City staff the analysis methodology to be utilized given the unique multi-modal aspects of the various analysis scenarios. To conduct an effective evaluation, Synchro software was deemed the appropriate tool to analyze intersection traffic operations, and Simtraffic software was selected to analyze queues.

Intersections were analyzed under AM and PM peak hour conditions consistent with the City of San Diego standards and guidelines. Average vehicle delay was determined utilizing the methodology in the *Highway Capacity Manual (HCM)*. The

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delay values (represented in seconds) were qualified with a corresponding intersection Level of Service (LOS).

Simtraffic was selected to analyze queues since Simtraffic models queues based on traffic simulated conditions accounting for upstream/downstream constraints (in this case short intersection spacing, mid-block pedestrian signal, etc).

Signal timing plans from the City were also obtained and included in the analyses. The signal timing inputs included all-red time, yellow time, walk time, flashing-don't-walk time, offsets, cycle length, etc.

LONG-TERM (YEAR 2035) TRAFFIC VOLUMES DEVELOPMENT

Based on discussions with City staff, it was decided to use the latest SANDAG Series 12 traffic model. A Forecast Model was conducted with College Avenue assumed as 4-lanes in the project vicinity (as opposed to the 6-lane network which is currently in the model) from which traffic volumes were derived. ***Appendix A*** includes the forecast plot. The model does not take into account potential reductions in vehicle trips that may result with implementation of the Complete Streets design due to the enhanced pedestrian and biking opportunities. For that reason, the analysis presented here is conservative.

Pedestrian Volumes

As noted, the CS design also proposes a mid-block pedestrian signal on College Avenue between Lindo Paseo and the existing suspended pedestrian bridge. The crosswalk is proposed to promote pedestrian mobility and increase interaction of pedestrians with the proposed retail uses. LLG conducted existing pedestrian counts on the pedestrian bridge and each of the crosswalks of the Lindo Paseo / College Avenue and Montezuma Road/College Avenue intersections. The future volumes at the proposed pedestrian signal were then estimated from these counts. These pedestrian volumes were included as a part of the intersection and queuing analysis.

Figure 7 shows the Long-Term traffic volumes in the project vicinity.

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TRAFFIC OPERATIONAL ANALYSIS

A detailed traffic operational analysis was conducted for each of the three designs for the Long-Term (Year 2035) scenario. The analyses included peak hour intersection LOS and queue analyses along the College Avenue corridor.

Long-Term (Year 2035) Intersection Operations

The following is a brief description of the Long-Term intersection operations. ***Table 1*** shows the AM and PM peak intersection operations.

4-Lane: As shown in *Table 1*, under the 4-Lane scenario, the intersection of College Avenue /Montezuma Road would operate at LOS E during the PM peak hour. The intersection would operate at LOS D during the AM peak hour, and the intersection of Lindo Paseo and College Avenue is calculated to operate at LOS D or better during both the AM and PM peak hours.

CS Design: As shown in *Table 1*, under the CS design, the LOS at both the College Avenue / Montezuma Road and College Avenue / Lindo Paseo intersections would be the same as under the 4-Lane scenario, although the delay times at both intersections are calculated to increase. In comparison to the 4-Lane scenario, the average corridor delay on College Avenue would increase by 14%. The additional delay is attributed to the increased pedestrian/bike mobility, narrow travel lanes, and mid-block pedestrian signal that would affect traffic flow and progression, reducing overall intersection capacity.

CS Design (No Pedestrian Signal): As shown in *Table 1*, with the pedestrian signal eliminated, under the CS design the intersection LOS would be the same as under the 4-Lane scenario, and the intersection delays are calculated to improve in comparison to the CS scenario due to improved traffic flow and progression. As shown on the table, the average corridor delay on College Avenue reduces by 4% (14% to 10%) in comparison to the CS scenario, and increases 10% from the 4-Lane scenario.

CS Design (No Pedestrian Signal; Lengthened LT Pocket): This design is a modification of the CS Design (No Pedestrian Signal) scenario that would retain the existing length of the southbound left-turn pocket at the College Avenue/Montezuma Road intersection. Because this design would include the same intersection improvements as the CS Design (No Pedestrian Signal), this scenario would not affect LOS results beyond those reported under the CS Design (No Pedestrian Signal) scenario. As such, intersection delays under this design would be the same as the CS Design (No Pedestrian Signal) scenario.

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Appendix B includes the peak hour intersection calculation sheets.

Long-Term (Year 2035) Corridor Queuing Analysis

The following is a brief description of the Long-Term queuing analyses on College Avenue. ***Table 2*** shows a comparison of the corridor queues on College Avenue for the various scenarios.

4-Lane: As shown in *Table 2*, queue lengths under the 4-Lane scenario are calculated to be 290 feet in the southbound AM peak hour and 570 feet in the southbound PM peak hour. These queue lengths are consistent with the calculated LOS operations presented above.

CS Design: As shown in *Table 2*, under the CS design, longer queues are calculated in the southbound direction during the PM peak hour on College Avenue. In comparison to the 4-Lane scenario, the increase in queuing is calculated to be approximately 290 feet in the northbound and 1,460 feet in the southbound PM peak hour. The queue lengths are primarily due to the interruption of traffic flow and progression with the mid-block pedestrian signal, compounded by narrower travel lanes and shorter turn-pockets between Lindo Paseo and Montezuma Road, thereby reducing intersection and corridor capacity.

CS Design (No Pedestrian Signal): As shown in *Table 2,* under the CS design without pedestrian signal, College Avenue queues in the northbound AM, northbound PM, and southbound AM are comparable to queues under the 4-Lane scenario, although longer queues are calculated in the southbound direction during the PM peak hour. However, with the elimination of the pedestrian signal, queues are calculated to generally improve relative to the CS Design. The queuing is calculated to be reduced by approximately 200 feet in the northbound and 380 feet in the southbound PM peak hour. However, in comparison to the 4-Lane scenario, queuing issues are still calculated with increase in queues to be approximately 90 feet in the northbound and 1,080 feet in the southbound PM peak hour.

CS Design (No Pedestrian Signal; Lengthened LT Pocket): In comparison to the 4-Lane scenario, queues under this scenario would be comparable under the northbound AM and PM peak hours, and southbound AM peak. During the southbound PM peak, queues are calculated to increase by 330 feet (570 feet to 900 feet), an increase that is within acceptable limits given the benefits of the CS Design. Additionally, with the existing southbound left-turn pocket on College Avenue maintained, the queues under this scenario are calculated to decrease (i.e., improve) in comparison to the CS Design (No Pedestrian Signal) scenario. The greatest decrease (improvement) is calculated in

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the southbound direction during the PM peak hour with the queues improving by 750 feet (1650 feet – 900 feet) in comparison to the CS Design (No Pedestrian Signal) scenario. This substantial benefit in queues is due to the longer southbound left-turn pocket, which allows more vehicles to clear at the College Avenue/Montezuma Road intersection, thereby reducing queues. In addition, the longer left-turn pocket also enhances the traffic flow and progression of the southbound through movements at the College Avenue/Lindo Paseo intersection, thereby improving the overall southbound queues.

Appendix C includes the simulation queuing calculation sheets.

CONCLUSIONS

The PLV Final EIR identified significant impacts to several roads in the area, including the segment of College Avenue between Montezuma Road and Canyon Crest Drive, which includes the segment of College where the Complete Streets design would be implemented. The EIR also identified significant impacts at the College Avenue intersections at Montezuma Road, Zura Way, Canyon Crest Drive and the I-8 Eastbound Ramp. As shown in this memo, implementation of either the CS, CS (No Pedestrian Signal), or CS (No Pedestrian Signal; Lengthened LT Pocket) design would not result in any additional impacted locations beyond those previously identified in the EIR, nor would they result in a substantial increase in the severity of those impacts.

The PLV project would revitalize the College area by increasing student housing within walking distance of SDSU, and providing retail opportunities for students, faculty/staff, and College area residents. Each of the proposed CS design variations for the segment of College Avenue fronting the PLV project includes several multi-modal elements, the intent of which is to promote the interaction between the various uses and enhance the safety of overall non-vehicular mobility in the College Area surrounding SDSU.

The incorporation of these multi-modal elements would affect vehicular traffic operations along College Avenue by increasing corridor delay and queues, although the impacted intersections and segments would be the same under all designs. Additionally, there is a substantial benefit in implementing these “complete streets” features. Complete Streets means moving people, not cars. The result will be cleaner air, a safer environment, an improved economy, and a higher quality of life. Areas that incorporate complete streets gain quality of life benefits as increased bicycling and walking are indicative of vibrant and active living. The overall benefits provided by these multi-modal features should be considered against the limited degradation in vehicular traffic operations.

Attachments:
Figure 1: Site Plan
Figure 2: Stepner Plan
Figure 3: Existing Roadway Configuration (College Avenue)
Figure 4: Complete Streets Design
Figure 5: Complete Streets Design (No pedestrian signal)
Figure 6: Complete Streets Design (No pedestrian signal; Lengthened LT Pocket)
Figure 7: Long-Term (Year 2035) with Project Traffic Volumes
Table 1: Long-Term (Year 2035) Intersection Operations
Table 2: Long-Term (Year 2035) Corridor Queue Summary
Appendix A: SANDAG Forecast Plot
Appendix B: Peak hour intersection calculation sheets
Appendix C: Queuing calculation sheets

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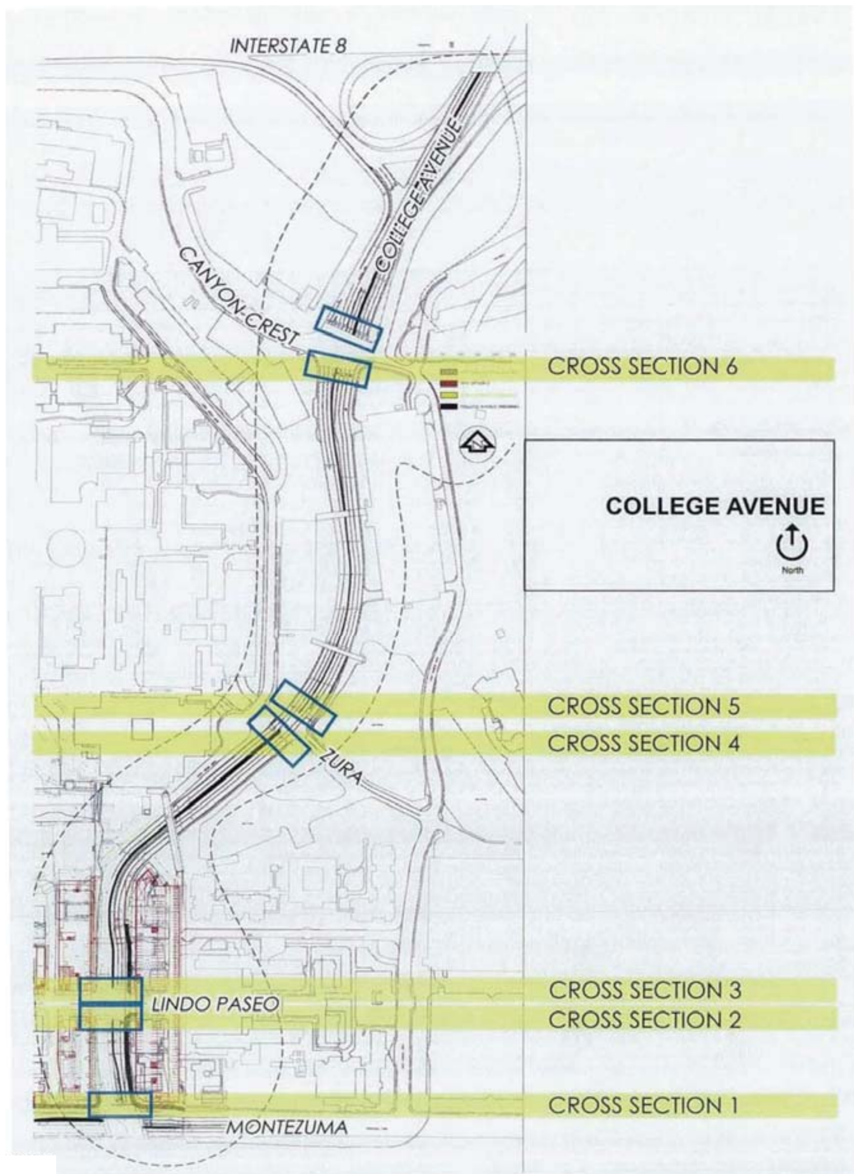
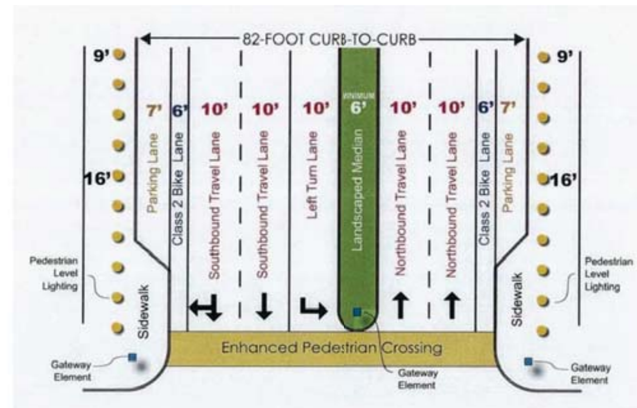
N:\2339\Figures
Date: 05/22/14

Figure 1

Site Plan

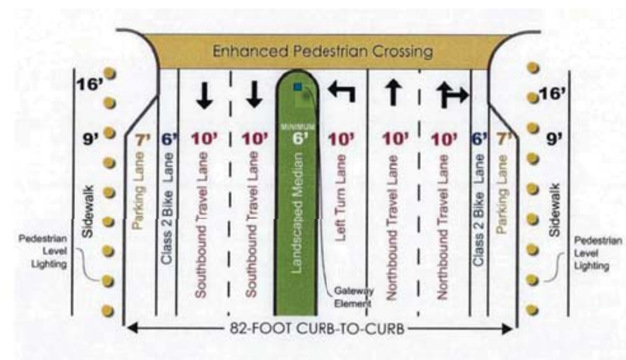
PLV - Complete Streets Analysis





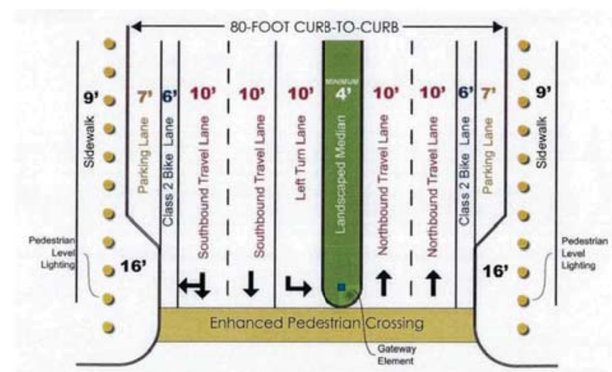
CROSS SECTION 1
COLLEGE AVENUE AT MONTEZUMA RD

NOT TO SCALE



CROSS SECTION 2
COLLEGE AVENUE SOUTH OF LINDO PASEO

NOT TO SCALE



CROSS SECTION 3
COLLEGE AVENUE NORTH OF LINDO PASEO

NOT TO SCALE

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N:\2339\Figures
Date: 06/24/14

Figure 2

Stepner Plan

PLV - COMPLETE STREETS ANALYSIS

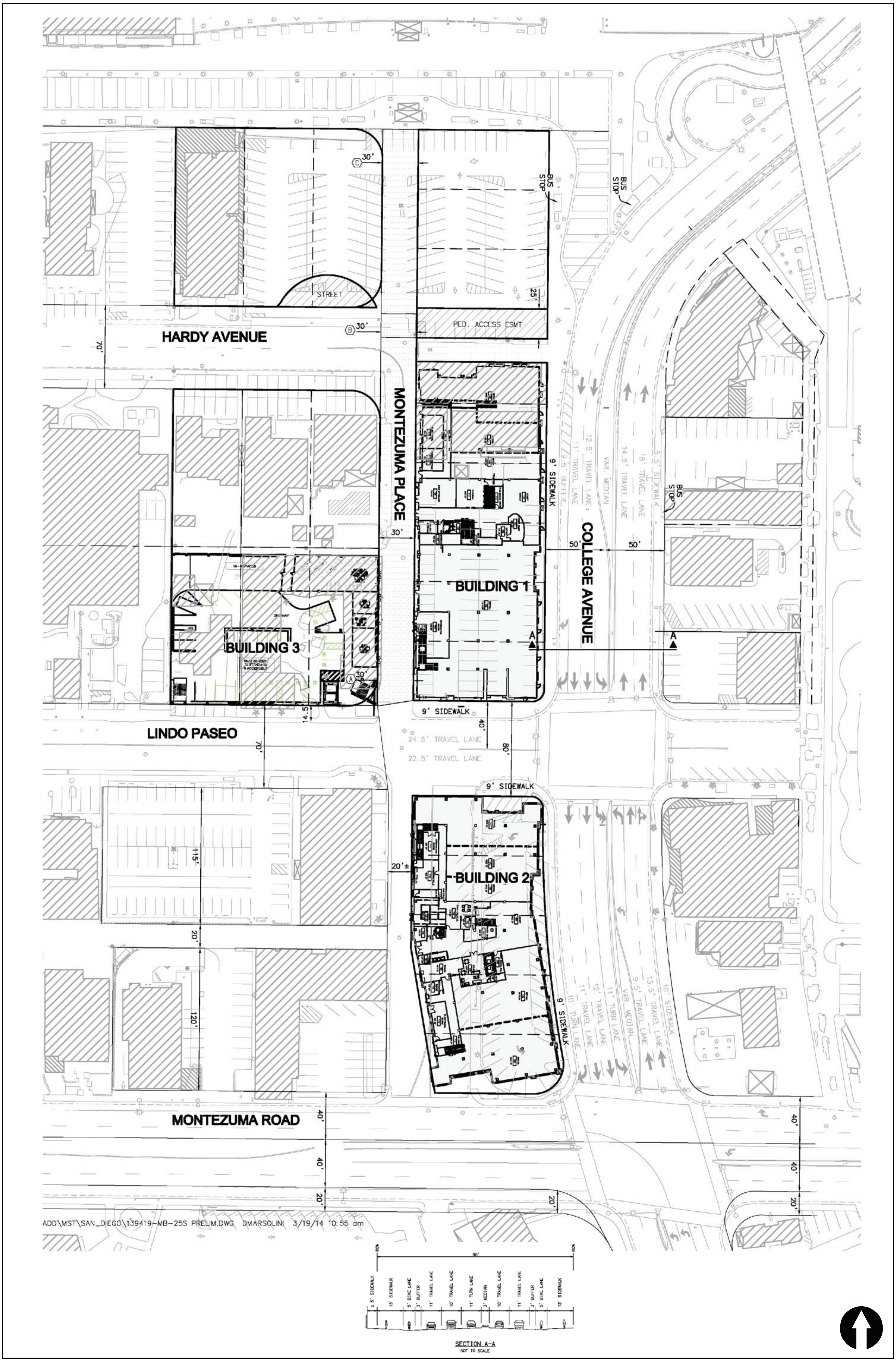

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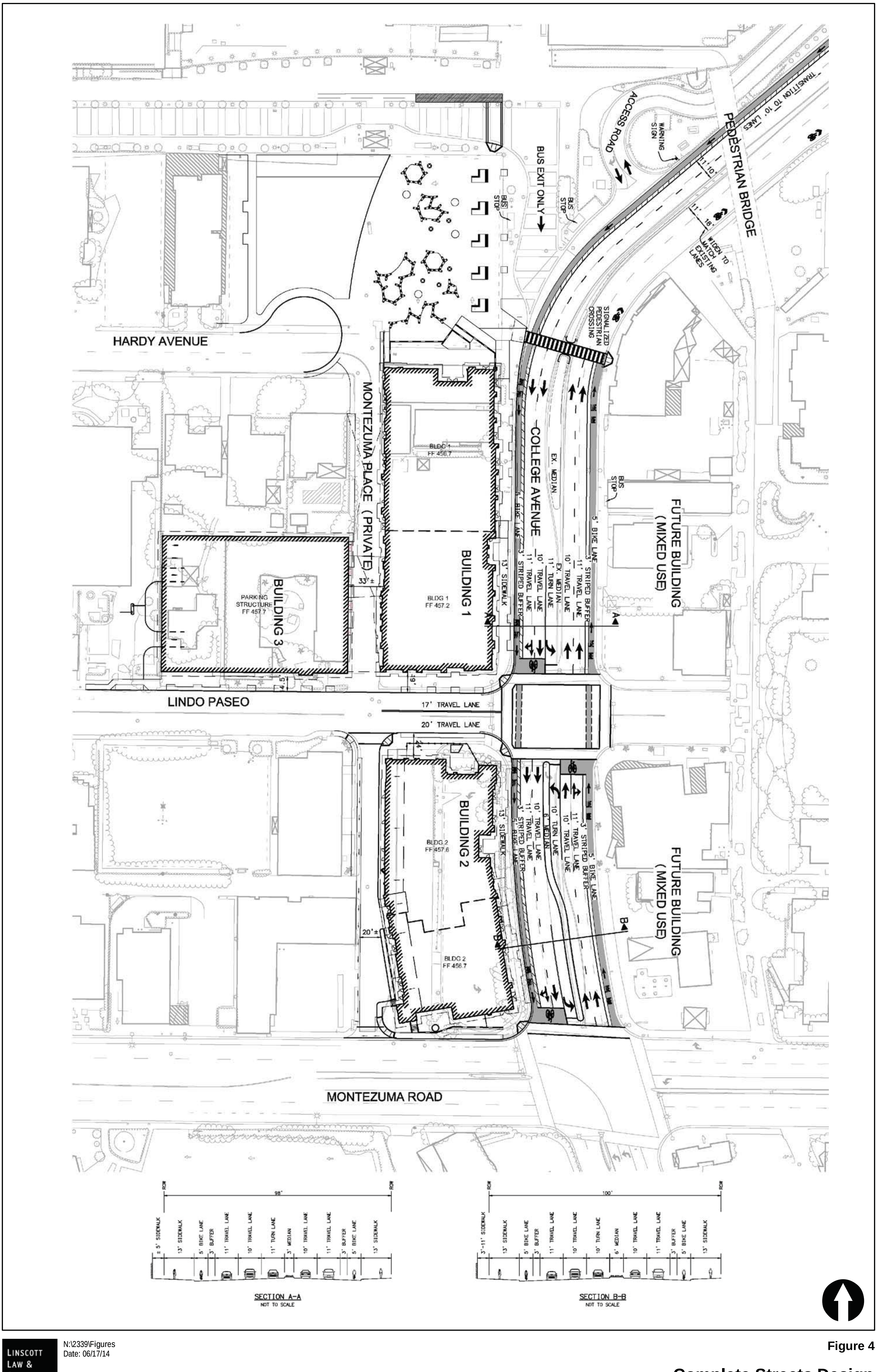
Figure 3

Existing Roadway Condition (College Avenue)


HARDY AVENUE
MONTEZUMA PLACE (PRIVATE)
BUILDING 3
PARKING STRUCTURE FF 457.7
BUILDING 1
BLDG 1 FF 456.7
BLDG 1 FF 457.2
COLLEGE AVENUE
EX. MEDIAN
BUS STOP
BUS EXIT ONLY
ACCESS ROAD
WARNING SIGN
PEDESTRIAN BRIDGE
TRANSITION TO 10' LANES
WIDEN TO MATCH EXISTING LANES
SIGNALIZED PEDESTRIAN CROSSING
FUTURE BUILDING (MIXED USE)
LINDO PASEO
17' TRAVEL LANE
20' TRAVEL LANE
BUILDING 2
BLDG 2 FF 457.6
BLDG 2 FF 456.7
FUTURE BUILDING (MIXED USE)
MONTEZUMA ROAD
SECTION A-A
NOT TO SCALE
SECTION B-B
NOT TO SCALE

