FINAL REPORT

North Park | Mid-City Bikeways Project:

University Bikeway

Traffic and Safety Impact Assessment

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Lead Agency:
San Diego Association of Governments (SANDAG)
401 B Street, Suite 800
San Diego, CA 92101

Contact:
Alison Moss, AICP, Project Manager
619.595.5354
Alison.Moss@sandag.org

Consultants to SANDAG:
Fehr & Peers
555 West Beech Street, Suite 302
San Diego, CA 92109

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EXECUTIVE SUMMARY

This Traffic and Safety Impact Assessment analyzes the impacts of the University Bikeway Project ("proposed project") to vehicular traffic as well as to safety for people who walk and bike in the proposed project area. Preparation of this assessment is required before the San Diego Association of Governments (SANDAG), the project's lead agency, can make a determination that the proposed project is exempt from the California Environmental Quality Act (CEQA) under Public Resources Code Section 21080.20.5.

The proposed project will make it easier and safer for people of all ages and abilities to walk and bike within San Diego's Mid-City communities, including City Heights and the Eastern Area communities, and it will connect the Mid-City communities to the City of La Mesa. The project is consistent with plans to provide an enhanced bicycle facility along University Avenue: the Mid-City Communities Plan specifies a bikeway from west of the project corridor to College Avenue, and the full project corridor is recommended in the City of San Diego Bicycle Master Plan (2013), and the SANDAG Regional Bike Plan Early Action Program (2013) (Project #14). The proposed project will include design elements and traffic safety measures that enhance the experience for people biking and walking, make streets safer for all users – including those who drive – and benefit people who live, recreate, work, and do business in the neighborhoods served by the proposed project. This is especially important on the University Avenue Corridor, which is designated as a Vision Zero Corridor in the (2015) Vision Zero San Diego report by Circulate San Diego.[1]

The University Bikeway spans Estrella Avenue from Orange Avenue to University Avenue and University Avenue from Estrella Avenue to 70th Street. It connects to the Howard-Orange Bikeway along Estrella Avenue. For the most part, the bikeway consists of buffered bike lanes – enabled through the removal of one through lane in each direction – and is enhanced by treatments such as protected intersections and protected bike lanes. The typical section of the proposed project generally includes two or four travel lanes, two buffered bike lanes, and two parallel parking lanes. For approximately one quarter of the project, the buffered bike lanes are additionally provided with parking protection, further increasing the comfort of people who bike in the corridor.

[1] Vision Zero is a strategy to eliminate all traffic deaths and severe injuries, while increasing safe, healthy, equitable mobility for all. It has been championed across Europe and the United States and was adopted by the City of San Diego City Council in October 2015. According to the (2015) Vision Zero San Diego report by Circulate San Diego, the Vision Zero Corridors consist of eight corridors that represent 30 percent of all collisions with people walking and 15 percent of all collisions with people bicycling. They also expect to contain 61 percent of all the expected population growth in the City of San Diego and 25 percent of all growth in the region. More information on Vision Zero and the corridors can be found in the referenced report.

OTHER IMPROVEMENTS

In addition to the buffered and parking-protected bike lanes, the project proposes several other treatments to facilitate the safe and comfortable movement of people walking, biking, and driving along the corridor. Other physical improvements which may be installed as part of the proposed project could include the following: new painted crossings at intersections or mid-block, pedestrian hybrid beacons, curb extensions, accessible curb ramps, sidewalks, pedestrian refuge islands, bus islands, bus stop enhancements, modifications to existing curbs, gutters and drainage inlets, colored concrete and/or colored pavement, intersection crossing (or "conflict") markings, shared lane markings, new signage, re-striping of travel lanes, new trees, landscaping or other measures to treat storm water, relocating existing underground utilities, new bikeway lighting at priority locations, and similar minor physical improvements.

WALKING AND BICYCLING SAFETY IMPACTS

The assessment concludes that the proposed project will result in potential safety benefits for people that walk and bike – and also take transit or drive – in the project area. The proposed project will decrease the level of traffic stress for people walking and biking along and across roadways in the project area by installing protected bike lanes, buffered bike lanes, shared lane markings, modified signal phasing for bicyclists and pedestrians, and other measures to calm motor vehicle traffic. Therefore, the proposed project will not result in any adverse bicycle and pedestrian safety impacts, and accordingly no additional bicycle and pedestrian safety mitigation measures beyond the project features are needed.

VEHICULAR TRAFFIC IMPACTS

The assessment also concludes that most University Avenue roadway segments in the study area will meet City of San Diego criteria for vehicular traffic conditions with implementation of the proposed project, except for segments within the following roadway sections: 1) between Estrella Avenue and 54th Street; and 2) between College Avenue and 70th Street. Traffic conditions along these segments worsen to LOS E or F with the implementation of the project, triggering a second tier of analysis. The study results along these segments meet the City of San Diego arterial analysis operating criteria, but the project causes these segments to be inconsistent with City standards due to below-standard intersection operations and because the proposed change in roadway classification (from a 4-lane major arterial to a 2-lane major arterial or 2-lane collector with center left-turn lane) is not identified in the adopted Mid-City Communities Plan. The reduction in vehicle capacity is needed to accommodate the proposed improvements that enhance safety for all transportation modes.

The study intersections would meet the City of San Diego operating standard under existing and future conditions with the proposed project, except at the following locations: University Avenue & 54th Street and University Avenue & College Avenue. To be consistent with City intersection operating standards at these locations, additional travel lanes would need to be maintained or signal phasing would need to be modified to allow right turns on red. Both of these potential changes would compromise bicycle comfort and safety and would conflict with the project goals.

SUMMARY OF CHANGES:

- Safety for people who walk and bike along the project corridor would improve with the proposed project.
- In proposing a Class II bikeway, the project is consistent with community, city, and regional plans to provide an enhanced bicycle facility along the corridor.
- Two road segments would be inconsistent with City of San Diego standards due to intersection operations below LOS D and the project reconfiguring a 4-lane major arterial shown in the Community Plan to a 2-lane major arterial and 2-lane collector with center left-turn lane.
- Under Existing and Future conditions with the project, operations at two signalized intersections would be inconsistent with City of San Diego operating standards. The potential changes necessary to meet City standards would compromise bicycle comfort and safety and would conflict with the project goals.

1.0 PROJECT DESCRIPTION

This chapter discusses the objectives of the proposed University Avenue Bikeway project, its design features and related physical improvements, and its anticipated safety features and potential safety benefits. The bikeway project is designed to increase safety and comfort for all roadway users by slowing vehicle traffic, providing designated space for people biking that is separate from where people drive, highlighting the presence of people who walk and bike, and enhancing safety at street crossings. The bikeway will link key origins and destinations including businesses, residences, schools, parks, and transit, in addition to providing a desired connection through the City Heights and Eastern Area neighborhoods.

1.1 PROJECT OBJECTIVES

The proposed project is part of the San Diego Association of Governments (SANDAG) Regional Bike Plan Early Action Program (Bike EAP 2013), a 10-year effort to expand the regional bike network and complete the high-priority projects approved in Riding to 2050: The San Diego Regional Bike Plan (Regional Bike Plan) (SANDAG 2010). The Regional Bike Plan and Bike EAP are part of larger goals for the region to increase transportation choices and to make riding a bike a viable, attractive transportation choice.

The project is also consistent with local plans to provide an enhanced bicycle facility along University Avenue: the Mid-City Communities Plan specifies a bikeway from west of the project corridor to College Avenue, and the full project corridor is recommended in the City of San Diego Bicycle Master Plan (2013).

In addition to closing gaps within the larger bikeway network that is being planned throughout the region, one of the objectives of the proposed project is to create connections between the Mid-City area of San Diego and La Mesa, including access to and through the City Heights and Eastern Area neighborhoods, and to create safe operating space and improve safety for all roadway users, including people who walk, bike, take transit and drive. The proposed project will achieve this through the implementation of Class II buffered bike lanes and Class IV protected bike lanes (made possible by removal of travel lanes), protected intersection and bend-out treatments, traffic calming, shortened street crossing distances, realigned curb ramps, improved sight distances, and traffic signal modifications.

There is clear and consistent policy direction on the local, regional, and state levels to enhance safety and provided connected infrastructure that supports biking and walking as viable choices for everyday trips and to reduce greenhouse gas and other air pollutant emissions, including but not limited to the following:

- Mid-City Communities Plan (1998)
- City of San Diego Bicycle Master Plan (2002)
- City of San Diego Climate Action Plan (2015)
- SANDAG Regional Bike Plan (2010)
- San Diego Forward: The Regional Plan (2015)
- SANDAG Climate Action Strategy (2010)
- Vision Zero San Diego (2015)

Analysis of 90 large American cities confirmed a positive correlation between how many people ride bikes and the supply of bike paths and lanes, even when controlling for other factors such as city size, climate, topography, vehicle ownership, income, and student population (Buehler 2012). Building facilities for people that walk and bike enhances safety for all roadway users, especially for women, senior citizens, and people who do not have experience riding bikes (FHWA 2015). A major reason existing ridership levels in the region are not higher is due to high levels of perceived and actual risks associated with riding a bike on the street (SANDAG 2010). Based on case studies nationwide, a large percentage of the population currently "interested in biking, but concerned about safety," is expected to begin to ride and to ride, more often, when served by a network of safe bikeways and low stress streets (NITC 2014).

Based on factors such as its population characteristics, facility gaps, incidence of collisions, and public comments related to problem areas, the University Avenue corridor was identified by SANDAG as an area where investments in bikeway infrastructure will yield substantial benefits. As a result, the proposed project is ranked as a "high-priority project" in the Regional Bike Plan (SANDAG 2010).

Described in greater detail, the purpose of this particular project is to provide livable, complete streets that serve people of all ages and abilities, and to design innovative facilities with appropriate separation from vehicular traffic, traffic calming elements, and end-of-trip facilities. The University Avenue Bikeway will improve, and complete, overall east-west bicycle travel within the City Heights and Eastern Area neighborhoods of San Diego by creating inviting and convenient bikeways that connect key community destinations, including schools, transit stops, and commercial centers. In addition to enhancing mobility for people riding bikes, some of the improved locations will include enhancements for people who walk, as well as new opportunities for landscaped areas, resulting in multi-modal benefits to the overall circulation network, including enhanced safety.

The design features of the project may include:

- Class II standard and buffered bike lanes
- Class III shared lane markings
- Class IV physically protected bike lanes
- Bend-outs
- Curb extensions
- Enhanced pedestrian crossings
- Striped crosswalks
- Bus islands

These design features are described in detail in **Section 1.3**.

1.2 PROJECT SAFETY AND POTENTIAL SAFETY BENEFITS

One of the major goals of the proposed project is to improve safety for all roadway users in the project area, people of all ages and abilities who walk, bike, and drive. The proposed project aims to improve safety with nearly 2.7 miles of buffered bike lanes, which provide dedicated space – along the roadway – for people who bike. In addition, the proposed project will include traffic calming features that promote safe driving speeds. The project also will improve conditions at intersections to enhance safety for people who walk, bike, and drive. These facilities provide varying degrees of perceived and actual safety desired by people who are interested in biking for transportation but are concerned about the safety of riding on streets with higher levels of traffic stress. The following facility types are proposed as part of this project:

Class II Bike Lanes Including Buffered Bike Lanes

Class II bike lanes are facilities located in roadway right-of-way and separated from vehicle lanes with a painted stripe, and in this case a two- to three- foot painted buffer (also called buffered bike lanes). These facilities lower traffic stress by providing designated space, by way of striping, for people riding bikes.

Class III Bike Routes

Class III bike routes are facilities located in roadway right-of-way where people on bikes share a lane with motor vehicle traffic as highlighted by "sharrows" and signage. Traffic calming devices help maintain low motor-driving speeds, thus benefitting people riding along the street, people crossing the street by walking or riding a bicycle, and vehicle drivers.

Class IV Bikeways

Class IV bikeways, or protected bike lanes, are facilities located adjacent to the roadway and separated from vehicle lanes with a physical barrier, such as flexible posts, inflexible walls or parked cars. These facilities provide the maximum amount of safety and separation from vehicles.

TRAFFIC CALMING AND OTHER PROJECT FEATURES

Several traffic calming measures and traffic control modifications will be implemented as part of the proposed project including curb extensions, bend-outs, protected intersections, enhanced pedestrian crossings, and narrowing the road through repurposing driving lanes for bikeways. These measures will encourage safe vehicle speeds, shorten crossing distances and exposure for people walking and biking, and increase the visibility of people walking and biking, thereby improving safety for people biking, walking, and driving. These features also will generally promote efficient travel for people who bike, walk, and drive.

Encouraging safe driving speeds through traffic calming helps attract a greater number of people to walk and bike. In addition, scientific studies have shown that when people walking or biking are involved in a crash with someone driving a vehicle, there is a significantly lower chance that they will be killed or suffer a serious injury when driving speeds on streets are maintained at less than 25 to 30 mph (Department for Transport 2010). For example, as shown in **Figure 1**, someone who is walking and is hit by a vehicle traveling at 20 mph has a 90 percent chance of survival, but the likelihood of survival decreases to 60 percent if the driver is traveling at 30 mph, and decreases further to 20 percent if the driver is traveling at 40 mph (SFMTA 2014). Each of the traffic calming treatments listed above is briefly described in the following paragraphs.

