North Park | Mid-City Bikeways Project:

Howard-Orange Bikeway

Traffic and Safety Impact Assessment

Lead Agency:

San Diego Association of Governments (SANDAG)

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EXECUTIVE SUMMARY

This Traffic and Safety Impact Assessment analyzes the vehicular traffic impacts and bicycle and pedestrian safety impacts of the Howard – Orange Bikeway Project ("proposed project"). 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 would make it easier and safer for people of all ages and abilities to travel on bikes within San Diego's Mid-City communities, including North Park and City Heights, and it would connect the Mid-City communities to the Uptown and Eastern communities. It also improves safety for people who walk and drive in the project area. The proposed project would 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. A description of the proposed project from west to east is provided below.

The Howard-Orange Bikeway spans Howard Avenue, from Park Boulevard to Interstate 805, where it continues as Orange Avenue and terminates at Estrella Avenue. For the most part, the bikeway consists of buffered bike lanes – enabled through the removal of the center turn lane – and is enhanced by intersection treatments such as neighborhood traffic circles (NTCs) and bend-outs. The typical section includes two travel lanes, two buffered bike lanes and two parallel parking lanes. For certain segments – to accommodate greater separation for people on bikes from vehicle traffic, or the maintenance or expansion of on-street parking – the section is altered (e.g. including extra-wide buffers or shared lane markings, instead of standard buffered bike lanes, as appropriate). The following paragraph provides separate descriptions for each instance where the section changes. Further detail on each segment is provided in Section 1.3 Description of Design Features and Related Physical Improvements.

HOWARD AVENUE BETWEEN PARK BOULEVARD AND GEORGIA STREET

In this segment, the proposed project maintains the same basic existing configuration: two travel lanes and no center turn lane, and would install shared lane markings. On the north side of the street, parallel parking would remain, while on the south side it would be converted from head-in and parallel to reverse angle and head-in angle parking.

HOWARD AVENUE BETWEEN GEORGIA STREET AND FLORIDA STREET

In this segment, the proposed project would remove the center turn lane to provide one extra-wide buffered bike lane on the uphill (westbound) portion, and a shared lane marking on the downhill (eastbound) portion.

HOWARD AVENUE BETWEEN FLORIDA STREET AND OREGON STREET

In this segment, the proposed project would remove the center turn lane to provide buffered bike lanes on both sides of the street. Parallel parking would remain on both sides of the street.

HOWARD AVENUE BETWEEN OREGON STREET AND IDAHO STREET

In this segment, the proposed project would remove the center turn lane, and add shared lane markings and reverse angle parking to the south side of the street. It would retain parallel parking on the north side of the street.

HOWARD AVENUE BETWEEN IDAHO STREET AND I-805 FREEWAY

In this segment, the proposed project would remove the center turn lane to provide buffered bike lanes on both sides of the street. Parallel parking would remain on both sides of the street.

ORANGE AVENUE BETWEEN I-805 AND ESTRELLA AVENUE

In this segment, the proposed project would remove the center turn lane to provide buffered bike lanes on both sides of the street. Parallel parking would remain on both sides of the street.

OTHER IMPROVEMENTS

In addition to the improvements described preceding paragraphs, 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 that may be installed as part of the proposed project could include new painted crossings at intersections or at mid-block, RRFBs, advanced signal phases for people walking and biking, new raised medians, curb extensions, accessible curb ramps, sidewalks, pedestrian refuge islands, 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.

BICYCLE AND PEDESTRIAN SAFETY

The assessment concludes that the proposed project would not have any negative bicycle or pedestrian safety impacts. In fact, the proposed project would have potential safety benefits for people that walk and bike – and also drive – in the project area. The proposed project would decrease the level of traffic stress for people walking and biking along and across roadways in the project area by installing buffered bike lanes, shared lane markings, and other measures to calm motor vehicle traffic. Therefore, 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 IMPACTS

The assessment also concludes that all intersections and roadway segments in the project area would meet City of San Diego criteria for acceptable vehicular traffic conditions with implementation of the proposed project, except for the following three roadway segments: (1) Orange Avenue, between Swift Avenue and 35th Street; (2) Orange Avenue, between 43rd Street and Fairmount Avenue; and (3) Orange Avenue, between 47th Street and Euclid Avenue. Traffic conditions along Segments 1 and 3 are considered “unacceptable” according to City of San Diego standards because the proposed change in roadway classification from a 3-lane collector to a 2-lane collector is inconsistent with the adopted Mid-City Communities Plan. Segments 1 and 3 and the intersections at either end of these segments operate acceptably (level of service (LOS) D or better) under City of San Diego criteria during peak hours under existing and future conditions.

In the case of segment 2, Orange Avenue, between 43rd Street and Fairmount Avenue, the intersections on either end operate acceptably (LOS D or better) during peak hours, but the segment operates at unacceptable LOS E in the following scenarios:

- Existing with project: EB direction in the AM peak hour.
- Future with project: EB direction in the AM and PM peak hours; WB direction in the PM peak hour.

In addition, the proposed change in roadway classification from a 3-lane collector to a 2-lane collector is inconsistent with the adopted Mid-City Communities Plan. Because of the unacceptable LOS E operations in the EB direction during the AM and PM peak hours and WB direction during the PM peak hour, as well as the inconsistency with the adopted Community Plan, the traffic conditions along this segment are considered unacceptable according to City of San Diego standards.

Mitigating the unacceptable LOS E along Orange Avenue, between 43rd Street and Fairmount Avenue, to an acceptable LOS D or better would require either: 1) an additional vehicle lane, or 2) substantial modification to signal timing. Adding an additional vehicle lane along this segment is not feasible due to lack of public right-of-way (i.e., there is not adequate space for an additional vehicle lane). Substantial modification of signal timing, in favor or Orange Avenue, is not feasible due to the high volumes and progression on both 43rd Street and Fairmount Avenue. Despite the unacceptable and unmitigable LOS E, however, travel times through this roadway segment would decrease by 1 to 10 seconds (depending on the direction and AM or PM peak hour) with implementation of the project compared to conditions without the project. This decrease in travel time would occur because traffic signal timing would be optimized at the intersections of Orange Avenue and 43rd Street and Orange Avenue and Fairmount Avenue as part of the project. Signal optimization is standard practice wherever changes in lane configurations at intersections are proposed. Therefore, even though the unacceptable LOS E along Orange Avenue between 43rd Street and Fairmount Avenue cannot be avoided, the project would improve travel times through this segment.

1.0 PROJECT DESCRIPTION

This chapter discusses the objectives 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 OBJECTIVES

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 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.

In addition to closing gaps within the larger bikeway network that is being planned throughout the region, the objectives of the proposed project is to create connections between the Uptown and Mid-City areas of San Diego, including access to and through the following neighborhoods: University Heights, North Park, City Heights, and Eastern Area, and to create safe operating space and improve safety for all roadway users, including people who walk, bike, and drive. The proposed project would achieve this through the implementation of Class II buffered bike lanes (made possible by removal of a center turn lane), bend-out treatments, Class III enhanced bike routes, neighborhood traffic circles, 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 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 North Park Community Plan Update
- The City of San Diego Bicycle Master Plan
- The City of San Diego Climate Action Plan
- The SANDAG Regional Bike Plan
- San Diego Forward: The Regional Plan
- The SANDAG Climate Action Strategy

Analysis of ninety 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 because of the 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 compact design, high-density development, mixed land use patterns, population characteristics, facility gaps, incidence of collisions, and public comments related to problem areas, the Howard – Orange corridor was identified by SANDAG as an area where investments in bikeway infrastructure would yield substantial benefits. As a result, the proposed project is ranked as "high-priority project" in the Regional Bike Plan (SANDAG 2010).

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, bicycle, and drive. The proposed project aims to improve safety with approximately 3.25 miles of buffered bike lanes, which provide dedicated space – along the roadway – for people who bike. In addition, the proposed project would include traffic calming features that promote safe vehicle speeds. The project also would improve conditions at intersections to enhance safety for people on bikes, walking, and driving. These facilities provide varying degrees of perceived and actual safety desired by people who are interested in biking for transportation, but who are concerned about the safety of riding on streets with higher levels of traffic stress.

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 provide a degree of safety desired by people who are interested in biking for transportation, but who are concerned about the safety of riding on streets with higher levels of motor vehicle traffic.

TRAFFIC CALMING AND OTHER PROJECT FEATURES

Several traffic calming measures and traffic control modifications would be implemented as part of the proposed project including neighborhood traffic circles (NTCs), curb extensions, bicycle bend-outs, raised crosswalks, speed cushions, mid-block curb extensions, and rectangular rapid flashing beacons (RRFB). These measures would encourage safe vehicle speeds, shorten pedestrian crossing distances and exposure, and increase pedestrian visibility, thereby improving safety for people biking, walking, and driving. These features also would generally promote efficient travel for people on bikes and driving vehicles.

Encouraging safe vehicle speeds through traffic calming helps attract a greater number of people to walk and bike. In addition, scientific studies have shown reduced severity of injuries and significantly lower risk of fatalities for people walking and biking when vehicle speeds on streets are maintained at less than 25 to 30 mph (Department for Transport 2010). For example, as shown in **Figure 1**, a pedestrian 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 vehicle is traveling at 30 mph, and decreases further to 20 percent if the vehicle is traveling at 40 mph (SFMTA, 2014). Each of the traffic calming treatments listed above is briefly described in the following paragraphs.

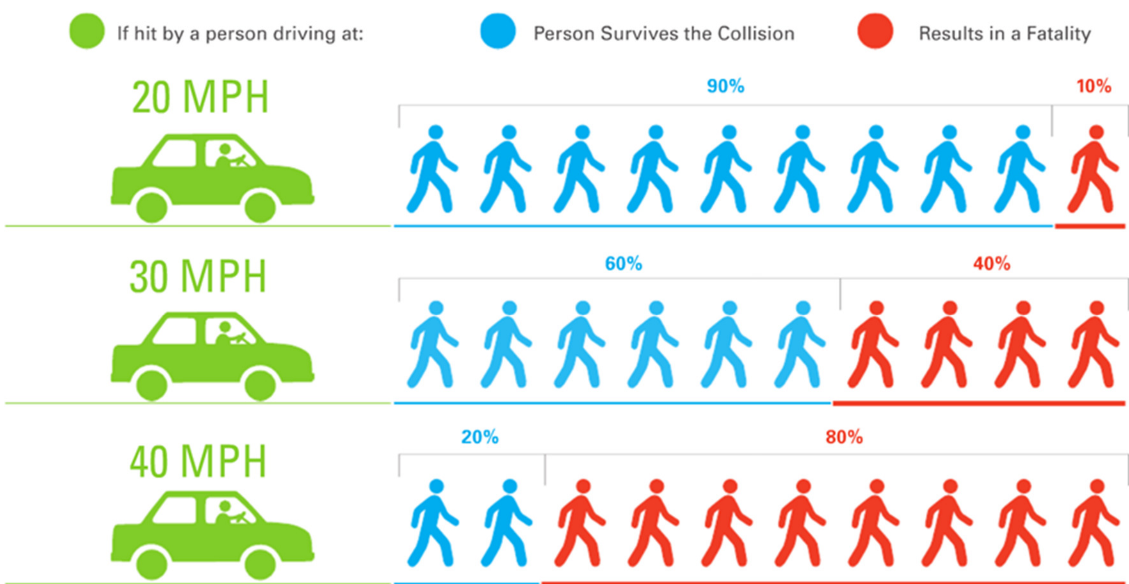


Figure 1 Pedestrian Survival Rate by Vehicle Speed

Neighborhood Traffic Circles (NTCs)

A neighborhood traffic circle is a type of intersection treatment that is used at physically constrained locations in place of stop-controlled or signalized intersections to help lower speeds, improve safety and reduce vehicle delays on the minor street approaches. Vehicles and bicycles travel in a counter-clockwise direction around a circular median in the center of the intersection, and users on all approaches must yield to vehicles already traveling around the NTC.

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 wider turn, which encourages safer speeds.

Speed Cushions with Midblock Curb Extensions

Speed cushions with midblock curb extensions are proposed at several locations throughout the Howard-Orange Bikeway. Speed cushions serve to moderate travel speeds along a roadway to enhance the safety for people walking, people riding bikes, and residents. The addition of midblock curb extensions to the speed cushions direct vehicles to stay in their designated travel lanes, avoid bicycle lane encroachments, and further encourage safe vehicle speeds.

