UPTOWN BIKEWAYS
SEGMENTS 1-4

TRAFFIC AND SAFETY IMPACT ASSESSMENT

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Executive Summary

This Traffic and Safety Impact Assessment analyzes the vehicle traffic and bicycle and pedestrian safety impacts of Uptown Bikeways: Segments 1-4 ("proposed project"). It concludes that the proposed project would not result in any vehicular traffic impacts, as defined by the City of San Diego Significance Thresholds for Traffic Impacts. The proposed project also would not have any negative bicycle or pedestrian safety impacts. Preparation of this assessment is required before the SANDAG Board of Directors can make a determination that the proposed project is exempt from CEQA under Public Resources Code Section 21080.20.5.

The proposed project would make it easier and safer for people of all ages and abilities to travel on bikes among City of San Diego neighborhoods in the Uptown area, connecting Uptown to Old Town, Mission Valley, Downtown, and North Park. It also improves safety for people who walk and drive in these neighborhoods. The proposed project would create inviting and convenient bikeways that link key community destinations, including schools, parks, transit, and commercial centers. The bikeways would feature design elements that enhance the experience for people biking and walking, make streets safer for all users, and benefit people who live, work and do business in the neighborhoods served by the proposed project.

The proposed project is shown in Figure 1. The project has been split into segments for construction, which would be built in four phases. The design features and other related physical improvements for each segment are briefly described below. The following description is based on the proposed project's current level of design and would be finalized during the final engineering design phase – with additional opportunities for public input – before each segment begins construction.

Phase 1: Fourth and Fifth Avenue Bikeways

The Fourth and Fifth Avenue Bikeways segment would consist of separated bike lanes and buffered bike lanes on Fourth Avenue and Fifth Avenue from B Street to Washington Street, as well as bike lanes and shared lane markings on Washington Street between Third Avenue and Fifth Avenue, and shared lane markings along Laurel Street from Fourth Avenue to Sixth Avenue (where not already existing). Phase 1 also would include pedestrian crossings across Sixth Avenue to Balboa Park at or near the intersections of Sixth Avenue and Grape, Juniper, and Nutmeg streets.

Phase 2: Eastern Hillcrest Bikeways

On University Avenue in Eastern Hillcrest, separated bike lanes would be installed from SR 163/Ninth Avenue to Normal Street and on Normal Street from University Avenue to Lincoln Avenue. Class III shared lane markings would be provided on Lincoln Avenue from Normal Street to Georgia Street, and on Herbert Street from University Avenue to Robinson Avenue. Buffered bike lanes would be provided on Robinson Avenue from Herbert Street to Park Boulevard. There would be no changes to University Avenue between First Street and SR163/Ninth Avenue.

Phase 3: Washington Street & Bachman Place Bikeways

Phase 3 would consist of separated and buffered bike lanes on Washington Street, from the Washington Street Trolley Station to University Avenue. It also would consist of separated bike lanes, buffered bike lanes and shared lane markings on San Diego Avenue from Washington Street to Noel Street.

For the Bachman Place Bikeways, Class III shared lane markings would be installed along northbound Third Avenue from the Washington Street intersection north to Lewis Street, with a buffered bike lane provided along the west side of Third Avenue for southbound people on bikes. Along Lewis Street from Bachman Place to Third Avenue, shared lane markings would be provided for eastbound people on bikes and a contra-flow bike lane would be provided for westbound people on bikes. Bachman Place would transition at various points among buffered bike lanes, separated bike lanes, or Class III shared lane markings from Lewis Street to Hotel Circle South. Separated bike lanes would be installed on Hotel Circle South, Camino De La Reina, and Avenida Del Rio from Bachman Place to Riverwalk Drive. Additionally, on Third Avenue from Washington Street to Walnut Avenue, and along Walnut Avenue from Third Avenue to Fifth Avenue, shared lane markings and wayfinding signage would be installed.

Phase 4: Mission Hills & Old Town Bikeways

On University Avenue in Mission Hills, Phase 4 would consist of Class III shared lane markings (where not already marked) and traffic calming features from Ibis Street to First Street. There would be no changes to University Avenue between First Street and SR 163/Ninth Avenue. The Old Town Bikeways would provide a combination of separated bike lanes, buffered bike lanes, and Class III shared lane markings on San Diego Avenue from Noel Street to Congress Street, and Congress Street from San Diego Avenue to Taylor Street.

Other Physical Improvements

In general, other physical improvements may include painted markings for new and relocated on-street parking stalls, new painted or raised crosswalks, mid-block crossings, new painted or raised medians, curb extensions, curb ramps, bus bulbs, pedestrian refuge islands, and other modifications to existing curbs, gutters and drainage inlets, raised intersections, colored concrete and/or colored pavement, new signage, re-striping of vehicle lanes, new landscaping or other measures to treat stormwater, new traffic signals, rapid rectangular flashing beacons (RRFBs), modifying existing traffic signals (e.g., new phase for people on bikes/walking), relocating existing underground utilities, repaving the roadway surface (e.g., slurry seal), additional street lighting at priority locations, and similar minor physical improvements.

Bicycle and Pedestrian Safety

The proposed project would make it safer for people to walk and bike – and also drive – in the study area. It does so by strategically installing safety features on streets with the highest levels of traffic stress, e.g., streets that are wide, have high vehicle speeds, large volumes of vehicle traffic, and steep slopes. By improving safety and reducing the levels of traffic stress, the proposed project would increase the number of people that feel comfortable and willing to ride a bike in the study area. Because the proposed project includes design features that would improve safety for people walking and people on bikes, and would not have any adverse safety impacts for pedestrians or bicyclists, this assessment concludes that no bicycle and pedestrian safety mitigation measures are needed.

The design features that improve safety for people walking and on bikes include separated and buffered bike lanes that use vertical elements or painted markings to physically separate people on bikes from vehicle traffic, Class III shared lane markings indicating that travel lanes are shared with people on bikes, traffic calming features that reduce vehicle speeds such as narrowed vehicle lane widths and speed cushions, and other improvements that improve the safety of biking and walking through or across intersections, such as traffic circles, curb extensions, and raised crosswalks.

Bicycle and pedestrian safety conditions are described using a "level of traffic stress" (LTS) methodology, which uses a numbered system from 1 to 4 to characterize the actual and perceived safety of streets for people walking and on bikes using the following criteria: (a) speed limit, (b) number of vehicle lanes and presence or absence of a median, (c) grade or slope, and (d) average daily traffic (ADT) volumes. LTS 1 represents the safest streets on which people are the most comfortable riding a bike and walking, while LTS 4 represents the least safe streets on which people are the least comfortable riding a bike and walking. Bicycle and pedestrian safety conditions also are assessed using historical study area data about collisions, fatalities, and injuries involving people walking or on bikes. The assessment of bicycle and pedestrian safety also takes into account the presence or absence in the study area of facilities and infrastructure associated with bicycle and pedestrian safety, including but not limited to the type of street network, block lengths, street width/number of vehicle lanes, sidewalks, crosswalks, curb ramps, and curb extensions.

Vehicular Traffic Impacts

The study area for assessing vehicular traffic conditions under implementation of the proposed project includes roadway segments and intersections directly and indirectly affected by the proposed project. In total, the study area includes 59 roadway segments and 92 intersections.

The analysis shows that all 59 roadway segments and all 92 intersections in the study area would meet City of San Diego criteria for acceptable vehicular traffic conditions with implementation of the proposed project. The proposed project does not result in any vehicular traffic impacts. As a result, there is no need for the proposed project to implement any mitigation measures for traffic impacts.

Vehicular traffic conditions are described using the "level of service" (LOS) methodology, which uses a report card-style system to categorize traffic conditions for intersections and roadway segments from LOS A to LOS F. Free flowing traffic conditions are represented by LOS A, whereas LOS F represents extreme traffic congestion. Because the study area is located within the City of San Diego, this assessment uses the City of San Diego's adopted criteria for evaluating vehicular traffic conditions at intersections and on roadway segments.

This study evaluates two time periods: 2013 and 2020. For each year, the study looks at traffic conditions "with project" and "without project" to assess the proposed project's potential vehicular traffic impacts on roadway segments and intersections. The roadway segment analysis addresses how the proposed project would affect all-day traffic conditions; the intersection analysis addresses vehicle traffic conditions during peak traffic periods: 7:00 a.m. to 9:00 a.m. (the morning peak period) and 4:00 p.m. to 6:00 p.m. (the evening peak period).

2013 Traffic Conditions, With and Without Project

This scenario compares existing (2013) traffic conditions for the study area's 59 roadway segments and 92 intersections with implementation of the proposed project to 2013 traffic conditions without the proposed project; 2013 data are used because 2013 was the year the proposed project's traffic analysis was commenced. If the "Existing with Project" scenario showed intersections or roadway segments failing to meet one or more City of San Diego criteria for acceptable vehicular traffic conditions, then that intersection or roadway segment would be identified as a potential vehicular traffic impact. However, none of the study area's 59 roadway segments and 92 intersections failed to meet City of San Diego criteria for acceptable vehicular traffic conditions in the "Existing with Project" scenario.

2020 Traffic Conditions, With and Without Project

This scenario compares forecasted 2020 traffic conditions at study area intersections and roadway segments with implementation of the proposed project to 2020 traffic conditions without the proposed project; 2020 data are used to show how the proposed project would affect future traffic conditions if it is built. If the "Future with Project" scenario showed intersections or roadway segments failing to meet one or more City of San Diego criteria for acceptable vehicular traffic conditions, then that intersection or roadway segment would be identified as a potential vehicular traffic impact. However, none of the study area's 59 roadway segments and 92 intersections failed to meet City of San Diego criteria for acceptable vehicular traffic conditions in the "Future with Project" scenario.

1.0 Project Description

This chapter discusses the objective of the proposed project, its safety features and potential safety benefits, and describes the proposed project's design features and related physical improvements.

1.1 Project Objective

The proposed project is part of the San Diego Association of Governments (SANDAG) Regional Bike Plan Early Action Program (Bike EAP), a 10-year effort to expand the regional bike network and complete high-priority bikeway projects approved in Riding to 2050: The San Diego Regional Bike Plan (Bike Plan) (SANDAG 2010a). The 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 objective of the proposed project is to create connections between neighborhoods within Uptown community as well as connections to adjacent communities, improve street safety and create links to the larger bikeway network being built throughout the region.