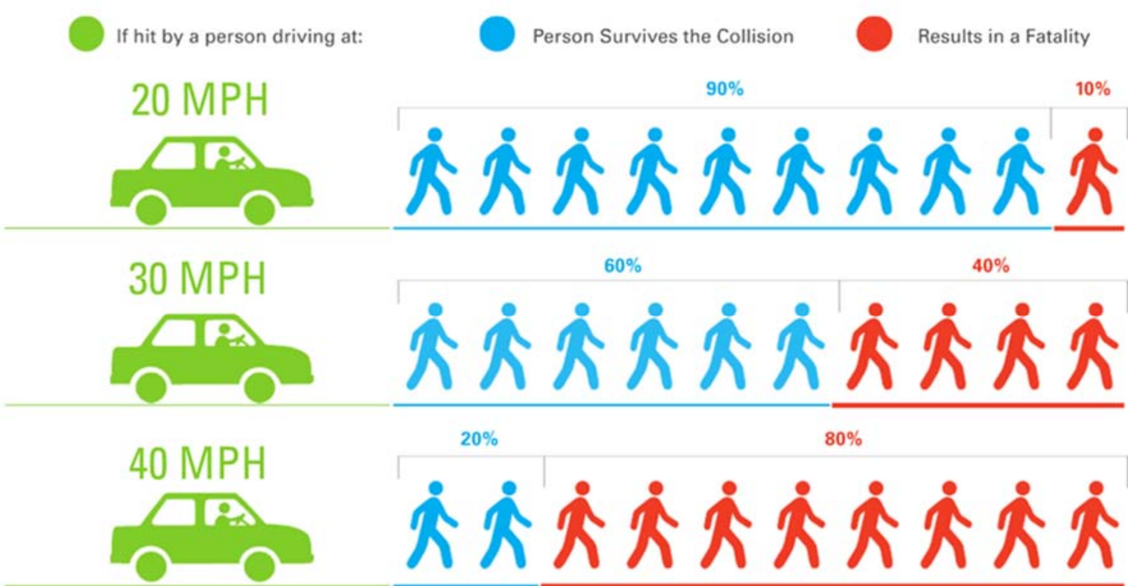

Figure 1 Pedestrian Survival Rate by Vehicle Speed (SFMTA 2014)

Curb Extensions

Curb extensions, also known as bulb-outs, are extensions of the curb line into the roadway. They are common where on-street parking is available on a roadway. Bulb-outs are intended to be used for both pedestrian safety and traffic calming purposes. The extension of the curb provides a shorter length of roadway for people walking to cross along with higher visibility of crosswalks to oncoming drivers. In the event a driver needs to make a turn, the shape of the bulb-out forces drivers to make a tighter turn, which encourages safer speeds.

Protected Intersection

A protected intersection is a combination of curb extensions and bicycle lanes. This feature directs people biking onto a large curb extension, out of the intersection, so that they are more visible to drivers making right turns. In some cases, people biking would cross during a protected bike phase using bike-specific signal heads during which no right turns are allowed. The feature provides space for vehicles to yield to people walking and/or people riding bikes across the side streets without blocking traffic on the main street. Protected intersections also provide shorter crossing distances for people walking and help to define distinct travel ways for each mode (e.g., through pavement markings, colored material, or other treatment).

Bus Islands

Bus islands eliminate one of the most dangerous conflicts between people driving (busses and cars) and those riding bikes. At bus islands, people on bikes will be routed behind the bus stop waiting area, and up to sidewalk grade. Ramping this portion of the bikeway to sidewalk grade alerts people on bikes to the potential for conflicts with people walking. The bus island configuration also alerts people walking to the potential for conflicts with people on bikes. Bus islands allow for buses to make in-lane stops, reducing transit delay.

Lane Repurposing and Roadway Narrowing

When a lane is repurposed, space is reallocated so the street functions more equitably and safely. In this project, space will be reallocated to infrastructure for walking and biking. The reallocated space benefits those who live, work, and shop in the corridor, as well as those traveling through the area. Studies across the country have shown that lane repurposing can help to reduce speeding and increase safety (Florida Department of Transportation 2014).

Enhanced Pedestrian Crossings

Pedestrian crossings can be enhanced using a variety of treatments including additional signing, striping, and other traffic control devices to increase driver awareness of people who walk across the vehicular travel way. Two more substantive enhancements are described below.

High Intensity Activated Crosswalk (HAWK)

According to the National Highway Traffic Safety Administration, HAWKs improve safety conditions by reducing crashes between people walking and vehicles at unsignalized intersections. HAWKs use flashing beacons that are triggered by either push buttons or a detection system. It is an intermediate option for locations that do not meet signal warrants.

Overall, traffic volumes on most of the unsignalized streets crossing the University Bikeway are relatively low and gaps for the existing or anticipated volume of people walking and biking are sufficient. However, at several locations, gaps in east-west traffic are more limited or the projected volume of traffic is expected to be higher than average given the adjacent land uses and or available facilities. At the University Avenue & Estrella Avenue intersection, for example, pedestrian and bicycle volumes crossing University Avenue are expected to be higher because of the connection to the Howard-Orange Bikeway. Due to this concentration of crossing volume, an enhanced crossing treatment was deemed an appropriate treatment at this location.

Accordingly, a High Intensity Activated Crosswalk (HAWK) installation is proposed for installation at University Avenue & Estrella Avenue in order to alert people driving to the presence of people walking and biking. Additionally, a High Intensity Activated Crosswalk (HAWK) installation is proposed where there is an existing intersection at University Avenue & Chollas Parkway. This intersection will be closed, and bus stops will be installed on either side of the street. Without a nearby intersection to provide a crossing to these bus stops, a HAWK will provide a safe mid-block pedestrian crossing.

Rectangular Rapid Flashing Beacon (RRFB)

According to the National Highway Traffic Safety Administration, RRFBs improve safety conditions by reducing crashes between people walking and vehicles at unsignalized intersections. RRFBs use irregular light-emitting diode (LED) flash patterns similar to emergency vehicles that are triggered by either push buttons or detection system. It is a lower cost alternative to traffic signals that increases driver awareness and yielding behavior when vehicles approaching a crossing.

1.3 DESCRIPTION OF DESIGN FEATURES AND RELATED PHYSICAL IMPROVEMENTS

The University Bikeway will improve east-west travel for people riding bikes through the Mid-City area by creating inviting and convenient bikeways that connect key community destinations, including schools, parks, transit stops, and commercial areas. The University Bikeway, later referred to simply as "the corridor," spans Estrella Avenue from Orange Avenue to University Avenue and University Avenue from Estrella Avenue to 70th Street, just past the city border with La Mesa. The bikeway alignment, along with a visualization of the proposed facility types and improvements, is illustrated in **Figure 2**. Typical cross sections are provided in **Appendix A**. The following description is based on the proposed project's current level of design and will be finalized during the final engineering design phase, before construction.

Throughout the corridor, space for the buffered bike lanes is made possible through the removal of the travel lanes. The typical section of the University Bikeway is as follows: one parallel parking lane, one buffered bike lane, two to four travel lanes, one buffered bike lane, and one parallel parking lane. For approximately one quarter of the corridor, the parking lane is provided between the buffered bike lanes and the travel lanes, further increasing the comfort of people who bike in the corridor. Separate descriptions are provided for each instance where the section changes, and include traffic calming and/or intersection details.

Estrella Avenue between Orange Avenue and University Avenue

In this segment, the proposed project will maintain the existing lane configuration and add shared lane markings, or "sharrows", on both sides of the street, providing a connection with the Howard-Orange Bikeway. Parallel parking will remain on both sides of the street.

University Avenue between Estrella Avenue and 50th Street

In this segment, the proposed project will remove one eastbound through lane to provide buffered bike lanes on both sides of the street. A raised median is expected to be installed that would prevent southbound and eastbound left-turn movements while maintaining northbound and westbound left-turn movements. An enhanced pedestrian crossing such as a HAWK will be installed at Estrella Avenue to facilitate crossings for people who walk and bike. The center left turn lane and parallel parking will remain.

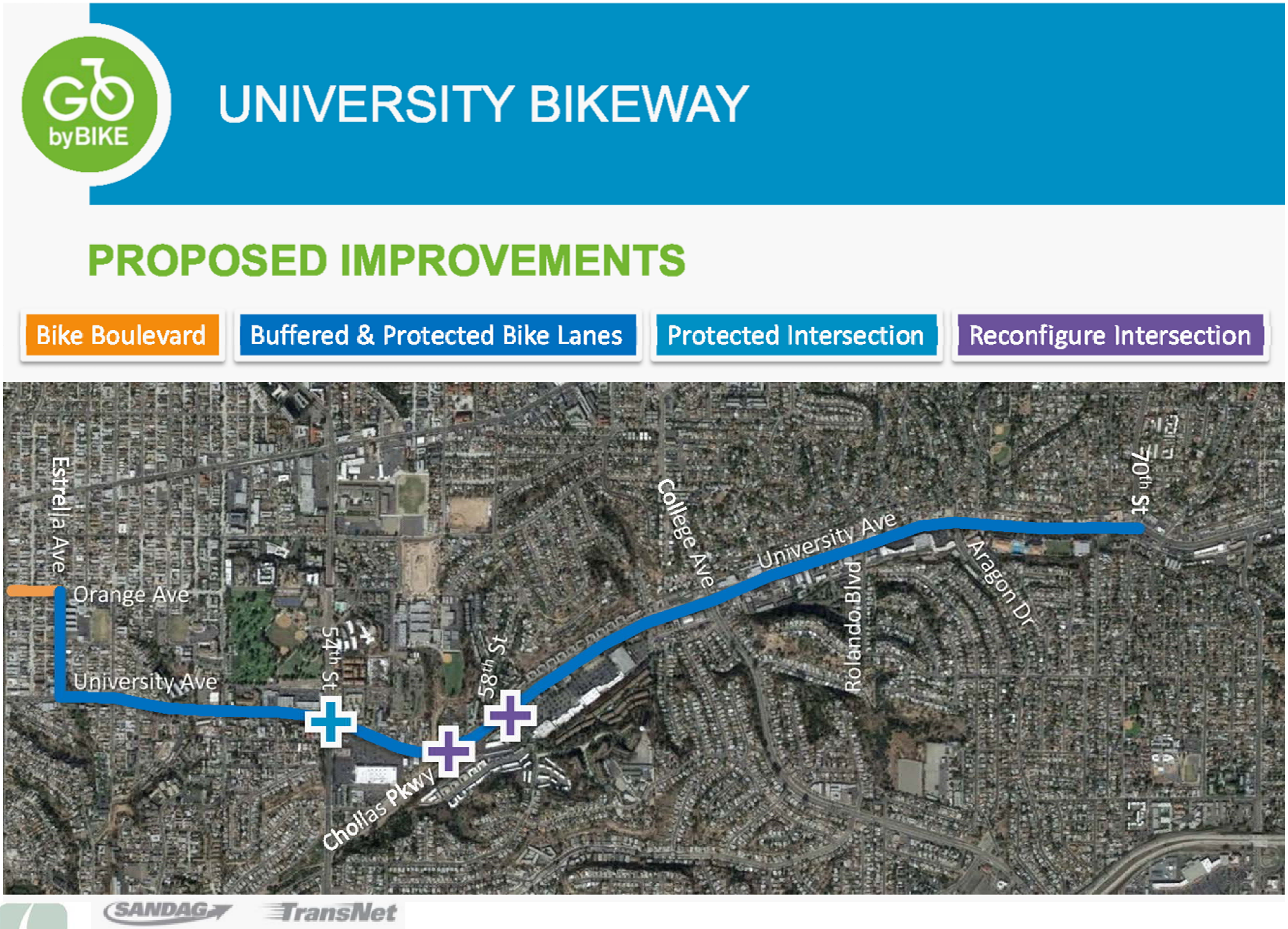

Figure 2
University Bikeway Alignment and Proposed Improvements

University Avenue between 50th Street and 52nd Street

In this segment, the proposed project will remove one travel lane in each direction to provide buffered bike lanes on both sides of the street. Where possible, bus stops will be converted to bus islands. Parallel parking will remain on both sides of the street, and on the north side of the street the parking will be between the buffered bike lane and the travel lane, offering additional protection for people who bike.

University Avenue between 52nd Street and Shiloh Road

In this segment, the proposed project will remove one travel lane in each direction to provide buffered bike lanes on both sides of the street. Shiloh Road and the opposite driveway are expected to be marked with signage as right-turn only during peak hours. Where possible, bus stops will be converted to bus islands. Parallel parking will remain on both sides of the street, and on the north side of the street the parking will be between the buffered bike lane and the travel lane, offering additional protection for people who bike.

University Avenue between Shiloh Road and 54th Street

In this segment, the proposed project will remove one travel lane in each direction to provide buffered bike lanes on both sides of the street. Where possible, bus stops will be converted to bus islands. Parallel parking will be removed from the south side of the street. 54th Street is expected to be converted to a protected intersection.

University Avenue between 54th Street and 58th Street

In this segment, the proposed project will maintain the existing configuration and provide buffered bike lanes on both sides of the street. Parallel parking will remain on the north side of the street. Between Chollas Parkway and 58th Street, parallel parking will remain on the south side of the street located between the buffered bike lane and the travel lane, offering additional protection for people who bike. Access to and from Chollas Parkway will be closed. An enhanced pedestrian crossing such as a HAWK will be installed at the former intersection to allow convenient pedestrian crossing to bus stops. At 58th Street, a protected intersection treatment is expected to be installed for the eastbound approach, and a protected bike lane is expected to be installed for the westbound approach.

University Avenue between 58th Street and College Avenue

In this segment, the proposed project will remove one eastbound through lane to provide protected bike lanes on both sides of the street. Protected bike lanes are expected to be installed at intersection approaches at University Square Driveway, 60th Street, and College Avenue. Where possible, bus stops will be converted to bus islands.

University Avenue between College Avenue and Rolando Boulevard

In this segment, the proposed project will remove one travel lane in each direction to provide buffered bike lanes on both sides of the street. Cartagena Drive and Bonillo Drive are expected to be marked with signage as right-turn only during peak hours. An enhanced pedestrian crossing such as an RRFB is additionally expected to be installed at Bonillo Drive. Protected bike lanes are expected to be installed at intersection approaches at Rolando Boulevard. Parallel parking will remain on both sides of the street.

University Avenue between Rolando Boulevard and Alamo Drive

In this segment, the proposed project will remove one travel lane in each direction to provide buffered bike lanes on both sides of the street. Where possible, bus stops will be converted to bus islands. A protected bike lane is expected to be installed at the eastbound intersection approach at Aragon Drive. Parallel parking will remain on both sides of the street, and on the south side of the street the parking will be between the buffered bike lane and the travel lane, offering additional protection for people who bike.