Bend-Outs

Bicycle bend-outs or simply bend-outs are 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. The feature also 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. Bend-outs also provide shorter crossing distances for people walking and help to clearly define travel ways for each mode (e.g., through pavement markings, colored material, or other treatment).

Speed Cushions and Raised Crosswalks

One of the most effective speed control devices is a speed cushion, which is a raised section of pavement across a roadway with sloped approaches for vehicles to traverse the hump. A speed cushion provides cut out sections across the hump to allow emergency vehicles to cross the device without substantially impacting response times.

A raised crosswalk is essentially a speed cushion with a flat section along the center across the entire street width that allows people walking to cross the street at curb level (i.e. without having to use a curb ramp or step off a curb). The sloped approaches to the crosswalk in the street serve to promote safe vehicles speeds, whether or not pedestrians are present.

Enhanced Pedestrian Crossings – 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.

Overall, traffic volumes on most of the streets crossing the Howard-Orange 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 Orange Avenue/Central Avenue intersection, for example, pedestrian and bicycle volumes crossing Orange Avenue are expected to be higher because of the attractiveness of Teralta Park and the Central Avenue Bikeway/multi-use path. Because of this concentration of crossing volume, an enhanced crossing treatment was deemed necessary at this location.

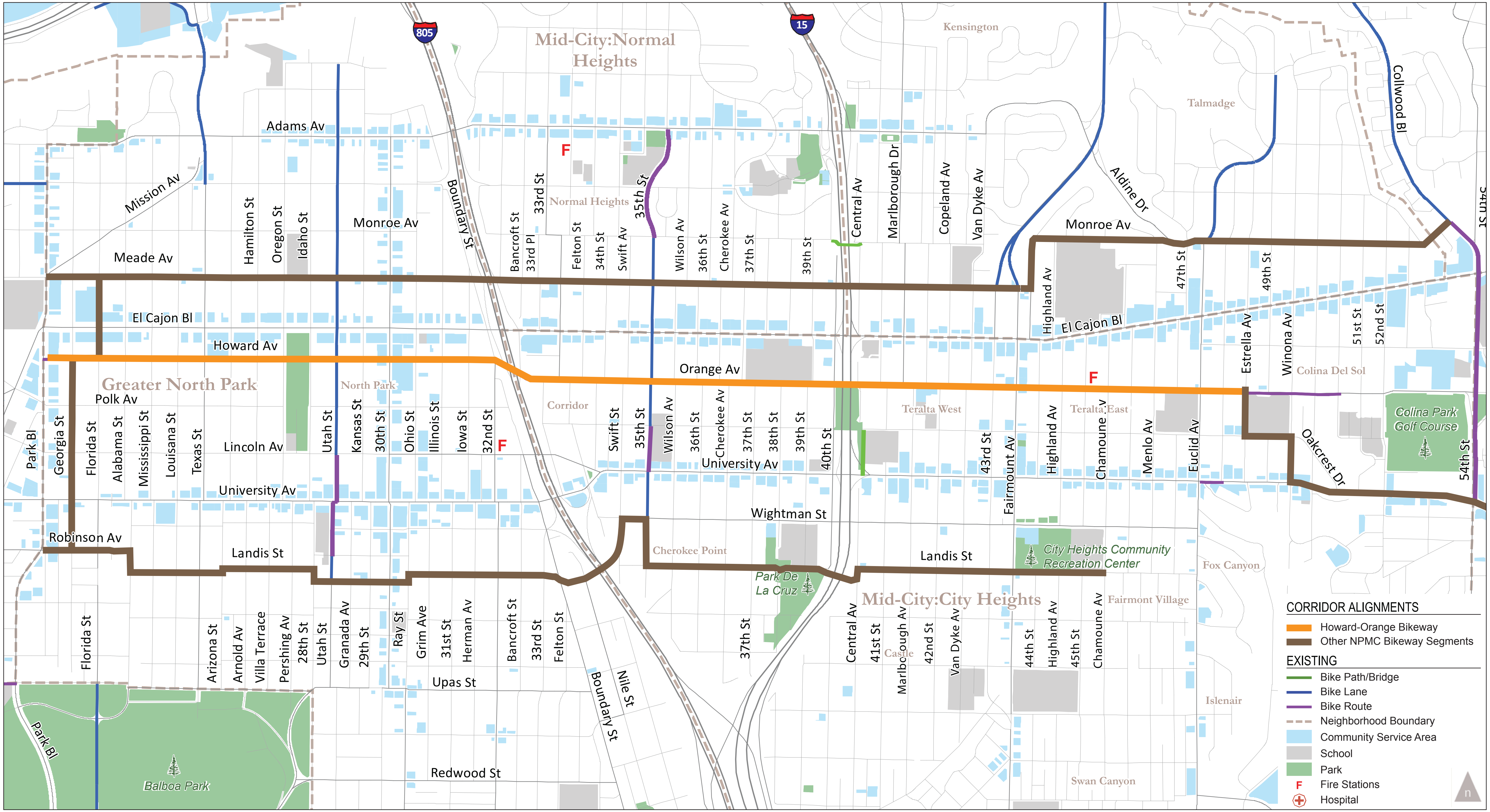
Accordingly, a rectangular rapid flashing beacon (RRFB) installation is proposed for the intersection of Central Avenue & Orange Avenue. The stop signs along the north and south legs are proposed to remain in place. Additionally, center medians are also proposed, which would provide a pedestrian refuge area. For Central Avenue & Orange Avenue, RRFBs would be installed on both the eastern and western legs of the intersection, and additional push button poles would be installed on the northwest and southeast corner of the intersection to allow people who are biking on Central Avenue to activate the RRFBs.

1.3 DESCRIPTION OF DESIGN FEATURES AND RELATED PHYSICAL IMPROVEMENTS

The Howard-Orange Bikeway is one of three (3) major bikeways that will improve east-west bicycle travel through the NPMC area by creating inviting and convenient bikeways that connect key community destinations, including schools, parks, transit stops, and commercial areas. The Howard-Orange Bikeway, later referred to simply as “the corridor,” spans Howard Avenue, from Park Boulevard to Interstate 805, where it continues as Orange Avenue and terminates at Estrella Avenue. The bikeway alignment is shown in **Figure 2**.

A visualization of the proposed facility types and improvements are illustrated in **Figure 3**. 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, before construction.

Throughout the corridor, space for the buffered bike lanes is made possible through the removal of the center turn lane. The typical section of the Howard – Orange Bikeway is as follows: one parallel parking lane, one buffered bike lane, two travel lanes (one westbound; one eastbound), one buffered bike lane, and one parallel parking lane. For certain segments – to accommodate greater separation for people on bikes from vehicle traffic, or the maintenance or expansion of on-street parking – the section is altered. Separate descriptions are provided for each instance where the section changes, and include traffic calming and/or intersection details.



* THE IMPROVEMENTS SHOWN ON THIS MAP ARE NOT FINAL AND MAY BE SUBJECT TO CHANGE

Note: Fire stations that serve the project area, but are not shown on the map are: #11 at University Ave/Allison Ave, #26 at 54th St/College Grove, and #5 at University Ave/9th St

Figure 2

Howard-Orange Bikeway Alignment

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Howard Avenue between Park Boulevard and Georgia Street

In this segment, the proposed project maintains the same basic existing configuration: two travel lanes and no center turn lane, and would install shared lane markings. On the north side of the street, parallel parking would remain, while on the south side it would be converted from head-in and parallel to reverse angle and head-in angle parking. A neighborhood traffic circle is planned for the intersection of Howard Avenue and Georgia Street.

Howard Avenue between Georgia Street and Florida Street

In this segment, the proposed project would remove the center turn lane to provide one extra-wide buffered bike lane on the uphill (westbound) portion, and a shared lane marking on the downhill (eastbound) portion. This hybrid design is intended to provide greater accommodation for people biking where it’s most needed, on the uphill portion (i.e. where more space is needed for climbing, and where bicycle and vehicle speeds are greatest). A neighborhood traffic circle is proposed for the intersection of Howard Avenue and Georgia Street.

Howard Avenue between Florida Street and Oregon Street

In this segment, the proposed project would remove the center turn lane to provide buffered bike lanes on both sides of the street. Parallel parking would remain on both sides of the street. In addition, this segment of Howard Avenue proposes many intersection treatments intended to facilitate safe crossings and calm traffic: a raised crosswalk at Alabama Street; a neighborhood traffic circle at Mississippi Street; a raised crosswalk at Louisiana Street; bend-out treatments at Texas Street; a neighborhood traffic circle at Arizona Street; and a neighborhood traffic circle at Oregon Street.

* THE IMPROVEMENTS SHOWN ON THIS MAP ARE NOT FINAL AND MAY BE SUBJECT TO CHANGE

Note: Fire stations that serve the project area, but are not shown on the map are: #11 at University Ave/Allison Ave, #26 at 54th St/College Grove, and #5 at University Ave/9th St

Figure 3

Proposed Project Facility Types and Improvements

SANDAG

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Howard Avenue between Oregon Street and Idaho Street

In this segment, the proposed project would remove the center turn lane, and add shared lane markings and reverse angle parking to the south side of the street. It would retain parallel parking on the north side of the street.

The success of this design, in encouraging safe driving speeds, and safe and comfortable lane sharing between people bicycling and driving, is dependent on adjacent traffic calming treatments. This segment of Howard Avenue proposes the following intersection treatments: neighborhood traffic circles at both Oregon and Idaho Streets. In addition, intersection improvements just one block east, at Utah Street (described below), further enhance the traffic calming along this segment.

Howard Avenue between Idaho Street and I-805 Freeway

In this segment, the proposed project would remove the center turn lane to provide buffered bike lanes on both sides of the street. Parallel parking would remain on both sides of the street. The success of this design, in encouraging safe driving speeds, and safe and comfortable intersections for all road users, is dependent on adjacent traffic calming treatments.

For Howard Avenue, between Idaho Street and Ohio Street, the project proposes the following intersection treatments: a neighborhood traffic circle and a raised crosswalk, at Idaho Street; a neighborhood traffic circle at Utah Street; and bend-out treatments at 30th Street. For Howard Avenue, between Ohio and I-805 freeway, the project proposes a series (3) of speed cushions and midblock curb extensions.

Orange Avenue between I-805 and Estrella Avenue

In this segment, the proposed project would remove the center turn lane to provide buffered bike lanes on both sides of the street. Parallel parking would remain on both sides of the street. The success of this design, in encouraging safe driving speeds, and safe and comfortable intersections for all road users, is dependent on adjacent traffic calming treatments.

For Orange Avenue, between I-805 and SR-15, the project proposes the following intersection treatments: bend-out treatments at 33rd Street; a series of speed cushions and midblock curb extensions between Felton Street and Swift Avenue; bend-out treatments on 35th Street; speed cushions and midblock curb extensions between 36th Street and Cherokee Avenue; a raised crosswalk at 37th Street; a new vehicle turn restriction (right turn only), to reduce conflicts and improve traffic flow for all roadway users at 39th Street; and a curb extension at 40th Street.

For Orange Avenue, between SR-15 and Estrella Avenue, the project proposes the following intersection treatments: a raised crosswalk with a Rectangular Rapid Flashing Beacon (RRFB) and median refuge island at Central Avenue; speed cushions and midblock curb extensions at 41^{st} Street; bend-out treatments at Marlborough Avenue; speed cushions and midblock curb extensions between 42^{nd} Street and Van Dyke Avenue; bend-out treatments at 43^{rd} Street and Fairmount Avenue; a raised crosswalk at Menlo Avenue; bend-out treatments at Euclid Avenue; and curb extensions at Estrella Avenue, where the project connects to another North Park | Mid-City Bikeway: the University Avenue Bikeway.

Other Improvements

In addition to the improvements described preceding paragraphs, 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 that may be installed as part of the proposed project could include new painted crossings at intersections or at mid-block, RRFBs, advanced signal phases for people walking and biking, new raised medians, curb extensions, accessible curb ramps, sidewalks, pedestrian refuge islands, 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.