The proposed project involves approximately 11 miles of existing urban roadways, providing on-street bikeway connections to Old Town, Five Points, Mission Valley, Uptown, Downtown, North Park and Balboa Park. The proposed project includes improvements to create safer conditions for all users, including people who walk, bike and drive. The proposed project would achieve this through traffic calming, separated bike lanes, buffered bike lanes, Class II bike lanes, Class III shared lane markings, shortened street crossing distances, realigned curb ramps, improved sight distances, and signal modifications.

There is clear and consistent policy direction on the local, regional and state levels to provide safe and 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 City of San Diego Bicycle Master Plan and Climate Action Plan, the SANDAG Regional Bike Plan, San Diego Forward: The Regional Plan, and the SANDAG Climate Action Strategy.

Analysis of ninety 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 bicycle and pedestrian facilities 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 because of the high levels of perceived and actual risks associated with riding a bike on the street (SANDAG 2010a). Based on case studies nationwide, the population currently interested in biking, but concerned about safety, is expected to begin to ride and ride more often when served by a network of safe bikeways and low stress streets (NITC 2014).

Based on factors such as its compact, high density, mixed land use patterns, population characteristics, facility gaps, incidence of accidents, and public comments related to problem areas, the Uptown area of the City of San Diego was identified by SANDAG as a location where investments in bikeway infrastructure would have the most benefits. As a result, the proposed project is ranked as "high-priority" in the Bike Plan.

1.2 Project Safety Features and Potential Safety Benefits

One of the major goals of the proposed project is to enhance safety for people on bikes and people walking in the study area. The proposed project aims to improve safety with separated and buffered bike lanes that physically separate people biking from vehicle traffic, and traffic calming features that reduce vehicle speeds and improve conditions at intersections for people walking and biking. These project features also aim to improve safety for people driving in the study area.

Separated Bike Lanes

Separated bike lanes are facilities located in roadway right-of-way and separated from vehicle lanes by a vertical element such as on-street parking, raised curbs or medians, bollards, landscaping, or planters. Separated bike lanes can be designed to provide for one-way or two-way travel adjacent to vehicular travel lanes and are exclusively for use by people on bikes. These facilities provide a degree of 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.

Buffered Bike Lanes

Buffered bike lanes are facilities located in roadway right-of-way and separated from vehicle lanes with a painted buffer. These facilities also provide a degree of 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.

Class II Bike Lanes

Class II bike lanes are facilities located in roadway right-of-way and separated from vehicle lanes with a painted stripe. These facilities also provide a degree of 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.

Class III Shared Lane Markings

Class III shared lane markings consist of bicycle markings within vehicle lanes to indicate shared space with people on bikes. The proposed project would generally combine these markings with other safety features (as described below), which would work together to help provide a degree of safety for people who are interested in biking, but are concerned about safety.

Other Safety Features

Several traffic calming measures and traffic control modifications would be implemented along each of the proposed project segments, such as traffic circles[1], speed cushions[2], curb extensions, raised crosswalks, raised medians, and narrowed vehicle lane widths.

[1] Traffic circles are raised center islands within intersections to manage vehicle speeds and volumes. They typically have either two-way or four-way stop or traffic signal control.

[2] Speed cushions are either speed humps or speed tables that include wheel cutouts to allow large vehicles (such as emergency vehicles) to pass unaffected, while reducing passenger car speeds.

These measures would reduce vehicle speeds, shorten pedestrian crossing distances, and increase pedestrian visibility, thereby improving safety for people on bikes, people walking, and people in vehicles. These features also would generally promote efficient travel for people on bikes and in vehicles.

Reducing and maintaining relatively low vehicular travel speeds through traffic calming helps attract a greater number of people to walk and bike on urban streets. Scientific studies have shown reduced severity of injuries and significantly lower risk of fatalities for people walking and biking when travel speeds on streets are maintained at less than 25 to 30 mph (Department for Transport, 2010).

1.3 Description of Design Features and Related Physical Improvements

A description of the Uptown Bikeways (proposed project) is provided below and the project alignment is illustrated in Figure 1. Typical cross sections are provided in Appendix A. The following description is based on the proposed project's current level of design and would be finalized during the final engineering design phase – with additional opportunities for public input – before each segment begins construction.

Phase 1: Fourth and Fifth Avenue Bikeways

In this segment, the proposed project would install one-directional, separated bike lanes and buffered bike lanes along Fourth and Fifth Avenues from B Street to Washington Street. The bikeways would be located in the existing vehicle lane along the left side of these roadways to avoid conflicts with public transit vehicles on the right side of these one-way streets. Additionally, Washington Street between Fifth Avenue and Third Avenue would transition between bike lanes and shared lane markings. Class III shared lane markings and signage would also be included along Laurel Street from Fourth Avenue to Sixth Avenue, where not already existing.

Along Fourth Avenue, there would be buffered bike lanes from B Street to Laurel Street, and separated bike lanes from Laurel Street to Washington Street. Along Fifth Avenue there would be separated bike lanes from B Street to Ash Street, buffered bike lanes from Ash Street to Date Street, and separated bike lanes from Date Street to Washington Street. The bikeways would be constructed within the existing roadway.

The portions that would change from 3-lane major to 2-lane major roads include Fourth Avenue from B Street to Date Street and from Laurel Street to Walnut Avenue and Fifth Avenue from B Street to Elm Street and from Robinson Street to Washington Street. The remaining segments of Fourth Avenue and Fifth Avenue would remain 2-lane major roads. Specifically, along Fifth Avenue from Elm Street to Robinson Street, separated bike lanes would replace the existing buffered bike lanes, and along Fourth Avenue from Laurel Street to Date Street buffered bike lanes would remain where they already exist.

In addition to the separated and buffered bike lanes, the proposed project would also install pedestrian crossings across Sixth Avenue to Balboa Park at or near the intersections of Sixth Avenue and Grape, Juniper, and Nutmeg streets.

Additional traffic calming features, traffic signal improvements, and other improvements to improve safety for people biking, walking, and driving would be installed. These include additional bicycle signal heads to enhance the safe movements through the intersections and reduce conflicts among people biking, walking, and driving, as well was changes to the signal timing at existing signalized intersections, which would improve the flow of bicycle, pedestrian, and vehicle traffic, and reduce potential increases in vehicle delay. Shortened crossing distances, realigned curb ramps, and improved sight distances also enhance safety for people who bike, walk, and drive.

Phase 2: Eastern Hillcrest Bikeways

Segment 2 begins on University Avenue at SR 163/Ninth Avenue, and continues east to Normal Street with a connection northeast to Georgia Street via Lincoln Avenue and a connection southeast to Park Boulevard via Herbert Street and Robinson Avenue. There would be no changes to University Avenue between First Street and SR 163/Ninth Avenue.

Along University Avenue from SR 163/Ninth Avenue to Normal Street, the proposed project would construct a separated bike lane on both sides of the street within the existing roadway. In addition, curb extensions, improved curb ramps, new on-street parking stalls, and high visibility crosswalks would be installed. The proposed project would change Normal Street from a 4-lane to a 2-lane roadway from University Avenue to Lincoln Avenue to accommodate a separated bike lane on both sides of the street.

Class III shared lane markings would be installed along Lincoln Avenue from Normal Street to Georgia Street, along with a traffic circle (at Centre Street), new on-street parking stalls, new high visibility crosswalks, curb ramps, and curb extensions. Class III shared lane markings also would be installed on Herbert Street from University Avenue to Robinson Avenue, along with new high visibility crosswalk markings, and curb extensions. On Robinson Avenue between Herbert Street and Park Boulevard, the center turn lane would be reconfigured to add buffered bike lanes on both sides of the street. This segment also would include new high visibility crosswalk markings, curb ramps, and curb extensions.

Phase 3: Washington Street & Bachman Place Bikeways

The Washington Street Bikeway would begin at the Washington Street Trolley Station and continue east along Washington Street to the ramps accessing University Avenue. It also would extend onto San Diego Avenue from Washington Street to Noel Street. The Bachman Place Bikeway would begin at Washington Street and Third Avenue and continue north to Bachman Place via Third Avenue and Lewis Street and into the Mission Valley community along Hotel Circle South, Camino De La Reina and Avenida del Rio before terminating at Riverwalk Drive in Fashion Valley Mall. This segment also would extend along Third Avenue south of Washington Street to Walnut Avenue, then head east on Walnut Avenue to Fifth Avenue.

The proposed project would install a two-directional, separated bike lane along the north side of Washington Street between the Washington Street Trolley Station, just west of Hancock Street, and San Diego Avenue. The bikeway would be constructed within the existing roadway. The proposed project would remove one of the two existing left turn lanes on eastbound Washington Street at San Diego Avenue.

FIGURE 1. UPTOWN BIKEWAYS PROJECT SEGMENTS 1-4

1. FOURTH AND FIFTH AVENUE BIKEWAYS
2. EASTERN HILLCREST BIKEWAYS
3. WASHINGTON STREET AND BACHMAN PLACE BIKEWAYS
4. MISSION HILLS AND OLD TOWN BIKEWAYS

The intersection of Washington Street and San Diego Avenue would be improved with curb extensions, high visibility crosswalks, and pavement markings to facilitate the bikeway transition from two-directional on the north side of Washington Street to one-directional on both sides of Washington Street. The signals at the intersections of Washington Street and Hancock Street, San Diego Avenue, and India Street would be converted to a coordinated signal system. As a coordinated system, the signals are timed to maximize vehicular flow through the West Washington Street area. A bus bulb would be constructed on the south side of Washington Street between San Diego Avenue and India Street.

The proposed project would narrow the one-way portion of San Diego Avenue from Washington Street to the I-5 northbound on-ramp from a one-way, 3-lane major roadway to a one-way, 2-lane major roadway in order to accommodate a two-way separated bike lane along the north side of San Diego Avenue. The two-way separated bike lane would continue west along the north side of San Diego Avenue until Pringle Street, at which point the bikeway would transition into a buffered bike lane heading north on San Diego Avenue to Noel Street. On San Diego Avenue heading south, a buffered bike lane would be provided from Noel Street to California Street and shared lane markings would be provided from California Street to Pringle Street.