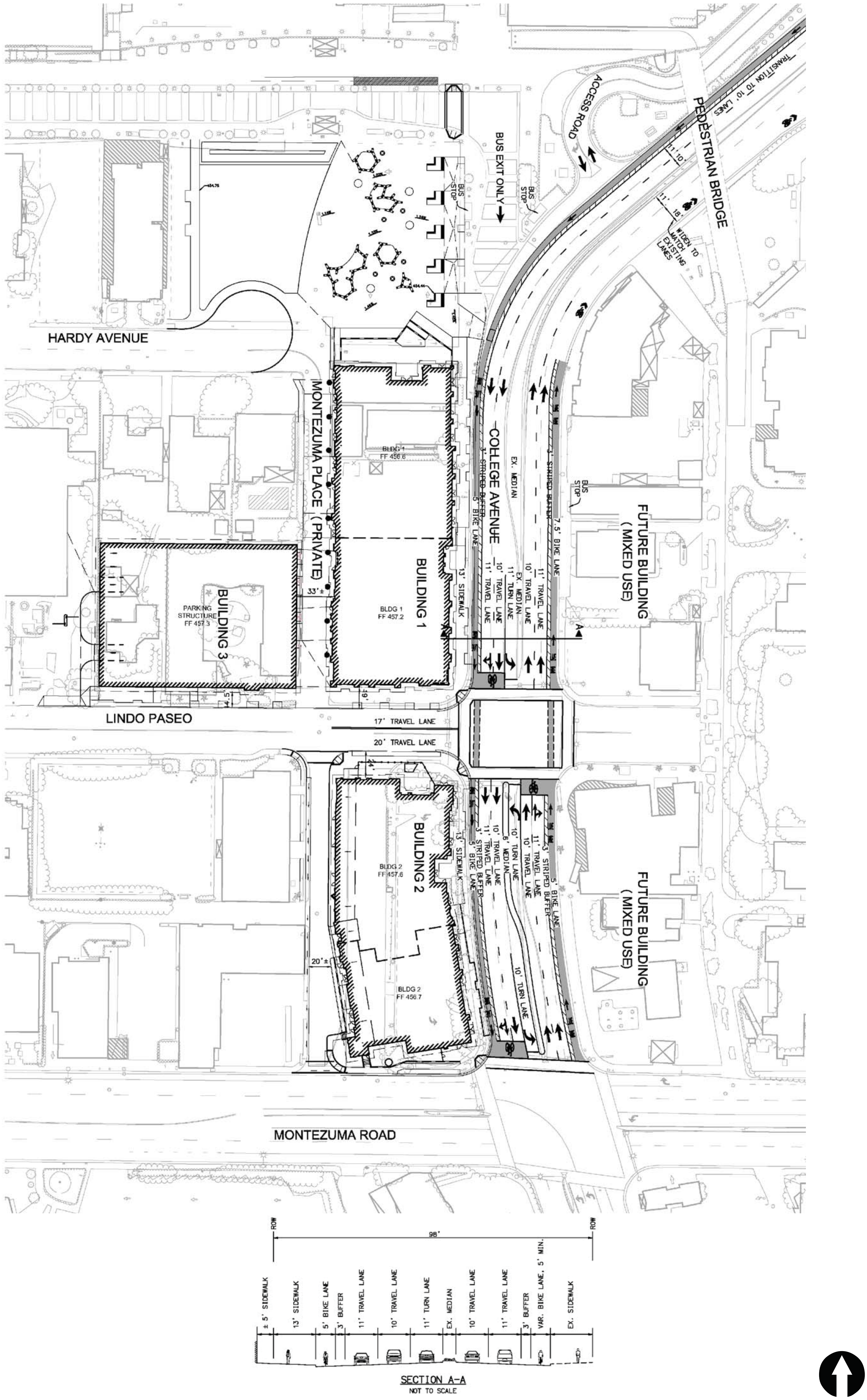


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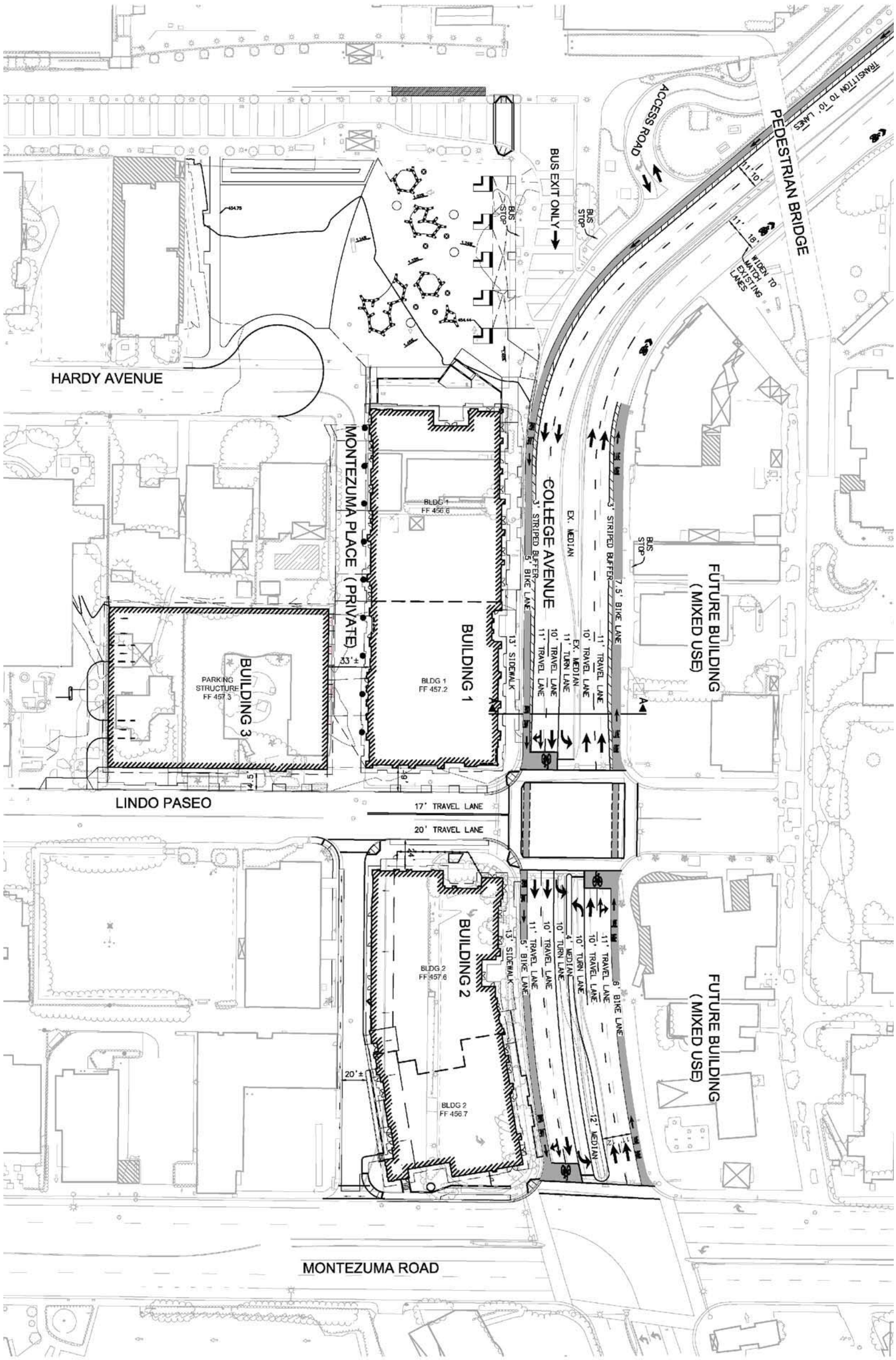
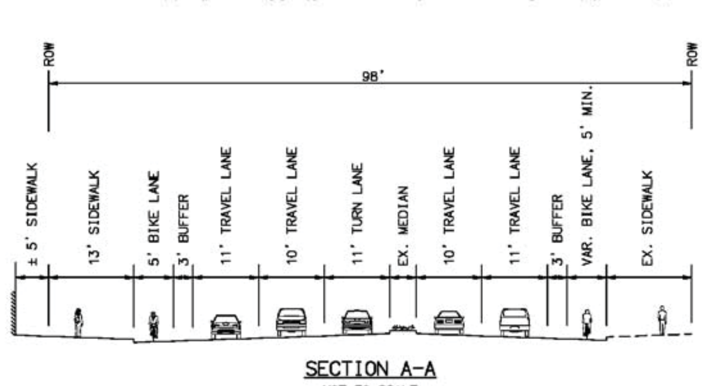
Figure 5
Complete Streets Design
(No Pedestrian Signal)





* Southbound left-turn pocket at College Avenue / Montezuma Road intersection maintained (i.e. existing condition).

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Figure 6

Complete Streets Design

(Lengthened Left-Turn Pocket)

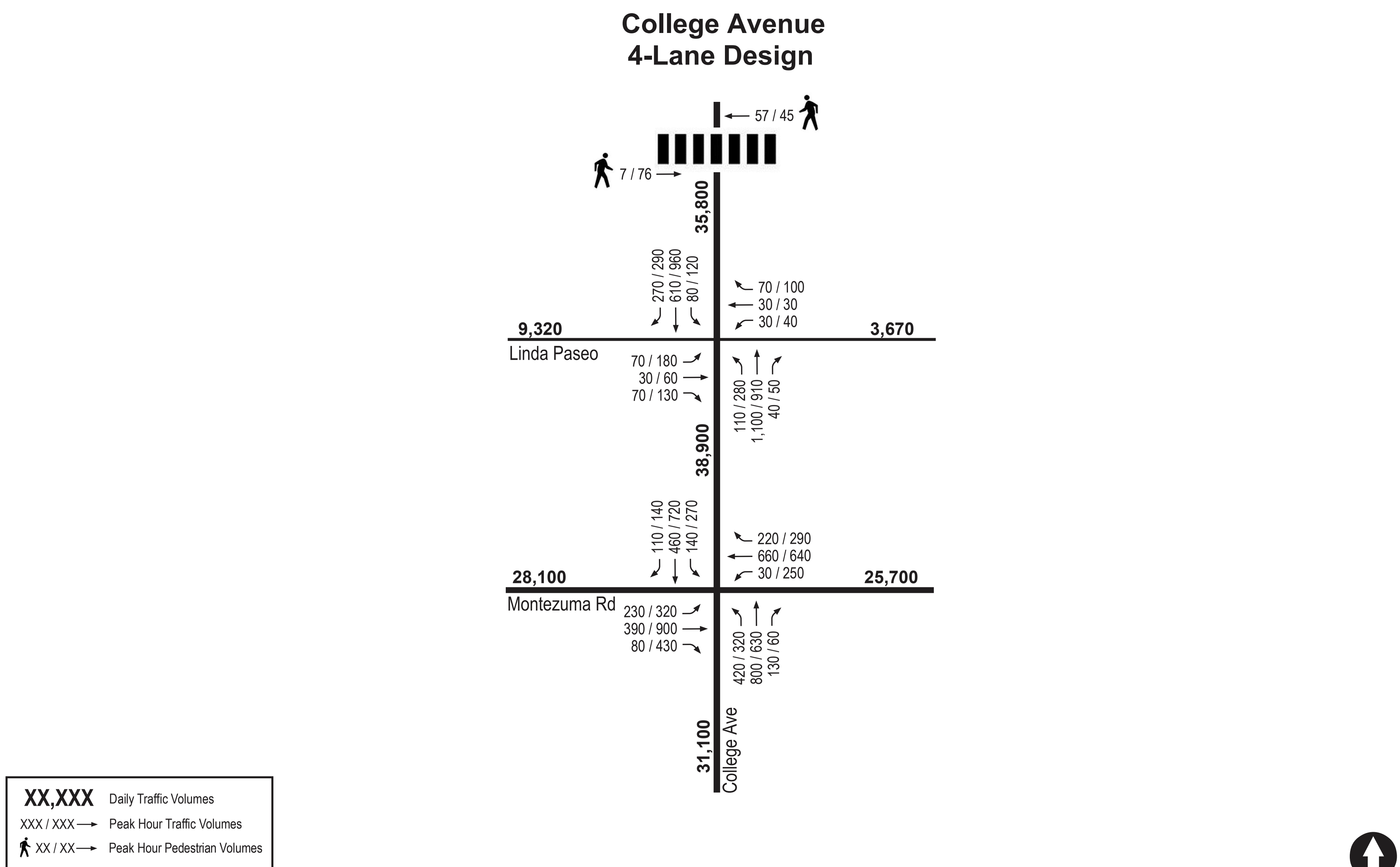

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Figure 7

Long-Term (Year 2035) with Project Volumes

PLV - Complete Streets Analysis

TABLE 1
LONG-TERM (YEAR 2035) INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing Geometry (A)		Complete Street Design (B)			Complete Street Design *(No Ped Signal)* (C)			Complete Street Design *(No Ped Signal; with* Lengthened LT pocket) (D)		
			Delay[a]	LOS[b]	Delay	LOS	Δ[c] (B - A)	Delay	LOS	Δ (C - A)	Delay	LOS	Δ (D - A)
1. College Avenue/ Lindo Paseo	Signal	AM	26.1	C	31.7	C	5.6	28.9	C	2.8	28.9	C	2.8
		PM	42.4	D	54.2	D	11.8	51.5	D	9.1	51.5	D	9.1
2. College Avenue/ Montezuma Road	Signal	AM	52.1	D	53.0	D	0.9	53.0	D	0.9	53.0	D	0.9
		PM	**66.0**	**E**	**69.6**	**E**	3.6	**69.6**	**E**	3.6	**69.6**	**E**	3.6
3. College Avenue/ HAWK Signal	Mid-Block Crosswalk	AM	–	–	15.8	B	–	–	–	–	–	–	–
		PM	–	–	10.4	B	–	–	–	–	–	–	–
Average Corridor Delay Increase (seconds)							**11.0**			**4.1**			**4.1**
Average Corridor Delay Increase (%)							**14.1%**			**9.8%**			**9.8%**

Footnotes:

a. Average delay expressed in seconds per vehicle.

b. Level of Service.

c. Δ denotes a change in delay.

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

TABLE 2
LONG-TERM (YEAR 2035) CORRIDOR QUEUE SUMMARY

Scenario	Northbound		Southbound	
	AM	PM	AM	PM
4-Lane with Existing Geometry	440’	450’	290’	570’
Complete Street Design	740’	740’	500’	2,030’
Complete Street Design *(No Ped Signal)*	470’	540’	310’	1,650’
Complete Street Design (*No Ped Signal; with Lengthened LT pocket)*	390’	480’	300’	900’

General Notes:

a. The queues shown in the above table are 50th percentile queues from SimTraffic. The queues shown are queues/lane.

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TECHNICAL APPENDICES
PLAZA LINDA VERDE

San Diego, California
May 23, 2014

LLG Ref. 3-14-2339

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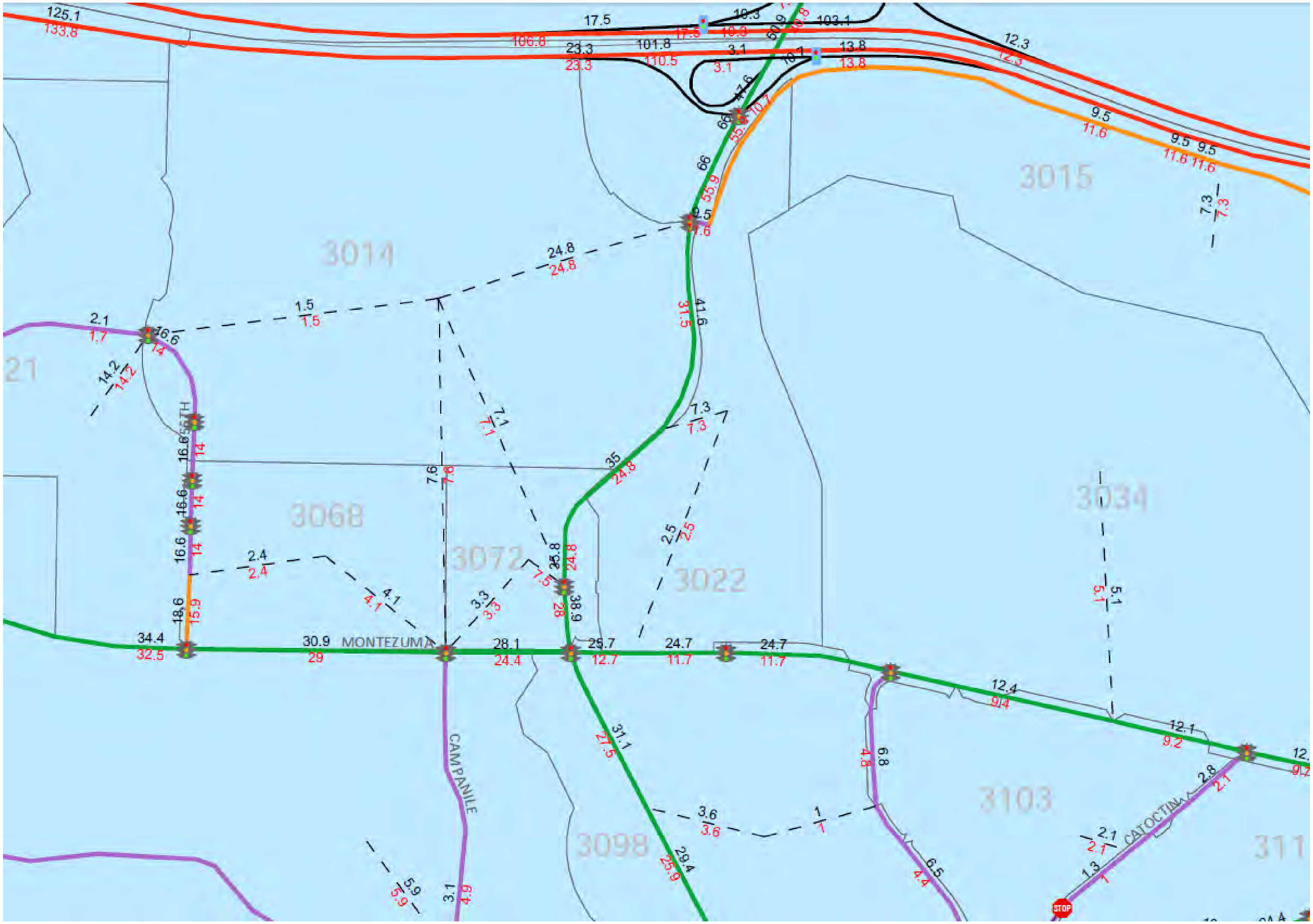
APPENDIX A

SANDAG FORECAST PLOT



3014
3015
3068
3072
3022
3034
3098
3103
MONTEZUMA
CAMPANILE
CATOCTIN
55TH

APPENDIX B

PEAK HOUR INTERSECTION CALCULATION SHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.86		0.88		1.00	0.99		1.00	1.00	0.70
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1617	1367		1473		1770	3497		1770	3539	1104
Flt Permitted		0.67	1.00		0.91		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1125	1367		1360		1770	3497		1770	3539	1104
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	29	0	0	2	0	0	0	67
Lane Group Flow (vph)	0	109	44	0	113	0	120	1237	0	87	663	226
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		33.1	33.1		33.1		13.5	76.0		11.0	73.7	73.7
Effective Green, g (s)		33.1	33.1		33.1		13.5	76.0		11.0	73.7	73.7
Actuated g/C Ratio		0.25	0.25		0.25		0.10	0.57		0.08	0.55	0.55
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	2.1
Lane Grp Cap (vph)		277	336		335		178	1976		145	1939	605
v/s Ratio Prot							c0.07	c0.35		0.05	0.19	
v/s Ratio Perm		c0.10	0.03		0.08							0.20
v/c Ratio		0.39	0.13		0.34		0.67	0.63		0.60	0.34	0.37
Uniform Delay, d1		42.3	39.5		41.7		58.4	19.7		59.6	16.9	17.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.2	0.8		2.7		7.7	1.5		4.4	0.5	1.8
Delay (s)		46.5	40.3		44.4		66.1	21.2		64.0	17.4	19.0
Level of Service		D	D		D		E	C		E	B	B
Approach Delay (s)		43.9			44.4			25.2			21.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	26.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	134.5	Sum of lost time (s)	9.3
Intersection Capacity Utilization	74.8%	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												
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
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	0.95	1.00	0.99		1.00	1.00	0.90
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	0.98		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	1496	1770	3539	1510	3433	3429		1770	3539	1428
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	1496	1770	3539	1510	3433	3429		1770	3539	1428
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	0	43
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	500	77
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.3		14.4	39.7	39.7
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.3		14.4	39.7	39.7
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.10	0.29	0.29
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)	283	1364	577	51	901	384	549	1180		185	1022	412
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.14	
v/s Ratio Perm			0.02			0.12						0.05
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.82	0.49	0.19
Uniform Delay, d1	56.5	29.5	26.6	66.1	47.9	43.5	56.0	41.8		60.3	40.5	36.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.2	4.3	10.0	7.7		23.4	1.7	1.0
Delay (s)	81.9	30.1	26.8	85.2	55.1	47.8	65.9	49.5		83.7	42.2	37.8
Level of Service	F	C	C	F	E	D	E	D		F	D	D
Approach Delay (s)		46.7			54.4			54.6			49.7	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	52.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.5	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	1.00	0.69
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1610	1359		1445		1770	3475		1770	3539	1086
Flt Permitted		0.60	1.00		0.83		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1008	1359		1212		1770	3475		1770	3539	1086
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	0	48
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1043	267
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		45.1	45.1		45.1		27.1	66.3		14.2	53.6	53.6
Effective Green, g (s)		45.1	45.1		45.1		27.1	66.3		14.2	53.6	53.6
Actuated g/C Ratio		0.32	0.32		0.32		0.19	0.47		0.10	0.38	0.38
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	2.1
Lane Grp Cap (vph)		325	438		390		343	1646		180	1355	416
v/s Ratio Prot							c0.17	0.30		0.07	c0.29	
v/s Ratio Perm		c0.26	0.09		0.12							0.25
v/c Ratio		0.80	0.26		0.38		0.89	0.63		0.72	0.77	0.64
Uniform Delay, d1		43.4	35.2		36.7		55.0	27.7		61.0	37.8	35.3
Progression Factor		1.00	1.00		1.00		1.42	0.74		1.00	1.00	1.00
Incremental Delay, d2		18.7	1.5		2.8		12.4	0.9		11.4	4.3	7.4
Delay (s)		62.0	36.6		39.5		90.4	21.4		72.4	42.1	42.7
Level of Service		E	D		D		F	C		E	D	D
Approach Delay (s)		53.1			39.5			37.0			44.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	88.4%	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												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
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	0.95	1.00	0.99		1.00	1.00	0.90
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	1495	1770	3539	1509	3433	3470		1770	3539	1426
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	1495	1770	3539	1509	3433	3470		1770	3539	1426
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	0	36
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	783	116
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	34.3		24.2	41.8	41.8
Effective Green, g (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	34.3		24.2	41.8	41.8
Actuated g/C Ratio	0.20	0.29	0.29	0.16	0.25	0.25	0.12	0.24		0.17	0.30	0.30
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)	358	1019	430	283	870	371	410	850		306	1057	426
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	c0.21		c0.17	0.22	
v/s Ratio Perm			0.17			0.16						0.08
v/c Ratio	0.97	0.96	0.60	0.96	0.80	0.65	0.85	0.88		0.96	0.74	0.27
Uniform Delay, d1	55.5	49.1	43.0	58.4	49.6	47.4	60.4	50.8		57.4	44.2	37.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.51	0.90	1.10
Incremental Delay, d2	39.8	20.0	6.2	42.5	7.6	8.5	14.5	12.3		31.7	3.3	1.1
Delay (s)	95.2	69.1	49.1	100.9	57.2	55.8	74.9	63.1		118.1	43.2	42.5
Level of Service	F	E	D	F	E	E	E	E		F	D	D
Approach Delay (s)		69.0			66.1			66.8			61.0	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	66.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.89		1.00	0.99		1.00	0.91	
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.95	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1622	1367		1481		1652	3380		1711	2961	
Flt Permitted		0.71	1.00		0.92		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1199	1367		1373		1652	3380		1711	2961	
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	29	0	0	2	0	0	34	0
Lane Group Flow (vph)	0	109	44	0	113	0	120	1237	0	87	922	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		40.1	40.1		40.1		14.1	69.0		11.2	66.3	
Effective Green, g (s)		40.1	40.1		40.1		14.1	69.0		11.2	66.3	
Actuated g/C Ratio		0.30	0.30		0.30		0.10	0.51		0.08	0.49	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		357	407		409		173	1731		142	1457	
v/s Ratio Prot							c0.07	c0.37		0.05	0.31	
v/s Ratio Perm		c0.09	0.03		0.08							
v/c Ratio		0.31	0.11		0.28		0.69	0.71		0.61	0.63	
Uniform Delay, d1		36.5	34.3		36.2		58.2	25.3		59.7	25.2	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.2	0.5		1.7		9.3	2.6		5.4	2.1	
Delay (s)		38.7	34.9		37.9		67.5	27.8		65.1	27.3	
Level of Service		D	C		D		E	C		E	C	
Approach Delay (s)		37.2			37.9			31.3			30.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	31.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	134.7	Sum of lost time (s)	14.4
Intersection Capacity Utilization	84.5%	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												
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	14	0
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	606	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.11	0.29	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	283	1363	576	51	900	384	549	1176		182	943	
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.19	
v/s Ratio Perm			0.02			0.12						
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.84	0.64	
Uniform Delay, d1	56.5	29.5	26.6	66.1	48.0	43.6	56.0	42.0		60.3	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.3	4.3	10.0	7.9		25.8	3.4	
Delay (s)	82.0	30.1	26.8	85.3	55.2	47.8	66.0	49.8		86.1	46.0	
Level of Service	F	C	C	F	E	D	E	D		F	D	
Approach Delay (s)		46.8			54.4			54.9			53.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	0	1240	0	0	960
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0
Lane Util. Factor			0.95			0.95
Frpb, ped/bikes			1.00			1.00
Flpb, ped/bikes			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			3539			3539
Flt Permitted			1.00			1.00
Satd. Flow (perm)			3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1348	0	0	1043
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1348	0	0	1043
Confl. Peds. (#/hr)	7	57				
Turn Type						
Protected Phases			2			6
Permitted Phases						
Actuated Green, G (s)			36.8			36.8
Effective Green, g (s)			36.8			36.8
Actuated g/C Ratio			0.50			0.50
Clearance Time (s)			4.0			4.0
Vehicle Extension (s)			3.0			3.0
Lane Grp Cap (vph)			1758			1758
v/s Ratio Prot			c0.38			0.29
v/s Ratio Perm						
v/c Ratio			0.77			0.59
Uniform Delay, d1			15.2			13.3
Progression Factor			1.00			1.00
Incremental Delay, d2			2.1			0.5
Delay (s)			17.2			13.9
Level of Service			B			B
Approach Delay (s)	0.0		17.2			13.9
Approach LOS	A		B			B

Intersection Summary			
HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	74.1	Sum of lost time (s)	37.3
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	0.93	
Flpb, ped/bikes		0.91	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1628	1359		1457		1652	3359		1711	3062	
Flt Permitted		0.54	1.00		0.62		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		917	1359		916		1652	3359		1711	3062	
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	20	0
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1338	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		31.1	31.1		31.1		25.6	80.0		14.5	69.1	
Effective Green, g (s)		31.1	31.1		31.1		25.6	80.0		14.5	69.1	
Actuated g/C Ratio		0.22	0.22		0.22		0.18	0.57		0.10	0.49	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		204	302		203		302	1919		177	1511	
v/s Ratio Prot							c0.18	0.31		0.08	c0.44	
v/s Ratio Perm		c0.28	0.09		0.16							
v/c Ratio		1.28	0.38		0.73		1.01	0.54		0.73	0.89	
Uniform Delay, d1		54.5	46.3		50.6		57.2	18.6		60.9	31.9	
Progression Factor		1.00	1.00		1.00		1.45	0.47		1.00	1.00	
Incremental Delay, d2		157.9	3.7		20.6		37.7	0.5		12.7	8.0	
Delay (s)		212.4	50.0		71.2		120.4	9.2		73.6	39.9	
Level of Service		F	D		E		F	A		E	D	
Approach Delay (s)		155.4			71.2			34.3			42.8	
Approach LOS		F			E			C			D	