2.0 TRAFFIC AND SAFETY ASSESSMENT METHODOLOGY

This assessment of bicycle and pedestrian safety and vehicular traffic conditions is based on the Level of Traffic Stress (LTS) methodology based on *Mineta Transportation Institute Report 11-19: Low-Stress Bicycling and Network Connectivity* (2012), 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

This assessment uses the LTS methodology for the assessment of bicycle and pedestrian safety impacts. The methods used for the LTS Analysis were adapted from the *2012 Mineta Transportation Institute (MTI) Report 11-19: Low-Stress Bicycling and Network Connectivity*. The approach outlined in the MTI report uses roadway network data, including posted speed limit, the number of travel lanes, and the presence and character of bicycle lanes, as a proxy for bicyclist comfort level.

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 1, is assigned to roads that would be tolerable 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 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" bicyclists. To support use of regional bikeways by people of all ages and abilities, including the Howard – Orange 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.

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: Mekuria, 2012
Note:
1. Physically separated bikeways automatically receive an LTS score of 1, regardless of other conditions. Since the LTS methodology does not distinguish between physical separation and striped separation, a striped buffer of greater than 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: Mekuria, 2012
Notes:
1. The lower LTS values are assigned to residential streets with no centerline striping.

Table 3 and **Table 4** identify the LTS criteria for intersection crossings with and without a median refuge island, respectively. To evaluate the level of traffic stress for people walking or biking across a roadway in the project area, the analysis takes into account the presence or absence of a median refuge island, the number of travel lanes, and the speed limit.

TABLE 3 LEVEL OF TRAFFIC STRESS CRITERIA FOR INTERSECTION CROSSINGS WITHOUT A MEDIAN REFUGE ISLAND

Speed Limit (Street Crossed)	Number of Lanes		
	≤ 3	4-5	≥ 6
≤ 25	LTS 1	LTS 2	LTS 4
30	LTS 1	LTS 2	LTS 4
≥ 35	LTS 2	LTS 3	LTS 4
≥ 40	LTS 3	LTS 4	LTS 4

Source: Mekuria, 2012

TABLE 4 LEVEL OF TRAFFIC STRESS CRITERIA FOR INTERSECTION CROSSINGS WITH A MEDIAN REFUGE ISLAND

Speed Limit (Street Crossed)	Number of Lanes		
	≤ 3	4-5	≥ 6
≤ 25	LTS 1	LTS 1	LTS 2
30	LTS 1	LTS 2	LTS 3
≥ 35	LTS 2	LTS 3	LTS 4
≥ 40	LTS 3	LTS 4	LTS 4

Source: Mekuria, 2012
Notes:
Physically separated bikeways automatically receive an LTS score of 1, regardless of other conditions. Since the LTS methodology does not distinguish between physical separation and striped separation, a striped buffer of greater than 2 feet in width is considered equal to physical separation for the LTS analyses.
For signalized intersections, the presence of a pedestrian or bicycle exclusive phase automatically receives an LTS of 1.

PEDESTRIAN AND BICYCLE COLLISIONS

Pedestrian and bicycle collisions 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 2010 to 2014, the most recent data available. Collisions being assessed included collisions with bicyclists and pedestrians with vehicles, 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 (2020) Conditions without the Project ("Future Without Project")
- Future (2020) 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 2020 or roughly three (3) years from the time that traffic volumes in the project corridor were studied. As such, the analysis evaluates 2020 traffic volume data to show how the proposed project would affect future traffic conditions once it is built. An average annual growth rate of 2% for intersections within the project corridor was determined based on a comparison of Base Year 2012 and future Year 2020 volumes (**Appendix F**).

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. [1]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 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. LOS D represents "at-capacity" operations. Operations are designated as LOS E or LOS F when volumes exceed capacity, resulting in stop-and-go conditions. The methodology for signalized and unsignalized intersection analysis is described below.

[1] 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.

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 a.m. to 9:00 a.m. 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 volumes were obtained in 2014, 2015, 2016, and 2017. Roadway segment volumes were collected on 2015 and 2017. For the volumes obtained prior to 2017, an annual growth factor of two 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. Consistent with City of San Diego guidelines, LOS D or better are considered acceptable peak hour intersection operations (*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 Chapter 16 of the 2000 Highway Capacity Manual (HCM) (Special Report 2009, Transportation Research Board). 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 5**, 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.

TABLE 5
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, 2000

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 2000 methodologies: all-way stop-controlled intersections and minor-street stop-controlled intersections. Analysis of neighborhood traffic circles (NTCs) is based on HCM 2010 methodology as described below.

All-Way Stop Controlled

The HCM 2000 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 2000 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" approaches are reported, as opposed to average intersection LOS and delay.

Yield-Controlled Neighborhood Traffic Circles

Although NTCs are not technically roundabouts because of their design limitations, they operate similarly in terms of the one-way flow of traffic around a central median island, yield control on all approaches, and entering vehicles yielding to vehicles already in the NTC. For vehicles to enter an NTC or roundabout, they must find a critical gap in the conflicting flow, where they may comfortably weave into the conflicting flow. The HCM 2000 method for assessing yield controlled roundabouts does not provide overall intersection LOS grades or volume-to-capacity (V/C) ratios. In order to compensate for this, the HCM 2010 method, which offers both of these metrics for roundabouts, was utilized to evaluate NTC operations for this study.

The average control delay for unsignalized intersections is calculated using Synchro 9.0 analysis software and is correlated to a LOS designation as shown in **Table 6**.

TABLE 6
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, 2000

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 acceptable traffic conditions on roadway segments.

Roadway Segment Analysis: Part 1

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

- 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 are considered acceptable under 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 acceptability of traffic conditions along the study segment:

- if the intersections at each end of the segment would operate at an acceptable LOS with the project (using the intersection criteria described in **Section 2.3**);
- if traffic conditions along the segment would operate at acceptable LOS D or better based on an HCM arterial analysis with the project during the AM and PM peak hours, and
- if the proposed street classification is consistent with the adopted Community Plan for the area.

If all three criteria are satisfied, then traffic conditions along the roadway segment are considered acceptable under City of San Diego standards. If any of the three criteria are not satisfied, then traffic conditions along the roadway segment are not considered acceptable under City of San Diego standards.

2.4 INTERSECTION AND ROADWAY SEGMENT STUDY LOCATIONS

The major operational change within the Howard-Orange bikeway is removal of the existing center two-way left-turn lane between intersections and separate left-turn pockets at intersections. Since signalized intersections typically serve higher traffic volumes than unsignalized intersections and some signalized intersections include separate left-turn phasing, all signalized intersections with proposed left-turn removal along the corridor were analyzed. In addition, a representative sample of unsignalized intersections was also analyzed in this impact assessment since the elimination of separate left-turn lanes could affect delay for movements controlled by stop signs on the cross streets of Howard and Orange Avenues. The process for selecting unsignalized intersections and roadway segments to analyze is described below.

Based on empirical evidence and field review, many of the unsignalized intersections and roadway segments along Howard and Orange Avenues exhibit acceptable levels of service, even during the peak hours. In turn, these unsignalized intersections and roadway segments are comparable in characteristics (e.g. intersection and roadway configuration, adjacent land uses, etc.) to many adjacent unsignalized intersections and segments along the corridor. Because of the observed acceptable level of service at key locations, and comparable characteristics between them and many adjacent locations, a study of every unsignalized intersection and roadway segment within the project area is not needed. Rather, a sample of unsignalized intersections and roadway segments was chosen that is representative of all unsignalized intersections and roadway segments in the project area. A geographically diverse selection of unsignalized intersections was made at generally two to four block intervals along the corridor. With implementation of the proposed project, unsignalized intersections and roadway segments not included in the analysis would perform equal to or better than those included in the analysis due to traffic volumes that are equal to or lower than those analyzed with similar traffic control devices, capacity, and lane configurations. The 19 study intersections are as follows:

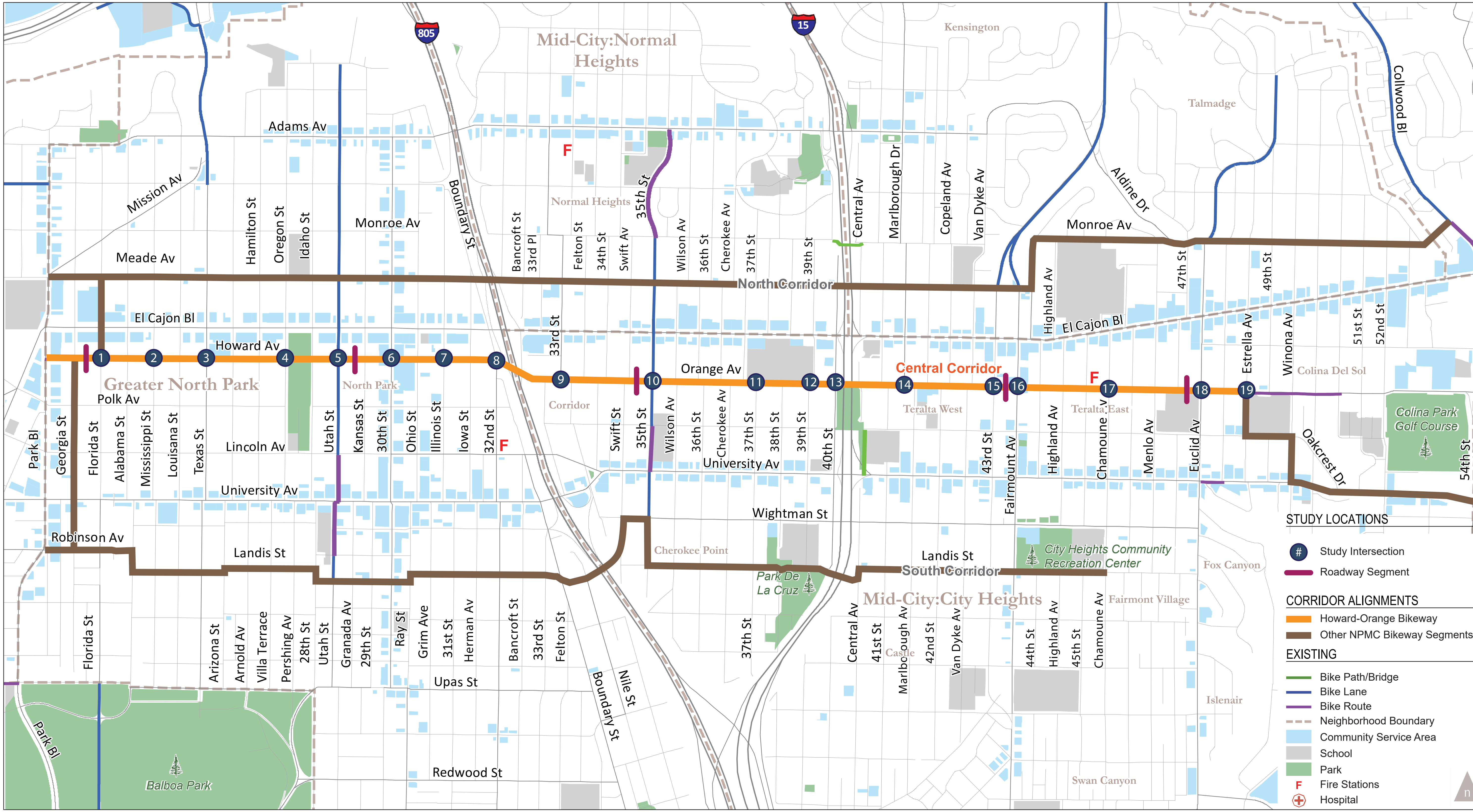
1. Florida Street & Howard Avenue
2. Mississippi Street & Howard Avenue
3. Texas Street & Howard Avenue
4. Oregon Street & Howard Avenue
5. Utah Street & Howard Avenue
6. 30th Street & Howard Avenue
7. Illinois Street & Howard Avenue
8. 32nd Street & Howard Avenue
9. 33rd Street & Orange Avenue
10. 35th Street & Orange Avenue
11. 37th Street & Orange Avenue
12. 39th Street & Orange Avenue
13. 40th Street & Orange Avenue
14. Marlborough Drive & Orange Avenue
15. 43rd Street & Orange Avenue
16. Fairmount Avenue & Orange Avenue
17. Chamoune Avenue & Orange Avenue
18. Euclid Avenue & Orange Avenue
19. Estrella Avenue & Orange Avenue

The five (5) roadway segments studied are as follows:

1. Howard Avenue between Georgia & Florida Street (East of Alley)
2. Howard Avenue between Utah Street & Kansas Street (West of Alley)

3. Orange Avenue between Swift Avenue & 35th Street (West of Alley)
4. Orange Avenue between 43rd Street & Fairmount Avenue (West of Alley)
5. Orange Avenue between 47th Street & Euclid Avenue

Figure 4 shows the location of the intersections and roadway segments analyzed in this traffic and safety impact assessment.