Bikeways on both sides of Washington Street would continue east of India Street (a separated bike lane on the south side and a buffered bike lane on the north side). A pedestrian walkway would also be constructed adjacent to the bikeway on the south side of Washington Street just east of the India Street and Andrews Street intersection. The westbound University Avenue ramp would be reconfigured to accommodate a buffered bike lane in the westbound direction. On Washington Street west of Hawk Street, the proposed project would remove approximately 800 feet of the number two westbound lane to accommodate a full transition lane for vehicles traveling westbound from the University Avenue ramps. The number two lane would remain west of the University Avenue ramp through the intersection of Washington Street and India Street. The improvement at the westbound University Avenue ramp does not affect the number of lanes at the intersection of Washington Street and India Street. The eastbound University Avenue ramp would be reconfigured to accommodate a vehicle lane, bikeway, and walkway.

For the Bachman Place Bikeways, Class III shared lane markings would be installed along northbound Third Avenue from the Washington Street intersection north to Lewis Street, with a contra-flow buffered bike lane provided along the west side of Third Avenue for southbound people on bikes. Curb extensions may also be provided at the intersection of Third Avenue with Washington Street. Along Lewis Street from Bachman Place to Third Avenue, shared lane markings would be provided for eastbound people on bikes and a contra-flow bike lane would be provided for westbound people on bikes. Bachman Place would transition among buffered bike lanes, separated bike lanes, or Class III shared lane markings at various points from Lewis Street to Hotel Circle South. Additionally, on Third Avenue from Washington Street to Walnut Avenue, and along Walnut Avenue from Third Avenue to Fifth Avenue, shared lane markings and wayfinding signage would be installed.

A two-way separated bike lane would be provided along the north side of Hotel Circle South from Bachman Place to Camino De La Reina. The two-way separated bike lane would then continue along the north side of Camino De La Reina to Avenida Del Rio, at which point it would continue along the west side of Avenida del Rio to Riverwalk Drive.

Phase 4: Mission Hills & Old Town Bikeways

In Mission Hills, on University Ave between Ibis Street and First Street, the project would consist of Class III shared lane markings (where not already marked) and traffic calming features, such as traffic circles, improved curb ramps, curb extensions, speed cushions, and high visibility crosswalks. There would be no changes to University Avenue between First Street and SR 163/Ninth Avenue.

In Old Town, the project would begin on San Diego Avenue at the intersection with Noel Street and head northwest towards Old Town Transit Center along San Diego Avenue and Congress Street. Buffered bike lanes would be provided on San Diego Avenue from Noel Street to just east of Hortensia Street, where the bikeway would transition to Class III shared lane markings until Congress Street. The shared lane markings would continue on Congress Street until just west of Mason Street, where the project transitions back to buffered bike lanes, which continue along either side of Congress Street until the project ends at Taylor Street and the Old Town Transit Center.

Other Physical Improvements

In general, other physical improvements may include painted markings for new and relocated on-street parking stalls, new painted or raised crosswalks, mid-block crossings, new painted or raised medians, curb extensions, curb ramps, bus bulbs, pedestrian refuge islands, and other modifications to existing curbs, gutters and drainage inlets, raised intersections, colored concrete and/or colored pavement, new signage, re-striping of vehicle lanes, new landscaping or other measures to treat stormwater, new traffic signals, rapid rectangular flashing beacons (RRFBs), modifying existing traffic signals (e.g., new phase for people on bikes/walking), relocating existing underground utilities, repaving the roadway surface (e.g., slurry seal), additional street lighting at priority locations, and similar minor physical improvements.

2.0 Traffic and Safety Assessment Methodology

This study of bicycle and pedestrian safety and vehicular traffic conditions is based on the Level of Traffic Stress (LTS) methodology based on Mineta Transportation Institute Low-Stress Bicycling and Network Connectivity (2012) and the City of San Diego Traffic Impact Study Manual (1998) and City of San Diego Significance Determination Thresholds, Development Services Department (2011).

2.1 Bicycle and Pedestrian Safety Methodology

Low traffic stress is a fundamental attribute of a street network that attracts more people who are "interested but concerned" about riding a bike for daily trips. The Federal Highway Administration (FHWA) Separated Bike Lane Planning and Design Guide provides an overview and discussion of the principles of low stress networks and its application in the process of planning and evaluating a bikeway network. Level of Traffic Stress (LTS) methodology, developed for the proposed project based on Mineta Transportation Institute Low-Stress Bicycling and Network Connectivity (2012), is used to evaluate bicycle and pedestrian safety impacts of the proposed project in the study area.

There are four general traffic stress categories, ranging from LTS 1 to LTS 4: LTS 1 indicates the lowest level of stress and conversely the most comfortable conditions for people of all ages to walk and bike, and LTS 4 indicating the highest level of stress and the least comfortable conditions to walk and bike.

As shown in Table 1, each LTS category is defined by four basic criteria, (1) the average speed of vehicle traffic, (2) the number of vehicular through lanes and physical separation (i.e. presence of a median), (3) the average daily vehicle trips (ADT), and (4) the slope of the street. Most people feel comfortable and are willing to ride a bike on a street with LTS of 1 or 2, fewer people will ride on streets in the LTS 3 category, while only a small fraction of people will ride a bike on streets in the LTS 4 category.

Table 1. Level of Traffic Stress Criteria

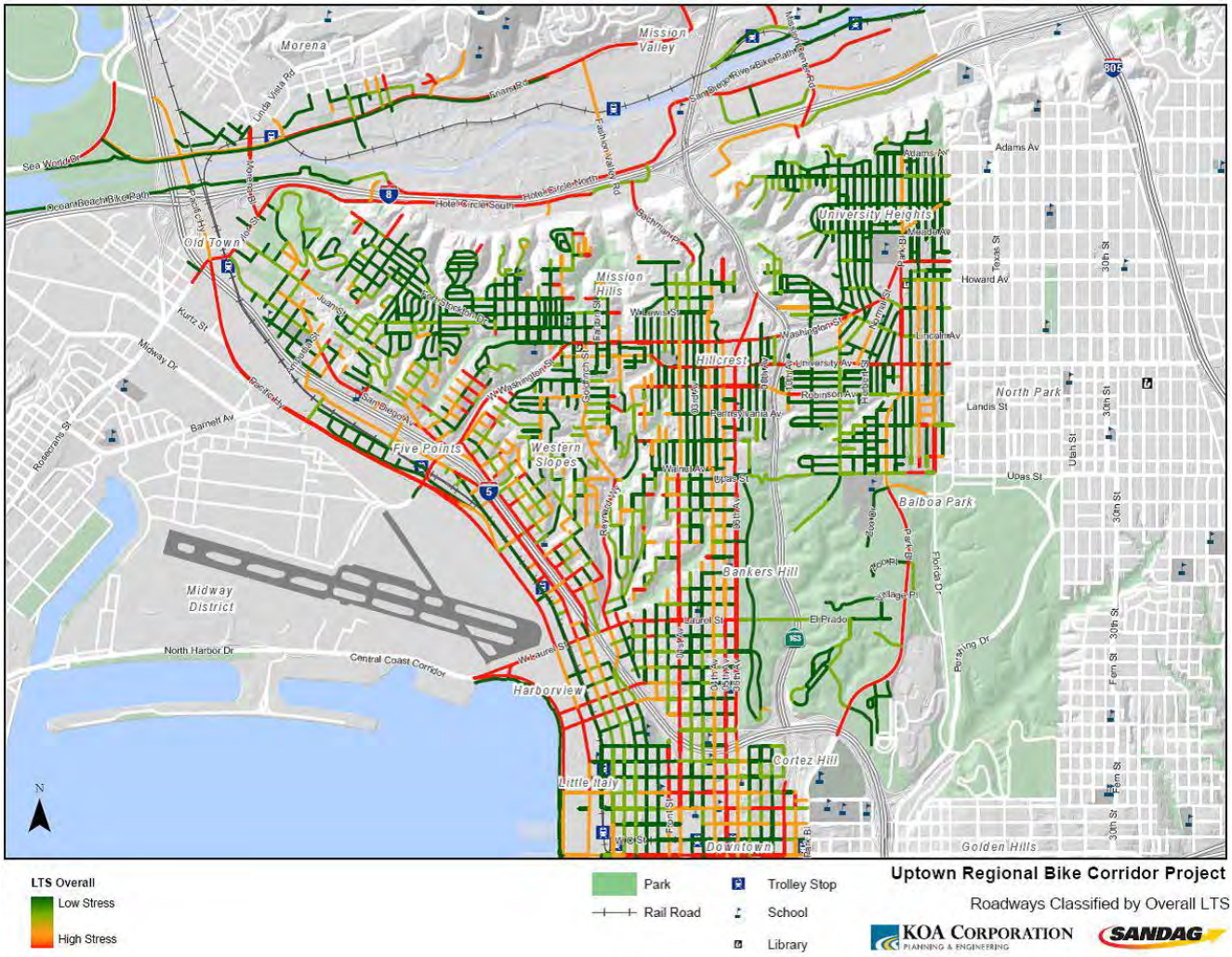
Criteria	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Speed limit	Less than 25 mph	25 or 30 mph	35 mph	40 mph or more
Vehicular through lanes and separation	2	4, separated by a raised median	more than 4, or 4 without a separating median	more than 4, or 4 without a separating median
Grade	5% or less	5%-10%	10%-15%	15% or more
Average Daily Trips	5,000 or less	5,000-10,000	10,000-15,000	15,000 or more

Source: Mineta Transportation Institute 2012.

For this analysis, every street in the study area was classified by LTS. As shown on Figure 2, the green segments indicate low-stress streets that currently serve most people (LTS 1 or 2). The red and orange segments are LTS 3 or 4 meaning they have high vehicle speeds, high vehicular traffic volumes, are wide, or have a steep grade and therefore most people are unlikely to feel comfortable or willing to ride bikes on them.

As Figure 2 shows, the higher LTS streets (i.e., red and orange) function as barriers between areas with low traffic stress (i.e., green) where most people are willing to ride a bike. The high LTS streets in the study area include: Fourth and Fifth Avenues, San Diego Avenue, Washington Street, University Avenue, and Bachman Place.

Figure 2. Level of Traffic Stress for the Uptown Bikeways Study Area



Source: SANDAG 2014.

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, Development Services Department (2011).

Four study scenarios were analyzed. Intersections were analyzed for the morning peak period (7:00 a.m. to 9:00 a.m.) and evening peak period (4:00 p.m. to 6:00 p.m.). Roadway segments were analyzed over a daily time period. The four scenarios are:

1. Existing (2013) Conditions Without Project ("Existing without Project")
2. Existing (2013) Conditions With Project ("Existing with Project")

3. Future (2020) Conditions Without Project ("Future without Project")
4. Future (2020) Conditions With Project ("Future with Project")

A combination of traffic modeling based on SANDAG's Series 12 Regional Growth Forecast (SANDAG 2010b) and observed traffic counts were used to determine the traffic volumes for each study scenario. The traffic modeling uses regional forecasts 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 study area. The analysis uses 2013 data because 2013 was the year the proposed project's traffic analysis was commenced; 2020 data are used to show how the proposed project would affect future traffic conditions if it is built.