University Avenue between Alamo Drive and 70th Street

At 70th Street, a crosswalk is expected to be added to the east side of the intersection. Where possible, bus stops will be converted to bus islands. Parallel parking will remain on both sides of the street, located between the buffered bike lane and the travel lane for the majority of the segment. The City of San Diego border with La Mesa is crossed in this segment at University Avenue & 69th Street, and the segment of University Avenue from 69th Street to 70th Street lies within the City of La Mesa. Partway through this segment, the eastern terminus of the project, the buffered bike lanes will transition to standard bike lanes on the north side of the street in order to tie into the existing configuration at the 70th Street intersection as well as planned improvements on University Avenue east of 70th Street.

Other Improvements

In addition to the improvements described in the preceding paragraphs, the project proposes several other treatments to facilitate the safe and comfortable movement of people walking, biking, taking transit, and driving along the corridor. Other physical improvements that may be installed as part of the proposed project could include the following: new painted crossings at intersections or at mid-block, protected bike phases, bike-specific signal heads, curb extensions, accessible curb ramps, sidewalks, pedestrian refuge islands, bus stop enhancements, modifications to existing curbs, gutters and drainage inlets, colored concrete and/or colored pavement, intersection crossing and shared lane markings, new signage, re-striping of travel lanes, new trees, landscaping or other measures to treat storm water, relocating existing underground utilities, new bikeway lighting at priority locations, and similar minor physical improvements.

2.0 TRAFFIC AND SAFETY ASSESSMENT METHODOLOGY

This assessment of safety for people who walk and bike is based on the Level of Traffic Stress (LTS) methodology based on the 2012 *Mineta Transportation Institute (MTI) Report 11-19: Low-Stress Bicycling and Network Connectivity*. The assessment of the vehicular traffic conditions is based on the *City of San Diego Traffic Impact Study Manual* (1998), and the *City of San Diego Significance Determination Thresholds, Development Services Department* (2011).

2.1 METHODOLOGY FOR ANALYZING SAFETY FOR PEOPLE WHO WALK AND BIKE

This approach was based on the 2012 *Mineta Transportation Institute (MTI) Report 11-19* and uses roadway network data, including the posted speed limit, the number of travel lanes, and the presence and character of bicycle lanes, as a proxy for the comfort level of people who bike. For this analysis, roadway segments and roadway crossings are classified into one of four levels of traffic stress to characterize the actual and perceived safety of roadways for people walking and biking. The lowest level of traffic stress (LTS), LTS 1, is assigned to roads that would be suitable for most children to ride, as well as to multi-use trails or physically separated bicycle facilities that are restricted for vehicle traffic use. LTS 2 roads are those that could be comfortably ridden by the mainstream adult population. The higher levels of traffic stress, LTS 3 and LTS 4, correspond to types of cyclists who will tolerate higher vehicle traffic volumes and speeds (Geller 2005). LTS 3 is the level assigned to roads that would be acceptable for current "enthused and confident" cyclists and LTS 4 is assigned to segments that are only acceptable to "strong and fearless" people on bikes. To support use of regional bikeways by people of all ages and abilities, including the University Bikeway, the bikeway program strives to achieve LTS 1 and LTS 2 wherever possible.

Table 1 and **Table 2** identify the LTS criteria for roadway segments with and without bikeways or bike lanes, respectively. To evaluate the level of traffic stress for people walking or biking along roadway segments in the project area, the analysis takes into account several factors, including the presence or absence of bikeways or bike lanes, the presence or absence of physical separation between a bikeway and the roadway, the presence or absence of a parking lane, the number of travel lanes, the width of bike lanes and parking lanes, the speed limit, and how often a bike lane is blocked.

It is important to note that while LTS is a helpful tool in providing a general understanding of conditions for people who walk and bike and in determining project impacts, it does not provide a detailed understanding of some of the benefits of the project's unique design features and also lacks the nuance to paint a clear picture of what it is like to walk or bike along the project corridor. For example, LTS does not account for unique crossing improvements, pavement conditions, treatments at bus stops, etc. Therefore, it is likely that the project features would provide an even more comfortable environment than LTS suggests.

TABLE 1 LEVEL OF TRAFFIC STRESS CRITERIA FOR ROADWAY SEGMENTS WITH BIKEWAYS OR BIKE LANES

Criteria	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Physically Separated Bikeway[1]				
Physical Separation Present	Yes	N/A	N/A	N/A
Bike Lanes Alongside Parking Lanes				
Through Lanes Per Direction	1	N/A	2+	N/A
Bike & Parking Lane Combined Width (feet)	≥ 15	14 to 14.5	≤ 13	N/A
Speed Limit (mph)	≤ 25	30	35	≥ 40
Bike Lane Blockage	Rare	N/A	Frequent	N/A
Bike Lanes Not Alongside Parking Lanes				
Through Lanes Per Direction	1	2 with median	≥ 2, 2 without median	N/A
Bike Lane Width (feet)	≥ 6	≤ 5.5	N/A	N/A

Source: MTI 2012
Note:
1. Physically separated bikeways automatically receive an LTS score of 1, regardless of other conditions. Using engineering judgement, a striped buffer of greater than or equal to 2 feet in width is considered physical separation for the LTS analyses.

TABLE 2 LEVEL OF TRAFFIC STRESS CRITERIA FOR ROADWAY SEGMENTS WITHOUT BIKEWAYS OR BIKE LANES

Speed Limit (mph)	2-3 Lanes	4-5 Lanes	≥ 6 Lanes
≤ 25	LTS 1 or 2[1]	LTS 3	LTS 4
30	LTS 2 or 3[1]	LTS 4	LTS 4
≥ 35	LTS 4	LTS 4	LTS 4

Source: MTI 2012
Notes:
1. The lower LTS values are assigned to residential streets with no centerline striping.

Table 3 identifies the LTS criteria for intersection approaches. The analysis takes into account the presence of a right turn lane, the length of that lane, and the turning speed. Physically separated bike facilities at an intersection including protected bike lanes automatically receive an LTS score of 1, regardless of other conditions.

TABLE 3 LEVEL OF TRAFFIC STRESS CRITERIA FOR INTERSECTION APPROACHES

Criteria	LTS
Physically Separated Bike Facility[1]	
Physical Separation Present	LTS 1
Pocket Bike Lanes	
Single right-turn lane up to 150 ft. long, starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is < 15 mph	LTS 2
Single right-turn lane longer than 150 ft. starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is < 20 mph	LTS 3
Single right-turn lane in which the bike lane shifts to the left but the intersection angle and curb radius are such that turning speed is < 15 mph.	LTS 3
Single right-turn lane with any other configuration; dual right-turn lanes; or right-turn lane along with an option (through-right) lane.	LTS 4
Bicycles in Mixed Traffic	
Single right-turn lane with length < 75 ft. and intersection angle and curb radius limit turning speed to 15 mph.	LTS 1
Single right-turn lane with length between 75 and 150 ft., and intersection angle and curb radius limit turning speed to 15 mph.	LTS 3
Otherwise.	LTS 4

Source: MTI 2012
Note:

1. Physically separated bikeways automatically receive an LTS score of 1, regardless of other conditions. Using engineering judgement, a striped buffer of greater than or equal to 2 feet in width is considered physical separation for the LTS analyses.

COLLISIONS INVOLVING PEOPLE WALKING OR BIKING

Collisions involving people walking or biking were assessed as a part of the analysis of the Existing Conditions Without the Project scenario. Collision data was collected from the Statewide Integrated Traffic Records System (SWITRS) of the State of California, maintained by the California Highway Patrol. Collision data was assessed for the corridors and intersections within the project area from 2012 to 2016, the most recent data available. Collisions being assessed included collisions of people who walk and bike with automobiles or fixed objects, identifying injuries and fatalities associated with these collisions.

2.2 VEHICULAR TRAFFIC METHODOLOGY

The vehicular traffic operations study methodology and analysis are consistent with the *City of San Diego Traffic Impact Study Manual, 1998* and *City of San Diego Significance Determination Thresholds, 2011*.

Four study scenarios were analyzed. Intersections were analyzed for the morning peak period (7:00 AM to 9:00 AM) and evening peak period (4:00 PM to 6:00 PM). The intersection analysis is based on the busiest one hour of traffic during each peak period. The roadway segment analysis examines daily roadway capacity over a 24-hour period. The four scenarios assessed are:

- Existing Conditions without the Project ("Existing Without Project")
- Existing Conditions with the Project ("Existing With Project")
- Future (2022) Conditions without the Project ("Future Without Project")
- Future (2022) Conditions with the Project ("Future With Project")

A combination of traffic modeling based on observed traffic counts and SANDAG's Series 13 Regional Growth Forecast (SANDAG 2010) was used to determine the traffic volumes for each study scenario.

The methodologies used to calculate roadway segment and intersection traffic are described in **Section 2.3**, and the process by which intersections and roadway segments were selected for vehicular traffic analysis is described in **Section 2.4**. A field review was also conducted to determine the existing intersection and roadway segment capacities. The field review identified existing intersection geometry, traffic control devices, and traffic signal phasing.

The traffic modeling uses regional forecasts (SANDAG's Series 13 Regional Growth Forecast) of population, housing, land use, and economic growth based on local jurisdiction land use plans and input, along with roadway capacities, to estimate future traffic volumes on roadways in the project area. The project is expected to be completed by Year 2022 or roughly five (5) years from the time that traffic volumes in the project corridor were studied. As such, the analysis evaluates 2022 traffic volume data to show how the proposed project will affect future traffic conditions once it is built. An average annual growth rate of approximately one percent within the project corridor was determined based on a comparison of Base Year 2012 and Future Year 2035 volumes (**Appendix E**).

TRAFFIC MODELING LIMITATIONS

When estimating future traffic volumes with implementation of the proposed project, the methodology does not assume any future trips will change from other travel modes (e.g., driving, transit, carpool) to biking or walking. While research indicates that the proposed project will encourage people to shift from other travel modes to biking or walking, sufficient data is not available to provide a transportation model that could accurately quantify reductions in future vehicle trips associated with implementation of the proposed project. As a result, the analysis of future vehicle traffic volumes does not assume any mode shift because of the proposed project implementation. Therefore, this analysis likely overestimates future traffic volumes and future vehicle delay as a result of the proposed project.

2.3 METHODOLOGIES FOR INTERSECTION AND ROADWAY SEGMENT CAPACITY ANALYSIS

The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. The methodology for signalized and unsignalized intersection analysis is described below.

INTERSECTION AND ROADWAY COUNT METHODOLOGY

Intersection turning movement counts involved the use of video counters to determine the total number of vehicles entering and exiting an intersection by movement (e.g., turning, through) during the weekday morning peak period from 7:00 AM to 9:00 AM and evening peak period from 4:00 PM to 6:00 PM. Segment counts involved laying tubes across roadway segments to count the number of vehicles during a 24-hour cycle. Intersection turning movement and roadway segment volumes were obtained in 2015 and 2017. For the volumes obtained prior to 2017, an annual growth factor of approximately one percent was applied to increase volumes to Year 2017 levels. **Appendix B** contains the individual intersection and roadway segment traffic counts.

METHODOLOGIES FOR INTERSECTION CAPACITY AND ROADWAY SEGMENT ANALYSIS

The analysis of intersection operations performed for this study is based upon procedures presented in the HCM, published by the Transportation Research Board in 2000 and 2010. Due to the HCM 2010's limitations with unique signal timings (e.g. custom phasing), the HCM 2000 methodology was applied at one intersection. Consistent with City of San Diego guidelines, LOS A through LOS D conditions meet the operation criteria (*Traffic Impact Study Manual, City of San Diego, July 1998*).

The City standard for intersection operations is *not* met if implementation of the proposed project causes one of the following criteria to be met:

1. An intersection operating at LOS D or better under existing or future conditions without the project worsens to LOS E or F with the proposed project, or
2. The delay at an intersection operating at LOS E or F without the proposed project increases by more than 2.0 and 1.0 seconds, respectively, because of the proposed project.

Signalized Intersections

Signalized study intersections were analyzed according to the method described in the 2010 Highway Capacity Manual (HCM). This LOS method analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections is calculated using the Synchro 9.0 analysis software. The LOS criteria used for the analysis are described in **Table 4**, identifying the thresholds of control delays and the associated LOS. The intersection analysis assumes optimization of signal timings and splits (i.e., the amount of time allocated to each approach) to some intersections in the future conditions.

Unsignalized Intersections

Control delay for unsignalized intersections is based upon geometric design of intersections and the interactions of motor vehicles. Two unsignalized intersection types can be assessed by the HCM 2010 methodologies: all-way stop-controlled intersections and minor-street stop-controlled intersections.

TABLE 4
SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Average Control Delay (seconds/vehicle)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	<10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	>10– 20
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	>20 – 35
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	>35– 55
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	>55 – 80
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	>80

Source: *Highway Capacity Manual*, Transportation Research Board, 2010

All-Way Stop Controlled

The HCM 2010 method for analyzing all-way stop-controlled intersections is based on conflicting traffic for motor vehicles stopped at an intersection. Average control delay is calculated using a weighted average of the delays by volume distributed across all motor vehicles entering the intersection.

Minor-Street or Side-Street Stop Controlled

The HCM 2010 method for analyzing minor-street stop-controlled intersections is based on the concept of gap acceptance and the presence of conflicting traffic for motor vehicles stopped on the minor street approaches. Control delay and level of service for the “worst” movements are reported, as opposed to average intersection LOS and delay.

The average movement delay for unsignalized intersections is calculated using Synchro 9.0 analysis software and is correlated to a LOS designation as shown in **Table 5**.

TABLE 5
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Average Control Delay (seconds/vehicle)
A	Little or no delay.	≤ 10.0
B	Short traffic delay.	<10.1- 15.0
C	Average traffic delays.	<15.1- 25.0
D	Long traffic delays.	<25.1- 35.0
E	Longer traffic delays.	<35.1- 50.0
F	Longest traffic delays with intersection capacity exceeded.	> 50.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2010

Roadway Segment Analysis

The roadway segment capacity analysis identifies the LOS scores for each roadway segment in the project corridor. It does so by comparing the design capacity of each roadway as determined by the City of San Diego planning documents with the existing or future traffic volumes that occur or are expected to occur on that roadway segment. This volume-to-capacity (V/C) analysis then uses City of San Diego criteria (provided in **Appendix C**) to determine the LOS score for each roadway segment based on the comparison of volume to capacity. A two-part analysis is performed to determine whether the proposed project meets City of San Diego criteria for traffic conditions on roadway segments.