* THE IMPROVEMENTS SHOWN ON THIS MAP ARE NOT FINAL AND MAY BE SUBJECT TO CHANGE

Note: Fire stations that serve the project area, but are not shown on the map are:
#11 at University Ave/Allison Ave, #26 at 54th St/College Grove, and #5 at University Ave/9th St

Figure 4

Howard-Orange Bikeway Study Intersections

N:\PROJECTS\Other_Office_Projects_SD Projects\SD14-0115_North_Park\HO_Mobility_Assessment\Fig_4_HO_StudyLocs

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 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 bicycle and pedestrian 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 FACILITIES AND COLLISION HISTORY

Both Howard Avenue and Orange Avenue are existing Class III bike routes according to the SANDAG Regional Bike Plan. Existing Class II bike lanes intersect the Howard-Orange project corridor at Utah Street and 35th Street.

Under existing conditions, the level of stress for the Howard-Orange project corridor is classified as LTS 2 based on the information in **Table 2**. The roadway is posted with a 25 mph speed limit and includes a three-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 as a means to collect and process data gathered from a collision scene. Within the Howard-Orange project corridor, a total of 12 bicycle collisions occurred during the five-year period from 2010 to 2014, which is the latest year for which complete SWITRS data are available. This total resulted in an average of 2.4 collisions each year, although the highest number of reported collisions in a given year was four, which occurred in both 2011 and 2014. Of the five-year total, these collisions did not include any fatalities or severe injuries, but all 12 resulted in some other type of evident injury. Collisions involving people bicycling were noted on the primary street (Howard Avenue or Orange Avenue) at the point where the incident occurred. Thus, collisions at intersections or along street segments, were only noted in this report if the primary street of the collision was either Howard Avenue or Orange Avenue.

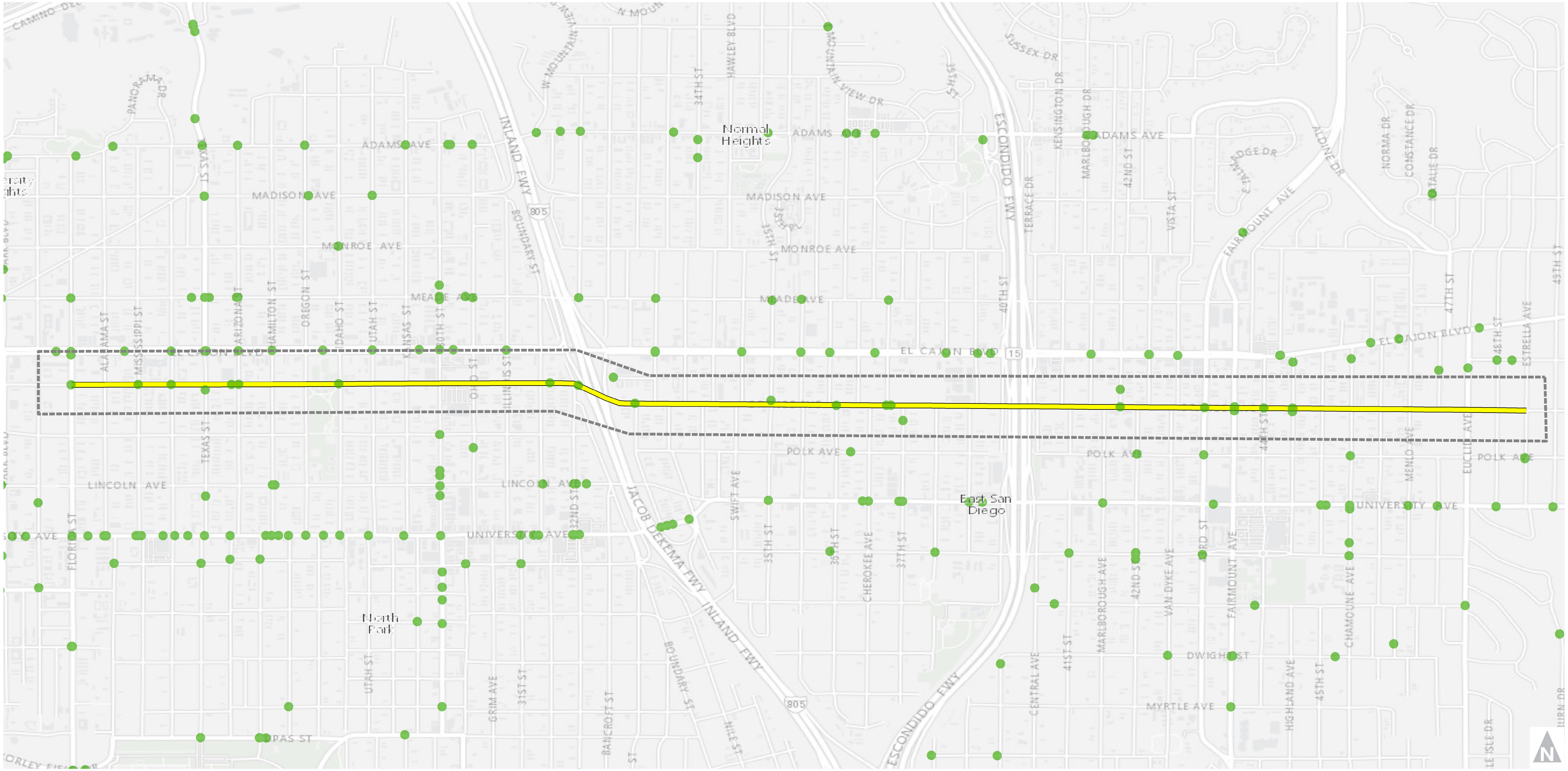
Although the focus of this assessment is the proposed Howard-Orange Bikeway, **Figure 5** shows the location of bicycle collisions on four parallel streets (El Cajon Boulevard, Polk Avenue, Lincoln Avenue, and University Avenue) for the 2010 through 2014 period, as well as those for Howard and Orange Avenues. Data from the four parallel streets are provided to depict the number of collisions involving people on bikes that have occurred in the immediate vicinity of the proposed project.

PEDESTRIAN FACILITIES AND COLLISION HISTORY

Sidewalks, Curb Ramps, Crosswalks and Curb Extensions

Existing conditions without the proposed Howard-Orange project in place were assessed for the presence of connected and continuous well-maintained sidewalks, curb ramps, and street crossings. Existing crosswalks are more frequent at four way intersections east of Interstate-805 on Orange Avenue, and less frequent on Howard Avenue between 32nd Street and Georgia Street. Well-maintained curb ramps are located at all intersections throughout the Howard-Orange project corridor. Continuous sidewalks exist throughout the project corridor in both the eastbound and westbound directions. Existing curb extensions are located along Orange Avenue between 46th Street and Estrella Avenue, but are not present elsewhere.

Under existing conditions, the level of stress for the Howard-Orange project corridor is classified as LTS 1 based on the information in **Table 3**. The roadway is posted with a 25 mph speed limit and includes a three-lane cross-section.



Howard-Orange Bicycle Collisions (2010-2014)

Collisions Involving People Walking

A total of 14 pedestrian collisions occurred along the Howard-Orange project corridor during the five-year period from 2010 to 2014 (the latest dataset available), or an average of 2.8 collisions each year. In the year with the highest total, 2014, four collisions were reported. Of the five-year total, these collisions included two fatalities, two severe injuries, and 10 collisions that resulted in some other type of evident injury. The two pedestrian fatalities occurred at Orange Avenue and 41st Street in 2013 and Howard Avenue at 30th Street in 2012. Collisions involving people walking were noted on the primary street (Howard Avenue or Orange Avenue) at the point where the incident occurred. Thus, collisions at intersections or along street segments, were only noted in this report if the primary street of the collision was either Howard Avenue or Orange Avenue.

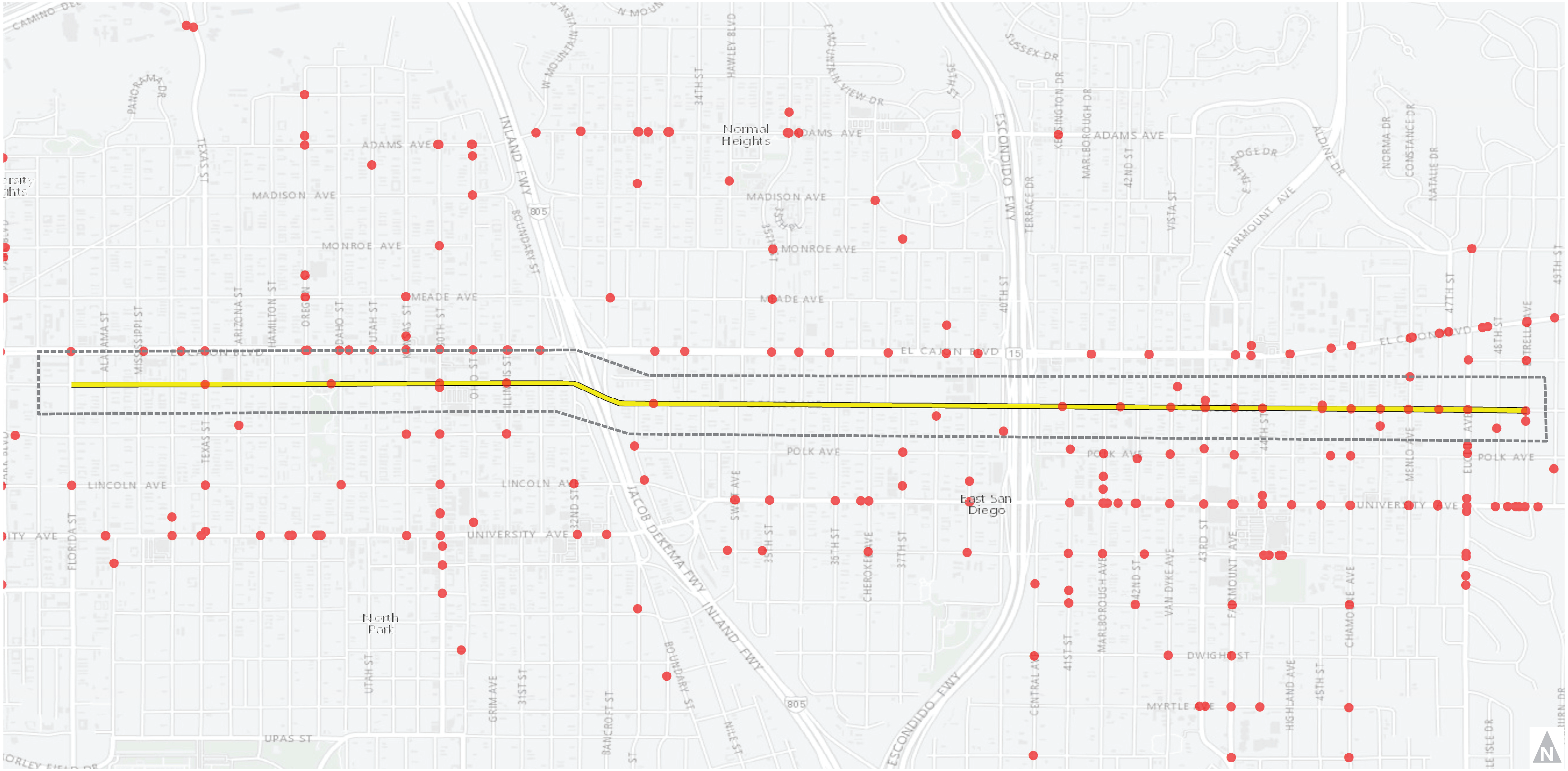
Although the focus of this assessment is the proposed Howard-Orange Bikeway, **Figure 6** shows the location of pedestrian collisions on four parallel streets (El Cajon Boulevard, Polk Avenue, Lincoln Avenue, and University Avenue) for the 2010 through 2014 period, as well as those for Howard and Orange Avenues. Data from the four parallel streets are provided to depict the number of collisions involving people walking that have occurred in the immediate vicinity of the proposed project.