Intersection Summary			
HCM Average Control Delay	54.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	11	0
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	924	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	28.9	40.3	40.3	22.4	33.8	33.8	16.7	33.9		24.6	41.8	
Effective Green, g (s)	28.9	40.3	40.3	22.4	33.8	33.8	16.7	33.9		24.6	41.8	
Actuated g/C Ratio	0.21	0.29	0.29	0.16	0.24	0.24	0.12	0.24		0.18	0.30	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	365	1019	430	283	854	364	410	840		301	981	
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	0.21		c0.17	c0.28	
v/s Ratio Perm			0.17			0.16						
v/c Ratio	0.95	0.96	0.60	0.96	0.81	0.66	0.85	0.89		0.97	0.94	
Uniform Delay, d1	54.9	49.1	43.0	58.4	50.1	47.9	60.4	51.2		57.4	47.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.29	1.18	
Incremental Delay, d2	34.6	20.0	6.2	42.5	8.4	9.0	14.5	13.3		30.7	11.0	
Delay (s)	89.5	69.1	49.1	100.9	58.6	56.9	74.9	64.5		104.5	67.7	
Level of Service	F	E	D	F	E	E	E	E		F	E	
Approach Delay (s)		67.8			67.1			67.8			76.5	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	69.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			↑↑
Volume (vph)	0	0	1190	0	0	1370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0
Lane Util. Factor			0.95			0.95
Frpb, ped/bikes			1.00			1.00
Flpb, ped/bikes			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			3539			3539
Flt Permitted			1.00			1.00
Satd. Flow (perm)			3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1293	0	0	1489
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1293	0	0	1489
Confl. Peds. (#/hr)	76	45				
Turn Type						
Protected Phases			2			6
Permitted Phases						
Actuated Green, G (s)			83.0			83.0
Effective Green, g (s)			83.0			83.0
Actuated g/C Ratio			0.69			0.69
Clearance Time (s)			4.0			4.0
Vehicle Extension (s)			3.0			3.0
Lane Grp Cap (vph)			2448			2448
v/s Ratio Prot			0.37			c0.42
v/s Ratio Perm						
v/c Ratio			0.53			0.61
Uniform Delay, d1			9.0			9.8
Progression Factor			1.00			1.00
Incremental Delay, d2			0.8			1.1
Delay (s)			9.8			11.0
Level of Service			A			B
Approach Delay (s)	0.0		9.8			11.0
Approach LOS	A		A			B

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	37.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.88		1.00	0.99		1.00	0.91	
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.95	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1616	1367		1472		1652	3380		1711	2961	
Flt Permitted		0.69	1.00		0.91		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1147	1367		1361		1652	3380		1711	2961	
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	30	0	0	2	0	0	33	0
Lane Group Flow (vph)	0	109	44	0	112	0	120	1237	0	87	923	0
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Effective Green, g (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Actuated g/C Ratio		0.26	0.26		0.26		0.10	0.55		0.08	0.53	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		299	356		355		173	1857		142	1567	
v/s Ratio Prot							c0.07	c0.37		0.05	0.31	
v/s Ratio Perm		c0.10	0.03		0.08							
v/c Ratio		0.36	0.12		0.32		0.69	0.67		0.61	0.59	
Uniform Delay, d1		40.7	38.1		40.1		58.2	21.6		59.7	21.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.4	0.7		2.3		9.3	1.9		5.4	1.6	
Delay (s)		44.1	38.8		42.5		67.5	23.5		65.1	23.3	
Level of Service		D	D		D		E	C		E	C	
Approach Delay (s)		41.9			42.5			27.4			26.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	134.7	Sum of lost time (s)	14.4
Intersection Capacity Utilization	84.5%	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												
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	14	0
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	606	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.11	0.29	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	283	1363	576	51	900	384	549	1176		182	943	
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.19	
v/s Ratio Perm			0.02			0.12						
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.84	0.64	
Uniform Delay, d1	56.5	29.5	26.6	66.1	48.0	43.6	56.0	42.0		60.3	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.3	4.3	10.0	7.9		25.8	3.4	
Delay (s)	82.0	30.1	26.8	85.3	55.2	47.8	66.0	49.8		86.1	46.0	
Level of Service	F	C	C	F	E	D	E	D		F	D	
Approach Delay (s)		46.8			54.4			54.9			53.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	0.93	
Flpb, ped/bikes		0.91	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1625	1359		1456		1652	3359		1711	3062	
Flt Permitted		0.57	1.00		0.70		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		953	1359		1028		1652	3359		1711	3062	
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	20	0
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1338	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Effective Green, g (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Actuated g/C Ratio		0.25	0.25		0.25		0.18	0.54		0.10	0.46	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		239	341		258		302	1823		177	1424	
v/s Ratio Prot							c0.18	0.31		0.08	c0.44	
v/s Ratio Perm		c0.27	0.09		0.14							
v/c Ratio		1.09	0.34		0.57		1.01	0.57		0.73	0.94	
Uniform Delay, d1		52.4	43.0		45.9		57.2	21.2		60.9	35.6	
Progression Factor		1.00	1.00		1.00		1.45	0.49		1.00	1.00	
Incremental Delay, d2		85.0	2.7		9.0		37.3	0.6		12.7	13.2	
Delay (s)		137.4	45.7		54.9		120.2	11.1		73.6	48.8	
Level of Service		F	D		D		F	B		E	D	
Approach Delay (s)		105.2			54.9			35.7			50.9	
Approach LOS		F			D			D			D	

Intersection Summary			
HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	11	0
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	924	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Effective Green, g (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Actuated g/C Ratio	0.20	0.29	0.29	0.16	0.25	0.25	0.12	0.24		0.18	0.30	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	358	1019	430	283	870	371	410	840		301	981	
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	0.21		c0.17	c0.28	
v/s Ratio Perm			0.17			0.16						
v/c Ratio	0.97	0.96	0.60	0.96	0.80	0.65	0.85	0.89		0.97	0.94	
Uniform Delay, d1	55.5	49.1	43.0	58.4	49.6	47.4	60.4	51.2		57.4	47.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.30	1.19	
Incremental Delay, d2	39.8	20.0	6.2	42.5	7.6	8.5	14.5	13.3		28.8	10.1	
Delay (s)	95.2	69.1	49.1	100.9	57.2	55.8	74.9	64.5		103.6	67.3	
Level of Service	F	E	D	F	E	E	E	E		F	E	
Approach Delay (s)		69.0			66.1			67.8			75.9	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	69.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.88		1.00	0.99		1.00	0.91	
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.95	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1616	1367		1472		1652	3380		1711	2961	
Flt Permitted		0.69	1.00		0.91		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1147	1367		1361		1652	3380		1711	2961	
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	30	0	0	2	0	0	33	0
Lane Group Flow (vph)	0	109	44	0	112	0	120	1237	0	87	923	0
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Effective Green, g (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Actuated g/C Ratio		0.26	0.26		0.26		0.10	0.55		0.08	0.53	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		299	356		355		173	1857		142	1567	
v/s Ratio Prot							c0.07	c0.37		0.05	0.31	
v/s Ratio Perm		c0.10	0.03		0.08							
v/c Ratio		0.36	0.12		0.32		0.69	0.67		0.61	0.59	
Uniform Delay, d1		40.7	38.1		40.1		58.2	21.6		59.7	21.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.4	0.7		2.3		9.3	1.9		5.4	1.6	
Delay (s)		44.1	38.8		42.5		67.5	23.5		65.1	23.3	
Level of Service		D	D		D		E	C		E	C	
Approach Delay (s)		41.9			42.5			27.4			26.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	134.7	Sum of lost time (s)	14.4
Intersection Capacity Utilization	84.5%	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												
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	14	0
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	606	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.11	0.29	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	283	1363	576	51	900	384	549	1176		182	943	
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.19	
v/s Ratio Perm			0.02			0.12						
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.84	0.64	
Uniform Delay, d1	56.5	29.5	26.6	66.1	48.0	43.6	56.0	42.0		60.3	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.3	4.3	10.0	7.9		25.8	3.4	
Delay (s)	82.0	30.1	26.8	85.3	55.2	47.8	66.0	49.8		86.1	46.0	
Level of Service	F	C	C	F	E	D	E	D		F	D	
Approach Delay (s)		46.8			54.4			54.9			53.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	0.93	
Flpb, ped/bikes		0.91	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1625	1359		1456		1652	3359		1711	3062	
Flt Permitted		0.57	1.00		0.70		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		953	1359		1028		1652	3359		1711	3062	
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	20	0
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1338	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Effective Green, g (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Actuated g/C Ratio		0.25	0.25		0.25		0.18	0.54		0.10	0.46	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		239	341		258		302	1823		177	1424	
v/s Ratio Prot							c0.18	0.31		0.08	c0.44	
v/s Ratio Perm		c0.27	0.09		0.14							
v/c Ratio		1.09	0.34		0.57		1.01	0.57		0.73	0.94	
Uniform Delay, d1		52.4	43.0		45.9		57.2	21.2		60.9	35.6	
Progression Factor		1.00	1.00		1.00		1.45	0.49		1.00	1.00	
Incremental Delay, d2		85.0	2.7		9.0		37.3	0.6		12.7	13.2	
Delay (s)		137.4	45.7		54.9		120.2	11.1		73.6	48.8	
Level of Service		F	D		D		F	B		E	D	
Approach Delay (s)		105.2			54.9			35.7			50.9	
Approach LOS		F			D			D			D	

Intersection Summary			
HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	11	0
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	924	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Effective Green, g (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Actuated g/C Ratio	0.20	0.29	0.29	0.16	0.25	0.25	0.12	0.24		0.18	0.30	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	358	1019	430	283	870	371	410	840		301	981	
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	0.21		c0.17	c0.28	
v/s Ratio Perm			0.17			0.16						
v/c Ratio	0.97	0.96	0.60	0.96	0.80	0.65	0.85	0.89		0.97	0.94	
Uniform Delay, d1	55.5	49.1	43.0	58.4	49.6	47.4	60.4	51.2		57.4	47.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.30	1.19	
Incremental Delay, d2	39.8	20.0	6.2	42.5	7.6	8.5	14.5	13.3		28.8	10.1	
Delay (s)	95.2	69.1	49.1	100.9	57.2	55.8	74.9	64.5		103.6	67.3	
Level of Service	F	E	D	F	E	E	E	E		F	E	
Approach Delay (s)		69.0			66.1			67.8			75.9	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	69.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX C

QUEUING CALCULATION SHEETS

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	197	45	155	124	244	300	124	222	227	85
Average Queue (ft)	85	39	62	103	205	198	54	122	142	69
95th Queue (ft)	176	50	121	136	272	317	109	213	240	101
Link Distance (ft)	441		451		250	250		274	274	
Upstream Blk Time (%)					0	2				
Queuing Penalty (veh)					2	14				
Storage Bay Dist (ft)		20		100			100			60
Storage Blk Time (%)	59	12		11	14		5	5	16	8
Queuing Penalty (veh)	41	12		58	16		15	4	43	25

NB: 200'

SB: 130'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	213	322	116	25	39	425	434	85	178	192	328	332
Average Queue (ft)	171	107	77	5	13	349	373	62	141	160	242	272
95th Queue (ft)	256	253	112	19	36	477	460	121	191	204	328	329
Link Distance (ft)		432	432			422	422				401	401
Upstream Blk Time (%)						2	3					
Queuing Penalty (veh)						0	0					
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	14					32	57	11			0	
Queuing Penalty (veh)	27					9	126	35			0	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	156	207	243	95
Average Queue (ft)	94	137	178	48
95th Queue (ft)	158	206	272	88
Link Distance (ft)		250	250	
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			1	
Storage Bay Dist (ft)	280			70
Storage Blk Time (%)			23	0
Queuing Penalty (veh)			25	1

NB: 240'
SB: 160'

	Linda	Montezuma	Total
NB*	200'	240'	440'
SB	130'	160'	290'

*- NB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	B10	B10
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R	T	T
Maximum Queue (ft)	504	77	514	125	269	267	124	353	344	85	134	254
Average Queue (ft)	461	47	432	122	244	154	111	301	300	57	46	73
95th Queue (ft)	490	69	548	128	275	309	131	391	384	102	127	221
Link Distance (ft)	441		451		250	250		274	274		1742	1742
Upstream Blk Time (%)	82		33		23	7		12	15			
Queuing Penalty (veh)	0		0		142	46		0	0			
Storage Bay Dist (ft)		20		100			100			60		
Storage Blk Time (%)	78	22		67	1		29	33	41	2		
Queuing Penalty (veh)	101	53		303	3		140	39	118	11		

NB: 190'

SB: 360'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	215	447	476	264	225	436	436	85	259	254	416	435
Average Queue (ft)	201	445	449	161	211	433	432	77	160	178	276	259
95th Queue (ft)	235	455	468	312	266	441	449	109	274	275	376	396
Link Distance (ft)		432	432			422	422				401	401
Upstream Blk Time (%)		23	20			24	35				1	3
Queuing Penalty (veh)		0	0			0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	36	29	32	0	17	36	34	58			1	
Queuing Penalty (veh)	162	93	137	0	53	90	100	184			4	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	243	262	270	95
Average Queue (ft)	230	216	209	71
95th Queue (ft)	264	285	320	123
Link Distance (ft)		250	250	
Upstream Blk Time (%)	12	4	14	
Queuing Penalty (veh)	0	23	77	
Storage Bay Dist (ft)	280			70
Storage Blk Time (%)	12	4	55	2
Queuing Penalty (veh)	42	11	77	7

NB: 260'
SB: 210'

	Lindo	Montezuma	Total
NB*	190'	260'	450'
SB	360'	210'	570'

* - NB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	160	55	228	125	249	301	125	333	303
Average Queue (ft)	99	38	108	93	215	223	79	175	222
95th Queue (ft)	165	66	225	137	277	293	157	320	307
Link Distance (ft)	456		454		249	249		286	286
Upstream Blk Time (%)					1	3		4	2
Queuing Penalty (veh)					6	20		17	9
Storage Bay Dist (ft)		20		100			100		
Storage Blk Time (%)	50	7		17	23		29	13	
Queuing Penalty (veh)	35	7		94	26		88	11	

NB: 220'

SB: 160'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	253	244	16	224	436	436	85	248	344	416	416
Average Queue (ft)	161	87	102	11	48	378	383	61	188	298	352	379
95th Queue (ft)	248	168	172	23	173	527	514	124	255	398	480	455
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)						8	10				6	3
Queuing Penalty (veh)						0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	11	1	0			39	58	16		0	11	
Queuing Penalty (veh)	22	3	0			12	128	52		0	47	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	264	270
Average Queue (ft)	116	252	236
95th Queue (ft)	146	271	274
Link Distance (ft)		249	249
Upstream Blk Time (%)		10	3
Queuing Penalty (veh)		36	12
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	48	8	
Queuing Penalty (veh)	110	11	

NB: 340'

SB: 220'

Intersection: 3: HAWK Ped Crosswalk & College Avenue

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (ft)	227	290	156	201
Average Queue (ft)	168	194	108	139
95th Queue (ft)	219	290	156	224
Link Distance (ft)	286	286	637	637
Upstream Blk Time (%)		1		
Queuing Penalty (veh)		3		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

			Lindo	Montezuma	Ped Signal	Total
NB:	180'	NB*	220'	340'	180'	740'
SB:	120'	SB*	160'	220'	120'	500'

* - NB & SB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	489	54	469	125	265	262	124	296	332
Average Queue (ft)	473	45	462	123	253	172	87	292	304
95th Queue (ft)	485	53	475	127	265	340	146	296	324
Link Distance (ft)	456		454		249	249		286	286
Upstream Blk Time (%)	81		93		52	4		48	52
Queuing Penalty (veh)	0		0		321	25		330	356
Storage Bay Dist (ft)		20		100			100		
Storage Blk Time (%)	63	30		76	1		9	73	
Queuing Penalty (veh)	81	71		344	3		45	87	

NB: 210'

SB: 260'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	462	462	260	224	440	436	85	181	344	416	416
Average Queue (ft)	212	459	437	56	170	434	436	84	141	216	413	412
95th Queue (ft)	217	468	516	196	242	442	437	88	192	354	421	425
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)		55	11			44	59				26	15
Queuing Penalty (veh)		0	0			0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	67	18	24	0	9	54	1	94		0	34	
Queuing Penalty (veh)	300	57	104	0	29	135	4	302		1	109	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	272	283
Average Queue (ft)	124	263	252
95th Queue (ft)	125	280	299
Link Distance (ft)		249	249
Upstream Blk Time (%)		60	25
Queuing Penalty (veh)		338	144
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	77	10	
Queuing Penalty (veh)	276	26	

WB: 390'

SB: 240'

Intersection: 3: HAWK Ped Crosswalk & College Avenue

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (ft)	204	204	1769	1769
Average Queue (ft)	133	140	1528	1539
95th Queue (ft)	199	209	2107	2086
Link Distance (ft)	286	286	1754	1754
Upstream Blk Time (%)			32	30
Queuing Penalty (veh)			0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

WB: 140'

SB: 1,530'

	Lindo	Montezuma	Ped Signal	Total
WB*:	210'	390'	140'	740'
SB*:	260'	240'	1,530'	2,030'

* - NB & SB excludes right-turns based on volume splits

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	94	45	179	124	262	291	115	276	308
Average Queue (ft)	53	40	112	96	177	205	78	166	224
95th Queue (ft)	87	49	158	151	305	307	123	254	308
Link Distance (ft)	456		454		249	249		274	274
Upstream Blk Time (%)					6	2		0	1
Queuing Penalty (veh)					38	10		0	0
Storage Bay Dist (ft)		20		100			100		
Storage Blk Time (%)	44	4		25	9		5	19	
Queuing Penalty (veh)	31	4		136	10		15	15	

WB: 190'
SB: 160'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	368	126	38	60	436	436	85	166	190	413	414
Average Queue (ft)	198	225	95	19	25	337	342	57	109	136	299	304
95th Queue (ft)	234	429	127	32	59	434	461	115	186	199	398	398
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)						7	17				1	1
Queuing Penalty (veh)						0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	25					41	45	35			4	
Queuing Penalty (veh)	49					12	99	116			19	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	264	266
Average Queue (ft)	97	175	160
95th Queue (ft)	142	291	271
Link Distance (ft)		249	249
Upstream Blk Time (%)		4	2
Queuing Penalty (veh)		14	6
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	30	9	
Queuing Penalty (veh)	68	13	

				Lindo	Montezuma	Total
NB:	280'		NB*	190'	280'	470'
SB:	150'		SB*	160'	150'	310'

*- NB & SB excludes right-turns based on volume splits.

CSP No Ped Signal PM

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	B10	B10
Directions Served	LT	R	LTR	L	T	TR	L	T	TR	T	T
Maximum Queue (ft)	488	54	469	124	268	264	125	364	350	1569	1569
Average Queue (ft)	473	45	461	123	257	166	112	348	344	1094	1106
95th Queue (ft)	487	54	477	128	271	318	135	359	349	1413	1444
Link Distance (ft)	456		454		249	249		274	274	1742	1742
Upstream Blk Time (%)	66		99		47	1		74	64		
Queuing Penalty (veh)	0		0		293	5		0	0		
Storage Bay Dist (ft)		20		100			100				
Storage Blk Time (%)	66	57		71	2		31	71			
Queuing Penalty (veh)	85	136		322	5		150	85			

WB: 210'

SB: 1,410'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	486	481	265	224	436	460	85	186	344	416	416
Average Queue (ft)	208	455	397	128	152	281	439	84	160	249	339	353
95th Queue (ft)	220	487	653	282	299	576	460	87	200	389	478	502
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)		39	15			5	53				7	8
Queuing Penalty (veh)		0	0			0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	70	10	13	0	9	16	18	74			15	
Queuing Penalty (veh)	315	34	55	0	28	40	51	235			47	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	269	268
Average Queue (ft)	124	263	261
95th Queue (ft)	125	273	270
Link Distance (ft)		249	249
Upstream Blk Time (%)		57	31
Queuing Penalty (veh)		322	178
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	68	20	
Queuing Penalty (veh)	244	54	

WB: 330'
SB: 240

	Lindo	Montezuma	Total
WB*	210'	330'	540'
SB*	1,410'	240'	1,650'

* - WB & SB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	285	45	159	124	177	130	138	235	304
Average Queue (ft)	138	36	61	94	92	88	99	161	218
95th Queue (ft)	269	60	97	144	157	137	157	232	311
Link Distance (ft)	456		454		249	249		274	274
Upstream Blk Time (%)									2
Queuing Penalty (veh)									0
Storage Bay Dist (ft)		20		100			200		
Storage Blk Time (%)	51	14		19	1			0	
Queuing Penalty (veh)	36	14		105	1			0	

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	189	219	17	82	408	414	85	186	344	416	416
Average Queue (ft)	170	118	133	13	39	316	324	42	154	229	317	337
95th Queue (ft)	227	188	215	23	79	471	483	105	230	370	493	475
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)						0	0				4	6
Queuing Penalty (veh)						0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	7	1				23	48	0		0	10	
Queuing Penalty (veh)	14	2				7	106	1		0	41	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	242	268	259
Average Queue (ft)	152	140	170
95th Queue (ft)	216	239	259
Link Distance (ft)		249	249
Upstream Blk Time (%)	0	1	1
Queuing Penalty (veh)	0	2	3
Storage Bay Dist (ft)	280		
Storage Blk Time (%)	0	1	
Queuing Penalty (veh)	0	1	

Network Summary

Network wide Queuing Penalty: 333

			Lindo	Montezuma	Total
NB: 390'	NB* :		90'	300'	390'
SB: 300'	SB* :		160'	140'	300'

* – NB & SB excludes right-turns based on volume splits

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	B10	B10
Directions Served	LT	R	LTR	L	T	TR	L	T	TR	T	T
Maximum Queue (ft)	472	54	310	125	266	259	224	345	345	759	694
Average Queue (ft)	471	44	161	124	260	222	124	333	344	344	401
95th Queue (ft)	472	55	286	126	270	261	206	360	346	680	679
Link Distance (ft)	456		454		249	249		274	274	1742	1742
Upstream Blk Time (%)	87				43	1		36	55		
Queuing Penalty (veh)	0				268	4		0	0		
Storage Bay Dist (ft)		20		100			200				
Storage Blk Time (%)	54	55		73	3			46			
Queuing Penalty (veh)	70	132		332	8			55			

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	215	462	476	462	224	436	436	85	236	344	387	412
Average Queue (ft)	204	441	416	199	201	431	436	84	153	196	253	256
95th Queue (ft)	238	486	546	329	284	448	437	89	217	317	355	367
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)		13	16	5		28	46				0	0
Queuing Penalty (veh)		0	0	0		0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	54	17	25	0	29	39	21	77			1	
Queuing Penalty (veh)	242	56	106	1	93	98	62	248			4	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	243	269	274
Average Queue (ft)	206	254	253
95th Queue (ft)	283	280	280
Link Distance (ft)		249	249
Upstream Blk Time (%)	2	37	38
Queuing Penalty (veh)	0	209	217
Storage Bay Dist (ft)	280		
Storage Blk Time (%)	2	37	
Queuing Penalty (veh)	7	100	

Network Summary

Network wide Queuing Penalty: 2311

			Lindo	Montezuma	Total
NB: 480'		WB*:	240'	240'	480'
SB: 900'		SB*:	670'	230'	900'

* - WB & SB excludes right-turns based on volume splits

MEMORANDUM

To:	Mr. Robert Schulz, AIA Associate Vice President of Real Estate, Planning & Development	Date:	July 14, 2014
From:	John Boarman, P.E. LLG Engineers	LLG Ref:	3-14-2339
Subject:	Plaza Linda Verde – *Diversion Analysis*		

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Linscott, Law & Greenspan Engineers (LLG) has prepared this traffic analysis memo for the San Diego State University (SDSU) Plaza Linda Verde (PLV) Project. This memo presents a supplemental long-term intersection analysis that accounts for the potential diversion of traffic from College Avenue if it were retained in its current 4-lane configuration between Montezuma Road north to the suspended pedestrian bridge rather than widened to 6-lanes as otherwise planned. A summary of the relevant background followed by a comparative analysis is provided below.

PROJECT HISTORY AND BACKGROUND

The PLV project is a mixed-use student housing development approved by The Board of Trustees of California State University in May 2011. The mixed-use student housing project, which is located in the College Area community of the City of San Diego, will include ground floor retail and upper floor student-housing, standalone student apartments, additional parking facilities, a Campus Green featuring a public promenade, and pedestrian malls in place of existing streets/alleys linking the proposed buildings to the main SDSU campus.

Alternative designs for College Avenue, referred to as Complete Streets Scenarios, have been presented that propose to retain College Avenue between Montezuma Road and the suspended pedestrian bridge in its current configuration as a 4-lane road rather than widening the segment to 6-lanes as otherwise planned. With the retainment of 4-lanes on College Avenue, traffic is anticipated to potentially divert to alternate routes.

As shown in the PLV Traffic Impact Analysis (see LLG Traffic Impact Analysis, Plaza Linda Verde, January 11, 2011 (TIA), pp. 78-81), the diverted average daily trips (ADT) from College Avenue commensurate with the reduction in capacity from 6-lanes to 4-lanes was estimated to be 4,000 ADT. These volumes would be distributed along Montezuma Road to parallel routes. ***Table 1*** shows the diverted traffic along street segments. The peak hour diverted volumes used to conduct the intersection analysis presented in this memorandum were derived from these ADT volumes.

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ANALYSIS APPROACH AND METHODOLOGY

Intersections were analyzed under AM and PM peak hour conditions consistent with the City of San Diego standards and guidelines. Average vehicle delay was determined utilizing the methodology in the *Highway Capacity Manual (HCM).* The delay values (represented in seconds) were qualified with a corresponding intersection Level of Service (LOS).