Roadway Segment Analysis: Part 1

First, the V/C analysis is performed to determine whether the proposed project will result in the following:

- Traffic conditions on any roadway segment to worsen from LOS D or better without the proposed project to LOS E or LOS F with the proposed project.
- A V/C ratio increase of more than 0.02 for LOS E roadway segments or 0.01 for LOS F roadway segments.

If a proposed project does not result in one of the above scenarios, then traffic conditions on that roadway meet the City of San Diego standards and no further analysis is required. If, however, a proposed project results in one of the scenarios described in Part 1, then a secondary analysis may be performed.

Roadway Segment Analysis: Part 2

The analysis considers the following three additional factors to determine if the roadway segment will meet the City of San Diego standards:

- if the intersections at each end of the segment will operate at LOS D or higher with the project (using the intersection criteria described in **Section 2.3**);
- if traffic conditions along the segment will operate at LOS D or better based on an arterial analysis with the proposed project during the AM and PM peak hours OR speeds increase by no more than 1 mph on roadway segments which operate at LOS E or LOS F without the proposed project; and
- if the proposed street classification is consistent with the adopted Community Plan for the area.

If any of the three criteria are not satisfied, then traffic conditions along the roadway segment do not meet the City of San Diego standards.

2.4 INTERSECTION AND ROADWAY SEGMENT STUDY LOCATIONS

The major operational change within the University Bikeway is the removal of travel lanes in each direction. Since signalized intersections typically serve higher traffic volumes than unsignalized intersections, all signalized intersections along the corridor were analyzed. In addition, all unsignalized intersections were analyzed in this impact assessment since the elimination of through lanes on University Avenue could affect delay for movements controlled by stop signs on the cross streets.

The 20 study intersections are as follows:

1. Estrella Avenue & Polk Avenue
2. Estrella Avenue & University Avenue
3. Winona Avenue & University Avenue
4. 50th Street & University Avenue
5. 52nd Street & University Avenue
6. Shiloh Road & University Avenue
7. 54th Street & University Avenue
8. 58th Street & University Avenue
9. University Square Driveway & University Avenue
10. 60th Street & University Avenue
11. College Avenue & University Avenue
12. Cartagena Drive & University Avenue
13. Bonillo Drive & University Avenue

14. Rolando Boulevard & University Avenue
15. Aragon Drive & University Avenue
16. Alamo Drive & University Avenue
17. Salvation Driveway & University Avenue
18. 68th Street & University Avenue
19. 69th Street & University Avenue
20. 70th Street/Lois Street & University Avenue

For roadway segment analysis purposes, the corridor was divided into segments based on each signal defining a segment limit. Because the western terminus of the project is the unsignalized intersection with Estrella Avenue, the study segment was extended to the next signal to the west, Euclid Avenue. In addition, the intersection with Chollas Parkway was used as an additional dividing point due to the large volumes coming to and from the corridor at that intersection. The resulting 12 study roadway segments on University Avenue are as follows:

1. Between Euclid Avenue and Winona Avenue
2. Between Winona Avenue and 52nd Street
3. Between 52nd Street and 54th Street
4. Between 54th Street and Chollas Parkway
5. Between Chollas Parkway and 58th Street
6. Between 58th Street and University Square Driveway
7. Between University Square Driveway and 60th Street
8. Between 60th Street and College Avenue
9. Between College Avenue and Rolando Boulevard
10. Between Rolando Boulevard and Aragon Drive
11. Between Aragon Drive and Salvation Driveway
12. Between Salvation Driveway and 70th Street

Figure 3 shows the location of the intersections and roadway segments analyzed in this traffic and safety impact assessment.

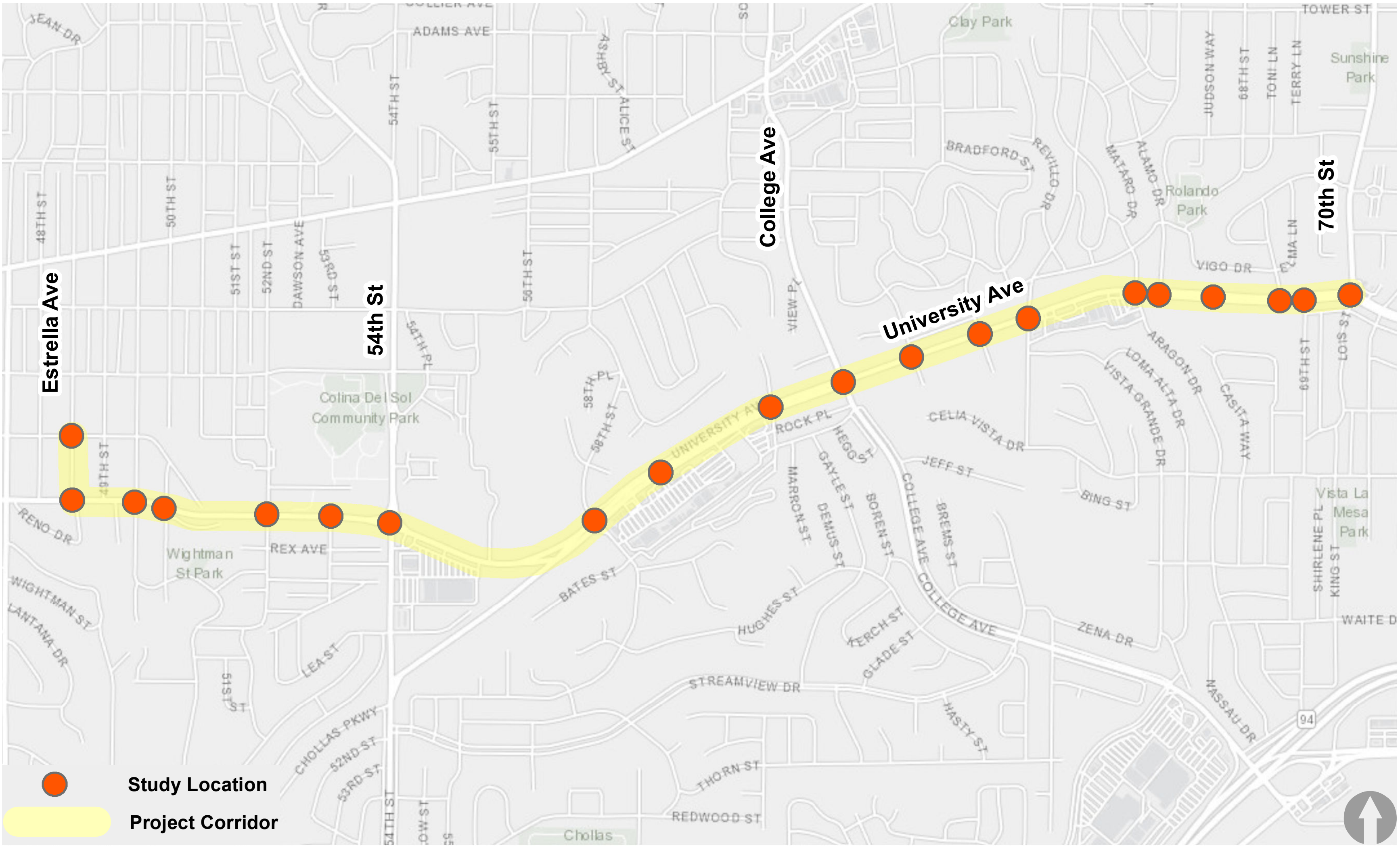

Figure 3

University Bikeway Study Locations

3.0 EXISTING CONDITIONS WITH AND WITHOUT THE PROJECT

This chapter describes safety conditions for people who walk and bike as well as vehicle traffic conditions (at roadway segments and intersections) under the Existing Conditions Without the Project and Existing Conditions With the Project scenarios.

3.1 EXISTING CONDITIONS WITHOUT THE PROJECT

This section describes existing conditions for intersections and roadway segments in the project corridor, including existing facilities and collision history for people who walk and bike, as well as vehicular traffic conditions including volumes, intersection turning movements, roadway classifications, and traffic control devices (e.g., traffic signals, stop signs).

BICYCLE FACILITIES AND COLLISION HISTORY

University Avenue has an existing Class II bike lane between 58th Street and College Avenue. Existing Class II bike lanes intersect University Avenue at 54th Street, College Avenue, and 70th Street.

Under existing conditions, the level of stress for the University Avenue project corridor is classified as LTS 4 based on the information in **Table 2**. The roadway is posted with a 35 to 40 mph speed limit and includes a four- to six-lane cross-section.

Collisions Involving People on Bikes

Data from the Statewide Integrated Traffic Records System (SWITRS) was obtained to assess the collision history within the corridor. SWITRS is a database that serves to collect and process data gathered from a collision scene. Within the University project corridor, a total of 14 collisions involving people on bikes occurred during the five-year period from 2012 to 2016, which is the latest year for which complete SWITRS data are available. This total resulted in an average of 2.8 collisions each year, although the highest number of reported collisions in a given year was four, which occurred in 2012. Of the five-year total, these collisions did not include any fatalities, but one resulted in someone suffering a severe injury, and the remaining 13 resulted in someone suffering some other type of injury. **Figure 4** shows the location of bicycle collisions along the project corridor.

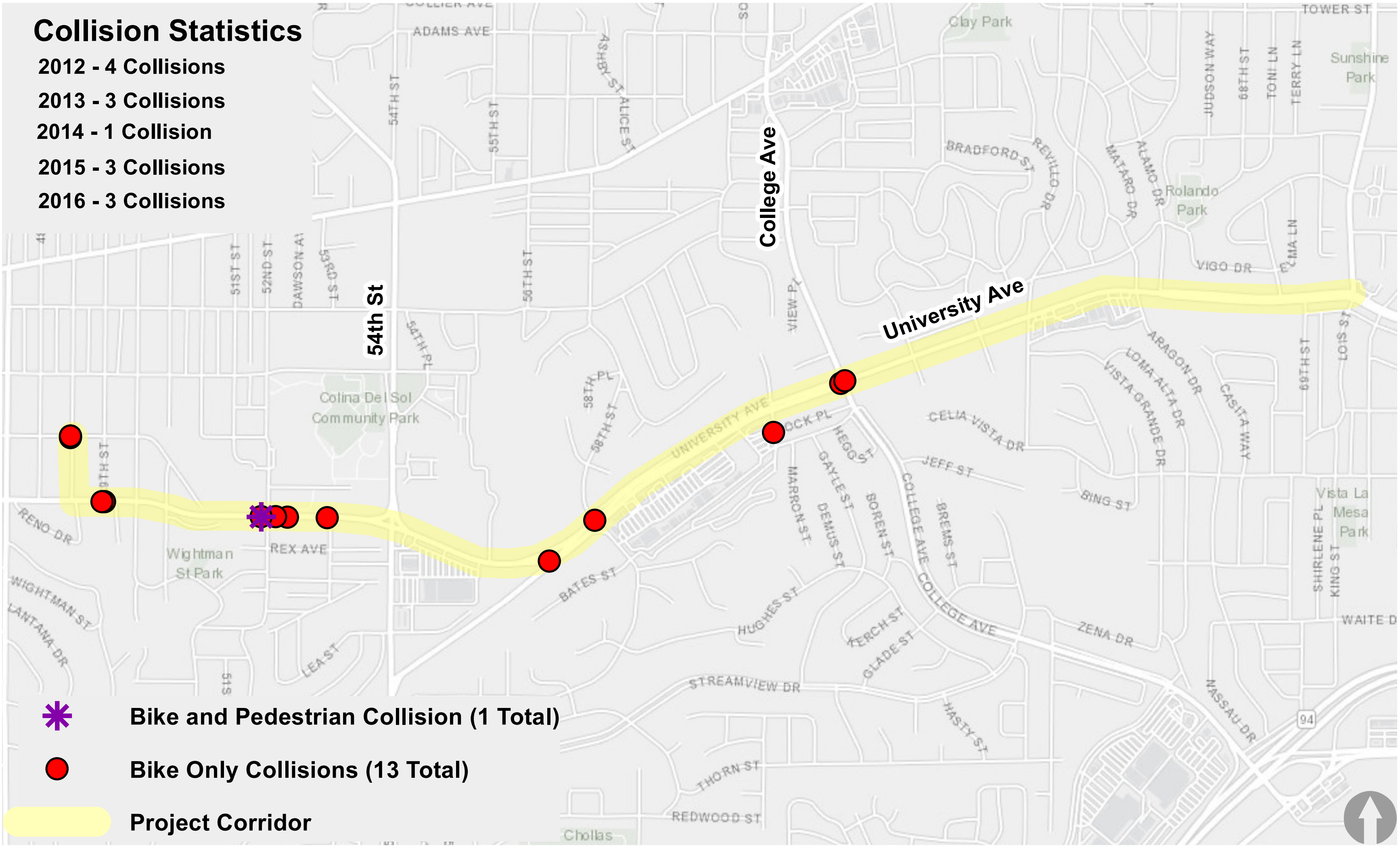

Figure 4

University Avenue Bicycle Collisions (2012 - 2016)

WALKING FACILITIES AND COLLISION HISTORY

Sidewalks, Curb Ramps, Crosswalks and Curb Extensions

Existing conditions without the proposed University Bikeway project in place were assessed for the presence of connected and continuous well-maintained sidewalks, curb ramps, and street crossings. Existing crosswalks are infrequent along the corridor, with separation of as much as 2,200 feet. Well-maintained curb ramps exist at most intersections. Some ramps are missing at the intersections of University Avenue & Chollas Parkway, University Avenue & Cartagena Drive, University Avenue & Alamo Drive, University Avenue & 68th Street, and University Avenue & 69th Street. Continuous sidewalks exist throughout the most of the corridor. Sidewalks are not provided on the south side of the street in the proximity of University Avenue & Chollas Parkway. On the north side of the street between 58th Street and 60th Street, a sidewalk is provided along the frontage road, but not on University Avenue where two bus stops are located. For some sections between College Avenue and Aragon Drive, no defined pedestrian path is provided and people who walk use the asphalt area of a parking lot adjacent to the curb.. Along the corridor, there are no existing curb extensions, and only one crosswalk provided at an unsignalized intersection: at University Avenue & 50th Street. At this location, the striped crosswalk across University Avenue is enhanced by a pedestrian refuge island in the raised median and Rectangular Rapid Flashing Beacons (RRFBs).