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.



Pedestrian Collisions

Howard-Orange Biikeway

Howard-Orange Pedestrian Collisions (2010-2014)

Howard Avenue is an east-west roadway that functions as a two-lane collector and extends between Park Boulevard and the Interstate 805 (I-805) freeway. East of I-805, Howard Avenue is designated as Orange Avenue as it crosses into Mid City from North Park. Howard Avenue has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides and is an existing Class III bike route. Driveways exist along the roadway and parking is allowed on both sides of Howard Avenue. The posted speed limit is 25 mph.

Orange Avenue is an east-west roadway that is classified as a two-lane collector and extends between Interstate 805 (I-805) and Colts Way. Orange Avenue provides direct east-west access to a number of local destinations including Teralta Park, Arroyo Paseo Charter High School, and Wilson Middle School. Orange Avenue contains existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees along the roadway. Parallel parking is allowed on both sides of Orange Avenue. The posted speed limit is 25 mph and it is an existing Class III bike route.

Florida Street is a north-south roadway that is a two-lane local collector road with a posted speed limit of 25 mph. Florida Street extends from Adams Avenue to Upas Street. Near the project corridor, Florida Street provides access to a commercial and retail center one block north on El Cajon Boulevard and provides access to residential units south of the project corridor. Florida Street contains existing curbs, sidewalks, and small landscaped parkway strips along the roadway. Parallel parking is allowed on both sides of Florida Street.

Mississippi Street is a north-south roadway that functions as a two-lane local road that extends from Adams Avenue to Upas Street. North of the project corridor, Mississippi Street provides access to the University Heights neighborhood as well as shops and restaurants along Adams Avenue. South of the project corridor, Mississippi Street provides direct access to residential properties and University Avenue. Mississippi Street has existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees on both sides. Driveways exist along the roadway with both parallel and perpendicular parking allowed in sections along Mississippi Street. The posted speed limit is 30 mph.

Texas Street is a north-south roadway that is classified as a two-lane collector road near Howard Avenue with a posted speed limit of 30 mph. Texas Street extends from Interstate 8 (I-8) to Upas Street. Texas Street provides access to Mission Valley (as a higher capacity roadway) to the north and extends south past University Avenue to Upas Street at the edge of Balboa Park. Existing curbs, sidewalks, and trees are located on both sides of the roadway. Parallel parking is allowed on both sides of Texas Street.

Oregon Street is a north-south roadway that functions as a two-lane local road that extends from Copley Avenue to University Avenue. Directly north of the project corridor, Oregon Street provides access to the San Diego indoor soccer complex and provides access to North Park Community Park south of the project corridor. Currently, Oregon Street contains existing curbs, sidewalks, and street trees on both sides. Driveways exist along the roadway with both parallel and perpendicular parking is allowed throughout Oregon Street. The posted speed limit is 30 mph.

Utah Street is a north-south roadway that is classified as a two-lane collector that extends from Copley Avenue to Upas Street. Adjacent to the project corridor, Utah Street provides existing bike lane coverage northbound to amenities on Adams Avenue and southbound to Balboa Park via Pershing Drive. It includes existing Class II bike lanes. Utah Street contains existing curbs, sidewalks, and intermittent landscaped parkway strips and street trees along the roadway. Parallel parking is allowed in most sections of Utah Street.

30th Street is a north-south roadway that functions as a two-lane local collector road that extends from Suncrest Drive to Juniper Street. 30th Street has existing curbs, sidewalks, and street trees on both sides. Parallel parking and driveway access exists on both sides of the roadway. South of the project corridor, 30th Street intersects with University Avenue providing access to the central commercial and retail point of North Park. The posted speed limit is 25 mph.

Illinois Street is a north-south roadway that functions as a two-lane local road that extends from Madison Avenue to University Avenue. Illinois Street is anchored by sections of commercial and retail opportunities on El Cajon Boulevard to the north and University Avenue to the south. Illinois Street has existing curbs, sidewalks, and intermittent landscaped parkway strips on both sides. Driveways exist along the roadway with both parallel and perpendicular parking allowed in sections along Illinois Street. The posted speed limit is 30 mph.

32nd Street is a north-south roadway that is classified as a two-lane local collector road with a posted speed limit of 25 mph. At the project corridor, 32nd Street borders I-805 and is the last intersection at the project corridor in North Park before Howard Avenue turns into Orange Avenue in Mid City. 32nd Street extends from Howard Avenue to one block south of Juniper Street. 32nd Street contains curbs, sidewalks, and trees on both sides of the roadway. Parallel parking is allowed on both sides of 32nd Street in most sections.

33rd Street is a north-south roadway that functions as a two-lane local collector road that extends from Mountain View Drive to University Avenue with a posted speed limit of 25 mph. Along the project corridor, 33rd Street is the first cross street in the Mid-City section of the Howard-Orange bikeway. 33rd Street contains curbs, sidewalks, and trees on both sides of the roadway. Parallel parking is allowed on both sides of 33rd Street in most sections.

35th Street is a north-south roadway that is classified as a two-lane local collector road that extends from Wilshire Drive to Swift Avenue. Adjacent to the project corridor, 35th Street provides existing bike lane coverage northbound to Monroe Avenue and southbound to Edison Elementary and University Avenue. 35th Street contains existing curbs, sidewalks, and street trees along the roadway. Parallel parking is allowed in most sections of 35th Street with angled parking allowed in the section next to Edison elementary school. The posted speed limit is 30 mph and it includes existing Class II bike lanes.

37th Street is a two-lane north-south local road that extends from Madison Avenue to Myrtle Avenue. Directly north of the project corridor, 37th Street provides access to Arroyo Paseo Charter High School and El Cajon Boulevard. 37th Street has existing curbs, sidewalks, and street trees on both sides. 37th Street terminates at the intersection of the project corridor in the northbound direction. Parallel, and angled parking access exists on both sides of the roadway. The posted speed limit is 30 mph.

39th Street is a north-south roadway that functions as a two-lane local road that extends from Circle Drive to Landis Street. Directly north of the project corridor, 39th Street provides access to Wilson Middle School and El Cajon Boulevard. 39th Street has existing curbs, sidewalks, and intermittent landscaped parkway strips on both sides. Driveways exist along the roadway with both parallel and perpendicular parking allowed in sections along 39th Street. The posted speed limit is 30 mph.

40th Street is a north-south roadway that is classified as a one to two lane major arterial road that extends from Adams Avenue to Landis Street. Directly south of the project corridor, 40th Street provides access to Teralta Park. 40th Street contains existing curbs, sidewalks, and street trees along the roadway. Parallel parking is allowed in most sections of 40th Street with angled parking allowed in the section next to Teralta Park. The posted speed limit is 25 mph.

Marlborough Drive is a north-south roadway that functions as a two-lane local road that extends from Palisades Road to Thorn Street. Near the project corridor, Marlborough Drive provides access to Our Lady of the Sacred Heart Church as well as other residential and commercial facilities in the southbound direction before University Avenue. Marlborough Drive contains existing curbs, sidewalks, and intermittent landscaped strips on both sides. Driveways exist along the roadway with primarily angled parking allowed on both sides of the roadway. The posted speed limit is 25 mph.

43rd Street functions as a southbound two to three lane major arterial roadway road that extends from Meade Avenue to Fairmont Avenue. Directly north of the project corridor, 43rd Street provides access to a mix of commercial and residential development. 43rd Street has existing curbs, sidewalks, and street trees on both sides. Driveways exist along the roadway with primarily parallel and angled parking allowed along most sections of 43rd Street. The posted speed limit is 25 mph.

Fairmount Avenue is a north-south roadway that is classified as a three-lane major arterial road that extends from Interstate 8 (I-8) to 47th Street. In near proximity to the project corridor, Fairmount Avenue provides access to a concentration of commercial, retail, and residential development in both the northbound and southbound directions. Fairmount Avenue contains curbs and sidewalks on both sides of the roadway. Parallel parking is allowed in most sections of Fairmount Avenue. The posted speed limit is 30 mph.

Chamoune Avenue functions as a two-lane local roadway that extends from El Cajon Boulevard to Redwood Street. In near proximity to the project corridor, Chamoune Avenue provides access to a mix of residential facilities in both the northbound and southbound directions. Chamoune Avenue contains landscaped parkway strips, trees, curbs, and sidewalks on both sides. Driveway access exist along the roadway with parallel parking allowed along most sections of Chamoune Avenue. The posted speed limit is 30 mph.

Euclid Avenue is a north-south roadway that is classified as a two-lane collector that extends from Adams Avenue to Sweetwater Road. Directly south of the project corridor, Euclid Avenue provides access to Euclid Elementary school and residential development. North of the Howard-Orange bikeway, Euclid Avenue provides access to single and multi-family residential facilities. Euclid Avenue contains curbs, crosswalks, and sidewalks on both sides of the roadway. Parallel parking is allowed in most sections of Euclid Avenue. The posted speed limit is 25 mph.

Estrella Avenue is a north-south local roadway that extends from Adams Avenue to University Avenue. Directly south of the project corridor, Estrella Avenue provides access to Ibarra Elementary school and residential development. North of the Howard-Orange bikeway, Euclid Avenue provides access to single and multi-family residential facilities. Estrella Avenue has existing curbs, sidewalks, and street trees on both sides. Driveways exist along the roadway with parallel parking allowed along most sections of the roadway.

Intersection Level of Service

Existing Without Project morning and evening peak period LOS for the 19 intersections in the project area are shown in **Table 7**. The intersection analysis worksheets for the Existing without Project condition are provided in **Appendix D**. As shown in **Table 7,** all intersections operate at an LOS of C or better along the project corridor under existing conditions.

TABLE 7
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT PROJECT

Intersection		Peak Hour	Traffic Control	Existing Without Project Conditions	
				Delay (sec/veh)[3]	LOS[4]
1	Florida Street & Howard Avenue	AM	AWSC[1]	9.7	A
		PM		11.9	B
2	Mississippi Street & Howard Avenue	AM	AWSC	7.8	A
		PM		8.8	A
3	Texas Street & Howard Avenue	AM	Signal	7.8	A
		PM		12.4	B
4	Oregon Street & Howard Avenue	AM	AWSC	8.4	A
		PM		9.9	A
5	Utah Street & Howard Avenue	AM	AWSC	9.4	A
		PM		12	B
6	30th Street & Howard Avenue	AM	Signal	11.5	B
		PM		14.5	B
7	Illinois Street & Howard Avenue	AM	AWSC	9.9	A
		PM		11.9	B
8	32nd Street & Howard Avenue	AM	SSSC[2]	10.2	B
		PM		11.0	B
9	33rd Street & Orange Avenue	AM	Signal	14.2	B
		PM		17.7	B
10	35th Street & Orange Avenue	AM	Signal	11.3	B
		PM		10.2	B
11	37th Street & Orange Avenue	AM	SSSC	12.5	B
		PM		13.4	B
12	39th Street & Orange Avenue	AM	SSSC	18.5	C
		PM		14.9	B

TABLE 7
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT PROJECT

Intersection		Peak Hour	Traffic Control	Existing Without Project Conditions	
				Delay (sec/veh)[3]	LOS[4]
13	40th Street & Orange Avenue	AM	Signal	24.3	C
		PM		23.6	C
14	Marlborough Drive & Orange Avenue	AM	Signal	9.9	A
		PM		6.0	A
15	43rd Street & Orange Avenue	AM	Signal	14.3	B
		PM		14.0	B
16	Fairmount Avenue & Orange Avenue	AM	Signal	17.3	B
		PM		12.4	B
17	Chamoune Avenue & Orange Avenue	AM	AWSC	18.5	C
		PM		17.1	C
18	Euclid Avenue & Orange Avenue	AM	Signal	19.5	B
		PM		21.7	C
19	Estrella Avenue & Orange Avenue	AM	AWSC	10.0	B
		PM		12.4	B

Source: Appendix D (LOS Calculation Sheets)

Notes:

[1] AWSC = All-way stop-controlled intersection

[2] SSSC = Side-street stop-controlled

[3] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop control intersections. The vehicular delay for the worst movement is reported for side street stop-controlled intersections.