The study area intersections were chosen based on the locations where College Avenue traffic would divert, principally along Montezuma Road both east and west of College Avenue. Intersections along College Avenue were not analyzed since traffic would <u>decrease</u> along this roadway as a result of the downsizing of College Avenue between the pedestrian bridge and Montezuma Road and, therefore, impacts necessarily would be less than previously reported. Additionally, the intersections of College Avenue/Montezuma Road and College Avenue/Lindo Paseo have been addressed in a separate related analysis (see LLG Memorandum, Plaza Linda Verde – Complete Streets Design Analyses (June 2014)).

LONG-TERM TRAFFIC VOLUMES DEVELOPMENT

The latest regionally adopted SANDAG Series 12 (which also includes College Avenue as 6-lanes) traffic model was used to develop Year 2035 Forecast Volumes. The diverted trips were then manually added/subtracted to the base 2035 volumes to account for a 4-lane College Avenue.

TRAFFIC OPERATIONAL ANALYSIS

The analysis presents a comparison of long-term intersection operations under a Complete Streets Scenario, which assumes a 4-lane College Avenue and corresponding diversion of traffic, with long-term intersection operations under a 6-lane scenario, as presented in the PLV TIA and corresponding EIR. ***Table 2*** shows the AM and PM peak intersection operations.

As shown in *Table 2*, the intersection LOS under the 4-lane Complete Streets Scenario is calculated to be equal to or lower than (i.e., better than) the LOS forecasted for the approved project as presented in the PLV TIA and EIR. This is due to several reasons, including available capacity on the surrounding roads, and lower long-term background traffic volumes presently forecast by SANDAG as compared to those used for the PLV TIA. Hence, under the Complete Streets Scenario, there would be no additional significantly impacted locations beyond those reported in the PLV TIA, nor would there be an increase in the severity of a previously identified significant impact as a result of the diversion of traffic from College Avenue to other area roadways.

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Appendix A includes the intersection calculation sheets.

Attachments:
Appendix A: Peak hour intersection calculation sheets

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TABLE 1
LONG-TERM DIVERSION TRAFFIC

Street Segment	Street Segment Diversion Traffic (ADT)[a]
College Avenue: I-8 to Montezuma Road	– 4,000
Montezuma Road: West of Collwood Boulevard	+ 3,000
Montezuma Road: Collwood Boulevard to 55th Street	+ 1,500
Montezuma Road: 55th Street to College Avenue	+ 1,500
Montezuma Road: College Avenue to Catoctin Drive	+1,350

Footnotes:
a. *Source*: LLG Traffic Impact Analysis, Plaza Linda Verde, January 11, 2011 (TIA), Table 19–1, pp. 80.

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TABLE 2
LONG-TERM INTERSECTION DIVERSION ANALYSIS

Intersection	Control Type	Peak Hour	PLV Traffic Study (Approved Project)[a]		Year 2035[d] with Diverted Traffic (Complete Streets Scenario)	
			Delay[b]	LOS[c]	Delay	LOS
Montezuma Road/ Collwood Road	Signal	AM PM	44.9 158.0	D F	43.0 155.1	D F
Montezuma Road/ 55th Street	Signal	AM PM	136.6 151.7	F F	113.8 133.3	F F
Montezuma Road/ Campanile Drive	Signal	AM PM	85.3 226.5	F F	52.2 116.5	D F
Montezuma Road/ Catocin Drive	Signal	AM PM	25.7 33.1	C C	20.0 20.9	C C
Montezuma Road/ El Cajon Boulevard	Signal	AM PM	76.2 80.6	E F	75.4 79.1	E E

Footnotes:

a. *Source*: LLG Traffic Impact Analysis, Plaza Linda Verde, January 11, 2011 (TIA), Table 10–1, pp. 56.
b. Average delay expressed in seconds per vehicle.
c. Level of Service.
d. Year 2035 Traffic Volumes based on SANDAG Series 12 Traffic Model.

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰↰	↱
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	0.09	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	159	3539	3433	1583
Volume (vph)	1654	320	71	1375	1150	112
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1798	348	77	1495	1250	122
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	1798	348	77	1495	1250	119
Turn Type		pm+ov	Perm			Perm
Protected Phases	4	2		8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	47.0	92.0	47.0	47.0	45.0	45.0
Effective Green, g (s)	47.0	92.0	47.0	47.0	45.0	45.0
Actuated g/C Ratio	0.47	0.92	0.47	0.47	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1663	1583	75	1663	1545	712
v/s Ratio Prot	c0.51	0.10		0.42	c0.36	
v/s Ratio Perm		0.12	0.49			0.08
v/c Ratio	1.08	0.22	1.03	0.90	0.81	0.17
Uniform Delay, d1	26.5	0.4	26.5	24.3	23.8	16.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.6	0.1	111.5	6.9	4.7	0.5
Delay (s)	74.1	0.5	138.0	31.2	28.5	16.9
Level of Service	E	A	F	C	C	B
Approach Delay (s)	62.2			36.4	27.4	
Approach LOS	E			D	C	

Intersection Summary			
HCM Average Control Delay	44.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰↰	↱
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)	3574	1599	1787	3574	3467	1599
Flt Permitted	1.00	1.00	0.09	1.00	0.95	1.00
Satd. Flow (perm)	3574	1599	160	3574	3467	1599
Volume (vph)	2017	410	93	2143	380	66
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2192	446	101	2329	413	72
RTOR Reduction (vph)	0	0	0	0	0	1
Lane Group Flow (vph)	2192	446	101	2329	413	71
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type		pm+ov	Perm			Perm
Protected Phases	4	2		8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	47.0	92.0	47.0	47.0	45.0	45.0
Effective Green, g (s)	47.0	92.0	47.0	47.0	45.0	45.0
Actuated g/C Ratio	0.47	0.92	0.47	0.47	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1680	1599	75	1680	1560	720
v/s Ratio Prot	0.61	c0.13		c0.65	0.12	
v/s Ratio Perm		0.15	0.63			0.04
v/c Ratio	1.30	0.28	1.35	1.39	0.26	0.10
Uniform Delay, d1	26.5	0.4	26.5	26.5	17.2	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	141.6	0.1	221.6	177.6	0.4	0.3
Delay (s)	168.1	0.5	248.1	204.1	17.6	16.1
Level of Service	F	A	F	F	B	B
Approach Delay (s)	139.8			205.9	17.4	
Approach LOS	F			F	B	

Intersection Summary			
HCM Average Control Delay	158.0	HCM Level of Service	F
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	81.7%	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	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	0.92		0.99		1.00	1.00	0.92
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	3501		1770	3539	1464		1750		1681	1696	1455
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (perm)	3433	3501		1770	3539	1464		1750		1681	1696	1455
Volume (vph)	1114	625	26	20	1194	375	50	15	10	143	10	202
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)	1211	679	28	22	1298	408	54	16	11	155	11	220
RTOR Reduction (vph)	0	3	0	0	0	231	0	6	0	0	0	186
Lane Group Flow (vph)	1211	704	0	22	1298	177	0	75	0	81	85	34
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8						6
Actuated Green, G (s)	25.0	52.8		1.6	29.4	29.4		16.0		16.0	16.0	16.0
Effective Green, g (s)	25.0	52.8		1.6	29.4	29.4		16.0		16.0	16.0	16.0
Actuated g/C Ratio	0.24	0.52		0.02	0.29	0.29		0.16		0.16	0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	838	1805		28	1016	420		273		263	265	227
v/s Ratio Prot	c0.35	0.20		0.01	c0.37			c0.04		0.05	c0.05	
v/s Ratio Perm						0.12						0.02
v/c Ratio	1.45	0.39		0.79	1.28	0.42		0.28		0.31	0.32	0.15
Uniform Delay, d1	38.7	15.0		50.2	36.5	29.6		38.1		38.3	38.4	37.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	207.0	0.1		82.7	132.6	0.7		2.5		3.0	3.2	1.4
Delay (s)	245.7	15.2		133.0	169.1	30.3		40.6		41.3	41.5	38.7
Level of Service	F	B		F	F	C		D		D	D	D
Approach Delay (s)		160.8			135.9			40.6			39.9	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM Average Control Delay	136.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	102.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.1%	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	↰↰	↑↱		↰	↑↑	↱		✢		↰	↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	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	0.93		0.98		1.00	1.00	0.92
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		0.97		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	3466		1770	3539	1467		1724		1681	1691	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (perm)	3433	3466		1770	3539	1467		1724		1681	1691	1458
Volume (vph)	571	1395	117	30	1613	217	60	15	20	575	20	563
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)	621	1516	127	33	1753	236	65	16	22	625	22	612
RTOR Reduction (vph)	0	6	0	0	0	98	0	10	0	0	0	436
Lane Group Flow (vph)	621	1637	0	33	1753	138	0	93	0	315	332	176
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8						6
Actuated Green, G (s)	21.9	48.5		2.3	28.9	28.9		16.0		16.0	16.0	16.0
Effective Green, g (s)	21.9	48.5		2.3	28.9	28.9		16.0		16.0	16.0	16.0
Actuated g/C Ratio	0.22	0.49		0.02	0.29	0.29		0.16		0.16	0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	761	1701		41	1035	429		279		272	274	236
v/s Ratio Prot	c0.18	c0.47		0.02	c0.50			c0.05		0.19	c0.20	
v/s Ratio Perm						0.09						0.12
v/c Ratio	0.82	0.96		0.80	1.69	0.32		0.33		1.16	1.21	0.75
Uniform Delay, d1	36.5	24.3		48.0	35.0	27.3		36.7		41.4	41.4	39.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	6.8	13.9		69.0	316.4	0.4		3.2		104.2	124.1	19.2
Delay (s)	43.3	38.2		117.0	351.3	27.7		39.9		145.6	165.5	58.7
Level of Service	D	D		F	F	C		D		F	F	E
Approach Delay (s)		39.6			309.7			39.9			108.6	
Approach LOS		D			F			D			F	

Intersection Summary			
HCM Average Control Delay	151.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	98.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	105.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98			0.95		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.97			0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	0.97	1.00
Satd. Flow (prot)	1770	3496		1770	3379			1606		1681	1712	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99		0.95	0.97	1.00
Satd. Flow (perm)	1770	3496		1770	3379			1606		1681	1712	1583
Volume (vph)	191	784	38	99	1321	271	34	30	105	126	26	195
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)	208	852	41	108	1436	295	37	33	114	137	28	212
RTOR Reduction (vph)	0	3	0	0	17	0	0	59	0	0	0	195
Lane Group Flow (vph)	208	890	0	108	1714	0	0	125	0	80	85	17
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot			Split			Split		Over
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases												
Actuated Green, G (s)	8.0	46.0		6.0	44.0			16.0		16.0	16.0	8.0
Effective Green, g (s)	8.0	46.0		6.0	44.0			16.0		16.0	16.0	8.0
Actuated g/C Ratio	0.08	0.46		0.06	0.44			0.16		0.16	0.16	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	142	1608		106	1487			257		269	274	127
v/s Ratio Prot	c0.12	0.25		0.06	c0.51			c0.08		0.05	c0.05	0.01
v/s Ratio Perm												
v/c Ratio	1.46	0.55		1.02	1.15			0.49		0.30	0.31	0.13
Uniform Delay, d1	46.0	19.6		47.0	28.0			38.3		37.0	37.1	42.8
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Incremental Delay, d2	243.5	0.4		92.6	76.8			6.5		2.8	2.9	0.5
Delay (s)	289.5	20.0		139.6	104.8			44.7		39.9	40.0	43.3
Level of Service	F	B		F	F			D		D	D	D
Approach Delay (s)		70.9			106.8			44.7			41.8	
Approach LOS		E			F			D			D	

Intersection Summary			
HCM Average Control Delay	85.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.5%	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.97			0.95		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	0.97	1.00
Satd. Flow (prot)	1770	3521		1770	3334			1590		1681	1712	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99		0.95	0.97	1.00
Satd. Flow (perm)	1770	3521		1770	3334			1590		1681	1712	1583
Volume (vph)	263	1744	35	250	1202	337	32	41	155	378	76	626
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)	286	1896	38	272	1307	366	35	45	168	411	83	680
RTOR Reduction (vph)	0	2	0	0	26	0	0	76	0	0	0	380
Lane Group Flow (vph)	286	1932	0	272	1647	0	0	172	0	241	253	300
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot			Split			Split		Over
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases												
Actuated Green, G (s)	8.0	46.0		6.0	44.0			16.0		16.0	16.0	8.0
Effective Green, g (s)	8.0	46.0		6.0	44.0			16.0		16.0	16.0	8.0
Actuated g/C Ratio	0.08	0.46		0.06	0.44			0.16		0.16	0.16	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	142	1620		106	1467			254		269	274	127
v/s Ratio Prot	0.16	c0.55		0.15	0.49			c0.11		0.14	c0.15	c0.19
v/s Ratio Perm												
v/c Ratio	2.01	1.19		2.57	1.12			0.68		0.90	0.92	2.36
Uniform Delay, d1	46.0	27.0		47.0	28.0			39.6		41.2	41.4	46.0
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Incremental Delay, d2	480.3	93.2		731.5	64.8			13.7		33.6	37.8	636.8
Delay (s)	526.3	120.2		778.5	92.8			53.3		74.7	79.2	682.8
Level of Service	F	F		F	F			D		E	E	F
Approach Delay (s)		172.5			188.7			53.3			427.9	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM Average Control Delay	226.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	111.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.94			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1770	3522		1770	3509			1713			1700	
Flt Permitted	0.95	1.00		0.95	1.00			0.84			0.88	
Satd. Flow (perm)	1770	3522		1770	3509			1472			1529	
Volume (vph)	30	622	20	80	1335	80	40	10	40	50	20	80
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)	33	676	22	87	1451	87	43	11	43	54	22	87
RTOR Reduction (vph)	0	2	0	0	4	0	0	27	0	0	39	0
Lane Group Flow (vph)	33	696	0	87	1534	0	0	70	0	0	124	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	4.6	38.6		8.2	42.2			29.1			29.1	
Effective Green, g (s)	4.6	38.6		8.2	42.2			29.1			29.1	
Actuated g/C Ratio	0.05	0.44		0.09	0.48			0.33			0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	93	1547		165	1685			487			506	
v/s Ratio Prot	0.02	0.20		c0.05	c0.44							
v/s Ratio Perm								0.05			c0.08	
v/c Ratio	0.35	0.45		0.53	0.91			0.14			0.25	
Uniform Delay, d1	40.2	17.2		38.0	21.1			20.7			21.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.3	0.2		3.0	7.8			0.6			1.2	
Delay (s)	42.5	17.4		41.0	28.9			21.3			22.6	
Level of Service	D	B		D	C			C			C	
Approach Delay (s)		18.6			29.6			21.3			22.6	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.90			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1770	3524		1770	3471			1673			1718	
Flt Permitted	0.95	1.00		0.95	1.00			0.94			0.75	
Satd. Flow (perm)	1770	3524		1770	3471			1583			1318	
Volume (vph)	60	1338	40	110	612	90	40	40	190	60	20	60
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)	65	1454	43	120	665	98	43	43	207	65	22	65
RTOR Reduction (vph)	0	2	0	0	11	0	0	83	0	0	26	0
Lane Group Flow (vph)	65	1495	0	120	752	0	0	210	0	0	126	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	7.4	39.3		9.8	41.7			29.2			29.2	
Effective Green, g (s)	7.4	39.3		9.8	41.7			29.2			29.2	
Actuated g/C Ratio	0.08	0.44		0.11	0.46			0.32			0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	145	1534		192	1603			512			426	
v/s Ratio Prot	0.04	c0.42		c0.07	0.22							
v/s Ratio Perm								c0.13			0.10	
v/c Ratio	0.45	0.97		0.62	0.47			0.41			0.30	
Uniform Delay, d1	39.5	25.0		38.5	16.7			23.8			22.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.2	17.2		6.2	0.2			2.4			1.8	
Delay (s)	41.7	42.2		44.7	16.9			26.3			24.6	
Level of Service	D	D		D	B			C			C	
Approach Delay (s)		42.2			20.7			26.3			24.6	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	33.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	1.00	0.95	0.91	0.91	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3390	1441	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3390	1441	3433	1583
Volume (vph)	201	1060	1390	704	185	84
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	1152	1511	765	201	91
RTOR Reduction (vph)	0	0	0	291	0	58
Lane Group Flow (vph)	218	1152	1511	474	201	33
Turn Type	Prot			Prot		Prot
Protected Phases	7	4	8	8	6	6
Permitted Phases						
Actuated Green, G (s)	18.7	62.8	40.1	40.1	40.1	40.1
Effective Green, g (s)	18.7	62.8	40.1	40.1	40.1	40.1
Actuated g/C Ratio	0.17	0.57	0.36	0.36	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	298	2004	1226	521	1241	572
v/s Ratio Prot	c0.12	0.33	c0.45	0.33	c0.06	0.02
v/s Ratio Perm						
v/c Ratio	0.73	0.57	1.23	0.91	0.16	0.06
Uniform Delay, d1	43.7	15.5	35.4	33.7	24.0	23.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.9	0.4	111.9	19.7	0.3	0.2
Delay (s)	52.6	15.9	147.3	53.4	24.3	23.3
Level of Service	D	B	F	D	C	C
Approach Delay (s)		21.7	115.7		24.0	
Approach LOS		C	F		C	

Intersection Summary			
HCM Average Control Delay	76.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↱	↱	↰↰	↱
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	1.00	0.95	0.91	0.91	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3390	1441	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3390	1441	3433	1583
Volume (vph)	146	780	1470	314	546	112
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	159	848	1598	341	593	122
RTOR Reduction (vph)	0	0	0	120	0	76
Lane Group Flow (vph)	159	848	1598	221	593	46
Turn Type	Prot			Prot		Prot
Protected Phases	7	4	8	8	6	6
Permitted Phases						
Actuated Green, G (s)	14.7	58.8	40.1	40.1	40.1	40.1
Effective Green, g (s)	14.7	58.8	40.1	40.1	40.1	40.1
Actuated g/C Ratio	0.14	0.55	0.38	0.38	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	1947	1272	541	1288	594
v/s Ratio Prot	c0.09	0.24	c0.47	0.15	c0.17	0.03
v/s Ratio Perm						
v/c Ratio	0.65	0.44	1.26	0.41	0.46	0.08
Uniform Delay, d1	43.7	14.2	33.4	24.6	25.2	21.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	0.2	121.9	0.5	1.2	0.3
Delay (s)	49.9	14.4	155.3	25.2	26.4	21.7
Level of Service	D	B	F	C	C	C
Approach Delay (s)		20.0	132.4		25.6	
Approach LOS		B	F		C	

Intersection Summary			
HCM Average Control Delay	80.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	106.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰↰	↱
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	0.08	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	155	3539	3433	1583
Volume (vph)	1670	310	70	1400	1120	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1815	337	76	1522	1217	120
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	1815	337	76	1522	1217	117
Turn Type		pm+ov	Perm			Perm
Protected Phases	4	2		8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	48.0	92.0	48.0	48.0	44.0	44.0
Effective Green, g (s)	48.0	92.0	48.0	48.0	44.0	44.0
Actuated g/C Ratio	0.48	0.92	0.48	0.48	0.44	0.44
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1699	1583	74	1699	1511	697
v/s Ratio Prot	c0.51	0.09		0.43	c0.35	
v/s Ratio Perm		0.12	0.49			0.07
v/c Ratio	1.07	0.21	1.03	0.90	0.81	0.17
Uniform Delay, d1	26.0	0.4	26.0	23.7	24.3	16.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	42.7	0.1	112.3	6.6	4.7	0.5
Delay (s)	68.7	0.5	138.3	30.3	29.0	17.4
Level of Service	E	A	F	C	C	B
Approach Delay (s)	58.0			35.4	27.9	
Approach LOS	E			D	C	

Intersection Summary			
HCM Average Control Delay	43.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰↰	↱
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)	3574	1599	1787	3574	3467	1599
Flt Permitted	1.00	1.00	0.08	1.00	0.95	1.00
Satd. Flow (perm)	3574	1599	157	3574	3467	1599
Volume (vph)	2050	400	90	2170	370	60
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2228	435	98	2359	402	65
RTOR Reduction (vph)	0	0	0	0	0	1
Lane Group Flow (vph)	2228	435	98	2359	402	64
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type		pm+ov	Perm			Perm
Protected Phases	4	2		8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	48.0	92.0	48.0	48.0	44.0	44.0
Effective Green, g (s)	48.0	92.0	48.0	48.0	44.0	44.0
Actuated g/C Ratio	0.48	0.92	0.48	0.48	0.44	0.44
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1716	1599	75	1716	1525	704
v/s Ratio Prot	0.62	c0.12		c0.66	0.12	
v/s Ratio Perm		0.15	0.63			0.04
v/c Ratio	1.30	0.27	1.31	1.37	0.26	0.09
Uniform Delay, d1	26.0	0.4	26.0	26.0	17.7	16.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	138.7	0.1	206.4	172.4	0.4	0.3
Delay (s)	164.7	0.5	232.4	198.4	18.2	16.6
Level of Service	F	A	F	F	B	B
Approach Delay (s)	137.9			199.7	17.9	
Approach LOS	F			F	B	

Intersection Summary			
HCM Average Control Delay	155.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	82.2%	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	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	0.92		0.99		1.00	1.00	0.92
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		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	3509		1770	3539	1464		1743		1681	1698	1455
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (perm)	3433	3509		1770	3539	1464		1743		1681	1698	1455
Volume (vph)	990	630	20	20	1180	320	50	10	10	120	10	180
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)	1076	685	22	22	1283	348	54	11	11	130	11	196
RTOR Reduction (vph)	0	2	0	0	0	200	0	6	0	0	0	165
Lane Group Flow (vph)	1076	705	0	22	1283	148	0	70	0	69	72	31
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8						6
Actuated Green, G (s)	25.0	52.8		1.6	29.4	29.4		16.0		16.0	16.0	16.0
Effective Green, g (s)	25.0	52.8		1.6	29.4	29.4		16.0		16.0	16.0	16.0
Actuated g/C Ratio	0.24	0.52		0.02	0.29	0.29		0.16		0.16	0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	838	1809		28	1016	420		272		263	265	227
v/s Ratio Prot	c0.31	0.20		0.01	c0.36			c0.04		0.04	c0.04	
v/s Ratio Perm						0.10						0.02
v/c Ratio	1.28	0.39		0.79	1.26	0.35		0.26		0.26	0.27	0.13
Uniform Delay, d1	38.7	15.0		50.2	36.5	29.0		38.0		38.0	38.1	37.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	136.9	0.1		82.7	126.2	0.5		2.3		2.4	2.5	1.2
Delay (s)	175.6	15.2		133.0	162.7	29.5		40.3		40.4	40.6	38.5
Level of Service	F	B		F	F	C		D		D	D	D
Approach Delay (s)		112.0			134.3			40.3			39.3	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM Average Control Delay	113.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	102.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.2%	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	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	0.93		0.98		1.00	1.00	0.92
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		0.97		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	3470		1770	3539	1468		1718		1681	1691	1459
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.96	1.00
Satd. Flow (perm)	3433	3470		1770	3539	1468		1718		1681	1691	1459
Volume (vph)	510	1390	110	30	1590	190	60	10	20	500	20	500
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)	554	1511	120	33	1728	207	65	11	22	543	22	543
RTOR Reduction (vph)	0	6	0	0	0	86	0	10	0	0	0	435
Lane Group Flow (vph)	554	1625	0	33	1728	121	0	88	0	275	290	108
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8						6
Actuated Green, G (s)	20.2	47.8		2.3	29.9	29.9		16.0		16.0	16.0	16.0
Effective Green, g (s)	20.2	47.8		2.3	29.9	29.9		16.0		16.0	16.0	16.0
Actuated g/C Ratio	0.21	0.49		0.02	0.30	0.30		0.16		0.16	0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	707	1691		41	1079	447		280		274	276	238
v/s Ratio Prot	c0.16	c0.47		0.02	c0.49			c0.05		0.16	c0.17	
v/s Ratio Perm						0.08						0.07
v/c Ratio	0.78	0.96		0.80	1.60	0.27		0.31		1.00	1.05	0.45
Uniform Delay, d1	36.9	24.3		47.7	34.1	25.8		36.2		41.0	41.0	37.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	5.7	13.8		69.0	275.0	0.3		2.9		55.3	68.1	6.1
Delay (s)	42.6	38.0		116.6	309.1	26.2		39.1		96.3	109.2	43.2
Level of Service	D	D		F	F	C		D		F	F	D
Approach Delay (s)		39.2			276.1			39.1			73.7	
Approach LOS		D			F			D			E	