Under existing conditions, the level of stress (of people walking and biking) for the University Avenue project corridor is classified as LTS 4 based on the information in **Table 3**. The roadway is posted with a 35 to 40 mph speed limit and includes a four- to six-lane cross-section.

Collisions Involving People Walking

A total of 32 collisions involving people walking occurred along the University Avenue project corridor during the five-year period from 2012 to 2016 (the latest dataset available), or an average of 6.4 collisions each year. In the year with the highest total, 2016, 9 collisions were reported. Of the five-year total, these collisions included two that resulted in death, four that resulted in severe injuries, and 26 that resulted in someone suffering some other type of injury. The two fatal pedestrian collisions both occurred at University Avenue and Shiloh Road in 2014. **Figure 5** shows the location of collisions involving people walking along the project corridor.

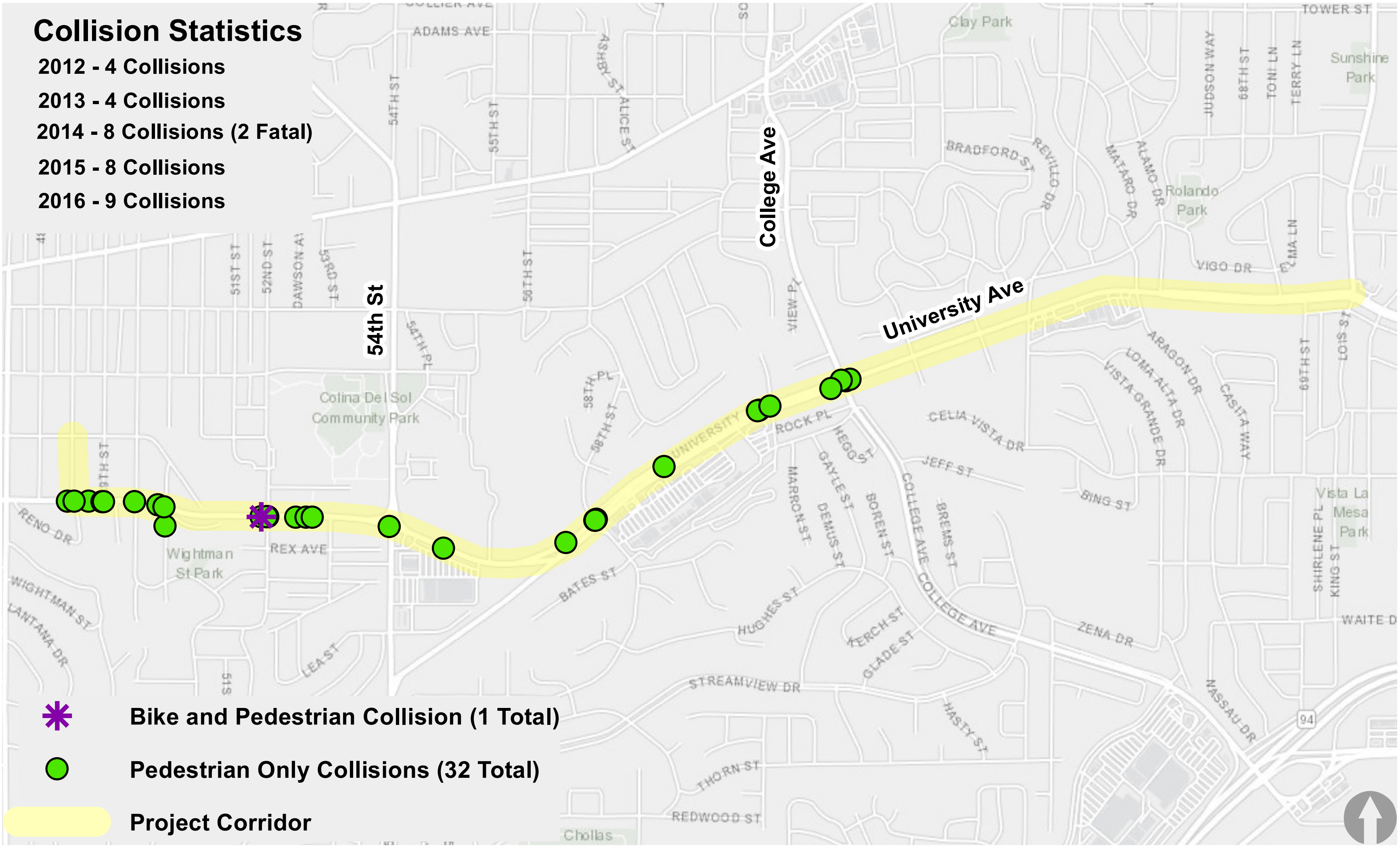

Figure 5

University Avenue Pedestrian Collisions (2012 - 2016)

VEHICULAR TRAFFIC CONDITIONS

This section describes the Existing Without Project condition for intersections and roadway segments along the project corridor, including existing vehicle traffic volumes and levels of service, intersection turning movements, roadway classifications, and traffic control devices (e.g., traffic signals, stop signs).

Roadway Network

The study roadways included in the vehicular operations analysis are described briefly below. The description includes the physical characteristics, adjacent land uses, and traffic control devices along these roadways.

University Avenue is an east-west roadway that functions as a four- to five-lane major arterial and extends between Washington Street and La Mesa Boulevard. University Avenue provides direct east-west access to a number of local destinations along the project corridor including Colina Del Sol Park, Will C. Crawford Senior High School, University Square shopping center, and the Kroc Center. University Avenue has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway. Additionally, a Class II bike lane is provided between 58th Street and College Avenue. Driveways exist along the roadway and parking is allowed along certain sections of University Avenue. The posted speed limit is 35 to 40 mph.

Polk Avenue is an eastbound-only local roadway that extends from 41st Street to Winona Avenue. In the vicinity of the project corridor, Polk Avenue provides access to Ibarra Elementary School and residential development. Polk Avenue has existing curbs and sidewalks on both sides of the roadway. Driveways exist along the roadway with parallel parking allowed on both sides. In the absence of a posted sign, the speed limit is 25 mph.

Estrella Avenue is a north-south local roadway that extends from Adams Avenue to University Avenue. In the vicinity of the project corridor, Estrella Avenue provides access to Ibarra Elementary School and residential development. Estrella Avenue has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway. Driveways exist along the roadway with parallel parking allowed on both sides. In the absence of a posted sign, the speed limit is 25 mph.

Winona Avenue is a north-south local roadway that extends from Lucille Drive to Landis Street. In the vicinity of the project corridor, Winona Avenue provides access to residential development. Winona Avenue has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway. Driveways exist along the roadway with parallel parking allowed on both sides. The posted speed limit is 25 mph.

50th Street is a north-south local roadway that extends from Oakcrest Drive to Whitman Street. 50th Street provides access to residential development and Whitman Street Neighborhood Park. 50th Street has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

52nd Street is a north-south local roadway that extends from Contour Boulevard to Ogden Street. 52nd Street provides access to residential development and Colina Del Sol Park. 52nd Street has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

Shiloh Road is a north-south local roadway that extends from University Avenue to Ogden Street. Shiloh Road provides access to residential development. Shiloh Road has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. In the absence of a posted sign, the speed limit is 25 mph.

54th Street is a north-south roadway that functions as a four-lane major arterial that extends from Montezuma Road to Euclid Avenue. 54th Street provides access to commercial uses including Northgate Market shopping center and residential side streets. 54th Street has existing curbs, sidewalks, an existing Class II bike lane, and intermittent landscaped parkway strips and street trees on both sides. Driveways exist along the roadway. The posted speed limit is 35 to 40 mph.

Chollas Parkway is a northeast-southwest roadway that functions as a four-lane collector that extends from University Avenue to 54th Street. Chollas Parkway provides a bypass to the University Avenue & 54th Street intersection. Chollas Parkway has no pedestrian facilities. The posted speed limit is 45 mph.

58th Street is a generally north-south roadway that functions as a two-lane collector that extends from Madison Avenue to Day Street. 58th Street provides access to residential development. 58th Street has existing curbs and sidewalks on both sides of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

University Square Driveway is a north-south two-lane driveway into University Square, a commercial shopping center. University Square Driveway has existing curbs and sidewalks on the east side of the roadway.

60th Street is a north-south local roadway that extends from a cul-de-sac north of University Avenue to Rock Street. 60th Street provides access to residential development and the Genie Car Wash & Oil Change. 60th Street has existing curbs and sidewalks on both sides of the roadway, except for a small segment of the east side just south of University Avenue. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

College Avenue is a north-south roadway that functions as a four-lane major arterial that extends from Navajo Road to Federal Boulevard. College Avenue provides a connection to SDSU to the north and SR-94 to the south, in addition to commercial uses and residential side streets. College Avenue has existing curbs, sidewalks, and an existing Class II bike lane only north of University Avenue. Driveways exist along the roadway. The posted speed limit is 35 to 40 mph.

Cartagena Drive is a north-south local roadway that extends from Rodrigo Drive to a cul-de-sac south of University Avenue. Cartagena Drive provides access to residential development north of the project corridor and commercial uses south of the corridor. Cartagena Drive has existing curbs and sidewalks on both sides of the roadway only north of University Avenue. Driveways exist along the roadway and parallel parking is allowed on both sides. In the absence of a posted sign, the speed limit is 25 mph.

Bonillo Drive is a north-south local roadway that extends from Marraco Way to a cul-de-sac south of University Avenue. Bonillo Drive provides access to residential development north of the project corridor and both commercial and multi-family residential development south of the corridor. Bonillo Drive has existing curbs and sidewalks on both sides of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

Rolando Boulevard is a north-south roadway that functions as a two-lane collector north of the corridor and a local street south of the corridor that extends from El Cajon Boulevard to Celia Vista Drive. Rolando Boulevard provides access to residential development. Rolando Boulevard has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway only north of the stormwater channel bridge. Driveways exist along the roadway. The posted speed limit is 25 mph.

Aragon Drive is a north-south local roadway that extends from El Cajon Boulevard to Livingston Street. Aragon Drive provides access to residential development. Aragon Drive has existing curbs and sidewalks on both sides of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

Alamo Drive is a north-south local roadway that extends from Rolando Boulevard to University Avenue and traces a portion of the city border with La Mesa to the north of the corridor. Alamo Drive provides access to residential development. Alamo Drive has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

Salvation Driveway is a north-south two-lane driveway into The Salvation Army Ray & Joan Kroc Community Center. Salvation Driveway has existing curbs and sidewalks on both sides of the roadway.

68th Street is a north-south local roadway that extends from Rolando Knolls Drive to University Avenue. 68th Street provides access to residential development. 68th Street has existing curbs and sidewalks on both sides of the roadway for only a small segment north of the project corridor. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

69th Street is a north-south local roadway that extends from University Avenue to Livingston Street and traces a portion of the city border with La Mesa to the south of the corridor. 69th Street provides access to residential development. 69th Street has existing curbs and sidewalks on the west side of the roadway. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph.

70th Street is a north-south roadway that functions as a two-lane arterial that extends from Alvarado Road to University Avenue. South of University Avenue, 70th Street is designated as Lois Street. College Avenue provides a connection to Rolando Elementary School, Sunshine Park, and I-8, in addition to residential development. 70th Street has existing curbs, sidewalks, and an existing Class II bike lane. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 35 mph. 70th Street, including its intersection with University Avenue, is located within the City of La Mesa.

Lois Street is a north-south local roadway that extends from University Avenue to 69th Street. Lois Street provides access to residential development and connects to 70th Street. Lois Street does not have existing pedestrian facilities. Driveways exist along the roadway and parallel parking is allowed on both sides. The posted speed limit is 25 mph. Lois Street, including its intersection with University Avenue, is located within the City of La Mesa.

Intersection Level of Service

Existing Without Project morning and evening peak period LOS for the 20 intersections in the project area are shown in **Table 6**. The intersection analysis worksheets for the Existing without Project condition are provided in **Appendix D**. As shown in **Table 6,** all intersections operate at an LOS of D or better along the project corridor under existing conditions except for the following four side-street stop-controlled intersections:

2. Estrella Avenue & University Avenue (AM & PM)
6. Shiloh Road & University Avenue (AM & PM)
12. Cartagena Drive & University Avenue (PM only)
13. Bonillo Drive & University Avenue (PM only)

Existing Roadway Segment Level of Service Without the Project

Existing Without Project LOS for the roadway segments along the project corridor are shown in **Table 7**. The assessment was based upon existing road geometry and the daily traffic volumes for the segments. Data obtained near each signalized intersection (e.g. between 50th Street and 52nd Street) was assumed to be representative of the entire segment (e.g. between Winona Avenue and 52nd Street). As shown in **Table 7**, all roadway segments along the project corridor operate at an LOS of D or better except for the segment from Euclid Avenue to Winona Avenue, which operates at LOS E.