[4] LOS calculations performed using the *2000 Highway Capacity Manual (HCM)* method.

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 8**. The assessment was based upon existing road geometry and the daily traffic volumes for the segments. As shown in **Table 8**, all roadway segments along the project corridor operate at an LOS of D or better.

TABLE 8
EXISTING ROADWAY SEGMENT LEVEL OF SERVICE WITHOUT THE PROJECT

	Roadway Segment	Lanes / Functional Class	ADT	V/C	LOS
1	Howard Avenue between Georgia Street & Florida Street	2C w/ CL	4,752	0.317	A
2	Howard Avenue between Utah Street & Kansas Street	2C w/ CL	5,381	0.359	B
3	Orange Avenue between Swift Avenue & 35th Street	2C w/ CL	8,458	0.564	C
4	Orange Avenue between 43rd Street & Fairmount Avenue	2C w/ CL	11,450	0.763	D
5	Orange Avenue between 47th Street & Euclid Avenue	2C w/ CL	6,365	0.424	B

Source: Appendix B (Traffic Counts) and Appendix C (City of San Diego Roadway Segment Analysis Criteria)
2C = 2-lane collector
CL = Center lane

3.2 EXISTING CONDITIONS WITH THE PROJECT

This section analyzes how existing vehicle traffic, bicycle, and pedestrian conditions in the project corridor would be affected if the proposed project were implemented.

BICYCLIST AND PEDESTRIAN CONDITIONS

The proposed improvements along the Howard-Orange Bikeway are designed to enhance bicycle and pedestrian safety within the physical constraints of the roadway. The removal of stop signs at select locations will expedite bicycle travel along the bikeways by allowing riders to maintain momentum and making riding through steeper sections of the bikeways less strenuous. These improvements will make traveling by bike much more competitive with driving for short trips. Both people biking and walking will benefit from safer speeds along the bikeways through implementation of traffic calming devices including speed cushions and raised crosswalks. 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 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 would improve to LTS 1 along nearly 95 percent of the bikeway length where separate bike facilities (i.e., buffered bike lanes) would be added. LTS 2 would continue to exist on those sections where people who bike would share the roadway and reverse angle parking is planned; however, these segments represent less than six percent of the total bikeway length. Overall, the project achieves LTS 2 ("the traffic stress that most adults will tolerate") or 1 ("suitable for children"), and is therefore consistent with best practices in low-stress network design (Mekuria, 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 10** 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 would remain at LTS 1, but numerous project features would enhance safety and help to reduce the potential for vehicle-pedestrian and vehicle bicycle conflicts. This includes shorter street crossings, better visibility of people who walk and bike, and slower overall travel speeds along the corridor. Overall, the project achieves LTS 2 ("the traffic stress that most adults will tolerate") or 1 ("suitable for children"), and is therefore consistent with best practices in low-stress network design (Mekuria, 2012).

TABLE 9
ROADWAY SEGMENT LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Roadway Segment		Existing Without Project		Existing With Project		
		Traffic Stress	Bicycle Facilities	Traffic Stress	Bicycle Facilities	Potential Safety Benefits
Howard Avenue	Park Boulevard to Florida Street	Low (2)	None	Low (2)	Sharrows in both directions or a buffered bike lane in one direction plus neighborhood traffic circle	Features designed to raise driver awareness of people who bike, reduced motor vehicle travel speeds
Howard Avenue	Florida Street to Oregon Street	Low (2)	None	Low (1)	Buffered bike lanes (both directions) plus neighborhood traffic circles and bend-outs	Class II facility separated by striped buffer; reductions in travel lane widths, motor vehicle travel speeds, and collision severity
Howard Avenue	Oregon Street to Idaho Street	Low (2)	None	Low (2)	Raised crosswalk plus neighborhood traffic circles	Features designed to raise driver awareness of people who bike; reductions in motor vehicle travel speeds and collision severity
Howard Avenue	Idaho Street to Boundary Street	Low (2)	None	Low (1)	Buffered bike lanes (both directions) plus neighborhood traffic circles, bend-outs, and raised crosswalks/chokers	Class II facility separated by striped buffer; reductions in travel lane widths, motor vehicle travel speeds, and collision severity
Orange Avenue	Boundary Street to Estrella Avenue	Low (2)	None	Low (1)	Buffered bike lanes (both directions) plus neighborhood traffic circles bend-outs, and raised crosswalks/chokers	Class II facility separated by striped buffer; reductions in travel lane widths, motor vehicle travel speeds, and collision severity

Source: Fehr & Peers, 2017

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	**Crossing Treatment**	**Traffic Stress**	**Crossing Treatment**	**Potential Safety Benefits**
Bikeway Street: Howard Avenue					
Georgia Street Mississippi Street Utah Street	LTS 1	Stop signs on all approaches, diagonal ramps	LTS 1	Neighborhood traffic circle, marked crosswalks, direct ramps, fewer vehicle lanes to cross, striped bike lane leading to east side of intersection, sharrows in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, potential reduced collision severity for all travelers
Florida Street Alabama Street Illinois Street	LTS 1	Stop signs on all approaches, diagonal ramps	LTS 1	Stop signs on all approaches, marked crosswalks, fewer vehicle lanes to cross, striped bike lane leading to intersection, sharrows in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits
Louisiana Street	LTS 1	Stop signs on all approaches, diagonal ramps	LTS 1	Side street stop, raised crosswalk across east leg, striped bike lane leading to intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, slower vehicle speed at intersection with removal of stop signs on Howard
Texas Street 30th Street	LTS 1	Side street stop only	LTS 1	Neighborhood traffic circle, marked crosswalks, direct ramps, fewer vehicle lanes to cross, striped bike lane leading to intersection, sharrows in intersection	Slower vehicle speeds, increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, potential reduced collision severity for all travelers
Arizona Street	LTS 1	Side street stop only	LTS 1	Neighborhood traffic circle, marked crosswalks, direct ramps, fewer vehicle lanes to cross, striped bike lane leading to intersection, sharrows in intersection	Slower vehicle speeds, increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, potential reduced collision severity for all travelers

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits
Hamilton Street Kansas Street Ohio Street	LTS 1	Stop signs on all approaches, diagonal ramps	LTS 1	All-way stop, marked crosswalks across north-south approaches only, fewer vehicle lanes to cross, striped bike lane leading to intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows
Oregon Street Idaho Street	LTS 1	Side street stop only	LTS 1	Side street stop, marked crosswalks across north-south approaches only, fewer vehicle lanes to cross, striped bike lane leading to intersection, sharrows in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows
Boundary Street	LTS 1	Side street stop only	LTS 1	Side street stop, marked crosswalks across north-south approaches only, fewer vehicle lanes to cross, striped bike lane leading to intersection, curb extensions on south approach, sharrows in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, slower vehicle turning speeds
Bikeway Street: Orange Avenue					

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits
33rd Street (South) Wabash Avenue Felton Street 34th Street (Both) Swift Avenue (Both) Wilson Avenue 36th Street Cherokee Avenue (Both) 41st Street Marlborough Avenue (North) 42nd Street (South) Copeland Avenue Van Dyke Avenue 44th Street 45th Street 46th Street 48th Street	LTS 1	Side street stop only, diagonal ramps	LTS 1	Side street stop only, marked crosswalks across north-south approaches only, fewer vehicle lanes to cross, striped bike lane leading to intersection, sharrows in intersection, speed cushions near intersections of 34th, Swift, Cherokee, 41st and Van Dyke	Slower vehicle speeds approaching intersections, increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits
33rd Street (North) 35th Street 43rd Street Fairmount Avenue Euclid Avenue	LTS 1	Push button signal activation, diagonal ramps, striped crosswalks	LTS 1	Signal, maintain and enhance marked crosswalks, fewer vehicle lanes to cross, direct ramps on some or all corners, striped bike lane leading to intersection on one side, bend outs on one or both sides, shorter crossing distances, fewer vehicle lanes to cross, sharrows in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, reduced right-turn conflicts for people who bike, slower vehicle turning speeds
37th Street 42nd Street (North)	LTS 1	Side street stop only, diagonal ramps	LTS 1	Side street stop, raised crosswalk across one leg of Orange, striped bike lane leading to intersection, fewer vehicle lanes to cross, sharrows or bike lane in intersection	Slower vehicle speeds approaching intersections, increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows
38th Street 39th Street (South) 47th Street	LTS 1	Side street stop only, marked crosswalk across one leg of Orange and cross street	LTS 1	Side street stop, maintain marked crosswalks, prohibit left-turns from 39th Street (South) only	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits
40th Street	LTS 1	Push button signal activation, marked crosswalks on three legs	LTS 1	Signal, modify east approach to include new marked crosswalk, curb extension and direct ramps	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, slower vehicle turning speeds
Central Avenue	LTS 1	Side street stop only, marked crosswalk across west leg of Orange, diagonal ramps	LTS 1	Side street stop, raised median islands on west and east legs, new marked crosswalks on north-south approaches, RRFB insllation for existing crosswalk, direct ramps, fewer vehicle lanes to cross, reduced crossing distance, sharrows in intersection (north-south)	Slower vehicle speeds approaching intersection, increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits
Marlborough Avenue (South)	LTS 1	Push button signal activiation, marked crosswalks on west and south legs, diagonal ramps	LTS 1	Signal, marked crosswalks, fewer vehicle lanes to cross, direct ramps, striped bike lane leading to intersection, bend outs on one side, shorter crossing distances, fewer vehicle lanes to cross, sharrows or bike lane in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, reduced right-turn conflicts for people who bike, slower vehicle turning speeds
Highland Avenue Chamoune Avenue	LTS 1	Stop signs on all approaches, diagonal ramps	LTS 1	Stop signs on all approaches, marked crosswalks, fewer vehicle lanes to cross, striped bike lane leading to intersection, sharrows in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows
Menlo Avenue	LTS 1	Stop signs and marked crosswalks on all approaches, diagonal ramps	LTS 1	All-way stop, maintain crosswalks and add raised crosswalk across east leg of Orange, striped bike lane leading to intersection, fewer vehicle lanes to cross, sharrows in intersection	Slower vehicle speeds approaching intersection, increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows

TABLE 10
INTERSECTION CROSSING LEVEL OF TRAFFIC STRESS FOR EXISTING CONDITIONS WITHOUT AND WITH PROJECT

Bikeway Street and Cross Street(s)	Existing Without Project		Existing With Project		
	Traffic Stress	Crossing Treatment	Traffic Stress	Crossing Treatment	Potential Safety Benefits
Estrella Avenue	LTS 1	Stop signs and marked crosswalks on all approaches, diagonal ramps	LTS 1	All way stop, maintain marked crosswalks, fewer vehicle lanes to cross, direct ramps, curb extensions on all corners, fewer vehicle lanes to cross, sharrows in intersection	Increased visibility to drivers and awareness of people walking or biking, reduced exposure to vehicle flows, reduced right-turn conflicts for people who bike, slower vehicle turning speeds

Source: Fehr & Peers, 2017

VEHICULAR TRAFFIC CONDITIONS

The Existing 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 Capacity

The removal of the center turn lane along all of Howard and the western section of Orange Avenue will reduce the street capacity by requiring vehicles to turn to and from the remaining through lanes instead of from the existing two-way center turn lane. This exact reconfiguration – of Howard Avenue – is proposed by the October 2016 North Park Community Plan. A similar reconfiguration of Orange Avenue, however, is not called for by the Mid-City Community Plan from August 1998. The effect of this roadway change on roadway segment and intersection operations is evaluated in Chapter 3 and Chapter 4 of this report.

Roadway Capacity Analysis

Table 11 shows the results for Part 1 of the roadway segment analysis. As shown in the table, the removal of the center turn lane with the project causes the LOS on two segments of Orange Avenue to decrease from LOS D or better to LOS F: 1) between Swift Avenue and 35th Street, and 2) between 43rd Street and Fairmount Avenue. As a result, these two roadway segments were subject to additional evaluation in Part 2 of the roadway segment analysis, to determine if the traffic conditions for these segments would be acceptable under the City of San Diego standards. The other roadway segments would remain at an acceptable LOS of D or better with implementation of the proposed project, so no further evaluation of these segments is required.