The proposed project study area and the 92 intersections and 59 roadway segments selected for vehicular traffic analysis are shown in Figure 3. The methodologies used to calculate roadway segment and intersection traffic volumes for each study scenario are described in more detail in Chapter 3.0 and Chapter 4.0.

Vehicle Traffic Modeling Limitations

When estimating future traffic volumes with implementation of the proposed project, the methodology does not assume any future trips would change from other travel modes (e.g., driving, transit, carpool) to biking or walking. While research indicates that the proposed project would encourage people to shift from other travel modes to biking or walking, the transportation model used for this analysis is not able to accurately quantify reductions in future vehicle trips associated with implementation of the proposed project.[3] As a result, the analysis of future vehicle traffic volumes does not assume any mode shift as a result of 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 Roadway Segment and Intersection Capacity Analysis

Roadway operating conditions are typically described in terms of "level of service." Level of service is a "report card" type scale used to indicate the quality of traffic flow on roadway segments and at intersections. Level of service (LOS) ranges from LOS A (free flow, little congestion) to LOS F (forced flow, extreme congestion). LOS definitions, analysis methodologies, and City of San Diego criteria for acceptable traffic conditions are discussed below and provided in Appendix B.

Roadway Segment Capacity Analysis

The roadway segment capacity analysis identifies the LOS score for each roadway segment in the study area. It does so by comparing the design capacity of each roadway as determined by City of San Diego planning documents with the existing or future traffic volumes that occur or are expected to occur on that roadway segment. The analysis then uses City of San Diego criteria to determine the LOS score for each roadway segment based on the comparison of volume to capacity. For more information on the City of San Diego criteria please see Appendix B.

[3] The extensive data sets required for accurate modeling travel behavior in response to bikeway projects are not available at this time. Implementation of safe connected networks of bicycle facilities to facilitate biking as a viable mode of transportation are relatively new and associated data collection has been conducted on a less formal, less regular basis than for driving or transit. Travel modeling for bikeways is in its infancy. As more bikeways are built, and more formal and frequent counts and surveys are conducted, the data required for modeling and demand forecasting will be available.

Figure 3. Study Area Segment and Intersection Map

Intersection Capacity Analysis

The analysis of peak-hour intersection performance was conducted using Synchro, a traffic analysis and signal optimization software application. Synchro supports the Highway Capacity Manual (HCM) methodology for signalized and unsignalized intersections and is consistent with the City of San Diego Traffic Impact Study Manual. The HCM 2000 methodology was used for this study. This methodology calculates the average delay in seconds that a driver is expected to experience at an intersection based on the traffic demand and configuration of the intersection. Appendix B contains the HCM delay and level of service criteria for signalized and unsignalized intersections in table format.

Signalized Intersections

The HCM methodology for analyzing signalized intersections is based on the "operational analysis" procedure. This procedure uses 1,900 passenger cars per hour of green per lane as the maximum saturation flow of a single lane at a signalized intersection. This saturation flow rate is adjusted to account for lane width, on-street parking, conflicting pedestrian flow, traffic composition (e.g., percentage of vehicles that are trucks), and shared lane movements (e.g., through and turn movements from the same lane). Average control delay is calculated using a volume-weighted average of all of the delays for all vehicles entering the intersection.

All-Way Stop-Controlled Intersections

The HCM methodology for analyzing all-way stop-controlled intersections is based on conflicting traffic for vehicles stopped at an intersection. These intersections operate in either two-phase or four-phase patterns, and flows are determined by a consensus of right-of-way that alternates between north-south and east-west movements. Average control delay is calculated using a volume-weighted average of the delays for all vehicles entering the intersection.

Two-Way Stop-Controlled Intersections

The HCM methodology for analyzing two-way stop-controlled intersections is based on gap acceptance and conflicting traffic for vehicles stopped on the minor street approaches. The critical gap (or minimum gap that would be acceptable) is defined as the minimum time interval in the major street traffic flow that allows one vehicle from the minor street to enter the intersection. Control delay and level of service for the "worst" approach are reported, rather than for the intersection as a whole.

City of San Diego Criteria for Traffic Conditions

The City of San Diego has established criteria to evaluate traffic conditions along roadway segments and intersections per the City of San Diego Traffic Impact Study Manual (1998) and City of San Diego Significance Determination Thresholds (2011). For roadway segments, changes to the volume to capacity ratio (V/C) become more stringent as LOS worsens and delay increases. For example, if a segment is performing at LOS E, the increase in V/C ratio that the City defines as "acceptable" is 0.02 or less. At LOS F, an increase in V/C ratio of 0.01 or less is considered "acceptable".

For intersections, the criteria are based on how much delay increases (in seconds) for the average driver. When an intersection performs at LOS E, an increase in average delay of 2.0 or more seconds is considered "unacceptable". If an intersection performs at LOS F, an increase in average delay of 1.0 or more seconds is considered "unacceptable". The City of San Diego criteria for traffic conditions are provided in Appendix B.

3.0 Existing Conditions With and Without the Project

This chapter describes bicycle and pedestrian safety conditions and vehicle traffic conditions (roadway segments and intersections) under the Existing without Project and Existing with Project scenarios.

3.1 Existing (2013) Conditions Without Project

This section describes existing conditions as of 2013 for intersections and roadway segments in the study area, including existing pedestrian facilities and safety, bicycle facilities and safety, and vehicular traffic conditions including volumes, intersection turning movements, roadway classifications, and traffic control devices (e.g., traffic signals, stop signs).

Pedestrian Facilities and Safety

Uptown experiences high pedestrian activity due in part to the design of the street network and the mix of office, retail and residential land uses. Mission Valley has a similar mix of land uses, but has less pedestrian activity than Uptown due in part to long block lengths, large parcel development and lack of connectivity between pedestrian-friendly streets found in newer residential developments. Old Town is a major tourist destination with high pedestrian activity. Downtown San Diego has a grid street network with short block lengths, is the region's central business district and a major residential area, resulting in one of the region's highest pedestrian activity areas.

Sidewalks, Curb Ramps, Crosswalks and Curb Extensions

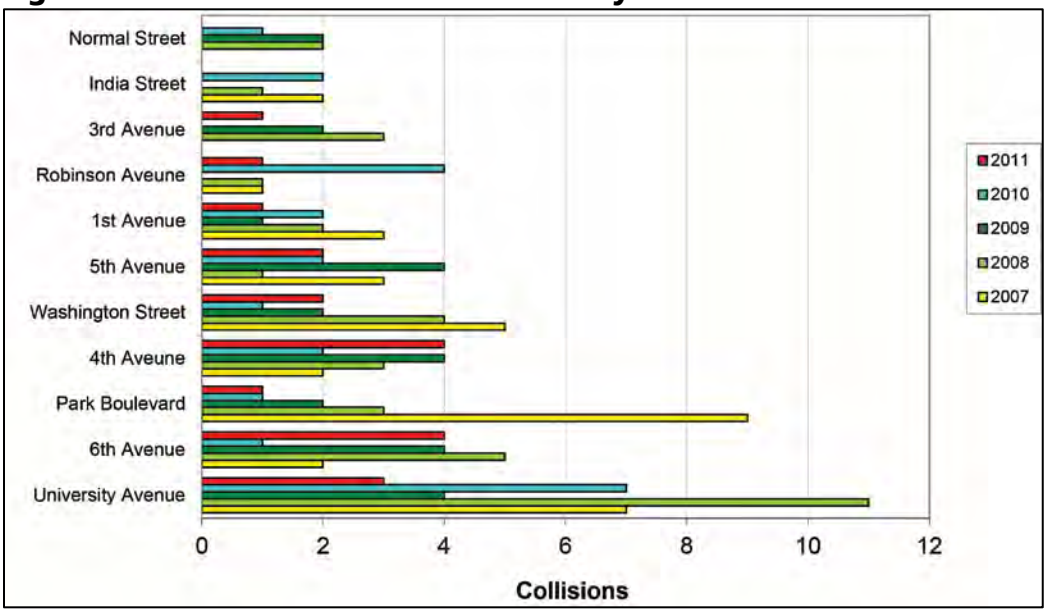
Existing conditions without the proposed project were assessed for the presence of contiguous, connected and well-maintained sidewalks, curb ramps, and street crossings. Curb ramps and crosswalks are located irregularly in the study area. Locations where sidewalks are missing include Fourth Avenue between Palm Street and Redwood Street and Washington Street west of Ibis Street and east of India Street. Curb extensions exist at University Avenue at Vermont Street and University Avenue at Richmond Street, but few exist elsewhere in the study area.

Collisions Involving People Walking

There were a total of 207 collisions involving people walking reported in the study area during the five years between 2007 and 2011, or an average of 42 collisions each year. These were comprised of five fatalities, 19 severe injuries, and 183 collisions that resulted in some other type of evident injury.

Collisions involving people walking were recorded on the street along which the person was walking when the incident occurred. Figure 4 shows the corridors along which five or more collisions involving people walking were reported. Between 2007 and 2011 the corridor with the highest incidents of collisions involving people driving a car and people walking is University Avenue followed by 6th Avenue and Park Boulevard, then 4th Avenue. These are commercial corridors where people walking are likely to be present in high numbers.