TABLE 6
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT PROJECT

Intersection	Peak Hour	Traffic Control	Existing Without Project Conditions	
			Delay (sec/veh)[1]	LOS[2,3]
1. Estrella Ave & Polk Ave	AM	AWSC	7.6	A
	PM		7.5	A
2. Estrella Ave & University Ave	AM	SSSC	**59.4**	**F**
	PM		**65.7**	**F**
3. Winona Ave & University Ave	AM	Signalized	20.6	C
	PM		19.5	B
4. 50th St & University Ave	AM	SSSC	15.9	C
	PM		17.0	C
5. 52nd St & University Ave	AM	Signalized	21.9	C
	PM		17.7	B
6. Shiloh Rd/Dwy & University Ave	AM	SSSC	**39.2**	**E**
	PM		**50.7**	**F**
7. 54th St & University Ave*	AM	Signalized	39.9	D
	PM		51.8	D
8. 58th Street & University Ave*	AM	Signalized	23.2	C
	PM		21.1	C
9. University Square Dwy & University Ave*	AM	Signalized	8.0	A
	PM		12.4	A
10. 60th St & University Ave*	AM	Signalized	11.2	B
	PM		16.0	B
11. College Ave & University Ave*	AM	Signalized	40.4	D
	PM		40.5	D
12. Cartagena Dr & University Ave	AM	SSSC	19.7	C
	PM		**43.2**	**E**
13. Bonillo Dr & University Ave	AM	SSSC	22.5	C
	PM		**37.6**	**E**
14. Rolando Blvd & University Ave*	AM	Signalized	13.4	B
	PM		12.0	B

TABLE 6
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT PROJECT

Intersection	Peak Hour	Traffic Control	Existing Without Project Conditions	
			Delay (sec/veh)[1]	LOS[2,3]
15. Aragon Dr & University Ave*	AM	Signalized	11.7	A
	PM		10.3	A
16. University Ave & Alamo Dr	AM	SSSC	12.6	B
	PM		16.2	C
17. Salvation Driveway & University Ave*	AM	Signalized	6.5	A
	PM		10.4	B
18. University Ave & 68th St	AM	SSSC	13.1	B
	PM		14.5	B
19. 69th St & University Ave	AM	SSSC	14.2	B
	PM		18.3	C
20. Lois St/70th St & University Ave	AM	Signalized	37.8	D
	PM		30.0	C

Source: Fehr & Peers, 2018
Notes:
1 Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. Worst movement delay reported for side-street-stop-controlled intersection
2 LOS calculations performed using the Highway Capacity Manual (HCM) method.
3 Below-standard seconds of delay per vehicle and LOS highlighted in bold.
* Existing or proposed signal phasing prevents the use of HCM 2010 at this intersection. The HCM 2000 method was applied instead.

TABLE 7
EXISTING ROADWAY SEGMENT LEVEL OF SERVICE WITHOUT THE PROJECT

Roadway Segment			Roadway Classification (# of Lanes)[1]	ADT	V/C[2]	LOS[3,4]
ID	University Avenue To/From					
1	Euclid Ave	Winona Ave	4C/3C w/CLTL	20,276	**0.90**	**E**
2	Winona Ave	52nd St	3/4M	20,246	0.67	C
3	52nd St	54th St	4M	21,583	0.54	C
4	54th St	Chollas Pkwy	4M	22,989	0.57	C
5	Chollas Pkwy	58th St	4M	29,080	0.73	C
6	58th St	University Square Dwy	5M	21,328	0.43	B
7	University Square Dwy	60th St	5M	23,838	0.48	B
8	60th St	College Ave	4/5M	22,014	0.55	C
9	College Ave	Rolando Blvd	4M	20,250	0.51	B
10	Rolando Blvd	Aragon Dr	4M	21,645	0.54	C
11	Aragon Dr	Salvation Dwy	4M	17,411	0.44	B
12	Salvation Dwy	70th St	4M	19,910	0.50	B

Source: Fehr & Peers, 2018

Notes:

1. 2C w/CLTL = 2-lane collector with center left-turn lane
   3C w/CLTL = 3-lane collector (2 lanes in one direction and 1 in opposing direction) with center left-turn lane; capacity is assumed to be 150% of 2C w/CLTL capacity
   3M = 3-lane major arterial (2 lanes in one direction and 1 in opposing direction); capacity is assumed to be 75% of 4M capacity
   4M = 4-lane major arterial
   5M = 5-lane major arterial (3 lanes in one direction and 2 in opposing direction); capacity is assumed to be 125% of 4M capacity
2. Volume-to-capacity ratio. Worst-case is shown on segments with multiple classifications
3. LOS calculations performed using City of San Diego Traffic Impact Study Manual (1998)
4. Below-standard ADT volumes per segment and LOS highlighted in **bold**.

3.2 EXISTING CONDITIONS WITH THE PROJECT

This section analyzes how existing conditions for people who walk, bike, and drive the project corridor would be affected if the proposed project were implemented.

CONDITIONS FOR PEOPLE WALKING AND BIKING

The proposed improvements along the University Bikeway are designed to enhance safety for people walking and biking within the physical constraints of the roadway. Both people biking and walking will benefit from safer speeds along the bikeways through implementation of traffic calming devices including pedestrian hybrid beacons. In addition, new pedestrian ramps and curb extensions at selected intersections will increase the visibility of people walking to drivers and enhance ADA accessibility.

LEVEL OF TRAFFIC STRESS ALONG ROADWAY SEGMENTS

The LTS for roadway segments in the project area was assessed based upon the criteria identified in the tables in **Section 2.1**. **Table 8** compares the level of traffic stress results along roadway segments in the project area for Existing Conditions without the Project and Existing Conditions with the Project.

With implementation of the project, the level of traffic stress will improve to or maintain LTS 1 along the entire bikeway length. Overall, the project achieves LTS 1 ("suitable for children"), and is therefore consistent with best practices in low-stress network design (MTI 2012).

LEVEL OF TRAFFIC STRESS FOR INTERSECTION CROSSINGS

The LTS for intersection crossings within the project area was assessed based upon the criteria identified in the tables in **Section 2.1**. **Table 9** compares the level of traffic stress results along roadway segments in the project area for Existing Conditions without the Project and Existing Conditions With the Project. With implementation of the project, the level of traffic stress is reduced to LTS 1, and numerous project features will enhance safety and help to reduce the potential for vehicle-pedestrian and vehicle-bicycle conflicts. This includes protected intersections, shorter street crossings, better visibility of people who walk and bike, and slower overall travel speeds along the corridor. Overall, the project achieves LTS 1 ("suitable for children"), and is therefore consistent with best practices in low-stress network design (MTI 2012).

TABLE 8
ROADWAY SEGMENT LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Roadway Segment		Existing Without Project		Existing With Project		
		Bicycle Facilities	Traffic Stress	Bicycle Facilities	Potential Safety Benefits	Traffic Stress
Estrella Avenue	Orange Avenue to University Avenue	None	Low (1)	Bike Boulevard (both directions)	Features designed to raise driver awareness of people who bike, reduced motor vehicle travel speeds	Low (1)
University Avenue	Estrella Avenue to 50th Street	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in number of travel lanes, motor vehicle travel speeds, and collision severity	Low (1)
University Avenue	50th Street to 52nd Street	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in number of travel lanes, motor vehicle travel speeds, and collision severity	Low (1)
University Avenue	52nd Street to Shiloh Road	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in number of travel lanes, motor vehicle travel speeds, and collision severity	Low (1)
University Avenue	Shiloh Road to 54th Street	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in number of travel lanes, motor vehicle travel speeds, and collision severity	Low (1)
University Avenue	54th Street to 58th Street	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in number of travel lanes, motor vehicle travel speeds, and collision severity	Low (1)

TABLE 8
ROADWAY SEGMENT LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Roadway Segment		Existing Without Project		Existing With Project		
		Bicycle Facilities	Traffic Stress	Bicycle Facilities	Potential Safety Benefits	Traffic Stress
University Avenue	58th Street to College Avenue	Buffered bike lanes	Low (1)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in travel lane widths, motor vehicle travel speeds, and collision severity	Low (1)
University Avenue	College Avenue to Rolando Boulevard	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in travel lane widths, motor vehicle travel speeds, and collision severity	Low (1)
University Avenue	Rolando Boulevard to Alamo Drive	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in travel lane widths, motor vehicle travel speeds, and collision severity	Low (1)
University Avenue	Alamo Drive to 70th Street	None	High (4)	Buffered bike lanes (both directions)	Painted buffer provides separation between people biking and people driving; reductions in travel lane widths, motor vehicle travel speeds, and collision severity	Low (1)

Source: Fehr & Peers, 2018

TABLE 9
INTERSECTION APPROACH LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT ON UNIVERSITY AVENUE

Cross Street(s)	Existing Without Project		Existing With Project		
	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits	Traffic Stress
Estrella Avenue	Side street stop only, diagonal ramps	Low (1)	Side street stop, enhanced pedestrian crossing such as a HAWK, bike lane leading to intersection on westbound approach	Increased visibility to drivers and awareness of people walking or biking	Low (1)
Winona Avenue	Push button signal activation, diagonal ramps, striped crosswalks	Low (1)	Signal, striped bike lane leading to intersection on both sides	Increased visibility to drivers and awareness of people biking	Low (1)
50th Street	Side street stop only, diagonal ramps, striped crosswalks, RRFB on west leg	Low (1)	Side street stop, striped bike lane leading to intersection on eastbound approach, buffered bike lane leading to intersection on westbound approach	Increased visibility to drivers and awareness of people walking or biking	Low (1)
52nd Street Salvation Driveway	Push button signal activation, diagonal ramps, striped crosswalks	Low (1)	Signal, striped bike lane leading to intersection on both sides	Increased visibility to drivers and awareness of people biking	Low (1)
Shiloh Road Cartagena Drive Alamo Drive 68th Street 69th Street	Side street stop only, diagonal ramps	Low (1)	Side street stop, striped bike lane leading to intersection on both sides	Increased visibility to drivers and awareness of people walking or biking	Low (1)

TABLE 9
INTERSECTION APPROACH LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT ON UNIVERSITY AVENUE

Cross Street(s)	Existing Without Project		Existing With Project		
	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits	Traffic Stress
54th Street	Push button signal activation, diagonal ramps, striped crosswalks, two free channelized right turns	High (4)	Signal, protected intersection on all approaches, channelized right turns expected to be converted to curb extensions	Increased visibility to drivers and awareness of people walking or biking, slower vehicle turning speeds	Low (1)
Chollas Parkway	Uncontrolled except for westbound left turn, no curb ramps or striped crossing	High (4)*	Chollas Parkway access closed, enhanced pedestrian crossing such as a HAWK	Elimination of bicycle/ vehicle conflicts and addition of enhanced pedestrian crossing	Low (1)**
58th Street	Push button signal activation, diagonal ramps, striped crosswalks except north leg, one yield-control channelized right turn	High (4)	Signal, direct ramps, protected bike lane leading to intersection on westbound approach, protected intersection treatment on eastbound approach	Increased visibility to drivers and awareness of people walking or biking, slower vehicle turning speeds	Low (1)
University Square Driveway	Push button signal activation, diagonal ramps, striped crosswalks	High (3)	Signal, striped bike lane leading to intersection on westbound approach, protected bike lane on eastbound approach	Increased visibility to drivers and awareness of people biking	Low (1)
60th Street College Avenue	Push button signal activation, diagonal ramps, striped crosswalks, striped bike lane leading to intersection on one side	High (3)	Signal, protected bike lanes leading to intersection on both sides	Increased visibility to drivers and awareness of people biking	Low (1)

TABLE 9
INTERSECTION APPROACH LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT ON UNIVERSITY AVENUE

Cross Street(s)	Existing Without Project		Existing With Project		
	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits	Traffic Stress
Bonillo Drive	Side street stop only, diagonal ramps	Low (1)	Side street stop, striped bike lane leading to intersection on both sides, enhanced pedestrian crossing such as an RRFB west leg	Increased visibility to drivers and awareness of people walking or biking	Low (1)
Rolando Boulevard	Push button signal activation, diagonal ramps, striped crosswalks	Low (1)	Signal, protected bike lanes leading to intersection on both sides	Increased visibility to drivers and awareness of people biking	Low (1)
Aragon Drive	Push button signal activation, diagonal ramps, striped crosswalks	Low (1)	Signal, striped bike lane leading to intersection on westbound approach, protected bike lane on eastbound approach	Increased visibility to drivers and awareness of people biking	Low (1)

Source: Fehr & Peers, 2018

* LTS methodology does not specify roadway merging conditions, but engineering judgement can be used to categorize this intersection as very high stress for people who bike.

** The project closes access to and from Chollas Parkway such that LTS at this point is governed by segment-level thresholds rather than intersection thresholds.

VEHICULAR TRAFFIC CONDITIONS

The Existing Conditions with the Project scenario examines how implementation of the proposed project will affect vehicle traffic conditions along roadway segments and at intersections in the project area. The results of the roadway capacity and intersection capacity analyses are provided below.

Proposed Changes to Roadway Segment and Intersection Capacity

Intersection operations for Existing Conditions assume all of the current lane configurations and traffic control devices in place. For Existing With Project Conditions, removal of the through lanes along the majority of the project corridor will reduce the street capacity. This reconfiguration of University Avenue is not identified in the Mid-City Community Plan from August 1998, although in proposing a Class II bikeway, it is consistent with the plan to provide an enhanced bicycle facility. The network assumptions would be modified as follows:

- One eastbound lane would be removed from the following intersections:
    - Estrella Avenue & University Avenue
    - Winona Avenue & University Avenue
    - 50th Street & University Avenue
    - 58th Street & University Avenue
- One westbound lane would be removed from the following intersections:
    - College Avenue & University Avenue
- One eastbound lane and one westbound lane would be removed from the following intersections:
    - 52nd Street & University Avenue
    - Shiloh Road & University Avenue
    - Cartagena Drive & University Avenue
    - Bonillo Drive & University Avenue
    - Rolando Boulevard & University Avenue
    - Aragon Drive & University Avenue
    - Alamo Drive & University Avenue
    - Salvation Driveway & University Avenue
    - 68th Street & University Avenue
    - 69th Street & University Avenue
- Other project features are expected to include turn restrictions via medians or signage, removal of high speed right turn lanes, addition of bike boxes, bike signals, and other walking and biking facility enhancements.

Roadway Capacity Analysis

Table 10 shows the results for the roadway segment analysis. The analysis assumes optimization of signal timings and splits (i.e., the amount of time allocated to each approach) to some intersections as part of the project implementation. As shown in that table, the removal of travel lanes with the project causes the LOS on six segments of University Avenue to decrease to LOS F:

1) between Euclid Avenue and Winona Avenue
2) between Winona Avenue and 52nd Street
3) between 52nd Street and 54th Street
9) between College Avenue and Rolando Boulevard
10) between Rolando Boulevard and Aragon Drive
12) between Salvation Driveway and 70th Street

As a result, these six roadway segments were subject to additional evaluation in Part 2 of the roadway segment analysis, to determine if the traffic conditions for these segments will meet the City of San Diego standards. The other roadway segments would meet the standards provided in Part 1 of the segment analysis with implementation of the proposed project, so no further evaluation of these segments is required. **Table 11** shows the results for Part 2 of the roadway segments analysis. The arterial analysis LOS summary tables and calculation sheets for the corresponding roadway segments are included in **Appendix F**.