TABLE 11
PART 1: ROADWAY SEGMENT ANALYSIS FOR EXISTING WITHOUT AND WITH PROJECT

	Roadway Segment	Existing Without Project				Existing With Project				
		Lanes / Functional Class	ADT	V/C	LOS	Lanes / Functional Class	ADT	V/C	LOS	Δ V/C
1	Howard Avenue between Georgia Street & Florida Street	2C w/ CL	4,752	0.317	A	2C MFF	4,752	0.594	C	0.277
2	Howard Avenue between Utah Street & Kansas Street	2C w/ CL	5,381	0.359	B	2C MFF	5,381	0.673	C	0.314
3	Orange Avenue between Swift Avenue & 35th Street	2C w/ CL	8,458	0.564	C	2C MFF	8,458	**1.057**	**F**	**0.493**
4	Orange Avenue between 43rd Street & Fairmount Avenue	2C w/ CL	11,450	0.763	D	2C MFF	11,450	**1.431**	**F**	**0.668**
5	Orange Avenue between 47th Street & Euclid Avenue	2C w/ CL	6,365	0.424	B	2C MFF	6,365	0.796	D	0.371

Source: Appendix B (Traffic Counts) and Appendix C (City of San Diego Roadway Segment Analysis Criteria)
2C = 2-lane collector
CL = Center lane
MF = Collector with multifamily frontage
Bold indicates roadway segments subject to additional evaluation in Part 2 of the roadway segment analysis to determine if the traffic conditions for these segments would be acceptable under the City of San Diego standards .

Table 12 shows the results for Part 2 of the roadway segments analysis. The HCM Arterial analysis LOS calculation sheets for the corresponding roadway segments are included in **Appendix E**.

TABLE 12
PART 2: ROADWAY SEGMENT ANALYSIS FOR EXISTING WITH PROJECT

Roadway Segment		Peak Hour Intersection LOS	Direction	Peak Hour Segment LOS, where ≥ D is Acceptable		Change in Vehicle Travel Time (sec)[1]		Consistent with Community Plan?
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
3	Orange Avenue between Swift Avenue & 35th Street	Acceptable in AM and PM for both intersections (LOS D or better)	EB WB	B B	B C	+0.7 -7.7	+0.3 -9.6	No
4	Orange Avenue between 43rd Street & Fairmount Avenue	Acceptable in AM and PM for both intersections (LOS D or better)	EB WB	E D	D D	-8.9 -6.0	-12.1 -7.3	No

Source: Appendix E (HCM Arterial Analysis Reports)
1. Existing Without Project Travel Time minus Existing With Project Travel Time

For the segment of Orange Avenue, between Swift Avenue and 35th Street, **Table 12** shows that the intersections at either end of this segment would operate at acceptable LOS D or better. In addition, an HCM arterial analysis shows that the segment would operate at acceptable LOS D or better during peak traffic periods. The negligible increases of less than one second and decreases in travel time about 8 to 10 seconds with the project result from optimizing the operation of the traffic signal at Orange Avenue and 35th Street, which is a standard practice with changes in lane configurations at intersections. Lastly, the project design in this segment is inconsistent with the (1998) adopted Mid-City Communities Plan: in proposing a Class II bikeway, it is consistent with the plan to provide an enhanced bicycle facility; however, the proposal to reconfigure the roadway from a 3-lane to a 2-lane collector is inconsistent with the 3-lane collector configuration in the Community Plan. Because of this inconsistency with the adopted Community Plan, the traffic conditions along this segment are considered unacceptable according to the City of San Diego Standards.

For the segment of Orange Avenue, between 43rd Street and Fairmount Avenue, it shows that the intersections at either end of this segment would operate at acceptable LOS D or better. In addition, the

HCM arterial analysis of the segment results in acceptable peak period operations (LOS D) in all but one scenario: the EB direction in the AM peak hour. Similar to the segment described above, the 43rd-to-Fairmount segment is also partially consistent with the (1998) adopted Mid-City Communities Plan: in proposing a Class II bikeway, it is consistent with the plan to provide an enhanced bicycle facility; however, the proposal to reconfigure the roadway from a 3-lane to a 2-lane collector is inconsistent with the 3-lane collector configuration in the Community Plan. Because of the unacceptable LOS E operations in the EB direction during the AM peak hour, as well as the inconsistency with the adopted Community Plan, the traffic conditions along this segment are considered unacceptable according to City of San Diego standards.

Mitigating the unacceptable LOS E along Orange Avenue, between 43rd Street and Fairmount Avenue, to an acceptable LOS D or better would require either: 1) an additional vehicle lane, or 2) substantial modification to signal timing. Adding an additional vehicle lane along this segment is not feasible due to lack of public right-of-way (i.e., there is not adequate space for an additional vehicle lane). Substantial modification of signal timing, in favor or Orange Avenue, is not feasible due to the high volumes and progression on both 43rd Street and Fairmount Avenue. Despite the unacceptable and unmitigable LOS E, however, travel times through this roadway segment would decrease by 6 to 12 seconds (depending on the direction and AM or PM peak hour) with implementation of the project compared to conditions without the project. This decrease in travel time would occur because traffic signal timing would be optimized at the intersections of Orange Avenue and 43rd Street and Orange Avenue and Fairmount Avenue as part of the project. Signal optimization is standard practice wherever changes in lane configurations at intersections are proposed. Therefore, even though the unacceptable LOS E along Orange Avenue between 43rd Street and Fairmount Avenue cannot be avoided, the project would improve travel times through this segment.

Proposed Changes to 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, the network assumptions were modified as follows:

- Lane configurations were modified to remove the left-turn lanes at all intersections along the proposed project
- Separate right-turn movements were removed from intersections where the installation of curb extensions/bend outs will result in a shared through/right-turn lane on the affected approaches. Affected intersections are as follow:
    - Texas Street & Howard Avenue
    - 30th Street & Howard Avenue
    - 32nd Street & Howard Avenue
    - 33rd Street & Orange Avenue

  - 35th Street & Howard Avenue
  - Marlborough Drive & Orange Avenue
  - 43rd Street & Orange Avenue
  - Fairmount Avenue & Orange Avenue
  - Euclid Avenue & Orange Avenue
  - Estrella Avenue & Orange Avenue
- Analysis methodologies were adjusted to reflect changes to traffic control devices proposed (e.g. All-Way Stop-Controlled to Side-Street Stop-Controlled). **Table 13** shows all the changes in traffic control devices between Without and With Project conditions.
- The northbound left-turn movement from 39th Street to westbound Orange Avenue is proposed to be removed consistent with the planned modifications at this intersection by the San Diego Unified School District (SDUSD) as discussed in the *Wilson-Central Transportation Impact Study, October 2016*. The SDUSD improvements are expected to be in place by Year 2021.

Intersection Analysis

The results of the operations analysis of Existing Without and With Project Conditions are presented in **Table 13**. **Appendix D** includes the corresponding LOS worksheets for all study scenarios. As shown in **Table 13**, all study intersections are expected to operate at an acceptable LOS D or better under the Existing without Project condition, and are projected to operate at an acceptable level under the Existing with Project condition.

TABLE 13
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT AND WITH PROJECT

Intersection		Peak Hour	Traffic Control (Without / With Project)	Existing Without Project Conditions		Existing With Project Conditions		Delay Change
				Delay (sec/veh)[4]	LOS[5]	Delay (sec/veh)[4]	LOS[5]	
1	Florida Street & Howard Avenue	AM	AWSC / AWSC[1]	9.7	A	9.9	A	0.2
		PM		11.9	B	12.4	B	0.5
2	Mississippi Street & Howard Avenue	AM	AWSC / NTC[2]	7.8	A	4.5	A	-3.3
		PM		8.8	A	5.3	A	-3.5
3	Texas Street & Howard Avenue	AM	Signal / Signal	7.8	A	7.9	A	0.1
		PM		12.4	B	12.8	A	0.4
		AM		8.4	A	5.3	A	-3.1

TABLE 13
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT AND WITH PROJECT

	Intersection	Peak Hour	Traffic Control (Without / With Project)	Existing Without Project Conditions		Existing With Project Conditions		Delay Change
				Delay (sec/veh)[4]	LOS[5]	Delay (sec/veh)[4]	LOS[5]	
4	Oregon Street & Howard Avenue	PM	AWSC / NTC	9.9	A	6.2	A	-3.7
5	Utah Street & Howard Avenue	AM	AWSC / NTC	9.4	A	5.9	C	-3.5
		PM		12	B	7.1	B	-4.9
6	30th Street & Howard Avenue	AM	Signal / Signal	11.5	B	12.2	B	0.7
		PM		14.5	B	16.0	B	1.5
7	Illinois Street & Howard Avenue	AM	AWSC / AWSC	9.9	A	9.9	A	0.0
		PM		11.9	B	12.5	B	0.6
8	32nd Street & Howard Avenue	AM	SSSC / SSSC[3]	10.2	B	11.5	B	1.3
		PM		11	B	12.7	B	1.7
9	33rd Street & Orange Avenue	AM	Signal / Signal	14.2	B	7.2	A	-7.0
		PM		17.7	B	10.4	B	-7.3
10	35th Street & Orange Avenue	AM	Signal / Signal	11.3	B	11.5	B	0.2
		PM		10.2	B	10.4	B	0.2
11	37th Street & Orange Avenue	AM	SSSC / SSSC	12.5	B	17.2	C	4.7
		PM		13.4	B	19.8	C	.4
12	39th Street & Orange Avenue	AM	SSSC / SSSC	18.5	C	25.1	D	6.6
		PM		14.9	B	19.9	C	5.0
13	40th Street & Orange Avenue	AM	Signal / Signal	24.3	C	20.3	C	-4.0
		PM		23.6	C	27.3	C	3.7
14	Marlborough Drive & Orange Avenue	AM	Signal / Signal	9.9	A	12.0	B	2.1
		PM		6.0	A	6.3	A	0.3
15	43rd Street & Orange Avenue	AM	Signal / Signal	14.3	B	12.1	B	-2.2
		PM		14.0	B	14.3	B	0.3
		AM		17.3	B	19.0	B	1.7

TABLE 13
INTERSECTION LEVEL OF SERVICE RESULTS FOR EXISTING WITHOUT AND WITH PROJECT

Intersection		Peak Hour	Traffic Control (Without / With Project)	Existing Without Project Conditions		Existing With Project Conditions		Delay Change
				Delay (sec/veh)[4]	LOS[5]	Delay (sec/veh)[4]	LOS[5]	
16	Fairmount Avenue & Orange Avenue	PM	Signal / Signal	12.4	B	14.0	B	1.6
17	Chamoune Avenue & Orange Avenue	AM	AWSC / AWSC	18.5	C	20.1	C	1.6
		PM		17.1	C	16.8	C	-0.3
18	Euclid Avenue & Orange Avenue	AM	Signal / Signal	19.5	B	12.7	B	-6.8
		PM		21.7	C	13.4	B	-8.3
19	Estrella Avenue & Orange Avenue	AM	AWSC / AWSC	10	B	10.3	B	0.3
		PM		12.4	B	12.8	B	0.0

Source: Appendix D (LOS Calculation Sheets)

Notes:

[1] AWSC = All-way stop-controlled intersection
[2]NTC = Neighborhood Traffic Circle; NTCs are All-Way Yield-Controlled
[3] SSSC = Side-street stop-controlled
[4] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop control intersections. The vehicular delay for the worst movement is reported for side street stop-controlled intersections.

4.0 FUTURE CONDITIONS WITH AND WITHOUT THE PROJECT

This chapter describes bicycle and pedestrian safety conditions and vehicle traffic conditions (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 2020)

This section describes existing conditions as of 2020 for intersections and roadway segments in the project corridor, 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 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 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 **Section 3.1**.

Proposed Changes to Intersection Capacity

No intersection capacity changes are anticipated for the year 2020 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 2020)

Future With Project conditions represent the conditions of the roadways and intersections within the project area in the year 2020 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 is 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 Howard-Orange Bikeway instead of traveling on streets with higher vehicle speeds and volumes.