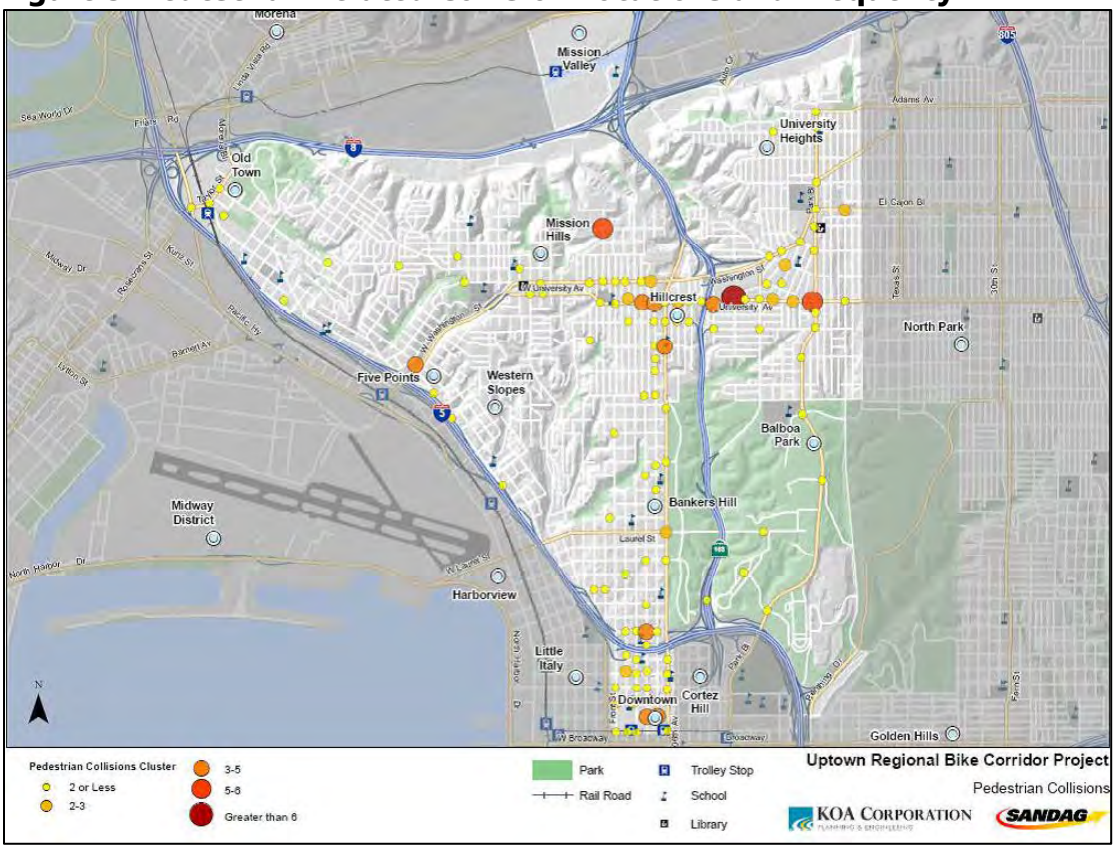
Figure 4. Pedestrian Related Collisions by Street



Source: SANDAG 2014.

Figure 5 shows the pedestrian collision locations and frequency within the study area. The greatest clusters of collisions involving people walking are on University Avenue through Hillcrest.

Figure 5. Pedestrian Related Collision Locations and Frequency



Source: SANDAG 2014.

Bicycle Facilities and Safety

As shown in Table 2, the study area and its vicinity feature a combination of Class I, II and III bike facilities. These locations have varying levels of traffic stress.

Table 2. Existing Bicycle Facilities in the Project Study Area

Facility	Location Description	Existing LTS Score
Class I	Upas Street from Seventh Avenue to Vermont Street	LTS 1-2
Class II	San Diego Avenue from Ampudia Street to Sutherland Street	LTS 3-4
Class II	Washington Street San Diego Avenue to University Avenue	LTS 4
Class II	Hotel Circle South east of Hotel Circle I-8 off ramp	LTS 4
Class II	Fourth Avenue from Date Street to Laurel Street	LTS 3-4
Class II	Fifth Avenue from Elm Street to Robinson Avenue	LTS 3-4
Class III	Congress Street from Taylor Street to Ampudia Street	LTS 3
Class III	University Avenue from Falcon Street to Third Avenue	LTS 3
Class III	Third Avenue from University Avenue to Upas Street	LTS 1-2
Class III	Upas Street from Third Avenue to Seventh Avenue	LTS 1-2
Class III	Upas Street from Vermont Street to Park Boulevard	LTS 4
Class III	Sixth Avenue south of Upas Street	LTS 4

Source: SANDAG 2014.

Collisions Involving People on Bikes

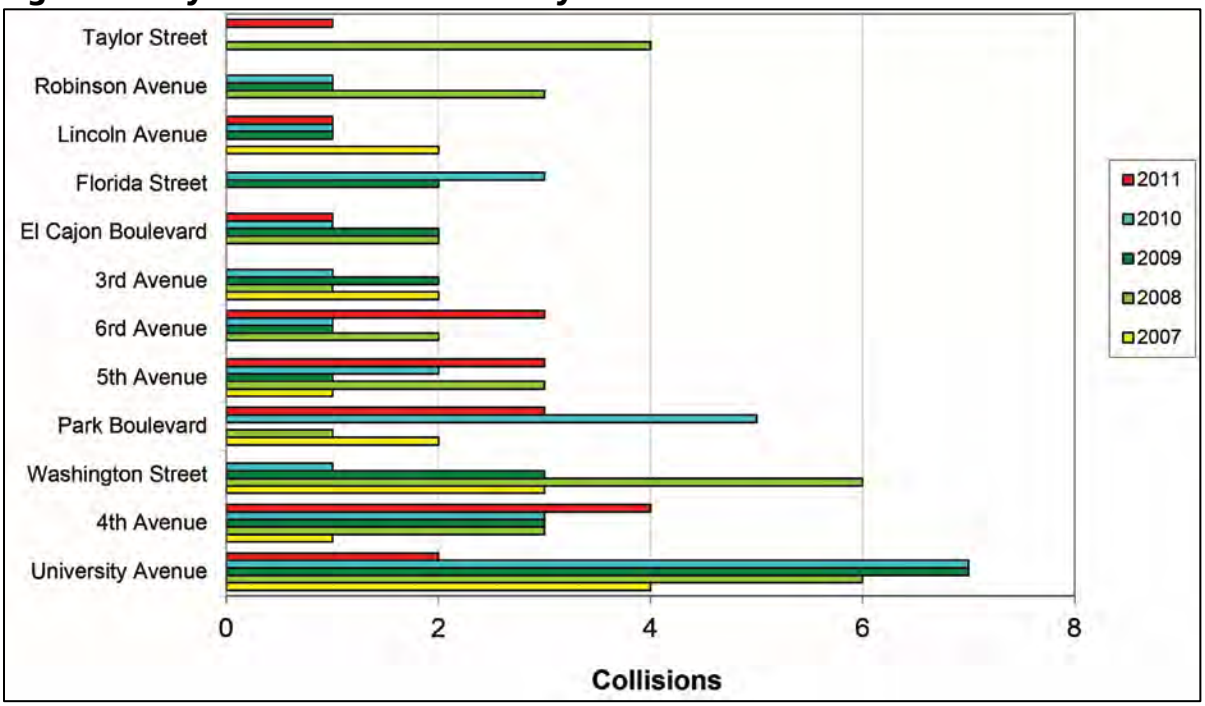
There were a total of 179 collisions that involved people riding bikes reported in the study area between 2005 and 2011, or an average of 36 collisions per year. There was one fatality during the time period (2008). Three collisions resulted in a severe injury and an additional 83 collisions resulted in some other type of evident injury.

Between 2007 and 2011, the roadways with the highest incidents of collisions between persons driving a car and riding a bike are (in descending order): University Avenue, 4th Avenue, Washington Street, and Park Boulevard. Bicycle related collisions by street for the study area are shown in Figure 6. The largest concentrations of collisions involving people riding bikes are near University Avenue and Park Boulevard and on Washington Street between 4th Avenue and 6th Avenue. Bicycle related collision locations and frequency in the study area are shown in Figure 7.

Vehicular Traffic Conditions

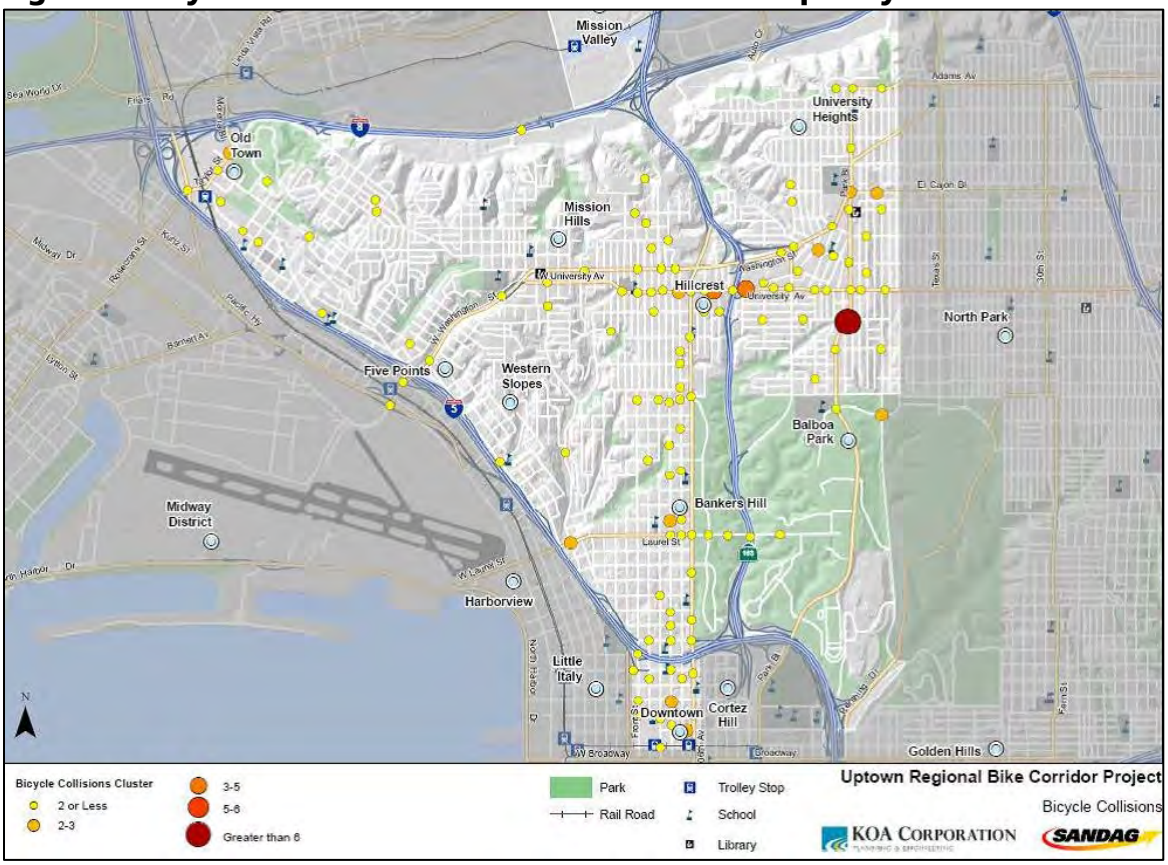
This section describes existing (2013) conditions without the project ("Existing without Project") for intersections and roadway segments in the study area, including existing vehicular traffic volumes, intersection turning movements, roadway classifications, and traffic control devices (e.g., traffic signals, stop signs). Segment counts involved laying tubes across roadway segments to count the number of vehicles during a 24-hour cycle. 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. For both segment and intersection counts, data was collected in October 2013 with validation in April 2015. Appendix C contains the individual roadway segment and intersection traffic counts.