For the segment of University Avenue between Euclid Avenue and Winona Avenue, **Table 11** shows:

- The Winona Avenue intersection at the east end of this segment will operate at LOS D or better. The project does not make changes at Euclid Avenue and no change in operation is anticipated.
- In addition, the arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 3-lane collector with a center left-turn lane to a 2-lane collector with a center left-turn lane is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet the City of San Diego Standards.

For the segment of University Avenue between Winona Avenue and 52nd Street, the table shows:

- The intersections at either end of this segment will operate at LOS D or better.
- In addition, the arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 3 to 4-lane major arterial to a 2-lane major arterial is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet to City of San Diego standards.

TABLE 10
PART 1: ROADWAY SEGMENT ANALYSIS FOR EXISTING WITHOUT AND WITH PROJECT

Roadway Segment			Existing Without Project				Existing With Project				
ID	University Avenue To/From		Roadway Classification (# of Lanes)[1]	ADT	V/C[2]	LOS[3,4]	Roadway Classification (# of Lanes)[1]	ADT	V/C[2]	LOS[3,4]	Δ V/C
1	Euclid Ave	Winona Ave	4C/3C w/CLTL	20,276	**0.90**	**E**	4C/2C w/CLTL	20,276	**1.35**	**F**	**0.45**
2	Winona Ave	52nd St	3/4M	20,246	0.67	C	2M	20,246	**1.01**	**F**	**0.34**
3	52nd St	54th St	4M	21,583	0.54	C	2M	21,583	**1.08**	**F**	**0.54**
4	54th St	Chollas Pkwy	4M	22,989	0.57	C	4M	22,989	0.57	C	0.00
5	Chollas Pkwy	58th St	4M	29,080	0.73	C	4M	29,080	0.73	D	0.00
6	58th St	University Square Dwy	5M	21,328	0.43	B	4M	21,328	0.53	C	0.10
7	University Square Dwy	60th St	5M	23,838	0.48	B	4M	23,838	0.60	C	0.12
8	60th St	College Ave	4/5M	22,014	0.55	C	4M	22,014	0.55	C	0.00
9	College Ave	Rolando Blvd	4M	20,250	0.51	B	2C w/CLTL	20,250	**1.35**	**F**	**0.84**
10	Rolando Blvd	Aragon Dr	4M	21,645	0.54	C	2C w/CLTL	21,645	**1.44**	**F**	**0.90**
11	Aragon Dr	Salvation Dwy	4M	17,411	0.44	B	2M	17,411	0.87	D	0.43
12	Salvation Dwy	70th St/Lois St	4M	19,910	0.50	B	2M	19,910	**1.00**	**E**	**0.50**

Source: Fehr & Peers, 2018

Notes:

1 2C w/CLTL = 2-lane collector with center left-turn lane
3C w/CLTL = 3-lane collector (2 lanes in one direction and 1 in opposing direction) with center left-turn lane; capacity is assumed to be 150% of 2C w/CLTL capacity
4C = 4-lane collector
2M = 2-lane major arterial (1 lane in each direction with a raised median and left turn pockets); capacity is assumed to be 50% of 4M capacity
3M = 3-lane major arterial (2 lanes in one direction and 1 in opposing direction); capacity is assumed to be 75% of 4M capacity
4M = 4-lane major arterial
5M = 5-lane major arterial (3 lanes in one direction and 2 in opposing direction); capacity is assumed to be 125% of 4M capacity

2 Volume-to-capacity ratio. Worst-case is shown on segments with multiple classifications

3 LOS calculations performed using City of San Diego Traffic Impact Study Manual (1998)

4 Below-standard ADT volumes per segment and LOS highlighted in **bold**.

TABLE 11
PART 2: ROADWAY SEGMENT ARTERIAL ANALYSIS FOR EXISTING WITH PROJECT

Study Segments			Peak Hour Intersection LOS	Direction	Peak Hour Speed-Based Performance		Change in Vehicle Travel Time (sec)[1]		Consistent with Community Plan?
ID	University Avenue To/From				Meets Criterion in AM?	Meets Criterion in PM?	AM Peak Hour	PM Peak Hour	
1	Euclid Ave	Winona Ave	Winona Avenue meets the City standard in AM and PM (LOS D or better). Euclid Ave is outside of the study area.	EB	Yes	Yes	+1.0	+7.5	No
				WB	Yes	Yes	-	-	
2	Winona Ave	52nd St	Meets the City standard in AM and PM for both intersections (LOS D or better).	EB	Yes	Yes	+2.9	+10.1	No
				WB	Yes	Yes	-0.3	+0.4	
3	52nd St	54th St	52nd St meets the City standard in AM and PM (LOS D or better). 54th St does not meet the City standard in AM or PM (LOS E).	EB	Yes	Yes	+5.4	+1.3	No
				WB	Yes	Yes	+6.1	+5.8	
9	College Ave	Rolando Blvd	Rolando Blvd meets the City standard in AM and PM (LOS D or better). College Ave does not meet the City standard in AM or PM (LOS E).	EB	Yes	Yes	+2.9	+12.2	No
				WB	Yes	Yes	-1.4	+5.8	
10	Rolando Blvd	Aragon Dr	Meets the City standard in AM and PM for both intersections (LOS D or better).	EB	Yes	Yes	+5.5	+3.5	No
				WB	Yes	Yes	+6.3	+8.6	
12	Salvation Dwy	70th St/Lois St	Meets the City standard in AM and PM for both intersections (LOS D or better).	EB	Yes	Yes	+0.7	+1.2	No
				WB	Yes	Yes	+1.2	+0.1	

Source: Appendix F (Synchro 9.0 Arterial Analysis)

1. Existing With Project Travel Time minus Existing Without Project Travel Time

For the segment of University Avenue between 52nd Street and 54th Street, the table shows:

- The 52nd Street intersection will operate at LOS D or better, but the 54th Street intersection will operate below the City standard.
- The arterial analysis shows that the segment meets the City of San Diego threshold.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane major arterial is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet City of San Diego standards.

For the segment of University Avenue between College Avenue and Rolando Boulevard, the table shows:

- The Rolando Boulevard intersection will operate at LOS D or better, but the College Avenue intersection will operate below the City standard.
- The arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane collector with a center left-turn lane is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along these segments do not meet City of San Diego standards.

Finally, for the segment of University Avenue between Rolando Boulevard and Aragon Drive, the table shows:

- The intersections at either end of this segment will operate at LOS D or better.
- In addition, the arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane collector with a center left-turn lane is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet to City of San Diego standards.

For the segment of University Avenue between Salvation Driveway and 70th Street, the table shows:

- The intersections at either end of this segment will operate at LOS D or better.
- In addition, the arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane major arterial is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along these segments do not meet City of San Diego standards.

Intersection Analysis

The results of the operations analysis of Existing Without and With Project Conditions are presented in **Table 12**. The analysis assumes optimization of signal timings and splits (i.e., the amount of time allocated to each approach) to some intersections as part of the project implementation. **Appendix D** includes the corresponding LOS worksheets for all study scenarios.

As shown in **Table 12**, two intersections will not meet the City's minimum operating standard after implementation of the proposed project:

7) 54th Street & University Avenue (AM & PM only)
11) College Avenue & University Avenue (AM & PM)

Improving the level of service to meet the City standard at these intersections would require maintaining additional travel lanes or modifying the signal phasing to allow right turns on red. Neither of these are feasible while maintaining bicycle comfort and safety.

Vehicle Queuing

Because the project prohibits right turns on red on several approaches, a review of vehicle queueing was also conducted at those intersections. **Appendix G** includes a list of the projected queues under Existing Without and With Project Conditions, as well as the queueing worksheets.

At multiple locations, the 95th percentile queues would extend beyond the storage capacity. Queues are expected to be as long as the 95th percentile estimates very rarely, and the average (50th percentile) queues are accommodated by the storage lanes. Further reducing queues would require additional turn lanes or modification of the signal phasing to increase the green time provided to turning vehicles. Neither of these are feasible while maintaining bicycle comfort and safety.

TABLE 12
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT AND WITH PROJECT

Intersection	Peak Hour	Traffic Control	Existing Without Project Conditions		Existing With Project Conditions		Delay Change
			Delay (sec/veh)[1]	LOS[2,3]	Delay (sec/veh)[1]	LOS[2,3]	
1. Estrella Ave & Polk Ave	AM	AWSC	7.6	A	7.6	A	0.0
	PM		7.5	A	7.5	A	0.0
2. Estrella Ave & University Ave	AM	SSSC	**59.4**	**F**	**46.1**	**E**	**-13.3**
	PM		**65.7**	**F**	**54.3**	**F**	**-11.4**
3. Winona Ave & University Ave	AM	Signalized	20.6	C	17.8	B	-2.8
	PM		19.5	B	17.6	B	-1.9
4. 50th St & University Ave	AM	SSSC	15.9	C	15.9	C	0.0
	PM		17.0	C	21.9	C	4.9
5. 52nd St & University Ave	AM	Signalized	21.9	C	28.7	C	6.8
	PM		17.7	B	18.2	B	0.5
6. Shiloh Rd/Dwy & University Ave	AM	SSSC	**39.2**	**E**	16.6	C	-22.6
	PM		**50.7**	**F**	19.6	C	-31.1
7. 54th St & University Ave*	AM	Signalized	39.9	D	**73.1**	**E**	**33.2**
	PM		51.8	D	**77.7**	**E**	**25.9**
8. 58th Street & University Ave*	AM	Signalized	23.2	C	27.8	C	4.6
	PM		21.1	C	29.1	C	8.0
9. University Square Dwy & University Ave*	AM	Signalized	8.0	A	11.3	B	3.3
	PM		12.4	B	16.4	B	4.0
10. 60th St & University Ave*	AM	Signalized	11.2	B	13.2	B	2.0
	PM		16.0	B	19.2	B	3.2
11. College Ave & University Ave*	AM	Signalized	40.4	D	**61.9**	**E**	**21.5**
	PM		40.5	D	**65.0**	**E**	**24.5**
12. Cartagena Dr & University Ave	AM	SSSC	19.7	C	16.1	C	-3.6
	PM		**43.2**	**E**	21.0	C	-22.2
13. Bonillo Dr & University Ave	AM	SSSC	22.5	C	15.1	C	-7.4
	PM		**37.6**	**E**	19.8	C	-17.8
14. Rolando Blvd & University Ave*	AM	Signalized	13.4	B	23.1	C	9.7
	PM		12.0	B	34.4	C	22.4

15. Aragon Dr & University Ave*	AM	Signalized	11.7	B	15.0	B	3.3
	PM		10.3	B	17.5	B	7.2
16. University Ave & Alamo Dr	AM	SSSC	12.6	B	15.4	C	2.8
	PM		16.2	C	20.5	C	4.3
17. Salvation Driveway & University Ave*	AM	Signalized	6.5	A	7.6	A	1.1
	PM		10.4	B	13.5	B	3.1
18. University Ave & 68th St	AM	SSSC	13.1	B	15.2	C	2.1
	PM		14.5	B	18.2	C	3.7
19. 69th St & University Ave	AM	SSSC	14.2	B	15.9	C	1.7
	PM		18.3	C	21.0	C	2.7
20. Lois St/70th St & University Ave	AM	Signalized	37.8	D	37.4	D	-0.4
	PM		30.0	C	28.7	C	-1.3

Source: Fehr & Peers, 2018

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. Worst movement delay reported for side-street-stop-controlled intersection

[2] LOS calculations performed using the *Highway Capacity Manual (HCM)* method.

[3] Below-standard seconds of delay per vehicle and LOS highlighted in **bold.**

* Existing or proposed signal phasing prevents the use of HCM 2010 at this intersection. The HCM 2000 method was applied instead.

4.0 FUTURE CONDITIONS WITH AND WITHOUT THE PROJECT

This chapter describes safety conditions for people who walk and bike as well as the vehicle traffic conditions (at roadway segments and intersections) under the Future Conditions Without the Project and Future Conditions With the Project scenarios.

4.1 FUTURE CONDITIONS WITHOUT THE PROJECT (YEAR 2022)

This section describes existing conditions as of 2022 for intersections and roadway segments in the project corridor, including existing facilities and collision history for people who walk and bike, as well as vehicular traffic conditions including volumes, intersection turning movements, roadway classifications, and traffic control devices (e.g., traffic signals, stop signs).

BICYCLE AND PEDESTRIAN CONDITIONS

Without the proposed project, this study assumes that bicycle and pedestrian safety conditions in 2022 will remain substantially the same as the existing conditions described in **Section 3.1**.

VEHICULAR TRAFFIC CONDITIONS

The Future Conditions without the Project scenario examines vehicle traffic conditions along roadways segments and at intersections in the project area in the future. The results of the roadway capacity and intersection capacity analyses are provided below.

Proposed Changes to Roadway Capacity

No roadway capacity changes are anticipated for the year 2022 without the proposed project. As such, the roadway network for the Future Without Project scenario is the same as the roadway network for the Existing Without Project scenario described in **Section 3.1**.

Proposed Changes to Intersection Capacity

No intersection capacity changes are anticipated for the year 2022 without the proposed project. As such, the intersection capacities for the Future Without Project scenario are the same as those analyzed in the Existing Without Project scenario described in **Section 3.1**.

4.2 FUTURE CONDITIONS WITH THE PROJECT (YEAR 2022)

Future With Project conditions represent the conditions of the roadways and intersections within the project area in the year 2022 if the proposed project were implemented.

BICYCLE AND PEDESTRIAN CONDITIONS

The bicycle and pedestrian safety assessment for these travel modes is expected to be the same for the Future with Project condition as the Existing with Project condition (see **Chapter 3** for this information). Safety for people who bike and walk is expected to be enhanced and the number and severity of collisions are expected to decline with the project in place. On parallel facilities, collisions could also be reduced in number and severity as people who bike shift to the University Bikeway instead of traveling on streets with higher vehicle speeds and volumes. As additional connections are constructed for people who walk and bike, more people will use the University Bikeway for non-motorized travel. Larger numbers of people walking and biking along the corridor will further increase the safety along the corridor as people driving develop an increased awareness of people walking or biking.