Intersection Summary			
HCM Average Control Delay	133.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	98.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98			0.95		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	0.97	1.00
Satd. Flow (prot)	1770	3512		1770	3383			1615		1681	1710	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99		0.95	0.97	1.00
Satd. Flow (perm)	1770	3512		1770	3383			1615		1681	1710	1583
Volume (vph)	170	690	20	60	1160	230	20	20	60	110	20	170
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)	185	750	22	65	1261	250	22	22	65	120	22	185
RTOR Reduction (vph)	0	2	0	0	16	0	0	53	0	0	0	170
Lane Group Flow (vph)	185	770	0	65	1495	0	0	56	0	69	73	15
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot			Split			Split		Over
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases												
Actuated Green, G (s)	8.0	48.0		4.8	44.8			16.0		16.0	16.0	8.0
Effective Green, g (s)	8.0	48.0		4.8	44.8			16.0		16.0	16.0	8.0
Actuated g/C Ratio	0.08	0.48		0.05	0.44			0.16		0.16	0.16	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	140	1672		84	1504			256		267	271	126
v/s Ratio Prot	c0.10	c0.22		0.04	c0.44			c0.03		0.04	c0.04	0.01
v/s Ratio Perm												
v/c Ratio	1.32	0.46		0.77	0.99			0.22		0.26	0.27	0.12
Uniform Delay, d1	46.4	17.7		47.5	27.9			37.0		37.2	37.3	43.1
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Incremental Delay, d2	185.8	0.2		34.8	21.6			2.0		2.3	2.4	0.4
Delay (s)	232.2	17.9		82.3	49.5			38.9		39.5	39.7	43.5
Level of Service	F	B		F	D			D		D	D	D
Approach Delay (s)		59.3			50.8			38.9			41.8	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM Average Control Delay	52.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	76.5%	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	↰	↑↱		↰	↑↱			✣		↰	↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.97			0.95		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	0.96	1.00
Satd. Flow (prot)	1770	3527		1770	3337			1603		1681	1707	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99		0.95	0.96	1.00
Satd. Flow (perm)	1770	3527		1770	3337			1603		1681	1707	1583
Volume (vph)	230	1530	20	150	1060	290	20	30	90	320	50	550
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)	250	1663	22	163	1152	315	22	33	98	348	54	598
RTOR Reduction (vph)	0	1	0	0	25	0	0	64	0	0	0	403
Lane Group Flow (vph)	250	1684	0	163	1442	0	0	89	0	196	206	195
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot			Prot			Split			Split		Over
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases												
Actuated Green, G (s)	8.0	46.0		6.0	44.0			16.0		16.0	16.0	8.0
Effective Green, g (s)	8.0	46.0		6.0	44.0			16.0		16.0	16.0	8.0
Actuated g/C Ratio	0.08	0.46		0.06	0.44			0.16		0.16	0.16	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	142	1622		106	1468			256		269	273	127
v/s Ratio Prot	c0.14	c0.48		0.09	0.43			c0.06		0.12	c0.12	0.12
v/s Ratio Perm												
v/c Ratio	1.76	1.04		1.54	0.98			0.35		0.73	0.75	1.54
Uniform Delay, d1	46.0	27.0		47.0	27.6			37.4		39.9	40.1	46.0
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Incremental Delay, d2	369.4	32.9		283.4	19.3			3.7		15.9	17.5	276.5
Delay (s)	415.4	59.9		330.4	46.9			41.1		55.8	57.6	322.5
Level of Service	F	E		F	D			D		E	E	F
Approach Delay (s)		105.9			75.3			41.1			215.7	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM Average Control Delay	116.5	HCM Level of Service	F
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱			✥			✥	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.94			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1770	3522		1770	3487			1718			1701	
Flt Permitted	0.95	1.00		0.95	1.00			0.88			0.91	
Satd. Flow (perm)	1770	3522		1770	3487			1542			1580	
Volume (vph)	30	300	10	50	640	70	30	10	30	40	20	70
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)	33	326	11	54	696	76	33	11	33	43	22	76
RTOR Reduction (vph)	0	3	0	0	10	0	0	18	0	0	32	0
Lane Group Flow (vph)	33	334	0	54	762	0	0	59	0	0	109	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	2.7	17.9		4.7	19.9			30.0			30.0	
Effective Green, g (s)	2.7	17.9		4.7	19.9			30.0			30.0	
Actuated g/C Ratio	0.04	0.28		0.07	0.31			0.46			0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	74	976		129	1074			716			734	
v/s Ratio Prot	0.02	0.09		c0.03	c0.22							
v/s Ratio Perm								0.04			c0.07	
v/c Ratio	0.45	0.34		0.42	0.71			0.08			0.15	
Uniform Delay, d1	30.2	18.6		28.6	19.8			9.6			10.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.2	0.2		2.2	2.2			0.2			0.4	
Delay (s)	34.5	18.9		30.8	22.0			9.9			10.4	
Level of Service	C	B		C	C			A			B	
Approach Delay (s)		20.3			22.5			9.9			10.4	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	64.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.97			0.91			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1770	3515		1770	3427			1678			1723	
Flt Permitted	0.95	1.00		0.95	1.00			0.95			0.84	
Satd. Flow (perm)	1770	3515		1770	3427			1604			1470	
Volume (vph)	50	640	30	80	300	80	30	30	130	50	20	50
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)	54	696	33	87	326	87	33	33	141	54	22	54
RTOR Reduction (vph)	0	4	0	0	28	0	0	61	0	0	20	0
Lane Group Flow (vph)	54	725	0	87	385	0	0	146	0	0	110	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	4.8	20.3		7.2	22.7			30.0			30.0	
Effective Green, g (s)	4.8	20.3		7.2	22.7			30.0			30.0	
Actuated g/C Ratio	0.07	0.29		0.10	0.33			0.43			0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	122	1027		183	1119			692			635	
v/s Ratio Prot	0.03	c0.21		c0.05	0.11							
v/s Ratio Perm								c0.09			0.07	
v/c Ratio	0.44	0.71		0.48	0.34			0.21			0.17	
Uniform Delay, d1	31.1	21.9		29.4	17.8			12.3			12.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.6	2.2		1.9	0.2			0.7			0.6	
Delay (s)	33.6	24.2		31.3	17.9			13.0			12.7	
Level of Service	C	C		C	B			B			B	
Approach Delay (s)		24.8			20.3			13.0			12.7	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	69.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	1.00	0.95	0.91	0.91	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3390	1441	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3390	1441	3433	1583
Volume (vph)	160	1120	1470	630	160	70
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	1217	1598	685	174	76
RTOR Reduction (vph)	0	0	0	242	0	48
Lane Group Flow (vph)	174	1217	1598	443	174	28
Turn Type	Prot			Prot		Prot
Protected Phases	7	4	8	8	6	6
Permitted Phases						
Actuated Green, G (s)	15.7	60.8	41.1	41.1	39.1	39.1
Effective Green, g (s)	15.7	60.8	41.1	41.1	39.1	39.1
Actuated g/C Ratio	0.15	0.56	0.38	0.38	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	1994	1291	549	1244	574
v/s Ratio Prot	0.10	c0.34	c0.47	0.31	c0.05	0.02
v/s Ratio Perm						
v/c Ratio	0.67	0.61	1.24	0.81	0.14	0.05
Uniform Delay, d1	43.7	15.7	33.4	29.9	23.1	22.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.8	0.6	113.8	8.5	0.2	0.2
Delay (s)	50.5	16.2	147.2	38.3	23.3	22.5
Level of Service	D	B	F	D	C	C
Approach Delay (s)		20.5	114.6		23.1	
Approach LOS		C	F		C	

Intersection Summary			
HCM Average Control Delay	75.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	107.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	1.00	0.95	0.91	0.91	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3390	1441	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3390	1441	3433	1583
Volume (vph)	120	820	1550	300	450	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	891	1685	326	489	98
RTOR Reduction (vph)	0	0	0	107	0	63
Lane Group Flow (vph)	130	891	1685	219	489	35
Turn Type	Prot			Prot		Prot
Protected Phases	7	4	8	8	6	6
Permitted Phases						
Actuated Green, G (s)	12.9	59.0	42.1	42.1	38.0	38.0
Effective Green, g (s)	12.9	59.0	42.1	42.1	38.0	38.0
Actuated g/C Ratio	0.12	0.56	0.40	0.40	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	1989	1359	578	1242	573
v/s Ratio Prot	c0.07	0.25	c0.50	0.15	c0.14	0.02
v/s Ratio Perm						
v/c Ratio	0.60	0.45	1.24	0.38	0.39	0.06
Uniform Delay, d1	43.6	13.5	31.4	22.2	24.9	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	0.2	114.4	0.4	0.9	0.2
Delay (s)	48.0	13.6	145.9	22.6	25.9	22.1
Level of Service	D	B	F	C	C	C
Approach Delay (s)		18.0	125.9		25.2	
Approach LOS		B	F		C	

Intersection Summary			
HCM Average Control Delay	79.1	HCM Level of Service	E
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

MEMORANDUM

To:	Mr. Robert Schulz, AIA Associate Vice President of Real Estate, Planning & Development	Date:	August 12, 2014
From:	John Boarman, P.E. LLG Engineers	LLG Ref:	3-14-2339
Subject:	Plaza Linda Verde – *Complete Streets Design* Analyses (Revised)		

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Linscott, Law & Greenspan Engineers (LLG) has prepared this focused traffic analysis memo for the San Diego State University (SDSU) Plaza Linda Verde (PLV) Project. This memo presents a supplemental analysis of the long-term traffic operations associated with the "*Complete Streets*" design, a pedestrian-friendly street design proposed for the segment of College Avenue north of the Montezuma Road intersection. A summary of the relevant background, description of the proposed street design, and operational analysis, are provided below.

PROJECT HISTORY AND BACKGROUND

The PLV project is a mixed-use student housing development approved by The Board of Trustees of California State University in May 2011. The mixed-use student housing project, which is located in the College Area community of the City of San Diego, will include ground floor retail and upper floor student-housing, standalone student apartments, additional parking facilities, a Campus Green featuring a public promenade, and pedestrian malls in place of existing streets/alleys linking the proposed buildings to the main SDSU campus. ***Figure 1*** shows a conceptual site plan of the project. As shown on the Figure, a portion of the PLV project will front the segment of College Avenue north of the College Avenue / Montezuma Road intersection.

The potential impacts of the PLV project were analyzed in the certified PLV Final EIR (SCH No. 2009011040). Specific to traffic and circulation, the primary analysis of College Avenue was based on both the existing 4-Lane scenario and the City of San Diego long-term circulation plan, which calls for a six-lane roadway with three lanes in each direction. The EIR analysis identified significant impacts to several roads in the area, including the segment of College Avenue between Montezuma Road and Canyon Crest Drive, which includes the segment of College where the Complete Streets design would be implemented. The EIR also identified significant impacts at the College Avenue intersections at Montezuma Road, Zura Way, Canyon Crest Drive, and the I-8 Eastbound Ramp. (See LLG Traffic Impact Analysis, Plaza Linda Verde, January 11, 2011 (TIA), pp. 82-83; PLV Final EIR, pp. 3.12-81 to 3.12-82.)

In addition to the primary analysis, the EIR also included a supplemental long-term analysis based on a more pedestrian-friendly four-lane College Avenue from

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Montezuma Road north to Canyon Crest Drive, a scenario put forth by Michael Stepner, a former City of San Diego planner. The supplemental analysis addressed the potential impacts associated with the redistribution of vehicle trips from College Avenue to other roadways (i.e., Fairmount Avenue, 70th Street, and Montezuma Road) that likely would result due to the reduced capacity of College Avenue. In addition to the impacts identified under the primary analysis, the supplemental analysis identified additional significant impacts to Fairmount Avenue and Montezuma Road (see TIA pp. 78-81; Final EIR pp. 3.12-99 to 3.12-105). ***Figure 2*** shows a conceptual schematic of the Stepner Plan.

For various reasons, the Stepner approach was not pursued beyond the Draft EIR stage. Recently, however, SDSU has developed a variation of the Stepner plan, generally referred to here as the "Complete Streets" design, for implementation on the limited segment of College Avenue between Montezuma Road north towards the existing campus suspended pedestrian bridge. Under this design, this segment of College Avenue would be based on a 4-lane configuration modified to include narrower travel lanes in each direction (one 10 feet wide and the other 11 feet wide), a five-foot Class II bike lane in each direction with intervening three-foot striped buffers, and 13-foot sidewalks on each side of the street. In addition, a signalized dedicated mid-block pedestrian crossing would be installed at the northern end of the improved segment. The primary difference between the Complete Streets design and the Stepner plan is the elimination of on-street parking and the addition of a signalized pedestrian crossing; in all other respects, the differences between the two plans are relatively minor (e.g., 11-foot v. 10-foot wide travel lanes, 5-foot v. 6-foot wide bike lanes, and 13-foot v. 16-foot wide sidewalks). The Complete Streets design in this case also includes a 20 foot wide eastbound approach on Lindo Paseo at College Avenue such that right-turning vehicles on Lindo Paseo would not be impeded by vehicles on Lindo Paseo waiting to turn left. An analysis of the Complete Streets design is provided in this memo.

In addition to the Complete Streets design, a variation on the design referred to here as the Complete Streets Design (No Pedestrian Signal) also is addressed. Under this design, the mid-block signalized pedestrian crossing would be eliminated.

Lastly, a third design referred to here as the Complete Streets design (No Pedestrian Signal; Lengthened LT Pocket) also is addressed in this memo. The Complete Streets design (No Pedestrian Signal; Lengthened LT Pocket) is similar to the Complete Streets design described above except that the signalized pedestrian crossing is eliminated and the southbound left-turn pocket at the College Avenue/Montezuma Road intersection is retained as it exists today (i.e., it would not be shortened). Additionally, in order to maintain the southbound left-turn pocket at its original

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storage, the 3 foot bike buffers on both sides of College Avenue would be removed from the segment south of Lindo Paseo, and the median would be narrowed from 6 feet to 4 feet.

While the PLV EIR previously addressed the potential traffic and circulation-related impacts associated with a four-lane College Avenue, in light of the more specific project-detailed information that is now available and the differences, though limited, between the Stepner, and the three CS designs, a supplemental traffic analysis is presented here to further analyze the potential effects associated with implementation of the Complete Streets, Complete Streets (No Pedestrian Signal), and Complete Streets (No Pedestrian Signal; Lengthened LT Pocket) designs.

The primary objectives of this memo are to:

- Provide a comparative traffic analysis of the proposed Complete Streets designs for College Avenue relative to a 4-Lane existing scenario; and
- Quantify the difference in traffic operations between the various scenarios.

ANALYSIS SCENARIOS

This memo analyzes the following four (4) scenarios in the Year 2035 timeframe:

- **4-lane Existing:** This scenario assumes College Avenue as 4-lanes with existing geometrics and is referred to as “4-Lane” hereafter. ***Figure 3*** shows a schematic of the existing roadway configuration along College Avenue.

- **Complete Streets Design (CS)***:* This design assumes a limited segment of College Avenue as 4-lanes, from Montezuma Road north towards the existing suspended pedestrian bridge. In addition, this scenario also assumes multi-modal features on College Avenue such as reduced lane widths, bike lanes, striped buffers, wider sidewalks and a mid-block pedestrian signal as shown in *Figure 2*. Another noteworthy change (in comparison to the 4-Lane scenario described above) is the elimination of the exclusive southbound (SB) right-turn lanes at the Lindo Paseo and Montezuma Road intersections on College Avenue. On-street parking, which was a feature of the Stepner plan, is not a part of this scenario. This design is referred to as “CS” hereafter. ***Figure 4*** shows a conceptual schematic of the Complete Streets Design.

- **Complete Streets Design (No Pedestrian Signal)***:* This design is identical to the CS design except that the mid-block pedestrian signal is eliminated. This scenario is referred to as "CS (No Pedestrian Signal)." ***Figure 5*** shows a conceptual schematic of this design.

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- **Complete Streets Design (No Pedestrian Signal) with retainment of current length of College Avenue SB left-turn pocket at Montezuma Road***:* This design is identical to the CS design (No Pedestrian Signal) except that the southbound left-turn pocket at the College Avenue/Montezuma Road intersection is retained as it exists today (i.e., it would not be shortened). This scenario is referred to as "CS (No Pedestrian Signal; Lengthened LT Pocket)." ***Figure 6*** shows a conceptual schematic of this design.

STUDY AREA

In light of the prior analyses conducted as part of the PLV Final EIR, the study area for this memo is the two intersections that would be primarily affected by the CS scenario: College Avenue / Lindo Paseo and College Avenue / Montezuma Road. In addition, the study area also includes the proposed mid-block pedestrian signal on College Avenue and its implications on traffic flow/operations.

There are no signalized intersections within a ¼ mile of these locations; ¼ mile is the distance at which it is expected that traffic flow would be affected by the CS scenario. Therefore, the study area includes all potentially affected intersections and the scope of the area will provide an accurate depiction of future conditions.

EXISTING CONDITIONS

The following is a brief description of existing roadway conditions in the study area vicinity:

College Avenue is currently built as a 4-lane Major Arterial between Montezuma Road and Zura Way. The speed limit on College Avenue is 40 mph. On-street parking is prohibited on College Avenue.

Lindo Paseo is currently built as a 2-lane Collector between Campanile Drive and College Avenue. On-street parking is permitted on Lindo Paseo.

Montezuma Road is currently built as a 4-lane Major Arterial between Campanile Drive and E. Campus Drive. The speed limit on Montezuma Road is 35 mph. Class II bike lanes and on-street parking are provided intermittently along Montezuma Road.

ANALYSIS APPROACH AND METHODOLOGY

LLG discussed with City staff the analysis methodology to be utilized given the unique multi-modal aspects of the various analysis scenarios. To conduct an effective evaluation, Synchro software was deemed the appropriate tool to analyze intersection traffic operations, and Simtraffic software was selected to analyze queues.

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Intersections were analyzed under AM and PM peak hour conditions consistent with the City of San Diego standards and guidelines. Average vehicle delay was determined utilizing the methodology in the *Highway Capacity Manual (HCM).* The delay values (represented in seconds) were qualified with a corresponding intersection Level of Service (LOS).

Simtraffic was selected to analyze queues since Simtraffic models queues based on traffic simulated conditions accounting for upstream/downstream constraints (in this case short intersection spacing, mid-block pedestrian signal, etc.). At the City's request, this memo reports both 50th and 95th percentile queues, which are provided for information purposes only as the City's CEQA traffic study guidelines do not require queuing analyses. 50th percentile queues represent average queues that have a 50% probability of being exceeded. 95th percentile queues are queue lengths that have only a 5% probability of being exceeded and, as such, present an extremely unlikely scenario. Based on standard traffic design practice, and as stated in the Synchro manual, "when designing the size of storage bays, it is normally sufficient to store a single cycle of queues" and the "50th percentile max queue is the maximum back of queue on a typical cycle". Therefore, LLG recommends using 50th percentile queues for preliminary design purposes.

Signal timing plans from the City were also obtained and included in the analyses. The signal timing inputs included all-red time, yellow time, walk time, flashing-don't-walk time, offsets, cycle length, etc. Based on a review of the signal timing plans, the College Avenue signals (Lindo Paseo and Montezuma Road) are currently "uncoordinated" in the AM peak hour but "coordinated" in the PM peak hour. Therefore, per City standard practice of utilizing existing signal timing plans, the traffic study was prepared accordingly to assume uncoordinated signals in the AM peak hour and coordinated signals in the PM peak hour.

LONG-TERM (YEAR 2035) TRAFFIC VOLUMES DEVELOPMENT

Based on discussions with City staff, it was decided to use the latest SANDAG Series 12 traffic model. A Forecast Model was conducted with College Avenue assumed as 4-lanes in the project vicinity (as opposed to the 6-lane network which is currently in the model) from which traffic volumes were derived. ***Appendix A*** includes the forecast plot. The model does not take into account potential reductions in vehicle trips that may result with implementation of the Complete Streets design due to the enhanced pedestrian and biking opportunities. For that reason, the analysis presented here is conservative.

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PEDESTRIAN VOLUMES

As noted, the CS design also proposes a mid-block pedestrian signal on College Avenue between Lindo Paseo and the existing suspended pedestrian bridge. The crosswalk is proposed to promote pedestrian mobility and increase interaction of pedestrians with the proposed retail uses. LLG conducted existing pedestrian counts on the pedestrian bridge and each of the crosswalks of the Lindo Paseo / College Avenue and Montezuma Road/College Avenue intersections. The future volumes at the proposed pedestrian signal were then estimated from these counts. These pedestrian volumes were included as a part of the intersection and queuing analysis.

Figure 7 shows the Long-Term traffic volumes in the project vicinity.

TRAFFIC OPERATIONAL ANALYSIS

A detailed traffic operational analysis was conducted for each of the three designs for the Long-Term (Year 2035) scenario. The analyses included peak hour intersection LOS and queue analyses along the College Avenue corridor.

Long-Term (Year 2035) Intersection Operations

The following is a brief description of the Long-Term intersection operations. ***Table 1*** shows the AM and PM peak intersection operations.

4-Lane: As shown in *Table 1*, under the 4-Lane scenario, the intersection of College Avenue /Montezuma Road would operate at LOS E during the PM peak hour. The intersection would operate at LOS D during the AM peak hour, and the intersection of Lindo Paseo and College Avenue is calculated to operate at LOS D or better during both the AM and PM peak hours. The approach delay (eastbound (EB) and westbound (WB) at the Lindo Paseo/ College Avenue intersection is calculated to operate at LOS D or better during the AM/PM peak hours.

CS Design: As shown in *Table 1*, under the CS design, the LOS at both the College Avenue / Montezuma Road and College Avenue / Lindo Paseo intersections would be the same as under the 4-Lane scenario, although the delay times at both intersections are calculated to increase. In comparison to the 4-Lane scenario, the average corridor delay on College Avenue would increase by 14%. The additional delay is attributed to the increased pedestrian/bike mobility, narrow travel lanes, and mid-block pedestrian signal that would affect traffic flow and progression, reducing overall intersection capacity. Under the CS Design, the approach delay (EB and WB) at the Lindo Paseo/ College Avenue intersection is calculated to operate at LOS E or worse during the PM peak hour. However, this is primarily due to the fact that the College Avenue signals are coordinated in the PM peak hour; by design, coordination favors the

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major street to ensure efficient traffic progression and flow. While the minor street delay (on Lindo Paseo) is high, it is typical of any coordinated signal system that favors major street flow and progression at the expense of minor street delay and congestion.

CS Design (No Pedestrian Signal): As shown in *Table 1*, with the pedestrian signal eliminated, under the CS design the intersection LOS would be the same as under the 4-Lane scenario, and the intersection delays are calculated to improve in comparison to the CS scenario due to improved traffic flow and progression. As shown on the table, the average corridor delay on College Avenue reduces by 4% (14% to 10%) in comparison to the CS scenario, and increases 10% from the 4-Lane scenario. Under the CS Design (No Pedestrian signal), the approach delay on Lindo Paseo is similar to CS Design.

CS Design (No Pedestrian Signal; Lengthened LT Pocket): This design is a modification of the CS Design (No Pedestrian Signal) scenario that would retain the existing length of the southbound left-turn pocket at the College Avenue/Montezuma Road intersection. Because this design would include the same intersection improvements as the CS Design (No Pedestrian Signal), this scenario would not affect LOS results beyond those reported under the CS Design (No Pedestrian Signal) scenario. As such, intersection delays under this design would be the same as the CS Design (No Pedestrian Signal) scenario. Under the CS Design (No Pedestrian signal; Lengthened LT Pocket), the approach delay on Lindo Paseo is similar to CS Design.

Appendix B includes the peak hour intersection calculation sheets.

Long-Term (Year 2035) Corridor Queuing Analysis

The following is a brief description of the Long-Term queuing analyses on College Avenue. ***Table 2A*** provides a comparison of the 50th percentile corridor queues on College Avenue for each of the various scenarios, and ***Table 2B*** provides a comparison of each scenario for the 95th percentile corridor queues.

4-Lane: As shown in *Table 2A*, 50th percentile queue lengths under the 4-Lane scenario are calculated to be 290 feet in the southbound AM peak hour and 570 feet in the southbound PM peak hour. These queue lengths are consistent with the calculated LOS operations presented above. *Table 2B* shows the 95th percentile queues, which are calculated to be longer than 50th percentile queues as expected.

CS Design: As shown in *Tables 2A* under the CS design, under the 50th percentile analysis, longer queues are calculated in the southbound direction during the PM peak

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hour on College Avenue. In comparison to the 4-Lane scenario, the increase in 50th percentile queuing is calculated to be approximately 290 feet in the northbound and 1,460 feet in the southbound PM peak hour. The queue lengths are primarily due to the interruption of traffic flow and progression with the mid-block pedestrian signal, compounded by narrower travel lanes and shorter turn-pockets between Lindo Paseo and Montezuma Road, thereby reducing intersection and corridor capacity. *Table 2B* shows the 95th percentile queues, which is calculated to be approximately 40% longer than the 50th percentile queues.

CS Design (No Pedestrian Signal): As shown in *Tables 2A and 2B*, under the CS design without pedestrian signal, under the 50th and 95th percentile analysis, College Avenue queues in the northbound AM, northbound PM, and southbound AM are comparable to queues under the 4-Lane scenario, although longer queues are calculated in the southbound direction during the PM peak hour. However, with the elimination of the pedestrian signal, queues are calculated to generally improve relative to the CS Design. The queuing is calculated to be reduced by approximately 200 feet in the northbound and 380 feet in the southbound PM peak hour. However, in comparison to the 4-Lane scenario, queuing issues are still calculated with increase in queues to be approximately 90 feet in the northbound and 1,080 feet in the southbound PM peak hour. *Table 2B* shows the 95th percentile queues, which is calculated to be approximately 40% longer than the 50th percentile queues.

CS Design (No Pedestrian Signal; Lengthened LT Pocket): As shown in *Tables 2A* and *2B*, under the 50th and 95th percentile analysis, in comparison to the 4-Lane scenario, queues under this scenario would be comparable under the northbound AM and PM peak hours, and southbound AM peak. During the southbound PM peak, 50th percentile queues are calculated to increase by 330 feet (570 feet to 900 feet), an increase that is within acceptable limits given the benefits of the CS Design. Additionally, with the existing southbound left-turn pocket on College Avenue maintained, the queues under this scenario are calculated to decrease (i.e., improve) in comparison to the CS Design (No Pedestrian Signal) scenario. The greatest decrease (improvement) is calculated in the southbound direction during the PM peak hour with the 50th percentile queues improving by 750 feet (1650 feet – 900 feet) in comparison to the CS Design (No Pedestrian Signal) scenario. This substantial benefit in queues is due to the longer southbound left-turn pocket, which allows more vehicles to clear at the College Avenue/Montezuma Road intersection, thereby reducing queues. In addition, the longer left-turn pocket also enhances the traffic flow and progression of the southbound through movements at the College Avenue/Lindo Paseo intersection, thereby improving the overall southbound queues. *Table 2B* shows

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the 95th percentile queues, which is calculated to be approximately 40% longer than the 50th percentile queues.

Appendix C includes the simulation queuing calculation sheets.