Figure 6. Bicycle Related Collisions by Street



Source: SANDAG 2014.

Figure 7. Bicycle Related Collision Locations and Frequency



Source: SANDAG 2014.

Roadway Network

The principal roadways in the study area are described briefly below. The description includes the physical characteristics, adjacent land uses, and traffic control devices along these roadways. Appendix D shows existing and proposed roadway classifications in the study area. Appendix E shows existing and proposed intersection geometry and control.

Avenida del Rio functions as a north-south aligned 4-lane collector street and crosses the San Diego River. It connects Camino de la Reina to Riverwalk Drive, one of the primary circulating roads around the Fashion Valley Mall. Parking is prohibited on Avenida del Rio and there is no posted speed limit.

Bachman Place functions as a north-south aligned 2-lane commercial collector between Lewis Street and West Arbor Drive and a 2-lane local collector between West Arbor Drive and Hotel Circle South. Bachman Place does not have sidewalks or curbs on the easterly side of the street between West Arbor Drive and Hotel Circle South. It has curbs and sidewalk on the westerly side from Arbor Drive to Hotel Circle South. Parking is available on the westerly side of the street between West Arbor Drive and Hotel Circle South and along both sides south of West Arbor Drive. Bachman Place provides access to an above ground parking structure at University of California San Diego Medical Center and lodging and accommodation on Hotel Circle South. The posted speed limit is 40 mph for approximately 800 feet south of Hotel Circle South and otherwise 25 mph. Bachman Place is a designated Class III bike route from Lewis Street to Arbor Drive.

Camino De La Reina functions as an east-west aligned 3-lane collector with a two-way left turn lane between Hotel Circle North and Camino De La Siesta and as a 4-lane urban collector between Camino De La Siesta and Mission City Parkway. Portions of Camino De La Reina have curbs and sidewalks along both sides. Camino De La Reina provides access to Fashion Valley Mall and lodging and accommodations along Hotel Circle. The posted speed limit is 30 mph between Hotel Circle North and Camino De La Siesta and 35 mph between Camino De La Siesta and Mission City Parkway. Camino De La Reina is classified as a Class III bike route between Hotel Circle North and Camino De La Siesta and between Mission Center Road and Qualcomm Way.

Congress Street is an east-west running roadway that functions as a 2 lane collector. Congress Street has curbs, sidewalks on both sides and is classified as a Class III bike route. Driveways exist along the roadway and parking is allowed on both sides of Congress Street except at the Old Town Transit Center. The posted speed limit is 25 mph.

Fifth Avenue functions in part as a 3-lane one-way northbound collector between Washington Street and Broadway, while Fifth Avenue has 2 lanes and a buffered bike lane from Elm Street north to Robinson Avenue. Fifth Avenue has curbs, sidewalks, and trees along both sides of the street. Driveways and parallel parking are located on both sides of the street. The posted speed limit is 30 mph. Fifth Avenue is classified as a Class III bike route south of Elm Street.

Fourth Avenue functions as a north-south aligned 2-lane collector between Washington Street and Walnut Avenue and a 3-lane one-way southbound collector between Walnut Avenue and Market Street. Fourth Avenue has 2-lanes and a buffered bike lane from Laurel Street south to Date Street. Fourth Avenue is lined with curbs, sidewalks, and trees. Driveways and parallel parking are located on both sides of the street. The posted speed limit is 30 mph. Fourth Avenue is classified as a Class III bike route south of Date Street.

Herbert Street functions as a north-south aligned 2-lane collector in a residential neighborhood between University Avenue and Robinson Avenue. It features sidewalks, curbs, driveways, utility poles, and on-street parallel parking on both sides of the street.

Hotel Circle functions as an east-west aligned 3-lane collector with a two-way left turn lane. Hotel Circle is split into North and South frontage roads along the I-8. Hotel Circle South has curbs, sidewalks, and trees along segments. Driveways and on-street parking are located on both sides of the street. The posted speed limit is 25 mph. Hotel Circle is classified as a Class II bikeway.

Lewis Street functions as an east-west aligned 2-lane collector between Fort Stockton Drive and Goldfinch Street. Bike lanes are provided between Fort Stockton Drive and Ibis Street. Lewis Street has sidewalks and curbs on both sides of the street. On-street parking is allowed between Fort Stockton Drive and Hawk Street.

Lincoln Avenue functions as an east-west aligned 2-lane collector between Normal Street and Georgia Street. There are curbs and sidewalks along both sides of the street. Single and multi-family residential properties line both sides of the street with driveways. Parking is permitted on both sides of the street with parallel parking on one side and diagonal parking on the other. The speed limit is 25 mph.

Normal Street functions as a north-south aligned 4-lane major arterial with a center median, between University Avenue and Lincoln Avenue. Normal Street has sidewalks and curbs on both sides of the street. Driveways and on-street parking are located on both sides of the street. Additionally from University Avenue to Harvey Milk Street, there is diagonal parking along the center median. The posted speed limit is 25 mph.

Park Boulevard functions as a 4-lane urban major arterial between Normal Street/El Cajon Boulevard and Robinson Avenue, and a 3-lane collector with a two-way left turn lane between Robinson Avenue and Upas Street. Park Boulevard is lined with curbs, sidewalks, and trees. Driveways and on-street parking are available on both sides of the street. The posted speed limit is 35 mph south of Normal Street/El Cajon Boulevard to Upas Street. Park Boulevard north of Upas has a buffered bike lane on both sides of the street.

Robinson Avenue functions as an east-west aligned 2-lane collector between Curlew Street and Vermont Street and a 3-lane collector with a two-way left turn lane between Vermont Street and Park Boulevard. Robinson Avenue is lined with curbs, sidewalks, and trees. Driveways and parallel parking are located on both sides of the street. Robinson Avenue provides access to and from SR 163 between Eighth Avenue and Tenth Avenue. The posted speed limit is 25 mph between Curlew Street and Tenth Avenue and 30 mph east of Tenth Avenue to Park Boulevard. Robinson Avenue is classified as a Class III bike route between Third Avenue and Park Boulevard.

San Diego Avenue functions as a north-south aligned 2-lane collector. San Diego Avenue is lined with curbs, sidewalks, and trees. Parking is permitted on both sides of the street. Overhead utility lines are located adjacent to curbs between Pringle Street and Old Town Avenue. The posted speed limit is 30 mph between West Washington Street and Old Town Avenue and 25 mph between Old Town Avenue and Twiggs Street. Portions of San Diego Avenue are classified as Class III bike routes.

Sixth Avenue functions as a north-south aligned 4-lane major arterial between I-5 and University Avenue. Sixth Street is lined with curbs, sidewalks, and trees. Driveways and parking are located on both sides of the street. It provides access to the westerly side of Balboa Park and to SR-163 north of University Avenue. The posted speed limit is 30 mph. Sixth Street also has as a Class III bike route south of Upas Street.

Taylor Street functions as an east-west aligned 5-lane major arterial between Congress Street and Pacific Highway with a center median, two dedicated left turn lanes, one through lane, and one dedicated right turn lane at Pacific Highway, two through lanes and one right turn/through lane at Congress Street, and one dedicated bus-only turn lane into Old Town Transit Center. This portion of Taylor Street is bisected by an at-grade railroad crossing with four tracks. On-street parking is not allowed.

Third Avenue functions as a north-south aligned 2-lane collector between Lewis Street and Redwood Street. Third Avenue is lined with curbs, sidewalks, and trees. Driveways and parallel parking are located on both sides of the street. The posted speed limit is 25 mph and it is classified as a Class III bike route south of University Avenue.

University Avenue functions as an east-west aligned 2-lane collector between First Avenue and Fifth Avenue and a 4-lane major street between Fifth Avenue and Park Boulevard. University Avenue is lined with curbs, sidewalks, and trees. On-street parking is on both sides of the street. Curb extensions exist on the south side of University Avenue at the Vermont Street and Richmond Street intersections. The posted speed limit is 25 mph between Ibis Street and Park Boulevard. University Avenue is classified as a Class III bike route between Falcon Street and Third Avenue.

Washington Street functions as an east-west aligned 4-lane major arterial between I-5 and Lincoln Avenue. Washington Street does not have sidewalks or curbs between I-5 and Hawk Street. It has curbs and sidewalk on both sides of the street east of Hawk Street. Curb extensions exist at the intersection of West Washington Street and Goldfinch Street. Parking is permitted on portions of the street. The posted speed limit is 45 mph between I-5 and Hawk Street and 35 mph east of Hawk Street to SR-163.

Walnut Street functions as an east-west aligned 2-lane collector between Third Avenue and Fifth Avenue. It has sidewalks, driveways, and on-street parking on both sides of the street.

West University Avenue functions as an east-west aligned 2-lane collector between Ibis Street and First Avenue. West University Avenue is lined with curbs, sidewalks, and trees. Driveways and parking are located east of Albatross Street on both sides of the street. The posted speed limit is 25 mph between Ibis Street and Park Boulevard. West University Avenue is classified as a Class III bike route between Falcon Street and Third Avenue.

3.2 Existing (2013) with Project Conditions

Existing (2013) With Project conditions represent the conditions of the roadways and intersections within the study area in the base year when the proposed project is fully implemented.

Bicycle and Pedestrian Conditions

The Existing with Project condition would not result in any adverse bicycle or pedestrian safety impacts in the study area. In fact, the proposed project would make it safer for people to walk and bike – and also drive – in the study area. As shown in Table 3, the Existing with Project condition would improve bicycle and pedestrian safety on high stress roadways in the study area by strategically installing separated bike lanes, buffered bike lanes, Class III shared lane markings, and other measures to calm and control traffic as described in Chapter 1.
For study area roadways with existing LTS 3 and LTS 4 (the highest levels of traffic stress), the proposed project would either improve the LTS of the existing roadway or provide a new LTS 1-2 facility on a parallel street. The proposed project would not result in any adverse bicycle and pedestrian safety impacts, and therefore no bicycle and pedestrian safety mitigation measures are needed.