VEHICULAR TRAFFIC CONDITIONS

The Future Conditions with the Project scenario examines how implementation of the proposed project would affect vehicle traffic conditions along roadways segments and at intersections in the project area. The results of the roadway capacity and intersection capacity analyses are provided below.

Proposed Changes to Roadway Segment and Intersection Capacity

No roadway capacity changes are anticipated for the year 2022 besides the changes proposed by the proposed project. Therefore, the Future With Project scenario analyzes the same roadway capacity changes as the Existing With Project scenario described in **Section 3.1**.

Roadway Capacity Analysis

Table 13 shows the results for the roadway segment analysis. As shown in that table, the removal of travel lanes with the project causes the LOS on seven segments of University Avenue to decrease to LOS E or F:

1) between Euclid Avenue and Winona Avenue
2) between Winona Avenue and 52nd Street
3) between 52nd Street and 54th Street
9) between College Avenue and Rolando Boulevard
10) between Rolando Boulevard and Aragon Drive
11) between Aragon Drive and Salvation Driveway
12) between Salvation Driveway and 70th Street

TABLE 13
PART 1: ROADWAY SEGMENT ANALYSIS FOR FUTURE WITHOUT AND WITH PROJECT

Roadway Segment			Future Without Project				Future With Project				
ID	University Avenue To/From		Roadway Classification (# of Lanes)[1]	ADT	V/C[2]	LOS[3,4]	Roadway Classification (# of Lanes)[1]	ADT	V/C[2]	LOS[3,4]	Δ V/C
1	Euclid Ave	Winona Ave	4C/3C w/CLTL	21,017	**0.93**	**E**	4C/2C w/CLTL	21,017	**1.40**	**F**	**0.47**
2	Winona Ave	52nd St	3/4M	20,987	0.70	C	2M	20,987	**1.05**	**F**	**0.35**
3	52nd St	54th St	4M	22,367	0.56	C	2M	22,367	**1.12**	**F**	**0.56**
4	54th St	Chollas Pkwy	4M	23,830	0.60	C	4M	23,830	0.60	C	0.00
5	Chollas Pkwy	58th St	4M	30,152	0.75	D	4M	30,152	0.75	D	0.00
6	58th St	University Square Dwy	5M	22,108	0.44	B	4M	22,108	0.55	C	0.11
7	University Square Dwy	60th St	5M	24,722	0.49	B	4M	24,722	0.62	C	0.13
8	60th St	College Ave	4/5M	22,819	0.57	C	4M	22,819	0.57	C	0.00
9	College Ave	Rolando Blvd	4M	21,545	0.54	C	2C w/CLTL	21,545	**1.44**	**F**	**0.90**
10	Rolando Blvd	Aragon Dr	4M	23,084	0.58	C	2C w/CLTL	23,084	**1.54**	**F**	**0.96**
11	Aragon Dr	Salvation Drwy	4M	18,569	0.46	B	2M	18,569	**0.93**	**E**	**0.47**
12	Salvation Dwy	70th St/Lois St	4M	21,233	0.53	C	2M	21,233	**1.06**	**F**	**0.53**

Source: Fehr & Peers, 2018

Notes:

1 2C w/CLTL = 2-lane collector with center left-turn lane
3C w/CLTL = 3-lane collector (2 lanes in one direction and 1 in opposing direction) with center left-turn lane; capacity is assumed to be 150% of 2C w/CLTL capacity
4C = 4-lane collector
2M = 2-lane major arterial (1 lane in each direction with a raised median and left turn pockets); capacity is assumed to be 50% of 4M capacity
3M = 3-lane major arterial (2 lanes in one direction and 1 in opposing direction); capacity is assumed to be 75% of 4M capacity
4M = 4-lane major arterial
5M = 5-lane major arterial (3 lanes in one direction and 2 in opposing direction); capacity is assumed to be 125% of 4M capacity

2 Volume-to-capacity ratio. Worst-case is shown on segments with multiple classifications

3 LOS calculations performed using City of San Diego Traffic Impact Study Manual (1998)

4 Below-standard ADT volumes per segment and LOS highlighted in **bold**.

As a result, these seven roadway segments were subject to additional evaluation in Part 2 of the roadway segment analysis, to determine if the traffic conditions for these segments will meet the City of San Diego standards. The other roadway segments will meet the standards provided in Part 1 of the segment analysis with implementation of the proposed project, so no further evaluation of these segments is required. **Table 14** shows the results for Part 2 of the roadway segments analysis. The arterial analysis LOS summary tables and calculation sheets for the corresponding roadway segments are included in **Appendix F**.

For the segment of University Avenue between Euclid Avenue and Winona Avenue, **Table 14** shows:

- The Winona Avenue intersection at the east end of this segment will operate at LOS D or better. The project does not make changes at Euclid Avenue and no change in operation is anticipated.
- In addition, an arterial analysis shows that the segment meets the City of San Diego criterion. In the westbound direction, the project does not make substantial changes to the configuration and no change in operation is anticipated along the segment.
- However, the proposal to reconfigure the roadway from a 4-lane collector and 3-lane collector with a center left-turn lane to a 2-lane collector with a center left-turn lane is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet the City of San Diego standards.

For the segment of University Avenue between Winona Avenue and 52nd Street, the table shows

- The intersections at either end of this segment will operate at LOS D or better.
- In addition, the arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 3 to 4-lane major arterial to a 2-lane collector with a center left-turn lane is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet City of San Diego standards.

For the segment of University Avenue between 52nd Street and 54th Street, the table shows:

- The 52nd Street intersection will operate at LOS D or better, but the 54th Street intersection will operate below the City standard.
- The arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane major arterial is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the LOS F intersection operations, as well as the inconsistency with the adopted Community Plan, the traffic conditions along these segments do not meet the City of San Diego standards.

TABLE 14
PART 2: ROADWAY SEGMENT ANALYSIS FOR FUTURE WITH PROJECT

ID	Study Segments: University Avenue To/From		Peak Hour Intersection LOS	Direction	Peak Hour Speed-Based Performance: Meets Criterion in AM?	Peak Hour Speed-Based Performance: Meets Criterion in PM?	Change in Vehicle Travel Time (sec)[1]: AM Peak Hour	Change in Vehicle Travel Time (sec)[1]: PM Peak Hour	Consistent with Community Plan?
1	Euclid Ave	Winona Ave	Winona Avenue meets the City standard in AM and PM (LOS D or better). Euclid Ave is outside of the study area.	EB	Yes	Yes	+1.4	+8.7	No
				WB	Yes	Yes	-	-	
2	Winona Ave	52nd St	Meets the City standard in AM and PM for both intersections (LOS D or better)	EB	Yes	Yes	+3.4	+11.0	No
				WB	Yes	Yes	+0.6	-0.6	
3	52nd St	54th St	52nd St meets the City standard in AM and PM (LOS D or better). 54th St does not meet the City standard in AM or PM (LOS F).	EB	Yes	Yes	+2.8	-0.4	No
				WB	Yes	Yes	+6.8	+6.6	
9	College Ave	Rolando Blvd	Rolando Blvd meets the City standard in AM and PM (LOS D or better). College Ave does not meet the City standard in AM or PM (LOS E).	EB	Yes	Yes	+4.0	+16.1	No
				WB	Yes	Yes	-1.3	+3.9	
10	Rolando Blvd	Aragon Dr	Meets the City standard in AM and PM for both intersections (LOS D or better).	EB	Yes	Yes	+6.5	+5.6	No
				WB	Yes	Yes	+7.7	+9.2	
11	Aragon Dr	Salvation Dwy	Meets the City standard in AM and PM for both intersections (LOS D or better)	EB	Yes	Yes	+1.1	+2.5	No
				WB	Yes	Yes	+4.7	+2.8	
12	Salvation Dwy	70th St/Lois St	Meets the City standard in AM and PM for both intersections (LOS D or better)	EB	Yes	Yes	-0.8	-1.4	No
				WB	Yes	Yes	+1.3	+0.3	

Source: Appendix F (Synchro 9.0 Arterial Analysis)

1. Future With Project Travel Time minus Future Without Project Travel Time

For the segments of University Avenue between College Avenue and Rolando Boulevard, the table shows:

- The Rolando Boulevard intersection will operate at LOS D or better, but the College Avenue intersection will operate below the City standard.
- The arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane collector with a center left-turn lane is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the LOS E intersection operations, as well as the inconsistency with the adopted Community Plan, the traffic conditions along these segments do not meet the City of San Diego standards.

For the segment of University Avenue between Rolando Boulevard and Aragon Drive, the table shows:

- The intersections at either end of this segment will operate at LOS D or better.
- In addition, the arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane collector with a center left-turn lane is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet to City of San Diego standards.

For the segment of University Avenue between Aragon Drive and Salvation Driveway, the table shows:

- The intersections at either end of this segment will operate at LOS D or better.
- In addition, the arterial analysis shows that the segment meets the City of San Diego criterion..
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane major arterial is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet to City of San Diego standards.

Finally, for the segment of University Avenue between Salvation Driveway and 70th Street, the table shows:

- The intersections at either end of this segment will operate at LOS D or better.
- The arterial analysis shows that the segment meets the City of San Diego criterion.
- However, the proposal to reconfigure the roadway from a 4-lane major arterial to a 2-lane major arterial is inconsistent with the 4-lane major arterial configuration in the (1998) adopted Mid-City Communities Plan.

Because of the inconsistency with the adopted Community Plan, the traffic conditions along this segment do not meet to City of San Diego standards.

Intersection Analysis

The results of the operations analysis of Future Without and With Project conditions are presented in **Table 15**. **Appendix D** includes the corresponding LOS worksheets for all study scenarios.

As shown in **Table 15**, two intersections will not meet the City's minimum operating standard after implementation of the proposed project:

7) 54th Street & University Avenue (AM & PM)
11) College Avenue & University Avenue (AM & PM)

Improving the level of service to meet the City standard at these intersections would require maintaining additional travel lanes or modifying the signal phasing to allow right turns on red. Neither of these are feasible while maintaining bicycle comfort and safety.

TABLE 15
INTERSECTION LEVEL OF SERVICE RESULTS FOR FUTURE WITHOUT AND WITH PROJECT

Intersection	Peak Hour	Traffic Control	Future Without Project Conditions		Future With Project Conditions		Delay Change
			Delay (sec/veh)[1]	LOS[2,3]	Delay (sec/veh)[1]	LOS[2,3]	
1. Estrella Ave & Polk Ave	AM	AWSC	7.7	A	7.7	A	0.0
	PM		7.6	A	7.6	A	0.0
2. Estrella Ave & University Ave	AM	SSSC	**>100.0**	**F**	**78.1**	**F**	**-47.6**
	PM		**>100.0**	**F**	**>100.0**	**F**	**-66.6**
3. Winona Ave & University Ave	AM	Signalized	21.6	C	18.3	B	-3.3
	PM		21.6	C	22.2	C	0.6
4. 50th St & University Ave	AM	SSSC	16.8	C	16.8	C	0.0
	PM		18.0	C	23.0	C	5.0
5. 52nd St & University Ave	AM	Signalized	22.8	C	31.2	C	8.4
	PM		18.9	B	20.2	C	1.3
6. Shiloh Rd/Dwy & University Ave	AM	SSSC	**62.0**	**F**	17.4	C	-44.6
	PM		**90.9**	**F**	21.2	C	-69.7
7. 54th St & University Ave*	AM	Signalized	42.7	D	**82.0**	**F**	**39.3**
	PM		**55.6**	**E**	**84.9**	**F**	**29.3**
8. 58th Street & University Ave*	AM	Signalized	25.1	C	29.9	C	4.8
	PM		36.6	D	31.9	C	-4.7
9. University Square Dwy & University Ave*	AM	Signalized	8.0	A	10.0	A	2.0
	PM		12.9	B	37.2	D	24.3
10. 60th St & University Ave	AM	Signalized	13.5	B	15.3	B	1.8
	PM		17.5	B	20.8	C	3.3
11. College Ave & University Ave	AM	Signalized	45.9	D	**70.9**	**E**	**25.0**
	PM		44.1	D	**74.2**	**E**	**30.1**
12. Cartagena Dr & University Ave	AM	SSSC	**37.2**	**E**	17.5	C	-19.7
	PM		**76.3**	**F**	15.2	C	-61.1
13. Bonillo Dr & University Ave	AM	SSSC	31.0	D	16.8	C	-14.2
	PM		**51.3**	**F**	24.2	C	-27.1
14. Rolando Blvd & University Ave	AM	Signalized	15.2	B	35.0	C	19.8
	PM		14.1	B	49.5	D	35.4

TABLE 15
INTERSECTION LEVEL OF SERVICE RESULTS FOR FUTURE WITHOUT AND WITH PROJECT

Intersection	Peak Hour	Traffic Control	Future Without Project Conditions		Future With Project Conditions		Delay Change
			Delay (sec/veh)[1]	LOS[2,3]	Delay (sec/veh)[1]	LOS[2,3]	
15. Aragon Dr & University Ave*	AM	Signalized	12.7	B	16.7	B	4.0
	PM		11.8	B	14.6	B	2.8
16. University Ave & Alamo Dr	AM	SSSC	13.6	B	17.1	C	3.5
	PM		17.5	C	23.0	C	5.5
17. Salvation Driveway & University Ave*	AM	Signalized	6.8	A	8.0	A	1.2
	PM		10.7	B	14.6	B	3.9
18. University Ave & 68th St	AM	SSSC	13.2	B	15.9	C	2.7
	PM		16.0	C	20.3	C	4.3
19. 69th St & University Ave	AM	SSSC	15.6	C	18.0	C	2.4
	PM		20.8	C	24.6	C	3.8
20. Lois St/70th St & University Ave	AM	Signalized	43.1	D	45.2	D	2.1
	PM		34.2	C	33.6	C	-0.6

Source: Fehr & Peers, 2018

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized intersections. Worst movement delay reported for side-street-stop-controlled intersection

[2] LOS calculations performed using the *Highway Capacity Manual (HCM)* method.

[3] Below-standard seconds of delay per vehicle and LOS highlighted in **bold.**

* Existing or proposed signal phasing events the use of HCM 2010 at this intersection. The HCM 2000 method was applied instead.

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