CONCLUSIONS

The PLV Final EIR identified significant impacts to several roads in the area, including the segment of College Avenue between Montezuma Road and Canyon Crest Drive, which includes the segment of College where the Complete Streets design would be implemented. The EIR also identified significant impacts at the College Avenue intersections at Montezuma Road, Zura Way, Canyon Crest Drive and the I-8 Eastbound Ramp. As shown in this memo, implementation of either the CS, CS (No Pedestrian Signal), or CS (No Pedestrian Signal; Lengthened LT Pocket) design would not result in any additional impacted locations beyond those previously identified in the EIR, nor would they result in a substantial increase in the severity of those impacts.

The PLV project would revitalize the College area by increasing student housing within walking distance of SDSU, and providing retail opportunities for students, faculty/staff, and College area residents. Each of the proposed CS design variations for the segment of College Avenue fronting the PLV project includes several multi-modal elements, the intent of which is to promote the interaction between the various uses and enhance the safety of overall non-vehicular mobility in the College Area surrounding SDSU.

The incorporation of these multi-modal elements would affect vehicular traffic operations along College Avenue by increasing corridor delay and queues, although the impacted intersections and segments would be the same under all designs. Additionally, there is a substantial benefit in implementing these "complete streets" features. Complete Streets means moving people, not cars. The result will be cleaner air, a safer environment, an improved economy, and a higher quality of life. Areas that incorporate complete streets gain quality of life benefits as increased bicycling and walking are indicative of vibrant and active living. The overall benefits provided by these multi-modal features should be considered against the limited degradation in vehicular traffic operations.

Attachments:
Figure 1: Site Plan
Figure 2: Stepner Plan
Figure 3: Existing Roadway Configuration (College Avenue)
Figure 4: Complete Streets Design
Figure 5: Complete Streets Design (No pedestrian signal)

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Figure 6: Complete Streets Design (No pedestrian signal; Lengthened LT Pocket)
Figure 7: Long-Term (Year 2035) with Project Traffic Volumes
Table 1: Long-Term (Year 2035) Intersection Operations
Table 2A: Long-Term (Year 2035) Corridor Queue Summary (50th percentile)
Table 2B: Long-Term (Year 2035) Corridor Queue Summary (95th percentile)
Appendix A: SANDAG Forecast Plot
Appendix B: Peak hour intersection calculation sheets
Appendix C: Queuing calculation sheets

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Figure 1

Site Plan

PLV - COMPLETE STREETS ANALYSIS

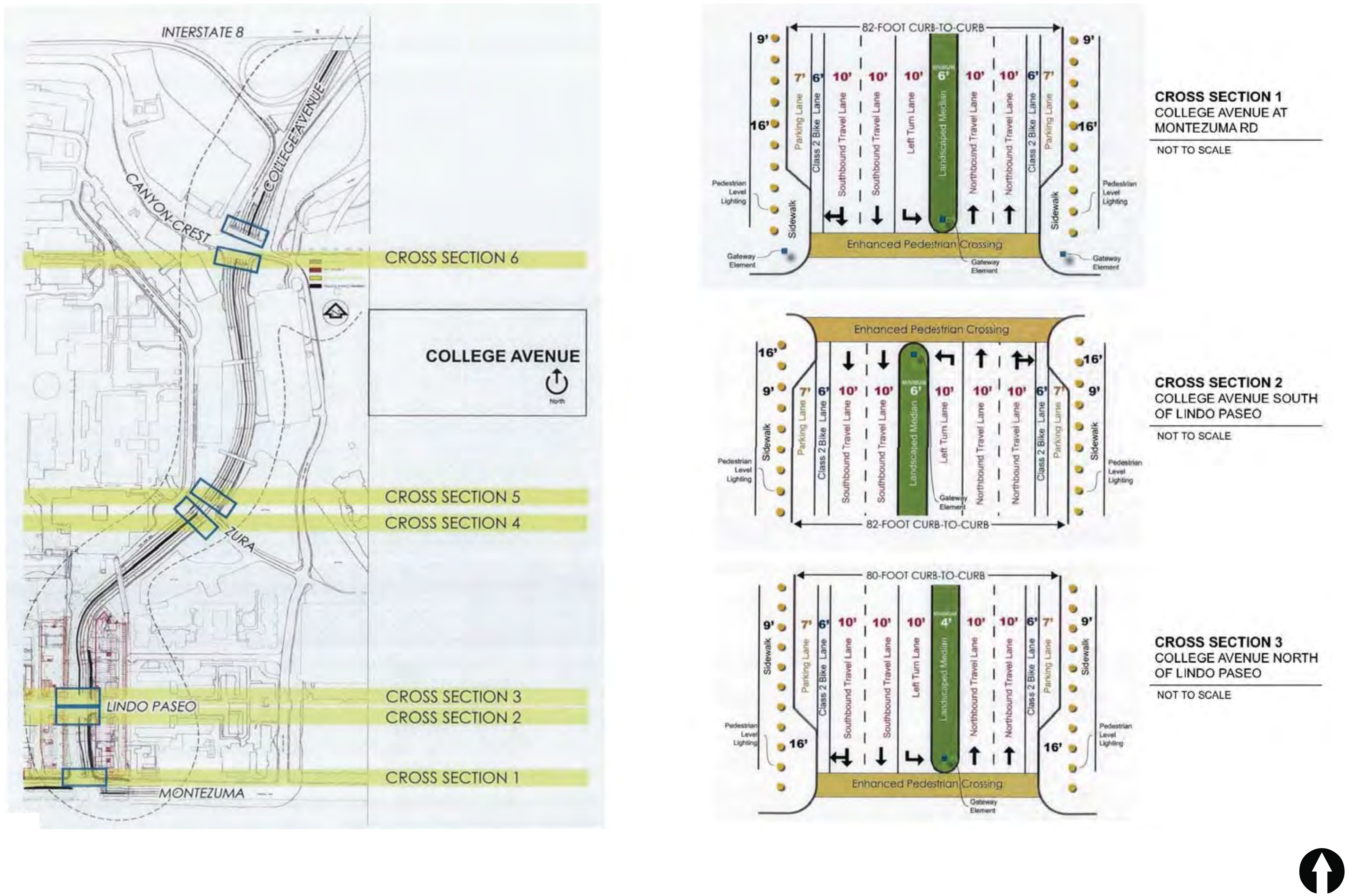

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Figure 2

Stepner Plan

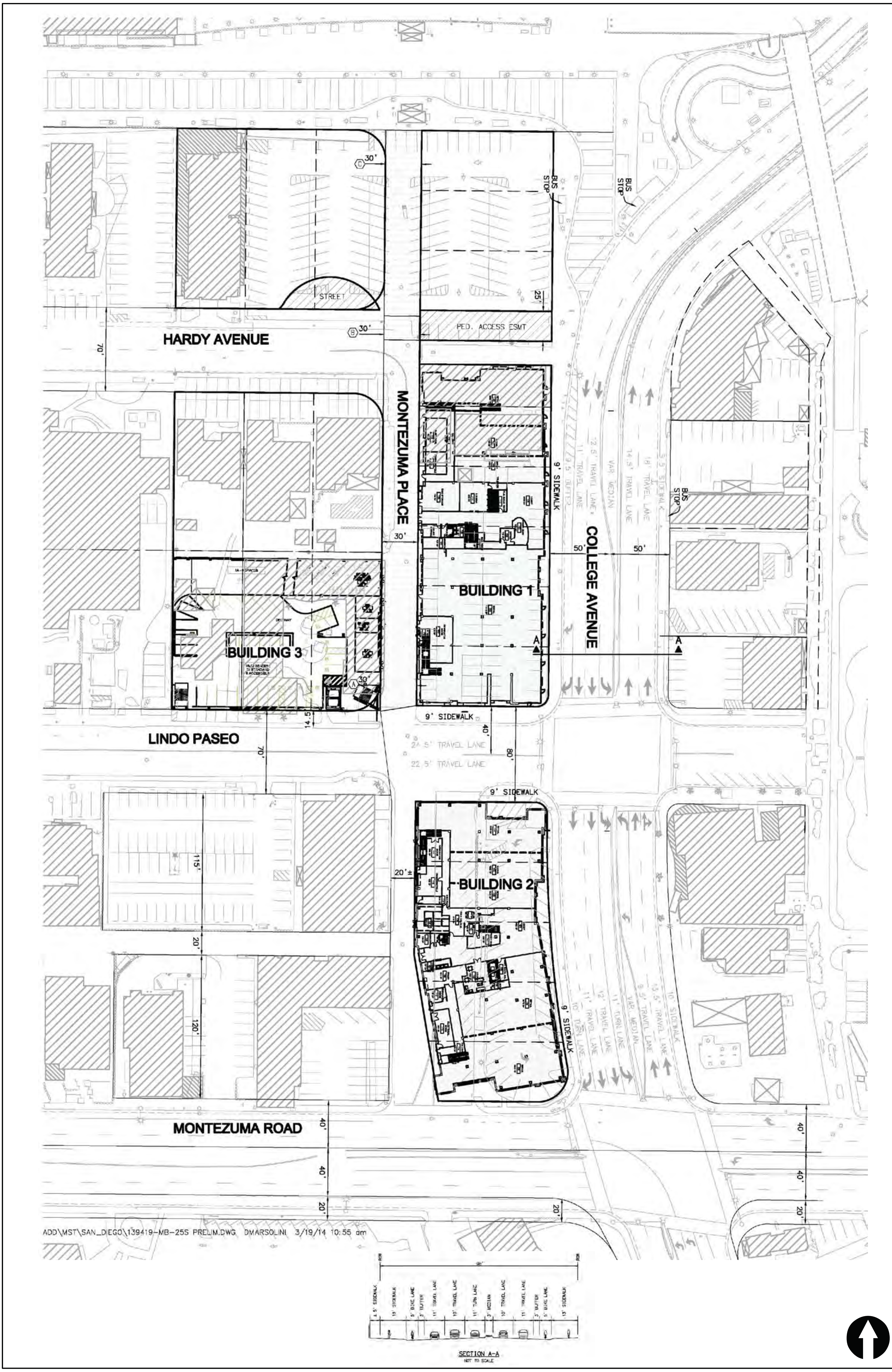

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Figure 3

Existing Roadway Condition (College Avenue)

PLV - Complete Streets Analysis

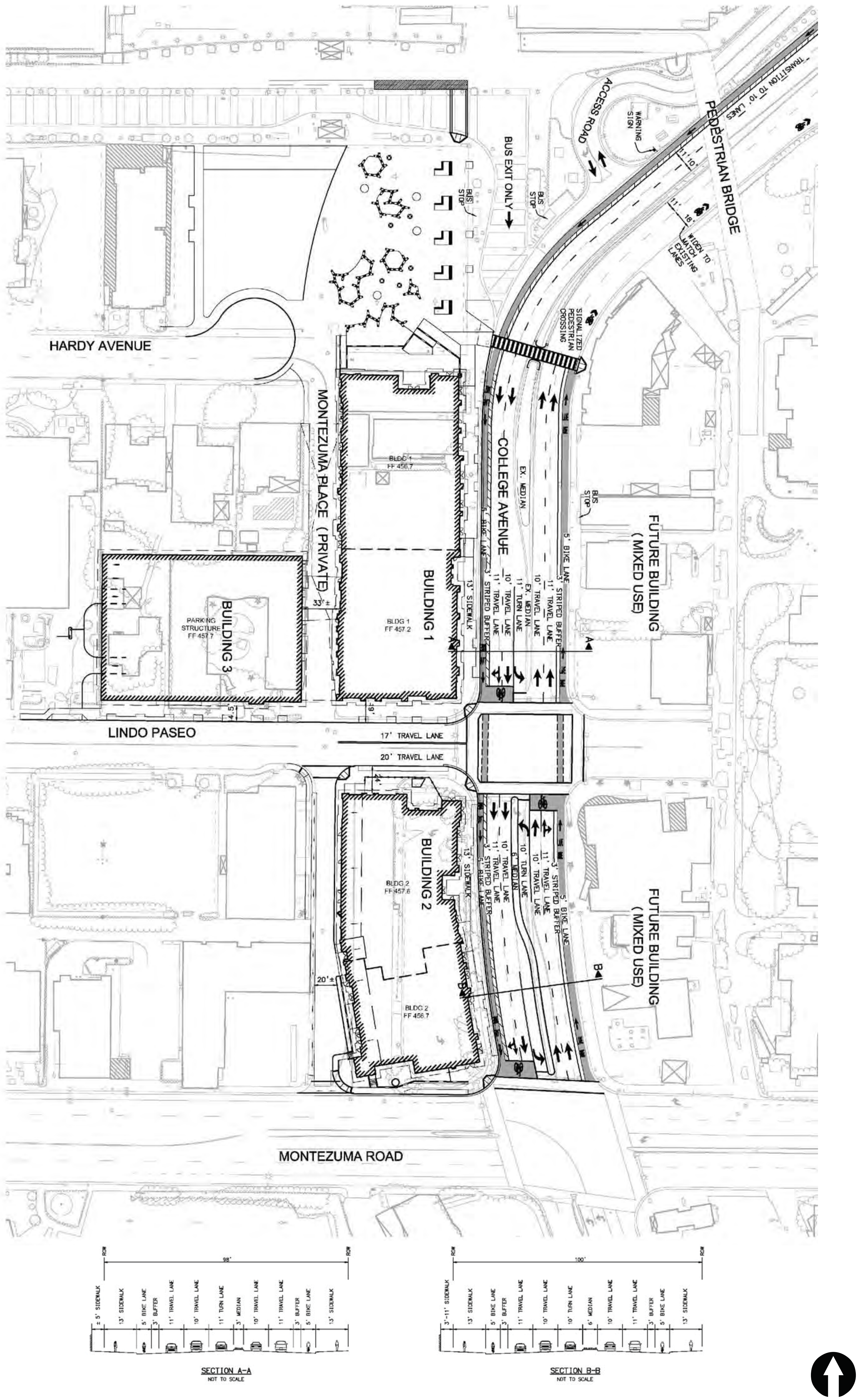

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Figure 4

Complete Streets Design

PLV - Complete Streets Analysis

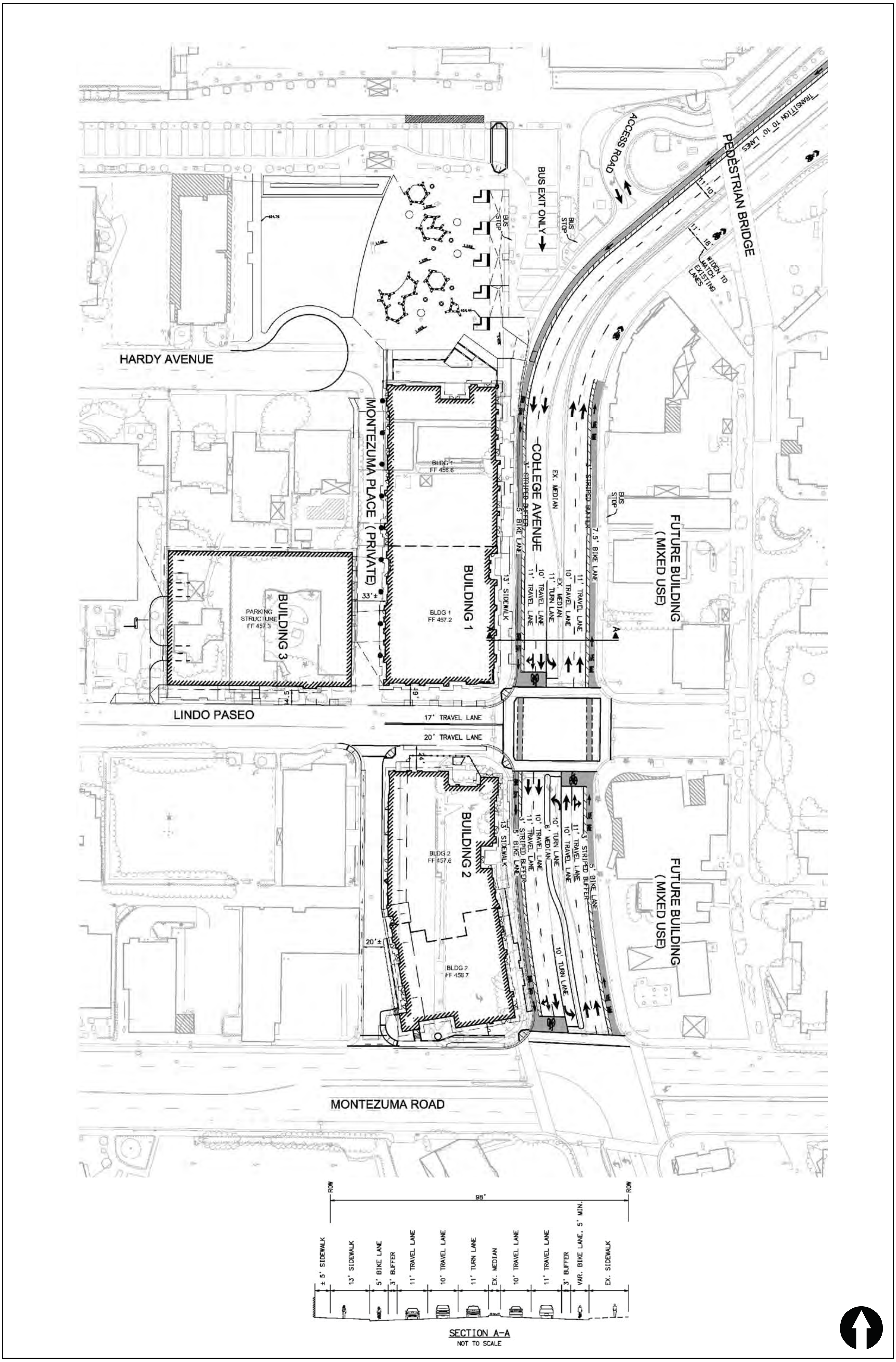

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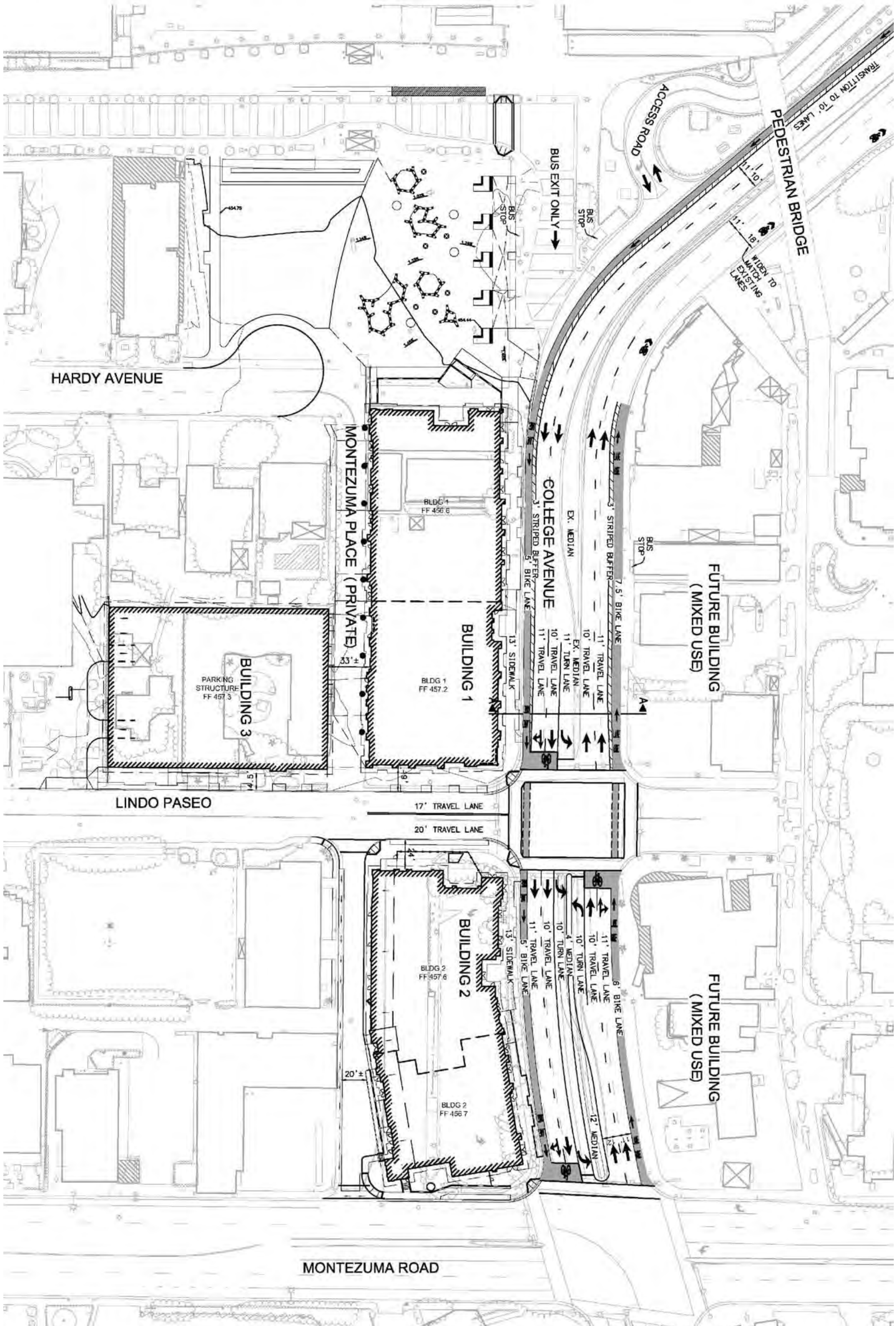
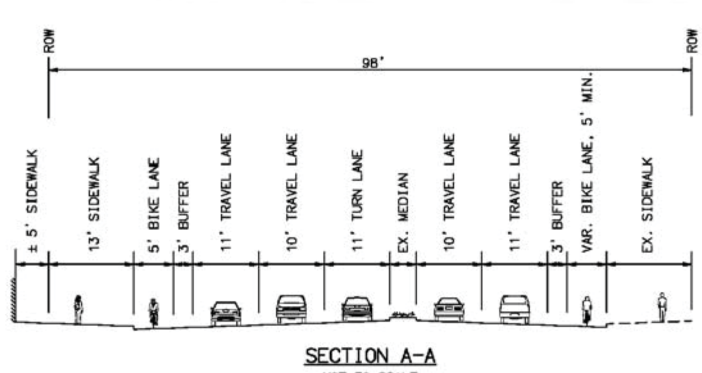
Figure 5
Complete Streets Design
(No Pedestrian Signal)





* Southbound left-turn pocket at College Avenue / Montezuma Road intersection maintained (i.e. existing condition).

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Figure 6
Complete Streets Design
(Lengthened Left-Turn Pocket)

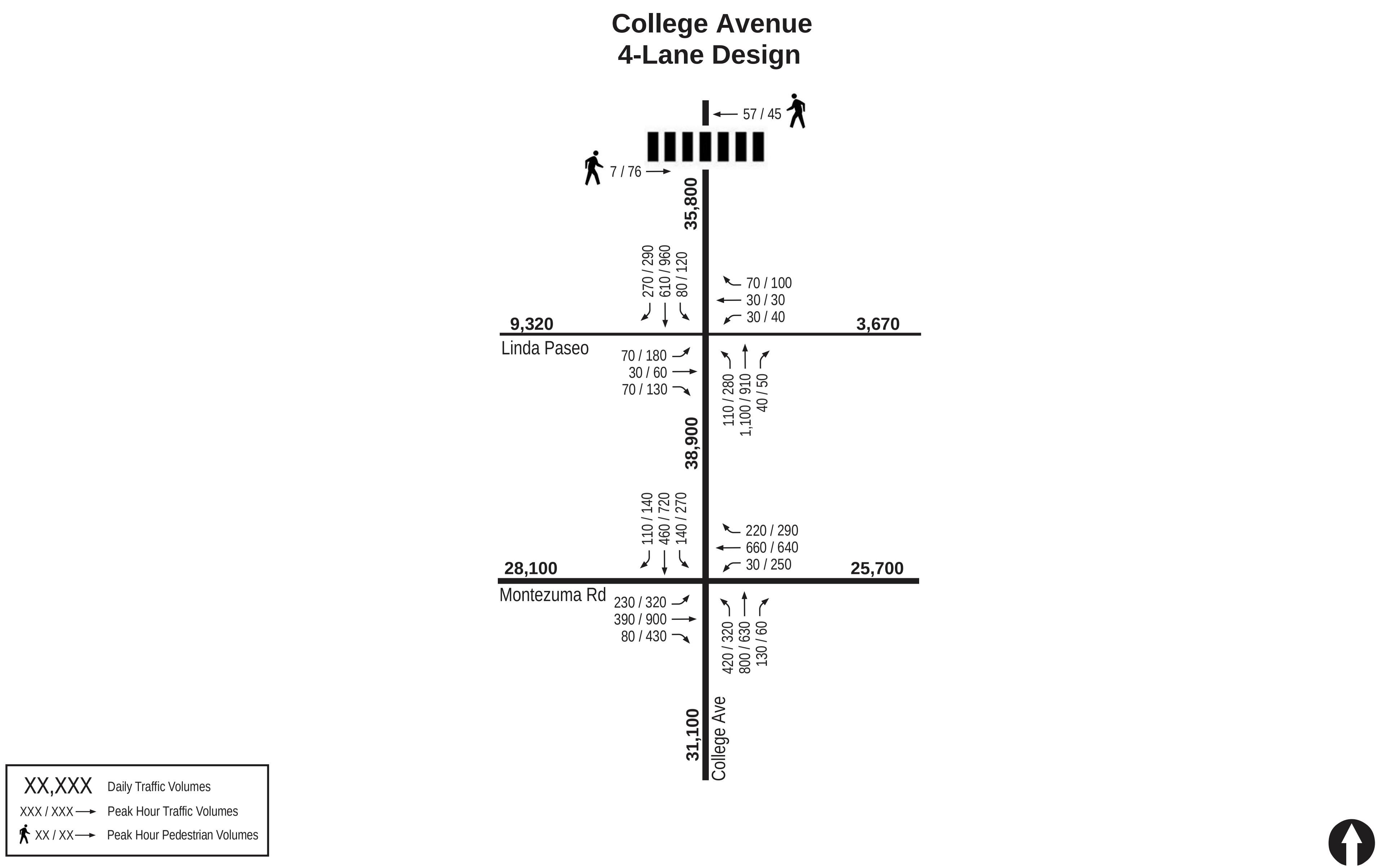

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Figure 7

Long-Term (Year 2035) with Project Volumes

PLV - Complete Streets Analysis

TABLE 1
LONG-TERM (YEAR 2035) INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing Geometry (A)		Complete Street Design (B)			Complete Street Design *(No Ped Signal)* (C)			Complete Street Design *(No Ped Signal;* with Lengthened LT pocket) (D)		
			Delay[a]	**LOS**[b]	**Delay**	**LOS**	**Δ**[c] **(B - A)**	**Delay**	**LOS**	**Δ (C - A)**	**Delay**	**LOS**	**Δ (D - A)**
1. College Avenue/ Lindo Paseo	Signal	AM PM	26.1 42.4	C D	31.7 54.2	C D	5.6 11.8	28.9 51.5	C D	2.8 9.1	28.9 51.5	C D	2.8 9.1
2. College Avenue/ Montezuma Road	Signal	AM PM	52.1 **66.0**	D **E**	53.0 **69.6**	D **E**	0.9 3.6	53.0 **69.6**	D **E**	0.9 3.6	53.0 **69.6**	D **E**	0.9 3.6
3. College Avenue/ HAWK Signal	Mid-Block Crosswalk	AM PM	– –	– –	15.8 10.4	B B	– –	– –	– –	– –	– –	– –	– –
Average Corridor Delay Increase (seconds)							**11.0**			**4.1**			**4.1**
Average Corridor Delay Increase (%)							**14.1%**			**9.8%**			**9.8%**

Footnotes:

Average delay expressed in seconds per vehicle.