Table 3. Potential Safety Benefits for Select High Traffic Stress Roadways

Roadway	Existing without Project		Existing with Project	
	Traffic Stress	Bike Facilities	Proposed Safety Feature(s)	Potential Safety Benefit(s)
Fourth Ave.	High (3)	Buffered bike lane (Date St. to Laurel St.)	Separated bike lane (Laurel St. to Washington St.), buffered bike lanes (B St. to Laurel St.), and various traffic calming and pedestrian improvements	Physical barrier/parking lane between bike and vehicle lanes, fewer vehicle lanes, shorter pedestrian crossings, slower vehicle speeds
Fifth Ave.	High (3-4)	Buffered bike lane (Elm St. to Robinson Ave.)	Separated bike lane (B St. to Ash St. and Date St. to Washington St.), buffered bike lanes (Ash St to Date St.), and various traffic calming and pedestrian improvements	Physical barrier/parking lane between bike and vehicle lanes, fewer vehicle lanes, shorter pedestrian crossings, slower vehicle speeds
Sixth Ave.	High (4)	Class III (south of Upas St.)	Separated and buffered bike lanes on parallel streets (Fourth and Fifth Ave.), pedestrian crossings at or near Grape, Juniper, and Nutmeg	Supplemental facilities provided on parallel streets, new pedestrian crossings provide connections to Balboa Park
San Diego Ave.	High (3-4)	Class II (Hortensia St. to California St.)	Separated bike lanes (Washington St. to Pringle St.), buffered bike lanes (Pringle St. to Hortensia St..), shared lane markings (Hortensia St. to Congress Ave.), and various traffic calming and pedestrian improvements	Physical or painted barrier between bike and vehicle lanes, fewer vehicle lanes, shorter pedestrian crossings, slower vehicle speeds
Washington St.	High (4)	Class II (east of India St to University Ave.)	Separated and buffered bike lanes (Washington St Trolley Station to University Ave.), bike lanes and shared lane markings (Third Ave. to Fifth Ave.), various traffic calming and pedestrian improvements	Physical or painted barrier between bike and vehicle lanes, fewer vehicle lanes, shorter pedestrian crossings, slower vehicle speeds
University Ave.	High (3-4)	Class III (Goldfinch St. to Fifth Ave.)	Class III (Ibis St. to First St.), Separated bike lanes (Tenth Ave. to Normal St.), various traffic calming and pedestrian improvements. There would be no changes to University Ave. between First St. and SR 163/Ninth Ave.	Physical barrier/parking lane between bike and vehicle lanes, shorter pedestrian crossings, slower vehicle speeds

Roadway	Existing without Project		Existing with Project	
	Traffic Stress	Bike Facilities	Proposed Safety Feature(s)	Potential Safety Benefit(s)
Bachman Place	High (4)	None	Separated bike lanes/buffered bike lanes/Class III (Lewis St. to Hotel Circle South)	Physical or painted barrier between bike and vehicle lanes, shorter pedestrian crossings, slower vehicle speeds
Camino de la Reina	High (4)	None	Separated bike lanes (Hotel Circle South to Avenida del Rio)	Physical barrier between bike and vehicle lanes
Normal Street	High (3)	None	Separated bike lanes (University Ave. to Lincoln Ave.)	Physical barrier between bike and vehicle lanes

Source: SANDAG 2014.

Vehicular Traffic Conditions

Traffic volumes for the existing (2013) conditions with project scenario ("Existing with Project") were calculated using the segment and intersection counts taken for the Existing without Project scenario and the SANDAG travel model. Using the Existing without Project traffic volumes, the SANDAG travel model was run twice for the year 2013, once using the existing street network without the proposed project, and once using the proposed street network under implementation of the proposed project. The results were compared to determine the increases or decreases in traffic volumes along study area roadways attributable to the proposed project. These rates of increase or decrease in traffic volumes were then applied to Existing without Project traffic volumes to calculate traffic volumes for the Existing with Project scenario.

Roadway Classification Changes

The proposed project would make the roadway classification changes described below. As a result, intersection geometries also would be altered along segments of these roadways.

Fifth Avenue would change from three lanes to two lanes from B Street to Elm Street and Robinson Avenue to Washington Street to accommodate a separated or buffered bike lane.

Fourth Avenue would change from three lanes to two lanes from Walnut Street to Laurel Street and from Date Street to B Street to accommodate a separated or buffered bike lane.

Normal Street would change from four lanes to two lanes to accommodate a separated bike lane. Diagonal parking would be provided on both sides of the roadway and additional parking would be provided in the center median.

San Diego Avenue would change from three lanes to two lanes from Washington Street to the I-5 northbound On-Ramp at McKee Street. Two lanes would access the ramp onto I-5 northbound with the second lane being an option lane to continue onto San Diego Avenue towards Old Town. This change would accommodate a two-way separated bike lane along the east side of San Diego Avenue.

Washington Street would be reduced to one westbound through lane between Hancock Street and San Diego Avenue. At San Diego Avenue, the exclusive westbound right turn lane approach and one eastbound left turn approach would be removed to accommodate a two-way separated bike lane along the north side of Washington Street.

Roadway Capacity Analysis

To determine whether the proposed project meets City of San Diego criteria for acceptable traffic conditions on roadway segments, the roadway capacity analysis evaluates whether the proposed project would result in:

1. Volume-to-capacity ratio to increase by more than 0.02 for LOS E roadway segments or 0.01 for LOS F roadway segments; or
2. Traffic conditions on any roadway segment to worsen from LOS D or better to LOS E or LOS F.

Table 4 shows all study area roadway segments operating at LOS E or F in the "Without Project" scenario for existing (2013) conditions.

Table 4: Existing (2013) Segment Analysis Summary – LOS E and F Segments

Roadway Segment	Existing without Project				Existing with Project			
	Lanes/ Functional Class	ADT	V/C	LOS	Lanes/ Functional Class	ADT	V/C	LOS
6th Avenue								
Laurel St. to Olive St.	4C NCL	14,720	0.981	**E**	4C NCL	14,560	0.971	**E**
Olive St. to Spruce St.	4C NCL	17,480	1.165	**F**	4C NCL	17,290	1.153	**F**
Spruce St. to Pennsylvania St.	4C NCL	19,020	1.268	**F**	4C NCL	18,813	1.254	**F**
Pennsylvania St. to Robinson Ave.	4C NCL	18,400	1.227	**F**	4C NCL	18,199	1.213	**F**
Robinson Ave. to University Ave.	4C NCL	22,490	1.499	**F**	4C NCL	22,245	1.483	**F**
Robinson Avenue								
5th Ave. to 6th Ave.	2C MFF	9,360	1.170	**F**	2C MFF	9,311	1.164	**F**
6th Ave. to 10th Ave.	2C MFF	9,630	1.204	**F**	2C MFF	9,579	1.197	**F**
University Avenue								
Washington/University Ramps to Albatross St.	2C MFF	11,310	1.414	**F**	2C MFF	10,838	1.355	**F**
Albatross St. to 1st Ave.	2C MFF	12,050	1.506	**F**	2C MFF	11,548	1.443	**F**
1st Ave. to 4th Ave.	2C MFF	11,590	1.449	**F**	2C MFF	11,107	1.388	**F**
6th Ave. to 10th Ave.	4C NCL	28,220	1.881	**F**	4C NCL	27,043	1.803	**F**
Washington Street								
8th Ave. to Lincoln Ave.	4MA	44,080	1.102	**F**	4MA	44,080	1.102	**F**
Hotel Circle								
Bachman Place to Camino de la Reina	2C CL	14,440	0.963	**E**	2C CL	14,526	0.968	**E**
San Diego Avenue								
Hortensia St. to Congress St.	2C MFF	8,040	1.005	**F**	2C MFF	8,040	1.005	**F**

Source: Appendix F.
Abbreviations:
NCL = Collector with no center lane
MFF = Collector with multiple family residential frontage
MA = Major Arterial
CL = Collector
ADT = average daily trips
V/C = volume-to-capacity ratio
LOS = level of service

As Table 4 shows, the proposed project would not increase average daily traffic (ADT) or volume-to-capacity (V/C) ratio on any LOS E or LOS F segments, except for Hotel Circle from Bachman Place to Camino de la Reina, which would operate at LOS E with a V/C ratio increase of 0.005. This is less than the City's maximum allowable increase of 0.02 V/C for LOS E roadway segments. In addition, the proposed project would not cause any roadway segment in the study area to worsen from LOS D or better to LOS E or LOS F. All other roadway segments would operate at LOS D or better with implementation of the proposed project and are shown in Appendix F. With implementation of the proposed project, all 59 roadway segments in the study area would meet the City of San Diego criteria for acceptable traffic conditions based on existing (2013) conditions. Therefore, no mitigation measures for traffic impacts are required.

Intersection Capacity Analysis

To determine whether the proposed project meets City of San Diego criteria for acceptable traffic conditions at intersections, the intersection capacity analysis evaluates whether the proposed project would result in:

1. An average delay increase of 2.0 or more seconds for intersections at LOS E or 1.0 or more seconds for intersections at LOS F; or
2. Traffic conditions at any intersection decreasing from LOS D or better to LOS E or LOS F.

Table 5 shows all study area intersections operating at LOS E or LOS F in the "Without Project" scenario for existing (2013) conditions. As the table shows, the proposed project would not increase average delay at any LOS E or LOS F intersections, except for the intersection of Washington Street and Eight Street, which would operate at LOS F with an average delay increase of 0.8 seconds. This is less than the City's maximum allowable increase of 1.0 seconds for an LOS F intersection.

In addition, the proposed project would not cause any intersection in the study area to worsen from LOS D or better to LOS E or LOS F. All other intersections in the study area would operate at LOS D or better with implementation of the proposed project and are shown in Appendix F. The Existing without Project intersection analysis worksheets are shown in Appendix G. The Existing with Project intersection analysis worksheets are shown in Appendix H. With implementation of the proposed project, all 92 intersections in the study area would meet City of San Diego criteria for acceptable traffic conditions based on existing (2013) conditions. Therefore, no mitigation measures for traffic impacts are required.