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 Capacity

No roadway capacity changes are anticipated for the year 2020 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 14 shows the results for the roadway segment analysis. As shown in that table, the removal of the center turn lane with the project causes the LOS on three segments of Orange Avenue to decrease from LOS D or better to LOS E or F: 1) between Swift Avenue and 35th Street (LOS F), 2) between 43rd Street and Fairmount Avenue (LOS F), and 3) between 47th Street and Euclid Avenue (LOS E). As a result, these three roadway segments were subject to additional evaluation in Part 2 of the roadway segment analysis, to determine if the traffic conditions for these segments would be acceptable under the City of San Diego standards. The other roadway segments would remain at an acceptable LOS of D or better with implementation of the proposed project, so no further evaluation of these segments is required.

TABLE 14
PART 1: ROADWAY SEGMENT LEVEL OF SERVICE RESULTS FOR FUTURE WITHOUT AND WITH PROJECT

	Roadway Segment	Future Without Project				Future With Project				
		Lanes / Functional Class	ADT	V/C	LOS	Lanes / Functional Class	ADT	V/C	LOS	Δ V/C
1	Howard Avenue between Georgia Street & Florida Street	2C w/ CL	5,037	0.336	B	2C MFF	5,037	0.630	D	0.294
2	Howard Avenue between Utah Street & Kansas Street	2C w/ CL	5,704	0.380	B	2C MFF	5,704	0.713	D	0.333
3	Orange Avenue between Swift Avenue & 35th Street	2C w/ CL	8,965	0.598	C	2C MFF	8,965	**1.121**	**F**	**0.523**
4	Orange Avenue between 43rd Street & Fairmount Avenue	2C w/ CL	12,137	0.809	D	2C MFF	12,137	**1.517**	**F**	**0.708**
5	Orange Avenue between 47th Street & Euclid Avenue	2C w/ CL	6,747	0.450	B	2C MFF	6,747	**0.843**	**E**	**0.394**

Source: Appendix B (Traffic Counts) and Appendix C (City of San Diego Roadway Segment Analysis Criteria)
2C = 2-lane collector
CL = Center lane
MF = Collector with multifamily frontage
Bold indicates roadway segments subject to additional evaluation in Part 2 of the roadway segment analysis to determine if the traffic conditions for these segments would be acceptable under the City of San Diego standards.

Table 15 shows the results for Part 2 of the roadway segments analysis. The HCM Arterial analysis LOS calculation sheets for the corresponding roadway segments are included in **Appendix E**.

TABLE 15
PART 2: ROADWAY SEGMENT ANALYSIS FOR FUTURE WITH PROJECT

Roadway Segment		Peak Hour Intersection LOS	Direction	Peak Hour Segment LOS, where ≥ D is Acceptable		Change in Vehicle Travel Time (sec)[1]		Consistent with Community Plan?
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
3	Orange Avenue between Swift Avenue & 35th Street	Acceptable in AM and PM for both intersections (LOS D or better)	EB WB	B B	B C	+0.8 -8.8	+0.3 -10.7	No
4	Orange Avenue between 43rd Street & Fairmount Avenue	Acceptable in AM and PM for both intersections (LOS D or better)	EB WB	E D	E E	-10.2 -6.8	-5.4 -1.1	No
5	Orange Avenue between 47th Street & Euclid Avenue	Acceptable in AM and PM for both intersections (LOS D or better)	EB WB	C C	C C	-10.7 -10.3	-10.2 +1.3	No

Source: Appendix E (HCM Arterial Analysis Reports)
1. Future Without Project Travel Time minus Future With Project Travel Time

For the segment of Orange Avenue, between Swift Avenue and 35th Street, it shows that the intersections at either end of this segment would operate at acceptable LOS D or better and that the segment would operate at acceptable LOS D or better during peak traffic periods. The negligible increases of less than one second and decreases in travel time about 9 to 11 seconds with the project result from optimizing the operation of the traffic signal at Orange Avenue and 35th Street, which is a standard practice with changes in lane configurations at intersections. SANDAG proposes to coordinate with City of San Diego staff during final design to optimize the operations of traffic signal at Orange Avenue and 35th Street. Lastly, the project design in this segment is inconsistent with the (1998) adopted Mid-City Communities Plan: in proposing a Class II bikeway, it is consistent with the plan to provide an enhanced bicycle facility; however, the proposal to reconfigure the roadway from a 3-lane to a 2-lane collector is inconsistent with the 3-lane collector configuration in the Community Plan. Because of this inconsistency with the adopted Community Plan, the traffic conditions along this segment are considered unacceptable according to the City of San Diego Standards.

For the segment of Orange Avenue, between 43rd Street and Fairmount Avenue, it shows that the intersections at either end of this segment would operate at acceptable LOS D or better. The analysis shows that the segment would only operate at acceptable LOS D or better in one scenario: in the WB direction during the AM peak hour. This segment would operate at unacceptable in the EB direction during the AM and PM peak hours and in the WB direction during the PM peak hour. Similar to the segment described above, the 43rd-to-Fairmount segment is also inconsistent with the (1998) adopted Mid-City Communities Plan: in proposing a Class II bikeway, it is consistent with the plan to provide an enhanced bicycle facility; however, the proposal to reconfigure the roadway from a 3-lane to a 2-lane collector is inconsistent with the 3-lane collector configuration in the Community Plan. Because of the unacceptable LOS E operations in the EB direction during the AM and PM peak hours and WB direction during the PM peak hour, as well as the inconsistency with the adopted Community Plan, the traffic conditions along this segment are considered unacceptable according to City of San Diego standards.

Mitigating the unacceptable LOS E along Orange Avenue, between 43rd Street and Fairmount Avenue, to an acceptable LOS D or better would require either: 1) an additional vehicle lane, or 2) substantial modification to signal timing. Adding an additional vehicle lane along this segment is not feasible due to lack of public right-of-way (i.e., there is not adequate space for an additional vehicle lane). Substantial modification of signal timing, in favor or Orange Avenue, is not feasible due to the high volumes and progression on both 43rd Street and Fairmount Avenue. Despite the unacceptable and unmitigable LOS E, however, travel times through this roadway segment would decrease by 1 to 10 seconds (depending on the direction and AM or PM peak hour) with implementation of the project compared to conditions without the project. This decrease in travel time would occur because traffic signal timing would be optimized at the intersections of Orange Avenue and 43rd Street and Orange Avenue and Fairmount Avenue as part of the project. Signal optimization is standard practice wherever changes in lane configurations at intersections are proposed. Therefore, even though the unacceptable LOS E along Orange Avenue between 43rd Street and Fairmount Avenue cannot be avoided, the project would improve travel times through this segment.

For the segment of Orange Avenue, between 47th Street and Euclid Avenue, it shows that the intersections at either end of this segment would operate at acceptable LOS D or better and that the segment would operate at acceptable LOS D or better during peak traffic periods. The project design in this segment is inconsistent with the (1998) adopted Mid-City Communities Plan: in proposing a Class II bikeway, it is consistent with the plan to provide an enhanced bicycle facility; however, the proposal to reconfigure the roadway from a 3-lane to a 2-lane collector is inconsistent with the 3-lane collector configuration in the

Community Plan. Because of this inconsistency with the adopted Community Plan, the traffic conditions along this segment are considered unacceptable according to the City of San Diego Standards.

Proposed Changes to Intersection Capacity

No intersection capacity changes are anticipated for the year 2020 besides the changes proposed by the project. Therefore, the Future with Project scenario assumes the same intersection capacity changes as the Existing with Project scenario described in **Section 3.1**.

Intersection Analysis

The results of the operations analysis of Future Without and With Project conditions are presented in **Table 16**. **Appendix D** includes the corresponding LOS worksheets for all study scenarios.

As shown in **Table 16**, all intersections are expected to operate at an acceptable LOS of D or better with the project in place in Year 2020.

TABLE 16
INTERSECTION LEVEL OF SERVICE RESULTS FOR FUTURE WITHOUT AND WITH PROJECT

Intersection		Peak Hour	Traffic Control (Without / With Project)	Future Without Project Conditions		Future With Project Conditions		Delay Change
				Delay (sec/veh)[4]	LOS[5]	Delay (sec/veh)[4]	LOS[5]	
1	Florida Street & Howard Avenue	AM	AWSC / AWSC[1]	10.1	B	10.3	B	0.2
		PM		12.8	B	13.3	B	0.5
2	Mississippi Street & Howard Avenue	AM	AWSC / NTC[2]	7.9	A	4.6	A	-3.3
		PM		9.0	A	5.5	A	-3.5
3	Texas Street & Howard Avenue	AM	Signal / Signal	7.8	A	7.9	A	0.1
		PM		12.6	B	13.2	B	0.6
4	Oregon Street & Howard Avenue	AM	AWSC / NTC	8.6	A	5.5	A	-3.1
		PM		10.2	B	6.4	B	-3.8
5	Utah Street & Howard Avenue	AM	AWSC / NTC	9.7	A	6.1	B	-3.6
		PM		12.8	B	7.5	B	-5.3
6	30th Street & Howard Avenue	AM	Signal / Signal	11.7	B	12.5	B	0.8
		PM		15.0	B	17.2	B	2.2
7	Illinois Street & Howard Avenue	AM	AWSC / AWSC	10.3	B	10.2	B	-0.1
		PM		12.8	B	13.4	B	0.6

TABLE 16
INTERSECTION LEVEL OF SERVICE RESULTS FOR FUTURE WITHOUT AND WITH PROJECT

Intersection		Peak Hour	Traffic Control (Without / With Project)	Future Without Project Conditions		Future With Project Conditions		Delay Change
				Delay (sec/veh)[4]	LOS[5]	Delay (sec/veh)[4]	LOS[5]	
8	32nd Street & Howard Avenue	AM	SSSC / SSSC[3]	10.4	B	11.7	B	1.3
		PM		11.2	B	13.2	B	2.0
9	33rd Street & Orange Avenue	AM	Signal / Signal	15.5	B	7.4	A	-8.1
		PM		18.7	B	10.9	B	-7.8
10	35th Street & Orange Avenue	AM	Signal / Signal	11.6	B	11.9	B	0.3
		PM		10.5	B	10.7	B	0.2
11	37th Street & Orange Avenue	AM	SSSC / SSSC	12.8	B	18.2	C	5.4
		PM		13.9	B	21.8	C	7.9
12	39th Street & Orange Avenue	AM	SSSC / SSSC	20.7	C	32.7	D	12.0
		PM		15.8	C	22.0	C	6.2
13	40th Street & Orange Avenue	AM	Signal / Signal	25.2	C	20.7	C	-4.5
		PM		22.9	C	28.0	C	5.1
14	Marlborough Drive & Orange Avenue	AM	Signal / Signal	10.8	B	13.4	B	2.6
		PM		6.2	A	6.5	A	0.3
15	43rd Street & Orange Avenue	AM	Signal / Signal	14.8	B	12.3	B	-2.5
		PM		14.4	B	15.0	B	0.6
16	Fairmount Avenue & Orange Avenue	AM	Signal / Signal	18.2	B	20.1	C	1.9
		PM		15.1	B	14.7	B	-0.4
17	Chamoune Avenue & Orange Avenue	AM	AWSC / AWSC	22.4	C	25.4	D	3.0
		PM		20.3	C	19.9	C	-0.4
18	Euclid Avenue & Orange Avenue	AM	Signal / Signal	20.9	C	13.9	B	-7.0
		PM		23.6	C	14.7	B	-8.9
19	Estrella Avenue & Orange Avenue	AM	AWSC / AWSC	10.4	B	10.8	B	0.4
		PM		13.4	B	13.9	B	0.0

Source: Appendix D (LOS Calculation Sheets)

Notes:
[1] AWSC = All-way stop-controlled intersection

TABLE 16
INTERSECTION LEVEL OF SERVICE RESULTS FOR FUTURE WITHOUT AND WITH PROJECT

Intersection	Peak Hour	Traffic Control (Without / With Project)	Future Without Project Conditions		Future With Project Conditions		Delay Change
			Delay (sec/veh)[4]	LOS[5]	Delay (sec/veh)[4]	LOS[5]	

[2]NTC = Neighborhood Traffic Circle; NTCs are All-Way Yield-Controlled

[3] SSSC = Side-street stop-controlled

[4] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop control intersections. The vehicular delay for the worst movement is reported for side street stop-controlled intersections.

[5] LOS calculations performed using the *2000 Highway Capacity Manual (HCM)* method.

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