Level of Service.

Δ denotes a change in delay.

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

TABLE 2A
LONG-TERM (YEAR 2035) CORRIDOR QUEUE SUMMARY, 50TH PERCENTILE QUEUE

Scenario	Northbound		Southbound	
	AM	**PM**	**AM**	**PM**
4-Lane with Existing Geometry	440’	450’	290’	570’
Complete Street Design	740’	740’	500’	2,030’
Complete Street Design *(No Ped Signal)*	470’	540’	310’	1,650’
Complete Street Design (*No Ped Signal; with Lengthened LT pocket)*	390’	480’	300’	900’

General Notes:

a. The queues shown in the above table are 50th percentile queues from SimTraffic. The queues shown are queues/lane.

TABLE 2B
LONG-TERM (YEAR 2035) CORRIDOR QUEUE SUMMARY, 95TH PERCENTILE QUEUE

Scenario	Northbound		Southbound	
	AM	**PM**	**AM**	**PM**
4-Lane with Existing Geometry	600’	650’	470’	860’
Complete Street Design	970’	890’	710’	2,640’
Complete Street Design *(No Ped Signal)*	670’	760’	480’	1,990’
Complete Street Design (*No Ped Signal; with Lengthened LT pocket)*	590’	610’	440’	1,250’

General Notes:

a. The queues shown in the above table are 95th percentile queues from SimTraffic. The queues shown are queues/lane.

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TECHNICAL APPENDICES
PLAZA LINDA VERDE

San Diego, California
May 23, 2014

LLG Ref. 3-14-2339

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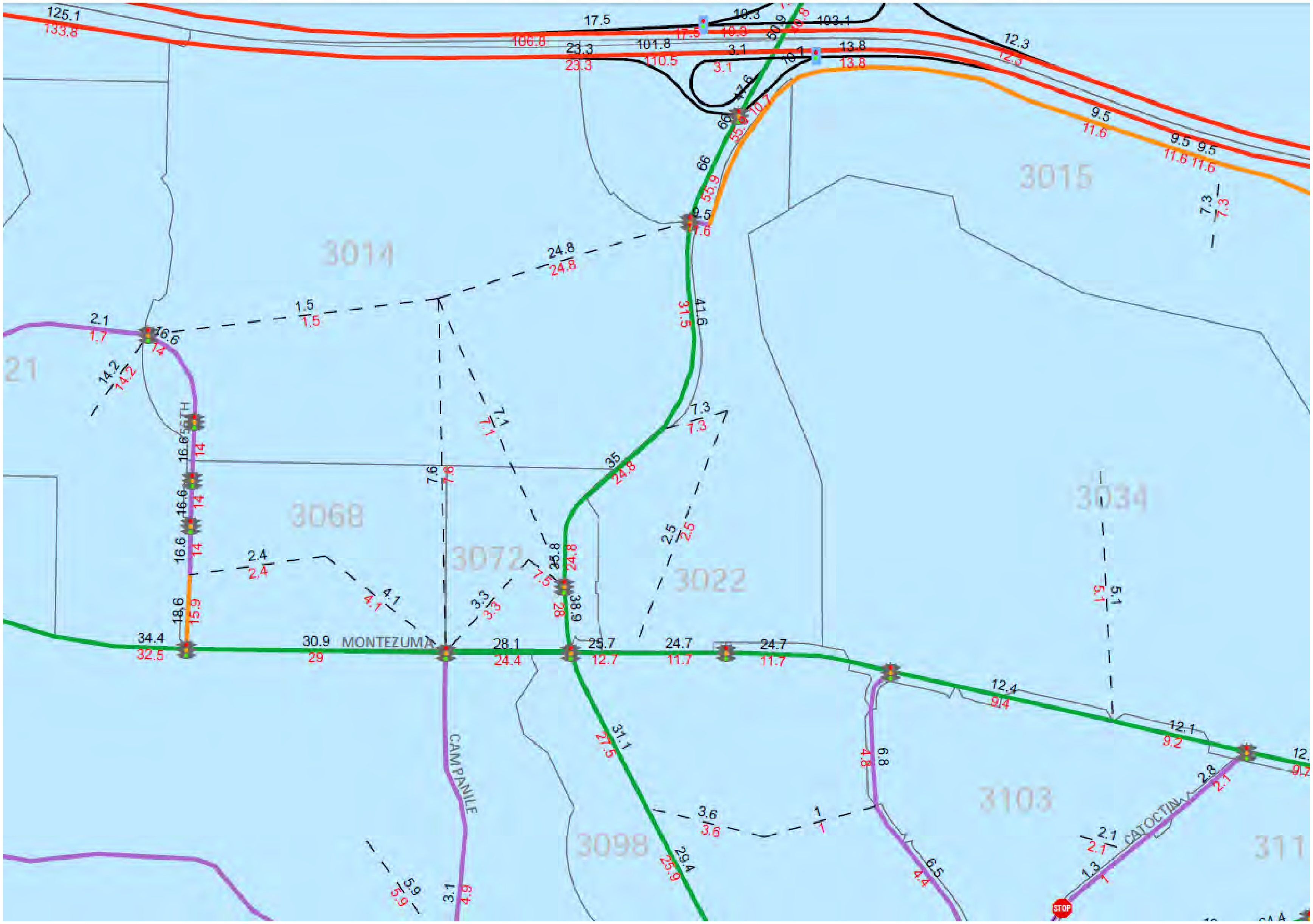
APPENDIX A

SANDAG FORECAST PLOT



3014
3015
3068
3072
3022
3034
3098
3103
MONTEZUMA
CAMPANILE
55TH
CATOCTIN

APPENDIX B

PEAK HOUR INTERSECTION CALCULATION SHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.86		0.88		1.00	0.99		1.00	1.00	0.70
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1617	1367		1473		1770	3497		1770	3539	1104
Flt Permitted		0.67	1.00		0.91		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1125	1367		1360		1770	3497		1770	3539	1104
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	29	0	0	2	0	0	0	67
Lane Group Flow (vph)	0	109	44	0	113	0	120	1237	0	87	663	226
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		33.1	33.1		33.1		13.5	76.0		11.0	73.7	73.7
Effective Green, g (s)		33.1	33.1		33.1		13.5	76.0		11.0	73.7	73.7
Actuated g/C Ratio		0.25	0.25		0.25		0.10	0.57		0.08	0.55	0.55
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	2.1
Lane Grp Cap (vph)		277	336		335		178	1976		145	1939	605
v/s Ratio Prot							c0.07	c0.35		0.05	0.19	
v/s Ratio Perm		c0.10	0.03		0.08							0.20
v/c Ratio		0.39	0.13		0.34		0.67	0.63		0.60	0.34	0.37
Uniform Delay, d1		42.3	39.5		41.7		58.4	19.7		59.6	16.9	17.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.2	0.8		2.7		7.7	1.5		4.4	0.5	1.8
Delay (s)		46.5	40.3		44.4		66.1	21.2		64.0	17.4	19.0
Level of Service		D	D		D		E	C		E	B	B
Approach Delay (s)		43.9			44.4			25.2			21.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	26.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	134.5	Sum of lost time (s)	9.3
Intersection Capacity Utilization	74.8%	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												
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
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	0.95	1.00	0.99		1.00	1.00	0.90
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	0.98		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	1496	1770	3539	1510	3433	3429		1770	3539	1428
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	1496	1770	3539	1510	3433	3429		1770	3539	1428
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	0	43
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	500	77
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.3		14.4	39.7	39.7
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.3		14.4	39.7	39.7
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.10	0.29	0.29
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)	283	1364	577	51	901	384	549	1180		185	1022	412
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.14	
v/s Ratio Perm			0.02			0.12						0.05
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.82	0.49	0.19
Uniform Delay, d1	56.5	29.5	26.6	66.1	47.9	43.5	56.0	41.8		60.3	40.5	36.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.2	4.3	10.0	7.7		23.4	1.7	1.0
Delay (s)	81.9	30.1	26.8	85.2	55.1	47.8	65.9	49.5		83.7	42.2	37.8
Level of Service	F	C	C	F	E	D	E	D		F	D	D
Approach Delay (s)		46.7			54.4			54.6			49.7	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	52.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.5	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	1.00	0.69
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1610	1359		1445		1770	3475		1770	3539	1086
Flt Permitted		0.60	1.00		0.83		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1008	1359		1212		1770	3475		1770	3539	1086
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	0	48
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1043	267
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		45.1	45.1		45.1		27.1	66.3		14.2	53.6	53.6
Effective Green, g (s)		45.1	45.1		45.1		27.1	66.3		14.2	53.6	53.6
Actuated g/C Ratio		0.32	0.32		0.32		0.19	0.47		0.10	0.38	0.38
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	4.9
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	2.1
Lane Grp Cap (vph)		325	438		390		343	1646		180	1355	416
v/s Ratio Prot							c0.17	0.30		0.07	c0.29	
v/s Ratio Perm		c0.26	0.09		0.12							0.25
v/c Ratio		0.80	0.26		0.38		0.89	0.63		0.72	0.77	0.64
Uniform Delay, d1		43.4	35.2		36.7		55.0	27.7		61.0	37.8	35.3
Progression Factor		1.00	1.00		1.00		1.42	0.74		1.00	1.00	1.00
Incremental Delay, d2		18.7	1.5		2.8		12.4	0.9		11.4	4.3	7.4
Delay (s)		62.0	36.6		39.5		90.4	21.4		72.4	42.1	42.7
Level of Service		E	D		D		F	C		E	D	D
Approach Delay (s)		53.1			39.5			37.0			44.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	88.4%	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												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
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	0.95	1.00	0.99		1.00	1.00	0.90
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	1495	1770	3539	1509	3433	3470		1770	3539	1426
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	1495	1770	3539	1509	3433	3470		1770	3539	1426
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	0	36
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	783	116
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	34.3		24.2	41.8	41.8
Effective Green, g (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	34.3		24.2	41.8	41.8
Actuated g/C Ratio	0.20	0.29	0.29	0.16	0.25	0.25	0.12	0.24		0.17	0.30	0.30
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)	358	1019	430	283	870	371	410	850		306	1057	426
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	c0.21		c0.17	0.22	
v/s Ratio Perm			0.17			0.16						0.08
v/c Ratio	0.97	0.96	0.60	0.96	0.80	0.65	0.85	0.88		0.96	0.74	0.27
Uniform Delay, d1	55.5	49.1	43.0	58.4	49.6	47.4	60.4	50.8		57.4	44.2	37.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.51	0.90	1.10
Incremental Delay, d2	39.8	20.0	6.2	42.5	7.6	8.5	14.5	12.3		31.7	3.3	1.1
Delay (s)	95.2	69.1	49.1	100.9	57.2	55.8	74.9	63.1		118.1	43.2	42.5
Level of Service	F	E	D	F	E	E	E	E		F	D	D
Approach Delay (s)		69.0			66.1			66.8			61.0	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	66.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.89		1.00	0.99		1.00	0.91	
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.95	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1622	1367		1481		1652	3380		1711	2961	
Flt Permitted		0.71	1.00		0.92		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1199	1367		1373		1652	3380		1711	2961	
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	29	0	0	2	0	0	34	0
Lane Group Flow (vph)	0	109	44	0	113	0	120	1237	0	87	922	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		40.1	40.1		40.1		14.1	69.0		11.2	66.3	
Effective Green, g (s)		40.1	40.1		40.1		14.1	69.0		11.2	66.3	
Actuated g/C Ratio		0.30	0.30		0.30		0.10	0.51		0.08	0.49	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		357	407		409		173	1731		142	1457	
v/s Ratio Prot							c0.07	c0.37		0.05	0.31	
v/s Ratio Perm		c0.09	0.03		0.08							
v/c Ratio		0.31	0.11		0.28		0.69	0.71		0.61	0.63	
Uniform Delay, d1		36.5	34.3		36.2		58.2	25.3		59.7	25.2	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.2	0.5		1.7		9.3	2.6		5.4	2.1	
Delay (s)		38.7	34.9		37.9		67.5	27.8		65.1	27.3	
Level of Service		D	C		D		E	C		E	C	
Approach Delay (s)		37.2			37.9			31.3			30.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	31.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	134.7	Sum of lost time (s)	14.4
Intersection Capacity Utilization	84.5%	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												
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	14	0
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	606	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.11	0.29	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	283	1363	576	51	900	384	549	1176		182	943	
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.19	
v/s Ratio Perm			0.02			0.12						
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.84	0.64	
Uniform Delay, d1	56.5	29.5	26.6	66.1	48.0	43.6	56.0	42.0		60.3	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.3	4.3	10.0	7.9		25.8	3.4	
Delay (s)	82.0	30.1	26.8	85.3	55.2	47.8	66.0	49.8		86.1	46.0	
Level of Service	F	C	C	F	E	D	E	D		F	D	
Approach Delay (s)		46.8			54.4			54.9			53.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			↑↑
Volume (vph)	0	0	1240	0	0	960
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0
Lane Util. Factor			0.95			0.95
Frpb, ped/bikes			1.00			1.00
Flpb, ped/bikes			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			3539			3539
Flt Permitted			1.00			1.00
Satd. Flow (perm)			3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1348	0	0	1043
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1348	0	0	1043
Confl. Peds. (#/hr)	7	57				
Turn Type						
Protected Phases			2			6
Permitted Phases						
Actuated Green, G (s)			36.8			36.8
Effective Green, g (s)			36.8			36.8
Actuated g/C Ratio			0.50			0.50
Clearance Time (s)			4.0			4.0
Vehicle Extension (s)			3.0			3.0
Lane Grp Cap (vph)			1758			1758
v/s Ratio Prot			c0.38			0.29
v/s Ratio Perm						
v/c Ratio			0.77			0.59
Uniform Delay, d1			15.2			13.3
Progression Factor			1.00			1.00
Incremental Delay, d2			2.1			0.5
Delay (s)			17.2			13.9
Level of Service			B			B
Approach Delay (s)	0.0		17.2			13.9
Approach LOS	A		B			B

Intersection Summary			
HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	74.1	Sum of lost time (s)	37.3
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	0.93	
Flpb, ped/bikes		0.91	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1628	1359		1457		1652	3359		1711	3062	
Flt Permitted		0.54	1.00		0.62		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		917	1359		916		1652	3359		1711	3062	
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	20	0
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1338	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		31.1	31.1		31.1		25.6	80.0		14.5	69.1	
Effective Green, g (s)		31.1	31.1		31.1		25.6	80.0		14.5	69.1	
Actuated g/C Ratio		0.22	0.22		0.22		0.18	0.57		0.10	0.49	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		204	302		203		302	1919		177	1511	
v/s Ratio Prot							c0.18	0.31		0.08	c0.44	
v/s Ratio Perm		c0.28	0.09		0.16							
v/c Ratio		1.28	0.38		0.73		1.01	0.54		0.73	0.89	
Uniform Delay, d1		54.5	46.3		50.6		57.2	18.6		60.9	31.9	
Progression Factor		1.00	1.00		1.00		1.45	0.47		1.00	1.00	
Incremental Delay, d2		157.9	3.7		20.6		37.7	0.5		12.7	8.0	
Delay (s)		212.4	50.0		71.2		120.4	9.2		73.6	39.9	
Level of Service		F	D		E		F	A		E	D	
Approach Delay (s)		155.4			71.2			34.3			42.8	
Approach LOS		F			E			C			D	

Intersection Summary			
HCM Average Control Delay	54.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	11	0
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	924	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	28.9	40.3	40.3	22.4	33.8	33.8	16.7	33.9		24.6	41.8	
Effective Green, g (s)	28.9	40.3	40.3	22.4	33.8	33.8	16.7	33.9		24.6	41.8	
Actuated g/C Ratio	0.21	0.29	0.29	0.16	0.24	0.24	0.12	0.24		0.18	0.30	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	365	1019	430	283	854	364	410	840		301	981	
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	0.21		c0.17	c0.28	
v/s Ratio Perm			0.17			0.16						
v/c Ratio	0.95	0.96	0.60	0.96	0.81	0.66	0.85	0.89		0.97	0.94	
Uniform Delay, d1	54.9	49.1	43.0	58.4	50.1	47.9	60.4	51.2		57.4	47.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.29	1.18	
Incremental Delay, d2	34.6	20.0	6.2	42.5	8.4	9.0	14.5	13.3		30.7	11.0	
Delay (s)	89.5	69.1	49.1	100.9	58.6	56.9	74.9	64.5		104.5	67.7	
Level of Service	F	E	D	F	E	E	E	E		F	E	
Approach Delay (s)		67.8			67.1			67.8			76.5	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	69.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			↑↑
Volume (vph)	0	0	1190	0	0	1370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0
Lane Util. Factor			0.95			0.95
Frpb, ped/bikes			1.00			1.00
Flpb, ped/bikes			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			3539			3539
Flt Permitted			1.00			1.00
Satd. Flow (perm)			3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1293	0	0	1489
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1293	0	0	1489
Confl. Peds. (#/hr)	76	45				
Turn Type						
Protected Phases			2			6
Permitted Phases						
Actuated Green, G (s)			83.0			83.0
Effective Green, g (s)			83.0			83.0
Actuated g/C Ratio			0.69			0.69
Clearance Time (s)			4.0			4.0
Vehicle Extension (s)			3.0			3.0
Lane Grp Cap (vph)			2448			2448
v/s Ratio Prot			0.37			c0.42
v/s Ratio Perm						
v/c Ratio			0.53			0.61
Uniform Delay, d1			9.0			9.8
Progression Factor			1.00			1.00
Incremental Delay, d2			0.8			1.1
Delay (s)			9.8			11.0
Level of Service			A			B
Approach Delay (s)	0.0		9.8			11.0
Approach LOS	A		A			B

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	37.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.88		1.00	0.99		1.00	0.91	
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.95	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1616	1367		1472		1652	3380		1711	2961	
Flt Permitted		0.69	1.00		0.91		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1147	1367		1361		1652	3380		1711	2961	
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	30	0	0	2	0	0	33	0
Lane Group Flow (vph)	0	109	44	0	112	0	120	1237	0	87	923	0
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Effective Green, g (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Actuated g/C Ratio		0.26	0.26		0.26		0.10	0.55		0.08	0.53	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		299	356		355		173	1857		142	1567	
v/s Ratio Prot							c0.07	c0.37		0.05	0.31	
v/s Ratio Perm		c0.10	0.03		0.08							
v/c Ratio		0.36	0.12		0.32		0.69	0.67		0.61	0.59	
Uniform Delay, d1		40.7	38.1		40.1		58.2	21.6		59.7	21.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.4	0.7		2.3		9.3	1.9		5.4	1.6	
Delay (s)		44.1	38.8		42.5		67.5	23.5		65.1	23.3	
Level of Service		D	D		D		E	C		E	C	
Approach Delay (s)		41.9			42.5			27.4			26.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	134.7	Sum of lost time (s)	14.4
Intersection Capacity Utilization	84.5%	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	↰	↑↑	↱	↰	↑↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	14	0
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	606	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.11	0.29	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	283	1363	576	51	900	384	549	1176		182	943	
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.19	
v/s Ratio Perm			0.02			0.12						
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.84	0.64	
Uniform Delay, d1	56.5	29.5	26.6	66.1	48.0	43.6	56.0	42.0		60.3	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.3	4.3	10.0	7.9		25.8	3.4	
Delay (s)	82.0	30.1	26.8	85.3	55.2	47.8	66.0	49.8		86.1	46.0	
Level of Service	F	C	C	F	E	D	E	D		F	D	
Approach Delay (s)		46.8			54.4			54.9			53.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	0.93	
Flpb, ped/bikes		0.91	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1625	1359		1456		1652	3359		1711	3062	
Flt Permitted		0.57	1.00		0.70		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		953	1359		1028		1652	3359		1711	3062	
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	20	0
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1338	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Effective Green, g (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Actuated g/C Ratio		0.25	0.25		0.25		0.18	0.54		0.10	0.46	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		239	341		258		302	1823		177	1424	
v/s Ratio Prot							c0.18	0.31		0.08	c0.44	
v/s Ratio Perm		c0.27	0.09		0.14							
v/c Ratio		1.09	0.34		0.57		1.01	0.57		0.73	0.94	
Uniform Delay, d1		52.4	43.0		45.9		57.2	21.2		60.9	35.6	
Progression Factor		1.00	1.00		1.00		1.45	0.49		1.00	1.00	
Incremental Delay, d2		85.0	2.7		9.0		37.3	0.6		12.7	13.2	
Delay (s)		137.4	45.7		54.9		120.2	11.1		73.6	48.8	
Level of Service		F	D		D		F	B		E	D	
Approach Delay (s)		105.2			54.9			35.7			50.9	
Approach LOS		F			D			D			D	

Intersection Summary			
HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	11	0
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	924	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Effective Green, g (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Actuated g/C Ratio	0.20	0.29	0.29	0.16	0.25	0.25	0.12	0.24		0.18	0.30	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	358	1019	430	283	870	371	410	840		301	981	
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	0.21		c0.17	c0.28	
v/s Ratio Perm			0.17			0.16						
v/c Ratio	0.97	0.96	0.60	0.96	0.80	0.65	0.85	0.89		0.97	0.94	
Uniform Delay, d1	55.5	49.1	43.0	58.4	49.6	47.4	60.4	51.2		57.4	47.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.30	1.19	
Incremental Delay, d2	39.8	20.0	6.2	42.5	7.6	8.5	14.5	13.3		28.8	10.1	
Delay (s)	95.2	69.1	49.1	100.9	57.2	55.8	74.9	64.5		103.6	67.3	
Level of Service	F	E	D	F	E	E	E	E		F	E	
Approach Delay (s)		69.0			66.1			67.8			75.9	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	69.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	30	70	30	30	70	110	1100	40	80	610	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.88		1.00	0.99		1.00	0.91	
Flpb, ped/bikes		0.90	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.95	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1616	1367		1472		1652	3380		1711	2961	
Flt Permitted		0.69	1.00		0.91		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1147	1367		1361		1652	3380		1711	2961	
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)	76	33	76	33	33	76	120	1196	43	87	663	293
RTOR Reduction (vph)	0	0	32	0	30	0	0	2	0	0	33	0
Lane Group Flow (vph)	0	109	44	0	112	0	120	1237	0	87	923	0
Confl. Peds. (#/hr)	140		85	85		140	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Effective Green, g (s)		35.1	35.1		35.1		14.1	74.0		11.2	71.3	
Actuated g/C Ratio		0.26	0.26		0.26		0.10	0.55		0.08	0.53	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		299	356		355		173	1857		142	1567	
v/s Ratio Prot							c0.07	c0.37		0.05	0.31	
v/s Ratio Perm		c0.10	0.03		0.08							
v/c Ratio		0.36	0.12		0.32		0.69	0.67		0.61	0.59	
Uniform Delay, d1		40.7	38.1		40.1		58.2	21.6		59.7	21.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.4	0.7		2.3		9.3	1.9		5.4	1.6	
Delay (s)		44.1	38.8		42.5		67.5	23.5		65.1	23.3	
Level of Service		D	D		D		E	C		E	C	
Approach Delay (s)		41.9			42.5			27.4			26.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	134.7	Sum of lost time (s)	14.4
Intersection Capacity Utilization	84.5%	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												
Volume (vph)	230	390	80	30	660	220	420	800	130	140	460	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1496	1770	3539	1510	3433	3429		1711	3259	
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)	250	424	87	33	717	239	457	870	141	152	500	120
RTOR Reduction (vph)	0	0	53	0	0	54	0	9	0	0	14	0
Lane Group Flow (vph)	250	424	34	33	717	185	457	1002	0	152	606	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Effective Green, g (s)	22.0	53.0	53.0	4.0	35.0	35.0	22.0	47.2		14.6	39.8	
Actuated g/C Ratio	0.16	0.39	0.39	0.03	0.25	0.25	0.16	0.34		0.11	0.29	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	283	1363	576	51	900	384	549	1176		182	943	
v/s Ratio Prot	c0.14	0.12		0.02	c0.20		c0.13	c0.29		0.09	0.19	
v/s Ratio Perm			0.02			0.12						
v/c Ratio	0.88	0.31	0.06	0.65	0.80	0.48	0.83	0.85		0.84	0.64	
Uniform Delay, d1	56.5	29.5	26.6	66.1	48.0	43.6	56.0	42.0		60.3	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.4	0.6	0.2	19.2	7.3	4.3	10.0	7.9		25.8	3.4	
Delay (s)	82.0	30.1	26.8	85.3	55.2	47.8	66.0	49.8		86.1	46.0	
Level of Service	F	C	C	F	E	D	E	D		F	D	
Approach Delay (s)		46.8			54.4			54.9			53.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	13.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	60	130	40	30	100	280	910	50	120	960	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.86		0.87		1.00	0.99		1.00	0.93	
Flpb, ped/bikes		0.91	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1625	1359		1456		1652	3359		1711	3062	
Flt Permitted		0.57	1.00		0.70		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		953	1359		1028		1652	3359		1711	3062	
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)	196	65	141	43	33	109	304	989	54	130	1043	315
RTOR Reduction (vph)	0	0	25	0	37	0	0	3	0	0	20	0
Lane Group Flow (vph)	0	261	116	0	148	0	304	1040	0	130	1338	0
Confl. Peds. (#/hr)	133		85	85		133	90		56	56		90
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Effective Green, g (s)		35.1	35.1		35.1		25.6	76.0		14.5	65.1	
Actuated g/C Ratio		0.25	0.25		0.25		0.18	0.54		0.10	0.46	
Clearance Time (s)		4.9	4.9		4.9		4.4	5.1		4.4	4.9	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0		2.0	2.1	
Lane Grp Cap (vph)		239	341		258		302	1823		177	1424	
v/s Ratio Prot							c0.18	0.31		0.08	c0.44	
v/s Ratio Perm		c0.27	0.09		0.14							
v/c Ratio		1.09	0.34		0.57		1.01	0.57		0.73	0.94	
Uniform Delay, d1		52.4	43.0		45.9		57.2	21.2		60.9	35.6	
Progression Factor		1.00	1.00		1.00		1.45	0.49		1.00	1.00	
Incremental Delay, d2		85.0	2.7		9.0		37.3	0.6		12.7	13.2	
Delay (s)		137.4	45.7		54.9		120.2	11.1		73.6	48.8	
Level of Service		F	D		D		F	B		E	D	
Approach Delay (s)		105.2			54.9			35.7			50.9	
Approach LOS		F			D			D			D	