Table 5. Existing (2013) Intersection Analysis Summary – LOS E and F Intersections

Intersection	Existing without Project		Existing with Project	
	Delay	LOS	Delay	LOS
AM Peak Hour				
Washington St. & Lincoln Ave.	62.6	**E**	62.6	**E**
Robinson Ave. & 10th St.	56.8	**F**	56.7	**F**
3rd Ave. & Washington St.	58.5	**F**	58.5	**F**
PM Peak Hour				
Washington St. & 8th St.	153.3	**F**	154.1	**F**
Washington St. & 9th St.	124.7	**F**	124.0	**F**
3rd Ave. & Washington St.	315.6	**F**	315.6	**F**
Avenida del Rio & Riverwalk Dr.	36.5	**E**	36.5	**E**

Source: Appendix F.
Note: LOS = level of service

4.0 Future Conditions With and Without the Project

The chapter describes bicycle and pedestrian safety conditions and vehicle traffic conditions (roadway segments and intersections) under the Future Without Project and Future With Project scenarios.

4.1 Future (2020) Conditions Without Project

This section describes future (2020) conditions without the proposed project for intersections and roadway segments in the study area, including existing pedestrian facilities and safety, bicycle facilities and safety, and 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 2020 would remain substantially the same as in the existing condition. Please refer to the discussion of bicycle and pedestrian safety under existing conditions without the proposed project provided in Chapter 3.0.

Vehicular Traffic Conditions

Traffic volumes for the future (2020) conditions without project scenario ("Future without Project") were calculated using the segment and intersection counts taken for the existing (2013) conditions without project scenario and the SANDAG travel model. The SANDAG travel model was run twice without the proposed project, once for 2013 and once for 2020. The results were compared to determine the rate of traffic increase or decrease along study area roadways due to growth and land use change from 2013 to 2020. These rates of increase or decrease were then applied to the Existing without Project traffic volumes to calculate traffic volumes for the Future without Project scenario.

Roadway Classification Changes

No roadway classification changes are anticipated for the year 2020 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 Chapter 3.0.

4.2 Future (2020) Conditions With Project

Future (2020) With Project conditions represent the conditions of the roadways and intersections within the study area in the year 2020 when the proposed project is fully implemented.

Bicycle and Pedestrian Facility Improvements

The bicycle and pedestrian facility improvements for the Future with Project scenario would be the same as those described for the Existing with Project scenario in Chapter 3.0. As described in Chapter 3.0, the Future with Project condition would not result in any adverse bicycle or pedestrian safety impacts in the study area. In fact, the proposed project would make it safer for people to walk and bike – and also drive – in the study area.

The Future with Project condition would improve bicycle and pedestrian safety in the study area by strategically installing separated bike lanes, buffered bike lanes, Class III shared lane markings, and other measures to calm and control traffic as described in Chapter 1.0. As shown in Table 3 in Chapter 3.0, for study area roadways with existing LTS 3 and LTS 4 (the highest levels of traffic stress), the proposed project would either improve the LTS of the existing roadway or provide a new LTS 1-2 facility with low traffic stress on a parallel street. The proposed project would not result in any adverse bicycle and pedestrian safety impacts, and therefore no bicycle and pedestrian safety mitigation measures are needed.

Vehicular Traffic Conditions

This section describes future conditions for roadway segments and intersections in the study area, including future vehicular traffic volumes, intersection turning movements, roadway classifications, and traffic control devices (e.g., traffic signals, stop signs).

Traffic volumes for the future (2020) conditions with project scenario ("Future with Project") were calculated using segment and intersection counts taken for the existing (2013) conditions without project scenario and the SANDAG travel model. The SANDAG travel model was run once without the proposed project for 2013, and once with the proposed project for 2020. The results were compared to determine the rate of traffic increase or decrease along study area roadways due to growth and land use change from 2013 to 2020 and due to the proposed street network under the proposed project. These rates of increase or decrease were then applied to Existing without Project traffic volumes to calculate traffic volumes for the Future with Project scenario.

Roadway Classification Changes

No roadway classification changes are anticipated for the year 2020 besides the changes proposed by the proposed project. Therefore, the Future with Project scenario assumes the same roadway classification changes as the Existing with Project scenario described in Chapter 3.0.

Roadway Capacity Analysis

To determine whether the proposed project meets City of San Diego criteria for acceptable traffic conditions on roadway segments, the roadway capacity analysis evaluates whether the proposed project would result in:

1. Volume-to-capacity ratio to increase by more than 0.02 for LOS E roadway segments or 0.01 for LOS F roadway segments; or
2. Traffic conditions on any roadway segment to worsen from LOS D or better to LOS E or LOS F.

Table 6 shows all study area roadway segments operating at LOS E or F in the "Without Project" scenario for future (2020) conditions. As the table shows, the proposed project would not increase average daily traffic (ADT) or volume-to-capacity (V/C) ratio on any LOS E or LOS F segments, except for Hotel Circle from Bachman Place to Camino de la Reina, which would operate at LOS F with a V/C ratio increase of 0.006. This is less than the City's maximum allowable increase of 0.01 V/C for LOS F roadway segments.

Table 6. Future (2020) Segment Analysis Summary – LOS E and LOS F Segments

Roadway Segment	Future without Project				Future with Project			
	Lanes/ Functional Class	ADT	V/C	LOS	Lanes/ Functional Class	ADT	V/C	LOS
6th Avenue								
Hawthorn St. to Laurel St.	4C NCL	13,828	0.922	**E**	4C NCL	13,690	0.913	**E**
Laurel St. to Olive St.	4C NCL	16,040	1.069	**F**	4C NCL	15,880	1.059	**F**
Olive St. to Spruce St.	4C NCL	19,048	1.270	**F**	4C NCL	18,857	1.257	**F**
Spruce St. to Pennsylvania St.	4C NCL	20,726	1.382	**F**	4C NCL	20,519	1.368	**F**
Pennsylvania St.to Robinson Ave.	4C NCL	20,050	1.337	**F**	4C NCL	19,850	1.323	**F**
Robinson Ave. to University Ave.	4C NCL	24,507	1.634	**F**	4C NCL	24,262	1.617	**F**
Robinson Avenue								
5th Ave. to 6th Ave.	2C MFF	9,883	1.235	**F**	2C MFF	9,834	1.229	**F**
6th Ave. to 10th Ave.	2C MFF	10,168	1.271	**F**	2C MFF	10,117	1.265	**F**
University Avenue								
Washington/University Ramps to Albatross St.	2C MFF	11,789	1.474	**F**	2C MFF	11,318	1.415	**F**
Albatross St. to 1st Ave.	2C MFF	12,555	1.569	**F**	2C MFF	12,053	1.507	**F**
1st Ave. to 4th Ave.	2C MFF	12,081	1.510	**F**	2C MFF	11,598	1.450	**F**
6th Ave. to 10th Ave.	4C NCL	29,415	1.961	**F**	4C NCL	28,239	1.883	**F**
Washington Street								
8th Ave.to Lincoln Ave.	4MA	45,312	1.133	**F**	4MA	45,312	1.133	**F**
Hotel Circle								
Bachman Place to Camino de la Reina	2C CL	17,119	1.141	**F**	2C CL	17,205	1.147	**F**
San Diego Avenue								
Hortensia Street to Congress Street	2C MFF	8,324	1.040	**F**	2C MFF	8,324	1.040	**F**

Source: Appendix I.
Abbreviations:
NCL = Collector with no center lane
MFF = Collector with multiple family residential frontage
MA = Major Arterial
CL = Collector
ADT = average daily trips
V/C = volume-to-capacity ratio
LOS = level of service

In addition, the proposed project would not cause any roadway segment in the study area to worsen from LOS D or better to LOS E or LOS F (all other roadway segments would operate at LOS D or better with implementation of the proposed project and are shown in Appendix I). With implementation of the proposed project, all 59 roadway segments in the study area would meet the City of San Diego criteria for acceptable traffic conditions based on future (2020) conditions. Therefore, no mitigation measures for traffic impacts are required.

Intersection Capacity Analysis

To determine whether the proposed project meets City of San Diego criteria for acceptable traffic conditions at intersections, the intersection capacity analysis evaluates whether the proposed project would result in:

1. An average delay increase of 2.0 or more seconds for intersections at LOS E or 1.0 or more seconds for intersections at LOS F; or
2. Traffic conditions at any intersection decreasing from LOS D or better to LOS E or LOS F.

Table 7 shows all study area intersections operating at LOS E or LOS F in the "Without Project" scenario for future (2020) conditions. As the table shows, the proposed project would not increase average delay at any LOS E or LOS F intersections, except for the intersections of Washington Street and Eighth Street, and Washington and Ninth Street, which would both operate at LOS F with average delay increases of 0.9 seconds and 0.1 seconds, respectively. These increases are less than the City's maximum allowable increase of 1.0 seconds for LOS F intersections.

In addition, the proposed project would not cause any intersection in the study area to worsen from LOS D or better to LOS E or LOS F. All other intersections in the study area would operate at LOS D or better with implementation of the proposed project and are shown in Appendix I. The Existing without Project intersection analysis worksheets are shown in Appendix J. The Existing with Project intersection analysis worksheets are shown in Appendix K. With implementation of the proposed project, all 92 intersections in the study area would meet City of San Diego criteria for acceptable traffic conditions based on future (2020) conditions. Therefore, no mitigation measures for traffic impacts are required.

Table 7. Future (2020) Intersection Analysis Summary – LOS E and LOS F Intersections

Intersection	Future without Project		Future with Project	
	Delay	LOS	Delay	LOS
AM Peak Hour				
6th Ave. & Upas St.	68.7	**E**	65.6	**E**
Washington St. & Lincoln Ave.	64.8	**E**	64.8	**E**
Robinson Ave. & 10th St.	57.5	**F**	57.4	**F**
3rd Ave. & Washington St.	73.1	**F**	73.1	**F**
PM Peak Hour				
6th Ave. & Upas St.	68.7	**E**	65.6	**E**
6th Ave. & University Ave.	60.2	**E**	56.1	**E**
Washington St. & Falcon St.	56.2	**E**	56.2	**E**
Washington St.& 8th St.	170.7	**F**	171.6	**F**
Washington St. & 9th St.	136.7	**F**	136.8	**F**
3rd Ave. & Washington St.	407.9	**F**	407.9	**F**
Avenida del Rio & Riverwalk Dr.	39.4	**E**	39.4	**E**

Source: Appendix I.
Notes: LOS = level of service

5.0 References

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