Intersection Summary			
HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	900	430	250	640	290	320	630	60	270	720	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	11	11
Total Lost time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1495	1770	3539	1509	3433	3470		1711	3284	
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)	348	978	467	272	696	315	348	685	65	293	783	152
RTOR Reduction (vph)	0	0	207	0	0	75	0	5	0	0	11	0
Lane Group Flow (vph)	348	978	260	272	696	240	348	745	0	293	924	0
Confl. Peds. (#/hr)	28		35	35		28	68		51	51		68
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Effective Green, g (s)	28.3	40.3	40.3	22.4	34.4	34.4	16.7	33.9		24.6	41.8	
Actuated g/C Ratio	0.20	0.29	0.29	0.16	0.25	0.25	0.12	0.24		0.18	0.30	
Clearance Time (s)	4.4	4.9	4.9	4.4	4.9	4.9	4.4	5.1		4.4	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	
Lane Grp Cap (vph)	358	1019	430	283	870	371	410	840		301	981	
v/s Ratio Prot	c0.20	c0.28		0.15	0.20		0.10	0.21		c0.17	c0.28	
v/s Ratio Perm			0.17			0.16						
v/c Ratio	0.97	0.96	0.60	0.96	0.80	0.65	0.85	0.89		0.97	0.94	
Uniform Delay, d1	55.5	49.1	43.0	58.4	49.6	47.4	60.4	51.2		57.4	47.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.30	1.19	
Incremental Delay, d2	39.8	20.0	6.2	42.5	7.6	8.5	14.5	13.3		28.8	10.1	
Delay (s)	95.2	69.1	49.1	100.9	57.2	55.8	74.9	64.5		103.6	67.3	
Level of Service	F	E	D	F	E	E	E	E		F	E	
Approach Delay (s)		69.0			66.1			67.8			75.9	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	69.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX C

QUEUING CALCULATION SHEETS

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	197	45	155	124	244	300	124	222	227	85
Average Queue (ft)	85	39	62	103	205	198	54	122	142	69
95th Queue (ft)	176	50	121	136	272	317	109	213	240	101
Link Distance (ft)	441		451		250	250		274	274	
Upstream Blk Time (%)					0	2				
Queuing Penalty (veh)					2	14				
Storage Bay Dist (ft)		20		100			100			60
Storage Blk Time (%)	59	12		11	14		5	5	16	8
Queuing Penalty (veh)	41	12		58	16		15	4	43	25

NB: 200' 290'
SB: 130' 230'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	213	322	116	25	39	425	434	85	178	192	328	332
Average Queue (ft)	171	107	77	5	13	349	373	62	141	160	242	272
95th Queue (ft)	256	253	112	19	36	477	460	121	191	204	328	329
Link Distance (ft)		432	432			422	422				401	401
Upstream Blk Time (%)						2	3					
Queuing Penalty (veh)						0	0					
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	14					32	57	11			0	
Queuing Penalty (veh)	27					9	126	35			0	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	156	207	243	95
Average Queue (ft)	94	137	178	48
95th Queue (ft)	158	206	272	88
Link Distance (ft)		250	250	
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			1	
Storage Bay Dist (ft)	280			70
Storage Blk Time (%)			23	0
Queuing Penalty (veh)			25	1

NB: 240' 310'
SB: 160' 240'

	Linda		Montezuma		Total	
NB*	200'	290'	240'	310'	440'	600'
SB	130'	230'	160'	240'	290'	470'

*- WB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	B10	B10
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R	T	T
Maximum Queue (ft)	504	77	514	125	269	267	124	353	344	85	134	254
Average Queue (ft)	461	47	432	122	244	154	111	301	300	57	46	73
95th Queue (ft)	490	69	548	128	275	309	131	391	384	102	127	221
Link Distance (ft)	441		451		250	250		274	274		1742	1742
Upstream Blk Time (%)	82		33		23	7		12	15			
Queuing Penalty (veh)	0		0		142	46		0	0			
Storage Bay Dist (ft)		20		100			100			60		
Storage Blk Time (%)	78	22		67	1		29	33	41	2		
Queuing Penalty (veh)	101	53		303	3		140	39	118	11		

NB: 190' 280'
SB: 360' 560'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	215	447	476	264	225	436	436	85	259	254	416	435
Average Queue (ft)	201	445	449	161	211	433	432	77	160	178	276	259
95th Queue (ft)	235	455	468	312	266	441	449	109	274	275	376	396
Link Distance (ft)		432	432			422	422				401	401
Upstream Blk Time (%)		23	20			24	35				1	3
Queuing Penalty (veh)		0	0			0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	36	29	32	0	17	36	34	58			1	
Queuing Penalty (veh)	162	93	137	0	53	90	100	184			4	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	243	262	270	95
Average Queue (ft)	230	216	209	71
95th Queue (ft)	264	285	320	123
Link Distance (ft)		250	250	
Upstream Blk Time (%)	12	4	14	
Queuing Penalty (veh)	0	23	77	
Storage Bay Dist (ft)	280			70
Storage Blk Time (%)	12	4	55	2
Queuing Penalty (veh)	42	11	77	7

			Lindo		Montezuma		Total	
NB: 260'	370'	NB*	190'	280'	260'	370'	450'	650'
SB: 210'	300'	SB	360'	560'	210'	300'	570'	860'

* - NB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	160	55	228	125	249	301	125	333	303
Average Queue (ft)	99	38	108	93	215	223	79	175	222
95th Queue (ft)	165	66	225	137	277	293	157	320	307
Link Distance (ft)	456		454		249	249		286	286
Upstream Blk Time (%)					1	3		4	2
Queuing Penalty (veh)					6	20		17	9
Storage Bay Dist (ft)		20		100			100		
Storage Blk Time (%)	50	7		17	23		29	13	
Queuing Penalty (veh)	35	7		94	26		88	11	

NB: 220' 280'

SB: 160' 270'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	253	244	16	224	436	436	85	248	344	416	416
Average Queue (ft)	161	87	102	11	48	378	383	61	188	298	352	379
95th Queue (ft)	248	168	172	23	173	527	514	124	255	398	480	455
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)						8	10				6	3
Queuing Penalty (veh)						0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	11	1	0			39	58	16		0	11	
Queuing Penalty (veh)	22	3	0			12	128	52		0	47	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	264	270
Average Queue (ft)	116	252	236
95th Queue (ft)	146	271	274
Link Distance (ft)		249	249
Upstream Blk Time (%)		10	3
Queuing Penalty (veh)		36	12
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	48	8	
Queuing Penalty (veh)	110	11	

NB: 340' 440'
SB: 220' 250'

Intersection: 3: HAWK Ped Crosswalk & College Avenue

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (ft)	227	290	156	201
Average Queue (ft)	168	194	108	139
95th Queue (ft)	219	290	156	224
Link Distance (ft)	286	286	637	637
Upstream Blk Time (%)		1		
Queuing Penalty (veh)		3		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

			Lindo		Montezuma		Ped Signal		Total	
NB:	180'	250'	NB*							
			220'	280'	340'	440'	180'	250'	740'	970'
SB:	120'	190'	SB*							
			160'	270'	220'	250'	120'	190'	500'	710'

* - NB & SB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	489	54	469	125	265	262	124	296	332
Average Queue (ft)	473	45	462	123	253	172	87	292	304
95th Queue (ft)	485	53	475	127	265	340	146	296	324
Link Distance (ft)	456		454		249	249		286	286
Upstream Blk Time (%)	81		93		52	4		48	52
Queuing Penalty (veh)	0		0		321	25		330	356
Storage Bay Dist (ft)		20		100			100		
Storage Blk Time (%)	63	30		76	1		9	73	
Queuing Penalty (veh)	81	71		344	3		45	87	

NB: 210' 290'
SB: 260' 270'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	462	462	260	224	440	436	85	181	344	416	416
Average Queue (ft)	212	459	437	56	170	434	436	84	141	216	413	412
95th Queue (ft)	217	468	516	196	242	442	437	88	192	354	421	425
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)		55	11			44	59				26	15
Queuing Penalty (veh)		0	0			0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	67	18	24	0	9	54	1	94		0	34	
Queuing Penalty (veh)	300	57	104	0	29	135	4	302		1	109	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	272	283
Average Queue (ft)	124	263	252
95th Queue (ft)	125	280	299
Link Distance (ft)		249	249
Upstream Blk Time (%)		60	25
Queuing Penalty (veh)		338	144
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	77	10	
Queuing Penalty (veh)	276	26	

NB: 390' 400'

SB: 240' 270'

Intersection: 3: HAWK Ped Crosswalk & College Avenue

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (ft)	204	204	1769	1769
Average Queue (ft)	133	140	1528	1539
95th Queue (ft)	199	209	2107	2086
Link Distance (ft)	286	286	1754	1754
Upstream Blk Time (%)			32	30
Queuing Penalty (veh)			0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

			Lindo		Montezuma		Ped Signal		Total	
WB: 140'	200'	WB*:	210'	290'	390'	400'	140'	200'	740'	890'
SB: 1,530'	2,100'	SB*:	260'	270'	240'	270'	1,530'	2,100'	2,030'	2,640'

*- NB & SB excludes right-turns based on volume splits

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	94	45	179	124	262	291	115	276	308
Average Queue (ft)	53	40	112	96	177	205	78	166	224
95th Queue (ft)	87	49	158	151	305	307	123	254	308
Link Distance (ft)	456		454		249	249		274	274
Upstream Blk Time (%)					6	2		0	1
Queuing Penalty (veh)					38	10		0	0
Storage Bay Dist (ft)		20		100			100		
Storage Blk Time (%)	44	4		25	9		5	19	
Queuing Penalty (veh)	31	4		136	10		15	15	

WB: 190' 300'
SB: 160' 230'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	368	126	38	60	436	436	85	166	190	413	414
Average Queue (ft)	198	225	95	19	25	337	342	57	109	136	299	304
95th Queue (ft)	234	429	127	32	59	434	461	115	186	199	398	398
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)						7	17				1	1
Queuing Penalty (veh)						0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	25					41	45	35			4	
Queuing Penalty (veh)	49					12	99	116			19	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	264	266
Average Queue (ft)	97	175	160
95th Queue (ft)	142	291	271
Link Distance (ft)		249	249
Upstream Blk Time (%)		4	2
Queuing Penalty (veh)		14	6
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	30	9	
Queuing Penalty (veh)	68	13	

			Lindo		Montezuma		Total	
NB:	280'	370'	NB*	190'	300'	280'	370'	470'	670'
SB:	150'	250'	SB*	160'	230'	150'	250'	310'	480'

*-NB & SB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	B10	B10
Directions Served	LT	R	LTR	L	T	TR	L	T	TR	T	T
Maximum Queue (ft)	488	54	469	124	268	264	125	364	350	1569	1569
Average Queue (ft)	473	45	461	123	257	166	112	348	344	1094	1106
95th Queue (ft)	487	54	477	128	271	318	135	359	349	1413	1444
Link Distance (ft)	456		454		249	249		274	274	1742	1742
Upstream Blk Time (%)	66		99		47	1		74	64		
Queuing Penalty (veh)	0		0		293	5		0	0		
Storage Bay Dist (ft)		20		100			100				
Storage Blk Time (%)	66	57		71	2		31	71			
Queuing Penalty (veh)	85	136		322	5		150	85			

WB: 210' 290'
SB: 1,410' 1,740'

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	486	481	265	224	436	460	85	186	344	416	416
Average Queue (ft)	208	455	397	128	152	281	439	84	160	249	339	353
95th Queue (ft)	220	487	653	282	299	576	460	87	200	389	478	502
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)		39	15			5	53				7	8
Queuing Penalty (veh)		0	0			0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	70	10	13	0	9	16	18	74			15	
Queuing Penalty (veh)	315	34	55	0	28	40	51	235			47	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	125	269	268
Average Queue (ft)	124	263	261
95th Queue (ft)	125	273	270
Link Distance (ft)		249	249
Upstream Blk Time (%)		57	31
Queuing Penalty (veh)		322	178
Storage Bay Dist (ft)	100		
Storage Blk Time (%)	68	20	
Queuing Penalty (veh)	244	54	

		Lindo		Montezuma		Total	
NB: 330' 470'	NB*	210'	290'	330'	470'	540'	760'
SB: 240' 250'	SB*	1,410'	1,740'	240'	250'	1,650'	1,990'

*- NB & SB excludes right-turns based on volume splits.

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	285	45	159	124	177	130	138	235	304
Average Queue (ft)	138	36	61	94	92	88	99	161	218
95th Queue (ft)	269	60	97	144	157	137	157	232	311
Link Distance (ft)	456		454		249	249		274	274
Upstream Blk Time (%)									2
Queuing Penalty (veh)									0
Storage Bay Dist (ft)		20		100			200		
Storage Blk Time (%)	51	14		19	1			0	
Queuing Penalty (veh)	36	14		105	1			0	

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	214	189	219	17	82	408	414	85	186	344	416	416
Average Queue (ft)	170	118	133	13	39	316	324	42	154	229	317	337
95th Queue (ft)	227	188	215	23	79	471	483	105	230	370	493	475
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)						0	0				4	6
Queuing Penalty (veh)						0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	7	1				23	48	0		0	10	
Queuing Penalty (veh)	14	2				7	106	1		0	41	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	242	268	259
Average Queue (ft)	152	140	170
95th Queue (ft)	216	239	259
Link Distance (ft)		249	249
Upstream Blk Time (%)	0	1	1
Queuing Penalty (veh)	0	2	3
Storage Bay Dist (ft)	280		
Storage Blk Time (%)	0	1	
Queuing Penalty (veh)	0	1	

Network Summary

Network wide Queuing Penalty: 333

		Lindo		Montezuma		Total	
NB: 390'	NB*:	90'	140'	300'	450'	390'	590'
SB: 300'	SB*:	160'	220'	140'	220'	300'	440'

* - NB & SB excludes right-turns based on volume splits

Intersection: 1: Lindo Paseo & College Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	B10	B10
Directions Served	LT	R	LTR	L	T	TR	L	T	TR	T	T
Maximum Queue (ft)	472	54	310	125	266	259	224	345	345	759	694
Average Queue (ft)	471	44	161	124	260	222	124	333	344	344	401
95th Queue (ft)	472	55	286	126	270	261	206	360	346	680	679
Link Distance (ft)	456		454		249	249		274	274	1742	1742
Upstream Blk Time (%)	87				43	1		36	55		
Queuing Penalty (veh)	0				268	4		0	0		
Storage Bay Dist (ft)		20		100			200				
Storage Blk Time (%)	54	55		73	3			46			
Queuing Penalty (veh)	70	132		332	8			55			

Intersection: 2: Montezuma Road & College Avenue

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	TR
Maximum Queue (ft)	215	462	476	462	224	436	436	85	236	344	387	412
Average Queue (ft)	204	441	416	199	201	431	436	84	153	196	253	256
95th Queue (ft)	238	486	546	329	284	448	437	89	217	317	355	367
Link Distance (ft)		447	447			421	421				401	401
Upstream Blk Time (%)		13	16	5		28	46				0	0
Queuing Penalty (veh)		0	0	0		0	0				0	0
Storage Bay Dist (ft)	190			240	200			60	320	320		
Storage Blk Time (%)	54	17	25	0	29	39	21	77			1	
Queuing Penalty (veh)	242	56	106	1	93	98	62	248			4	

Intersection: 2: Montezuma Road & College Avenue

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	243	269	274
Average Queue (ft)	206	254	253
95th Queue (ft)	283	280	280
Link Distance (ft)		249	249
Upstream Blk Time (%)	2	37	38
Queuing Penalty (veh)	0	209	217
Storage Bay Dist (ft)	280		
Storage Blk Time (%)	2	37	
Queuing Penalty (veh)	7	100	

Network Summary

Network wide Queuing Penalty: 2311

			Lindo		Montezuma		Total	
NB: 480'		WB*:	240'	260'	240'	350'	480'	610'
SB: 900'		SB*:	670'	990'	230'	260'	900'	1,250'

* - WB & SB excludes right-turns based on volume splits

Michael Haberkorn

'rom:	Jamie Frye <Jpfrye@sundt.com>
ꞌent:	Thursday, August 14, 2014 12:47 PM
To:	Robert Schulz (rschulz@mail.sdsu.edu)
Cc:	Michael Haberkorn
Subject:	131450 - SDSU South Campus Plaza - TCP-12 Mitigation Measure
Attachments:	COMPLETE STREETS MITIGATION MEASURE (Rev 7-31-14) - For Cost Estimate.docx

Bob,

Per your request, the cost for the attached additional mitigation measures are as follows:

$2,500 (total – breakdown below).

- Directional/Arrows = $1,428
- Striping = $1,072

Please don't hesitate to call or e-mail should you have any questions or concerns.

Thanks,

SUNDT

James P. Frye, CPC, DBIA, LEED AP, Employee Owner

Sundt Construction, Inc.

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jpfrye@sundt.com

COMPLETE STREETS MITIGATION MEASURE

TCP-12 Following issuance by the City of San Diego of a Public Right-of-Way Permit authorizing CSU/SDSU to undertake the following work, CSU/SDSU, or its designee, shall implement at its own cost the following improvements on the segment of College Avenue between Montezuma Road north to Hardy Road:

(1) Re-stripe College Avenue at Lindo Paseo to provide a left-turn lane, a through-lane, and a shared through/right-turn lane in the northbound and southbound directions;

(2) Re-stripe College Avenue at Montezuma Road to provide a left-turn lane, a through-lane, and a shared through/right-turn lane in the southbound direction; and,

(3) Re-stripe Lindo Paseo at College Avenue to provide a 20-foot wide travel lane on eastbound Lindo Paseo to enable right-turning vehicles to pass left-turning vehicles unimpeded.

TABLE 3.12-23A (REVISED SEPTEMBER 2014)
TRAFFIC MITIGATION COSTS AND FAIR-SHARE AMOUNT
APPORTIONED BASED ON TYPE USE

PLAZA LINDA VERDE TRAFFIC MITIGATION FAIR-SHARE						PROJECT FAIR-SHARE IMPACT PERCENTAGE APPORTIONED BASED ON TYPE USE		PRESENT (2010) TOTAL ESTIMATED IMPROVEMENT COST (per RBF Consulting ENR: 8566)	PRESENT (2010) PROJECT FAIR-SHARE AMOUNT APPORTIONED BASED ON TYPE USE (Present Dollars)		NEAR-TERM (2015) PROJECT FAIR-SHARE AMOUNT APPORTIONED BASED ON TYPE USE (Dollars Adjusted for Inflation to 2015 ENR: 10060 Multiplier: 1.17441046)		HORIZON YEAR (2030) PROJECT FAIR-SHARE AMOUNT APPORTIONED BASED ON TYPE USE (Dollars Adjusted for Inflation to 2030 ENR: 12799 Multiplier: 1.49416297)		PROJECT FAIR-SHARE AMOUNT TOTAL APPORTIONED BASED ON TYPE USE (Based on Mitigation 3.1)	
=	NO.	LLG TRAFFIC REPORT IMPACT AND MITIGATION NO.		IMPACTED INTERSECTION/ROAD SEGMENT	MITIGATION MEASURE DESCRIPTION	Retail	Student Housing		Retail	Student Housing	Retail	Student Housing	Retail	Student Housing	Retail	Student Housing
INTERSECTIONS	1	-	E-1	College Avenue/ I-8 Eastbound Ramp	Re-stripe College Avenue between Canyon Crest Drive and the I-8 eastbound ramps to provide additional (3rd) northbound through lane.	2.77%	1.35%	(Included within Mitigation No. 7)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	B-1	E-2	College Avenue/ Canyon Crest Drive	Re-stripe College Avenue from 500 feet south of the Canyon Crest Drive Intersection to the I-8 eastbound ramps to provide additional (3rd) northbound through lane.	3.53%	2.18%	(Included within Mitigation No. 7)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3	B-2	E-3	College Avenue/ Zura Way	3.1 - Provide a traffic signal at the intersection of College Avenue and Zura Way. Or 3.2 - Provide an additional southbound left-turn lane at the College Avenue/Montezuma Road intersection.	3.77%	2.33%	$396,700[1]	$14,956[2]	$9,243	$17,564[3]	$10,855	N/A	N/A	$17,564	$10,855
	4	B-3	E-4	College Avenue/ Montezuma Road	Widen the College Avenue/Montezuma Road intersection to provide an additional (2nd) left turn lane on the ~~southbound and~~ westbound approaches.	3.21%	1.80%	~~$1,005,800~~ $930,000[5]	~~$32,286~~ $29,853	~~$18,105~~ $16,740	~~$37,917~~ $35,060	~~$21,263~~ $19,660	N/A	N/A	~~$37,917~~ $35,060	~~$21,263~~ $19,660
	5		E-5	Montezuma Road/ 55th Street	Provide a right-turn overlap phase for the westbound right-turn lane at the 55th Street/Montezuma Road intersection.	2.00%	0.88%	$32,200	$644	$283	N/A	N/A	$962	$423	$962	$423
	6	B-4	E-6	Montezuma Road/ Campanile Drive	Widen Campanile Drive to provide a 75-foot long dedicated right-turn lane on the northbound approach at the Montezuma Road/Campanile Drive intersection.	5.31%	1.53%	$282,700	$15,011	$4,325	$17,629	$5,079	N/A	N/A	$17,629	$5,079
ROAD SEGMENTS	7	C-1	F-1	College Avenue: Canyon Crest to Zura Way	Re-stripe College Avenue to provide an additional (3rd) northbound through lane between I-8 eastbound ramps and Zura Way.	29.49%	5.74%	$1,094,900	$322,886[4]	$62,847[4]	$379,201	$73,808	N/A	N/A	$379,201	$73,808
	8		F-2	College Avenue: Zura Way to Montezuma Way	~~Widen College Avenue to provide an additional (3rd) northbound through lane on College Avenue between Zura Way and Montezuma Road [segment between Zura Way and Hardy Lane to be re-striped].~~ (1) Re-stripe College Avenue at Lindo Paseo to provide a left-turn lane, a through-lane, and a shared through/right-turn lane in the northbound and southbound directions; (2) Re-stripe College Avenue at Montezuma Road to provide a left-turn lane, a through-lane, and a shared through/right-turn lane in the southbound direction; and, (3) Re-stripe Lindo Paseo at College Avenue to provide a 20-foot wide travel lane on eastbound Lindo Paseo to enable right-turning vehicles to bypass stopped left-turning vehicles unimpeded.	2.14%	0.40%	~~$2,340,200~~ $2,500[6]	~~$50,080~~ $2,500	~~$9,361~~ N/A	~~N/A~~ $2,500	N/A	~~$74,828~~ N/A	~~$13,987~~ N/A	~~$74,828~~ $2,500	~~$13,987~~ N/A
	9	C-2	F-3	Montezuma Road: 55th Street to College Avenue	Provide a raised median on Montezuma Road between 55th Street and College Avenue.	6.77%	0.91%	$365,100	$24,717	$3,323	$29,027	$3,903	N/A	N/A	$29,027	$3,903
								~~$5,517,603~~ $3,104,100	~~$460,580~~ $410,567	~~$107,487~~ $96,761	~~$481,338~~ $480,981	~~$114,908~~ $113,305	~~$75,790~~ $962	~~$14,410~~ $423		
													SUB-TOTALS		$481,943 ~~$557,128~~	$113,728 ~~$129,318~~
													GRAND TOTAL		$595,671 ~~$686,446~~	

Notes:

[1] Cost assumes providing a traffic signal at the intersection (MM 3.1). Providing an additional southbound left-turn lane instead (MM 3.2) would cost $177,700.

[2] Mitigation No. 3.2 2010 fair-share amount is $6,700 (R) + $4,140 (SH).

[3] Mitigation No. 3.2 2015 fair-share amount is $7,867 (R) + $4,863 (SH).

[4] Amount to be apportioned between City of San Diego (Impacts B-1/E-2 and C-1/F-1) and Caltrans (Impact E-1) based upon affected right-of-way. Caltrans portion is $9,356 (R) and $4,561 (SH).

[5] Estimate per RBF Consulting (pers. comm. September 3, 2014)

[6] Estimate per Sundt Construction, Inc. (pers. comm. August 14, 2014).